Distributed Generation and the Importance of the Electric Power Grid

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The Edison Electric Institute (EEI) is the association that represents all U.S. investor-owned electric companies. Our members provide electricity for 220 million Americans, operate in all 50 states and the District of Columbia, and directly employ more than 500,000 workers.

With more than $85 billion in annual capital expenditures, the electric power industry is responsible for millions of additional jobs. Reliable, affordable, and sustainable electricity powers the economy and enhances the lives of all Americans.

EEI has 70 international electric companies as Affiliate Members, and 250 industry suppliers and related organizations as Associate Members.

Organized in 1933, EEI provides public policy leadership, strategic business intelligence, and essential conferences and forums.
September 1882: Edison used a steam engine to drive his dynamo to generate direct current electric power for a central power generating station on Pearl Street in New York City. It had 85 customers and 400 lamps.

January 2013: GE unveiled a new wind turbine design, billed as “the world’s most efficient high output brilliant wind turbine”. The turbine features an integrated energy storage system. It comes with a data-driven system designed to boost efficiency and improve power output and is the first to use the Industrial Internet to help manage the variability of wind providing smooth predictable power.
The Industry Record

$860b
electric power industry

2.2%
Gross Domestic Product

500,000+
workers employed by IOUs

IOUs serve more than 70% of America’s industries, businesses, and consumers.
Notes: Total company spending of U.S. Investor-Owned Electric Utilities, consolidated at the parent or appropriate holding company. Projections based on publicly available information and extrapolated for companies reporting fewer than three projected years (6% in 2014 and 2015).

Sources: EEI Finance Department, company reports, SNL Financial (October 2013).
Evolving Generation Mix

Source: DOE – Energy Information Administration.
Different Regions of the Country Use Different Fuel Mixes to Generate Electricity

*Includes generation by agricultural waste, landfill gas recovery, municipal solid waste, wood, geothermal, non-wood waste, wind, and solar.

** Includes generation by tires, batteries, chemicals, hydrogen, pitch, purchased steam, sulfur, and miscellaneous technologies.

Sum of components may not add to 100% due to independent rounding.


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Non-Hydro Renewable Sources More Than Double Between 2012 and 2040

Utilities lead PV installations and integration

Installed PV capacity (MW)

Utility scale projects
- Natural economies of scale
- Can be optimally located and sized
- Cost advantages over rooftop solar
- Allow all customers to benefit

Source: SEIA, U.S. Solar Market Insight, Q3 2013; EEI
CO₂ Emissions and Intensity

Electric Power Sector CO₂ Emissions Tonnage and Intensity, 2000-2012

Electric Power CO₂ emissions, MMtons

Electric Power CO₂ Intensity, tons/MWh

Electric Power CO₂ Intensity
...And Transforming the Grid

- Utilities are deploying advanced grid technologies that harden the grid and enable increased penetration of renewables, demand response, electricity storage, and electric vehicles.
- Synchrophaser technologies, automated feeder switches and supporting sensors, voltage regulators, communications equipment, smart meters, etc.

Source for Photos: Schweitzer Engineering Laboratories, AES Energy Storage, EEI
The Electric Distribution System In Transition

- Customers are gaining new distributed energy resource options, including DG.
- The structure and operation of distribution systems will change as “smart” infrastructures are built out and new DER technologies are deployed.
  - Ultimately, power will flow in 2 directions across distribution systems.
  - Supporting a safe and reliable grid infrastructure is critical to the deployment of new technologies.

Source for graphics: EPRI, The Integrated Grid: Realizing the Full Value of Central and Distributed Energy Resources, February 2014
Other Factors Contributing to the Transition

- Customer preference for “choice” or “self-supply”
- New solar financing and deployment models
- Advances in enabling technologies
  - Evolution of “smart” infrastructure technologies
- Benefits of decentralized resources
  - Resiliency, outage restoration
  - Cyber and physical security
  - Department of Defense policy to expand renewables, “islanding”
The Grid Is At the Center of the Transition

Services and Benefits of the Grid

- Energy transfers and transactions: buying from and selling back to the grid
- Balancing supply and demand
- Voltage and frequency control services
- Energy back up

Picture: Inhabitat.com
Typical Energy Production and Consumption for a Small Customer with Solar PV

Source: Value of the Grid to DG Customers, Institute for Electric Innovation, October 2013
Current Rate Designs Work Poorly for DG

- **What’s the Problem?** Most rates recover a large share of fixed costs through variable use charges.

- DG customers continue to rely on the grid and increase grid costs, most of which are fixed.

- Under most rate designs, rates to customers with DG fail to recover right amount of fixed grid costs.

- Net metering makes the cost-recovery problem worse, shifting fixed costs to non-DG customers.
Net Metering Does Not Align with Ratemaking Principles

- Prices to customers should be based upon the **actual wholesale cost** to provide them electricity, and the fixed costs of delivery, power quality and related services.

- Any **subsidies** (additional costs borne by some classes of ratepayers to benefit others) should be **transparent**.

- Net metering at retail rates creates a **hidden subsidy** benefiting distributed generation owners at the expense of other electricity ratepayers that is being defended on the basis of the “societal benefits” that it provides.
Luxury Power: Why Energy Is Becoming More Expensive and What Politicians Must Do About It

“We did it too good and now we have to correct because otherwise we have an increasing of energy costs, which will harm jobs in Germany in a serious way.”

- Wolfgang Schäuble
German Finance Minister

Source: Der Spiegel, September 2, 2013

Merkel Backs Plan to Cut Germany's Green Energy Subsidies

Chancellor Urges Cabinet to Adopt Cuts and Stop Bickering

By ANDREA THOMAS
Updated Jan. 22, 2014 5:34 p.m. ET
Shaping the Future Is Transformational

New opportunities

- Changing Customer Model
- Changing Utility Business Model
- Changing Regulatory Model

Grid
Electricity: What’s It Really Worth?
The True Value of Reliable, On-Demand Electricity

Suppose that you have a refrigerator that uses 525 kWh per year, and that your retail electricity rate is 11.5 cents/kWh:

Would you accept 6 cents to shut if off for eight hours?

How about 17 cents to shut if off for an entire day?

How about $1.16 to shut if off for a week?

Or how about $60 to keep it off for the entire year?
Conclusion

- It is vital for our nation to have a diverse supply of safe and reliable electricity.
- The U.S. electric grid delivers a valuable product essential to all Americans.
- The electric power industry is leading the transformation to make the grid more flexible and more resilient to meet the growing demands of our digital society.
- Everyone who uses the grid should help pay to maintain it and keep it operating reliably.
- Electric rates should be fair and affordable for all customers.