National Laboratory of the Rockies

Control Room of the Future: AI Meets Digital Twin

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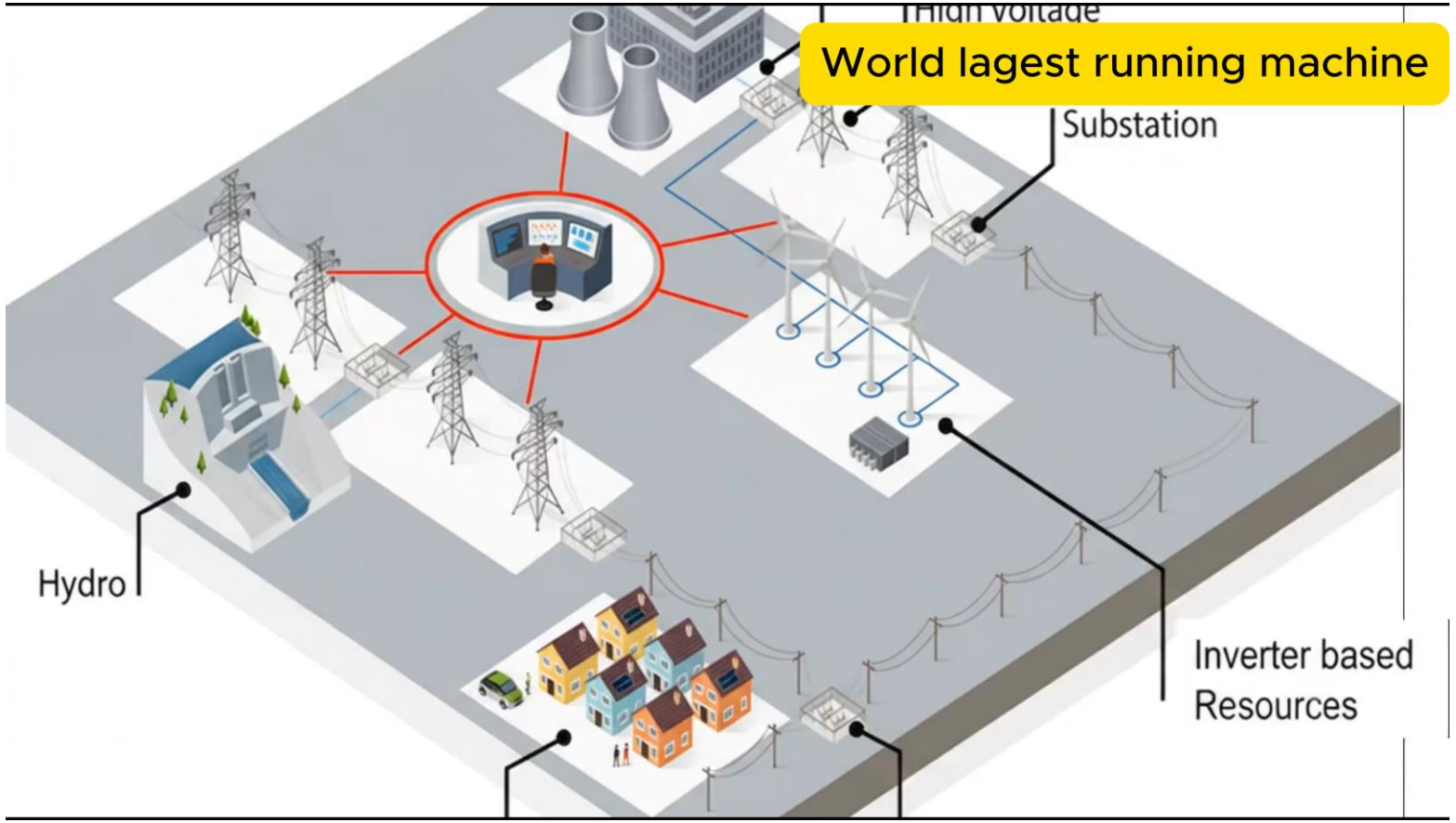
Photo from Getty-181828180

Control Room Operator: Brain of the Grid

FORECAST **SCHEDULE** **DISPATCH**



COLLECT DATA | EVALUATE GRID STATE | TRANSFER POWER

Engineering | Training | IT | Cyber | Support

System Reliability

- What happens if something goes wrong?

Stability

- Secure power flow to prevent abnormal grid conditions.

