

The background features a dark grey field with several large, overlapping circles in shades of blue, green, and brown. A network of thin white lines connects small white dots, creating a web-like pattern across the entire image.

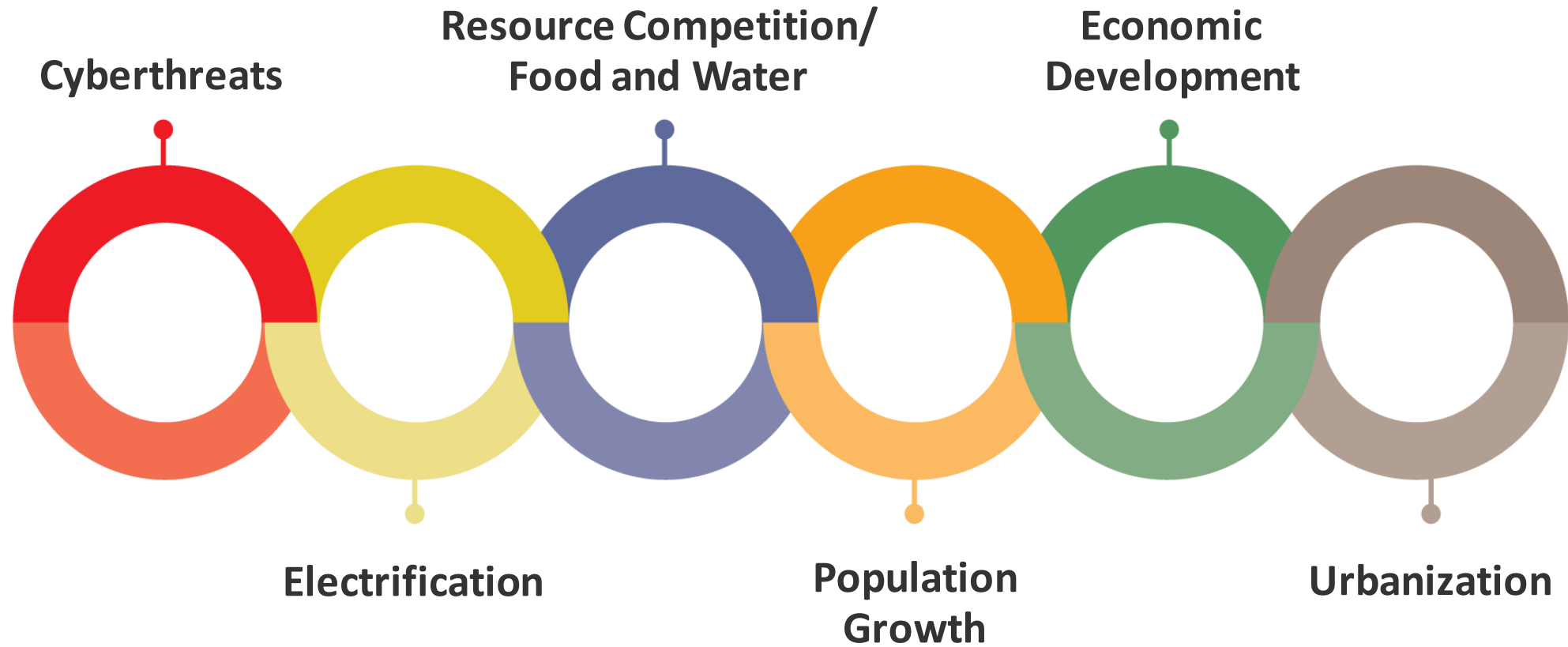
Renewables and Integration

LEAP 2021
November 1, 2021
Virtual Panel

Some of the most important research challenges to realizing a clean and secure energy future are at the system level.



Megatrends



- By 2050 the global population is projected to increase by approximately 20%; GDP is projected to increase by a factor of 2 –*emerging economies*
- In the absence of *sensible* measures, the global energy consumption would likely increase by approximately 40%, and CO₂ emissions by 60%

Advanced Research on Integrated Energy Systems – Proving out Solutions for a Decarbonized Energy System



- ARIES is a research platform developed by the National Renewable Energy Laboratory and DOE's Office of Energy Efficiency and Renewable Energy.
- It was designed to fill a significant gap: there is no research platform that can support the nation's transition to a decarbonized energy system.
- Without a safe environment to prove things out, we could be introducing significant risk, vulnerability, and expense to the electric grid and customers.


ARIES - a research platform to accelerate the transition to a modern energy system




- Identify the best path to reach local and national **decarbonization goals**
- Look at **system-wide resilience** to pinpoint weaknesses and solutions
- **Troubleshoot and de-risk new technologies** before they are connected to the electric grid
- **Embed cybersecurity** as a fundamental layer to all research
- **Accelerate deployment** by providing a research platform that can replicate the real-world

Renewable Integration Enabling R&D

Making it possible to pivot and stay ahead of the rapidly evolving energy sector and supporting research of critical importance:

 **Power electronics** to control and integrate rapidly increasing electronics-based technologies

 **Infrastructure** to adapt existing energy infrastructure for integration, safety, monitoring, and controls

 **Hybridization** to achieve enhanced coordinated capabilities beyond isolated technologies

 **Energy storage** to balance variable renewable generation and demand

 **Cybersecurity** to secure operations to prevent disruption, damage, and loss of functionality

Environmental justice to demonstrate solutions, technologies, controls, integration community-scale

Renewables and Integration



Panel

What is possible for the future of renewables integrated in our energy system



Discussion

Discuss priority challenges and opportunities

Panelists



Jen King

Research Engineer –
Controls and Hybrids
NREL



Sairaj Dhople

Associate Professor,
Electrical and Computer
Engineering
University of Minnesota



Steve Szymanski

Vice President, Sales
and Marketing –
Americas
Nel Hydrogen



Jason MacDowell

Senior Director –
Technology, Strategy &
Policy
GE



Panelists

What is the possible for integrating renewable generation into our evolving energy system?

Requirements



What are the requirements for integrating renewables for a decarbonized energy system?

Discussion

Challenges



What are the biggest challenges in your mind of putting large amounts of renewables on the grid?

Discussion

Integration Technologies



What are promising technologies or technology combinations for deployment?

Discussion

Transition



How can we address the transition with an aging infrastructure and rapidly increasing demands?

Discussion

Barriers



What are possible barriers to widespread deployment of renewables?

Discussion

Measures of Success



What are metrics that will determine whether we have been successful?

Thank You

