AI for Nuclear Energy

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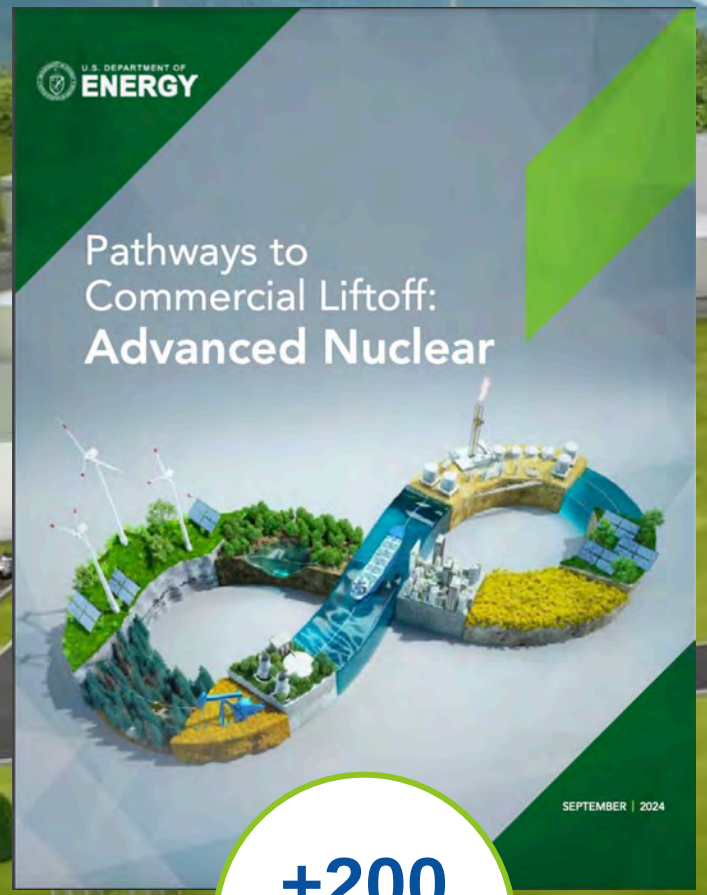
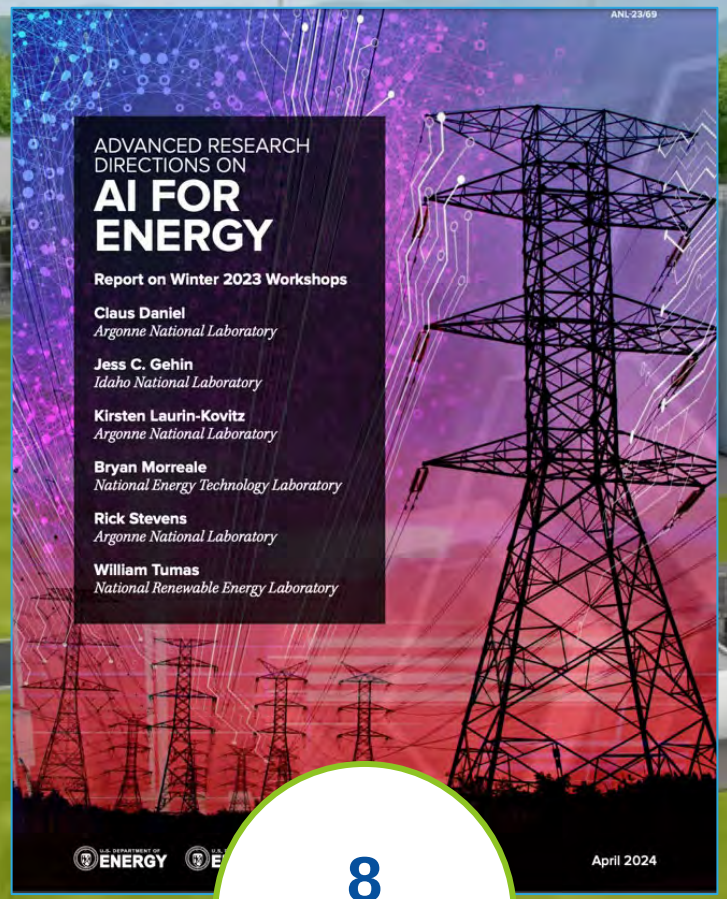
U.S. Nuclear Energy Outlook



