

Energía y Cambio Climático

Energías renovables a nivel global

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WWF-Mexico
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FORO: El papel de la Ley para la
Transición Energética (LTE) en avanzar las
Energías Renovables en México



Contenido

1. Estado de las energías renovables
2. Tendencias de inversion
3. Reformas, mercados e instituciones



Fuentes

Energy and Climate Change, International Energy Agency, 2015.

Luke Mills, *Global Trends in Clean Energy Investment*, 10 de abril de 2015.

Owen Zinaman *et al.*, *Power Systems of the Future*, 21st Century Power Partnership, Febrero 2015.

Renewable Energy Country Attractiveness Index, Ernst & Young, 45, Septiembre 2015.

REMAP 2030, International Renewable Energy Agency, 2014.



Estado de las energías renovables

La IEA ha identificado como un propósito político clave que el 2020 sea el año de mayores emisiones en el sector energía (*Bridge Scenario*).

Figure 2.3 ▶ Global energy-related CO₂ emissions in the INDC Scenario and remaining carbon budget for a >50% chance of keeping to 2 °C

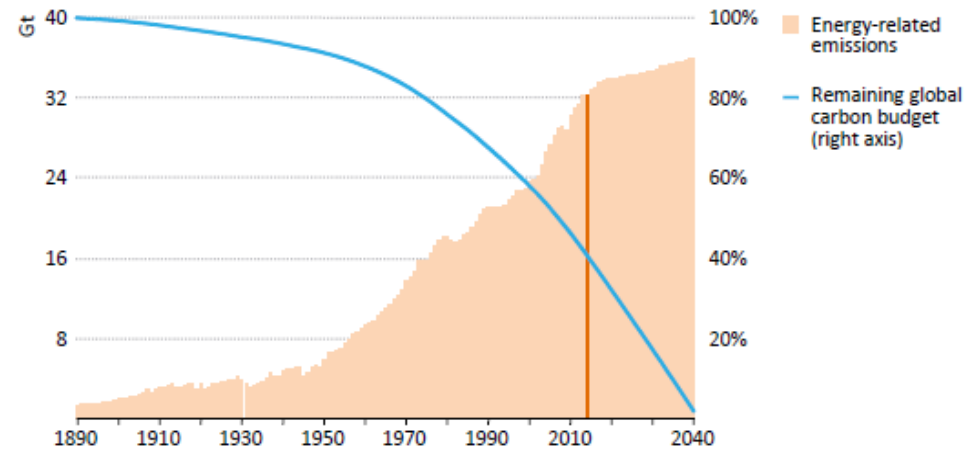
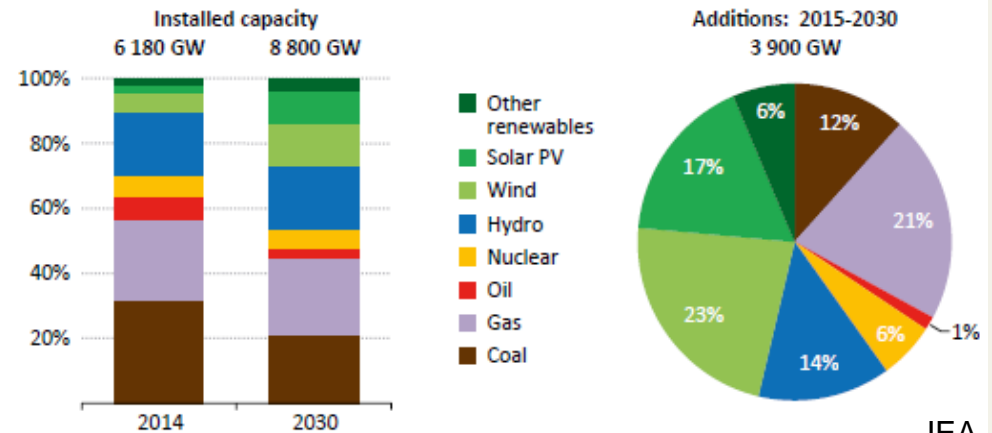


