Policy Brief

Transitioning from Long-term Physical Contracts to Short-term Markets

26 September 2023

Danish Energy Agency

Green Strategic Partnership India-Denmark

ENERGINET

Contributing Experts:

Markus Benjamin Janitzek, Special advisor**,** Danish Energy Agency
Khem Raj Gautam, Sector expert, Danish Energy Agency
Caroline Sejr Damgaard, Special advisor, Danish Energy Agency
Andreas Sejr Andersen, Advisor, Danish Energy Agency
Ravi Chandra Kadam, Senior advisor, CERC
Pardeep Jindal, Chief Engineer, CEA
S.S Brapanda, Director - Market Operation, Grid-India
Samir Chandra Saxena, Executive Director – Grid-India
K.V.N Pawan Kumar, Chief Manager, Grid-India
Jim Vilsson, Senior Economist, Energinet
Morten Pindstrup, International Chief Engineer, Energinet

Acknowledgements

This policy brief is a product of the India-Denmark Energy Partnership (INDEP) cooperation. The publication summarises the discussion points and learnings from the INDEP – Joint market working sessions with staff from Central Electricity Authority (CEA), Central Electricity Regulatory Commission (CERC), Grid Controller India, Danish Energy Agency, and Energinet. The learnings and takeaways presented here are not necessarily the views of the respective organisation.

Introduction

This policy brief is based on knowledge sharing exercises in the INDEP cooperation on electricity markets and focuses on possible lessons learned from the Danish and European experience in the transitioning from long-term contracts to short-term markets that may be relevant to India's transition.

In Europe, establishment of short-term markets occurred as part of the liberalisation of the electricity market, in a step-by-step process over the past 20 years. One of the key challenges in the early stages of this process was the move from long-term bilateral contracts from before liberalisation, to a system based on participation in markets. Similar challenges exist in India, where the prevalence of long-term physical contracts can pose challenges for development of effective and liquid short-term markets.

This policy brief addresses four key considerations regarding the transitioning from long-term physical contracts for electricity generation to short-term markets:

- Prerequisites for transitioning to short-term markets;
- Ensuring effective markets;
- Implementation of financial derivatives and their effect on and interaction with existing markets;
- Potential way forward in India

Key Takeaways

- Policy push is important to accelerate the transition to short-term markets, where the policies must set out a well-defined starting point, and a clear scope towards a targeted end state (target model).
- Transparency, market monitoring and surveillance regulation are essential for building trust in markets. Publicly available information enables market participants to understand the market setup, develop risk management strategies, undertake future planning and make informed investment decisions. Market monitoring and surveillance ensures good practice and adherence to rules and standards.
- Forward markets can provide opportunity for cost-efficient balancing and the same level of security and resource availability as the physical long-term contracts, providing steady cash flow for market participants, foundation for investment decisions, and ensuring long-term security of supply. Forward markets provide an alternative to long-term physical contracts, the design of the forward market products could consider resource adequacy as part of the contract.
- High fees may reduce the advantage of using a power exchange or financial exchange compared to long-term agreements. It is important to ensure that these fees are not diminishing the benefits of participating in the market, especially when establishing new platforms for trade.
- Transitioning from long-term contracts to short-term markets is a process, and will involve gradual developments with dynamic interaction between regulation and implementation. It also involves process of adapting regulations to reflect practical experience and to address unforeseen challenges.

Why short-term markets?

Short-term electricity markets provide a mechanism for electricity generators and consumers to buy and sell electricity near-real-time. Short-term electricity markets provide a means for grid operators and market participants to manage supply and demand imbalances. By allowing suppliers to quickly adjust their output based on changes in demand, these markets allow cost efficient balancing.

Short-term electricity markets also promote competition among generators. In a competitive market, generators must offer competitive prices to ensure they are dispatched, which ensures cheaper prices to consumers. Most importantly, short-term electricity markets help facilitate the integration of intermittent renewable energy sources into the grid by allowing renewable energy generators to sell their electricity when it is available, which improves efficiency of the system as a whole and can help to reduce curtailment and increase the overall amount of renewable energy on the grid.[1]

Prerequisites for transitioning to short-term markets

Institution building

Trust in the political process, fair and equal regulation (implemented by an independent, active and resourceful regulator), and trust in fair and transparent market-places are critical to creating an environment where actors, including potential investors, have the confidence to engage.