+200 GW

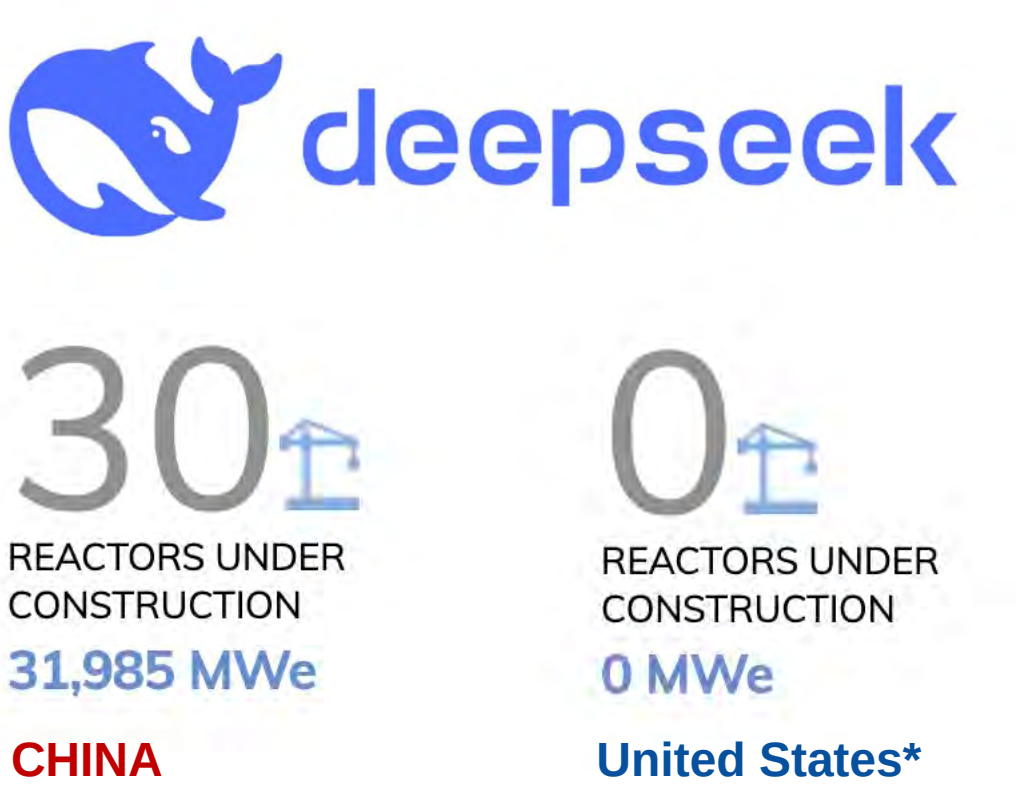


8 Labs

Unleash Commercial Nuclear Power in the United States:

"The long-awaited American nuclear renaissance must launch during President Trump's administration. … America must lead … affordable and **abundant nuclear energy**. As such, the Department will work diligently and creatively to enable the **rapid deployment** and export of next-generation nuclear technology." – Secretary Wright

