Making money out of the Smart Grid

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Overview

1. How do electricity markets operate today?
2. What may be different about a smart grid market?
3. Why aren’t grids and markets “smarter” now – what is stopping us?
An electricity market

24 hrs before delivery

- Generators, suppliers and traders buy and sell electricity
- Forward/ futures contract market
- Short term bilateral market

Gate Closure

- System operator balancing
- Balancing mechanism bids and offers
- Ancillary services

Final notifications

Delivery

- Imbalance settlement
Who makes money from electricity today?

- Network owners
- System operators
- Generation asset owners
- Traders
- Suppliers
Who participates in electricity markets?

Up to gate closure…

Buying and selling generation
OTC/ bilateral/ pool/ exchange trading
Balancing within portfolio
Forecasting (not controlling) demand
Who participates in electricity markets?

After gate closure...

Balancing actions
Centrally controlled
Bids and offers to balancing mechanism
Highly regulated

System operators

Large controllable generators

Large controllable demand
Who pays?

Consumers
How could a smart grid be different?
Who could participate in a smart grid?

Medium consumers
Small consumers

Energy storage
Electric vehicles

Traders and ESCos

Distribution system owners and operators

Large consumers

Large controllable Distributed
Variable Small

Suppliers

Transmission network owners and operators
What is new in a smart grid?

- More real time metering
- More demand management
- More smart appliances
- More energy storage
- More electric vehicles
- More variable generation
- More distributed energy
- More small generators to offset demand
- More ability to isolate micro grids
- More sensors
- More control
- Nothing?
A smart appliance?

- Off-peak energy is stored for later use
- Timing can be controlled by distribution system operator
- Developed in first half of 20th century
- Consumers incentivised through tariffs since 1960s
Possible benefits – why get involved

- Reduce energy bills
- Benefit from difference in peak and off-peak prices
- Payment for grid services
- Lower costs or higher revenue
- Reduce or manage cost of grid constraints or interruption
- Reduce or manage cost of balancing and control
- Reduce energy bills
- Increase payment for generation
- Reduce cost of connecting to grid
- Benefit from difference in peak and off-peak prices
- Payment for grid services
- Lower costs or higher revenue
- Reduce or manage cost of grid constraints or interruption
- Reduce or manage cost of balancing and control
Who pays?

Consumers
Why aren’t grids “smarter” now?
Who will actually participate in a smart grid market?

Now

A few very knowledgeable people

Smart grid

More people with less knowledge

But...

Most people don’t want to think about electricity

Not as exciting as a new car or new TV

Not business critical – won’t get you a promotion

Someone else needs to manage it for them
How could it work in practice?

Suppliers, Traders and Energy Services Companies will have important role

- “Package” electricity services into saleable commodities
- Appropriate charging and payments for electricity and services
- Communicate to consumers and small generation
- Cover up-front costs?

Grid Scale Energy Storage: Technologies and Forecasts Through 2015
www.greentechmedia.com
What is stopping us?

• Market participants and technology are (almost?) there… we know what we want to do

• Why isn’t it happening already?

Market incentives aren’t there yet

• Pricing does not reflect cost of electricity at that point in time

• Distributed generators do not provide services to grid in the same way as conventional generators
What is stopping us?

Barriers in the market?

- Suppliers are large and vertically integrated
- Central control only for large consumers and generators
- Consumers don’t care enough to demand energy services
- High upfront costs of technology and infrastructure
- Strict requirements for grid & system constrain innovation

Governments and Regulators may need to…
- influence the way that markets operate
- cover (some) infrastructure costs
- let participants make money from the smart grid
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