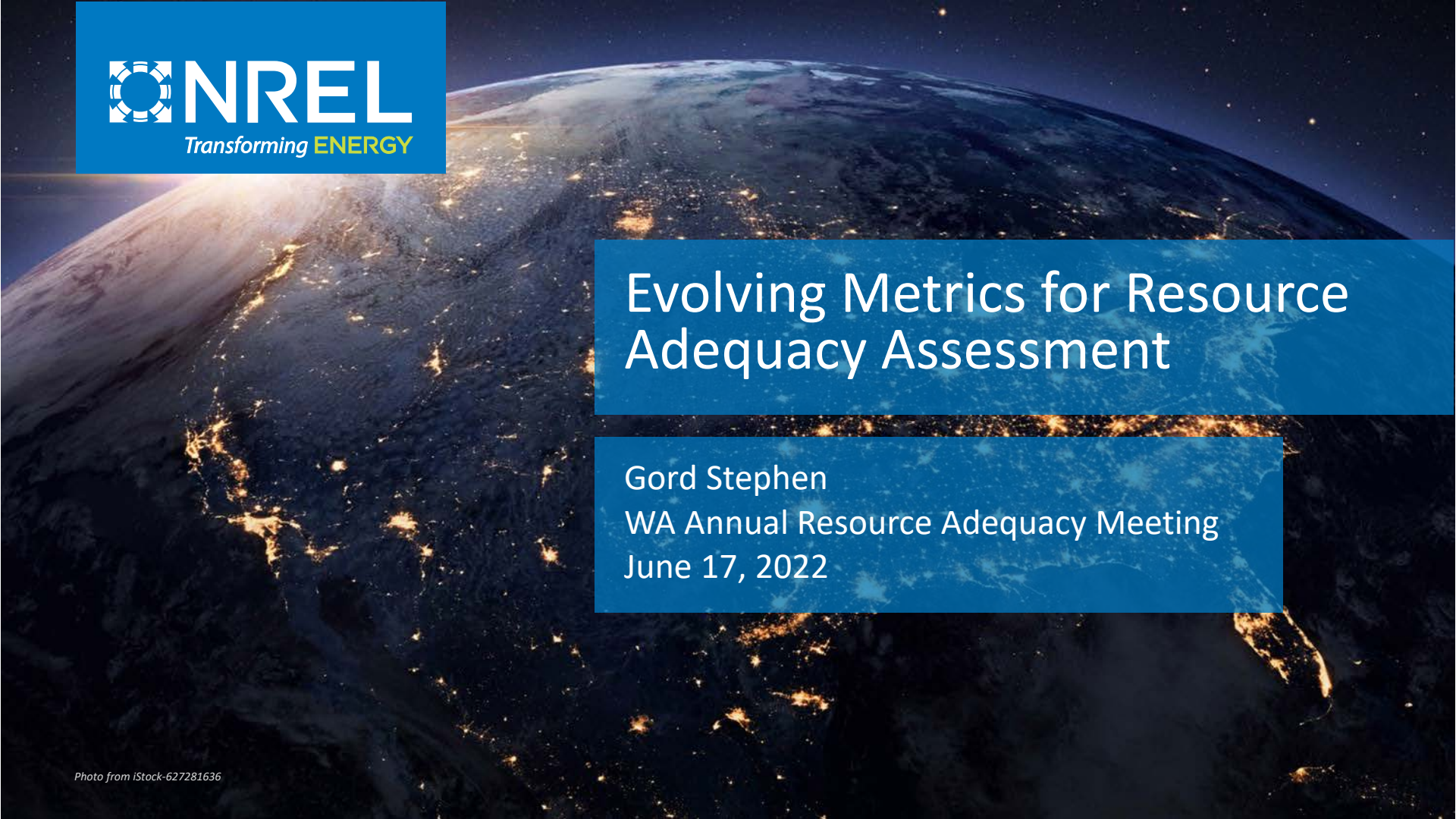

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Transforming ENERGY

Evolving Metrics for Resource Adequacy Assessment

Gord Stephen

WA Annual Resource Adequacy Meeting

June 17, 2022

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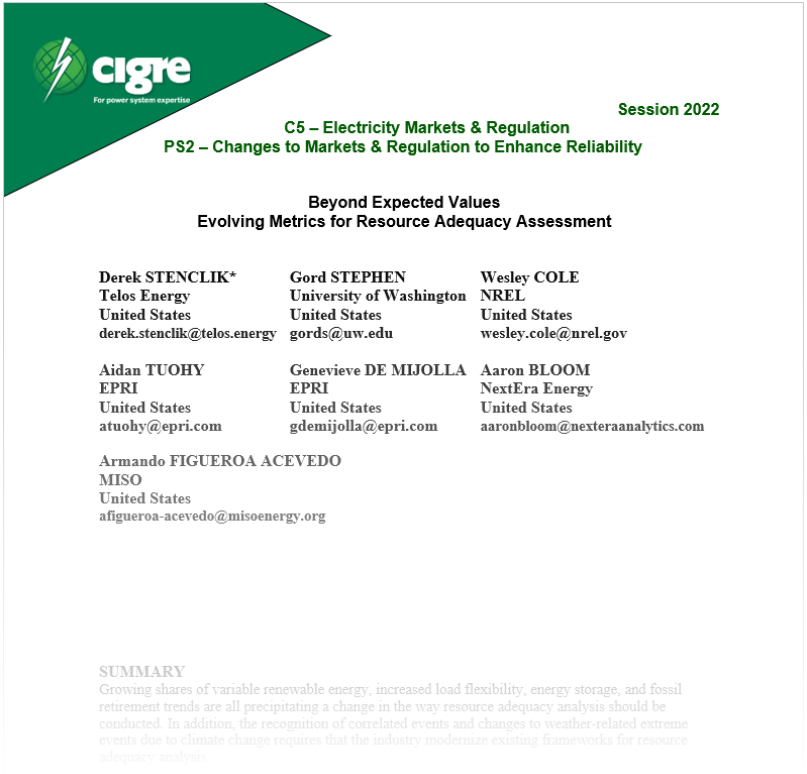
Work

Based on work by the ESIG "Redefining Resource Adequacy" Task Force

ESIG
ENERGY SYSTEMS INTEGRATION GROUP



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Session 2022

C5 – Electricity Markets & Regulation
PS2 – Changes to Markets & Regulation to Enhance Reliability

Beyond Expected Values
Evolving Metrics for Resource Adequacy Assessment

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SUMMARY
