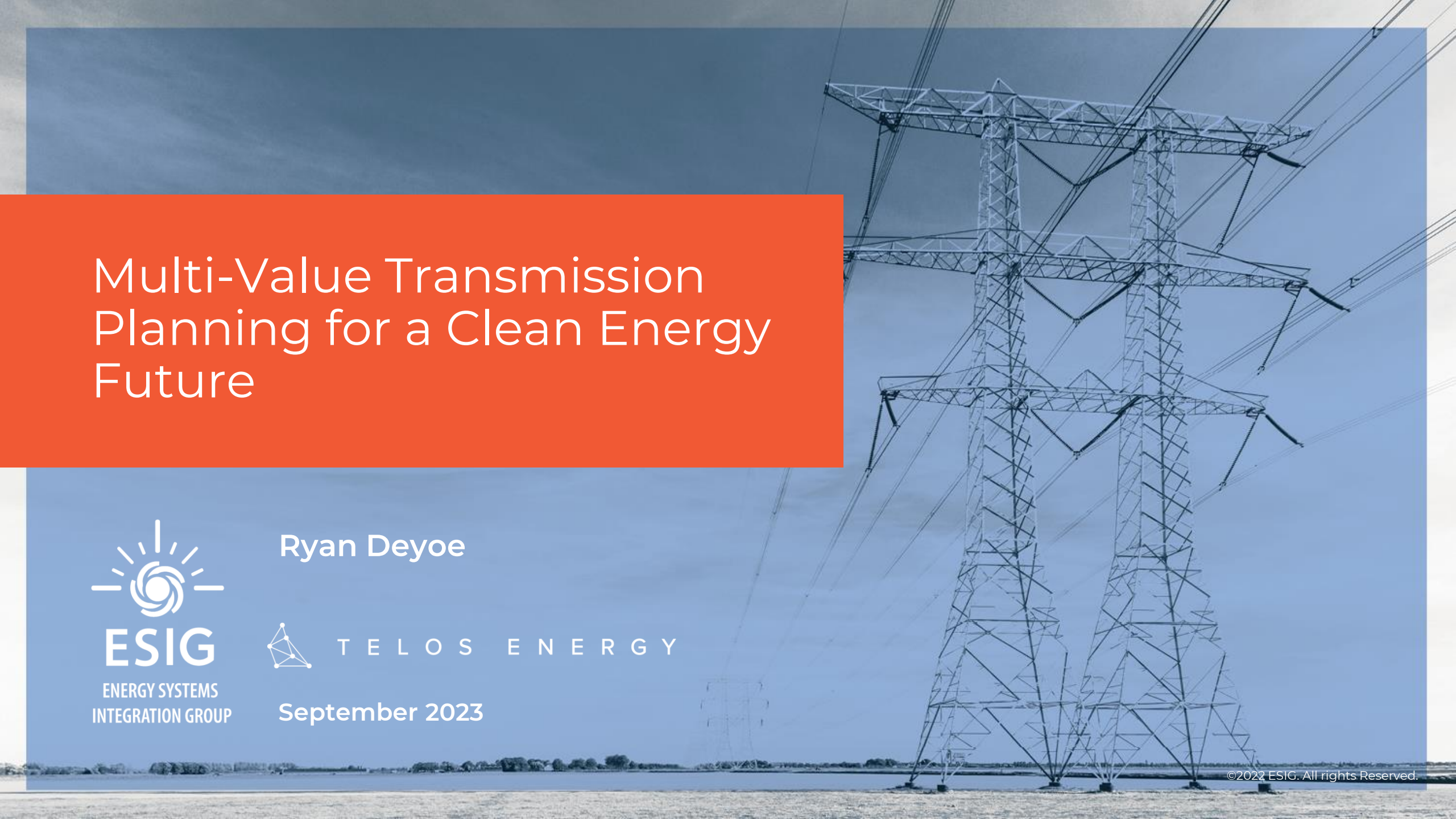
Multi-Value Transmission Planning for a Clean Energy Future



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ESIG
ENERGY SYSTEMS INTEGRATION GROUP

