



**Pecan Street Project Inc.**

# Two energy economies

Electricity

Percentage from  
petroleum:

**0.6** percent

Transportation

Percentage *not* from  
petroleum:

**0.3** percent

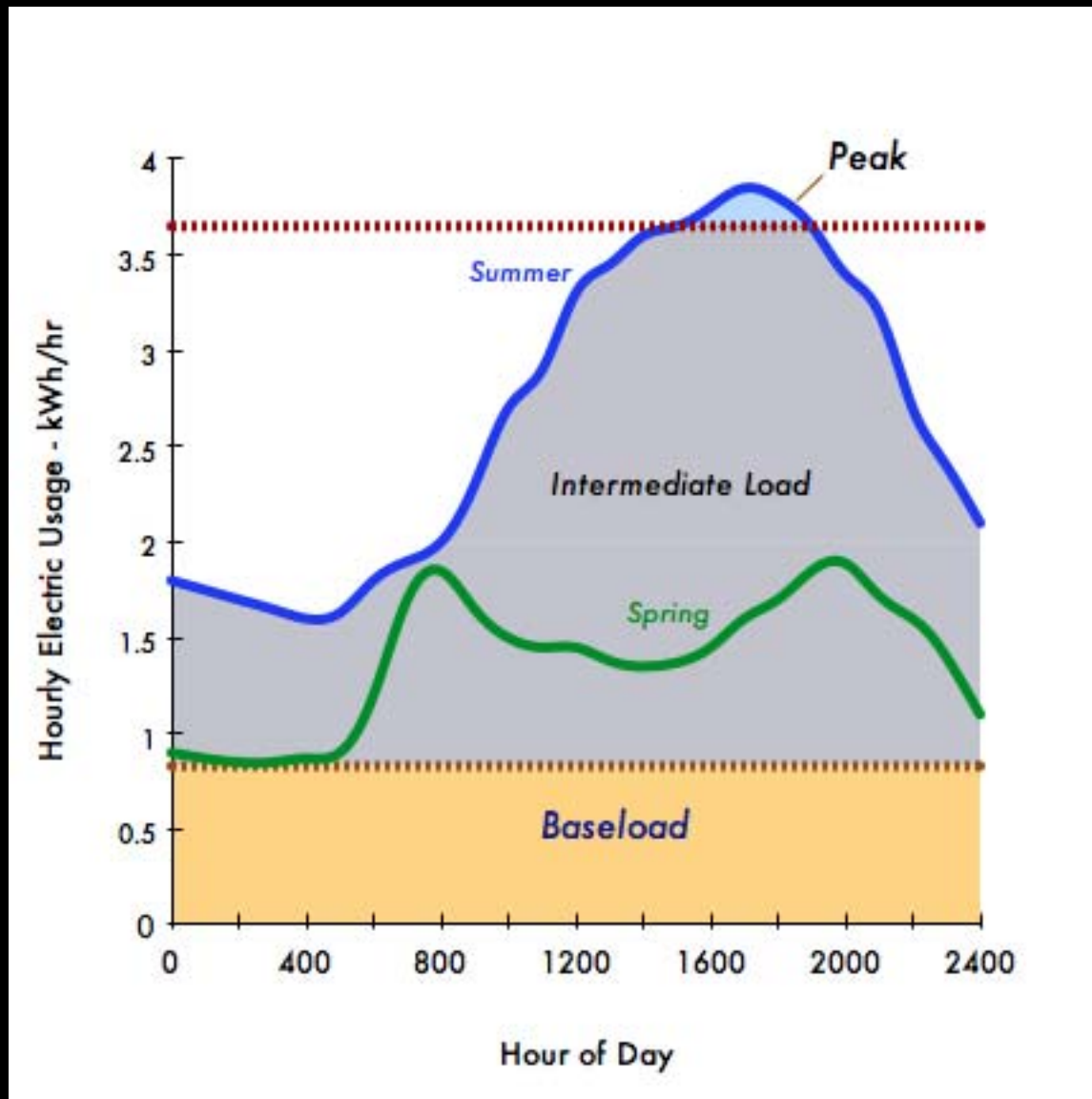
# Challenges in electricity

## Peak demand

Pollution impact

Pricing model

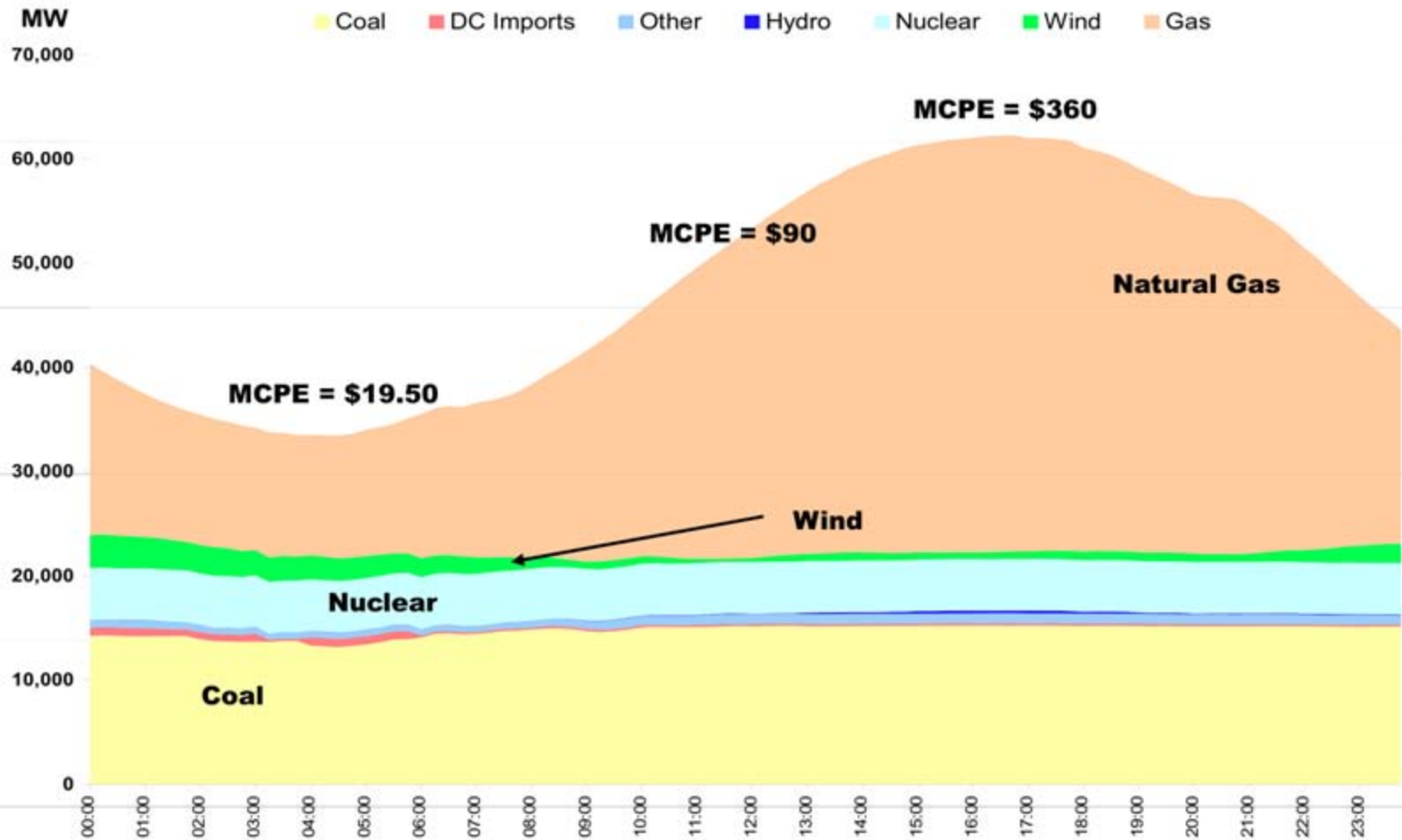
