Understanding the absence of renewable electricity imports to the European Union

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Abstract

Purpose – This paper aims to analyse reasons for the absence of renewable electricity (RE) imports to the European Union, for which the authors develop a multi-level heuristic.

Design/methodology/approach – The heuristic covers three sequential acceptance levels: political attractiveness (macro-level), the "business case" (micro-level) and civil society perspectives (public discourse level).

Findings – Numerous factors on all three levels determine the success/demise of renewables trade. So far, trade has failed on the macro-level, because European policymakers perceive that targets can be achieved domestically with significant co-benefits and because exporter countries have rapidly increasing electricity demand, limiting the realisable exports. As policymakers deemed it unattractive, they have not implemented policy-supported business cases. Public opposition against trade has not been an issue as no concrete plans or projects have been proposed.

Research limitations/implications – The authors show that the factors determining whether a RE programme is successful are plentiful and extend far beyond potential cost savings. This suggests that future research and the energy policy debate should better account for how cost savings are weighed against other policy aims and explicitly include the perspectives of investors and the public.

Originality/value – This paper adds the first holistic analysis of success/failure factors for RE trade to Europe. The three-level, sequential framework is new to energy policy analysis.

Keywords Acceptance, Stakeholder meetings, Exports, Imports, Literature analysis, Article 9, Cooperation mechanism, Renewable electricity

Paper type Research paper

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1. Introduction

The decarbonisation of the power sector is at the heart of European energy policy debates. At the centre of the discussion of how to achieve this by mid-century is not only the question of which technologies are most suited and should be supported – be it nuclear, fossil fuels with carbon capture and storage or renewables – but also the geographic scale at which the decarbonisation should take place. If the European Union (EU) chooses a renewables path, several studies have shown that there are great economic benefits of expanding renewables in a unified European approach and not through a collection of individual national programmes (Dalla Longa and Raimundo, 2012; ECF, 2010; Unteutsch and Lindenberger, 2014).

Article 9 of the EU Renewables Directive allows renewable electricity (RE) imported from countries outside the EU to count towards the fulfilment of Member States' 2020 renewables targets to increase the cost-efficiency of Member State target achievement (2009/28/EC, 2009). Importantly, the imported RE counts towards Member State targets only if the renewable power is physically imported to the EU, thus ensuring that the imported RE comes from new and additional power stations and avoiding double-counting of the RE towards both exporter and importer state targets. Furthermore, this requirement helps avoid carbon leakage by ensuring that the RE does not generate Clean Development Mechanism certificates (Fichtner, 2012). Indeed, it has been shown that importing part of Europe's electricity needs from non-EU regions, such as North Africa, could be an economically particularly attractive path with large cost savings – up to 60 per cent lower support costs – compared to both the EU-wide and the individual country approaches (Czisch, 2006; Dii, 2012; Resch *et al.*, 2015; Trieb *et al.*, 2014).

Despite the cost-efficiency of cooperation, only Italy and Luxemburg foresee imports – from other EU countries – in their renewable energy action plans for 2020, whereas all other countries aim to meet their targets domestically (Beurskens and Hekkenberg, 2011). The European Commission, meanwhile, pushes the Member States to use Article 9 and achieve cheaper decarbonisation (EC, 2011). To this end, the Commission published a guidance document focusing on how the cooperation mechanisms can be implemented (EC, 2013), suggesting that the absence of Article 9 projects is mainly an issue of procedure: clarifying the administrative aspects of RE imports will get projects running. Here, we question whether this is true.

In the past, much research has been dedicated to the macro-economic benefits of renewable energy cooperation and for assessing policy instruments to expand RE in Europe (e.g. the EU-funded projects "RES4LESS"[1], "DIA-CORE"[2] or "BETTER"[3]). In this article, we adopt a holistic approach to identify the factors determining the success or failure of Article 9 of the EU Renewables Directive. In particular, we search among these factors to explain why no country has used, or concretely plans to use, Article 9 despite its supposed economic benefits.

In Section 2, we develop a multi-level heuristic for analysing the implementation of renewable energy programmes. We describe the method in Section 3 and identify the factors affecting success or failure of Article 9 in Section 4. We discuss our findings and what our framework means for renewable energy policy research and the political RE debate in Section 5, before presenting our conclusion in Section 6.

2. Theory

Renewable energy programmes, just as other transitions towards sustainability, have three characteristics that distinguish them from other types of system transitions (Geels, 2010, 2011; Karakosta *et al.*, 2010; Smith *et al.*, 2005). First, they are purposive and goal-oriented, as opposed to most historical transitions, which were emergent. Second, private actors have low incentives to carry out such transitions, because the new technologies are more expensive and have higher capital costs than most established technologies, because of sunk costs in already established energy systems and because the ultimate goal (more sustainable energy) is a collective good. Third, because of the two first reasons, things are very unlikely to start moving without government interventions, both concerning financial (e.g. subsidies) and regulatory aspects (e.g. grid access). Ultimately, therefore, understanding the success or demise of renewable energy programmes is about understanding the "interactions between technology, policy/power/politics, economics/business/markets, and culture/discourse/public opinion" (Geels, 2011, p. 25).

Sustainability is an ambiguous concept, and any transition that falls into that domain is subject to disagreement on even the most basic questions (Dryzek, 1997; Geels, 2010, 2011; Stirling, 2014), including:

- whether the present situation is really unsustainable (e.g. peak oil is not imminent, so why waste money on renewables);
- whether a proposed solution is a transition towards, or rather away from, sustainability (e.g. nuclear vs renewables); and
- the best policy instruments to achieve that solution.