One important role for the regulator is that of consumer protection. In a free market there is a power disparity between individual customers on the demand side and the companies (sometimes large corporations) on the supply side. Thus, there is a need for effective supervision of the sector through regulation and establishment of relevant authorities.

Regulatory development

Regulation and political direction can have an important role in facilitating the transition to a market-based system in the energy sector. However, in most cases, this will happen gradually in parallel with the transformation of the system. The Danish experience demonstrates that it is not necessary to wait for large-scale comprehensive regulation to be in place before starting development towards a market system. The transition, in a Nordic context, was not achieved through one or few major changes but as a gradual process with dynamic interaction between regulation and implementation. Regulations were adapted several times to reflect practical experience and to address unforeseen challenges.

[1] Based on the EU experiences we assume that it is efficient for a lowest cost generation to move towards short-term markets, however, there are also other alternatives that are not necessarily included in this brief.

Figure 1 provides an overview of the Danish process and major milestones towards the European electricity market target model.

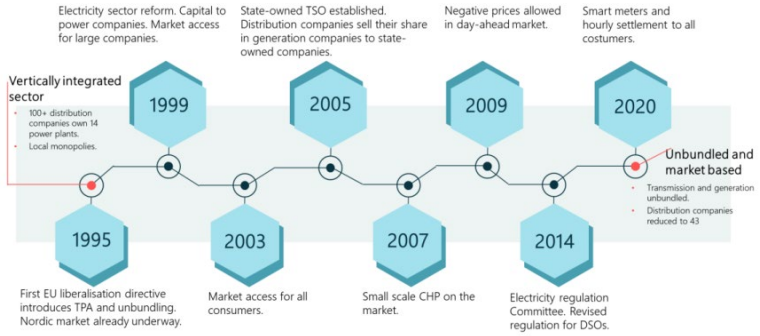

Figure 1 Danish steps in transitioning the electricity markets

Political direction for electricity market development

Policy interventions to increase participation in short-term markets must take into consideration the potential impact on existing generators relative to their situation in the existing markets. Arrangements like this should be based on a clear development path with a clear understanding of the starting point, desired end state (target model) and the process to get there, in order to guide the process and provide certainty for stakeholders about what to expect. In this way it is possible to manage a gradual process of implementation, introduce timely interventions to address barriers during the process of transition, and monitor when the implementation could be considered finalised (target model).

When the Day-Ahead market was established in Denmark in the early 2000s, many large generators and consumers were bound in long-term physical contracts. This meant that they had no incentives to participate in the emerging short-term market (Day-Ahead market), in addition to the new market conditions still being relatively unfamiliar to the generators. Low participation and low prices in the Day-Ahead market at the time reduced profitability for generators and increased their need for capital. Thus, a policy push was required to facilitate and support the transition.

A "transition subsidy" was introduced to allow large generators to keep the hedged position that the physical long-term contract offered, while at the same time taking an active role in the electricity market and acting on the price signals in the Day-Ahead market.[2]

The increased volumes in the Day-Ahead market together with use of financial contracts for hedging purposes, also increased the available volumes in the balancing time frame (near real time), which allowed for cost efficiency in the balancing time frame, decreasing the cost of balancing.

Today power plants in Denmark operate competitively because they are flexible and can maximise generation in hours with the highest prices as well as react quickly (ramp up/down) to price signals in the market.

