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Energy solutions  
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# Regulation to accelerate smart grid investment, development and application

**IEA Smart Energy Systems Roadmap  
Scaling up Smart Energy Systems**

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March 1<sup>st</sup>, 2016, PARIS

**The Regulatory Assistance Project (RAP)<sup>®</sup>**

## About RAP

The Regulatory Assistance Project (RAP) is a global, non-profit team of experts that focuses on the long-term economic and environmental sustainability of the power sector. RAP has deep expertise in regulatory and market policies that:

- Promote economic efficiency
- Protect the environment
- Ensure system reliability
- Allocate system benefits fairly among all consumers

Learn more about RAP at [www.raonline.org](http://www.raonline.org)

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### **The Regulatory Assistance Project (RAP)<sup>®</sup>**

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# Path to smart goals using the smart grid

1. Long term requirements and pace of change - the need for foresight and dealing with uncertainty
2. Reveal the value of flexibility & energy efficiency
3. Engage consumers
  - Oblige, incentivize and enable actors to use smart grids
4. Oblige, incentivize and enable actors responsible for delivering smart grid infrastructure

# 1. Long term requirements and pace of change: the need for foresight and dealing with uncertainty

- ✓ The smart grid as a flexible and robust platform, not an end-state
- ✓ Smart objectives and smart policies before smart grids
  - Affordable energy transition through cost effective integration of clean distributed energy resources
  - Targets for GHG reductions, renewables and energy efficiency, decarbonisation of heat and transport
  - Clear (binding) commitments to pace of change
  - Coordinated and coherent policies:
    - Coordinated ambition and timelines
    - Exploit synergies and optimise trade offs
    - Cross-sectoral coordination

## 2. Reveal the value of flexibility and energy efficiency

- Wholesale power markets with quality price signals in all timescales
  - ✓ Prices that reflect scarcity and surplus (with preconditions)
- Network tariffs & locational pricing
  - ✓ Tariffs to promote DER services
  - ✓ Prices that encourage efficient siting of energy resources
- Overcome market barriers by creating value for energy efficiency through regulation:
  - ✓ Embed Efficiency First principles in legislation (e.g. planning)
  - ✓ Energy efficiency obligations

# 3. Engage consumers

- a. Informed choice but keep it simple
- b. Enablers through automation and agents/aggregators
- c. Ensure consumers have fair access to the value of flexibility and energy efficiency
  - i. Rights/option for the demand side to participate in wholesale markets
  - ii. Oblige, incentivize and enable actors who can use smart grids to capture value and ensure this value is fairly passed on to customers
- d. Protection

## 3.c Ensure consumers have fair access to the value

**Oblige, incentivize and enable actors who can use smart grids to capture value and ensure this value is fairly passed on to customers**

### I. System/network operators:

- i. revenue regulation that incentivizes use of smart grid to achieve goals
- ii. competitive procurement of all cost effective resources
- iii. network tariffs that incentivize efficient consumer behavior (both system efficiency and energy efficiency)
- iv. ensure all potential users of DER services can fairly access them

### II. New entrants - ensure non-traditional energy resources and new or small market actors can access value (of flexibility/energy efficiency) and compete on a level-playing field

