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Securing Investment in Renewable Energy: The Role of Subsidies

I. Support Schemes

The cost of producing electricity from some renewable technologies has declined rapidly in the last decade. IRENA reported in 2022 that the global average levelised cost of electricity production (GALCofE) fell between 2010 and 2021 by 88 per cent for utility-scale solar power, by 67 per cent for onshore wind and concentrated solar power and by 60 per cent for offshore wind and that the GALCofE was now lower by 11 per cent for new utility-scale solar power and hydropower and by 39 per cent for onshore wind than for the cheapest new fossil-fuel-fired power generating option.[1] The competitiveness of these better-established renewable technologies in electricity markets with other power-generation technologies makes them increasingly attractive to investors even without incentives from public support as confidence grows in the ability to recover development costs and turn a profit from projects using these technologies through the sale of electricity in markets.

However, care is needed with attempting to draw conclusions about the appeal for investors for renewable energy technologies as a whole from global average figures. The costs position and therefore the confidence of developers in recovering development expenses and making a profit will very for each project depending on factors such as its location (eg, the quality of the resource available for power production varies significantly depending on factors such as wind speeds, solar radiation etc.) and experience in the relevant market with renewable energy investment. The size of a project has an impact on its financial viability. Renewable energy developments often have much lower generating capacities then fossil fuel power plant and are therefore less able to benefit from economies of scale. The maturity of technologies is also a key consideration with newer renewable energy technologies not yet having benefited from the regular experience with their deployment in large scale developments that have

[1] IRENA, *Renewable Power Generation Costs in 2021* (IRENA 2022) 17.

enabled significant cost reductions for solar and wind energy. For renewable projects using well-established solar and wind energy technologies, levelised costs of energy may be higher, sometimes much higher, than the global average, leaving them less able to compete with new generating facilities using alternative technologies or with incumbent power producers. Newer technologies, whose commercial use on a large scale is not yet established, will typically struggle to compete and therefore to gain a foothold in markets and access to the opportunities that affords for reducing production costs by learning from doing.

Other factors that may disadvantage renewable electricity developments in the eyes of potential backers include the uncertainty of overall revenues from intermittent generating plant; and the fact that existing energy companies may be unwilling to redeploy substantial asset bases to the renewables sector because of sunk investment (financial and psychological) in their current fossil fuel business models. In addition, a large proportion of renewable electricity project expenditure derives from fixed up-front development costs, with operating costs being minimal due to 'fuels', excluding biomass-based energy, being freely available, whereas the proportion of fixed up-front costs for fossil fuel projects is smaller with a higher proportion of variable operating costs, mostly for fuel. Projects with a high proportion of fixed up-front costs may be thought of as riskier by investors because they are less able to adapt to volatile electricity market prices (eg, they need stable electricity prices at minimum levels over lengthy timeframes to be able to cover initial expenditure). In contrast, fossil fuel businesses can hedge against fluctuations in coal/gas prices.

Means of producing renewable energy in industry, heating, cooling and transportation are also disadvantaged by higher production costs and lower availability of renewable alternatives compared to fossil fuels such as petroleum and natural gas that have benefitted from several decades of experience with technologies for their production and consumption.[2] The fall in the costs of renewable electricity production is also changing the position here, making electrification based on renewable sources an increasingly attractive alternative to sticking with the status quo. However, it must be borne in mind that consumers must also purchase the equipment needed to produce energy for meeting these needs (eg, a new electric or hydrogen-fuelled car, a heat-pump or a biomass boiler) and that costs for these items may be higher for the non-fossil fuel consuming technologies than for manufacturers of equipment that have already realised efficiencies through decades of use and the establishment of worldwide capacities for their production enabling fully realised economies of scale for production costs. Concerns of this nature are naturally relevant not only for the consumer looking to replace equipment to meet energy needs for transport, heating, cooling, or in industry and for equipment producers but also for producers of energy whose marketability depends on consumer choices.

