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Load Management Standards Workshop on Smart Grid Activities and Technology

PG&E's Smart Grid Vision

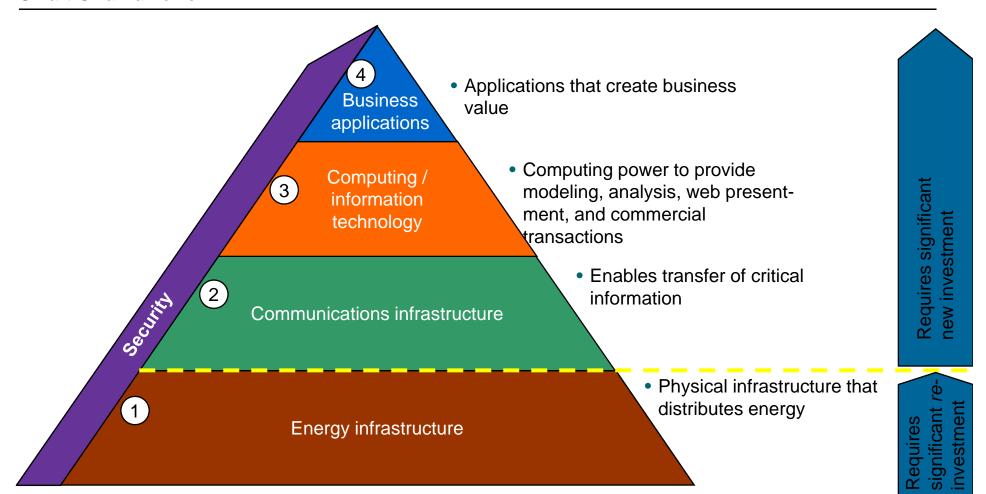
Andrew Tang Senior Director Smart Energy Web April 29 2008



Smart Grid Framework

The Smart Grid integrates energy infrastructure with communications and computing technologies to enable a wide range of customer offerings and grid benefits.

Smart Grid framework

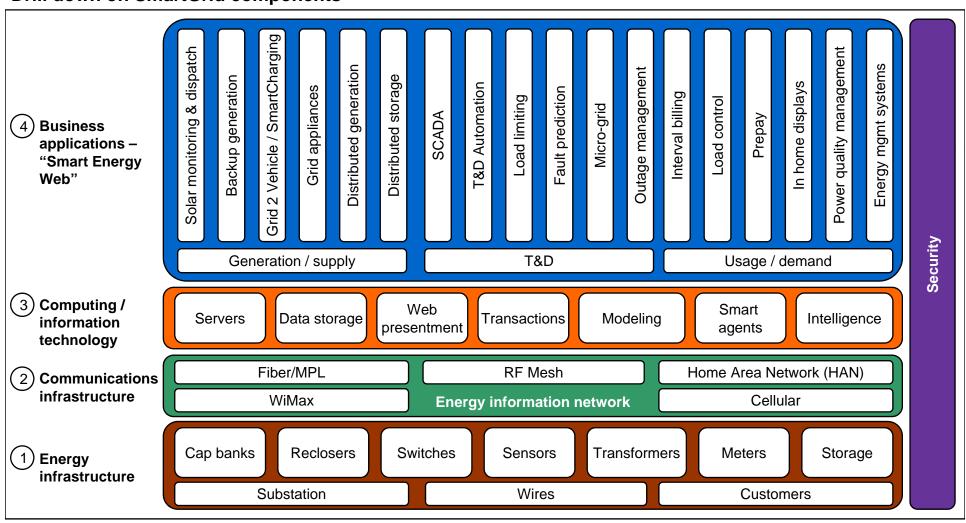




Smart Grid Components

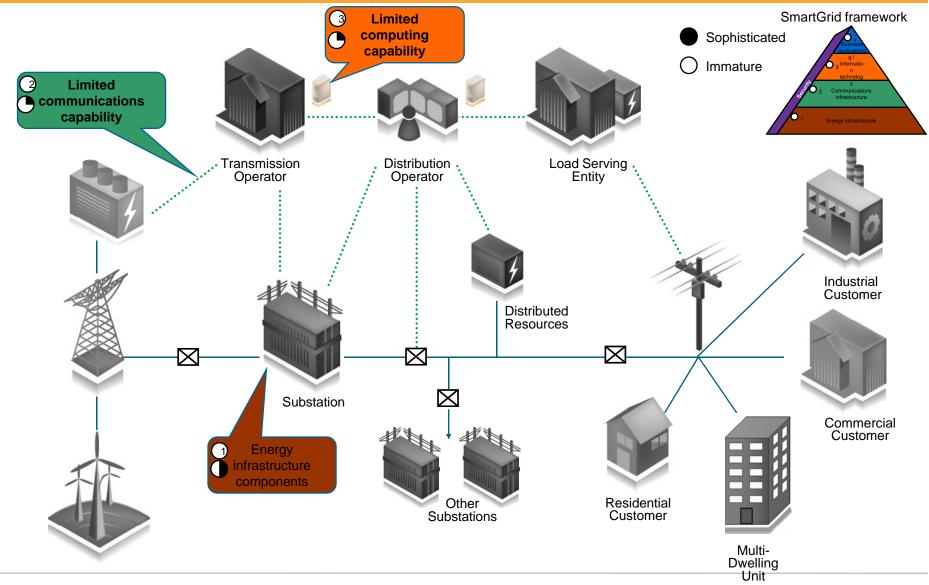
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Drill down on SmartGrid components