Acknowledging this makes things more complicated than seeking a techno-economically optimal path fulfilling certain boundary conditions, as a sustainability transition is a normative issue determined by values and individual preferences. To understand and be able to analyse the success or failure of renewable energy programmes, we need to look not only at what is easily measured using technical system modelling, macroeconomic optimisation, etc., but also include aspects such as cultural constraints, values, interests and power (Stirling, 2014). This means, for example, that cost optimality as the result of power system modelling may be irrelevant to a policymaker, because he or she rejects other aspects of the modelling (e.g. an underlying assumption that Europeanisation of energy policy is good) or views other aspects, such as job creation or landscape protection, as more important than cost. Such standpoints are not wrong, but they are different from those of an economic modeller (Schmidt and Lilliestam, 2015).

We take our starting point from the concept of social acceptance as developed by Wüstenhagen *et al.* (2007). In their view, acceptance of a technical solution is a three-dimensional concept (see Table I).

These issues are interconnected but take place in different arenas, and acceptance problems encountered in only one of these dimensions may cause difficulties to implement the transition programme. Although we agree that this framework is both useful and relevant, we also view that these dimensions are interconnected not only in terms of actors and ideas moving across dimension borders but also are temporally linked in a logical chain of events.

Here, we propose a heuristic for the analysis of energy policy programmes, drawing and expanding on Wüstenhagen *et al.* (2007) and building on macro, micro and public discourse levels of acceptance:

- the macro level refers to macroeconomic and political attractiveness of a programme;
- the micro level is concerned with the business case for investing in energy assets; and
- the public discourse level refers to the perceptions of costs, benefits and fairness of the programme in the general and directly affected population.

These dimensions form a logical and temporal cascade of conditions for the successful implementation (Figure 1). For example, the business case (the micro-level acceptance) depends on policymakers having created a suitable investment environment, which they will only do if a dominant policy coalition deems RE imports attractive (macro-level acceptance); similarly, whether the public accepts an import project is irrelevant if the business case is lacking as, in that case, no projects are proposed or built.

We characterise the acceptance levels, drawing on Mackie's (1966) INUS conditions, as INS conditions: a positive evaluation on one of the acceptance-levels is insufficient in itself yet necessary, as it is a part of a sufficient condition (the positive evaluation of all three levels) for the success of the programme. If all three levels are positive, one after the other, the programme may be implemented (Figure 1).

On the macro level, we find highly aggregated issues ranging on a national or international policy level. Scientific advice concerning specific policy proposals is an intrinsic part of energy politics on this level, especially concerning estimates of macroeconomic aspects such as system costs, renewable energy support costs or job creation/destruction. These estimates are used in the political debate by policymakers, lobbyists, NGOs, etc. in the policy formation process. A proposed policy programme achieves political acceptance if is supported by a dominant policy coalition (Geels, 2010; Weible *et al.*, 2009). Importantly, it is not the "objective" quantified benefits of a programme that determine who supports or rejects a programme but the actors' valuation of them (Stirling, 2014).

If a dominant coalition finds that the benefits (economic, political, etc.) are higher than in alternative pathways and if other vital policy aims are not affected negatively,

Dimension	Acceptance of what?	Acceptance by whom?
Socio-political	Technologies	Policymakers
	Policies	Key stakeholders
		The public
Market	Renewable energy (traded in the market)	Consumers
	Renewable energy technology	Investors
		Prosumers
Community	Specific projects	Residents
	Siting decisions	Local authorities

Table I.
Three dimensions of renewable energy social acceptance

Source: Adapted from Wüstenhagen *et al.* (2007)

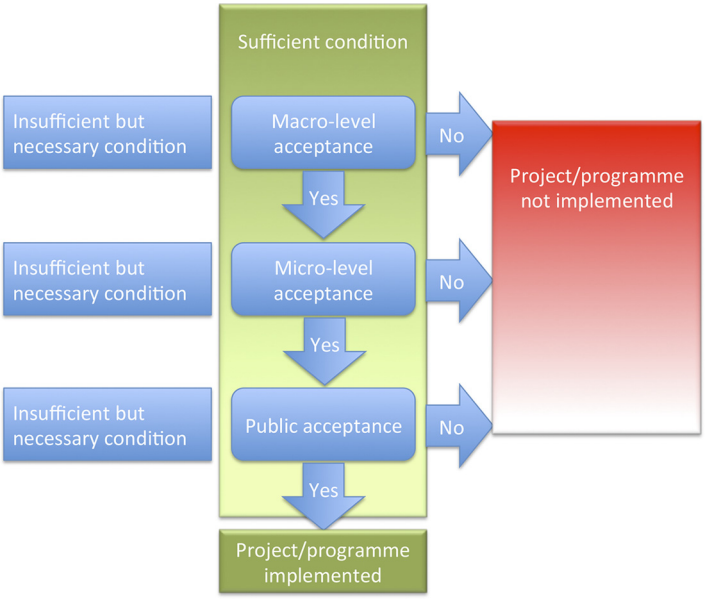

Figure 1. Hierarchy of INS conditions for the successful implementation of renewable energy programmes

then policy may act to trigger the implementation. Such macro-level acceptance is the first INS condition.

If the valuation on the macro-level is positive, then our heuristic assumes that policy implements a market or policy framework to support renewables. For this to result in actual projects, investors and project developers must be aware of and principally interested in such investment opportunities. Once potential business cases are known, actors start judging the opportunities. This is a roughly predictable issue: one can, using standard economic tools, assess existing or future business cases. However, non-financial aspects are also important, including bureaucracy (e.g. lengthy permission processes), corruption (e.g. grease money), infrastructure access (e.g. grid connection) and political risk (e.g. support cancellation; Geels, 2010; Komendantova *et al.*, 2014). If investors find a business case sufficiently good, they may invest: micro-level acceptance is the second INS condition.