Investors may be put off from investing in projects because of concerns that they would not be able to recover monies invested and a reasonable profit margin through

[2] IRENA, *Remap: Roadmap for a Renewable Future (2016 edition)* (IRENA, 2016) 106–20; IRENA, *Global Energy Transformation: A Roadmap to 2050: 2019 Edition* (IRENA, 2019) 32.

energy sales alone. Alternatively, they may only be willing to loan money for such projects at interest rates that developers would find prohibitive. In view of this, governments with policies for increasing renewable energy production and consumption use financial incentives (support schemes) to attract investment in projects for producing renewable energy and technologies which consume it (eg, biomass boilers) in circumstances where it would not be provided under normal market conditions.

This chapter considers the main approaches which governments employ to support renewable energy development financially. Consideration of them is grouped under two headings: measures used to enhance access to funding for the development of technologies to the point where they are ready for commercialisation ('investment support'); and measures which enable the recovery of development costs once renewable technologies are operational ('operating support'). The section on operating support describes common characteristics of three scheme types used worldwide to support renewable energy developments: feed-in tariffs; obligation and certificate schemes (also known, particularly in the U.S., as renewable portfolio schemes);[3] and premium schemes. Commonly occurring strengths and weaknesses of these scheme types for creating investor confidence in projects are examined. Case studies of the principal support schemes for renewable electricity projects introduced by the UK Government during this century as well as Germany's experience with feed-in tariffs provide examples of how these scheme types have been used in practice and further illustrate characteristics which can affect their utility for attracting investment in the renewables sector.

II. Investment Support

Financial backing for research into and the development of early-stage renewable energy technologies and for the trialling of pre-commercial prototypes is often hard to obtain because of the high risk that monies invested will not be recovered.[4] Alternatively, investors may only be prepared to provide capital at rates of return that would make it difficult to recover development costs through energy sales without substantial operating support (see section III below). States use measures, collectively referred to as 'investment support', to make it easier for innovators to develop new renewable energy technologies and to encourage consumers to use them through the provision of public financial support.[5]

[3] Craig Hart and Dominic Marcellino, 'Subsidies or Free Markets to Promote Renewables?' (2012) 3 *Renewable Energy Law and Policy* 196, 198–200.

[4] Katy Hogg and Ronan O'Regan, 'Renewable Energy Support Mechanisms: An Overview' in Matt Bonass and Michael Rudd (eds) *Renewables: A Practical Handbook* (Globe Business Publishing Ltd. 2010) 31, 35–39.

[5] ibid; Commission, 'Review of European and national financing of renewable energy in accordance with Article 23(7) of Directive 2009/28/EC', SEC (2011) 131 final, 4–6; Commission, 'European Commission guidance for the design of renewable support schemes – Accompanying the document Communication from the Commission: Delivering the internal market in electricity and making the most of public intervention' SWD (2013) 439 final, 11–12; Zeineb Abdmouleh, Rashid Alammari and Adel Gastli, 'Review of Policies Encouraging Renewable Energy Integration and Best Practices' (2015) 45 *Renewable and Sustainable Energy Reviews* 249.

Grant schemes provide funding to developers for the development and testing of eligible renewable energy technologies. The provision of long-term public loans enables them to access investment at much lower rates of return then would be available to them through private finance. Alternatively, guarantees of repayment from public bodies in the event that a borrower defaults may enable developers to access private finance more cheaply. Long-term grants are also used to encourage the purchase of renewable technologies by domestic and business consumers. For example, Member States of the European Union offer investment grants to promote the take up of renewable energy heating systems such as biomass boilers.[6]

In addition to making public funds available, governments provide tax incentives and reductions to support investment by reducing the financial burden on developers. These may include reduced corporate tax rates, tax holidays and tax credits.[7] Reduced tax rates can also be used to encourage the consumption of renewable energy rather than fossil fuels. The use of biofuels in road transport is commonly promoted by applying lower rates of fuel tax to them compared to petrol or by allowing tax offsets for their consumption.[8]

Investment support is generally viewed as playing a supporting role to operating support, its main function being to enable technologies to reach the point where they are capable of commercial-scale operation. Its key contribution, in addition to creating the space for new technologies to progress from idea, initial design or laboratory-based experiment via the prototype stage to possible deployment, is to lower the costs of those initial stages (eg, by making funds available at lower rates than are available from private lenders) so that costs to be recouped through operation are less daunting. However, the European Commission, in its guidance of 2013 on support for renewable energy, encourages the wider use of investment support in place of operating support because it does not distort the operation of energy markets.[9]