# How customers use electricity



# What this electricity costs utilities

## Summer Day Load Shape with Fuel Mix

### Generation by Fuel - August 4, 2008



# What this electricity costs you

MCPE of \$360 = **42¢** / kW hr

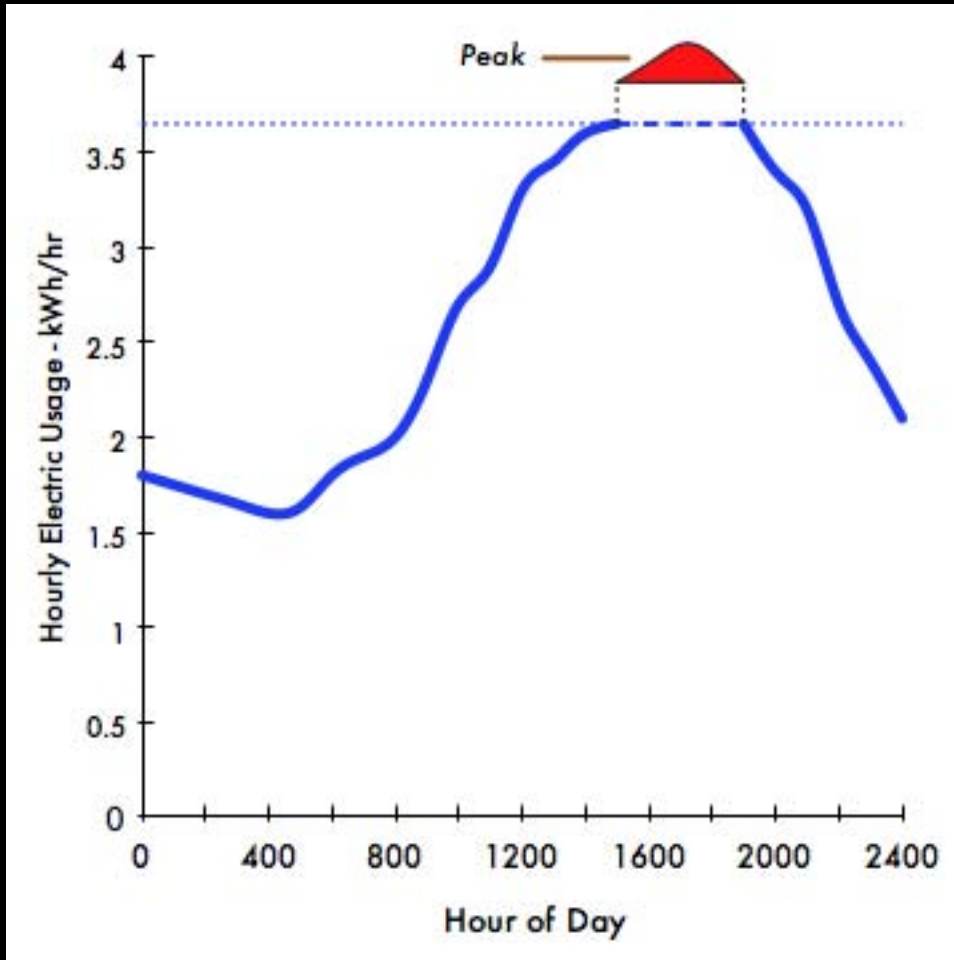
MCPE of \$19.50 = **8¢** / kW hr

Texas average **11.54¢** / kW hr

