Design, Development and Implementation of Joint Purchasing Options under EU Energy Platform

Final Report

Frontier Economics and Freshfields Bruckhaus Deringer
September 2024

Authors

Frontier Economics

Vikram Balachandar

David Bothe

Gregor Braendle

Julia Gorochovskij

Mika Gehrung

Matthias Janssen

Ann-Katrin Lenz

Christoph Riechmann

Freshfields Bruckhaus Deringer

Ulrich Scholz

Hendrik Wessling

We are grateful for further input provided by Walter Boltz, Peter Kreuzberg, Axel Ockenfels and Jörg Spicker.

EUROPEAN COMMISSION

Directorate-General for Energy
Directorate EPTF — Energy Platform Task Force

Unit TF1 — Diversification Strategy and Joint Purchasing

Contact: ENER.TF.1 Secretariat

E-mail: ENER-TF1-SECRETARIAT@ec.europa.eu

European Commission
B-1049 Brussels

Design, Development and Implementation of Joint Purchasing Options under EU Energy Platform

Final Report

Directorate-General for Energy

2024

Manuscript completed in 2024

PDF Web	ISBN 978-92-68-21960-7	doi: 10.2833/436329	MJ-01-24-005-EN-N
PDF Print	ISBN 978-92-68-21961-4	doi: 10.2863/9622100	MJ-01-24-005-EN-C

Luxembourg: Publications Office of the European Union, 2024

Contents

frontier economics

EXECUTIVE SUMMARY

AggregateEU was part of a response to an unprecedented energy crisis

The withdrawal of Russian gas supplies – which started in 2021, and accelerated following Russia's war against Ukraine – led to an energy crisis. There were concerns across Europe, particularly in countries previously dependent on Russian gas supplies, regarding the ability to secure access to sufficient gas volumes. Amid skyrocketing wholesale gas prices in Europe, which peaked in 2022, there was similarly a fear that, in attempting to secure additional volumes from a tight global market, EU member states would bid up prices between themselves. Infrastructure operators and the market had to undertake a significant and rapid adjustment to facilitate increased Liquefied Natural Gas (LNG) imports and gas flows from Western to Eastern Europe.

In response to the crisis, the EU quickly introduced a package of emergency legislation to secure energy supplies (for example gas storage filling obligations and energy demand reduction measures), diversify away from the Russian energy sources, and soften the impacts of the crisis on consumers. In addition, to also address the supply side, the EU Energy Platform was established in April 2022. The platform aimed to contribute to affordable and secure (non-Russian) gas supplies for the EU by a coordinated outreach to alternative international suppliers, by means of a more efficient use of existing infrastructure, improved transparency and help to ensure more equal access to new or additional gas sources in the face of the acute threat to the security of supplies, including to LNG supplies. As part of the EU Energy Platform the EU also set up a demand aggregation and joint purchasing mechanism (DA/JPM), called AggregateEU.

AggregateEU consolidated demand from European users and tenders this out to (non-Russian) international suppliers to enable joint acquisitions of natural gas. Specifically, four short-term tendering rounds and one mid-term tendering round have been organised between April 2023 and February 2024.

We have been tasked with reviewing the performance of AggregateEU and the role of DA/JPM going forwards

EU co-legislators have decided that DA/JPM for natural gas will become a permanent voluntary tool. The new legal basis for natural gas allows for extending DA/JPM for captured methane and biomethane and supports relevant policy objectives to "…*develop a roadmap for the global roll-out of the 'You Collect, We Buy' scheme*"[1] and to support biomethane.[2] In addition, co-legislators have empowered the European Commission to introduce DA/JPM for renewable and low-carbon hydrogen under "*a pilot mechanism to support the market*

[1] https://ec.europa.eu/commission/presscorner/detail/en/IP_23_6057, accessed 4 March 2024.

[2] See, for example, the REPowerEU communication.

development of hydrogen".[3] They also requested the introduction of DA/JPA for Strategic raw materials as part of the Critical Raw Materials Act[4], subject to an assessment by the CRM Board.

Given this context, DG ENER has commissioned Frontier Economics, with Freshfields Bruckhaus Deringer as sub-contractor for legal support, to carry out the following tasks:

- **Assess the functioning and impact of the AggregateEU platform (Sections 2 and 3 of this report):** We assess AggregateEU's impacts (including on the wider gas market) against its stated objectives, relative to a (hypothetical) counterfactual in which AggregateEU was not introduced. Based on this, we make recommendations regarding the role of DA/JPM going forward for natural gas;

- **Assess new possible avenues for joint purchasing (Section 4):** In a second step, we assess how the scope of DA/JPM could be expanded to other products, including (low-carbon and renewable) hydrogen, biomethane, natural gas recaptured from methane flaring or venting, captured CO_2, and strategic raw materials; and

- **Analyse existing company co-operation models (Section 5):** We evaluate whether and how purchasing co-operation models have supported the delivery of DA/JPM benefits in practice. We explore the role of potential alternative purchasing co-operation models for natural gas and for products supporting EU decarbonisation aims (see Section 4).

Overall, AggregateEU may have supported the development of new commercial relationships; there is no clear evidence of significant negative impacts (Section 3.1 and 3.2)

We employed a qualitative approach to evaluating AggregateEU, drawing on publicly available data, data from AggregateEU tendering rounds, stakeholder interviews and anonymised summaries of DG ENER's own stakeholder engagement. We mapped out the potential channels through which AggregateEU may affect the gas market and tested our hypotheses against the available evidence.

Our main finding is that AggregateEU may have **contributed to establishing new commercial relationships,** though the extent to which matches with new suppliers resulted in the conclusion of gas supply contracts is unclear. This is consistent with feedback from stakeholders, particularly regarding the initial tendering rounds. It is difficult to ascertain the

[3] See https://energy.ec.europa.eu/topics/energy-systems-integration/hydrogen/european-hydrogen-bank/pilot-mechanism-support-market-development-hydrogen_en#:~:text=The%20pilot%20hydrogen%20mechanism%20will,low%20carbon%20hydrogen%2C%20and%20derivatives and Regulation (EU) 2024/1789 of the European Parliament and of the Council of 13 June 2024 on the internal markets for renewable gas, natural gas and hydrogen, amending Regulations (EU) No 1227/2011, (EU) 2017/1938, (EU) 2019/942 and (EU) 2022/869 and Decision (EU) 2017/684 and repealing Regulation (EC) No 715/2009 (recast), OJ L, 2024/1789, 15.7.2024.

[4] Regulation (EU) 2024/1252 of the European Parliament and of the Council of 11 April 2024 establishing a framework for ensuring a secure and sustainable supply of critical raw materials and amending Regulations (EU) No 168/2013, (EU) 2018/858, (EU) 2018/1724 and (EU) 2019/1020, OJ L, 2024/1252, 3.5.2024

extent to which some of this impact on “counterparty discovery” may have been realised by the market itself in the absence of AggregateEU. That said, levels of voluntary participation (for example, approximately 33 bcm of demand was submitted in the mid-term tender on a fully voluntary basis) indicate participants derived utility from participation.

As context for our findings it is important to note that:

- participation in AggregateEU is voluntary, and any trades executed subsequent to matching are on a commercial basis (without any explicit subsidy or risk sharing with public authorities). As such, we would not expect (and indeed we find limited evidence for) significant direct impacts on prices and LNG supplies. This is not necessarily a negative sign – it may simply indicate there is not significant inefficiency in the wholesale gas market as it currently stands, facilitated by multiple efforts on EU and national policy level to create a competitive, transparent and liquid internal energy market; and

- the first AggregateEU tendering round took place in April 2023. While gas prices were elevated compared to historical (pre-crisis) levels at this time, they had climbed down significantly from the peaks reached during 2022, in part due to the wider policy efforts previously noted. We do not have evidence for the potential impact of AggregateEU, had it been introduced sooner or had the security of supply situation in 2023 been more challenging.

DA/JPM for natural gas should adapt to changing market circumstances (Section 3.3)

Co-legislators have decided that DA/JPM for natural gas will become permanent, albeit remaining voluntary. Given this, we take the current AggregateEU design as a starting point for future DA/JPM for natural gas. We consider how it should adapt given it was originally conceived as a crisis measure.

Based on the results of the evaluation and stakeholder feedback, it would be **beneficial to keep the product focus and frequency of tendering under review,** to preserve the effectiveness of DA/JPM for natural gas. In particular, certain elements might be deployed only in the event of an energy crisis, during which the need to establish new supplier relationships may be greatest. And under normal market conditions, the Commission or service provider could regularly monitor market needs to ensure DA/JPM complements the market offering as much as possible. In practice, this may involve a restriction or reduction of the short-term tenders under normal market conditions.

We consider there may also be a **case for providing greater information to players** (particularly smaller ones) on the **opportunities to trade directly in the wholesale market** for gas, though this might come with additional risks to the development of commercial solutions.

The most appropriate form of DA/JPM for the products supporting EU decarbonisation goals depends on the characteristics of the market in question (Section 4)

In a further step, we have also considered how DA/JPM could support the development of the markets for (renewable and possibly low-carbon) hydrogen, biomethane, natural gas recaptured from methane flaring or venting, captured CO_2 and strategic raw materials.

In principle, DA/JPM might take a variety of forms, including mandatory mechanisms and those involving a public central buyer. Potentially, some of these mechanisms could be more effective in terms of creating buyer market power. However, these more interventionist forms of DA/JPM would also carry more significant risks for the normal functioning of commodity markets. We do not consider them further since there is currently no clear legal basis for such mechanisms.

Accordingly, we have **focused on voluntary forms of DA/JPM without a public central buyer**. We have defined and focussed our assessment on three high-level forms of voluntary DA/JPM. The key features of each form are as follows:

- a **transparency platform** may improve transparency on existing market participants and may thus **reduce transaction costs** for searching especially for new and smaller market participants;
- a **matching platform** could, in addition, support **coordination across the value chain** in combination with additional measures; and
- the addition of **demand aggregation on the platform** could contribute to **addressing supplier market power** and **mitigating the risk of outbidding** during a supply crisis.

The services provided by DA/JPM could, in principle, be provided commercially. As such there is some **risk that public provision could crowd out private offerings**, leading to reduced competition and innovation over the longer-term. **Policymakers need to balance** this risk against the need to support a quick market development of the products in question.

Taking into account the legal basis and political opportunity, for each product, **our initial views regarding the possible features** of DA/JPM that may be appropriate are as follows:

- **Hydrogen – transparency platform, potentially transitioning to matching:** Among other barriers, the emerging market for low-carbon and renewable hydrogen faces a "chicken and egg" problem: investments in supply and demand require certainty regarding transportation and storage infrastructure (and vice versa). While infrastructure planning and regulation and the design of business models for hydrogen production and consumption play an important role in addressing this coordination issue, DA/JPM can play a complementary role through providing transparency regarding supply, demand and potentially infrastructure development. The addition of "lighter" forms of matching functionalities could help reduce search costs for counterparties (in particular for smaller

players). This could also support potential producers' applications for European Hydrogen Bank support. Either approach could be consistent with the pilot mechanism for hydrogen foreseen under the Gas Regulation (see above). As the hydrogen market develops, the platform could potentially evolve towards organising regular calls for expression of supply interest.

- **Biomethane – transparency platform, potentially transitioning to matching:** In the case of biomethane, the main barriers relate to market access and co-ordination (in relation to feedstock) and a high degree of regulatory fragmentation (for example, regarding the cross-border acceptance of certificates linked to biomethane sustainability attributes) limiting cross-border trade. While wider policy interventions may support in addressing these barriers, DA/JPM could act a as a focal point for transparency to support market entry, by providing information on regulatory differences across countries regarding certificate acceptance and/or regarding infrastructure, feedstock and biomethane demand to support biomethane production investment decisions.

- **Captured methane – matching platform (supported by Methane Transparency Database):** Once methane emissions intensity targets under the recently adopted EU Methane Regulation become binding in 2030, projects seeking to reduce methane venting or flaring will have greater certainty regarding buyers' willingness to pay for methane emissions reductions. As an interim measure, initial development of the market could be supported through allowing buyers to request natural gas produced from lower methane emissions intensity sources through DA/JPM for natural gas. The information on the emissions intensity of different natural gas supplies could come from the Methane Transparency Database due to be set up in 2025. While it might involve higher set-up and running costs, a platform enabling demand transparency for gas from abatement projects may help such projects secure off-takers and, in turn, help them to secure finance.

- **Captured CO_2:** The nascent CO_2 market faces similar barriers to the hydrogen market. However, as there is no direct legal basis for development of DA/JPM for carbon management, we do not analyse detailed design consideration for carbon management in this report.

- **Strategic Raw Materials:** In combination with other policy measures to strengthen supply chain resilience for SRMs, a DA/JPM can help to address main barriers of high supplier power and security of supply. However, the optimal design details for DA/JPM vary according to the market structures of the individual commodities, which differ significantly. Therefore, we analysed the following four SRM case studies, which were selected to cover a broad spectrum of differences in the relevant market structures.

    - **Lithium – matching platform:** The immature lithium market is characterised by a moderate supply concentration and a very high projected demand growth. Due to the latter, increased security of supply concerns exist. This could be addressed by a matching platform to facilitate counterparty discovery and potentially help in ramping up capacities in EU in line with CRM act targets.

- **Cobalt – demand aggregation platform:** The cobalt market is also immature and shows high projected demand growth. However, supply concentration is higher and transparency limited. A demand aggregation platform (with binding bids) could potentially increase buyer power to some extent and thereby strengthen security of supply and address high supplier power (with particular focus on longer term contracts). In addition, DA/JPM could play a role in enabling a market for certified products, helping EU undertakings to comply with the corporate due diligence directive.

- **Nickel – unclear role for additional platforms:** The nickel market is an example of a more mature market with established exchange trading, moderate supply concentration and moderate projected demand growth (relative to other SRMs). We conclude therefore that the role for DA/JPM for nickel is unclear and potentially limited.

- **Rare earth elements (for permanent magnets) – unclear role for additional platforms:** Rare earth elements (REEs) are a unique series of 17 chemical elements, of which seven are considered strategic due to their use in permanent magnets. The markets for REEs are all characterised by low liquidity and transparency due to limited trade volumes, high import dependency along the whole supply chain as well as limited substitutability. Demand aggregation can play a role in improving risk hedging, provided the EU can first develop downstream refining and manufacturing capacities to provide an EU market for REEs.

These views above are based on our analysis and discussions with stakeholders **– further consultation would be required** to refine the designs further.

For all commodities, policymakers should continue to **facilitate access to relevant credit support** for participants (e.g. by providing information on opportunities to secure financial instruments, in a similar way to AggregateEU today). Providing this information for free on a DA/JPM platform could lead to additional visibility of such information for stakeholders interested in participation.

Going beyond the above facilitative actions, e.g. through **financial support of the costs associated to the credit support** (subject to State aid rules and the Financial Regulation)**, could encourage more trading, though may also come with risks.** For example:

- Support could be made **available to certain parts of the market only**, for example, only to trades carried out on a DA/JPM platform, or only to specific companies. This may encourage trade for parts of the markets benefitting from financial support. However, it may also **distort companies' risk hedging and competition in the overall market.**

- Support could be granted in **exceptional circumstances only**, e.g. limited to crisis situations, which is **likely to be less distortive**. Structural measures could also be less

distortive, in particular where credit support is an appropriate instrument to address a particular market failure.

Co-operation between buyers may be helpful under certain circumstances – policymakers can best support through providing guidance and addressing barriers to market entry (Section 5)

Buyers may decide to purchase jointly, subject to competition law. There are varying forms of joint purchasing arrangement – more formal arrangements may be more appropriate where transacting is more complex and involves a high degree of transaction-specific investments. Companies can also outsource purchasing to other companies. Outsourcing is usually more appropriate where products can be easily specified and costs of monitoring performance are low.

On AggregateEU, participants can choose to outsource participation to a degree. They can either outsource fully to a "central buyer", who participates directly on AggregateEU and contracts with suppliers, or they can participate themselves and outsource certain ancillary services such as booking required transmission or LNG terminal capacity to an "agent-on-behalf".

There has been limited use of the co-operation models on AggregateEU to date. Only two companies submitted demand bids as central buyers, together accounting for less than 0.1% of the total demand. However, the finding that co-operation on AggregateEU has been limited requires careful interpretation. It does not provide evidence of limited value to co-operation more generally. Indeed, players may have been already effectively co-operating through other routes, including through outsourcing to other parties outside the platform (meaning that this co-operation may not have been visible on AggregateEU) and for other commodities.

The potential benefits to companies (and, ultimately, consumers) from co-operation include reduced purchasing costs. In general, market participants can effectively internalise the relevant benefits and costs of co-operation, and are best placed to evaluate the co-operation model that best suits them. Participants will consider co-operation models with a broader view of their participation in the market in mind (i.e. not solely linked to their participation in DA/JPM). For example, for smaller players, outsourcing may make more sense than (essentially) extending operations upstream by forming a joint purchasing agreement (which entails additional complexity).

Direct intervention to support specific forms of corporate structure may risk distorting competition. However, policymakers can still play an important role in continuing to:

- inform participants regarding the opportunities for, and legal constraints on, purchasing co-operation;
- addressing barriers to entry to retail and wholesale energy and commodity markets across the EU, which can facilitate outsourcing and joint purchasing models.

RÉSUMÉ

AggregateEU a été un élément de réponse à une crise énergétique sans précédent.

L'interruption des livraisons de gaz russe, qui a commencé en 2021 et s'est accélérée suite à la guerre de la Russie contre l'Ukraine, a entraîné une crise énergétique profonde. Dans toute l'Europe, en particulier dans les pays qui dépendaient auparavant des approvisionnements en gaz russe, des inquiétudes sur la capacité à garantir l'accès à des volumes de gaz suffisants ont été soulignées. Face à la montée en flèche des prix de gros du gaz en Europe, à leur plus haut niveau en 2022, il y a également eu des craintes qu'en tentant d'obtenir des volumes supplémentaires sur un marché mondial tendu, les États membres de l'UE ne fassent monter les prix entre eux. Les opérateurs d'infrastructures et le marché ont dû procéder à un ajustement important et rapide pour faciliter l'augmentation des importations de gaz naturel liquéfié (GNL) et des flux de gaz de l'Europe de l'Ouest vers l'Europe de l'Est.

En réponse à la crise, l'UE a rapidement introduit un ensemble de mesures législatives d'urgence pour sécuriser l'approvisionnement en énergie (par exemple, des obligations de remplissage des stockages de gaz et des mesures de réduction de la demande d'énergie), diversifier son approvisionnement en éliminant les sources d'énergie russes, et atténuer l'impact de la crise sur les consommateurs. En outre, pour s'attaquer également au problème de l'offre, la plateforme énergétique de l'UE a été créée en avril 2022. Cette plateforme a pour objectif de contribuer à un approvisionnement en gaz (non russe) abordable et sûr pour l'UE par une action coordonnée auprès d'autres fournisseurs internationaux, grâce à une utilisation plus efficace des infrastructures existantes, à une meilleure transparence et à un accès plus équitable à des sources de gaz nouvelles ou supplémentaires face à la menace aiguë qui pèse sur la sécurité des approvisionnements, y compris les approvisionnements en GNL. Dans le cadre de la plateforme énergétique de l'UE, l'UE a également mis en place un mécanisme d'agrégation de la demande et d'achat commun (DA/JPM), appelé AggregateEU.

AggregateEU consolide la demande des utilisateurs européens et lance des appels d'offre auprès de fournisseurs internationaux (non russes) pour permettre des acquisitions conjointes de gaz naturel. Plus précisément, quatre appels d'offres à court terme et un appel d'offres à moyen terme ont été organisés entre avril 2023 et février 2024.

Nous avons été chargés d'examiner les performances d'AggregateEU et le rôle du DA/JPM à l'avenir.

Les colégislateurs de l'UE ont décidé que la DA/JPM pour le gaz naturel deviendrait un outil volontaire permanent. La nouvelle base juridique pour le gaz naturel permet d'étendre le DA/JPM au méthane capté et au biométhane et soutient les objectifs politiques pertinents visant à "...*élaborer une feuille de route pour le déploiement mondial du système " Collectez,*

nous achetons'"[5] et à soutenir le biométhane.[6] En outre, les colégislateurs ont habilité la Commission européenne à introduire le DA/JPM pour l'hydrogène renouvelable et à faible teneur en carbone dans le cadre d'un "*mécanisme pilote visant à soutenir le développement du marché de l'hydrogène*".[7] Ils ont également demandé l'introduction du DA/JPM pour les matières premières stratégiques dans le cadre de la loi sur les matières premières critiques[8], sous réserve d'une évaluation par le Comité européen des matières premières critiques.

Dans ce contexte, la DG ENER a chargé Frontier Economics, avec Freshfields Bruckhaus Deringer comme sous-traitant pour le soutien juridique, d'effectuer les tâches suivantes :

- **Évaluer le fonctionnement et l'impact de la plateforme AggregateEU (sections 2 et 3 du présent rapport) :** Nous évaluons l'impact d'AggregateEU (y compris sur le marché du gaz au sens large) par rapport à ses objectifs déclarés, par rapport à un contrefactuel (hypothétique) dans lequel AggregateEU n'aurait pas été introduit. Sur cette base, nous formulons des recommandations concernant le rôle du DA/JPM pour le gaz naturel ;

- **Évaluer de nouvelles possibilités d'achats communs (section 4) :** Dans une deuxième étape, nous évaluons comment le champ d'application du DA/JPM pourrait être étendu à d'autres produits, y compris l'hydrogène (à faible teneur en carbone et renouvelable), le biométhane, le gaz naturel récupéré à partir du torchage ou de l'évacuation du méthane, le CO_2 capturé et les matières premières stratégiques (SRM) ; et

- **Analyser les modèles de coopération existants entre les entreprises (section 5) :** Nous évaluons si et comment les modèles de coopération en matière d'achat ont contribué à la concrétisation des avantages associés au DA/JPM. Nous étudions le rôle d'autres modèles potentiels de coopération en matière d'achat pour le gaz naturel et pour les produits soutenant les objectifs de décarbonisation de l'UE (voir section 4).

Dans l'ensemble, le projet AggregateEU peut avoir favorisé le développement de nouvelles relations commerciales ; il n'y a pas de preuve évidente d'impacts négatifs significatifs (Section 3.1 et 3.2)

Nous avons utilisé une approche qualitative pour évaluer AggregateEU en nous appuyant sur des données accessibles au public, des données issues des appels d'offres d'AggregateEU, d'entretiens avec les parties prenantes et de résumés anonymes de discussions entre la DG

5 https://ec.europa.eu/commission/presscorner/detail/en/IP_23_6057, consulté le 4 mars 2024.

6 Voir, par exemple, la communication de REPowerEU.

7 Règlement du Parlement européen et du Conseil sur le marché intérieur du gaz renouvelable, du gaz naturel et de l'hydrogène, modifiant les règlements (UE) n° 1227/2011, (UE) 2017/1938, (UE) 2019/942 et (UE) 2022/869 et la décision (UE) 2017/684 et abrogeant le règlement (CE) n° 715/2009 (refonte), 7 mai 2024, https://data.consilium.europa.eu/doc/document/PE-105-2023-INIT/en/pdf.

8 Règlement (UE) 2024/1252 du Parlement européen et du Conseil du 11 avril 2024 établissant un cadre pour garantir un approvisionnement sûr et durable en matières premières critiques et modifiant les règlements (UE) n° 168/2013, (UE) 2018/858, (UE) 2018/1724 et (UE) 2019/1020, JO L, 2024/1252, 3.5.2024.

ENER et les parties prenantes. Nous avons cartographié les canaux potentiels par lesquels AggregateEU pourrait affecter le marché du gaz et avons testé nos hypothèses par rapport aux preuves disponibles.

Notre principale conclusion est que le projet AggregateEU a pu **contribuer à l'établissement de nouvelles relations commerciales,** bien que l'on ne sache pas exactement dans quelle mesure les rapprochements avec de nouveaux fournisseurs ont abouti à la conclusion de contrats d'approvisionnement en gaz. Cette constatation est conforme aux réactions des parties prenantes, en particulier en ce qui concerne les premiers appels d'offres. Il est difficile de déterminer dans quelle mesure une partie de cet impact sur la "découverte de la contrepartie" aurait pu être réalisée par le marché lui-même en l'absence d'AggregateEU. Cela dit, les niveaux de participation volontaire (par exemple, environ 33 milliards de m3 de demande ont été soumis dans l'appel d'offres à moyen terme sur une base entièrement volontaire) indiquent que les participants ont tiré profit de leur participation.

Il est important de noter que nos résultats s'inscrivent dans un contexte spécifique :

- la participation à AggregateEU est volontaire, et toutes les transactions exécutées après le rapprochement entre acheteurs et vendeurs se font sur une base commerciale (sans subvention explicite ni partage des risques avec les autorités publiques). En tant que tel, nous ne nous attendons pas à ce qu'il y ait des impacts directs significatifs sur les prix et les approvisionnements en GNL (et nous ne trouvons d'ailleurs que peu de preuves en ce sens). Ce n'est pas nécessairement un signe négatif - cela peut simplement indiquer qu'il n'y a pas d'inefficacité significative sur le marché de gros du gaz actuellement, grâce aux multiples efforts déployés au niveau de l'UE et des politiques nationales pour créer un marché intérieur de l'énergie compétitif, transparent et liquide ; et

- le premier appel d'offres d'AggregateEU a eu lieu en avril 2023. Alors que les prix du gaz étaient élevés par rapport aux niveaux historiques (avant la crise) à ce moment-là, ils avaient considérablement baissé par rapport aux sommets atteints en 2022, en partie grâce aux efforts politiques plus larges mentionnés précédemment. Nous ne disposons pas de données sur l'impact potentiel d'AggregateEU s'il avait été introduit plus tôt ou si la situation de la sécurité de l'approvisionnement en 2023 avait été plus difficile.

Le mécanisme DA/JPM pour le gaz naturel devrait être adapté afin de tenir compte de l'évolution des conditions du marché (section 3.3)

Les colégislateurs ont décidé que le DA/JPM pour le gaz naturel deviendrait permanent, tout en restant volontaire. Dans ce contexte, nous prenons la conception actuelle du mécanisme comme point de départ pour le futur DA/JPM pour le gaz naturel. Nous examinons comment il devrait être adapté, étant donné qu'il a été conçu à l'origine comme une mesure de crise.

Sur la base des résultats de l'évaluation et du retour d'information des parties prenantes, il serait **utile de réexaminer régulièrement le type de produit offert et la fréquence des appels d'offres,** afin de préserver l'efficacité du DA/JPM pour le gaz naturel. En particulier,

certains éléments pourraient n'être déployés qu'en cas de crise énergétique, lorsque la nécessité d'établir de nouvelles relations avec les fournisseurs est la plus forte. Dans des conditions de marché normales, la Commission ou le prestataire de services pourrait suivre régulièrement les besoins du marché afin de s'assurer que le mécanisme DA/JPM complète autant que possible l'offre du marché. Dans la pratique, cela peut impliquer une restriction ou une réduction des appels d'offres à court terme dans des conditions de marché normales.

Nous estimons qu'il pourrait également être utile **de fournir davantage d'informations aux acteurs** (en particulier les plus petits) sur les **possibilités de négocier directement sur le marché de gros** du gaz, bien que cela puisse entraîner des risques supplémentaires pour le développement de solutions commerciales.

La forme la plus appropriée du DA/JPM pour les produits soutenant les objectifs de décarbonation de l'UE dépend des caractéristiques du marché en question (section 4)

Dans un deuxième temps, nous avons également examiné comment le DA/JPM pourrait soutenir le développement des marchés de l'hydrogène (renouvelable et éventuellement à faible teneur en carbone), du biométhane, du gaz naturel récupéré lors du torchage ou de l'évacuation du méthane, du CO_2 capturé et des matières premières stratégiques.

En principe, le DA/JPM pourrait prendre diverses formes, y compris des mécanismes obligatoires et des mécanismes impliquant un acheteur central public. Potentiellement, certains de ces mécanismes pourraient être plus efficaces quand il s'agit de renforcer la capacité de négociation des acheteurs. Toutefois, ces formes plus interventionnistes du DA/JPM comporteraient également des risques plus importants pour le fonctionnement normal des marchés des matières premières. Nous ne les examinons pas plus avant, car il n'existe actuellement aucune base juridique claire pour de tels mécanismes.

Par conséquent, nous **nous sommes concentrés sur les formes volontaires de DA/JPM sans acheteur central public**. Nous avons structuré notre évaluation autour de trois formes possibles de DA/JPM volontaires. Les principales caractéristiques de chaque forme de mécanismes volontaires sont les suivantes:

- une **plateforme de transparence** peut améliorer la transparence du marché pour les participants et peut donc **réduire les coûts de transaction** pour la recherche, en particulier pour les nouveaux participants ou les participants plus petits;
- une **plateforme de rapprochement entre acheteurs et vendeurs** pourrait, en outre, soutenir la **coordination tout au long de la chaîne de valeur** en combinaison avec des mesures supplémentaires ; et
- l'ajout de l'**agrégation de la demande sur la plateforme** pourrait contribuer à **lutter contre le pouvoir de marché des fournisseurs** et à **atténuer le risque de surenchère** en cas de crise de l'offre.

Les services fournis par DA/JPM pourraient, en principe, être fournis commercialement. Il existe donc un certain **risque que les services publics évincent les offres privées**, ce qui réduirait la concurrence et l'innovation à long terme. Les **décideurs politiques doivent trouver un équilibre entre** ce risque et la nécessité de soutenir un développement rapide du marché pour les produits en question.

En tenant compte de la base juridique et de l'opportunité politique nous résumons pour chaque produit ci-dessous nos recommandations initiales sur les formes et caractéristiques que nous considérons appropriées pour le DA/JPM :

- **Hydrogène – plateforme de transparence, transition potentielle vers le rapprochement entre acheteurs et vendeurs :** entre autres obstacles, le marché émergent de l'hydrogène à faible teneur en carbone et renouvelable est confronté au problème de la "poule et de l'œuf" : les investissements dans l'offre et la demande nécessitent des certitudes concernant les infrastructures de transport et de stockage (et vice versa). Si la planification et la régulation des infrastructures ainsi que la conception de modèles commerciaux pour la production et la consommation d'hydrogène jouent un rôle important dans la résolution de ce problème de coordination, le DA/JPM peut jouer un rôle complémentaire en assurant la transparence de l'offre, de la demande et, éventuellement, du développement des infrastructures. L'ajout de formes "plus légères" de rapprochement entre acheteurs et vendeurs pourrait contribuer à réduire les coûts de recherche pour les contreparties (en particulier pour les petits acteurs). Cela pourrait également aider les producteurs potentiels à demander le soutien de la Banque européenne de l'hydrogène. L'une ou l'autre approche pourrait être cohérente avec le mécanisme pilote pour l'hydrogène prévu dans le cadre du règlement sur le gaz (voir ci-dessus). Au fur et à mesure du développement du marché de l'hydrogène, la plateforme pourrait évoluer vers l'organisation d'appels réguliers à manifestation d'intérêt.

- **Biométhane – plateforme de transparence, transition potentielle vers le rapprochement entre acheteurs et vendeurs :** Dans le cas du biométhane, les principaux obstacles sont liés à l'accès au marché et à la coordination (en ce qui concerne les feedstock) et à un degré élevé de fragmentation réglementaire (par exemple, en ce qui concerne l'acceptation transfrontalière des certificats liés aux attributs de durabilité du biométhane), ce qui limite les échanges transfrontaliers. Si des interventions politiques plus larges peuvent contribuer à lever ces obstacles, le DA/JPM pourrait servir de point focal pour la transparence afin de soutenir l'entrée sur le marché, en fournissant des informations sur les différences réglementaires entre les pays concernant l'acceptation des certificats et/ou concernant l'infrastructure, les matières premières et la demande de biométhane afin de soutenir les décisions d'investissement dans la production de biométhane.

- **Méthane capté – plateforme de rapprochement entre vendeurs et acheteurs (soutenue par la base de données sur la transparence du méthane) :** Lorsque les objectifs d'intensité des émissions de méthane fixés par le règlement européen (récemment adopté) deviendront contraignants en 2030, les projets visant à réduire

l'évacuation ou le torchage du méthane auront davantage d'informations claires quant à la disposition des acheteurs de payer pour les réductions d'émissions de méthane. À titre de mesure provisoire, le développement initial du marché pourrait être soutenu en permettant aux acheteurs de demander du gaz naturel produit à partir de sources à plus faible intensité d'émissions de méthane par l'intermédiaire du DA/JPM pour le gaz naturel. Les informations sur l'intensité des émissions des différentes sources de gaz naturel pourraient provenir de la base de données sur la transparence du méthane qui doit être mise en place en 2025. Bien qu'elle puisse entraîner des coûts de mise en place et de fonctionnement plus élevés, une plateforme permettant la transparence de la demande de gaz provenant de projets de réduction des émissions peut aider ces projets à trouver des acheteurs et, à leur tour, les aider à obtenir des financements.

- **Capture du CO_2** : Le marché naissant du CO_2 est confronté à des obstacles similaires à ceux du marché de l'hydrogène. Toutefois, comme il n'existe pas de base juridique directe pour le développement de DA/JPM pour la gestion du carbone, nous n'analysons pas dans ce rapport les aspects détaillés de la conception pour la capture de carbone.

- **Matières premières stratégiques (ci-après SRM) :** En combinaison avec d'autres mesures politiques visant à renforcer la résilience de la chaîne d'approvisionnement pour les SRM, un DA/JPM peut contribuer à lever les principaux obstacles liés au pouvoir de marché élevé des fournisseurs et assurer la sécurité d'approvisionnement. Toutefois, concevoir de façon optimale de tels mécanismes de DA/JPM dépend directement des différentes structures de marché de chaque matière première. C'est pourquoi nous avons analysé les quatre études de cas suivantes, sélectionnées de façon à couvrir un large éventail de structures de marché.

  - **Lithium – plateforme de rapprochement :** Le marché immature du lithium se caractérise par une concentration modérée de l'offre et une très forte croissance prévue de la demande. En raison de cette dernière, il existe des préoccupations accrues en matière de sécurité de l'approvisionnement. Une plateforme de rapprochement pourrait permettre de répondre à ces préoccupations en facilitant la recherche de contreparties et en contribuant éventuellement à l'augmentation des capacités dans l'UE, conformément aux objectifs du règlement CRM.

  - **Cobalt – plateforme d'agrégation de la demande :** Le marché du cobalt est également immature et la croissance de la demande prévue est élevée. Toutefois, la concentration de l'offre est plus élevée et la transparence limitée. Une plateforme d'agrégation de la demande (avec des offres contraignantes) pourrait potentiellement augmenter le pouvoir de négociation des acheteurs et ainsi renforcer la sécurité de l'approvisionnement tout en remédiant au fort pouvoir de marché des fournisseurs (en mettant particulièrement l'accent sur les contrats à long terme). En outre, le DA/JPM pourrait jouer un rôle dans la mise en place d'un marché pour les produits certifiés, en aidant les entreprises de l'UE à se conformer à la directive sur le devoir de diligence des entreprises.

- **Nickel – le rôle de plateformes supplémentaires n'est pas clair :** Le marché du nickel est un exemple de marché plus mature avec des échanges boursiers établis, une concentration modérée de l'offre et une croissance modérée de la demande prévue (par rapport à d'autres SRM). Nous concluons donc que le rôle du DA/JPM pour le nickel n'est pas clair et potentiellement limité.

- **Éléments de terres rares (pour les aimants permanents) – rôle incertain pour les plates-formes supplémentaires : Les éléments de terres** rares (REE) constituent une série unique de 17 éléments chimiques, dont sept sont considérés comme stratégiques en raison de leur utilisation dans les aimants permanents. Les marchés des terres rares sont tous caractérisés par une liquidité et une transparence faibles en raison de volumes d'échanges limités, d'une forte dépendance à l'égard des importations tout au long de la chaîne d'approvisionnement et d'une substituabilité limitée. L'agrégation de la demande peut jouer un rôle dans l'amélioration de la couverture des risques, à condition que l'UE puisse d'abord développer des capacités de raffinage et de fabrication en aval afin de faire émerger un marché européen pour les terres rares.

Ces recommandations sont basées sur notre analyse et sur les discussions avec les parties prenantes **- une consultation supplémentaire serait nécessaire** pour affiner les contours de leurs mises en œuvre.

Pour toutes les matières premières, les décideurs politiques devraient continuer à **faciliter l'accès** des participants à un **soutien au crédit pertinent** (par exemple en fournissant des informations sur les possibilités de sécuriser les instruments financiers, d'une manière similaire à ce que fait AggregateEU aujourd'hui). La mise à disposition gratuite de ces informations sur une plateforme du type DA/JPM pourrait accroître la visibilité de ces informations pour les parties prenantes intéressées à participer.

Aller au-delà des actions de facilitation susmentionnées, par exemple en **soutenant financièrement les coûts associés au soutien au crédit** (sous réserve des règles relatives aux aides d'État et du règlement financier)**, pourrait encourager l'intensification des échanges, mais pourrait également comporter des risques.** A titre d'exemple :

- Le soutien pourrait être réservé à **certaines parties du marché,** par exemple aux transactions effectuées sur une plateforme du type DA/JPM, ou à des entreprises spécifiques. Cela pourrait encourager les échanges pour les parties des marchés bénéficiant d'un soutien financier. Toutefois, cela pourrait également **fausser la couverture des risques des entreprises et la concurrence sur l'ensemble du marché.**

- Le soutien pourrait être accordé **uniquement** dans des **circonstances exceptionnelles**, par exemple limité aux situations de crise, ce qui est **susceptible d'entraîner moins de distorsions**. Les mesures structurelles pourraient également avoir moins d'effets de

distorsion, notamment lorsque le soutien au crédit est un instrument approprié pour remédier à une défaillance particulière du marché.

La coopération entre les acheteurs peut être utile dans certaines circonstances – les décideurs politiques peuvent apporter un soutien optimal en fournissant des orientations et en s'attaquant aux barrières à l'entrée sur le marché (section 5)

Les acheteurs peuvent décider d'acheter conjointement, sous réserve du droit de la concurrence. Il existe différentes formes d'accords d'achat en commun - des accords plus formels peuvent être plus appropriés lorsque les transactions sont plus complexes et impliquent un niveau élevé d'investissements spécifiques à la transaction. Les entreprises peuvent également confier leurs achats à d'autres entreprises. L'externalisation est généralement plus appropriée lorsque les produits peuvent être facilement spécifiés et que les coûts de contrôle des performances sont faibles.

Sur AggregateEU, les participants peuvent choisir d'externaliser leur participation dans une certaine mesure. Ils peuvent soit sous-traiter entièrement à un "acheteur central", qui participe directement à AggregateEU et passe des contrats avec les fournisseurs, soit participer eux-mêmes et sous-traiter certains services auxiliaires tels que la réservation de la capacité de transport ou de terminal GNL requise à un "agent mandataire".

Jusqu'à présent, les modèles de coopération ont été peu utilisés sur AggregateEU. Seules deux entreprises ont soumis des offres en tant qu'acheteurs centraux, représentant ensemble moins de 0,1 % de la demande totale. Toutefois, la conclusion selon laquelle la coopération sur AggregateEU a été limitée doit être interprétée avec prudence, car elle ne prouve pas que la valeur de la coopération est limitée d'une manière plus générale. En effet, il se peut que les acteurs aient déjà coopéré efficacement par d'autres voies, notamment en externalisant vers d'autres parties en dehors de la plateforme (ce qui signifie que cette coopération peut ne pas avoir été visible sur AggregateEU) et pour d'autres produits de base.

Les avantages potentiels de la coopération pour les entreprises (et, en fin de compte, pour les consommateurs) comprennent la réduction des coûts d'achat. En général, les acteurs du marché peuvent effectivement internaliser les avantages et les coûts de la coopération et sont les mieux placés pour évaluer le modèle de coopération qui leur convient le mieux. Les participants envisageront les modèles de coopération en ayant à l'esprit une vision plus large de leur participation au marché (c'est-à-dire qui ne soit pas uniquement liée à leur participation au DA/JPM). Par exemple, pour les petits acteurs, l'externalisation peut s'avérer plus judicieuse que l'extension (essentiellement) des opérations en amont par la conclusion d'un accord d'achat groupé (qui entraîne une complexité supplémentaire).

Une intervention directe pour soutenir des formes spécifiques de structure d'entreprise peut risquer de fausser la concurrence. Toutefois, les décideurs politiques peuvent encore jouer un rôle important en continuant à :

- informer les participants des possibilités de coopération en matière d'achat et des contraintes juridiques qui s'y rattachent ;
- éliminer les barrières à l'entrée sur les marchés de détail et de gros de l'énergie et des matières premières dans l'UE, ce qui peut faciliter les modèles d'externalisation et d'achat en commun.

GLOSSARY

Table 1 List of defined terms and abbreviations used in the report

Defined term	Definition
ACER	European Union Agency for the Cooperation of Energy Regulators
ALSI	Aggregated LNG Storage Inventory
AR	Argentina
ASM	Artisanal and small scale mining
AT	Austria
AU	Australia
bcm	Billion cubic metres
BE	Belgium
BR	Brazil
CA	Canada
CCS	Carbon capture for storage
CCU	Carbon capture for utilisation
CD / DRC	Democratic Republic of the Congo
CfD	Contracts for Difference
CH	Switzerland
CL	Chile
CN	China
CME	Chicago Mercantile Exchange
Commission, COM, EC	European Commission
Council	European Council
CO_2	Carbon dioxide
Critical Raw Materials Act	Regulation (EU) 2024/1252 of the European Parliament and of the Council of 11 April 2024 establishing a framework for ensuring a secure and sustainable supply of critical raw materials and amending Regulations (EU) No 168/2013, (EU) 2018/858, (EU) 2018/1724 and (EU) 2019/1020, OJ L, 2024/1252, 3.5.2024

Defined term	Definition
CRM	Critical Raw Materials
CRW UA	Custom Warehouse Regime (Ukraine Storage)
CU	Cuba
CZ	Czech Republic
DA/JPM	Demand Aggregation and Joint Purchasing Mechanism
DE	Germany
DG ENER	Directorate-General Energy
DK	Denmark
EE	Estonia
EFET	European Federation of Energy Traders
EL	Greece
ENTSOG	European Network of Transmission System Operators for Gas
ES	Spain
ETS	Emissions trading system
EU	European Union
EV	Electric vehicle
FI	Finland
First Gas Directive	Directive 98/30/EC of the European Parliament and of the Council of 22 June 1998 concerning common rules for the internal market in natural gas
FR	France
g	Gram
Gas Directive	Directive (EU) 2024/1788 of the European Parliament and of the Council of 13 June 2024 on common rules for the internal markets for renewable gas, natural gas and hydrogen, amending Directive (EU) 2023/1791 and repealing Directive 2009/73/EC (recast), OJ L, 2024/1788, 15.7.2024
Gas storage Regulation	Regulation 2022/1032 of the European Parliament and of the Council of 29 June 2022 amending Regulations (EU) 2017/1938 and (EC) No 715/2009 with regard to gas storage, OJ L 173, 30.6.2022, p. 17–33
Gas Regulation	Regulation (EU) 2024/1789 of the European Parliament and of the Council of 13 June 2024 on the internal markets for renewable gas, natural gas and hydrogen, amending Regulations (EU) No

Defined term	Definition
	1227/2011, (EU) 2017/1938, (EU) 2019/942 and (EU) 2022/869 and Decision (EU) 2017/684 and repealing Regulation (EC) No 715/2009 (recast), OJ L, 2024/1789, 15.7.2024
GHG	Greenhouse gas
GIE	Gas Infrastructure Europe
GoO	Guarantee of Origin
GWh	Gigawatt hours
HHI	Herfindahl-Hirschman-Index
ID	Indonesia
IFI	International Financial Institution
Industrial Carbon Management Strategy	Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: Towards an ambitious industrial carbon management for the EU, COM(2024) 62 final
IPCC	Intergovernmental Panel on Climate Change
IT	Italy
JOGMEC	Japan Oil, Gas and Metals National Corporation
Kg	Kilogram
HREE	Heavy rare earth metals
HR	Croatia
LEBA	London Energy Brokers Association
LHS	Battery grade lithium
LMIC	Low and middle income countries
LNG	Liquefied Natural Gas
LREE	Light rare earth metals
LT	Lithuania
MD	Moldova
Methane regulation	Regulation (EU) 2024/1787 of the European Parliament and of the Council of 13 June 2024 on the reduction of methane emissions in the energy sector and amending Regulation (EU) 2019/942, OJ L, 2024/1787, 15.7.2024
MJ	Megajoule

Defined term	Definition
MS	Member States
Mt	Megatonne
MWh	Megawatt hours
NBP	National balancing points
NECP	National Energy and Climate plans
NL	Netherlands
Nm^3	Normal cubic meter
NO	Norway
NUTS	Nomenclature of territorial units for statistics
OECD	Organisation for Economic Co-operation and Development
OEM	Original equipment manufacturers
OTC	Over-the-counter
PGM	Platinum group metals
PH	Philippines
PoS	Proof of Sustainability
PL	Poland
PT	Portugal
PV	Photovoltaic
REE	Rare earth elements
RED III	Renewable Energy Directive: Directive (EU) 2023/2413 of the European Parliament and of the Council of 18 October 2023 amending Directive (EU) 2018/2001, Regulation (EU) 2018/1999 and Directive 98/70/EC as regards the promotion of energy from renewable sources, and repealing Council Directive (EU) 2015/652
REGATRACE	Renewable Gas Trade Centre in Europe
RFNBO	Renewable fuels of non-biological origin
RHS	Lithium spodumene
RMIS	Raw Materials Information System
RU	Russia
SI	Slovenia
SK	Slovakia

Defined term	Definition
Solidarity Regulation	Council Regulation (EU) 2022/2576 of 19 December 2022 enhancing solidarity through better coordination of gas purchases, reliable price benchmarks and exchanges of gas across borders
SoS	Security of Supply
SPA	Sale and Purchase Agreement
SRM	Strategic raw materials
t	Tonne
TFEU	Treaty on the Functioning of the European Union
TTF	Title transfer facility
TWh	Terawatt hours
UDB	Union Database
UN	United Nations
UAE	United Arab Emirates
VTP	Virtual gas trading points

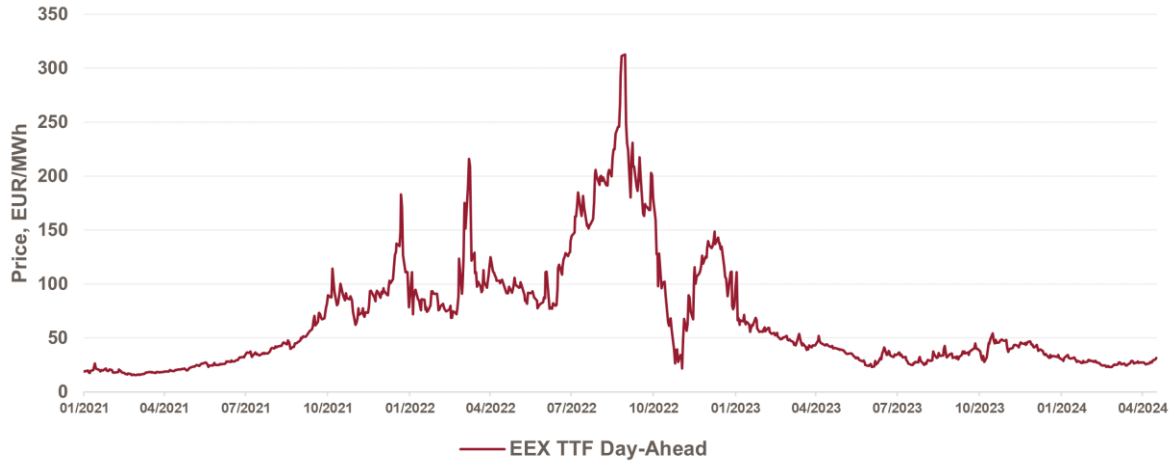
Source: Frontier Economics

1 Introduction

1.1 AggregateEU was introduced in the energy crisis with the aim of contributing to lower gas prices and improved security of supply

From the middle of 2021, the ease of Covid-19 lockdown measures globally, in combination with supply shocks, led to a significant increase in gas prices.[9] Following Russia's aggression towards Ukraine and related gas supply insecurity, gas prices (and electricity prices) skyrocketed further, peaking in 2022. Security of supply concerns (and related price pressures) have since eased. Figure 1 illustrates the evolution of the wholesale gas price in Germany; price developments in other European markets were broadly similar.

Figure 1 Wholesale gas price, TTF (Day-ahead)



Source: Frontier Economics, based on Energate data.
Note: "TTF" (Title Transfer Facility) refers to the Netherlands virtual trading point.

The withdrawal of Russian gas supplies also resulted in a shift in gas flows within Europe. Traditionally, both gas infrastructure and gas trading in Europe were not geared towards dealing with flows from West to East. Both physical infrastructure and commercial behaviour therefore needed to adapt in a short space of time to ensure security of gas supplies across Europe.

The EU's response to the crisis was multi-pronged, and included measures[10] to:

9 Further background on this is, for example, set out at the following link: https://www.frontier-economics.com/uk/en/news-and-articles/articles/article-i8747-gas-prices-whipsaw-across-europe/.

10 The Commission's RePowerEU Communication set out a blueprint for reform. This was followed by the adoption of emergency legislation, including Council Regulation (EU) 2022/1854 on an emergency intervention to address high energy prices (including targets for electricity demand reduction), Regulation (EU) 2022/1032 with regards to gas storage

- secure gas supplies (including imposing gas storage filling obligations and facilitating new LNG capacity);
- coordinate gas and electricity demand reduction across Member States;
- limit wholesale gas prices ("Market Correction Mechanism");
- allow Member States to limit windfall profits of energy companies (e.g. Revenue Cap for inframarginal electricity producers); and
- accelerate the deployment of renewable energy sources.

Part of the EU's response to rising gas prices was the set-up of a demand aggregation and joint purchasing mechanism (DA/JPM), with the subsequent adoption of Regulation (EU) 2022/2576 (the "Solidarity Regulation") in December 2022.[11]

The DA/JPM platform for natural gas, called AggregateEU, consolidates demand from European users and tenders this out to (non-Russian) international suppliers to enable combined acquisitions of natural gas, and aims to contribute to affordable and secure gas supplies for the EU. According to the Solidarity Regulation adopted in 2022, Member States had to ensure that undertakings participate in demand aggregation with volumes at least equal to 15% of Member States' gas storage filling targets. This obligation was implemented during the first year of AggregateEU's operation. It was then removed with the prolongation of the Solidarity Regulation in December 2023. Therefore, participation on AggregateEU is now fully voluntary.

1.2 Recent amendments to EU legislation see a continued role for DA/JPM in natural gas and possible roles in other sectors

On 19 December 2023, the Council extended the Solidarity Regulation by one year until 31 December 2024. This includes the extension of AggregateEU until the end of 2024.[12] In May 2024 the Gas Regulation was revised and adopted by both European Parliament and Council and was published on 15 July 2024.[13] Article 42 foresees a permanent mechanism for voluntary demand aggregation for natural gas, to be operational from 2025 (i.e. following the expiry of the Solidarity Regulation).

(the Gas Storage Regulation), the Solidarity Regulation, Council Regulation (EU) 2022/1369 on coordinated demand-reduction measures for gas and Council Regulation (EU) 2022/2577 laying down a framework to accelerate the deployment of renewable energy.

11 https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32022R2576&qid=1695826755669.

12 https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A32023R2919.

13 Regulation (EU) 2024/1789 of the European Parliament and of the Council of 13 June 2024 on the internal markets for renewable gas, natural gas and hydrogen, amending Regulations (EU) No 1227/2011, (EU) 2017/1938, (EU) 2019/942 and (EU) 2022/869 and Decision (EU) 2017/684 and repealing Regulation (EC) No 715/2009 (recast), OJ L, 2024/1789, 15.7.2024.

In addition, the concept of demand aggregation and joint purchasing is raised in several other contexts:

- **Hydrogen**: The EU Hydrogen Strategy[14] notes the role of hydrogen in supporting EU decarbonisation goals. Article 52 of the revised Gas Regulation[15] empowers the Commission to introduce a pilot voluntary mechanism for support to market development for hydrogen (to be implemented under the activities of the European Hydrogen Bank[16]). The mechanism, would be temporary and last until 31 December 2029. Subject to the Commission's assessment of the performance of the pilot mechanism, it "…*may submit a separate legislative proposal for a voluntary demand aggregation mechanism for hydrogen.*"

- **Biomethane:** The revised definition of natural gas in the Gas Directive also includes biomethane (conforming to applicable quality standards and grid-injected), so DA/JPM for biomethane is a possibility.[17] Biomethane is the purified version of biogas, produced from the breakdown of organic matter. Biomethane can be injected into the gas grid with limited or no need for changes to infrastructure and end-user appliances. Further, it is a renewable gas and thus projected to become a significant means to decarbonise the energy system. Accordingly, the REPowerEU communication set an ambition to scale EU biomethane production up to 35 bcm annually by 2030.[18]

- **Captured methane:** Methane is the second most important greenhouse gas contributor to climate change following carbon dioxide. As well as introducing legislation to tackle energy sector methane emissions in Europe and in global supply chains[19], the Commission has announced it will "…*develop a roadmap for the global roll-out of the 'You Collect, We Buy' scheme*".[20] Such a scheme would aim to provide gas-exporting countries with additional incentives to reduce methane leaks, venting and flaring, and to make this gas available to EU and international gas markets. It may be possible to combine such a scheme with DA/JPM, using the legal basis in the Gas Regulation for natural gas.

---

14 Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: "A hydrogen strategy for a climate-neutral Europe", COM(2020) 301 final.

15 Regulation (EU) 2024/1789 of the European Parliament and of the Council of 13 June 2024 on the internal markets for renewable gas, natural gas and hydrogen, amending Regulations (EU) No 1227/2011, (EU) 2017/1938, (EU) 2019/942 and (EU) 2022/869 and Decision (EU) 2017/684 and repealing Regulation (EC) No 715/2009 (recast), OJ L, 2024/1789, 15.7.2024.

16 https://energy.ec.europa.eu/topics/energy-systems-integration/hydrogen/european-hydrogen-bank_en.

17 Directive (EU) 2024/1788 of the European Parliament and of the Council of 13 June 2024 on common rules for the internal markets for renewable gas, natural gas and hydrogen, amending Directive (EU) 2023/1791 and repealing Directive 2009/73/EC (recast), OJ L, 2024/1788, 15.7.2024.

18 European Commission (2022), „ REPowerEU Plan", accessed on 20 February 2024 at http://tinyurl.com/bdf5zt8a.

19 Regulation (EU) 2024/1787 of the European Parliament and of the Council of 13 June 2024 on the reduction of methane emissions in the energy sector and amending Regulation (EU) 2019/942, OJ L, 2024/1787, 15.7.2024.

20 https://ec.europa.eu/commission/presscorner/detail/en/IP_23_6057, accessed 4 March 2024.

- **Critical Raw Materials (CRM)**: Critical raw materials are often vital inputs for strategic sectors such as renewable energy, the digital industry, and the aerospace and defence sectors. Article 25 of the Critical Raw Materials Act[21] requires the Commission to set up and operate, subject to an assessment, DA/JPM for strategic raw materials (as defined in Article 3).

- **CO_2 transport or storage services**: Carbon management technologies, involving storage or use of captured CO_2 emissions, are projected to be an important part of EU decarbonisation efforts. The Net-Zero Industry Act (NZIA) regulation entered into force in June 2024 to establish a Union market for CO_2 storage services, increasing availability of CO2 storage sites and support for ICM technology projects across Europe. Additionally, the Commission, in its industrial carbon management strategy[22], the Commission "…*foresees to develop, with Member States, by early 2026 at the latest, a platform for demand assessment and demand aggregation for CO_2 transport or storage services, with the aim of matching CO_2 suppliers with storage and transport providers and providing contract and procurement transparency…*"

1.3 This study aims to both evaluate the past performance of AggregateEU and consider next steps for DA/JPM in the energy sector and elsewhere

In light of the above, DG ENER has commissioned Frontier Economics, with Freshfields Bruckhaus Deringer as sub-contractor for legal support, to analyse:

- What lessons learned can be drawn from the experience with AggregateEU and the role of DA/JPM in natural gas going forwards (Task 1);

- How co-operation models can best enable the benefits of DA/JPM (Task 2); and

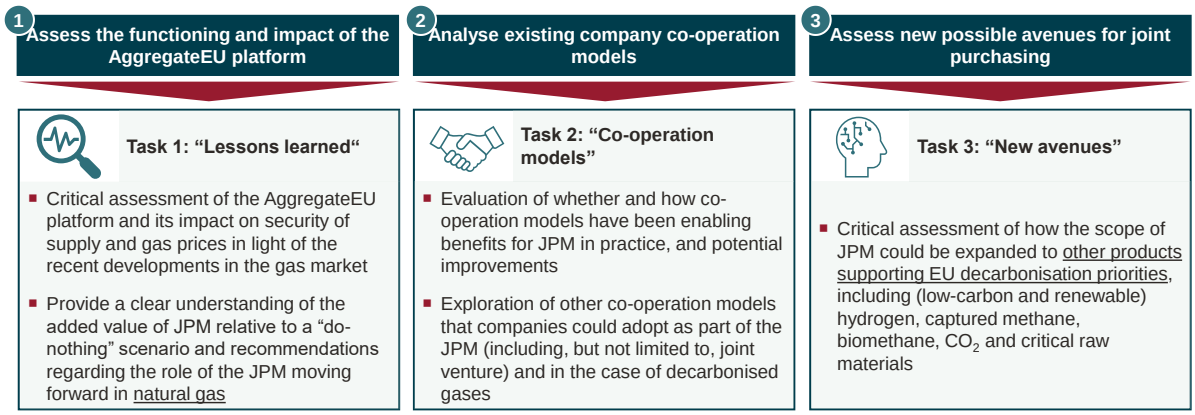
- The potential enduring role of DA/JPM going forwards, for products other than natural gas supporting EU decarbonisation priorities (Task 3).

These objectives are summarised in Figure 2 below.

21 Regulation (EU) 2024/1252 of the European Parliament and of the Council of 11 April 2024 establishing a framework for ensuring a secure and sustainable supply of critical raw materials and amending Regulations (EU) No 168/2013, (EU) 2018/858, (EU) 2018/1724 and (EU) 2019/1020, OJ L, 2024/1252, 3.5.2024.

22 Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: Towards an ambitious industrial carbon management for the EU, COM(2024) 62 final.

Figure 2 Study objectives



Source: Frontier Economics

1.4 Structure of this report

This intermediate report is structured as follows:

- Section 2 discusses the context for the introduction of AggregateEU;
- Section 3 covers our evaluation of AggregateEU for natural gas, including the role of co-operation models (i.e. the "backward-looking" aspects of Task 1), and considers options for evolving DA/JPM for natural gas;
- Section 4 considers the role of DA/JPM for other products supporting EU decarbonisation priorities (Task 3); and
- Section 5 discusses the role of co-operation models on AggregateEU and for other products (Task 2).

In addition:

- Annex A contains more detail on the "theory of change" we have developed for the evaluation of AggregateEU (i.e. supporting the analysis presented in Section 3); and
- Annex B contains details of our stakeholder outreach.

2 Motivation and objectives behind AggregateEU

Before we turn to the evaluation of AggregateEU in Section 3, we discuss some important context in this section.

- We set out some background on trading in the wholesale market for natural gas (Section 2.1);
- We discuss the context for AggregateEU's introduction (Section 2.2);
- We summarise AggregateEU's intended aims and objectives (Section 2.3); and
- We summarise the results of the initial four short-term tendering rounds and the first mid-term tender (Section 2.4).

2.1 Background: In the EU, market participants trade natural gas using various routes to secure gas supplies and manage commercial risks

To understand the context for AggregateEU's introduction and the potential effects of DA/JPM on the wholesale market for natural gas, it is at first important to understand the various platforms and ways in which gas is traded in the EU, which have been established over two decades of liberalisation. While what we describe below is specific to wholesale gas markets, many of the general principles also apply to other (mature) commodity markets (and as such, is also relevant background for Task 3).

2.1.1 Trading plays a crucial role in a liberalised wholesale market for gas

Prior to the introduction of the First Gas Directive[23] in 1998, it was commonplace for gas markets to be organised on a national and/or regional basis, with the full value chain of gas activities (production/imports, storage, transmission, distribution and retail) taking place within vertically-integrated nationalised monopoly companies.[24]

The aim of liberalising markets was, in part, to allow competition both upstream (in production/imports) and downstream (in retail), by allowing non-discriminatory third party access to monopoly infrastructure (e.g. gas pipelines). Liberalisation has led to specialisation at each step of the value chain, involving the following groups of players at each step of the value chain (Figure 3):

- **Producers and importers:** While there is some gas production within the EU (notably in the Netherlands), the majority of EU gas needs are served by imports. In 2022, 97% of

23 Directive 98/30/EC of the European Parliament and of the Council of 22 June 1998 concerning common rules for the internal market in natural gas, OJ L 204, p. 1–12.

24 See also https://www.europarl.europa.eu/factsheets/en/sheet/45/energiebinnenmarkt, accessed 11 March 2024.

EU gas demand was met by (net) imports (up from 83% in 2021).[25] Gas reaches the EU either via pipeline or at **Liquefied Natural Gas (LNG) terminals**. Upstream players include both state-owned and private gas producers.

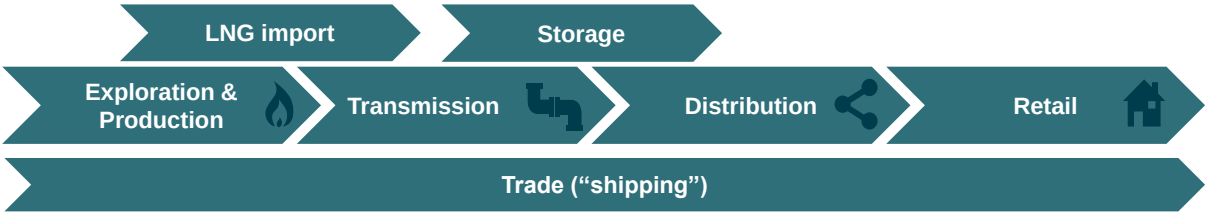
- **Shippers:** In gas markets, the term "shippers" usually refers to traders ("midstreamers") that purchase ("originate") gas from producers and importers, frequently under long-term contracts (where necessary booking capacity at LNG terminals), and sell gas to retailers and large energy customers. They book the required **transmission capacity** between hubs to transport the gas from the landing point of import to the destination hub. Shippers also book capacity at **gas storage facilities**.

- **Retailers:** Retailers purchase gas from shippers and sell to customers in their hub. Retailers will pay charges for local (i.e. within-hub) transmission and distribution to **network system operators**, and pass these charges on to their customers.

- **Larger end customers** may opt to participate directly in the wholesale market, by-passing retailers.

