

# Do Vertically Integrated Utilities Plan for a Competitive Energy Market?

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One Case Study From  
A Merchant's Point of View

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# Entegra Power Group, LLC

- Formed June 1, 2005, with corporate headquarters in Tampa, Florida
- Owns and operates two of the largest IPP power plants in the U.S.
  - Union Power Partners, 2200 MW, NG CC, Entergy market, located near El Dorado, AR
  - Gila River Power, 2200 MW, NG CC, AZ-SNV-NM market, located near Gila Bend, AZ
- Spin off from TECO Energy, same management team
- Owners include a consortium of major banks and equity hedge funds and governed by an independent board of directors



Union Power Station

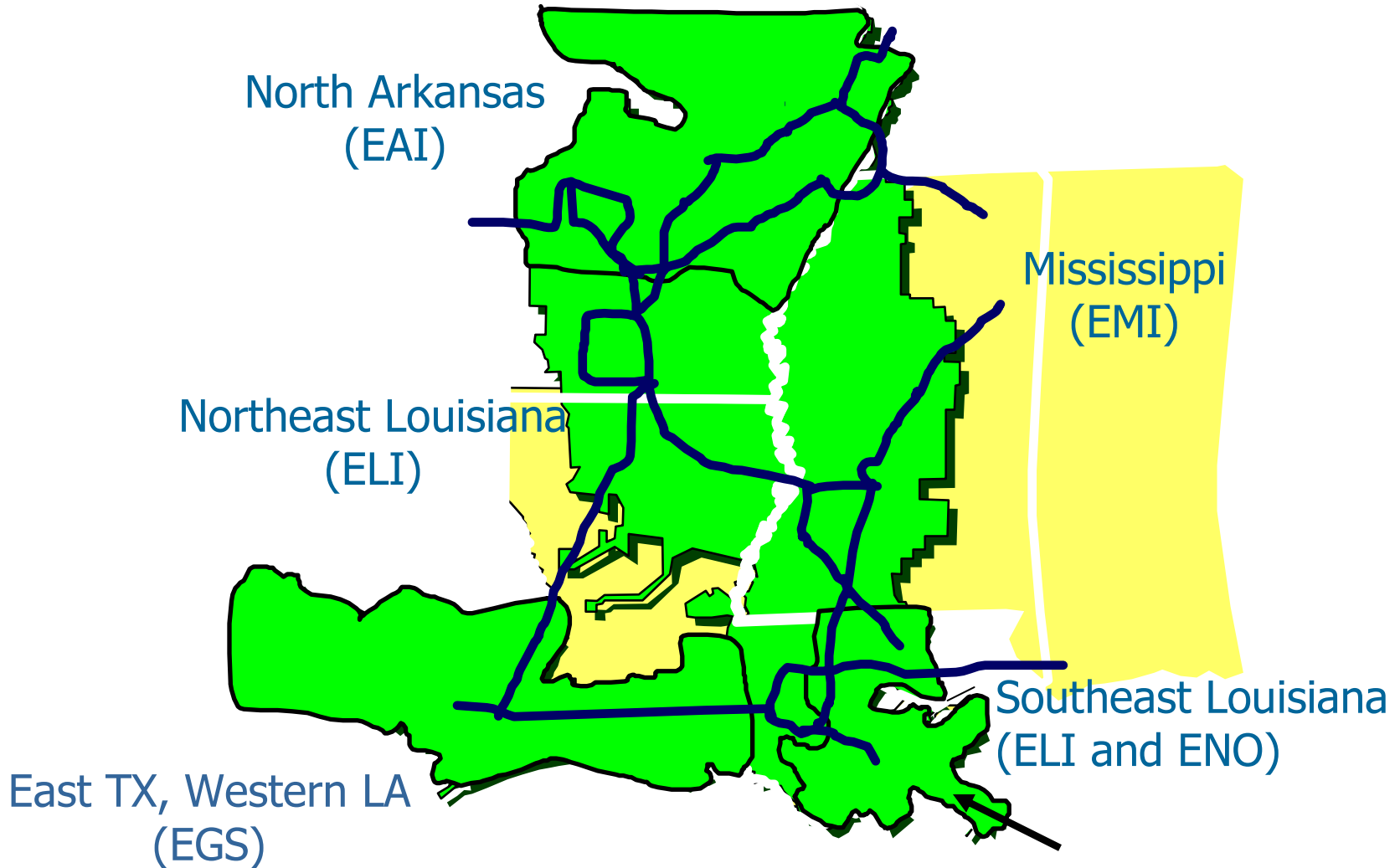
# The Entergy Footprint

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## The “Genesis” of the Entergy System

- Evolved from 5 individual companies that were constructed separately
- The individual systems were designed for local utility generation to serve local load
- The system was upgraded throughout the 1960s with a 500 kV backbone
- With the exception of the 500 kV backbone, the basic topology of the system has not changed much from what was originally laid out

# The Entergy Footprint



# The Entergy Footprint

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## The Entergy System Today

- The five Entergy operating companies (EAI, EMI, ELI, EGS, ENO) are dispatched as a single system
- The five operating companies share a single transmission tariff (OATT)
- Transmission planning is performed jointly
- The five operating companies are regulated by four State Commissions (AR, MS, LA and TX), the City of New Orleans as well as the FERC

# The Entergy Footprint

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## The Entergy System Today

- NERC's Summer Assessment for 2006 showed a 53% capacity margin in the Entergy subregion of SERC
- Has over 14,000 MW of unsubscribed merchant gas generation with effective heat rates that range from 6,900 to 7,300 btu/kwh
- Has over 15,000 MW of utility-owned gas generation with effective heat rates exceeding 11,000 btu/kwh
- Has two major and one minor constrained load pocket (WOTAB, Amite South and Jackson, MS)
