



Leadership Through Innovation

Asia Clean Energy Forum 2016

Vision for smart grid deployment to 2050

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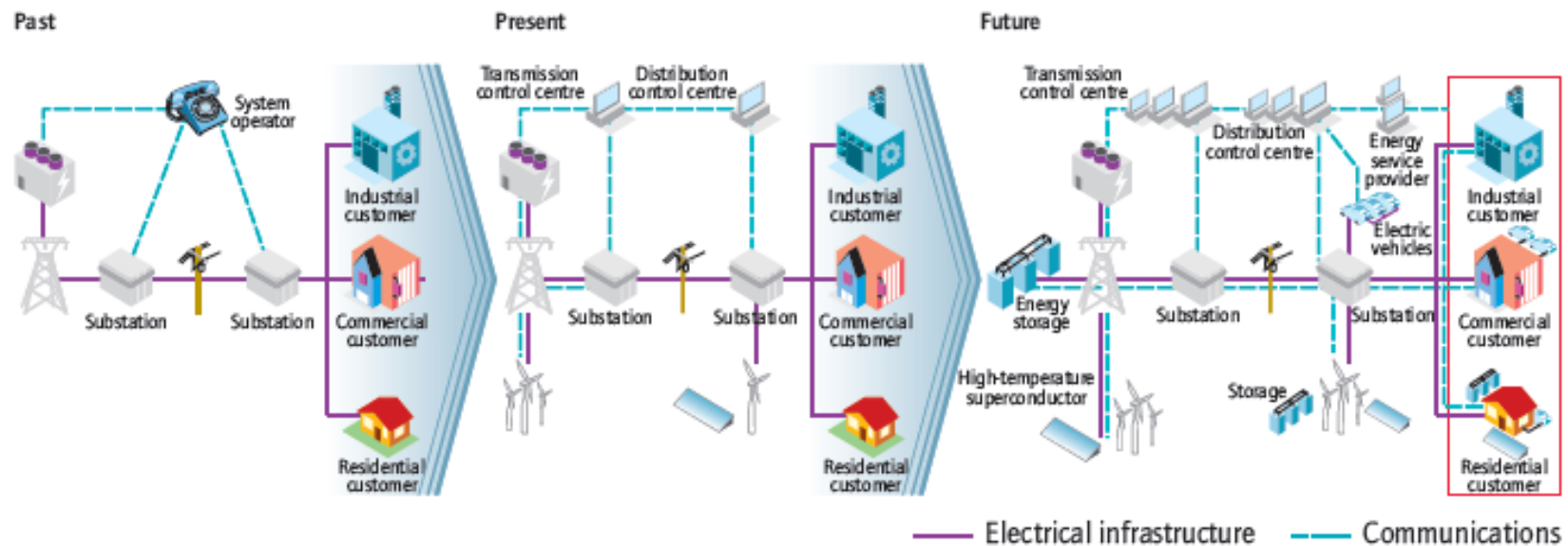
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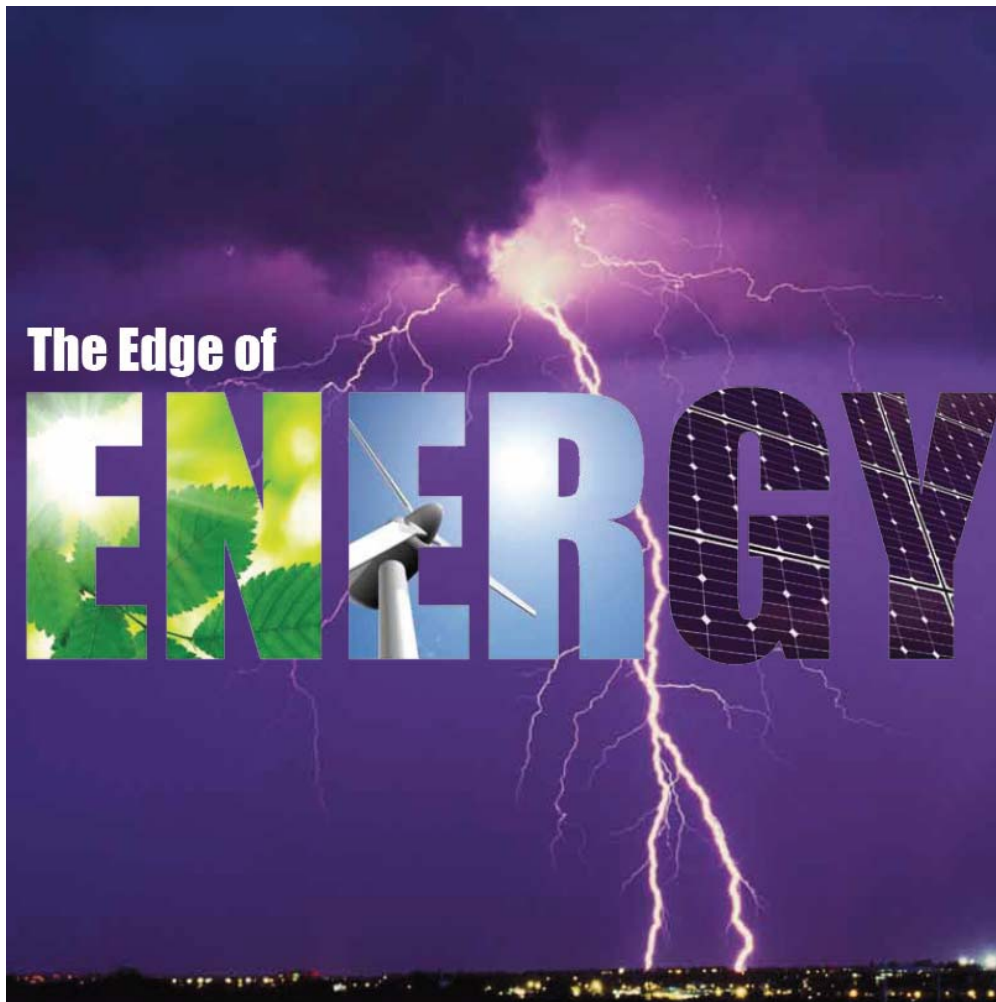