Growing shares of variable renewable energy, increased load flexibility, energy storage, and fossil retirement trends are all precipitating a change in the way resource adequacy analysis should be conducted. In addition, the recognition of correlated events and changes to weather-related extreme events due to climate change requires that the industry modernize existing frameworks for resource adequacy analysis.

Four Potential Steps Forward

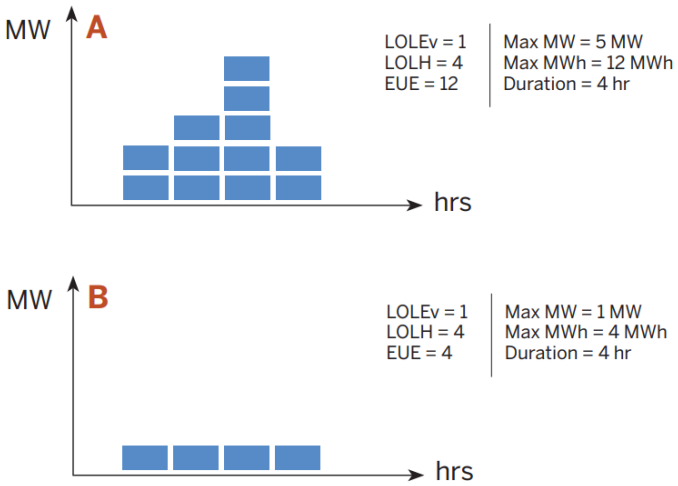
1. Place greater emphasis on normalized unserved energy metrics
2. Report a suite of metrics
3. Study full outcome distributions and quantify tail risks
4. Examine the nature of individual shortfall events

