Panel – How Can We Partner to Create Opportunity and Have Impacts?

Moderator – Prof. Paul R. Ohodnicki, Jr. – University of Pittsburgh

Panelist 1 – Dr. Saba Almalkie, Ansys

Panelist 2 – Joshua Gould, Duquesne Light

Panelist 3 – Dr. Robert Lieberman, Lumoptix

Panelist 4 – Robie Lewis, NETL

Panelist 5 – Arvind Tiwari, General Electric

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NATIONAL ENERGY TECHNOLOGY LABORATORY

Panelist 1

Dr. Saba Almalkie, Ansys

Saba Almalkie is an application engineering manager at Ansys. She holds a Ph.D. in Mechanical Engineering from the University of Massachusetts, Amherst with a focus in Theoretical and Computational Fluid Dynamics and Turbulence. She joined Ansys in 2012. Since, she has been engaging and partnering with customers across sectors and industries to understand their engineering challenges and processes, and to architect and develop simulation solutions that deliver business outcomes such as accelerating design cycle, improving productivity, reducing cost, and gaining a competitive edge. She has established application engineering teams and has led strategic business development and delivery of several novel multidisciplinary projects driving significant business value. Currently, she leads a multidisciplinary technical team focused on enabling customers in their digital transformation, expanding simulation usage within the engineering organizations, and driving application of engineering simulation beyond product development to the full product lifecycle via technology integration, automation and optimization, democratization, multi-fidelity modeling and digital twins. She collaborates closely with Ansys product development to provide field feedback and industry needs resulting in continuous improvement of Ansys portfolio.

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Panelist 2

Joshua Gould, Duquesne Light

Josh is Director of Innovation at Duquesne Light, where he leads the Innovation Center, identifies and maintains a portfolio of innovation opportunities, and serves as the principal liaison with external parties focused on innovation. These efforts include a major effort in concert with PG&E and Exelon Utilities to monitor the health of DLC's underground cable network – much of which requires sensors – and deploying sensor-related technology such as Dynamic Line Rating (or DLR) technology on the transmission grid.

Prior to joining Duquesne Light in 2019, Josh founded and led a new innovation department called the Innovation Hub at Con Edison.
Previously he led the Department of Energy's Advanced Research Projects Agency – Energy (ARPA-E's) commercialization efforts focused on the electric grid where we worked with companies such as AutoGrid and Smart Wires who raised over $300M from investors such as Bill Gates.

Josh has a Certificate in Electrical Engineering from Siemens Power Academy, a Master's of Business Administration from Tuck School of Business at Dartmouth, and a bachelor's degree from Claremont McKenna College, and volunteers his time at CMU's Swartz Center for Entrepreneurship to local entrepreneurs. In 2021, Josh was named as one of 11 "Champions of Innovation" globally, by industry magazine Energy Central.

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Panelist 3

Dr. Robert Lieberman, President, Lumoptix

Robert Lieberman, President of Lumoptix LLC, is a Member of the U.S. National Academy of Engineering (NAE). Educated in solid-state physics and molecular biophysics at the University of Michigan, Dr. Lieberman worked for ten years at AT&T Bell Labs in the Semiconductor Development, Physics Research, and Materials Research Laboratories.

Dr. Lieberman became Vice President of R&D at Physical Optics Corporation (POC) in 1991, and in 1998 spun off his division of POC to found Intelligent Optical Systems (IOS). In addition to serving as President and CTO, Dr. Lieberman maintained an active research career as Principal Investigator for NSF, NIH, DOE, NASA, DARPA, and other U.S. agencies until his retirement from IOS in 2015. He continues to work on scientific and engineering research and policy through his consulting firm, Lumoptix.

Dr. Lieberman holds 34 U.S. patents on biological, physical, and chemical sensors and systems, has organized and chaired more than 30 conferences on optical sensors, and has helped found several companies. Dr. Lieberman is a Life Member of IEEE, a Fellow of SPIE, and was SPIE's 2016 President. He was a founding member of the National Photonics Initiative and currently serves as a director and/or advisory board member of several for-profit and nonprofit organizations.

