



**Pecan Street Project Inc.**



## What we do

- Smart grid R&D
- Industry standards – *testing and evaluation*
- Economic analysis
- Pricing model development and testing



## Values and focus

- Customer benefit
- Replicable, scalable – *across market types*
- Environmental progress
- Promote innovation and opportunity
- Data and fact-driven



## Who we are

- Headquartered at UT
- 7 employees
- \$4 M budget • *FY 2010-11*
- 501(c)(3)
- Spend more on UT researchers and grad students than on own salaries





Who we  
are

## Board of directors

- Roger Duncan, *President*
- Tom Edgar, UT, *Secretary*
- Jose Beceiro, Chamber, *Treasurer*
- Isaac Barchas, UT
- Jim Marston, EDF
- Randi Shade, Austin City Council
- Larry Weis, Austin Energy



## Major programs

- Smart grid demonstration project (*DOE*)
- Economic sector analysis (*EDA*)
- Home energy research (*DOE and Doris Duke Charitable Foundation*)



## Major programs

- Home Research Lab
- Industry Standards Cmte



# 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
- CHP gas microturbine
- Chilled water loop



# 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**

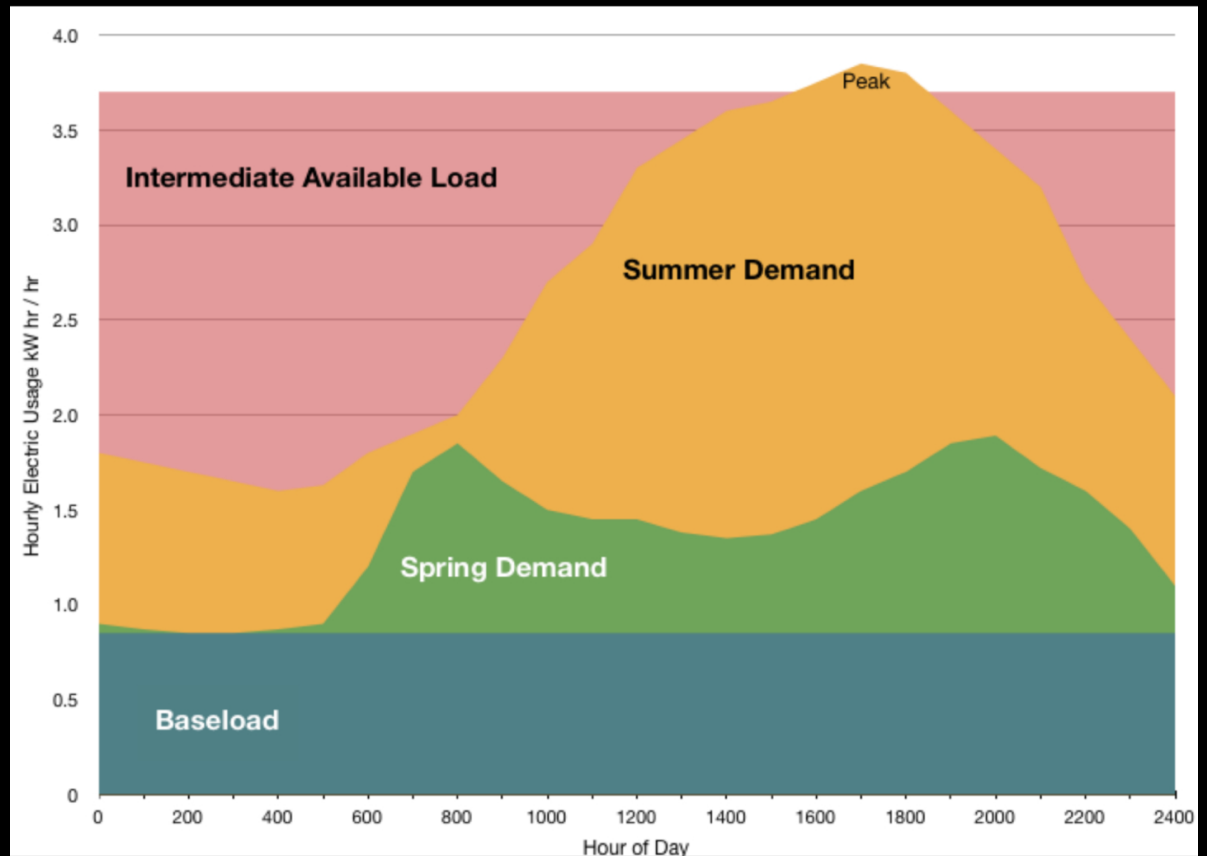
Challenges in  
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**Peak demand**