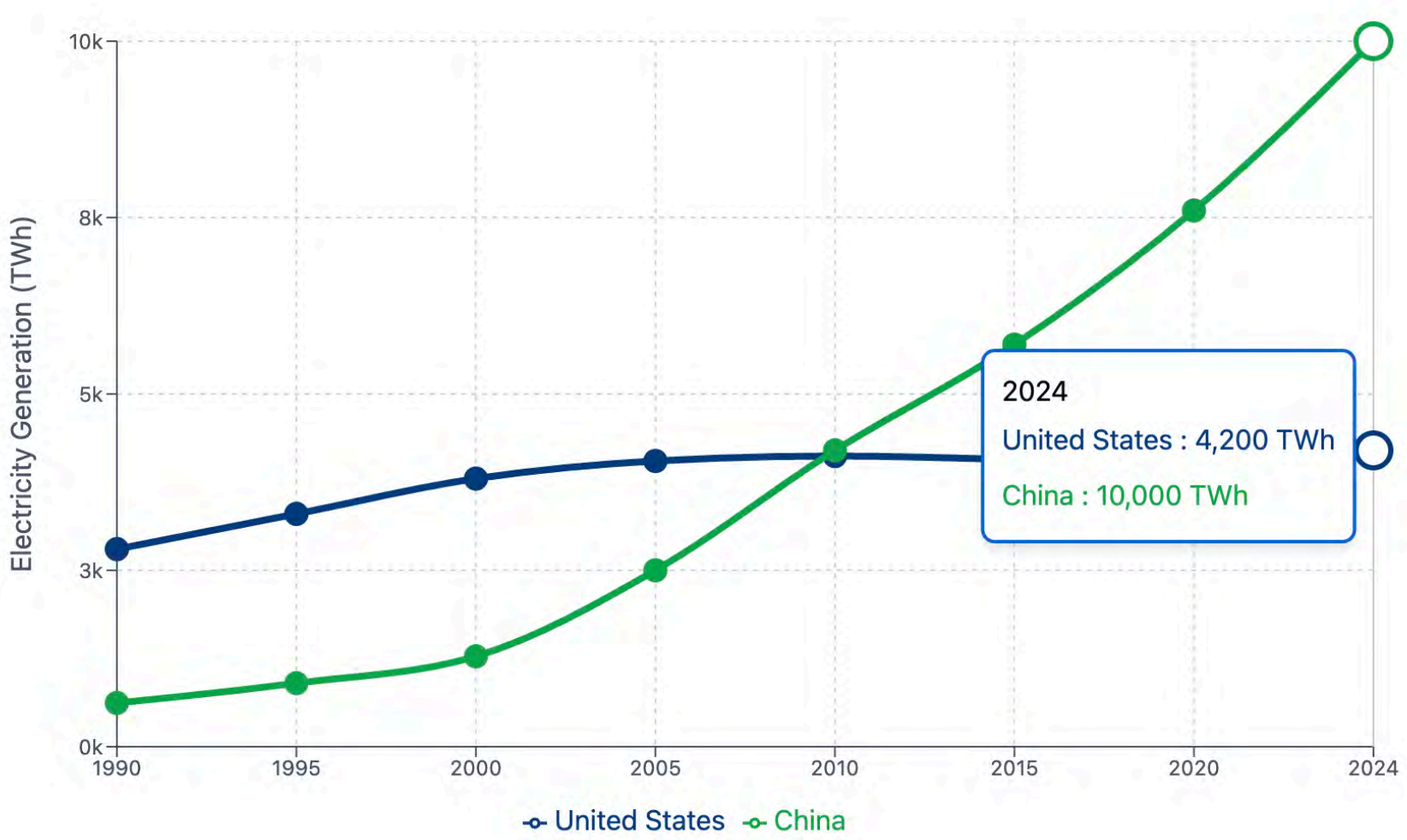
Competitive Landscape with AI & Nuclear Energy



- **DeepSeek has made *significant improvements* with reinforcement learning removing the need for human labeled data**
- **DeepSeek V3**, released last year, demonstrated performance **comparable to OpenAI's GPT-4o**, showcasing significant advancements in Chinese generative AI technology
- Chinese researchers have been actively attempting to **reverse-engineer** OpenAI's reasoning engine technology since the release of DeepSeek V3
- China has **30 nuclear reactors under construction** while the U.S. currently has 0 (World Nuclear Association)
- OpenAI's latest model, **O3, outperforms DeepSeek R1** with superior benchmarks, though it requires substantial compute and energy resources, estimated at 1,785 kWh per task.

* 4 construction permits are filed and/or approved (ACU, Kairos, X-Energy, TerraPower)

Total electricity generation over time, showing China's dramatic rise from 1990 - 2024.