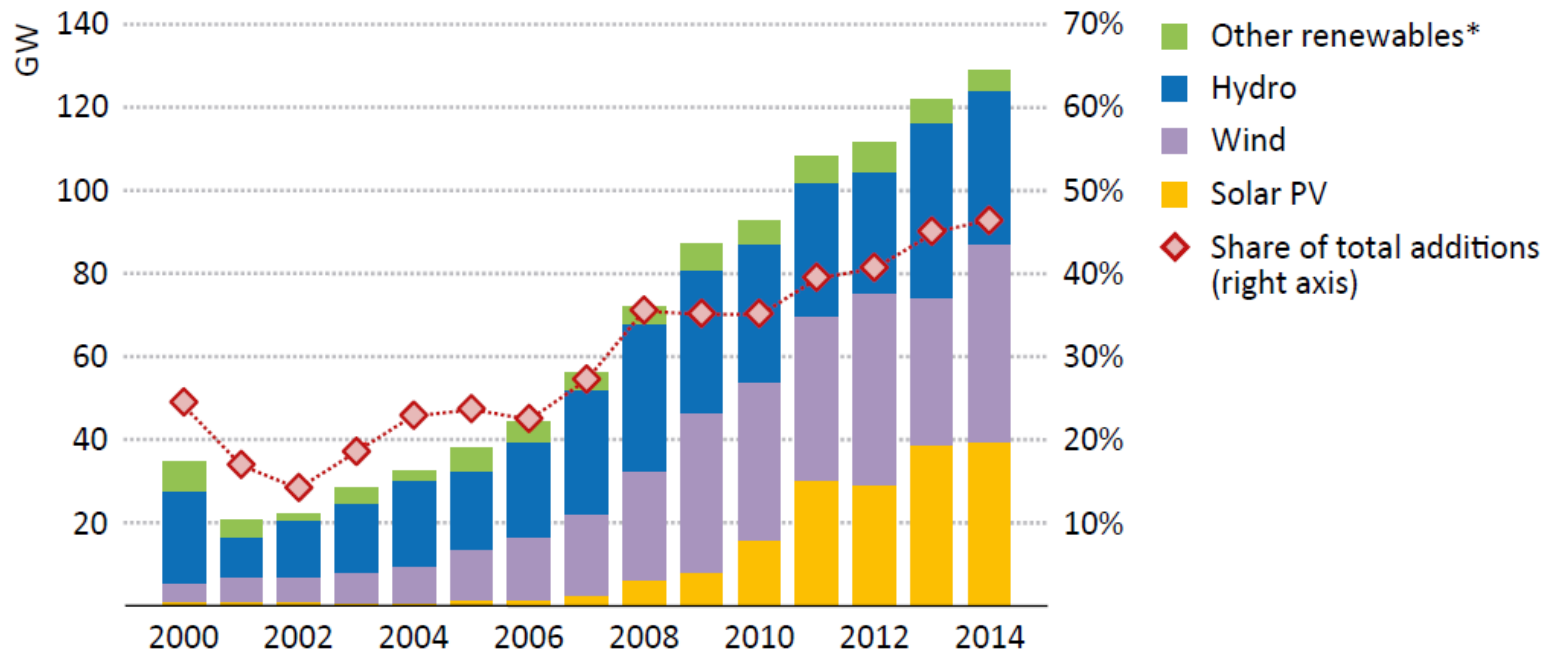
Figure 3.10 ▶ World power generation capacity mix and capacity additions in the Bridge Scenario



IEA

Estado de las energías renovables

Figure 1.1 ▶ Global renewables-based power capacity additions by type and share of total capacity additions

