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Traditional market design principles and elements

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DNV



Webinar Series: Wholesale Electricity Market Design and Challenges in Developing Economies

May 23-26, 2022 | Online format

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- Rationale and Objectives for Market Reforms
- Market Design Characteristics
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Rationale and Objectives

Market reforms have been triggered by several reasons.

- Inefficiency of vertically integrated companies
- Lack of competition
- Lack of transparency in the operating environment
- Low quality of supply
- Existence of non-cost reflective electricity prices
- Inability to finance new investment programs (relevant for developing countries)

Objectives

The design features of the reformed markets followed closely the reform objectives.

Market Reform Objectives	Market Design Features
<ul style="list-style-type: none">• Improve overall transparency and efficiency• Implement competition where possible• Create a level playing field and attract private investments• Ensure proper allocation of risks• Decarbonisation of Industry	<ul style="list-style-type: none">• Separate monopoly from competitive services• Establish market model / trading mechanism• Establish effective regulatory framework• Address transition issue• Promotion / Integration of RES

Examples

There are numerous examples around the globe of countries that have restructured their electricity markets.



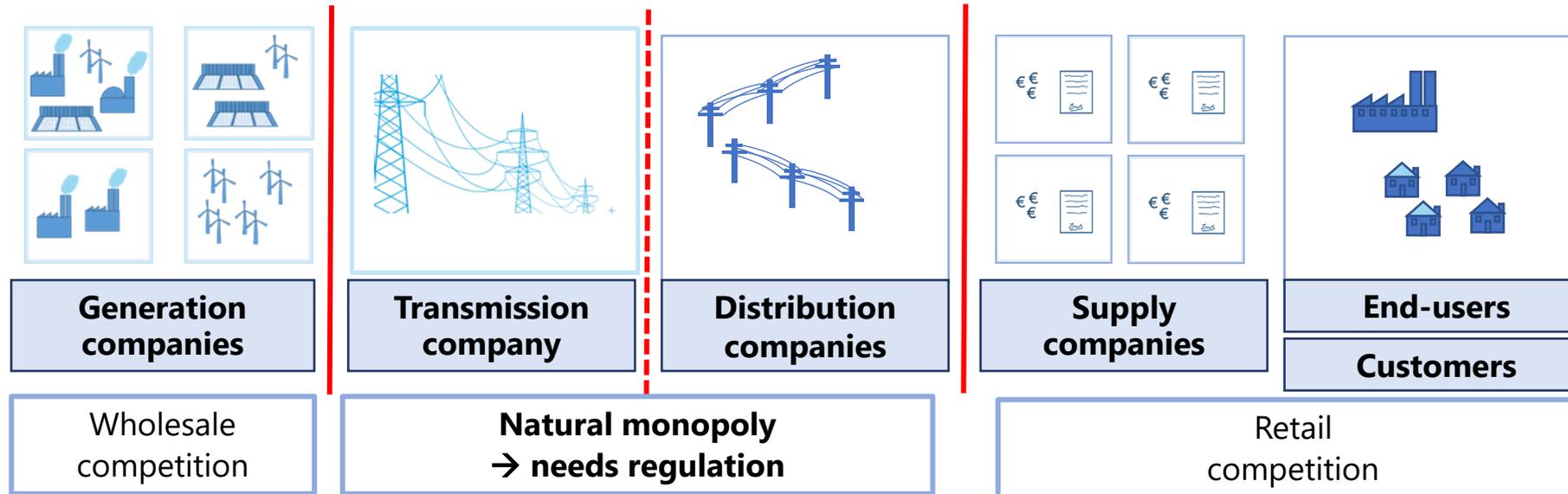
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Market Design Characteristics

Separation of Functions

Industry unbundling has been an essential prerequisite to establish transparency and non-discriminatory access arrangements.