[2] There are several ways of ensuring such a push, where the most important factor is to link the settlement of the long-term physical contract to the short-term markets

Ensuring effective short-term markets to facilitate the transitioning

Role of balance responsible parties

For smaller producers and consumers, the relative costs to participate in the markets can be high. To this end, the role of the balance responsible party (BRP) can be an effective tool to reduce costs and barriers to entry (Energinet, n.d.). The role is based on the free and equal access to the grid, and as a consequence of this, the balance responsible party has at least the financial and in some areas the physical responsibility to be balanced. This role essentially functions as an aggregator and benefits from economies of scale to reduce the costs of participation in the markets for small generators and consumers. In Europe the role of the BRP has been important, enabling small generators to establish a balance contract with an existing BRP.

Transparency

Market understanding and transparency are important to build trust in the markets. The transparency regulation (543/2013) in Europe establishes that information is published on a central and common data platform, which was implemented as the ENTSO-E's transparency platform (ENTSO-E, 2023). This platform contains all information on planned/ unplanned unavailability of 100 MW or more, Offer of cross zonal capacities, price information, forecasts of production and consumption: day, week, and year, statistics on actual production and consumption, information about balancing market and countertrading or re-dispatching measures.

Publicly available price information and reporting/monitoring makes it easier for market participants to conduct analyses for their own risk management strategies and future planning and investment decisions, based on the electricity price. The European power exchanges all have prices and volumes of the Day-Ahead market (and average of the intraday market) made publicly available after gate closure time. For operational reasons, prices on the Nordic balancing market are delayed with one hour to avoid changes in the production and consumption plans in the operational hour of the market.

Market monitoring and surveillance

Market monitoring and market surveillance is another significant aspect of building trust in the markets and ensuring efficiency. The Regulation (EU) 1227/2011 on Wholesale Energy Market Integrity and Transparency (REMIT) of 25 October 2011 was specifically designed to accommodate the operational complexity of physical energy markets and specificities of the energy sector (electricity and natural gas) and to complement the market abuse legislation covering the financial sector. REMIT applies therefore on wholesale energy markets and contains provisions against market manipulation and insider trading for wholesale energy products.

Power exchanges and financial exchanges have implemented market surveillance mechanisms in their organisations to secure that the markets are fair. This entails appropriate governance models, internal procedures and policies, and appropriate record keeping.

The Agency for the Cooperation of Energy Regulators (ACER) acts as an overarching regulating entity in Europe and is responsible for collecting all the data under REMIT. ACER analyses the markets continuously, and reports potential breaches to the responsible National Regulatory Authority (NRA) of the country where the BRP is registered. It is then the national authorities that are responsible for further investigations and prosecution nationally.

Market manipulation is typically assessed in a two-step approach; firstly, it is analysed if the market participant was able to influence the price or the interplay by its behaviour, and secondly if the

market participant has a legitimate technical, regulatory and/or economic justification for said behaviour.

Size of bidding zones

Bidding zones are used as a congestion management tool. The bidding zone borders in a market represent the structural congestion of the system. Thus, if a system is generally without structural congestion, splitting a market into more bidding zones is unnecessary. The larger the bidding zones, the more potential volume and liquidity in the electricity market. The Nordic area is divided into 12 bidding zones, whereas Germany only has one bidding zones with larger production and consumption. If the bidding zones are too large, it will likely not reflect the congestion in the system. Thereby the dispatching is unlikely to be possible to realise due to system security, which means extensive re-dispatching will be needed, which is inefficient due to a lower number of generators being available in the re-dispatching phase than in the dispatching phase. However, market coupling across power exchanges and transmission capacity between bidding zones allows liquidity to be shared between smaller and larger bidding zone.

Transaction costs

Transaction costs consist of the fees paid to the exchanges and the part of the fess payable by the exchanges to the regulator (ACER)[3]. Increased regulation or reporting requirements on exchanges executed trades can increase the transaction cost for market participants. Since the exchange is preferred from a regulatory transparency point of view it is important to find the balance between strict legal requirements and the benefit it gives the market. In EU, the use of bank guarantees as collateral was disallowed by the EU Commission for forward markets[4]. Such a change increased the direct cost for market participants, as more money was required upfront in order to conduct a trade, which also had an indirect cost, in the form of e.g., opportunity costs (as money is tied up in collaterals, it cannot be spent on business development, leading to opportunities missed). The direct cost of trading on the exchange (fee paid to the exchanges) can be decreased by allowing for competition among the exchanges in all markets. The indirect cost can only be decreased with the best possible market structure and optimal level of regulatory intervention.

