



From Water Heaters to CashBack Hybrids

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FERC Demand Response Authority

★ **General Statutory Authority- FPA**

- **Just and Reasonable Rates-**
- **No Undue Discrimination-**
 - **Order 890**

★ **Specific Authority**

- **PURPA- 1978 & 2005**
 - **Net Metering and Advanced Meters**
- **EPAAct 2005- Sec. 1223 & 1241**
 - **Load Control, Distributed Generation, Storage**

EPA Act 2005 DR Directives

- ★ “Timed Based Pricing & Other Demand Response Shall Be Encouraged”
- ★ “Deployment of DR Technologies Shall Be Facilitated”
- ★ “Unnecessary Barriers to Demand Response Shall be Eliminated”

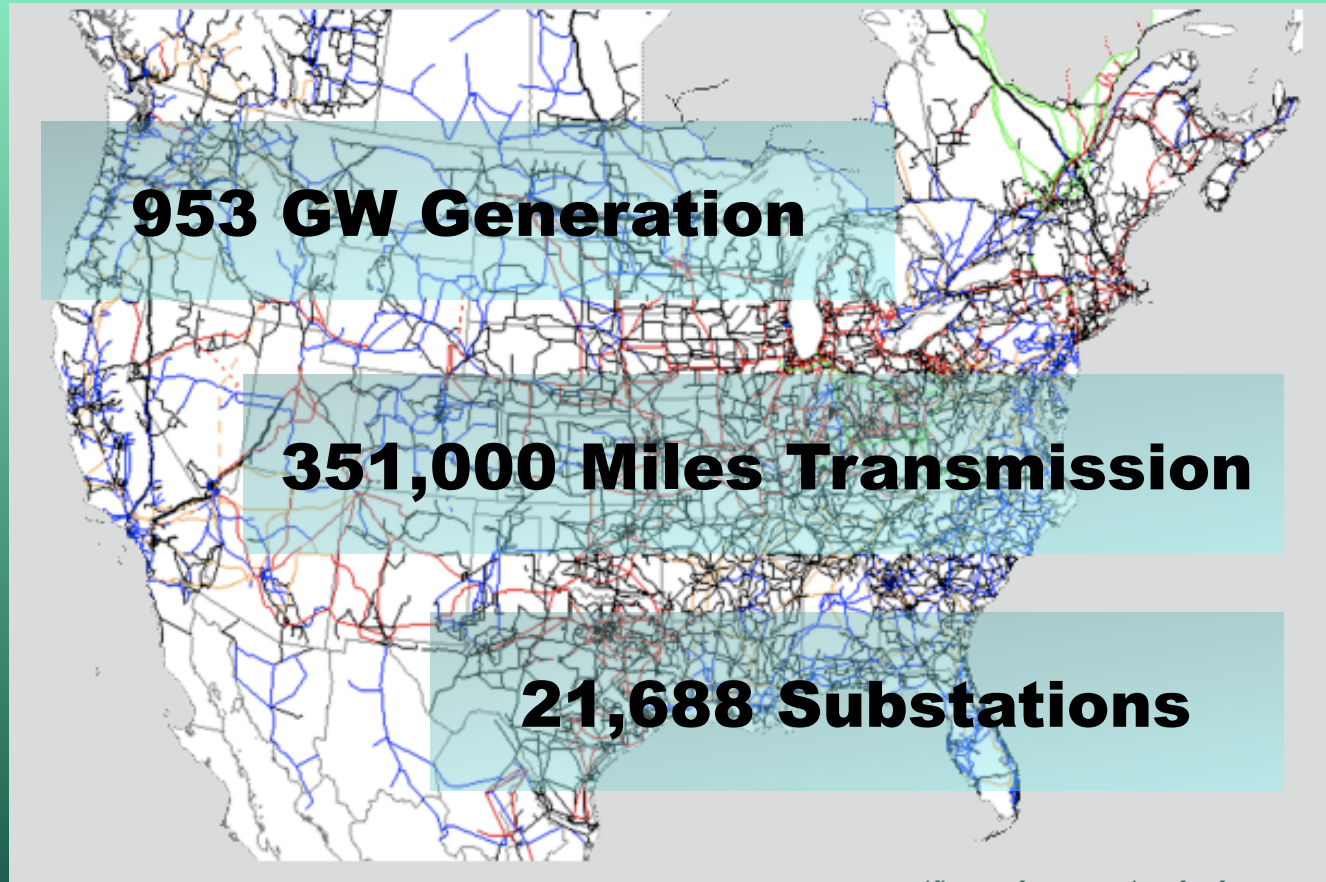
**Demand Response
It's the Law!**

FERC DR Assessment

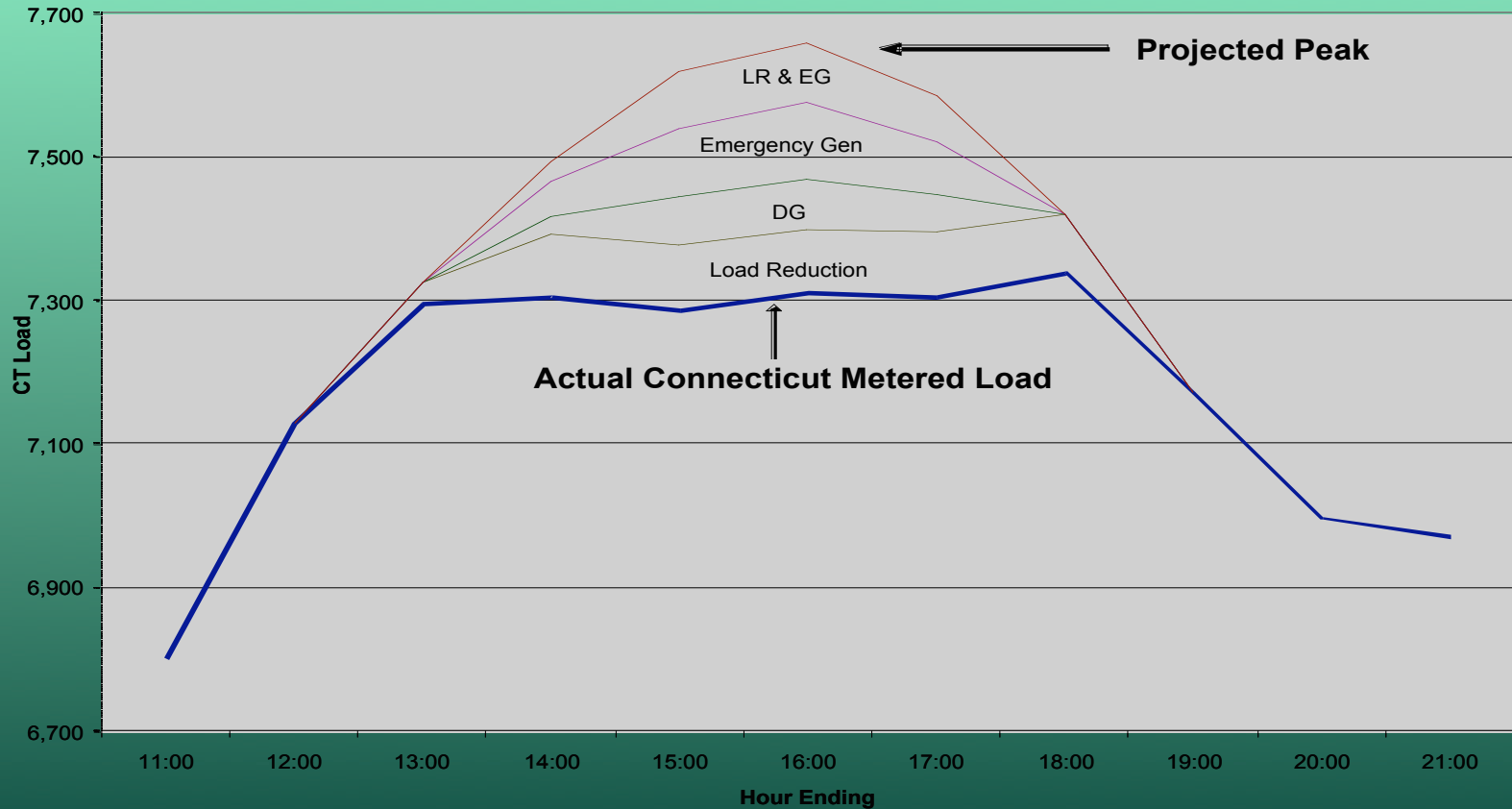
- ★ **Saturation/Penetration Advanced Meters**
- ★ **Existing DR & TOU Programs**
- ★ **Annual Contribution of DR**
- ★ **DR Potential as Quantifiable Resource
for Regional Planning**
- ★ **Current Role of DR in Regional
Transmission Planning and Operations**
- ★ **Regulatory Barriers to DR**