- Has six RMR utility gas generation plants with annual CFs that range from 7% to 30%



# The Entergy Footprint

## Summed Up

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- Original jurisdictional boundaries in combination with load and utility generation placement, have defined the topology of the transmission grid
- The 5 Entergy operating companies in the region are
  - Dispatched jointly
  - Planned jointly for transmission maintenance and expansion
  - Operated under a single OATT
- High use of inefficient, utility-owned gas generation to manage system reliability (RMR)
- A significant amount of unsubscribed and more economic merchant gas generation is located in the Entergy region

# Entergy Footprint

## Transmission Issues Today

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### RMR Requirements

#### ■ Transfer Limitations

- Due to line limitations, inter-regional power transfers are limited; Entergy's high cost gas generation within constrained load pockets serves load

#### ■ Voltage Support Needs

- Significant reliance on Entergy's high cost gas generation within constrained load pockets provides voltage support

### Transmission bottlenecks

- Due to the addition of merchant generation, transmission bottlenecks have been revealed that limit power flow across the Entergy system



# Entergy Process

## Transmission Planning Criteria

### Standards Applied

- NERC Reliability Standards
- SERC Supplements
- Entergy Transmission Planning Guidelines



# Entergy Process

## Transmission Planning Criteria

### Entergy's Stated Planning Criteria and Objectives

- System remains stable
- Thermal Limits within Applicable Ratings
- Voltage Limits within Applicable Ratings
- System does not Cascade
- No Loss of Demand or Curtailed Firm Transfers
  - Except on the faulted element
  - Except in the affected area
  - Except as planned, in a controlled fashion (Category C)
- Voltage Control and Reactive Power
  - Transmission customers maintain a 98% power factor
  - Capacitor banks used to compensate for reactive power losses
  - Shunt reactors used to mitigate high voltage
  - Transmission lines not generally used to facilitate greater reactive margin
  - Reliance on generators is minimized
  - Interconnected utilities expected to supply 100% of their own reactive requirements

