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# Electricity Markets – *How Does Washington Compare to the World?*

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# Contents

## ■ Global Perspective

- Energy markets are evolving ... regional issues are diverse but do share certain common threads at a global level
- Energy demand growth shifting to emerging markets where economic concerns are at odds with climate change concerns

## ■ National Perspective

- Load growth remains tepid, but reserve margins tightening in certain key areas
- Shale gas and the war on coal are shaping national power generation planning
- Shale gas is an especially critical element of U.S. energy policy, especially given the opportunities associated with global LNG exports
- Nuclear suffering under a mountain of cost concerns
- Utilities being forced to take a hard look at future operation in certain regions where renewable energy deployment is increasing

## ■ Energy Northwest Perspective

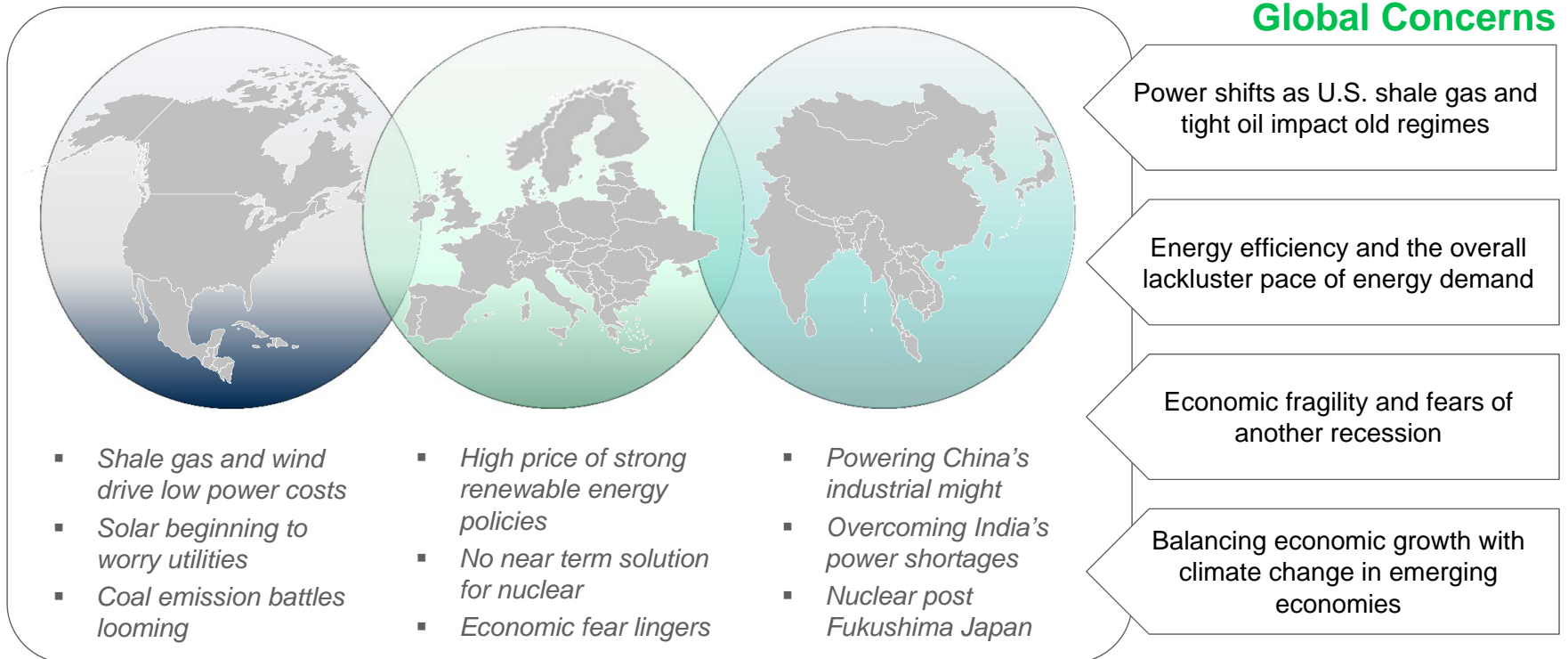
- Policies and planning largely in line with national trends
- Heavy emphasis on efficiency is noteworthy approach to coping with low load growth in a cost effective manner
- Renewables deployment is strong but more aggressive targets may be in order