★ <http://www.ferc.gov/legal/staff-reports/demand-response.pdf>

The World's Most Complex Machine

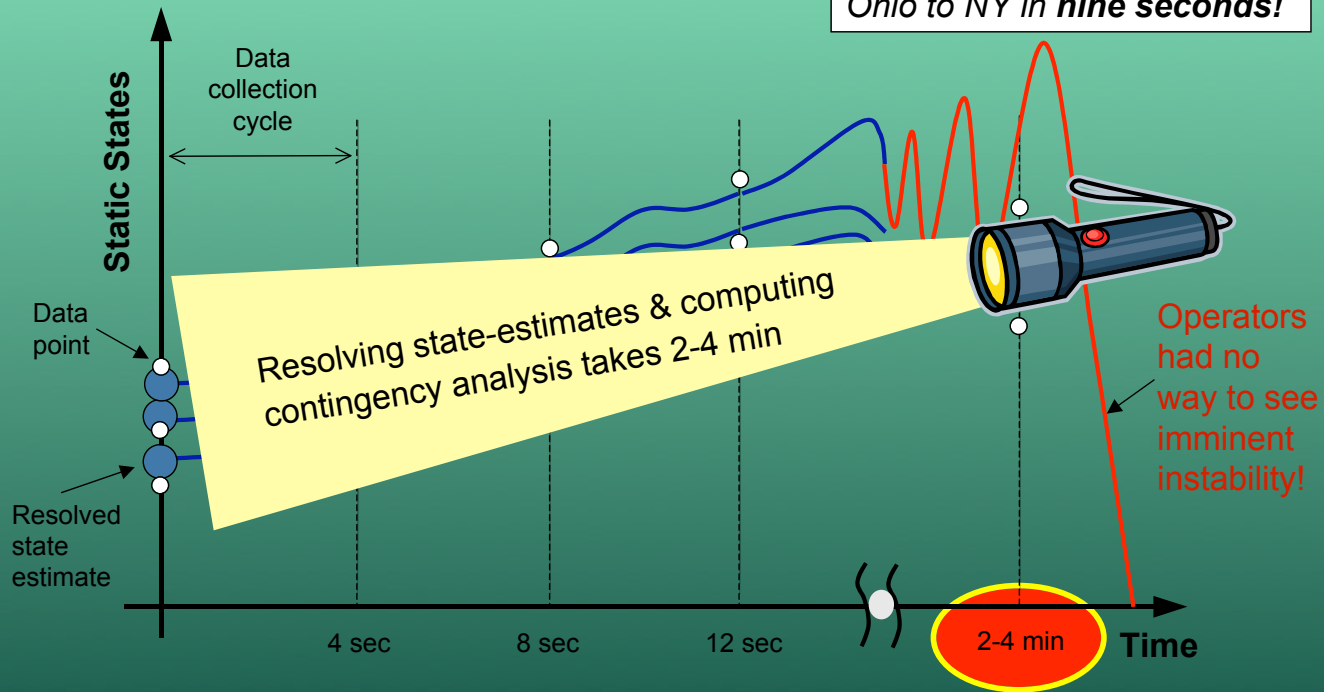


Connecticut Load- August 6, 2006

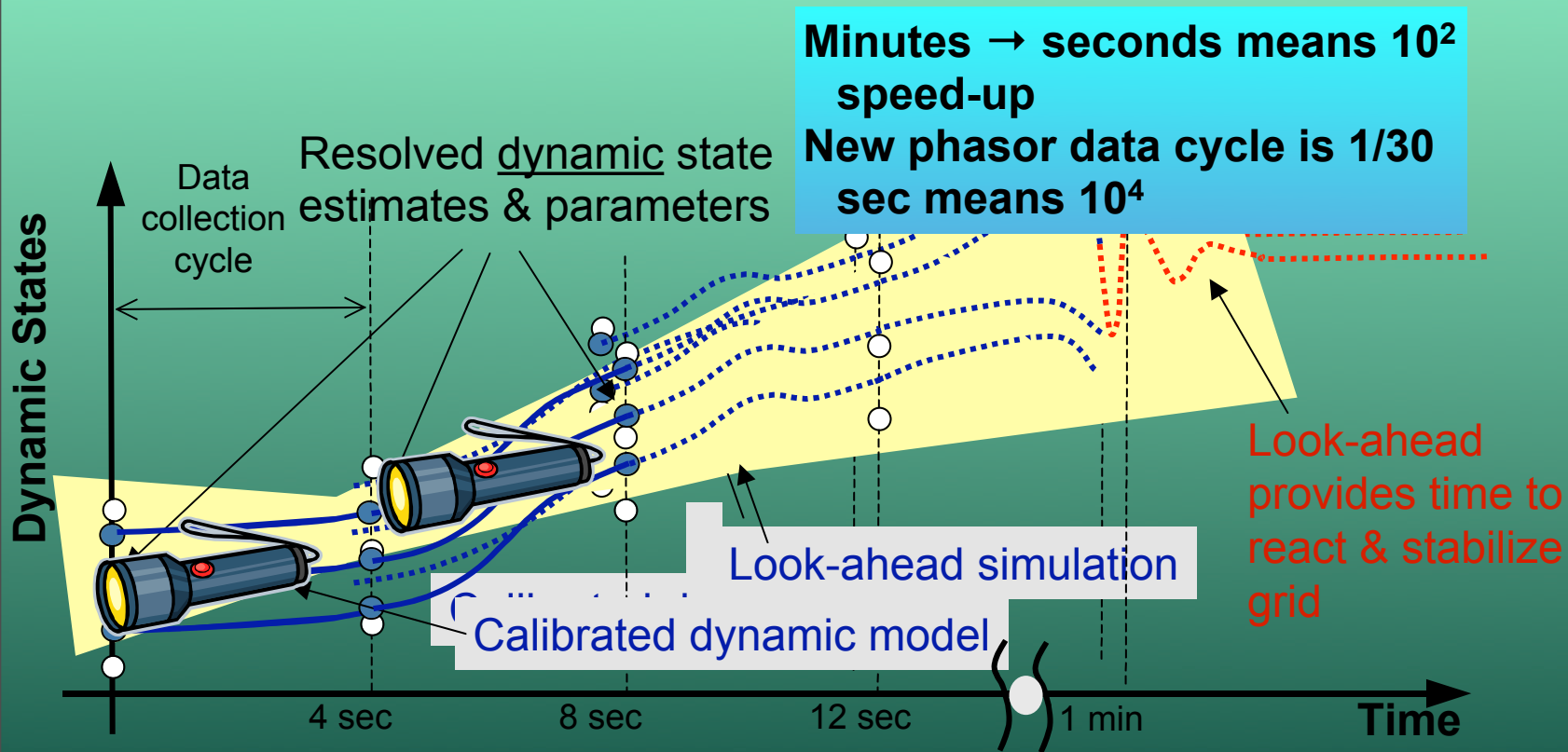


Blackout Avoidance- DR & Better Data

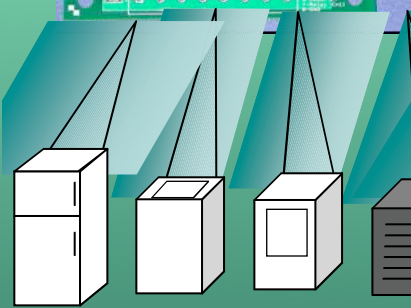
Point-of-departure: Static State Estimation



Blackout Avoidance- DR & Better Data

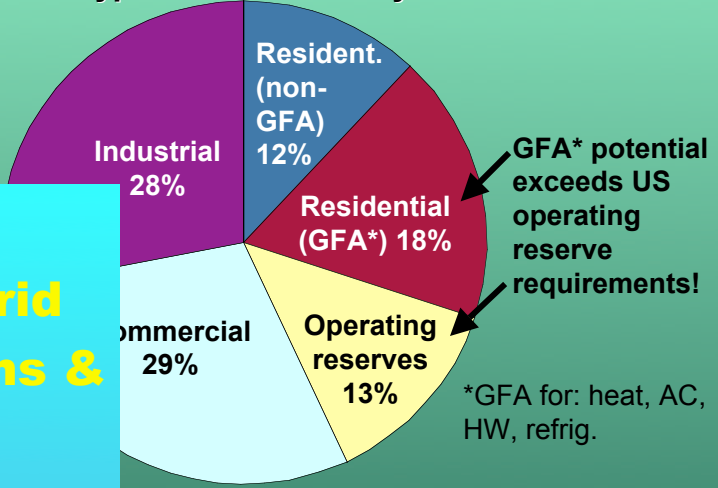


Grid Friendly™ Appliances- DR & Spinning Reserves



Grid Friendly Appliances sense grid frequency excursions & control region's appliances to act as spinning reserve – No communications required!

Loads and Reserves on a Typical U.S. Peak Day



Demand Response- More than Peak Load Reduction

- ★ **PJM/CAISO/ERCOT Use DR As Ancillaries**
- ★ **California & LIPA Testing ACLM as Spinning Reserves**
- ★ **ConEd-DR T&D Expansion Alternative**
- ★ **ISO-NE Testing DG & DR (< 5 MW) as Reserves**
- ★ **BPA-DR and DG For Transmission Deferral**

Demand Response- Transmission Operations & Planning

- ★ **Recognize & Accommodate DR in Scheduling Energy**
- ★ **Specify Ancillaries as Functions Not Technology Specific**
- ★ **DR Can Provide:**
 - ★ **Operating & Spinning Reserves**
 - ★ **Regulation**
 - ★ **Frequency Response**
 - ★ **Reserves**
- ★ **Consider DR As Alternatives**
 - ★ **Transmission Enhancement**
 - ★ **Transmission Expansion**
- ★ **Treat DR As Permanent Solution**
- ★ **Develop Better DR Forecasting Tools**

Quiz of the Day



How Can We Substantially:

- Lower Consumers' Total Energy Bills?**
- Improve Efficiency & Reliability of the Electric Grid?**
- Improve Financial and Operational Stability of Public Power Systems?**
- Reduce U.S. Foreign Oil Dependency?**
- Reduce GHG Emissions?**
- Improve Urban Air Quality?**

One Possible Answer



**THE CASHBACK
HYBRID**



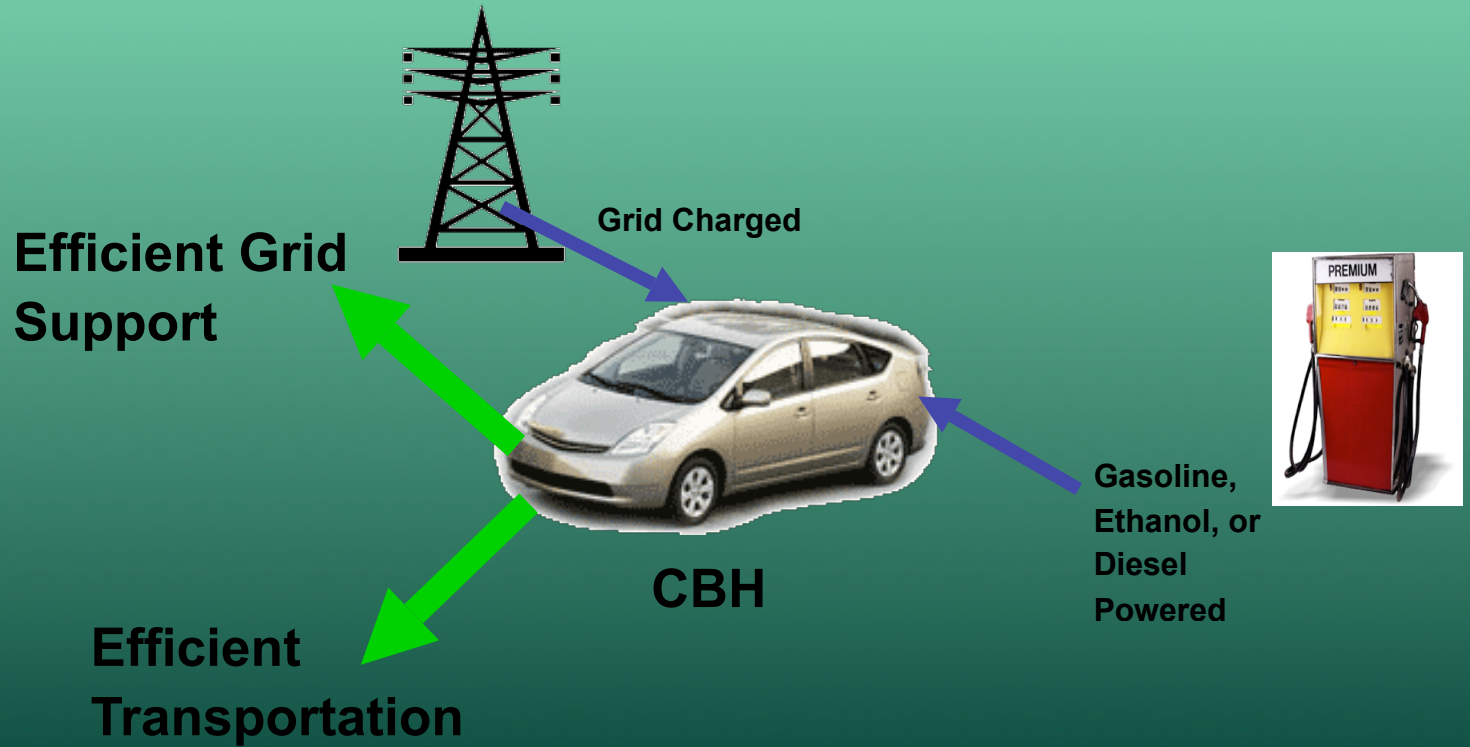
Three Types of Hybrids

- ★ Hybrid → Gasoline/Electric /45 mpg (HEV)
- ★ Plug-In Hybrid → HEV + Bigger Battery + One Way Plug (PHEV)
 - Recharged with Plug @ Home or Work
 - Added Batteries Extend Range to ~ 30-60 Miles
 - 100-150 mpg Equivalent
 - Most Drivers < 30 Miles/Trip 300 Days/Year 1.2 Hours/Day
- ★ CASHBACK Hybrid → PHEV + Intelligence
 - SMART Plug-In with Electronic Chip
 - 2-Way Communication
 - Can Recharge from Grid and **Supply Power to Grid!!**



CASHBACK Hybrid

Dual Fuel & Dual Benefits



CBH Electric System Benefits

★ Efficient Grid Management

- Ancillary Services (Spinning Reserve & Regulation)
- Dispatchable Reactive Power
- Peak Demand Services (Demand Response)
- Reduced Operating and Planning Reserves
- Distribution/Substation Level Support
- Reduced Line Losses
- Improved Power Plant Efficiency
- Improved Load Factor

