



Regional Ancillary Service Market Mechanism for the Development of Renewable Energy in Northwest China

Power Sector Roundtable Report Series

July 2020

Roadmap for Building the Ancillary Service Market

Current Problems

Grid Operation

- The **curtailment rate for new energy** needs to be improved due to insufficient local demand and limited peak-regulation capacity.
- Changes are not in the interest of thermal power enterprises. As such, the mechanism for **coordinating the interests** of new and traditional energy sources needs to be improved.
- There is mismatch between grid construction and electricity development. **Source-grid planning** also needs to be coordinated.
- The power **market trading mechanism** is poorly developed. The ability to **allocate resources on a larger scale** has yet to be developed.

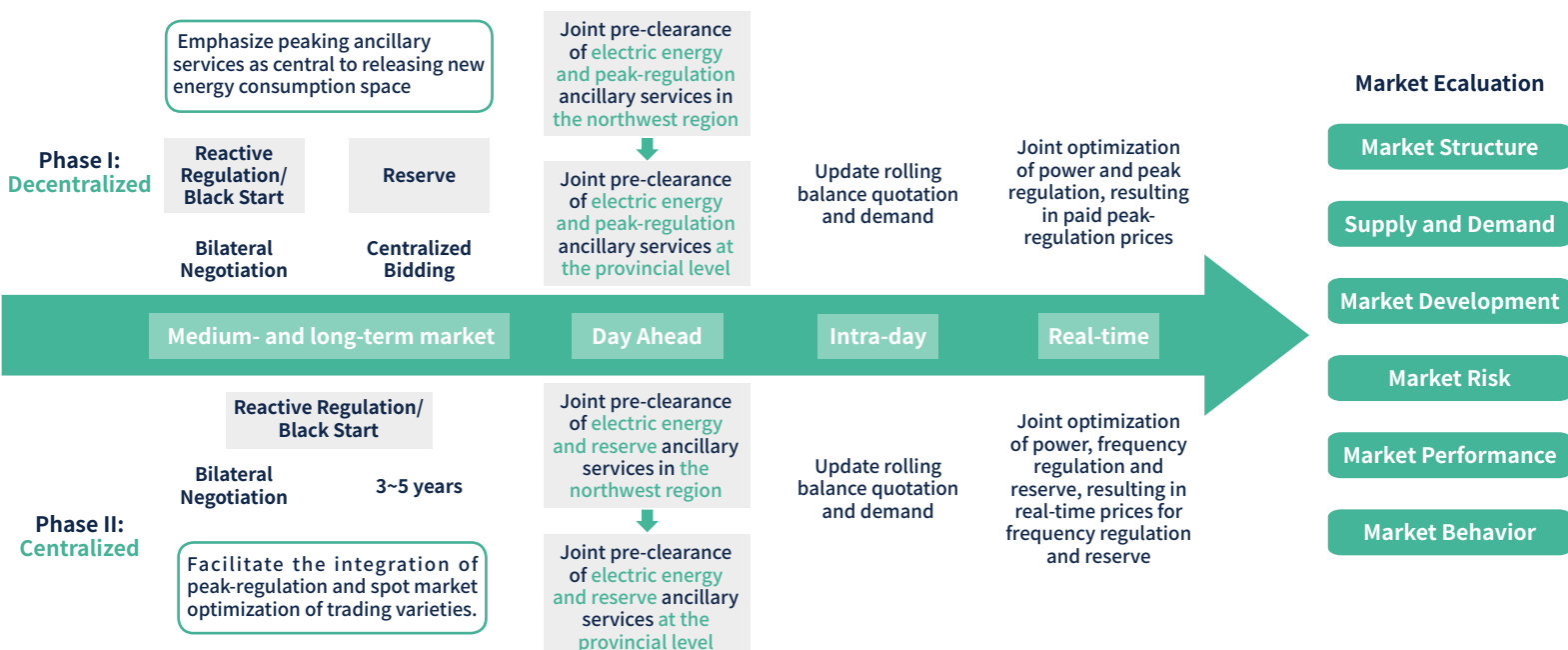
Ancillary Service Market

- The spatiotemporal distribution of new energy sources is imbalanced, and **regional peak-regulation capacity** should be further improved.
- Coordination of the interests of market players is insufficient, and the **peak-regulation capacity of thermal power units** needs to be further explored.
- There is a lack of market player diversity and the **market share** needs to be further expanded.
- The market system is imperfectly constructed, and **market dynamics** need to be further activated.

