ENTSO-E Public Consultation on ERAA

February 2020

Response to questions

8. What is your general feedback on the methodology?

We believe that the draft methodology presented by ENTSO-E would generally benefit from considerable refinement. Some sections are more thoroughly developed than others, such as the methodology for assessing available supply, although we find that this is still incomplete. Other parts, e.g., the methodology for assessing demand, including demand response (DR), are largely underdeveloped. With significant effort and improvement, the draft methodology could be well suited to the task at hand.

In addition, we find that the proposed methodology will result in an overly conservative assessment. For example, the proposed methodology underestimates the resources available on both the supply and the demand side and would thus result in an overestimation of the risks for consumers. By the same token, it is worth noting that ENTSO-E and transmission system operators (TSOs) are suggesting to rely primarily on past experience in Europe to develop the methodology and the approach to critical inputs. It is important to assess whether the past experience upon which they propose to rely was gained under relevant conditions and whether there might be pertinent experience in markets outside of Europe from which one could draw.

Given the rapid changes in today's power sector, we can no longer plan the power system of the future based on the power system of the past. Luckily, we can look to lessons learned from applicable international experience. Doing so ensures that new solutions align with the significant advances agreed in the recent Clean Energy for All Europeans (CE4All) legislative package. We encourage ENTSO-E and TSOs to direct all of their efforts to planning the system of the future based on the expected changes to the power system, leveraging any and all relevant experience, wherever it might be found.

We provide more details on the aforementioned comments on the methodology, and other areas, under the rest of the consultation's questions. The list of comments is not exhaustive, but rather represents some of the key priority areas where we believe the proposed methodology would benefit from improvement.

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9. Do you have comments on the description and data collection of the European Resource Adequacy Assessment (Articles 4 & 5)?

In relation to the demand assessment (Article 3; section 3) in the proposed methodology, we note:

It would be important for the proposed methodology to clarify in greater detail the scope of demand to which it refers: Does it refer to demand net of distributed generation, i.e., demand as seen on the TSO level? Or does it refer to gross demand, i.e., including demand that is met locally? Or is it some other measure of demand?

Overall, the methodology for then assessing demand needs further detail for clarity and guidance. For example, the document doesn't explain how ENTSO-E and national TSOs are planning to assess the DR potential across different sectors and subsectors of the economy, how they are going to assess the marginal activation cost of DR (€/MWh), and other aspects.

More specific comments under this section below:

- "(Demand) It shall be calculated considering the stochasticity of climate variables, economic growth…" (paragraph a). We agree that demand should be modelled for different years, representing different climate conditions. At the same time, the selection of historical years should be considered carefully. The effects of climate change could mean that the probability of climate conditions such as those in the more distant history (e.g., in the 1980s) reoccurring is significantly lower than conditions in more recent years. This is something that ENTSO-E should investigate carefully in the context of this study. For more on this point, please see our response on the final question of the consultation.
- In addition to the impacts of climate change, demand profiles might have changed due to the impact of smart meters and technology, the gradual expansion of dynamic pricing, the reform of balancing and intraday markets with the objective of sending more accurate pricing signals to market participants, and other factors. We expect this to be true overall, with some variance between different Member States.

  In simple terms, demand has become more responsive in recent years than it was 30 years ago. This would mean that treating all data within the historical database in the same way would be inappropriate. We therefore suggest that ENTSO-E investigates this point further in order to determine the relevance of historical data for modelling future scenarios. At a minimum, we would expect an analysis of the historical demand profiles in order to assess whether there have been significant changes across the years.
- Moreover, ENTSO-E is planning to consider economic growth in forecasting future demand. While undoubtedly economic growth is a driver of demand, the direct link between the two is gradually fading away in recent years. This is a result of energy efficiency measures, increased productivity and other factors, and is a trend that is expected to continue in future years. In other words, the type of econometric modelling, based primarily on GDP growth projections, that was frequently used in the past to

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forecast future demand is no longer adequate.

