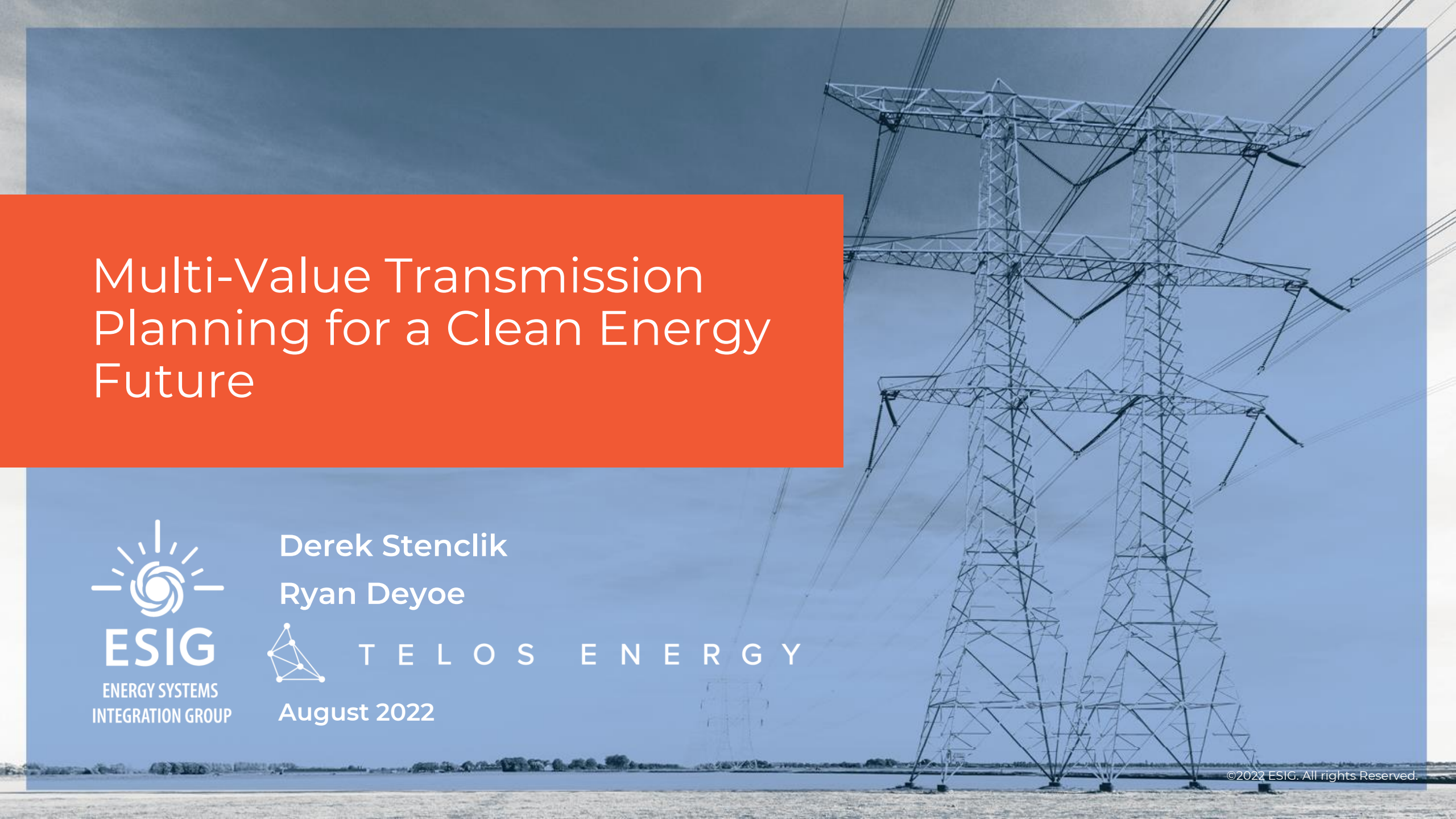
Multi-Value Transmission Planning for a Clean Energy Future