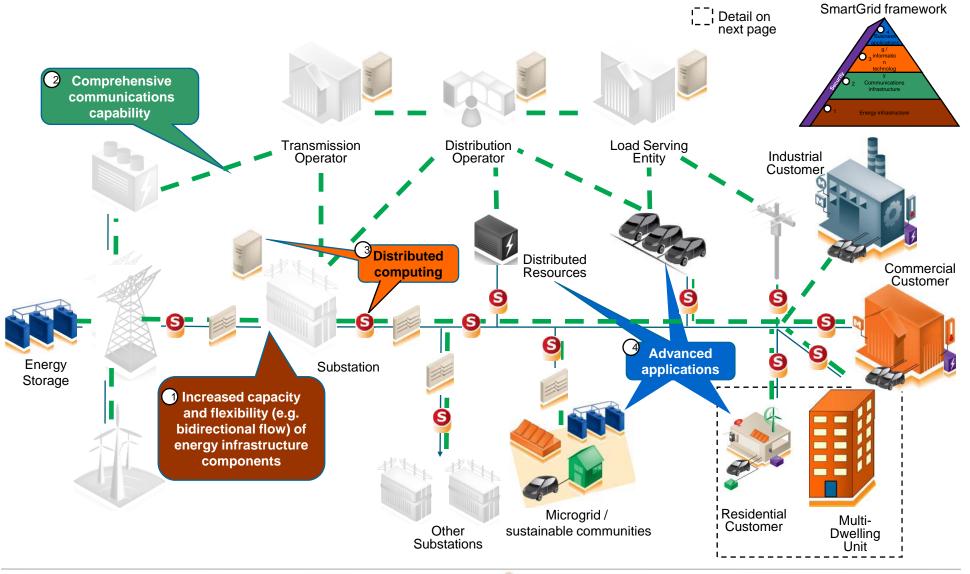


Today's Grid





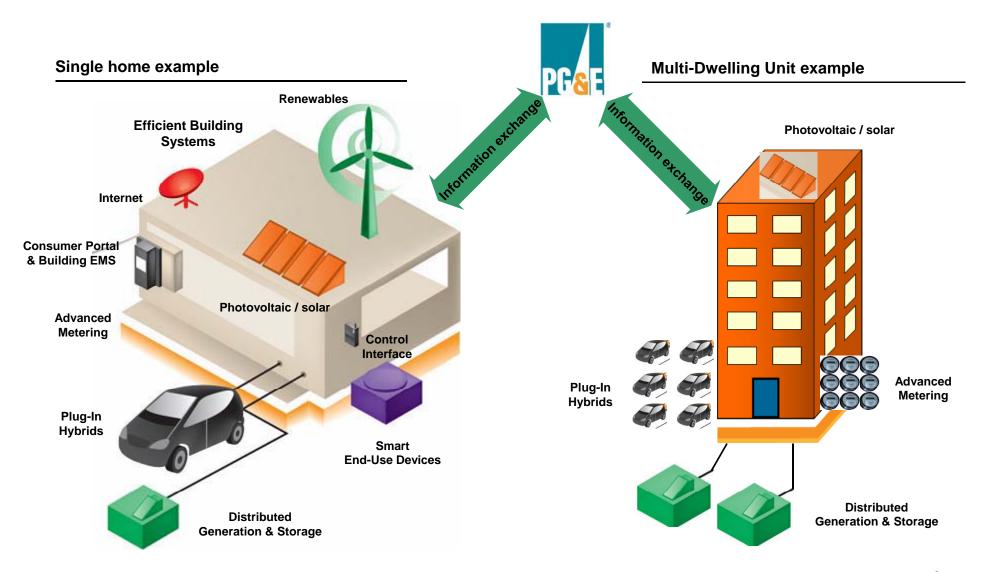
Future Smart Grid







Smart Grid Customer Opportunities





AMI Provides Enabling Communications Layer

Phase 3 - Future Enable future services and foster innovation

Phase 2 – Near term

Transform existing services using advanced communications capability

Phase 1 - Today Integrate existing services to new platform

- Basic energy management system _ Smart Grid

Customer Products and Services

- Interval rates
- Net metering

Utility Operations Benefits

- Meter reading
- Limited disconnect
- Basic load control
- Limited SCADA
- Basic outage management

Customer Products and Services

- Prepay billing options
- In-home displays

Utility Operations Benefits

- Confirmed load control
- Distribution automation
- Advanced outage management
- Load limiting
- Distributed storage and generation
- Backup generation
- Solar generation output
- PHEV smartcharging

Customer Products and Services

- Automated energy management system
- Real-time pricing
- Energy trading

Utility Operations Benefits

- Micro-grids
- Fault prediction
- Distributed battery
- Vehicle to Grid
- PHEV grid ancillary services
- Other distributed generation (e.g., fuel cell technology)

SmartMeter Upgrade network seamlessly exchanges information between utility assets

Time



Why pursue the Smart Grid?

A Smart Grid can enable:

Customer benefits

- Improved service reliability
- Increased power quality management capabilities
- Improved ability to manage customers' total energy costs
- Improved energy efficiency
- Improved distributed and renewable resource and storage integration
- Enables SmartCharging and Grid to Vehicle (G2V)
- Enhanced product pricing options

System benefits

- Improved system reliability
- Improved system efficiency
- Reduced congestion costs
- More effective planning capability
- Enhanced power management
- Continued safety improvements
- Improved integration of renewable and other distributed resources
- Integrated customer products and grid operations "future-proof system"
- Effective integration of microgrids and "sustainable" communities