# Entergy's Process

## Transmission Planning Activity



Annually, the Transmission Business Unit (TBU):

- Develops a 2-year transmission construction program
- Develops a 5-year transmission planning horizon
- Holds a Transmission Summit to present results to market stakeholders
  - Not a collaborative process with stakeholders

# Entergy's Process

## Transmission Planning Activity

### TBU Transmission Planning Objective

- To facilitate the reliable delivery of energy from designated network resources to native load
  - ESI provides TBU with load forecast and designated network resources to serve projected load
  - TBU applies the generation dispatch to the system model and designs a transmission network to deliver energy reliably to load
- Whose needs have been considered in the planning process, just the utility's needs?



# Entergy's Process

## Transmission Planning



### Taking a Closer Look

1. Designated network resources consist primarily of utility-owned generation with inefficient generation included as system capacity and included in dispatch
2. No requirement to forecast RMR requirements or evaluate RMR mitigation alternatives
3. No requirement to consider economics of dispatch or prevailing economics of the Entergy market
4. No requirement to address overloads in short-term models (<18 mths)



# The Entergy Footprint

North Arkansas

Jackson, MS

Mississippi

Southeast Louisiana

9,400 MW CC Merchant

7,200 MW Utility Gas  
1,100 MW Utility CC  
(300 MW Utility RMR)

West of the  
Atchafalaya Basin  
(WOTAB)