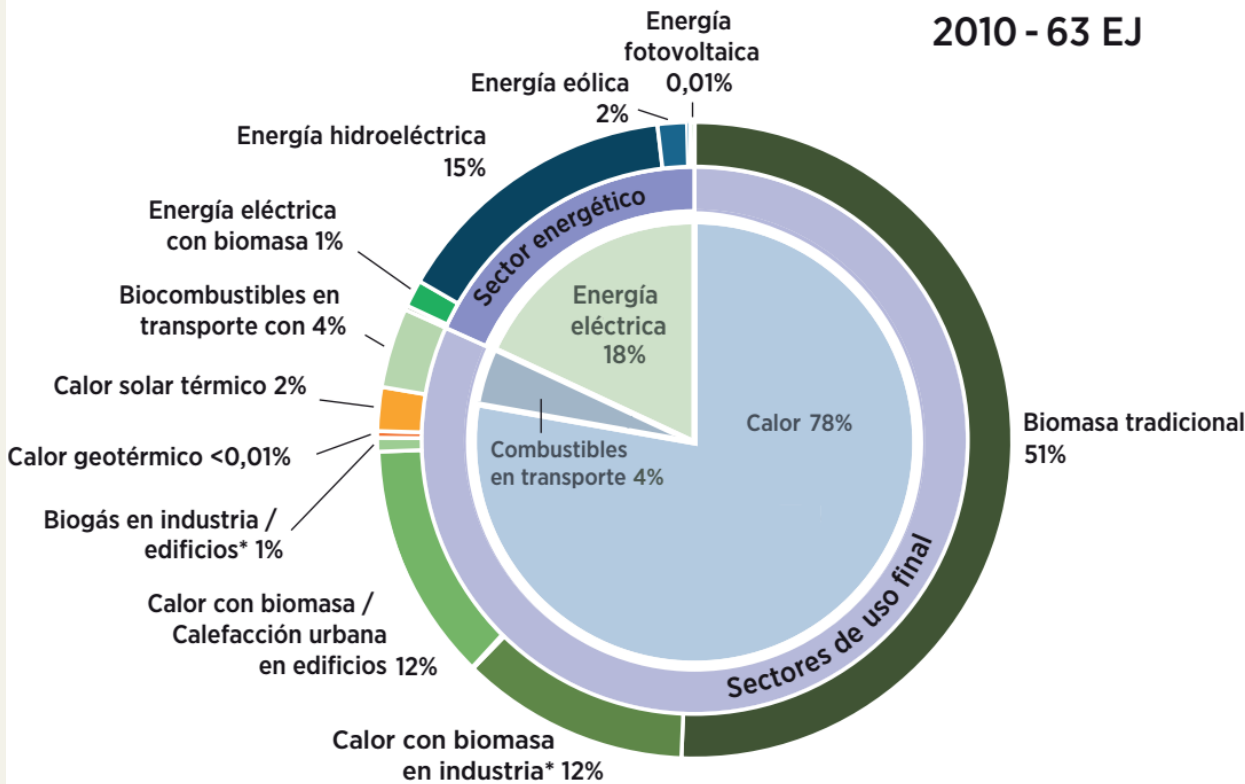


* Includes geothermal, marine, bioenergy and concentrating solar power.



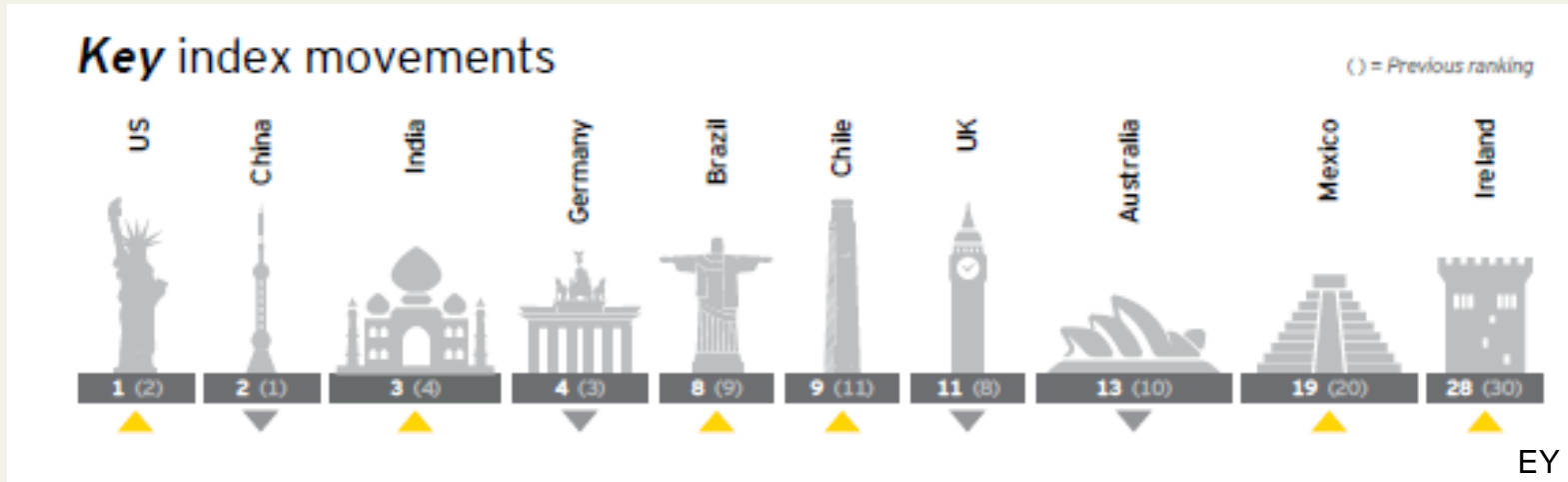
Estado de las energías renovables

REmap 2030
Hoja de ruta
para las energías renovables



Es importante tener en perspectiva las energías renovables no eléctricas, aunque se espera se duplique el nivel de electrificación del uso final de energía.