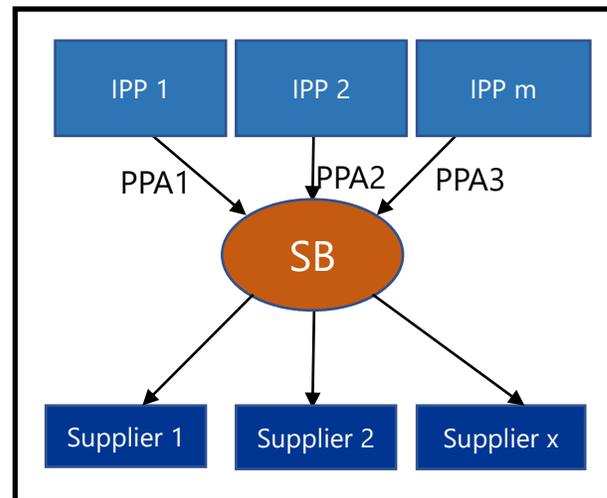


- Unbundling divides activities into two categories: the natural monopolies of electricity networks and the potentially contestable activities of production and supply.
- It aims to prevent unintended interactions between the regulated and contestable sectors in terms of cost and revenue allocation, as well as accessibility and sharing of information
- Depending on the market design generation and supply companies can compete with each other and new companies can enter market selling electricity on wholesale market.

Market Models

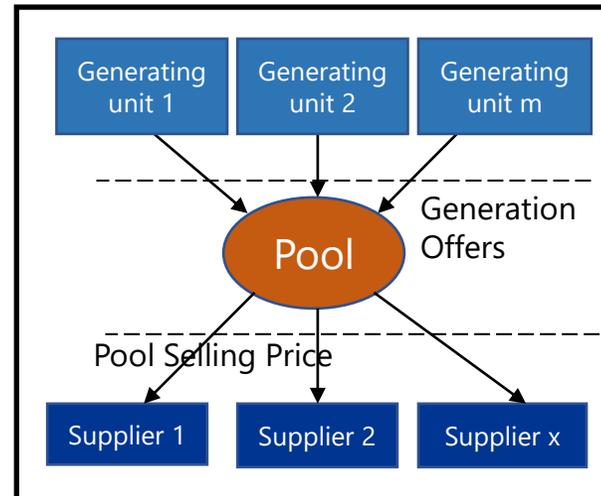
Depending on the policy objectives, local context and trading mechanism three types of market models have been implemented.

Single Buyer



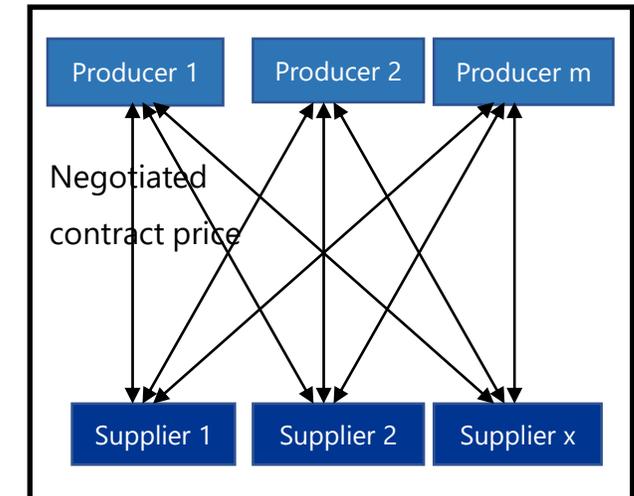
- Centralised scheduling
- Unit-based
- Merit order, marginal cost
- PPA's / take-or-pay provisions

Electricity Pool



- Centralised scheduling
- Unit-based
- Price-based or cost-based offers
- Unidirectional exchanges

Bilateral Market



- Decentralised scheduling
- Company-based
- Negotiated prices
- Bidirectional trade

Long-term PPAs have been signed in the environment of single buyer models characterised by limited elements of competition.