★ Storage & Integration of Renewables- Wind & PV

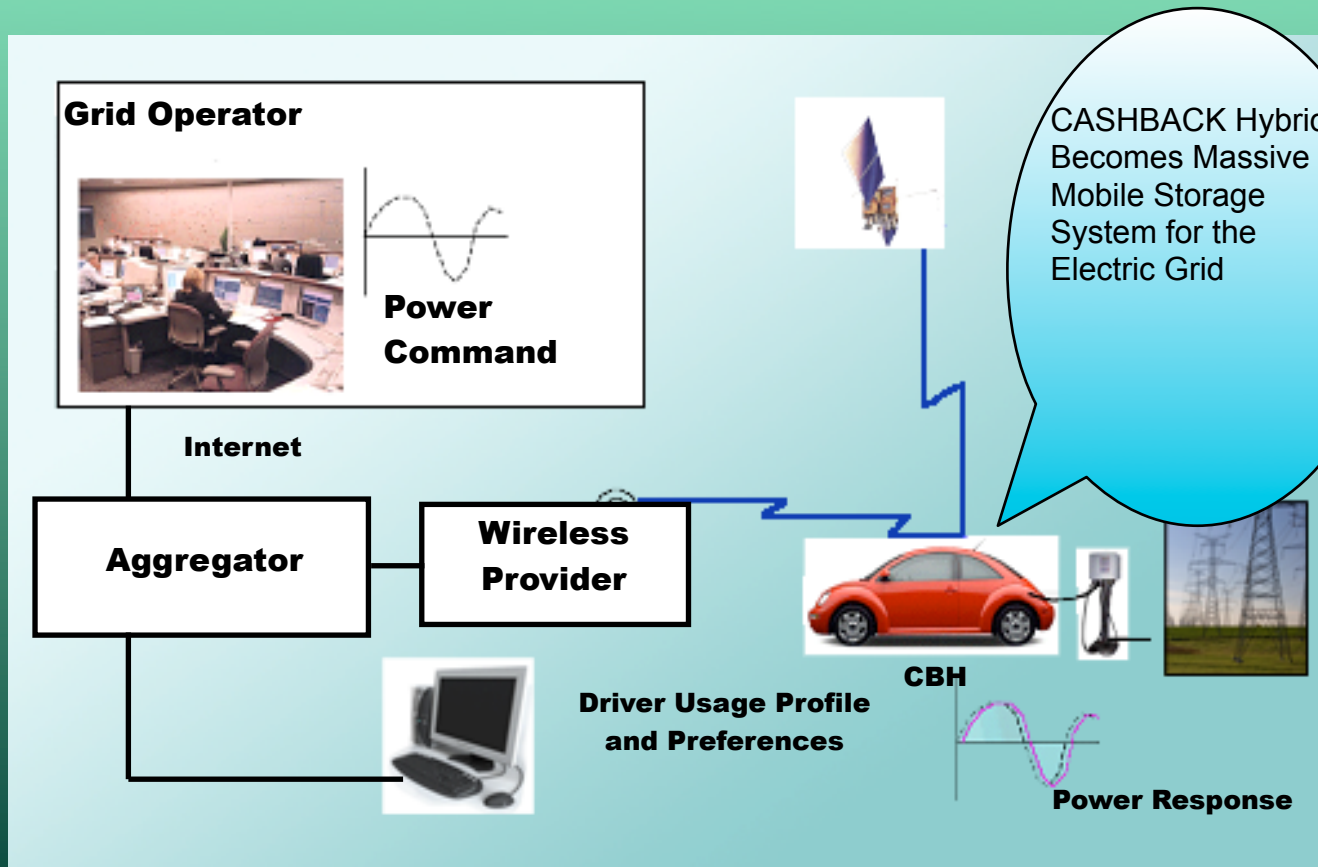
★ Emergency Power Supply

- 1 CBH Power 4 Houses @ Ave Load 1.5 kW/house

★ Electric Transit Power Support

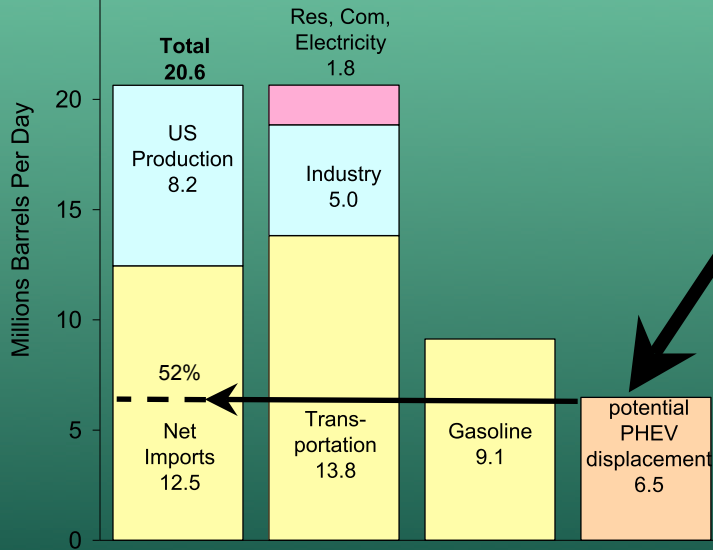
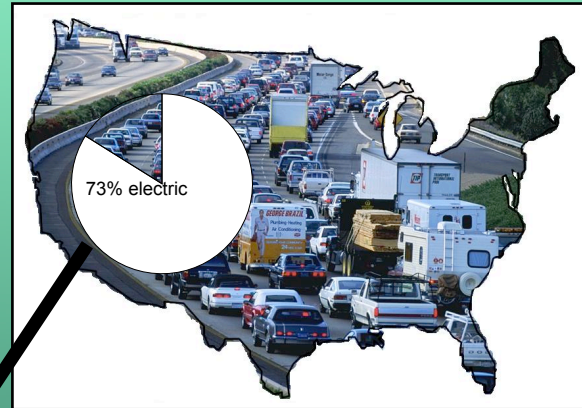
- Can Power Traction Spikes for Local Rail

CASHBACK Hybrid Grid Support



Idle Off-Peak Capacity Could Supply 73% of Energy Needs of a CHB