Demand forecasting in the future will require a better understanding of the structure of the economy (e.g., European economies have been shifting from manufacturing to services, which has a significant impact on demand), developments in each subsector, the impact of energy efficiency across the different sectors and subsectors, and other factors. Overall, it will require significantly more detailed modelling and understanding than in the past. In this sense, we believe that the methodology should combine a top-down and a bottom-up approach. The top-down approach would determine some key parameters and assumptions that are relevant for all sectors, such as GDP growth and fuel prices. While the bottom-up approach would consider a detailed breakdown of all sectors into their subsectors (e.g., industry breakdown into cement, iron and steel, petrochemicals, etc.) and examine them separately. For example, energy efficiency and demand response potential could be significantly different between different subsectors. This breakdown and detailed analysis would then be used to forecast future demand, both annual and peak-level demand. Special attention should be paid to the relationship between annual and peak demand, as recent trends differ from the past. Such a breakdown would also help to make a more accurate assessment of demand response potential across the different subsectors, see more in the following point.

- ENTSO-E is intending to treat explicit and implicit DR in the same way, despite the fact that the first affects the supply curve and the latter the demand curve (see article 4, paragraph 3.c.). This is illogical based on the very definition of the types of DR. Implicit demand response is related to the savings that consumers can make on their bills by shifting their consumption from hours of high retail prices to hours of lower rates. On the other hand, explicit demand response is shifting demand in response to prices in the wholesale or other market, from which the consumer profits. This therefore follows different logic.

  Realised implicit demand response is already captured by historical profiles. As the roll-out of smart meters, smart technology and dynamic pricing becomes more widespread, however, we expect implicit demand response to grow significantly in the future. To assess the effects of implicit demand response, ENTSO-E and national TSOs can examine real-life experience from countries with an established, competitive retail market and the presence of time-varying retail prices, such as Scandinavia, the Netherlands and Great Britain. This could, for example, include an indirect assessment of implicit demand response, based on realised demand against expected demand, and/or an assessment based on data from consumers that have signed up for dynamic pricing contracts and would presumably involve working with suppliers and national regulatory authorities. It would be useful for ENTSO-E to develop a methodology for estimating the effects of implicit demand response in the context of the ERAA methodology.

  In terms of explicit demand response, the potential should be assessed per subsector,

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taking into consideration the opportunity costs for different processes and uses to assess the activation prices of DR, among other factors. For assessing the potential per subsector, we recommend that ENTSO-E and TSOs engage with different users, such as industrial, commercial consumers, and aggregators, to better understand the potential for explicit demand response. Moreover, ENTSO-E should utilise any available resources on demand resource potential by the European Commission, academia and industry associations, among others. The ERAA should contain a methodology about how ENTSO-E is planning to assess explicit demand response (e.g., the available potential, activation prices, activation duration, and other measures).

The significant potential for both implicit and explicit demand response, and the relatively low levels of demand response realised so far across Europe — for example, in comparison with the US and elsewhere — warrants ENTSO-E's particular attention in the coming years. Constantly exploring and improving the methodology will benefit all Member States. This approach is also well aligned with the recently agreed CE4All package, the main objective of which was to create conditions for consumers to play an active part in the power market.

- According to Article 4, par 3.c on demand-side resources (DSRs): "Explicit and implicit DSR shall be considered in the assessment if such technology is considered *as available, mature and competitive* within the concerned period of the assessment." The proposed methodology goes on to clarify that: "for the avoidance of doubt, *'mature and competitive'* refers to the existence of robust data upon the data collection process which allows to define: i) the potential for DSR, ii) one or several DSR price and volume bands, iii) any technical or economical activation and duration constraints for each of the bands defined (e.g., energy constraints)." In the spirit of the points made above, it would be entirely inconsistent with the CE4All package for ENTSO-E and TSOs to only consider DR where relevant technologies are already deployed. DR is both mature and competitive, having been utilised in several jurisdictions in Europe and across the globe often for several decades. This is indisputable. The ERAA methodology would be incomplete, therefore, without clearly requiring inclusion of implicit and explicit DR.
- The process for assessing the profiles of electric vehicles and heat pumps requires more detail in the ERAA methodology. Despite the imminent increase in these demand-side resources, the current provisions are inadequate for the purposes of this document.