AE Green Choice  
batch 1 **5.25 ¢** / kW hr

# Status quo

## Build peaking power plant



Construction cost

Interest - construction cost

Transmission lines

Upsize substations

Upsize distribution

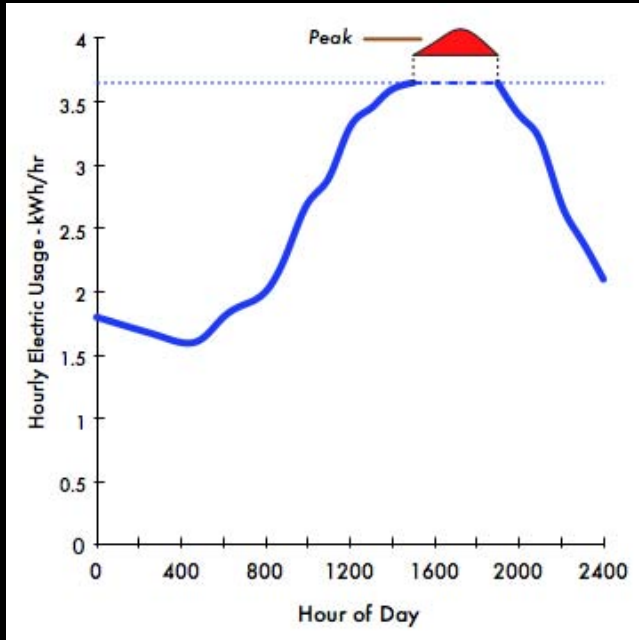
Fuel to burn at plant

Water

Pipelines and fuel transport

Pollution mitigation