## Global Perspective

# Global Electricity Market Facing a Myriad of Challenges

## Regional Power Market Concerns



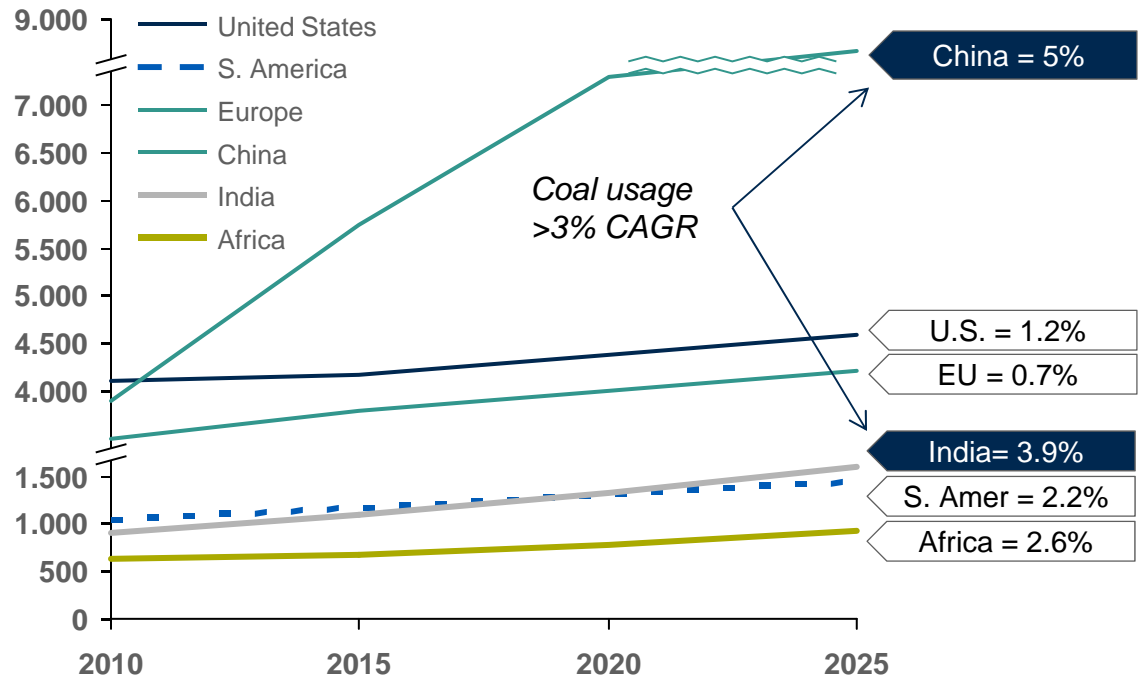
Source: MAKE

The world is in the midst of a global power shift ... regional macroeconomic and policy issues define local power market dynamics