ESIG
ENERGY SYSTEMS INTEGRATION GROUP

Derek Stenclik

Ryan Deyoe

TELOS ENERGY

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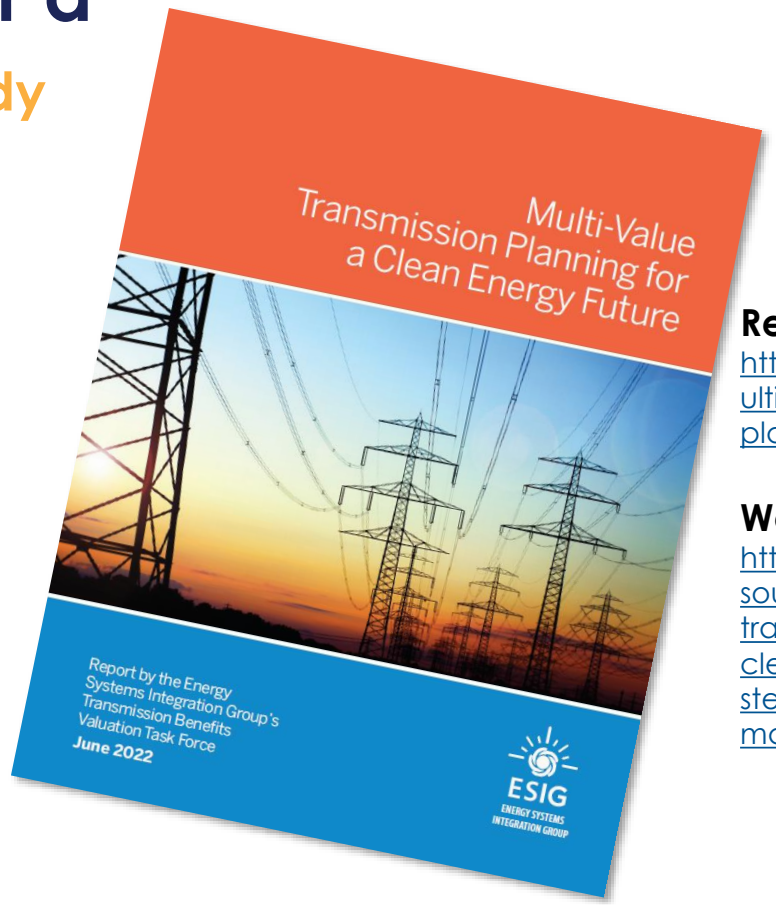
New ESIG Report

Multi-Value Transmission Planning for a Decarbonized Future, an ERCOT Case Study

A Report of the Energy Systems Integration Group's Transmission **Task Force**

Key Recommendations

1. Go beyond production costs and implement a multi-benefit framework,
2. Plan for the long-term, but start today,
3. Get comfortable with uncertainty and adopt established methods to deal with it,
4. Quantify resource adequacy and resilience benefits,
5. Break down silos and plan interregional projects.



Report:
https://www.esig.energy/multi-value-transmission-planning-report/

Webinar:
https://www.esig.energy/resources/multi-value-transmission-planning-for-a-clean-energy-future-derek-stenclik-and-ryan-deyoe-may-2022/

Four barriers to transmission planning for a clean energy future

A series of interviews with ESIG members and transmission planners highlighted four key barriers to transmission planning:

1. Focus on local reliability rather than regional economic efficiency, leaving value on the table
2. Interconnection queues favor short-term network upgrades rather than proactive planning
3. Lack of interregional planning and interstate coordination
4. Cost allocation is difficult, controversial and political

The transition to a high-renewables grid means that our conventional ways of planning transmission needs to be modified

Today's Typical Transmission Planning Framework

Generator Interconnection

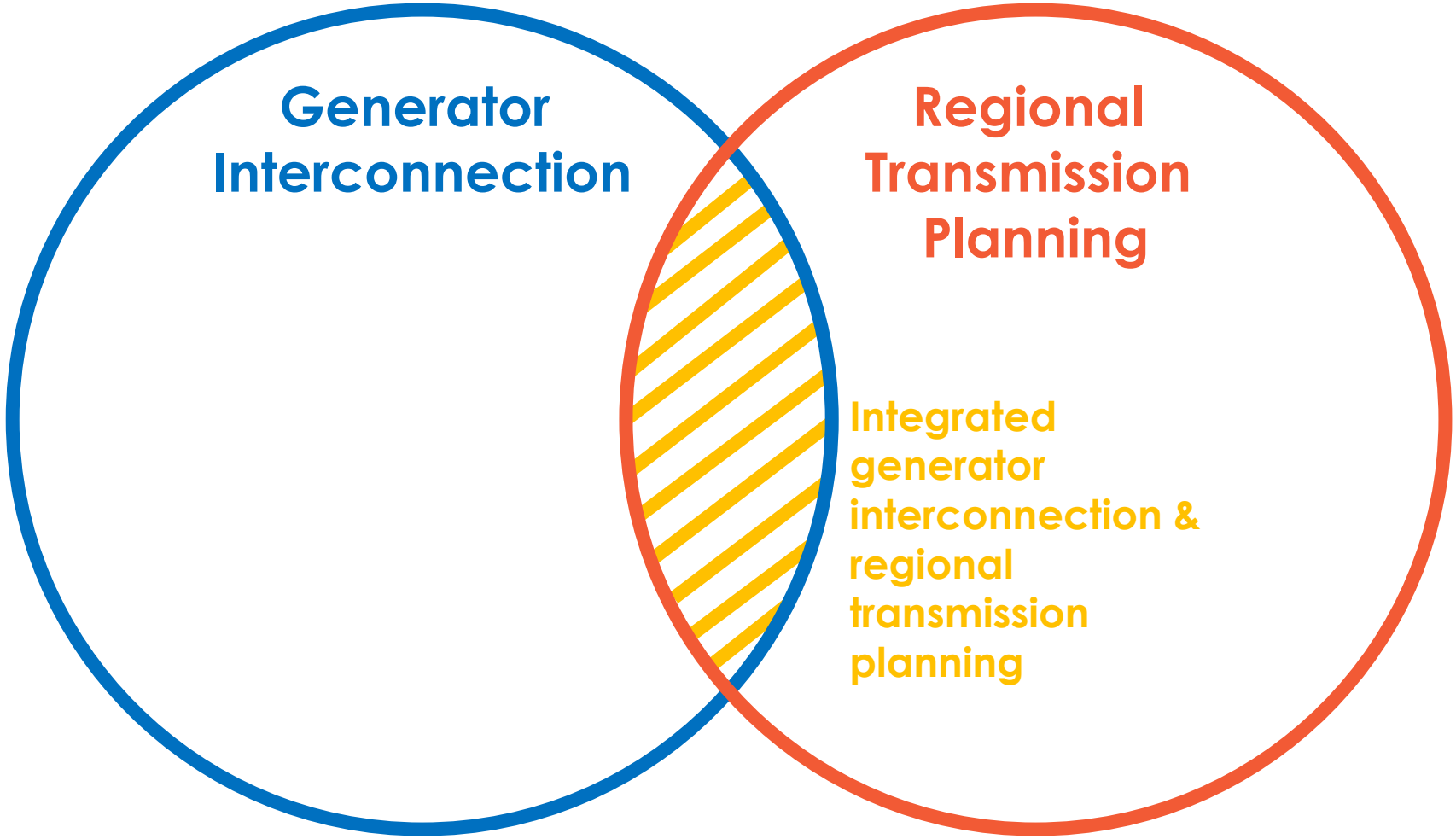
- Individual project or cluster analysis
- Local reliability analysis only
- Static "snap-shot" analysis
- Limited transmission upgrades for specific project(s)
- Reliability > Economic benefits
- Short-term horizon
- Generator pays for upgrades

