ARPA-E Distributed Generation Workshop

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SOUTHWEST GAS
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Southwest Gas Service Territory

1.8 Million Customers

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SWG Responsibility

Deliver solutions to our natural gas customers.

Have real answers

How are we going to do this?

Provide solutions that

Reduce overall use of energy and greenhouse gas emissions

Offer superior user benefits (cost, comfort, convenience, etc.)

Educate Policy Makers and Customers

- **Conserve natural resources and to optimize the efficient use of facilities and resources. In short, deliver the most efficient unit of energy to the customer.**

Regulatory Environment

Aggressive Demand Side Management goals

AZ Energy Efficiency Standard for Gas and Electric

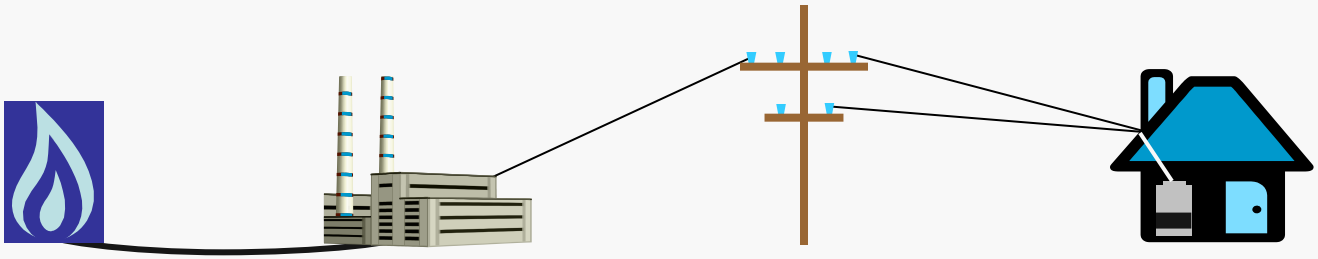
- **Decoupling Policy Statement**

Public Utility Commissioners/Staff and Public interest groups are becoming very engaged in the site vs. source argument

RESOURCE OPTIMIZATION

Site versus Source

100%

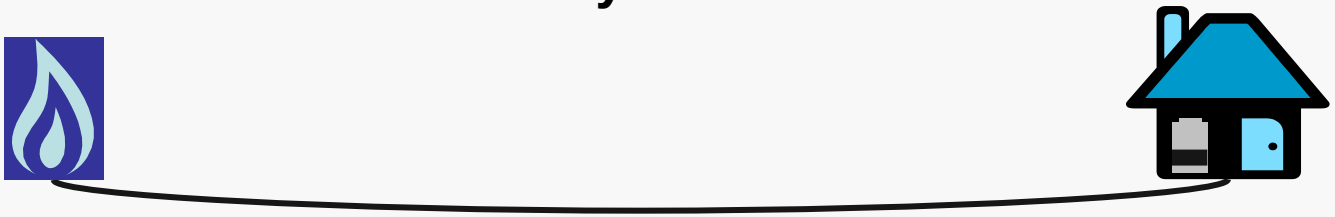


28.9% efficient

ELECTRIC – about 71% lost in generation and transmission

NATURAL GAS – only 4.5% lost in distribution

100%



95.5% efficient

Full Fuel Cycle

Electricity

From the coal mines

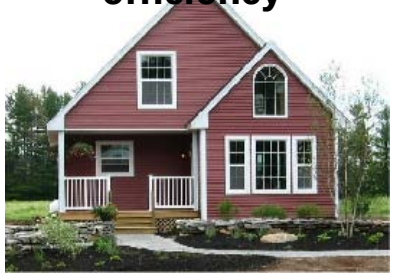
To the coal power plant

To overhead transmission lines at 33% efficiency

To the electric substation

To neighborhood power lines

Delivered to home at 28.9% efficiency



Natural Gas

From the natural gas wells

To the natural gas processing plant

To underground interstate pipelines at 98% efficiency

To the city gate

Delivered to home at 95.5% efficiency

Smarter Greener Better

Using natural gas at the site (home or building) is much more efficient than using it at the source (power plant).