Tendencias de inversión



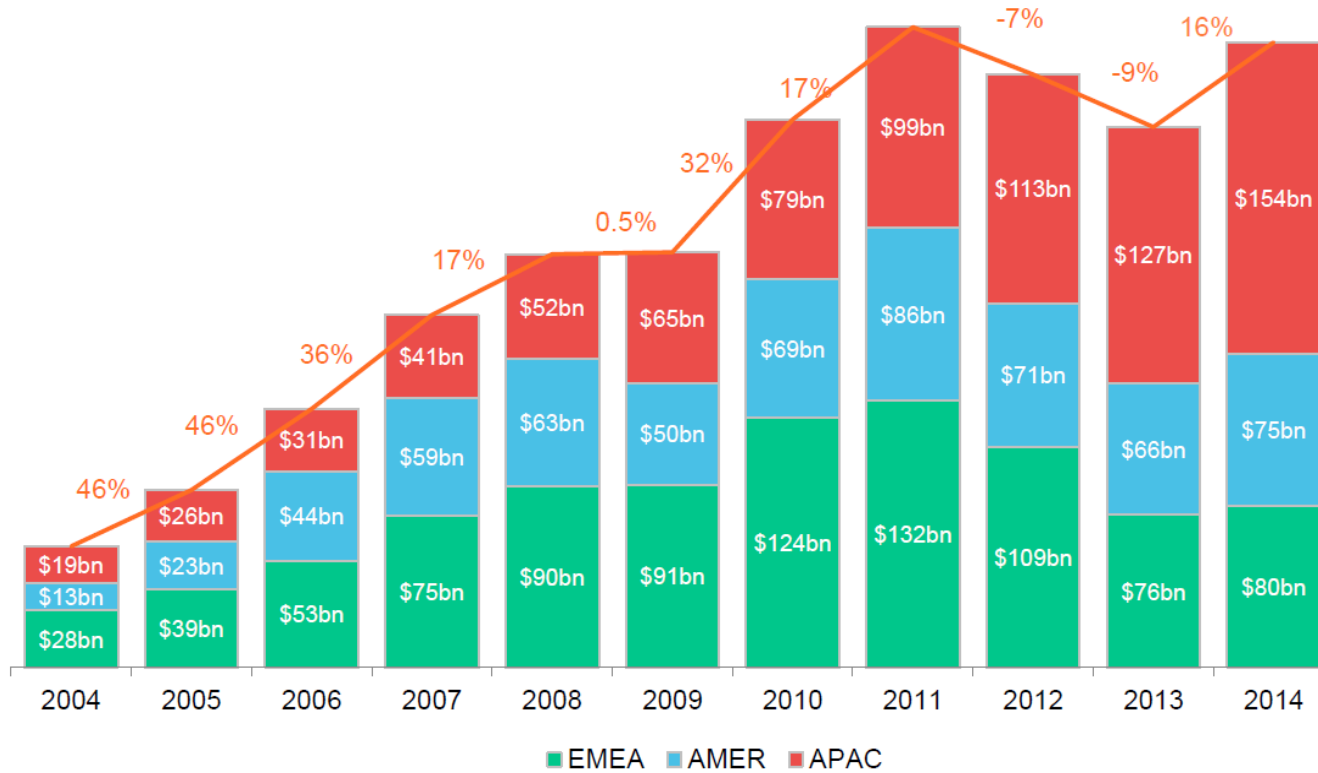
1. Chile espera que el 45% de todos los nuevos proyectos sean renovables intermitentes, y en 2015 subastará el 29% de los requerimientos de la próxima década.
2. Brasil realiza subastas de largo plazo (3 y 5 años adelante) con diferencias por tecnologías y generales.
3. El *Clean Power Plan* llevará los estados a desarrollar sistemas de mandatos y hasta subastas de energía renovables. Es una regulación con base en *externalidades*.
4. En India se espera que las subastas ayuden a alcanzar la meta de 100GW solares y 60GW eólicos en 2022.