It should be noted that high fees may reduce the advantage of using a power exchange or financial exchange compared to long-term agreements. Therefore, considering consequences to fee structure and competition therein between power exchanges when implementing policy changes is also important, in order to secure incentives for joining the short-term market is not diminished by high fees.

In addition to a financial exchange, decentralised over-the-counter (OTC) platforms play a significant role in forward market setup in Europe, especially in Germany. OTC offers flexibility to market participants with regards to the terms and conditions of the trade. Participants can negotiate customized contracts that suit their specific needs and risk profiles, which potentially could be a more cost-effective and efficient means of managing price risk compared to exchange-traded markets.

Financial settlement of contracts

The Day-Ahead market has been the backbone for dispatching power in Europe, and it is used as the reference price for all traded physical and financial contracts in the European electricity market. Other markets such as the intraday market, does not have the same pricing structure, as it is primarily used for balancing the portfolio deviation and not for dispatching. The intraday market uses the pay-as-bid pricing principle known from stock or currency markets. This in combination with

3 See Nordpool (2022) for an overview of fee structures at Nord Pool, one of the European Power Exchanges.

4 Bank guarantees are allowed for participation in Day-Ahead market as of now.

the fact that the intraday market in the past, prior the Single Intraday market coupling and the introduction of REMIT and TP regulation, has not been as strictly regulated in terms of transparency and publication of prices, where the ownership of prices is diffuse and kept confidential, which has made the intraday market less suited for being the reference price for financial products. This makes it difficult to find a consensus on a clear reference price within the intraday market, e.g., an average price or last clearing price etc.

Additionally, an important change when moving from long-term physical contracts to short-term markets is the change of cash flow for all involved parties. Generators will, in a market set up where the short-term market is used for dispatching, receive the primary source of income from the market and the power exchanges/ market operator[5]. Consumers, who are buying power from the market, will instead of paying a specific producer for the power, pay for the use of power to the power exchange. The function of the power exchanges operation in the specific country or region is therefore also clearing and settlement alongside the buying and selling of power. Since bilateral contacts are usually tied to large counterparty risks, such agreements come with a large collateral and credit cost. As the power exchange/market operator handles the payment stream in an anonymised manner from all parties in a market-based setup, the transaction cost for each individual market participant should in the long run be reduced compared to a bilateral contract. The role of the power exchange/market operator is therefore of social economic value since transaction cost are reduced. In addition, aspects of cash liquidity are to be considered, as settlement on the short-term market occurs close to instantly, the long-term contracts are settled on a monthly basis.

The role and importance of forward markets for short-term markets

A well-functioning forward market with a trustworthy and transparent underlying wholesale market is necessary to achieve the full benefits that can be provided by the short-term markets. Financial contracts provide more liquidity to short-term markets, and secure the lowest costs of generation, compared to physical contracts, which limit flexibility as generators are bound to their physical delivery via the agreed physical contracts.

Forward markets can offer market participants similar security as physical long-term contracts in terms of providing a stable cash flow, serving as a foundation for investment decisions, and ensuring long-term security of supply. These aspects are integral to managing risks throughout the life cycle of a power project. The forward market in the Nordics is the primary tool for market participants to manage their current and future price risks. In the Nordics, the volume traded in forward market is roughly twice the size of Day-Ahead market.

The forward market creates a foundation for a steady cash flow for both consumer and production units. Market participants with physical assets that are active in the forward market will buy and sell the hedging instruments available, both through the exchanges and OTC, to protect against future price changes.

Before physical projects are in place, almost all generation units secure long-term financial contracts in order to secure financing, by using the forward hedge as security towards the investors and banks. In the Nordics over the last decade the norm has become 10-15 years financial contracts (often in the form of financial power purchase agreements (PPAs)), in order to secure financing from the bank.