In the current gas market structure, **trading therefore plays an important role in connecting the various steps of the value chain and in facilitating competition up- and downstream**. Note that, in practice, these **roles are often not mutually exclusive** and many companies may carry out more than one of the above roles simultaneously (although, given EU internal market legislation, these activities may not be carried out in conjunction with operation of transmission networks). For example, shippers can be pure trading operations or may also be involved in production and/or retail themselves.

Figure 3 The value chain of the wholesale gas market: illustration



Source: Frontier Economics

Trades of natural gas usually refer to a specific delivery point for the hand-over of the traded gas. Historically, gas was mainly traded at physical hubs (e.g. Zeebrugge, Baumgarten). Over the last two decades, the creation of market zones and entry-exit tariff models facilitated the establishment of so-called **virtual gas trading points (VTP), or "hubs"** (e.g. TTF in the Netherland). These VTP are fictitious delivery points that serve as transfer points for the

[25] Eurostat, https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Natural_gas_supply_statistics, accessed 27 February 2024. The increase in import dependence in 2022, compared to 2021, largely reflects reduced gas demand in 2022.

processing of gas deliveries within a market area. Hubs have increasingly become the main reference markets for trades.

2.1.2 Trading plays an important role in risk management

One of the primary motivations for energy companies to trade gas is for "hedging" – which involves buying future inputs or selling future outputs at a specified price to reduce exposure to wholesale risk. Wholesale risk refers to the degree of exposure to variability in revenues (for producers/importers) or costs (for consumers/retailers), and consists primarily of:

- **Price risk:** The degree to which participants are exposed to unpredictability in wholesale market prices; and
- **Volume risk:** The degree to which participants are exposed to unpredictability in expected supply and demand volumes (holding the price the same).

Several factors may drive volatility in prices, volumes, or both, such as wider economic conditions, supply availability and weather conditions.

Participants' **hedging activity will depend on the risks they are trying to manage**:

- Consumers, including industrials, may value a high degree of predictability over energy prices over a certain period (e.g. several years). To **limit their price risk exposure** towards their customers if offering fixed *retail* prices, retailers may, in turn, want to "lock in" *wholesale* prices for gas by entering physical ("**forward**") or financial ("**futures**") contracts that are traded up to several years in advance. Retail contracts commonly offer fully or partially fixed prices to customers, but for variable volumes, exposing them to **volume risk** (e.g. unforeseen fluctuations in customer volumes, due to weather patterns). Retailers may seek to manage volume risk through a combination of trading "option" contracts (providing them with a degree of flexibility on volumes purchased) or through trading in short-term wholesale markets, such as the "**spot**" market.
- Import supply chains require large investments in long-living assets (production sites, transport infrastructure). Investors make decisions to build such assets with varying degrees of wholesale revenue certainty, depending on their risk appetite. To the extent needed, **producers/importers usually (partly) hedge wholesale risks** by entering long-term sales contracts with shippers.
- Shippers, in turn, will sell volumes to various actors further downstream, potentially packaged together with other services (e.g. optionality regarding volumes). They usually diversify their risk exposure through a combination of having a broad portfolio of customers and producers and hedging. As such, average costs for shippers will tend to be lower once a **certain scale** is reached.
- Market participants **hold risk capital** to cover any remaining risks that cannot be efficiently managed through hedging.

The extent and choice of hedging tool is essentially a **trade-off between the cost of hedging and the cost of risk capital**. Liquidity will be an outcome of the degree to which preferences for hedging converge on both sides of the market (as well as any demand for speculative trading, which we do not cover in this report).

2.1.3 Wholesale trading of gas takes place on various platforms and products

Participants can trade gas on **exchanges** (that act as a central counterparty to all hosted trades, with standardised credit and collateral terms) or "**Over-the-Counter**", or OTC, (in which case trades and credit and collateral terms, are typically agreed bilaterally – though OTC trades can also be cleared centrally). Credit and collateral terms agreed for bilateral OTC trades will reflect, among other things, the creditworthiness of the respective counterparties.

Market participants may use a combination of both platforms, and may vary trading over different platforms at different points on time, to help them efficiently address wholesale, cash liquidity and credit risks.

As briefly referred to above, energy commodities, traded on the relevant venues of regulated exchange and OTC markets, broadly fall in two categories:

- **Spot products** – Physical contracts for immediate settlement between the buyer and seller (payment and delivery). In energy markets, spot products can be traded very close to physical delivery, e.g., day-ahead (for delivery on the next day) and intraday (for same-day delivery). They are always linked to a physical flow of the underlying commodity, e.g., natural gas. Day-ahead markets are typically the most liquid type of spot market.

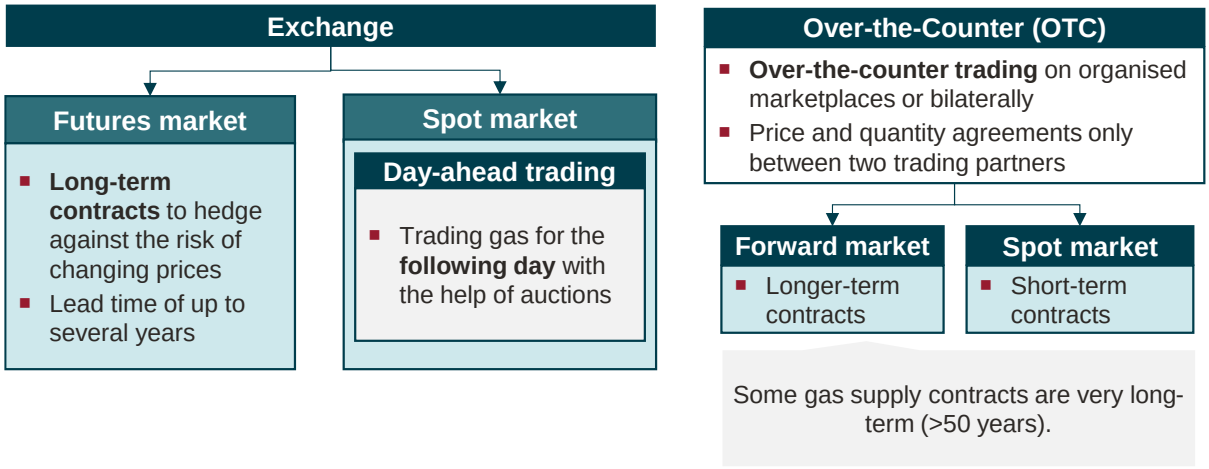
- **Derivatives** – Forward contracts (both physically or financially settled), where the time period between execution and settlement exceeds the spot delivery period and whose value is dependent on an underlying fixed or reference price of the commodity. The most relevant products are forwards, futures, swaps, and options. Futures and forwards are both contracts on the future transaction of an underlying asset at a price agreed today. The difference is that futures are standardised contracts traded on central energy exchanges while forwards (whether cleared centrally or bilaterally) are traded "over-the-counter" (OTC) and may be customised. Forward/future products are traded between several days and months and – for annual products – up to several years before the actual delivery. Settlement can take place either physically or financially.[26]

The trades negotiated following the AggregateEU matching process are examples of OTC trades for forward contracts. Figure 4 provides a summary of the types of wholesale gas products and trading platforms used by market participants.

[26] Financial settlement requires bids to be placed on the spot market to ensure physical delivery and off-take.

The total volume traded on EU hubs, comprising both OTC and exchange trades, amounted to approximately 6,896 bcm in 2023 (see Figure 5).[27] By comparison, the EU's total consumption of natural gas was around 323 bcm in 2023 [28]. The volume traded significantly exceeds consumption as it includes both financially-settled futures contracts (traded on exchanges) and since physically-settled volumes may be traded and re-traded several times before delivery. The ratio of traded volumes (here: 6,896 bcm) to consumption (here: 323 bcm), referred to as "churn rate" (here: 21.3), is often used as indicator for the level of trading liquidity.

Figure 4 Wholesale natural gas: simplified overview of trading routes and products



Source: Frontier Economics

[27] Natural gas quantities are reported in volumes throughout the report. Measures of energy content are converted into volumes assuming a calorific value of 38.3 MJ/m^3 at 15°C.

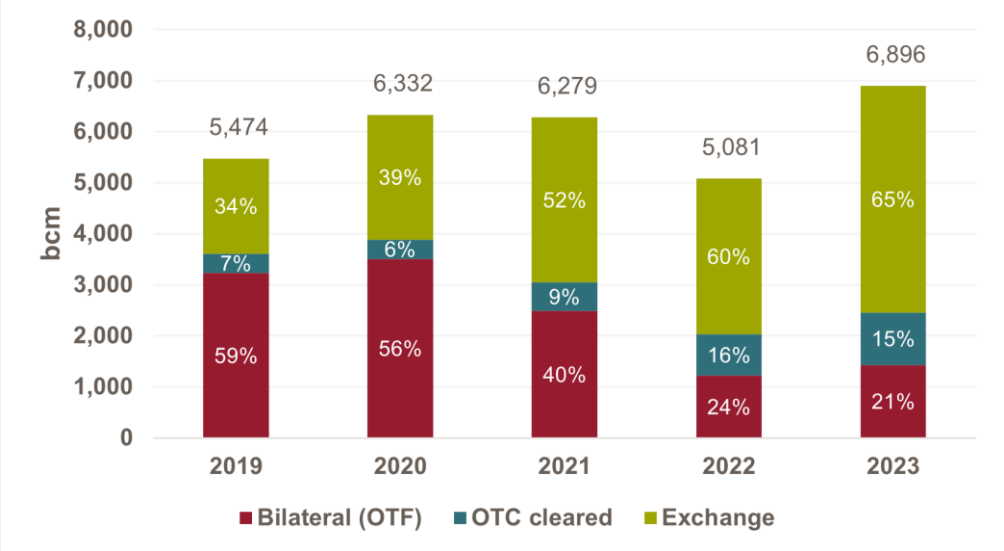
[28] See Eurostat (https://ec.europa.eu/eurostat/web/products-eurostat-news/w/ddn-20240528-1#:~:text=The%20EU's%20demand%20for,cumulated%20data%20began%20in%202008).

Box: Liquidity across trading venues is key for efficient and resilient energy markets

European gas trading volumes between 2019 and 2023 (Figure 5) show that market participants are active on different venues:

- Even at the peak of the recent energy crisis in 2022, both exchange and OTC trading platforms accounted for material trading volumes: In the year 2022, overall trading volumes for gas dropped below those in previous years. In 2023, gas trading volumes have already fully recovered and even achieved higher trading volumes than in the period of 2019-2021.
- **Data for recent years shows a trend towards trading with central clearing, but bilateral OTC trading remains important:** Despite a drop in bilateral OTC trading volumes in 2022, bilateral trade agreements with counterparty credit lines (instead of central clearing) for collateralisation remained of importance for market participants. This category accounted for 24% of the overall gas volumes traded in 2022.

Figure 5 Traded volumes, natural gas, Europe



Source: Frontier Economics based on data received from London Energy Brokers Association (LEBA). See Frontier Economics and Luther (2024) "Principles of energy market regulation – securing efficient & resilient energy trading: report prepared for Energy Traders Europe"

2.2 The withdrawal of Russian gas supplies had a disruptive effect that provided a spur for the introduction of AggregateEU

2.2.1 The EU was historically dependent on supplies of Russian gas, with dependence particularly high in many Eastern European countries

Prior to the energy crisis, the EU as a whole was heavily dependent on Russian gas. In 2021, Russian gas made up 45% of EU gas imports.[29] In certain countries, particularly in Eastern Europe, dependence on Russian gas prior to the crisis was even higher (see Figure 6 below).

Figure 6 Estimated share of Russian gas supplies (% of 2021 volumes purchased)

Source: Frontier Economics illustration based on ACER 2023 Market Monitoring Report (Figure 20)

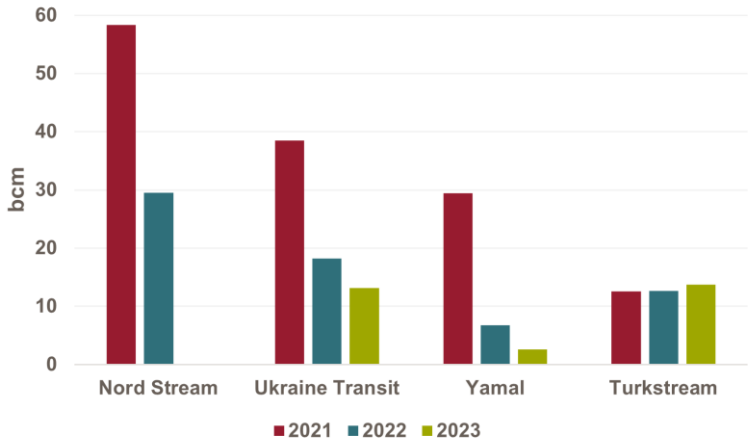
[29] https://www.consilium.europa.eu/en/infographics/eu-gas-supply/, accessed 29 February 2024.

Many Eastern European hubs are also among the least liquid[30] in the EU.[31] A detailed analysis of the drivers for this is beyond the scope of this study.[32] All else equal, lower levels of liquidity can increase barriers to entry for (non-vertically integrated) retailers and shippers.

2.2.2 The decline in Russian gas supplies and the political desire to reduce reliance on Russian gas led to security of supply concerns

Gas imports from Russia subsequently declined substantially (see Figure 7). This started in mid-2021 (the Commission is investigating antitrust concerns related to Gazprom's conduct[33]), and continued following the invasion of Ukraine by Russia in late February 2022.

Figure 7 Russian pipeline gas imports by route



Source: *Frontier Economics based on ENTSOG (available https://transparency.entsog.eu/#/map)*[34]

Note: *Volumes as of 16 April 2024. Ukraine Transit flows might contain supplies from Ukrainian storage.*

30 ACER refers to liquidity as "...*the volume of the transactions taking place at the trading platforms, and more specifically … the ease of trading of gas contracts without causing significant price fluctuations …*". See https://www.acer.europa.eu/sites/default/files/documents/Publications/ACER_MMR_2023_Gas_market_trends_price_drivers.pdf accessed 14 March 2024.

31 A comprehensive overview of liquidity across European gas hubs is set out in Patrick Heather, (2023) "European Traded Gas Hubs: their continued relevance", Oxford Institute for Energy Studies paper NG 183, available at: https://www.oxfordenergy.org/wpcms/wp-content/uploads/2023/06/European-Traded-Gas-Hubs-their-continued-relevance-NG183.pdf.

32 As explained in section 2.1.2, liquidity will tend to reflect market participant preferences for trading and the cost of risk capital. As such, low levels of liquidity need not always constitute a market failure in and of itself, and participants in less liquid hubs may be able to manage risks in other ways (for example, "proxy" hedging using products traded in more liquid hubs, such as the Dutch TTF). Sometimes, however, low liquidity may be symptomatic of underlying market failures or barriers, including high market shares of dominant incumbent utilities.

33 https://one.oecd.org/document/DAF/COMP/WP2/WD(2022)28/en/pdf.

34 The graph sums physical entry flows at the connection points Greifswald / NEL, Greifswald / OPAL, GCP GAZ-SYSTEM/UA TSO, Budince, VIP Bereg (HU) / VIP Bereg (UA), Uzhgorod (UA) - Velké Kapušany (SK), Uzhhorod (UA) - Velké Kapušany (SK), Isaccea (RO) - Orlovka (UA) I, Isaccea (RO) - Orlovka (UA) II, Isaccea (RO) - Orlovka (UA) III, VIP Mediesu Aurit - Isaccea (RO-UA), Point of Interconnection (PWP) (PL), Kotlovka, Mallnow, Strandzha (BG) / Malkoclar (TR), Strandzha 2 (BG) / Malkoclar (TR), Kipi (TR) / Kipi (GR).

While increased supplies of liquefied natural gas (LNG) temporarily eased the price tide, there were concerns regarding uneven access to LNG supplies across Europe – in particular that **certain countries** (as described in Section 2.2.1) may be **more vulnerable to security of supply issues** (due to a combination of geography – i.e. not having direct access to LNG or own production of gas – and infrastructure bottlenecks within the EU).

The withdrawal of Russian gas supplies also required a substantial re-organisation of gas markets within Europe. Traditionally physical (and commercial) flows of gas have been in the East to West direction. Given the bulk of (spare) EU LNG capacity was initially located in Western Europe (e.g. France, Spain), the replacement of Russian gas supplies with LNG led to a need for greater flows in the West to East direction. This was initially hampered by limitations in cross-border capacity (in part due to technical issues[35]), and led to high congestion (reflected in price divergence between EU hubs). Subsequently, the degree of price convergence between hubs has eased, in part with the commissioning of 50 bcm of new LNG capacity since mid-2022.[36] The re-organisation of the gas markets, and the disruption to existing long-term Russian gas supply contracts, will also have required market participants to find new counterparties.

2.2.3 Changes in supply also had significant effects on gas prices

During the Covid-19 pandemic, Europe experienced low energy demand and, as a result, low energy prices. The ease of lockdown measures globally, in combination with the supply shocks described above, led to a significant increase in gas prices from the middle of 2021.[37] Following Russia's aggression towards Ukraine and related gas supply insecurity, gas prices (and electricity prices) skyrocketed further. There was a fear that, in attempting to secure additional volumes from a tight global market, EU member states would bid up prices between themselves. As illustrated in Figure 8 below:

- Energy prices reached a first peak by the end of 2021, primarily due to supply-side issues.
- The invasion of Ukraine by Russia in late February 2022 created a new geopolitical reality with even greater supply insecurity, which significantly elevated both gas and electricity prices.
- The energy crisis reached its peak during the summer of 2022 as Russian pipeline flows to Europe gradually diminished while Europe needed to meet its gas storage targets for

35 For example, there were initially some concerns regarding potential impacts on network users of gas exports from France to Germany given that, in France, gas is odorised at the transmission level, while in Germany, this happens at distribution level.

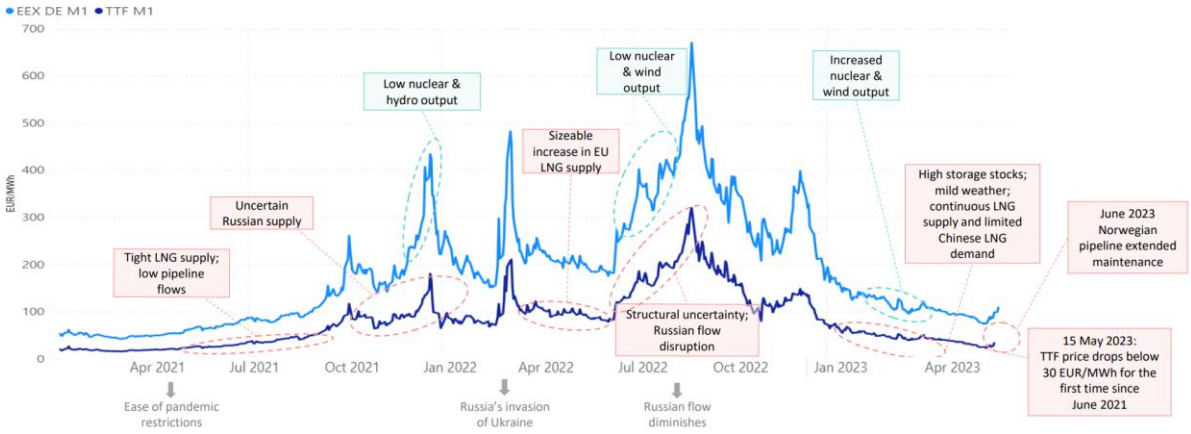
36 See ACER (2024) Market Monitoring Report.

37 Further background on this is, for example, set out at the following link: https://www.frontier-economics.com/uk/en/news-and-articles/articles/article-i8747-gas-prices-whipsaw-across-europe/.

the winter 2022/23. Electricity prices were particularly affected by high gas prices due to low wind and nuclear power output caused by water shortages.

- Following this period, a reduction was observed in gas and electricity prices. This has been attributed to factors including robust LNG and Norwegian pipeline supplies, milder winter temperatures, Europe's achievement of 80% storage targets, and substantial policy interventions.

Figure 8 Electricity & natural gas price evolution (month ahead, €/MWh)



Source: ACER (2023): Key developments in EU gas wholesale markets, https://acer.europa.eu/Publications/ACER_MMR_Key_Developments_Gas_2023.pdf

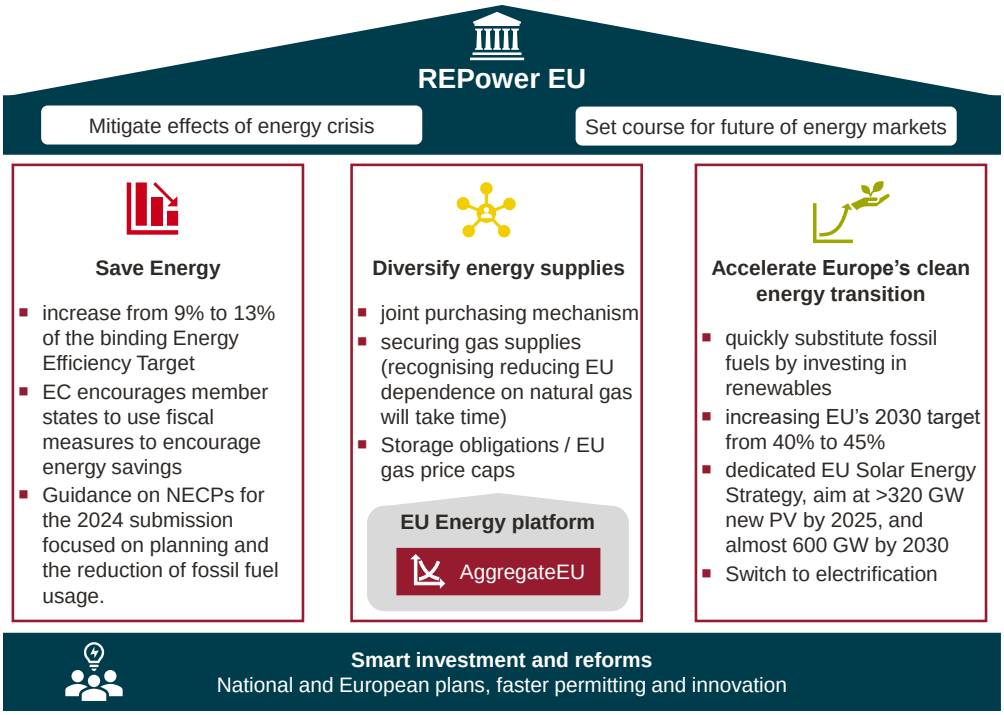
2.2.4 The EU demonstrated a swift policy response to the crisis

The most substantial policy response to the energy market disruptions on the EU side was set out in the REPowerEU Communication, published in May 2022 to mitigate the effects of the crisis on the one hand, and set the right course for the future of EU energy markets on the other hand.

The main pillars of the REPowerEU plan are presented in Figure 9 below. As noted in Section 1.1, while REPowerEU included AggregateEU to support diversification of gas supplies, this was part of a wider package of measures (subsequently adopted as EU legislation) to address both high prices and energy security, which also included:

- imposing gas storage filling obligations and facilitating new LNG capacity;
- coordinating gas and electricity demand reduction across Member States;
- limiting wholesale gas prices ("Market Correction Mechanism");
- allowing Member States to limit windfall profits of energy companies (e.g. Revenue Cap for inframarginal electricity producers); and
- accelerating the deployment of renewable energy sources.

Figure 9 Main pillars of REPowerEU Plan



Source: Frontier Economics based on EC REPowerEU Plan: https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:52022DC0230

2.3 AggregateEU was intended to support affordability and security of gas supplies, particularly for vulnerable regions

The EU Energy Platform was established in April 2022 as a tool to diversify gas imports away from Russia and improve energy security. AggregateEU was introduced as part of the EU Energy Platform, with the adoption of the Solidarity Regulation. It aggregates demand from European users and tenders this out to international suppliers to enable combined acquisitions of natural gas. Participation in the mechanism is fully **voluntary** (with one exception during the initial year of its operation regarding the fulfilment of storage filling targets to ensure security of supply).[38]

The RePowerEU communication proposed "…*a joint European platform for contractualisation of gas supply based on bilateral negotiations with major gas producers would help diversification and smart risk management, hence ensuring security of supplies on favourable*

[38] Prior to the prolongation of the Solidarity Regulation in December 2023, Member States were required to ensure demand bids accounting for 15% of their mandated storage obligations are submitted via AggregateEU. However, entities acting under the storage obligation are under no obligation to actually purchase gas from sellers matched on the platform. Over all EU member states, this corresponds to approximately 13.5 billion cubic meters of gas each year (see EU Energy Platform factsheet, Joint gas purchasing to increase energy security for Europe). Note that while it may be implied, the obligation to place bids on AggregateEU does not explicitly state that Member States must ensure bids are entered for delivery of gas in the year corresponding to the storage filling obligation.

conditions for all buyers across the EU."[39] While this could have implied a range of potential mechanisms, the European Council provided further guidance in May 2022 stipulating that any platform should be voluntary.[40] This necessarily limited the potential scope of AggregateEU.

According to the explanatory memorandum[41] accompanying the 2022 Commission proposal for the Solidarity Regulation, AggregateEU is intended to [bold emphasis added by Frontier]:

- "…*allow the EU to use its **collective purchasing power** to **negotiate better prices**, reduce the risk of Member States outbidding each other on the already tight market and, in doing so, counter-productively driving up prices*…";
- "…***improve transparency** and **help smaller Member States** in particular, which are in a less favourable situation as buyers*…";
- "…***coordinat[e] and aggregate[e]** … **demand** to support the **filling of gas storage** for the next, fast approaching, filling season*…";
- "…*support EU undertakings in their efforts to **obtain additional gas** and help to ensure more equal access to **new or additional gas sources** in the face of the current acute threat to the **security of supplies***…"; and
- "…*[address] the strong interest in a number of Member States to be able to operate in **gas purchasing consortiums**, subject to the relevant competition considerations*".

AggregateEU was also intended, at the outset, to:

- Supplement (but not replace) existing marketplaces or practices;
- support smaller companies or those in landlocked countries in particular, which might benefit from demand aggregation – given the size of their demand or their lack of experience in contracting LNG;
- provide market players with a tool of finding and entering into contractual relations with potentially new counterparties.

AggregateEU may be described as a **"matchmaking" service**. It provides a way for market participants to **establish contacts**, and possible contractual relationships, with new producers/importers – including giving large consumers an option of doing so directly (i.e. without the need to contract through gas shippers). It may also provide an opportunity for customers and retailers to establish contacts with new shippers. As we later discuss in Section

39 https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM%3A2022%3A108%3AFIN.

40 https://data.consilium.europa.eu/doc/document/ST-1-2022-INIT/en/pdf.

41 https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:52022PC0549.

3.2, this is the main way in which AggregateEU can support the stated objectives for its introduction listed earlier.

AggregateEU is operated by the service provider Prisma European Capacity Platform GmbH and is available through the PRISMA website.[42] The platform collects demand for gas delivered to one of 27 national balancing points (NBP), or to one of two "virtual LNG points"[43] and matches buyers with offers from potential sellers.

2.4 Six tendering rounds have been held since AggregateEU's introduction

There are two distinct tender formats within the AggregateEU platform: "short-term" tenders (five of which have been held to date) and "mid-term" tenders (one of which has been held).

2.4.1 The designs of short-term and mid-term tenders differ on aspects other than product duration

Short-term tenders

- **Buyers** are able to specify their demand for each month and location for individual calendar months up to 18 months in the future. Buyers **do not specify their willingness to pay** in their demand bids, **only** their demanded **volumes and delivery time**. For LNG, buyers also specify their preferred terminal(s) for delivery.[44] Buyers need to meet the minimum stipulated quantities of 300 GWh (location/month) in LNG tenders and 5 GWh (location/month) in NBP tenders.

- Demand within each month and location are then **aggregated** and an information sheet published to buyers containing the total aggregated demand for the tenders in which they participated. Buyers have the possibility to withdraw their demands at this stage.

- **The aggregated demands** within each month and location are published as a tender to **sellers** on the platform. Sellers are able to submit offers consisting of their offered volume, their indicative price, and the offer validity date. In LNG tenders, sellers are also able to specify their preferred terminal(s) for delivery. In LNG tenders, buyers are also notified about other buyers in the zone for possible co-operation. All offers are specified in reference to TTF month-ahead prices for the month of delivery.[45]

---

42 PRISMA was awarded the service contract after the Commission had launched a tender in December 2022, according to Article 6 of the Solidarity Regulation, in which it invited eight platform operators and trading system providers to submit bids.

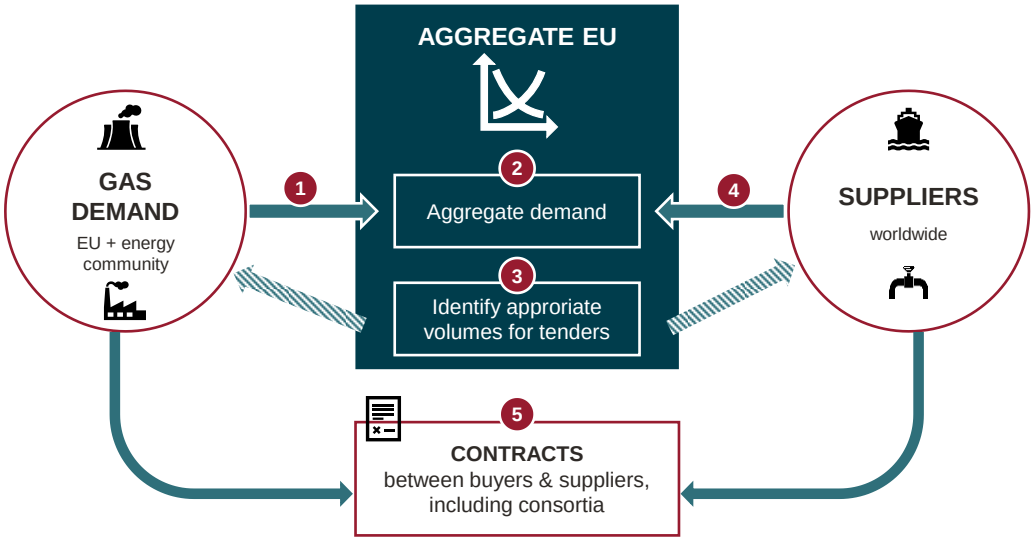
43 National balancing points, in the context of AggregateEU, include both physical and "virtual trading points" within a national transmission system. The two virtual LNG points are the two regions defined by ACER in the context of its LNG price assessment, North-West Europe and South Europe, and include any LNG receiving terminals within the two regions.

44 However, demand aggregation takes place at the level of the two virtual LNG points.

45 For LNG tenders during the first two matching rounds, prices were indicated in €/MWh.

- **All demand is matched to the lowest-cost supplies**. Matched volumes are **allocated pro-rata** to all buyers. This means that all buyers (regardless of their willingness to pay or size) **receive the same average indicative price** offer within each tender.
- Shippers can participate as **sellers or buyers** in a given tendering round (but cannot participate on both sides of the same tendering round).
- After buyers and sellers receive their matches, AggregateEU's function ends and all contracts must be concluded outside the platform. All offers by sellers on AggregateEU are non-binding. The platform requests buyers to report whether a contract was concluded (and its competitiveness) as a result of their matches, but this is **not** mandatory.

Figure 10 Basic functioning of AggregateEU short-term tenders



1 Companies can submit their demand for both pipeline gas and LNG.
2 AggregateEU pools the gas demand received.
3 The aggregated demand is put out to tender on the international market.
4 AggregateEU matches European customers with supply offers.
5 Purchasing contracts are negotiated between companies and gas suppliers outside AggregateEU.

Source: Frontier Economics based on European Commission

Mid-term tenders

In contrast to the short-term tender process described above, buyers enter their demands for entire 6-month periods under the mid-term tender format. Moreover, the platform does not publish aggregated demand volumes to potential sellers. Instead, the demands of individual buyers are published to sellers as separate, pseudonymous tenders. Sellers can then respond to these tenders simply by expressing their interest to supply the demanded quantity (i.e., sellers do not quote a price offer). Buyers receive the contact details of all sellers who noted their interest to supply their respective demands. The main differences between the short-term and the mid-term tender formats are summarised in Table 2.

Table 2 Comparison of short-term and mid-term tenders

	Short-term	Mid-term
Product duration	Demand and offer bids for specific calendar months, up to around 18 months in the future. Earliest bids two months in advance.	Demand and offer bids for 6-month periods (summer and winter). Bids for up to 5 years in the future.
Demand aggregation	Demand aggregation at each location and calendar month and published as single tender.	Demand of each individual buyer published as pseudonymous tender for each 6-month period.
Offer process	Sellers submit offers including (i) quantity, (ii) indicative price, (iii) offer validity date, and (iv) preferred terminals (for LNG).	Sellers simply express their interest in supplying the demand for a specific buyer.
Matching results	Both buyers and sellers receive contact details of counterparties. Buyers see indicative price.	Only buyers will receive the contact details of their suitable matches

Source: https://aggregateeu.prisma-capacity.eu/support/solutions/articles/36000476612-what-are-the-differences-between-short-term-and-mid-term-tenders-

2.4.2 Five short-term tenders have been held to date

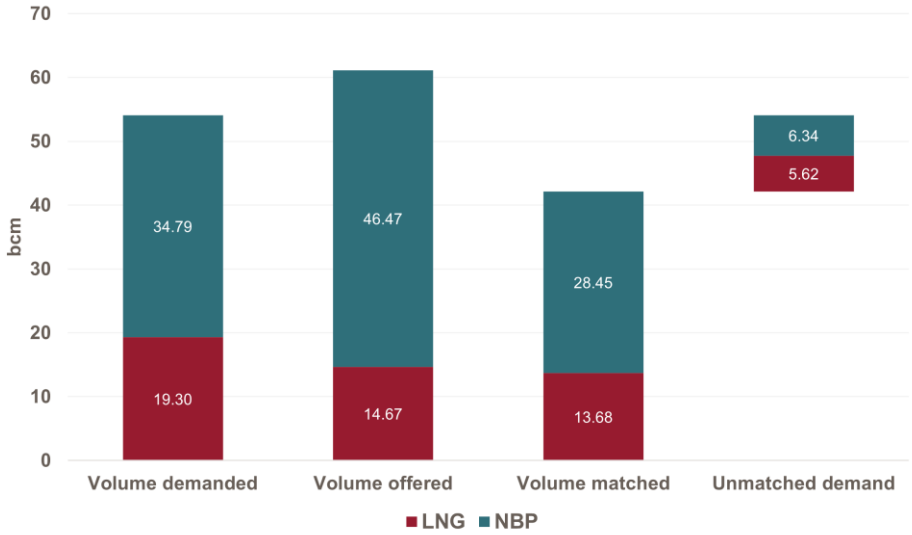
Four short-term tendering rounds (covering products for delivery of gas up to around 18 months in advance) have been organised from April to December 2023. A fifth short-term tendering round was held in March 2024, during the course of our study, for delivery up to March 2025. We have not accounted for the results of the fifth short-term tendering round in our report.

During the first four rounds, 54.08 bcm of gas demand have been aggregated and 61.14 bcm have been offered, with 42.13 bcm matched.[46] The volumes matched cover gas for delivery in 2023, 2024 and 2025.

36% of the total demand and 32% of the total matched volume are made up of LNG. By comparison, LNG accounted for a disproportionately large share of the total unmatched demand, with 29% of the total LNG demand not being matched as compared to 18% of the total remaining demand.

[46] Frontier Economics calculations, based on AggregateEU data.

Figure 11 Total volumes demanded, supplied and matched on AggregateEU, over four tender rounds

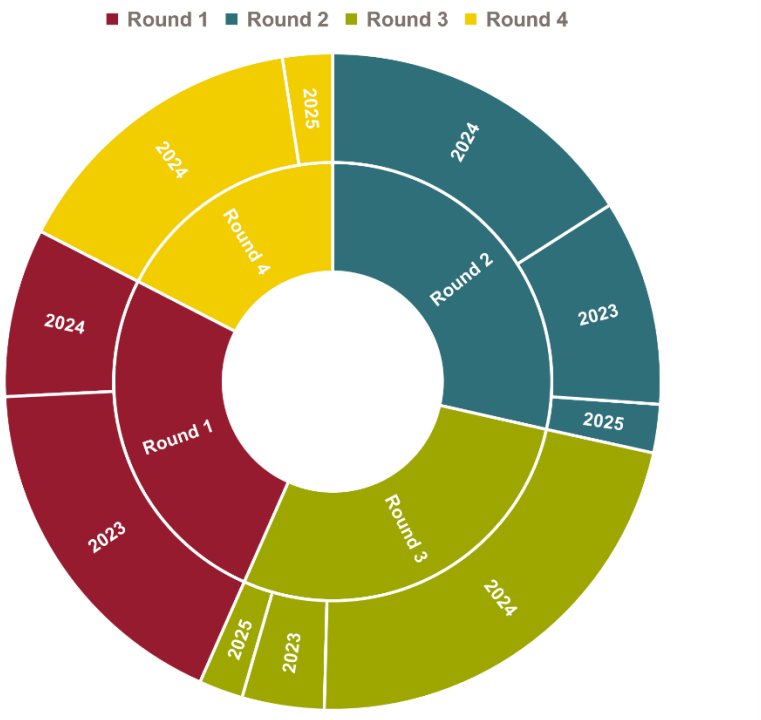


Source: Frontier Economics calculations, based on AggregateEU data.

Voluntary reporting on the outcome of negotiations with matched sellers by participating buyers covers a volume of 18.94 bcm, i.e., approximately half of the total volume matched. Among these reports, 8 buyers confirmed having concluded contracts for 0.77 bcm, as a result of matches made on AggregateEU. The voluntary nature of reporting (see Section 3.2.4) leaves open the possibility that additional supplies were contracted through matches from the platform.

Activity on the platform, in terms of volumes demanded and matched, remained consistent across the initial three tender rounds, with a slight decline observed in both metrics during the fourth round. In total, 110 buyers from 26 countries and 48 sellers participated in the platform. The number of participating companies has declined steadily on both the demand and supply side, from 63 buyers and 32 sellers in the first round to 30 buyers and 13 sellers in the fourth round.

Figure 12 Total matched volume, by tender round and year of delivery



Source: Frontier Economics calculations, based on AggregateEU data.

2.4.3 The first mid-term tender was held in February 2024

The first "mid-term" tendering round was held in February 2024, for products for delivery during 6-monthly windows (summer and winter) up to September 2029.

In the first mid-term tender round, 19 companies participated and collectively submitted demand for 33.66 bcm of gas. Sellers expressed their interest to supply a total of 97.36 bcm. This means that, on average, for each unit of demand, there were three sellers who indicated their willingness to supply it. For 33.65 bcm out of the total 33.66 bcm demanded, there was at least one seller who expressed their interest to supply.[47]

47 Results of February 2024 mid-term tender received by DG ENER. Available: https://energy.ec.europa.eu/news/international-suppliers-offer-almost-100bcm-gas-european-consumers-first-mid-term-tender-under-eu-2024-02-28_en#:~:text=The%20first%20tender%20with%20a,to%20demand%20by%20European%20consumers.

3 Evaluation of AggregateEU

Overall, we aim to ascertain the impact AggregateEU has had on natural gas market outcomes and wider costs, relative to a (hypothetical) counterfactual in which AggregateEU was not introduced. We also aim to identify lessons learned for the future operation of DA/JPM in natural gas.

This section is structured as follows.

- We describe our evaluation approach, including possible transmission mechanisms for a beneficial impact of AggregateEU (Section 3.1);
- We set out the results of our evidence gathering on the historical performance of AggregateEU (Section 3.2); and
- We describe and assess potential ways in which DA/JPM for natural gas could be reformed (Section 3.3).

3.1 We apply a "contribution analysis" approach to the evaluation

When evaluating the impact AggregateEU has had on natural gas market outcomes and wider costs, relative to a (hypothetical) counterfactual in which AggregateEU was not introduced, there are a number of challenges to overcome:

- the evaluation needs to disentangle the effects of AggregateEU in a market characterised by the presence of multiple players operating at different levels along the value chain (gas production, gas supply, transport, intermediary services such as shippers, gas demand) and on different platforms, in different regions;
- there are no readily available metrics to isolate and measure the size of the impact of AggregateEU specifically on the functioning of the EU gas market; and
- outcomes (both improvements as well as negative effects) can take time to materialise and may not be immediately observable at the time of the evaluation.

As such, quantitative methods for evaluation, used to compare outcomes for a 'treatment group' affected by an intervention with a control group that is not affected, are not appropriate. Such approaches rely on strong assumptions that do not hold in our case, such as the existence of a control group, the ability to collect high quality data on intended outcomes or impacts, or the ability to account for other differences between treatment and control group. Accordingly, our focus has been on a "contribution analysis"[48]:

[48] HM Treasury in the UK also refers to a "contribution analysis" as an example of a "theory-based approach". See HM Treasury (2020), Magenta Book: Central Government Guidance on Evaluation.

- identifying possible channels through which AggregateEU could have resulted in impacts on the wholesale gas market (e.g. what are the potential market failures and/or barriers that AggregateEU could address), relative to a counterfactual in which there was no intervention;
- considering the possible role of external factors, as well as unintended consequences from AggregateEU; and
- assessing the extent to which the available evidence (both qualitative and quantitative) can shed light on the different transmission mechanisms.

In the following we describe our approach (Section 3.1.1) and the sources of information we used (Section 3.1.2), before we lay out the results in Section 3.2.

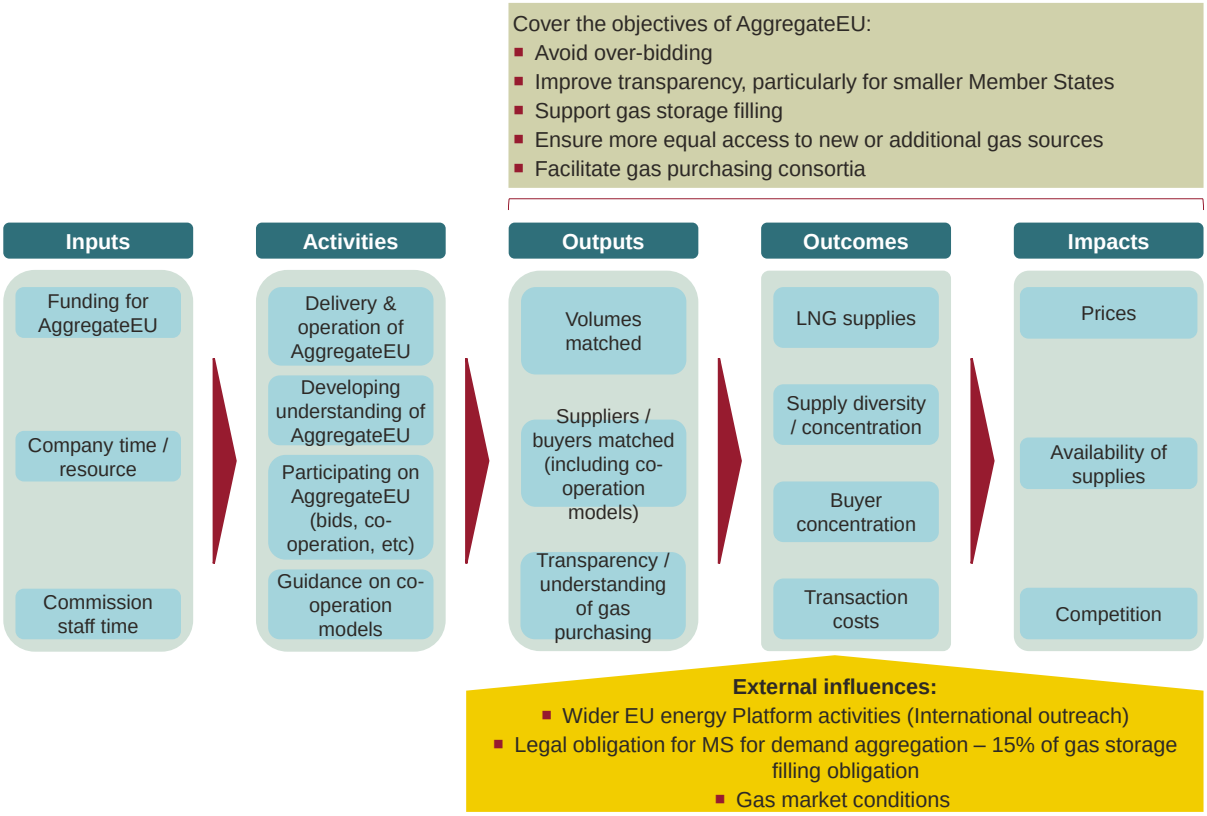
3.1.1 We considered several possible pathways through which AggregateEU may have affected gas market and wider outcomes

A "theory of change" describes the specific activities, how they are resourced, and link those to the outputs, outcomes and impacts that are intended to result from these activities and the expected timing at which impacts materialise. We use the following definitions:

- **Inputs:** resources made available to AggregateEU (including public funding and the opportunity costs in terms of official staff time and incremental resources expended by participants);
- **Activities:** how inputs are used to deliver outputs;
- **Outputs:** the direct result of the activities being carried out;
- **Outcomes:** the more immediate (i.e. early- to medium-term) effects of AggregateEU (both intended and unintended);
- **Impacts:** Longer-term effects of the intervention (again, both intended and unintended).

The "logic model" in Figure 13 provides a visual representation of the theory of change we have developed for AggregateEU, taking into account feedback from DG ENER. Further detail on the development of the theory of change is set out in Annex A .

Figure 13 Overview of logic model



Source: Frontier Economics

The key questions we assess are as follows:

- In terms of **inputs and activities**, that the Commission and PRISMA (the AggregateEU service provider) delivered the platform and engaged with market participants is not in dispute. We therefore **focus on whether AggregateEU led to a change in resources expended by companies** on gas trading, and to a change in trading routes used – as this may help understand potential unintended consequences.

- In terms of **outputs and outcomes**, for AggregateEU to have affected prices, supplies and competition (and given we can assume it did not directly change gas demand), it must have led to a change in supply or in bargaining power. As such we consider whether AggregateEU:

- **increased LNG supplies** to the EU or to particular regions (on the assumption that non-Russian pipeline gas sources would have limited flexibility to increase supplies to the EU);
- **increased supplier diversity**, reducing the risk of exercise of market power, both in terms of:
  - production/imports; and
  - shippers (by allowing customers to potentially "bypass" shippers and directly – potentially collectively – interact with producers/importers);
- led to **effective demand aggregation**, strengthening bargaining power; and
- **improved liquidity and market transparency**, resulting in reduced transaction costs.

- in terms of final **impacts**, we also consider the evidence (based on stakeholder feedback) for any impact of AggregateEU on **gas prices**.

3.1.2 We have drawn on multiple sources of evidence to assess the above questions

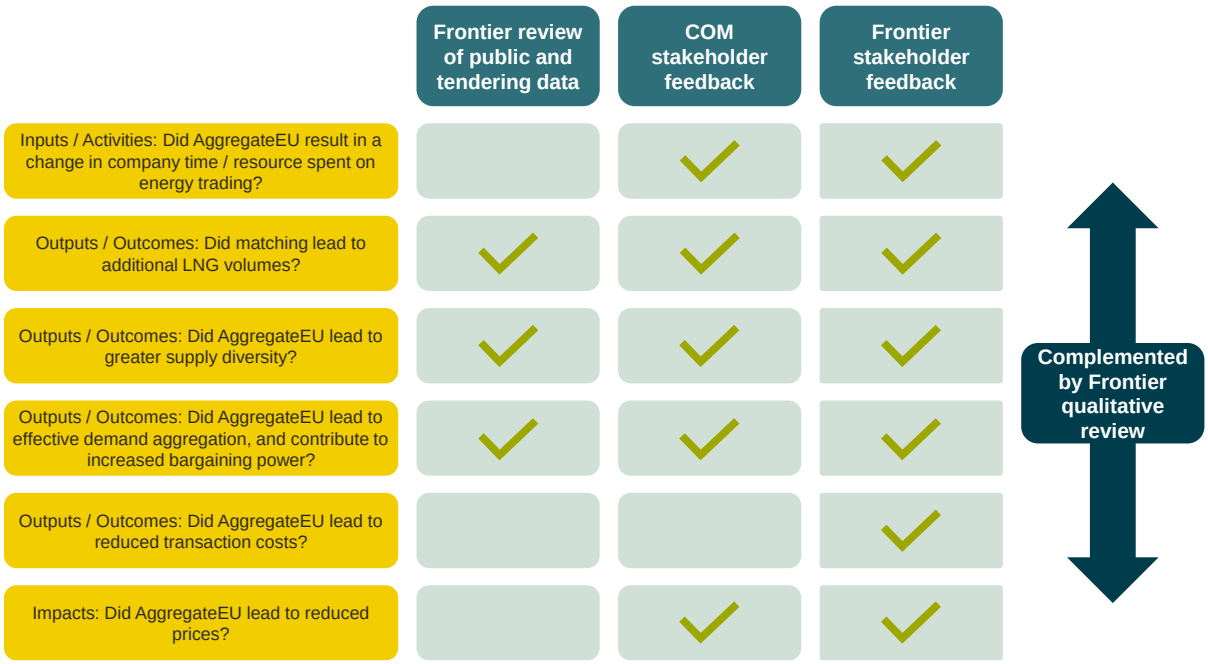
In assessing the above questions, we have relied on the following sources of information:

- **Publicly available data:** Where relevant, we make use of public source data (e.g. from ACER market monitoring reports) and information from third party studies.
- **Tendering data:** DG ENER has provided us with (fully anonymised) detailed data on individual bids, offers and matches in the first four tendering rounds, and data reported by companies on the status of contractual negotiations following matching. DG ENER also provided us with its own summary analysis of the outcomes of the first four tendering rounds.
- **COM stakeholder engagement:** DG ENER has provided us with an anonymised summary of its own stakeholder outreach in relation to AggregateEU. DG ENER's outreach included 15 events at Member States, engagement with regional groups, specific feedback from companies that reported as having contracted under AggregateEU, five workshops with different industrial sector groupings, and consolidated feedback from the industrial advisory group. The data we received pertains to stakeholder outreach conducted before and during the fourth quarter of 2023, thus reflecting feedback up to the third tender round.
- **Frontier stakeholder interviews:** We have carried out a series of bilateral interviews with stakeholders, including AggregateEU participants and non-participants. To ensure a diversity of views in our assessment, we have engaged with a wide range of stakeholders

across the value chain (suppliers and buyers of relevant products), as well stakeholders that are not direct market participants have closely observed relevant market impacts. We have also ensured to cover a geographical spectrum across Europe (especially Eastern Europe). We provide details on selection process, format and topics of the interviews in Annex B However, it should be stressed that the organisations we have interviewed do not necessarily form a representative sample of gas market participants, and as such, we have placed appropriate weighting on these views and have interpreted them critically.

Finally, we supplement the above with our own views, based on economic theory and knowledge of energy markets and trading. Figure 14 summarises which data sources have been used to answer the key high-level questions.

Figure 14 Mapping of data sources to key evaluation questions



Source: Frontier Economics

3.2 Results of the evaluation

In this sub-section we set out the results of our evaluation, starting with a summary (Section 3.2.1), followed by a more detailed explanation (Sections 3.2.2 to.3.2.7). Our assessment in relation to the use of co-operation models on AggregateEU is set out at Section 5.3.2.

3.2.1 Summary

As a reminder, AggregateEU was set up in the context of an acute energy crisis with very high wholesale gas prices and severe concerns about security of gas supply. As such, it was intended to, in conjunction with other emergency measures and alongside existing market tools, support EU undertakings in their efforts to obtain additional gas (including to fill gas

storages). It was also intended to improve transparency and help to ensure more equal access to new or additional gas sources in the face of the acute threat to the security of supplies, in particular in smaller Member States with less opportunities to liquidly source gas. Finally, it is possible (although we have not assessed this) that AggregateEU may have signalled, from an institutional perspective, the EU and its Member States' willingness to co-operate on commodity purchases to international partners. At the outset, we make the following overarching observations:

- Given AggregateEU is voluntary, and any trades executed subsequent to matching are on a commercial basis (without any explicit subsidy or risk sharing with public authorities), we would not expect significant direct impacts on prices and LNG supplies. Accordingly, while we assess the impacts on prices (since this was an explicit objective for the measure) the evidence for such impacts is limited (see Section 3.2.6). That there is limited evidence of material impacts on prices and LNG supplies (see Section 3.2.3) could also be taken as a positive sign – of there not being significant inefficiency in the wholesale gas market as it currently stands, facilitated by multiple efforts on EU and national policy level to create a competitive, transparent and liquid internal energy market.

- Further, as explained in Section 2, the first AggregateEU tendering round took place in April 2023. While gas prices were elevated compared to historical (pre-crisis) levels at this time, they had climbed down significantly from the peaks reached during 2022 (in part due to wider policy efforts, as previously noted). As such, AggregateEU may not have been fully stress-tested. Its impacts, had it been introduced sooner (and had the winter 2022/23 been colder), may have been different. Though (as we note in Section 3.3), the fact that it was still introduced provides optionality to adjust the mechanism going forwards to suit market needs.

To the extent there has been a more clearly identifiable beneficial impact of AggregateEU, it has likely been a **contribution to establishing new commercial relationships** (see Section 3.2.4). For example, based on voluntary reporting by AggregateEU participants, at least 9 buyers were matched with between 1 and 5 counterparties each, with whom they did not have prior contractual relationships. The extent to which such matches were ultimately fruitful (i.e. resulted in trades) is unclear. However, there is some feedback from stakeholders that AggregateEU contributed to additional supply relationships, particularly in the initial tendering rounds.

It is plausible that new counterparties may have been found in the absence of AggregateEU in an environment in which parties sought to mitigate the effects of volatile energy prices. That said, while participation on the AggregateEU short-term tenders declined over time, there has clearly been some level of voluntary participation.[49] Total demand submitted during the four

[49] The precise level of voluntary participation is difficult to assess, as the first four short-term tenders took place before the prolongation of the Solidarity Regulation, and therefore while it was still mandatory for Member States to place bids on the platform equivalent to 15% of their national gas storage filling obligation. As explained in footnote 38, while it may be implied, the obligation to place bids on AggregateEU does not explicitly state that Member States must ensure bids are

first tenders was 54.08 bcm, which equates to four times the mandatory volumes to be submitted (estimated at c.13.5 bcm). Furthermore, approximately 33bcm of demand was submitted in the mid-term tender by which time participation was fully voluntary.

We have not been able to precisely ascertain (Section 3.2.7) from participants whether the value they derived from participating exceeds the overall costs of AggregateEU (those incurred by the Commission, PRISMA and participants, as well as wider market impacts). But we expect any regret from implementing the measure to be limited, since **the overall costs of AggregateEU are likely to have been relatively limited** (Section 3.2.2), in its current form:

- The service contract for PRISMA cost EUR 1 million/year in the first year (most of which related to development costs) with costs in the second year being much lower (EUR < 100,000);
- Any additional costs incurred by companies in participation on AggregateEU are likely to have been limited, also based on participant feedback that handling of the platform was straightforward; and
- Despite concerns from some stakeholders, there is limited evidence for AggregateEU having distorted competition between trading platforms (given its current form and levels of participation).

Further:

- as noted above, the introduction of AggregateEU means there is optionality to adjust the mechanism going forward to suit market needs (for example in the event of a future crisis); and
- while we have not been able to assess this, it is plausible that, by signalling the EU's willingness to act collectively on global markets when faced with an external threat, AggregateEU (together with other measures taken to enhance the EU's "strategic autonomy") may help reduce the likelihood of third countries seeking to use trade to exert pressure on the EU.

3.2.2 Inputs/activities to AggregateEU

The direct cost of the AggregateEU platform is the service contract with PRISMA (EUR 1 million per year) as well as the time and resources that DG ENER have expended on establishing and evaluating the platform. The platform also generates (limited) costs on the part of users associated with onboarding.

entered for delivery of gas in the year corresponding to the storage filling obligation. As such, based on the evidence available to us, it is difficult to make a precise comparison between volumes bid on AggregateEU and national storage filling obligations.

Few of the participants we interviewed commented directly on whether AggregateEU led to a change in resources required for energy trading.

- An energy trader commented to Frontier that the PRISMA tool itself was user-friendly, though did not comment on the resource impact of any subsequent negotiation and trading activity.
- An LNG supplier explained their participation also with the fact that the platform was free of charge and that it did not cost too much for them ("just some working hours").
- A trader acting on behalf of industrial customers stated to Frontier that a high effort was involved to enable industrial customers to participate, as they had to restructure their procurement and renegotiate or adapt existing contracts.
- One stakeholder fed back to DG ENER that a dedicated team was put in place to follow up on matches. Another stakeholder reported that the follow-up steps after matching is time consuming.

The above feedback needs to be interpreted with caution. The direct cost of participating on AggregateEU itself is likely to have been fairly limited (with most complexity, if any, resulting from contractual negotiations that might follow as a result). While it provides anecdotal evidence for participation on AggregateEU having created some demands on company time/resource, it is not clear whether all of these resources are entirely additional, compared to the counterfactual: companies will have to have expended resources in contracting regardless of whether AggregateEU was introduced, possibly to a greater extent, faced with high and volatile energy prices.

In terms of possible displacement of trading activities, one concern (raised by two stakeholders when speaking to Frontier) was that the presence of AggregateEU may affect competition between trading platforms. One of these stakeholders recognised that AggregateEU as such is not a trading platform; the concern expressed was that it may place emphasis on OTC trading over exchange-based trading.

Given the platform is voluntary, and given AggregateEU volumes (matched and contracted) account only for a small amount of overall gas trading in the EU[50], any distortion is likely to have been very limited in practice. This view is consistent with stakeholder feedback provided to DG ENER. Further, none of the stakeholders interviewed by Frontier reported a change in trading strategy for activities outside of AggregateEU (i.e. indicating that AggregateEU resulted in displacement of trading volumes), though this could also be because of the

[50] Over the first four tender rounds, buyers placed demand bids for 54.08 bcm of natural gas, of which 42.13 bcm were matched (see Section 2.4.1) . These bids covered tenders for physical delivery spanning 2023, 2024, and 2025. By comparison, the total volume traded on EU hubs, including OTC and exchange trades, was approx. 6,896 bcm in 2023 (see Figure 5).

relatively level of volumes matched/contracted through AggregateEU as a proportion of overall traded volume.

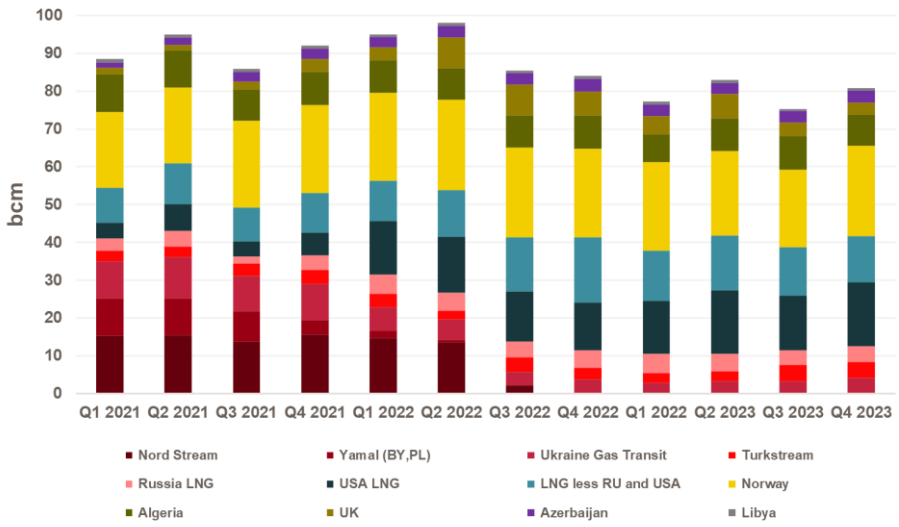
3.2.3 Outputs/Outcomes: Impacts on LNG supplies

Overall, Europe managed to get through the energy crisis without any major unintended gas supply disruptions as they have been feared early after the Russian invasion in Ukraine and corresponding lacking Russian gas supplies in spring and summer 2022.[51]

The reduction in Russian gas deliveries to the EU has been offset by:

- a reduction in gas demand (of around 13% on 2021 levels[52]); and
- an increase in LNG supplies (notably from the US – see Figure 15). LNG imports to the EU in 2022 increased by 57% relative to their 2019-2021 average and by 62% in 2023 relative to the 2019-2021 average.

Figure 15 EU gas imports by origin



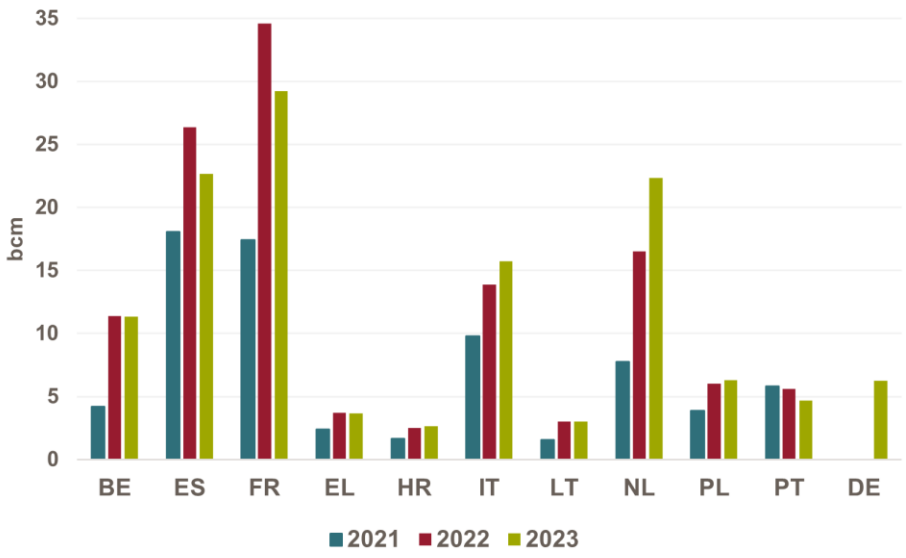
Source: Bruegel European natural gas imports data based on ENTSOG, GIE and Bloomberg

51 See https://www.entsog.eu/sites/default/files/2022-07/SO0036-22_Yearly_Supply_Outlook_2022-2023_0.pdf , accessed 16 April 2024. "*Without immediate market/political reaction (with respect to the actions listed below), most of the European gas storages would be depleted during the winter period and most Central Eastern European (CEE), North-Western (NW) and South-Eastern Europe (SEE) countries will not be able to fill storages during Summer 2023 to levels necessary to ensure security of gas supply for Winter 2023/2024.* "

52 Reductions in the demand for natural gas include the switching to alternative sources of energy. See https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Natural_gas_supply_statistics#Consumption_trends, accessed 14 March 2024.

This was mainly facilitated by higher capacity usage at existing LNG terminals (see Figure 16), although new terminals (notably in Germany) also came online during the crisis.

