Extracting Insights from Many Scenarios: Examples from FACETS

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The Framework for Analysis of Climate-Energy-Technology Systems (FACETS) is a multi-region US TIMES model

- 134 Power regions
- Unit-level power sector
- State-level demands and policies
When we run scenarios, we run *lots* of them

- 78 Clean Power Plan scenarios
- Dimensions: compliance pathway, interstate compliance trade, gas resource, energy efficiency

1. "Business as usual" depends very much on what you assume

- Emission trajectories depend on gas price, renewable technology costs, and lifetimes of existing nuclear units (light vs. dark lines), and
- The impact of each of these dimensions depends upon what’s assumed for the others
- We now call these “No New Policies” cases
2. Response to policy is similarly sensitive: carbon taxes under different gas prices

Low gas prices lead to lower emissions in No Policy case and early in tax cases, flipping later. In the No Policy case, BOTH high AND low gas prices result in lower emissions than Reference gas prices after 2030.
What do we look for in interpreting many scenarios?

- What are the competing technologies?
  - Who’s on the margin in different scenarios?
Marginal competition varies across scenarios in 2035 generation mix

- Coal vs. wind
- Gas vs. coal
- Gas vs. coal
- All of the above?
What do we look for in interpreting many scenarios?

• What are the competing technologies?
  • Who’s on the margin in different scenarios?

• How does that affect the response to incentives set up by policy?
The difference in marginal technologies across scenarios impacts the response to a moderate carbon tax...
...which in turn drives the emissions outcomes

When gas is the marginal capacity, emissions reductions are not sustained over time.
What do we look for in interpreting many scenarios?

• What are the competing technologies?
  • Who’s on the margin in different scenarios?

• How does that affect the response to incentives set up by policy?

• How is the response to one dimension affected by the others?

• Identify key combinations of dimensions: are there combinations of dimensions in which a policy becomes ineffective? Super costly? Non-binding?
  • This allows us to identify key risks and opportunities

• What is consistent across scenarios?

• How do different sensitivites affect the winner and losers from a policy?
Conclusions

• Never again “A BAU scenario”

• Relationships within the energy system are what matters:
  • We should be delivering an understanding of these relationships, not projections

• Finding ways to empower policymakers/stakeholders to explore results and learn about these relationships themselves is a key goal and challenge
For More Information about FACETS

See [http://www.facets-model.com](http://www.facets-model.com) or contact Evelyn.L.Wright@gmail.com