Global Perspective

# Global Energy Demand Shifting to Emerging Markets

## Global Generation, 2010-2025e (,000 GWh)



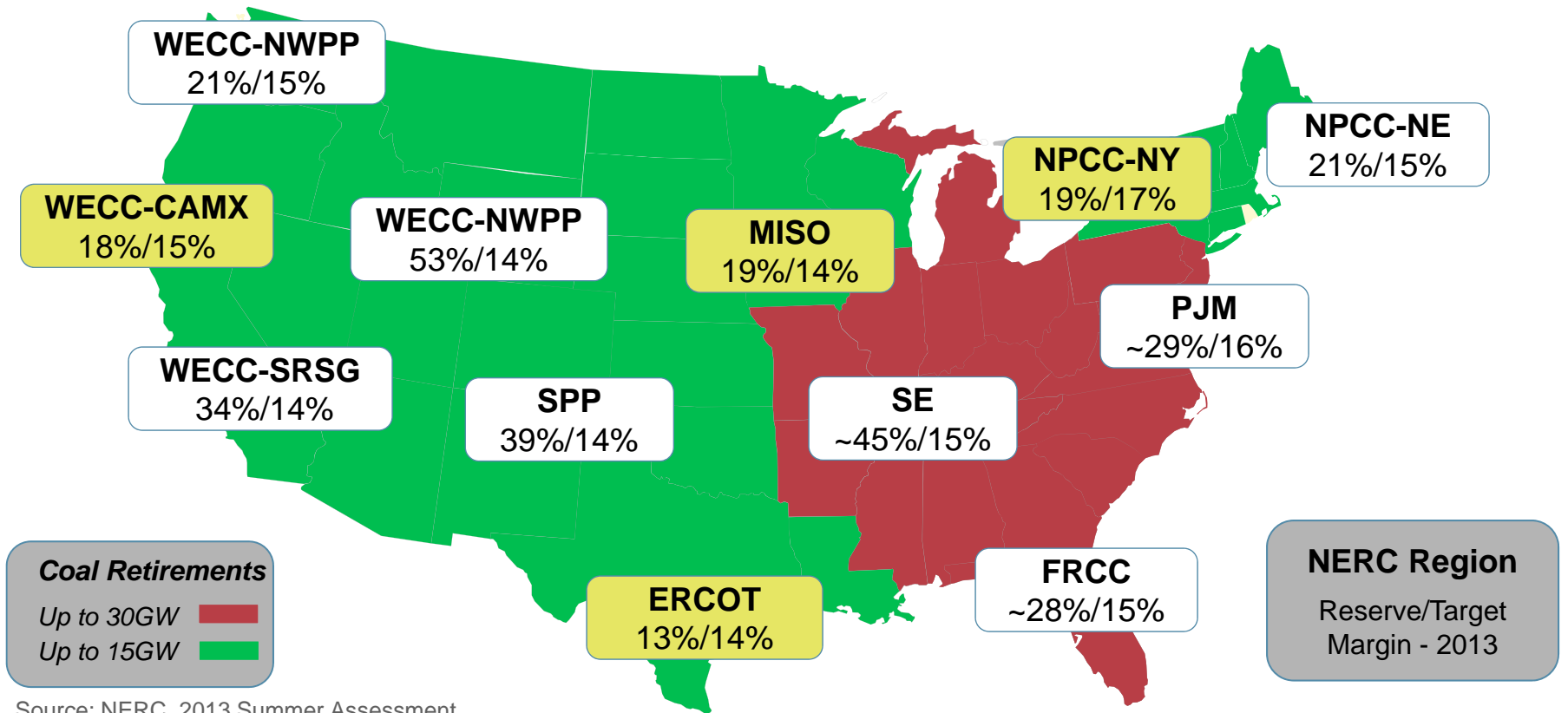
Source: EIA IEO 2013, MAKE

## Expected Growth Rates

- OECD countries' compound annual growth largely under 1% thru 2025
- By contrast, China's growth is staggering in terms of new capacity needs
- Non-OECD countries expected to add over 1,200GW of new generation capacity thru 2025
- Coal is key for emerging markets
  - OECD CAGR = -0.2%
  - Non-OECD CAGR = 2.9%

Emerging markets want cheap and reliable power to enable economic growth and in many cases electrification to increase quality of life for citizens