Pollution impact

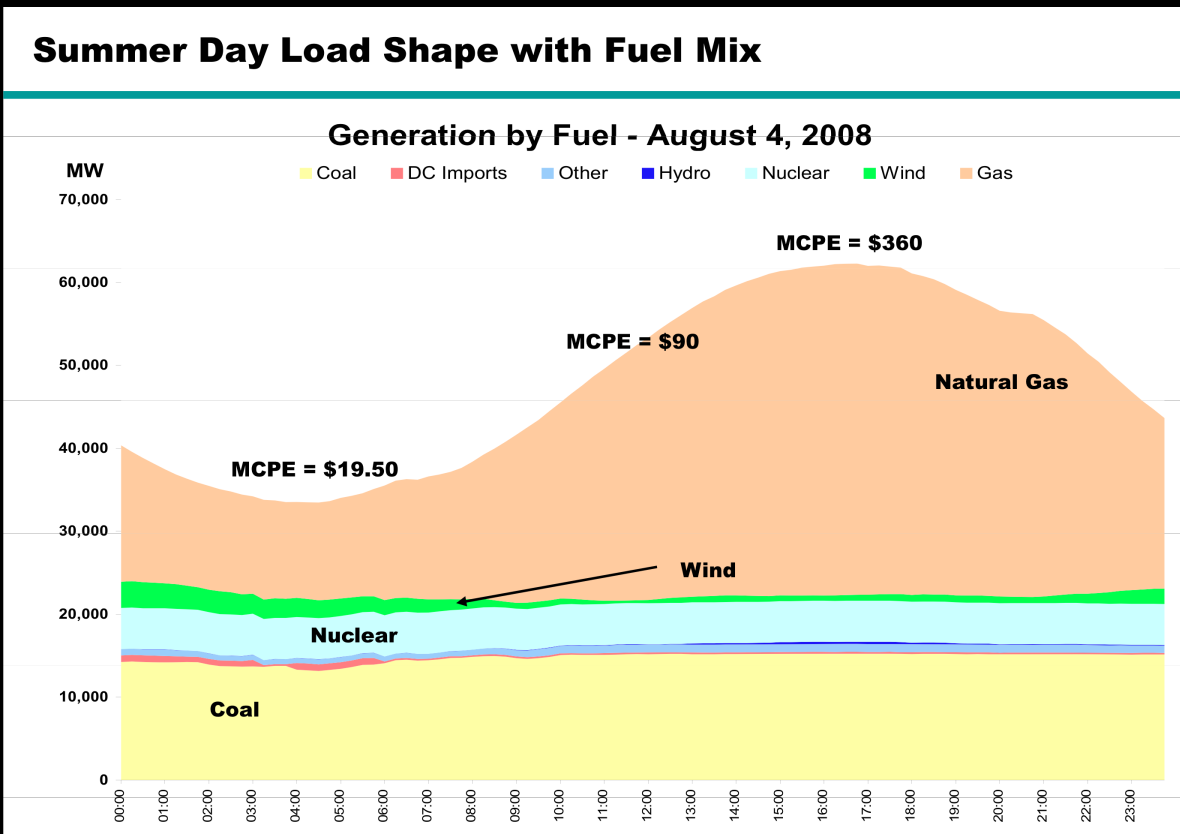
Pricing model

# How customers use electricity





What this  
electricity costs  
utilities



What this  
electricity  
costs you

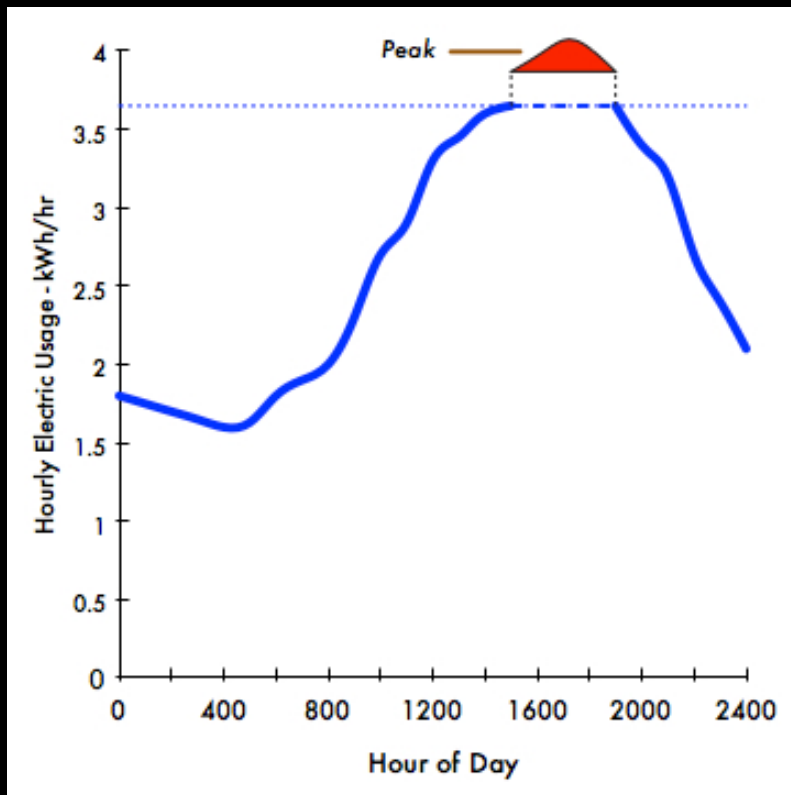