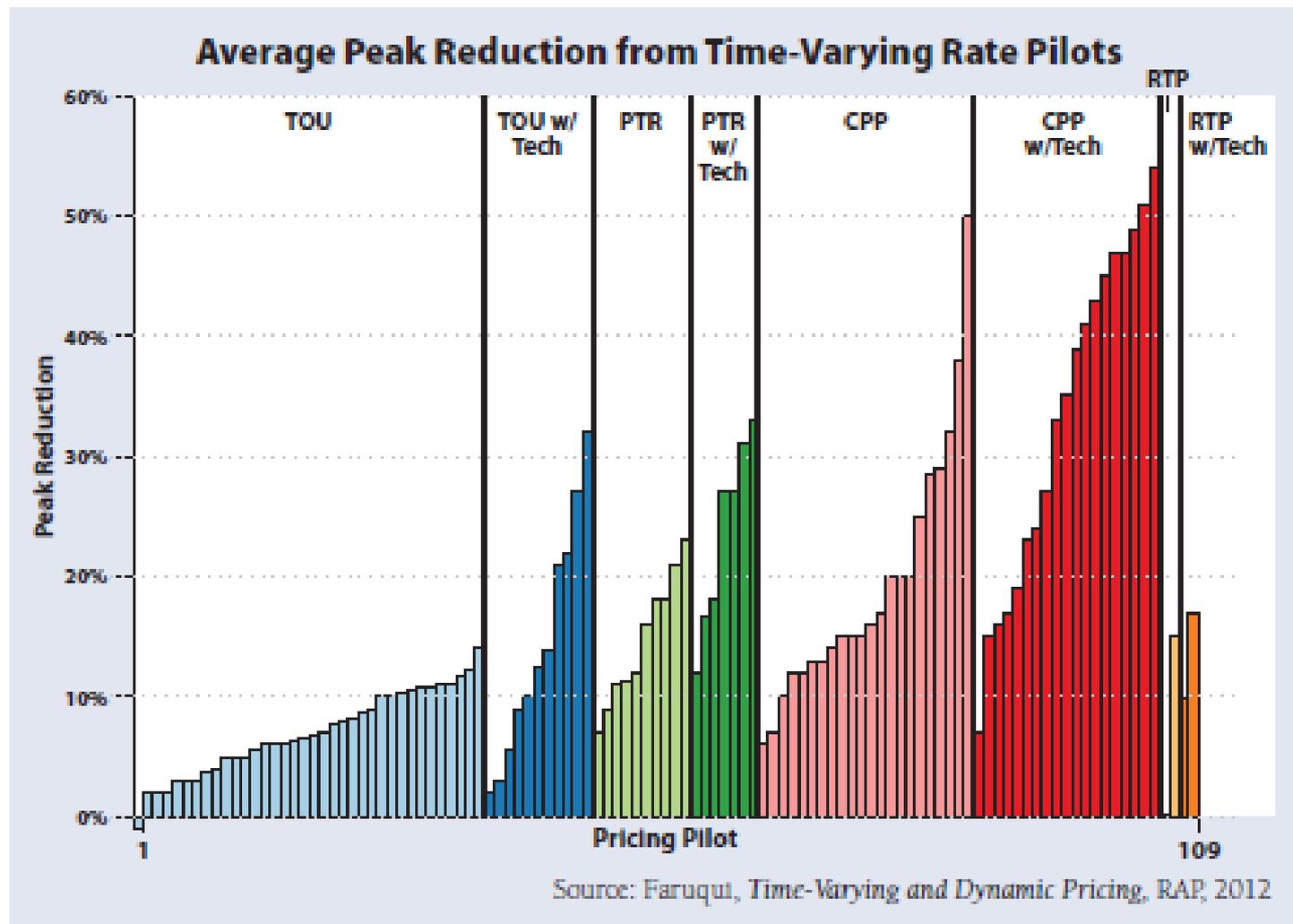
### III. Incumbent suppliers/retailers – ensure competitive markets but if value not passed on to consumers then intervene (e.g. oblige time-varying pricing options)

# Principles for smart network tariffs (incentivise customers, promote DER services)

- **Universal Service:** A customer should be able to connect to the grid for no more than the cost of connecting to the grid.
- **Time-Varying:** Customers should pay for grid services and power supply in proportion to how much they use and when they use it.
- **Fair Compensation:** Customers supplying power to the grid should be compensated fairly for the value of the power they supply.