Then, the third level becomes important: the acceptance of affected citizens and attractiveness to the general population. This applies to both the programme as such and to the projects that make up the programme (Geels, 2010; Wüstenhagen *et al.*, 2007). Whether "people" like a renewable energy project or programme is not solely determined by "objective" factors, such as expected CO_2 savings, but also by values and deep beliefs – which are the rather stable base for personal and group perceptions and actions – as well as emotions, which may be more volatile and situation-specific (Schwartz, 1999; Weible *et al.*, 2009). The public discourse has a direct impact on policy: opposition could force policymakers to drastically alter policies, as happened in Germany after Fukushima, and local citizens often have far-reaching power to delay or stop specific projects, which is common for transmission projects. If the general public

and affected citizens support the project, or at least do not actively oppose it, then all three INS conditions are fulfilled, and the programme may be realised.

Our heuristic is nothing more (or less) than a tool for analysis of renewable energy programmes. It is not a precise description of the policy process or how stakeholders argue and make decisions, but it is a tool to structure and help understand the complexity of the large number of issues on several levels determining the success or demise of an energy programme. As such, it is useful for energy policy analysis, which is often too narrowly focused on techno-economics. Yet, social systems are not machines, and the mechanistic view of how one level accepts the programme and lets the next level take over is a great simplification. As a heuristic, it, nevertheless, allows us to seek all factors determining success and failure by guiding our attention to the entire breadth of detail determining the multi-level nature of RE programme acceptance and to the fact that RE is not primarily a matter of cost optimisation but one of perspectives, interests, power and values.

3. Method

We apply two different methods for identifying the factors determining the success or failure of Article 9 and to identify which of these factors explain why it has not been used.

First, we carry out an extensive meta-analysis of the existing literature on RE cooperation. No academic study so far has investigated the reasons why Article 9 has not been used, and no dedicated case studies have been presented on the topic. However, there is a large literature assessing single aspects of RE expansion and cooperation.

Second, we draw on the extensive stakeholder work carried out within the BETTER project, a 30-month EU-funded project investigating whether and how RE cooperation can help Europe and non-EU countries to cost-efficiently reach their renewables targets. In addition to the BETTER deliverables cited, main sources of input are the discussions and presentations at four European stakeholder workshops in Madrid, Athens, Vienna and Paris from February 2013 to October 2014, three workshops in potential exporter countries in Rabat (October 2013), Ankara (May 2014) and Belgrade (July 2014), as well as at the BETTER final conference in Brussels in March 2015 (see www.better-project.net).

4. Results: factors for the success or failure of Article 9

In this section, we identify which factors are important for the realisation of RE trade under Article 9 and, as far as possible, which of these are particularly important for the weak interest in using it.

4.1 Macro level

4.1.1 Importer country perspective. From the EU Member State perspective, the question of whether to import RE is a matter of weighing the advantages and disadvantages compared to a domestic-only pathway. We identified four factors driving or limiting interest in Article 9 from this perspective.

4.1.1.1 Cost-efficiently achieving renewables targets. The main reason for RE imports is the improved cost efficiency of importing cheaper RE from countries with very good resources compared to a domestic-only generation strategy (Klessmann, 2012; Klessmann *et al.*, 2010; Ragwitz *et al.*, 2012). Including the imports from very good renewable generation sites in neighbouring countries may allow an importer country to discard its own marginal quality sites for electricity production, thus reducing the costs

while still achieving the RE target (Patt *et al.*, 2011). The findings of the BETTER project indicate that the potential cost savings from the use of Article 9 compared to a country-by-country target achievement are €3.8-8.6bn by 2030, or 27-33 per cent of the support cost (Resch *et al.*, 2015), whereas the RES4LESS project found that intra-EU cooperation could reduce support costs by 5-17 per cent (Dalla Longa and Raimundo, 2012).

Only two potential Article 9 projects have been discussed so far: the failed Moroccan-German Desertec deal (Section 4.1.3) and two planned high-voltage direct current (HVDC) lines from the Western Balkans, especially Serbia, through Montenegro and/or Albania to Italy. The latter projects are to transport fossil-fuelled power from the Balkan to Italy, but could – theoretically – also be used to transport RE to Italy under Article 9 in the future. The Italian plans are only at the discussion stage (Joanneum, 2014).

4.1.1.2 Conflicts with growth and industry policy targets. Member states expand renewables not only to meet RE or climate targets but also to trigger growth and job creation in sustainable industries (Lilliestam *et al.*, 2014). Hence, a Member State government must decide whether to reach its RE target domestically, at higher costs but with higher co-benefits such as investments, growth and job creation in the RE sector, or to import cheaper RE whilst "exporting" these co-benefits, or even to risk political disadvantages due to missing the target.

Hence, without or with only unambitious long-term binding RE targets and without an explicit clarification of whether and how the cooperation mechanisms will continue post-2020, RE imports will remain unattractive to national policy. In late 2014, an EU-wide 27 per cent renewable energy target for 2030 was adopted, and it remains to be seen if Member States perceive a need for external cooperation to achieve this target [4] – presently, they appear not to (Schinke and Klawitter, 2014). Further open questions are whether Article 9 will be prolonged at all in the post-2020 context and what the consequences of failing the 2030 targets will be.