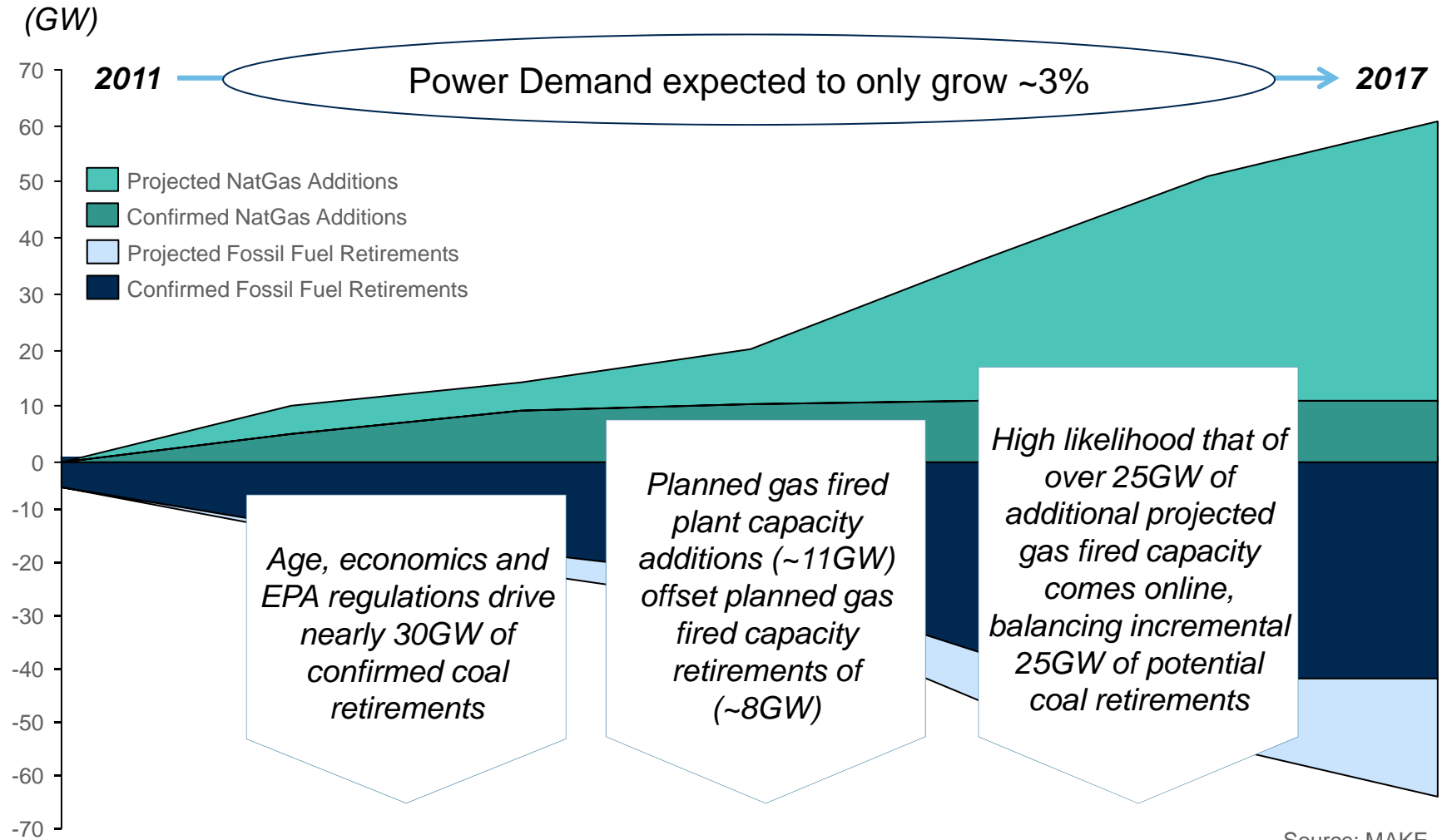
# Reserve Margins Tightening in Some Regions