Regional Transmission Planning

- Full system-wide analysis
- Economic, Reliability, and Adequacy
- Full-year or multi-year analysis across broad range of conditions
- Regional or interregional transfers
- Economic >= reliability
- Longer-term horizon
- Policy and environmental benefits
- Load pays

Limited overlap & coordination

What we need to do…



Integrated generator interconnection & regional transmission planning

- Multi-benefit planning
- Renewable Energy Zones
- Combined benefits of generator interconnection and system-wide benefits
- Longer time horizon
- Wider range of benefits

Implementing a multi-value framework for valuing transmission upgrades:

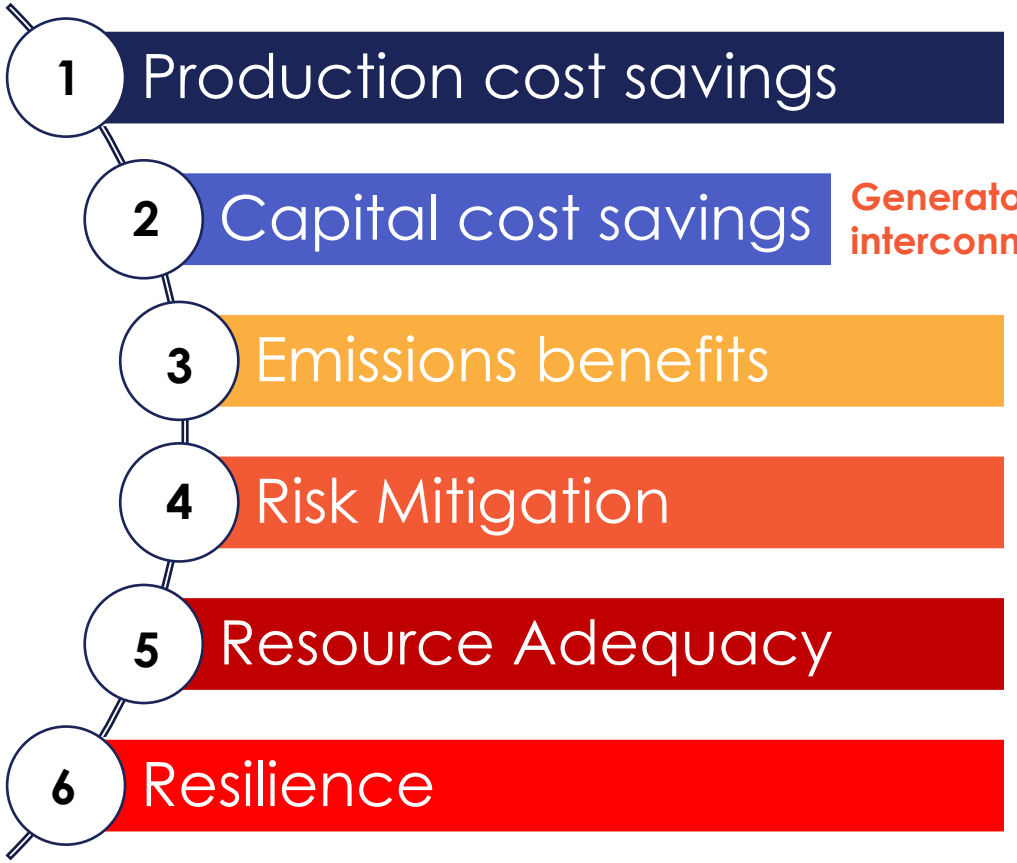
Reframing Transmission Valuation Methods: ERCOT Case Study