Western Region

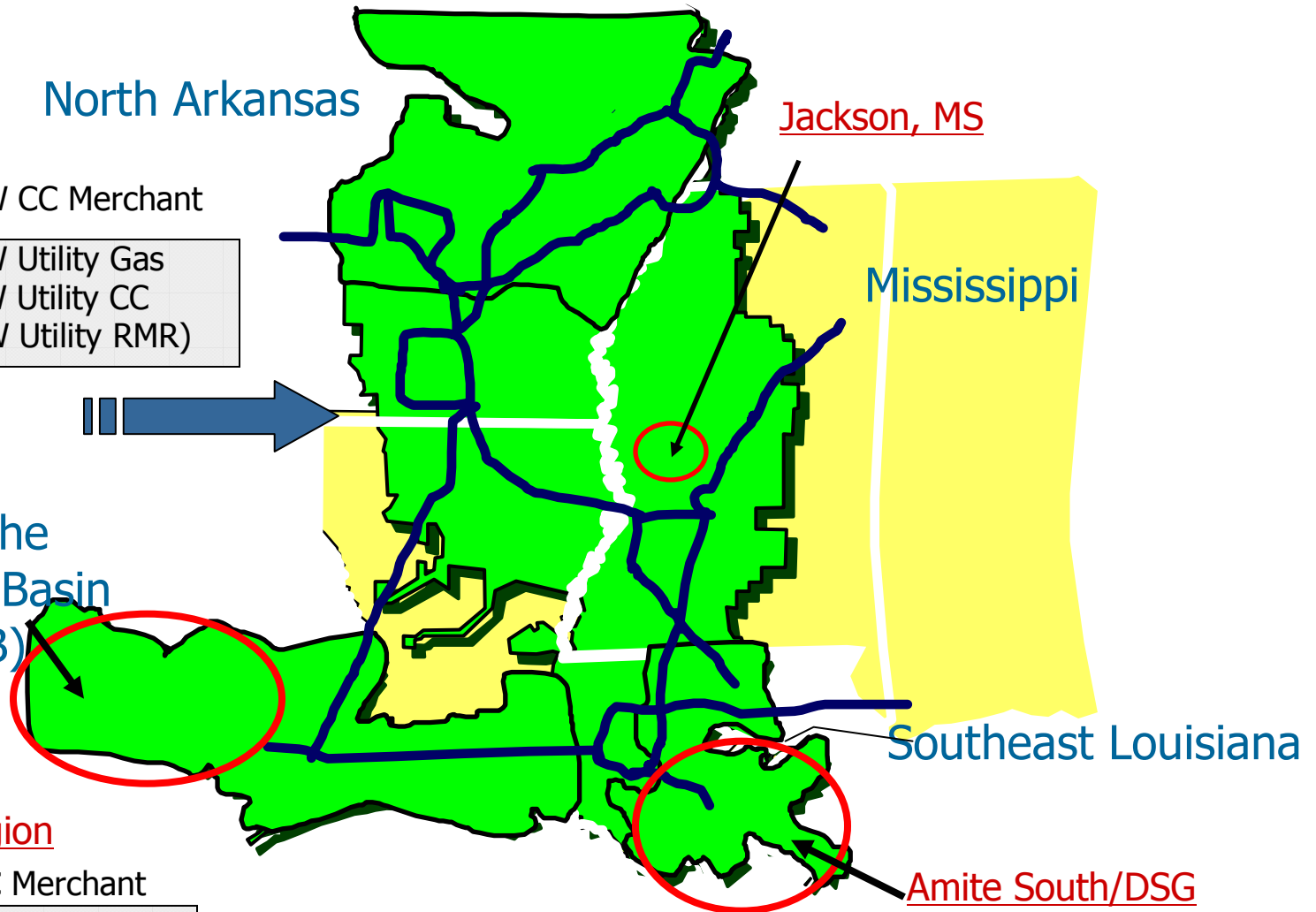
3,000 MW CC Merchant

3,200 MW Utility Gas  
(2,900 MW Utility RMR)

Amite South/DSG

2,200 MW CC Merchant

4,700 MW Utility Gas  
(2,600 MW Utility RMR)





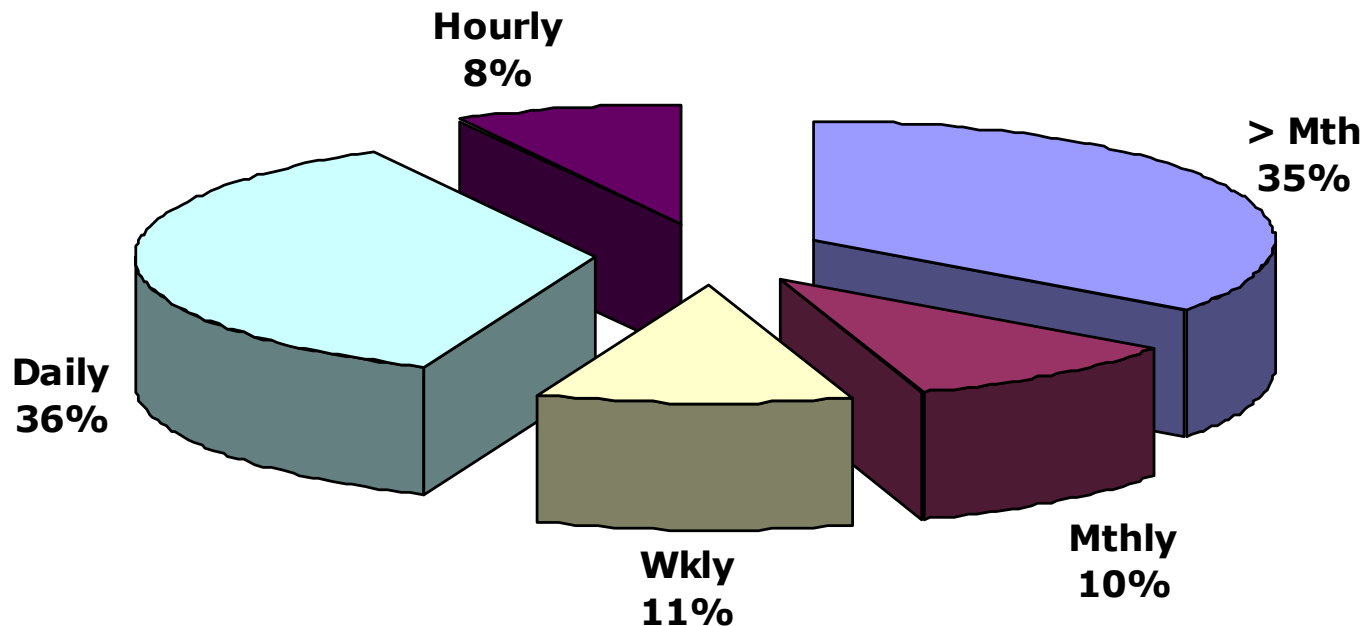
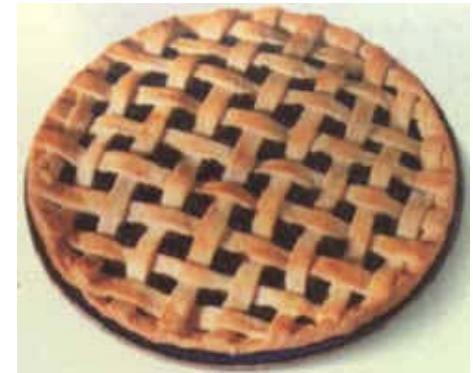
# Entergy's Process