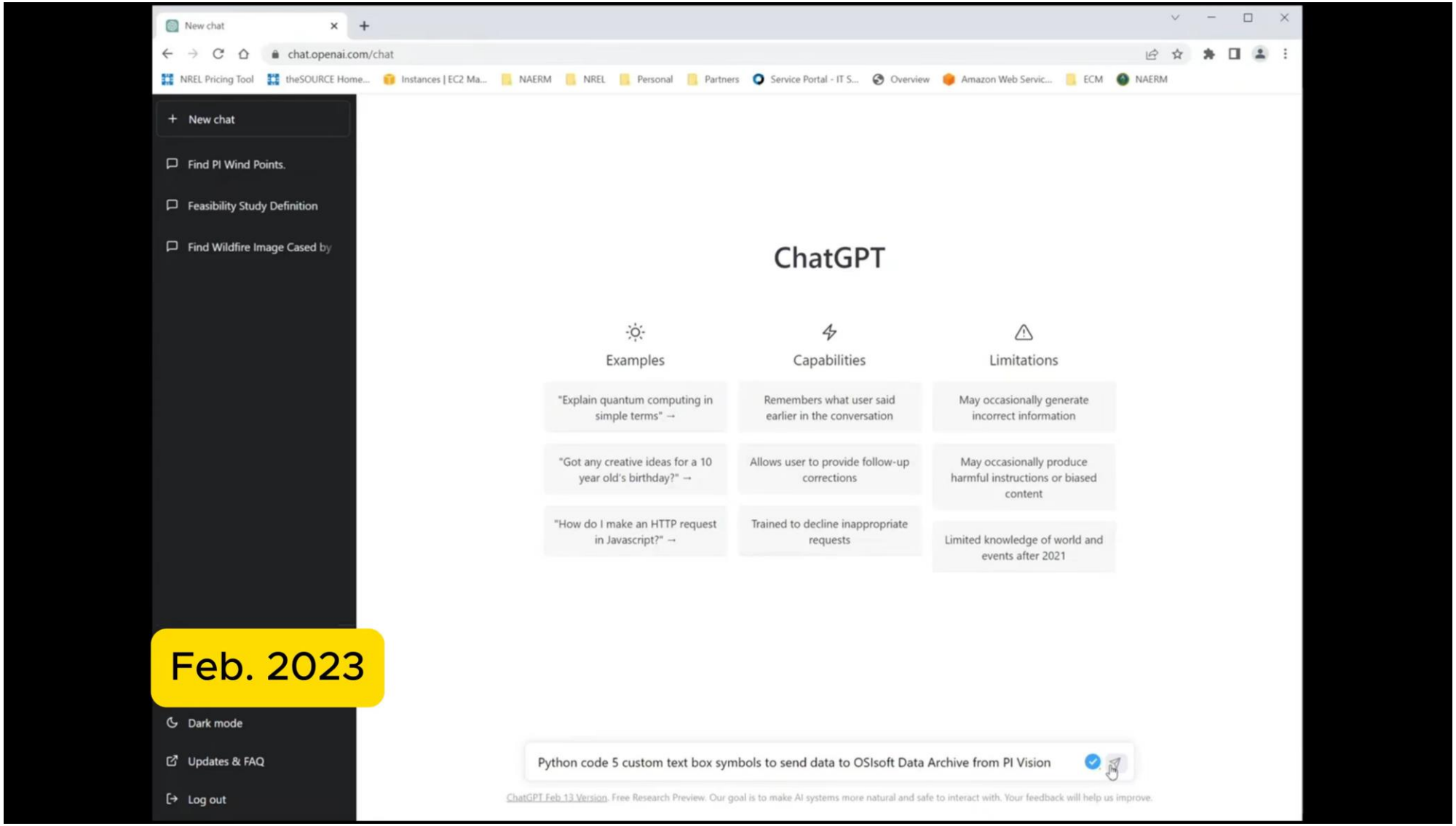
Affordability

- Achieve optimal cost through economic dispatch and scheduling.

Resilience

- Quickly restore service after faults or unexpected events.