Objective:

- Revitalize multi-value transmission planning
- Provide a playbook for transmission planners
- Simplify the message for key industry stakeholders
- Influence FERC NOPR and efforts at ISOs/RTOs

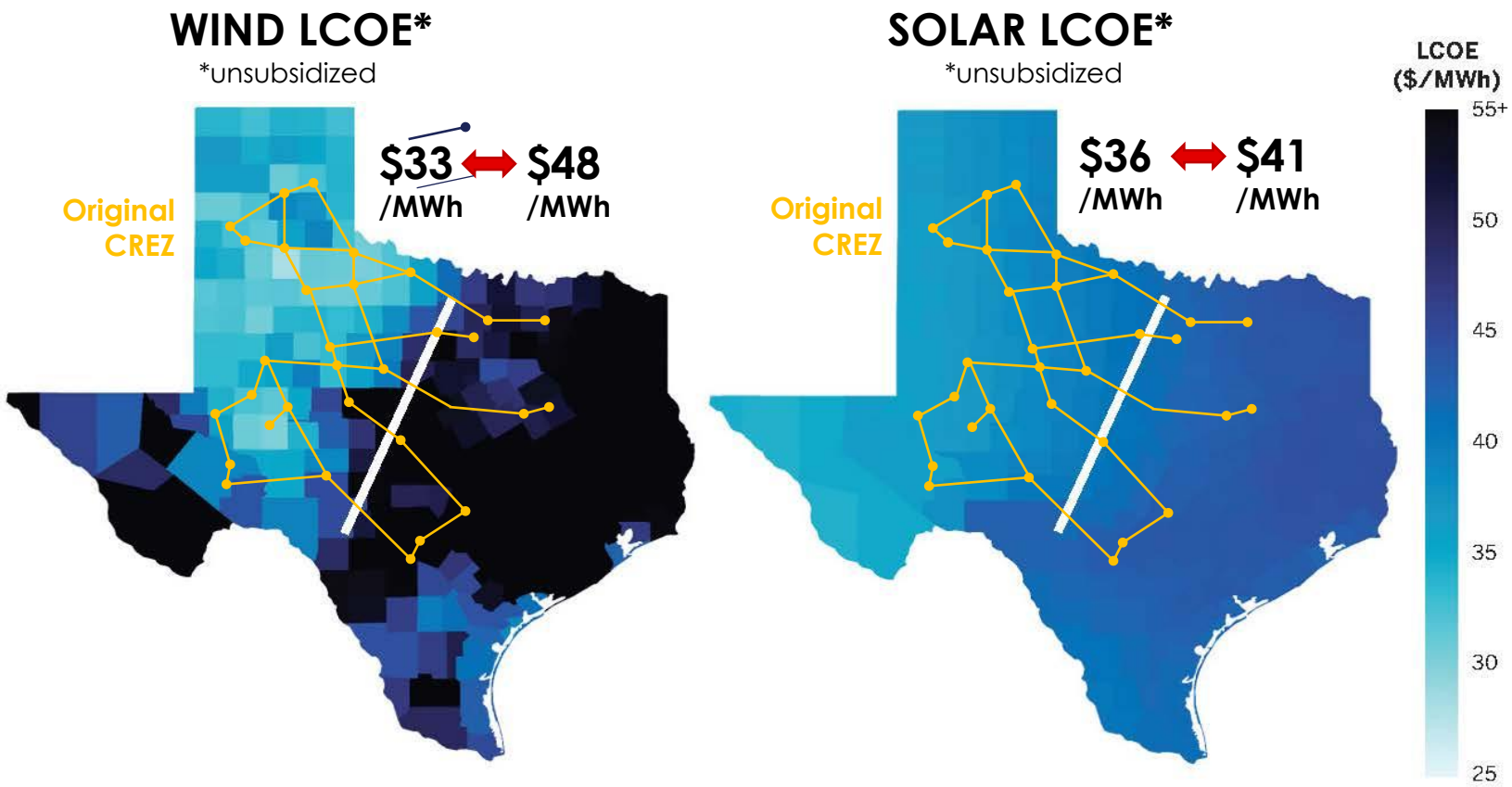
How:

Use the ERCOT West Texas Export and interregional transmission as a *case study* to illustrate the benefits of a multi-value framework



Reduced Capital Cost Benefits

How do we capture the benefits of accessing lower cost resources?



Data Source: The Energy Institute at The University of Texas at Austin, *Levelized Cost of Electricity in the United States by County*, version 1.4.0, https://calculators.energy.utexas.edu/lcoe_map/#/county/tech

Assumptions:

Absent new transmission, renewables would shift east
33% of additions 2023-2026
66% of additions 2026-2030

13.5 GW of capacity shifted east by 2030…*energy is unchanged*

To get the same amount of energy from higher cost resources (lower resource, higher land cost, etc.)