## Designation of Network Resources

- Inefficient gas generation makes up 60% of Entergy's installed capacity
- In 2005, 29% of Entergy's energy requirements were met with 3<sup>rd</sup> party purchased power
- In 2005, 65% of Entergy's 3<sup>rd</sup> party purchases were short-term (less than 1 year)
- Short-term resources are not considered designated network resources
- Disconnect in the planning process between capacity and energy resources

# Entergy's Process

## Designation of Network Resources



At least 65% or ~24,000 GWh of short-term 3<sup>rd</sup> party purchased power displaced Entergy's designated network resources

# Entergy's Process

## Designation of Network Resources

- Entergy only considers the deliverability of designated network resources in maintaining and upgrading the transmission system

### **System / Market Impacts**

- Transmission system not maintained or expanded to optimize purchase power opportunities
- Transmission system maintained to ensure inefficient, utility-owned gas generation can serve future load needs
- Worse yet...transmission upgrades/expansion can negatively impact deliverability of efficient merchant generation

# Entergy's Process

## Modeling Assumptions

- Flows in the planning models not representative of historical patterns or likely future patterns
- Constraints in planning models not real -- "*Phantom*"
- Operating models show some short-term purchases (week ahead) but 46% of purchases daily and hourly
  - The "real" constraints show up during the operating day
  - Contributes to real-time transmission curtailments
    - TLRs in July, 2003 – 2
    - TLRs in July, 2004 – 200
    - TLRs in July 2005 – 79
    - TLRs in July 2006 – 626

# Entergy's Process

## Modeling Assumptions

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- No requirement to address overloads in OASIS models (Planning and Operating)
- What does this mean??? Does it matter???
  - Simply put, if a transmission request shows 0 ATC, one can assume that the "basecase" has overloads.
  - Entergy is under no obligation to address overloads in planning models, even if network resources dispatched to meet native load are the primary cause for the overload

# Entergy's Process

## Modeling Assumptions

- Unrealistic dispatch coupled with unaddressed facility overloads in models results in a distortion of the deliverability of market/merchant generation

### **System / Market Impacts**

- Increasing need for TLR actions in real-time, resulting in higher fuel costs to ratepayers
- Creates tremendous volatility in "posted" transmission service availability in the market
- Negatively impacts forward market development due to perceived risk of transmission access
- Undermines the development of a competitive wholesale generation market