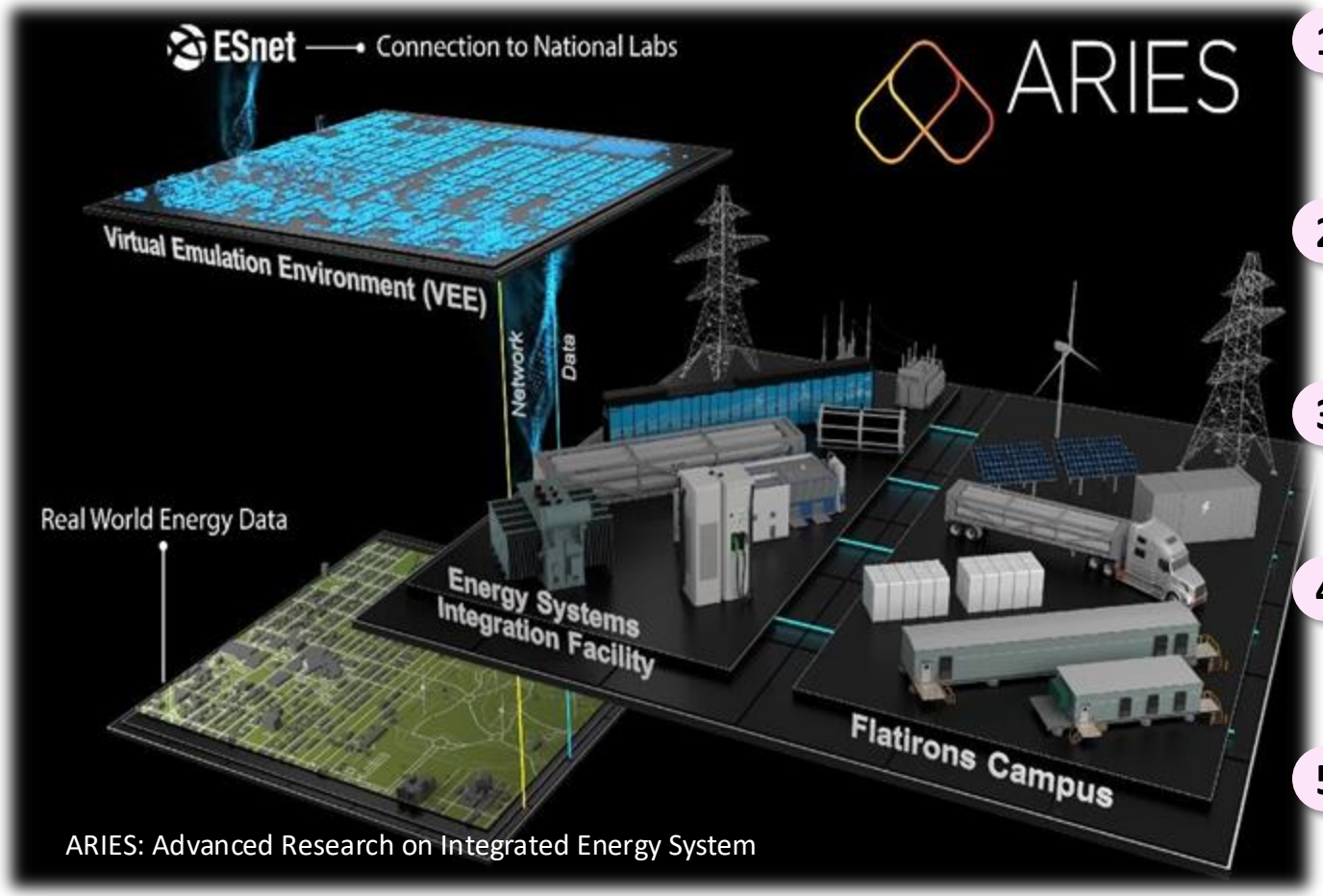
Software Breakthrough: Coding by Your Local AI



eGridGPT Alarm (SEA-IT) Dashboard

SEA-IT: **S**CADA **E**nhanced **A**larm **I**ntelligence **T**ool, running on-premise AI model with Department of Energy funding
eGridGPT: electric Grid **G**enerative **P**re-trained **T**ransformer

The Role of AI in the Control Room: 5 A's



ARIES: Advanced Research on Integrated Energy System

1. **Accurate** Result: By Learning Physical Laws
2. **Assist** Operator: By providing real-time guidance and support
3. **Automate** Process: By reducing repetitive tasks and optimizing workflows
4. **Augment** Data: By contextualizing raw data and prescribing insights
5. **Alignment** with Stakeholders: By synchronizing broader business and stakeholder objectives

eGridGPT: Trustworthy AI in the Control Room

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Generative AI for Power Grid Operations

Seong Lok Choi,[1] Rishabh Jain,[1] Cong Feng,[1]

Diagnosing Hurdles Between AI and Grid Operation

Grid Industry

- **Software** Limitation: No parallel processing (CPU vs GPU)
- **Data** Limitation: No AI training data (NDA protected)
- **Hardware Cost** Limitation: Utility investment base on rate cases

AI Industry

- **Accuracy**: Grid follows the physical laws, not probabilistic outcomes
- **Resiliency**: Extreme or edge cases AI never trained before
- **Adoptability**: Which is comfortable, Waymo or Uber?