# Alternate approaches



Build power plant

Energy Efficiency  
Distributed Generation  
Demand Response

~~Construction cost~~

~~Interest - construction cost~~

~~Transmission lines~~

~~Upsize substations~~

~~Upsize distribution~~

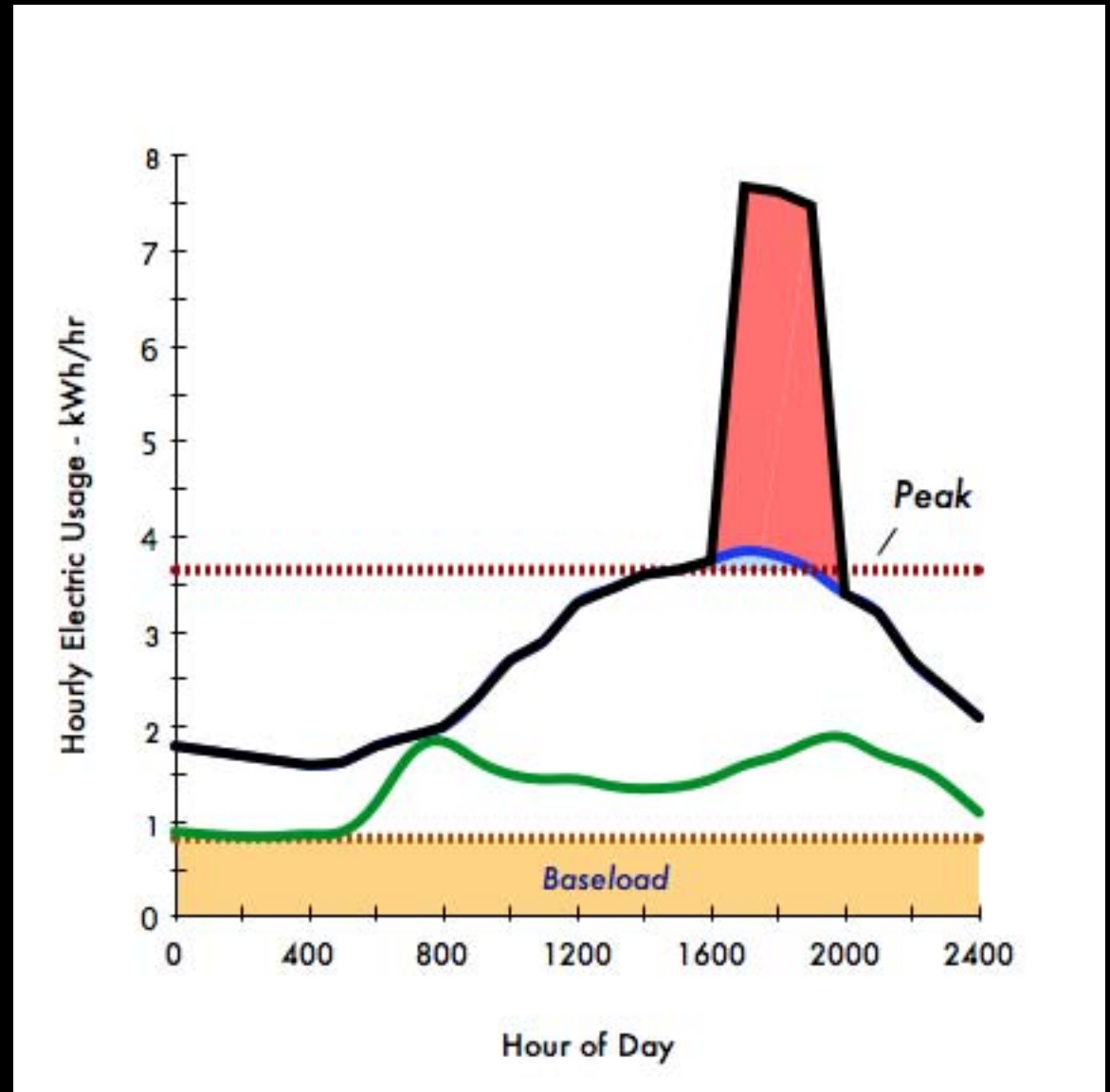
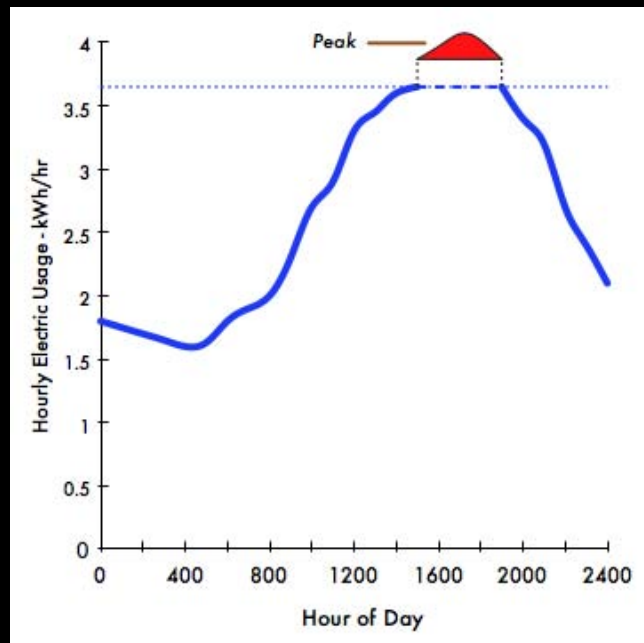
~~Fuel to burn at plant~~