Source: NERC, 2013 Summer Assessment

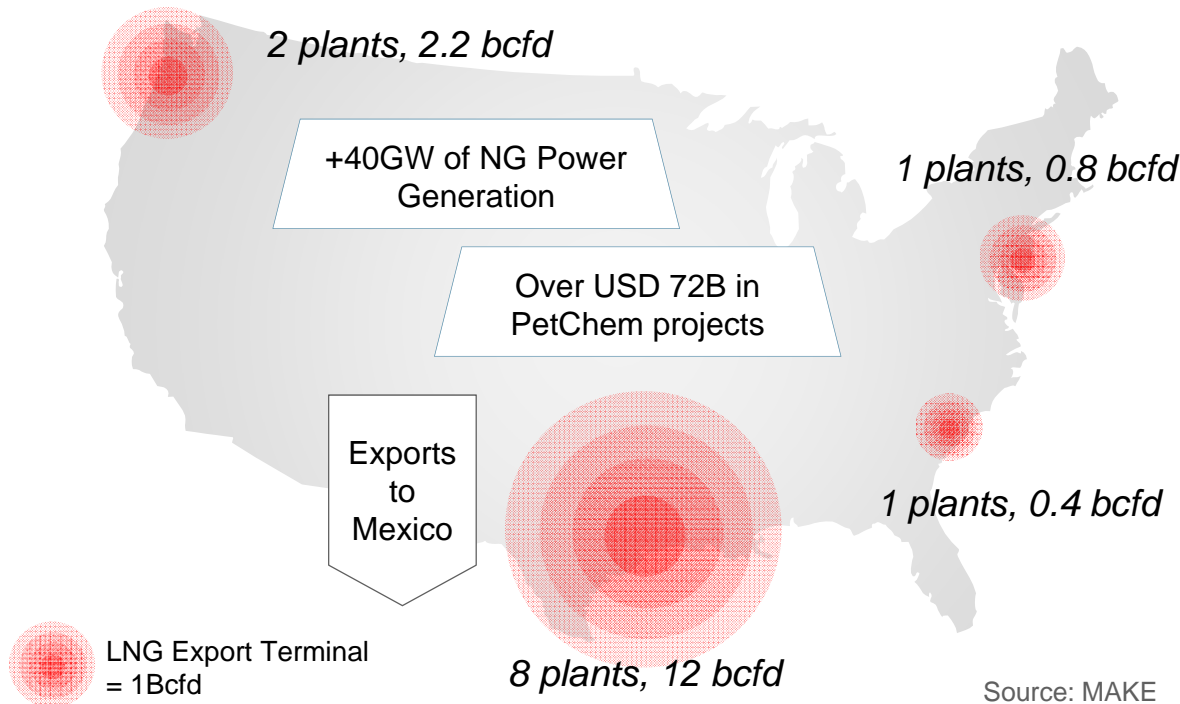
Coal retirements will tighten margins, but only be a concern in MISO where margins are already limited

# Mid Term Power Market Dynamics Favor Natural Gas



# U.S. Shale Gas – Too Much of a Good Thing?

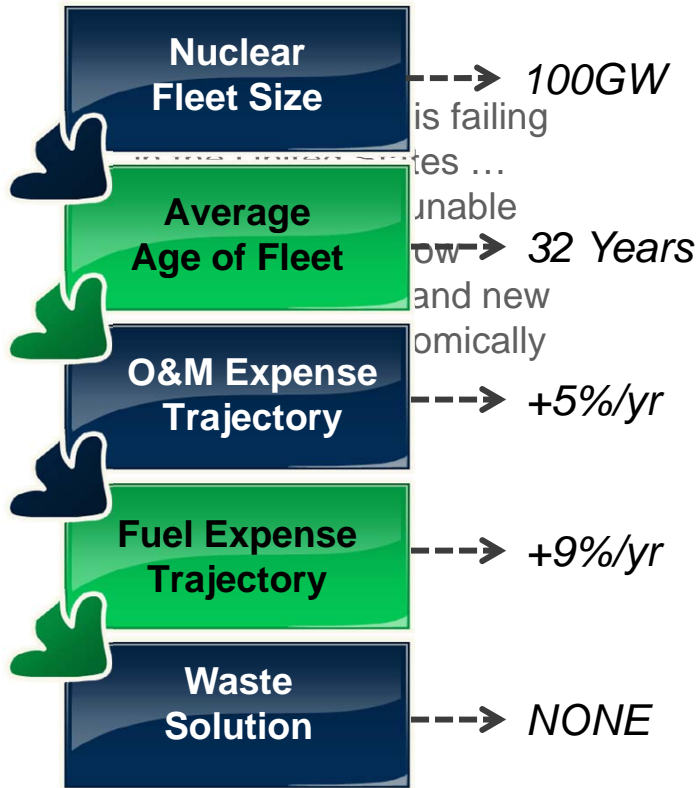
## Natural Gas Investments Through 2020



- 2012 U.S. total natural gas demand was ~70 Bcfd
- Expecting around 6.0 Bcfd in export terminals to be approved
- Despite recent setbacks, expectations are for greater pipeline exports to Mexico
- In five years total natural gas demand could increase by >15%
- Export operations not expected to have substantial impact on domestic pricing