Benefits

$179 million in 2026
$493 million in 2030
Who gets this benefit?

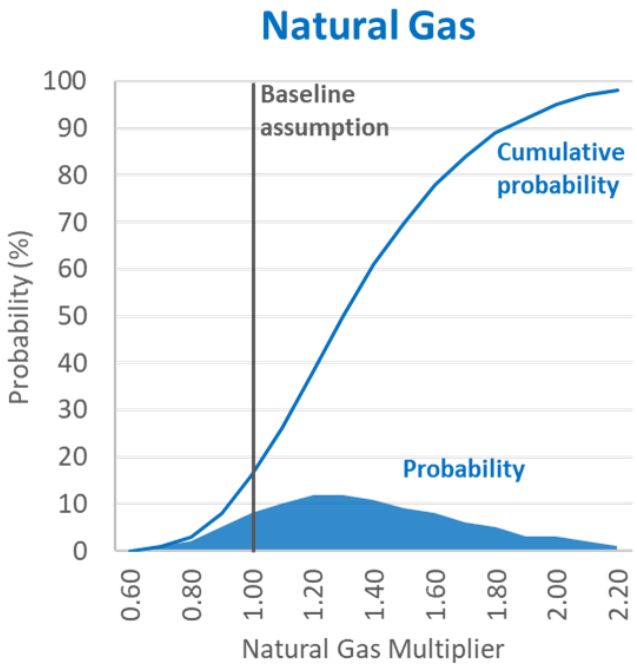
Transmission may be a no-regrets investment when you look across a range of futures