The world's electricity systems face a number of challenges, including ageing infrastructure, continued growth in demand, the integration of increasing numbers of variable renewable energy sources and electric vehicles, the need to improve the security of supply and the need to lower carbon emissions.

Smart grid technologies offer ways not just to meet these challenges but also to develop a cleaner energy supply that is more energy efficient, more affordable and more sustainable.

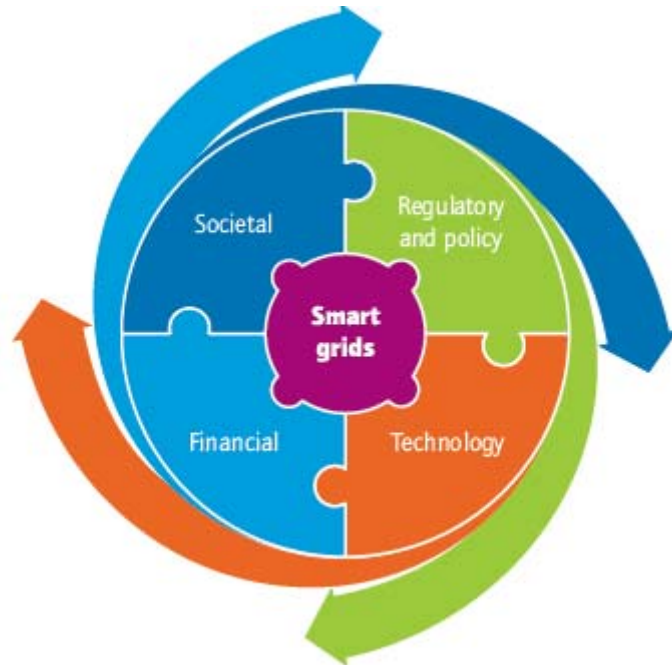


KEY POINT: The “smartening” of the electricity system is an evolutionary process, not a one-time event.



Smart grids are complex systems that incorporate a number of technologies, consumer interactions and decision points. This complexity makes it difficult to define detailed development and deployment scenarios.