MCPE of \$360 = **40¢** / kW hr

MCPE of \$19.50 = **6¢** / kW hr

Texas average **11.54¢** / kW hr

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

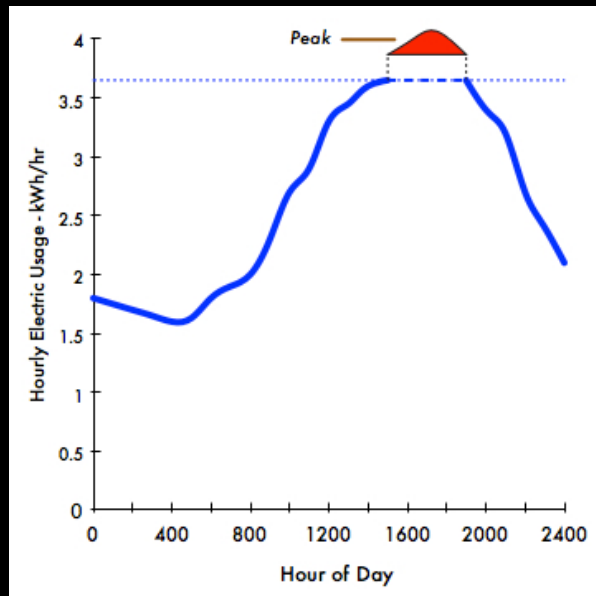
# Status quo



## 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~~