Regional sizing of reserves: the proposed methodology stipulates that the sizing of reserves will be performed by each TSO at the load-frequency block level. The proposed methodology appears to suggest that TSOs will assess the size of reserves at the national or subnational level. Yet, the methodology doesn't define the term "load-frequency block," which is necessary to interpret ENTSO-E's proposal. More importantly, it is unclear from the proposed methodology whether the sizing of the reserves will be performed at the regional level, as agreed in the recently approved CE4All package. According to Article 37 on the *Tasks of regional coordination centres (RCC)*, each *regional coordination centre shall carry out the*

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task of *regional sizing of reserve capacity* (among others). The RCCs will provide these assessments as recommendations to the TSOs. It therefore appears that the proposed methodology by ENTSO-E is inconsistent with the CE4All package. Sizing reserves by regions will mean that a lower level of reserves is required across a region, since greater diversity in supply and demand means that the same reserves can be used to meet system security needs in different areas of the region.

In order to address the apparent inconsistency, we recommend that ENTSO-E work closely with the RCCs to develop a fit-for-purpose methodology for considering the regional sizing of reserves in the ERAA. In the interim, and in the absence of any concrete information, we suggest that ENTSO-E and the TSOs consider the regional sizing of reserves through the use of sensitivities, i.e. by running the same scenarios where only the assumptions around the reserve requirements change (lower requirements than in the central scenario/scenarios). ENTSO-E could use evidence from areas that have recently moved to similar arrangements to define the level of "reserve savings" through the application of regional sizing. For example, in Germany, the amount of balancing reserves has decreased by around 20% since 2008, following the decision to shift from subregional sizing (for each TSO-area separately) to national sizing of reserves, despite the increasing amounts of variable renewables in the power system. (Source: Bundesnetzagentur für Elektrizität, Gas, Telekommunikation, Post und Eisenbahnen, Bundeskartellamt, Monitoring Report 2018, 2019; WindEurope, Integrating wind into the energy system, Infographic, 2018).

Forced outages of supply: According to Article 4 of the draft methodology, "forced outages of supply shall be considered in a probabilistic manner. Assumptions on outage rates per technology type and mean time to repair shall build on historical outage events in Europe." ENTSO-E is considering forced outages as stochastic parameters.

While it is true that the rate of forced or unplanned outages has a stochastic component, there is ample evidence from international markets that plant operators can and do affect the rate of outages in response to market conditions and market design. A tighter supply situation, accompanied with an enhanced market design as envisaged in the CE4All package, should send stronger signals to market participants to adopt the maintenance and operational measures needed during such periods. By exploiting these tighter situations, e.g., scarcity periods, market participants can boost their profitability. Historical data on average annual availability from the past decade in Europe has largely been accumulated under conditions of significant surplus supply or in markets in which much of the marginal cost of responding to scarcity conditions is socialized rather than reflected in real-time energy market prices, or both. These data have little or no relevance for assessing the expected availability of resources under conditions when the need for new investment is imminent, in markets where generators' profitability is highly reliant on their ability to operate during periods when market conditions are projected to be tight. Such data are available from several markets outside of Europe and must be leveraged to ensure valid inputs.

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We believe that the proposed methodology will underestimate the amount of capacity available to meet peak demand, or otherwise overestimate the security of supply risks, as these will be based on irrelevant historical information. The purpose of the RAA is to identify expected adequacy concerns and should therefore reflect the best information about resource performance under tight market conditions. Average annual availability data, especially under surplus supply conditions, can give a false picture of the resources available to meet peak demand. At the same time, the wholesale market design is to be updated by, for example, removing regulatory and other distortions (e.g., price caps), thus sending more accurate pricing signals to market participants. These changes can be expected to lead to higher availability of resources to meet peak demand. The new market design ensures that all market participants have a greater incentive to be available in the market when it matters the most and will adapt their maintenance and operational practices accordingly.

For example, Potomac Economics, the independent market monitor for the Electric Reliability Council of Texas (ERCOT), a market that resembles closely the agreement under the CE4All, shows that forced outages were only 2% in the months of July and August 2018, when the highest demand in the market typically occurs. This was during a year when ERCOT expected to experience a tight summer. It also indicates that generators likely took longer planned outages during the shoulder months in order to ensure greater availability during the peak season. This is also in line with the expected response to improved market economics (Potomac Economics. 2019. *2018 State of the market report for the ERCOT electricity markets*. Fairfax, VA: Author).