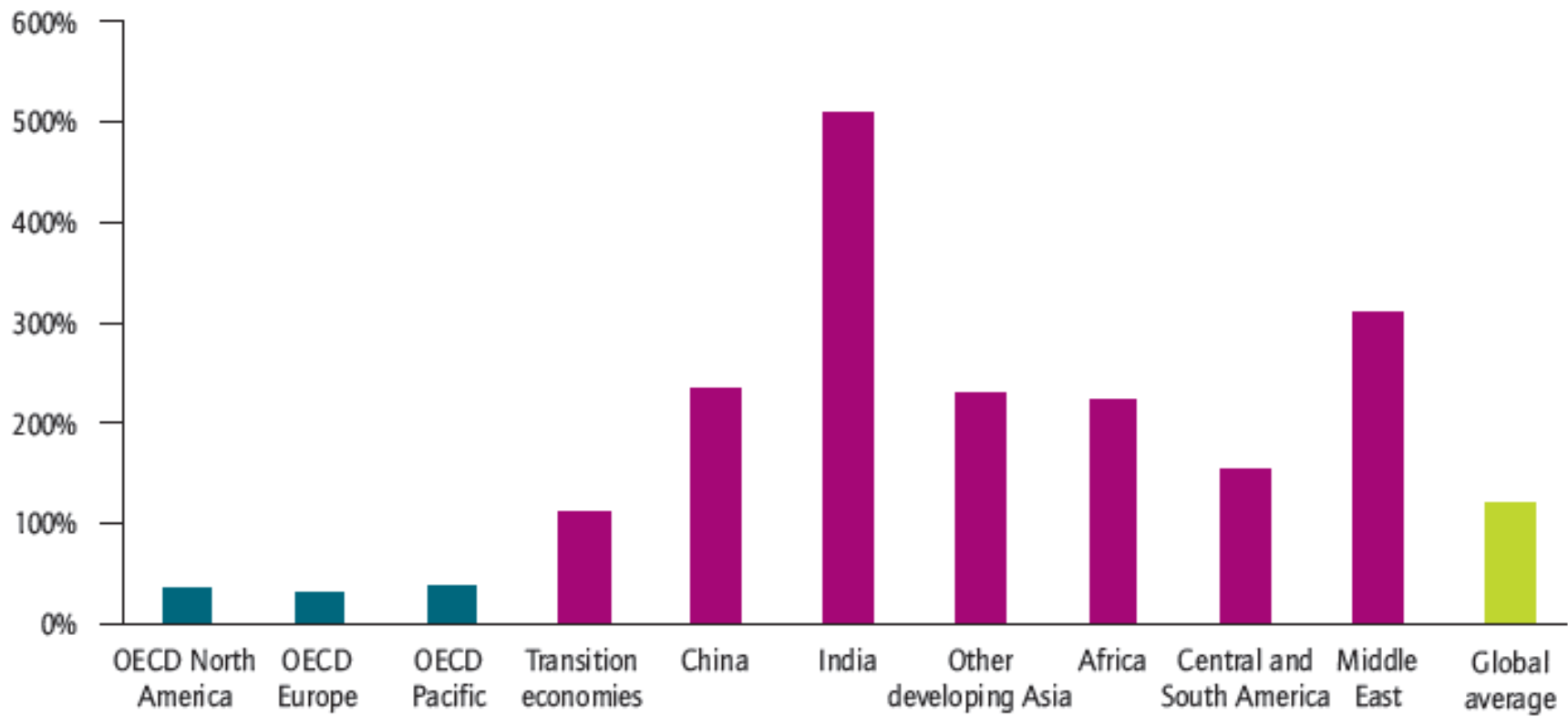
Smart grid technologies are being developed worldwide, so much of the research, development and demonstration (RD&D) can be discussed in a global context. But deployment needs to be discussed at the regional level, where important factors such as the age of infrastructure, demand growth, generation make-up, and regulatory and market structures vary significantly.