III. Operating Support

States use measures, collectively described as operating support, to attract investment in projects using renewable energy technologies that have matured sufficiently for commercialisation. This is often done by providing in law that renewable energy generators will receive a set price from a legally obligated purchaser for the electricity that they produce or an additional sum on top of revenues realized through sales of electricity in the market (feed-in tariffs and feed-in premiums). The aim in both cases is to give confidence that overall revenues received will enable project cost recovery

[6] Commission, SEC (2011) 131 final (n 5), 6, 9–10. Current information on Member State support schemes can be found at: Renewable energy policy database and support: Start (res-legal.eu) (accessed 4 October 2022).
[7] Hogg and O'Regan (n 4) 37–39.
[8] Commission, SEC (2011) 131 final (n 5) 6.
[9] Commission, SWD (2013) 439 final (n 5) 11–12.

and profitability. Another common legal approach is to combine an obligation for sectoral actors such as electricity/gas/transport fuel suppliers to include a proportion of renewable energy in their supplies with a requirement that this should be demonstrated by them by obtaining certificates provided to the original producers of the renewable energy. This creates a potentially desirable combination of a legally required market for renewable energy and of additional revenue from the sale of certificates (obligation/certificate schemes). Subsidies may be made available as of right to qualifying technologies or through competitive measures such as tenders and auctions in which developers submit tenders or bids for support. Sections III.1 to III.4 below offer fuller comment on the strengths and weaknesses of these support scheme types and of competitive allocation for attracting investment in renewable energy projects. Case studies in Section IV examine uses of the scheme types to support electricity in Germany and the UK.

The use of operating support can be more controversial than investment support for the following reasons:

- Operating support distorts market competition directly. It is disliked by those who view undistorted markets as the most cost-efficient means of meeting energy needs. For example, the European Commission sees subsidies as necessary measures for pursuing the EU's renewable energy policy, but ones which do not sit well with its goal of an EU-wide fully competitive internal energy market.[10]
- The costs of such schemes often fall directly on electricity sector companies who then pass them on to consumers in energy bills. Rising energy bills are often attributed, rightly or wrongly, to governmentally imposed renewable energy costs. Resulting public opposition can lead to subsidies being reduced or withdrawn and to wariness of policymakers over introducing new support schemes.[11]
- Some argue that schemes such as FITs are bad in the long-term for the development of renewable energy because they remove producers from market pressures and therefore from competitive drivers for increasing technological efficiency and related reduction in production costs.[12] By the same token, they argue that schemes which combine some additional revenue for renewable generators with market exposure are preferable for promoting the long-term growth of renewable energy.[13] Others view the use of feed-in tariffs more positively, arguing that market avoiding schemes create a space for technological improvement in which possibilities for reducing production costs can be explored. They contrast this with the risk that schemes which expose subsidy recipients to market pressures may deter investment

[10] ibid, 3–8.
[11] Leah Stokes, 'The Politics of Renewable Energy Policies: The Case of Feed-in Tariffs in Ontario, Canada' (2013) 56 *Energy Policy* 490.
[12] Commission, SWD (2013) 439 (n 5), 5 and 7–9; Doerte Fouquet and Thomas Johansson, 'European Renewable Energy Policy at Crossroads – Focus on Electricity Support Mechanisms' (2008) 36 *Energy Policy* 4079; Sirja-Leena Penttinen, 'The First Examples of Designing the National Renewable Energy Support Schemes under the Revised EU State Aid Guidelines' (2016) 37 *European Competition Law Review* 77.
[13] ibid.

or mean that this is only available at higher rates of interest than those available for plant supported by feed-in tariffs, thereby leading to higher cost renewable energy for consumers.[14] It has also been argued (with some support from analysis of past technological change) that the drive for increasing profit which is intrinsic to corporate behaviour in capitalist economies should motivate a search for increasing efficiency by renewable generators in order to maximise financial gain whilst benefiting from a feed-in tariff.[15]

The main purpose of operating support schemes is to enable access to finance for renewable energy projects in circumstances where investors would otherwise not be willing to invest by addressing investors' perception of risk.[16] Common sources of investor risk perception include:

- *Price risk* – that revenue received from renewable energy production will not cover project costs.
- *Route to market risk* – that a buyer will not be found for energy produced by the generating plant. Generators benefitting from subsidies which expose them to market pressures such as premiums and certificate sales under certificate/obligation schemes will only receive the subsidy if they can find a buyer for the electricity in the first place.
- *Volume risk* – that the volume of energy production will not be sufficient to cover development costs OR, with regard to intermittent electricity in particular, that financial penalties will be levied where actual output falls short of volumes which the generator has already committed to place on the market (balancing risk).[17]
- *Allocation risk* – when tenders/auctions are used to distribute support, that the funding needed for a project will not be obtained. Allocation risk is particularly likely to deter investment where costs must be incurred up front before a tender or auction bid can be submitted (eg, for undertaking environmental impact assessment, obtaining planning permission, making a grid connection).

A. Feed-in Tariffs[18]

Common features: Under FIT schemes, an actor specified by law (typically a system operator or supplier) has a legal obligation to purchase all energy produced by specified types of renewable generating plant at a fixed price and for a fixed period of

[14] Hogg and O' Regan (n 4), 39–42; Fouquet and Johansson (n 12), 4084–85. Volkmar Lauber, 'The European Experience with Renewable Energy Support Schemes and Their Adoption: Potential Lessons for Other Countries' (2011) 2 *Renewable Energy Law and Policy* 120, 126–32.

[15] Aviel Verbruggen and Volkmar Lauber, 'Basic Concepts for Designing Renewable Electricity Support Aiming at a Full-scale Transition by 2050' (2009) 37 *Energy Policy* 5372, 5378–39; Lauber (n 14) 129–30.

[16] Hogg and O'Regan (n 4), 33–34 and 39–44.

[17] Corinna Klessmann, Christian Nabe and Karsten Burges, 'Pros and Cons of Exposing Renewables to Electricity Market Risks – A Comparison of the Market Integration Approaches in Germany, Spain, and the UK' (2008) 36 *Energy Policy* 3646.

[18] This section draws on discussion of the feed-in tariff scheme type in published work including Klessmann et al (n 17); Fouquet and Johansson (n 12); Verbruggen and Lauber (n 15); Hogg and O'Regan

time, the price and period also being specified in the law. For example, see Germany's Act on Granting Priority to Renewable Energy Sources 2000 (EEG) under which the system operators were required to pay fixed rates for electricity from renewable sources, typically over a 20-year period.[19] The electricity purchased was sold by them on the market and costs shared amongst Germany's transmission system operators and eventually passed on to consumers. This FIT scheme came to an end in August 2014 for most generating plant over 500kw despite enormous success with supporting the growth of renewable electricity production due to public and political concerns of the type mentioned below.[20]

Benefits: They provide stable long-term support for renewable energy development and therefore generate investor confidence. For these reasons, they are particularly effective for securing investment in new technologies. The tariff rate and time period for payment must be set correctly to achieve these effects. Degression, a term meaning the reduction of rates available to new claimants annually to reflect declining development costs, reduces risk of overpayment. FITs arguably stimulate innovation through developers being given a space within which to pursue efficiency gains. Some argue that the guaranteed receipt of a set amount for a set time discourages efficiency enhancement, but others counter that, for most businesses, the profit motivation will drive efficiency gains in order both to improve margins between the cost of energy production and feed-in tariff rates and to ensure that they are maintained once the period of support ends.[21]

Concerns (raised by the European Commission and others) include that: they may result in higher energy prices due to the absence of a stimulus to innovate and cut prices that exposure to the market provides; that they have a significantly distorting effect on the functioning of energy markets; the potential of windfall profits for renewable energy producers if tariff rates are set too high or production costs drop unexpectedly; and that higher costs and windfall profits may lead to public opposition not only to feed-in tariff schemes, but in general to legal interventions in favour of renewables leading to higher energy prices.[22] In addition, the fact that FIT payments are received irrespective of demand means that producers can be unresponsive to market conditions.[23] As a result, market prices have sometimes been negative on very

