We are pleased to share fresh insights from the Energy Systems and Climate Analysis (ESCA) team. ESCA researchers have published work addressing the uses of scenarios in net-zero planning, how to represent climate impacts in electric system planning, evaluating local climate change impacts, GHG emissions accounting for common carrier energy infrastructure, and climate data gaps.

For more of our research head to ESCA's website.

VIEW WEBPAGE

We have launched a new, interactive webpage describing the dynamics of decarbonization and summarizing ESCA's long history of cutting-edge climate change and decarbonization research. Created in response to member requests for public materials, we encourage you to share this link and let us know how it helps support your conversations on decarbonization.

Research Highlights

Uses and Limits of Decarbonization Scenarios to Inform Net-Zero Transitions

Understanding decarbonization scenarios is important for informed policy design, company strategy, and stakeholder engagement as net-zero transition plans are developed. ESCA researchers John Bistline, Anahi Molar-Cruz, and Steven Rose contributed to a new peer-reviewed paper that evaluates uses and limits of decarbonization scenarios when planning for economy-wide net-zero transitions. They find sectoral variation precludes a one-size-fits-all approach, regional variation results in differences in mitigation approaches that are not well represented by national scenarios, and incomplete representation of policy design, socioeconomic drivers and other risks may result in higher uncertainty than is covered in the scenarios. This paper was completed alongside a scenario data base from the Fifth National Climate Assessment. In addition, authors have created a three-page summary presenting key takeaways from this work.

VIEW FULL PAPER

READ SUMMARY

For more information reach out to John Bistline.

Representing climate impacts in bulk electricity systems

Weather and climate uncertainties are important to consider within electricity planning, particularly as changing and extreme conditions place new risks on assets and challenge existing and future reliability. ESCA researchers Ryan Fulleman and Andrea Staid outline a climate-informed integrated electric system planning framework to describe how these uncertainties can be incorporated into long term electricity planning as part of the Climate READi Initiative. This report provides guidance for planners working to integrate climate data and asset impacts across models to support integrated bulk electric system planning.

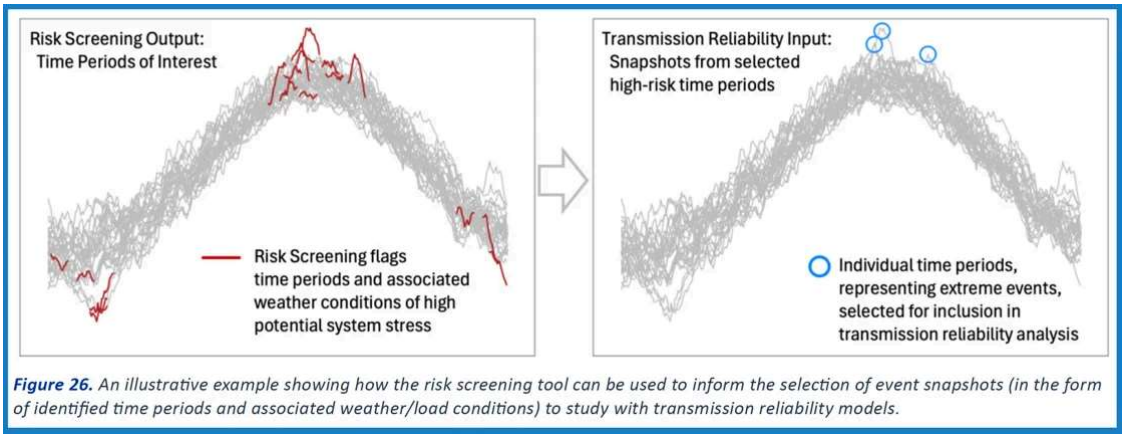


Figure 26. An illustrative example showing how the risk screening tool can be used to inform the selection of event snapshots (in the form of identified time periods and associated weather/load conditions) to study with transmission reliability models.

READ REPORT

For more information reach out to Andrea Staid.

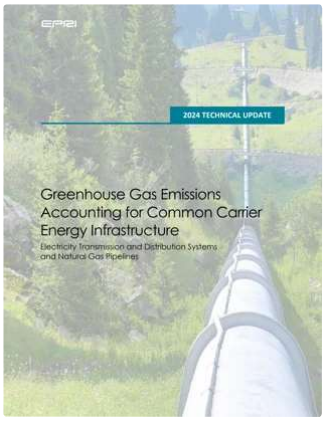
Evaluating Local Climate Change Impacts

ESCA researchers Erik Smith, Delavane Diaz, Steve Rose, and Laura Fischer present an approach for utilities and operators to analyze local climate change information that is essential for planning. This report outlines the process of taking climate data and making it fit-for-purpose, including guidance on necessary conversations, scoping, hazards, and metrics with an emphasis on communication throughout the process and in presenting the results to diverse audiences. Companies can leverage this process for their own climate risk assessment and to guide potential responses.

READ REPORT

For more information reach out to Erik Smith.

