Empowering the Future with Modeling & Simulation

"Workforce Development through Certification in Systems Engineering, Energy Systems & Microgrids"

Microgrid Systems

Certification & Workforce Development

CLEVELAND ENGINEERING SOCIETY

Learn · Connect · Lead

TELEPATH SYSTEMS

Energy + Electronics + Technology

NASA

INCOSE

E&M TECHNOLOGY, SYSTEMS AND VALUE CHAIN CONFERENCE & EXPO

SEPTEMBER 12-15, 2023

CLEVELAND I-X CENTER

"It's tough to make predictions, especially about the future … " Yogi Berra

SOME Predictions:

- **SIGNIFICANT TRANSFORMATIVE CHANGE is underway (e.g. – AI, EV, Crypto, Nuke, etc..)**
  - especially Energy Sector / Critical Infrastructure, Data Centers, etc..
  - driven by need for Capacity, Security, Resilience – and Clean, Renewable Power

- **Major TRANSFORMATIONS require NEW SKILLS -- and Collaborative Teams**
  - New TECHNOLOGIES, their application, capabilities, and limitations
  - Shared understanding of key SYSTEMS principles, architecture and Integration

- **WORKFORCE DEVELOPMENT -- an essential step**
  - toward realizing needed "Trans-disciplinary" teams and skills
  - EDUCATION at multiple levels must be a high priority K-12, Graduate, Community

- **CONNECTING our TALENT - Conferences, Forums, Exhibits**
  - SHARING of KNOWLEDGE, exchange of ideas and new experience = major accelerator of progress
  - Key developments among companies, institutions, and communities on a common journey.
  - Workshops, Summits, Forums and Conferences all contribute to advance the cause.

Microgrid Systems Certificate | Cleveland State University

Division of Continuing and Extended Education

Course Catalog

Executive Director
Nancy M. Pratt, Ph.D.
n.pratt@csuohio.edu

Microgrid Systems

In development (Spring/Summer 2025): Introduction to Microgrids

Microgrid systems are a crucial innovation in energy management, offering localized grids that can operate independently or in conjunction with the main grid. These systems enhance energy resilience, reduce environmental impact, and improve energy efficiency.

This six-week microcredential offers a comprehensive exploration of the fundamentals of microgrids, a transformative technology reshaping energy generation and distribution. Designed for engineers, energy professionals, and individuals interested in sustainable and resilient energy solutions, the program provides in-depth knowledge of microgrid operations, essential components, and their vital role in the future of energy systems. Through this program, participants will gain a comprehensive understanding of microgrid architecture, deployment strategies, and the integration of renewable energy sources, preparing them to meet changing workforce and industry sector needs. Developed and taught by expert faculty and leading industry professionals, this microcredential equips participants with both theoretical insights and practical skills. As the foundational course in a stacking series, it prepares learners to progressively build expertise in designing, managing, and optimizing modern microgrid systems.

The Microgrid Systems microcredential series is a collaboration between CSU's Department of Mechanical Engineering at the Washkewicz College of Engineering, the Division of Continuing and Extended Education, and Telepath Systems, ensuring industry-relevant content and real-world applications.