~~Water~~

~~Pipelines and fuel transport~~

~~Pollution mitigation~~

# Electric vehicle impact



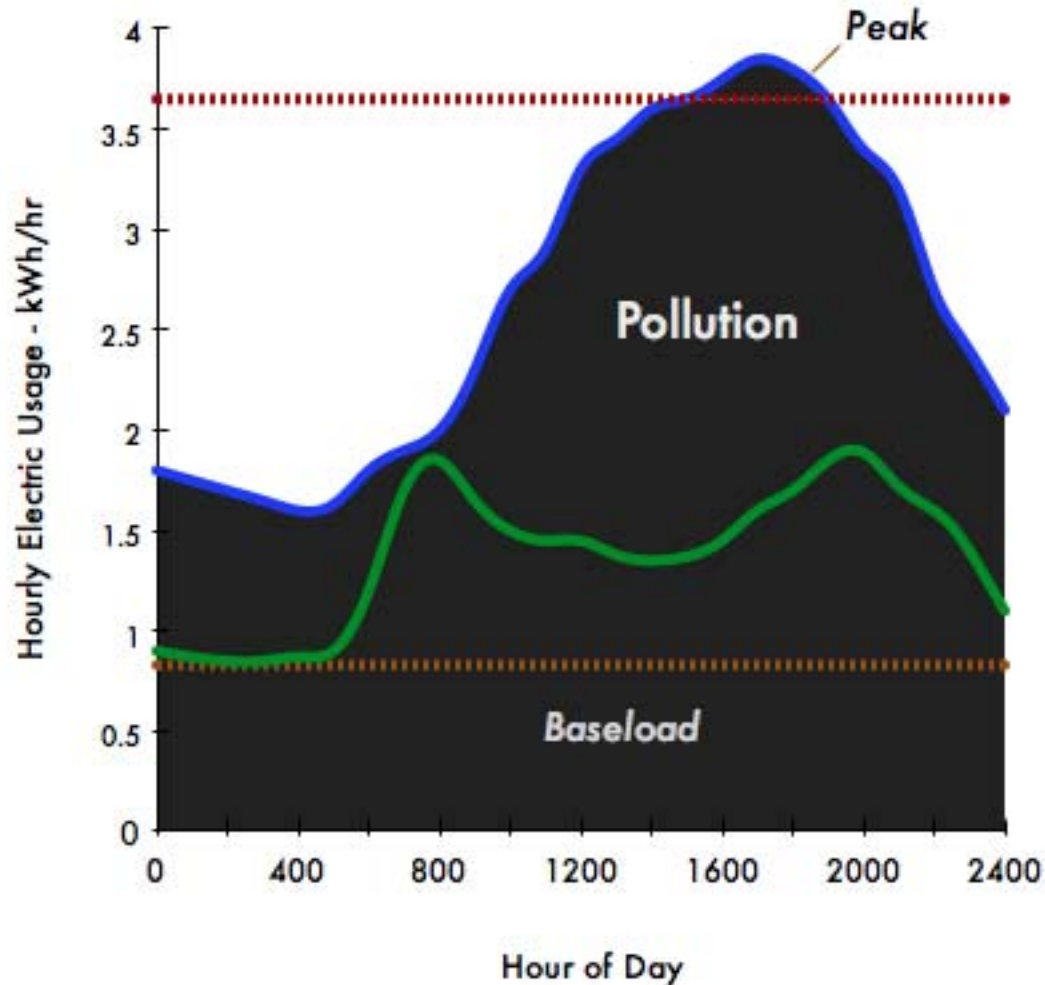
# Challenges in electricity

Peak demand

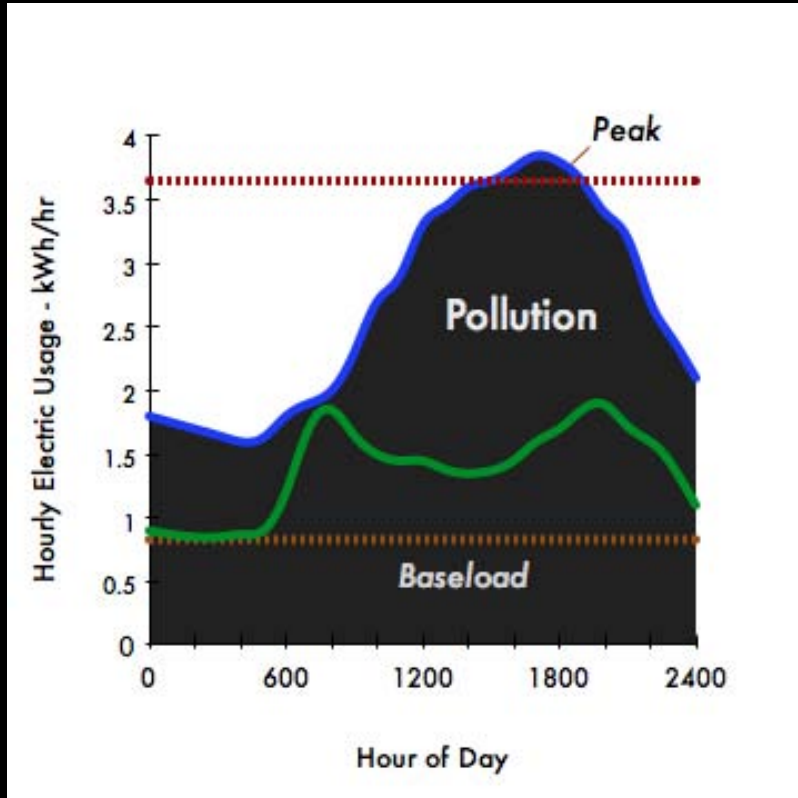
**Pollution impact**

Pricing model

# Pollution challenge



# Options



## Conventional

Nuclear (baseload only)

