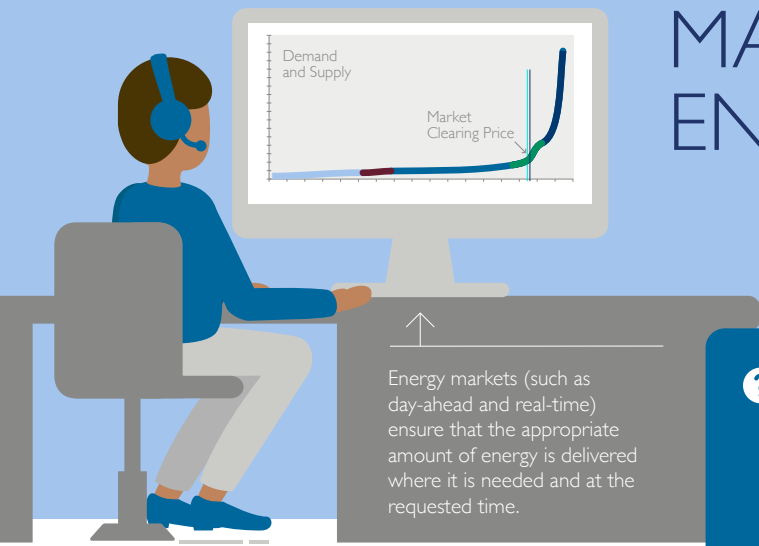
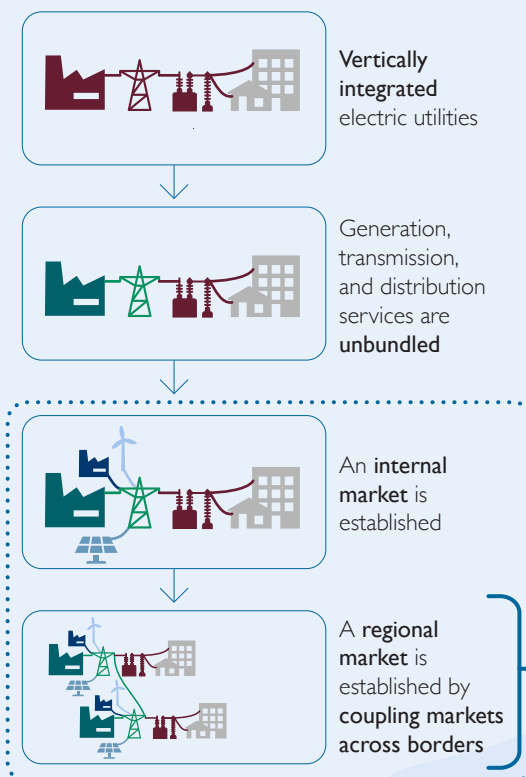


MARKETS PROMOTE ENERGY INDEPENDENCE BY INCREASING TRANSPARENCY AND INVESTMENT



EVOLUTION of the Electricity Sector



? What are wholesale energy markets?

Energy markets operate much like a stock exchange. A market operator will match the bids of all purchasers with the offers of all sellers periodically - over a platform that is open and transparent.

👍 Benefits of Markets:

- Ensure supply meets demand at least cost.
- Provide price transparency.
- Indicate price signals for new investments.
- Shift risk from public institutions/customers to private companies.

? What are REGIONAL wholesale energy markets? (known as market coupling)

Operators in different regions collaborate to establish a joint market. A common algorithm is used to maximize efficiency and minimize cost, and simultaneously match sellers' offers with purchasers' bids for the entire region or coupled market.

👍 Benefits of Regional Markets:

- **Competition:** as the number of market participants increase, innovation, efficiency, and investment in new technologies emerge.
- **Economies of scale:** as the region expands, the cost of energy production decreases.
- **Generation diversity:** as an energy market expands, the generation portfolio becomes more diverse and efficient.
- **Renewable integration:** a larger geographic market is able to accommodate more intermittent generation, such as wind and solar.
- **Lower market concentration:** as an energy market expands, the market shares of owners with large generation portfolios will decrease along with their market power.