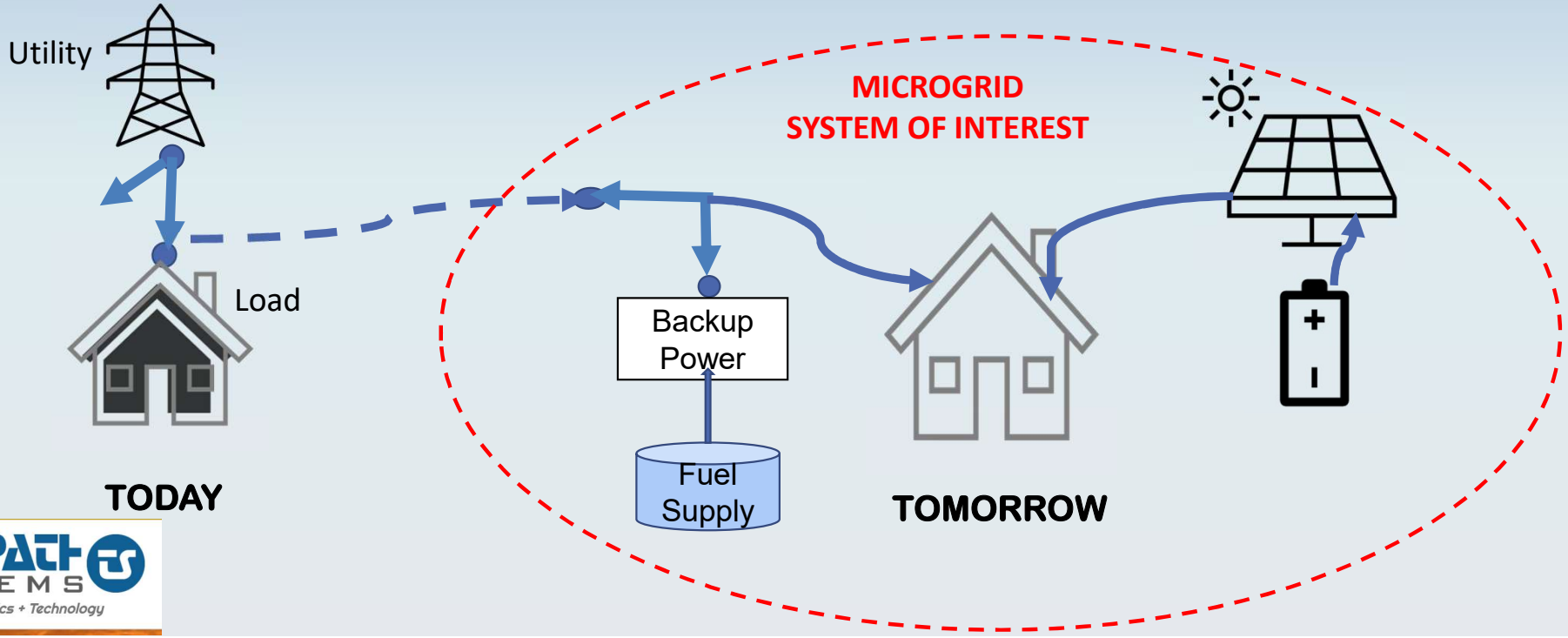
Microgrid Systems - Certification & Workforce Development

- **WHAT –**
  - **New Workforce training program in Microgrid Systems leading to Certification at 3 levels of competency**
  - To **develop skills, supplement knowledge** of students, industry employees, and public policy leaders
- **WHEN -**
  - starting **Summer of 2025 at Foundation Level 1**, continuing series to **Level 2 by Fall 2025; Level 3 – in 2026**
- **WHERE –**
  - Hybrid, Mostly Virtual, some physical **on-site at CSU**, in classroom and computer lab.
- **WHO -**
  - collaborative effort by **CSU in partnership with Telepath Systems**, supported by **CES, NASA, INCOSE** & other
  - Instruction & Lectures delivered by experienced **Subject Matter Experts, Speakers** at E&M, EnergyTech
- **WHY -**
  - Essential **Workforce Development** to enable expansion and transformation of future energy systems
  - Excellent **complement to the CSU Modeling & Simulation** Concentration in Sustainable Energy (MS-SES)
  - **Added Value** - increased understanding of **Systems Principles, Methods, Models & Life-cycle** management

" SO – what is a MICROGRID"
(and why should I care?)

- **US Department of Energy describes it as**

  "A group of interconnected loads and distributed energy resources with clearly defined electrical boundaries that acts as a single controllable entity with respect to the grid (and can) connect and disconnect from the grid to enable it to operate in both grid connected and islanding mode".