Figure 16 Total LNG send-out by country



Source: Frontier Economics based on GIE ALSI

Both the demand reduction and increased LNG capacity and utilisation have been triggered by both market incentives (i.e. high gas prices) and policy interventions on EU and Member State level. Relevant policies include, for example coordinated gas demand reduction at EU-level[53] and the acceleration of plans for new LNG terminals (for example in Germany[54]).

As noted in Section 3.2, the required re-organisation of the market started taking place before the first AggregateEU tender was run. This does not preclude an intervention such as AggregateEU may have had an additional impact, had the intervention been brought in sooner. However, based on the evidence we have reviewed, we cannot identify a clear causal link between AggregateEU and the observed increase in LNG imports to the EU.

Any potential link also needs to be considered in the context of the scale of additional LNG supplies to the EU:

- LNG volumes matched via AggregateEU were a small share of overall LNG imports. In 2023, total EU imports of LNG were equal to 128 bcm.[55] By comparison, the LNG matched on AggregateEU for delivery in 2023 was equal to 3.50 bcm (see Figure 17, the matched

53 https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A32022R1369.

54 https://www.cleanenergywire.org/news/first-direct-lng-flows-german-gas-grid-expected-end-2022.

55 Frontier Economics based on GIE ALSI.

volume to be delivered in 2024 was equal to 8.82 bcm), and actually contracted volumes much lower if at all LNG contracts have been agreed (see below).

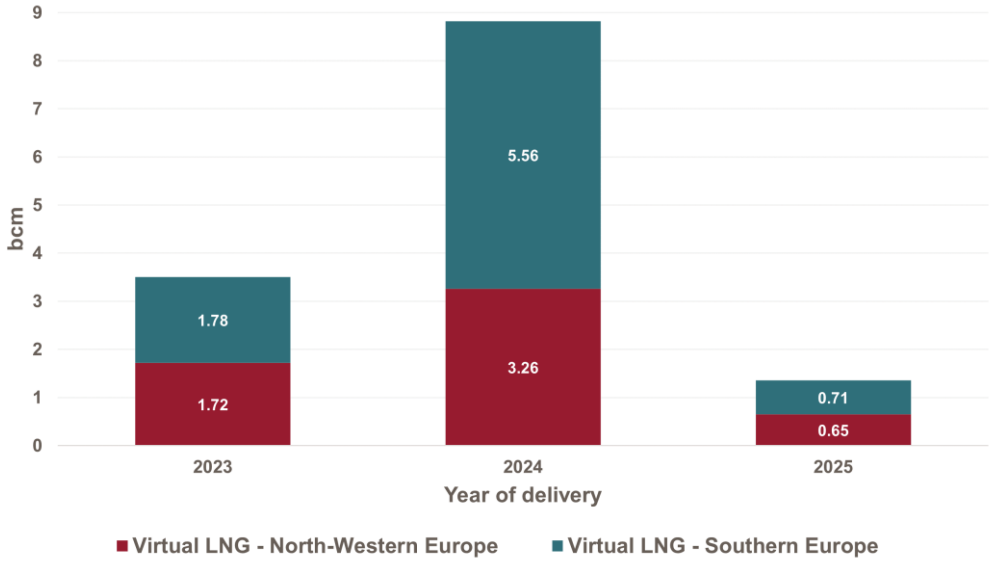
- This is also true at regional level. For example, the volume of LNG send-out in Southern European countries (GR, HR, IT, PT) in 2023 was ca. 26.67 bcm, compared to LNG volumes matched on the platform to be delivered in 2023 in Southern Europe (1.78 bcm).

- LNG bids (and bids matched) on AggregateEU fell over rounds 2 to 4, possibly indicating declining interest in purchasing LNG via AggregateEU, as well as declining interest from sellers in participating (see Figure 18).

- Unfortunately, it is not possible to say how much, if any, of the LNG volumes matched were contracted, as reporting on the outcomes of such negotiations is not mandatory. The available information on contracting covers volumes corresponding to approximately half of the total volume matched on AggregateEU. Only 0.77 bcm of natural gas, or 1.8% of the total matched volume, were reported as successfully contracted by buyers. These reported contracts all pertained to non-LNG supplies.

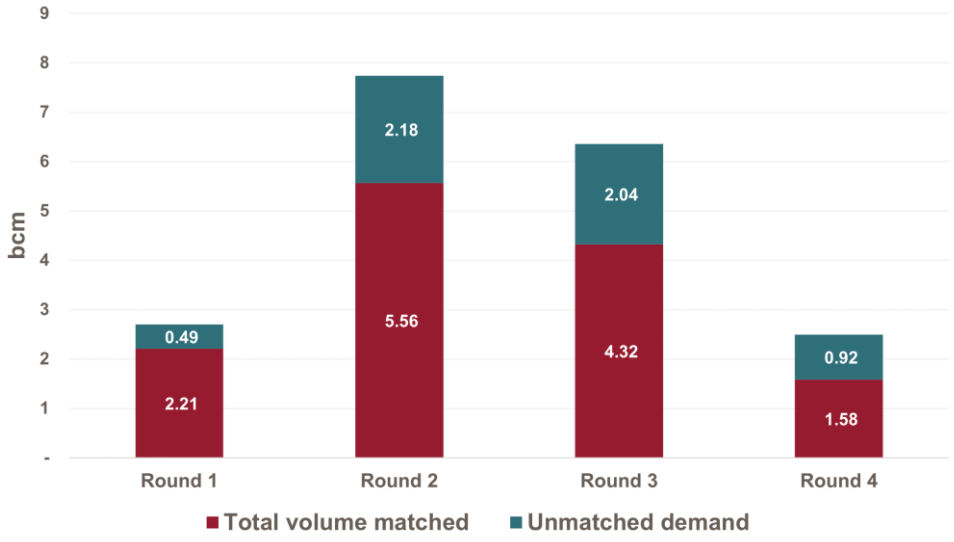
On the one hand, LNG volumes procured through AggregateEU were low as a share of total demand, which may be interpreted that AggregateEU had a small impact. On the other hand, we recognise that it is possible that participation in AggregateEU may have generated positive spillovers in terms of LNG procurement in the wider market, for example in terms of establishing new relationships with LNG suppliers to the EU. However, we do not have evidence for this having been the case. Further, LNG suppliers tend to be large players and most, if not all, are likely to be already known to the market. In particular, during a time of high energy prices, we would expect the market to have been actively searching for any additional sources of LNG supplies regardless of whether AggregateEU was in place (though we consider in the next Section the extent to which AggregateEU may have supported the discovery of new counterparties more generally).

Figure 17 LNG matched volumes, by location and year of delivery



Source: Frontier Economics calculations, based on AggregateEU data

Figure 18 Bids for LNG on AggregateEU, by tendering round



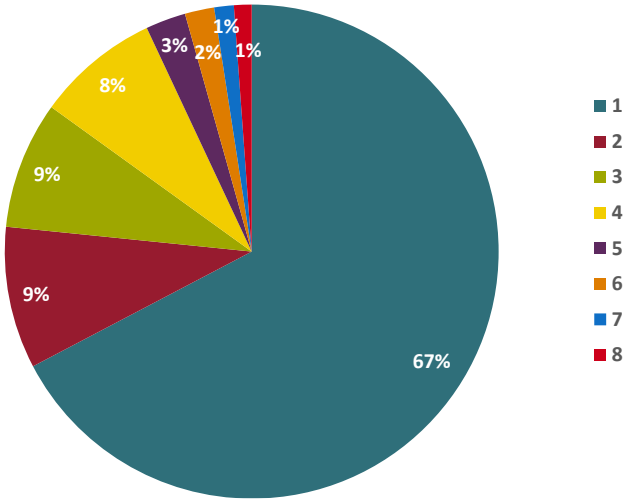
Source: Frontier Economics calculations, based on AggregateEU data

3.2.4 Outputs/outcomes: Supplier diversity

LNG supply on AggregateEU was concentrated, and became more so over the first four tendering rounds

Out of the 48 sellers who participated in the platform, 8 offered LNG. LNG supply on the platform was very concentrated – 67% of the total LNG offered over the first four rounds came from one seller (see Figure 19). Moreover, the supply of LNG was increasingly concentrated over tender rounds – in the third and fourth round, the share of LNG supply by the biggest seller were 72% and 94% respectively.[56]

Figure 19 Share of each seller in LNG offered over four tender rounds



Source: Frontier Economics calculations based on AggregateEU data

Parties were matched to new counterparties

The platform requests (though does not mandate) that buyers who have initiated communication with a matched seller report the current status of those negotiations and submit a final report once negotiations are concluded. For the first four tendering rounds, 52 buyers reported on the outcome of 591 matches, covering around half of all volumes matched. 8 buyers reported concluding a contract with at least one seller, while 48 buyers reported the last status of their negotiations as either pending or unsuccessful.

Buyers are not asked to report whether they were matched with a new counterparty on the platform. However, 9 buyers indicated in their optional remarks that, for at least one matched seller, they were either in the process of negotiating an EFET agreement or that no such agreement was in place prior to the matching.

56 Frontier Economics calculations, based on AggregateEU data.

Some (limited) positive feedback from stakeholders regarding improved seller diversity, but impacts may have worn off after initial tendering rounds

Stakeholder feedback regarding the impact of AggregateEU on supplier diversity (see box below) is generally that:

- AggregateEU may have initially resulted in matches being made with new counterparties on occasion;
- Except in rare instances, matches were not suitable (e.g. due to missing contractual requirements); and
- With further tendering rounds, further new matches have typically not been generated.

Box: Stakeholder feedback regarding supplier diversity

In feedback provided to DG ENER, one stakeholder commented that it duplicated existing trading routes, another stated that it was an opportunity to "virtually exchange business cards & rekindle old contacts", while another commented that AggregateEU is "not bringing new supply thus far".

That said, DG ENER reports that:

- (at least) 6 participants have been matched with counterparties with whom no EFET agreement was already in place;
- 2 companies were in the process of onboarding new counterparties after being matched;
- 1 party contracted with a new counterparty.

Further, based on their stakeholder outreach, DG ENER concluded that credit rating and absence of guarantees were key or at least one of the reasons for not pursuing relationships with new counterparties. This was stated by 5 stakeholders.

In feedback provided to Frontier:

- a trader (as a buyer and seller) and an LNG supplier (as a seller) stated that they were already familiar with most (but not all) matches. The LNG supplier further stated that other matched buyers showed low responsiveness or could not provide relevant documents on time (e.g. they were focussing on signing contracts on EFET standard agreements).
- Another trader (with a focus on acting as a buyer, but also as a seller for virtual hubs) signed a contract with a new counterparty in round 1, but noted that since then, there have been no new counterparties. Concerning LNG, this company stated explicitly that they were not matched with new counterparties on LNG supplier side.
- A company trading on behalf of industrial customers sees new trade opportunities as, in its view, without AggregateEU, bilateral contracts with larger supplier are not feasible for smaller industrial customers (though it has not yet negotiated any contracts under AggregateEU).

In the counterfactual, customers are likely to have sought to diversify in any case

As noted in Section 3.2.2, it is likely that, faced with high and volatile energy prices, many customers will have expended greater resources on energy trading regardless of whether AggregateEU was introduced. This may have contributed to counterparty discovery, even under a counterfactual in which AggregateEU would not have been in place.

3.2.5 Outputs/outcomes: Transparency and liquidity

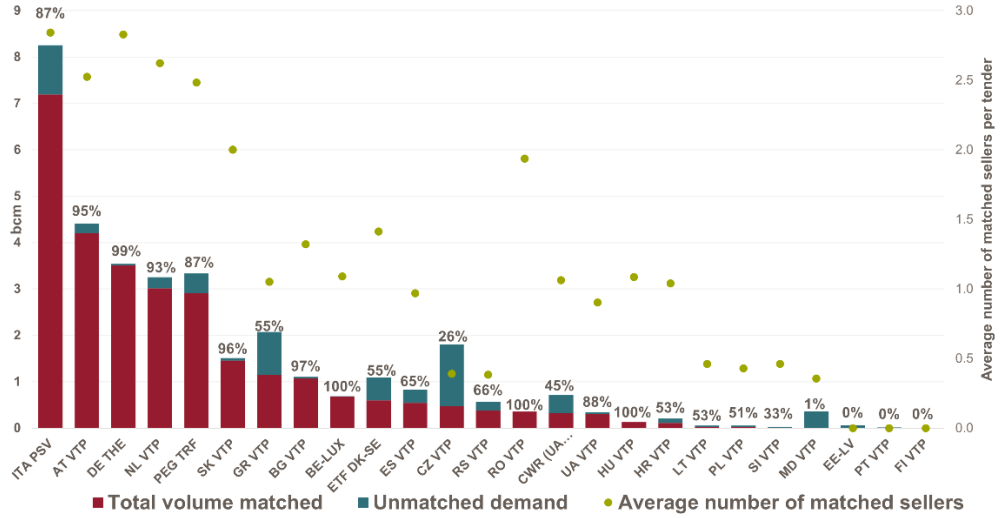
Figure 20 shows the distribution of volumes bid and matched at different balancing points, over the first four AggregateEU tendering rounds.

- Over the four tender rounds, a total volume of 28.45 bcm of pipeline gas was matched between buyers and sellers. Most of the (non-LNG) activity was concentrated on the most liquid hubs in Western Europe (73% of all volumes matched in IT, AT, DE, NL, FR).[57]
- A large share of the demand at the more liquid hubs was matched – in contrast, smaller shares at the less liquid hubs were matched. 55% or less of the total demand submitted on each of the least liquid hubs in EL, DK/SK, HR, LT, PL, CRW UA, SI, CZ, MD, EE, PT, and FI was matched.
- Participation on the less liquid hubs declined over the four tender rounds. The number of companies expressing demand on one of the 10 least liquid hubs declined from 19 in the first tendering round to 9 in the last tendering round. However, it is also possible that this is because some companies found suitable trading partners in earlier rounds. Alternatively it may have been related to the calming energy market situation.
- Buyers were also matched with more sellers on average on the more liquid hubs (green dot in Figure 20).

On average, buyers were matched with more than 2.5 sellers on the most liquid hubs. In contrast, where demand was matched on the less liquid hubs, the supply was more concentrated, such that on the least liquid hubs, buyers were on average matched with less than 0.5 sellers (since a large share of the total demand was not matched).

[57] See Section 2.2 for a discussion on liquidity.

Figure 20 Demand distribution over balancing points, first four AggregateEU tendering rounds



Source: Frontier Economics, based on AggregateEU data supplied by DG ENER

Note: The data labels show how much of the total demand expressed at the different locations was matched on the platform.

We note that reduced levels of activity on less liquid hubs do not necessarily indicate that AggregateEU did not provide a benefit in such hubs. However, it is interesting to consider why activity might have been lower on these hubs. According to anonymised comments shared by DG ENER, some stakeholders explained that demand in Eastern European hubs may have been held back by:

- limited cross-border capacity; or
- regulatory barriers (such as purchases of imports of gas triggering national storage obligations in Member States such as Poland and Romania).

Such explanations are plausible, although they suggest wider issues that would need to be addressed by other forms of intervention (e.g. planning and funding for cross-border infrastructure).

In feedback provided to Frontier:

- Two traders and an LNG supplier expressed a view that there was little transparency of the AggregateEU process itself as well as of outcomes like traded volumes and prices for participants;[58]

- An organisation representing large gas users also fed back that AggregateEU provided less of an overview, but they appreciated that the Commission has tried to increase transparency; and

- A trader operating on behalf of industrial customers stated that AggregateEU offered a potentially more transparent alternative for industrial customers and increased transparency for long-term risk reduction.

3.2.6 Impacts: Prices

As noted in the introduction to this section, it would be surprising if there were clear evidence that AggregateEU, in its current form, had a material effect on gas prices. In any case, we do not have data on prices of contracts concluded following matching on AggregateEU as companies were not requested to provide this information, so are unable to carry out a direct quantitative comparison on the impact on prices.[59]

The limited stakeholder feedback on this subject (see below) suggests that, overall, prices reached via AggregateEU are unlikely to have been vastly different to those of the wider market. This would be consistent with:

- The fact that participation in AggregateEU was voluntary, that bids and offers were non-binding, and both sellers and buyers had outside options for trading gas; and

- A view that arbitrage was effective – consistent with the wholesale gas market being relatively efficient.

[58] As stated in Section 2.3 AggregateEU was also intended to improve transparency, although the relevant dimensions of transparency (e.g. regarding potential suppliers, volumes or prices) were not explicitly stated. Article 46 (5) of the recast Gas Regulation will oblige companies to report volumes, counterparties and duration of contracts concluded.

[59] As part of the voluntary reporting on contracting outcomes, buyers could provide qualitative feedback to PRISMA regarding their assessment of whether the terms of contract were a) very competitive, b) competitive, c) less competitive, or d) not competitive. This relates to the competitiveness of the purchase in comparison with other purchasing options for the company reporting. In relation to the 0.77 bcm contracted, 97% of responding indicated that the terms contracted were “very competitive” or “competitive”. Based on this qualitative information, however, we are unable to quantitatively assess the extent of any gains achieved by EU buyers.

Box: Stakeholder feedback regarding prices on AggregateEU

Speaking to Frontier:

- A trader stated that, when acting as buyer, prices from matching were typically higher than market prices. Any lower offers emphasised they were non-binding when contacted.
- Another trader referred to two deals with the same counterparty in the first tender round at a fair price.
- A municipal utility did not provide any evidence, but expressed their view that they are sceptical about the rationale that aggregating volumes results in competitive price advantage in natural gas. In their experience, larger volumes demanded usually result in higher prices, at least in the more short-term time frame.

According to anonymised feedback shared by DG ENER:

- One company stated that suppliers enter offers priced at unrealistic levels;
- Two companies mentioned that prices on AggregateEU reflect market prices and are thus not cheaper than the wider market;
- One buyer reported contracting at a better price than available at their exchange

3.2.7 Other observations

Participation was free of charge, so we do not have robust empirical evidence on whether the value derived by participants[60] exceeds the cost of providing it. We have tried to ascertain this value in our conversations with stakeholders. Of those that participated on AggregateEU (three players), all said charges for using AggregateEU would have reduced their willingness to use the service. One said charges would be a “showstopper” for industrial consumers. This indicates that part of the utility of AggregateEU for participants is as a low-regret additional (and free) “option” for trading gas.[61]

3.3 DA/JPM for natural gas should adapt to changing circumstances

It is important to consider which conclusions can be derived from the experience of AggregateEU for the future use of DA/JPM for natural gas and the implications of changing

60 That players submitted approximately 33 bcm of demand in the mid-term tender all, and that most of this demand was matched to sellers (see section 2.4), despite it being fully voluntary, indicates that participants derived some utility from participation.

61 Several stakeholders also expressed the view that non-participation may have been negatively affected their reputation with policymakers. We do not have evidence to suggest how material this reputational effect may have been.

market circumstances following the peak of the energy crisis. We start by describing the long list of options identified and explaining which ones have been taken forward for further assessment (Section 3.3.1). We then present our assessment of the shortlisted options for reform (Section 3.3.2).

3.3.1 We developed a shortlist of options to assess

As we set out in further detail in Section 4, there are a variety of different types of DA/JPM beside AggregateEU, each of which address somewhat different barriers: For instance a mandatory mechanism (Boltz et al (2022)[62] have set out a vision for one possible emergency mechanism) could potentially more effectively help to avoid overbidding for LNG in the event of a future gas supply crisis (though may, depending on design, also come with greater risk of adverse impacts on the gas wholesale market). Such a mechanism could, in theory, also be linked to coordinated gas demand reduction measures across Member States (thereby allowing an efficient trade-off between demand reduction and securing additional supplies).

However, co-legislators have agreed that DA/JPM for natural gas will remain voluntary (see Section 1.2). **Given there is no legal basis for a mandatory DA/JPM, we do not focus on this option**. In addition, there is no explicit reference to a voluntary central buyer in the current legal basis. **As such, we have also ruled out options under which the Commission would act as a central buyer.**

Given this, **we take the current AggregateEU design as a starting point for future DA/JPM for natural gas**. We then consider the extent to which certain changes to the current design could contribute to maximising the effectiveness of AggregateEU, while minimising any potential negative impacts on the wholesale market for natural gas.

Based on the results of the evaluation, stakeholder feedback and our internal thinking, we identified a long-list of potential adjustments to AggregateEU (see Table 3 below).

62 Boltz, W., K.D. Borchardt, T. Deschuyteneer, J. Pisani-Ferry, L. Hancher, F. Lévêque, B. McWilliams, A Ockenfels, S. Tagliapietra and G. Zachmann (2022) 'How to make the EU Energy Platform an effective emergency tool', Policy Contribution 10/2022, Bruegel.

Table 3 Long list of options identified

Option	Description
Financial guarantees	Stakeholders have fed back to DG ENER that insufficient credit ratings can be a barrier to participation for some buyers as it reduces the willingness of counterparties to trade with them. One way to address this might be the provision of financial guarantees to buyers.
Credit terms	Speaking to Frontier, some stakeholders suggested it may be helpful to agree standardised credit/collateral terms, as an eligibility criterion. One seller suggested it may be helpful to give sellers a greater ability to set criteria for being matched to buyers, to increase the likelihood of matches being fruitful.
Ensuring compatibility of national laws/ regulations	Some stakeholders noted that national laws may effectively create a barrier to participation on AggregateEU (for example, obligations that require companies that import gas to maintain a certain share of gas in storage).
Product differentiation	One stakeholder raised the possibility for buyers to specify demand in terms of the source/origin of the natural gas.
Amending/keeping product focus under review	Product focus could be kept under review with aim of providing greatest added value in terms of transparency (potentially consistent with some stakeholder suggestions to focus on mid- to longer-term products)
Reviewing frequency of a call for expression of interest for supply	Setting clear conditions for triggering further calls (e.g. triggered in event of future energy crisis)
Change pricing/ matching rules	One stakeholder suggested including seller indicative pricing for mid-term products (as well as for short-term calls for expression of interest).
Extending the amount of information provided / greater facilitation of trading	Platform could provide greater information to players (particularly smaller ones) on opportunities to trade directly in the wholesale market for gas (i.e. not only restricted to participation on AggregateEU). At a basic level this could include a comprehensive overview of the process for trading gas. In addition, it could include elements such as providing greater information on the range of available counterparties, their capacity and/or potential financing options.

Source: Frontier Economics

Based on discussions with DG ENER, **we did not further pursue the following options**:

- **Financial guarantees:** We understand that, in practice, sustainable finance taxonomy rules[63] would reduce the willingness of many banks to provide guarantees for the purchase of natural gas. We therefore agreed with DG ENER not to consider this option further for natural gas. We consider this issue further for other products in Section 4.7.
- **Credit terms:** We understand that a core principle for AggregateEU is that it should allow equal access for all buyers. As such, we do not consider such options further.
- **Ensuring compatibility of national laws/regulations:** The interventions cited by stakeholders affect trade in gas more generally (not limited to the effect on participation in DA/JPM). Addressing such barriers effectively would require wider intervention (i.e. not simply changes to the design of DA/JPM). As such, this issue is beyond the scope of our study.
- **Product differentiation:** As the envisaged use case was to help with certification, we pick this up as part of our Task 3 work considering the application of DA/JPM to captured methane.

We have taken the remaining options forward for further assessment.

3.3.2 Assessment: it would be beneficial to keep the product focus and frequency of calls for expression of interest under review

Summary

Figure 21 summarises our assessment of the shortlisted options.

To start with, we make the observation that, since the EU now has experience of running DA/JPM for gas, and indeed given there is already a platform in place[64], the EU has much **greater flexibility going forwards to adjust the mechanism** on an ongoing basis to suit market needs. It would therefore be **beneficial to keep the product focus and frequency of calls for expression of interest under review**. In particular, certain elements might be deployed only in the event of an energy crisis. And under normal market conditions, the Commission or service provider could regularly monitor market needs to ensure DA/JPM complements the market offering as much as possible.

There may also be a **case for extending the degree of information provision and trade facilitation**, though this might come with additional risks to the development of commercial solutions. We **do not recommend introducing seller indicative pricing for mid-term calls**

63 https://finance.ec.europa.eu/sustainable-finance/tools-and-standards/eu-taxonomy-sustainable-activities_en

64 Notwithstanding that, a new tender for a service provider will need to be issued following the adoption of the recast Gas Regulation.

for expression of interest, as there is a risk this might undermine the effectiveness of matching.

Figure 21 Summary of assessment of options for reform of AggregateEU for natural gas

Evaluation criteria		Keeping product focus under review	Review frequency of calls for expression of interest	Seller indicative pricing (mid-term product)	Extending information provision
Criteria	**Description**				
Effectiveness / efficiency	Will the solutions support DA/JPM objectives at lowest cost?	Largely preserves value add	Largely preserves value add	Risk that effectiveness may be undermined	Could help reduce transaction costs
Dynamic efficiency	Will the solutions promote innovation and cost reduction over the longer-term?	(small) reduction in risk of distortions to trading	(small) reduction in risk of distortions to trading	Unclear / limited direct impact on wider market	Risk of crowding out commercial solutions
Resilience and adaptability	Is the measure resilience and adaptable to future changes in market conditions?	*As we do not consider changes to the high-level form of DA/JPM for natural gas, all measures are equally adaptable to future market conditions.*			
Ease of implementation and administrative costs	Does the instrument require substantial changes to legislation / involve additional administrative costs?	(Small) additional one-off costs	Reduced running costs	(small) additional one-off costs	Additional one-off and ongoing costs

Legend: Improvement compared to current AggregateEU design; Limited / no change, compared to current AggregateEU design; Deterioration compared to current AggregateEU design

Source: Frontier Economics

We provide further detail on our assessment below.

Keeping product focus under review

The Commission or service provider would review where they may be gaps in the current market offering (for example, that are not already liquidly traded on established marketplaces), and focus the product offering on addressing those gaps. The Commission or service provider could assess gaps by reviewing market monitoring data regarding levels of wholesale market liquidity (such as that collected by ACER) and/or issuing surveys. It would also be important to judge how well DA/JPM could help address gaps (for example, it is unlikely DA/JPM will be able to directly deal with poor short-term liquidity or help with continuous hedging needs for retailers, but it may still help with counterparty discovery).

In practice, this may involve a restriction or reduction of the current short-term tenders (under normal market conditions). We assume the principle of equal access means that the measure would still need to ensure full EU coverage, though potentially the mechanism could focus on products where the gap is larger in regions with less liquid markets (for example, continuing with mid-term calls for expression of interest, where liquidity in longer-term trades is limited except on some hubs such as TTF[65]). The logic would also be consistent with the extension

65 https://www.oxfordenergy.org/wpcms/wp-content/uploads/2023/06/European-Traded-Gas-Hubs-their-continued-relevance-NG183.pdf.

of AggregateEU to longer-term products, such as those linked to decarbonisation, or involving a greater degree of optionality.

As noted previously, the evidence regarding whether AggreagateEU has, in practice, made a greater contribution to counterparty discovery in less liquid markets is not conclusive (though stakeholder feedback has been that this may be the case). That said, our view is that (at least during normal market conditions), there may be limited added value in terms of counterparty discovery for products that are more openly traded. So, overall, keeping the product focus under review is **likely to largely preserve the effectiveness and efficiency of the measure**.

Keeping the product focus under review would also **limit the risk of potential distortions to trading behaviour** (e.g. appearing to give a preference to certain trading routes), compared to the current operation of AggregateEU (although, as noted previously, there is limited evidence for such distortions based on AggregateEU's current operation).

In terms of the administrative impacts, implementing a change may require a **one-off change to the existing tender process** to facilitate a restriction in products, which we assume would be relatively low cost. We **assume ongoing platform running costs may remain similar** to those currently incurred, on the assumption that platform running costs are relatively fixed per tender round (and depend less on the number of products covered). This is unless short-term tenders were completely abandoned (which will reduce running costs).

Review frequency of calls for expression of interest

The rationale for this option is that the greatest value-add for counterparty discovery may come at times of market upheaval (such as that experienced during the recent crisis), during which flows may change direction and players may need to establish new contractual relationships. The Commission and/or service provider could monitor the market and could decide, on the basis of certain trigger events (e.g. requests from market, supply disruptions), to call for (additional) tendering rounds, potentially covering a greater range of products than might be covered under tendering rounds run under normal market conditions (see next option).

As explained in Section 3.2, we do not have conclusive evidence on whether the platform delivered added value in terms of counterparty discovery, and whether the value added was greater during times of crisis (partly since the first tendering round came some time after the peak of the crisis). However, this would be consistent with the original rationale for AggregateEU (i.e. as a crisis intervention), and is also consistent with the level of participation (in short-term tenders) falling between tendering rounds. Therefore, the option could **largely preserve the effectiveness and efficiency of DA/JPM for natural gas.**

Similarly to the previous option, restricting the frequency of trading would also **reduce any potential distortions to trading behaviour**, compared to the current operation of AggregateEU.

In terms of administrative impacts, we assume reducing the frequency of tendering would allow for **lower running costs**.

Amending the pricing rule for mid-term products

As noted in Section 2.4.1, in the tender for mid-term products, sellers do not submit indicative prices. The rationale for introducing indicative prices would presumably be to facilitate negotiations following any matching (having indicative prices could, in theory, give buyers some indication of a benchmark price, which could help them decide on their approach to contract negotiations).

In practice, it is unclear to us this value would materialise. Mid-term products are, on most EU hubs, less liquidly traded. While this increases the value of a benchmark, it also makes it challenging to monitor the robustness of any indicative seller bids (contrary to the case for short-term products). The difficulty in monitoring seller bids might make it easier for sellers to influence and manipulate the matching process by altering their bids. Alternatively, the need to submit indicative bids could reduce the willingness of sellers to participate in the first place. Overall, therefore, we see a **risk that the effectiveness and efficiency of the measure could be undermined**. There would, however, be limited direct impact on the wider market.

In terms of administrative impacts, such a change would involve a change to matching process, and so entail some **additional one-off costs** in terms of specification/design (although we would assume such costs would be limited, as any specification/design work could be based on the process in place for short-term tenders).

Extending the degree of information provision

The platform could provide greater information to players (particularly smaller ones) on the opportunities to trade directly in the wholesale market for gas (i.e. not only restricted to participation on AggregateEU). This would apply both to suppliers (particularly foreign suppliers, who may be less familiar with EU requirements) and buyers within the EU. At a basic level this could include a comprehensive overview of the process for trading gas, including any relevant regulatory requirements. As a potential further build, it could include elements such as providing greater information on:

- the identity and range of available counterparties,
- the extent of any spare capacity and/or
- potential financing options.

By increasing market transparency and facilitating market access, such a service **may reduce transaction costs**, compared to the current operation for AggregateEU.

However, depending on the extent of information provision, it may also stray into areas that could be potentially covered by commercial solutions. For example, brokers, OTC platforms,

and exchanges have commercial incentives to facilitate trade in natural gas and bring counterparties together. There is therefore a risk, depending on the precise extent of information provided, of crowding out commercial services, leading to **reduced incentives to provide and innovate in such services over the long run**. This would be less of a risk, to the extent the focus remains on clarifying regulatory requirements (where there is a clearer role for policymakers in reducing barriers).

In terms of administrative impacts, such a change would not involve any changes to the tendering process. However, it would entail some **additional one-off costs** in terms of developing guidance, information provision, as well as **additional ongoing costs** of engaging with market participants and keeping guidance up-to-date.

4 Adapting demand aggregation and joint purchasing to support EU decarbonisation priorities

As noted in Section 1.2, given recent legislative and policy developments, it is relevant to consider the potential for DA/JPM to be applied to other products. The products covered in this intermediate report are: (low-carbon and renewable) hydrogen, biomethane, natural gas recaptured from methane flaring or venting, strategic raw materials and captured CO_2.

- **Hydrogen**: The EU Hydrogen Strategy[66] notes the role of hydrogen in supporting EU decarbonisation goals. Article 52 of the revised Gas Regulation[67] empowers the Commission to introduce a pilot voluntary mechanism for support to market development for hydrogen (to be implemented under the activities of the European Hydrogen Bank[68]). The mechanism would be temporary and last until 31 December 2029. Subject to the Commission's assessment of the performance of the pilot mechanism, it "…*may submit a separate legislative proposal for a voluntary demand aggregation mechanism for hydrogen.*"

- **Biomethane:** The revised definition of natural gas in the Gas Directive also includes biomethane (conforming to applicable quality standards and grid-injected), so DA/JPM for biomethane is a possibility.[69] Biomethane is the purified version of biogas, produced from the breakdown of organic matter. Biomethane can be injected into the gas grid with limited or no need for changes to infrastructure and end-user appliances required. Further, it is a renewable gas and thus projected to become a significant means to decarbonise the energy system. Accordingly, the RePowerEU communication set an ambition to scale EU biomethane production up to 35 bcm annually by 2030. [70]

- **Captured methane:** Methane is the second most important greenhouse gas contributor to climate change following carbon dioxide. As well as introducing legislation to tackle energy sector methane emissions in Europe and in global supply chains[71], the Commission has announced it will "…*develop a roadmap for the global roll-out of the 'You*

66 Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: "A hydrogen strategy for a climate-neutral Europe", COM(2020) 301 final.

67 Regulation (EU) 2024/1789 of the European Parliament and of the Council of 13 June 2024 on the internal markets for renewable gas, natural gas and hydrogen, amending Regulations (EU) No 1227/2011, (EU) 2017/1938, (EU) 2019/942 and (EU) 2022/869 and Decision (EU) 2017/684 and repealing Regulation (EC) No 715/2009 (recast), OJ L, 2024/1789, 15.7.2024.

68 https://energy.ec.europa.eu/topics/energy-systems-integration/hydrogen/european-hydrogen-bank_en.

69 Directive (EU) 2024/1788 of the European Parliament and of the Council of 13 June 2024 on common rules for the internal markets for renewable gas, natural gas and hydrogen, amending Directive (EU) 2023/1791 and repealing Directive 2009/73/EC (recast), OJ L, 2024/1788, 15.7.2024.

70 European Commission (2022), „ REPowerEU Plan", accessed on 20 February 2024 at http://tinyurl.com/bdf5zt8a.

71 Regulation (EU) 2024/1787 of the European Parliament and of the Council of 13 June 2024 on the reduction of methane emissions in the energy sector and amending Regulation (EU) 2019/942, OJ L, 2024/1787, 15.7.2024.

Collect, We Buy' scheme".[72] Such a scheme would aim to provide gas-exporting countries with additional incentives to reduce methane leaks, venting and flaring, and to make this gas available to EU and international gas markets. It may be possible to combine such a scheme with DA/JPM, using the legal basis in the Gas Regulation for natural gas.

- **Critical Raw Materials (CRM)**: **)**: Critical raw materials are vital inputs for strategic sectors such as renewable energy, the digital industry, and the aerospace and defence sectors. Article 25 of the Critical Raw Materials Act[73] requires the Commission to set up and operate, subject to an impact assessment, DA/JPM for strategic raw materials (as defined in Article 3).

- **CO_2 transport or storage services**: Carbon management technologies, involving storage or use of captured CO_2 emissions, are projected to be an important part of EU decarbonisation efforts. The Net-Zero Industry Act (NZIA) regulation entered into force in June 2024 to establish a Union market for CO_2 storage services, increasing availability of CO2 storage sites and support for ICM technology projects across Europe. Additionally, the Commission, in its industrial carbon management strategy[74], the Commission "…*foresees to develop, with Member States, by early 2026 at the latest, a platform for demand assessment and demand aggregation for CO_2 transport or storage services, with the aim of matching CO_2 suppliers with storage and transport providers and providing contract and procurement transparency…*"

This Section is structured as follows:

- in **Section 4.1**, before considering the potential role of DA/JPM for each specific product in further detail, we explore the range of possible high-level forms of DA/JPM. We explain the market barriers or failures each form of DA/JPM can address and how they perform against our assessment criteria. We do so at a generic level before subsequently considering specific products;

- based on the results of the previous step, we consider further the relevance of DA/JPM for each of the products specifically. We first discuss the case of **hydrogen** in **Section 4.2.** In **Sections 0 to 4.5**, we discuss **biomethane, natural gas recuperated from methane flaring, and strategic raw materials**.[75] For each product, we:

---

72 https://ec.europa.eu/commission/presscorner/detail/en/IP_23_6057, accessed 4 March 2024.

73 Regulation (EU) 2024/1252 of the European Parliament and of the Council of 11 April 2024 establishing a framework for ensuring a secure and sustainable supply of critical raw materials and amending Regulations (EU) No 168/2013, (EU) 2018/858, (EU) 2018/1724 and (EU) 2019/1020, OJ L, 2024/1252, 3.5.2024.

74 Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: Towards an ambitious industrial carbon management for the EU, COM(2024) 62 final.

75 For the purposes of this study, we agreed with DG ENER not to consider the design of DA/JPM for CO_2, as the timescales for the development of DA/JPM for CO_2 are somewhat longer-term, compared to DA/JPM for other products. However, the potential relevance of DA/JPM for CO_2 is still considered in Section 4.6.

- provide a high-level summary of the sub-section;
- provide an introduction into the relevant basics of the respective market;
- discuss potential market barriers affecting the respective market (with a special focus on those that DA/JPM could, in principle, help to address);
- identify the potential role of DA/JPM in the respective market and relevant high-level forms of DA/JPM (that have the potential to be effective); and based on this
- describe and assess more concrete and detailed design options;

- in **Section 4.6**, we conclude on a very high level how DA/JPM could be beneficial for captured CO_2 and why we do not further analyse DA/JPM for CO_2 in this report.
- in **Section 4.7**, we analyse issues related to financial instruments and DA/JPM.

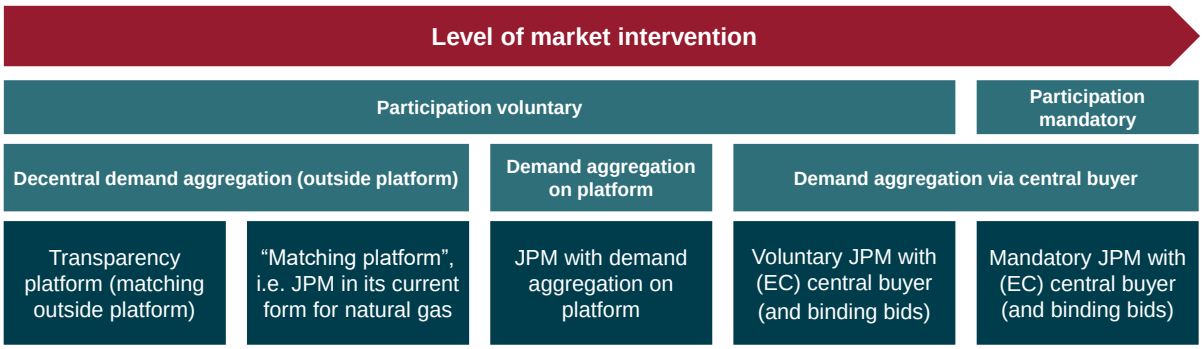
4.1 The potential role of DA/JPM

4.1.1 The level of market intervention varies across different forms of DA/JPM

In principle, DA/JPM might take different forms. The main distinctions are whether:

- participation is voluntary or mandatory; and
- demand aggregation takes place outside of the platform, on the platform (but decentralised) or via a central buyer acting on the platform.

Figure 22 A DA/JPM can take different forms



Source: Frontier Economics

Based on these distinctions, we have defined five high-level forms of DA/JPM (see Figure 22), which cover a broad spectrum of theoretically possible forms of DA/JPM. There is currently no legal basis for a mandatory mechanism, nor is the introduction of a public central buyer foreseen. As such, they are not considered when we later discuss more concrete design

options for each product in sections 4.2 to 4.5. Nevertheless, for completeness, we consider them at a theoretical level:

- **Transparency platform.** The least interventionist form consists of a transparency platform, which collects, processes and assesses market data. Such data might include e.g. demand estimates and supply offers (on different timelines), willingness to pay, production cost and infrastructure availability and potential bottlenecks. By sharing the information with relevant stakeholders (buyers, suppliers, infrastructure and storage operators) potential buyers and suppliers can be connected. In addition, the mechanism may also support the development of the required transportation infrastructure. Important design questions would include which potentially sensitive information is shared with whom, to which extent and in which form (aggregated or not)[76] and how to ensure information collected is reliable.

  There are some optional extensions of a transparency platform (called "**transparency plus platform"** in the following). First, a call for expression of interest could take place for a less clearly defined product. Second, there could be some lighter forms of demand and supply matching, e.g. based on more flexible bids or also imperfect matches.

- **Matching platform,** i.e. similar to AggregateEU in its current form for natural gas. Under this model, buyers can submit (indicative) bids (potentially with prices), potentially jointly with other buyers. Indicative bids and offers are matched at a platform. As bids and offers are not binding, any potential contracts are negotiated and signed outside of the platform.

- **JPM with demand aggregation on platform.** Under this model, both sellers and buyers place bids on the platform. In a next step, demand is aggregated implicitly (similar to an exchange). In addition, buyers could still form e.g. consortia.

- **Voluntary JPM with EC as central buyer.** Rather than forming private buyer consortia, buyers submit demand via a public central buyer. Buyers' participation is voluntary. As an implication of the purchasing, the public buyer assumes a degree of credit risk in the first instance, which may implicitly involve a degree of public funding/underwriting. However, individual buyers need to commit in advance to purchasing the volumes bid for.

- **Mandatory JPM with EC as central buyer.** Similar to the previous model, except that participation is mandatory (potentially limited to certain circumstances, such as a supply emergency).

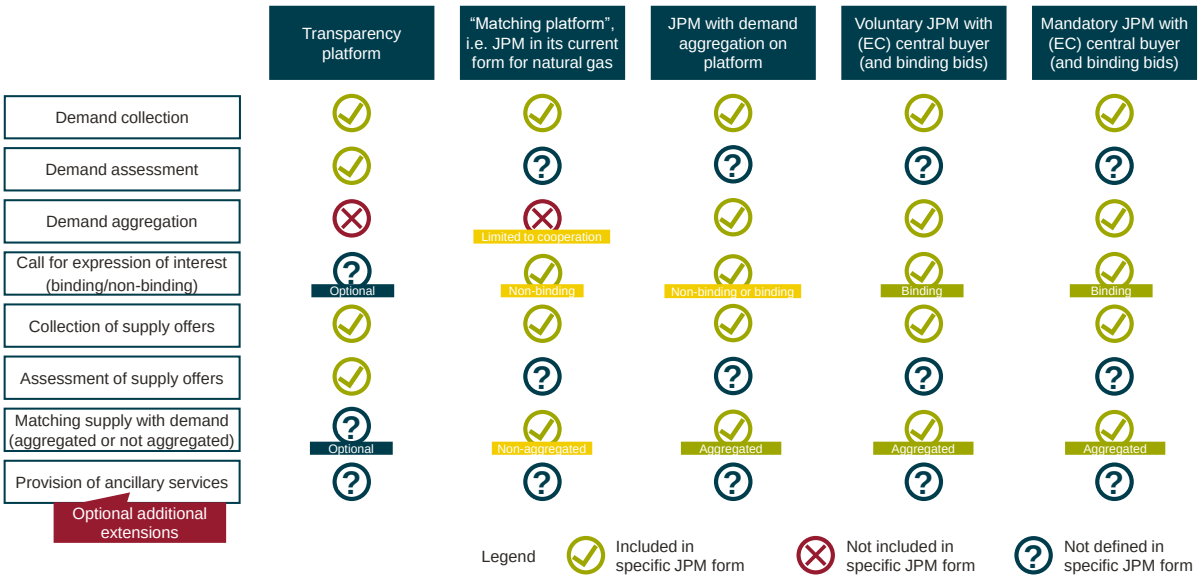
Figure 23 provides a visual summary of the activities that would be involved under each high-level option. Each of the models may involve certain detailed design considerations, such as the sharing of (aggregated) information between market participants/stakeholders, the frequency of the calls for expression of interest (for demand or supply), the products considered, and whether ancillary services (such as related to clearing or financial incentives)

[76] As explained later on, competition law apply to the sharing of information between competitors.

are also provided by the platform. We do not consider these detailed design considerations further in this sub-section, but discuss them in the following sub-sections for each commodity individually if relevant and in Section 4.7 for financial incentives.

Please not that this section explores theoretical use cases for the aggregation mechanism and that any service or product to be made available through the aggregation mechanism will have to comply with applicable legal requirements of the Member States and those of the Union. In particular, any kind of co-operation and information sharing between competitors (on the purchasing or the supply side) must be limited to what is strictly necessary for the achievement of the objective pursued and done in accordance with the EU competition rules as set out in the Horizontal Cooperation Guidelines.[77]

Figure 23 Mapping of activities to high-level forms of DA/JPM



Source: *Frontier Economics, based on DG ENER input.*

Note: *Examples of ancillary services include: financing, transport, storage, balancing and clearing.*
Demand and supply offers are assessed as part of a transparency platform, but not necessarily as part of the other forms of DA/JPM or at least not to a similar extent. The reasoning behind this is that the reliability of information can either be checked by counterparties or is incentivised by binding bids.

4.1.2 In general, DA/JPM may help to overcome supplier market power, security of supply issues and barriers related to market transparency

According to economic theory, markets perform essential functions, such as efficiently allocating production factors to the best possible uses, providing the economic foundation for technical progress and innovation, ensuring production at lowest cost possible and distributing

77 Communication from the Commission – Guidelines on the applicability of Article 101 of the Treaty on the Functioning of the European Union to horizontal co-operation agreements, C/2023/4752, OJ C 259, 21.7.2023, p. 1–125 ("Horizontal Guidelines"), Section 6.

profits based on performance.[78] This assumes the absence of market failures (including assuming effective competition).

However, in case of market failures[79], state interventions can improve societal welfare. Policy intervention can also help to address other barriers (that may not strictly represent market failures) or achieve specific policy objectives (such as addressing distributional concerns).

We have identified five market failures and barriers, that could potentially be addressed by some form of DA/JPM.[80] These are:

- high supplier market power;
- low security of supply/resilience;
- low market liquidity;
- high cost incurred for market access; and
- coordination problems across the value chain.

Figure 24 summarises our assessment of how the five high-level forms of DA/JPM might address the market failures above:

- supplier market power and security of supply can only be addressed by some form of aggregation of demand for contracts, provided that participation is sufficiently high. Only a mandatory mechanism is able to guarantee completely that outbidding in situations of scarcity is avoided;
- all forms of DA/JPM have limited effects on market liquidity;
- market access issues could at least partly be addressed even by a pure transparency platform; and
- addressing coordination problems across the value chain in nascent markets require high participation in DA/JPM and may require a combination with subsidies and long-term contracts. Note that, in case subsidies involve State aid, they must comply with State aid

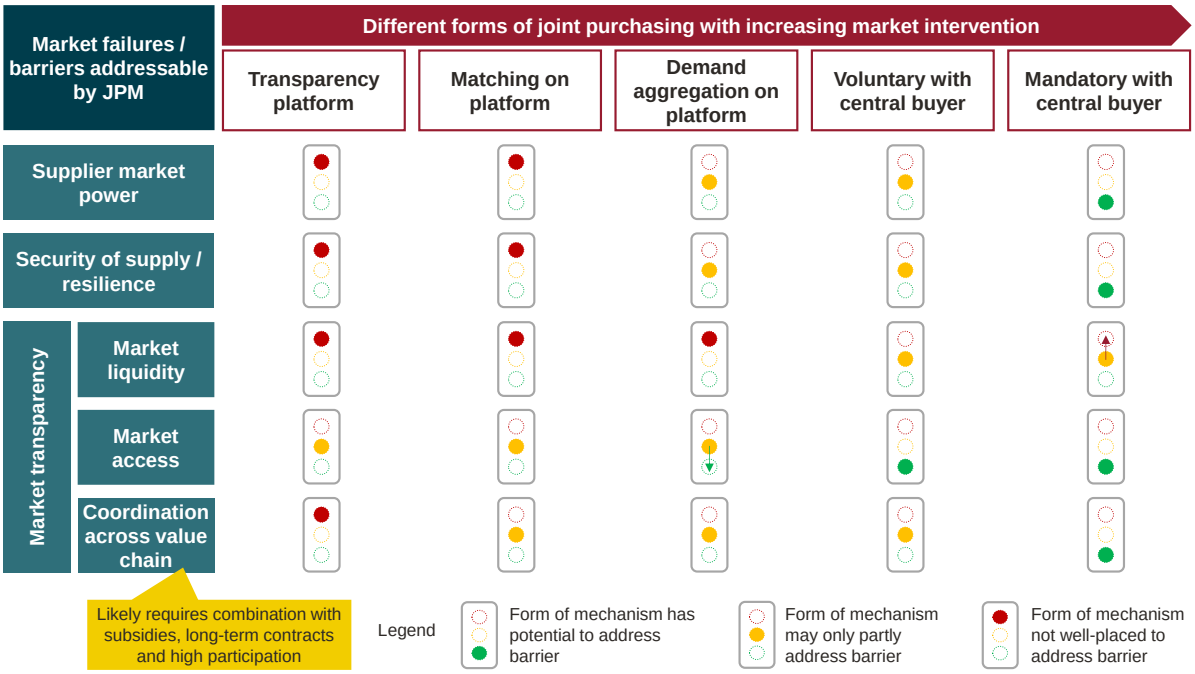
78 See for the functions of a market e.g. https://www.bpb.de/shop/zeitschriften/izpb/staat-und-wirtschaft-294/8487/staatliche-handlungsfelder-in-einer-marktwirtschaft/.

79 See for a summary of different market failures/barriers e.g. Fritsch (2014): Marktversagen und Wirtschaftspolitik – Mikroökonomische Grundlagen staatlichen Handelns, 9 Edition, Munich: Vahlen.

80 Market failures/barriers, which cannot be addressed by DA/JPM, e.g. related to technological immaturity or negative externalities, are outside the scope of our analysis.

rules. Any subsidies involving EU funding would need to be consistent with the Financial Regulation[81] (which, inter alia, requires consistency with State aid rules).

Figure 24 Different forms of DA/JPM can address the market failures/barriers to varying degrees



Source: Frontier Economics

Below we add further detail on:

- The nature of each market failure or barrier; and
- our assessment of the suitability of the different forms of DA/JPM in addressing them.

High supplier market power.

High structural market power can distort market outcomes (leading to lower quantities supplied than would be efficient, and to higher prices), resulting in market failure. Market failure can result from high concentration of supply and high barriers to entry for new suppliers (in the case of commodities, market power may be relevant where supply is dependent on limited and geographically concentrated natural resources, controlled by a limited number of actors).

Depending on its precise form, DA/JPM may help to address supplier market power by:

[81] European Commission, Directorate-General for Budget, Financial regulation applicable to the general budget of the Union – July 2018, Publications Office, 2021, https://data.europa.eu/doi/10.2761/985939.

- increasing countervailing buyer power via demand aggregation (subject to competition law); and
- increasing the number of suppliers, to the extent demand aggregation can stimulate new entry (for example if combined with long-term contracts).

The higher the total aggregated demand, and the fewer outside options suppliers have for selling to the EU market, the higher the effect of countervailing buyer power. Hence, if participation is mandatory and the largest possible aggregated demand reached, the effectiveness is expected to be at maximum.

Low security of supply/resilience.

Certain products may have a low price elasticity of demand (i.e. low responsiveness of demand to changes in price), over a given time frame. This can be the case, for example, for products with few substitutes. For such goods, a sudden reduction in supply may lead to a very large increase in prices, since the willingness to pay is quite high.

If the market is close to capacity (i.e. there is scarcity), there is an increased risk that buyers start to compete for scarce supplies, leading to overbidding and reduced consumer surplus. While this is not necessarily inefficient (i.e. not necessarily a market failure), it does have negative distributional consequences. Viewed from the perspective of the EU, for products for which the EU is heavily dependent on imports, reductions in EU consumer welfare translate to reductions in EU societal welfare (i.e. transfers from the EU to foreign producers).

DA/JPM may help to avoid overbidding given the risk of supply shocks to the extent that:

- participation at the DA/JPM is high. If this is the case, a JPM can help to avoid outbidding during shortages and (subject to competition law) increase political bargaining power for the EU vis a vis foreign suppliers (the extent will also depend on share of the global market accounted for by EU demand). Participation will be highest under mandatory DA/JPM with a (public) central buyer. Participation of individual companies in voluntary DA/JPM may be lower since there may be an incentive for individual participants to break the co-operation, as bidding higher prices may help to secure additional volumes; and
- DA/JPM simplifies access to long-term contracts (longer-term contracts reduce exposure to high prices) and helps increase diversity of supplies (the risk of reduction of supply is lower in case one supplier falls short). That said, the incentives to ensure diversity may also depend on the characteristics of the individual product markets.[82] This could be facilitated to some extent by all forms of DA/JPM, depending on precise design.

[82] For example, for natural gas, in a supply emergency, the allocation of scarce gas volumes may not necessarily follow contractual positions but may instead be driven by emergency provisions, such as those under the gas Security of Supply Regulation (Regulation (EU) 2017/1938 of the European Parliament and of the Council of 25 October 2017 concerning measures to safeguard the security of gas supply and repealing Regulation (EU) No 994/2010, OJ L 280, p. 1–56).

Low market liquidity (linked to market transparency)

Markets with low liquidity are characterised by a low number of transactions at the market, high bid-ask spreads, limited trading options and low market transparency. As explained in Section 2.1, low levels of liquidity need not constitute a market failure *per se*[83], though may sometimes be symptomatic of other underlying market failures. Other things equal, low market liquidity may increase the costs to market participants (particularly those that are not vertically-integrated) of managing risks and, as such, may increase barriers to entry. In case of low market liquidity DA/JPM could, depending on its design, provide a focal point for market trading. It could do so by ensuring a minimum level of market depth in key periods and key products (particularly in less liquid markets). This will be the case where mechanisms involve binding bids, and if participation is high (which may be best fulfilled in case of the mandatory DA/JPM).

High cost incurred for market access (linked to market transparency)

Low transparency on trade options and supply lead to high transaction costs for searching and contracting, particularly for smaller market participants, in less liquid markets.[84] This may include a reduced willingness of large producers/importers to deal with multiple smaller customers. The fact that smaller players face higher costs in such markets is not a market failure *per se,* and may rather indicate other underlying issues. It may also reflect the benefit of operating at scale in commodity markets (see also Section 2.1). Commercial solutions for addressing such barriers include:

- Aggregation of customer volumes provided by retailers, traders, or other joint venture models; and
- Commercial providers of market intelligence.

Especially regarding the latter, there is some risk that public provision could crowd out private offerings. Therefore, policymakers need to balance this risk against their desire to support a quick market development of the products in question. To the extent policy intervention is judged to be required in addition to reliance on commercial solutions, depending on its precise form, DA/JPM may:

- provide an overview of available trade options and alternatives;
- decrease the cost of obtaining market intelligence (especially for small market participants); and/or

83 Participants in less liquid hubs may be able to manage risks in other ways (for example, “proxy” hedging using products traded in more liquid hubs, such as the Dutch TTF in case of natural gas).

84 A similar problem may arise for new market participants if transaction cost are very high. However, the larger the new market participant, the higher the likelihood that potential benefits will outweigh the transaction cost.

- enable direct access (particularly for smaller customers in less liquid markets) to producers by aggregating trading volumes, thereby increasing trading options.

The extent to which the different forms of DA/JPM address the cost for market access differs, with the more “interventionist” forms tending to have a greater impact .

- A transparency platform may improve transparency on existing market participants and thus reduce transaction costs for searching especially for new and smaller market participants.

- If matching on the platform takes place, this may improve transparency on market participants in general and reduce transaction costs for searching for all market players. The same is true for demand aggregation on the platform, but it additionally reduces the contracting cost for large suppliers.

- Introducing a central buyer adds the further advantage of reducing contracting costs for smaller market participants, too.

Coordination problems across the value chain (linked partly to market transparency)

High uncertainty around future production and demand development in nascent markets can lead to inefficiently delayed investments. This is especially the case in markets that require anticipatory infrastructure developments to enable both supply and demand (i.e. the so-called “chicken and egg problem”). This leads to an increased need for coordination between supply and demand investment decisions.

To some extent, such coordination could be supported by DA/JPM, for example, if designed in a way that improves investment security by increasing longer-term certainty or visibility of investment decisions being taken place across the value chain. The impacts will depend on the form of DA/JPM:

- A transparency platform may slightly reduce this uncertainty.

- For the other forms of DA/JPM, de-risking investments across the chain may require combining DA/JPM with subsidies if decreasing costs can be expected e.g. due to learning curve effects and spillovers. This can motivate first-mover buyers to sign long-term contracts (at sufficiently high volumes), which can help ensure investment certainty for producers.[85] In case of economies of scale of investment, e.g. in pipeline infrastructure, high volumes increase the effectiveness of the combination of subsidies and DA/JPM. Hence, the combination with a mandatory JPM with a (public) central buyer ensuring high

[85] The rationale behind that is that in nascent markets high learning curves and high future cost decreases are expected and – without subsidies - first-mover buyers would be locked in contracts with prices higher than future market prices, which they would not be willing to sign.

participation will tend to ensure higher volumes and will therefore tend to best address the coordination issue (relative to the other forms of DA/JPM)[86].

4.1.3 DA/JPM is not the only way of addressing the market failures and barriers discussed above

Alternative (or, in some cases, complementary) measures may also be able to address these market failures/barriers (Figure 25 provides some illustrative examples, many of which are already, or are planned to be, in place in the EU or in member states).

Figure 25 Alternative or complementary options may also address the market failures/barriers

Market failures / barriers addressable by JPM		Examples of alternative interventions
Supplier market power		▪ (Continued) enforcement of national / EU competition law ▪ Increase of market transparency similar to e.g. REMIT
Security of supply / resilience		▪ Storage filling obligations / strategic stockpiling ▪ Co-ordinated demand reduction within the EU (potentially together with JPM)
Market trans-parency	*Market liquidity*	▪ Enforcement of national / EU competition law regarding national monopolies ▪ Market making ▪ Appropriate energy and financial market regulation ▪ Safeguarding orderly price formation through market integrity ▪ Improve physical access to commodities
	Market access (Only market barriers, not failures)	▪ (Continued) enforcement of national / EU competition law for mid-streamers ▪ Certification schemes for not yet standardised commodities (e.g. biomethane) ▪ Provide financial information/support to smaller companies outside of a JPM
	Coordination across value chain	▪ (Financial) support for long-term contracts by early movers, e.g. in form of a CfD ▪ Policy coordination across member states ▪ Support of anticipatory infrastructure development

Source: *Frontier Economics*

Note: *The list of alternative options to address the listed market failures/barriers is not exhaustive.*

While a full consideration of the alternatives is out of scope of this study, we provide a more detailed explanation of an exemplary measure, which could be combined with DA/JPM to strengthen security of supply for strategic raw materials in the box below.

86 No statement can be made at this point how this form of a JPM performs compared to other alternative interventions.

Box: How strategic stockpiling via DA/JPM could address security of supply for strategic raw materials in the short term

Regarding supply of strategic raw materials (SRMs) in, the EU is often highly dependent on imports along the whole supply chain (as we explain in more detail in Section 4.5.3). In markets characterised by high supplier concentration, supply diversification, possibly including an increase in EU extraction and processing capacity for SRM, is not feasible in the short term. This leaves a risk to security of supply (for example in the case of disruption of supply by the dominant player or due to very high prices).

One option to strengthen the resilience of the supply chain in the short term could be strategic stockpiling through a DA/JPM platform. For example, Japan's International Resource Strategy allows the state-owned Japan Oil, Gas and Metals National Corporation (JOGMEC) to establish an stockpiling for rare metals to maintain a stable supply in case of short-term supply disruptions. In terms of applying such stockpiling to the EU, there are different implementation options, for example:

- National central stockpiling: member states could set up a central mandate for stockpiling (e.g. to a state-owned company). However, members states would then need to finance these strategic reserves.
- Private decentral stockpiling: a DA/JPM platform could incentivise private undertakings to voluntary build up strategic stock. For example, this could be done by providing incentives required to borrow funds for the purchase of SRMs which go beyond the volume actually required for production (see Section 4.7.2). For example, decreasing financing cost of additional stock would increase the attractiveness of strengthening resilience against short-term supply disruptions.

Overall, stockpiling would be particularly relevant for SRMs with a high import dependency along the supply chain and limited opportunities for diversification of supply sources.

4.1.4 Wider impacts should also be considered in any assessment of high-level DA/JPM forms

Policy intervention can sometimes negatively affect welfare if interventions are not well-targeted or designed ("policy failure"). Policy intervention can also result in implementation and administration costs. Such impacts need to be weighed up against a given measure's effectiveness in addressing market failures/barriers (discussed above).

We incorporate these potential further effects under the following headings:

- **static efficiency:** the extent to which the chosen form of DA/JPM ensures that the product is produced at lowest cost and prices for consumers;

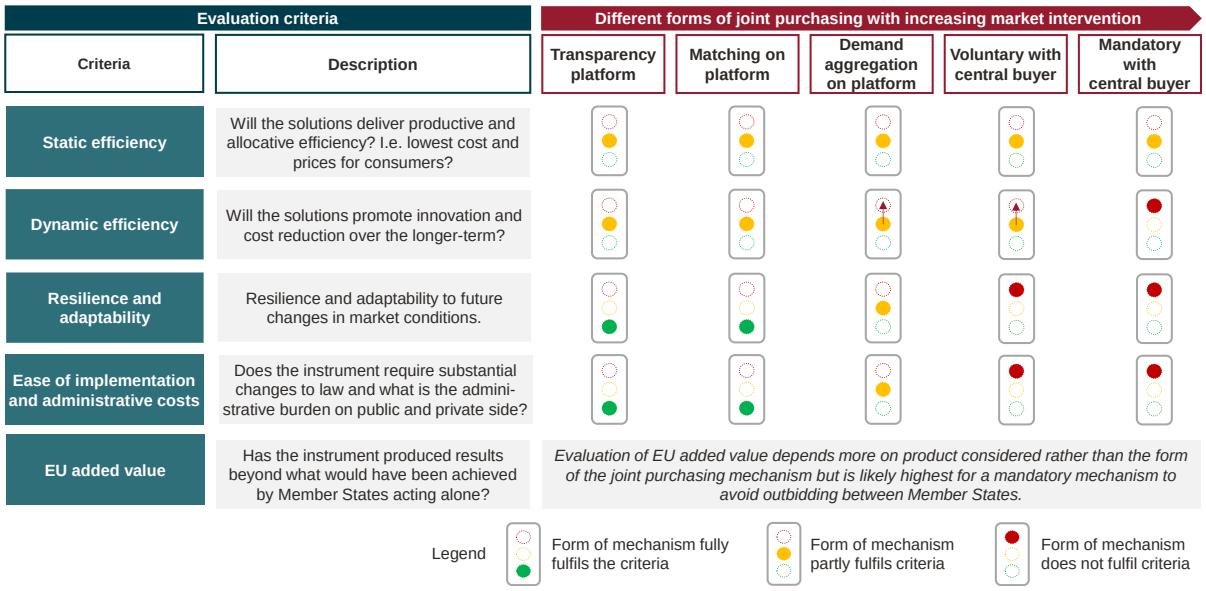
- **dynamic efficiency**: the extent to which the chosen form of DA/JPM promotes innovation and cost reduction over the long run. In this regard, DA on platform or a central buyer increases the risk of "crowding out" commercial solutions, leading to reduced competition and innovation, and increased costs in the long run. The latter effect is especially relevant for the case of a mandatory central buyer.

