

Making Energy Efficiency, Demand Response, and Distributed Generation Count as Grid Resources

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What's in a name?

"Pa-pa-dee-me-tree-ew"

- It's (very) Greek
- Does not fit on a soccer jersey

Schneider Electric at a glance

The global specialist in energy management

Large Company

24

billion € of sales in 2012

41%

of sales in new economies

140 000+

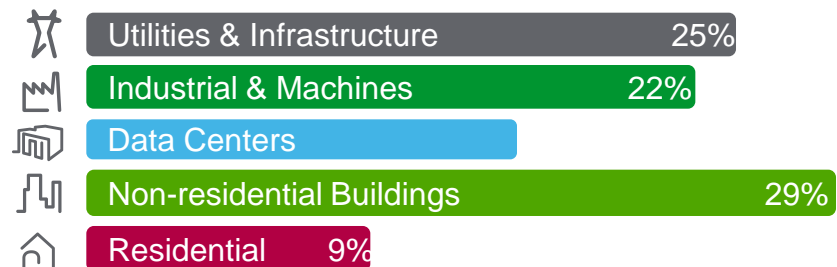
employees in 100+ countries

4-5%

of sales devoted to R&D

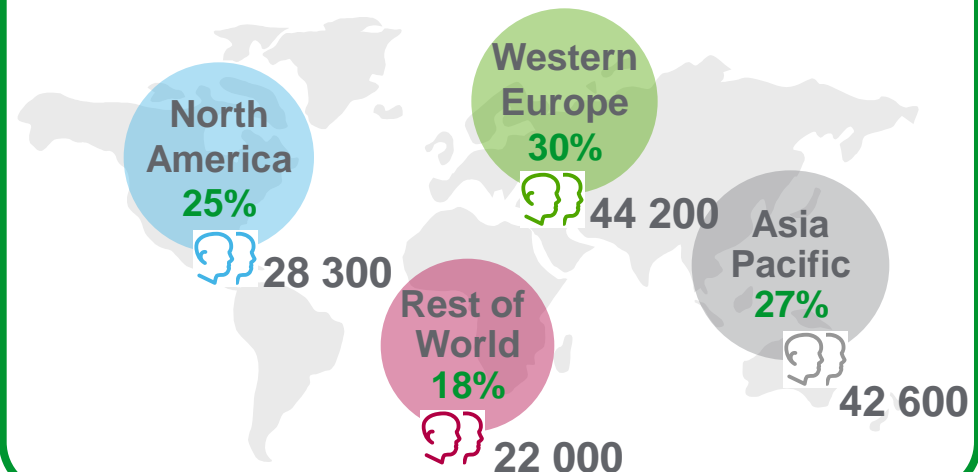
Diversified End Markets

FY 2012 Sales
(billion €)



Balanced Geographies

FY 2012 sales
Year-end 2012 employees



Schneider Electric U.S.A.

5.6

billion \$ sales in 2012

18000

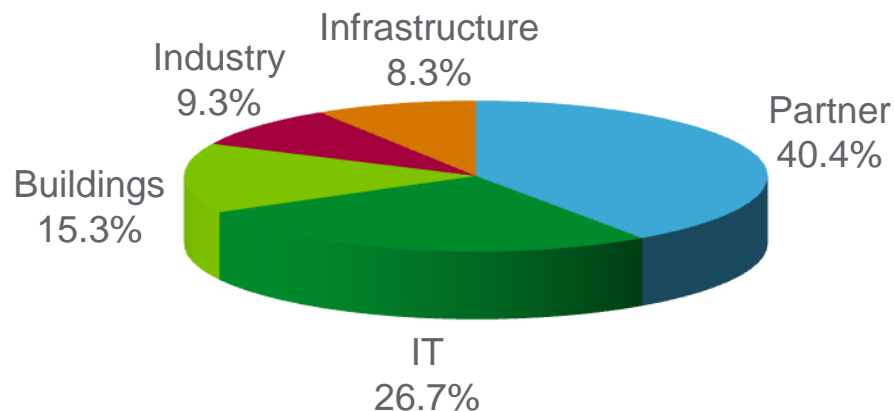
people across the country

240

facilities across the country

- 40 Manufacturing Facilities
- 6 Distribution Centers
- 6 R&D Centers
- Business, Sales & Services

FY 2012 Sales



Market Leading Brands

APC[™]
by Schneider Electric

SQUARE D[®]
by Schneider Electric

Schneider
Electric
PELCO
by Schneider Electric

Energy today

“Our current electricity model is based on distribution of centralized assets, built with 20th century technologies and business ideas (centralized economies of scale, regulated monopolies, one-way power flow, limited information, analog systems, control centers)”

- John Cooper, NextWatt Solutions

Energy tomorrow

“In contrast, we are actively engaged in discussing an emergent energy paradigm based on distributed, decentralized assets, built based on 21st century technologies and business ideas (decentralized economies of diversity, open markets, two-way power and information flow, abundant information, digital systems, and responsive markets using transactive energy concepts and standards”

- John Cooper, NextWatt Solutions

DER: supply- and demand-side resources connected to distribution grid

Distributed generation (DG)

- Rooftop solar
- Community-scale and commercial renewables
- Combined heat and power (CHP)

Storage facilities

Electric vehicles and charging stations

Energy efficiency, demand response technologies & energy management systems

Any combination of the above

- Micro-grids
- Virtual power plants
- Net energy zero facilities

DER: growing in volume and diversity in response to myriad forces

Policies to diversity supply portfolios

- State RPS
- EE, DR, storage procurement targets

Greater availability and declining costs of technologies

- Declining cost of PV; EVs, residential storage; commercial micro-grids; building automation systems; smaller-scale DG

Customer choices

- Efficiency; automated DR
- Need for local resilience to major grid/supply disturbances
- Customized supply options (green, terms/conditions)

DER growth is changing the electric industry in significant ways

Growing DER participation in ISO/RTO wholesale markets

- Volume of small resources will present challenges for metering, modeling and real-time grid operation
- Combinations of different DER form virtual power plants that participate as a single source

Increasing share of end-use energy is produced locally

- Without relying on the grid (DG)
- In the future, will rooftop PV + storage bypass distribution grid altogether?