TELOS ENERGY

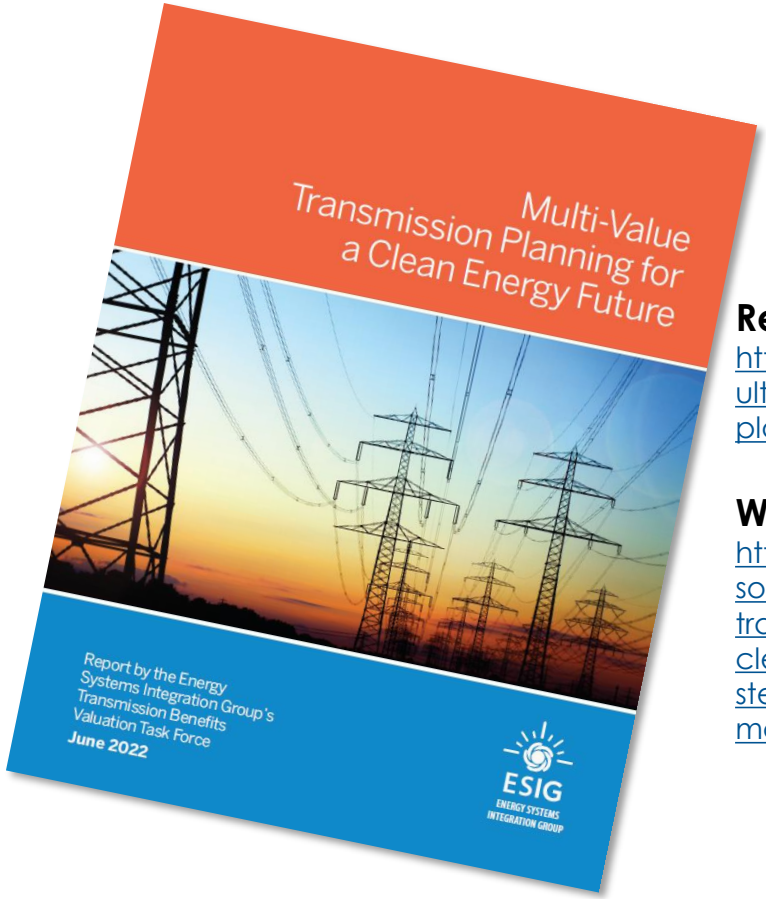
September 2023

Multi-Value Transmission Planning for a Decarbonized Future

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/

Next Steps: Deeper dive into interregional transmission and resilience

Going beyond production cost savings

Today's approach…

- Most economic transmission projects are evaluated based solely on production cost savings
- Only 10% of transmission is built based on economic planning
- As we integrate more wind and solar, production costs go down and transmission benefits erode, but the need only increases
- Exposes customers to long-term costs

Tomorrow's need…

- Multi-value benefits approach incorporates **risk**, **resource adequacy**, and **resiliency**
- Recognizes transmission as an insurance policy to future uncertainty
- **Invests in enabling infrastructure for the clean energy transition, rather than generating capacity (future stranded assets)**

Implementing a multi-value framework for valuing transmission upgrades:

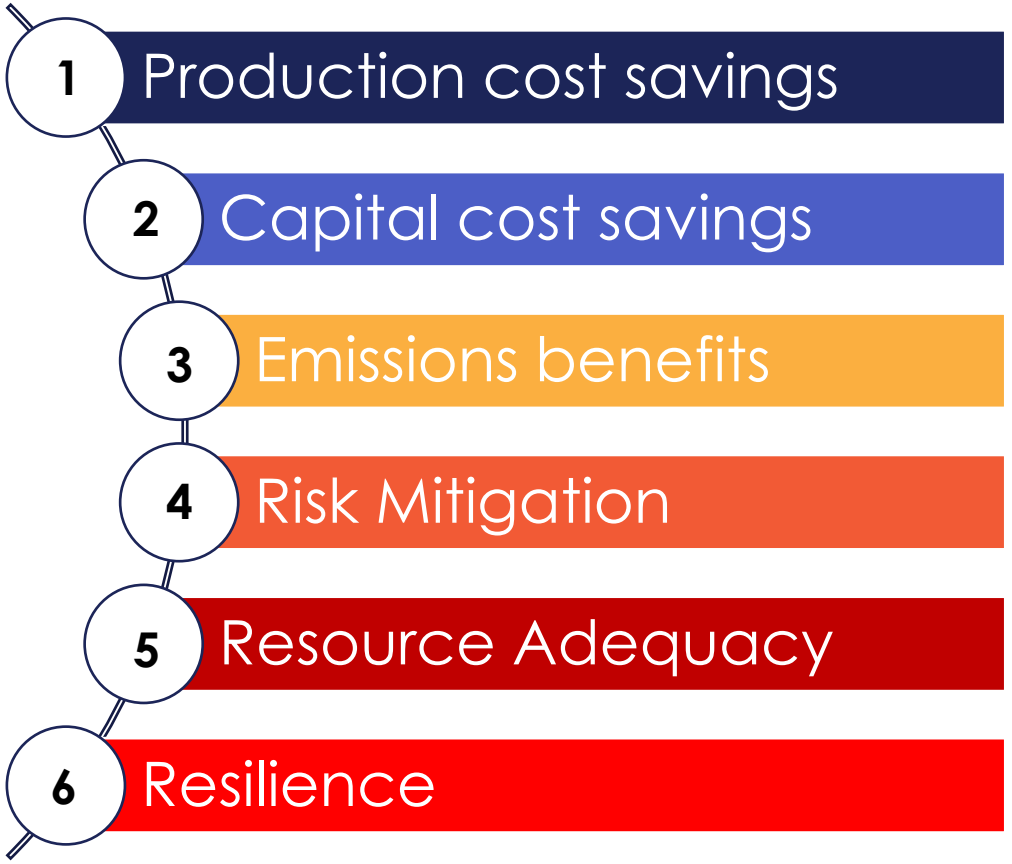
Reframing Transmission Valuation Methods: ERCOT Case Study