Further, the form of DA/JPM should be **resilient and adaptable to future changes** in market conditions and deliver the desired market outcome at **lowest implementation and administrative cost**. This is generally the case for less interventionist forms of DA/JPM, which interfere less with normal market functioning, and can be more easily reversed or adapted.

Finally, we assess the extent of **EU value added**, i.e. whether DA/JPM at EU level produces market outcomes that could not be reached by a single member state acting alone. As this depends on the geographical scope of the market, this aspect needs to be analysed in the following for each of the products separately. However, in case of a global market, the EU value added is likely to be highest in case of a mandatory central buyer, which is set up to avoid outbidding between Member States and hence secure security of supply.

Overall, this shows (see also Figure 26 for an overview) that the cost of DA/JPM generally increases with the level of market intervention. Whether it is worth bearing these costs depends on the extent to which a market failure/barrier is present, which will depend on the product in question. We consider this in the following sub-sections, for each product in turn.

Figure 26 Further criteria need to be considered for a proper evaluation of different forms of DA/JPM



Source: Frontier Economics

4.2 Renewable and low-carbon hydrogen

In this section we discuss how and in which form DA/JPM can be beneficial to the hydrogen[87] market, starting with a summary, followed by a detailed write-up.

4.2.1 Summary

Introduction (Section 4.2.2)

Renewable and low-carbon hydrogen is expected to play a substantial role in decarbonising the EU's economy, especially in hard-to-decarbonise industries, in the transport sector and as some form of seasonal and long-term storage. However, the current market for hydrogen is small and is largely for hydrogen produced from fossil fuels. An established market for renewable and low-carbon hydrogen does not currently exist. To support the development of such a market, Article 52 of the revised Gas Regulation allows the Commission to introduce a temporary and voluntary demand aggregation mechanism for hydrogen ("pilot mechanism"). The Commission may introduce a legislative proposal for an enduring voluntary mechanism depending on the results of the pilot.

Key market barriers (Section 4.2.3)

The envisaged quick development of a renewable and low-carbon hydrogen market is hindered by several market failures and barriers. Key barriers during the ramp-up phase are the initially high **production costs** of renewable hydrogen that are significantly higher than the willingness or ability of potential users to pay, and the **"chicken and egg problem"** of coordination between supply, demand and infrastructure. In addition, there are **market access barriers for smaller market participants** due to high transaction costs of identifying counterparties, as well as moderate **security of supply risks** over the medium-term time frame.

Role of DA/JPM (Section 4.2.4)

A successful ramp-up of the hydrogen market requires significant policy support, in particular financial and regulatory support to overcome the initial high costs of producing and consuming hydrogen, and the lack of dedicated transport and storage infrastructure. DA/JPM may accompany wider measures to support the development of the hydrogen market by addressing – at least to some extent – the following barriers: market access barriers, the need for coordination along the value chain and security of supply risks. Since there is no legal basis for more interventionist forms of DA/JPM, we focus on a transparency platform featuring a degree matching functionality.

87 We focus on hydrogen and do not refer to any derivatives (like ammonia or synthetic fuels) as they may exhibit different characteristics, e.g. regarding transport requirements or market players. Hence, a separate assessment would be required in order to come to a valid conclusion on the benefits/costs of different forms of DA/JPM for these derivatives.

Form of DA/JPM (Section 4.2.5)

Given that Art. 52 foresees the implementation of some form of DA/JPM, we consider the following enhanced transparency platforms could be among the most appropriate forms of intervention. These platforms facilitate, to some extent, increased market access (especially for smaller players) and reduce the uncertainty regarding demand, supply and infrastructure development to some extent:

- During early market ramp-up, we consider a transparency platform with matching of supply and demand bids for the near as well as medium-term future (i.e. beyond 2030) may be an appropriate form of DA/JPM. Bids are posted independently of each other on a continuous basis (analogous to continuous intraday trading for power). This is in line with the possible functionalities of the hydrogen pilot mechanism listed in Art. 52.

- As the renewable and low-carbon hydrogen market picks up, a platform supporting the organisation of a call for off-takers at certain regular intervals could be beneficial. Established stakeholders are already organising such calls on an individual basis[88] and a transparency platform could assist smaller players in running similar initiatives while benefiting from a standardized format. This could, should policymakers wish to intervene, be seen as potential further step towards a JPM with demand aggregation addressing also security of supply issues, which may still be relevant in the medium- to long-term.

4.2.2 Introduction to the hydrogen market and legal basis for DA/JPM

Hydrogen is expected to play a substantial role in decarbonising the EU's economy. As outlined for example in the European Hydrogen Strategy, renewable and low-carbon electricity can decarbonise a large share of the EU final energy consumption by 2050, but not all of it. Renewable and low-carbon hydrogen[89] are able to bridge some of this gap through providing energy for hard-to-decarbonise industries, like the steel and chemical industry,[90] and for the transport sector, as well as providing some form of seasonal and long-term storage.

However, the current market for hydrogen is quite small, as hydrogen is currently mainly used in the chemicals industry for producing ammonia (fertiliser) and methanol. In addition, most of this hydrogen is produced from fossil fuels, which results in significant greenhouse gas emissions. An established market for renewable and low-carbon hydrogen, in which hydrogen

88 See e.g. https://salcos.salzgitter-ag.com/en/h2tender.

89 Renewable hydrogen refers to hydrogen, which is produced by electrolysis based on renewable electricity. The latter needs to be proved by certain criteria set out in the Delegated Regulation (EU) 2023/1184. Low carbon hydrogen refers to hydrogen derived from non-renewable sources that meet a criterion of 70% less lifecycle GHG emissions than fossil fuels (see Art. 2 No. 11 of the Directive of the European Parliament and of the Council on common rules for the internal markets in renewable and natural gases and in hydrogen (recast) from 7 May 2024, https://data.consilium.europa.eu/doc/document/PE-104-2023-INIT/en/pdf).

90 See e.g. Frontier Economics (2023) "The future of energy intensive industry in Europe", a study on behalf of Dezernat Zukunft; and Agora Energiewende/Wuppertal Institut (2019): Klimaneutrale Industrie: Schlüsseltechnologien und Politikoptionen für Stahl, Chemie und Zement. Berlin, November 2019.

will be used more widely and in much larger amounts, does not currently exist or – more positively formulated – is in the ramp-up phase. Market development is hindered by various market failures and barriers, which we will analyse in more detail in the following Section 4.2.3.

To support the market development of hydrogen, especially the visibility as well as the demand and supply assessment for hydrogen, Article 52 of the revised Gas Regulation allows the Commission to introduce a pilot voluntary mechanism to be implemented under the activities of the European Hydrogen Bank[91]. The mechanism will be temporary and will last until 31 December 2029. Subject to the Commission's assessment of the performance of the pilot mechanism, it *"…should be able to submit a legislative proposal to develop a mechanism for voluntary demand aggregation and the joint purchasing of hydrogen."*[92] The pilot mechanism may include the following features (though the list is not exhaustive):

- *"collection and processing of market data on, for instance, availability of infrastructure or development of hydrogen flows and prices, to increase the transparency of the market development of hydrogen;*
- *collection and assessment of demand from off-takers;*
- *collection of offers for hydrogen from suppliers;*
- *access to relevant and necessary information collected pursuant to this paragraph to suppliers and off-takers, subject to their consent and pursuant to Union competition rules*."[93]

4.2.3 Market failures and barriers for hydrogen market development

The most important barriers to the development of the hydrogen market – consistent with stakeholder feedback – are the (current) high cost of renewable and low-carbon hydrogen and insufficient coordination along the value chain (also referred to as the "chicken and egg problem" between supply, demand and infrastructure). In addition, moderate security of supply risks and market access barriers (especially for smaller market participants) exist.

In the remainder of this section, we discuss the market failures and barriers above in more detail.

91 https://energy.ec.europa.eu/topics/energy-systems-integration/hydrogen/european-hydrogen-bank_en.

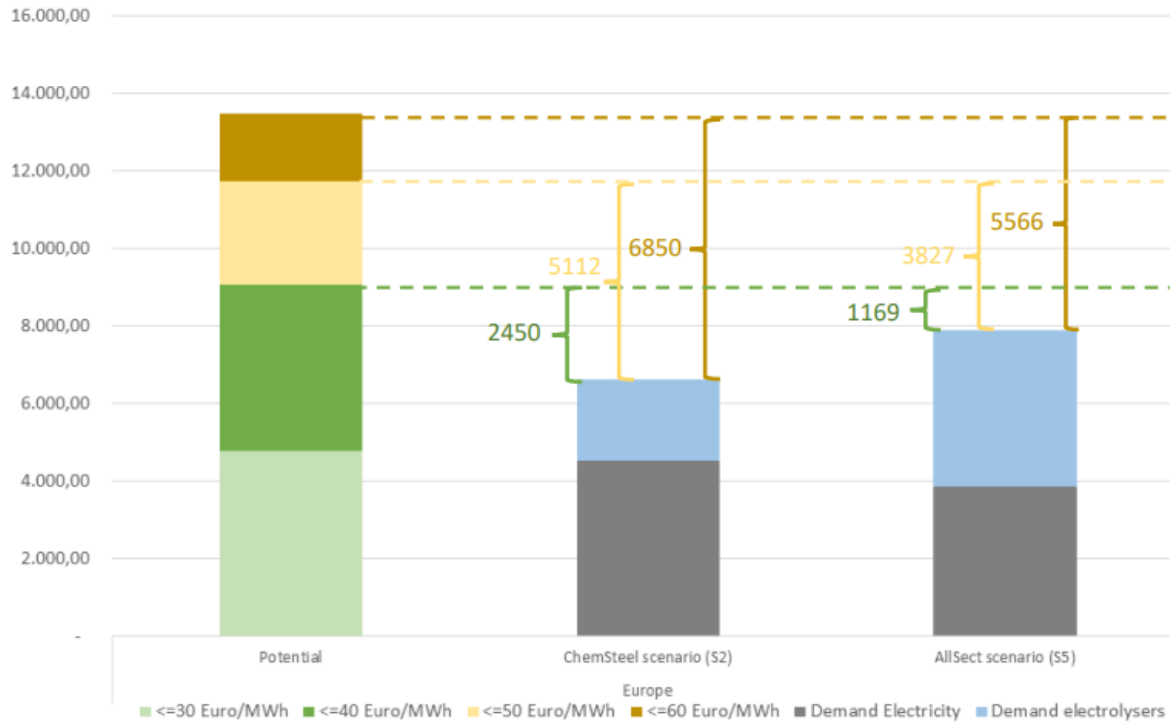
92 Regulation (EU) 2024/1789 of the European Parliament and of the Council of 13 June 2024 on the internal markets for renewable gas, natural gas and hydrogen, amending Regulations (EU) No 1227/2011, (EU) 2017/1938, (EU) 2019/942 and (EU) 2022/869 and Decision (EU) 2017/684 and repealing Regulation (EC) No 715/2009 (recast), OJ L, 2024/1789, 15.7.2024.

93 Regulation (EU) 2024/1789 of the European Parliament and of the Council of 13 June 2024 on the internal markets for renewable gas, natural gas and hydrogen, amending Regulations (EU) No 1227/2011, (EU) 2017/1938, (EU) 2019/942 and (EU) 2022/869 and Decision (EU) 2017/684 and repealing Regulation (EC) No 715/2009 (recast), OJ L, 2024/1789, 15.7.2024.

Sources of hydrogen – some potential for reliance on imports, though sources of imports may also be more diverse

Some production is expected in the EU, though the technical potential and demand varies heavily between Member States.[94] There is uncertainty regarding both supply potential and demand. Some studies estimate the technical supply potential to produce renewable and low-carbon hydrogen in the EU to exceed forecasted demand in the long run (see Figure 27).

Figure 27 Technical potential for production of renewable and low-carbon hydrogen within the EU exceeds forecasted demand in the long run



Source: *Quitzow et al. (2023): Mobilizing Europe's Full Hydrogen Potential: Entry-Points for Action by the EU and its Member States. HYPAT Discussion Paper No 5/2023. Karlsruhe: Fraunhofer ISI (Ed.), p. 11.*

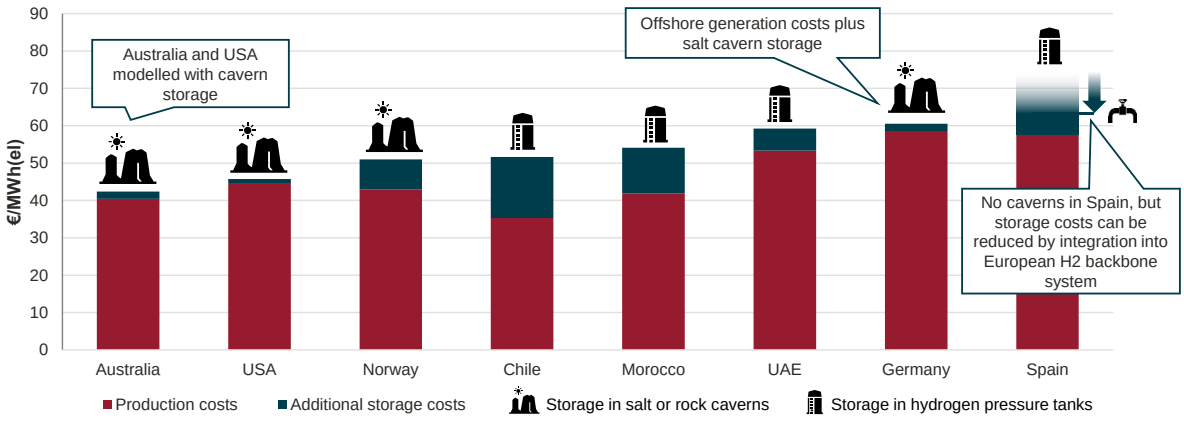
Note: *Similar evidence is provided by Guidehouse (2021): European Hydrogen Backbone, Analysing future demand, supply and transport of hydrogen, p. 8.*

While interpreting the results above, it needs to be borne in mind that these studies did not consider impacts on landscapes, regulatory constraints, other environmental and socio-political factors as well as water availability. Likely due to this as well as due to the fact that technical potential, costs and projected demand vary across European countries, some

94 There are high surplus (e.g. Nordic countries, Spain and France) and also deficit countries (e.g. Germany or the Netherlands). See Quitzow et al. (2023): Mobilizing Europe's Full Hydrogen Potential: Entry-Points for Action by the EU and its Member States. HYPAT Discussion Paper No 5/2023. Karlsruhe: Fraunhofer ISI (Ed.).

countries like Austria, Germany or the Netherlands[95] foresee hydrogen imports. Also the REPowerEU plan foresees the import of ca. 330 TWh of renewable hydrogen.[96] We have previously projected that the costs of producing hydrogen could be substantially lower in third countries than in parts of the EU (Figure 28).

Figure 28 Comparison of levelized costs of hydrogen production (baseload) in different countries in 2045



Source: Frontier Economics (2023): The future of energy intensive industry in Europe

That said, even if the EU may rely on hydrogen imports to an extent, compared to natural gas, access to the feedstock for producing renewable hydrogen in particular is more widely spread across different countries in the world and less dependent on natural reservoirs. Hence, there are a greater number of potential future suppliers[97], meaning that structural market power issues should be reduced, compared to natural gas.

Security of supply issues should also be reduced compared to natural gas, but could still be relevant over the medium-term time frame in the event of unexpected shocks, since production capacity increases will require some time to materialise.

Coordination issues across the value chain

The development of the hydrogen market is hindered by the current reluctance to invest in production facilities, infrastructure, and specific investment on demand side. This is due to the following two market failures: First, the costs of hydrogen are currently still higher than the

95 Austria foresees imports of 330 TWh hydrogen (out of 500 TWh) by 2030 (see Wasserstoffstrategie für Österreich 2022). Germany expects in his updated hydrogen strategie (Fortschreibung der Nationalen Wasserstoffstrategie NWS 2023) an import of 45-90 TWh of hydrogen (of 95-130 TWh consumption in total) by 2030. Finally, the Netherlands consider the Port of Rotterdam as an important import terminal for hydrogen in the future.

96 Communication from the Commission to the European Parliament, the European Council, the Council, the European Economic and Social Committee and the Committee of the Regions, REPowerEU Plan, COM(2022) 230 final.

97 See e.g. Frontier Economics (2018): International aspects of a power-to-x roadmap, study for the World Energy Council – Germany.

willingness/ability of potential users to pay. Second, a “chicken and egg problem” between supply, demand and infrastructure exists.

On the first point, decarbonisation via hydrogen applications is currently still comparatively expensive. The production costs of renewable hydrogen are currently still significantly higher than the willingness or ability of potential users to pay: the full costs of producing hydrogen using electrolysis based on onshore wind, for example, are still over €180/MWh (equivalent to around €6/kg).[98] By comparison, the wholesale price for fossil natural gas (including the current price for CO_2 certificates) is currently around €50-60/MWh. Neither the price signals via the EU ETS I (industry and electricity sector) nor the future EU ETS II (currently still capped prices in the heating and transport sector) are sufficient to make hydrogen applications profitable at current costs. Scaling up production is expected to lead to considerable cost reductions in hydrogen production in the future (“learning-by-doing”). However, the ”the experience gained by initial investors is also available to the entire industry (“learning spillovers”). Absent intervention, these positive externalities disincentivised initial investments, and learning curve effects are under-realised.

The second reason for insufficient hydrogen-related investments (absent policy intervention) is investments in hydrogen production and demand will be based on the expected availability of hydrogen transport (and storage) infrastructure (and vice versa). Given hydrogen pipelines are natural monopolies, and their placing can, in turn, influence production and consumption locations, this requires strategic planning. An additional element is required where natural gas infrastructure is repurposed as (while less expensive than new-build) repurposing involves a trade-off with security of supply for natural gas. Hydrogen storage potential may not be uniformly distributed across Europe. This may require an increased European coordination and solidarity in the future compared to the past/current situation in natural gas. For example, currently only salt caverns are proven as being suitable for hydrogen storage. This type of storage is available mainly in Northern Europe.

Accordingly, a “chicken and egg problem” between supply, demand and infrastructure exists. On the one hand, investors are reluctant to invest in hydrogen production and infrastructure as long as there is insufficient guaranteed demand and infrastructure to transport it. On the other hand, potential customers are reluctant to convert their systems to green hydrogen as long as availability and cost efficiency are not guaranteed. The uncertainty leads to significant risks for investors in hydrogen production and consumption facilities as well as potential hydrogen transport and storage operators. These risks and an inadequate coordination of investments between the different stages of the hydrogen value chain hinder hydrogen-related investments. A coordinated approach between producers, infrastructure providers and end users is therefore crucial for a successful ramp-up.

Several European energy infrastructure operators are developing plans for hydrogen transmission networks. EU legislation regarding the planning and regulation of hydrogen

[98] See Hydex Plus Green, https://www.energate-messenger.de/markt/gas-oel-und-wasserstoff/preise/231165/hydexplus-green, accessed on 14/11/2023.

infrastructure (including co-ordination) has recently been adopted.[99] That said, much of this will require implementation at both EU and national level. As things stand, there is a risk that investments in production and consumption may still be held back.

High transaction costs and low market liquidity in the ramp-up phase

Regulatory uncertainty regarding the future design of the market and access conditions to infrastructure increase the cost for accessing and thereby developing a potential future hydrogen market. As long as there is no liquid market for renewable and low-carbon hydrogen, risks and transaction costs are high, especially for smaller consumers.

4.2.4 Potential role of DA/JPM for hydrogen

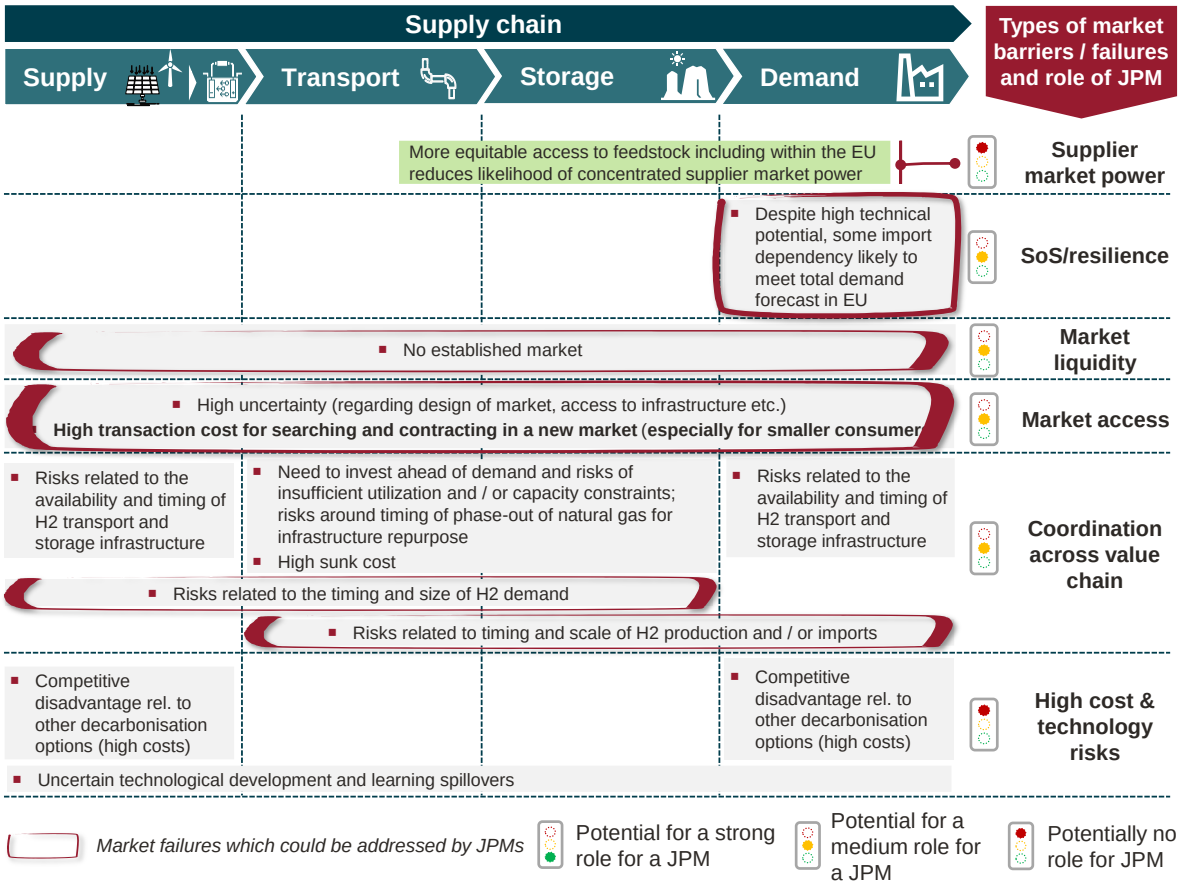
A transparency platform could be a way of supporting the development of hydrogen, and could be a basis for further developments

Figure 29 provides a summary of the market failures and barriers appearing during the ramp-up and likely during the transitionary phase of the hydrogen market. From this figure as well as Section 4.2.3 it becomes evident that a successful ramp-up of the hydrogen market requires significant policy support. In particular, it will be important to address the initially high cost of hydrogen and the lack of transport and storage infrastructure e.g. through financial and regulatory measures. While DA/JPM is not able to address the high cost issue by itself, it may reduce the uncertainty of demand and supply to a certain extent and provide useful insights in connection with transport and storage needs, including for planning purposes. Furthermore, DA/JPM has the potential to address the market access barrier as well as the security of supply risk partly.

Overall, DA/JPM might therefore be part of a package of measures to support the market ramp-up of hydrogen. However, the potential positive impacts of DA/JPM depend (as previously stated) on the accompanying measures implemented as well as on the form of DA/JPM selected. As discussed above and shown by the yellow traffic lights in Figure 29, DA/JPM (as a standalone measure) can only partly address the market barriers relevant to hydrogen.

[99] See the Directive (EU) 2024/1788 of the European Parliament and of the Council of 13 June 2024 on common rules for the internal markets for renewable gas, natural gas and hydrogen, amending Directive (EU) 2023/1791 and repealing Directive 2009/73/EC (recast), OJ L, 2024/1788, 15.7.2024; and the Regulation (EU) 2024/1789 of the European Parliament and of the Council of 13 June 2024 on the internal markets for renewable gas, natural gas and hydrogen, amending Regulations (EU) No 1227/2011, (EU) 2017/1938, (EU) 2019/942 and (EU) 2022/869 and Decision (EU) 2017/684 and repealing Regulation (EC) No 715/2009 (recast), OJ L, 2024/1789, 15.7.2024.

Figure 29 Market barriers and failures in the hydrogen market during ramp-up and potentially transitionary phase



Source: Frontier Economics

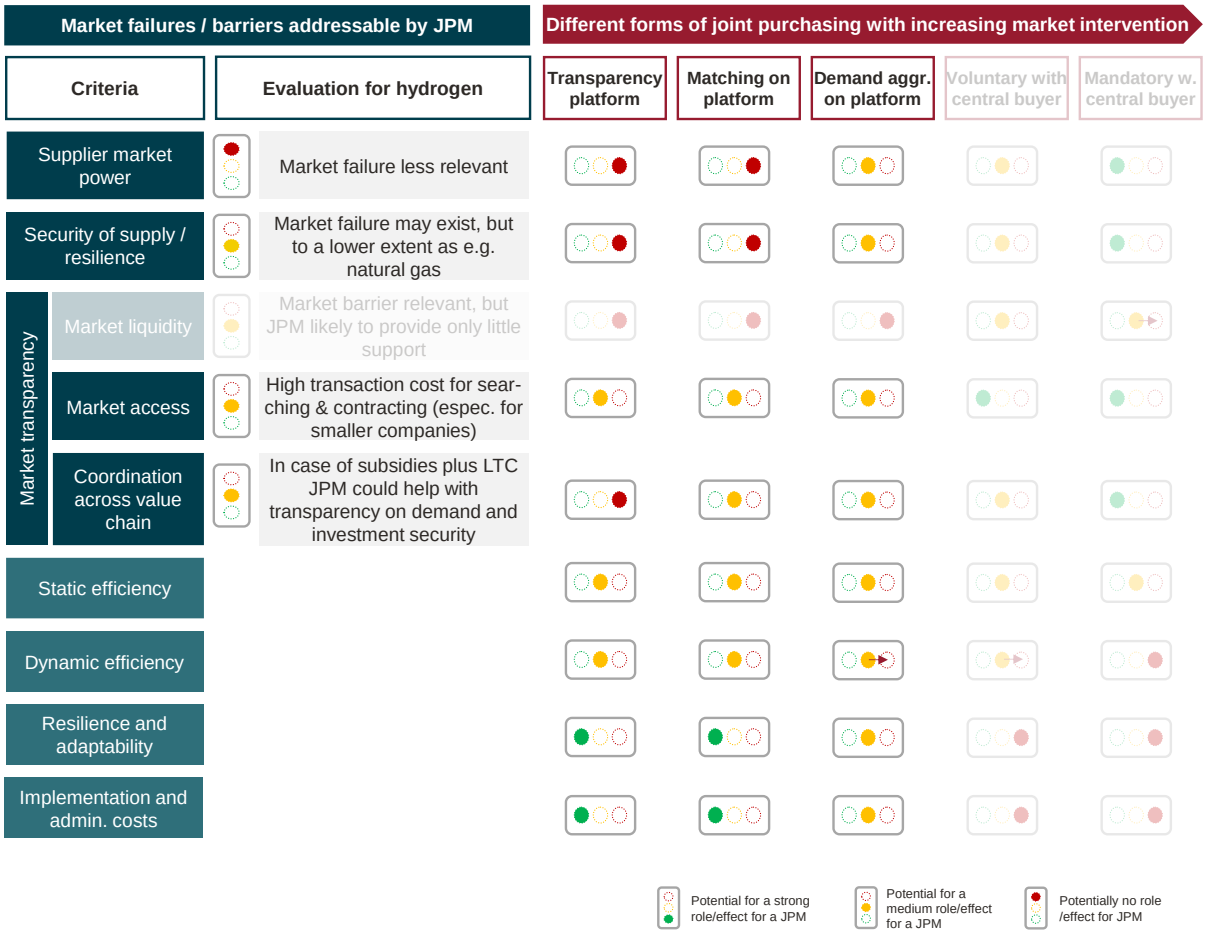
JPM with central public buyer, matching platform and DA on platform not further considered

In principle, a mandatory **JPM with a public central buyer** (combined with subsidies and long-term contracts for the coordination issues) might be most effective in dealing with all of the three barriers (security of supply, market access and coordination issue), see Figure 30. However, as outlined in Section 4.1.1 – this comes at very high cost (including decreased competition, low resilience as well as high implementation and administrative cost). There is also no legal basis for a mandatory mechanism (see Section 4.2.2): the foreseen pilot mechanism to support the market development for hydrogen is to remain voluntary (see Art. 52 of the revised Gas Regulation), as would be any potential enduring mechanism for hydrogen. In addition, there is no explicit reference to it in the current legal basis, which is why we have also ruled out the option of a voluntary JPM with public central buyer.

The market access barrier as well as the uncertainty regarding demand, supply and infrastructure development, can at least partly be addressed also via a **matching platform or demand aggregation on the platform**. Since the renewable and low-carbon hydrogen

market is still in its infancy, it would be challenging at this stage, in practical terms, to specify products that should be tendered on any platform. Further, the hydrogen market is likely to remain regional (and intra-EU) initially. For these reasons, we do not consider these options in detail at this stage. However, demand aggregation on the platform could become increasingly relevant as the hydrogen market develops as it could play some role in addressing potential future security of supply issues.

Figure 30 Transparency platform enhanced by lighter forms of matching functionalities most efficient in the short term



Source: Frontier Economics

"Transparency plus" platform can help to address some market barriers and comes at low cost

Our focus is therefore on a **transparency platform**, which can be **enhanced by "lighter" forms of matching functionalities** and/or calls for expression of interest for less clearly defined products, called transparency plus platform in the following. At a later point in time,

should circumstances require, the transparency mechanism could still be further evolved (for example, to a JPM with demand aggregation on the platform).[100]

The transparency plus platform is able to (at least partly) address the following market barriers:

- Such mechanisms may reduce transaction cost for searching and may facilitate counterparty discovery (worldwide), and thereby market access. In this regard, the value of the platform is likely to be higher for smaller players,[101] for whom transaction costs for searching (outside of a transparency platform) are likely to be higher absent intermediaries (which do not yet exist).

- Related to this and considering that the hydrogen market is likely to develop first regionally, a forward looking approach, i.e. including hydrogen deliveries after 2030 and also from suppliers outside the EU, might increase the benefit of the platform. This is based on the assumption that the development of hydrogen production projects abroad, of physical infrastructure required for international trade and of the commercial framework for trade may take several years.

- In addition, via public sharing of aggregated data, uncertainty regarding development of production, demand and infrastructure can potentially partly be reduced.[102]

Based on conceptional thinking, existing initiatives[103] and stakeholder feedback, we identified two design options for a transparency plus platform, which provide either a **matching independently of each other posted needs and supplies (case study 1)** or a **support of the organisation of a call for off-takers at certain points in time (case study 2)**. We will discuss the two case studies in more detail in the following Section 4.2.5.

100 In the long-run, if and when a liquid and well-functioning hydrogen market is established (as expected e.g. by the European hydrogen strategy (COM(2020) 301 final), the market failures/barriers described for the ramp-up phase are – with the exception of security of supply – of lower relevance. As noted above, the exposure to a security of supply risk is in general lower for hydrogen, compared to natural gas. This could be addressed through forms of DA/JPM that involve demand aggregation.

101 This is confirmed during stakeholder interviews explicitly. Further, we draw this conclusion from the statement that larger hydrogen stakeholders stated that identification of market participants is not an issue of transparency for them, but more of the high hydrogen price.

102 Note that the transparency/information provided by the platform would be distinct to the sort of transparency regarding supply and demand provided by existing infrastructure planning processes (e.g. TYNDP), which will also apply to hydrogen following the entry into force of the Hydrogen and Decarbonised Gas Markets package. These are scenario planning exercises intended to inform efficient network development. They are not intended to support contracting between off-takers and suppliers.

103 In April 2024, LHyfe launched a (currently) free marketplace for green hydrogen, where off-takers with their own hydrogen transport solution can place bids, who can then be seen by registered and certified suppliers throughout Europe (to date France, Germany, Benelux, Spain, Sweden, Norway, Denmark). (See https://www.lhyfe-heroes.com/h2-marketplace.) A further example for increasing transparency in the hydrogen sector are the services provided by Argus (see https://www.argusmedia.com/en/solutions/products/argus-hydrogen-and-future-fuels). Argus provides information on production cost as well as a database with tender details and offtake agreements, electrolyser capacities and sales, planned capacities for e-methanol, e-SAF and synthetic natural gas.

Any transparency mechanism will need to ensure data provided is robust

The **value** of such a transparency platform to participants will **increase, the greater the level of participation and reliable reporting**. Therefore, the basic condition for the platform to add value is that companies participate in voluntary data disclosure – subject to EU competition rules, especially those regarding the exchange of commercially sensitive information (as stated in Section 4.1.1). The latter means that data might be published in aggregated form only or shared only vertically (i.e. with counterparties, and not with competitors on the same step on the value chain).

According to economic theory, achieving voluntary participation of competing firms in information disclosure is only applicable if there are **sufficient incentives for co-operation**.[104] In other words, firms will only report if their expected payoff from disclosing data (value-add of platform to them) outweighs costs/risks of providing such information. In the case of a potential transparency mechanism:

- There is a potential **collective (longer-term) payoff** from the platform providing reliable information. Reporting from all participants could enable project development and benefit the hydrogen market as a whole.
- However, the direct **individual payoff of disclosing private information may depend** on the type of data provided. Irrespective of others' choices, data disclosure may entail costs/risks to participants. These individual costs may outweigh the individual benefits, in the absence of additional incentives for firms to co-operate (we discuss options for strengthening incentives at the end of the chapter).

The costs to participants to providing information depend on the **type and sensitivity** of information in question, and who receives this information.

During subsidised market ramp-up, it is uncertain whether firms will voluntarily disclose sensitive private information, such as costs

Large parts of low-carbon/renewable hydrogen value chain may need to be subsidised in the initial stages of market development. As such, especially for lower-cost players, there may be a high perceived risk of providing truthful cost information to public authorities. Such players may fear that policymakers could take steps to limit inframarginal rents in future.[105] Disclosing cost information therefore has a high individual cost (and limited individual benefit).[106]

[104] This part of economic theory is called game theory, which sets out a framework to analyse strategic interactions between competing rational players - for example, companies competing on a specific market.

[105] Such a fear could, in turn, disincentivise innovations to achieve future cost reductions.

[106] Stakeholders confirm that they consider disclosing prices and cost information as risky and would not in itself provide this information on a platform.

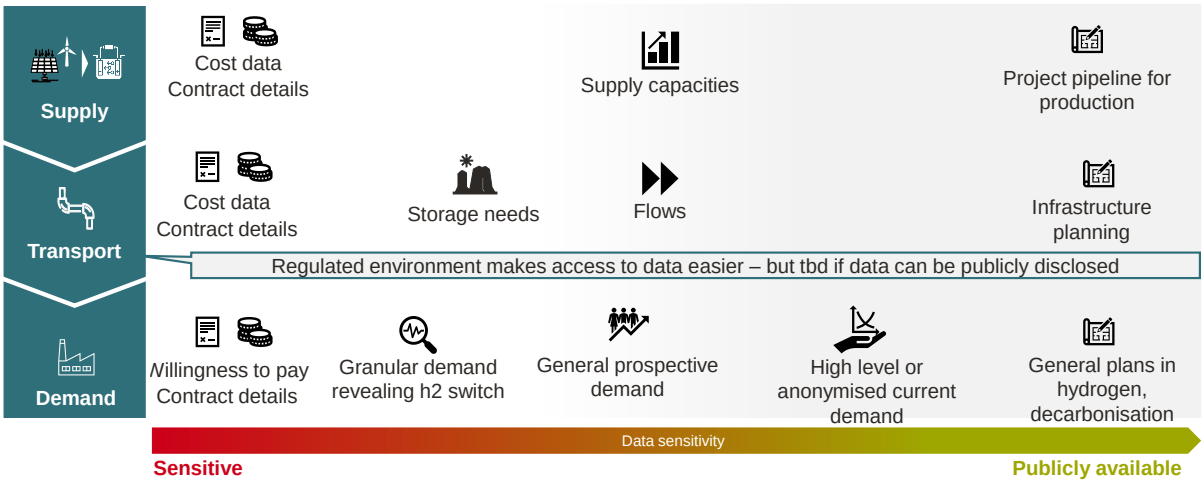
Some cost-related information (e.g. subsidy levels for projects granted support) will be publicly available. For such information, there is limited cost to participants to providing this information.

Supply and demand – role for platform to assess data which is (to some extent) already publicly available

Regarding granular hydrogen demand and supply, details on timings, quantities as well as quality, and location of demand/supply, in particular in the course of a transitional switch to hydrogen, could be commercially confidential. Incentives to accurately disclose this type of data with (potential) counterparties[107] could be limited due to concerns that disclosure could affect commercial negotiations.

A transparency platform could potentially add value through providing **plausibility checks** to categorise the quality of forecasts provided by users. In particular, assessing data could serve to check if submissions are speculative or backed up by additional evidence, such as grid connection agreements, planning permission requests, a taken final investment decision, or subsidy contracts.

Figure 31 Illustration of data sensitivity in hydrogen market



Source: Frontier Economics

4.2.5 Concrete design considerations and case studies

Given the results of our high-level assessment, we outline below two case studies of potential forms of DA/JPM, which are based on some common characteristics. Both may support the

[107] That means data will only be shared vertically along the value chain, not horizontally.

development of the hydrogen market in the EU. In a second step, we will evaluate them based on the assessment criteria discussed in Section 4.1.4.

Overall, our analysis of the two case studies shows that both proposals can at least partly facilitate market access (especially for smaller stakeholders) and reduce the uncertainty regarding development of production, demand and infrastructure to some extent. Regarding further effects, both case studies may increase static and dynamic efficiency, but the extent of any effect is uncertain . However, both case studies would also entail lower implementation and administrative costs, compared to more advanced and more interventionist types of DA/JPM. Finally, there is some EU value added from ensuring coverage across Member States and from potentially providing a better focal point (due to larger scale / reduced transaction costs) for international and domestic suppliers compared to several national platforms.

Considering that Art. 52 of the revised Gas Regulation foresees the implementation of some form of DA/JPM, our view is that Case Study 1 is suited to address a situation, where standards for hydrogen products are difficult to define. Once standards are in place, case study 2 could be considered, as its design better enables a transition to JPM with demand aggregation (which, as discussed above, could become more relevant for hydrogen once the market is more developed).

Common features to both case studies

Both “transparency plus” platforms are based on common characteristics:

- **Registration**: For entering the transparency platform, a one-time registration for suppliers and off-takers is required. The requirements are listed in Figure 32.
- **Sharing of data**: In both cases, individual participant data would not be publicly available, however aggregated and anonymized data of demand and supply volumes per country/region as well as the quality of hydrogen will be shared publicly[108] to improve the transparency of the hydrogen market. These data could e.g. serve as input for infrastructure providers, incentivise new production facilities or a fuel switch of off-takers. The data could also be shared within the EC or other EC services, e.g. for infrastructure planning but also for others purposes.
- Incentives for participation and data sharing can be derived via several ways:
  - The platform may provide an individual benefit to the stakeholders with regards to counterparty discovery. This is not only relevant in general, but for suppliers e.g. also

[108] This means that access to data should not be limited to stakeholders, who provide data, e.g. in order to provide incentives for participation and data sharing. Limiting data access could be detrimental for the market ramp up, because potential future stakeholders might not be able to access information supporting the production of/switch to hydrogen in this case.

with regard to being able to apply for the domestic auctions under the European Hydrogen Bank.[109]

- As an alternative, participation and data sharing could also be increased by making participation mandatory for suppliers or off-takers applying to potential new EU subsidy programmes. However, it needs to be noted that if these suppliers would not have participated otherwise, there may be some (private) additional costs of participation, which can be minimised and need to be weighed against the potential positive (social) benefits of the platform.

Figure 32 Registration requirements for a hydrogen transparency platform

Step of value chain	Requirements in registration process
Hydrogen suppliers	■ Contact data and location (country / region) ■ Proof of quality of the hydrogen (if applicable per production plant): ▫ Renewable hydrogen: fulfilment of the criteria set out in the Delegated Regulation (EU) 2023/1184 ▫ Low carbon hydrogen: requirement to meet the criterion of 70 % less lifecycle GHG emissions than fossil fuels ■ Per production plant/location: location/infrastructure connection (including purity and pressure of hydrogen), status/firmness of the supply capability and annual production volume ■ Instrument(s) for contract negotiations (e.g. credit rating, letter of credit, guarantees, collateral)
Hydrogen off-takers	■ Contact data and location (country / region) ■ Type of off-taker / industry ■ Per demand unit (factory in which hydrogen is consumed): location/ infrastructure connection (including purity and pressure of hydrogen), possibly demand profile and annual demand volume ■ Instrument(s) for contract negotiations (e.g. credit rating, letter of credit, guarantees, collateral)

Source: Frontier Economics

Note: This information is collected as part of registration, but not necessarily shared in detail publicly.

Case Study 1: Matching of independently posted supply and demand bids

The first case study is characterised by a matching of supply and demand bids for the near as well as medium-term future (i.e. beyond 2030), which are posted independently of each other, i.e. irrespective of the actions of its potential counterparts. All bids are non-binding. In detail, the process encompasses three steps.

[109] See CINEA (2023). Innovation Fund (INNOVFUND) – Auction call for proposals, Innovation Fund auction call for RFNBO Hydrogen (INNOVFUND-2023-AUC-RFNBO-Hydrogen), Version 1.1, 20 December 2023, available at https://ec.europa.eu/info/funding-tenders/opportunities/docs/2021-2027/innovfund/wp-call/2023/call-fiche_innovfund-2023-auc-rfnbo-hydrogen_en.pdf.

- After registration, off-takers and suppliers are able to post their needs/offers either year-round or in regular intervals at certain points in time on the platform by stating the desired product (type of hydrogen), volumes, profile, location and duration. In the first instance, there is a risk of legacy bids, i.e. bids which are no longer valid or at least in some parts (e.g. regarding volume, profile or duration) outdated. This issue can be addressed by deleting bids automatically if the indicated duration of the bid is expired or by requesting a confirmation that a bid is still valid in a certain frequency. The advantage of such continuous bidding – compared to entering of bids at regular intervals – consists in the fact that unfulfilled bids are kept and suppliers/off-takers do not need to enter them again at each round.

  In early stages with low liquidity and without real calls for expression of interest, the characteristics of the bids could be described in a more flexible way. For example, submitting min/max values or a range for volumes and duration could be sufficient. This is since first, that the definition of standardised products might be difficult during early market ramp-up and second, overly rigid definitions could hinder the development of standards based on the evolution of market needs. We suggest that standards could evolve based on the needs of the platform users over time and assume year-round-bids in the following for Case Study 1.

- **In case of a suitable match, participants would be notified** and contact information shared with both parties. **Matching criteria** could be the characteristics mentioned above (type of product, volume, profile, location and duration) as well as an available transport route or the firmness of bids:

  - The matching based on the **type of product, the volume, profile, location and duration** can be done either only in case of a **perfect matching or also for imperfect matches**. The latter is sensible in times of low liquidity at the beginning and especially if no min/max values or ranges are indicated by the suppliers/off-takers. However, a bandwidth for each criteria needs to be defined for imperfect matches. With increasing liquidity, the requirements for a match can be raised.

  - Regarding the **availability of a transport route**, we suggest allowing off-takers to choose whether they are matched to suppliers:

    - **even if there is no pipeline transport route available** (i.e. self-pick-up could be assumed[110]). This may be relevant for deliveries involving lower quantities and shorter distances, which may be covered by non-pipeline transport such as trucking, potentially as an interim solution pending the development of a pipeline network.

    - **only in case of a feasible pipeline transport option**. This would require the platform to incorporate and update publicly available data on hydrogen

[110] This is also the case in the private market platform set up by LHyfe, see footnote 103.

infrastructure development (capacity, timing and location). This information could be shared on the transparency platform as additional public information – even though it might be already available publicly, it might be useful to have this information at a central location at limited additional cost. This second option may become increasingly relevant as the hydrogen network develops and hence for more forward looking bids (e.g. for bids beyond 2030+).

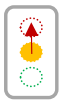
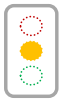
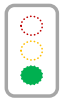
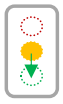
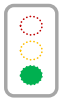
- An additional value added of a transparency platform could be provided if the platform provider assesses the **firmness of the demand/supply bids**. This can be done via complementing the information provided with objective elements (for example by additional evidence provided like grid connection agreements, planning permission requests, a taken final investment decision, or subsidy contracts, see Section 4.2.4). A match might only be declared if the level of firmness is similar or exceeds a certain threshold set by bidders. As soon as there is some liquidity on the platform and matches are getting more numerous, the level of firmness of the bids should increasingly be taken into account, because the prospects for a contract conclusion increases for bids with strongly diverging firmness. At the beginning, the threshold for a match could be lower, but could be raised with increasing liquidity.

- **After a match, the supplier and off-taker are informed** and provided with each others' contact data, the information contained in the counterparty bid regarding the matching criteria, and the availability of instruments for contract negotiations.

- **Further discussions and potential contracts would then happen bilaterally and outside the platform** as the supply and demand bids placed at the platform are non-binding.

Based on the assessment criteria discussed in Section 4.1.4, we outline in Figure 33 our assessment of how the suggested matching platform performs. Overall, the transparency platform enhanced by a year-round matching of supply and demand may help especially smaller stakeholders by reducing search cost and can be developed to keep up with changing market circumstances. There is a trade-off regarding the provision of information on available transport routes, which increase the implementation as well as administrative costs. However, since stakeholders consider availability of hydrogen transport infrastructure as – besides the high production cost of renewable hydrogen – the main barrier for market development, incorporating this information is likely to lead to higher benefits. This is especially true if the platform is – as far as we understood – envisaged to support transactions beyond 2030.

Figure 33 Evaluation of Case Study 1: Matching of supply and demand entered independently of each other (with information on availability of transport route)

Evaluation criteria		Assessment
Static efficiency		▪ Possibly some efficiencies from reduction of search costs for counterparty discovery (for both off-takers and suppliers) ▪ Some, but rather low risk of legacy bids ▪ *Red arrow: without information on transport, higher search costs*
Dynamic efficiency		▪ Limited direct impact ▪ Limited potential for longer-term efficiencies from facilitating imports in the medium-term and thereby increasing competition ▪ Possible risk of crowding out commercial solutions
Resilience and adaptability		▪ Flexibly adaptable matching service based on stage of market development (e.g. matching can develop from rather imperfect to more precise matches), but entered bids need to be aligned ▪ Standardisation is left to the market and able to develop over time
Ease of implementation and administrative costs		▪ Assessing the firmness of the bids may lead to substantial cost ▪ *Green arrow: implementation and administrative cost decrease substantially, if information on infrastructure is not provided* ▪ Cost are likely to be lower compared to JPM with demand aggregation on the platform
EU added value		▪ Platform could be provided as a commercial service, but some value from offering this information for free given policy goals ▪ Facilitation of international suppliers and indirect support of developing a cross-border hydrogen network ▪ Platform could help reaching a level playing field between Member States with varying degrees of advancement in developing hydrogen production

Source: *Frontier Economics*

Note: *Bullet points in italic refer to an evaluation for an option without providing information on availability of transport route.*

Case Study 2: Supporting the organisation of a call for supply interest

The second case study focuses more on satisfying consumption needs by organising a call for supply interest at regular intervals. The main difference to case study 1 is therefore that demand bids are placed sequentially and suppliers are asked to react to specific demand bids, i.e. suppliers can post their supply bids in reaction to single bids. The procedure differs compared to case study 1 as follows.

A **call is organised by the platform provider at regular intervals** (e.g. every 3-6 months, no year-round placement of bids). Each call consists of four steps:

- First, registered off-takers can submit their hydrogen needs via indicating the desired product, volume, profile, location, duration and whether they need a transport service/availability. Compared to case study 1, standardisation of the format of bids might be more reasonable to reduce costs incurred by suppliers of screening the stated needs (see next step) e.g. by providing filtering options.

- Second, the platform would invite suppliers to directly reply to individual bids placed by off-takers by posting a non-binding offer (including an indicative price) for a specific demand bid. In order to make the process for off-takers less time-consuming, they could also enter a general supply bid for selected demand bids. Compared to case study 1, this means that suppliers are not just aware of aggregated demand and the final bid they are matched with, but are able to look at every single bid posted by off-takers.

  When looking at the bids, suppliers are informed (e.g. in a separate column of the list of demand bids) whether transport is required and whether a pipeline transport route from the location of the supplier's production unit(s) to the off-taker's location would be available. This information should be provided by the platform algorithm based on – again – publicly available data on hydrogen pipeline development collected by the platform provider.

- As a third step, the platform summarises the supply offers for each demand bid and shares the supply offers as well as contact data with the off-takers. Potentially this could be based on a ranking. While the precise weighting of criteria would need further consideration, the offers could be ranked first based on their fit regarding the type of product, volume, profile, location, duration and firmness (see matching criteria in case study 1) and second based on the price indications provided by suppliers. This replaces the automatic matching of case study 1.

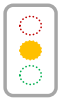
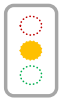
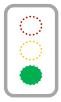
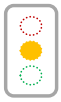
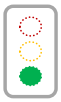
- Finally, off-takers can then decide whether to enter into exploratory discussions regarding offtake agreements outside the platform.

Figure 34 summarises the assessment of how the suggested support for organising a call for off-takers performs, which is very similar to the evaluation of case study 1. Primarily, the resilience and adaptability differ slightly.[111] On the one hand, regular calls make it easier to change the framework compared to a situation with year-round entering of bids, where already entered bids might not fit with the "new" standard. On the other hand, the requirements for standardisation are slightly higher and development of standards can be less flexible and market driven. Considering this, case study 1 is better suited to address a situation, where standards for hydrogen products are difficult and prejudicial to define. When certain standards can already be envisaged, case study 2 could be more suitable, as its design better enables

[111] Regarding the provision of information on infrastructure availability, the evaluation of the trade-off between benefits and cost is similar, but the justification slightly differs. On top of the argument that the availability of hydrogen transport infrastructure is one of the main market barriers, providing information on transport routes can reduce the burdens for suppliers of checking whether, for each of the demand bids, a transport route would be available.

a transition to JPM with demand aggregation (which, as discussed above, could become more relevant for hydrogen once the market is more developed).

Figure 34 Evaluation of Case Study 2: Supporting the organisation of a call for off-takers

Evaluation criteria	Assessment	
Static efficiency		▪ Possibly some efficiencies from reduction of search costs for counterparty discovery (for both off-takers and suppliers)
Dynamic efficiency		▪ Limited direct impact ▪ Limited potential for longer-term efficiencies from facilitating imports in the medium-term and thereby increasing competition ▪ Possible risk of crowding out commercial solutions
Resilience and adaptability		▪ Platform can be developed further towards a more formal matching depending on the market development, and changes can easily be introduced at a new round ▪ Some low level of standardisation is required for filtering options
Ease of implementation and administrative costs		▪ Assessing the firmness of the bids as well as providing the information on infrastructure lead to substantial cost ▪ However, cost are likely to be lower compared to JPM with demand aggregation on the platform
EU added value		▪ Platform could be provided as a commercial service, but some value from offering this information for free given policy goals ▪ Facilitation of international suppliers and indirect support of developing a cross-border hydrogen network ▪ Platform could help reaching a level playing field between Member States with varying degrees of advancement in developing hydrogen production

Source: Frontier Economics

4.3 Biomethane

In this section we discuss how and in which form DA/JPM can help support the development of the biomethane market. We start with a summary and then provide further detail.

4.3.1 Summary

Introduction (Section 4.3.2)

Biomethane that meets standards for injection into the natural gas grid is a **renewable alternative** for natural gas from fossil sources. Biomethane will thus play a key part in supporting the achievement of EU climate targets. Accordingly, REPowerEU sets an explicit target of **increasing EU production of biomethane** from 3 bcm per year (in 2022) to 35 bcm per year by 2030, and also aims for an **integration of biomethane into the EU internal gas** market. Biomethane can be **bundled with relevant certification** to help off-takers verify their renewables target compliance on Union level and/or to serve as proof of origin for voluntary reporting purposes.

Key market barriers (Section 4.3.3)

Without policy and financial support, biomethane is **not yet cost-competitive** with natural gas, even when accounting for cost of carbon emissions at current carbon prices.

Currently, the biomethane market in Europe is characterised by rather **geographically confined production and consumption centres** (driven by national support schemes) with some increases in **biomethane trade between Member States** (mainly driven by non-subsidized production), though **high regulatory heterogeneity** still limits cross-border trade.

Role of DA/JPM (Section 4.3.4)

In combination with efforts to **standardise regulatory frameworks** and additional infrastructure investments to facilitate cross-border tradability, a platform focussing on **transparency** for biomethane may help to address barriers around **market access** and **coordination** to support biomethane ramp-up. A more advanced (supply) **aggregation mechanism matching suppliers and off-takers** may become beneficial at later stages of market development, if production is ramped up sufficiently and cross-border barriers to trade are mitigated.

Form of DA/JPM (Section 4.3.5)

During the ramp-up phase, a **platform providing transparency on regulatory differences** across Member States may reduce the costs to biomethane suppliers of navigating the certification process across multiple national issuing bodies.

At a higher cost, a platform providing **transparency on existing infrastructure, feedstock and demand** with local granularity may support decisions by prospective biomethane producers regarding where to invest and by infrastructure operators and regulators regarding investment needs.

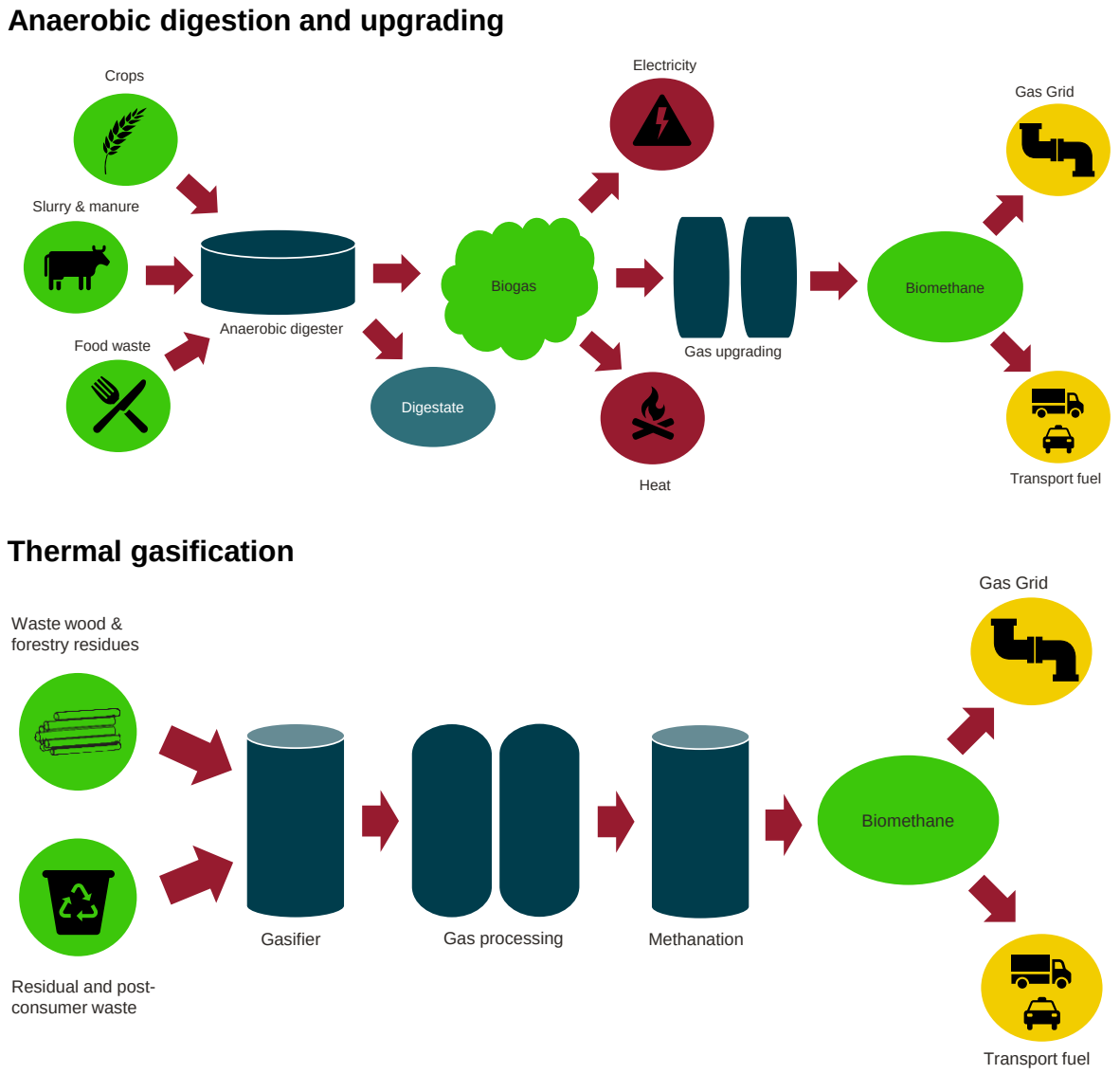
In a more developed market, a **platform supporting counterparty discovery through cross-border matching and potential supply aggregation mechanisms** may more actively encourage cross-border trade.

4.3.2 Introduction to the biomethane market

Biogas is an energy source generated through the fermentation process of various forms of biomass. While biogas can be used for the co-generation of heat and electricity, its high CO_2 content limits its direct use in natural gas applications. It has the potential to be upgraded to the quality of natural gas, known as biomethane, in which case it is a renewable alternative to natural gas from fossil sources (Figure 35).[112]

[112] Frontier Economics (2019), The future value of gas infrastructure in a climate-neutral Europe, https://www.frontier-economics.com/media/lqqlhwwr/value-of-gas-infrastructure-report.pdf, Annex A.

Figure 35 Biomethane production processes



Source: Frontier Economics (2019), "The future value of gas infrastructure in a climate-neutral Europe", Annex A, accessed on 5 June 2024 at https://www.frontier-economics.com/media/lgqlhwwr/value-of-gas-infrastructure-report.pdf

The EU-27 currently leads as the largest existing producer of biomethane, having produced approximately 3 bcm in 2022.[113] A number of characteristics make it a relevant commodity to consider for the future energy value chain:

- **High demand substitutability with natural gas**: Biomethane can be integrated into existing natural gas infrastructure and in many end-use applications without the need for significant technical adjustments. Furthermore, the production of biomethane generally is

[113] Gas for Climate (July 2022), "Biomethane production potentials in the EU", accessed on 26 February 2024 at http://tinyurl.com/mtpyhey9.

not dependant on seasonal variations and can thus be provided consistently throughout the year.[114]

- **Sustainability properties relevant for the energy transition**: Biomethane can be produced with net zero carbon emissions. Any CO_2 released during the combustion of biomethane is offset by CO_2 absorbed by the initial feedstock during growth, making it possible to ensure carbon neutrality of overall production processes.[115]

- **Diverse number of potential producers**: Biomethane can be produced using various forms of biomass. As such, the production of biomethane is less reliant on natural reservoirs compared to natural gas. Furthermore, every country within the EU has the potential to contribute to biogas and/or biomethane production[116] (see Figure 36), with feedstock available to a diverse array of potential producers. Countries such as Germany, France, and Spain have demonstrated both high current production levels and significant additional future potential in this regard. Thus, concerns around supplier concentration and resilience vis-á-vis natural gas are reduced.

RePowerEU has outlined plans to further increase biomethane production to 35 bcm by 2030[117]. According to projections, this ramp-up could be supported by existing technical biomethane potential across the EU, estimated to be capable of sustaining up to 1,150 TWh[118] (c. 118 bcm) annually[119].

114 dena (2015), "Biomethane: The energy system's all rounder", accessed on 26 February 2024 at http://tinyurl.com/bpapcbjn.

115 dena (2015), "Biomethane: The energy system's all rounder", accessed on 26 February 2024 at http://tinyurl.com/bpapcbjn.

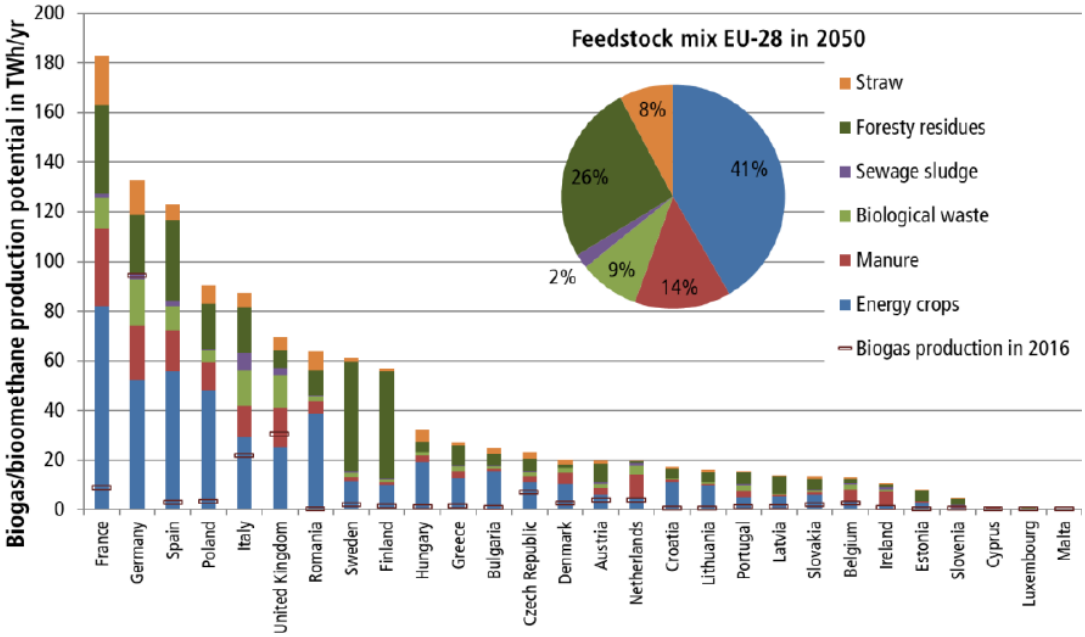
116 International Energy Agency (2022), "Scaling up biomethane in the European Union: Background paper", accessed on 20 February 2024 at http://tinyurl.com/3u2wczze.