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Panelist 4

Robie Lewis, NETL

Robie Lewis is currently a General Engineer at the U.S. Department of Energy's National Energy Technology Laboratory (NETL) within the Office of Fossil Energy and Carbon Management (FECM). In this role, Robie serves as the Technical Project Coordinator for the Sensors, Controls, and Novel Concepts Program and manages projects from various research and development (R&D) Programs within FECM. NETL's FY 2022 Sensors, Controls and Novel Concepts portfolio is comprised of over 40 projects, utilizing diverse and innovative technologies and approaches to help the address energy solutions on behalf of the Nation.

Robie has helped lead sensor R&D efforts for the Department for more than 15 years, serving as both NETL Project Manager and formerly as Department of Energy HQ Program Manager. Robie holds a Bachelor of Science degree from West Virginia University in Mechanical Engineering and is an alum of the Partnership for Public Service's Excellence in Government Fellows Program as both a fellow and an invited co-Coach. Often seen transporting his teenage children to their widely disparate destinations of interest, Robie enjoys being outdoors and can't help but wonder if in some future word bank expansion one of his names may appear as the Wordle-of-the-day.

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Panelist 5

Gary Choquette, Pipeline Research Council International

Gary Choquette joined PRCI as a Senior Program Manager in February 2012 and currently is an Executive Director. He has worked in the natural gas transportation industry for more than 35 years. He has experience in facility design, construction, technical support, hydraulic modeling, compression performance, noise, vibration, pulsation, controls, software design, SCADA, gas measurement, and gas control. He has served in management roles in gas measurement, engineering design, construction and right of way, operations software development and SCADA support, and gas control. He has numerous publications related to pipeline hydraulics, controls, and operations. He currently manages the execution of PRCI's research efforts as well as PRCI's information management systems. Mr. Choquette has a bachelor's degree in mechanical engineering from the University of Nebraska and is a registered professional engineer in the state of Texas.

Panelist 6

Arvind Tiwari, General Electric

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Flexible, reliable and intelligent solutions that can solve for complex challenges while maximizing value

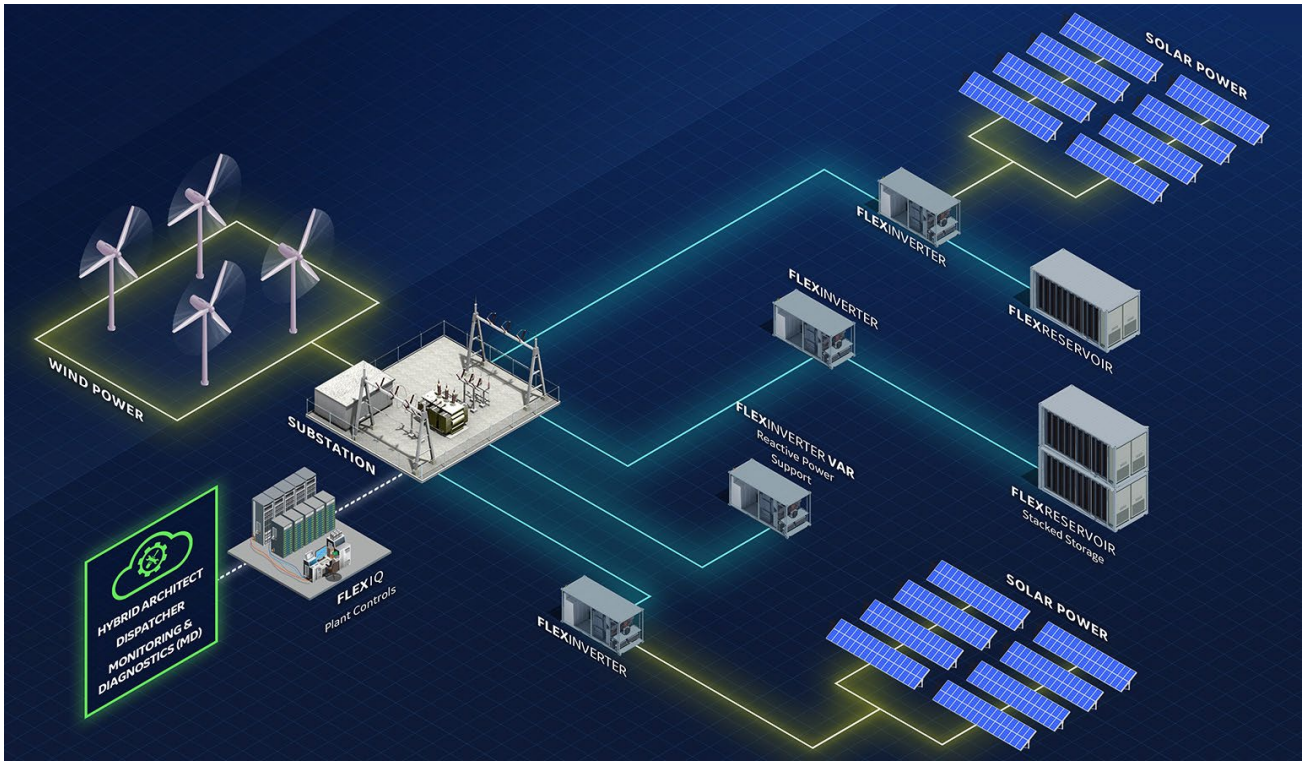
Who benefits?

