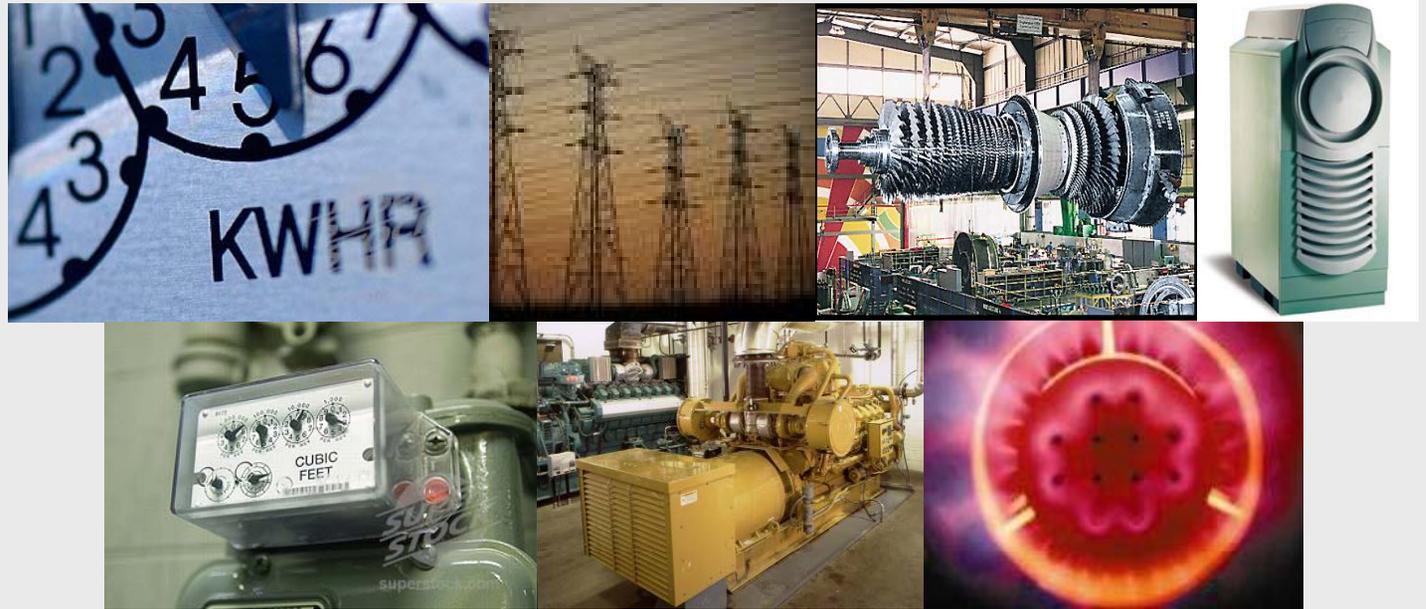


Consumer Benefits for Integrated Energy Systems in the California Smart Grid of 2020



Topics

1. Benefits of Energy System Integration
2. Smart Grid Functionality
3. Optimization of the electric and gas grids
4. Energy efficiency & carbon management
5. GTI Smart Grid activities
6. Conclusions

Benefits of Energy System Integration

- > Lowest-cost energy option for Residential and Commercial customers
- > Maximum information and flexibility for consumer choice
- > Provides additional degrees of freedom for both electric and gas utilities to serve customer bases
- > Facilitates carbon management, integration of renewables and renewable natural gas
- > Consistent with “Net Zero” home

Smart Grid Functionality

- > Natural gas provides 32% of the energy consumed by CA residential and commercial sector and 40% of CA power generation is fueled by natural gas
- > Both systems include options for renewable and zero-carbon energy
- > Current and future appliances and devices can be used to shift load from electric to gas grids in response to price and load signals
- > Smart Grid can accommodate consumer choice or supervisory control to optimize energy delivery

Optimization of the Electric and Natural Gas Grids

- > Ability to aggregate and control distributed resources
 - CHP, Micro-CHP, Micro-grids, District Energy
- > Utilization of waste heat in CHP systems lowers overall energy use, unloads electric grid
- > Distributed Energy becomes an asset on the electric grid vs. competition
 - Minimizes need for new power generation and electric T&D upgrades
 - Localized grid support improves power quality

AMI Enables Energy Efficiency & Carbon Management

- > Real time price signals drive fuel selection, reducing overall energy costs
 - Drives the market for new gas/electric/solar hybrid devices
- > Ability to monitor and optimize energy efficiency and carbon footprint of any given site
- > Ability to quantify gains in energy efficiency and reductions in carbon emissions
 - DSM program validation
 - Pending GHG regulations

Smart Grid Activities

- > Initiating collaborative project with 20+ natural gas or combo gas/electric utilities
- > Defining the operational data and system requirements necessary to support widespread deployment of natural gas fired distributed energy resources
- > Developing a natural gas perspective on the Smart Grid
 - System functionality, benefits and value
 - The role of the utility, energy delivery or energy management?
 - Enabling regulatory frameworks
 - Developing a path forward

Conclusions

- > Natural gas integrated within Smart Grid
- > Real time gas data inputs via AMI
- > Hybrid electric/gas/renewable end-use equipment will increase energy efficiency
- > Software algorithms required to allow site optimization by energy cost, efficiency and/or carbon footprint

Optimization of both the electric and natural gas grids will yield enhanced benefits to the consumer!