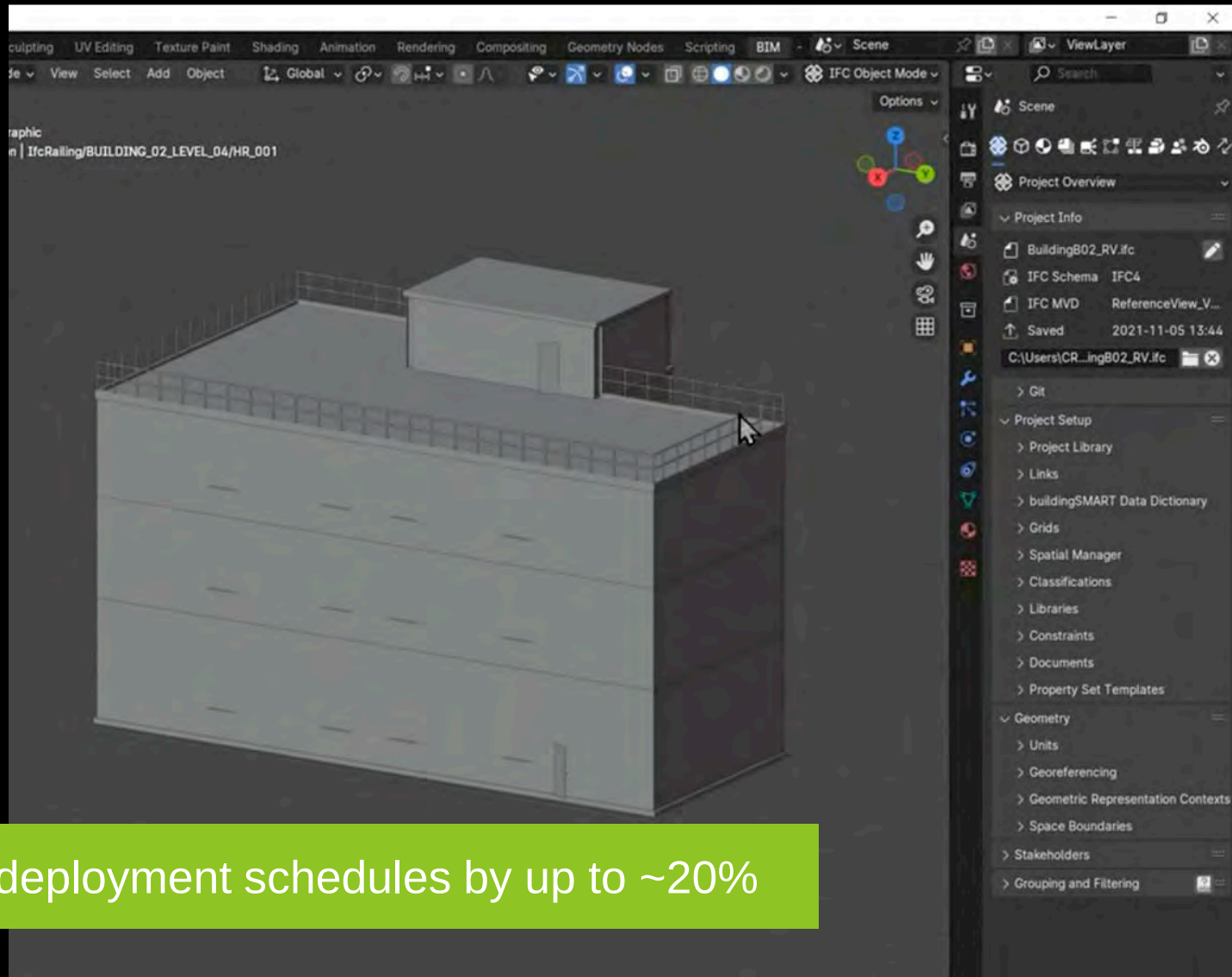


AI and Data Center Industry Nuclear Energy Investment

Grand Challenge Opportunities

- Accelerating Deployment & Licensing
- AI-driven Accelerated Irradiation Testing
- Autonomous Operations & Maintenance
- Capstone: Autonomous Reactor & Data Center

Challenge 1: Accelerating Deployment & Licensing



Goal: Reduce design and deployment schedules by up to ~20%

Challenge 2: AI-driven Accelerated Irradiation Testing with Autonomous Labs

Background: Material and fuel irradiation capabilities are in high-demand due to NRC licensing requirements.

Purpose: Accelerate irradiation testing, reducing the barrier to entry, and increasing throughput at this critical point in next-generation nuclear reactor deployment.