So far, the European Commission strongly emphasises the advantages and potential cost savings from cooperation (EC, 2013), but still most Member States specifically seek to reap the co-benefits – especially job creation – of expanding RE domestically instead of trading RE, despite the higher cost (EC, 2012). No Member State currently sees a need for imports: all countries believe that their 2020 targets can be met domestically. Indeed, no European country allows for remuneration of RE imports from non-EU countries[5] in their national support schemes, and there are no concrete plans for this in the 2020 or 2030 context (Ahner and Glachant, 2014; Schinke and Klawitter, 2014); only the UK is officially investigating, with a decision pending, whether and how to include foreign RE in their support scheme (DECC, 2014). This means that there is presently no real driver for Article 9 projects and no interest from Member States to push RE trade and define a business environment for such projects.

4.1.1.3 Energy security and system reliability. RE imports from third countries can diversify an importer country's electricity mix and add additional dispatchable options, thus increasing the energy security despite potentially increased imports (Lilliestam and Ellenbeck, 2011, 2012; Trieb *et al.*, 2014). In addition, the predictability of intermittent renewables is increased by expanding the size of transmission grid and by enabling stochastic smoothing of both the feed-in and demand over very large areas (Czisch, 2006); cooperation offers possibilities of accessing additional dispatchable

renewables unavailable within the EU, in particular, concentrated solar power (CSP) from North Africa and possibly hydropower from the Western Balkans or Turkey (IPCC, 2011; Pfenninger *et al.*, 2014; Trieb *et al.*, 2014). Currently, however, the potential security threat of electricity import dependency is the stronger argument in the policy debate (Lilliestam, 2014).

4.1.1.4 Development cooperation. Co-effects between RE and development cooperation objectives, such as electrification, can both increase the political attractiveness of Article 9 and create new funding opportunities (Erdle, 2010; Schinke and Klawitter, 2014). It may be attractive for Europe to help developing countries deploy renewables, for export and domestic use, and to avoid more countries developing nuclear capacities with potentially significant geopolitical implications (Marktanner and Salman, 2011). Some Member States may see growing RE generation abroad as an opportunity for increased component exports.

4.1.2 Exporter country perspective. Exporter country policymakers must weigh the benefits of exports, such as additional revenues, against the disadvantages of expanding RE domestically for the consumption abroad. We identified three main factors relevant for Article 9.

4.1.2.1 Domestic demand. Many countries neighbouring Europe, especially around the Mediterranean, have rapidly increasing electricity demand (Worldbank, 2015). Securing new generation is a key policy priority, and exporting RE may have two seemingly contradictory effects (Frieden *et al.*, 2016).

First, building up dedicated export capacities would generate income that can, in principle, finance domestic generation, but would effectively lower the potential for domestically consumed renewables, unless the potential is very high (as it is for, e.g. solar power in North Africa). Second, a higher remuneration for exports than domestic electricity could enable investments at sites where renewable generation for domestic use is not profitable, thus increasing the capacity available for domestic use; which of these is the case depends on the country's potentials, the remuneration of exports and the time perspective. This has been an issue in scientific literature (Trieb, 2006, 2013), but in policy, the first perspective appears dominant.

Currently, the fast demand increase makes it likely that any RE or other electricity trade will initially go from the EU to the neighbouring countries, especially to North Africa. Although the potential for exports is in principal very large, the rapid demand growth vastly reduces the realistic possibilities for near- to mid-term exports: it is very unlikely that there will be surplus electricity to export from neighbouring countries to the EU, at least within this decade (Schinke and Klawitter, 2014).

4.1.2.2 Technology transfer. Technology transfer induced by RE export projects may help potential exporter countries to move faster towards more sustainable energy structures, as installing renewables, even if only for exports, will likely build up new domestic know-how. (Karakosta *et al.*, 2010). In addition, by installing renewable capacities, the feasibility of RE projects in the export country is demonstrated, which reduces the perceived risk of such projects. This, in turn, may lower financing costs for further RE projects, which is a particularly important effect for developing and emerging countries where financing costs are high (Ondraczek *et al.*, 2015).

4.1.2.3 Jobs, growth and economic effects. Production, installation, operation and maintenance work of RE generators and grid infrastructure creates additional

revenues, jobs and economic growth in the manufacturing and service sectors. By using the cooperation mechanism, European (and other) investors would invest, and trigger growth, in a region they otherwise may not have chosen. Further, the direct revenues from Article 9 could generate €1-6bn/a for the exporting countries by 2030 (Resch *et al.*, 2015). There is some potential for job creation if export country-based companies are the main providers of upstream and downstream manufacturing and maintenance services: Komendantova *et al.* (2014) find that 100,000-300,000 job years could be spawned by 700 TWh/a CSP exports from North Africa to Europe if all components are manufactured in North Africa. Job creation was consistently mentioned as a key reason for exports at the exporter country workshops in the BETTER project. However, well-crafted policies – including in non-energy policy areas such as education – are necessary to leverage this potential. In addition to new jobs, fossil fuel-exporting countries may replace dwindling oil or gas exports with renewables exports or use renewables domestically to free fossil resources for more lucrative exports (Lilliestam and Patt, 2016).

4.1.3 Transit country perspective. Transit countries have a weak rationale for RE trade: they do not benefit from low-cost imported RE and from the additional export income, but have disadvantages from additional power lines or electricity flowing through their system. Political and public opposition against lines benefitting only other countries should thus be expected. Furthermore, the transit country may, such as Spain, have an oversupply of electricity and/or be an exporter itself (Lilliestam *et al.*, 2014): in such cases, transit countries may see trade in the other direction, towards the EU, as a direct threat.