Policy Recommendations

- The ancillary service market should be adapted to the development of the electricity market **in phases**, following a "**region first, then province**" model;
- Customers position for participating in the ancillary service market should be clarified, while at the same time properly allocating the costs of ancillary services and transferring the costs of ancillary services from the generation side to the customer side **in an orderly manner**.
- Structure the northwestern regional ancillary service market under the unified national electricity market, **with good integration between regional and provincial levels and between the ancillary service market and the electricity energy market**.
- Improve the ancillary service market **evaluation system** to reflect the market operation results in a comprehensive and reasonable manner.

Construction Model for the Electricity Ancillary Service Market

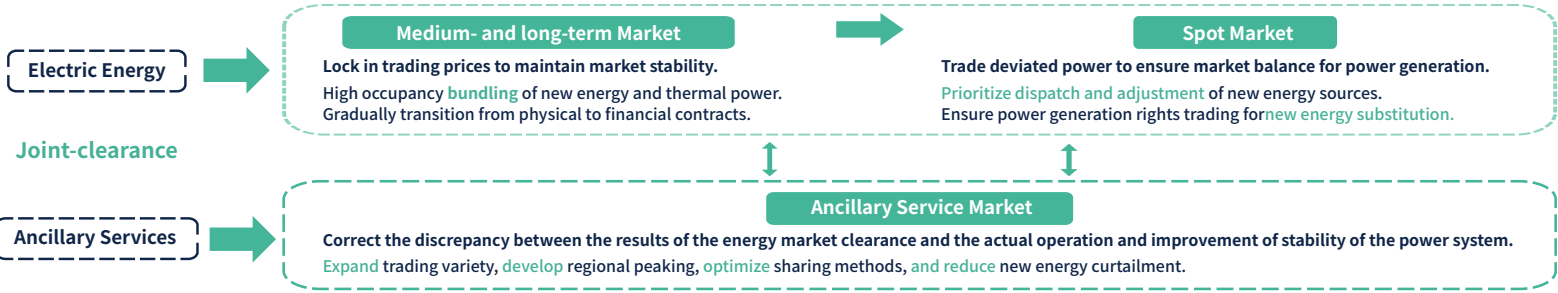


Design of Mechanisms of the Electricity Ancillary Service Market

Trading Varieties	Trading Mechanism		Cost-Sharing Mechanism for Ancillary Services
	Clearing Mechanism	Pricing Mechanism	
k-regulation Ancillary Services	Centralized bidding and unified marginal price clearing. Quote on the day prior, corrected within the day, and operated real time on the principle of "call on demand, call in sequence", prioritizing the calls of low-priced peak-regulation services.	Ladder pricing. Peak-regulation ancillary services are priced primarily on the basis of power consumption, with start-stop peak regulation priced according to the number of starts and stops.	Current Situation: Ancillary service costs are mainly shared on the generation side, with new energy plants bearing a larger share of ancillary service costs. Disadvantages: The obligation to provide ancillary services cannot be passed on to the user side, which is not conducive for improving the users' own load forecasting and for increasing the enthusiasm of market players to provide ancillary services. Recommendation: Establish an ancillary services cost sharing mechanism with the participation of electricity consumers. Pathway: Taking into account the immaturity of the customer side in the market's early stages, a larger proportion should be shouldered by power generating enterprises and the remaining burden can be passed to the customers. As the consciousness of market players matures, gradually increase the proportion shared by market customers.
Frequency Regulation and Reserve Ancillary Services	Phased construction. At the beginning of market development, reserve ancillary services will be procured through centralized bidding in the medium and long-term market; when the market matures, frequency regulation and reserves will be quoted one day in advance in the spot market, with joint marginal clearance with electric energy.	Frequency regulation ancillary services are priced according to capacity and electricity. The power and capacity quotes declared for reserve ancillary services form a unified market clearing marginal price based on the principle of comprehensive procurement cost minimization. The winning reserve unit receives a capacity payment, and if it is actually dispatched in the spot market, it receives a further energy payment.	
Paid Reactive Regulation and Black-start Ancillary Services	Transactions by means of medium- and long-term bilateral contracts.	Paid reactive regulation is priced according to the amount of power used, and black start is priced according to capacity and the number of times used.	