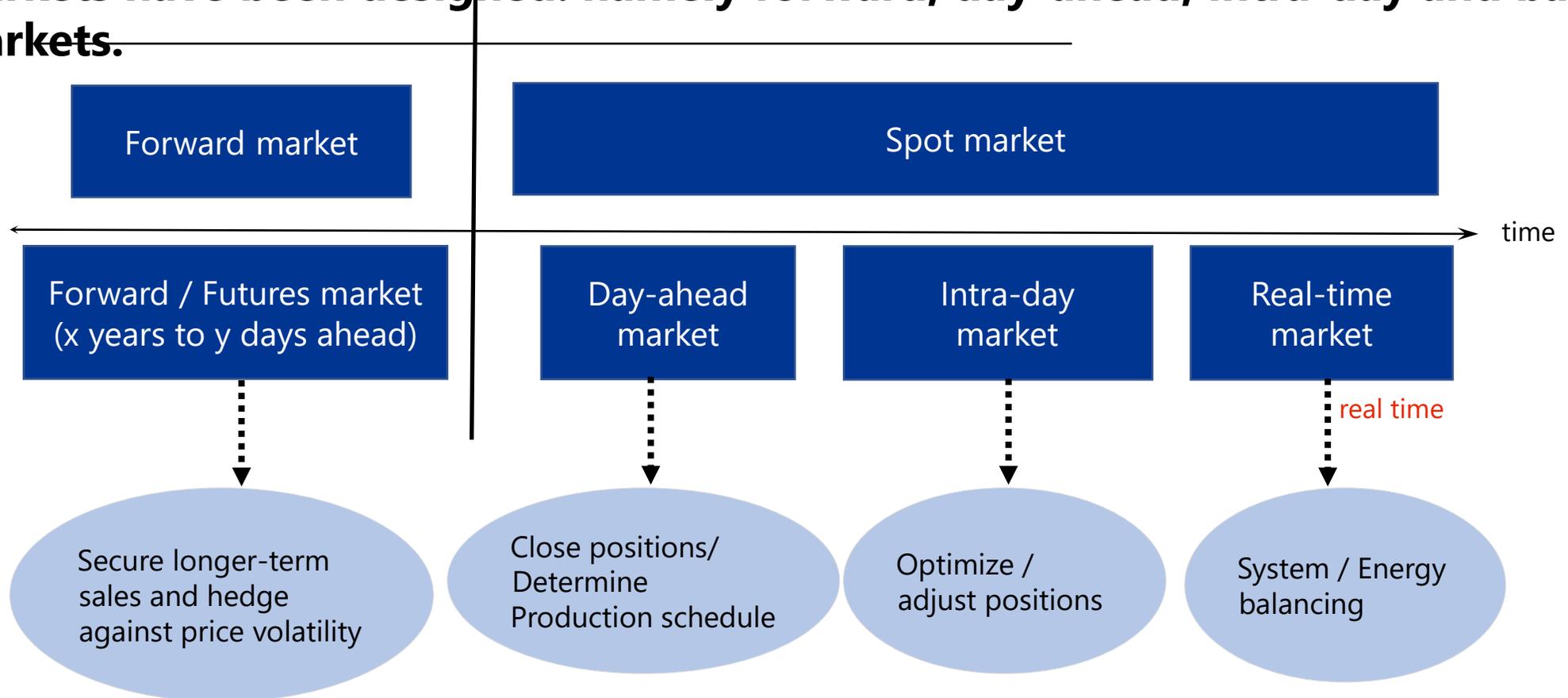
- Long-term PPAs have been signed in the environment of single buyer models. Under these models only new capacity development is exposed to competition, while the continued operation of the power plants follows the provision of power purchase agreements.
- The revenue that a generator receives under its contract is normally broken down into two main components: revenue from availability (capacity) charges and revenue from energy charges.
- The energy charge is intended to reimburse the generator for the costs associated with running the plant, i.e., fuel and variable operating and maintenance costs.
- The availability (capacity) charge is intended to recover the capital cost including a reasonable rate of return on the investments and the non-variable operating and maintenance costs.
- The contract terms of a PPA might appear expensive, especially when cheaper power on more flexible terms becomes available through competitive market arrangements. Stranded cost (above-market cost) may occur.
- Generators are protected from market risk by their long-term PPAs, they have little incentives to participate in a competitive market.