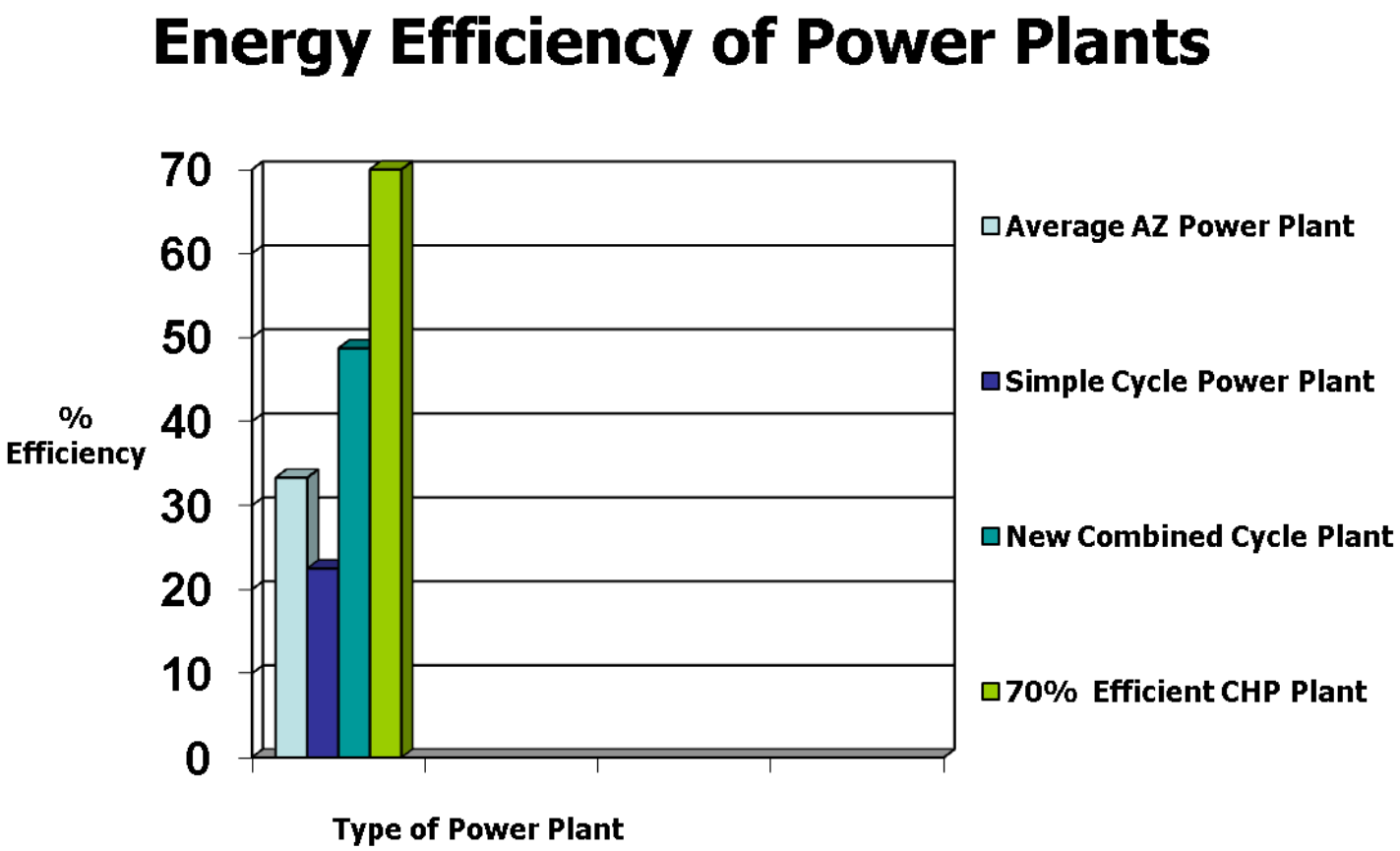
AZ CHP Program

- **$500/kW** for CHP systems with minimum fuel efficiency of **70%,** up to a maximum of 50% of the installed cost of any project.

- **$450/kW** for CHP systems with minimum fuel efficiency of **65%,** up to a maximum of 50% of the installed cost of any project.

- **$400/kW** for CHP systems with minimum fuel efficiency of **60%,** up to a maximum of 50% of the installed cost of any project.

Efficiency: Power Plants



CHP Energy Barriers in Arizona

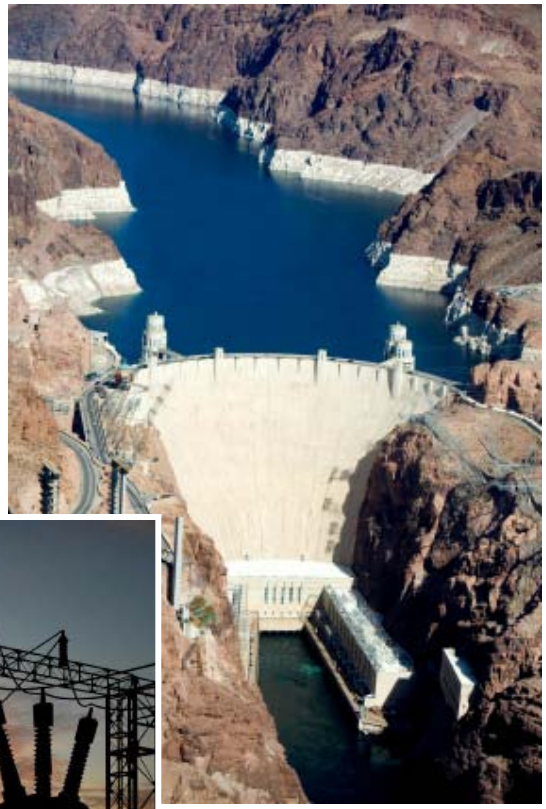
- **Volumetric Rate Design is an Obstacle**
- **National Interconnection Requirements (IEEE #1547) Still Not Adopted**
- **CHP Developers selling to customers is being challenged by electric utilities**

Gas-Fired Heat Pumps (GHP)

- **What is a GHP?**
  - The mechanical system for the heating and cooling cycle is the same as an electric heat pump (EHP)
  - **Main differences are:**
    - A GHP uses a natural gas (or propane) fired engine to drive its compressors instead of an electric motor
    - Captures and uses waste heat from the engine
    - Variable speeds / variable capacity (versus on/off for electric units)
      - Maximizing fuel economy
      - Maximizing comfort

Environmental Merits of Energy Efficiency

- Lower emissions
- Save primary energy
- Smaller carbon foot print
- Ozone friendly
- Water savings




Questions?
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