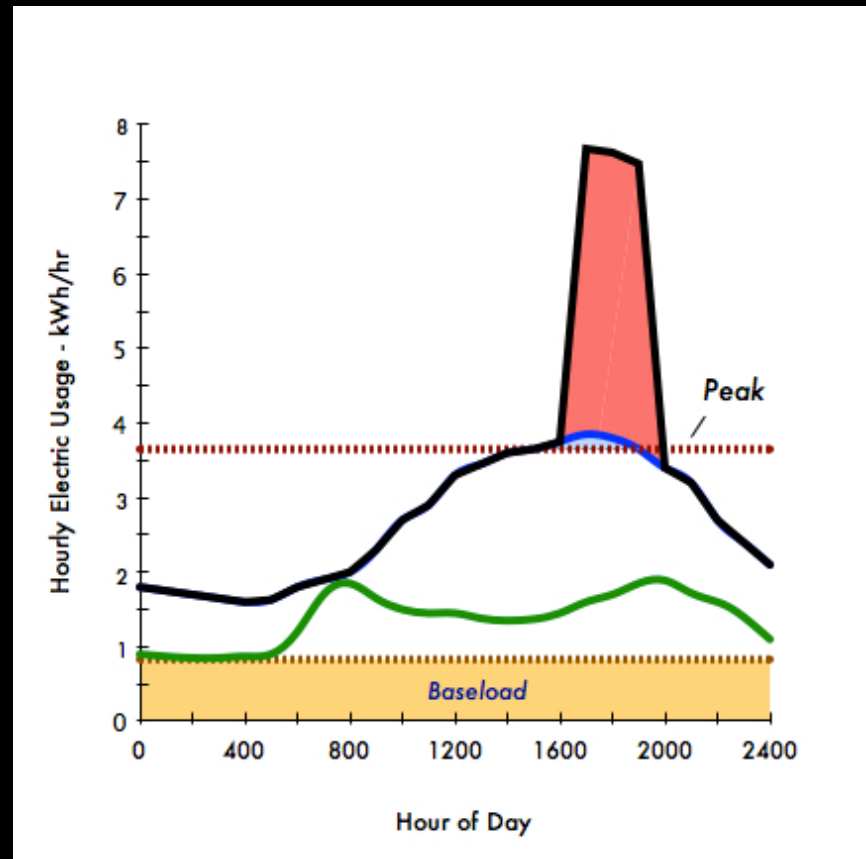
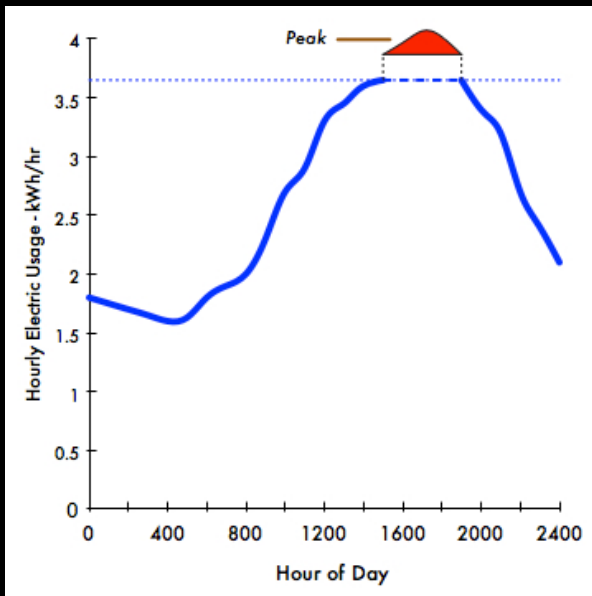
~~Water~~

~~Pipelines and fuel transport~~

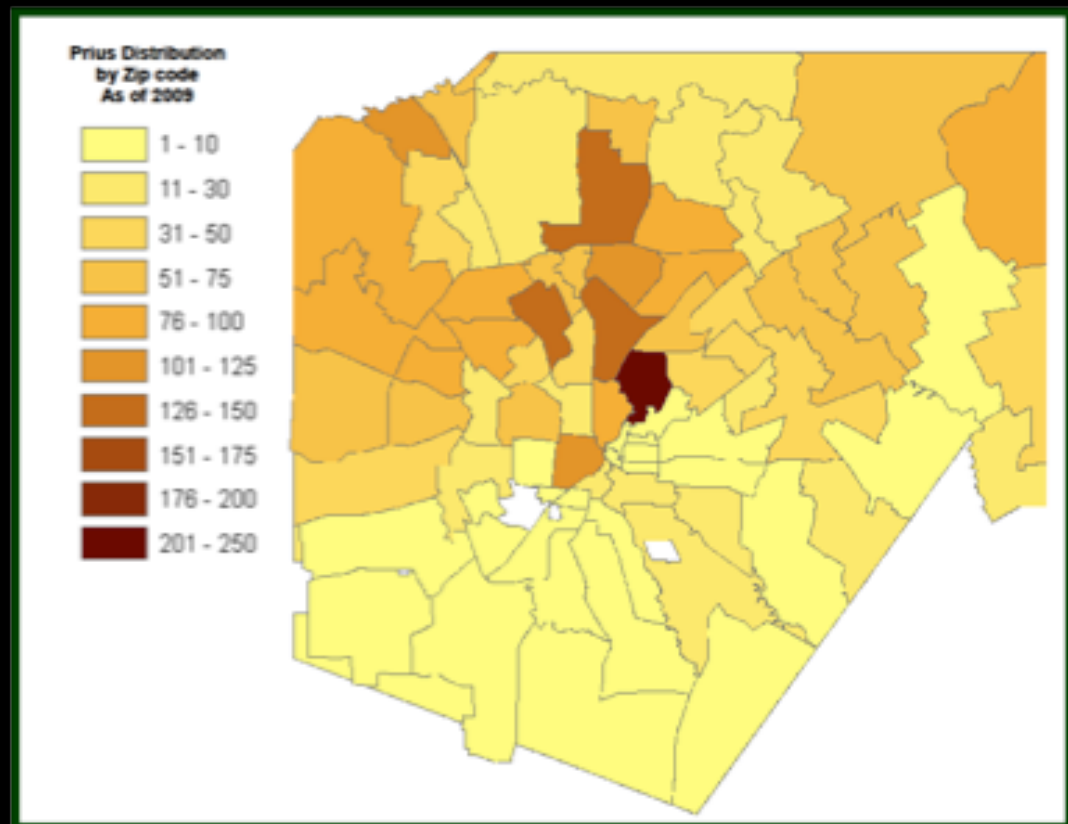
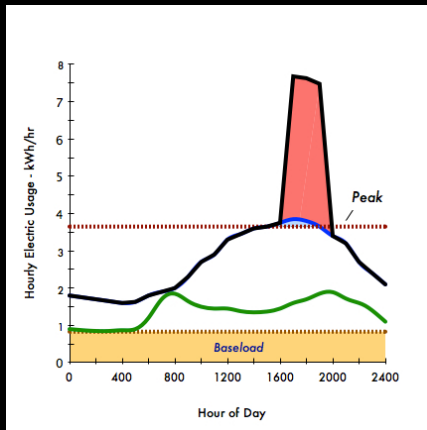
~~Pollution mitigation~~