Tendencias de inversión

NEW INVESTMENT IN CLEAN ENERGY BY REGION 2004-14 (\$BN)

Bloomberg
NEW ENERGY FINANCE



Note: Total values include estimates for undisclosed deals. Includes corporate and government R&D, and spending for digital energy and energy storage projects (not reported in quarterly statistics).

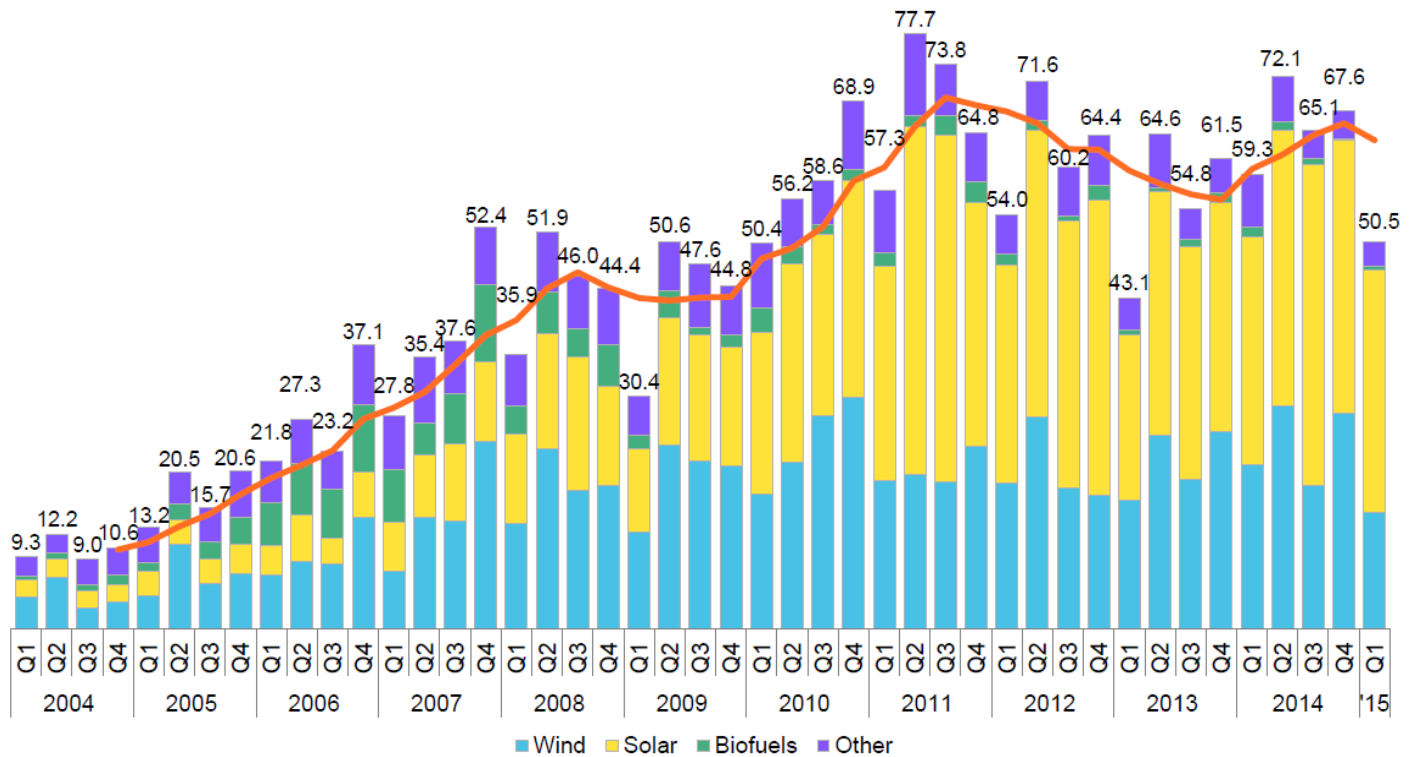
Source: Bloomberg New Energy Finance



Tendencias de inversión

NEW INVESTMENT IN CLEAN ENERGY BY SECTOR Q1 2004-Q1 2015 (\$BN)