5 Although a power exchange and Nominated Electricity Market Operator (NEMO) have slightly different roles in EU, they can be used interchangeably in this text.

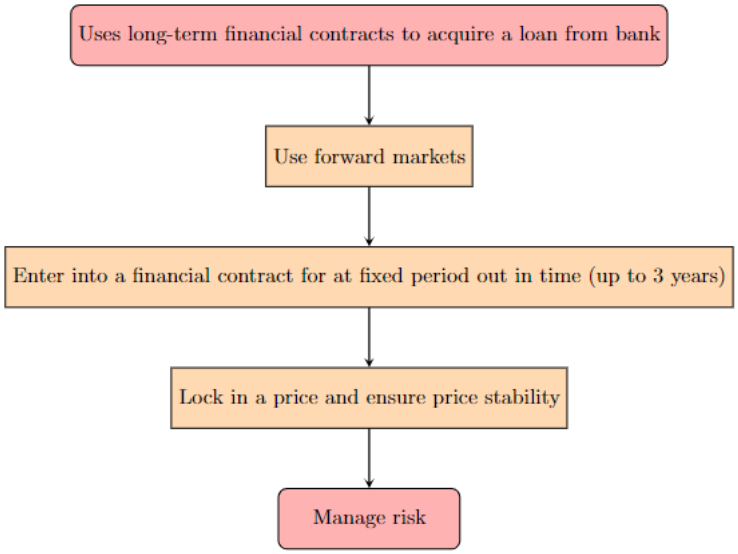

Figure 2: Flow chart of risk management typically used by generators and consumers

Suppliers use the long-term financial instruments (e.g. Financial PPAs and contracts for difference (CfD's)[6] to price contracts given to their consumers when contracts are signed. Forward markets are used to hedge the residual volumes[7] of these long-term financial contracts. Therefore, both demand and supply side market participants are active, which is a requirement for liquidity to exist. Generation units often outlive PPA periods, whereas forward markets offer the steady cash flow for these units.

When market participants have entered into long-term hedges, their existence in the market is secured for the duration of the contract. This creates certainty for the grid operator for long-term availability of both supply and consumption in the grid.

It is important to discuss and ascertain what the role and place of long-term physical contracts are in the overall electricity market setup. From a resource adequacy perspective, long-term physical contracts are a great tool to ensure adequacy. Yet, it can be argued (from experiences in Europe/Denmark) that with the right linkage from financial contracts[8] the same resource adequacy can be satisfied, while gaining the benefits of increased liquidity in short-term markets and increased cost-efficiency of generation.

---

[6] A CfD provides the seller and buyer a hedge at a particular agreed price for each of the hours during the contract period. A CfD contract has an agreed price and when the price in the Day-Ahead market is above the agreed price, the seller of the CfD contract is bound to send the price difference to the buyer of the CfD contract and vice versa

7 Residual volume is the volume for each market time unit that has not been covered by the PPA contract (or the excessive volume bought from the PPA) due to differences in production and consumption profiles. Residual volumes for a conventional power plant exist, for example, when the production plant trips or, for other reasons, they cannot deliver the agreed volumes.

8 If generators need the financial stability of a long-term contract, it is equally efficient for them to enter into a long-term financial contract with a reference price from a power exchange. Then the consumer buys power from the power exchange at the price given at any time, and the generator delivers power at the same price. Afterwards there is a financial settlement between the two parties where they settle according the long-term contract condition and the fixed price agreed in that contract. It will then vary if the consumer pays the generator a bit more, or if the generator is paying the consumer depending on if the price on the power exchange is above or below the agreed financial long-term contract price.

What could be a potential way forward in India

As highlighted above, establishing a clear target model and development path is important for the development of effective short-term markets. This section considers potential next steps in the Indian context, to inform further discussions.

There is already a strong foundation for transitioning to short-term markets in India, as the Indian energy sector has already been unbundled and wholesale electricity markets established. Moreover, India already has a robust regulatory framework, bidding zones that do not entail internal congestions, and competition on fees (as there are three power exchanges in India). Thus, some major steppingstones are already in place in order to improve the liquidity of the short-term markets.