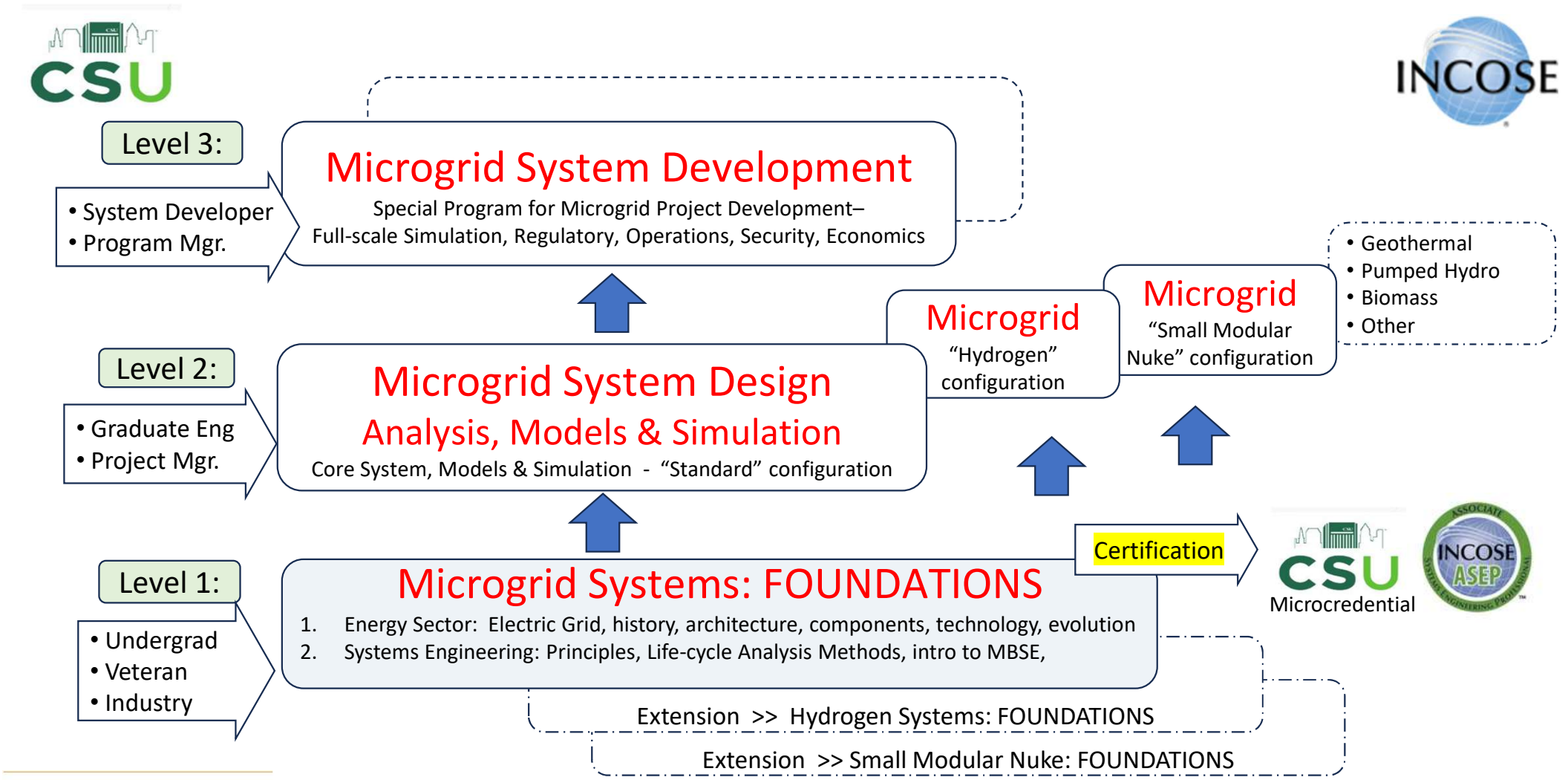


Special Focus: MICROGRID SYSTEMS

- **WHY Microgrids?** A **MEGA Trend for transforming the Energy Grid**
  - Rising demand for electricity far exceeds current grid capacity
  - Current national grid is aging and vulnerable to many threats
  - Microgrids add needed CAPACITY as well as RESILIENCE & SECURITY
- **The CHALLENGE: Each Microgrid is UNIQUE**
  - Requires **Systems Engineering and Analysis** of multiple options, configurations
  - Estimates of System Performance drive Economic assessments, Valuation
- **Focus: Systems Engineering, Modeling & Simulation** (Digital TWINS/MBSE)
  - INCOSE is established Premier professional society in Systems Science, Principles, Methods
  - MBSE development methods & practice evolved over several decades
  - Real-time SIMULATION of MICROGRID Designs will reduce RISK of investment
  - New TECHNOLOGY enables vast capabilities in real-time simulation... (e.g. – NVIDIA)

WHY Systems Engineering / Thinking

- The WORLD (and technical systems) continues to be more Complex and Interrelated (Whole >> Sum of Parts)
- SE – an Integrative, Trans-Disciplinary approach to help teams collaborate to manage system DESIGN, COMPLEXITY – and CHANGE
- SE aims to ensure the Pieces work together to achieve the objectives of the WHOLE System, responsive to stakeholder needs
- INCOSE is the established professional engineering society – the global premier organization focused on SE and Model-based methods


Level 3:
• System Developer
• Program Mgr.
Microgrid System Development
Special Program for Microgrid Project Development–
Full-scale Simulation, Regulatory, Operations, Security, Economics
Level 2:
• Graduate Eng
• Project Mgr.
Microgrid System Design
Analysis, Models & Simulation
Core System, Models & Simulation - "Standard" configuration
Microgrid
"Hydrogen" configuration
Microgrid
"Small Modular Nuke" configuration
• Geothermal
• Pumped Hydro
• Biomass
• Other
Level 1:
• Undergrad
• Veteran
• Industry
Microgrid Systems: FOUNDATIONS
1. Energy Sector: Electric Grid, history, architecture, components, technology, evolution
2. Systems Engineering: Principles, Life-cycle Analysis Methods, intro to MBSE,
Certification
Microcredential
Extension >> Hydrogen Systems: FOUNDATIONS
Extension >> Small Modular Nuke: FOUNDATIONS

Q & A

THANK YOU !!!

Jejuhasz@telepathsystems.com