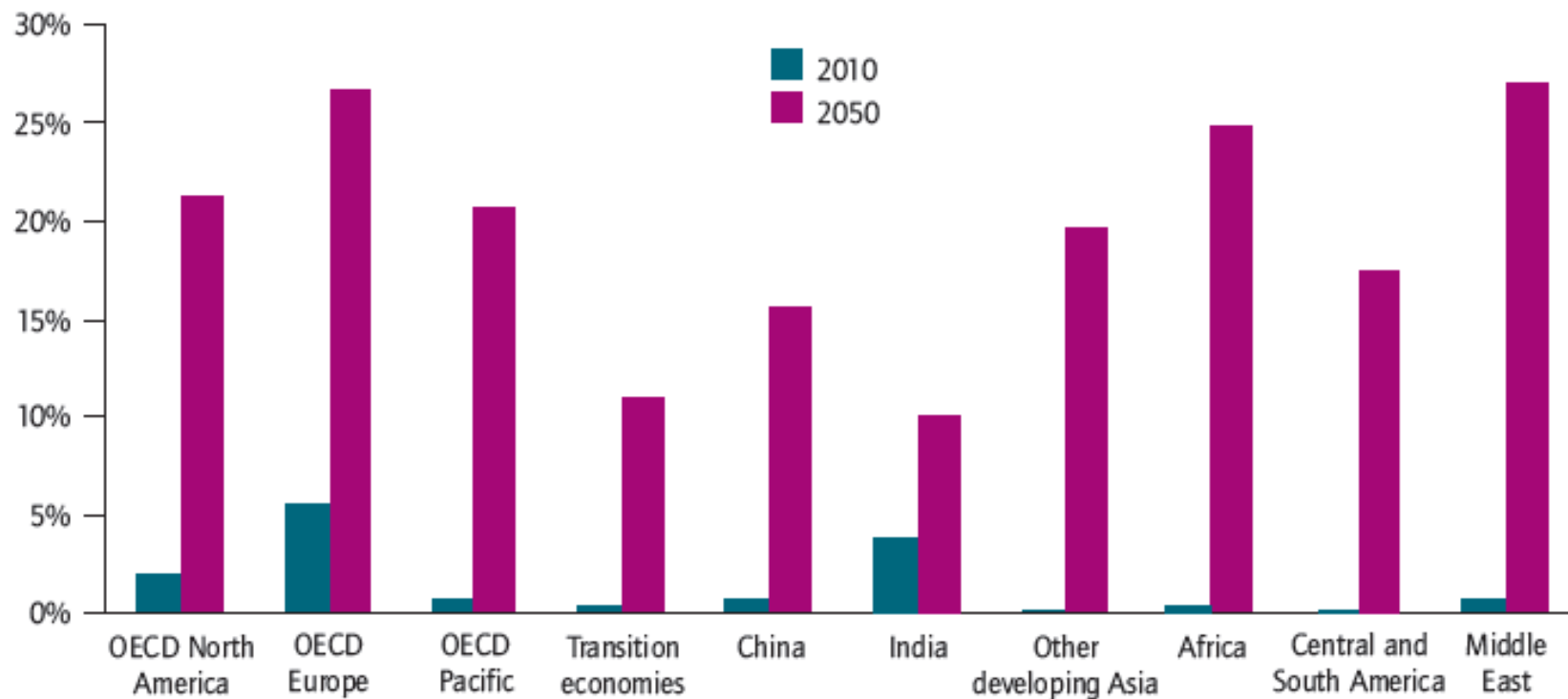
The Smart Grid Roadmap should aim to:

- Increase understanding among a range of stakeholders of the nature, function, costs and benefits of smart grids.
- Identify the most important actions required to develop smart grid technologies and policies that help to attain global energy and climate goals.
- Develop pathways and milestones to follow targets based on regional conditions.
- Incorporate other initiatives to support smart communities or city approaches.

KEY POINT: Smart grids provide an opportunity to link societal, financial, technology and regulatory and policy objectives.