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



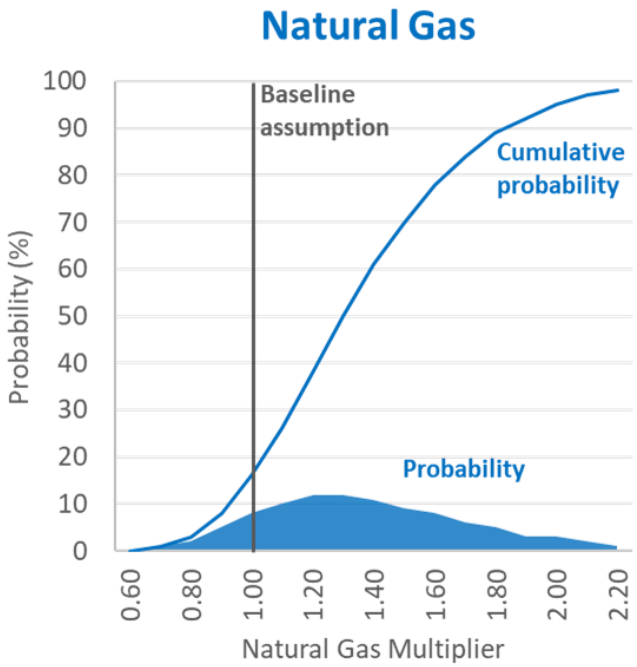
Transmission may be a no-regrets investment when you look across a range of futures