Indeed, a transit country refusal brought the one concretely proposed Article 9 project to an end, as Spain refused to be a transit country for solar power from Morocco to Germany in the 2012 Desertec deal. No case study work has been done to investigate in detail why Spain refused, but several BETTER interviews indicate that Spain feared the loss of export revenues from their electricity exports to Morocco; the Desertec consortium was unaware of this issue, as Spain was involved in the negotiations at a very late stage. In addition, the Andalusian grid (where imports would feed in) is weak, and the Spanish power market is already oversupplied with domestic generation so that imports could threaten both system stability and the economic prospects of domestic actors (Lilliestam *et al.*, 2014; Stonington, 2012; Trieb, 2013).

4.1.3.1 Additional income and compensation. The transit country may benefit economically, thus possibly offsetting its disadvantages, in two ways. First, they may receive a fee for the transited electricity, as is often the case for gas and oil pipelines. This is especially likely in the case of point-to-point high-voltage direct current (HVDC) lines transiting a non-EU country. Transit fees are not allowed with the EU: only the limited funds from the transmission system operator (TSO) compensation fund can be allocated to affected system operators (Regulation 838, 2010). Second, if the transit country is located at the Union border, it is the place where the electricity enters the EU. Such transit countries may then use the imported RE to overachieve their own renewables target and sell the surplus to the importer country via statistical transfers. At the BETTER workshops, this was not seen as sufficiently compensating the negative effects in transit countries.

4.2 Micro level

A suitable investment environment is necessary for investments to happen. Such a business case relates to the market and support scheme structure in the country where the electricity is traded (Section 4.2.1), risks and uncertainty for investors (4.2.2) and infrastructure availability are traded.

4.2.1 Prices and investment profitability

4.2.1.1 Multi-level governance factors, cost-benefit allocation. For investments to happen, regulations in several countries must be aligned (Jacobsen *et al.*, 2014). This refers both to pricing mechanisms, which is allowed to build generation and transmission (see below), and regulatory issues such as verification of RE production and compatibility of technical standards (Ahner and Glachant, 2014; Heinemann *et al.*, 2012; MEDREG, 2012).

Questions of price setting and benefit sharing between exporter, importer and transit countries must be settled probably at the international level. This includes not only cost benefit allocation and the apportionment of RE for exports and for the domestic market but also ownership and financing issues, technology transfer and component manufacturing location.

Most potential export countries *de jure* allow independent power producers, including foreign investors, but there are often large *de facto* barriers for market entry (Deutsche Bank, 2011; Paving the Way, 2012). Importantly, some countries require a minimum share of domestic ownership (e.g. 51 per cent in Algeria and Egypt; Dii, 2014). If a dedicated RE trade agreement is created, issues of who is allowed to invest in and own assets must be addressed.

4.2.1.2 Support schemes and markets. Reliability and predictability of quantity and price of possible electricity sales are crucial for planning and financing (IPCC, 2011). To make imports attractive, the price received in the import country must be sufficient, higher than the price in the exporter country and somewhat predictable. As most renewables are presently not cost competitive, the business case for renewables is determined by policy support schemes (Klessmann *et al.*, 2010). The market price is important in countries with a premium support scheme (part of which is based on the market price) and may become important in the future if renewables enter a market setting.

Presently, no Member State includes foreign – including from other EU countries – RE in their support systems (Ahner and Glachant, 2014), leaving two other financing options. First, power purchase agreements between exporter and importer countries may offer an attractive option for both. This would de-risk the investment and reduce financing costs. Second, import projects can be designed to serve peak demand, during which prices are higher, thus re-financing themselves without dedicated policy support (Price and Cable, 2001).

If not all electricity is exported, parts of the income will arise in the exporter country's market. In many countries, especially in the Middle East and North Africa, prices are low and subsidised, reducing the profit potential of domestic renewables projects – unless they are supported too (Dii, 2014). In addition, rules for grid access and congestion management in importer, transit and export countries are key measures to secure predictable income of bulky and large-scale electricity trade investments (de Jager and Rathmann, 2008).

4.2.2 Risks and uncertainty. Uncertainty and risk are major barriers for investors to finance projects, especially in policy-bounded domains such as RE, although insurances are available for most risks (Watts, 2011).

4.2.2.1 Policy and target stability in importer countries. Renewables support schemes in export and import countries are the main source of income for traded electricity. Such schemes are politically defined and may change, sometimes abruptly or even retroactively. In Europe, the national support schemes are driven by European climate/renewables targets (Lilliestam *et al.*, 2014) so that weak European long-term targets do not create an incentive for imported renewables. The policy risk in the EU is generally low.

4.2.2.2 Political and policy stability and bureaucratic efficiency in exporter countries. Many potential exporter countries suffer from political and administrative uncertainties. Often, bureaucratic inefficiency makes permission processes slow – and thus costly – and unpredictable. These problems are sometimes exacerbated by corruption (Komendantova *et al.*, 2014).

Some risks, such as export embargoes and nationalisation of assets or political instability, including revolutions, are difficult to manage and may deter investors (especially foreign) and greatly increase the risk premium (van Dril *et al.*, 2011). Terrorist attacks against electricity import infrastructure is hardly a threat to energy security, but a serious one to investors, who may see their multi-billion Euro investments damaged or destroyed (Lilliestam, 2014).

4.2.2.3 Economic stability. Exchange rates, interest rates and inflation are important determinants for the revenue stream for foreign direct investments. Economic turmoil, such as in some North African countries and in, for example, Greece, may deter investors. The soft currencies of many countries around Europe are an obstacle for long-term financing of foreign direct investments (Deutsche Bank, 2011). To reduce investor risk, support schemes may be defined in foreign currency, as currently considered by Egypt (Ellenbeck *et al.*, 2013), but this puts the currency risk on the exporting state, reducing the macro-level attractiveness of such solutions. Presently, many economically instable countries surrounding Europe are also politically instable, adding to the already strong risk perception for these countries.