Grid Operator

- Lower Wind & Solar variability
- Increased flexibility
- Grid CAPEX deferral
- Peaker replacement
- Grid security/blackout avoidance

Asset Owner

- Increased Capacity Factor
- Hybrid DEVEX, CAPEX & OPEX optimization
- Optimized power forecasting & output
- Access to Energy, Capacity and Grid Services revenue streams



Arvind Tiwari, GE Research

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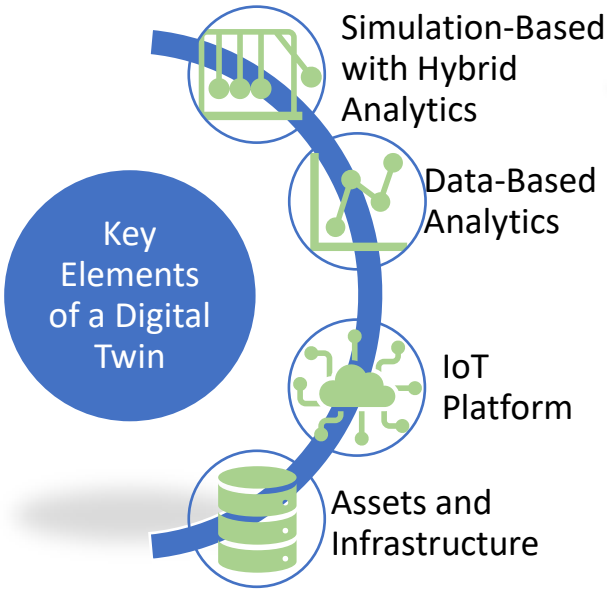

Ansys

Virtual sensors → Accurate predictions → Perform what-ifs → Explore failures

Accurate and evolving Digital Twins with Hybrid Analytics

DT: Collaborative ecosystem delivering transformative business outcomes

Enabling interoperability, developing best practices, and collecting success metrics through **University, Lab, Industry Partnership**

- Global DT initiatives: **DT Consortium** (awareness, interoperability, and development)

digital twin™ CONSORTIUM

What more can we do?

- **Execute successfully on collaborative projects** that spark innovation while considered high risk
  - **Test digital twins in real world**: Develop and Run twins in the field 24/7/365
  - **Collect & publish long term value of twins**, outcomes and metrics, and potential gaps
  - **Accelerate adoption** by developing workforce with required expertise

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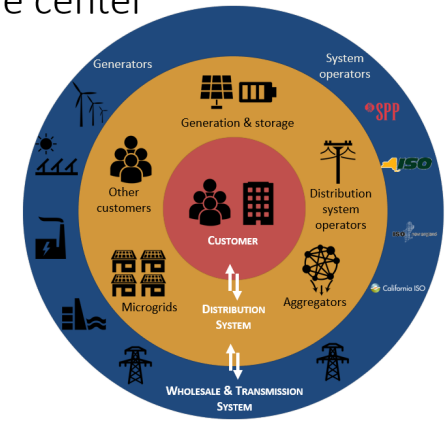
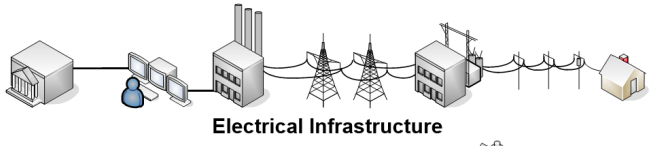
Grid "3.0": Multi-directional with customers at the center