Highly Reliable Organization

- **Reluctance to simplify**: Reliability is the prerequisite for innovation
- **Commitment to resilience**: Utility respect NERC CIPs. No cloud
- **Deference to Expertise**: Does AI follow NERC certification?

eGridGPT: Control Room of the Future

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Thank You.

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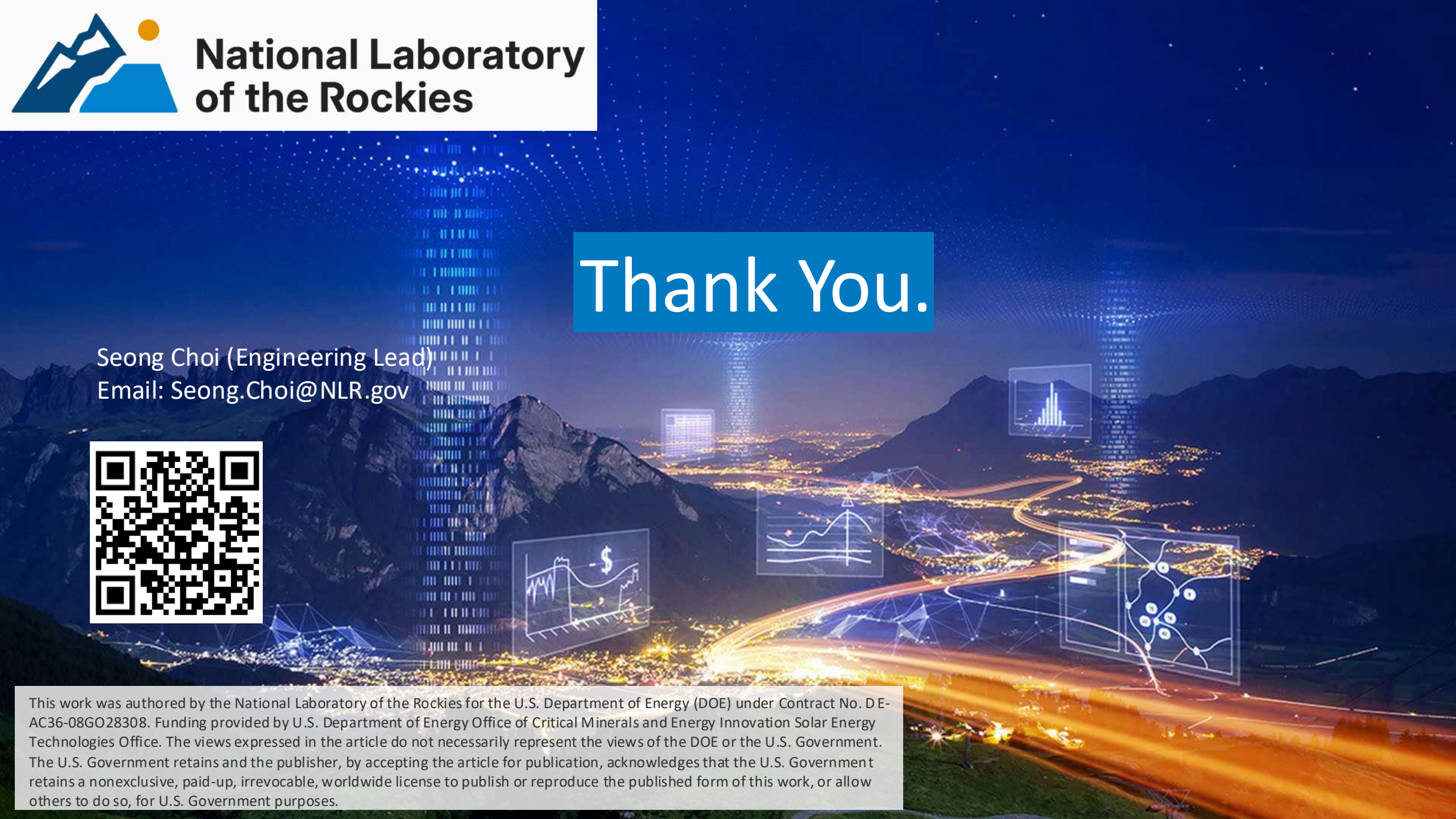

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