In order to address this issue, it would be more logical for ENTSO-E and TSOs to estimate the forced outages based on the availability of resources during peak demand periods with tight situations (e.g., a margin of less than 5%, or a value similar to the Agency for the Cooperation of Energy Regulator's (ACER) definition of scarcity periods), from European and international markets that resemble the market design of the future. For example, it would be reasonable to consider the case of Belgium in the past few winters or ERCOT in the last couple of summers, but not Poland in summer 2016, as the market was subject to significant regulatory distortions, such as the imposition of tight price caps.

10. Do you have any remarks on the economic viability assessment and the associated scenarios (Articles 3 & 6)? Please provide your remarks on the economic viability assessment.

We identified that the assessment only considers revenues from the energy market and not from any other streams available in the power sector. This approach will lead to an underestimation of the economically viable resources in the market. It effectively ignores the existence of any ancillary services markets, for example, whereby resources would commonly receive an availability and utilisation payment. As an example, National Grid introduced the Enhanced Frequency Response service in recent years. In 2016, National Grid procured 200MW for this service, fully provided by storage facilities. Under ENTSO-E's proposed methodology, this kind of development would not have likely been economically viable, as an important revenue stream would not have been available to them.

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In order to address this omission in ENTSO-E's currently proposed methodology, we believe there are two options: i) either explicitly model all these different markets and revenue streams, or ii) exogenously assume that certain resources will be available independent of the economic viability assessment. The former approach requires more work and could be more difficult to integrate into the modelling. There are also uncertainties in relation to the bidding strategies and therefore revenues of different resources. The latter approach is a much simpler methodology to implement, as these assumptions can be decided by national TSOs. At the same time, however, it has the disadvantage of being dependent on subjective views, which could lead to inconsistent approaches or assumptions across different TSOs, or simply inaccurate projections. To mitigate this risk, one could envisage a working group to develop a consistent methodology for determining these types of assumptions and establish an external review of them. We believe it would be sensible to start with the second approach and explore the first one. Given that the economic viability assessment is still a work in progress, we suggest that ENTSO-E explores the possibility of adding this feature in the modelling. It is critical for ENTSO-E and TSOs to consider revenues beyond the energy-only market in the assessment, and to also explain how they are planning to take this into account and why.

11. Would you have any comments on the adequacy assessment process and the different stakeholder interactions (Articles 7 and 8)?

Under this question, we provide comments for articles 7-9.

It would be important for Article 7 to expand on the contents of the report to be produced by ENTSO-E and national TSOs. Preferably, ENTSO-E would consult on the contents of the report with the public to identify what would be most useful for its audience. It will also be important that ENTSO-E publishes all the assumptions that are used in the assessment, to the greatest possible level of granularity.

Paragraph 2 of article 7 is unclear: Does this refer to simultaneous scarcity events between neighboring bidding zones? What is ENTSO-E considering as "the source of the adequacy concerns" for this analysis? What does source refer to? Is this, for example, the reasons that lead to a scarcity event? Scarcity events tend to occur because of a combination of factors, e.g., a combination of cold weather resulting in high demand, plant failures and low wind. How is ENTSO-E planning to assess the causality of each potential factor that affects security of supply? The methodology should contain an explanation of what this paragraph is planning to achieve and how.

In relation to article 8 of the assessment, we note the following: First, we recognise the intention of ENTSO-E to consult widely with stakeholders in the preparation and production of the assessment and agree that broad engagement will bring benefits to the quality of the assessment. In addition to this, we believe that proactive and ongoing engagement with stakeholders will be essential. This is of particular importance in the first few years of developing the methodology and undertaking the assessment, as it can be reasonably expected that there will be a steep learning curve for ENTSO-E and the involved stakeholders.