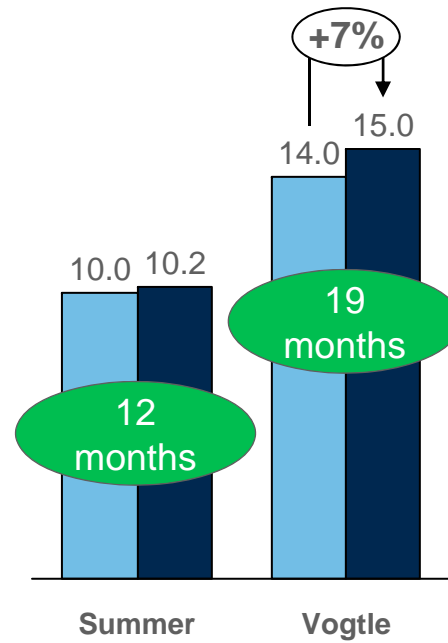
Challenge lies in balancing domestic industrial users' desire for lower power prices and satisfying natural gas value chain's desire to increase profits via export

# Nuclear Renaissance Has Fizzled

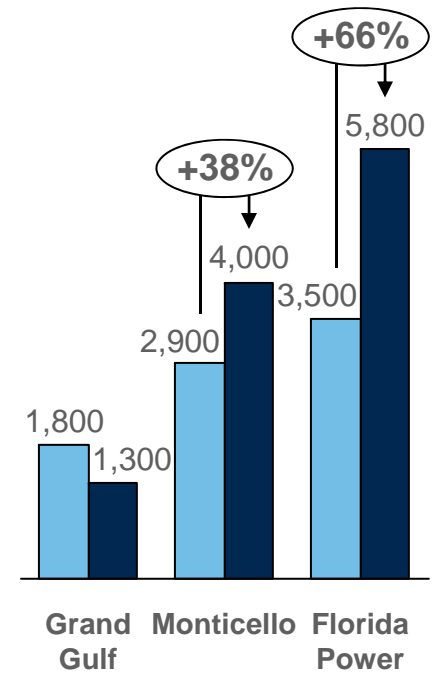


Source: Cooper

## New Unit Delays & Cost Overruns (bUSD)



## Upgrades Also Far Overbudget (USD/kw)





# United States Utility Challenges Abound



## Energy Regulations

- EPA regulations under fire once again, with Supreme Court engaged this time
- New regulations essentially ban new coal unless using IGCC-CCS type solution
- California introducing legislation mandating 1.3GW of energy storage by 2020

## Energy Efficiency

- Progress continues to be made in terms of EE activities
- USD 7.3MM budget for electricity & gas efficiencies
- Estimating 22,000GWh of power savings in 2011
- 5% increase in GDP/MMBTU from 2011-2012
- 24 states have mandatory EE policies

## Distributed Generation

- Solar and wind still account for tiny part of overall generation at national level
- Regional grid operators beginning to see impact of increased solar usage (Hawaii)
- Solar expected to get down to <USD 0.50/watt in next five years
- EIA calling for 16% renewables by 2040 (likely very conservative ...)