Additionally, with the agreement on the roles and responsibilities between Securities and Exchange Board of India and CERC, an important foundation has been laid for the transition in India, providing regulatory clarity for forward markets, and the forward market is currently being developed. The clear definition and role of financial and electricity regulator is required for the financial settlement of the physical long-term contracts.

CERC has recently issued guidelines (CERC, 2022) specifying the provisions relating to the OTC platform and has allowed the registration of OTC platforms. This is also a right step forward to promoting financial transactions and provide market participants with more options for trading in the electricity sector

However, a current challenge remains around liquidity in short-term markets at a time when long-term physical contracts remain dominant, where based on discussions of the INDEP working group on electricity markets, and potential lessons learned from the Danish and European experiences, a policy push to incentivise companies to somehow participate in the short-term markets, could also be a relevant approach in India.

For a policy push towards the short-term markets there are many aspects that need to be carefully considered, such as change in cash flow, change in risk, operational procedures within the markets but also at the level of the system operators, e.g. IT infrastructure requirements.

A concrete suggestion for such policy push could be based on a proposal floated by the Ministry of Power for enlarging the scope of Security Constrained Economic Dispatch (SCED) to include more power plants and to run the National Merit Order Dispatch through SCED on a Day-Ahead basis for providing a look ahead schedule. The Day-Ahead SCED schedules would provide a look-ahead visibility to the power plants about their expected schedule over 96-time blocks, thereby enabling them to be better prepared to handle ramping up or down when required by schedules in the real-time. It is proposed to expand the scope of national level merit order scheduling under SCED by including all the regional entity's' thermal power plants, which can declare a compensation charge (like energy charge) on a periodic basis. Subsequently, intra-state thermal generators may also be included in SCED which would require improvements/changes at the State Load Despatch Centres and intra-state generator level. These changes will increase the availability of resource at short-term and thereby increase the liquidity in the short-term markets.

Different possibilities for the kind of policy push should be considered carefully taking into the account the time required for the policies to make an impact.

One could for example start with a policy that mandates generators close to end of their legacy contracts to participate in short-term markets. Another policy push can be to ensure that contracts

do not exceed 10-15 years (similar to the timeframe for financial PPA's in the Nordics), to avoid lock-in to legacy contracts for decades going forward and allowing flexibility in reacting to policy changes.

Lastly, as indicated in this policy brief, it is of outmost importance to establish a detailed, strong and thorough setup for market monitoring and surveillance, in order to strengthen the trust in the markets, ensure efficiency in operation and allow for well-functioning and robust markets.

Abbreviations

ACER	Agency for the Cooperation of Energy Regulators
NRA	National Regulatory Authority
BRP	Balance responsible party
DEA	Danish Energy Agency
INDEP	The India-Denmark Energy Partnership
CEA	Central Electricity Authority
CERC	Central Electricity Regulatory Commission
REMIT	Wholesale Energy Market Integrity and Transparency
ACER	The Agency for the Cooperation of Energy Regulators
OTC	Over-the-counter
PPA	Power purchase agreement
CfD	Contract for difference
SCED	Security Constrained Economic Dispatch

References

Central Electricity Regulatory Commission. (2022). *Guidelines for Registration and Filing Application for Establishing and Operating Over the Counter (OTC) Platform*. Retrieved from https://cercind.gov.in/regulations/173-Guidelines.pdf.

Energinet. (n.d.) *How to become a balance responsible party*. Retrieved from https://en.energinet.dk/electricity/new-player/how-to-become-a-balance-responsible-party/#:~:text=A%20Balance%20Responsible%20Party%20buys,this%20is%20not%20a%20requirement. Accessed 2023-06-20.

Entso-E. (2023). Entso-E Transparency Platform. Retrieved from https://transparency.entsoe.eu/. Accessed 2023-06-20.

Nord Pool. (2022). Fee Schedule 2022. Retrieved from https://www.nordpoolgroup.com/4ad9ce/globalassets/download-center/remit/fees-schedule-2022.pdf.