



# Two Years Since the National CIE Strategy Research Impacts

September 2024

*Changing the World's Energy Future*

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**September 2024**

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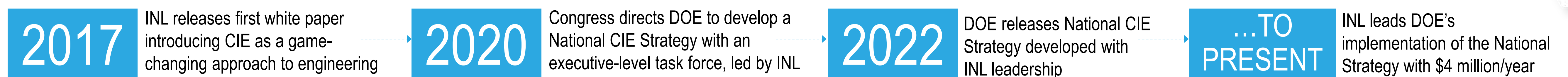
**Prepared for the  
U.S. Department of Energy  
Under DOE Idaho Operations Office  
Contract DE-AC07-05ID14517**



# Cyber-Informed Engineering (CIE)

Engineering Out Cyber Threats – Reducing cyber risk with engineering mitigation

INL transforms CIE from idea → national strategy → community-led practice that is changing energy infrastructure designs, engineering curriculum, and standards implementation



## CIE has an international community of practitioners

- CIE Community of Practice (COP) with 200+ members
- 40+ conference & workshop presentations, 15+ podcasts, articles, interviews
- INL testified before Congress on CIE progress
- National Cybersecurity Strategy (2023) directs DOE to implement CIE

## CIE is transforming engineering curricula

- Developing Curriculum Guidance with a working group of 36 universities
- Partners with 6+ universities to integrate CIE into courses, certificates, & research



Developing a CIE laboratory with test bed to provide hands-on experience



Integrating CIE into 4 engineering courses, including engineering professional certification coursework



CIE concepts aligned with program engaging interdisciplinary teams for long-term engineering projects



Built CIE into 4 certificate programs for cyber-physical systems security



Building a Cybersecurity Research Lab with 5 sector-specific CIE research stations



Integrating CIE modules into 9 courses spanning multiple engineering disciplines



Launched CIE “summer camp” for students to develop CIE solutions and build educational modules

## CIE is shaping the standards conversation



ISA 99 WG14 is building CIE concepts into an ISA/IEC 62443 Security Profile for Energy OT Control Systems



CIE referenced in IEC TR 63486 ED1 on cyber risk management for nuclear instrumentation and control



Identified CIE as the resource to lead long-term sustainment & culture change for highest cyber maturity

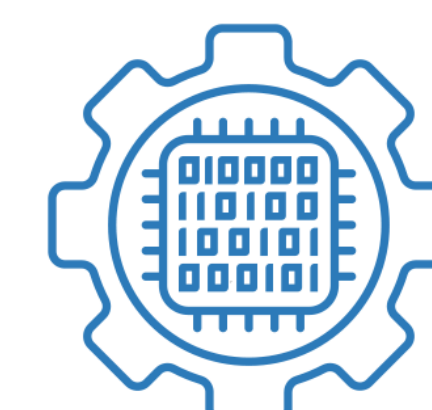


CIE included in upcoming Power & Energy Society Roadmap, stimulating ongoing dialogue

## CIE is influencing active infrastructure projects at energy companies

- CIE Implementation Guide & Analysis Tool walk engineers through questions that help employ CIE principles across the systems engineering lifecycle
- Direct engagement with 5 asset owners to integrate CIE into upgrades and new designs, including microgrid installations
- R&D guidance for DOE to inform new funding opportunities; DOE NE is considering use
- CIE Resource Library contains 85+ publications from multiple labs

INL.GOV/CIE



Cyber-Informed Engineering

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