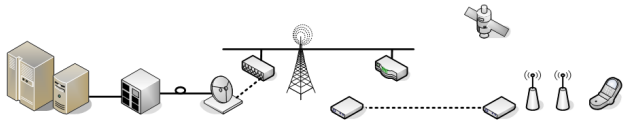


Customers exchange services & value with each other and the grid

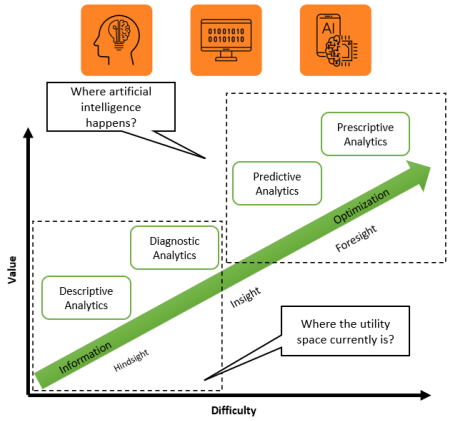
There is now the possibility for bidirectional exchanges between each step of the energy value chain, visualized here as concentric circles. For example, aggregators can now bid customer resources into wholesale markets. In this example, flows are directly counter to the traditional linear flow from generator to consumer.

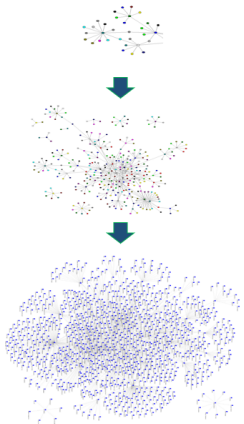
Merging 3 infrastructures

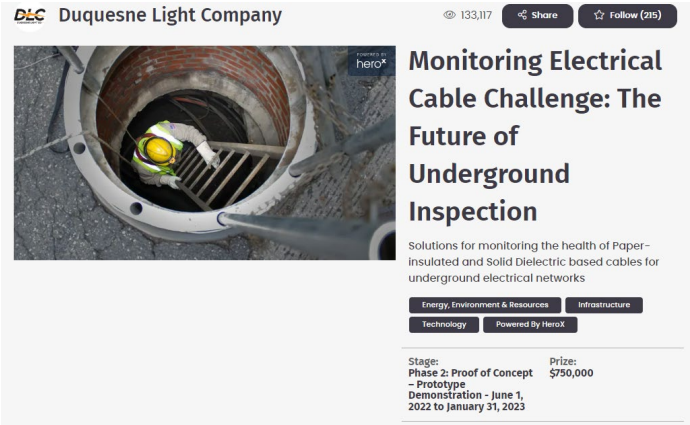




Challenge in getting from here to there: Power systems intelligence, control, dispatch







https://www.herox.com/DLCCableChallenge

https://www.youtube.com/watch?v=kfM8vPZIRw8&t=1s

Creating Opportunities for Impact

- ***Diverse Markets:***
  - Electricity generation (fossil, nuclear, solar, wind, geothermal, hydro),
  - Transmission and distribution (electricity, petrochemical, hydrogen)
  - Industrial processes (heating, fabrication)
- ***Diverse Activities:***
  - Academia (research, innovation, engineering, workforce development)
  - Industry (engineering, production, operations)
  - Government (research, standards, regulation)
- ***Unified Technology Focus:***
  - Information gathering (sensors of all kinds)
  - Information processing and presentation (making sensor data useful)
- ***The Key: Partnership at all Levels From the Start***

"What's Needed" ← A TWO WAY STREET! → "What's Possible"

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Partnering with NETL - Opportunities