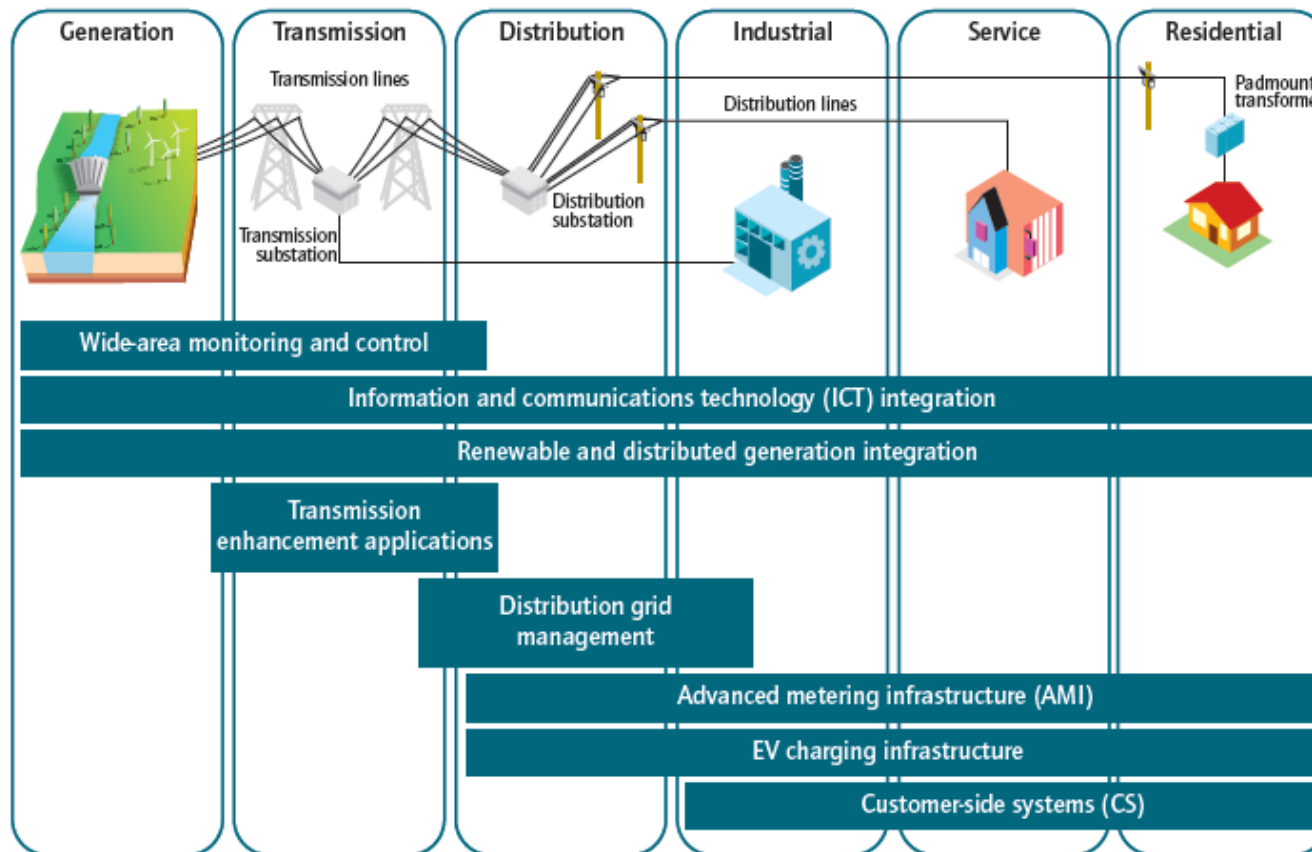


KEY POINT: Emerging economies will need to use smart grids to efficiently meet rapidly growing electricity demand.



KEY POINT: All regions will need smart grids to enable the effective integration of significantly higher amounts of variable resources to their electricity grids.

The many smart grid technology areas – each consisting of sets of individual technologies – span the entire grid, from generation through transmission and distribution to various types of electricity consumers. Some of the technologies are actively being deployed and are considered mature in both their development and application, while others require further development and demonstration.



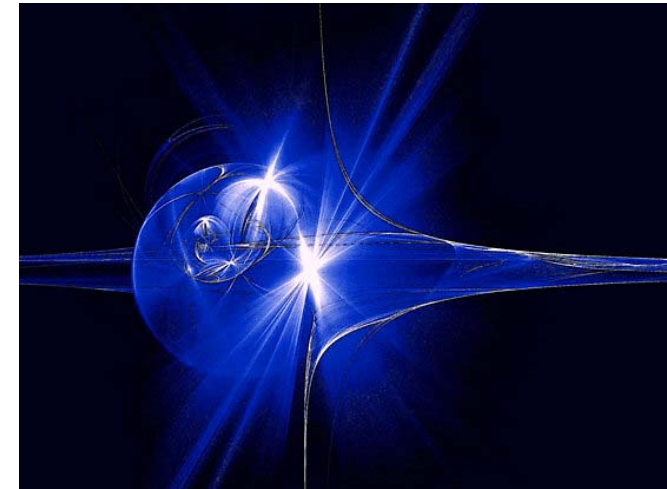


Motivated by economic, security or environmental factors, countries need to choose their own priorities when adopting smart grid technologies in support of moving to smart city or smart community solutions. Where possible, the costs and benefits of different approaches must be quantified to assess the impacts of potential deployments. Following regional characteristics need to be taken into account in any assessment

- Current and planned mix of supply, including fossil, nuclear and renewable generation.
- Current and future demand, and sectoral make-up of demand, such as manufacturing industry, residential load prevalence or the deployment of electric vehicles.
- Status of existing and planned new transmission and distribution networks.
- Ability to interconnect with neighboring regions.
- Regulatory and market structure.
- Climatic conditions and resource availability.