Bloomberg
NEW ENERGY FINANCE



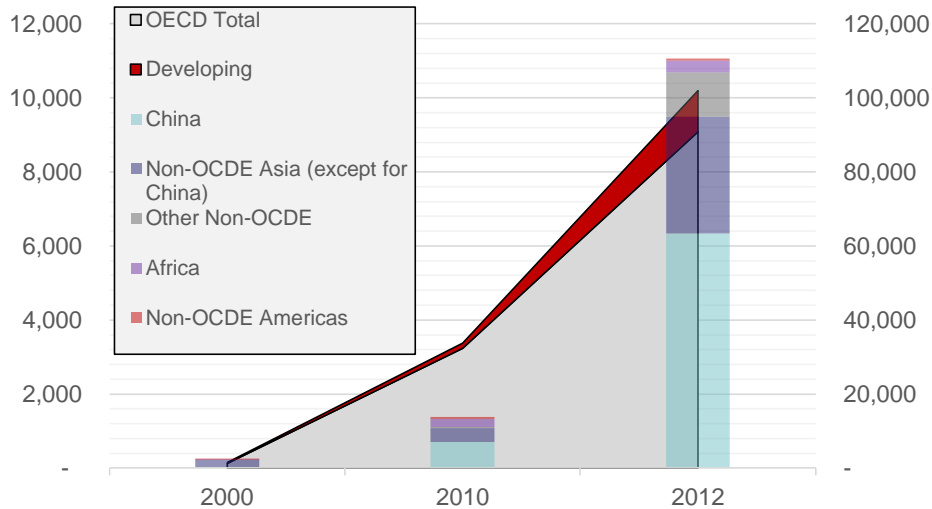
Note: Total values include estimates for undisclosed deals. Excludes corporate and government R&D, and spending for digital energy and energy storage projects (reported in annual statistics only).

Source: Bloomberg New Energy Finance



Tendencias de inversión

Figure 1. Solar generation (GWh)



Source: IEA, Energy Statistics for Non-OCDE Countries. 2014 Edition; Energy Statistics

Source: JM Valenzuela, "Solar Energy in Developing Markets", *Stanford Energy Journal*, <http://energyclub.stanford.edu/journalitem/solar-energy-in-developing-markets-taking-stock-on-global-trends/>

a. Servicio eléctrico a escala

- + Acceso limitado a carbón o gas natural barato.
- Restricciones en mercados de capital (alto riesgo país y limitado mercado financiero).
- = Intervención para reducir riesgo (subastas).

a. Generación distribuida

- + Altos costos de servicio eléctrico
- Alto costo de crédito al consumidor (limitado mercado financiero)
- = Intervención para hacer accesible crédito (riesgo y costo) / Inversión limitada por liquidez.

Hay una ventaja en tener una política macroeconómica estable que reduzca el riesgo país y el costo del crédito: - Chile A; Mexico y Peru A ~ B+; resto de AL Bs excepto Argentina Venezuela.

- ¿Llega a los consumidores?
- ¿Hay barreras regulatorias o de planeación?



Tendencias de inversión

The diagrams below set out some of the most common types of auction and key considerations when designing effective procurement programs.

“Sealed bid” bidding process

Participants simultaneously submit sealed bids for the product(s) on offer. An initial prequalification stage is typically used to filter those bidders deemed most capable of delivery (based on predefined criteria). The auctioneer then evaluates and ranks qualifying bids based on price and any other non-price criteria specified in the evaluation methodology.

- ▶ Generally relatively straightforward to implement, subject to the complexity of the bid requirements and evaluation criteria.
- ▶ Undisclosed nature of the bids enhances competition and reduces the risk of collusion, although this model is less useful for price discovery.

“Descending clock” bidding process

“Live” multiround bidding allocates multiple projects or units of capacity. The auctioneer offers an initial high price to create excess supply, then lowers it in successive rounds to determine the quantity bidders are willing to supply until the volume bid matches demand.

- ▶ It can be more difficult to implement and risks collusion, but does allow for faster price discovery and greater transparency.
- ▶ Dynamic process enables bidders to adapt prices and quantities in response to other bids. However, non-price criteria cannot be evaluated.