1 - Place greater emphasis on normalized unserved energy

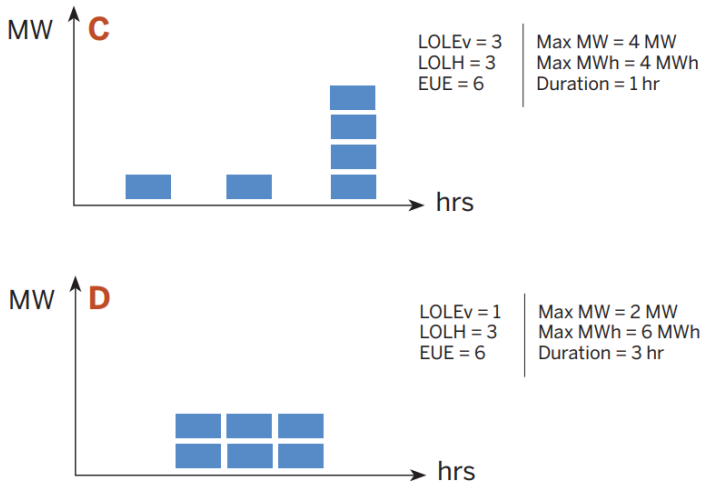
- Traditional metrics (LOLP, LOLE/LOLH) consider the expected frequency (and potentially duration) of events, but not the magnitude of those events
- Expected unserved energy (EUE) incorporates frequency and duration, but also magnitude
- Normalized EUE (NEUE) provides a uniform metric that can be compared across different system sizes, demand levels, analysis periods, etc

2 – Report a suite of metrics

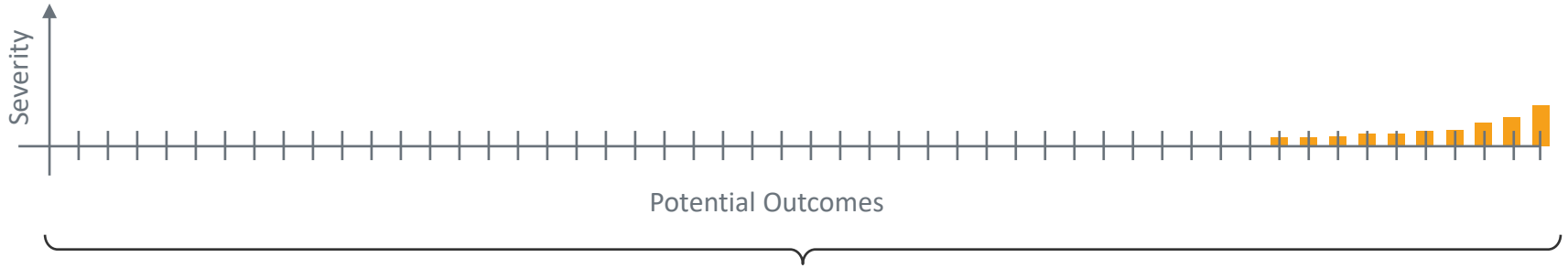
Example 1— Same LOLEv and LOLH, but very different events



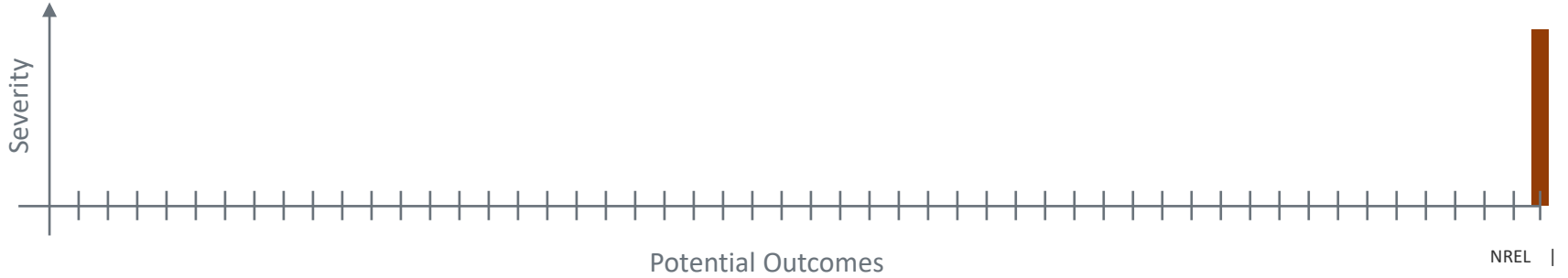
Example 2— Same LOLH and EUE, but very different events