117 European Commission (2022), "REPowerEU Plan", accessed on 20 February 2024 at http://tinyurl.com/bdf5zt8a.

118 European Commission, Directorate-General for Energy, Fischer, C., Smit, T., Michalski, J. et al. (2020), "Impact of the use of the biomethane and hydrogen potential on trans-European infrastructure", Publications Office, https://data.europa.eu/doi/10.2833/492414, accessed on 6 June 2024 at https://op.europa.eu/en/publication-detail/-/publication/10e93b15-8b56-11ea-812f-01aa75ed71a1/language-en/format-PDF/source-323798790#.

119 We note that these estimates account for technical potential and thus assume that all bioenergy not used today is available for biogas/biomethane production. Accordingly, these figures are estimates of maximum biomethane production. They do not represent projections of actual biomethane production, which are further dependent on policy developments around factors such as competing energetic uses of bioenergy and the degree of electrification.

Figure 36 Technical biomethane potential EU-27 by Member State and by feedstock



Source: European Commission, Directorate-General for Energy, Fischer, C., Smit, T., Michalski, J. et al. (2020), "Impact of the use of the biomethane and hydrogen potential on trans-European infrastructure", Publications Office, https://data.europa.eu/doi/10.2833/492414, accessed on 6 June 2024 at https://op.europa.eu/en/publication-detail/-/publication/10e93b15-8b56-11ea-812f-01aa75ed71a1/language-en/format-PDF/source-323798790#."

There has also been some indication that the significant production potential within the EU-27 could be additionally supplemented by imports potential from outside the EU. For instance, significant consideration has been given to the possibility of biomethane imports from Ukraine. Depending on the speed of economic recovery, biomethane production in Ukraine could be increased to 11 TWh by 2030, and 50 TWh by 2050[120-121], a significant share of which may be available for export to the EU.

Biomethane has now been specifically defined in the Gas Directive as qualifying as "natural gas" if it can be technically and safely injected into the natural gas system[122]. **Biomethane therefore falls under the legal mandate for a permanent mechanism for voluntary**

120 Zentrum Liberale Moderne, Zukunft Gas (October 2023), accessed on 2 May 2024 at https://libmod.de/wp-content/uploads/LibMod_PP_UkraineBiomethane_en.pdf.

121 UABIO (2022), "Перспективи Виробництва Біометану b України" [Prospects for the production of biomethane in Ukraine], accessed on 2 May 2024 at https://uabio.org/wp-content/uploads/2022/09/UA-Position-paper-UABIO-29.pdf.

122 Directive (EU) 2024/1788 of the European Parliament and of the Council of 13 June 2024 on common rules for the internal markets for renewable gas, natural gas and hydrogen, amending Directive (EU) 2023/1791 and repealing Directive 2009/73/EC (recast), OJ L, 2024/1788, 15.7.2024.

demand aggregation for natural gas from 2025 (see Article 42 of the recast Gas Regulation[123]), as outlined in more detail in Section 1.2.

Given EU internal market legislation, biomethane can be theoretically traded as natural gas once it is entered into the commercial flow of the gas market (see Section 2.1). In addition, the sustainability characteristics of biomethane can be remunerated through different means, including:

- direct subsidy schemes operated by Member States;
- voluntary markets for certificates ("guarantees") of renewable origin (GoOs) under Article 19 of the recast Renewable Energy Directive[124] (RED III) and typically issued by national issuing bodies to producers[125]; and
- Proof of Sustainability (PoS) to meet obligatory targets for minimum shares of renewable energy (see Articles 25-31 of RED III), provided by EU-recognised certification schemes[126].

To ensure traceability of renewable fuels such as biomethane across the European gas grid, the European Commission has further committed to set up a Union database (UDB) for accounting, which will treat the EU interconnected gas grid as a single mass balance system. The UDB will accordingly require registration of renewable gases injected into and withdrawn from the EU gas grid, as well as the provision of data on availability and type of applicable support schemes by national bodies. Article 31a of the recast Renewable Energy Directive (RED III) commits the Commission to setting up the UDB in November 2024.[127]

While GoOs can be traded as a financial product separately to the commodity itself ("book & claim") through various channels like OTC trading, bilateral exchange or platforms, any sustainability certification will remain inherently bundled with the product through the mass

123 Regulation (EU) 2024/1789 of the European Parliament and of the Council of 13 June 2024 on the internal markets for renewable gas, natural gas and hydrogen, amending Regulations (EU) No 1227/2011, (EU) 2017/1938, (EU) 2019/942 and (EU) 2022/869 and Decision (EU) 2017/684 and repealing Regulation (EC) No 715/2009 (recast), OJ L, 2024/1789, 15.7.2024.

124 European Parliament and European Council (20.11.2023), "Directive (EU) 2018/2001 of the European Parliament and of the Council of 11 December 2018 on the promotion of the use of energy from renewable sources (recast)", Articles 25-30, accessed on 10 April 2024 at https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:02018L2001-20231120.

125 National registries typically each implement their "own" Guarantees of Origin certification schemes. These are supported by rules of certification such as those introduced by the European Energy Certificate System (EECS).

126 In general, national certification schemes tend to seek recognition by the European Commission, so that national certificates may be used to meet EU sustainability criteria. An example of a recognised certification scheme is REDcert, which can implement PoS for different sustainable raw materials.

127 European Parliament and European Council (31.10.2023) "Directive (EU) 2023/2413 of the European Parliament and of the Council of 18 October 2023 amending Directive (EU) 2018/2001, Regulation (EU) 2018/1999 and Directive 98/70/EC as regards the promotion of energy from renewable sources, and repealing Council Directive (EU) 2015/652", accessed on 3 May 2024 at https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=OJ:L_202302413.

balancing principle[128]. Given the legal framework for DA/JPM does not extend to purely financial products such as GoOs, for the purposes of assessing biomethane for suitability of application of DA/JPM, **we focus on natural gas certified as biomethane, taking into account the bundling with proof of sustainability for the compliance with renewable energy targets as foreseen by RED III**[129].

4.3.3 Market failures and barriers for biomethane market development

The stated policy goal of REPowerEU of increasing domestic production of biomethane and its integration into the EU internal gas market currently faces barriers. Stakeholders have noted that corporate off-takers have shown significant demand for biomethane, which cannot yet all be met by existing production sites. We outline the main market failures and barriers below.

The high cost of producing biogas and upgrading to biomethane currently hinders cost competitiveness with substitutes such as natural gas, limiting uptake

In the absence of policy interventions, biomethane remains more expensive compared to natural gas due to a combination of market failures such as externalities of natural gas not being priced in, as well as barriers such as higher production costs.

In principle, the negative environmental externalities of natural gas usage and production are addressed through the EU emissions trading system (ETS), which causes a carbon cost to be incurred through emissions from natural gas usage. This reduces the overall cost gap between the two commodities, given that biomethane production and usage is overall carbon-neutral and thus does not incur this carbon cost under ETS. The higher the carbon price, the more cost competitive biomethane becomes with natural gas. The future ETS2 for fuels used in road transport and buildings will go further to ensuring that negative externalities associated with fossil fuel use in these sectors are also priced in.

A further gap in costs stems from the higher direct costs incurred during the production of biomethane, given its status as a less mature technology. In addition, biomethane production entails some fundamentally higher costs. These typically involve the installation of biodigesters as well as the collection of feedstock, which can vary heavily between types of feedstock and regions[130]. For biomethane to be fully substitutable into common applications for natural gas, it additionally requires the removal of CO_2 and any other contaminants present, incurring further costs. Biomethane production cost is also dependant on economies of scale,

128 Renewable Gas Trade Centre in Europe (2021), "Guidelines for the Verification of Cross-Sectoral Concepts", accessed on 11 April 2024 at https://www.ergar.org/wp-content/uploads/2018/10/D4.1-Guidelines-for-the-Verification-of-Cross-Sectoral-Concepts.pdf.

129 European Parliament and European Council (20.11.2023), "Directive (EU) 2018/2001 of the European Parliament and of the Council of 11 December 2018 on the promotion of the use of energy from renewable sources (recast)", Article 0, accessed on 10 April 2024 at https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:02018L2001-20231120.

130 IEA (2020), „Outlook for biogas and biomethane", accessed on 26 February 2024 at https://iea.blob.core.windows.net/assets/03aeb10c-c38c-4d10-bcec-de92e9ab815f/Outlook_for_biogas_and_biomethane.pdf.

with smaller producers currently predominant in the industry incurring higher costs per MWh[131]. Sustainability certificates are available and allow producers to be renumerated for additional costs, but do not necessarily provide sufficient remuneration to profitably sell biomethane at natural gas prices.

Overall, larger biomethane producers may offer the product at competitive prices if the carbon price from natural gas-related emissions is large enough, but on average, biomethane remains more expensive as an energy carrier than natural gas[132]. Given its limited channels for distribution of subsidies or allocation of premia, DA/JPM is not well-placed to address this particular barrier.

The market for biomethane is still focused around local, geographically confined production and consumption centres

Biomethane markets currently remain centred around geographically confined production and consumption. There is limited cross-border market access and liquidity. This implies that consumers currently still have limited de-facto options when choosing a potential supplier to procure biomethane.

Additional investments in infrastructure may be required to link local production sites to transmission grids to enable physical transportation of the product over larger distances (subject to coordination between transmission and distribution infrastructure operators)[133]. RePowerEU accordingly foresees the promotion of "*the adaptation and adjustment of existing and the deployment of new infrastructure for the transport of biomethane through the EU gas grid"* to address this barrier[134]. This raises the prospect of higher potential suppler diversity in the future.

However, during the transition to a more integrated cross-border market, participants may initially face higher transaction costs for searching and contracting with cross-border counterparties. DA/JPM may help to encourage counterparty discovery across these currently localised/regional markets, during the transitional phase.

131 BIP Europe (October 2023), "Insights into the current cost of biomethane production – from real industry data", accessed on 3 May 2024 at https://bip-europe.eu/wp-content/uploads/2023/10/BIP_TF4-study_Full-slidedeck_Oct2023.pdf.

132 According to BIP Europe, "the cost of biomethane production in 2021 was on average €87/MWh for producers of c. 540 Nm^3/h, and €54 MWh for producers of >1,200 Nm^3/h." At an emission factor of natural gas of 56 gCO_2/MJ, one can expect c. 0.2 tCO_2 of carbon emissions per MWh of natural gas. An EU ETS price of €70/tCO_2 then amounts to a carbon cost of c. €14/MWh, which is to be added to the wholesale TTF price of natural gas to take into account carbon pricing. At this EU ETS price, larger producers may then offer biomethane at competitive prices if the natural gas price exceeds €40/MWh.

133 Frontier Economics, CE Delft, and THEMA Consulting Group (2019), "Potentials of sector coupling for decarbonisation - Assessing regulatory barriers in linking the gas and electricity sectors in the EU - Final report", accessed on 9 April 2024 at https://cedelft.eu/wp-content/uploads/sites/2/2021/03/CE_Delft_3S10_Sector_coupling_final_2020.pdf.

134 European Commission (2022), "REPowerEU Plan", pg. 8, accessed on 20 February 2024 at http://tinyurl.com/bdf5zt8a.

Heterogeneity in regulation frameworks and quality standards across European countries heighten the need for coordination to facilitate trade

A large variety of potential feedstocks and upgrading technologies increases the variability in the quality and composition of biogas in comparison to natural gas. Depending on intended use cases, biomethane nevertheless needs to fulfil certain quality standards for its use as a direct substitute to natural gas (such as permissible levels of CO_2). However, gas quality standards for biomethane are currently inconsistently applied across European countries, increasing transaction costs across regions and inhibiting trade. There is an increased need for EU-level coordination to ensure the universal application of relevant standards. To begin addressing this, the revised Gas Regulation[135] has already set out plans to reduce restrictions to cross-border flows due to gas quality differences going forward.

Similarly, national implementation of EU-level regulation (such as regarding the issuance of GoOs or PoS by Member States as foreseen by RED II[136]) remains heterogeneous. Biomethane with certain subsidies may be excluded from cross-border trading (e.g. relevant certification may not be issued for biomethane subsidised with feed-in tariffs). Support scheme designs vary across Member States (see Figure 37). Together, this may hinder cross-border trade (and resulting efficiency gains) and indicates a potential need for increased EU-level coordination in relation to subsidy schemes and certification.

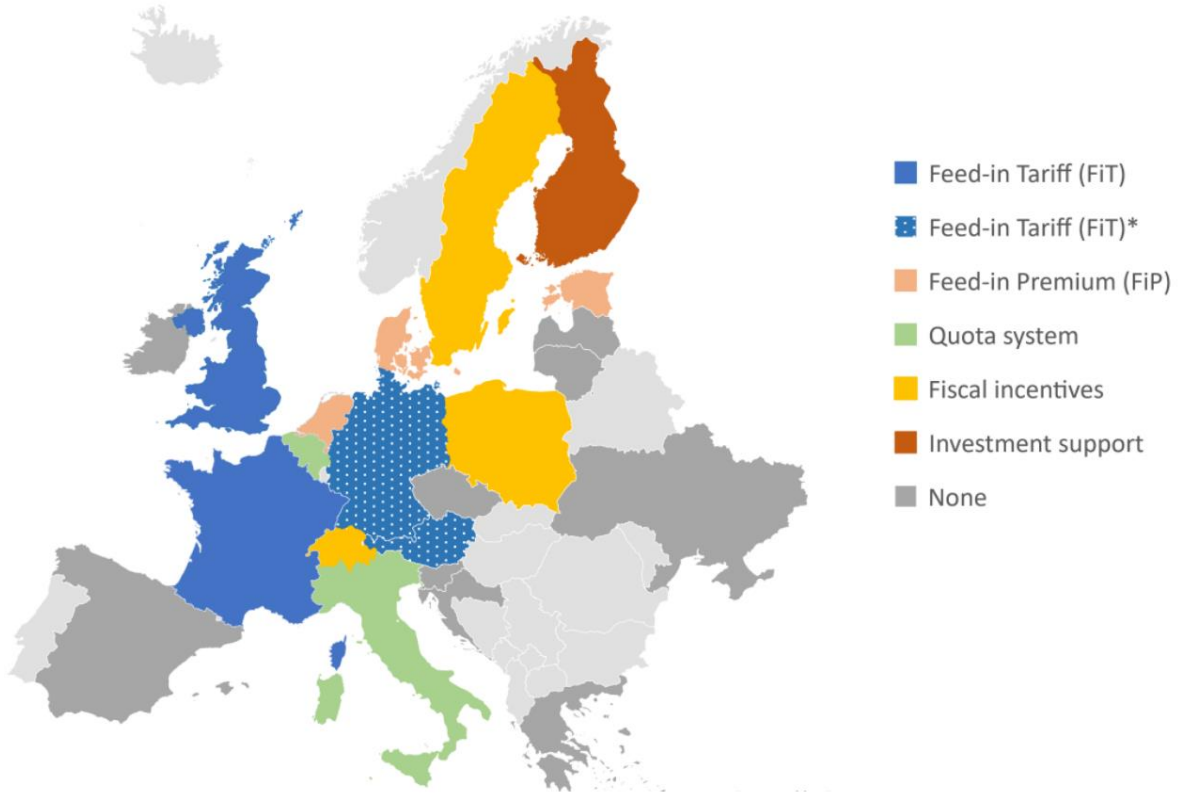
On a standalone basis, the DA/JPM cannot address this heterogeneity in relation to national implementation of EU policy. While the establishment of the Union Database, planned for November 2024, may provide a route to alleviating these issues by treating the EU gas grid as one mass balancing system, Member States are still empowered to set their own, and potentially higher, standards for sustainable gases[137], which may preserve some heterogeneity despite the establishment of the UDB.

135 Regulation (EU) 2024/1789 of the European Parliament and of the Council of 13 June 2024 on the internal markets for renewable gas, natural gas and hydrogen, amending Regulations (EU) No 1227/2011, (EU) 2017/1938, (EU) 2019/942 and (EU) 2022/869 and Decision (EU) 2017/684 and repealing Regulation (EC) No 715/2009 (recast), OJ L, 2024/1789, 15.7.2024.

136 European Parliament and European Council (20.11.2023), “Directive (EU) 2018/2001 of the European Parliament and of the Council of 11 December 2018 on the promotion of the use of energy from renewable sources (recast)”, Articles 25-30, accessed on 10 April 2024 at https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:02018L2001-20231120.

137 European Parliament and European Council (31.10.2023) “Directive (EU) 2023/2413 of the European Parliament and of the Council of 18 October 2023 amending Directive (EU) 2018/2001, Regulation (EU) 2018/1999 and Directive 98/70/EC as regards the promotion of energy from renewable sources, and repealing Council Directive (EU) 2015/652“, accessed on 3 May 2024 at https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=OJ:L_202302413.

Figure 37 Support schemes in place per country (2020)



Source: *Renewable Gas Trade Centre in Europe (February 2020), "Mapping the state of play of renewable gases in Europe", accessed 16 April 2024 at https://www.regatrace.eu/wp-content/uploads/2020/02/REGATRACE-D6.1.pdf.*

Note: **In Austria and Germany, the support schemes apply only if the end-use of the biomethane is electricity production. In Belgium, the support scheme is only applicable in Wallonia.*

The ongoing transformation away from natural gas introduces some coordination risks concerning the timing and scale of demand for biomethane (as a natural gas substitute)

A large number of stakeholders in the energy value chain are expecting a system transformation from natural gas (and its direct substitutes, including biomethane) towards hydrogen (or alternative energy carriers). However, there is high uncertainty around its timing and scale, leading to uncertainties around the expected ramp-down of demand for direct substitutes for natural gas such as biomethane[138]. Given that infrastructure repurposed for the transport of hydrogen cannot be used to transport biomethane, this increases the degree of coordination required along the biomethane value chain. A DA/JPM has some potential to

[138] We note that the coordination problems with infrastructure for biomethane methane might arise due to uncertainty about future/long-term availability of pipelines (assuming decreasing natural gas demand and/or transformation to hydrogen pipelines). This also depends on policy decisions on future use of biomethane e.g. for heating. Investments required to strengthen the distribution network and/or build production facilities for biomethane may be reduced or held off due to this uncertainty. This coordination problem, however, is smaller in magnitude compared to the "chicken-and-egg" problem present for the still-nascent hydrogen market.

partly reduce this uncertainty around demand and supply development by facilitating the formation of new (long-term) contracts This would require regulatory clarity around the handling of longer-term bookings of natural gas pipelines with decreasing usage.

4.3.4 Potential role of DA/JPM for biomethane

A DA/JPM is unlikely to help overcome the existing key market barriers for biomethane by itself. Figure 38 restates the barriers where DA/JPM may add the most relative value (see Section 4.1) and summarises our assessment of whether these barriers apply for the biomethane market, in light of stated policy goals:

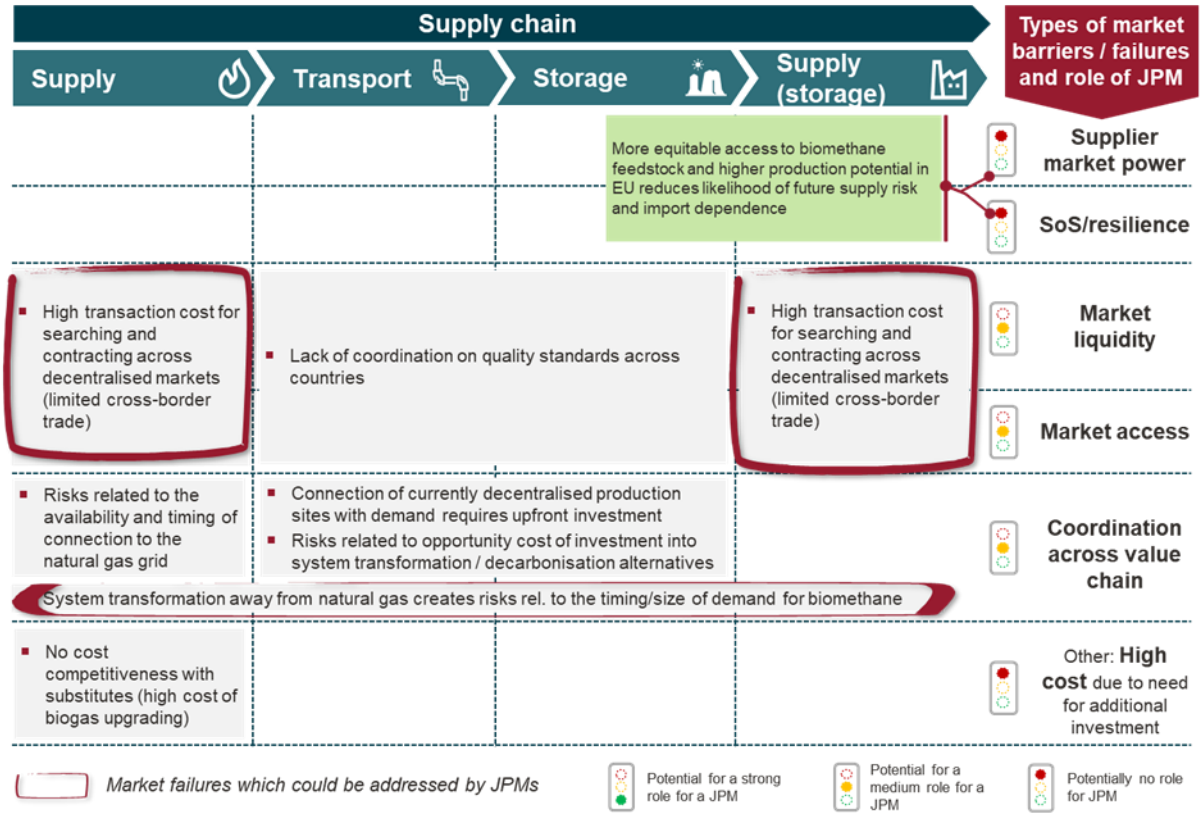
- **Limited long-term concerns around security of supply and concentration of supplier power:** Given the variety of biomethane feedstock and its distribution across the EU-27, it can be made accessible to a large number of potential producers. Assuming an ongoing role of biomethane in the energy value chain, this makes high concentration of market power with single suppliers less likely in the longer term. The large production potential within the EU additionally reduces the extent of dependencies on energy imports. The potential of DA/JPM specifically to address concerns around security of supply and supplier market power is thus less likely to add value in the biomethane market.

- **Cost competitiveness with natural gas cannot be addressed effectively through DA/JPM alone:** The comparatively high costs of biomethane require e.g. subsidies or obligations on the demand side for higher take-up (demand schemes), in particular while natural gas is still available. The allocation of subsidies or imposing obligations is not a (core) function of DA/JPM, and it is thus not well-placed to address the current lack of cost competitiveness of biomethane with natural gas.

- **Some rationale for a DA/JPM tool to address barriers to (particularly cross-border) market access, liquidity, and coordination during market ramp-up:** At its current stage, the lack of coordination of regulatory standards across countries poses an important barrier to (especially cross-border) market liquidity, and remains a pressing policy issue to be addressed, although the establishment of the Union Database[139] provides a way for the implementation of an inter-European mass balancing system and thus should reduce barriers to trade for a given certification system. Once uniform product and certification standards are established and consistently applied, DA/JPM may help to reduce transaction costs for searching and contracting as cross-border trade expands. Furthermore, a DA/JPM may provide some visibility on future demand for pipeline transportation of natural gas(-equivalents) to support infrastructure coordination.

[139] European Parliament and European Council (20.11.2023) “Directive (EU) 2023/2413 of the European Parliament and of the Council of 18 October 2023 amending Directive (EU) 2018/2001, Regulation (EU) 2018/1999 and Directive 98/70/EC as regards the promotion of energy from renewable sources, and repealing Council Directive (EU) 2015/652“, accessed on 3 May 2024 at https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=OJ:L_202302413.

Figure 38 Market barriers and potential for role of DA/JPM in biomethane markets



Source: Frontier Economics

A combination with regulatory efforts and additional infrastructure investments to facilitate cross-border tradability will be required to effectively mitigate remaining barriers. In the following we focus on thinking about how any form of DA/JPM could contribute to supporting biomethane market development.

We note that some barriers in particular around value chain coordination could only be fully addressed with mandatory forms of DA/JPM with central buyer mechanisms, which come at a high cost and are out of scope given the legal basis set out in the Gas Regulation. Assuming continued regulatory efforts to facilitate cross-border trade, current barriers around market access, and coordination may be alleviated with less **interventionist forms of a DA/JPM tool** (see upper half of Figure 39):

- There are several ways in which different forms of **transparency platforms,** e.g. transparency and notifications**,** may add value:
  - A **transparency platform on regulatory differences** which provides an overview of existing biomethane certification schemes across the EU-27, including those with national requirements beyond the standards of RED certifications, may be a way to encourage market access and liquidity at relatively low cost. In particular, providing

information to suppliers on where they can trade their product (given their product characteristics) may support ramp-up of cross-border trade. We outline more concrete design details for such a platform in **Case Study 1** below.

- A **transparency platform on existing infrastructure, demand and potential supply** could also be envisioned. Such a platform could allow potential market participants to announce planned feedstock, supply and demand volumes for certified biomethane with granular (e.g. NUTS3-level) information on location. Infrastructure operators could submit or publish current status and envisaged development of infrastructure. Such a platform could serve to signal availability of feedstock, infrastructure and counterparties. This, in turn, could facilitate the development of biomethane upgrade and injection facilities in optimal locations. While this option is costlier to implement than the option described above, and its success is conditional upon high participation rates and the provision of reliable information by registered members, it may support the ramp-up of biomethane production to meet local demand before the implementation of more harmonised regulation across the EU-27. We outline more concrete design details for such a platform in **Case Study 2** below.

- **Matching platforms,** e.g. based on aggregation of supply, may also add value:

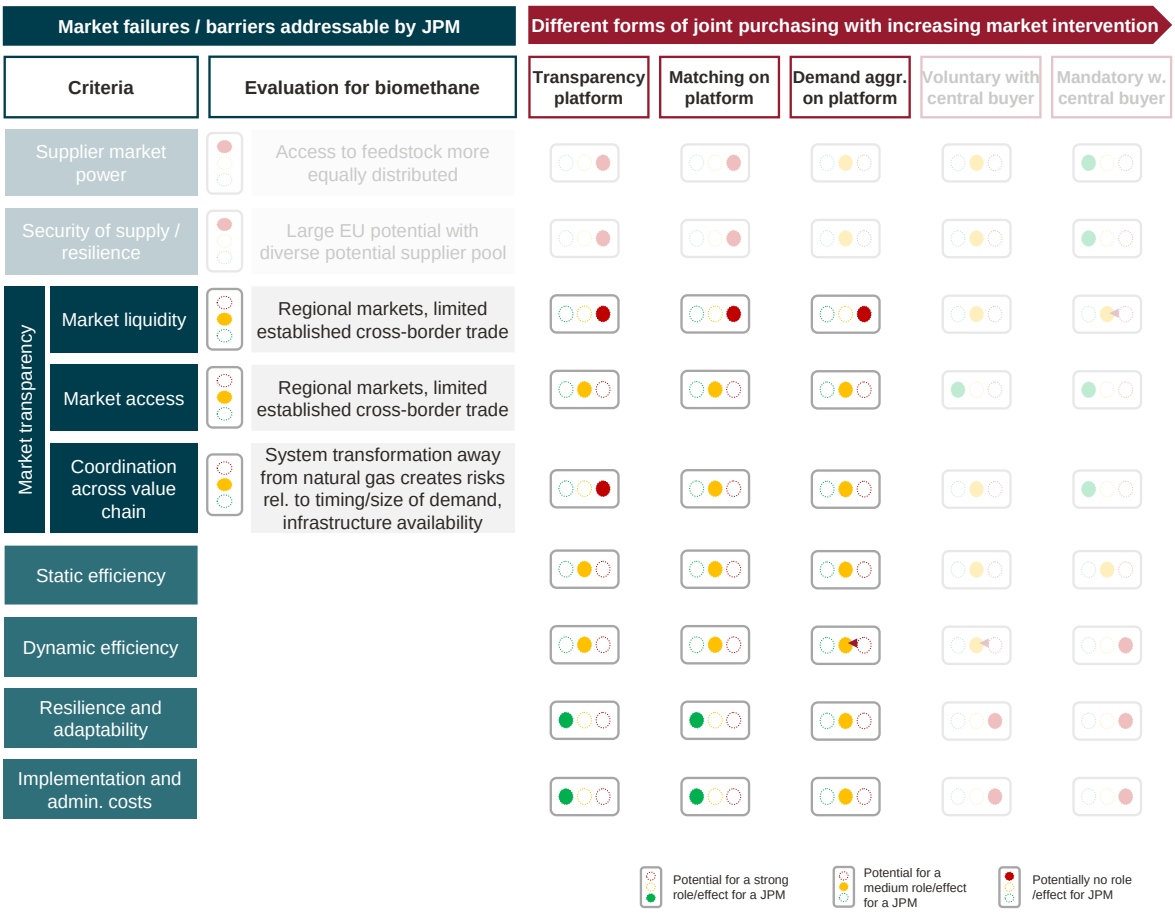
  - In principle, given existing barriers around coordination, market access and liquidity and cross-border trade, a **matching service** between suppliers and off-takers may add additional value, particularly for coordination. Such a service may encourage the extension of relationships between off-takers and suppliers beyond localised production and consumption centres, and thus potentially encourage cross-border counterparty discovery and provide incentives to assess and coordinate on infrastructure needs. However, given the above-mentioned barriers to cross-border trade, a cross-border matching mechanism would provide significantly **more value-add at a later stage of market development** (as also confirmed by early stakeholder feedback).

  - The potential value added of **demand aggregation** compared to a transparency or matching platform consists mainly in reducing the costs of contracting with multiple parties for larger (not aggregated) counterparties. For biomethane, supplier diversity is likely to result in negligible market power on the supplier side. Given the additional administrative cost of establishing a platform with functional **demand aggregation**, we thus see limited marginal benefit from extending the tool to support demand aggregation, even in the longer run. However, given the fragmentation on the supply side of the biomethane market, there is a stronger case for **aggregation of supply and feedstock** in the longer term.[140] For this case and with a potential implementation at a later stage of market development, in mind (including following the development

[140] We note that some additional complexity may arise from the feasibility of supply and feedstock aggregation, as it may be impacted by limitations to the ability to simultaneously process different types of feedstock, as well as by its variable GHG implications.

of the Union Database), we outline an **aggregation mechanism** in **Case Study 3** below (Section 4.3.5).

Figure 39 Demand and supply collection with (potential) matching are most sensible forms of DA/JPM given current market structures for biomethane



Source: Frontier Economics

4.3.5 Concrete design considerations and case studies

Given the results of our assessment, we outline below three case studies of potential forms of DA/JPM, which, given existing market characteristics, may spur the development of the biomethane market in EU-27.

Case Study 1: Transparency platform on regulatory differences

As a "lighter-touch" platform solution, we present as a potential case study a transparency platform which focuses on consolidating and providing information on the requirements for trading biomethane in each EU Member State. As noted above, in principle, biomethane and GoOs (separately from the underlying commodity) can be freely traded across the EU. In

practice, Member States often impose specific and differentiated requirements on the content of GoOs and the registration and certification of biomethane for use towards national targets that may limit their tradability. According to stakeholder feedback, this means that biomethane suppliers have to invest significant resources into understanding regulatory differences across the European Union, thus imposing practical barriers to trade.

This platform is then to be targeted at producers of biomethane, and would aim to give them an overview of where their produced volumes may be tradeable. This should take into account relevant variables such as CO_2 content, type and country of certification, and whether or not they are aiming to bundle their product with GoOs. The main function of the platform would then be to ease biomethane suppliers' entry into EU markets other than their country of production, by making necessary information on where they could trade with given regulation more easily accessible.

We outline illustrative requirements for registration of participants to the platform, including the type of information to be provided, in Figure 40.

Figure 40 Illustrative suggestions for registration requirements in case study 1

Step of value chain	Requirements in registration process
Biomethane producers	▪ Contact data and location (country / region) ▪ Certification of natural gas product as biomethane, and type of certification / relevant biomethane registry ▪ Annual production volume and location of infrastructure connection / delivery point ▪ Type of certification for Proof of Sustainability ▪ Choice to bundle their product with only Proof of Sustainability, or additional bundle with Guarantees of Origin

Source: Frontier Economics

To make the platform efficient and user-friendly and thus encourage uptake and participation, our suggestion would be to standardise the functionalities of the platform as much as possible:

- **Registration process**: Participants may be provided with the possibility to fill out standardised forms. To keep administrative costs low, the platform may forego the verification of provided information, given its focus to reduce research costs for suppliers rather than collect valid supply information – though the verification of documents confirming the certification of the registering participant's natural gas product as biomethane may be required to ensure compliance with the given legal basis[141].

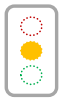
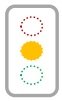
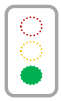
[141] We note that the information provided to the platform by individual suppliers is for verification purposes and should not be shared publicly or with other stakeholders (unless in an aggregated form).

- **Provision of relevant information**: After registration and submission of information to the platform, participants receive an output showing a list of countries and/or regions where their product can be sold with their existing certification and given relevant regulation. Additionally, registered participants may select other countries of interest to receive information on which additional or alternative certification is required to trade there.

- **Ancillary services**: Registered participants may benefit from receiving information on existing public funding opportunities, as well as from access to standard biomethane purchase agreements to ease entry into other EU markets further.

We note that, given this exemplary design, the platform provides no direct benefit in terms of counterparty discovery, but may encourage the ramp-up of cross-border trade specifically by **reducing informational barriers to market access.** Against this background, we outline in Figure 41 our assessment of how the suggested platform performs against our evaluation criteria.

Figure 41 Evaluation of Case Study 1: Transparency platform on regulatory differences

Evaluation criteria	Assessment
Static efficiency	 ▪ Given focus on provision of information, limited tangible impact on static efficiency ▪ Possibly some efficiencies from reduction of search costs
Dynamic efficiency	 ▪ Limited direct impact; possibly some indirect positive effects if the platform successfully helps to ramp up cross-border trade and increases international competition ▪ Potential to crowd out commercial offerings, increasing costs of delivering service over long run
Resilience and adaptability	 ▪ Highly adaptable given that focus is on the provision of information, which can be flexibly updated (or discarded from the platform once outdated or no longer relevant)
Ease of implementation and administrative costs	 ▪ Low administrative and implementation costs: pure transparency platform requires some development costs (IT set-up and collection of relevant information), but given lack of organised member interaction, low costs for upkeep
EU added value	 ▪ EU value from combining information on certification and standards across Member States rather than a focus on just one

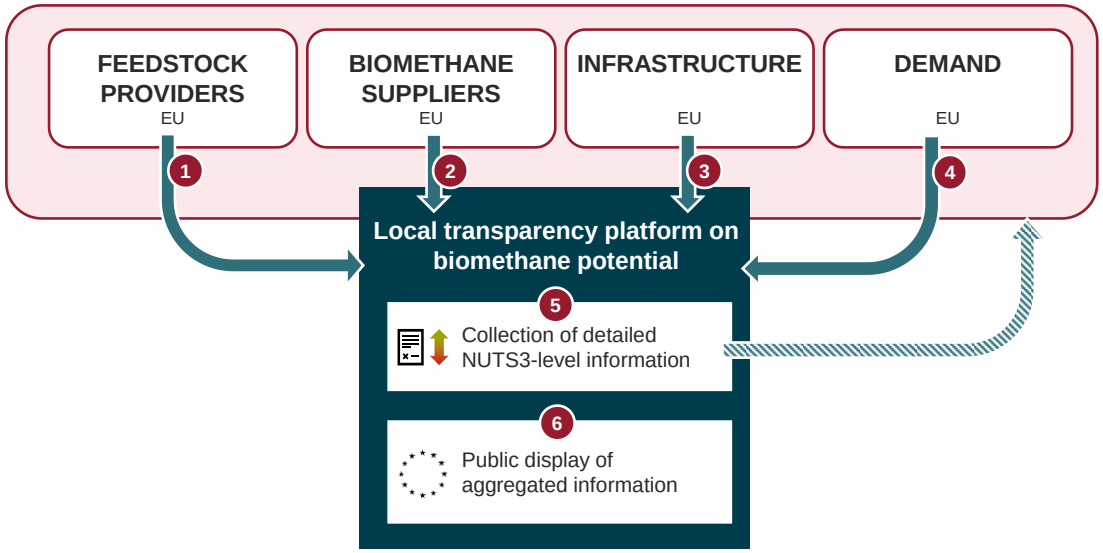
Source: Frontier Economics

Given comparatively low administrative cost, high adaptability and limited potential for distorting effects, we consider the **implementation of the platform suggested in this case study a relatively low-regret measure** which can easily be adapted in case policy priorities and measures change over time.

Case Study 2: Transparency on existing infrastructure, demand and potential supply

To encourage the ramp-up of biomethane production in the short term, potentially valuable support could be delivered by a transparency platform which provides a view on demand, feedstock availability and existing biomethane production, complemented by existing infrastructure. Given current market structures, the information submitted to and displayed by the platform should be of high granularity with respect to location data – data should be collected **on a local level** (e.g. NUTS3) across the Union. Such a platform would require information across four different steps of the value chain: Feedstock providers, biomethane producers, infrastructure providers, as well as (potential) off-takers. We illustrate the structure of the platform in Figure 42.

Figure 42 Illustrative suggestions for DA/JPM platform structure in biomethane case study 2



1. Potential feedstock providers can submit their type of feedstock, yearly volume and estimated calorific value
2. Existing biomethane suppliers can submit biomethane certification, annual production volume, and grid connection point
3. Infrastructure providers can submit existing and planned infrastructure with (expected) injection capacity
4. (Potential) off-takers can submit estimated annual demand for biomethane with exact location of relevant grid connection
5. Platform collects information and makes information on presence and location accessible to verified counterparties
6. Platform publicises aggregated information on demand, supply, and potential

Source: Frontier Economics

The collection of information on the volume of available feedstock, existing production and demand at a high level of geographical detail may reduce search costs for investors in

production facilities. In particular, it may help to identify unrealised potential in areas where significant feedstock is available, production sites have not yet been established, and distribution and/or transmission infrastructure is geographically close. The latter could be beneficial in particular to identify additional potential which can be realised without significant additional investments in infrastructure and for buyers located in geographical proximity. Making the amount of total locally available feedstock visible may also help to underpin investment in larger production plants and thus help to realise economies of scale from biomethane production (though the effectiveness of the platform may vary by Member State depending on the local policies in place to support biomethane).

To keep search costs to a minimum, at the core of the platform, it would be essential for potential investors to be able to request access to contact details of potential feedstock suppliers. We outline illustrative requirements for the registration of participants to the platform, including the type of information to be provided, in Figure 43.

Figure 43 Illustrative suggestions for registration requirements in case study 2

Step of value chain	Requirements in registration process
Production potential / Feedstock providers	▪ Contact data and exact location ▪ Type of feedstock, yearly volume and estimated calorific value
Biomethane producers	▪ Contact data and exact location ▪ Certification of natural gas product as biomethane, annual production volume ▪ Instrument(s) for contract negotiations (e.g., letter of credit, guarantees, collateral)
Infrastructure / Transport	▪ No registration necessary; to be added from existing (public) information on networks across the EU ▪ Registration required for entry of planned infrastructure, to be entered with exact location and envisioned capacity
Demand / Off-takers	▪ Contact data and exact location ▪ Type of off-taker / industry, estimated annual demand for biomethane ▪ Instrument(s) for contract negotiations (e.g., letter of credit, guarantees, collateral)

Source: Frontier Economics

Note that the level of functionality, as well as the level of detail required to be provided for registration on the platform may substantially increase implementation costs for the

development of the platform, as well as administrative costs for registering members[142]. To encourage participation in the platform and the realisation of described effects, it may be valuable to add a feedback system to registered participants. Accordingly, the following could be functionalities on the platform which encourage connectivity and counterparty discovery:

- **Notification to interested parties and possibility to request access to contact details:** Interested parties such as potential investors may choose to be notified of the presence of new registered participants, with the possibility to select their regions of interest across the Union. Registered participants should also be able to request access to contact details of stakeholders within their regions of interest to ease (especially local) counterparty discovery.

- **Notification to feedstock providers:** Registering feedstock providers may benefit from a notification informing them of proximity of their business to

  - existing natural gas infrastructure (implying the possibility to obtain a grid connection without the need for significant investment); and

  - other potential feedstock suppliers (implying the possibility to negotiate off the platform to aggregate their feedstock supply and thus achieve economies of scale).

- **Notification to potential off-takers:** Registering participants which have proclaimed demand for biomethane may benefit from a notification informing them if a new biomethane supplier registers on the platform in their region or selected regions of interest, and providing them with contact data in order to be able to enter negotiations off the platform.

In addition to these core notification services outlined above, potential ancillary services to be offered on the platform could be:

- **Publication of aggregated information**: An aggregated version of the information collected on the platform could be made available to the public, potentially on a more regionally aggregated level (e.g. NUTS2). This can demonstrate policy focus on spurring biomethane production and trading, and further support investments by publicly signalling market activity in terms of production potential and demand (though we note that this would be especially effective if provided information is independently verified).

- **Provide information on suitable public funding opportunities**: As an additional service, registered participants may receive an overview of available public funding opportunities to further incentivise investments. Most of this information should already be publicly available, for example from research done for EU-funded project

142 Given current market structures and as confirmed by stakeholder feedback, the provision of financial guarantees is more valuable for the supplier and/or feedstock side, more so than providing it for potential buyers. Suppliers in the biomethane market tend to be rather small (<1% market share). Accordingly, large entities demanding biomethane may tend to have lower credit risk than their contracting partners on the supply side, increasing the value of providing financial guarantees for the supply side.

REGATRACE. Some value could be added by filtering funding opportunities on basic relevant selection criteria, such as production region and type of feedstock used.

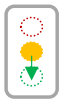
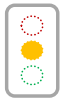
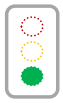
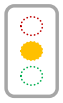
- **Offering standard biomethane purchase agreements**: In order to ease off-platform negotiations where relevant, a standard biomethane purchase agreement could be developed (as already in place for biogas[143]) and offered as a template to participants that have been notified. In particular, given stakeholder feedback on issues securing investments given longer-term uncertainty around biomethane demand, the platform could offer longer-term purchase agreements. This could nudge participants towards the negotiation of longer-term products, and thus reduce demand uncertainty for potential biomethane suppliers.

Overall, the focus of the platform is on **reducing informational barriers to the identification of opportunities for coordination** across the Union, as well as on the potential for ramping up production and liquidity by **reducing search costs for potential investors**. Against this background, we outline in Figure 44 our assessment of how the suggested platform performs against our evaluation criteria. The platform performs well on adaptability. According to stakeholder feedback, however, at the early stage of market development it is most likely to bring together market participants from the same Member State (due to regulatory differences across the Union).

We note that this platform requires a significant amount of high-value information to be beneficial for market development, and thus requires a high participation rate at least in regions where a ramp-up of biomethane production is supported by national policy. It is thus **difficult to implement effectively** and realise its potential benefits fully. Overall, we thus recommend this platform only as a lower priority given its more significant implementation cost.

143 CEGH (15 July 2023), “EFET CEGH Biogas Certificates Standard Agreement”, accessed on 25 April 2024 at https://www.cegh.at/de/efet-cegh-biogas-certificates-standard-agreement/.

Figure 44 Evaluation of Case Study 2: Transparency on existing infrastructure, demand and potential supply

Evaluation criteria	Assessment
Static efficiency	 ▪ Possibly some efficiencies from reduction of search costs for potential investors ▪ Some potential efficiencies if the platform is used by (potential) biomethane suppliers to achieve economies of scale by combining feedstock sources locally, depending on extent to which projects are economic
Dynamic efficiency	 ▪ Limited direct impact ▪ Limited potential for longer-term efficiencies from scale economies if platform is extended interregionally (given limited value of transporting feedstock over longer distances) ▪ Potential to crowd out commercial offerings, increasing costs of delivering service over long run
Resilience and adaptability	 ▪ Flexibly adaptable matching service based on stage of market development (e.g. matching and notification services can be amended to a more interregional focus)
Ease of implementation and administrative costs	 ▪ Lack of organised member interaction (e.g. through tendering) limits ongoing administrative costs ▪ However, difficult to implement given significant participation rates and consistently up-to-date information are required for the platform to deliver tangible benefits
EU added value	 ▪ Limited further EU value add in the short term as platform could be implemented by Member States independently with likely similar effects, but some potential for benefits over the longer run if information is to be standardised across MS

Source: Frontier Economics

Case Study 3: Aggregation mechanism

As case study 3, we consider a platform meant to provide value at a later stage of development of the biomethane market, acknowledging stakeholder feedback that cross-border matching between buyers and suppliers may become valuable only in the medium to long term.

We outline exemplary requirements for registration of participants to the platform, including the type of information to be provided, in Figure 45. This case study would require information across two parts of the value chain, biomethane producers as well as (potential) biomethane off-takers. A valuable functionality for off-takers would be the option to be identifiable as such to producers if located in a region where they are able to trade biomethane, given their existing product standards, certifications and access to infrastructure. This has the potential to

encourage (cross-border) counterparty discovery and inter-EU market access when existing biomethane supply has ramped up sufficiently in order to meet existing demand.

Figure 45 Exemplary suggestions for registration requirements in biomethane case study 3

Step of value chain	Requirements in registration process
Biomethane producers	▪ Contact data and location (country / region) ▪ Certification of natural gas product as biomethane, and type of certification / relevant biomethane registry ▪ Annual production volume and location of infrastructure connection / delivery point ▪ Type of certification for Proof of Sustainability ▪ Choice to bundle their product with only Proof of Sustainability, or additional bundle with Guarantee of Origin ▪ Instrument(s) for contract negotiations (e.g., letter of credit, guarantees, collateral) ▪ Indicative pricing
Demand / Off-takers	▪ Contact data and location ▪ Type of off-taker / industry, estimated annual demand for biomethane (including interest in only PoS or also GoO) ▪ Instrument(s) for contract negotiations (e.g., letter of credit, guarantees, collateral)

Source: Frontier Economics

To enable the realisation of these effects, the matching functionality has to become core to the envisioned platform. Potential core functions of the platform could thus be:

- **Matching based on location and tradability/provision of contact data**: After registering their projected production and relevant certification on the platform, suppliers may be able to request the contact data of potential off-takers, if located in a region that supports trade of the registered supplier's product.

- **Matching with other suppliers:** If the demand of matched potential off-takers exceeds the suppliers' projected production, suppliers may be able to request the contact data of other registered suppliers able to trade biomethane in the relevant region of demand. This can pave the way for counterparty discovery and encouragement of supply aggregation (within the limits of compliance with EU competition rules on commercialisation agreements). Depending on the form of co-operation chosen, this may significantly benefit off-takers by reducing contracting costs.

- **Calls for expression of interest (for demand or supply):** If private initiatives do not develop in the longer term, the platform may also support calls for expression of interest

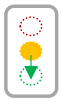
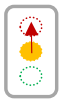
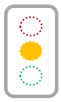
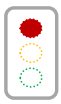
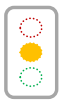
(for demand or supply) by off-takers for their consumption needs. This would require suppliers to submit indicative bids to meet off-takers' demand, and depending on the level of competition, may additionally encourage counterparty discovery by attracting alternative suppliers outside of the off-takers region.

In addition to the core matching functionality, potential ancillary services to be offered on the platform could be similar to what was proposed for case study 1:

- **Publication of aggregated information**: A nationally aggregated version of registered supply and demand volumes could be made available to the public, in order to signal biomethane market development and potentially incentivising infrastructure investments to connect production and demand without existing infrastructure connections.
- **Provide information on suitable public funding opportunities**: As an additional information dissemination service, registered participants may receive an overview of available public funding opportunities to further incentivise investments into biomethane production.
- **Offering standard biomethane purchase agreements**: In order to ease off-platform negotiations where relevant, a standard biomethane purchase agreement could be developed and offered as a template to matched participants.

As described, the platform has a focus on cross-border counterparty discovery and the reduction of search costs, and thus has some potential to encourage cross-border trade once production has been ramped up. Against this background, we outline in Figure 46 our assessment of how the suggested platform performs against our evaluation criteria.

Figure 46 Evaluation of Case Study 3: Aggregation mechanism

Evaluation criteria		Assessment
Static efficiency		▪ Possibly some efficiencies from reduction of search costs for off-takers (e.g. mid-streamer services)
Dynamic efficiency		▪ Limited direct impact ▪ Potential to crowd out commercial offerings, increasing costs of delivering service over long run; greater risk of negative longer-run impacts given significance of intervention
Resilience and adaptability		▪ Regularity of organised member interaction reduces flexibility of the platform to adapt to changing market conditions
Ease of implementation and administrative costs		▪ Organised member interaction (through matching and/or tendering) significantly increases ongoing administrative costs ▪ Difficult to implement given significant participation rates and consistently up-to-date information are required for the platform to deliver tangible benefits
EU added value		▪ Some potential for benefits over the longer run if information to be standardised across MS

Source: Frontier Economics

The platform has potential for some **(limited) efficiency gains** through its potential value for market participants providing mid-streamer services such as trading and contracting. For these stakeholders, registration as an off-taker may help reduce search costs to identify and contract smaller biomethane suppliers, while itself acting as a supply aggregator. However, there are some concerns around the **ongoing administrative costs** of a platform with organised member interactions such as described here. We also emphasise that we strongly recommend against the implementation of the platform, before issues around regulatory heterogeneity are addressed. In the meantime, commercial services may also develop when the market evolves to a stage where a platform in this form is more beneficial.

In the future we **recommend to reassess market structures and potentially developing private initiatives before considering its implementation** in the longer run, in particular given potential concerns around dynamic efficiency at higher levels of intervention.

4.4 Natural gas captured from methane abatement

In this section we discuss how and in which form DA/JPM can be beneficial to the market for natural gas from methane abatement, starting with a summary and followed by a detailed write-up.

4.4.1 Summary

Introduction (Section 4.4.2)

There is potential to **reduce global methane emissions** through the implementation of methane abatement projects, which capture natural gas that is currently being vented, flared, or leaked. The commercialisation of captured volumes may additionally contribute to **increasing energy security**.

Key market barriers (Section 4.4.3)

Current barriers to methane abatement include **high implementation costs** with a negative impact on cost competitiveness, **high investment risk** from a combination of economic and political factors, and **coordination needs** due to uncertainty with regards to long-term gas demand and infrastructure availability. Additionally, the **complexities of methane emissions measurements** pose a barrier to the establishment of certification systems and the formation of voluntary markets.

Role of DA/JPM (Section 4.4.4)

Before the introduction of binding obligations around methane emissions from imported oil and gas under the EU methane regulation, a DA/JPM may help to incentivise early investment by **addressing some of the existing barriers around market access and coordination across the value chain**. In particular, a focus on **demand collection and/or aggregation on the platform** may **reduce demand uncertainty** and so contribute to incentivising the implementation of abatement projects. It may thus **bridge the policy gap** towards the emergence of a more formal market in anticipation of binding obligations.

Form of DA/JPM (Section 4.4.5)

An **add-on feature to DA/JPM for natural gas that provides opportunities for off-takers to express preferences on monitoring and reporting of methane emissions** of participating suppliers (using information from the planned Methane Transparency Database) may reward players which have already begun implementing abatement measures .

At a higher cost, a **platform enabling demand transparency for gas specifically from abatement projects** may help new projects which have already been developed and structured with financiers to secure off-takers to reduce risk of investment.

4.4.2 Introduction to methane abatement and legal basis for DA/JPM

It is estimated that in 2023, globally, the energy sector caused around 120 Mt of methane emissions[144], such as from venting, flaring, or leakage. A significant share of this natural gas currently going unused in the energy value chain could be "captured" and brought to market, representing potential additional gas supplies that would allow further diversification away from Russian imports. The International Energy Agency[145] estimated that **4 bcm of natural gas** could be additionally made available to the European Union over a short time period (12 months) – mainly from African countries such as **Algeria, Angola, Egypt and Nigeria.** Methane from abatement projects is inherently interconnected with the natural gas market, but it still has distinct properties:

- **High demand substitutability with natural gas**: On a technical level, the capturing and sale of otherwise wasted methane provides an additional supply of natural gas and is fully interchangeable in all natural gas applications.
- **Desirable sustainability properties**: The capturing and supply of otherwise wasted methane by definition reduces emissions of methane into the atmosphere, along with its associated negative impacts. It therefore has a lower carbon footprint compared to regularly procured natural gas and could thus be considered a lower-carbon alternative.
- **Cost offsetting potential from abatement projects**: Depending on the abatement measure and location, certain abatement projects can operate at a profit, if the captured volumes are brought to market. Figure 47 shows the marginal abatement cost curve for oil and gas operations by abatement measure, demonstrating how much methane could be abated at what cost. A negative value implies that the value of recovered gas may offset the cost of abatement[146].
- **Potential additional willingness to pay**: Suggestions of additional (price) incentives from buyers[147] signals a potential additional willingness to pay for methane captured from relevant abatement measures.

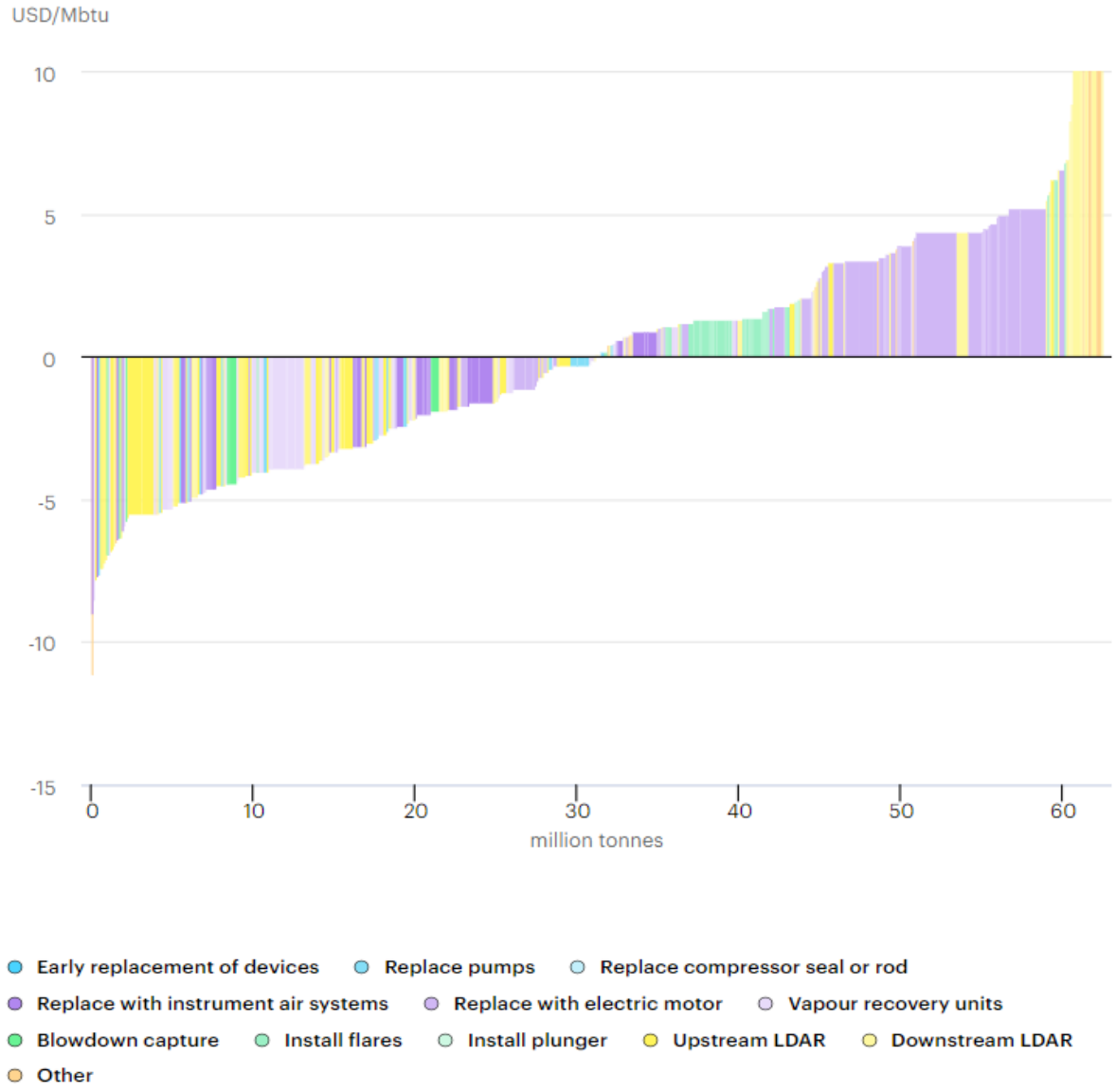
144 IEA (2024), Global Methane Tracker 2024, IEA, Paris, Licence: CC BY 4.0, accessed on 3 May 2024 at https://www.iea.org/reports/global-methane-tracker-2024.

145 International Energy Agency (2022), „How to Avoid Gas Shortages in the European Union in 2023", accessed on 16 February 2024 at http://tinyurl.com/3e2t9ks9.

146 International Energy Agency (October 2021), "Curtailing Methane Emissions from Fossil Fuel Operations: Pathways to a 75% cut by 2030", accessed on 10 April 2024 at https://tinyurl.com/m6dv76kw.

147 International Energy Agency (2022), „How to Avoid Gas Shortages in the European Union in 2023", accessed on 16 February 2024 at http://tinyurl.com/3e2t9ks9.

Figure 47 Marginal abatement cost curve for oil and gas methane emissions by mitigation measure, 2022



Source: *International Energy Agency 2023, "Marginal abatement cost curve for oil and gas methane emissions by mitigation measure, 2022", accessed on 10 April 2024 at https://www.iea.org/data-and-statistics/charts/marginal-abatement-cost-curve-for-oil-and-gas-methane-emissions-by-mitigation-measure-2022, License: CC BY 4.0.*

Note: *Based on 2017-2021 average gas prices (wellhead). LDAR = Leak Detection and Repair.*

Given its fully interchangeability for use in existing natural gas infrastructure, it is covered by the revised Gas Directive[148], and thus by the legal mandate for the development of a permanent mechanism for voluntary demand aggregation for natural gas from 2025 (see Section 1.2 for more detail on the legal basis).

The European Commission has also announced the development of *"a roadmap for the global roll-out of the 'You Collect, We Buy' scheme,*" aiming to *"incentivise companies to capture and commercialise gas that would otherwise go to waste through venting and flaring,"*[149] and thus toward the policy goal of the Global Methane Pledge to achieve at least a 30% global reduction in methane emissions from 2020 levels by 2030[150]. This is complemented by the newly adopted EU methane regulation[151] which plans to place binding methane intensity thresholds on Europe's oil and gas imports from 2030.

Given this framework, for the purposes of assessing methane from abatement projects for suitability of application of DA/JPM, we evaluate the potential options against the background of the stated **policy goals of emissions reduction and energy security**. We focus on considering a short-term bridging solution before obligations under the EU methane regulation become binding in the medium term. As noted above, while methane from abatement projects is inherently interconnected with the natural gas market, we have assessed it as a separate, lower-carbon natural gas product.[152]

4.4.3 Market failures and barriers for methane abatement

The implementation of methane abatement projects and the integration of captured volumes into EU energy imports faces barriers, as described below.

The lack of certification hinders the realisation of a potentially higher willingness to pay and thus limits the incentive for relevant producers to make required investments, given limited cost competitiveness

Making currently flared, vented, or leaked methane available for export requires the implementation of methane abatement measures such as leak detection and repair

148 Directive (EU) 2024/1788 of the European Parliament and of the Council of 13 June 2024 on common rules for the internal markets for renewable gas, natural gas and hydrogen, amending Directive (EU) 2023/1791 and repealing Directive 2009/73/EC (recast), OJ L, 2024/1788, 15.7.2024.

149 European Commission (2 December 2023), "EU announces €175m financial support to reduce methane emissions at COP28", press release, accessed 4 March 2024 at https://ec.europa.eu/commission/presscorner/detail/en/IP_23_6057.

150 Global Methane Pledge (website), accessed 10 April 2024 at https://www.globalmethanepledge.org/.

151 Regulation (EU) 2024/1787 of the European Parliament and of the Council of 13 June 2024 on the reduction of methane emissions in the energy sector and amending Regulation (EU) 2019/942, OJ L, 2024/1787, 15.7.2024..

152 Our focus is on supporting the development of a voluntary market as a "bridging" solution until the binding methane intensity thresholds on Europe's oil and gas imports are put into place from 2030.

programmes[153], which involve high costs[154]. This reduces cost competitiveness with regular natural gas products, in particular since the implementation costs of methane abatement projects in many cases cannot be offset by selling captured methane at market prices[155].

In principle, this could be addressed through subsidy or through voluntary markets, and many parts of relevant industries have voluntarily demonstrated willingness and efforts to reduce their methane emissions[156,157]. However, currently, there is no available certification which allows consumers to recognise the procurement of (an increased share of) captured methane towards renewable targets compliance goals. There is also no established separate market for lower-carbon methane from gas capturing projects yet which would allow the precise allocation of premia reflecting potential higher willingness to pay of consumers. In turn, this currently leaves limited (price) incentive for potential producers to make required investments into methane capture projects (though this could be offset through early investments due to binding obligations under the future EU methane regulation from 2030 onwards).

The detection and measurement of methane emissions is complex and makes consistent product definitions required for a formal market difficult

Defining methane captured from abatement projects as a lower-carbon gas product requires comprehensive and accurate measurement of reductions in methane emissions from implemented projects. While technologies and practices to implement methane abatement exist and are technologically mature, the steps required to accurately measure reductions are expensive and relatively complex.[158] Particularly if methane reductions are measured as a share of supplied and/or transported gas, the accurate trade of a lower-carbon natural gas product will require some form of mass balancing system to allow for accurate remuneration and the avoidance of double-counting. The current absence of a common system to measure emission reductions and define lower-carbon natural gas products poses a barrier to the establishment of formal (voluntary) markets.

A large number of potential abatement projects have high underlying investment risk

Depending on the size and location of potential methane abatement projects, their financing may be inhibited by a combination of several risk factors. In particular, project planning may

153 International Energy Agency (2022), „How to Avoid Gas Shortages in the European Union in 2023“, accessed on 16 February 2024 at http://tinyurl.com/3e2t9ks9.

154 IEA (2020), „Methane Tracker 2020: Methane abatement options“, accessed 6 June 2024 at https://www.iea.org/reports/methane-tracker-2020/methane-abatement-options.

155 International Energy Agency (October 2021), “Curtailing Methane Emissions from Fossil Fuel Operations: Pathways to a 75% cut by 2030”, accessed on 10 April 2024 at https://tinyurl.com/m6dv76kw.

156 IEA (2024), “Global Methane Tracker 2024: Tracking pledges, targets and action”, accessed on 6 June 2024 at https://www.iea.org/reports/global-methane-tracker-2024/tracking-pledges-targets-and-action.

157 The Oil & Gas Decarbonization Charter, “Our signatories”, Webpage, accessed on 6 June 2024 at https://www.ogdc.org/signatories/.