E.g., Colombia, US (New Jersey, Illinois), UK (non-fossil fuel obligation)

First-price

Participants bid for a single project, site or product, predefined by the auctioneer and usually based on a specific technology. A single winner is selected and receives its own bid price. *E.g., Morocco, China, France*

Pay-as-bid

Participants compete for multiple projects or units up to a fixed capacity or budget. Auctions can be technology-specific or technology-neutral. There will typically be multiple winners and each receives its own bid price. *E.g., South Africa, Peru*

Uniform pricing

Similar to the pay-as-bid model, except multiple units (of the same product) are all sold at the market clearing price i.e., all bidders receive the marginal price, being the highest winning bid. *E.g., UK, Germany*

Hybrid

Typically a descending clock auction followed by a pay-as-bid sealed bid phase. The first stage is used to enable quick price discovery and shortlist bidders eligible to participate in a subsequent sealed bid phase that seeks out the lowest price and reduces the risk of collusion. *E.g., Brazil*

Tendencias de inversión

Compliance: strict vs. lenient

Guarantees (such as bid bonds) and predefined performance penalties increase contract certainty and reduce the risk of project delay. **However ...**

strict criteria can reduce participation (especially by smaller companies) and increase the administrative burden/transaction costs for both parties.

Prequalification: strict vs. lenient

Stricter criteria typically provide a higher degree of certainty that eligible bidders are capable of project delivery. **However ...**

stringent requirements can discourage some bidders and weaken upfront competition, and increase the administrative burden/transaction costs.

Non-price criteria: strict vs. lenient

Mandatory criteria guarantees local economic development benefits and can signal a government's long-term investment commitment or energy strategy. **However ...**

it may be more costly for bidders to comply (depending on the technology) and a lack of domestic supply chain can cause project delays. Local content requirements can also sometimes face legal challenges.

Technology: neutral vs. specific

Neutral-technology auctions are typically more competitive and seek the most cost-effective technologies. **However ...**

specific auctions enable proactive management of the energy mix and create the flexibility to address technology-specific risks or set tailored criteria.

Frequency: standalone vs. systematic

Ad hoc auctions enable greater flexibility to adapt to changing market conditions. **However ...**

they can create stop-start deployment cycles, while scheduled auctions enable more effective long-term energy planning and initiate learning curve to improve later rounds.

Volume: fixed vs. price sensitive

Fixed capacity volume auctions are simple to implement and communicate. They can also be split by project size, equipment source or utilization (e.g., base load vs. peak load). **However ...**

When prices are low, they cannot take advantage by contracting more than the pre-specified quantity.

Site selection: offtaker vs. developer

Offtaker/government selection reduces developer cost and liability, lowering the bid premium and risk of delay. The spread of sites may also be more appropriate if centrally planned (i.e., relative to grid, demand centers). **However ...**

site evaluation can be slower or more bureaucratic, and requires public resource.

Grid permit: pre- vs. post-auction

Requiring bidders to secure grid access permits for proposed projects reduces the risk of project delay and enables grid expansion planning. **However ...**

it can limit bidder participation or rule out otherwise attractive projects, and can be complex or costly to provide permits to all bidders.