3 – Quantify tail risks

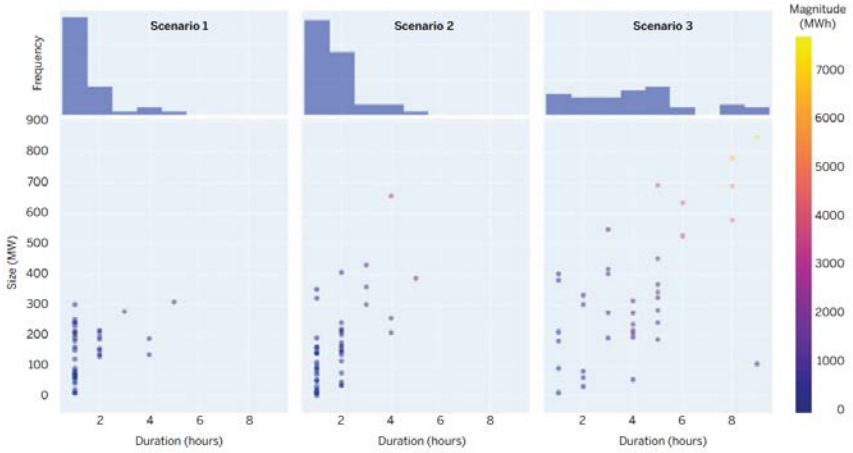


Same outcome “on average”, different worst-case scenarios

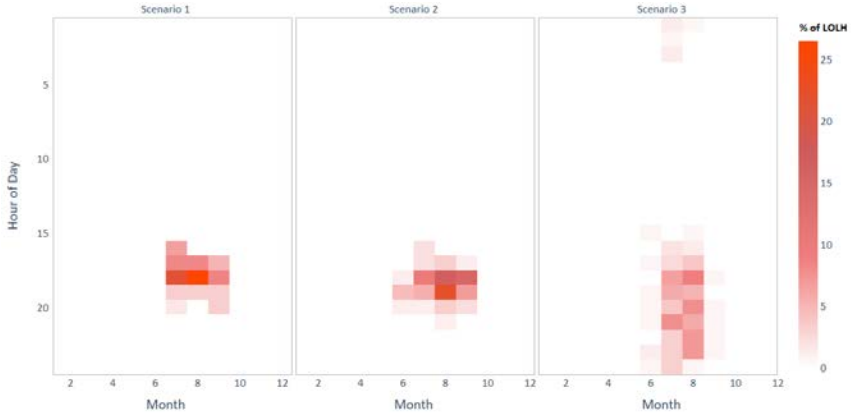


4 – Examine the nature of individual shortfall events

One-size-fits-all capacity investments are no longer the only mitigation strategy



Source: Energy Systems Integration Group.



Frequency, magnitude, duration, and timing of individual events determine the potential viability of variable renewables, storage, demand response as alternative investments

Understanding and Communicating Risk

- Need to balance accessible and transparent adequacy assessment (and reporting) with technical rigor and precision
- Using new / multiple new metrics can better capture physical realities, but also complicates explanations to a wider audience
- Can we communicate the same information in better ways?

Example: Same information, different presentation – which is easier to understand?

- 1234 MWh expected unserved energy
- 10 parts-per-million normalized expected unserved energy
- 0.001% expected unserved energy
- 99.999% average energy availability

Thank You!

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NREL/PR-6A40-83025

This work was authored in part by the National Renewable Energy Laboratory, operated by Alliance for Sustainable Energy, LLC, for the U.S. Department of Energy (DOE) under Contract No. DE-AC36-08GO28308. Funding provided by U.S. Department of Energy Office of Energy Efficiency and Renewable Energy Strategic Analysis Office. The views expressed in the article do not necessarily represent the views of the DOE or the U.S. Government. The U.S. Government retains and the publisher, by accepting the article for publication, acknowledges that the U.S. Government retains a nonexclusive, paid-up, irrevocable, worldwide license to publish or reproduce the published form of this work, or allow others to do so, for U.S. Government purposes.

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