Fleet Substituting for Current Light Vehicles (Cars, SUVs, PickUps, & Vans)... without adding generation or T&D capacity

Grid Be Used Dependence on



**Displaces 6.5 MMBpd (52% Imports)
Increases Electric Sales
Reduces GHG emissions by 27%
Emissions Move > Tailpipes to Smokestack
... Cheaper to Clean Up & Less Urban Pollution**

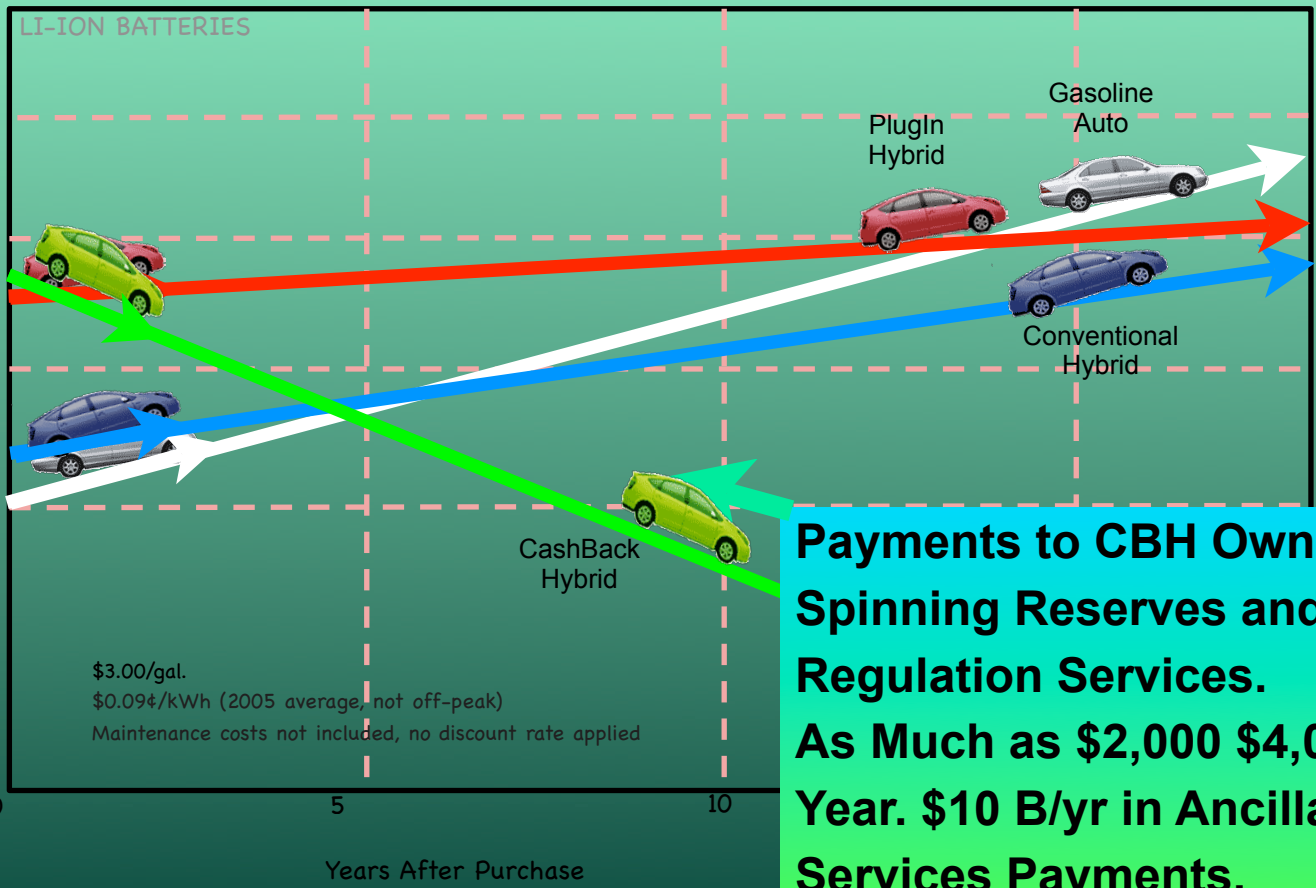
CBH Economic Benefits to the Public Power Sector