(n 4); Toby Couture and Yves Gagnon, 'An Analysis of Feed-in Tariff Remuneration Models: Implications for Renewable Energy Investment' (2010) 38 *Energy Policy* 955; Lauber (n 14); Hart and Marcellino (n 3); Stokes (n 11); Commission, SWD (2013) 439 (n 5); Olivia Woolley, 'Replacing Fossil Fuel Generation with Renewable Electricity: is Market Integration or Market Circumvention the Way Forward' in Raphael Heffron and Gavin Little (eds) *Delivering Energy Law and Policy in the EU and US: A Reader* (Edinburgh University Press 2016) 179; Marcella Nicolini and Massimo Tavoni, 'Are Renewable Energy Subsidies Effective? Evidence from Europe' (2017) 74 *Renewable and Sustainable Energy Reviews* 412, 413–14; and Yuliya Karneyeva and Rolf Wüstenhagen, 'Solar Feed-in tariffs in a Post-grid Parity World: The Role of Risk, Investor Diversity and Business Models' (2017) 106 *Energy Policy* 445, 446–47.

[19] Hart and Marcellino (n 3), 201–03.

[20] Henning Thomas, 'Transforming the German Feed-in-tariff System: Legal Aspects from a Regional Perspective' in Marjan Peeters and Thomas Schomerus (eds) *Renewable Energy in the EU* (Edward Elgar 2014) 75.

[21] See nn 12–15 above.

[22] Stokes (n 11); Penttinen (n 12).

[23] Commission, SWD (2013) 439 final (n 5) 9.

windy days during which demand is low. Note that the claim that FITs lead to higher energy prices is open to debate. Evidence suggests that they may offer a cheaper means of attracting investment than schemes giving market exposure to generators because investors are willing to provide funds at lower rates of return due to the steady guaranteed revenue.[24]

B. Feed-in Premiums[25]

Common features: The premium scheme type offers a potential alternative to FIT and certificate/obligation schemes for supporting renewable energy development using technologies which are ready for commercial deployment, but which have not yet achieved cost competitiveness with fossil fuel energy. Electricity from generating plant supported under such schemes is sold into markets, but the risks associated with exposure to price volatility are tempered by the payment of a premium (typically by the operators of transmission systems or by electricity suppliers) for each unit of sold electricity. The payment may be fixed at a specified level or may be a 'floating' amount that falls as electricity and carbon prices increase. Such scheme types may require subsidy recipients to pay monies received by them for each unit of electricity that exceeds the prescribed amount to the subsidy provider. The aim is to avoid situations where receiving electricity revenues and a premium would lead to a much higher recovery than is necessary for a generator to cover development costs because of a high market price. See Section IVB below for discussion of such a requirement under the UK's Contracts for Difference scheme. Repayment requirements may be included in a scheme design to address public concerns over 'windfall profits' for subsidy recipients but may make the premium scheme type less of a stimulus for renewable energy development by established generating companies than the certificate/obligation scheme type for reasons discussed in the following section.

Premium schemes are likely to become the dominant scheme type in the European Union due to strong support from the European Commission. Its guidelines on state aid in the field of energy and the environment for the period 2014 to 2020 advised that aid should be granted as a premium in addition to the market price from 1 January 2016 save for low-capacity/small-scale developments that may continue to receive FITs.[26] The 2018 RES Directive confirms the guidance by requiring that Member States, when using direct price support schemes to support electricity from renewable sources other than small-scale and demonstration installations, should do so in the form of a market premium (Art 4(3)).

[24] See sources at n 15 above.
[25] This section draws on discussion of the premium scheme type in published work including Klessmann et al (n 17), Couture and Gagnon (n 18) 960–64, Commission SWD (2013) 439 final (n 5) 8–9, Erik Gawel and Alexandra Purkus, 'Promoting the Market and System Integration of Renewable Energies through Premium Schemes – A Case Study of the German Market Premium' (2013) 61 *Energy Policy* 599 and Woolley (n 18).
[26] Commission, 'Guidelines on State Aid for Environmental Protection and Energy 2014–2020', 2014/C 200/01, 25, para 125.