# Electric vehicle impact



Not all neighborhoods will be impacted equally



*Prus ownership distribution in San Antonio*

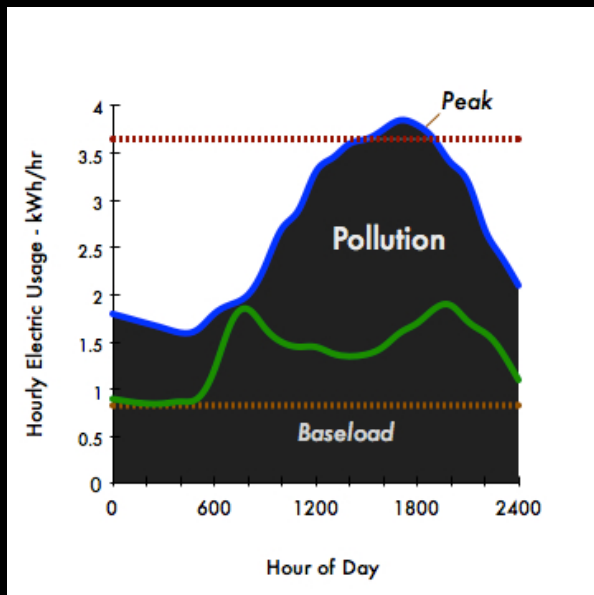
Challenges in  
electricity

Peak demand

**Pollution impact**

Pricing model

# Options



## Baseload

Nuclear  
Coal

## Intermediate

Natural gas  
Coal

## Peak

Natural gas  
Solar (west aligned)

## Partial options

Wind  
Solar (south aligned)

Challenges in  
electricity

Peak demand

Pollution impact

**Pricing model**

Two components of  
electricity delivery

**Generation**

**Transmission**

and

**distribution**

## Retail electricity cost structure

With spikes in electricity use ...