Reformas, mercados e instituciones

Power Systems of the Future

*A 21st Century Power Partnership
Thought Leadership Report*

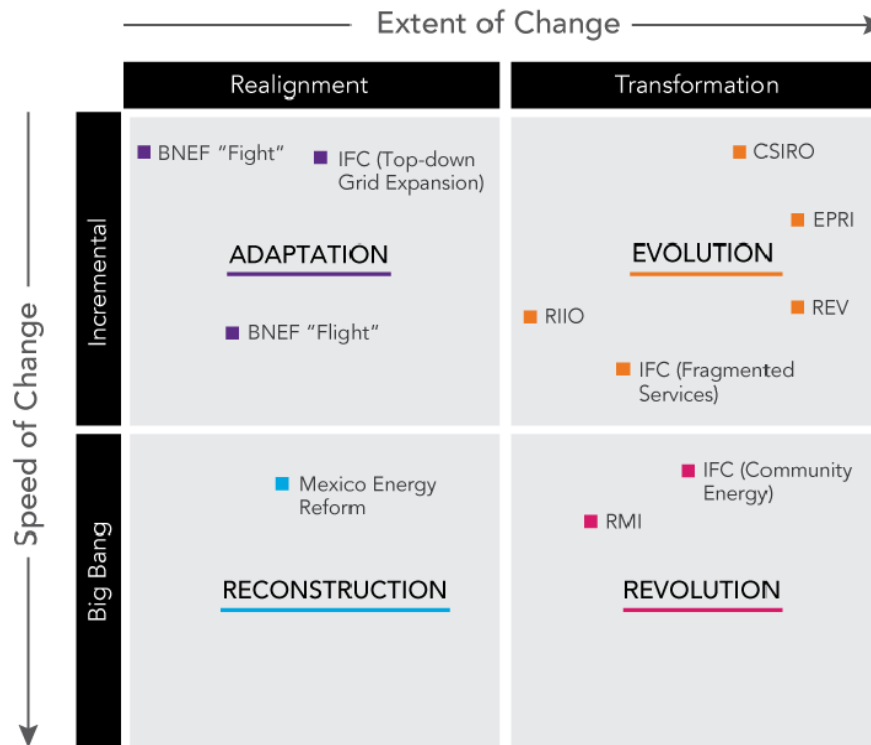


Figure 4. Illustrative Mapping of Scenarios for Emerging Power Systems. Names represent both examples in progress (e.g., Mexico Energy Reform) and institutions that have published reports on future scenarios (e.g., RMI)



Reformas, mercados e instituciones

Power Systems of the Future

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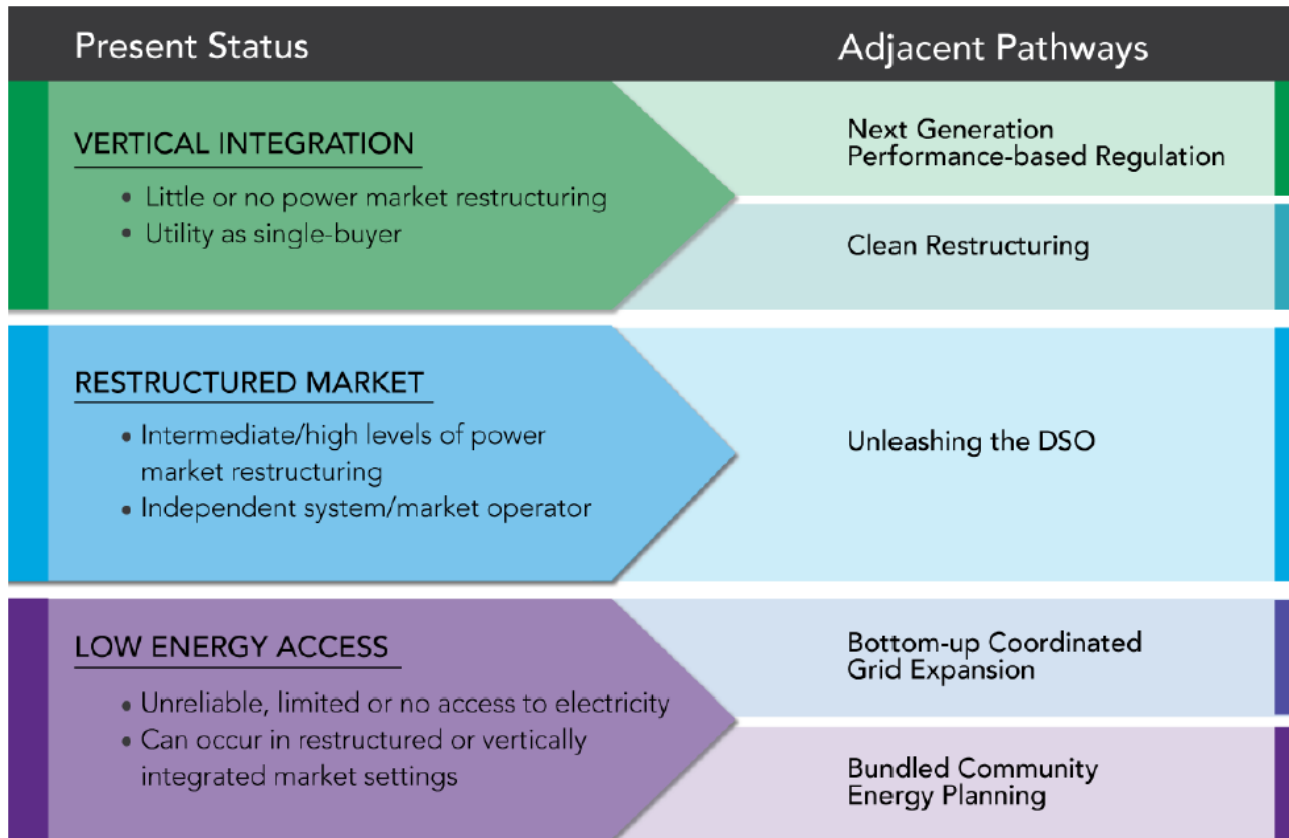


Figure 6. Applicability of Pathways based on Present Status of Power Sector Organization



Gracias !

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