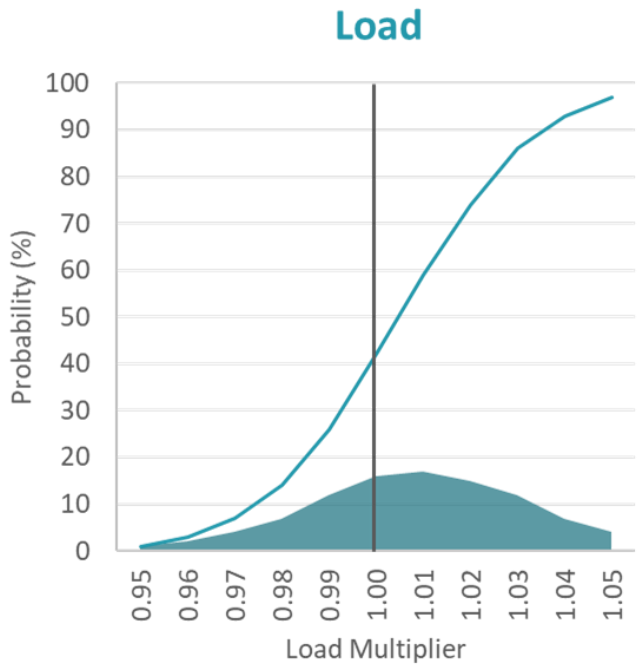
3 Renewable and Retirement Levels

x40 Stochastic Gas Price & Load Levels

120 Different Futures Evaluated

over 1 million hours of chronological modeling





Transmission may be a

Low Regrets asset

for Future Uncertainty

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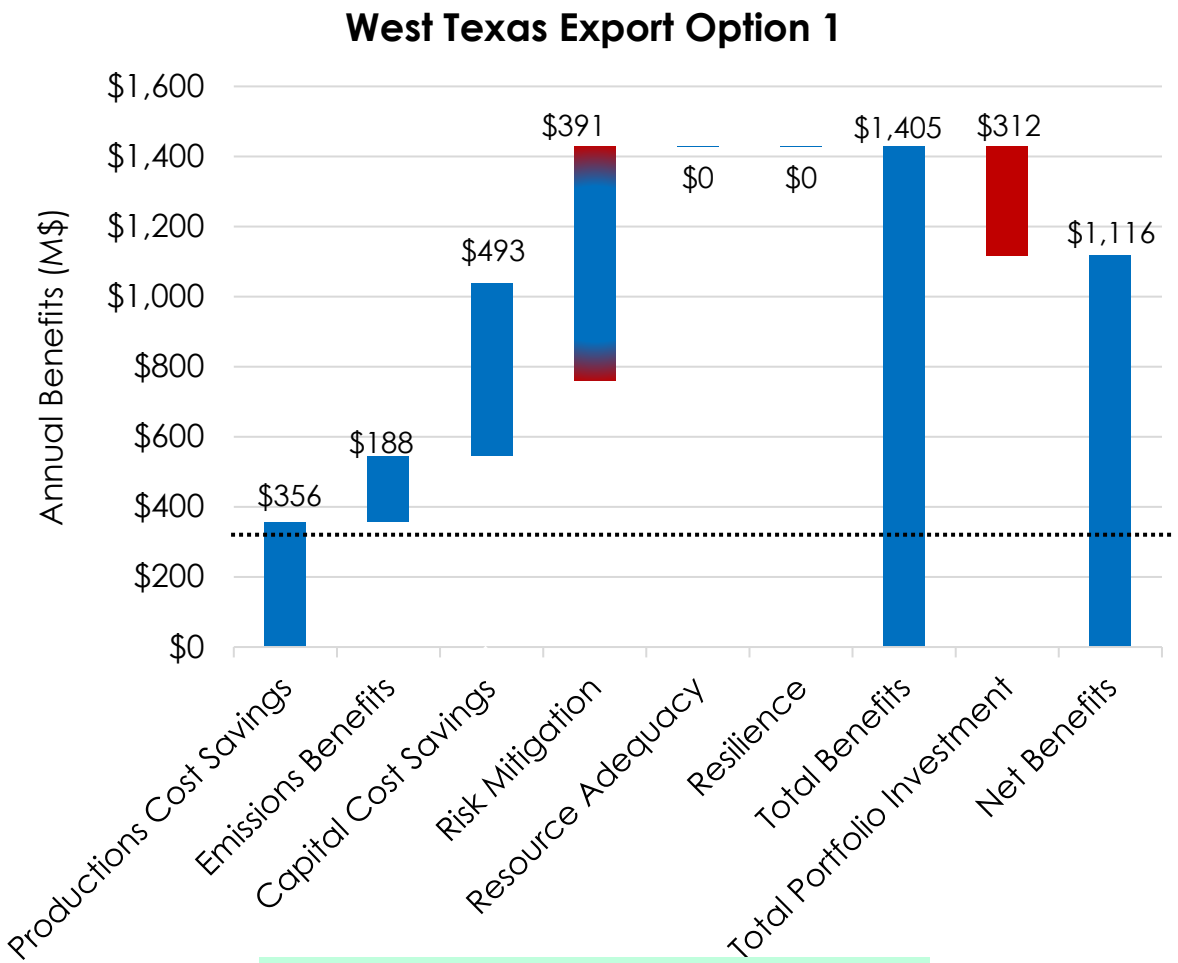
Our processes need to incorporate a value stacking & prioritization of benefits