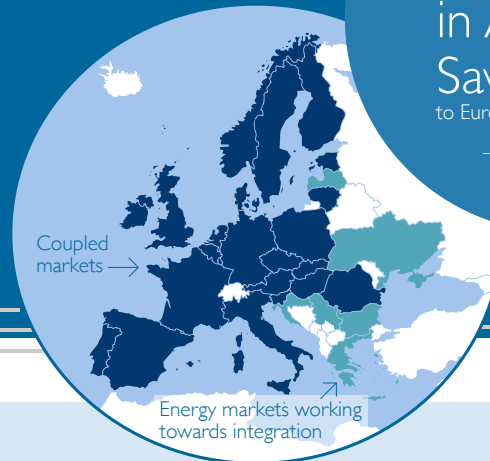
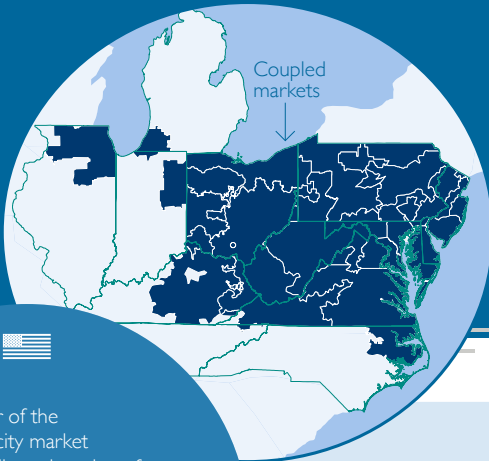
Establishing regional wholesale markets TAKES TIME AND EFFORT



The expansion of **EU energy market coupling** delivered

€1 Billion
in Annual
Savings
to European consumers.

– ACER Market
monitoring report



PJM, operator of the
largest electricity market
in the U.S., delivered a value of

\$1.8+ Billion
in Annual Savings
from energy production costs &
integrating more efficient resources.

– www.pjm.com

MARKET EXPANSION



PJM (U.S.)



EU

- | | | |
|---|------|---|
| | 2019 | Ukrainian day-ahead market established |
| | 2018 | |
| | 2017 | Serbian day-ahead market established |
| | 2016 | |
| | 2015 | |
| | 2014 | Coupling Northwest Europe |
| | 2013 | Romania joined 3M Market Coupling (4M Market Coupling) |
| | 2012 | |
| | 2011 | 3M Market Coupling (Czech Republic, Slovakia, and Hungary) |
| | 2010 | UK coupling |
| | 2009 | |
| | 2008 | Coupling Central West Europe (CWE) |
| | 2007 | Coupling Central Eastern Europe |
| | 2006 | Coupling CWE and Nordics |
| | 2005 | |
| | 2004 | Trilateral market coupling (Netherlands, Belgium, France) |
| | 2003 | EU Second Energy Package (Further liberalization of markets) |
| | 2002 | |
| | 2001 | |
| | 2000 | Central auction office for cross border capacity allocation established (Netherlands, Belgium, Germany) |
| | 1999 | |
| | 1998 | |
| | 1997 | Europe's first independent energy exchange established in The Netherlands |
| | 1996 | |
| | 1995 | EU First Energy Package – prompts the opening of energy markets through open access and unbundling |
| | 1994 | |
| | 1993 | |
| | 1992 | Scandinavian market coupling initiated |
| Ohio Valley Electric Corporation joins PJM | | |
| East Kentucky Power Cooperative joins PJM | | |
| Duke Ohio/Kentucky join PJM | | |
| American Transmission Systems, Inc and Cleveland Public Power join PJM | | |
| Dominion and Duquesne Light join PJM | | |
| Commonwealth Edison, American Electric Power, and Dayton Power & Light join PJM | | |
| Allegheny Power joins PJM | | |
| PJM granted regional transmission organization (RTO) status | | |
| PJM established as an independent company | | |
| Federal Energy Regulatory Commission Order 888 issued – promotes wholesale competition through open access | | |
| Energy Policy Act – enhances competition by removing barriers for independent generation developers to compete with incumbent generation owners | | |

This infographic is made possible by the generous support of the American people through the United States Agency for International Development (USAID) under the Energy and Infrastructure Division of the Bureau for Europe and Eurasia. The contents are the responsibility of the National Association of Regulatory Utility Commissioners (NARUC) and do not necessarily reflect the views of USAID or the United States Government.



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National
Association of
Regulatory
Utility
Commissioners

Source: <https://www.tennet.eu/our-key-tasks/market-facilitation/market-coupling-timeline/>