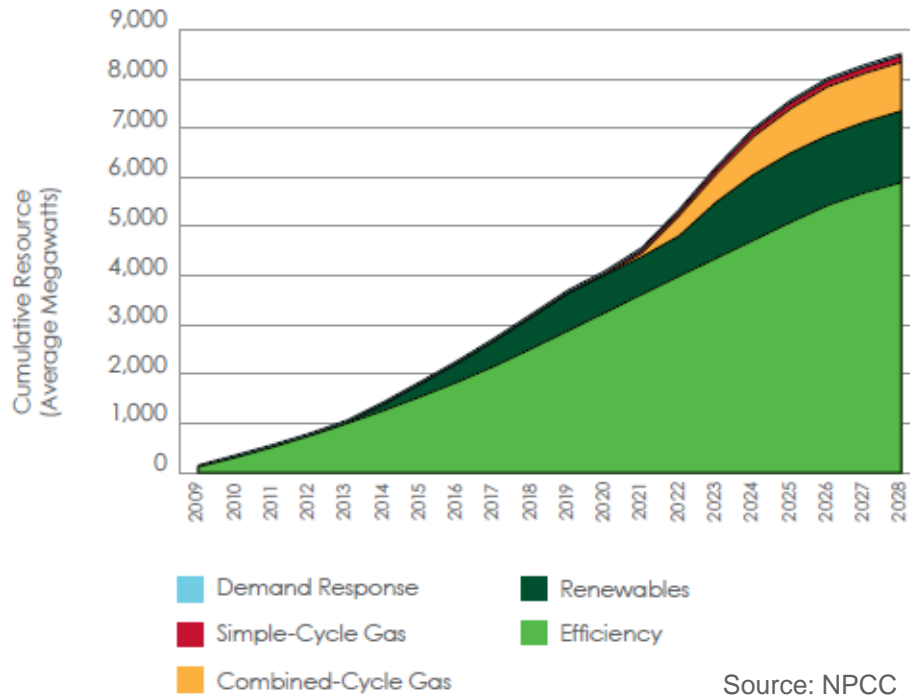
Source: MAKE

**Utilities must flex their business model ... balancing investments needed to support distributed generation while losing revenue to those same assets**



# How Does Washington State Compare to the Nation?

## Resource Additions, Sixth Power Plan



## Key Takeaways

- Electricity demand not likely to return to pre-recession levels until 2014
- No new nukes ....
  - Columbia granted 20 year extension
- HEAVY emphasis on electrical efficiency
  - Reducing MWh at cost of only USD 20/MWh
- Retiring coal plants, adding natural gas plants “as-needed”
  - Centralia plant to be shutdown by 2025
- Increased deployment of renewables with emphasis on proper integration
  - Meet state RPS program
- Utilities facing revenue challenges from diminished power demand

Washington’s electricity generation plans match up quite well with national trends in the electricity markets ... “nega-watts” offer partial solution to utility conundrum

## Renewables in Washington State and the Region

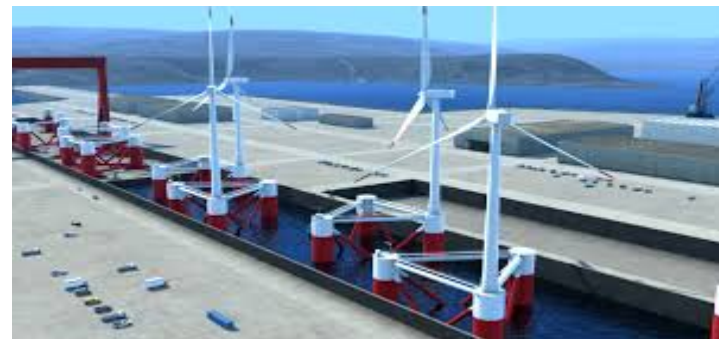
### Some Key Facts

- PPAs for onshore wind slowing
  - 267MW project slated for COD in 2015 for PGE (Tucannon River)
- Ahead of RES mandates, demand from adjacent states limited
  - Only 2-3GW required by 2025 for WA
  - TRECS allowances in CA shrink to 10%
  - No ID RES, OR only 1GW by 2025
- Around 2700MW of onshore wind installed
  - Lingering concerns on curtailment despite FERC ruling on BPA curtailment
- Only ~20MW of solar installed despite local content incentives

Source: MAKE

### Offshore Wind Energy Innovation

- Principle Power granted lease by BOEM for 30MW project deploying floating wind turbine foundations
- Also received USD 47MM grant from the DOE for 30MW project
- Lease location in Coos Bay off the coast of Oregon



Source: Principle Power

Washington has rich resources and should seek to maximize its low cost energy positioning with storage innovations that aid in managing curtailment concerns

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## Questions?

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