Benefits: The scheme type provides a happy medium between feed-in tariff schemes and certificate/obligation schemes with regard to price risk. In contrast to FIT schemes, the premium scheme type combines the market exposure, which some argue is needed to drive renewable energy producers to improve efficiency with a lower level of price risk than under the certificate/obligation scheme type because they offer a steadier revenue stream for energy which has found a buyer.[27]

Concerns: That the scheme type leaves risks intact or only partially addressed which may deter investment, particularly by smaller generators and for newer technologies. Route to market risk and related price risk are present as premiums are only paid for electricity sold in markets.[28] Indeed this risk may be higher than under certificate/obligation schemes as renewable energy production is not dragged upwards by an obligation to include a specified amount of energy from renewable sources in their supplies. See the case study on the UK's contracts for difference scheme at section IVC below under which a legal response, a mandatory buyer of last support, was introduced to address concerns that producers with CFDs would not be able to benefit from them if a market for their electricity was not found. In addition, some price risk remains for smaller-scale generators who do not sell electricity in markets themselves, but do so through wholesalers who take on risks of market operation on behalf of generators in return for purchasing electricity at discounted prices.[29]

C. Obligation/Certificate Schemes[30]

Common features: Some states have enacted laws which oblige electricity sector actors (usually suppliers, but sometimes also producers and consumers) to include a specified proportion of electricity from renewable sources in their overall production, supply or consumption.[31] Compliance with the obligation is demonstrated by the provision of certificates. These are issued to renewable electricity producers who may sell them either together with or separately from electricity to obligated actors. The idea behind such schemes is that the receipt of two separate revenue streams should enable developers of renewable electricity installations to recover monies invested in them. This type of scheme is also widely used in connection with energy for transportation with suppliers of fuel being obliged to include a proportion of energy from renewable sources in their supplies.[32] Obligation schemes can be technology neutral or can give differing levels of support for different technologies (a practice known as banding). This is generally done by providing that well-established technologies such as onshore wind will receive

[27] See discussion of the debate over the merits of market exposure above.
[28] Gawel and Purkus (n 25) 607–08.
[29] ibid, 607; Klessmann et al (n 17), 3652 and 3656; Lauber (n 14) 130–31.
[30] This section draws on discussion of the certificate/obligation or renewable portfolio standards scheme types in published work including Fouquet and Johansson (n 12); Verbruggen and Lauber (n 15) 5739–41; Hogg and O'Regan (n 4) 42–44; Lauber (n 14); Commission, SWD (2013) 439 final (n 5), 10–11; Woolley (n 18); and Nicolini and Tavoni (n 18), 413–14.
[31] Commission, SWD (2013) 439 final (n 5), 10–11 and 25.
[32] Commission, SEC (2011) 131 final (n 5), 6 and 10.

fewer certificates for each unit of energy produced than newer technologies such as wave and tidal energy that require stronger initial support to become established.

Claimed benefits: The scheme type combines (potentially generous) support for renewable energy with market exposure, thereby reducing price risk whilst encouraging renewable energy producers to innovate and drop prices (in theory) with corresponding benefits for consumers. The obligation acts as a driver in general for renewable energy development although this may tend to favour better established lower cost technologies and larger-scale projects (with resulting economies of scale) unless banding or some similar intervention is made to promote newer technologies.[33] The reason for this is that chances of deriving a profit through the two revenue streams increase as the initial development costs decrease. As the case study of the UK's Renewables Obligation at section IVB below reveals, this scheme type has tended to attract investment in the renewables sector from well-resourced incumbent energy companies who are willing and able to accept risks of occasional loss in view of the potential for significant profits through selling certificates when market prices are high.[34]

Concerns: Both revenue streams (energy prices and certificate sales) are highly variable. This double exposure to markets creates significant investment risk for developers that monies expended on a project and an attractive profit margin will not be recouped.[35] As noted above, the scheme type may work better for incumbents who are more able because of existing asset bases and revenue streams to take a financial hit than new market entrants. It also tends to encourage investment in the cheapest well-established renewables. There is also some evidence to suggest that costs of investment and therefore of energy can be higher for projects supported by certificate/obligation schemes due to higher interest charges for monies loaned because of the greater exposure to price risk.[36]

D. Allocating Support through Tenders/Auctions

Governments often choose to make renewable energy support available through competitive processes. Developers are invited to submit tenders or bids in auctions stating the price that they would like to receive for energy produced by the supported plant. The government will then choose those which meet competition conditions. Typically, the preference will be for the lowest-priced bids because they place the least financial burden on the public purse and/or on consumers. Allocating subsidies through competitive processes is seen as a means of driving down the cost of renewable energy production in addition to greater market exposure.[37] They can also be used to channel revenues to large projects and preferred technologies.