Role of Bilateral Contracts

- Importance of bilateral contracts
 - Essential instrument for hedging price of future production / demand against volatility of spot market
 - Alternative: Vertical integration
- Physical vs. financial products
 - Physical trading
 - Firm commitment to deliver or receive certain product (e.g. energy) at an agreed location, time and price (in a bilateral market!)
 - Financial trading
 - Agree on financial compensation to be made depending on price of underlying asset (e.g. electricity)
 - Related to forward trading

Market Models

As energy trading is conducted through different consecutive time periods, different markets have been designed: namely forward, day-ahead, intra-day and balancing markets.



Regulatory Framework



The increasing complexity of industry relationships and the need of transparent and non-discriminatory rules led to the establishment of explicit specialised regulation.

- Regulatory authorities have been established to deal with *inter alia*:
 - implementation of industry unbundling
 - implementation of non-discriminatory access arrangements
 - opening of the electricity market
 - setting tariffs for regulated services
- Together with policy makers and industry stakeholders, regulators developed the principles and the rules for the new competitive markets.
- The degree of regulatory independence in terms of election., decision making and funding has been different across the different countries

RES Integration

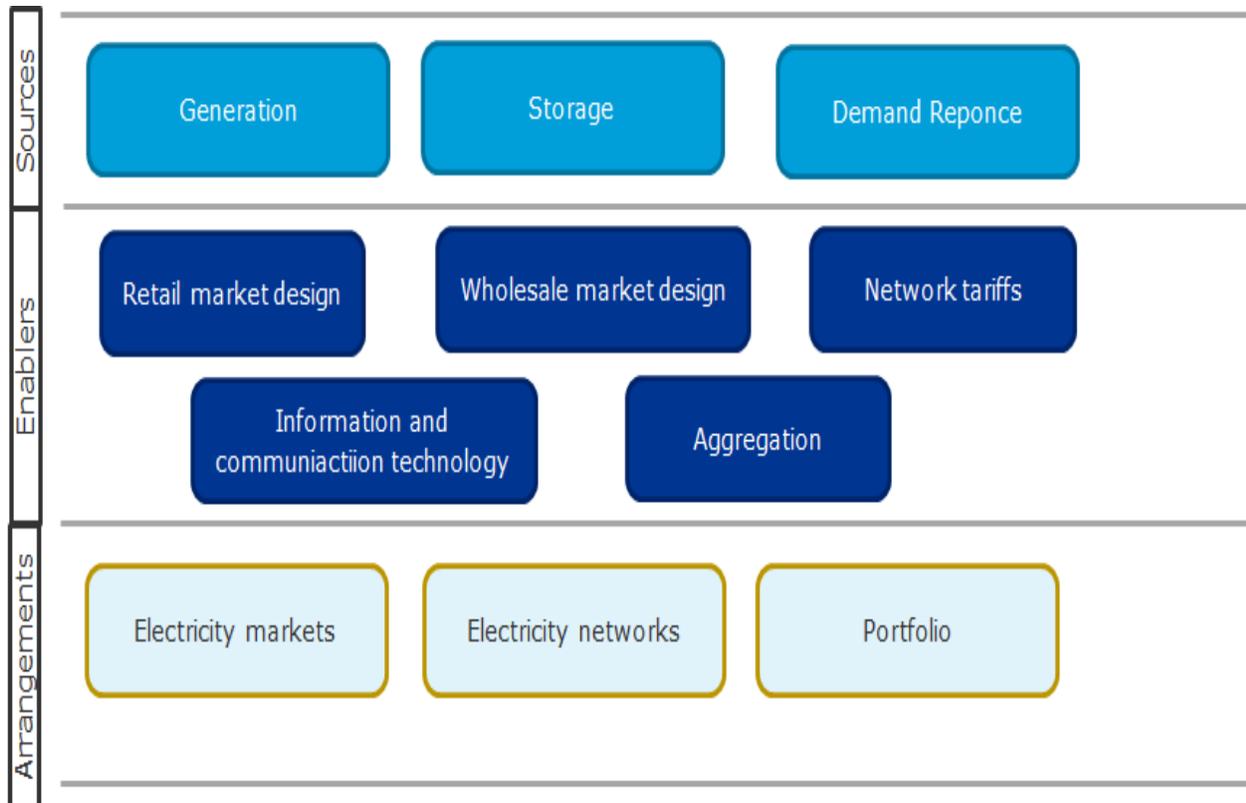
Market design has been further developed to facilitate the integration of electricity RES production.