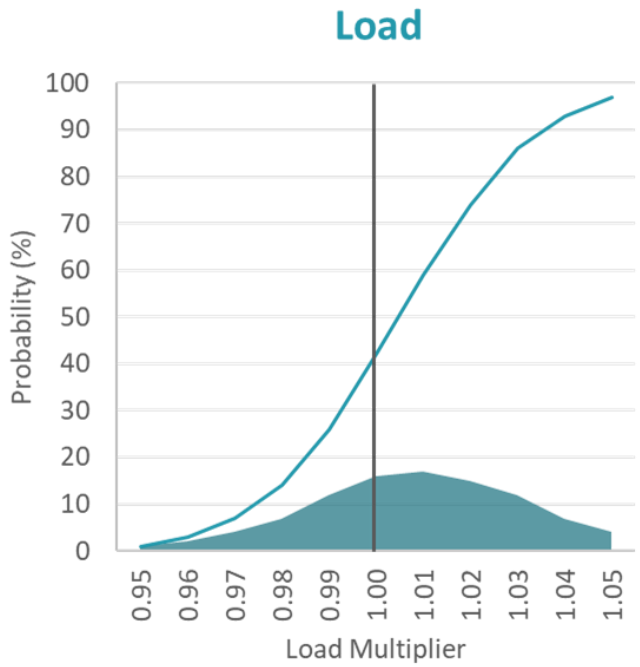
3 Renewable and Retirement Levels

x40 Stochastic Gas Price & Load Levels

120 Different Futures Evaluated

over 1 million hours of chronological modeling





Transmission may be a

Low Regrets asset

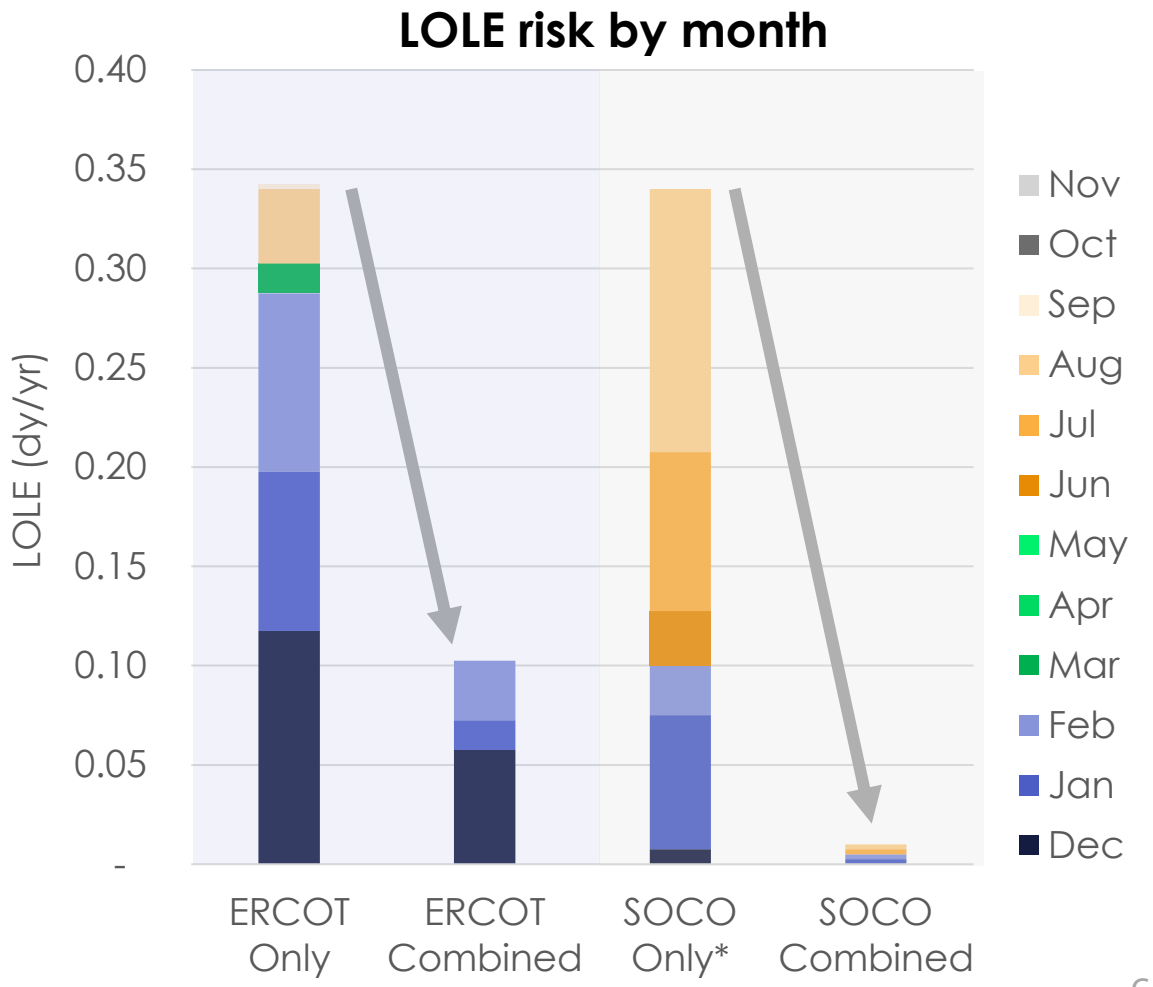
for Future Uncertainty

Interregional Resource Adequacy Benefits

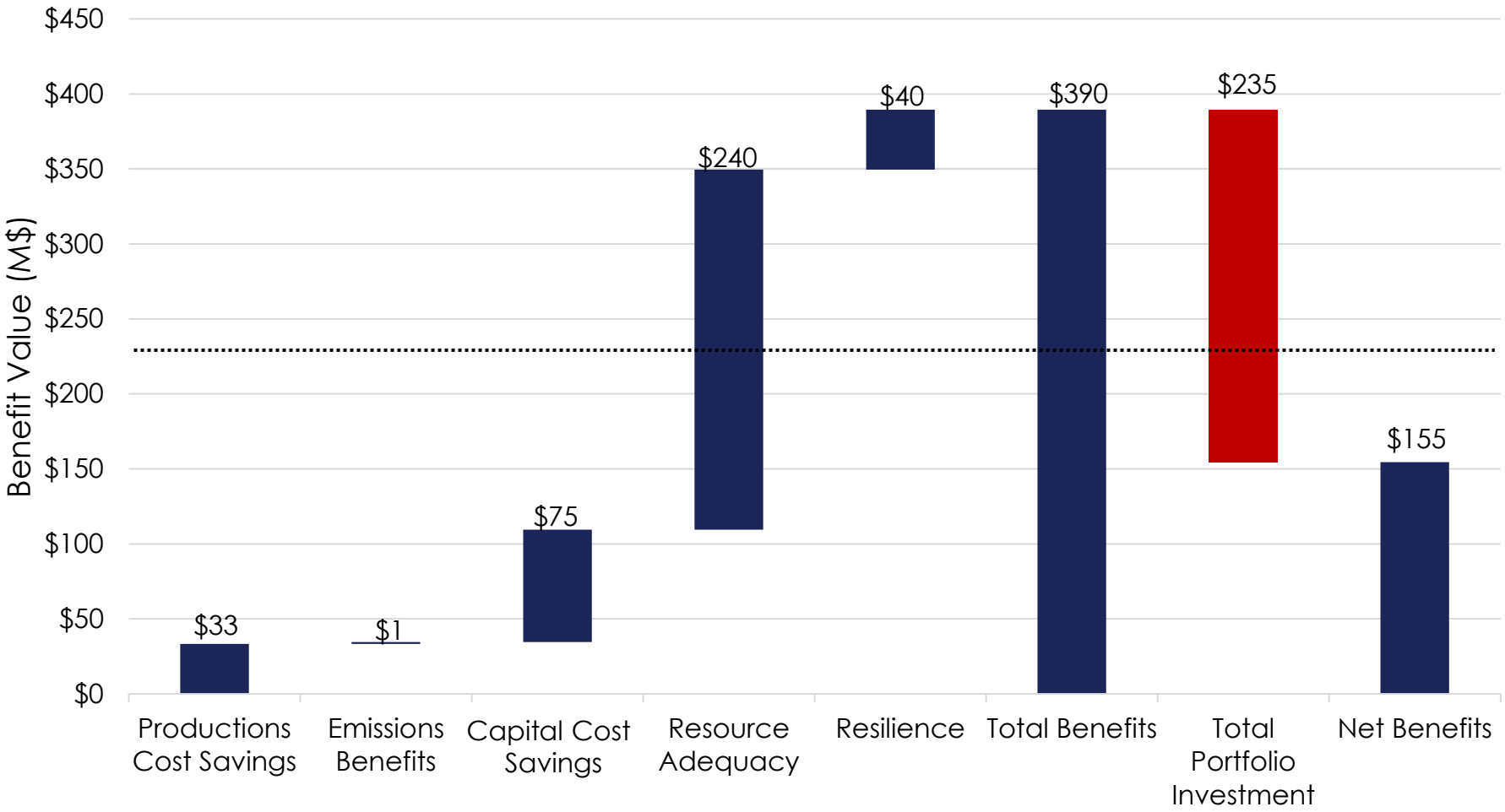
- **With additional Southern retirements, the connected system sees RA benefits at both ends of the HVDC line *without adding any new resources***
- Interregional transmission accesses load diversity and renewable resource diversity
- Improves ERCOT resource adequacy and enables deferral of new gas capacity 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