158 IEA (2020), Methane Tracker 2020, IEA, Paris, accessed on 3 May 2024 at https://www.iea.org/reports/methane-tracker-2020/methane-abatement-options, Licence: CC BY 4.0.

be complex due to the coordination required between several stakeholders such as suppliers, investors, regulators, and local communities.[159] This can be compounded by policy and security risks, especially for projects in low- and middle-income countries.[160]

Direct contact between consumers and potential suppliers of methane captured in abatement projects, or awareness of this potential demand, may also be limited so far. Given additional uncertainties around the amount and reliability of gas supply from implemented abatement projects, the comparatively small pay-offs from smaller-scale projects, as well as off-taker payment risk, demand commitments alone (in particular from smaller consumers) may not be sufficient to incentivise required investments in the short term, before obligations on methane emissions intensity under the EU methane regulation are in place.[161]

The potential additional capacity required to import additional gas supplies increase coordination requirements and investments across the value chain

The ability of gas from methane capture projects to access global markets also depends on available export capacity in potential supplying countries (currently expected to concentrate around the North of Africa). Such countries may have limited additional export capacity to transport larger volumes of natural gas.[162] A lack of visibility regarding the market for lower emissions intensity methane may hinder investments in upgrades to export infrastructure. At the same time, a lack of export infrastructure may disincentivise investments in methane capture projects.

This is further complicated by the expected system transformation and expected ramp-down of the natural gas market, which may create uncertainty around longer-term gas demand and further inhibits investment decisions[163].

159 G. Lorenzato, S. Tordo, B. van den Berg, H. M. Howells, and S. Sarmiento-Saher (2022), "Financing Solutions to Reduce Natural Gas Flaring and Methane Emissions", World Bank Group, accessed on 10 May 2024 at https://tinyurl.com/2wdmecb7.

160 IEA (2024), Global Methane Tracker 2024, IEA, Paris, Licence: CC BY 4.0, accessed on 3 May 2024 at https://www.iea.org/reports/global-methane-tracker-2024.

161 G. Lorenzato, S. Tordo, B. van den Berg, H. M. Howells, and S. Sarmiento-Saher (2022), "Financing Solutions to Reduce Natural Gas Flaring and Methane Emissions", World Bank Group, accessed on 10 May 2024 at https://tinyurl.com/2wdmecb7.

162 As of 2021, "North America and [export countries in the] Eastern Mediterranean could exceed export capacity between forecasted net increases to supply and increases from methane/flaring commercialization efforts", S&P Global Commodity Insights (December 2022), „Levers for capturing methane emissions to improve gas availability", accessed on 16 February 2024 at http://tinyurl.com/p5vwfap9

163 We note that the coordination problems in the context of implementation of methane abatement projects might arise due to uncertainty about future/long-term availability of pipelines (assuming decreasing natural gas demand and/or transformation to hydrogen pipelines). Investments required to implement methane abatement projects or increase infrastructure capacity (in the case of additional volumes) may be reduced or held off due to this uncertainty. This coordination problem, however, is smaller in magnitude compared to the "chicken-and-egg" problem present for the still-nascent hydrogen market.

The supply of lower-carbon captured methane ultimately relies on natural reservoirs and is thus at heightened supply risk, although mitigated by available demand substitutes

Given its interconnection with regular natural gas products, the supply of lower-carbon captured methane in the long-term is dependent on the availability of natural reservoirs, as well as on (supplier) investment into methane abatement projects. This has similar implications for supplier market power and security of supply as in the natural gas market.

However, in the absence of regulatory obligations for procuring (a higher share of) captured methane for GHG compliance in the short term, the demand for lower-carbon captured methane specifically is likely to be more elastic in normal market conditions given the availability of direct (and likely more competitively priced) substitutes. Supply risk and individual supplier market power is therefore likely to be reduced compared to the market situation for regular natural gas, as long as the procurement of lower-carbon natural gas remains voluntary[164].

4.4.4 Potential role of DA/JPM for methane abatement

A certification system that allows for the remuneration of captured methane's emissions-saving properties as well as its usage towards greenhouse gas emission targets, or the direct allocation of subsidies towards the implementation of methane abatement projects may be in theory effective policy options to encourage methane abatement in the short term. In the following, we focus on thinking about how any form of DA/JPM could contribute to overcoming existing barriers in the short term, in particular as a bridging solution until binding obligations are in place under the EU methane regulation.

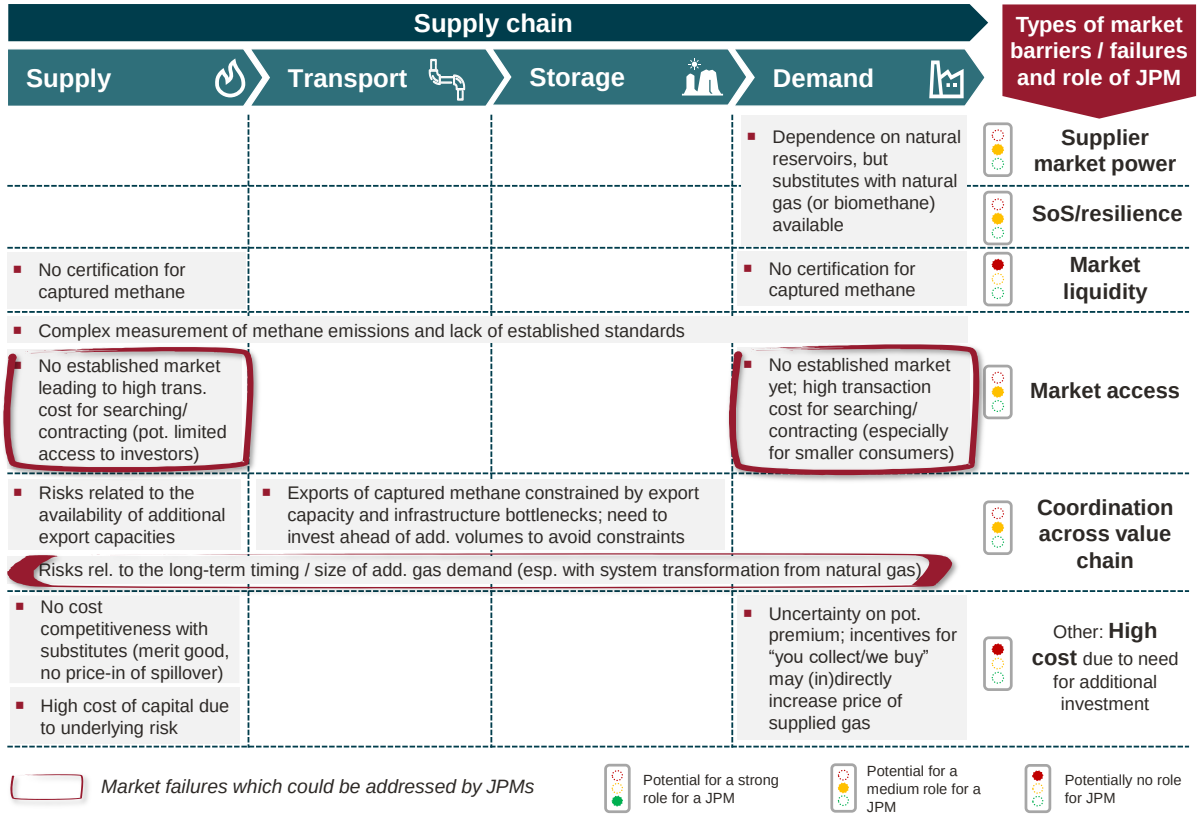
A DA/JPM can play a role in signalling demand and willingness to pay for methane saved in methane abatement projects, providing additional (demand) certainty for potential investors into methane abatement projects, as well as encourage counterparty discovery for interested parties

Figure 48 restates the barriers that DA/JPM may be able to support in addressing (see Section 4.1) and summarises our assessment of whether these barriers apply for the implementation of methane abatement projects, in light of stated policy goals. Overall, DA/JPM can at least partly address the market failures or barriers of supplier market power, security of supply, market access and coordination across the value chain. This is provided that some norms regarding the measurement and definition of captured methane can be established in advance that might facilitate the emergence of a voluntary market for captured methane, for example

[164] If the procurement of lower-carbon gas becomes mandatory, substitutability between lower-carbon and regular natural gas decreases, which would increase supply risk on the (currently still hypothetical) market for lower-carbon gas.

based on existing international standards[165]. Before the obligations on methane intensity thresholds under the EU Methane regulation become binding, DA/JPM could address the cost competitiveness barrier outlined above if complemented with premia, subsidies, or the implementation of a relevant certification system,

Figure 48 Market barriers and potential for role of DA/JPM to encourage methane abatement



Source: Frontier Economics

Before considering how more specific forms of DA/JPM may add value, we note that mandatory forms of DA/JPM, as well as those where public institutions take on credit risk as central buyers are out of scope of the legal framework and are not considered further.

In less interventionist forms, in particular given the need for increased demand certainty to spur investment, a DA/JPM may add value in various forms:

- An add-on feature to DA/JPM for natural gas which utilises information from the planned **Methane Transparency Database** can function as an opportunity for **off-takers to express preferences on suppliers' methane emissions performance** more generally

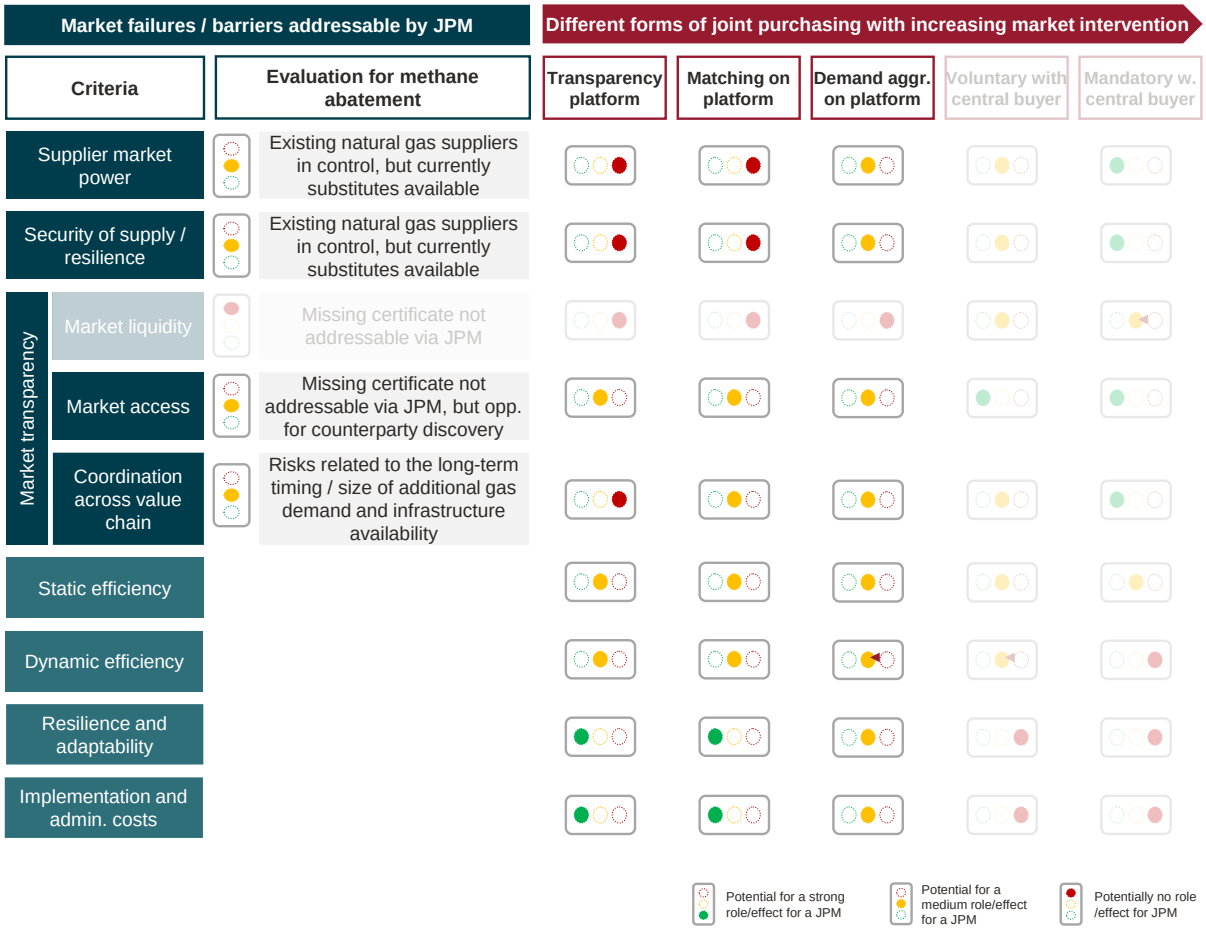
165 For usage in suggested case studies before the establishment on EU standards on methane emissions intensity calculation, existing global standards such as by the Oil & Gas Methane Partnership (OGMP 2.0) may be considered as a reference.

and thus can play a role in further signalling policy interest in methane abatement. In particular, it could allow producers of natural gas which have already begun investing in reducing their methane emissions to be recognised, and thus may (at least indirectly) incentivise new projects that do not require subsidy. We consider more detailed design considerations under **Case Study 1** below (Section 4.4.5).

- For natural gas explicitly captured in new abatement projects, in principle, including both supply and demand on a transparency platform and allowing for a **matching service** may facilitate market access for smaller players, provide signals for potential investors and support coordination on infrastructure (although to a limited extent, given non-binding bids). However, as confirmed by stakeholder feedback, the main barrier to implementation of new methane abatement projects particularly in low- and middle-income countries (LMIC) is a risk profile with a high required rate of return. High returns are difficult to achieve without premia on the product. Against this background, a pure buyer/seller matching platform for natural gas explicitly captured in new abatement projects may have limited impact as the structure of abatement projects needs to be co-financed in advance. Additional financial incentives may also be very useful given the novelty of these projects, with securing off-takers an important additional step. A further development could be a **demand transparency platform targeted at suppliers and financiers looking to find potential off-takers for methane from new abatement projects.** We consider this model in more detail under **Case Study 2** below (Section 4.4.5).

- Given the need for coordination across the value chain, demand collection on the platform may help to incentivise the implementation of new abatement projects, especially if demand volumes reach a critical scale to make such projects into viable business cases. Further, under the assumption that methane abatement projects can bring additional gas volumes to the market from already existing gas producers, a DA/JPM with **demand aggregation on the platform** may contribute to counterbalancing existing supplier power and enhance resilience through increasing volumes (though the need to counterbalance supplier power is contrasted with the policy goal of incentivising suppliers to invest in and implement additional projects).

Figure 49 Some structured demand aggregation may be a viable temporary solution to increase demand certainty for captured methane before the establishment of a more formal market



Source: Frontier Economics

4.4.5 Concrete design considerations and case studies

Given the results of our assessment, we outline below case studies of potential forms of DA/JPM, which, given existing market characteristics, may help incentivise methane abatement before binding obligations on methane intensity thresholds from the EU methane regulation come into force.

From stakeholder feedback, we note that players active in oil and natural gas exploration today may have already implemented (or be in the process of implementing) methane abatement projects, both to encourage efficient operations as well as in anticipation of binding obligations. As confirmed by stakeholders, the particularities of methane emission measurement may make product definition for natural gas captured in abatement projects difficult in practice. As such, we note more generally that, for product definition, aligning with methane emissions intensity standards from industry top performers could be an interim option for the

establishment of a DA/JPM mechanism for natural gas captured in abatement projects, until a formal intensity standard is set by the Commission according to the EU Methane Regulation, and should be considered for the potential implementation of the case studies outlined below[166].

Case Study 1: Incorporation of methane emissions performance into DA/JPM for natural gas

We first consider a potential measure whose aim would be enable off-takers of natural gas to express preferences on suppliers' performance on methane emissions monitoring and reporting. Thus, the measure may acknowledge and reward companies which have already begun implementing methane abatement measures in the absence of a certification system. From conversations with relevant stakeholders, there is indication that there is an insufficient public awareness that methane abatement can be economically sustainable or even profitable, with projects still viewed as "not worth the effort". More transparency on off-taker preferences in this regard may help to signal policy prioritisation of this issue[167], and incentivise the implementation of more abatement projects.

Given the already planned development of the Methane Transparency Database under the EU methane regulation[168], more focus on suppliers' methane emissions performance could be made possible through its incorporation into the DA/JPM for natural gas. Specifically, DA/JPM for natural gas could allow for the incorporation of information on suppliers' methane emissions monitoring into the matching process – to be fed directly by information from the Methane Transparency Database after its establishment. Potential off-takers may then express their preferences on being matched with suppliers performing particularly well on methane emissions. This may allow suppliers of natural gas to be recognised for the measures that are already being taken.

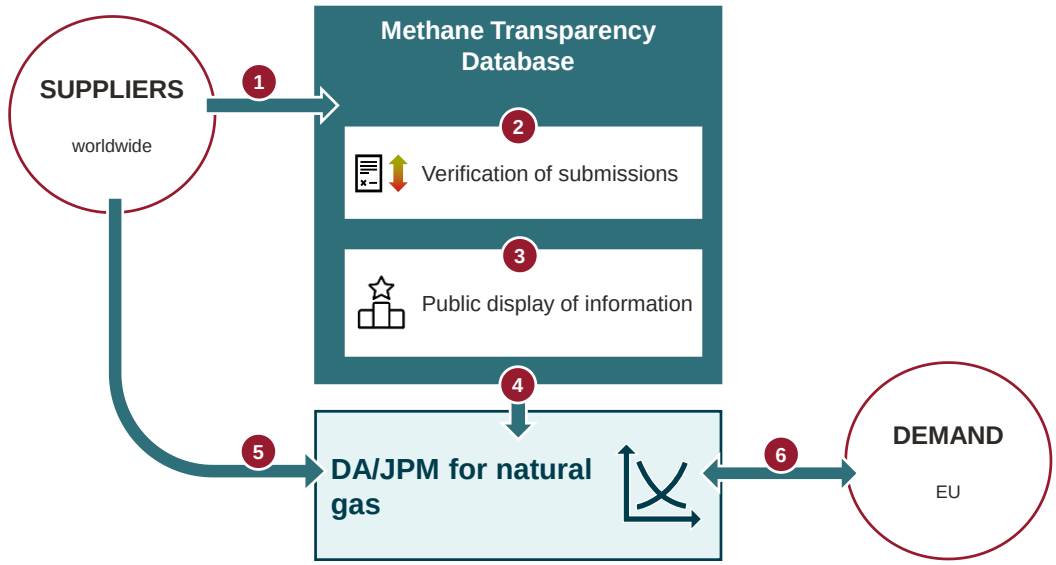
We illustrate the structure of the envisioned process in Figure 50.

166 For usage in suggested case studies before the establishment on EU standards on methane emissions intensity calculation, existing global standards such as by the Oil & Gas Methane Partnership (OGMP 2.0) may be used.

167 We note that the economic significance of an envisioned „signalling benefit" is difficult to predict and measure.

168 Regulation (EU) 2024/1787 of the European Parliament and of the Council of 13 June 2024 on the reduction of methane emissions in the energy sector and amending Regulation (EU) 2019/942, OJ L, 2024/1787, 15.7.2024.

Figure 50 Illustrative suggestion for integration with DA/JPM in methane abatement case study 1



1 Suppliers submit their methane emissions measurements and methodologies
2 Platform verifies compliance of submitted methane emissions information with measurement standards
3 Platform provides verified information on methane emissions publicly and recognises well-performing suppliers
4 Information on suppliers' methane emissions performance gets fed into the DA/JPM platform
5 Suppliers connect DA/JPM registration with their methane performance profile and submit offers for natural gas
6 Off-takers state matching preferences on methane emissions and platform conducts matching accordingly

Source: Frontier Economics

The core function of this service would be to enable the incorporation of off-taker preferences on suppliers' methane emissions into the tendering and matching process in a DA/JPM for natural gas. As such, the main functionalities could include the following:

- **Incorporation of information from the Methane Transparency Database**, in particular:
  - **Integration of methane emission measurements and methodologies into supplier profiles and bids**: As a way to provide transparency on the methane emissions performance of suppliers participating in the DA/JPM for natural gas, the measure may draw information on suppliers' methane emission performance from the Methane Transparency Database, and connect it to their platform profiles.
  - **Recognition of well-performing suppliers**: Based on the planned methane performance profiles from the Methane Transparency Database[169], participating

169 European Parliament (10 April 2024), „P9_TA(2024)0190 Methane emissions reduction in the energy sector – European Parliament legislative resolution of 10 April 2024 on the proposal for a regulation of the European Parliament and of the Council on methane emissions reduction in the energy sector and amending Regulation (EU) 2019/942 (COM(2021)0805 – C9-0467/2021 – 2021/0423(COD))", accessed on 17 April 2024 at https://www.europarl.europa.eu/doceo/document/TA-9-2024-0190_EN.pdf.

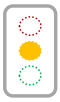
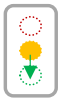
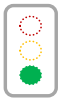
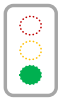
suppliers may be recognised for their implemented abatement measures and emissions intensity and have their performance highlighted directly on the DA/JPM platform when matched. This may additionally act as an indirect incentive for implementation of further abatement projects from players who are interested in obtaining exposure for these projects from a marketing perspective in the short term.

- **Incorporation of off-takers' preferences on methane emissions performance into tendering process**: Off-takers may be given the opportunity to express their preferences on the incorporation of the emissions performance in the matching process. This may be done via different options, such as:
  - exclusive matching with suppliers with active projects in methane abatement, and/or meeting a set methane emissions MRV or intensity thresholds, with price ranking as a second criteria;
  - matching based on price and activities in methane abatement as equal criteria; or
  - matching based on price ranking only.

In addition to the core functionality with a focus on incorporating off-taker preferences on suppliers' emissions performance, additional value may be provided through ancillary services, such as **provision of information on suitable public funding opportunities for methane abatement**. As an additional service, registered suppliers may receive an overview of available public funding opportunities to incentivise further investments. For instance, value could be added by providing an overview of International Financial Institutions (IFIs) which have available financing for methane abatement projects.

In the form described above, the service would not directly reward additional abatement activities *per se,* since a low emissions intensity could reflect historical activities undertaken. However, the feature may **indirectly reward additional abatement measures** by providing a route for off-takers (on a voluntary basis, e.g. for GHG protocol reasons) to express preferences for and contract with lower-emissions suppliers. Though this information may already be publicly available, this could contribute by achieving a **reduction in search and transaction costs as well as by providing direct information on contractable volumes and access to offtake opportunities**. Furthermore, its longer-term administrative costs are reduced as it will draw on information contained within the already planned Methane Transparency Database. Against this background, we outline in Figure 51 our assessment of how the suggested service performs against our evaluation criteria.

Figure 51 Evaluation of Case Study 1: Incorporation of methane emissions performance into DA/JPM for natural gas

Evaluation criteria		Assessment
Static efficiency		▪ Limited direct impact ▪ If participation is high, possibly some efficiencies from reduction of search costs for off-takers looking to incorporate suppliers' methane emissions performance in their procurement choices
Dynamic efficiency		▪ If participation is high and off-takers show preference for matching based on methane emissions performance, potential positive effects through incentivisation of further abatement projects
Resilience and adaptability		▪ High adaptability due to focus on optional choices for off-takers and voluntary disclosure of information to the Methane Transparency Database
Ease of implementation and administrative costs		▪ Integration with DA/JPM for natural gas (AggregateEU) and sourcing of information from Methane Transparency Database limits ongoing administrative costs
EU added value		▪ Some potential benefits from integration with EU-level platform due to possibility to aggregate across Member States

Source: Frontier Economics

Given the focus on voluntary information provision and link with DA/JPM for natural gas, the platform performs well on adaptability. There may also be **some potential for positive effects on dynamic efficiency** (conditional on participation being high and expression of preferences for matching base don methane emissions performance), with the possibility for additional future abatement projects to be incentivised. Overall, given high adaptability and limited potential for distorting effects, we consider the **integration of the service into DA/JPM for natural gas as suggested in this case study a relatively low-regret measure.**

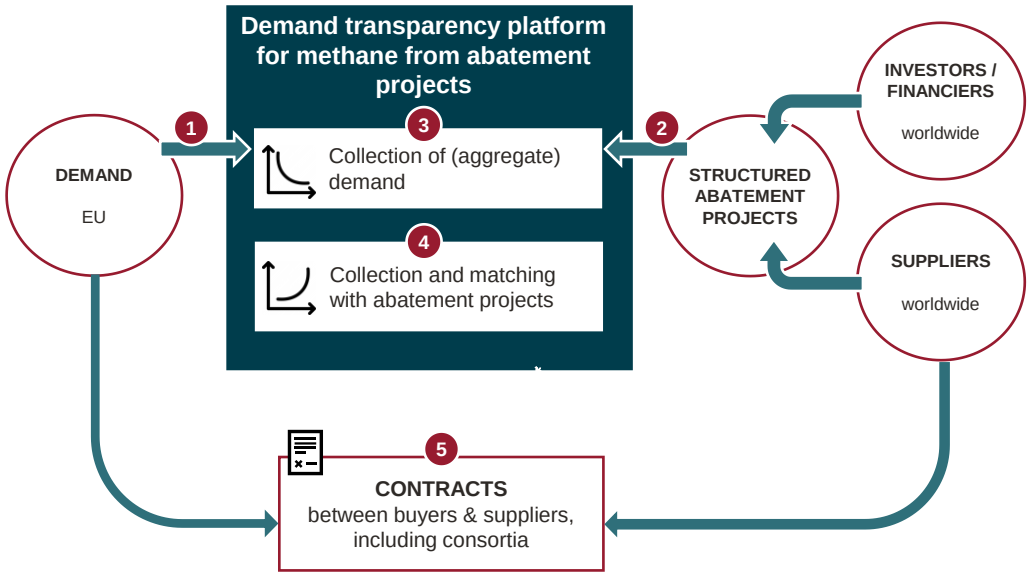
Case Study 2: Demand transparency platform targeted at suppliers and financiers looking to find potential off-takers for methane from abatement projects

An alternative platform design that may help encourage methane emissions reduction could more directly connect suppliers of gas from potential abatement projects with off-takers to help reduce the risk of investment. However, particularly in low- and middle-income countries (LMIC), such projects are risky and require a very high rate of return, and their structuring may

need to be co-financed in advance. These projects may be challenging to realise without subsidies or certification in the initial phases, especially as early stakeholder feedback indicates that buyers are likely unwilling to pay a high premium for lower-carbon methane before the implementation of binding obligations.

We have therefore considered a demand transparency platform targeted at investors and financiers to find potential off-takers for methane from already structured abatement projects. This model goes beyond a buyer/seller matching platform, and puts the reduction of risk of structured projects at its centre by helping to secure off-takers for additional gas at a set price.[170] A potential structure is shown in Figure 52.

Figure 52 Exemplary suggestions for DA/JPM platform structure in methane abatement case study 2



1. Interested off-takers submit est. annual demand for natural gas from abatement projects (pot. with indicative pricing bid)
2. Suppliers submit structured abatement projects with predicted emissions savings and expected additional supply
3. Platform collects information on existing demand
4. Platform matches interested off-takers and structured projects based on volume and pricing
5. SPAs are negotiated between interested off-takers and suppliers outside the platform

Source: Frontier Economics

We outline exemplary requirements for registration of participants to the platform, including the type of information to be provided, in Figure 53. Note that the involvement of already structured projects allows for more concrete product definitions, but also implies significant

170 While the possibility for potential suppliers to register on the platform without already structured projects may be implementable at low additional cost, we note that these may see limited take-up given the concentration of many potential abatement projects in low- and middle-income countries.

preparation work from investors. Thus, the addition of security from off-takers is considered as a final step to reduce financing costs for existing projects.

Figure 53 Exemplary suggestions for registration requirements in methane abatement case study 2

Step of value chain	Requirements in registration process
Abatement project investors (suppliers and financiers)	▪ Contact data of involved parties (suppliers, investors, financiers) ▪ Project description (e.g. nature of project, location, committed financing volume) ▪ Description / methodology of measuring methane emissions ▪ Estimation of methane emissions saved, and additional volumes made available for sale (per year) ! Note that for increased effectiveness of the measure, projects require a clear product definition, including volume of additional gas and what measure it results from; ideally the methodology of measuring methane emissions should be set in advance as a benchmark
Demand / Off-takers	▪ Contact data and location ▪ Type of off-taker / industry ▪ Estimated annual demand for natural gas from abatement projects ▪ Instrument(s) for contract negotiations (e.g., letter of credit, guarantees, collateral)

Source: Frontier Economics

Against this background, we consider several functionalities to be potential core functions of the platform:

- **Matching/provision of contact data**: After registering relevant potential abatement projects, they may be connected with registered potential off-takers, for instance through matching based on indicative price[171]. This can pave the way for counterparty discovery, and project managers may receive their contact data for off-platform negotiations.

- **Demand aggregation:** If the size of submitted abatement projects exceeds the indicative volumes demanded by off-takers, there may be additional value in the option for the volume of potential off-takers' bids to be aggregated through buyer co-operation models

171 We note that there may be some transparency benefits to the submission and matching of indicative pricing bids, given currently limited transparency on willingness to pay for natural gas captured in abatement projects, particularly with regards to a potential premium on the regular natural gas price. However, this transparency benefit may be reduced due to the challenge in monitoring the robustness of indicative bids (as elaborated upon further in Section 3.3.2), particularly if they are non-binding and relate to products to be delivered in the medium to long term. Thus, the potential transparency benefit has to be weighed against the additional administrative cost on implementing a price-based matching mechanism.

in order to match expected volumes per project. This option may be valuable particularly for projects which only become viable at large contracted volumes, and may benefit potential suppliers of projects by reducing total contracting costs. However, we note that committing to formal buyer co-operation involves a large deal more commitment from potential off-takers (see Section 5). An explicit requirement to participate in formal demand aggregation may thus reduce participation, and could be replaced by lower-cost alternatives such matching several off-takers to projects without binding commitments.

- **Tendering:** The platform may also support calls for tenders by projects for the additional gas volumes expected to be saved in registered methane abatement projects – though we note that take-up of this option may be limited given current insights on off-takers willingness to pay.

In addition to these core functionalities, potential ancillary services to be offered on the platform could add further value:

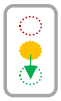
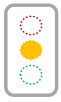
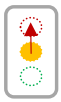
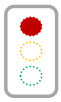
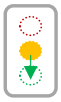
- **Provision of credit ratings of matched potential off-takers to financiers**: As a way to further reduce transaction cost, the platform may optionally provide proof of credit rating with successful matches in order to ease risk assessment for suppliers and due diligence for financing providers

- **Publishing aggregated information on demand**: Gathering information on submitted demand volumes and sharing aggregated information publicly may have the benefit of signalling demand side and policy interest to the public, thus potentially encouraging the faster formation of voluntary markets.

- **Provision of information on standard methodologies to measure methane emissions:** Again, we caution that there are substantial complexities in the development of standard measurement methodologies. However, similarly to the platform presented under Case Study 1, the provision of information around standard methodologies for the measurement of methane emissions could significantly contribute to the value-add of the platform, and would substantially facilitate due diligence of the quality of projects to be submitted to it.

As presented here, the platform provides a type of “last-mile” service for the implementation of abatement projects, by helping to secure demand from off-takers, reduce investment risk, and thus potentially reduce cost of financing. Against this background, we outline in Figure 54 our assessment of how the suggested platform performs against our evaluation criteria.

Figure 54 Evaluation of Case Study 2: Demand transparency platform for methane from abatement projects

Evaluation criteria	Assessment	
Static efficiency		▪ Possibly some efficiencies from reduction of search costs for potential suppliers / investors
Dynamic efficiency		▪ Potential to crowd out commercial offerings, increasing costs of delivering service over long run ▪ If financial incentives are included, clear match required between incentives and additional costs incurred to avoid distorting competition between upstream players
Resilience and adaptability		▪ Focus on short-term usage: limited benefit from platform after obligations under the EU methane regulation are adopted ▪ Regularity of organised member interaction reduces flexibility of the platform to quickly adapt to changing market conditions
Ease of implementation and administrative costs		▪ Organised member interaction (through matching and/or tendering) significantly increases ongoing administrative costs ▪ Difficult to implement given preparation required for submission of potential projects to the platform
EU added value		▪ Some potential (signalling) benefits from communicating aggregated EU demand for lower-carbon methane ▪ International suppliers may benefit from access to a larger range of off-takers and larger volumes in one single platform

Source: Frontier Economics

Given interdependencies with the natural gas market, many relevant market participants may already be familiar with each other. However, the platform may still provide value through a **reduction of search and transaction costs** for suppliers implementing abatement projects, by providing transparency on demand for methane from abatement projects specifically. This effect may be enhanced if the platform enables effective demand aggregation, and if the platform allows for verification of information relevant for contract negotiation (such as credit ratings). The platform further performs reasonably well on added value from Union-level intervention due to access to a larger range of off-takers and larger volumes in one single platform, particularly if participation rates are high.

However, we note that the suggested platform **performs more weakly on administrative cost and resilience**. Administrative costs in particular increase with added features such as tendering and demand aggregation, while resilience of the platform is limited almost by definition from focus on its usage before emission obligations become binding under the EU methane regulation. Given its projected limited-term usage, we suggest further evaluation of

the cost and benefit of each platform function carefully, and recommend a focus on the implementation of low-regret core functions such as collecting demand and matching.

4.5 Strategic raw materials

In this section we discuss how and in which form DA/JPM can play a role in procuring strategic raw materials, starting with a summary, followed by a detailed write-up.

4.5.1 Summary of the potential role of DA/JPM for strategic raw materials

Introduction (Section 4.5.2)

Strategic raw materials are defined as a group of raw materials which are characterised by their **importance for strategic areas** such as renewable energy, digital, aerospace and defence technologies, their **projected demand growth relative to current supply** and the **difficulties of scaling up production**. The current list of strategic raw materials includes 17 elements. Against this backdrop, the EC's Critical Raw Materials Act aims to ensure access to a secure, diversified, affordable and sustainable supply of strategic raw materials by mitigating supply chain risks related to strategic dependencies and enhancing economic resilience.

Key market barriers (Section 4.5.3)

Production and trade of strategic raw materials is global, and so is competition for access to them. However, supply is increasingly dominated by a few countries, while the EU largely depends on imports, translating into **high supplier power**. SRM markets are often still **untransparent and experience intense price volatility due to low liquidity.** In addition, price developments are not purely market-based but could also increasingly take on a geopolitical dimension.[172] This generally leads to a **significant risk of supply disruption with limited opportunities for diversification**.

Role of DA/JPM (Section 4.5.4)

In combination with other policy measures to strengthen supply chain resilience for SRMs, a DA/JPM can help to address main barriers of high supplier power and security of supply. In general, a demand aggregation platform could, as part of broader measures, be suitable to broaden risk hedging opportunities and potentially increase countervailing buyer power to strengthen resilience. More specifically, optimal design details for DA/JPM vary according to the market structures of the individual commodities, which differ significantly across the current list of 17 different SRMs. Therefore, we present possible design forms using four different

[172] For example, in July 2023, China announce export curbs on gallium and germanium starting a month later. See Reuters (2023): China to restrict exports of chipmaking materials as US mulls new curbs, July 4 2023, https://www.reuters.com/markets/commodities/china-restrict-exports-chipmaking-materials-us-mulls-new-curbs-2023-07-04/, retrieved on 05 June 2024.

SRM case studies. The SRMs were selected to cover a broad spectrum of differences in the relevant market structures. As a result, case studies give an overview of the diversity of possible approaches to DA/JPM for SRMs.

Case studies of specific SRMs (Sections 4.5.5 to 4.5.8)

Figure 55 summarises our main takeaways on the market structure and resulting DA/JPM design recommendations.

Figure 55 High-level summary of market structure and DA/JPM design for lithium, cobalt, nickel and REEs for permanent magnets

	Market structure	DA/JPM design
Lithium	Immature market, moderate supply concentration, very high projected demand growth, therefore increased security of supply concerns	**Matching platform to facilitate counterparty discovery** (and potentially help in ramping up capacities in EU in line with **CRM act targets**)
Cobalt	Immature market with limited transparency, no long-term agreements, high supply concentration, high projected demand growth	**Demand aggregation** to strengthen security of supply and **address high supplier power** (with particular focus on longer term contracts). In addition, **certification** to help EU undertakings to comply with corporate due diligence directive
Nickel	More mature market with established exchange trading, moderate supply concentration, moderate projected demand growth (relative to other SRMs)	**Role** for DA/JPM **unclear** (and in our view likely to be limited)
REEs for permanent magnets	Low liquidity and transparency due to limited trade volumes, high import dependency along the whole supply chain, limited substitutability	Potential role for **demand aggregation in improving risk hedging**, although **applicability uncertain** due to low trading volumes. Initial priority on **ramping up downstream capacities** to provide basis for upstream JPM.

Source: Frontier Economics

There are some general principles which can be derived from the case studies:

- The **entire supply chain is relevant to strengthening resilience**. DA/JPM at the beginning of the supply chain could be most impactful, but only when downstream activities are in the hands of EU companies.
- DA/JPM is particularly applicable when a standardised product (commodity) can be traded. This may be challenging for SRMs with a high degree of product differentiation.
- While DA/JPM may add some value for SRMs with high market volatility, high concentration and low transparency, its impact could be limited. Given an unlevel playing field in production of many SRMs and the EU's target to strengthen resilience by

increasing domestic production capacities the **impact of DA/JPM could be more substantial if combined with other policy measures**.[173]

4.5.2 Introduction to strategic raw materials

Global energy transition and the shift towards a digital economy contribute to changing geopolitics of resources where specific raw materials with high relevance to strategic future sectors could, in the longer term, take a role similar to fossil fuels today.[174] While demand for such materials is projected to rapidly increase in the future, global production is often highly concentrated in a few countries, both at extraction and refining stages. Supply of raw materials to the EU is therefore critically dependent on quasi-monopolistic supplies from third countries (albeit with the difference compared to fossil fuels that, in principle, once consumed, it is possible to recycle raw materials for future re-use).

To mitigate associated risks for supply chains with high strategic importance and to enhance the EU's economic resilience, the Commission has introduced the Critical Raw Materials Act (CRM Act).[175] The act includes measures to ensure sustainable and secure access to critical raw materials (CRMs), which are defined as a group of raw materials of **high importance for the overall EU economy** and a **significant risk of supply disruption**. The CRM act also establishes the category of "strategic raw materials" (SRMs) – these are additionally characterised by their **importance for strategic areas** such as renewable energy, digital, aerospace and defence technologies, their projected demand growth relative to current supply (see Figure 56), and the difficulties of scaling up production.

The current list of raw materials that shall be considered strategic includes 17 elements: bauxite/alumina/aluminium, bismuth, boron (metallurgy grade), cobalt, copper, gallium, germanium, lithium (battery grade), magnesium metal, manganese (battery grade), graphite (battery grade), nickel (battery grade), platinum group metals, rare earth elements for permanent magnets, silicon metal, titanium metal, and tungsten.[176] These materials are essential inputs to key strategic products which the EU needs for energy transition and digital industry, aerospace and defence. For example,

- lithium, graphite, cobalt, nickel and manganese are critical in the production of batteries;

---

173 To strengthen the impact of DA/JPM, additional policy measures could be required to increase demand for products with specific characteristics (e.g. sustainable/low-carbon materials sourced in the EU). This could, for example, be achieved via quotas or with subsidies for EU production – however, a detailed consideration of such measures is out of scope of this study.

174 European Commission (2023): Impact Assessment Report Accompanying the document Proposal for a Regulation of the European Parliament and of the Council establishing a framework for ensuring a secure and sustainable supply of critical raw materials and amending Regulations (EU) 168/2013, (EU) 2018/858, 2018/1724 and (EU) 2019/1020, p. 167.

175 By CRM act, we refer to the following regulation: Regulation (EU) 2024/1252 of the European Parliament and of the Council of 11 April 2024 establishing a framework for ensuring a secure and sustainable supply of critical raw materials and amending Regulations (EU) No 168/2013, (EU) 2018/858, (EU) 2018/1724 and (EU) 2019/1020, OJ L, 2024/1252, 3.5.2024.

176 See CRM Act, Annex I, Section 1.

- rare earth elements are needed for permanent magnets and traction motors;
- platinum is used in fuel cells.

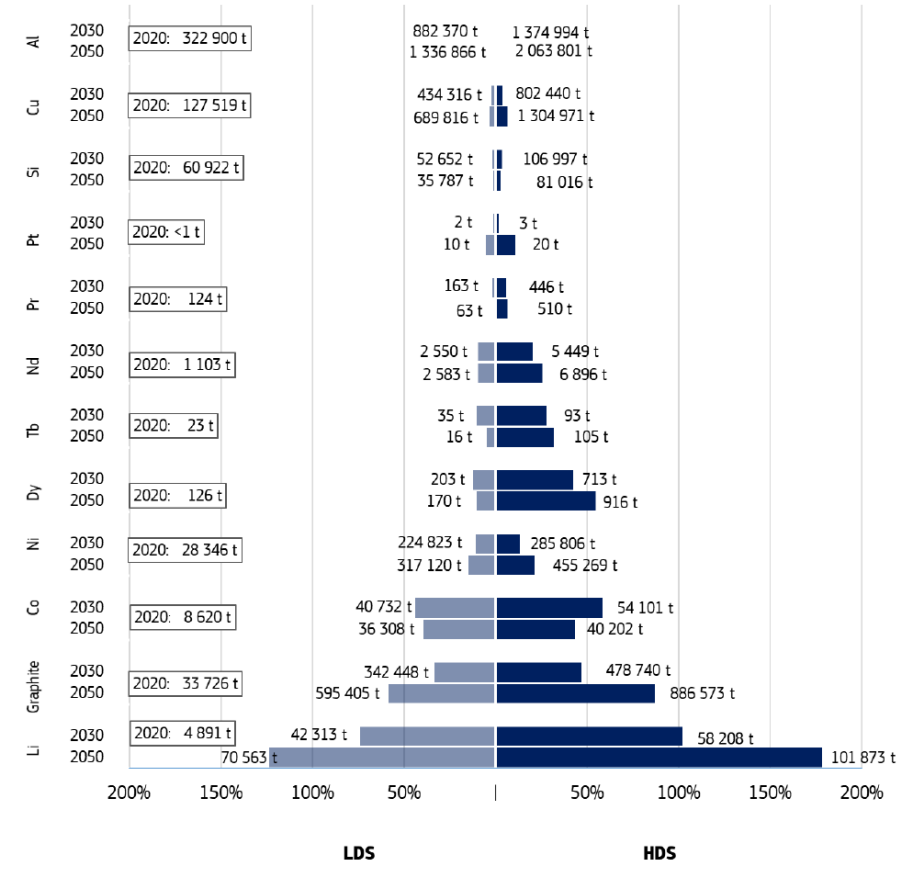
Against this backdrop, the EC's Critical Raw Materials Act aims to "*ensure the EU's access to a secure, diversified, affordable and sustainable supply*"[177] of strategic raw materials by mitigating supply chain risks related to strategic dependencies and enhancing economic resilience. Specifically, Article 25 of the CRM Act requires the Commission to *"set up and operate a system to aggregate the demand of interested undertakings consuming strategic raw materials established in the Union and seek offers from suppliers to match that aggregated demand."*[178] This shall include the option to jointly negotiate purchasing conditions to achieve better conditions or prevent shortages – with participation being open to all interested undertakings within the EU. On the basis of an assessment, the Commission shall set out

- for which strategic raw materials (and at which processing stage) a DA/JPM could add value,
- minimum amounts of demand per SRM to participate in the system, which should take into account the expected interested participants and the needs of small and medium enterprises while maintaining a manageable number of participants.

177 See European Commission, Critical Raw Materials: ensuring secure and sustainable supply chains for EU's green and digital future, Press Release, 16 March 2024, https://ec.europa.eu/commission/presscorner/detail/en/ip_23_1661.

178 CRM act, p. 35.

Figure 56 EU demand forecast for strategic raw materials – all sectors



Source: JRC analysis (Li = lithium, Co = cobalt, Ni = nickel, Dy = dysprosium, Tb = terbium, Pr = praseodymium, Pt = platinum, Si = silicon metal, Cu = copper, Al = aluminium).

Source: Carrara et al (2023): Supply chain analysis and material demand forecast in strategic technologies and sectors in the EU – A foresight study, Publications Office of the European Union, Luxembourg, 2023, doi:10.2760/386650, JRC132889.

4.5.3 Market failures and barriers for strategic raw materials

Market barriers for strategic raw materials are multifaceted and can vary across different SRMs.[179] Nevertheless, there are overarching barriers and market failures we have identified, some of which might be potentially addressed through DA/JPM.

In general, there is a significant degree of supplier power for strategic raw materials

Production and trade of strategic raw materials is global, and so is competition for access to them. However, supply of SRMs requires access to natural reservoirs and a few countries increasingly dominate extraction and processing, while the EU is largely dependent on imports from them.

[179] This is why we analyse specific DA/JPM design with case studies of four specific SRMs (see Sections 4.5.5 to -1142010832.480.54202).

Overall, China, is currently in a dominant position for the supply of SRMs. For some materials, there are alternative suppliers, which allows for supply diversification. In many other cases, Chinese dominance is almost monopolistic.[180] This includes ownership of facilities in third countries – for example, China owns 70% of cobalt mines in the Democratic Republic of the Congo, these mines therefore supply exclusively to Chinese refineries.

While market concentration is high on the supply side, demand concentration is often substantially lower, with multiple companies and countries competing for demand. This can result in substantial supplier power and low countervailing buyer power. Therefore, there could be a potential role for DA/JPM in giving demand in the EU more weight compared to market-dominating suppliers.

Per definition, strategic raw materials are characterised by supply risks which are expected to increase in the future

Per definition, SRMs are facing a significant **risk of supply disruption** which would threaten the EU's economic resilience in future strategic sectors.

A high concentration of suppliers, as explained above, automatically increases supply risk as there are limited opportunities for diversification and the loss of one supplier can hardly be compensated. This risk is exacerbated by a number of factors (common to all SRMs, but varying in severity from one SRM to another):

- **Market volatility**: Many SRM markets experience volatility, with demand and prices closely tied to the global economic landscape. This dynamic environment poses challenges and opportunities for market participants.
- **Geopolitical influence on access**: Geopolitical factors, alongside natural events, affect SRM access. Markets can be subject to trade restrictions or subsidies and policy interventions to markets often involve geostrategic considerations. These challenges could become even more relevant in an increasingly unstable future global geopolitical environment.
- **Governance challenges**: Supply countries often exhibit lower governance scores,[181] necessitating efforts to address these challenges to ensure a reliable supply chain.
- **Difficulty in scaling up production**: Slow supply growth in raw materials can pose a challenge in responding promptly to increased market demand (for example, signalled by rising prices) as expanding mine capacity or starting new operations need long lead

[180] See Carrara et al (2023): Supply chain analysis and material demand forecast in strategic technologies and sectors in the EU – A foresight study, Publications Office of the European Union, Luxembourg, 2023, doi:10.2760/386650, JRC13288.

[181] The EC criticality methodology assesses country specific supply risks by taking into account Worldwide Governance Indicators (WGI), see European Commission, Study on the Critical Raw Materials for the EU 2023 – Final Report, Annex 9.

times.[182] This barrier is particularly relevant for SRMs, which are currently produced as by-products in the mining of other, higher volume, raw materials (e.g. cobalt as a by-product in copper mining). For these materials, supply is very inelastic and dependent on market conditions of the main material.

- **High dependency regarding future strategic areas**: As strategic raw materials are key to producing products needed for energy transition and digital economy and there is limited scope for substitution, their importance will increase further in the coming decades. In addition to global demand competing for the same pool of raw materials, there will be increasing sectorial competition, as many SRMs are used not only for one strategic product but in many different areas with increasing future importance.[183]

Market liquidity varies between strategic raw materials

There are significant differences in market size and liquidity between individual strategic raw materials:

- Market size and trading volumes are large for some materials. For example, copper is traded liquidly on exchanges with a global demand of 731,500 t and EU demand of 127,519 t in 2020 (see Figure 56)
- For other materials, markets are much less liquid. Dysprosium, the most important HREE, had a global demand of only 733 t and an EU demand of 126 t in 2020 (see Figure 56) with China accounting for a market share of 100% of supplies to the EU.[184] Market volumes are even lower for other HREEs.

Immature and illiquid SRM markets experience strong volatility, with demand and prices closely tied to the global economic landscape and policy interventions. This dynamic environment poses challenges and opportunities for market participants. However, the potential for DA/JPM to increase liquidity by reducing transaction costs for searching for new suppliers is rather unclear, as suppliers are limited and can be identified. Additional measures to DA/JPM need to be assessed regarding their ability to address the problem of low market liquidity.

There are additional barriers in SRM markets which cannot be addressed by DA/JPM alone

Extraction of strategic raw materials (for example of HREEs) can entail a strong impact on the environment – but environmental impacts often remain an externality. Extraction will be

182 For example, projections in the IEA Global Critical Minerals Outlook 2024 show a mixed picture of future demand and supply balances. There is a significant gap between prospective supply and demand for lithium and balances for nickel and cobalt look tight, while rare earth elements may not face supply volume issues. See IEA (2024): Global Critical Minerals Outlook 2024, p. 7.

183 For example, rare earth elements are needed in wind turbine generators as well as in other key technologies such as digital applications and electric vehicle traction motors.

184 See EC (2023) Study on the Critical Raw Materials for the EU, p. 6.

cheaper where environmental regulations are laxer. The EU, however, generally imposes higher standards on mining and refining than other regions. In the case of missing transparency conditions, such as missing environmental certification, it is challenging for SRM markets to reflect any additional willingness to pay for environmental sustainability.[185] There are some first-mover coalitions for producing and purchasing materials with a lower CO_2 footprint.[186] However, these voluntary initiatives have so far been exceptions, and the procurement of SRMs is often strongly cost-driven (i.e., there is a limited willingness to pay for sustainable product characteristics). In addition, some countries protect their SRM supply chain, for example by adjusting taxes and customs duties, or by subsidising energy costs.[187]

Taken together, this means **SRM markets are often missing a level playing field** and EU companies may find it particularly difficult to compete against companies with more favourable conditions – which in turn is reflected in low EU capacities for SRM mining and refining. Against this backdrop, increasing EU production capacities in line with the CRM act might require a "resilience premium"[188].

4.5.4 Potential role of DA/JPM for strategic raw materials

Addressing market barriers in SRM markets and improving the EU's resilience in strategic sectors may require a broad combination of policy measures. In this section, we describe how and which forms of DA/JPM could play a role in addressing identified market barriers. Figure 57 provides an overview of barriers where DA/JPM may add the most value (see Section 4.1) and summarises our assessment of whether these barriers generally apply to strategic raw materials. Based on the high-level assessment of market failures and barriers outlined in this section, there is a rationale for DA/JPM to address risks regarding the security of supply.

We note in advance that some **barriers could only be fully addressed with mandatory DA/JPM** forms, which come at a high cost and are out of scope given the basis set out in the CRM act. Nevertheless, less interventionist forms of DA/JPM can play some role in mitigating

185 Substantial externalities in raw materials mining and refining currently lead to adverse environmental and social effects – this could be mainly due to missing transparency and certification schemes and a lack of environmental standards.

186 For example,

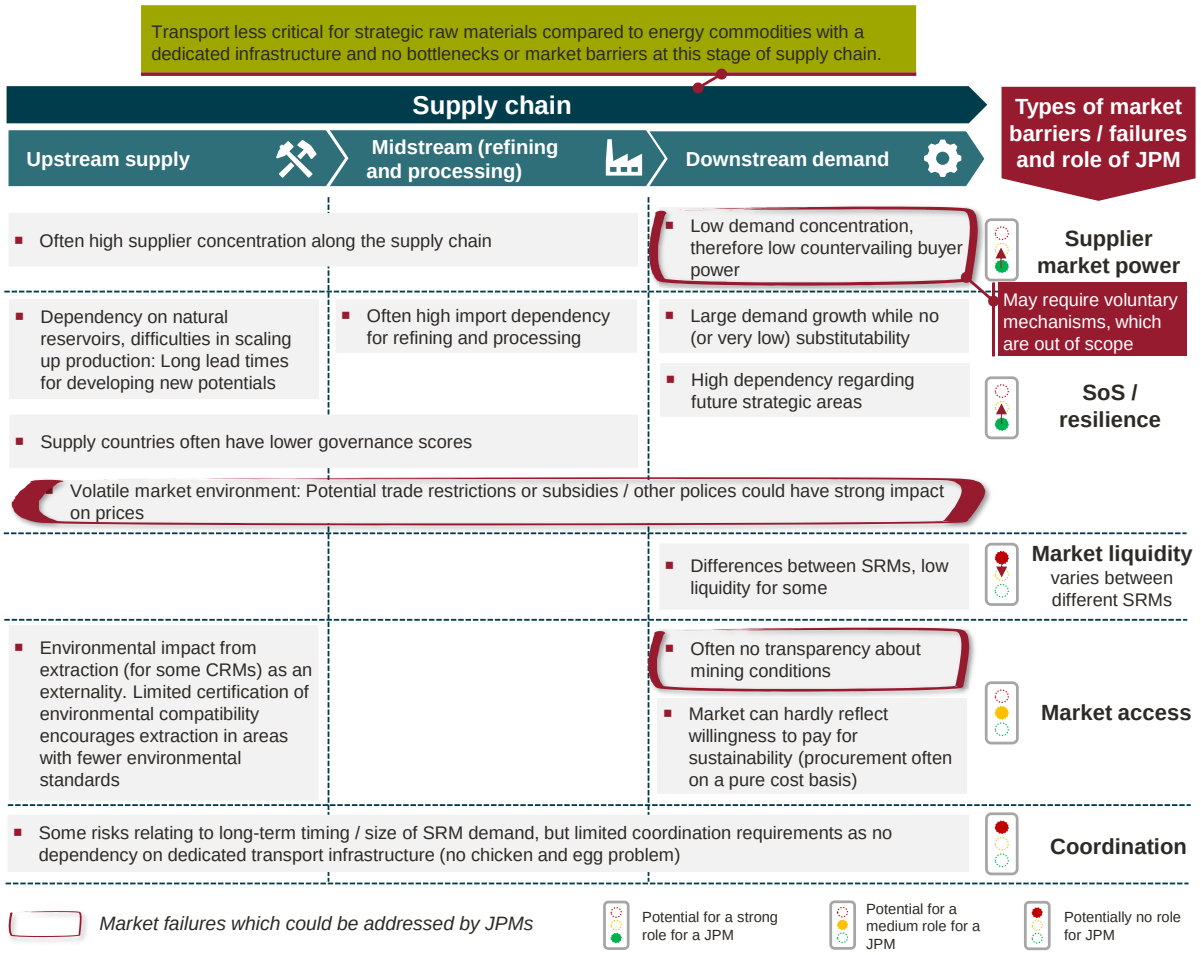
- members of the first-mover coalition for aluminium commit to purchasing catalytic volumes of low-CO_2 emissions aluminium by 2030. See https://www3.weforum.org/docs/WEF_First_Movers_Coalition_Aluminium_Commitment_2022.pdf, retrieved on 17 June 2024.
- Vale and Tesla have signed a long-term contract for the supply of low-carbon nickel from Canada in 2022. See https://vale.com/fr/w/vale-confirms-supply-deal-with-tesla-for-low-carbon-nickel, retrieved on 17 June 2024.

187 For example, rare earth ores can be imported to China duty-free, whereas import of processed rare earths comes at a tax. In addition, there is a VAT refund on the export of processed rare earths (such as magnets). See Gauß et al (2021). Rare Earth Magnets and Motors: A European Call for Action. A report by the Rare Earth Magnets and Motors Cluster of the European Raw Materials Alliance. Berlin 2021.

188 This could be introduced by mandates for diversified sourcing, or requirements for imports to create a level playing field. However, given the global market this could lead to lower volumes imported to the EU.

the barriers listed above. Based on Article 25 of the CRM act, suitable approaches with lower cost could be a matching platform and demand aggregation on the platform.

Figure 57 Potential role of DA/JPM in addressing market barriers in SRM markets



Source: Frontier Economics

As outlined, individual SRM commodity markets can differ significantly in their characteristics. As this may impact the optimal detailed DA/JPM forms, we analyse design details using the example of four different SRMs with a broad spectrum of differences in the relevant market structures (as illustrated in Figure 58):

- **Lithium** is currently an immature market with a high level of uncertainty and volatility and some (limited) futures exchange trading. Given its high strategic importance in the future, projections suggest a substantial demand increase. Lithium resources and reserves are moderately concentrated, with some potentials in the EU.[189] (Section 4.5.5)

189 See RMIS Lithium dashboard: https://rmis.jrc.ec.europa.eu/rmp/Lithium.

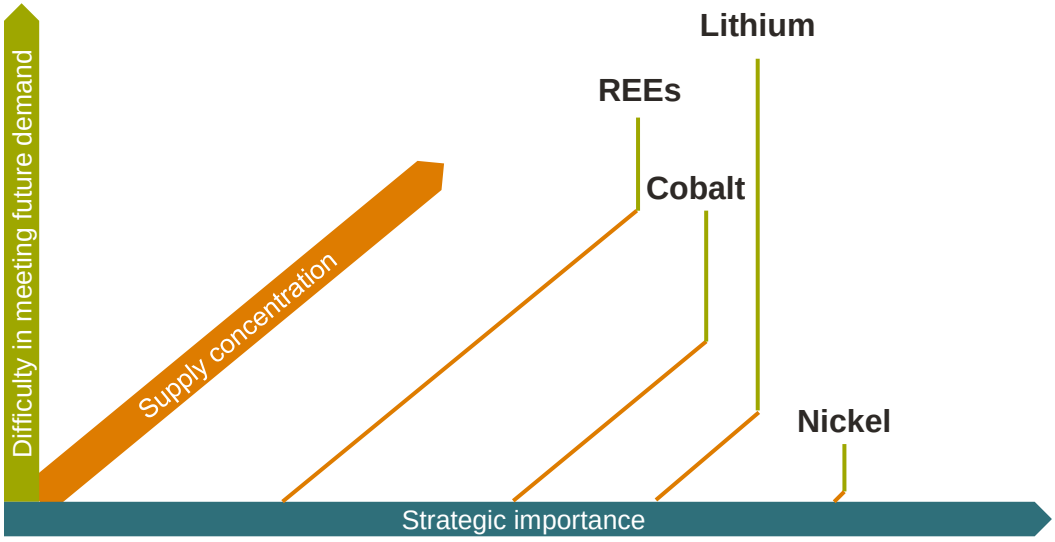
- The **cobalt** market is immature, with limited transparency and limited risk hedging opportunities but a large projected future demand increase. Currently, cobalt is mostly mined as a by-product (in copper and nickel mining), with a highly concentrated supply side.[190] (Section 4.5.6)

- **Nickel** is a mature market with established exchange trading, moderate supply concentration[191] and some options for diversification. As a component of steel, nickel has a high importance in all relevant strategic sectors already today; in the future, the use of nickel in batteries will become increasingly important.[192] (Section 4.5.7)

- **Rare earth elements** (REEs) are a unique series of 17 chemical elements, of which **seven are considered strategic due to their use in permanent magnets**. Trading of these materials is generally untransparent and characterised by low liquidity. The whole supply chain is highly concentrated, covering mining, refining and magnet manufacturing. (Section -1142117552.480.291655)

We elaborate on specific market structures and corresponding suitable forms of DA/JPM in the following sections before we provide concluding remarks on where and when DA/JPM could add value for SRMs (Section 4.5.9).

Figure 58 Exemplary illustration of different market characteristics for SRMs



Source: Frontier Economics based on insights from Carrara et al (2023) and European Commission, Study on the Critical Raw Materials for the EU 2023 – Final Report

190 See RMIS Cobalt dashboard: https://rmis.jrc.ec.europa.eu/rmp/Cobalt.

191 Nickel is a much larger market than cobalt, with lower concentration in mining. While for some nickel mines, cobalt is part of the ore mix and therefore mined as a by-product of nickel, this is not the case for all nickel mines.

192 See Carrara et al (2023) for an overview of Nickel use in strategic technologies.

4.5.5 Case study lithium – JPM design against backdrop of moderate supply concentration but high risk of supply disruption

Lithium is an indispensable raw material input for certain types of rechargeable batteries, particularly those used in electric vehicles (EVs) and renewable energy storage systems. As the world shifts towards cleaner energy sources and electric transportation to combat climate change, global demand for lithium is projected to skyrocket – for example, the Commission's foresight study on strategical raw materials projects global lithium demand to increase by between 1,400 and 1,900% until 2050 relative to 2020. Given its importance for batteries, the CRM act listed battery-grade lithium as a strategic raw material, a high-purity lithium metal product used for alloys and anode materials in lithium batteries. In terms of its supply chain, lithium is primarily mined in lithium brine ponds or hard rock mines (as spodumene ores). It is then converted to intermediate products (lithium sulfate or lithium chloride) and finally refined into a battery-grade product (such as lithium hydroxide (LiOH) or lithium carbonate (Li2CO3)). Therefore, lithium supply and trade is not limited to a single commodity, but there are differentiated products along the supply chain.

The lithium market is still immature and subject to large price volatility amid uncertain future demand increase and supply ramp-up

While lithium is considered one of the most important and most discussed strategic raw materials due to the projected increase in demand, the lithium market is still relatively immature. However, transparency and risk hedging opportunities have increased recently. Therefore, a change in supply and stocking rates is likely to disproportionately impact balances and prices compared to more mature markets.[193]

This is evident from recent price developments, as illustrated in Figure 59:

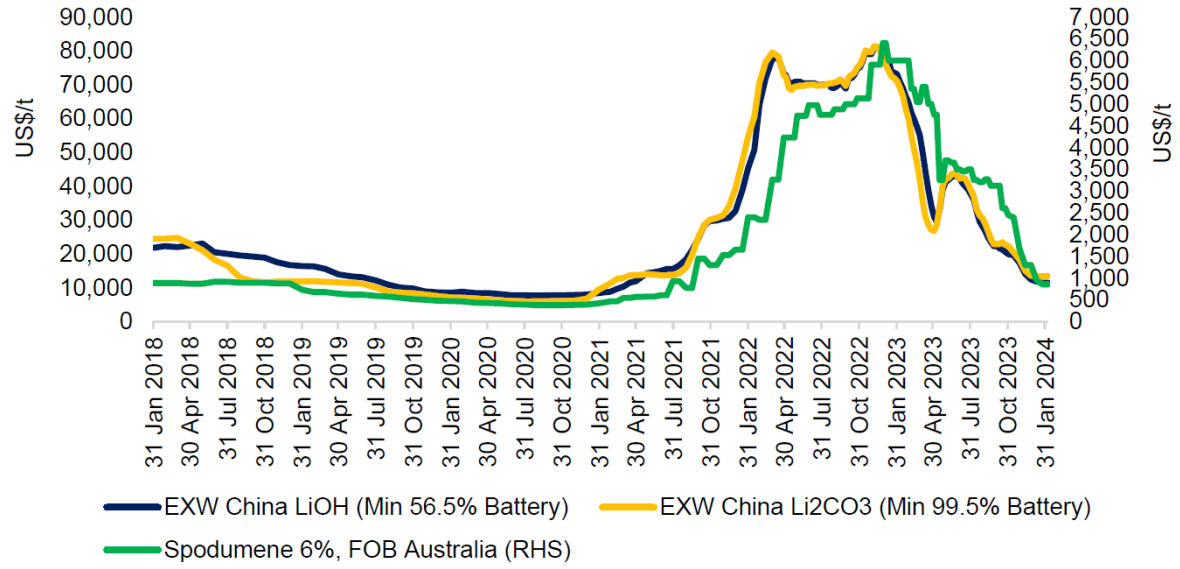
- From 2021 until 2023, lithium prices increased strongly, signalling demand growth and insufficient liquid supply volumes.
- Since the end of 2023, prices have fallen by over 80% due to a range of factors,[194] such as
  - Chinese overcapacity: significant inventory builds in cells and cathodes in China led to suppliers offering lower prices;
  - macro policy: in particular China accelerated its pivot to EV and battery manufacturing;
  - EV market dynamics: Slowing demand for electric vehicles led to margin pressures for OEMs.