4.2.2.4 First-mover risks. As no Article 9 projects have been implemented to date, investors, banks, etc. have no experience with such projects, leading to a high risk perception. This makes the first projects more expensive and difficult to finance; this risk premium should decrease with increasing experience. Hence, institutional funding is useful to finance first projects; indeed, the large-scale pilot CSP project in Ouarzazate, Morocco, was financed by concessional loans (Worldbank, 2014).

4.2.3 Availability of infrastructure

4.2.3.1 Presence of infrastructure. Availability of sufficient grids or the possibility to build new transmission in exporter, importer and transit countries is *conditio sine qua non* for Article 9 trade, as the electricity must be physically imported to the EU. The existing infrastructure is insufficient for exports, especially from North Africa, so that large-scale grid investments must accompany Article 9 projects. Given the long lead times for power lines, no physical imports to the EU will be possible in the coming 5-10 years (Schinke and Klawitter, 2014).

4.2.3.2 Infrastructure investment rules and cost allocation. Only system operators (EU) or the national power company (most neighbouring countries) are allowed to build transmission lines; in the EU, actors other than the system operators can build merchant

interconnector lines. The costs of new or reinforced transmission lines will therefore fall on the affected TSOs (and ultimately the consumers) so that fair transmission cost allocation mechanisms – especially for transit countries – are key aspects of trade deals (Heinemann *et al.*, 2012).

4.2.3.3 Grid access. Grid access rules – including feed-in priorities, guaranteed grid connection and connection cost sharing – are currently not always explicitly regulated in potential export countries, reducing the attractiveness of generation investments. If transit is needed, the rules for transit may need to be clarified deal-by-deal, including both rights-of-way for bypassing lines or cost allocation rules for national grid reinforcements (Trieb, 2013).

If point-to-point HVDC links are envisioned, access to national grids in transit and exporter countries is not necessary, but still, the legal possibility to build such power lines must exist (MEDREG, 2012). As indicated at the BETTER workshops in Athens, it is possible that the present European regulatory framework does not allow international point-to-point HVDC links transiting an EU country. Therefore, new legislation specifically addressing the technical features of international HVDC lines may be needed, further reducing the short- to mid-term feasibility of long-distance RE trade.

4.3 Public discourse level

The public may react to an energy policy or project in different ways, depending on perceptions of personal (dis)advantages (Section 4.3.1), perceptions of unfairly distributed costs and benefits (4.3.2) or conflicting beliefs (4.3.3).

4.3.1 Interest arguments. Interest arguments refer to perceived effects on "me" or "us" and include economic, political or environmental interests.

4.3.1.1 Economic interests. Actors supporting or opposing RE trade will likely use cost arguments to support their standpoint. Whereas lower costs are the very rationale at the macro-level, some actors may not believe this to be true or they define "cost" differently than overall system costs (Ellenbeck, 2013). For example, although the Desertec vision is driven by low-cost decarbonisation (Trieb, 2006), its opponents strongly criticise the expensiveness of CSP imports (Scheer, 2011; Lilliestam and Hanger, 2016). Further, job creation and the build-up of new industries are key arguments for expanding renewables. Importing RE may lead to a trade-off between job creation in the importer and exporter country, an issue that can assume a prominent discursive role pro (exporter countries) and contra trade (importer countries).

4.3.1.2 Political interests. International RE trade leads to questions of energy security and sovereignty. Although mutual benefits could arise in times of peace and stability (Trieb, 2006), the situation may be different in times of tensions and political unrest. Relying on electricity imports or, if the perspective is reversed, revenues from electricity sales to Europe, induces a dependency that can be perceived as threat to energy security. Similarly, exposure to terrorism or natural disasters are expected arguments against large-scale electricity trade (Lilliestam, 2014; Lilliestam and Ellenbeck, 2012).

4.3.1.3 Environmental interests. Climate and environmental protection are primary drivers for RE, including imports, but RE also causes local environmental problems, including potentially disruptive effects such as high water consumption for electricity projects in already arid areas. Opposition based on environmental concerns can thus be expected from citizens in the affected country. Severe environmental impacts in exporter

countries (e.g. from large-scale hydropower) could also trigger protests in the importer country if these are perceived as disproportional or unfair (Jobert *et al.*, 2007).

4.3.2 Fairness. The perception of fairly distributed costs and benefits among exporter, transit and importer countries and among societal and corporate actors influence the political and social support of RE trade (Klessmann, 2012).

4.3.2.1 Fairness between countries. The RE trade must be perceived as fair by all involved countries' politics and citizens. This is not just economic: for example, the perception of unjust outsourcing of environmental impacts from Europe could trigger opposition. A major area for fairness disagreements is the benefit sharing between importer and exporter countries, such as conflicts concerning where jobs are created (Section 4.1.1; Klessmann, 2012).

Fears of neo-colonialism are especially pronounced with respect to former European colonies and protectorates in North Africa and the Middle East (Dittmann, 2011): here, "political vanities" may lead to a perception of exporter countries being the playground of European industrialists playing "solar colonizers" (Marktanner and Salman, 2011). This perception would be exacerbated if all additional generation were directly exported, especially if domestic exporter country markets remain undersupplied. The neo-colonialism issue is very prominently featured as a political argument against RE trade, as highlighted at all BETTER workshops.