Micro-grids and local systems able to island

Substantial re-thinking of traditional ways of doing business

Utility revenues based on kWh are declining

- RPS grid parity (nearly there)
- Behind-the-meter and net-energy-metered production
- Per capita decline in consumption despite explosion in electronic devices

Infrastructure challenges

- How do utilities and regulators ensure continued financial stability?
- How do utilities and regulators modernize distribution grids in fair and prudent manner?

Operational and market challenges

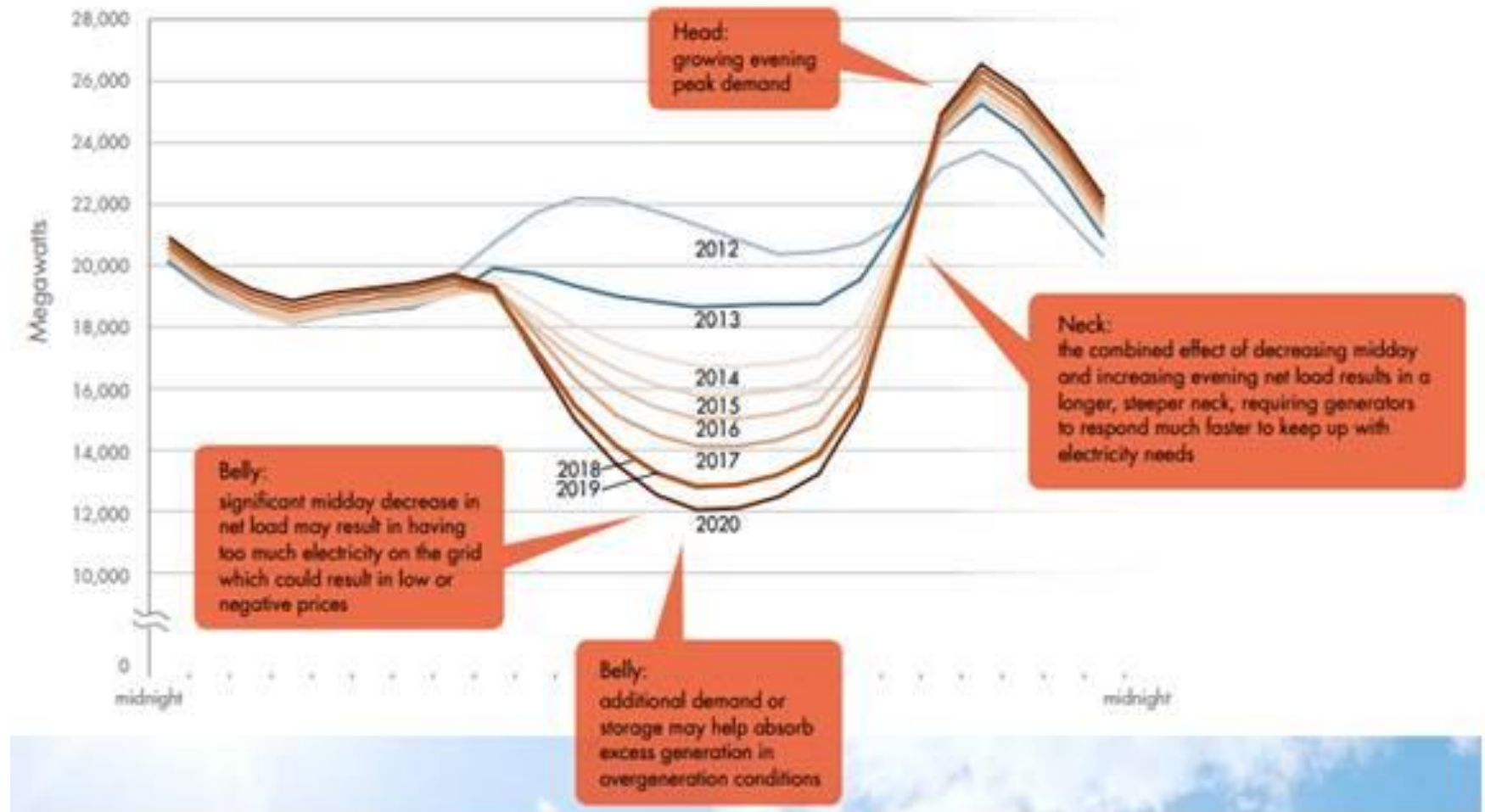
- How do we redefine roles and responsibilities when the retail and wholesale sides merge together?

Regulatory challenges and opportunities

- How do we maintain grid reliability in negative pricing environment?

CAISO provides an example

The Duck: The California ISO's Flexibility Curve



(the ISO's *Building A Sustainable Energy Future; 2014-2016 Strategic Plan*)

Additional policy considerations

New revenue models that emphasize balancing & flexibility (vs. current kWh sales / delivered model)

- Energy visibility and dynamic pricing tariffs
- Quantify and recognize measured energy savings from code adoption
- Integrate situational awareness into the distribution grid
- Charge DER/loads that add variability to grid; Compensate DER/loads that help manage variability

Greater regional coordination & integration

- No one state can address all issues by itself
- Regional congestion management provides system reliability and may help reduce costly new grid infrastructure

Thank you!

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