OEA, OEI, and DIU Geothermal Energy Discussion

16 Dec 2022 1300-1500 ET

- **Mr. Kirk Phillips, Director,** Air Force Office of Energy Assurance
- **Andrew Higier, PhD, Acting Director Energy Portfolio,** Defense Innovation Unit
- **Mr. Bob Hughes, Executive Director,** Army Office of Energy Initiatives

Kirk A. Phillips

Director, Air Force Office of Energy Assurance

U.S. AIR FORCE

Purpose and Agenda

PURPOSE

- Energy program overview
- Networking and relationship building
- Discuss energy goals and plans

AGENDA

- DIU 101, Dr. Andrew Higier, DIU Acting Director, Energy Portfolio (20 mins)
- OEI 101, Mr. Bob Hughes, OEI Executive Director (20 mins)
- OEA 101, Mr. Kirk Phillips, OEA Executive Director (20 mins)
- Questions and Discussion (60 mins)

Andrew Higier, PhD

Acting Director, Energy Portfolio, Defense Innovation Unit

DIU MISSION

DIU is a fast-moving, cross-DoD organization focused exclusively on commercial companies to solve national security problems.

Elements of our Mission

Accelerate DoD adoption of commercial technology

Transform Military capacity and capabilities

Strengthen the national security innovation base

Key Differentiators

Unique project lifecycle from curation to transition

Joint force & mandate to scale value across DoD

Broad and deep integration into key tech ecosystems

WE DELIVER THE BEST COMMERCIAL TECH TO DOD

Most important DoD problems

DIU facilitates projects between our DoD partners and commercial companies to prototype, transition, and scale advanced technology.

Qualified DoD vendors

Department of Defense

DIU provides…

- Access to leading commercial technology
- Collaborative prototype process
- Delivery of capabilities in 12-24 months
- Solutions at commercial cost curves

Commercial Companies

DIU provides…

- Opportunity to solve high-impact national security problems
- Simple process and faster time to award
- Access to large volume defense contracts
- Liaison with DoD partner

WE FOCUS ON CRITICAL TECHNOLOGY AREAS WHERE THE COMMERCIAL SECTOR IS IN THE LEAD

Energy	AI/ML	Autonomy	Cyber	Human Systems	Space

ENERGY — DIU'S NEWEST PORTFOLIO

Leveraging advancements in the commercial sector to strengthen resilience on military installations and enhance operational energy capabilities.

LINES OF EFFORT

Installation Resilience

Optimizing energy generation, storage, and delivery to ensure installation infrastructure is smart, secure, and efficient.

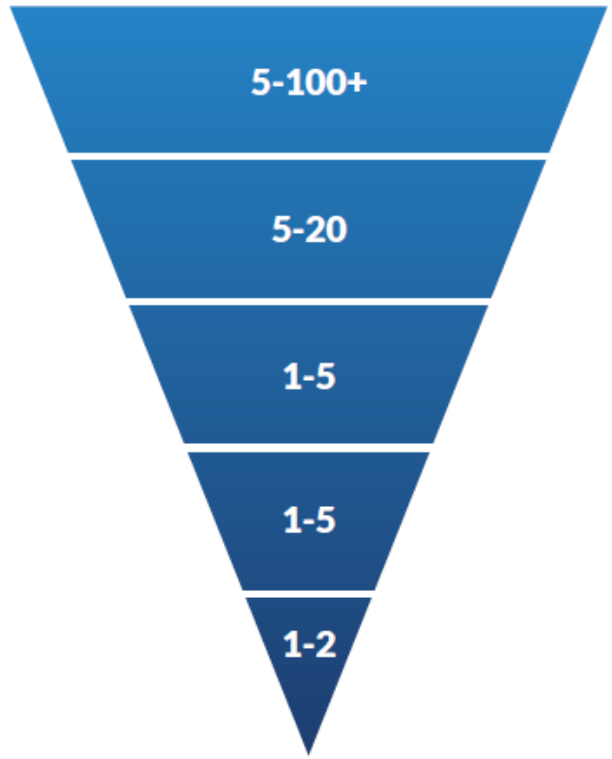
Operational Energy

Enhancing the range, duration and efficiency of military platforms to optimize performance in contested environments and extreme conditions.