Wind

Gas-fired plants

Remote solar

Carbon sequestration

Biomass

## Smart grid/ clean energy

Energy efficiency

Green building

Software – system mgmt

Distribution-system solar

Rooftop solar

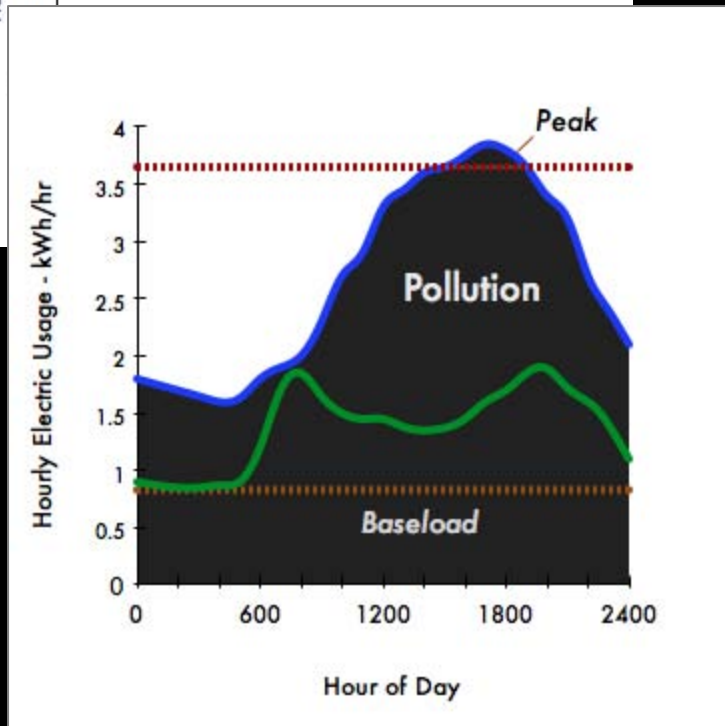
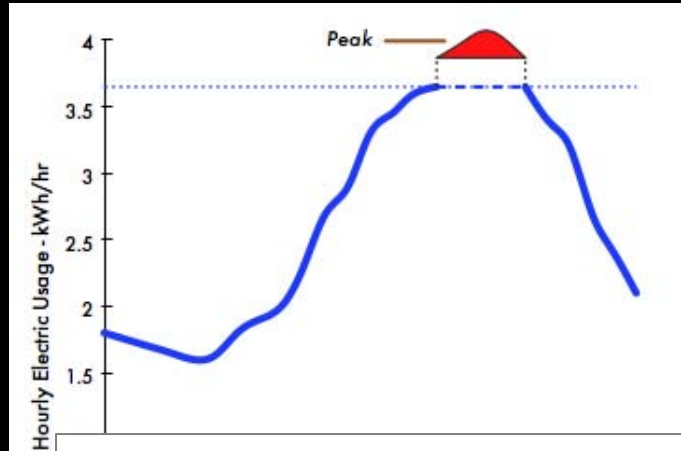
Demand response

Energy storage

Smart meters

CHP, gas micro-turbines

# Solving two problems at once



Energy efficiency  
Green building  
Software – system mgmt  
Distribution-system solar  
Rooftop solar  
Demand response  
Smart meters  
CHP, gas micro-turbines  
New pricing models

**Smart grid**

# Challenges in electricity

Peak demand

Pollution impact

**Pricing model**

# Two components of electricity delivery

**Generation**

**Transmission and distribution**

# Electricity generation cost structure

Costs increase as electricity use increases

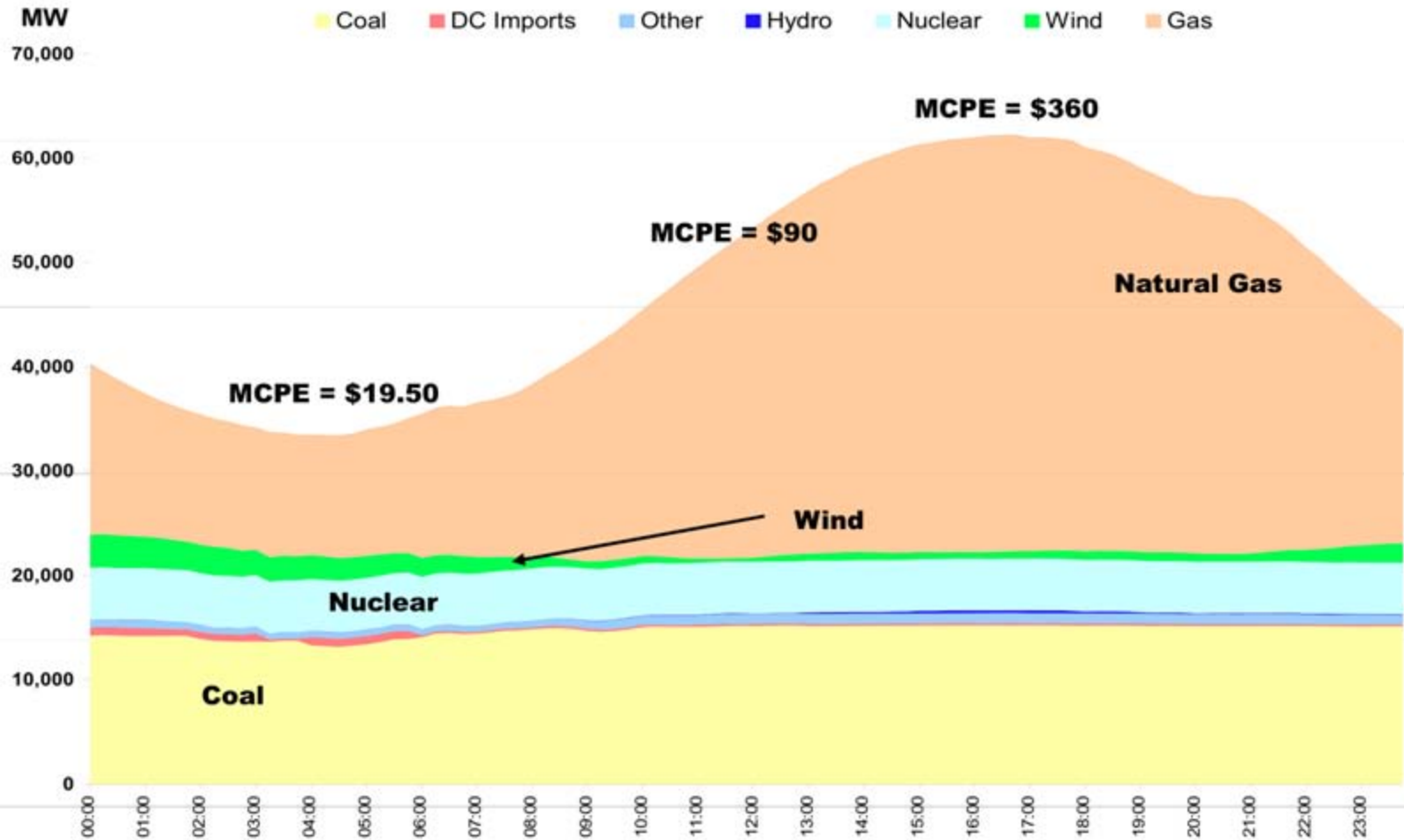
Revenues increase as electricity use increases