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

BCR adj-PC only: 0.14 | total: 1.66

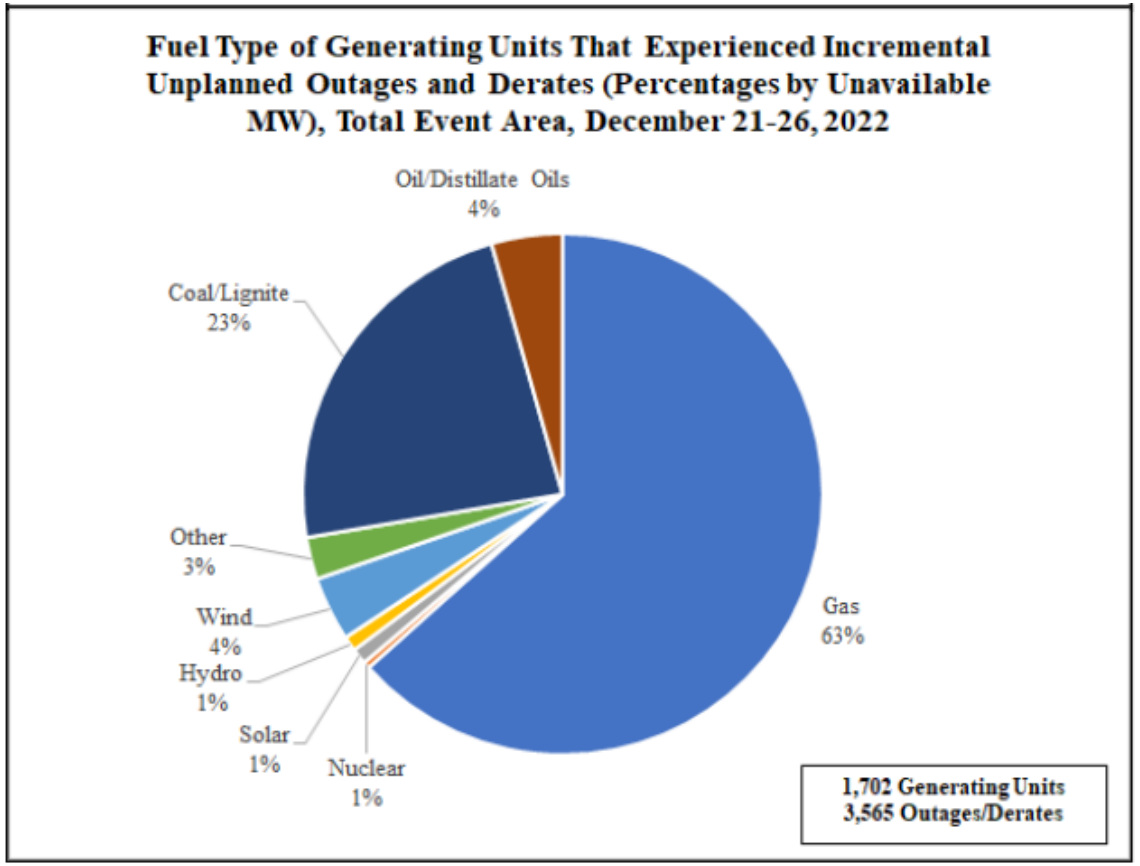
NERC and FERC Winter Storm Elliott Findings

Correlated outages represent extreme risks that span regions

Unplanned Generation Outages totaled 90,500 MW, 13% of the Eastern Interconnections anticipated resources

Implications for Interregional Transmission

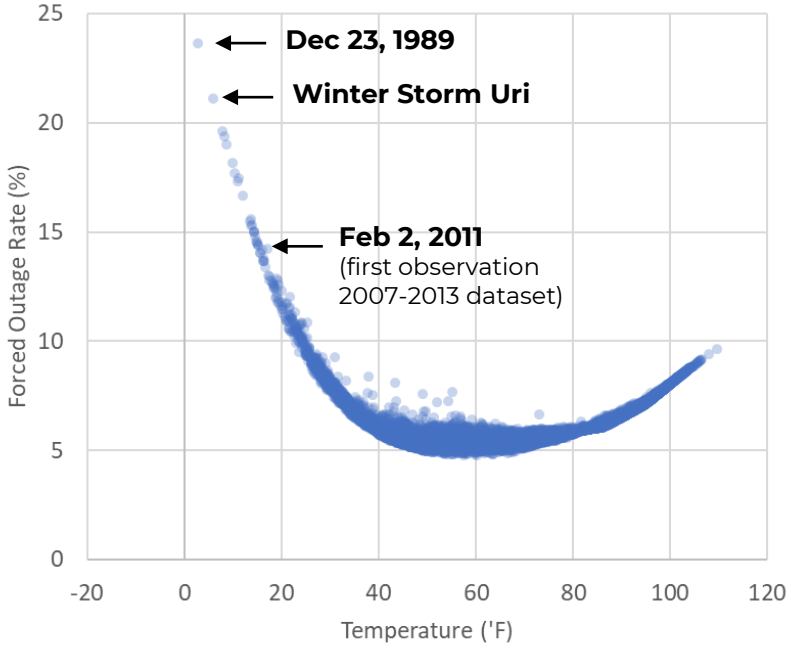
1. The value of existing transfer capabilities is immense during extreme events,
2. Transferring energy beyond direct neighbors (across weather systems) enhances reliability benefits,
3. **Extreme weather scenarios (tail risks) should be considered by planners**,
4. Co-optimized generation and transmission across regions could ensure even greater capacity is available during extreme events