*Bidirectional, time-sensitive prices that more accurately reflect costs most closely align with the principles of modern rate design. Fixed charges and poorly designed demand charges do not align well with these principles.*

# Consumers do respond if incentivised and enabled



## 4. Oblige, incentivize and enable actors responsible for delivering smart grid infrastructure

- I. Determination of revenues for network operators (or vertically integrated utilities)
- II. Access to finance for grid modernization
  - development banks (smart criteria for lending);
  - carbon trading scheme revenues
- III. Obligations/targets/standards:
  - roll out of smart meters, energy management systems
  - capabilities of smart grid platform and equipment interfacing with platform e.g.:
    - equipment/appliances in buildings
    - electric Vehicles

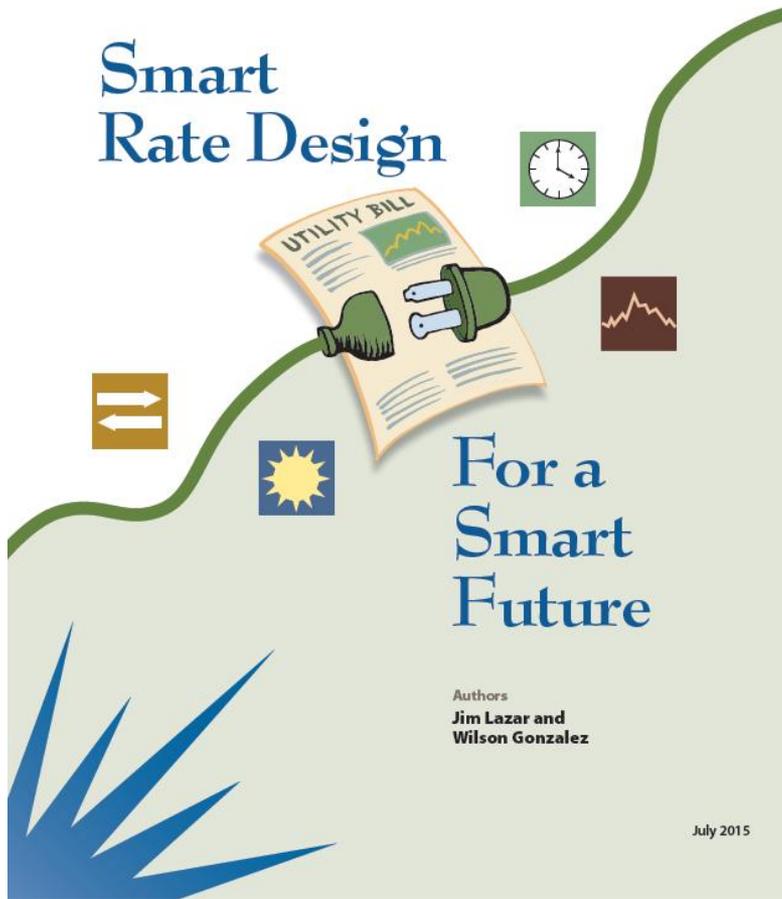
# Principles for setting revenues of regulated network operators (incentivising the network operator)

1. Decouple revenues from sales/throughput
2. Remove/minimise capex bias
3. Link revenues to performance
4. Manage risk (promote innovation)
5. Well designed adjustment mechanisms that ensure timely and sufficient recovery of revenues

# Smart grid performance indicators - example

		Year 0	Year 1	Year 2	Year 3
SG1	Percent of commercial consumers greater than 100 kW with smart meters	0	10%	50%	100%
SG2	Percent of commercial consumers less than 100 kW with smart meters	0	0	10%	30%
SG3	Percent of residential consumers with smart meters	0	0	0	10%
SG4	Percent of distribution substations with smart grid controls	0	10%	20%	30%
SG5	Percent of distribution circuits with smart grid controls	0	0	10%	20%
SG6	Percent of commercial consumers > 100 kW with interval data collected in mdms	0	0	10%	50%
SG7	Percent of commercial load enrolled in demand response programs	0	5%	15%	25%
SG8	Percent of total peak demand enrolled in demand response programs, including critical peak pricing	0	2%	5%	15%

# Thank you!



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