Greenhouse Gas Emissions Accounting for Common Carrier Energy Infrastructure



READ REPORT

Current greenhouse gas emissions accounting frameworks provide generic guidelines with varying accounting methods and estimation techniques, which produce a complex accounting challenge for operators of common carrier infrastructure, such as natural gas pipelines and electric system transmission and distribution lines. ESCA researchers Adam Diamant and Arin Kaye collaborated with the Greenhouse Gas Management Institute to produce this report that provides guidance and interpretation of frameworks for GHG emissions accounting for common carrier energy infrastructure.

For more information reach out to Adam Diamant.

Climate Data Gaps

EPRI researchers Erik Smith, Laura Fischer, Delavane Diaz, Justin Sharp, and Jacob Mardian provide an overview of existing climate data gaps specific to energy sector planning and operations as part of the Climate READi Initiative. This assessment outlines data gaps by product type and by climate variable and hazard, culminating in a discussion on next steps to address these gaps.

READ REPORT

CLIMATE DATA GAP	IMPORTANCE TO THE POWER SECTOR	CURRENT GAP ASSESSMENT			POSSIBLE APPROACHES TO NARROW GAP
		TECHNICAL	RESOURCE	USER ACCESS	
Hourly climate projections (2.3)	Long-term planning (Power system models need hourly inputs)				Saving hourly timesteps from model runs; Statistical or dynamical downscaling
Surface and hub-height wind (3.1.5) and solar observations (3.1.6)	Reliable operations and planning (Verification of gridded datasets, like WIND Toolkit and NSRDB)				Coordination/regulatory changes to make proprietary wind and solar farm data available
Increased spatial resolution surface and hub-height winds (3.1.5)	Reliable operations (characterizing wind droughts, near-term forecasts) and long-term planning (resource investments, siting, etc.				Improved physical modeling, including dynamical downscaling. Use of AI downscaling methods (e.g. GAN) if determined to be accurate
Wind gust and maximum sustained wind data (3.1.5; 3.3.2; 3.3.3)	Direct damage to infrastructure				More observations and additional physical modeling
Wildfire data from observations and climate model simulations (3.3.1)	Direct damage to infrastructure, liability risks				Investments in the development of satellite capabilities and fire models
Hydrological data from observations and climate model simulations (3.2)	Reliable operations (Improved hydrological drought and water quality modeling), direct damage to infrastructure				Investments in more gages, better surface models, and improved hydrological/ hydraulic models
Small scale severe weather (3.3.3)	Direct damage to infrastructure, reliable operations				Advancements in scientific understanding, improvements in modeling conditions conducive to severe weather. Better industry reporting of severe weather impacts.

For more details contact Laura Fischer.

Back Pocket Insights

Accessible, two-page summaries of our longer reports make for quick takeaways and easy referencing. Find all our Back Pocket Insights on the Thought Leadership tab of our website.

Opportunity on the Margin: Electricity Prices Under Deep Decarbonization

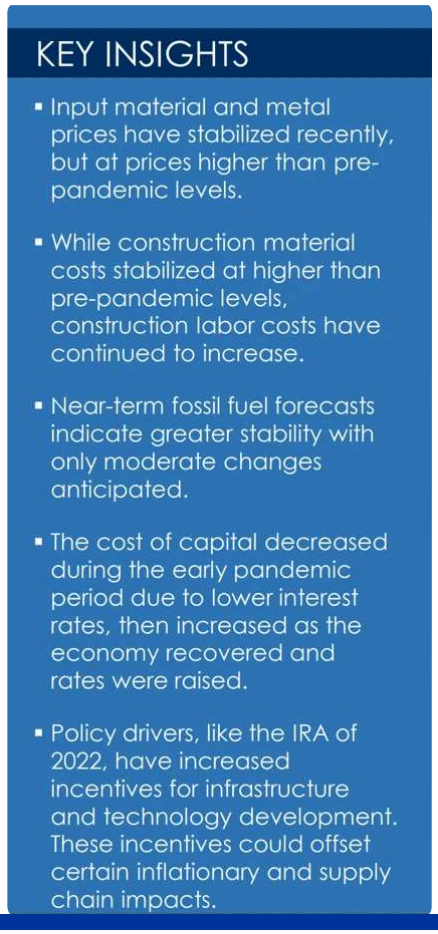
READ BRIEF

KEY INSIGHTS

- **Net zero energy systems may rely on high fixed-cost resources** including wind, solar, and battery storage.
- **High fixed cost resources may recover most of their revenue in energy markets** despite being revenue positive on the margin at near-zero prices.
- **The opportunity cost of capacity investment and dispatch may lead to non-zero price hours at any time without curtailment**.
- **Systems with overbuilt renewables may have significantly more curtailment** and therefore more zero-price hours.

Assessing Key Market Trends Impacting Technology Costs in Energy System Resource Planning

READ BRIEF



Member Center

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Resource Planning for Electric Power Systems

ED&CS Advisory Meetings Materials

178B: Planning for Data Centers and Large Loads webcast

Energy, Environmental, and Climate Policy Analysis

ED&CS Advisory Meetings Materials

201B: Rule 111 Sensitivity Analysis webcast

For more information about Resource Planning for Electric Power Systems please contact Nidhi Santen.

For more information about Energy, Environmental, and Climate Policy Analysis please contact John Bistline.

Thank you for your continued interest in our work. If you have any questions please email eea@epri.com.

Best,

EPRI Energy Systems and Climate Analysis Group

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