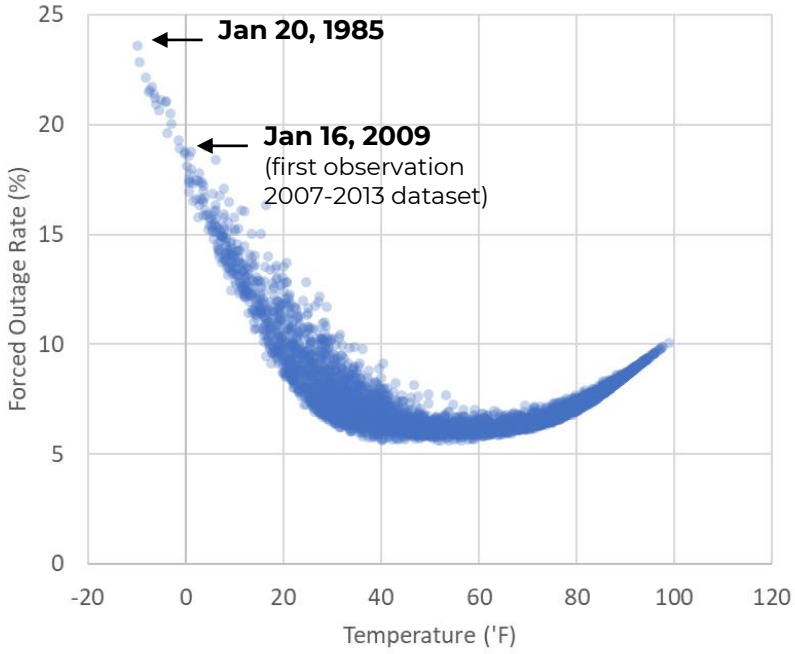
Presentation: https://www.ferc.gov/news-events/news/presentation-ferc-nerc-regional-entity-joint-inquiry-winter-storm-elliott

Weather Dependent Outages Should be Incorporated in Planning Studies

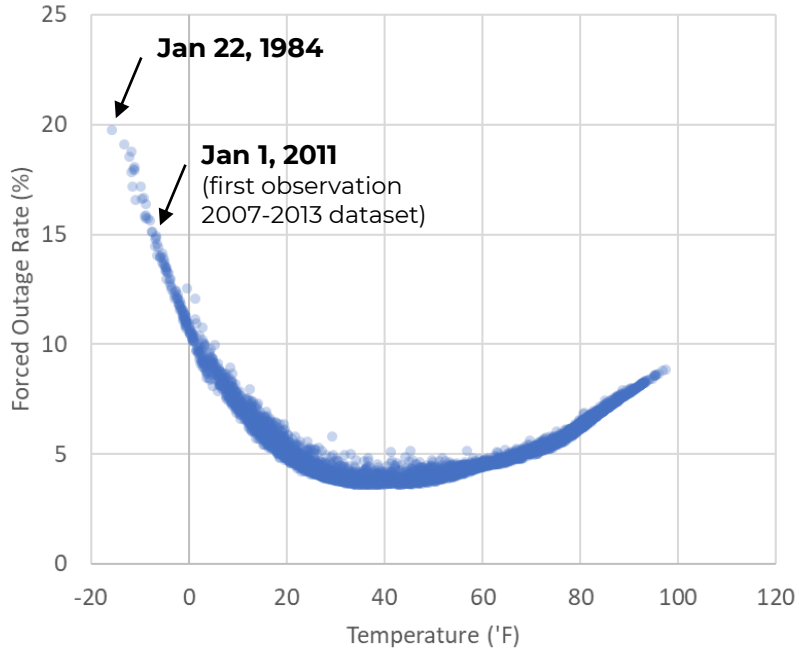
ERCOT



MISO



ISONE



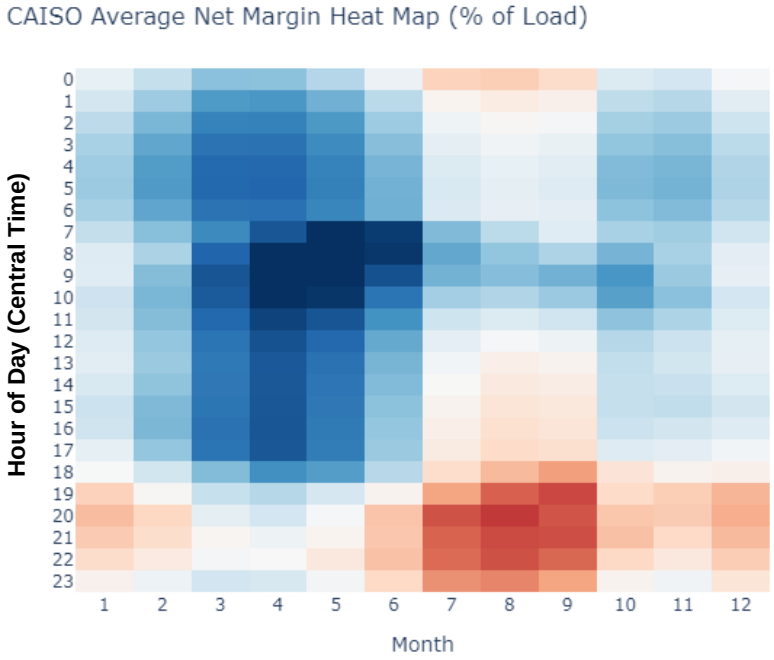
Forced outage rate (%) = capacity weighted, system fleet wide thermal outage as a percentage of installed capacity