UNIQUE PROJECT LIFECYCLE - FAST & COMPETITIVE

Problem Curation & Diligence		• Receive, understand, and evaluate DoD partner problem • Confirm commercial market exists to address problem	
Commercial Solutions Opening (CSO)	**Phase 1**	• Solicit digital proposals in response to a problem statement	~10 business days
	Phase 2	• Evaluate proposals and invite a short list of bidders to pitch	60-90 days to contract award (goal)
	Phase 3	• Select contract awardee/s and negotiate agreement	
Prototyping		• Execute prototype project	12-24 months
Transition		• Award non-competitive agreement to successful performers • Deliver and scale solution to transition partner/s	

Approximate Number of Vendors Participating



U.S. ARMY OFFICE OF ENERGY INITIATIVES

SECURING ARMY INSTALLATIONS WITH **ENERGY** THAT IS **RESILIENT**, **AFFORDABLE**, AND **SUSTAINABLE**

Army Office of Energy Initiatives Overview and Geothermal Opportunity

Mr. Bob Hughes

16 December 2022

Overall Classification of this Brief: UNCLASSIFIED

U.S. ARMY OFFICE OF ENERGY INITIATIVES

Army Office of Energy Initiatives (OEI)

Office of Energy Initiatives:

- Established by the Secretary of the Army as a task force (2011), permanent office in 2014 (AD 2014-22)
- Serving as the Army's central management office for partnering with Army installations to implement **large-scale renewable energy projects** that **leverage private financing**
- Current focus is to secure Army installations with **carbon-free energy** that is **resilient, affordable, and sustainable**, focusing on creating an **"islandable" capability** – energy security projects that include onsite generation, storage, and controls

Value to the Army:

- Provides an enterprise perspective and advisory capability to develop, facilitate, and manage complex, long-term, large-scale, privately financed energy projects
- Current operational portfolio leveraged $600M+ in Direct Private Investment and $600M+ in O&M
- A single office with the capability to analyze opportunities that leverage updated authorities, policies, and programs for direct Army benefit, i.e., 10 USC § 2912 to capture energy cost savings and reinvests dollars into energy resilience projects; $100M over two fiscal years (2020/2021)

Anniston Army Depot, Alabama*: 7 MW solar project and FY 20 ERCIP Project to Bring "Islandable" Capabilities*

Redstone Arsenal, *Alabama: 10 MW Solar Project and Battery Energy Storage System*

Schofield Barracks*, Hawaii: 50 MW Biofuel/Multi-fuel Project provides energy resilience for Schofield Barracks, Field Station Kunia, and Wheeler Army Air Field*

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Army OEI Capabilities

ORIGINATION CELL

- Use integrated data analytics and stakeholder priorities to develop implementable solutions
- Develop energy projects by considering specific threats and hazards; assessing risks, mission impacts, and security and resilience measures; reviewing utility Integrated Resource Plans
- Identify funding streams and acquisition methods

FINANCE

- Determine economic feasibility of projects and project life cycle costs based on years of similar experience
- Perform billing/utility analysis and rate impact analysis
- Monitor technology trends

PROJECT EXECUTION

- Continue due diligence to validate energy projects and land availability, coordinate environmental actions, perform source selection, execute supporting contracts, monitor construction and overall performance
- Utilize relationships with utility, industry, and Army partners to execute projects

ARMY OEI CAPABILITIES

ENGINEERING

- Develop conceptual designs of energy projects
- Develop optimization models combining technologies to meet mission requirements
- Develop cost estimates and support design reviews for energy projects

BUSINESS OPERATIONS

- Essential to provide strategy and policy to meet Army and OSD objectives for mission energy readiness on installations
- Develop standard operating procedures and project development tools to standardize and expedite project development and execution
- Utilize expertise in federal and state legislation to determine impact on energy project development
- Develop proposals for legislative changes to increase opportunities

EXTERNAL ENGAGEMENT

- Achieve awareness and support of Army Energy Program with key stakeholders to include Congress, Army, DoD, Energy and Finance industries, state and local governments, and the public
- Build and maintain trust, confidence, and active support for Army Energy Program with key audiences
- Demonstrate Army Energy Program's national leadership influence in energy resilience, and establish its recognition as a force in the marketplace

Centralized office with diverse skill set focused on delivering energy solutions for mission accomplishment

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The "OEI Way" to Acquire Resilient Infrastructure