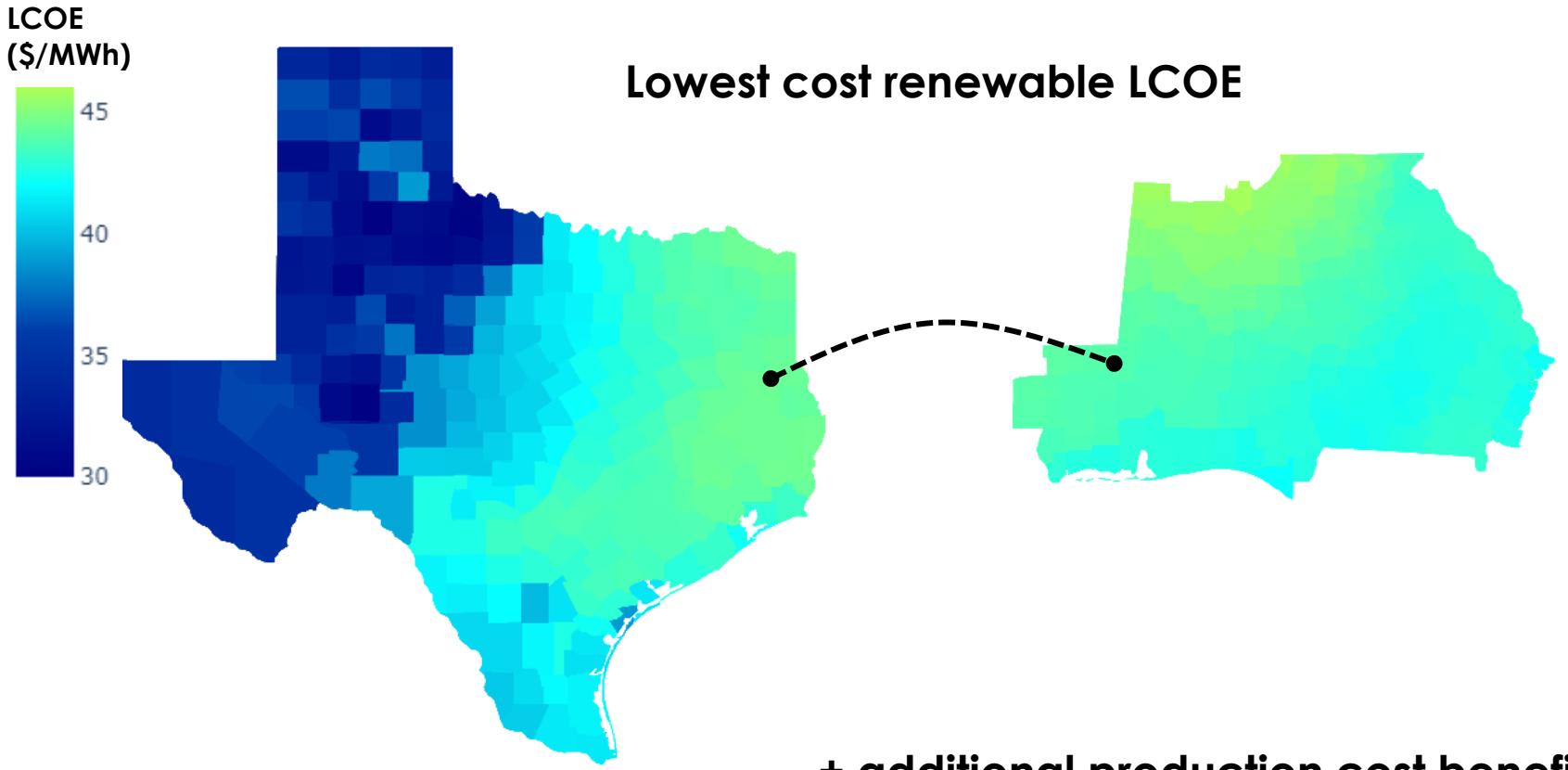
BCR adj-PC only: 1.1 | total: 4.5

- Transmission benefits are much broader than production cost savings, despite planning process in most regions
- Multi-value frameworks are not uniform, different transmission will have different benefits
- Early identification and prioritization of benefits in the transmission planning process is important

Interregional Transmission Opportunities

Capturing low-cost renewable diversity and reliability benefits

Proposed 2GW "shovel-ready" transmission project



2 GW transmission line

2 GW of contracted wind*
x43% capacity factor
7500 GWh/year

x$10/MWh price differential
= 75M$/year capital cost savings

**conservative assumption, could fill the line by overbuilding with minimal spilled energy*

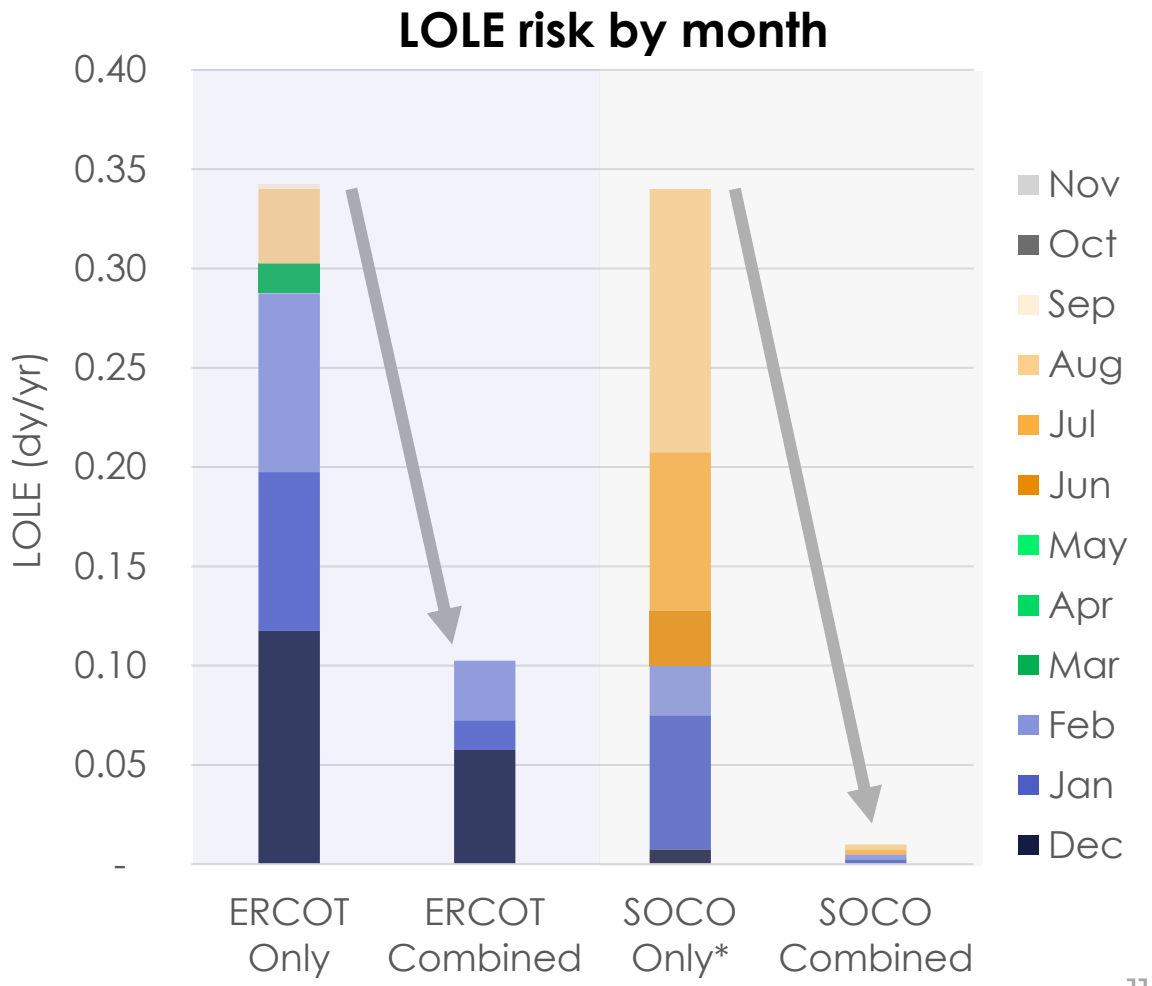
+ additional production cost benefits attributed to renewables with a different diurnal profile (not quantified)