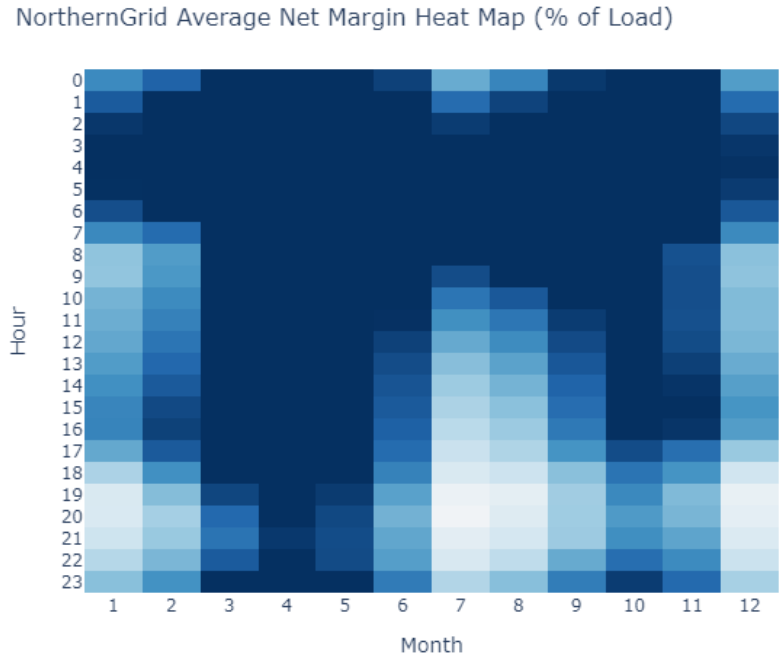
Planners need to ensure that a wide enough lens is being used to capture extreme increases in outage probabilities due to cold weather

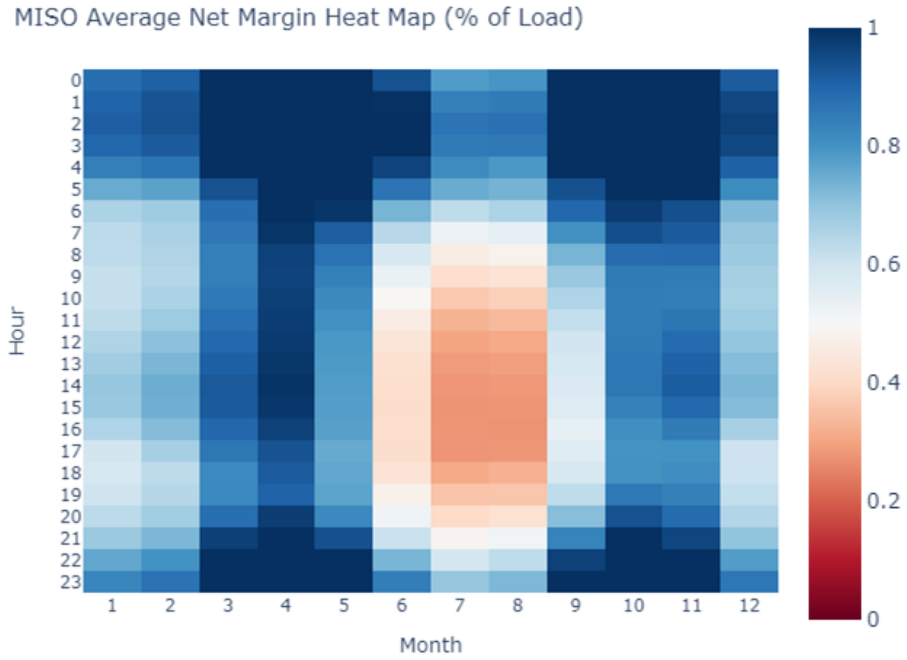
Regional Margin Heat Maps

- Low margin periods vary across the regions and should be used to assess existing and future transfer capability benefits for sharing capacity when regions are stressed

- Regions are at different points along the energy transition and possess different quality resources (solar vs. wind vs. hydro) which interregional transmission can enable access to, if we plan for it







Join us for our presentation on resilience benefits of interregional transmission at the Fall 2023 ESIG Technical Workshop

Registration: https://www.esig.energy/event/2023-fall-technical-workshop/

THANK YOU

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