Competitive allocation has its uses, but can also add to a perception of renewable energy projects as risky by investors where a project's viability depends on securing a

[33] Lauber (n 14), 126–31.
[34] ibid, 130–31.
[35] ibid, 126–31.
[36] Commission, SWD (2013) 439 final (n 5), 10–11.
[37] ibid, 6–7.

subsidy (see the reference to allocation risk above).[38] Tenders and auctions can also introduce risks of lost development costs where, as is often the case, a project needs to be reasonably well-advanced (having obtained its licence, undergone an environmental impact assessment) before a subsidy can be applied for.[39] These additional sources of risk add to those already present for subsidies with market exposure. See the case study on the UK's Contracts for Difference scheme below for an illustration of the additional investment risks associated with subsidies made available through competitive allocation.

The use of auctions to distribute renewable energy funds will come under close scrutiny in the EU during the remainder of this decade and the start of next. This is because the EU's State Aid guidelines for energy and the environment requires that subsidies for generating plant of 1MW or over (6MW or 3 units for onshore wind) should be made available through competitive processes under all new schemes submitted for State Aid approval from the start of 2017.[40] The 2018 RES Directive reinforces this guidance by obliging Member States to ensure that support for electricity is granted 'in an open, transparent, competitive, non-discriminatory, and cost-effective manner' save where dealing with small-scale installations and demonstration projects.[41]

E. Regulatory Risk

In addition to the risk factors examined at Section III above, potential developers and investors in the renewables sector will also consider regulatory risk when assessing whether a subsidy gives them sufficient confidence in the prospects of profiting from their initial outlay to proceed with their plans. Regulatory risk covers the possibility that governments may subsequently alter the terms on which support is provided after the investment has been made.[42] Regulatory risks often arise in connection with developing countries whose investment environments may be perceived in general as uncertain from political, legal and macro-economic perspectives.[43] However, there have also been several well-known instances of subsidy scheme alteration after an award has been made or investment in a sector committed in developed countries.[44]

[38] David Toke, 'Renewable Energy Auctions: How Good are They?' (2015) 8 *International Journal of Sustainable Energy Management and Planning,* 43–56.

[39] Natalie Kozlov, 'Contracts for Difference: Risks Faced by Generators under the New Renewable Support Scheme in the UK' (2014) 7 *Journal of World Energy Law and Business*, 282, 283–84.

[40] Commission, State Aid Guidelines (n 26) para 126.

[41] 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 [2018] OJ L 328/82 (the 2018 RES Directive), art 4(4).

[42] Anatole Boute, 'Regulatory Stability and Renewable Energy Investment: The Case of Kazakhstan' (2020) 121 *Renewable and Sustainable Energy Reviews* 109673, 1–2; UNEP Finance Initiative, *Financing renewable energy in developing countries: Drivers and Barriers for Private Finance in sub-Saharan Africa* (UNEP February 2012) Financing_Renewable_Energy_in_subSaharan_Africa.pdf (unepfi.org) (accessed 5 October 2022), 44–45.

[43] UNEP Finance Initiative (n 42), 44–45.

[44] Daniel Behn and Ole Kristian Fauchald, 'Governments under Cross-fire? Renewable Energy and International Economic Tribunals' (2015) 12 *Manchester Journal of International Economic Law* 117, 119–27.

Legal design flaws in subsidies such as setting significantly more generous rates for renewable energy technologies than they require to cover development costs and success with attracting investment far exceeding expectations have left developed states facing scheme funding problems and with fears that public discontent may necessitate a subsidy's reduction or withdrawal for schemes under which costs are passed on to consumers. For example, rates paid and the duration of support under Spain's feed-in tariff scheme for solar energy had to be reduced for subsidies already awarded in 2010 due to growth in renewable investment at a scale and rate far exceeding the electricity system's ability to absorb new generating capacity.[45] One reason for this was the limited capacity of distribution system operators to pass on scheme costs to consumers leading to a huge deficit in payment for electricity provided by generators. Sudden change in the terms on which subsidies are offered can also affect renewable energy growth by reducing workload and revenues for businesses established in the expectation of long-term government support for a renewable energy sub-sector at previously stated levels. For example, a sudden reduction in the feed-in tariff rates offered for solar panels by the UK government was reported to have harmed the nascent development of a skilled supply chain for providing and installing this renewable technology in the UK.[46]