Transit countries do not directly benefit from most benefits of RE trade, but have direct disadvantages from the transit lines (Section 4.1.3). Compensation from exporter or importer countries may be insufficient to increase local public acceptance, either because the compensation does not trickle down or because the public still rejects lines from which it has no immediate benefits. This is an important issue: transit country rejections may make entire trade deals moot, as experienced after Spain refused to sign the Desertec deal in 2012 (Section 4.1.3).

4.3.2.2 Fairness between actors. The perception of fairness is also greatly influenced by the cost benefit allocation between policy, investors and the public. The clearest issue relates to conflicts between the negatively affected public, especially in the exporter country, and investors, who earn the money. In Europe, and (slowly) increasingly in neighbouring countries, public participation in planning and permission processes is a focus, aiming to access local knowledge and avoid local protests (Schmidt and Lilliestam, 2015).

The relation of imported and domestic electricity and how they are handled by the support scheme holds potential for opposition in importer countries: too high import remuneration could trigger protests, for example, because of higher consumer prices or the suspicion that policy is too industry-friendly. Similarly, a closed deal between a state and an energy investor/company, with no visible benefits for the exporter country population, may enliven the neo-colonialism debate also in the importer country.

4.4 Collective belief systems

Assessing acceptance parameters on a broader societal or community scale requires us to acknowledge the social construction of collective belief systems, cognitions and identities. These parameters are constantly derived and reproduced from a complex set of conditions such as collective experiences, values, media attention and loudly voiced interests of influential groups.

4.4.1 The power of history. Historical developments and resulting cognitive identities have strong effects on public acceptance of policy options (Kuper and van Soest, 2003). For example, given their difficult past, RE imports from Russia to the Baltic states or Poland, which would in principle qualify for Article 9, are not even discussed as an option.

Further, the electricity system has worked well – for its intended purposes – and has grown slowly, requiring the long-term build-up of a skilled workforce. Hence, any new pathway strongly deviating from the historical one must be very well justified, or it will likely cause opposition already because it is different. Regional collective identities, for example the identification with mining industries, may generate opposition against perceived threats to these historically successful energy pathways.

4.4.2 Conflicting aims. In society, as in policy and science, there are multiple narratives about renewables. Importing RE is only one of many possible futures, connected to liberal policy traditions based on the political and economic benefits of increased trade and mutual dependencies. Ideas of energy autarky and decentralisation are, however, also prominent in the RE discussion, especially among system- or capitalism-critical groups (Scheer, 2011) and in more national-conservative and securitised discursive settings (Hakes, 2008). Advocates of autarky or decentralisation are not convinced by the alleged cost efficiency of RE imports, as they view other values (e.g. independence, decentralisation) as threated by large-scale imports (Schmidt and Lilliestam, 2015; Lilliestam and Hanger, 2016). Opposition against RE trade can, thus, also arise simply because people want a different future.

5. Discussion

Whether an RE programme is successful is a highly complex issue, requiring policymakers, business communities and the public, possibly in several countries, to deem it attractive. Our analysis of factors influencing the attractiveness of RE trading under Article 9 of the EU Renewables Directive highlights this complexity (Table II).

On the macro level, the attractiveness is determined by weighing political goals against each other. For an importer, the lower cost of imported RE must be weighed against, for example, the industry jobs not arising in component manufacturing and operation, especially if the trade deal has a local manufacturing requirement for the exporter country. Similarly, an exporter must weigh increased income and, potentially, a new manufacturing industry against exploiting its generation sites for export and making them unavailable for domestic use. The transit country must weigh negative environmental and power system impacts against possible compensation.

On the micro level, attractiveness refers to the "business case". This is similar to the business case for RE within one country, but adds the complexity of doing international infrastructure-bound (and hence, capital-intensive) business. Electricity remuneration, risk management and infrastructure access are key issues here.

On the public discourse level, the perception of the impacts of the RE trade is the main determinant. Here, the discursive construction of fairness and what is right is as important as the (future) impacts themselves.

Among these factors, we that find that three issues appear particularly important for the failure of Article 9. Of these, the first causes Article 9 to fail on the macro level, whereas the other factors will become important if RE trade becomes attractive to national policymakers in the future.

Level	Category	Factor
Macro level	Importer country	Cost-efficient RE target achievement, conflicts with other policy targets, energy security, reliability development cooperation
	Transit country	Income and compensation for impacts
	Exporter country	Satisfy growing electricity demand, technology transfer
		Jobs, growth and economic effects
Micro level	Prices and investment profitability	Multi-level governance, cost/benefit allocation
		Support schemes and markets
	Risk and uncertainty	Policy stability and targets (importer)
		Policy, political stability and bureaucracy (exporter)
		Economic stability
		First-mover risks
	Infrastructure	Presence of infrastructure, infrastructure investment rules, grid access
Public discourse level	Interest arguments	Economic interests, political interests, environmental interests
	Fairness	Fairness between countries, neo-colonialism
		Fairness between actors
	Collective beliefs	Power of history
		Conflicting aims

Table II. Summary of the three acceptance levels and the factors affecting the success or failure of Article 9

Article 9 has failed because no country has had the political will to implement it. If the political will were present, a policy framework would have been implemented, or at least suggested, in at least one importer and one exporter country. Currently, no EU country allows for remuneration of non-EU RE and no country has concrete plans for using Article 9; Italy is investigating a deal with Serbia, and the UK discusses including foreign RE in their support scheme, but these ideas are still vague.