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In this regard, we believe that the creation of working groups, consisting of experts and interested organisations, would be beneficial for enhancing the methodology and assessment. ENTSO-E could create working groups, for example, to address some of the key elements of the assessment: e.g. i) demand, ii) supply, and iii) network. (This list is neither meant to be exhaustive nor to represent the only possible configuration. There could be working groups on the assumptions and, separately, on the report itself and how to make sure this meets stakeholders' needs). The groups could meet at regular intervals and deal with key questions and methodological aspects of the assessment in an open, transparent and constructive way. Such an approach would help to promote an ongoing dialogue between ENTSO-E and stakeholders, debate ideas and feed useful inputs into the assessment. The current proposal for annual consultations cannot guarantee the same level of engagement. While we appreciate this would require additional resources from ENTSO-E, national TSOs and other relevant parties (e.g. ACER), we believe that the benefits of such an approach far outweigh its costs.

In relation to the process (article 9), we believe it is imperative that ENTSO-E, in collaboration with ACER, set up an independent review of the input data and assumptions used in the assessment. The proposed methodology suggests that some of the assumptions and input data are decided at an EU level by ENTSO-E, while the bulk of the input data is determined at the national level. According to the methodology, ENTSO-E will perform quality checks of the data submitted by national TSOs. The scope of the proposed checks, however, is not clear. For example, are these meant to be high-level quality checks to make sure that TSOs have submitted the data in the requested units or is this meant to be a check of the extent to which the assumptions by national TSOs are reasonable? In addition to any checks to be performed by ENTSO-E, it is also important to have an independent, expert organisation review the input assumptions by national TSOs and assess them for their quality and consistency across the geographical coverage of the assessment.

The most recent data from national TSOs reveals, for instance, abnormally low availability of generation under scarcity conditions, extensive differences in forecasts of demand response potential and, on average, much lower potential than has been exhibited in comparable markets exercising best practices. There is no obvious reason why this should be the case, nor have any compelling reasons been offered. The review should identify any inconsistencies and areas for further improvement in the quality of data and assumptions. The independent auditor should produce a report, to be made publicly available, based on its analysis, including recommendations for improvement. The scope of the independent review should be agreed in collaboration with ACER that is responsible for approving or amending the overall methodology.

The ERAA report should also pursue continuous improvement. This would include a review of past assessments against realised outturns, in order to evaluate the performance of the assessments and identify areas of strong performance and need for improvement. For example, the 2023 assessment could include an assessment of past performance with regard to 2021-2022. It would be best performed on the main outputs of the assessment, i.e., the risk indicators, but should also include a series of assumptions, such as peak/annual demand projections, generator availability, supply assumptions and interconnector contributions during scarcity events.

To ensure a meaningful comparison, the revised loss of load expectation (LOLE) and energy not supplied (ENS) calculations should be estimated with regard to reference, average type weather conditions; stand-alone assessments against extreme weather conditions, without regard to the statistical probability of such events, are inappropriate, since base calculations are meant to incorporate such conditions and their historical probabilities, in estimating the annual average probability of loss-of-load events. This leads to "false positives" for resource adequacy concerns relative to the value of lost load that underpins the LoLE and ENS targets in the first instance. They should also assume perfect foresight with regard to the realised assumptions (i.e., what would have been the LOLE/ENS, given the realised weather-corrected, peak demand outturn). We suggest that ENTSO-E and national TSOs develop a series of metrics in order to assess past performance and consult on them with the public. The annual report should include a chapter containing the results of this analysis, and explanations by ENTSO-E, especially for the elements that the assessment didn't perform satisfactorily.

12. Do you have any further comments on the methodology that you would like to share? Please provide additional comments, if applicable.

ENTSO-E asserts in the proposed methodology that (article 10, paragraph 3): "This ERAA methodology provides the key principles and requirements to be considered as a basis to perform the European assessment. However, different requirements may be gradually deployed in each subsequent annual ERAA based on latest capabilities and improvements with respect to technical, data and computational capabilities and resources to ensure a state-of-the-art approach is followed." In response to this paragraph, we would like to offer a few comments.

- At first, the methodology shouldn't be about key principles and requirements, but about the detailed methodology itself that will be applied for assessing the risks to security of supply across the European Union. This is the expectation from stakeholders; the key principles have already been set in the European legislation.
- The methodology recognises that different requirements have not yet been set out in the current methodology, but fails to provide any timeline for doing so. In addition, it suggests that some requirements might not be addressed at all, which would appear inconsistent with the agreed legislation. To remedy this gap, we recommend ENTSO-E clarify in its methodology which requirements have not been addressed and then develop a clear timeline, with milestones, demonstrating when it is planning to develop and deploy the different elements. Given the current status of the assessment, we believe that a three-year timeframe is a reasonable target for ENTSO-E and TSOs to establish a robust adequacy assessment and address the flaws of the proposed methodology we have highlighted in the current document. ENTSO-E's submission to ACER should include this information.