193 See Mehdi (2024): Lithium price volatility: where next for the market?, OIES Energy Insight 145, the Oxford Institute for Energy Studies, February 2024.

194 See Mehdi (2024), p. 8.

- This leaves the lithium market in a tension between the short and long term. While western greenfield investments would not be economically viable if prices remained at their current level, brownfield capacity will be insufficient in the long run to serve projected demand.[195]

Figure 59 Illustration of spot prices for battery grade lithium (LHS) and lithium spodumene (RHS)



Source: Mehdi (2023, p.1) based on Benchmark Minerals

Market transparency barriers are a sign of immaturity and may not require DA/JPM in the long term as exchange trading and liquidity develop

Historically, lithium was mainly traded in long-term bilateral contracts with fixed price components between suppliers and off-takers, with limited transparency regarding pricing agreements and difficult market access for newcomers.[196] As the market has matured, exchange trading of lithium started recently[197] and open interest in lithium futures reached record highs in April 2024[198] – signalling increasing stakeholder interest in risk hedging for lithium prices. In turn, barriers to market access have fallen and could be resolved in the long

195 See Mehdi (2024), p. 11.

196 See Mehdi (2024), p. 5.

197 London Metal Exchange (LME) started offering lithium futures contracts in June 2021. Chicago Mercantile Exchange (CME), the world's largest derivatives marketplace introduced Lithium future in June 2023. See https://www.lme.com/en/metals/ev/about-lithium and https://www.cmegroup.com/media-room/press-releases/2023/6/20/cme_group_to_launchlithiumcarbonatefuturesaselectricvehicledeman.html, retrieved on 15 April 2024.

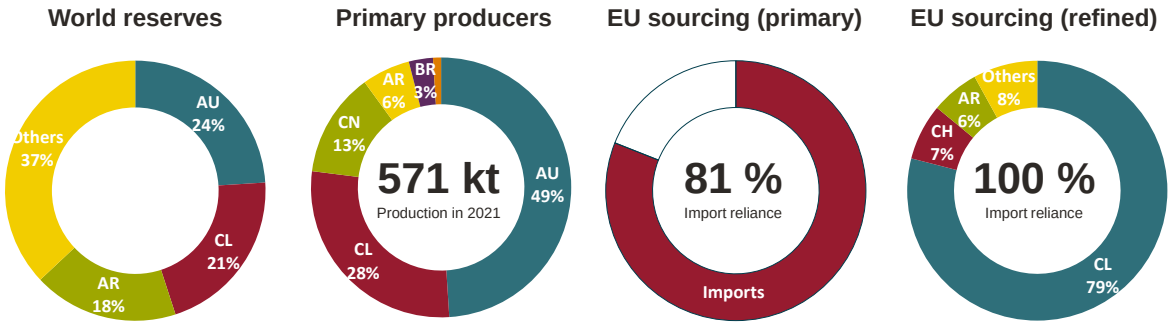
198 See Bloomberg (2024): Lithium Trading Hits Record on CME as Funds Seize Budding Market, https://www.bloomberg.com/news/articles/2024-04-02/lithium-trading-hits-record-on-cme-as-funds-seize-budding-market, retrieved on 15 April 2024.

term without further intervention (please refer to Section 4.1.3 for an explanation of measures outside of DA/JPM).

Demand aggregation might be too strong an intervention for lithium

Lithium resources and reserves are moderately concentrated (see Figure 60),[199] indicating some potential for supplier market power. As noted above, demand for lithium is expected to grow rapidly. However, concentration is more limited compared to other strategic raw materials and (as noted above) risk hedging opportunities are already emerging in the market, reducing barriers to entry for production.[200] Further, projected demand increases are to a large extent policy-driven. Investors are less well-placed to manage policy-driven risks regarding future demand. Demand aggregation (as a standalone measure) may struggle to provide enough certainty for offtakers to enter into long-term agreements to secure potential increased supply in the future. As such, the value added of a demand aggregation platform might be limited given the higher cost attached to such a platform relative to less interventionist forms. This trade-off is also evident from Figure 61.

Figure 60 Market structure for lithium is characterised by high import dependency but some scope for diversification

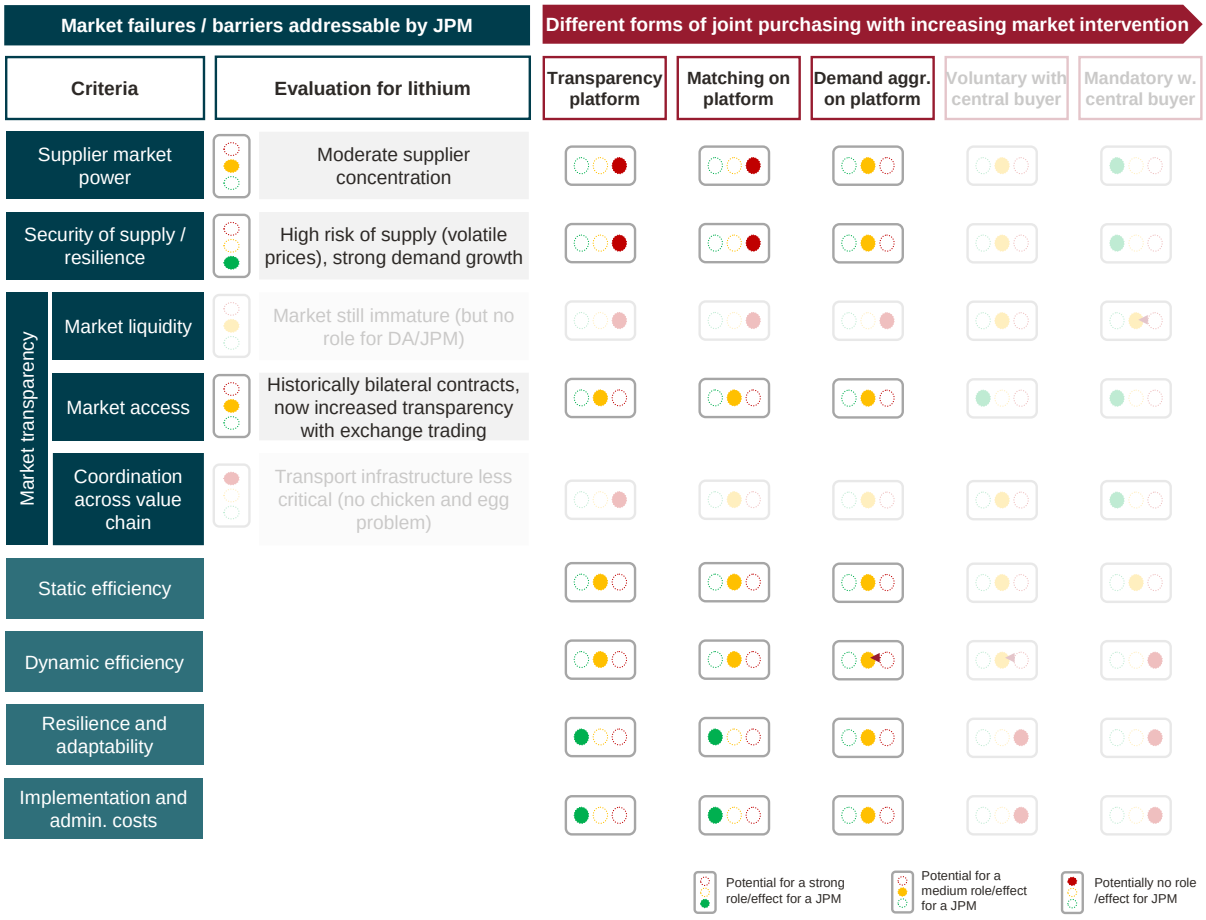


Source: *Frontier Economics based on EC Raw Materials Information System*
Note: *AU = Australia, CL = Chile, AR = Argentina, CN = China, BR = Brazil, CH = Switzerland*

199 The RMIS factsheet for Lithium indicates a HHI of 1,613 for resources and 1,501 for reserves. See https://rmis.jrc.ec.europa.eu/rmp/Lithium, retrieved on 15 April 2024.

200 In addition, demand aggregation may not be a suitable measure to ramp up domestic capacities, as increasing buyer power (and possibly increasing price pressure on suppliers) may not increase incentives to enter the market on the supply side. The same applies to the development of domestic recycling capacity, which is an important building block in strengthening European resilience as part of the CRM Act, but for which demand aggregation may not be helpful. That said, note that recycling has not been our focus in this analysis.

Figure 61 There is a trade-off between costs and value added for DA/JPM forms in the lithium market



Source: Frontier Economics

A matching platform could help counterparty discovery and improve coordination for long-term contracts

A risk of supply disruption (see Figure 61) is not necessarily a market failure because, generally, scarcity in a market is reflected in rising prices, which, in turn, increase the incentives for new supply investments. However, due to the long planning times for supplies, the dependence on natural reservoirs and the high importance of lithium for strategic objectives of the EU, there is a rationale for policy intervention to secure supply and strengthen resilience. In addition, price developments and access to lithium are not solely market-based but also increasingly take on a geopolitical dimension. Against this backdrop, there are at least the following two particular measures to strengthen EU security of supply for lithium:

1. Enable risk hedging for EU players (for example, via long-term contracts or price floor agreements). This can mostly be done already in the lithium market, so the value added of DA/JPM may be limited.

2. Increase EU supply chain capacities to reduce dependence on players and countries outside the EU (in line with the CRM acts).[201] The box below outlines the exemplary role DA/JPM could play in achieving these targets (combined with other measures) and focuses on domestic lithium from the EU, which would be particularly relevant for reaching CRM act capacity targets. In addition, the platform could also support diversification outside the EU.

However, regarding demand pooling on a DA/JPM platform, it is worth noting that lithium is not a single commodity, but products are differentiated even within the category of battery-grade lithium, with end users qualifying the product.[202] DA/JPM would therefore need to take into account trading of different lithium products. How exactly products on the platform can be standardised at different points of the supply chain would still need to be determined in more detail.

Box: How matching of long-term demand with supply offers could support EU lithium mining development to reach targets outlined in CRM act

- **Step 1:** Interested stakeholders post projected long-term demand (contracts potentially including price floor agreements) for **lithium from within the EU**[203]
- **Step 2:** Platform pools the demand received
- **Step 3:** Platform publishes a call for expression of interest for the volumes – with broad participation, these volumes could be large enough to enhance intra-EU investments
- **Step 4:** Potential suppliers submit volume and price offers (could be for recycling or for new resources)
- **Step 5:** Platform matches demand and supply with priority on best offers (lowest supply prices)
- **Step 6:** Customers/producers can decide whether to enter into exploratory discussions regarding offtake agreements

201 The CRM act sets out a benchmark of reaching domestic extraction capacity of at least 10% of the EU's annual consumption. According to forecasts in Carrara et al (2023, p. 11), this would correspond to at least 4,200 t annual extraction capacity.

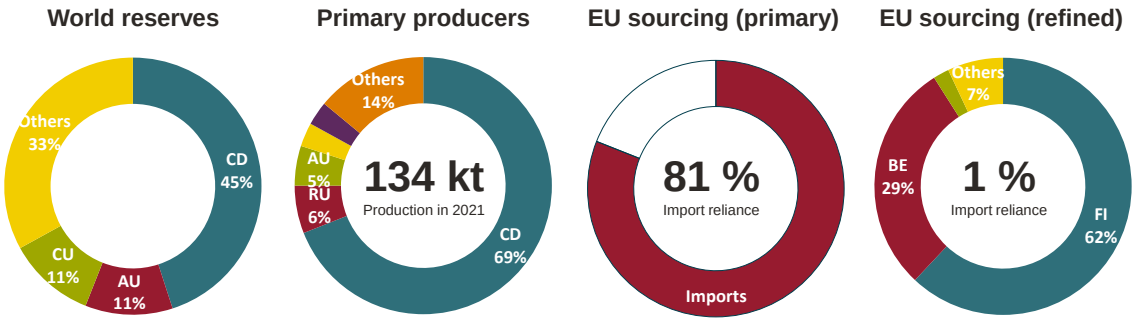
202 Stakeholders noted that this complicates DA/JPM in comparison to other commodites (e.g. AggregateEU for natural gas, where a single commodity is traded).

203 While this example is focused on EU supply, the platform could also support diversification outside the EU.

4.5.6 Case study cobalt – DA/JPM to enable long-term supply agreements in a market characterised by high supply concentration and limited transparency

Cobalt is critical to the production of rechargeable lithium batteries. But while demand for the metal is expected to grow significantly in the future, the market is currently hampered by a number of barriers.

Figure 62 Market structure for cobalt is characterised by high supply concentration and import reliance in primary production



Source: Frontier Economics based on EC Raw Materials Information System
CD = Democratic Republic of the Congo, AU = Australia, CU = Cuba, RU = Russia, FI = Finland, BE = Belgium

The cobalt market is still illiquid and characterised by a very high supply concentration in resourcing and refining

While there is some trading of cobalt futures (e.g. at CME), the market is still illiquid and characterised by a high supply concentration (see Figure 62) and volatile prices (see Figure 63):

- 69% of cobalt is resourced in the Democratic Republic of the Congo (DRC),[204] This also includes a 15% to 30% share from “artisanal and small scall mining” (ASM), which uses simple, labour-intensive means and low-tech machinery.[205] ASM often goes in hand with significant negative impacts on the environment and health.[206]
- China accounts for a global market share of 77% in cobalt refining.

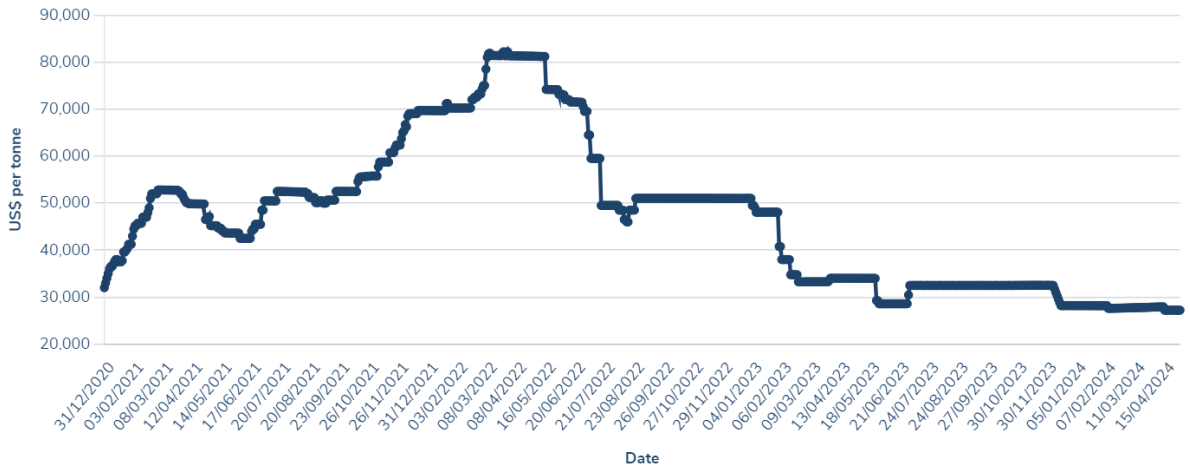
204 While most mines are located in the DRC, China is leading ownership in terms of mining capacity.

205 Estimates indicate 255,000 diggers at work in DRC mining cobalt, including 35,000 children. See Kara (2018): Is your phone tainted by the misery of the 35,000 children in Congo's mines? The Guardian, https://www.theguardian.com/global-development/2018/oct/12/phone-misery-children-congo-cobalt-mines-drc, retrieved on 3 May 2024.

206 See Schwartz et al (2021). A review of the scope of artisanal and small-scale mining worldwide, poverty, and the associated health impacts. GeoHealth. https://doi.org/10.1029/2020GH000325.

- Concentration is also high regarding future resources and reserves[207], which define potentials for a cobalt market ramp-up.
- The current market environment is characterised by volatility and most recently by a strong downward spiral in prices. Oversupplies, mainly caused by Chinese mining company CMOC increasing its production volume, led to a substantial decrease in prices from 2022 onwards (see Figure 63). Oversupplies might last until 2028 and are expected to further strengthen China's dominance in the production of raw material.[208]

Figure 63 Cobalt prices are characterised by a high volatility, with a strong price decrease from 2022 onwards



Source: LME Cobalt, Contract Type Cash, https://www.lme.com/Metals/EV/LME-Cobalt#Price+graphs

Diversifying cobalt resourcing may be challenging at the extraction stage

Cobalt is often mined as a by-product of metals with higher deposit concentration and higher demand: Copper mines accounted for 57% of cobalt mining in 2020, and nickel for 30%. This makes supply very inelastic, as it may not be economically viable to ramp up cobalt production on its own, so changes in cobalt prices do not lead to significant supply adjustments.

This is a particular challenge when looking at resource potential in the EU. There are some resources, mostly in Scandinavia, but the cobalt content of the resources is comparatively low. Therefore, without a significant improvement in extraction technology (or a significant increase

207 HHI is 1,944 for resources and 2,390 for reserves. See EU Raw Materials Profiles for Cobalt: https://rmis.jrc.ec.europa.eu/rmp/Cobalt.

208 See Dempsey (2024): Cobalt market stung by record oversupply, Financial Times,, London, 1 March 2024, https://www.ft.com/content/e6f131c8-4945-45f9-84ad-18eec58df0d9, retrieved on 2 May 2024.

in price),[209] it is **currently not economical to exploit EU resources**. Given the resource situation in the EU, a major expansion of domestic mining capacity is unlikely (or very costly), making supply diversification much more difficult. The situation could be different on the refining side, where there already are refining capacities and expansion is feasible. This could also benefit transparency, which is a key market barrier in the cobalt market. As mentioned above, unfavourable product sourcing conditions are a serious problem and product sustainability is currently difficult to track when cobalt enters the EU market via Chinese refineries. These circumstances have even led to increased efforts by battery manufacturers to develop new chemistries using less cobalt – driven by US and European OEMs trying to avoid cobalt from the DRC due to a lack of transparency on labour and environmental standards.[210]

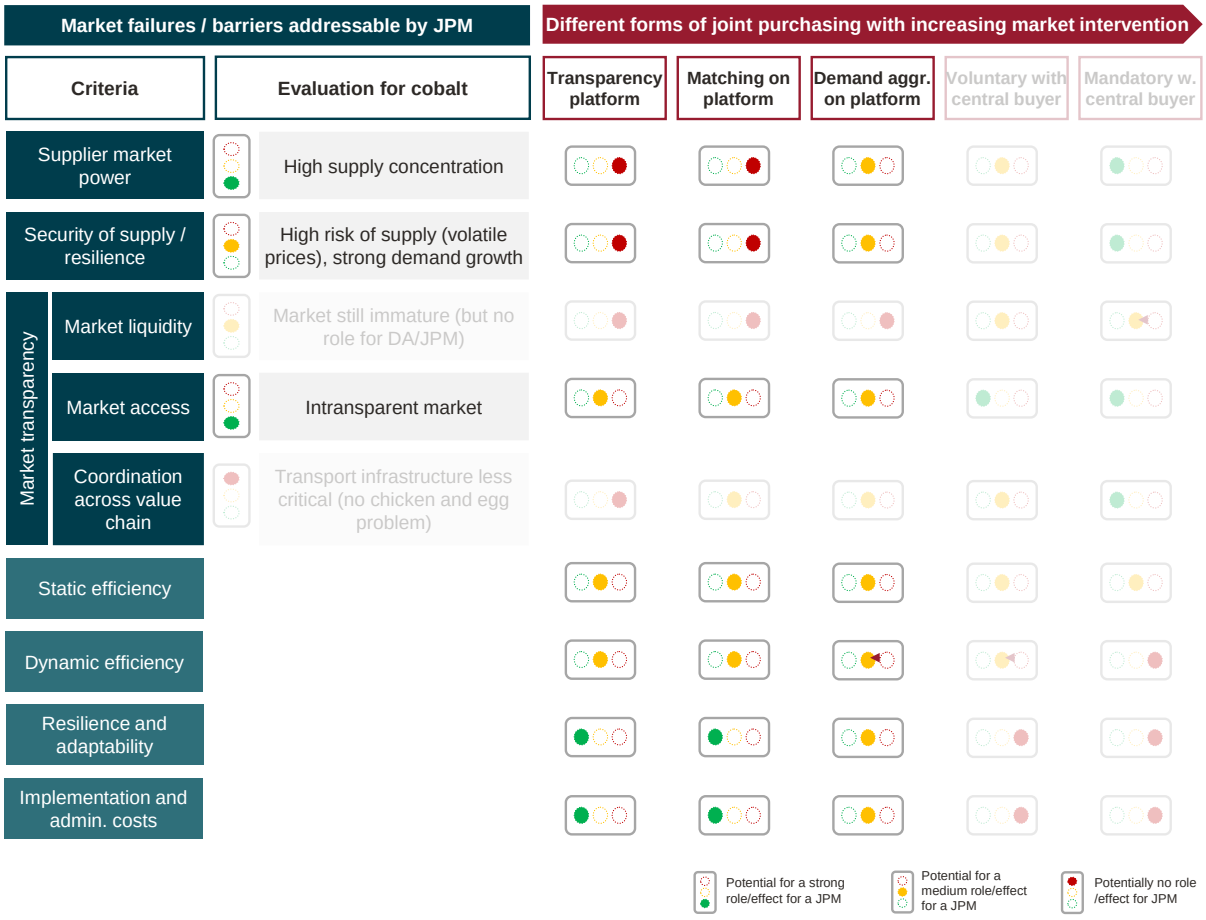
Given high supply concentration and limited risk hedging opportunities, a demand aggregation platform (with binding bids) could potentially increase buyer power to some (limited) extent

Against the backdrop of supply remaining highly concentrated in the future, a demand aggregation platform could be best placed in increasing buyer power (for EU refineries), as summarised in Figure 64.

209 See Horn et al (2021): Cobalt resources in Europe and the potential for new discoveries, Ore Geology Reviews, Volume 130, 2021.

210 See S&P Global commodity insights: Oversupply, low prices for cobalt to persist in 2024 as demand slips. https://www.spglobal.com/commodityinsights/en/market-insights/latest-news/metals/122723-oversupply-low-prices-for-cobalt-to-persist-in-2024-as-demand-slips, retrieved on 2 May 2024.

Figure 64 Demand aggregation could be the most suitable form of DA/JPM to address market barriers in cobalt



Source: Frontier Economics

The impacts in terms of decreasing prices for EU refineries would be subject to any constraints imposed by competition law (see Section 5). A demand aggregation mechanism with binding bids would also involve greater set-up costs and come with a greater risk of crowding out existing trading platforms. Further, addressing transparency issues in cobalt might require additional features in the design of a demand aggregation platform, which we explain in the following.

While a pure DA/JPM trading platform may not solve sustainability and environmental concerns alone, there could be value added in combination with assessing and certifying supplies

Against the background of missing transparency, DA/JPM could play an additional role in enabling a market for certified products. A particular use case could be trading products over

the platform which are certified[211] to comply with the EU directive on corporate sustainability due diligence.[212] Companies in the EU are already obliged to take measures to ensure the sustainability of their supply chains,[213] but this is a challenge, especially for non-transparent raw materials sourced from countries outside the EU, such as cobalt. Therefore, supporting sustainable resourcing could significantly reduce the administrative burden on companies in strategic sectors. However, it is worth noting that certification, in particular including "green" or social premia coming with higher cost, could lead to a competitive disadvantage in global markets for EU demand side players (e.g. automobile manufacturers). Therefore, players may be very price-sensitive, and demand for products whose standards go beyond the minimum requirements set out by the EU is questionable. In this sense, a particular value added of the platform could be to help minimise the costs to participants of complying with existing EU requirements. Figure 65 summarises how demand aggregation combined with certification could look like. This approach could also be valid for other SRM's.

Experience in cobalt suggests that significant market launches are top-down (demand side) driven, as they often require significant investment (e.g., dealing with the adverse effects of ASM).[214] Smaller actors may not be able to trigger these investments alone, even if they have a significant willingness to pay for certified products. Demand aggregation could play a role in aggregating volumes to strengthen the signals for new product standards and associated investments.

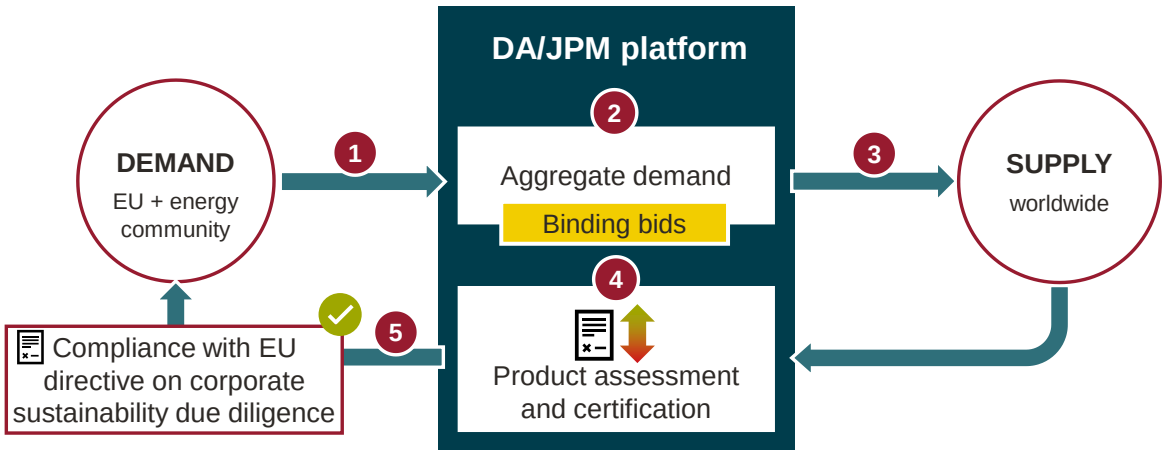
211 Certification could follow existing schemes such as the UN Guiding Principles on Business and Human Rights, OECD Guidelines for Multinational Enterprises, or OECD Due Diligence Guidance for Responsible Supply Chains of Minerals from Conflict-Affected and High-Risk Areas.

212 See Directive of the European Parliament and of the Council on Corporate Sustainability Due Diligence and amending Directive (EU) 2019/1937, https://data.consilium.europa.eu/doc/document/ST-6145-2024-INIT/en/pdf.

213 See article 6 of the Directive: "Member States shall ensure that companies take appropriate measures to identify and assess actual and potential adverse impacts arising from their own operations or those of their subsidiaries and, where related to their chains of activities, those of their business partners".

214 See Dempsey (2023): Artisanal mining: the struggle to clean up a murky industry, Financial Times, https://www.ft.com/cobalt1, retrieved on 3 May 2024.

Figure 65 How a demand aggregation platform with supply assessment could increase transparency in resourcing and help complying with the EU directive on corporate sustainability due diligence



1. Companies can submit demand for cobalt (including sustainability standards)
2. Platform pools and aggregates demand received.
3. The aggregated demand is put out to tender on the international market.
4. Platform assesses and certifies supply offers and matches them to demand
5. Cobalt purchased under platform meets the criteria of supply chain due diligence

Source: Frontier Economics

4.5.7 Case study nickel – role of DA/JPM unclear

Nickel is part of a wide range of key strategic technologies, such as wind turbines, electrolysers, heat pumps, robotics and digital infrastructure.[215] As such, nickel is of particular economic and strategic importance and trading volumes are much higher than for other SRMs, such as lithium or cobalt.[216] Most nickel is currently used in austenitic steel, where it improves resistance against corrosion and oxidation at elevated temperatures.[217] In future, there will be an increasing role of nickel in batteries, which is why the EC considers battery grade nickel as strategic raw material.[218]

215 See Carrara et al (2023), table 1.

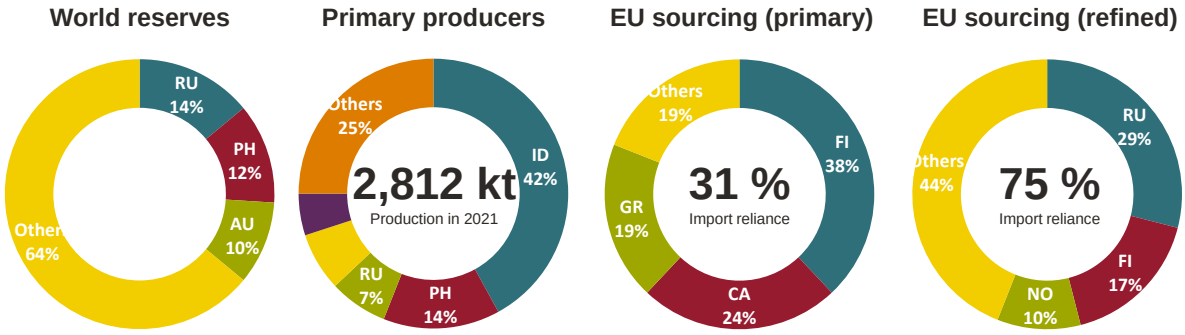
216 EU demand was at 28,346 tonnes in 2020 according to Carrara et al. (2023) and is forecasted to increase to between 317,120 and 455,269 tonnes in 2050.

217 High prices for such steel have already lead to substitution in the past: Some steel products require high levels of nickel, but there is some scope to use cheaper materials where nickel is not critical. For example, ThyssenKrupp has developed stainless steel alternatives with lower nickel grades: https://www.thyssenkrupp.com/en/newsroom/press-releases/thyssenkrupp-nirosta-supplies-special-steels-for-offshore-oil-production-3471.html.

218 See CRM Act, Annex I, Section 1.

Compared to other SRMs, the nickel market is liquid with established futures exchange trading (e.g. LME) and room for supply diversification. Concentration of resources and reserves is moderate (see Figure 66),[219] limiting the risk of substantial supply disruption. Additionally, EU import reliance for primary sourcing is at only 31%, as major supplies come from Finland and Greece.

Figure 66 The market for nickel is moderately concentrated



Source: *Frontier Economics based on EC Raw Material Information System*

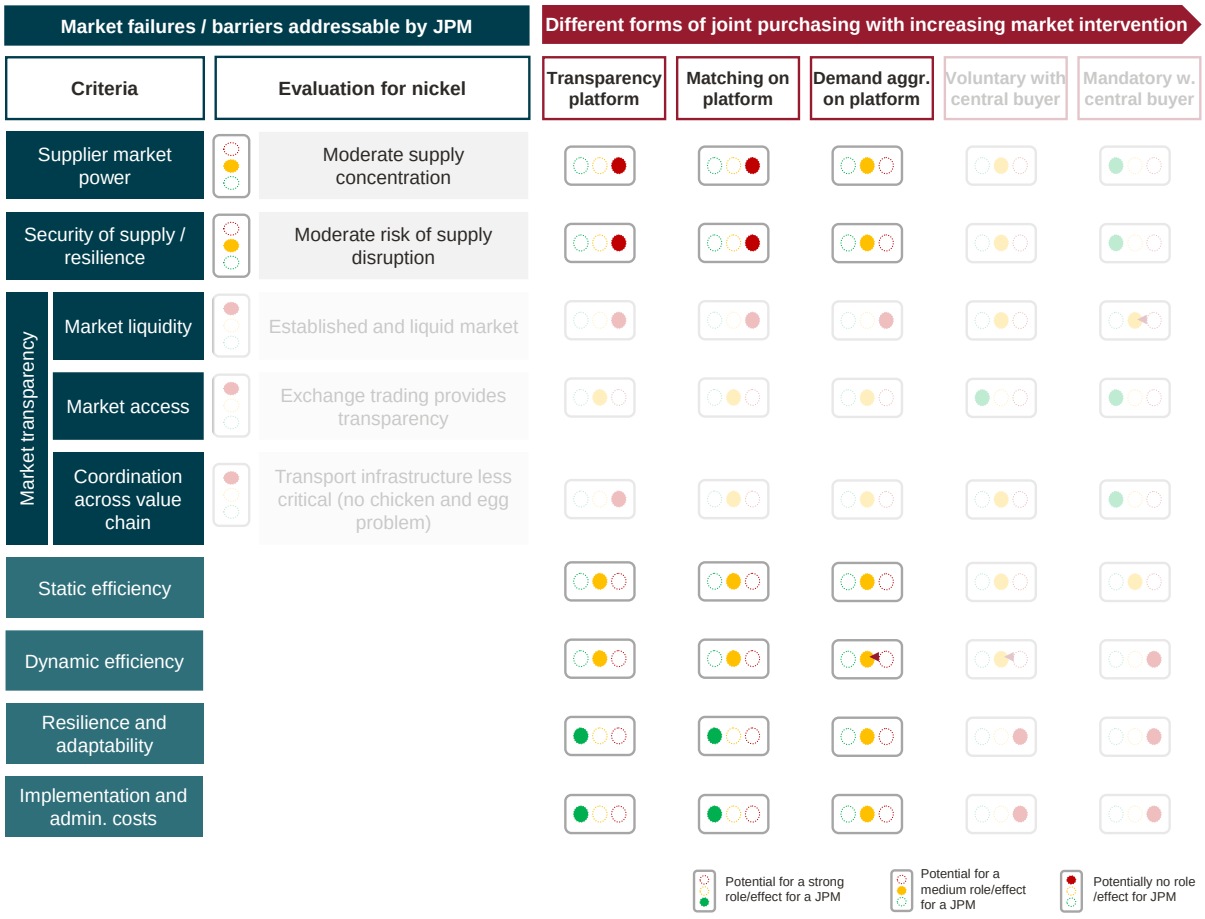
Note: *RU = Russia, PH = Philippines, AU = Australia, ID = Indonesia, FI = Finland, CA = Canada, GR = Greece, NO = Norway*

DA/JPM may not be required to address substantial barriers in nickel markets…

As summarised in Figure 67, market barriers in nickel are less substantial than those of commodities with less liquidity and higher concentration. As the market already offers opportunities to diversify and hedge risks, DA/JPM may not be required to address market barriers. In addition, stakeholders mention that nickel products are already differentiated for end use at the beginning of the supply chain. Therefore, aggregating demand for standardised products on a platform may be challenging. There may be some limited role in increasing the diversity of traded (long-term) products for smaller players which go beyond time scales for exchange-traded futures (when transaction costs for bilateral contracts might be too high for smaller companies).

219 RMIS indicates a HHI of 762 for resources and 876 for reserves, see https://rmis.jrc.ec.europa.eu/rmp/Nickel.

Figure 67 In the nickel market, there is no evident case for DA/JPM



Source: Frontier Economics

…Yet, there could be a role in strengthening cross-commodity spillover

Setting up DA/JPM for nickel may be motivated not by the commodity itself, but by composite materials in mining. Typically, resource deposits contain higher concentrations of multiple SRMs, for example nickel mining is often combined with cobalt, copper and platinum group metals.[220] While mining a single metal would often not be economically viable, combining several metals makes a business case. This is particularly true for resource extraction in Europe, including new sustainable methods. For example, significant quantities of various SRMs can be extracted from mining waste, and some EU projects have found that these can be recovered profitably.[221] However, recovery is mostly uneconomical if only one specific raw

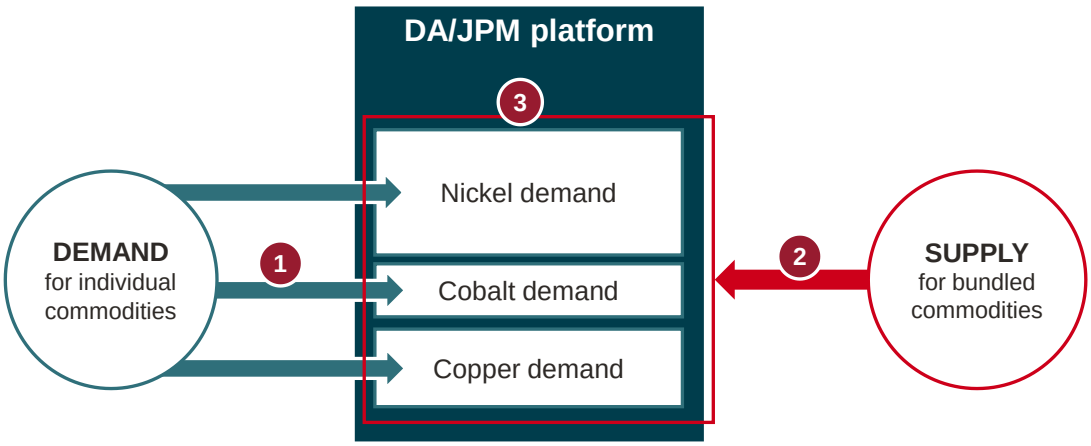
220 See for example nickel mining overview from Glencore: https://www.glencore.com/what-we-do/metals-and-minerals/nickel, retrieved on 3 May 2024.

221 See European Commission, Joint Research Centre (2019): Recovery of critical and other raw materials from mining waste and landfills – State of play on existing practices, Publications Office, 2019, https://data.europa.eu/doi/10.2760/600775

material is considered, but by jointly recovering and valorising base metals the process can be realised commercially.[222]

DA/JPM could play a role in coordinating counterparty discovery across a range of SRM commodities, such as Nickel, Copper and Cobalt,[223] to increase transparency on economic viability of extracting individual SRMs as part of a conglomerate in the ore mix. A platform trading several SRM commodities could improve cross-commodity coordination and internalise potential externalities and spillovers. However, there is limited evidence for the added value of such a bundled DA/JPM. It is plausible that the market is currently providing such services already (or could provide such services). Therefore, setting up DA/JPM for coordination across commodities would require further analysis and stakeholder feedback, including in relation to which commodities to best combine in such an exercise.

Figure 68 How a DA/JPM platform could coordinate counterparty discovery across commodities



1. Companies can submit demand for individual commodities
2. Suppliers submit bundled offers serving a range of commodities
3. Platform coordinates counterparty discovery between demand for individual commodities and bundled supply

4.5.8 Case study rare earth elements – DA/JPM to address high supply dependency in untransparent market

Rare earth elements (REEs) are a unique series of 17 chemical elements. In terms of their reserves, they are not as “rare” as the name might suggest but relatively abundant in the

222 European Commission (2023): Impact Assessment for CRM act, p. 188

223 For example, the mineral reserves in the Hautalampi mining project in Finland contain 13,700t Ni, 11,000t Cu and 3,500t Co, see https://eurobatteryminerals.com/wp-content/uploads/2019/04/UNFC_Hautalampi_09_05_2023.pdf, retrieved on 2 May 2024.

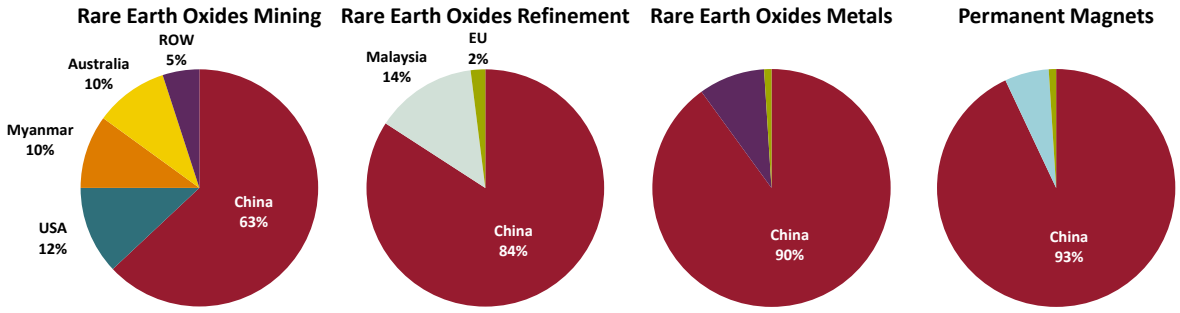
earth's crust. However, they mostly occur in low concentrations in minerals, and they are difficult to separate from other elements, making them "rare".

Of the full list of 17 REEs, the Commission considers "*rare earth elements for permanent magnets"* as strategic raw materials, these include neodymium (Nd), praseodymium (Pr), terbium (Tb), dysprosium (Dy), gadolinium (Gd), samarium (Sm), and cerium (Ce).[224] Permanent magnets are used in the motors of most electric vehicles and generators in wind turbines. Therefore, they are an essential part of the EU's green transition.

The EU is highly dependent on imports along the entire value chain of rare earth elements for permanent magnets

Despite a strong projected growth path, rare earths are generally traded in low volumes, which will remain comparably low in the future. For example, dysprosium had a global demand of only 733t and EU demand of 126t in 2020, with China accounting for a market share of 100% of supplies to the EU.[225] Market volumes are even lower for other rare earths. As a result, REE markets are quite illiquid, and there are no exchange-traded futures or similar products to enable risk hedging for prices. Instead, trading usually happens bilaterally, significantly limiting transparency. In addition, supply concentration is very high along the whole value chain from mining to until production of permanent magnets (see Figure 69). While China is dominant along the whole value chain, the EU is entirely dependent on imports, which poses a risk to security of supply.

Figure 69 Concentration along the global supply chain of permanent magnets



Source: Frontier Economics based on Gauß et al (2021): Rare Earth Magnets and Motors: A European Call for Action. A report by the Rare Earth Magnets and Motors Cluster of the European Raw Materials Alliance. Berlin 2021

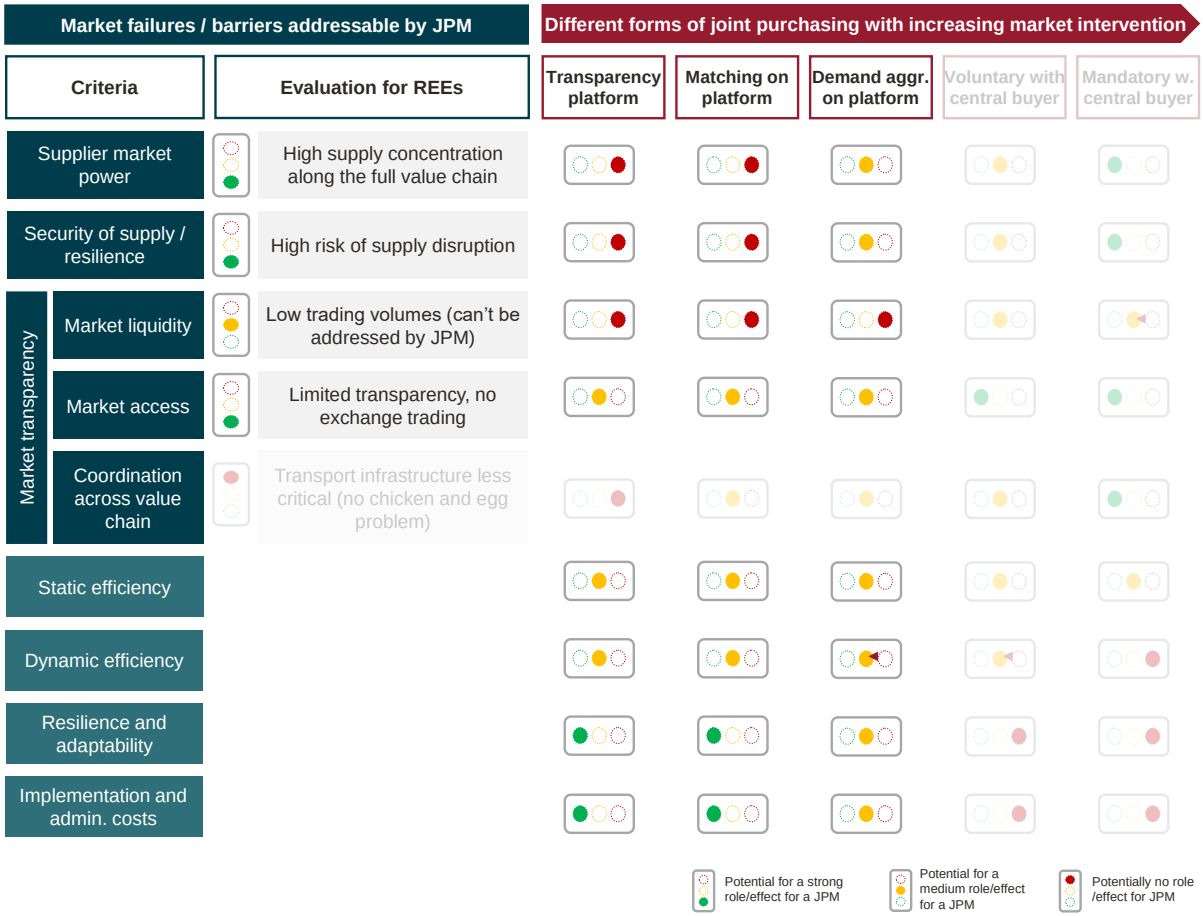
224 See CRM Act, Annex 1. For this reason, we will focus on REEs for permanent magnets in the following.

225 See EC (2023) Study on the Critical Raw Materials for the EU, p. 6.

Demand aggregation is best placed to address barriers of high supply concentration and a high risk of supply disruption, but applicability is uncertain given low market liquidity

Given supply side concentration and import dependency lead to substantial resilience concerns, a demand aggregation platform with binding bids would be best suited to help demand-side players form consortia and potentially increase their buyer power to some extent (subject to competition law - see Section 5). However, trading volumes are generally low and differ between individual REEs, so regular calls for expression of interest (for demand and supply) may not be applicable due to low liquidity. Therefore, the applicability of demand aggregation is uncertain and would need to be tested.

Figure 70 There are substantial market barriers in the market for REEs which could be addressed by demand aggregation platform



Source: Frontier Economics

Demand aggregation being most impactful at the beginning of the supply chain would require securing capacities further downstream

The EU is highly dependent on imports not solely at the mining stage but along the whole supply chain of permanent magnets (see Figure 69). Therefore, even in case of feasibility of demand aggregation at the beginning of the supply chain (e.g. for rare earth oxides after mining), demand aggregation will not be able to address market barriers to strengthen the resilience of permanent magnets supply as long as downstream activities (e.g. production of magnets) is highly concentrated outside of the EU. Instead, resilience could be strengthened from downstream to upstream activities subsequently.[226] That means for REEs, demand aggregation would initially add potential value for the procurement of permanent magnets. However, as such magnets are already differentiated products (depending on their end-use), it may be hard to form consortia and aggregate demand for a standardised product. Therefore, ramping up domestic manufacturing capacities would be a prerequisite for demand aggregation to add value in strengthening security of supply for REEs used in permanent magnets.

In ramping up domestic capacities along the supply chain, a matching platform could help in finding co-operation partners[227]

As there are resource potentials for REEs in Europe (although most of them are currently not economically viable), DA/JPM could play a role in counterparty discovery to ramp up domestic resourcing of REEs for permanent magnets in line with targets in the CRM act. Similar to other SRMs, setting up additional (intra-EU) resources for supply diversification will require long-term contracts and co-operation instead of one-off transactions. This could include buyers forming consortia or even entering into stronger forms of co-operation, such as setting up a joint venture for long-term REE procurement.[228] However, while DA/JPM could facilitate agreements for EU capacity ramp-up to some extent, stakeholders note the importance of creating a policy environment such that EU producers can compete in a global market. Otherwise, a ramp-up of European capacities may not be possible.

4.5.9 Concluding remarks on where and when DA/JPM could add value

Regarding the potential role of DA/JPM, the CRM act sets out that the Commission shall declare for which strategic raw materials (and at which processing stage) DA/JPM could add value. Since market structures and associated barriers differ between SRMs, this needs to be assessed individually for each SRM. However, some general principles can be derived from the case studies in the previous chapters. We summarise those in the following.

226 While DA/JPM is in principle sensible at the beginning of the supply chain (mining/resourcing), this should be accompanied by an increase in the EU downstream processing capacities (or at least a diversification of capacities).

227 This would be a different approach than designing demand aggregation to strengthen procurement of foreign supplies.

228 As already outlined, such agreements would need to comply with EU competition rules.

The entire supply chain is relevant to strengthening resilience: DA/JPM at the beginning of the supply chain is particularly useful when downstream activities are in the hands of EU companies

Currently, the EU often imports processed materials or materials that have already been used in products (e.g. PV cells). These are preceded by several steps along the supply chain, generally mining and refining for most SRMs and further processing steps if necessary.

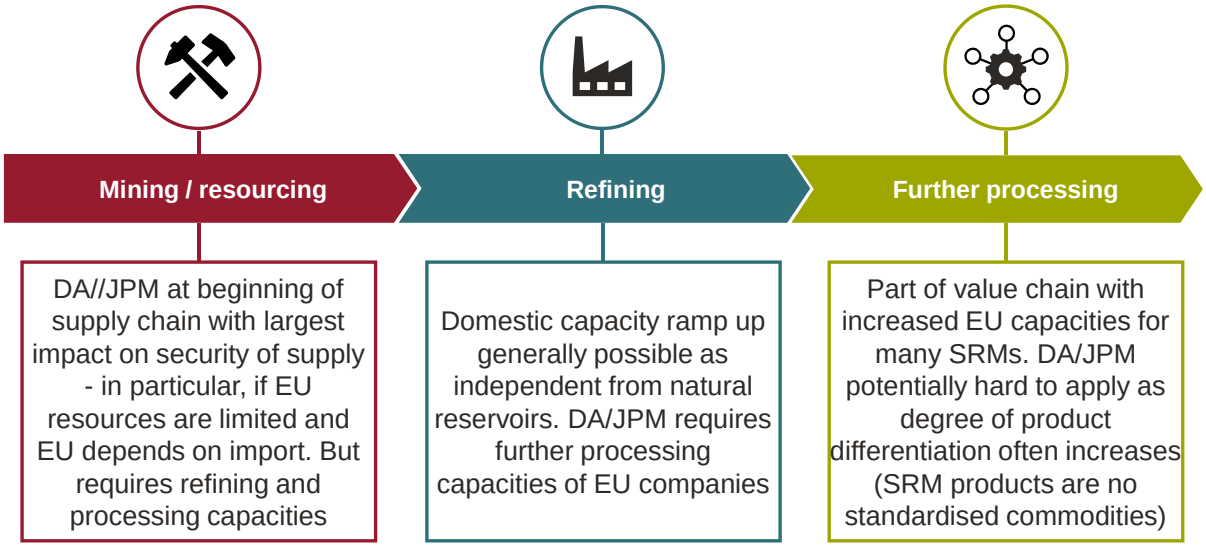
In theory, **DA/JPM could bring the most substantial value in procuring SRMs at the beginning of the supply chain** after mining. This is because the resourcing of SRMs is dependent on natural reservoirs. Given its insufficient resources and reserves, the EU will necessarily need to import specific SRM, and strengthening security of supply is therefore most critical at the mining stage.

In practice, **procuring SRM resources at the mining stage is sensible if downstream processes in the supply chain are already more resilient**. For example, if procured raw materials can be further processed and refined in the EU. DA/JPM cannot play a sensible role in addressing security of supply for unprocessed raw materials if the EU does not have the necessary capacities further down the supply chain.

Therefore, regarding specific SRMs, **DA/JPM should initially start at the point of the supply chain where EU companies have sufficient capacity for further processing** (otherwise there will not be enough demand from EU players).

In the longer term, DA/JPM could be expanded to cover upstream parts of the supply chain. Long lead times for developing resourcing capacities require early analysis and development of EU resourcing potentials. Stronger forms of co-operation agreements, such as consortia or even joint ventures, may be necessary to achieve a capacity ramp-up across the entire supply chain in the EU. DA/JPM might play a role in finding suitable co-operation partners and implementing projects through long-term agreements. Additionally, this could help achieve CRM act targets, though this will likely require additional policy measures, such as funding, quotas, tax reductions, or other financial measures.

Figure 71 Applicability of DA/JPM is subject to EU import dependency along the supply chain



Source: Frontier Economics

In general, DA/JPM is particularly applicable when a standardised product (commodity) can be traded

The value added of demand aggregation benefits from liquid demand for a good with uniform characteristics. For energy commodities such as natural gas, the product is very uniform. This is different for SRMs as there is often not just a single commodity of raw material but differentiated products. Therefore, **precise product specifications and standards are more relevant for SRMs**. The degree of product differentiation often increases along the supply chain, so at a high level, DA/JPM may add particular value in the early stages of product processing (but again, this varies widely between SRMs).

While DA/JPM may add some value for SRMs with high market volatility, high concentration and low transparency, it would benefit from additional policy measures

Given an unlevel playing field in production of many SRMs and the EU's target to strengthen resilience by increasing domestic production capacities, it is worth noting that the **impact of DA/JPM could be more substantial if combined with additional policy measures, such as subsidies.** For example, DA/JPM could set out calls for expression of interest to find lowest cost resources to fulfil given capacity targets if public funding may help bridging potential cost gaps. However, measures requiring additional budget are out of scope of this study.

4.6 CO_2

4.6.1 Summary

Introduction (Section 4.6.2)

In order to achieve economy-wide climate neutrality by 2050, capturing emissions will be crucial – particularly in the so-called hard-to-abate sectors where mitigation options are limited. Against this background, the Commission has published an industrial carbon management strategy which will be based on carbon capture for storage (CCS), carbon removals and carbon capture for utilisation (CCU). The strategy also includes a reference to the introduction of DA/JPM in the carbon management market to help ramping up the currently very nascent market from 2030 onwards.

Key market barriers (Section 4.6.3)

The development of the CO2 market is currently hindered by several market barriers:

- high degree of uncertainty and technological risk;
- chicken and egg problem during the ramp-up of a CO_2 market, i.e. supply, transport and demand must ramp up simultaneously;
- storage supply facilities show some characteristics of a natural monopoly and may lead to market power;
- missing transparency of local carbon transport and storage options as well as (local) demand for storage.

Role of DA/JPM (Section 4.6.4)

Overall, there is indication of a rationale for DA/JPM as DA/JPM could help during the early stages of a nascent CO_2 market only by facilitating market access and coordination between stakeholders along the value chain at least to some extent. Given some similarities to the hydrogen market, the specific form of DA/JPM for CO_2 could be comparable to the considerations for hydrogen. However, as there is no direct legal basis for development of DA/JPM for carbon management, we do not analyse detailed design consideration for carbon management further for the time being.

4.6.2 Introduction to the role of CCS and CCU

The European Union is committed to achieving economy-wide climate neutrality by 2050, which includes reaching net CO_2 emissions. Capturing emissions will be crucial in reaching the climate targets – particularly in the so-called hard-to-abate sectors where mitigation options are limited:

- The Intergovernmental Panel on Climate Change (IPCC) refers to CCS as **a critical CO_2 mitigation option.** Six of the seven IPCC illustrative mitigation pathways involve major use of CCS, and the seventh requires global energy demand to halve in the next 30 years.[229]

- In June 2024, the Net-Zero Industry Act (NZIA) regulation[230] entered into force to establish a Union market for CO_2 storage services, increasing availability of CO_2 storage sites and support for industrial carbon management technology projects across Europe. The NZIA sets an EU-wide CO^2 storage objective to make 50 million tonnes of annual CO_2 injection capacity available by 2030. Companies that hold an oil and gas production license under the Hydrocarbon Directive[231] must contribute to this storage objective. The contribution of oil and gas companies can be achieved directly, through the development of CO_2 storage sites. However, oil and gas companies can also enter into agreements with other storage developers and contribute either financially or through other means. As demand grows, CO2 storage capacity needs to be rapidly developed. Modelling results indicate that around 280 million tonnes would have to be captured by 2040 and around 450 million tonnes by 2050 in line with the EU's climate targets.[232]

Against this background, the Commission has published an industrial carbon management strategy which will be based on three pathways, namely carbon capture for storage (CCS), carbon removals and carbon capture for utilisation (CCU)[233]:

- **Capturing CO_2 emissions** of fossil, biogenic or atmospheric origin **for permanent storage** (CCS);

- **removing and permanently storing** biogenic or atmospheric CO_2 from the atmosphere; and

- **capturing CO_2 for utilisation** to substitute fossil-based carbon in synthetic products or fuels (CCU).

Accordingly, forecasts suggest a ramp-up of the currently very nascent CO_2 market accelerating from 2030 (see Figure 72). By 2050, 450 Mt CO_2 could be captured and used or stored annually. The ramp-up also includes the expansion of a dedicated transport and

229 See IPCC, 2023: Climate Change 2023: Synthesis Report. Contribution of Working Groups I, II and III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [Core Writing Team, H. Lee and J. Romero (eds.)]. IPCC, Geneva, Switzerland, pp. 35-115, doi: 10.59327/IPCC/AR6-9789291691647.

230 Regulation (EU) 2024/1735 of the European Parliament and of the Council of 13 June 2024 on establishing a framework of measures for strengthening Europe's net-zero technology manufacturing ecosystem and amending Regulation (EU) 2018/1724 (Text with EEA relevance), OJ L, 2024/1735, 28.6.2024.

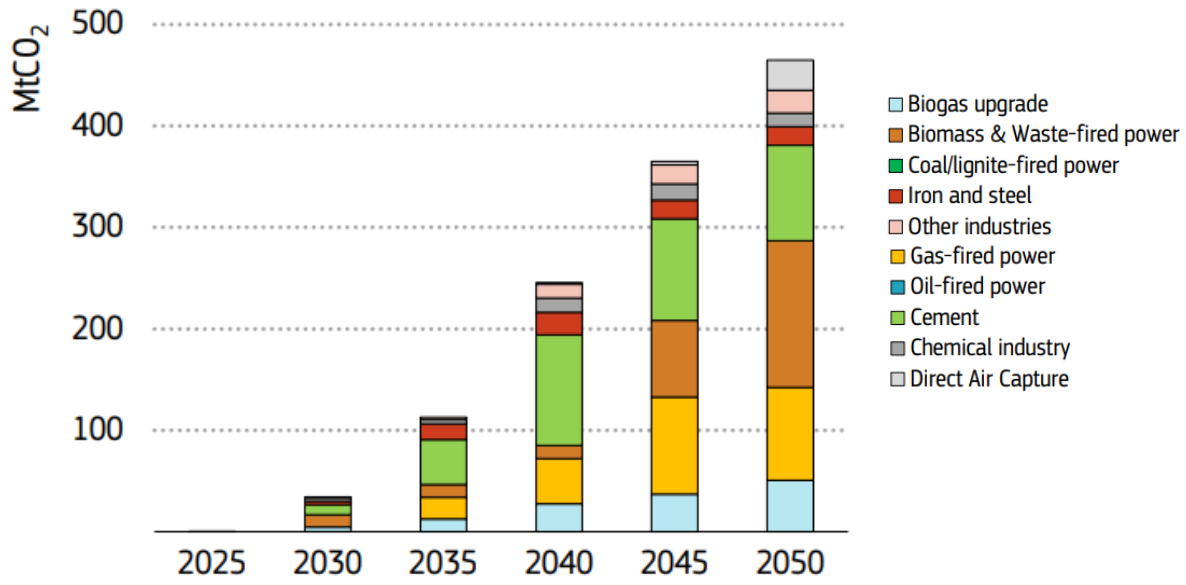
231 Directive 94/22/EC of the European Parliament and of the Council of 30 May 1994 on the conditions for granting and using authorizations for the prospection, exploration and production of hydrocarbons, OJ L 164, 30.6.1994, p. 3–8

232 See European Commission Communication "Towards an ambitious Industrial Carbon Management for the EU", 6 February 2024, p. 2.

233 See EC (2024).

storage infrastructure. So far, there is no CO_2 network in place, only individual pipelines. EC modelling[234] estimates that by 2050, the European CO_2 pipeline network could reach up to 19,000 km and require investment of between EUR 9.3 billion and EUR 23.1 billion.

Figure 72 CO_2 captured by source in the EU, 2025-2050, based on the net zero in the EU in 2050



Source: Joint Research Centre: Carbon capture utilisation and storage in the European Union - 2023 Status Report, https://setis.ec.europa.eu/carbon-capture-utilisation-and-storage-european-union-0_en

In its industrial carbon management strategy, the Commission also "*…foresees to develop, with Member States, by early 2026 at the latest, a platform for demand assessment and demand aggregation for CO_2 transport or storage services, with the aim of matching CO_2 suppliers with storage and transport providers and providing contract and procurement transparency.*"[235] As such, the communication provides a basis for thinking about DA/JPM in the carbon management market, even though this does not provide a legal basis yet. Based on the Commission's statements, this could cover various aspects of voluntary DA/JPM forms, including demand aggregation and matching on the platform. In contrast to AggregateEU, the Commission foresees a CO_2 platform to address longer timelines to provide contractual certainty for deployment of infrastructure and capturing installations.

234 European Commission, Joint Research Center, Tumara, D., Uihlein, A. and Hidalgo Gonzalez, I., Shaping the future CO_2 transport network for Europe, Publications Office of the European Union, Luxembourg, 2024, https://data.europa.eu/doi/10.2760/582433, JRC136709.

235 Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: Towards an ambitious industrial carbon management for the EU, COM(2024) 62 final.

4.6.3 Barriers for the development of a CO_2 market

The development of a CO_2 market faces several market barriers.

There is a high degree of uncertainty and technological risk regarding the future CO_2 market

Presently, there is no established market for CO_2 management, and substantial uncertainties persist regarding its long-term outlook:

- Many technologies are still in development, and CO_2 management is yet to be tested on a large scale. Further cost reductions are crucial for mass adoption but the extent of technological spillovers and learning rates in line with greater application is uncertain.
- Policy frameworks are being initiated, but some regulatory uncertainty remains. It relates specifically to the extent and areas where Carbon Capture and Storage (CCS) can be applied. It also includes current public concerns, emphasising the need to establish acceptance for the storage of CO_2.
- Due to the uncertain market circumstances and partly uncertain regulatory framework conditions, there is currently no transparency regarding demand and especially supply of CO_2 storage.