- Cooperative Research and Development Agreement (CRADA)
- Contributed Funds-In Agreement (CFA)
- Memorandums of Understanding (MOU)/ Memorandums of Agreement (MOA)
- Interagency Agreements (IAA)
- Interinstitutional Agreements (IIA)
- Small Business Innovation Research (SBIR) & Small Business Technology Transfer (STTR) Programs
- Unsolicited Proposals (USP)
- Non-disclosure Agreement (NDA)
- Funding Opportunity Announcement (FOA)

Resources:

- NETL uses FedConnect.net, Grants.gov and SAM.gov to post FOAs
- Proposals and applications are only accepted electronically through FedConnect.net or Grants.gov
- https://netl.doe.gov/business/solicitations-hub

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U.S. DEPARTMENT OF ENERGY

Flexible, reliable and intelligent solutions that can solve for complex challenges while maximizing value

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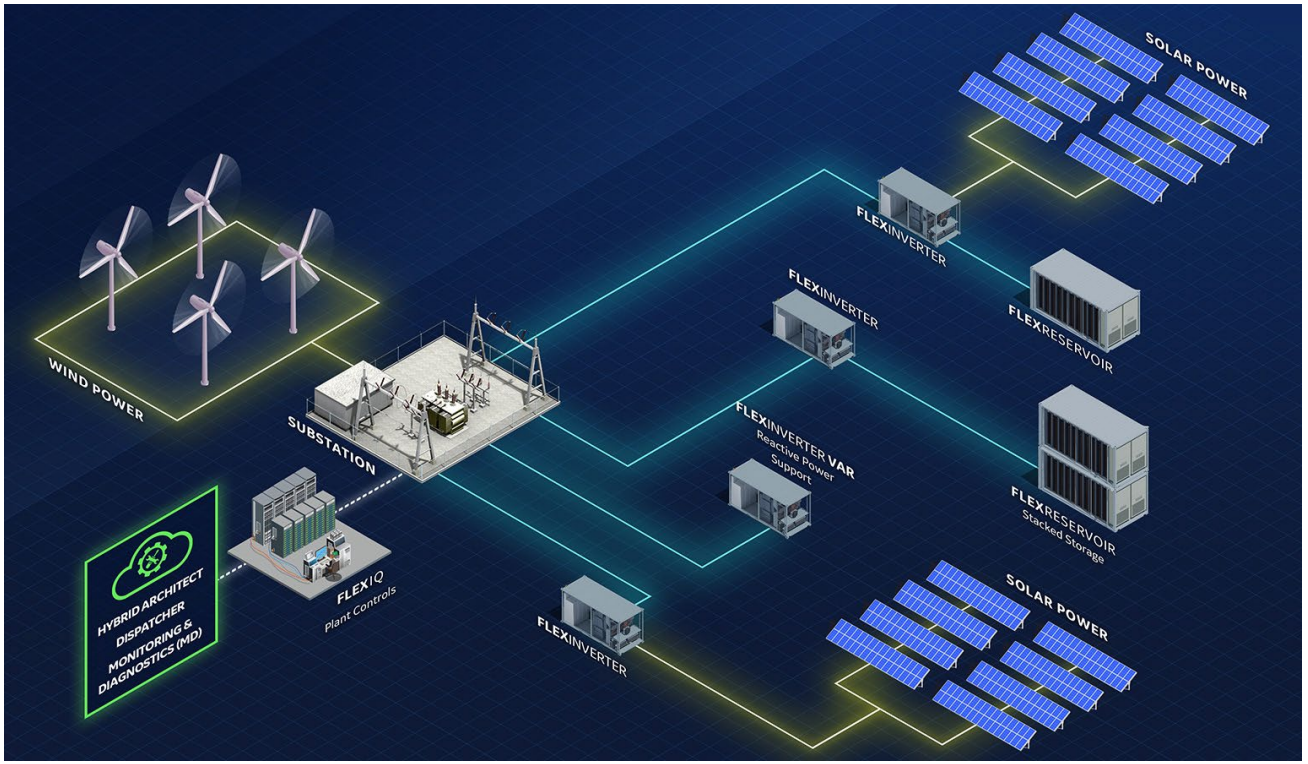

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Available Technologies

- NETL's technology portfolio contains a broad range of innovations that have resulted from research
- Technologies and intellectual property available for licensing on NETL's website

Available Technologies:
https://www.netl.doe.gov/business/tech-transfer/available-technologies

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