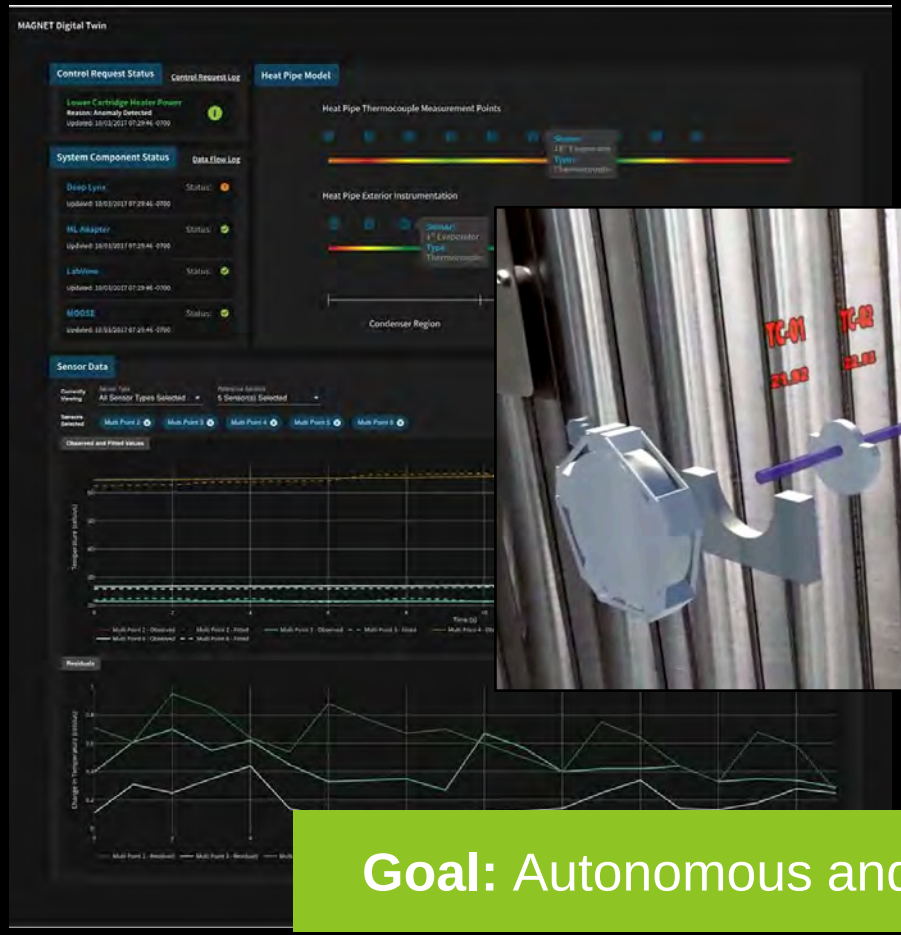
- "Virtual Irradiation" will revolutionize the material/fuel testing process by allowing companies to quickly iterate on component/test design through an AI-driven interface.
- Semi-autonomous laboratories for post-irradiation examination (PIE) testing using advanced robotics and machine-learning control algorithms
- AI-optimized reactor core power, flux, or cycle duration, based on gas cap size, gas composition, and/or material selection/thickness

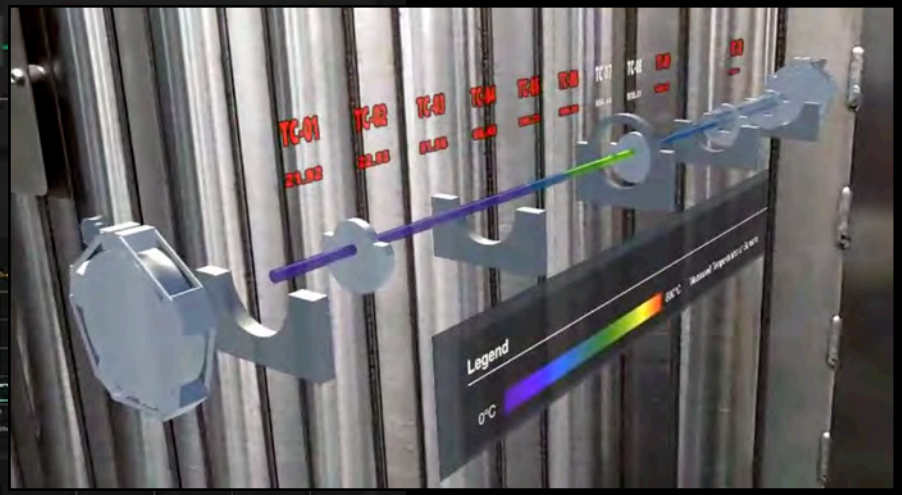
Goal: Accelerate nuclear experimentation and testing

Challenge 3: Autonomous Operations and Maintenance

First Autonomously
Controlled Non-Nuclear
Microreactor

First real-time, real-world **digital twin** of a nuclear reactor





Goal: Autonomous and Remote Reactor Technology Operations

Capstone: Autonomous Reactor & Data Center

- Domestic AI infrastructure is a **national security imperative** for U.S. economic, military, and scientific global dominance
- Advanced nuclear reactors offer a reliable source of electricity near AI data centers, **avoiding grid connection delays**
- National laboratories can partner with industry to build **AI-designed reactors that autonomously power AI data centers**, accelerating reactor development and testing AI data center loads

Questions

Nuclear Energy Training and Design Reviews