# Entergy's Process

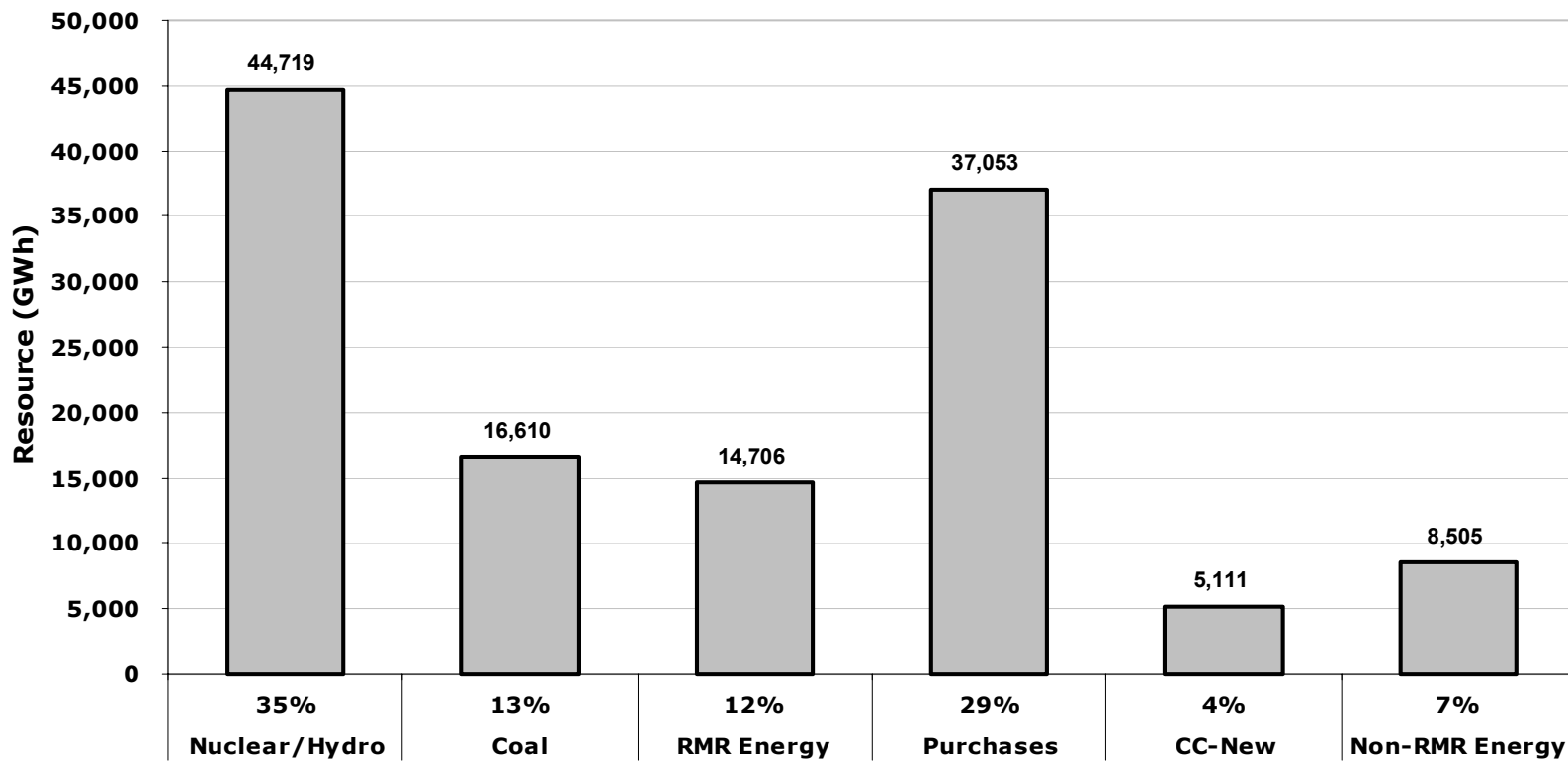
## RMR Assessment

- Internally developed transmission planning objectives do not address reducing the need for RMR generation
  - No forecast of expected RMR generation
  - No mitigation requirements for RMR generation
- RMR generation used extensively to manage line loading constraints and local voltage support needs
  - 6 plants on the Entergy system have been identified as providing RMR benefits
  - RMR energy production exceeded 14,500 GWh in 2005
  - RMR plants effective HR exceeded 11,000 btu/kwh in 2005