- ★ Little New Investment....Use Scarce Capital Elsewhere
- ★ Increases Revenues from Residential Customers for Additional Off-Peak Consumption...While Lowering Total Consumer Energy Bills
- ★ Spreads Fixed Costs of Generation, Transmission, Distribution Over More kWh – Average Fixed Costs Are Reduced
- ★ Reduces Price Volatility and Market Price Spikes...Similar to Long Term Contract Hedge
- ★ Reduces Market Power & Lowers Prices

Will Consumers Pay More for CBHS? (The Compact Fluorescent Syndrome)

- **Green Image, “feel-good factor”**
- **Reduced Petroleum Use and Lower Fuel Costs**
- **Reduced Air Pollution and CO₂**
- **National Energy Security**
- **Less Maintenance & Reduced Fill-Ups**
- **Convenience of Home Recharging (Off-Peak)**
- **Improved Acceleration (High Torque of Electric Motors)**
- **Tax Incentives??**

The “Cash Back” in CashBack Hybrid- why Consumers Don't Have to Pay More



Payments to CBH Owners for Spinning Reserves and Regulation Services. As Much as \$2,000 \$4,000 per Year. \$10 B/yr in Ancillary Services Payments.

Why to Support the CashBack Hybrid?

★ **The CASHBACK Hybrid Will:**

- **Save Consumers on Total Energy Bills**
- **Cost Less Than Gasoline Car in <5 Years**
- **Improve the Overall Efficiency of the Electric System Saving All Consumers on Their Electric Bills**
- **Will Reduce GHG and Urban Pollution**
- **Will Reduce Foreign Oil Imports**
- **Will Improve Electric Grid Reliability and Security**

Demand Response Integration Issues

- ★ **Disconnect- Retail Pricing & Wholesale Markets**
- ★ **Retail & Wholesale Rules/Laws**
 - ★ **State-level Barriers to DR**
 - ★ **Coordination Federal-State Jurisdiction**
- ★ **Utility Disincentives For DR**
 - ★ **Throughput & Ratebase Incentives**
 - ★ **Cost recovery & Incentives for DR Technologies**
- ★ **M&V Issues**
 - ★ **Available When Needed**
 - ★ **Cost Effectiveness**
- ★ **Third Party Provider Barriers**
- ★ **Market Transparency & Access to Data**

FERC Actions on Demand Response

★ Past FERC Actions

- ★ 08/06- Issued DR Assessment- Promising Potential
- ★ 09/06- Directed CAISO, Midwest ISO & SPP- Consider DR Participation Energy & Ancillary Services Markets
- ★ 11/06- Joined w/NARUC Created Joint FERC/NARUC DR Collaborative
- ★ 2/07- Issued Order 890 Required DR Incorporated in OATT Tariffs & Regional Transmission Planning on “Comparable Basis”
- ★ 2/07- Held Workshop on Competitive Wholesale Markets
- ★ 2/07- Held Second NARUC/FERC Collaborative Meeting
- ★ 3/07- Issued Reliability Order Incorporated DR for Reliability

FERC Future Actions & Needs

- ★ **Future FERC Actions**
 - ★ **4/07- Workshop on DR (Washington D.C.)**
 - ★ **4/07- Continued Workshop on Competitive Markets**
 - ★ **Collaboration & Coordination w/State PUCs and RTO/ISOs**
- ★ **FERC Needs**
 - ★ **Information on Barriers**
 - ★ **Greater Participation by DR Providers in RTO/ISO Stakeholder Processes**
 - ★ **Market Participant Ideas and Input**
 - ★ **Equal Access**
 - ★ **Equal Market Payments**
 - ★ **Enhanced Participation**