Assemble Comprehensive Solutions in a "Building Blocks" Approach

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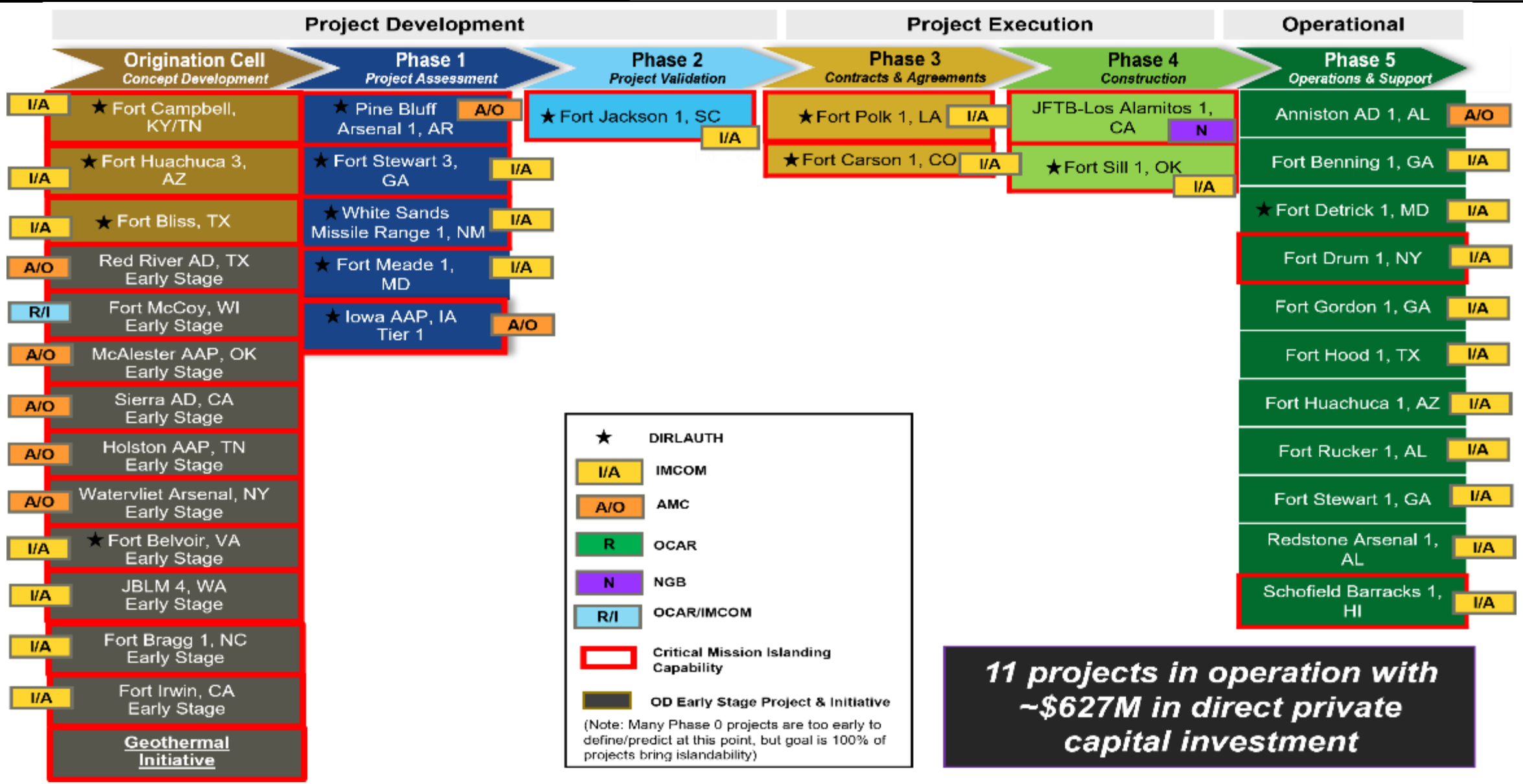
Direct Private Investment (DPI) Portfolio Overview – By Phase



11 projects in operation with ~$627M in direct private capital investment

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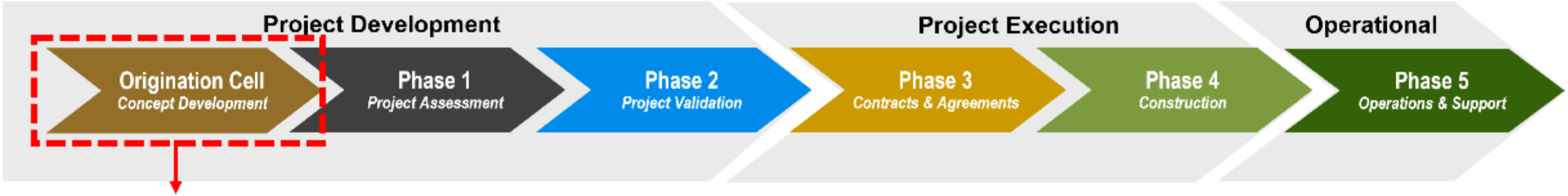
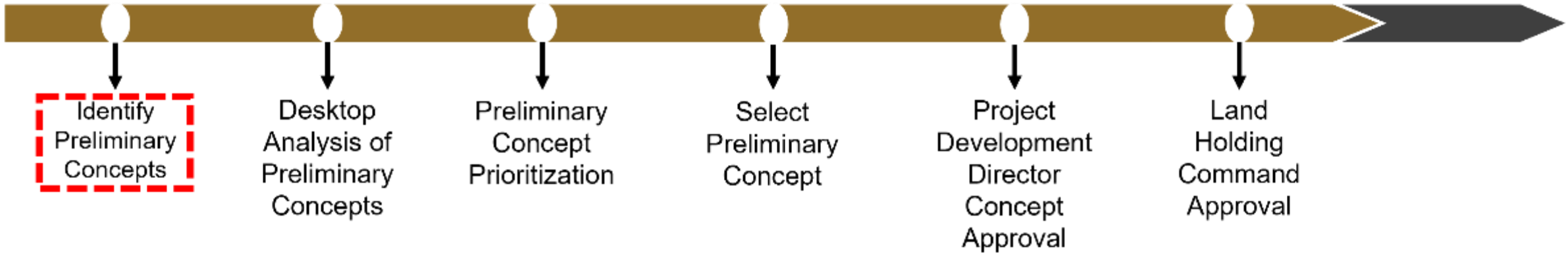
The OEI Process: Origination Cell to Phase 5