Three issues related to the macro-level attractiveness are prominent in the literature and kept recurring during 30 months of BETTER project stakeholder consultations:

- The EU progress towards the 2020 targets is good, reducing the short-term need for RE imports to Member States. The low ambition and remaining uncertainty of the 2030 and longer-term EU renewables targets diminish the rationale for cooperation. Given the relatively weak 2030 targets decided in 2014, the potential importer savings are low. Both issues make Article 9 less attractive to EU states than when the RE Directive was decided in 2009.
- Local and national value creation and job creation are key drivers for renewables in the EU and constitute the prime imperative for potential exports. Yet, from an EU perspective, importing electricity could mean exporting parts of these benefits. The Member States thus, so far, prefer to achieve the target domestically despite the potentially higher costs to reap these benefits themselves.

- The weak interest of potential exporters is at least partially caused by their rapid domestic demand increase: all capacities are needed for domestic supply so that no surplus capacities are available for export in the short- to mid-term.

In sum, Article 9 has failed because there is no perceived need for it in the EU and the exporters have no surplus electricity to sell.

Second, the grid infrastructure for large-scale trade is not present. Yet, without it, no electricity can be physically imported to the EU, but physical import is a requirement of Article 9. The existing 600-MW link between Morocco and Spain, which currently transports electricity from north to south, could be the first seed of a western Mediterranean cooperation, but Spain – which is currently oversupplied with electricity – has a very weak interest to allow imports to Europe via Spain. Indeed, Spain is the only country to have explicitly turned down a concrete trade deal (as a transit country in the German–Moroccan Desertec deal). Hence, even if generation investments for exports were profitable, it would be difficult or impossible to import the electricity to Europe. Given the long lead times for transmission lines, mentionable RE exports to the EU can be practically ruled out before 2020, and probably well into the 2020s, even if all other barriers were immediately resolved.

In future research, a case study for the failed Desertec deal and precise answers to why Spain rejected it would be greatly interesting. Presently, no case study about the Spanish rejection of the Desertec deal – the only possible Article 9 case study – has been published.

Third, there is currently no business case for Article 9, as no country has undertaken concrete steps towards a suitable market or support scheme environment. As long as national policymakers deem Article 9 unattractive, this should not be expected to change. Other potential issues, such as the public opposition or acceptance of Article 9, have not (yet) become barriers or drivers, as no national Article 9 programme or specific projects have been implemented or even discussed in concrete terms.

On the theoretical and conceptual side, our framework and results contribute to energy policy research in two main respects. First, we propose that not only must acceptance be reached at all three levels (as other have done before us) but also there should be a temporal sequence: macro-level acceptance must come first, followed by micro-level and public acceptance. As we show, Article 9 fails already on the macro level, and, hence, there is no suitable policy framework for RE trade and, trivially, no business case; public opposition or acceptance is not a relevant issue for plans that are not even proposed. We, thus, suggest that the current policy discussion of how to implement Article 9 misguiding: a more fruitful discussion would be whether it should be used and, if so, under which conditions.

Second, we highlight that the attractiveness of a policy programme is not merely a result of "objective" costs and benefits, but of a wide range of economic, political and social value judgements made by numerous different actor-types and sometimes actors in several countries. Although such multi-level perspectives are often acknowledged[6], the mainstream energy policy literature does not address differing values and perspectives in the same detail as costs and techno-economic aspects. Yet, people may value one and the same issue differently, and it is possible that contradictory judgments are correct simultaneously, but from different perspectives. For example, an importer country government may perceive the lower cost of cooperation as an important

industry-political measure, as it makes electricity cheaper – compared to a domestic-only pathway – for domestic customers; alternatively, it could view the jobs arising in other countries as lost to the domestic job market, making it a bad industry-political move. Which argument is right is a value-judgement: in their own sense, both are right. The EU Member States have so far mainly adopted the second standpoint.

6. Conclusion

We identified 24 factors of importance for the success or failure of Article 9 of the EU Renewables Directive, relevant on three different levels in exporter, transit and importer countries. We find that Article 9 has failed because EU policymakers perceive that they can better reach the targets domestically and with higher co-benefits such as new jobs and local value creation: importing RE would be cheaper, but at the cost of losing other benefits. In addition, most exporter states have rapidly rising electricity demand, greatly limiting the room for exports in the short- and mid-term: at least for now, the exporters have no surplus RE to sell. Even if trade was deemed desirable, the required import infrastructure to the EU is lacking, making RE trade under Article 9 practically impossible within this decade.

In this paper, we developed a multi-level heuristic for analysis of renewable energy programmes. We suggest that a programme must not only be attractive to different types of actors on different levels but also this must happen in a specific order: first, a dominant policy coalition must evaluate the programme as attractive; second, investors must find the business case, largely defined by policy, attractive; third, the public must accept, or at least not actively oppose, both the programme as a whole and its individual projects.

The sequential nature of our heuristic is an important contribution to the energy policy literature and debate: had we looked at all levels simultaneously, we would have arrived at similar conclusions as the European Commission, stating that the business case is missing and that public support may be lacking. Although we believe that both these points are true, they are, for now, largely irrelevant: as policymakers deem Article 9 unattractive, the programme already stops at the highest level – this is why there is no business case. How investors or the general public view Article 9 is, thus, of academic interest, as the question of their perspective does not arise.

Notes

1. Available at: www.res4less.eu
2. Available at: http://diacore.eu
3. Available atwww.better-project.net
4. As the 2030 target is European, without national effort sharing, the intra-EU cooperation mechanisms are no option for 2030, which makes imports from non-EU countries the only cooperation mechanism potentially available.
5. Sweden and the non-EU country Norway have a joint support scheme and Germany will allow European projects to apply for a small share of its future tendering scheme.
6. For example, Wüstenhagen *et al.*, 2007, on which we based our framework, is the 13th most cited article in *Energy Policy*.

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