Interregional Resource Adequacy Benefits

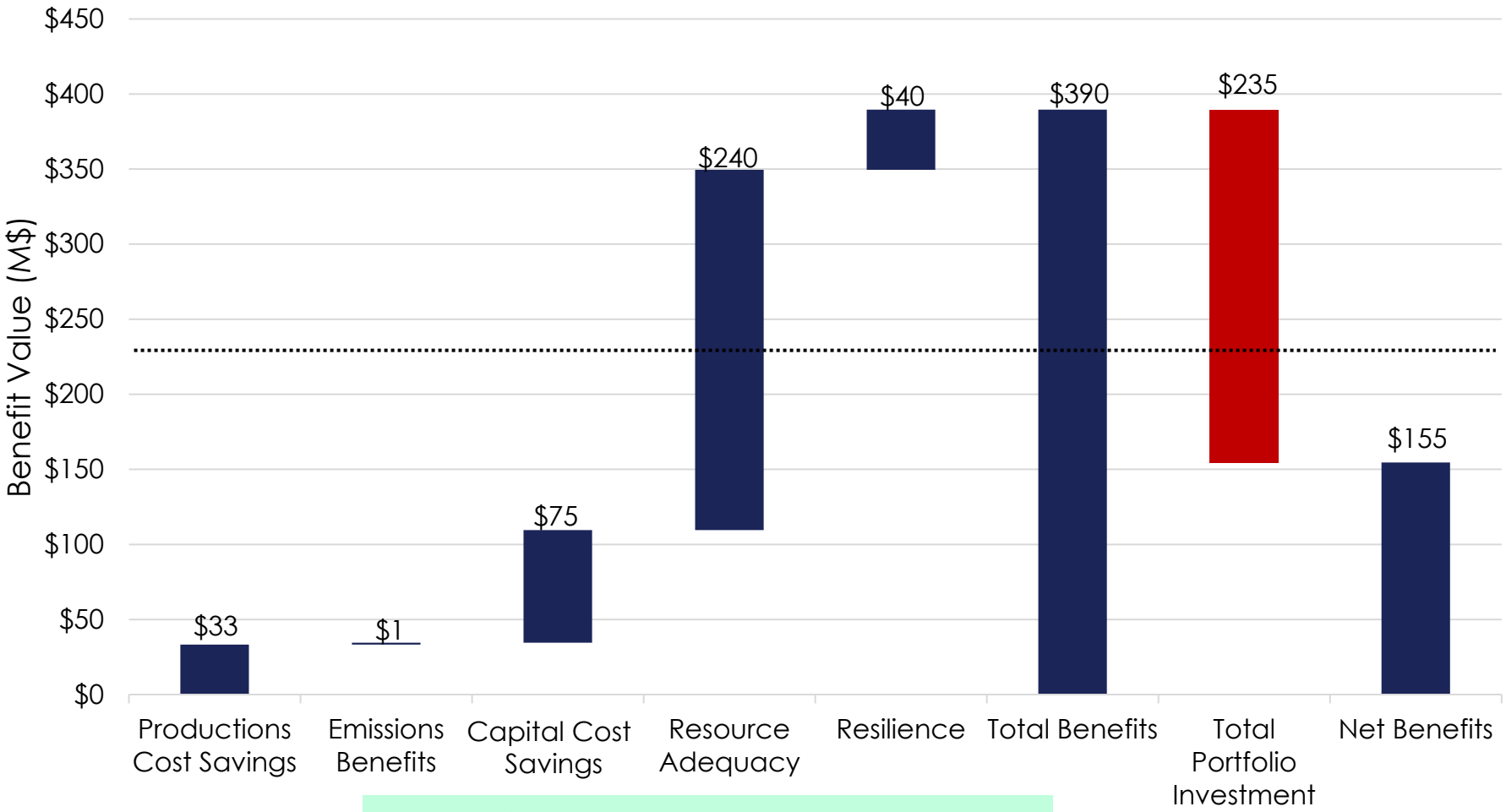
- **With additional Southern retirements, the connected system sees RA benefits at both ends of the HVDC line *without adding any new resources***
- Interregional transmission accesses load diversity and renewable resource diversity
- Improves ERCOT resource adequacy and enables deferral of new gas capacity and additional coal retirements in southeastern US
- Transmission can improve resource adequacy similar to 4 GW of new natural gas capacity
  [2 GW in ERCOT + 2 GW in Southern Company]

$240 Million/year of avoided capital cost*

*based on Net-CONE of new gas of $60/kW-yr



Bringing it all together, the multi-value stack



BCR adj-PC only: 0.14 | total: 1.66

Interregional transmission captures more benefit from resource adequacy and resilience, less benefit from production cost savings and emissions

Risk mitigation benefits not evaluated in this example

THANK YOU

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