  This approach would suggest that ENTSO-E report on the progress against this timeline in its annual report, for example in an annex. This should contain information about, but not be limited to, the current status of different elements and methodology improvements

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that are in progress, any tests undertaken, results and issues identified, and any updates to the timeline if required. The methodological document should be updated on an annual basis accordingly to reflect methodological improvements. We also recommend that ENTSO-E consult annually with stakeholders about the methodology for the assessment and continue with this practice until at least the methodology can be considered robust enough.

- We agree with ENTSO-E's intention to use the latest capabilities and improvements to ensure that a state-of-the-art approach is followed.

Historical climate data: According to the methodology, ENTSO-E and TSOs will use different climate data-years through the ENTSO-E Pan-European Climate Data set (PECD). The methodology doesn't contain any information about the contents of this dataset in terms of the years covered in it. Our understanding is that the PECD dataset contains data for the past 35 years (e.g., at present for the period 1984-2019). The methodology goes on to state that: "Climate years, including years considering realistic but extreme weather conditions and the effect of climate change, are first selected one-by-one." What the methodology fails to address is what is considered realistic. For example, can it be considered realistic to expect that the conditions for the year 1985 could be replicated in the future in terms of climate parameters, given the presence of climate change? Is the probability of the year 1985 reoccurring the same as that of the year 2017 reoccurring in the next ten years? These are very important questions that ENTSO-E's methodology needs to address.

Currently, the Mid-tern Adequacy Forecast assessment and proposed methodology assume that every historical climate year could happen again in the future with the same level of probability, i.e., 1985 is as likely to happen as 2017. However, it is well recognised that our climate is changing rapidly and, for example, the past five years have been the hottest in the history of climate records (see, for example, National Oceanic and Atmospheric Administration (NOAA), 2018 was 4th hottest year on record for the globe; National Aeronautics and Space Administration (NASA) and NOAA, NASA, NOAA Analyses Reveal 2019 Second Warmest Year on Record). Similarly, climate change is affecting precipitation patterns across Europe. This raises questions about the credibility of such an assumption. One of the key drivers of shortages in the modelling and in reality is extremely high demand, which is also driven by the climate (see, for example, recent analysis on Belgium; Belgian Commission for Electricity and Gas Regulation (CREG), Reaction to the consultation organised by DG Energy (European Commission) on Belgium's market reform plan, 2020). Therefore, it is essential that ENTSO-E investigates these aspects and the credibility of its assumptions in relation to the climate years considered in the assessment. This would require the involvement of climate scientists who could shed more light on these critical aspects of the assessment.

Article 10 states that: "c) deploy the flow-based market modelling approach where applicable

(e.g. where real time flow-based market coupling is implemented)". From this article, it is unclear what applicable means. We believe that the modelling of flow-based market coupling (FBMC) should be taken into consideration in the assessment, where a decision has been made, in addition to where it's already implemented. If, for example, a Member State decides in 2022 to participate in the FBMC starting from 2024, the 2022 assessment should already consider that the relevant country implements FBMC from 2024 onward in the assessment. In any case the assessment should respect the recent agreement in the CE4All regarding the availability of interconnectors to the market (e.g. Article 16 of the Electricity Regulation on the General principles of capacity allocation and congestion management, and others as relevant).

Impact of policies on DG deployment and use: It is also important for the assessment to take into consideration the impacts of future policies in the deployment of distributed generation. For example, policies that link the remuneration of distributed generation to wholesale prices would presumably lead to different utilisation of the energy produced by these resources. Prosumers could increase self-consumption at times of lower wholesale prices and potentially increase injections to the grid when wholesale prices are higher. This is a question that will become increasingly relevant from the medium term, and as more and more countries are moving away from net metering and feed-in tariff types of policies to market-oriented policies.

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