A cost-efficient market ramp-up requires increased coordination across the value chain

As the CO_2 market is at a very early stage, there are significant risks related to the timing and size of carbon management demand and supply. Similar to hydrogen (as explained in Section 4.2.3), initiating the ramp-up of a CO_2 market can be described as a chicken-and-egg problem[236] – in establishing a CO_2 value chain, supply, transport, and demand must ramp up simultaneously, as it is difficult to attract a single element without the other. For example, carbon management supply needs to be established for capturing appliances, since without use or storage, capturing is meaningless. However, storage investments are not made without corresponding demand – so supply and demand must be built up simultaneously. This calls for coordination across the value chain, which is also highlighted in an EC report on shaping the future CO_2 transport network for Europe: "*To reduce investment costs, the planning and development of storage capacities and CO_2 capture projects should be carefully coordinated*."[237]

[236] The options for storing CO_2 also depend on regulatory conditions in EU member states. It is still unclear whether CO_2 is primarily stored offshore or whether onshore storage is also permitted, which would increase the range and significantly increase the geographical proximity to storage. EC modelling identifies up to 100 potential storage sites in the EU if decentralised onshore storage is included (see European Commission et al. 2024).

[237] See European Commission et al. 2024, p. 3.

The coordination requirement applies in particular to large-scale infrastructure investments that have to bear high sunk costs and where there is a risk of underutilisation at the beginning. However, as the cost gap between large-scale pipeline transport and alternatives such as transport via truck or ship is smaller for CO_2 than for hydrogen, a cost-efficient market ramp-up does not require developing a full pipeline transport network ahead of supply and demand.[238]

Market power of storage supply facilities and other market failures due to natural monopolies can be addressed by regulation

Storing CO_2 permanently on a large scale requires natural reservoirs and large upfront investment, which means that potential storage supply is geographically limited and there are high barriers to entry. It also means that storage supply will be significantly more concentrated than demand. Given the dependence of demand geographical proximity of storages, there is a lock-in effect for carbon capture appliances which require subsequent transport and storage. These market conditions ensure considerable market power on the supply side, without corresponding countervailing buyer power.

In addition, similar market failures apply to the CO_2 infrastructure as in other energy networks (such as hydrogen or natural gas), which are characterised by natural monopolies. But these market failures can be addressed by regulatory intervention with existing measures and do not require DA/JPM.

4.6.4 Potential role of DA/JPM for CO_2

Figure 73 summarises the results of our high-level assessment. Overall, there is indication of a **rationale for DA/JPM** in removing market barriers in the market for carbon management.

- DA/JPM cannot remove technological uncertainty in the market. However, it can make coordination along the supply chain during the market ramp-up easier by increasing transparency.
- By increasing transparency, DA/JPM could also play a potential role in enabling coordination along the value chain as long as long-term contracts – potentially supported by subsidies in the initial phases – are signed.[239] However, since a cost-efficient market ramp-up does not require developing a full pipeline transport network ahead of supply and demand (as in the case of hydrogen), the rationale for market intervention is less pronounced than for hydrogen (see Section 4.2.3).

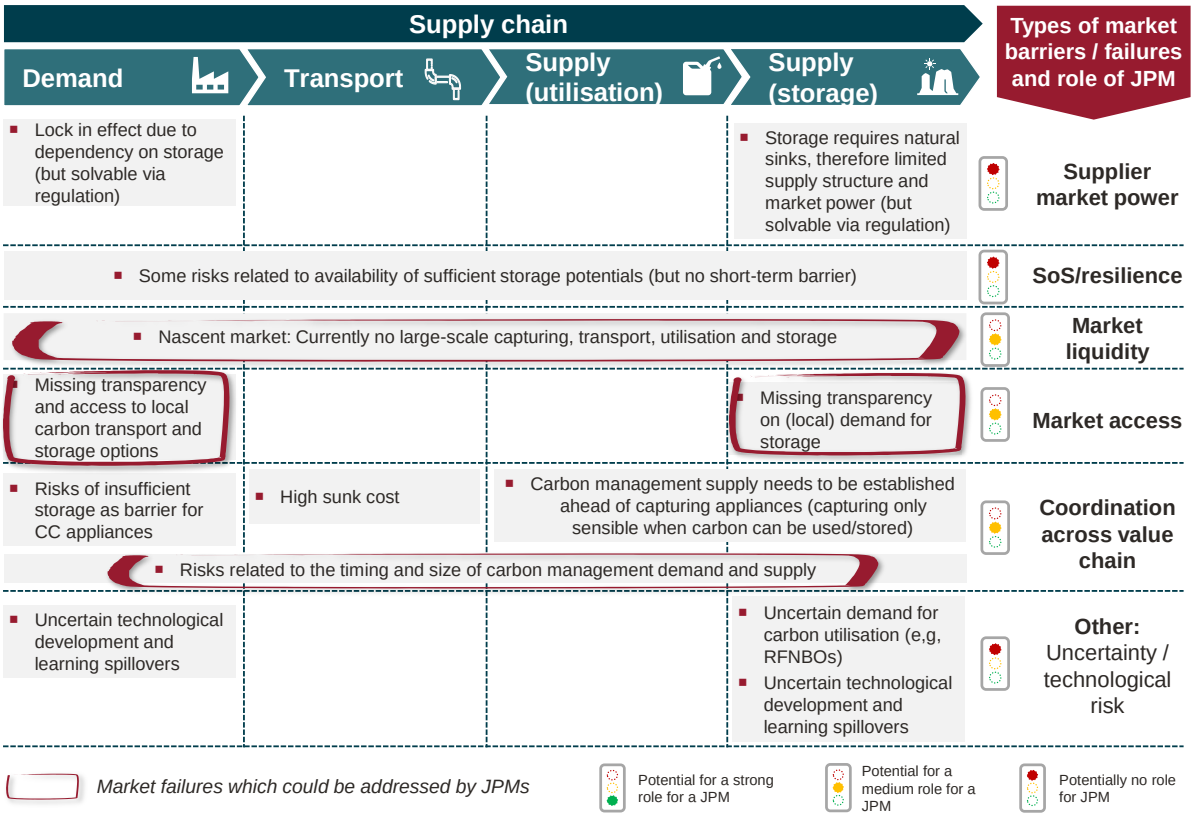
[238] See European Commission et al. (2024, p. 70): "Another possibility is to use alternative and perhaps cheaper modes of transport such as trucks, rail, barges, or, when feasible, shipping until the necessary storage infrastructure is developed. These modes of transportation can be useful in such situations, but their role will be crucial for the transport of captured CO_2 to capture nodes, especially in the early phase of network development."

[239] Long-term contracts would decrease risks related to timing and size of carbon management demand and supply.

- Storage supply could be limited due to dependency on geological reservoirs, but current forecasts suggest a regional (intra-EU) market with limited trade outside the EU. As such, there is no role for DA/JPM to limit supplier power outside the EU.

- In particular, **DA/JPM could help during the early stages of a nascent CO_2 market by facilitating market access, coordination between stakeholders** and optimisation of existing transportation routes along the value chain. For instance, increased demand visibility enabled by DA/JPM can contribute to accelerating the deployment of storage supply.

Figure 73 Market barriers in the market for carbon management



Source: Frontier Economics

Similar to hydrogen, the CO_2 market is expected to strongly ramp up from 2030 onwards, including the development of dedicated infrastructure. Hence, **market access barriers and – to a lower extent – coordination between stakeholders** along the value chain needs to be addressed. Given these similarities, the specific form of DA/JPM for CO_2 could be comparable to the considerations for hydrogen (see Section 4.2) – even though there are also some relevant differences[240]. For example, as outlined in the carbon management strategy, the

[240] Relevant differences between the hydrogen and the CO_2 market cover 1) that the thinking on a future market and infrastructure is less advanced for CO_2 than for hydrogen and that the policy frameworks is still being discussed, 2) that

platform could provide transparency to infrastructure planning and facilitate matching storage demand and storage availability (provide timing and location) – which should particularly help smaller capturing players with limited bargaining power.[241]

Unlike the case of natural gas (including biomethane and natural gas captured from methane abatement), hydrogen and strategic raw materials, there is no direct legal basis for the development of a DA/JP mechanism for carbon management. Consequently, we do not analyse carbon management further for the time being.

4.7 Financial instruments on DA/JPM platform

4.7.1 On AggregateEU, DG ENER promoted the use of financial instruments to support trading activity

Managing credit risk (the risk of loss due to counterparty defaulting on their obligation) is an innate feature of commodity markets. As explained in Section 2.1, players trading commodities over-the-counter (OTC) will take account of their counterparties' creditworthiness on a bilateral basis prior to agreeing terms for a transaction (including amount of collateral required and types of acceptable collateral). This is different for exchange-based trading, where collateral and clearing arrangements are standardised for all players, regardless of creditworthiness.

There are no credit requirements for participating on AggregateEU (though when subscribing to AggregateEU, participants are invited to specify whether they have a credit rating and the financial instrument(s) at their disposal to support contract negotiations).[242] As explained in Section 3.3.1, this is due to the policy goal of ensuring equal access to gas supplies. However, the requirement to demonstrate creditworthiness nevertheless still applies to any OTC trades negotiated and executed following matching on DA/JPM.

In stakeholder feedback provided to DG ENER, credit rating and the absence of financial guarantees were mentioned as one of the key reasons for not pursuing relationships with new counterparties. This is consistent with stakeholder feedback provided to Frontier. The potential concern might be that limited creditworthiness and ability to provide financial guarantees may act as barrier for new relationships, particular for smaller players, undermining the effectiveness of AggregateEU.

This issue has been recognised already. AggregateEU provides guidance regarding financial instruments available to counterparties to support credit checks.[243] These may be provided on a commercial basis (e.g. banks may provide a guarantee, in exchange for a fee). AggregateEU

infrastructure development going ahead of demand and supply is less relevant for CO_2, and 3) that current forecasts suggest a regional (intra-EU) market with limited trade outside EU.

241 See EC (2024), p. 11.

242 https://aggregateeu.prisma-capacity.eu/support/solutions/articles/36000425597-how-to-subscribe-to-the-aggregateeu-service-.

243 https://aggregateeu.prisma-capacity.eu/support/solutions/articles/36000431205-what-are-financial-instruments-.

also provides guidance on the support available from public financial institutions, building on an outreach exercise conducted by DG ENER.[244] Such support, when involving EU member state funds, will be subject to State aid control. As a result it will either need to be on a market basis, and therefore not involve State aid, or will need to be compatible with relevant State aid guidelines. Support from International Financial Institutions (to the extent this would be backed by an EU budgetary guarantee) would need to be consistent with the Financial Regulation[245] (which, inter alia, requires consistency with State aid rules).

The question is whether more can be done, beyond the above facilitative actions, to support trading for natural gas and the other products being considered in this report. Some stakeholders have suggested the possibility that the public sector assumes a share of the risk, in particular through **financial support of the costs associated to the credit support** (e.g. discounted fee for credit guarantees). We consider the case for this in the following sub-section.

4.7.2 Financial support could encourage more trading, though may also come with risks

We abstract from whether such financial support would be granted by EU, Member States or other public institutions.[246] Clearly, EU harmonised support would be less distortive than an approach based on State aid, as it would ensure more of a level playing field within the EU. However, it would require EU budget. According to State aid rules, any aid should only be provided where it is appropriate, necessary and proportionate.

In the following, we outline **general principles** on the idea of providing credit support. There are different ways in which support could be granted, in particular regarding the:

- **marketplace** – support could be provided on all marketplaces or for specific trading routes:
  - Support might be made available to certain parts of the market only, for example, only to trades carried out on a DA/JPM platform. This may encourage trade on the part of the market generating from financial support. However, it may also divert trade from other platforms, thereby **distorting companies' risk hedging**. As outlined in Section 2.1, market participants use a combination of platforms, and may vary trading over different platforms at different points on time, to help them efficiently address wholesale, cash liquidity and credit risks. As noted previously, some stakeholders have expressed a similar concern that DA/JPM may affect competition between trading platforms and potentially may place emphasis on OTC trading over exchange-

244 https://aggregateeu.prisma-capacity.eu/support/solutions/articles/36000435569-how-to-get-support-from-public-financial-institutions-.

245 European Commission, Directorate-General for Budget, Financial regulation applicable to the general budget of the Union – July 2018, Publications Office, 2021, https://data.europa.eu/doi/10.2761/985939.

246 As noted above, Member State financial support will be subject to State aid control.

based trading (see Section 3.2.2). While we have not found clear evidence of such displacement to date, this may be more of a concern were public financial support to be made available only to those participating on DA/JPM.

- In principle, enabling credit support **for the market as a whole will lead to fewer distortions** in market participants' risk management preferences. It could be comparable to a market-wide subsidy and hence could be one way of addressing certain market failures.[247] For example, given several market failures or barriers hindering the ramp-up for hydrogen (as discussed in Section 4.2.3), there could be some rationale for subsidy, in particular to address initially high production costs. Credit support could serve as an alternative to, for example, production subsidies.[248] However, it is worth noting that direct subsidies (e.g. subsidising production) might still be less distortive as subsidising credit guarantees might encourage riskier trades than optimal, or enable less creditworthy counterparties to engage in trading. In addition, designing credit support in a way that does not have any effect on trading behaviour might be challenging. Presumably some choice would need to be made regarding which financial instruments to support - and not all financial instruments will be equally relevant across both OTC and exchange trading.

- **market participants** – credit support could be open for the market as a whole (which, as already descried above, would tend to be less distortive) or only be granted for specific companies, for example to smaller companies only. This could reduce the costs of trading for smaller participants. However, it may also **distort competition** between companies, for example by encouraging smaller market participant size. In the long run, this could lead to **higher costs,** if companies are not incentivised to take advantage of scale economies of trading and risk management (as described in 2.1) or to co-operate (as described later in Section 5)

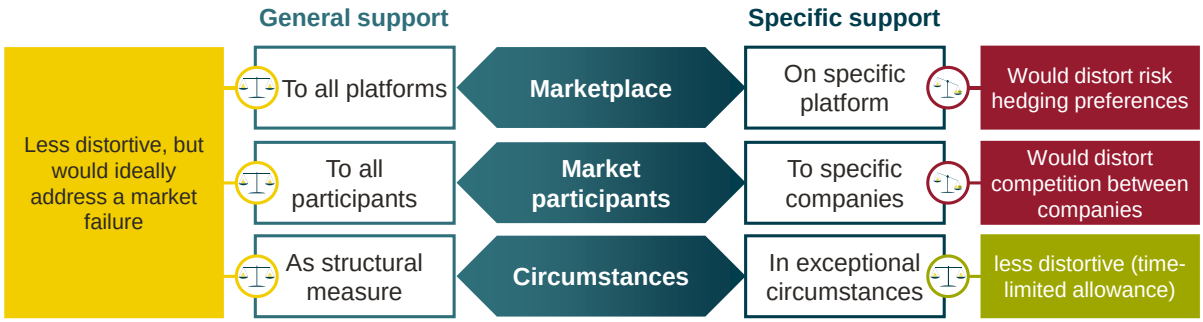
- **circumstances** – financial support could serve as a structural measure or be granted in exceptional circumstances only. The latter could be limited to **crisis situations and is likely to be less distortive**. For example, this would be consistent with the time-limited allowance, subject to certain conditions for liquidity support during the energy crisis. In line with the comments on general support to a whole market, **structural measures** could also be less distortive in particular **when there is a market failure or a specific policy goal**.

Figure 74 summarises these principles, which apply generally across all products considered in this report.

247 According to economic theory, market failures result in inefficient resource allocation and suboptimal outcomes, potentially leading to social welfare losses. Therefore, policy intervention may be required to correct these failures through measures such as subsidies or regulation. In the absence of a market failure, there is no general economic rationale for intervention, as the market would function efficiently also without support.

248 Decreasing costs for credit guarantees could increase willingness to pay on the demand side.

Figure 74 Potential impact of financial support on competition level playing field



Source: Frontier Economics

Overall, public financial support of credit arrangements will tend to be less distortive if applied across a broader base,[249] although avoiding distortions completely will be challenging. More appropriate tools for addressing market failures (such as those hindering the ramp-up of hydrogen and biomethane), may exist.

It would be lower regret for the Commission to deploy measures already implemented on AggregateEU, such as providing guidance regarding financial instruments available to counterparties to support credit checks as well as guidance on the support available from public financial institutions. In addition, it will also be important to consider the role of financial regulation (which affects credit and collateral requirements for market participants) – though this is outside the scope of this study. These actions would be relevant across all products, regardless of whether DA/JPM is introduced. Providing this information for free on DA/JPM platforms described in previous chapters could lead to additional visibility of such information for stakeholders interested in participation.

[249] However, applying public financial support across a broader base would be hard to justify in a functioning market without substantial market failures to be addressed by such a measure. Targeting only specific parts of the market instead might in turn distort competition, as outlined above in the paragraph on “market participants”.

5 The role of co-operation between buyers

AggregateEU allows companies to co-operate in joint purchasing, subject to competition law. This section reviews the experience of buyer co-operation on AggregateEU to date and considers its role going forward, including for products other than natural gas. It is structured as follows:

- We describe models for buyer co-operation (Section 5.1);
- We discuss considerations that may guide parties' choice of co-operation models (Section 5.2);
- We review the experience of company co-operation on AggregateEU (Section 5.3); and
- We critically assess the role of co-operation models going forwards and the role of policy intervention to support co-operation (Section 5.4).

5.1 Models for co-operation

5.1.1 At a high-level, we distinguish between "outsourcing" and "joint purchasing"

Companies may **engage in joint purchasing** and/or **outsource** purchasing.

The Commission uses the term "joint purchasing agreement" when referring to agreements between purchasers to set up a common organisation acting on behalf of the members of a buyer group that provides the interface between suppliers in the upstream market and the purchasers in the purchasing market that the organisation represents.[250] The essence of joint purchasing is that the buyer group, by bargaining collectively on behalf of its members, seeks to negotiate more favourable terms and conditions than would have been obtained if each purchaser had acted alone.[251] Participants of a joint purchasing agreements typically make transparent that they act jointly on behalf of members; often they have defined the form and functioning of their co-operation in written agreements.[252]

---

250 European Commission, Directorate-General for Competition, Whish, R., Bailey, D., Horizontal guidelines on purchasing agreements – Delineation between by object and by effect restrictions – Final report, Publications Office of the European Union, 2022, https://data.europa.eu/doi/10.2763/65104 3.4).

251 European Commission, Horizontal guidelines on purchasing agreements: Delineation between by object and by effect restrictions (3.4).

252 Communication from the Commission – Guidelines on the applicability of Article 101 of the Treaty on the Functioning of the European Union to horizontal co-operation agreements, C/2023/4752, OJ C 259, 21.7.2023, p. 1–125 ("Horizontal Guidelines") (279-282). Note that joint purchasing agreements are distinct to a "buyer cartel". The Commission uses the term "buyer cartel" when referring to agreements or concerted practices between at least two purchasers that concern the content or modalities of a purchaser's individual interaction with suppliers and that constitute a restriction of competition

EU competition law recognises that co-operation arrangements such as purchasing agreements can deliver benefits for EU consumers, especially where they provide a countervailing effect against seller market power, but that they may also, under certain conditions, harm competition upstream and/or downstream.[253]

Companies can outsource purchasing on an individual basis or jointly outsource. Companies can outsource:

- **To one partner ("piggy backing"):** For example, one company might utilise another's established supplier relationships or procurement infrastructure to streamline their purchasing process; or
- **To a third party**: Procurement is carried out by a separate, third party organisation who specialises in carrying out a task on behalf of its customers/members. The third party usually performs the task for several organisations and offers standardised terms of service or framework contracts to all its customers.

Outsourcing (whether piggy-backing or to a third party) is how most buyers and retailers access the wholesale market today (see Section 2.1).

5.1.2 Joint purchasing can take different forms

Joint purchasing agreements may, in turn, take various forms.[254] The COM Horizontal Guidelines cover joint purchasing carried out through various vehicles, including by a jointly controlled company, by a company in which other companies hold non-controlling stakes, purchasing in the context of a contractual arrangement or looser forms of co-operation.[255] The main differences between different forms of co-operation are with respect to the intensity of co-operation and the degree of institutionalisation of the partnership.

- which degree of **control** does the group have itself – can they make decisions independently; do they need approval from its members' management, or are all decisions made ad-hoc by representatives of members without a central organisation?

by object under Article 101 TFEU. For example, a buyer cartel may exist where purchasers agree to exchange commercially sensitive information between themselves about their individual purchasing intentions or their negotiations with suppliers, outside any genuine joint purchasing arrangement that interacts with suppliers collectively, on behalf of its members. This concerns, in particular, exchanges between purchasers about the purchase prices they will pay (maximum prices, minimum discounts and other aspects of prices), other terms and conditions of purchase, sources of supply (both in terms of suppliers and territories), volumes and quantities, quality or other parameters of competition (for example timing, delivery and innovation). A buyer cartel is very unlikely to fulfil the conditions of Article 101(3) TFEU to benefit from an exemption (see section 5.3). See also European Commission, Horizontal guidelines on purchasing agreements: Delineation between by object and by effect restrictions" (1.7 and 3.4).

253 Horizontal Guidelines (277)

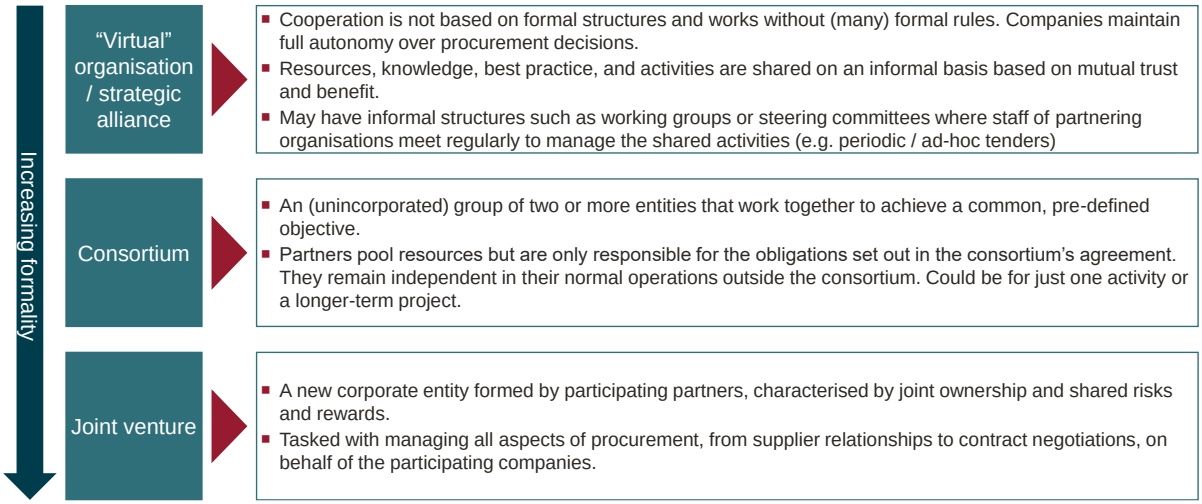
254 RBB Economics (2007), "The competitive effects of buyer groups", written for the Office of Fair Trading.

255 Horizontal Guidelines (273)

- How are **risks** and **rewards** shared between members of the group?
- How **flexible** is the structure (ad-hoc agreement established for the purpose of one contract vs long-term, institutional partnership)?

While a variety of forms of joint purchasing exist, we have simplified into the three categories shown in Figure 75 below.

Figure 75 High-level joint purchasing models



Source: Frontier Economics

5.2 Companies' choice of co-operation model

There are two relevant concepts in theoretical literature – the resource-based view and transaction cost theory.

The **resourced-based view** is relevant to the choice of **whether to outsource or not**. considers firms as a bundle of resources and capabilities that are employed to create competitive advantage. According to this view[256], the value of resources (machines, staff, capital, supplier relationships, brands, reputation industrial organisation, etc.) derives from their rarity, inimitability, and non-substitutability. To maximise long-run profitability, firms must leverage their core competencies by exploiting and developing their rare, inimitable, and non-substitutable resources.

Broadly, the implication of the resourced-based view companies will wish to have more direct control of procurement where this is key for an organisation's service delivery. Where it is not,

256 Initially expressed in Penrose (1959), "The Theory of the Growth of the Firm", Oxford Blackwell. Further developed by Barney (1991), "Firm Resources and Sustained Competitive Advantage", in Journal of Management (vol. 17(1), pp. 99-120) and Prahalad and Hamel (2009), "The Core Competence of the Corporation" in Knowledge and Strategy (pp. 41-59), Routledge.

or where companies gain no advantage from performing such activities internally, companies may choose to outsource.

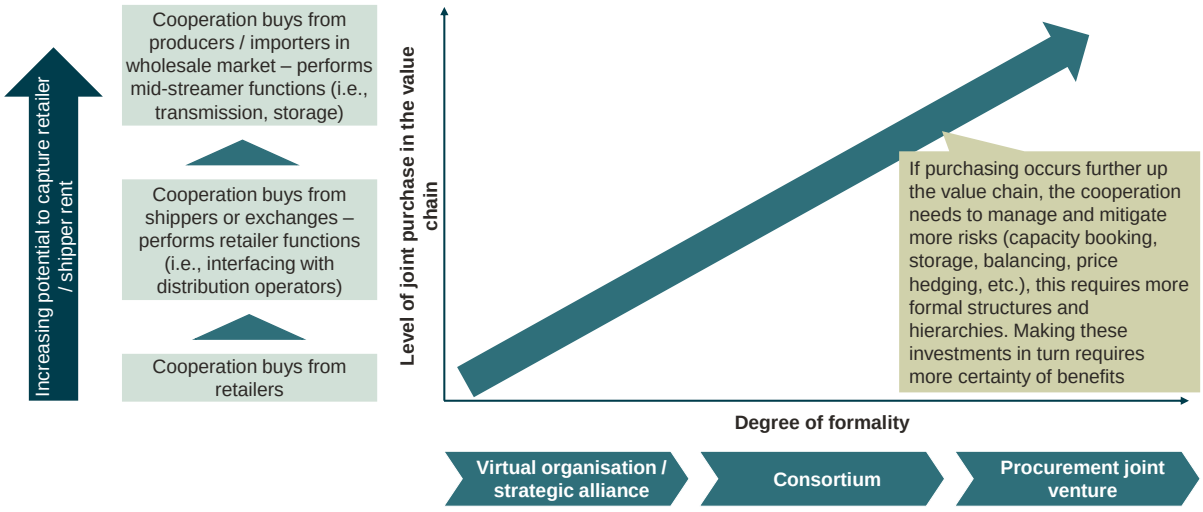
Transaction cost theory[257] is relevant to the **degree of formality of purchasing co-operation**. At its core, the theory emphasises the trade-off between the 'transaction costs' associated with utilising market mechanisms versus the internal 'coordination costs' of organising an activity within an organisational hierarchy. More market-based forms of co-operation involve lower initial set-up costs and offer a high degree of flexibility. However, they come with higher transaction costs (costs of specifying, monitoring and enforcing contracts) and are subject to exploitation. More hierarchical forms of co-operation are less flexible, more costly to set up and involve higher coordination costs compared to more market-based approaches. However, since activities are governed by formal rules and processes and incentives within the hierarchy are more aligned, this form of co-operation comes with a lower risk of exploitation and therefore lower transaction costs.

The situational characteristics most suited to more hierarchical forms of co-operation are 1) high degree of uncertainty over specifying and monitoring contracts, 2) high transaction frequency and 3) high degree of asset specificity (the degree to which transaction-specific investments are made).

In general, the further joint purchasing extends up the gas value chain, the greater the complexity involved (see section 2.1 for further detail). Therefore, with greater complexity, more formal approaches of co-operation may be appropriate (see Figure 76 below). Making the required investments in more formal co-operation structures in turn requires greater visibility of the potential benefits.

257 Initially expressed in Coase (1937) "The Nature of the Firm" in Economica (vol. 4, pp. 386-405), and further developed by Williamson (1991) in "Strategizing, Economizing, and Economic Organization" in Strategic Management Journal (Winter Special Issue, vol. 12, pp. 75-94).

Figure 76 Co-operating further upstream involves greater risks and corresponding formality of co-operation



Source: Frontier Economics

5.3 The role of co-operation models on AggregateEU

5.3.1 On AggregateEU, co-operation models are intended to support demand aggregation and joint purchasing

On AggregateEU, companies can choose to co-operate in joint purchasing (though this is not mandatory). The Commission has stated[258] that co-operation may be useful for buyers that [bold emphasis added by Frontier]:

- *"would like submit demand that is **lower than the minimum volume** foreseen for a given tender;*
- *do **not have expertise in negotiating** gas purchase contracts; [and/or]*
- *do **not have necessary transmission, LNG or storage capacities** (e.g. buyers located in landlocked countries)."*

The two models that participants can use (both of which are forms of **outsourcing**) are:

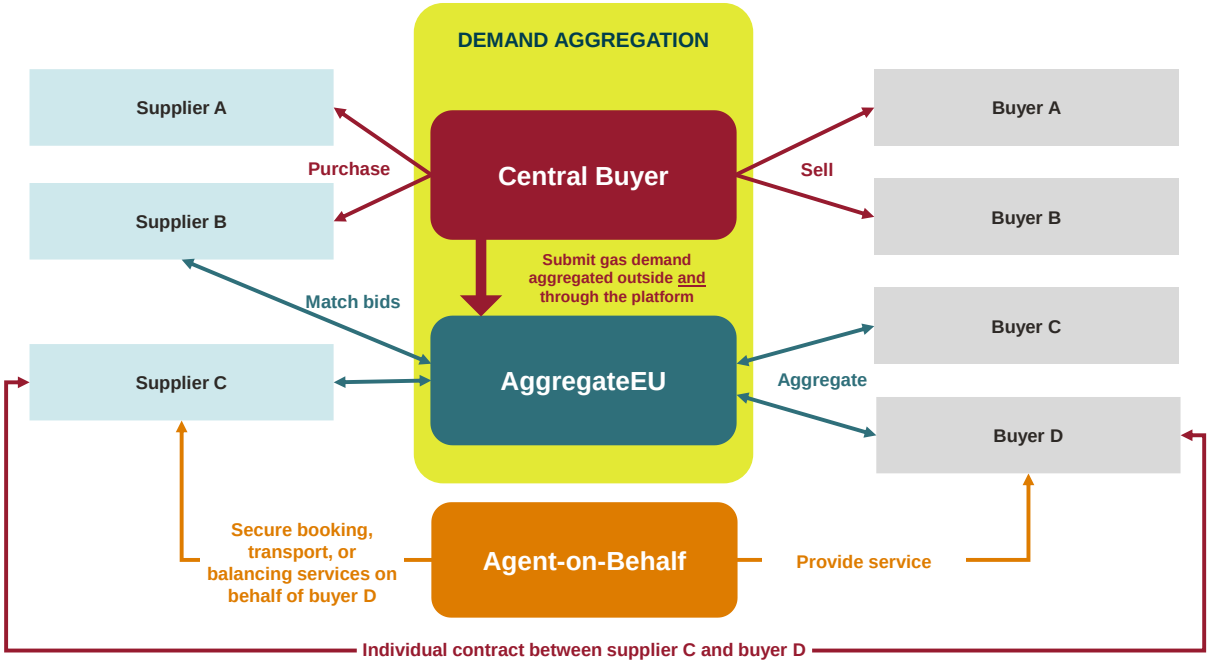
- **Central buyer:** participants contract with a "central buyer", who **participates directly** on AggregateEU and contracts with suppliers;

258 https://energy.ec.europa.eu/topics/energy-security/eu-energy-platform/aggregateeu-questions-and-answers_en.

- **Agent-on-behalf:** participants bid individually on the platform and sign contracts individually, but may (collectively) **engage an agent to provide services** such as booking required transmission or LNG terminal capacity.

The two models are illustrated in Figure 77 below. The stated rationale for these co-operation models (see above) is consistent with the theoretical overview in Section 5.2 regarding the potential reasons companies may have for outsourcing purchasing activities.

Figure 77 Central Buyer and Agent-on-Behalf co-operation models



Source: Frontier Economics, adapted from EC IAG Discussion Paper from 20 March 2023: Principles for company co-operation for demand aggregation and joint purchase of gas

5.3.2 There has been relatively limited use of the co-operation models on AggregateEU to date

To our knowledge, based on both feedback provided to us and the tendering round data made available to us by DG ENER (see Section 3.1.2), the available co-operation models have been sparsely used on AggregateEU. Only two companies submitted demand bids as Central Buyers, together accounting for less than 0.1% of the total demand. Feedback provided to DG ENER was that listed central buyers and agents on behalf were frequently unresponsive or that some central buyers, when contacted, instead sold their own commodity.

Speaking to Frontier, one industrial gas consumer cited concerns regarding competition law. One gas trader stated it was not approached to act as a central buyer or agent-on-behalf.

5.3.3 The finding that co-operation on AggregateEU has been limited requires careful interpretation

As noted above, the co-operation models on AggregateEU to date are examples of outsourcing. As per the logic in Section 5.2 companies will tend to outsource where they do not gain an advantage from performing activities internally.

The relatively low level of use of the agent-on-behalf and central buyer models does not necessarily imply a desire on behalf of gas consumers to retain control of procurement decisions. Many participants on the platform were gas traders and retailers with existing procurement operations. Neither does it provide evidence of limited value to co-operation more generally. Indeed, players may have been already **effectively co-operating through other routes**:

- The services provided by a central buyer are similar to those provided by shippers in the wholesale gas market.[259] Shippers may also have to deal with buyers and sellers of varying credit ratings. Managing these risks requires a certain scale to deliver efficiently (see Section 2.1.2).

- Other smaller players in the gas market that do not trade directly in the wholesale market may already effectively outsource their trading needs to other companies (we encountered one such example in our stakeholder conversations: a municipal utility who handled trading on behalf of smaller towns). This may mean that there is no need to set up a separate co-operation vehicle for participating on AggregateEU specifically.

To consider the potential for joint purchasing models to emerge, it is helpful (as per the framework set out in Section 5.2) to consider the costs and benefits to companies of forming consortia:

- Wholesale gas trading involves managing significant risks (e.g. related to differing duration, profile and location of contracts bought and sold). Given this, more **formal co-operation models are likely to be favoured by companies,** compared to less formal models. Such structures take **more time and involve more effort** to set up.

- Whether it is worth companies engaging in this therefore depends on the extent and certainty of any benefit to companies of purchasing co-operation.

- The size of the benefit to companies from purchasing co-operation will depend on the extent to which co-operation helps to reduce the purchase price of imported gas or reduce the costs that might otherwise have been incurred related to the margins earned by shippers on resale of imported volumes to retailers and customers. However:

259 Shippers will typically purchase gas in large quantities (e.g. LNG cargoes) from producers on different timeframes, pooling requirements across customers, and re-package this into different products and locations to meet supplier/ customer needs, managing requirements for storage capacity and cross-border transmission capacity where required.

- since the platform is voluntary, there is **limited ability to exert buyer power** over gas producers, since gas producers have outside options for selling their gas to the EU wholesale market. Competition law may place a further constraint on the ability of co-operation to lead to buyer market power (see box below); and

- the ability of co-operation vehicles to capture margins that might otherwise have been earned by shippers and retailers depends on the extent to which markets (for shipping and retail) are not already competitive and the barriers to entry to effectively acting as a shipper or retailer. We have not, as part of this study, assessed the extent to which retail and mid-stream gas markets are competitive across the EU.

- The benefit of co-operation may be greater if it covers all gas purchasing activities (and is not limited to participation on AggregateEU). However, as noted above, such "structural" buyer co-operation may mean that buyer co-operation on AggregateEU is less visible.

Box: Competition law and purchasing co-operation

Joint purchasing agreements are subject to an assessment within their legal and economic context of their actual and likely effects on competition. According to the Commission, the assessment is carried out with respect to possible restrictive effects on both the upstream purchasing market as well as the downstream selling market(s) in which the parties are active. In particular, competition concerns may result where the members of joint purchasing agreements have market power in either the upstream or the downstream markets.[260]

In general, while there is no absolute threshold for determining market power, according to the Guidelines, joint purchasing agreements are unlikely to be viewed as having anticompetitive effects when the parties to the co-operation have a joint market share not exceeding 15% in either the buyer or the seller market ('safe harbour'). Moreover, the agreement is unlikely to have restrictive effects on competition where parties of a joint purchasing agreement are not active on the same seller market.[261]

For joint purchasing agreements which do not benefit from the above-mentioned principles, the Commission requires a detailed assessment of effects on the relevant markets. Such an assessment must take into account a number of factors including but not limited to the share of parties in the relevant buying and selling market(s), the presence of countervailing seller power in the upstream buying market, the intensity of links between firms, and the risks of collusion in the downstream seller market.[262]

260 Horizontal Guidelines (286; 288).

261 Horizontal Guidelines (291; 298).

262 Horizontal Guidelines (292-298).

Finally, joint purchasing agreements that constitute a restriction of competition, either by object or by effect, may benefit from exemption under Article 101(3) where they give rise to countervailing efficiency gains. Purchasing agreements may be assessed under Article 101(3) when three conditions are met: (1) any competition restrictions caused by the joint purchasing must be limited to what is strictly necessary to achieve the efficiency gains generated by the joint purchasing; (2) the efficiency gains resulting from joint purchasing have to be passed on to customers to an extent that outweighs any restrictive effects on competition caused by the joint purchasing; and (3) the restrictions may not eliminate competition 'in respect of a substantial part of the products in question' both on the purchasing and on the selling markets.[263]

5.4 Role of co-operation models for DA/JPM going forwards

As explained above, joint purchasing can, at least in principle, play a role in reducing costs to customers. For voluntary mechanisms, the key potential benefit is likely to be linked to reducing the costs associated with shipper/retailer margins as discussed above.

However, joint purchasing also involves costs and risks. In general, market participants can effectively internalise the relevant benefits and costs of co-operation, and are best placed to evaluate the co-operation model that best suits them. For example, for smaller players, outsourcing may make more sense than forming a joint purchasing agreement (with the complexities that the latter entails). Participants will consider co-operation models with a broader view of their participation in the market in mind (i.e. not solely linked to their participation in DA/JPM).

The precise nature of risks involved in trading, market structure issues and barriers to entry may differ between products. As such, the co-operation forms that might emerge may vary between products. For example:

- For hydrogen (see Section 4.2), initial transactions may be bespoke/specific (before the market commoditises). This might reduce the benefit of outsourcing, and increase the benefit of more formal joint purchasing arrangements. On the other hand, the supply side is likely to be less concentrated (compared to natural gas), which decreases the potential benefits of buyer co-operation. The prospect of a significant change in market structure and increasing commoditisation may further reduce incentives to invest in creating more formal joint purchasing agreements in the near term. However, in case that the hydrogen pilot is not just focusing on the likely regional short-term demand/supply, but includes hydrogen deliveries after 2030 and hence from suppliers outside the EU, there may be a higher benefit of buyer co-operation for more forward looking bids.

- For biomethane, buyer co-operation is unlikely to be valuable (compared to natural gas) as supply is likely to be less concentrated. Further, markets are likely to be more

263 Horizontal Guidelines (305-309).

local/regional in nature initially, before potentially expanding geographic coverage (see Section 4.3). The prospect of a significant change in market structure may reduce incentives to invest in creating more formal joint purchasing agreements;

- For captured methane, the supply side market structure is similar to that for natural gas (see Section 4.4), indicating a similar value to co-operation. However, the market for captured methane is at an embryonic stage and may change significantly once binding methane emissions standards apply to gas imported to the EU. As such, similar to hydrogen and biomethane, there may be low incentives to invest in the creation of formal joint purchasing agreements;

- For many strategic raw materials (see Section 4.5), supply is concentrated. There may therefore be a greater value to buyers from co-operation. In addition, there is arguably reduced complexity associated with booking transportation and storage capacity (compared to natural gas and hydrogen). This may reduce barriers to both outsourcing and joint purchasing (though the ease of trading will vary by commodity, and may change over time). Given lead times associated with developing new extraction and refining facilities, market structures may take time to change. As such, there may be greater interest from buyers in investing in more hierarchical forms of co-operation, given the longer-term nature of transactions and especially given that some transactions (e.g. purchasing rare earth minerals alongside other commodities) may be quite asset-specific.

While direct intervention to support specific forms of corporate structure may risk distorting competition, policymakers can still play an important role across all products:

- in minimising the transaction and information costs associated with forming joint purchasing arrangements. While policymakers might not be able to explicitly encourage buyer co-operation, there may still be a role for continuing to inform participants regarding:
  - the opportunities for (and legal constraints on) purchasing co-operation;
  - available agents on behalf, who are willing to provide additional services, or central buyers, in relation to participation in DA/JPM; and

- in addressing barriers to entry to retail and wholesale energy and commodity markets across the EU. Buyers can still benefit from reduced transaction costs (without the need to form joint purchasing agreements) provided that markets are competitive.

Annex A – AggregateEU evaluation "Theory of Change"

In this Annex, we set out in more detail the rationale underpinning the logic model presented in Figure 13 in Section 3.1.

A.1 Inputs and activities

The links between inputs and activities are summarised in Table 4 below. As the funding for AggregateEU and the fact that Commission staff time was used to support the development of AggregateEU is not in dispute, an important question is whether **company time**/resource spent participating in AggregateEU (and negotiating contracts) is **entirely additional** (compared to the counterfactual), or whether it may have **displaced incremental time/ resource** spent on other trading routes.

Table 4 Links between inputs and activities

Input	Corresponding Activities
Funding for AggregateEU (cost of PRISMA service contract)	▪ Initial delivery of AggregateEU ▪ Operation of AggregateEU ▪ Ongoing refinement of processes and systems over time ▪ The service contract for PRISMA cost EUR 1 million/year in the first year (most of which related to development costs) with costs in the second year being much lower (EUR < 100,000)
Company time/ resource	▪ Assisting on the design of AggregateEU (for instance, related to participation in the Industrial Advisory Group) ▪ Understanding AggregateEU ▪ Participating on AggregateEU (preparing offers/bids) ▪ Investigating and arranging co-operation models ▪ Negotiating contracts following matching
Commission staff time:	▪ Procuring the service provider ▪ Engaging with PRISMA and wider stakeholders on design of AggregateEU ▪ Supporting awareness among stakeholders ▪ Developing guidance on co-operation models

Source: Frontier Economics

A.2 Outputs

The principal output of the process is the **matching** of buyers and sellers itself (i.e. the output of the AggregateEU tendering process). This includes the overall volumes matched, the parties that were matched, and the (indicative) prices of the matched offers.

An ancillary output (though not one we have focussed on in our analysis) is whether the engagement in relation to AggregateEU may have helped boost understanding and/or transparency regarding gas purchasing more generally.

A.3 Outcomes

We wish to identify how the outputs of AggregateEU might have led to results (i.e. potential outcomes) that could affect the main impacts of interests (see following sub-section), namely:

- prices (across time and in different geographical markets); and
- the availability of gas supplies.

Broadly (and assuming that gas demand was not affected by the introduction of AggregateEU) the relevant outcomes to consider are those that affect supply and bargaining power:

- **Changes in the supply sources available to the EU and/or to particular regions:** A net increase in supply would have contributed to lower prices, other things equal (and reduced risk of missing storage filling obligations). On the assumption that non-Russian pipeline gas sources would have limited flexibility, they **key question is whether AggregateEU resulted in additional LNG supplies**.
- **Changes in supply diversity/concentration:** The impact of greater diversity of supplies and/or reduced concentration depends on the extent to which supplies are scarce. When gas supplies are extremely scarce, all producers and importers are essentially "pivotal" (and therefore are able to exercise market power), in the sense that, without their capacity, demand cannot be served. When suppliers are less scarce (i.e. outside of a crisis), greater diversity of supplies will tend to reduce the risk of exercise of market power. It is important to **consider both diversity/concentration** in terms of **producers/importers** and in terms of **shippers**.
- **Changes in buyer concentration:** In a market characterised by supplier market power, prices will tend to be above (marginal) cost. If buyers are more concentrated, they may be able to negotiate lower prices. The key question is therefore **whether AggregateEU led to effective demand aggregation**.
- **Changes in liquidity and transparency:** Lower transaction costs would (assuming a competitive market) have resulted in lower prices for consumers. A key question is **whether AggregateEU resulted in a reduction in transaction costs for customers**.

It is also important to consider:

- how the above outcomes might vary across tendering rounds and across different geographical markets;
- the extent to which such outcomes might be different, compared to the counterfactual (for instance, could higher prices have prompted customers to change their behaviour (increased supplier switching, aggregating demand) without AggregateEU?); and
- the degree to which AggregateEU might have achieved the outcomes more efficiently than the market.

A.4 Impacts

Changes in the outcomes described in the previous sub-section may have impacts on:

- **Prices** (average price levels and price dispersion across the EU);
- **Availability of supplies** (including reduced risk of missing storage obligations and solidarity between Member States); and
- **Competition** (both between producers/importer and between shippers). While competition is related to both prices and availability of supplies, the effects of changes in competition can take time to materialise. We have therefore considered it as a separate impact.

The challenges described at the outset of Section 2.4.3 (in relation to identifying the net additional effect of AggregateEU, relative to a counterfactual in which AggregateEU was not implemented) are particularly acute for the above impacts. We have therefore placed less emphasis on assessing impacts of AggregateEU, though do briefly present anecdotal evidence on the effect of AggregateEU on prices.

Annex B – Details on Frontier Economics' stakeholder outreach

B.1 Stakeholder selection and process

In this section, we set out details on stakeholder interviews, which served as source of evidence to our contribution analysis. Table 5 provides an overview of selection process, stakeholder outreach, and interview topics.

Table 5 Overview of stakeholder interviews

Category	Description
Relevance	We aimed to interview stakeholders which are **relevant** to the evolution of the respective product market. Accordingly, we focussed our outreach on stakeholders which are expected to remain (or could/should become) active participants in their respective product market, as well as relevant sector associations and non-profit organisations. In case of natural gas, our interviews covered both stakeholders which participated in AggregateEU as well as stakeholders which did not.
Outreach	Our goal was to engage with a range of stakeholders to ensure a diversity of views in our assessment. In particular, we wanted to ensure diversity along the following dimensions: ▪ **Geography**: We engaged with stakeholders based across Western, Northern, Central, Southern, and Eastern Europe. ▪ **Size**: We engaged both medium-sized and large enterprises. ▪ **Product market**: For Task 1, we focussed our outreach on stakeholders of the natural gas market. For Task 3, our outreach focused on various stakeholders for hydrogen, biomethane, methane abatement, and strategic raw materials. ▪ **Role in market**: We engaged with both suppliers and buyers of relevant products, as well as with associations and non-profit organisations. Over the course of the project, we conducted 29 interviews in total.
Format	We conducted (online) interviews with a length of minimum one hour.
Topics	Overall, interviews covered the following topics: ▪ For Task 1: □ Participation in AggregateEU and reasons for (non-)participation □ For participants: Experience with platform

Category	Description
	▫ For non-participants: Considerations on alternatives and future participation ▫ Future reforms (natural gas, hydrogen and other commodities) ▪ For Task 3, for each relevant commodity: ▫ Role of stakeholder in relevant product market ▫ Potential role for JPM in relevant product market ▫ Considerations on concrete business models We used a set of interview questions as a basis for our interviews, which we shared with stakeholders in advance. The list of questions served as a general guidance during interviews, the focus topics varied between stakeholders. Annexes B.2 and B.3 provides a full overview of the interview questions for Task 1 and Task 3, respectively.

Source: Frontier Economics

B.2 Detailed list of stakeholder interview questions – Task 1

Section A: Introductory questions

1. Describe your purchasing and/or selling strategy for natural gas before the introduction of AggregateEU?

2. Did you participate on AggregateEU?

   a. ***If 'YES', go to Section B***

   b. ***If 'NO', go to Section C***

Section B: List of questions for participants

3. Generally, did you participate in AggregateEU as buyer, seller or both?

4. Why did you participate at AggregateEU (instead of e.g. just buying at an outside option)?

5. How much would you have been willing to pay to participate on AggregateEU?

6. How did your participation in AggregateEU evolve over the four tendering rounds? For example with regard to volumes and contracting strategy.

7. Diversity of sellers/buyers:

   a. Have you been matched with a new supplier/buyer, i.e. someone, with which you have not contracted before or someone, you was not even aware of?

   b. Have you contracted with a new supplier/buyer?

c. How did your participation in AggregateEU affect your relationship(s) with your existing supplier(s)/buyer(s)?

d. Did you observe an increase in the number and quality of buyers/suppliers over the four tendering round?

8. Please describe your experience of signing contracts?

9. Did AggregateEU increase the transparency concerning potential buyers/suppliers, prices, negotiation margins or further aspects?

10. Do you have any further remarks on the pro-rata matching mechanism?

11. Did you make use of one of the co-operation models foreseen under the platform?

a. If yes,

i. which type of co-operation model did you chose and why?

ii. what has been the impact of participating in a co-operation model (compared to e.g. using a mid-streamer)?

iii. has there been any issues or challenges, which could be addressed in the future?

b. If no,

i. have there been barriers to participate in a co-operation model?

ii. Do you have any suggestions for potential solutions to overcome the barriers?

12. Do you have any suggestions for future improvements/changes on co-operation models?

GO TO SECTION D

Section C: List of questions for non-participants

13. What were your reasons for not participating?

14. What alternative options did you use instead for purchasing gas?

15. Are you considering using AggregateEU in the future?

16. Under what circumstances would you consider to participating?

GO TO SECTION D

Section D: Future reforms (natural gas, hydrogen, other commodities)

17. Regarding demand aggregation/joint purchasing for natural gas, do you have any other observations or feedback, or suggestions for improvements/changes?

18. Thinking about the proposed pilot mechanism for the supporting the market development of hydrogen, how could greater transparency regarding hydrogen production and consumption help market participants? What sort of information would be most useful to provide?

19. Thinking about potential longer-term uses for joint purchasing/demand aggregation, which commodities could particularly benefit from EU-level intervention and why?

B.3 Detailed list of stakeholder interview questions – Task 3

Section A: Introductory questions

1. Do you have a purchasing and/or selling strategy for any of the following commodities, and/or are you planning to develop one in the future?

    a. Hydrogen

    b. Biomethane (certified as natural gas)

    c. Methane abatement

    d. Critical raw materials

    How does this strategy look like and what types of risks are you trying to manage via this strategy?

2. Which EU geographies (i.e. regional markets) are you active in? How does your purchasing strategy differ across geographies?

3. What types of products (e.g. contract length) do you tend to buy?

4. Do you source from a single retailer/supplier, or do you purchase from multiple suppliers/ platforms?

Section B: Hydrogen

We acknowledge that there are several market barriers for the ramp-up of renewable and low-carbon hydrogen, such as high production costs of early adopters and a “chicken and egg” coordination challenge between supply, infrastructure and demand. Not all of these can and will be addressed by any form of DA/JPM, in particular not the cost challenge given that the DA/JPM will not include any subsidy element. Accordingly, in the following we focus on

security of supply risks, barriers to market access (especially for smaller players) and the coordination across the value chain, which can at least partly (inter alia via combination with other potential policy measures) addressed by DA/JPM.

1. **Do you think that (some form of) a DA/JPM tool may help to support the hydrogen ramp-up?**

    a. If yes, how? What combination of features or which of the specific forms suggested (transparency platform, matching platform, JPM with demand aggregation on platform), would you consider to be most helpful?

    b. If not, why? What are your main concerns?

5. **Transparency platform:**

    a. Could greater transparency regarding hydrogen production, consumption and infrastructure development help market participants?

        i. If yes:

            1. How would this impact your company's (e.g. find off-takers/suppliers more easily) / the overall market development (e.g. speed up market ramp up)?

            2. What sort of information would be most useful to provide (e.g. project pipeline, supply capacity, prospective demand, timing on infrastructure development (amount, timing, location), costs)?

            3. What kind of information would you be willing to provide under which circumstances/individual pay-offs (e.g. only accessing of data possible when sharing your own, offering of additional tendering features – see proposals below)?

        ii. If not, why?

    b. Do you have/expect problems in finding an off-taker/supplier for hydrogen (either short term as well as more forward looking)? Would this be more likely the case for smaller players? If yes, how would you evaluate the following proposals to solve this issue?

        i. Proposal 1: Would it be of help, if an off-taker were to submit its needs on the platform in a tender-like format (quantities, profile, duration, etc.) and the suppliers would be invited to reply. In essence, the supplier would look at the demand requested by off-takers before posting its own data on supply or contact the off-takers bilaterally.

ii. Proposal 2: Would it be of help to post your needs/offers in a tender-like format (quantities, profile, duration, etc.) on a platform, where you will be notified in case of a suitable match?

iii. Extension to proposal 2: Would it be of help, if the platform played a role in "rating" the quality of the "match" (i.e. the firmness of demand/supply), and relaying this information to customers/producers.

6. Matching platform:

a. Do you see any additional value in having regular explicit tenders at certain points in time (as in the current DA/JPM for natural gas) compared to a transparency platform with some lighter form of matching (see proposals)? Or more generally, how could matching help market participants?

If yes,

i. According to which criteria should participants be matched?

ii. What sort of information should be provided to create matches and encourage counterparty discovery?

iii. Should submitted bids be binding, or should negotiations take place outside of the platform?

b. Do you envision some form of co-operation models to be a helpful tool?

i. If yes, which type of co-operation model (see e.g. the existing co-operation under AggregateEU) and why?

ii. If no, what do you consider to be barriers which prevent co-operation models from adding value? And do you have any suggestions for potential solutions to overcome the barriers?

7. JPM with demand aggregation on platform

a. How could demand aggregation via a private central buyer help market participants? Does it for example help with providing investment security for larger investment (either on supplier or buyer side) or avoid outbidding in case of scarcity?

8. Would you be willing to sign long-term contracts (e.g. within a buyer consortium at a matching platform or as part of demand aggregation on the platform) in order to ensure investment in hydrogen production facilities and hence secure supply for the future? If not, why?

9. Potential add-ons of a platform

a. Would it be of value to provide **standardised contracts** (which can be voluntarily or obligatory)?

b. Is securing credits or credit guarantees an issue for financing hydrogen products or covering the purchase contract? If yes, would support for identification of financial institutions as potential financial counterparts for buyers or for financing hydrogen products be valuable and of which type?

10. Do you see potential value-add from a DA/JPM tool over the long term, in a more mature hydrogen market?

a. If yes, in your view, would the form of the DA/JPM change relative to its form during the hydrogen ramp-up?

b. If not, why?

Section C: Natural gas certified as biomethane

1. Do you think that (some form of) a DA/JPM tool may help to support the biomethane market, particularly with a view on i) spurring biomethane production, and ii) increasing the rate of grid connection of existing sites?

a. If yes, how? What combination of features or which of the specific forms suggested (transparency platform, matching platform, JPM with demand aggregation on platform), would you consider to be most helpful?

b. If not, why? What are your main concerns?

2. **Transparency platform**:

a. Could greater transparency regarding biomethane production and consumption help market participants? E.g. could announcing the envisioned supply and demand volumes for certified low-carbon biomethane encourage the extension of supplier relationships beyond already existing localised production and consumption centres, and thus potentially encourage interregional counterparty discovery and provide incentives to coordinate on and assess infrastructure needs?

What sort of information would be most useful to provide?

b. Or does this require some lighter form of matching, e.g. via posting the needs/offers in a tender-like format (quantities, profile, duration, etc.) on a platform, where you will be notified in case of a suitable match.

3. **Matching platform**:

a. Do you see any **additional value in having regular explicit tenders** (as in the current DA/JPM for natural gas) compared to a transparency platform with some

lighter form of matching (see above)? Or more generally, how could matching help market participants?

If yes,

i. According to which criteria should participants be matched?

ii. What sort of information should be provided to create matches and encourage counterparty discovery?

b. Do you envision some form of **co-operation models** to be a helpful tool?

i. If yes, which type of co-operation model (see e.g. the existing co-operation under AggregateEU) and why?

ii. If no, what do you consider to be barriers which prevent co-operation models from adding value? And do you have any suggestions for potential solutions to overcome the barriers?

4. **JPM with aggregation on platform**:

a. Could **demand aggregation help to attract alternative/new suppliers** and thereby facilitate switching of suppliers and maybe increase competition leading to lower prices? If so, from where – neighbouring country, region, Union-level?

b. Could **aggregation of feedstock** at local/regional level and **transparency of demand** lower the market entrance barrier posed by costs and hence make it a more attractive business case for potential investors?

c. Could **supply aggregation** facilitate switching from natural gas to biomethane for larger consumers? What would be the possible delivery points for such aggregated supply?

d. Would tendering on the platform add value?

e. Should submitted bids be binding, or should negotiations take place off of the platform?

5. Potential add-ons of a platform:

a. **Is securing credits or credit guarantees an issue for financing biomethane production or covering the purchase contract?** If yes, would support for identification of financial institutions as potential financial counterparts for buyers or for financing biomethane production be valuable and of which type?

Section D: Methane abatement

1. **Do you currently have plans to directly invest in methane abatement projects?** Do you have any other projects or policies to encourage methane abatement? If yes, which? If not, why not?

2. **Would you be willing to pay more than the market price for natural gas, if relevant volumes could be certified to be low-carbon gas but does not count against climate targets? What role do you see for existing carbon certification mechanisms?**

3. **Do you think that (some form of) a DA/JPM tool may help to increase methane abatement efforts**, particularly with a view on measures such as the implementation of leak detection and repair programmes, and the prevention of large-scale venting of natural gas?

    a. If yes, how? What combination of features or which of the specific forms suggested (transparency platform, matching platform, JPM with demand aggregation on platform), would you consider to be most helpful?

    b. If not, why? What are your main concerns?

4. **Transparency platform**:

    a. Could a transparency platform providing information e.g. on planned projects and demand speed up a voluntary market? What sort of information would be most useful to provide?

    b. Could increased transparency on planned projects help to finance abatement projects? Different business models could exist, e.g.

        i. A buyer accessing specifically gas from abatement projects could act as direct investor in those abatement measures.

        ii. A financier, for instance an IFI, is directly involved in the abatement project: its design, its oversight and financing the investment. Simultaneously, a European off-taker signs a sale and purchase agreement for the additional gas being delivered.

    Or should there be – as an add-on to DA/JPM platform of any kind – additional measures for securing credits or credit guarantees for financing abatement measures or covering the purchase contract? If yes, would support for identification of financial institutions as potential financial counterparts for buyers or for financing hydrogen products be valuable and of which type?

    c. Would the establishment of some norms regarding the measurement and definition of captured methane as part of the platform help to facilitate the emergence of a

voluntary market for captured methane before the EU Methane Regulation is in place?

5. **Matching platform**:

   a. Could demand collection on a platform supplemented by a matching function incentivise investment into methane abatement projects even before viable certification and thereby incentive the development of a voluntary market as this could be seen as signal for willingness of policy to actively support this market development?

   b. Could a matching platform speed up the counterparty discovery (e.g. reverse tenders on a project basis)?

      If yes,

      i. According to which criteria should participants be matched?

      ii. What sort of information should be provided to create matches and encourage counterparty discovery?

   c. Do you envision some form of **co-operation models** to be a helpful tool?

      i. If yes, which type of co-operation model (see e.g. the existing co-operation under AggregateEU) and why?

      ii. If no, what do you consider to be barriers which prevent co-operation models from adding value? And do you have any suggestions for potential solutions to overcome the barriers?

6. **JPM with demand aggregation on platform**:

   a. Could demand aggregation help to limit potential supplier market power? Are there any other potential benefits of demand aggregation during tendering?

   b. Should submitted bids be binding, or should negotiations take place off of the platform?

7. **Do you see potential value-add from a DA/JPM tool in case of an existing EU Methane Regulation (including sustainability certificates)?**

   a. If yes, in your view, would the form of the DA/JPM change relative to its form during the first phase without certificates?

   b. If not, why?

8. Are there any other policies that you think could encourage methane abatement at increasing rates?

Section E: Strategic raw materials

1. Which critical raw materials are most relevant for your selling/purchasing strategy?

a. Copper

b. Tungsten

c. Cobalt

d. Nickel (battery grade)

e. Magnesium metal

f. Platinum group metals (Iridium, Palladium, Platinum, Rhodium and Ruthenium)

g. Manganese (battery grade)

h. Natural graphite

i. Germanium

j. Boron (metallurgy grade)

k. Rare earth elements (Neodymium, Praseodymium, Terbium, Dysprosium, Gadolinium, Samarium and Cerium)

l. Titanium

m. Bismuth

n. Gallium

o. Lithium (battery grade)

p. Silicon metal

2. For the materials relevant to your strategy, do you see any significant barriers to market functioning? Do you consider any of the following market characteristics to be present?

a. High supplier market power

b. Low security of supply

c. Low market liquidity

d. High cost incurred for market access

e. Issues with coordination across the value chain.

If yes – how does your current purchasing strategy account for the presence of such factors?

If yes – do you think that (some form of) a DA/JPM tool may help to address these characteristics?

f. If yes, how? What combination of features or which of the specific forms suggested (transparency platform, matching platform, JPM with demand aggregation on platform), would you consider to be most helpful?

g. If not, why? What are your main concerns?

3. Thinking about specific forms, which form of mechanism do you think could add value for the procurement of relevant strategic raw materials?

4. **Transparency platform**: Would greater transparency regarding production and consumption of the considered SRM help market participants? What sort of information would be most useful to provide?

5. **Matching platform**:

   a. Would a matching platform help market participants? According to which criteria should participants be matched? What sort of information should be provided to create matches and encourage counterparty discovery?

   b. Do you envision some form of co-operation models to be a helpful tool in order to provide the possibility for aggregating demand?

      i. If yes, which type of co-operation model (see e.g. the existing co-operation under AggregateEU) and why?

      ii. If no, what do you consider to be barriers which prevent co-operation models from adding value? And do you have any suggestions for potential solutions to overcome the barriers?

6. **JPM with demand aggregation on platform**:

   a. Could demand aggregation help market participants in case of security of supply or supplier market power?

   b. Would tendering on the platform add value? Should submitted bids be binding, or should negotiations take place off of the platform?

7. Would you be willing to sign long-term contracts in order to ensure investment in SRM production facilities and hence secure supply for the future and hedge against future price increases?

Section F: Other commodities

1. **Do you have any other observations or feedback, or suggestions for improvements/ changes?**

GETTING IN TOUCH WITH THE EU

In person

All over the European Union there are hundreds of Europe Direct information centres. You can find the address of the centre nearest you at: https://europa.eu/european-union/contact_en

On the phone or by email

Europe Direct is a service that answers your questions about the European Union. You can contact this service:

– by freephone: 00 800 6 7 8 9 10 11 (certain operators may charge for these calls),

– at the following standard number: +32 22999696, or

– by email via: https://europa.eu/european-union/contact_en

FINDING INFORMATION ABOUT THE EU

Online

Information about the European Union in all the official languages of the EU is available on the Europa website at: https://europa.eu/european-union/index_en

EU publications

You can download or order free and priced EU publications from: https://op.europa.eu/en/publications. Multiple copies of free publications may be obtained by contacting Europe Direct or your local information centre (see https://europa.eu/european-union/contact_en).

EU law and related documents

For access to legal information from the EU, including all EU law since 1952 in all the official language versions, go to EUR-Lex at: http://eur-lex.europa.eu

Open data from the EU

The EU Open Data Portal (http://data.europa.eu/euodp/en) provides access to datasets from the EU. Data can be downloaded and reused for free, for both commercial and non-commercial purposes.

Publications Office
of the European Union