The incentives, or drivers, behind smart grid deployment and the interactions between such drivers need to be understood in the context of local or regional electrical systems.

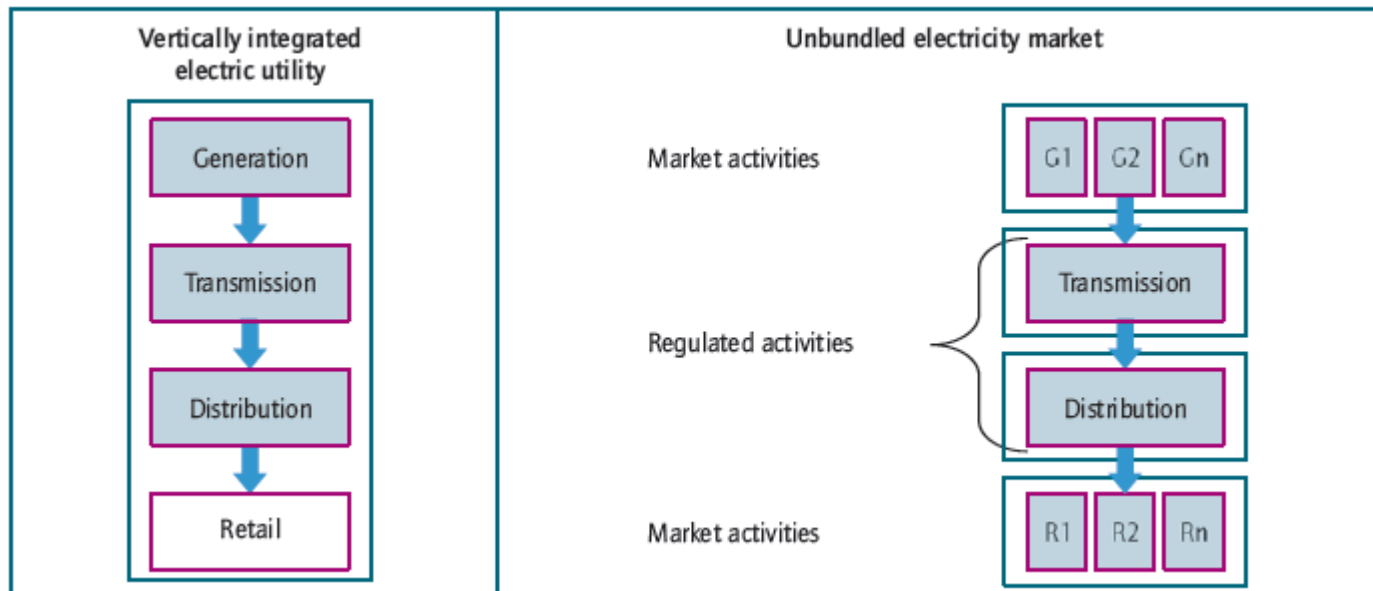
Following data need to be analyzed for a vision of a regional energy system.



- Annual demand.
- Electric vehicle (EV) deployment and peak demand as a function of EV deployment.
- Demand response potential.
- Future potential electricity use in buildings.
- Deployment of intermittent RE sources on grid and off grid
- Microgrid solutions with the capability of an independent community approach

Current regulatory and market systems, both at the retail and wholesale levels, can present obstacles to demonstration and deployment of smart grids.

It is vital that regulatory and market models – such as those addressing system investment, prices and customer participation – evolve as technologies offer new options.



KEY POINT: *The unbundling of electricity markets has introduced benefits and complexity to the electricity sector.*

Compared with customers in other industries, such as telecommunications, travel and retail, electricity consumers are typically not provided with either the service options or pricing information needed to manage their consumption.

Providing these options and information can help customers become smarter while delivering significant benefits to grid operators, including reduced costs.

Smart grid customer policies fall into three groups: consumer feedback, pricing and customer protection.



So where are we heading to???

- There will be significant changes how we produce and consume energy.
- Utilities will have to quickly adopt and implement new business processes and consumer engagement processes.
- EV's, Microgrids, and RE integration will dramatically change consumer behavior and the way utilities operate.
- Policy makers are challenged to keep up with the development of technology.





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Thank you!

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