*but...*

# What this electricity costs utilities

## Summer Day Load Shape with Fuel Mix

### Generation by Fuel - August 4, 2008



# Electricity generation cost structure

As electricity use increases...

costs increase faster than revenues

*How long can you sell 42¢ electricity for 11¢?*

# Electricity distribution cost structure

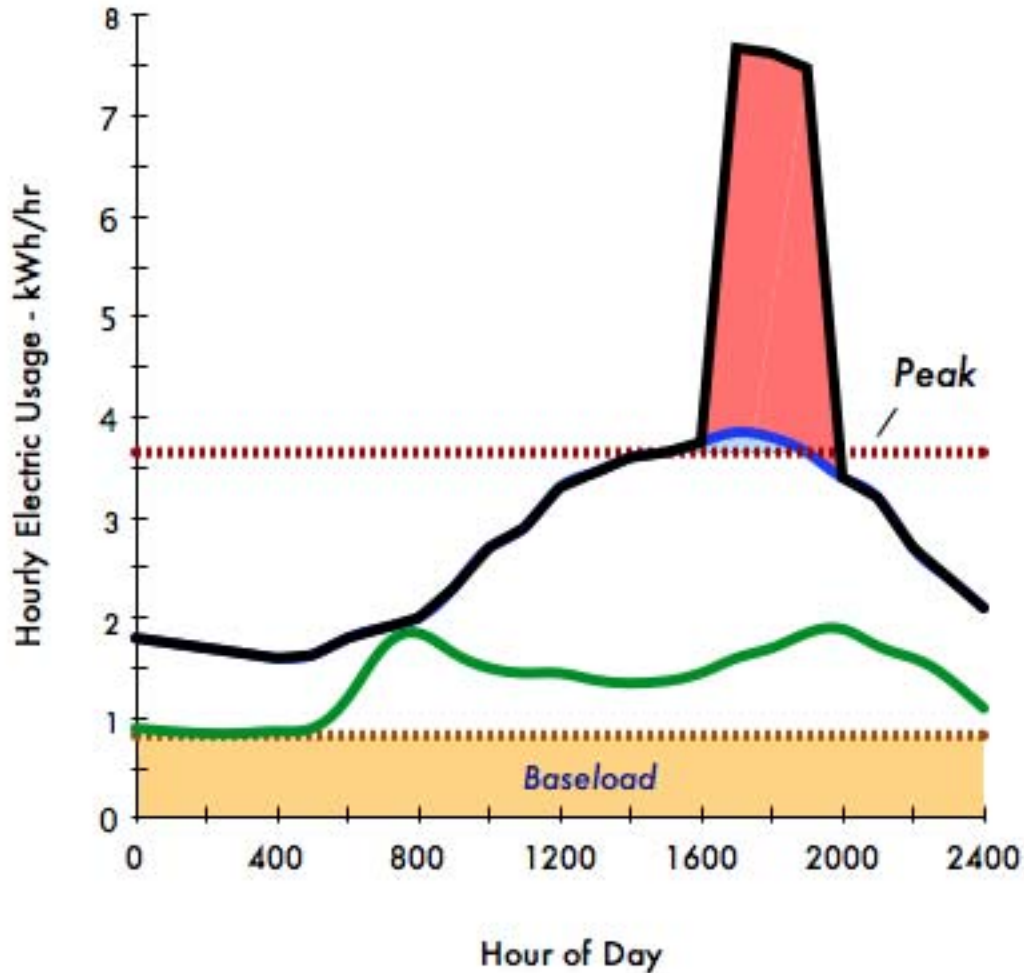
As electricity use increases...

... revenues increase

... costs stay flat

*unless...*

# Electric vehicle impact



# Electricity distribution cost structure

With spikes in electricity use ...