- Policy actions and adaptation of market design has been essential to support the integration of RES
- The integration of RES has been supported by specific rules related to primary support schemes, market rules (forecasting, scheduling, purchase obligations, balancing) , the rules for connection and use of network.
- While at the beginning regulators applied mainly technology-specific feed-in tariffs and premium systems, in the last years we observe the application of organised auctions in several jurisdictions.

RES Integration

The existing challenges of RES integration suggested that new thinking on market design is required.



- There was a fundamental debate whether wholesale electricity markets dominated by RES producers with “zero marginal cost” can provide adequate long-run signals for capital investments and what is the role of supplementary capacity mechanisms in this context.
- Another aspect focuses on the development of more sophisticated flexibility/ancillary services markets to ensure the efficient matching of supply and demand in real time in systems with a large share of intermittent renewables.
- Such markets should also integrate demand response and storage technologies.

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Major Challenges

Major Challenges

In developed countries the challenges have been typically related to compatibility constraints and conflicting objectives among the energy policy / market design aspects.

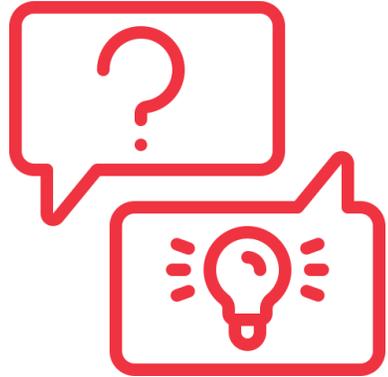
- In developed countries, the challenges have been typically related to the changes in the electricity industry arising from regional / national policy with respect to climate, competition and security of supply on the one hand, and from the economic and technical development on the other.
- The typical examples here are related to compatibility constraints and conflicting objectives among the energy policy / market design components like the promotion of renewable policy and non-discriminatory funding of above-market cost, the penetration of renewable technologies and competition on energy markets, decarbonisation objectives and maintaining the competitiveness of national economy, etc.

Major Challenges

In emerging countries the steering of the transition process has been a major challenge.

- Emerging countries have often been operating power sector where no open access and competitive arrangements exist, i.e. single buyer models or vertically integrated industries combined with external IPPs. Depending on the specific industry structure and the contractual framework, different market and regulatory arrangements have been applied.
- One of the major challenges in the countries that have opted to move to competitive markets has been the management of the transition process. Among these challenges are the implementation of unbundling, development of wholesale market design, coordination of market opening, integration of existing long-term power purchase agreements, establishment of access rules and explicit network regulation, system planning aspects etc.
- Further substantial challenges / conflicts have traditionally been observed in the tariff area. In several cases, the market reforms triggered the need to abolish subsidies / cross-subsidies and introduce cost reflective tariffs. The latter leads to substantial price increases for specific customer groups.

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**THANK YOU
FOR YOUR ATTENTION!**

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