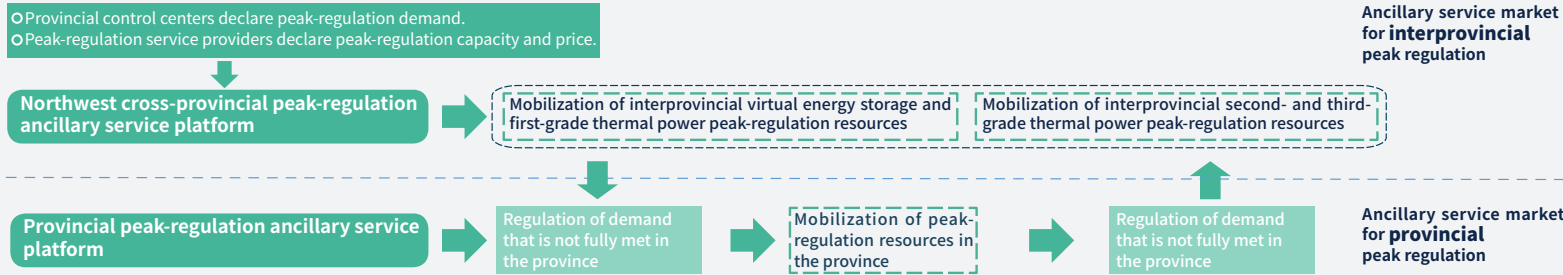
Integration of the Regional Ancillary Service Market with Other Markets

Integration of the Northwest Regional Ancillary Service Market with the Electricity Energy Market



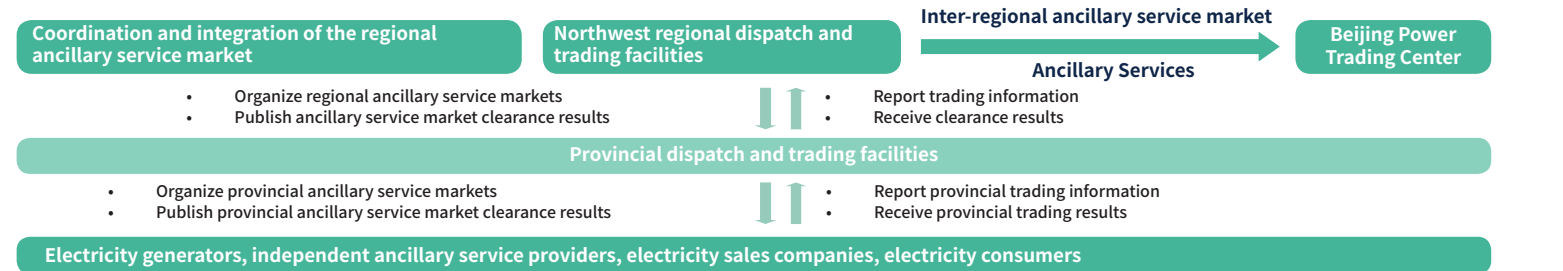
Integration of the Northwest Regional Ancillary Service Market with the Provincial Market:

"Region first, then province"



Integration of the regional market with the inter-regional markets:

Establishing a regional market structure with a three-tier model consisting of inter-regional, regional and provincial markets



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