Distribution utilities incur large fixed costs for additional capacity

Additional capacity only used a few hours a year

Additional capacity only produces revenue a few hours a year

*Costs increase faster than revenues*

# Creating dynamic economic sector

Collaboration of

- research university
- private sector
- public sector

Innovate

Create new companies

**Pricing models** that  
reward innovation

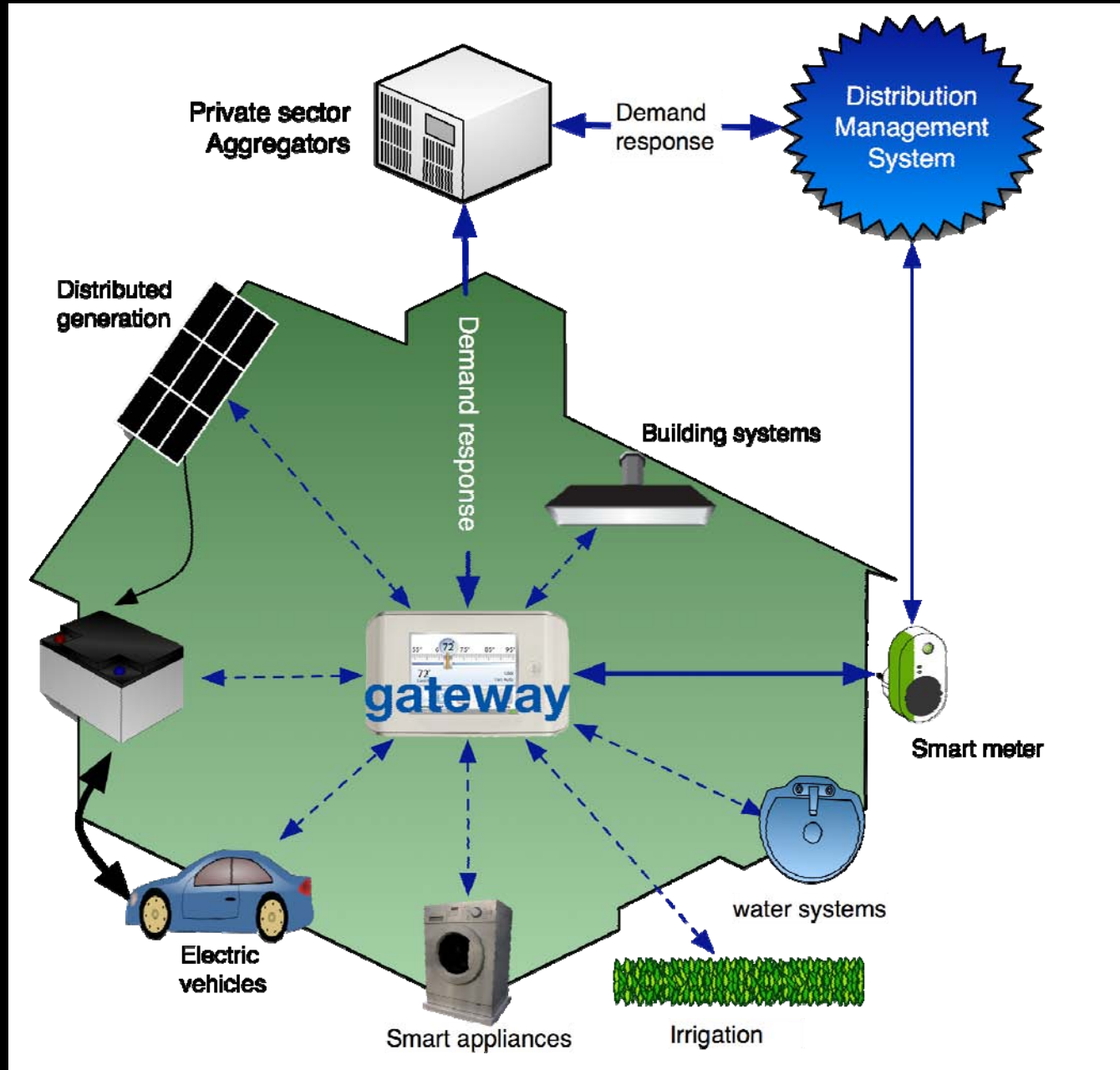


# Austin's Mueller Community



- 711 acre mixed use
- 2 miles from Capitol
- All green-built
- world's first LEED platinum hospital
- reclaimed water system
- native landscaping
- 25% affordable housing
- senior housing
- Critical loads
- CHP gas microturbine
- Chilled water loop

# Electricity's future



# What is electricity's future?

Look at telecom

Distribution-level systems

Decoupled pricing

Energy Internet

# What is electricity's future?

## Disruptive technologies

- Solar (distribution only)
- Electric vehicles

## Core technologies and services

- Advanced batteries
- CHP gas microturbines
- Computer chips embedded in devices
- Software
- Private sector aggregators

# Implications for community building

Increased use of solar (distribution only)

Green building and energy efficiency are financially rewarded

Electric vehicle charging in homes

Urban design and community planning impacts