Retail utilities incur costs for peak  
capacity

Additional capacity only used a few  
hours a year

Additional capacity only  
produces revenue a few hours  
a year

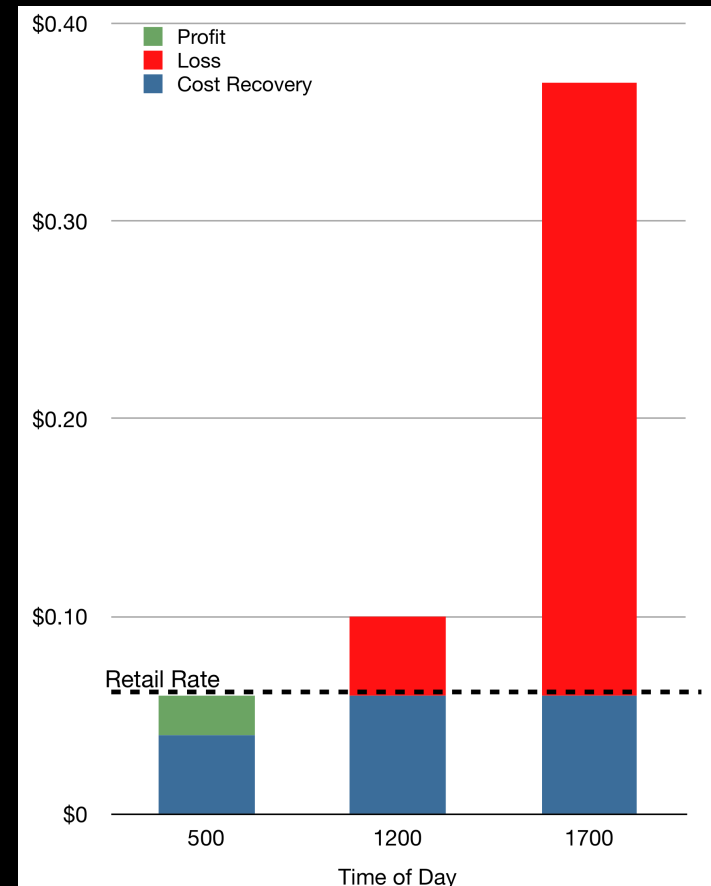
*Peak plants side idle up to  
95% of year*

## Retail electricity cost structure

As electricity use  
increases...

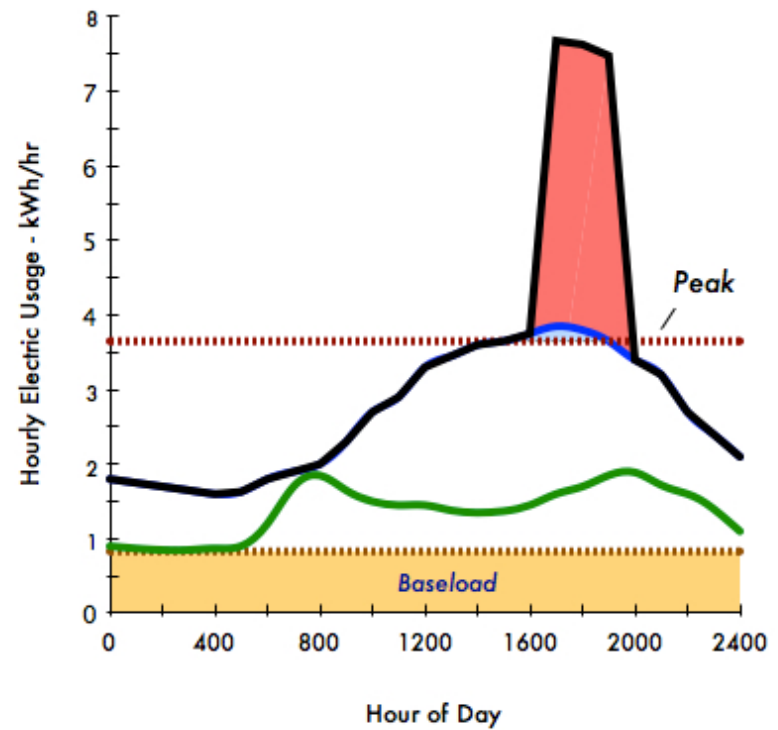
Retail utilities lose money  
selling peak electricity