Concerns for funders over the reliability of support offered by governments can lead them to increase interest rates charged on capital loaned substantially.[47] Confidence amongst investors in the predictability of government support can therefore make a significant difference for the financial viability of renewables and for growth in their use. Law is used in a number of ways to create the investor confidence in support stability required for monies to be loaned at more affordable rates. First, laws can make it more difficult for the government concerned to change its position including by imposing penalties for doing so. EU law promotes confidence in support schemes offered by its Member States by obliging them to publish long-term schedules stating expected support over a five-year period including timing, frequency of tendering and expected capacity, budgetary or technological limits on funding availability.[48] The effectiveness of support schemes and their distributional effects on different consumer groups must be assessed every five years with the results of the assessment being taken into account in subsequent scheme revisions.[49] A Member State which was to revise 'the level of, and the conditions attached to, the support granted to renewable energy projects … in a way that negatively affects the rights conferred thereunder and undermines the economic viability of projects that already benefit from support' would be in breach of EU law and exposed to the prospect of Commission-initiated proceedings potentially leading to a fine.[50] Legally binding national targets for increasing the proportion

[45] Behn and Fauchald (n 44) 120–23.
[46] Fiona Harvey, 'Solar Companies to sue UK Government for £140M over feed-in tariff cuts' (Guardian newspaper, 23 January 2013) Solar companies to sue UK government for £140m over feed-in tariff cuts | Solar power | The Guardian (accessed 4 October 2022).
[47] Corinna Klessmann and others, 'Policy Options for Reducing the Costs of Reaching the European Renewables Target' (2013) 57 *Renewable Energy* 390, 394–95.
[48] 2018 RES Directive (n 41) art 6(3).
[49] ibid, art 6(4).
[50] ibid, art 6(1).

of energy from renewable sources in energy supplies also assist with creating confidence in the likely continuity of support for renewable energy although, as examined in Chapter 4, their ability to have this effect depends on the strength of the supporting legal regimes for securing compliance with them.[51]

In addition, states enter investment treaties to give confidence to nationals from participating states that the terms on which investments are made in host states will not be changed arbitrarily.[52] A main purpose for developing and developed states to conclude investment treaties is to leverage investment which would not otherwise be made due to a lack of confidence in the host state's investment environment. The Energy Charter Treaty's provisions on investment were also intended to perform that function by giving nationals of developed west European states the confidence to conduct and finance development in energy rich states previously forming part of the Soviet Union.[53] Many of the cases heard under the Energy Charter Treaty's dispute resolution mechanism have involved claims that states have failed to provide fair and equitable treatment to investors by other parties due to ex-post alteration of support offered for renewable energy.[54]

Second, problems experienced with feed-in tariffs necessitating change have often been due to subsidies being made available in law to any actor falling under the relevant law's definition of persons entitled to support. The need for *ex post* intervention can be reduced by better defining and placing limits on the available support in law. See Boute's discussion of reducing regulatory risks associated with subsidies by limiting quantities of supported output, providing finite budgets or setting maximum electricity volumes for competitive allocations and restricting scheme access to generators in defined locations where connecting new power plants does not necessitate major network upgrade works.[55] Including provisions that allow change in the terms on which subsidies are provided when this is justified by a change in circumstances since the scheme was introduced can also be used to avoid the rigidity that makes disruptive change unavoidable. In this regard the EU's 2018 RES Directive allows Member States to 'adjust the level of support in accordance with objective criteria, provided that such criteria are established in the original design of the support scheme'.[56]

IV. Case Studies: Providing Operating Support for Renewable Energy

The following case studies of the three operating support scheme types discussed above and used by Germany (Feed-in tariff) and the United Kingdom (Certificate/

[51] Chapter 4, Section IV.
[52] Anatole Boute, 'Combating Climate Change through Investment Arbitration' (2012) 35 *Fordham International Law Journal* 613.
[53] Energy Charter Treaty (adopted on 17 December 1994, entered into force on 16 April 1998) 2080 UNTS 95.
[54] Boute (n 42) 2–4.
[55] ibid, 3–4.
[56] 2018 RES Directive (n 41) art 6(2).