# Entergy's Process

## RMR Assessment

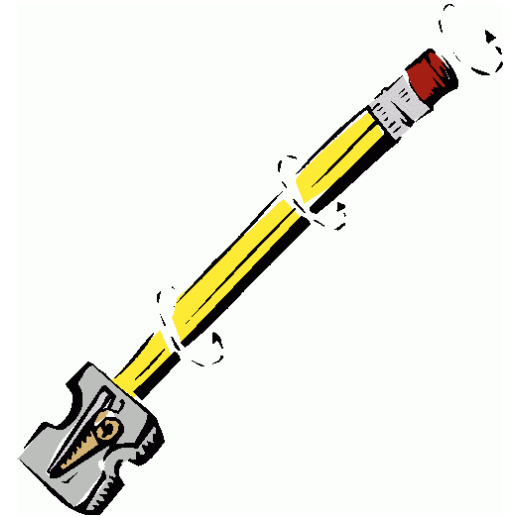
**Entergy, 2005 Energy Resources**



# Entergy's Process

## RMR Assessment

Sharpening our pencil and taking a better look at the issue...



<b><u>2005</u></b>		
Average Weighted Heat Rate of Merchant Offers to Entergy	9,267	btu/kwh
Average Weighted Heat Rate of Utility-Owned Gas Generation	11,561	btu/kwh
Average NG Price, Henry Hub	8.00	\$/mmbtu
Merchant Dispatch Price	74.14	\$/MWh
Utility-Owned Gas Generation Dispatch Price	92.49	\$/MWh
Potential Savings from Merchant Purchases	18.36	\$/MWh
Utility-Owned Gas Generation	23,000	GWh
Displacing 50% of Utility-Owned Gas Generation	\$211,082,535	

# Entergy's Process

## RMR Assessment

- Entergy has no requirement to assess RMR impacts and has not developed an RMR exit strategy that would allow these units to be phased out of service in favor of more efficient technologies

### **System / Market Impacts**

- Transmission upgrades to mitigate the need for RMR generation have not been identified
- Cost/benefit analysis of potential alternatives are unknown
- Continued use of inefficient RMR generation at the expense of ratepayers

# Entergy's Process

## Conclusions

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- Transmission Planning does not include a “clearly” defined objective to optimize the balance between transmission investment, market purchases and utility generation uses
- Generation assumptions not reflective of historical or expected system conditions
- Maintaining system reliability in real-time through excessive TLR actions is not in accord with good utility practice
- Extreme volatility in posted transmission availability
- Despite a severe overbuild in the footprint, inefficient utility-owned gas generation supplants more economic generation, presumably due to transmission constraints and voltage support needs

# Entergy's Process

## Conclusions

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- Are the interests of ratepayers and IOUs properly aligned in today's environment?
- Whose needs have been considered in the planning process? Why aren't stakeholders involved?
- Can the planning process skew the market's competitive balance?
- Have the proper planning criteria been employed? Should planning only assure reliability or should it include resource optimization strategies?
- How much regulatory oversight is appropriate in the planning process?



# Entergy's Process

## Conclusions

- But the big question is, how much do these issues matter? Do planning practices really impact ratepayers?

Highest residential electric bills in the U.S.

1. El Paso Electric Co.
2. Tampa Electric Co.
3. Entergy Gulf States Inc. in Texas
4. Progress Energy Florida Inc.
5. Entergy Louisiana Inc.
6. Entergy Gulf States Inc. in Louisiana
7. South Carolina Electric & Gas Co.
8. Dominion North Carolina Power
9. Entergy Mississippi Inc.
10. Florida Power & Light Co.

Source: "Groups urge probe into Entergy practices, costs"

By MARK BALLARD Capitol News Bureau, Published: Aug. 15, 2006

Edison Electric Institute, Washington, D.C.