*How long can you sell 40¢  
electricity for 11¢?*





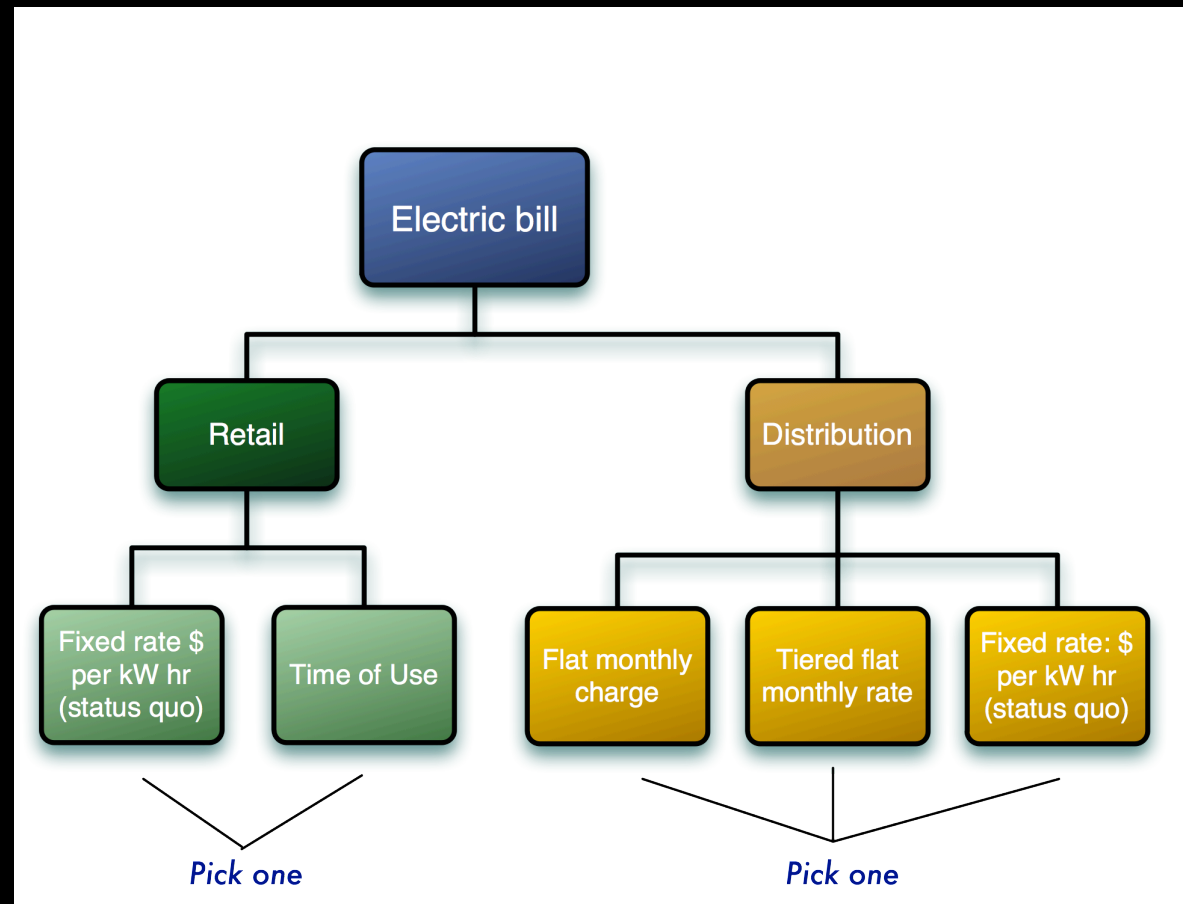
Spikes are coming.





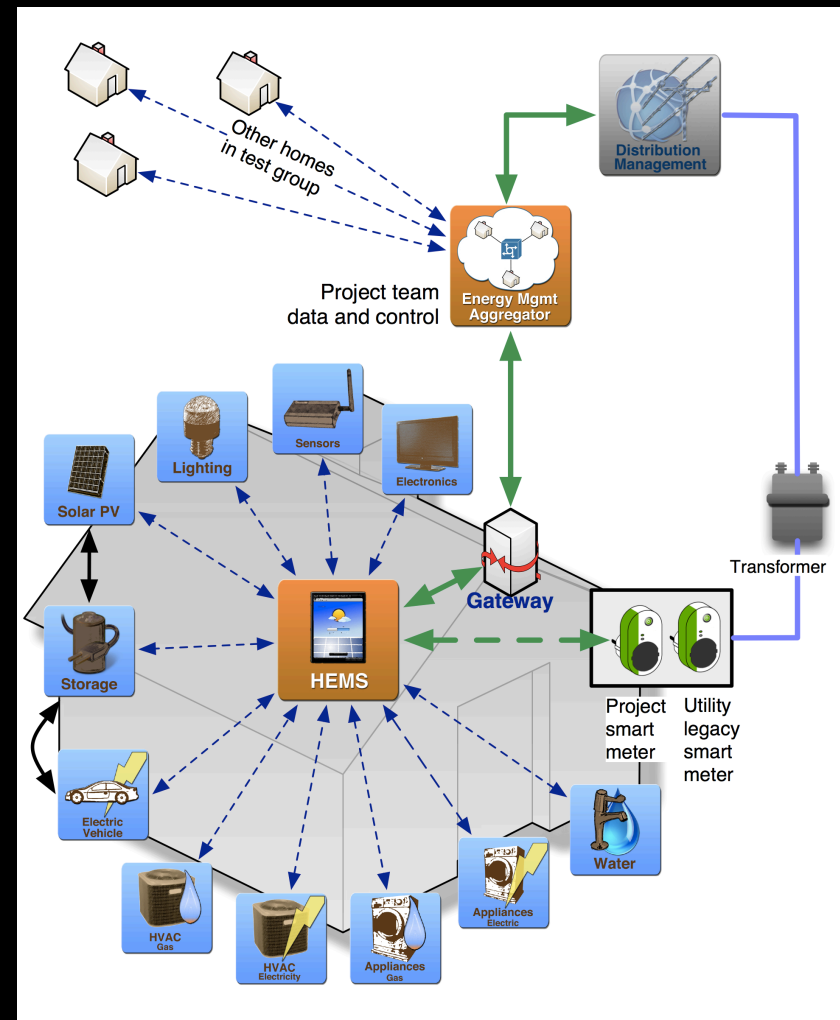
How we get there:

Pricing





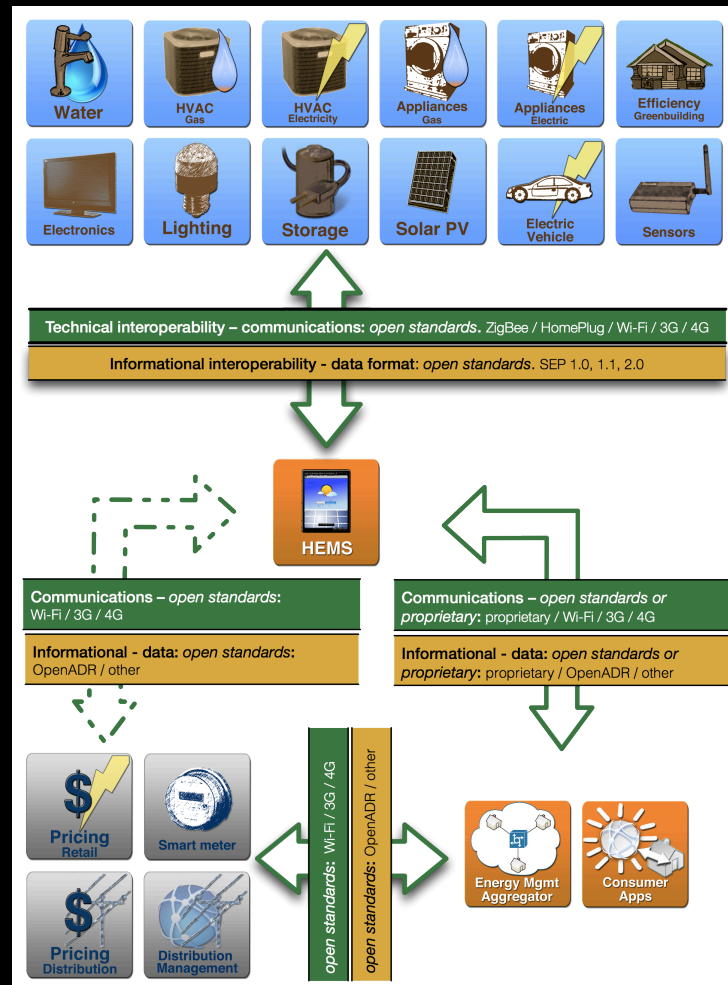
# How we get there: Customer-focused systems





How we get there:

Industry standards



# What is electricity's future?

Look at telecom

Distribution-level systems

Decoupled pricing

Energy Internet

# Disruptive Technologies on Micro-Grid

- Residential Solar
  - Incentives
  - High penetration rate
- Electric Vehicle
  - Charge stations
  - High penetration rate
- Residential Storage
- HEMS
- Commercial Solar and Storage

# Micro-grid characteristics

- Provide value to Prosumers of energy
  - Energy Trading between customers
  - Energy Storage
  - Backup Power from clean sources
- Embedded intelligence and communications
  - Pricing signals
  - Support variety of pricing models depending on maturity
- Adaptable Mesh network
- Sustainable business model in an era of cheap energy