Origination Cell: *Concept Development*

- Develops energy projects based on gaps and deficiencies to critical missions, regulatory and market landscape, and financial and technical analysis
- Identifies funding streams and acquisition methods with a priority focus on direct private capital investment
- Develops documentation for concept approval process and project execution team



Market Landscape and Partnerships

To address vulnerabilities to critical mission sustainment, the OEI along with its DoD partner organizations issued a Request for Information (RFI) concerning the feasibility of geothermal energy at Army installations

– RFI responses yielded no actionable Army project opportunities

DoD Geothermal Working Group:

- Army OEI
- US Army Corps of Engineers
- Air Force OEA
- Navy Geothermal Program Office
- Defense Logistics Agency
- Defense Innovation Unit
- Department of Energy Geothermal Technologies Office

<u>Current Course of Action:</u> The Department of Defense's efforts through the Defense Innovation Unit in pursuit of novel geothermal prototype projects

In parallel to the current course of action, the Department of Defense also continuously seeks industry partners to collaborate on advanced, enhanced, and conventional geothermal energy generation

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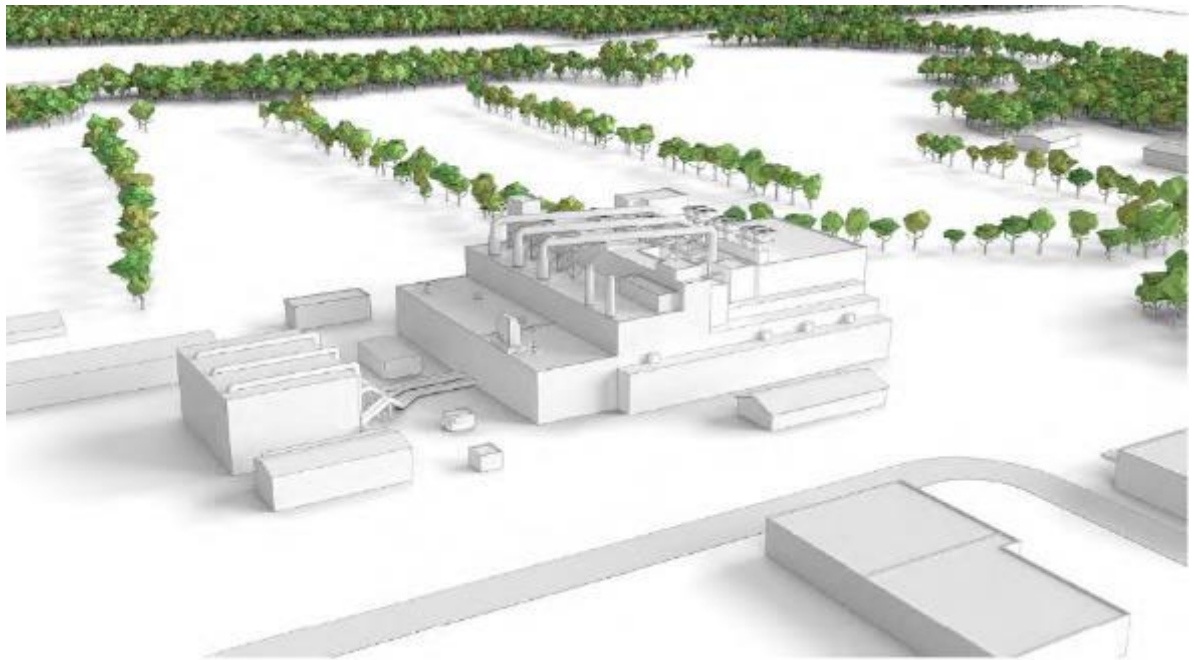
Deficiency to Critical Mission: Fort Wainwright, Fairbanks, AK

Existing Central Heat and Power Plant

- Commissioned 1955
  - In operation 30 years beyond the typical design life of similar facilities
- 45 MWth – Primary requirement; Serves 100% of installation's heat demand
  - Steam utilidor distribution system
- 19 MWe – Total installed capacity; Peak demand is 21 MWe
  - Balance of electricity demand purchased from local utility



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Conventional Hydrothermal Resource Potential

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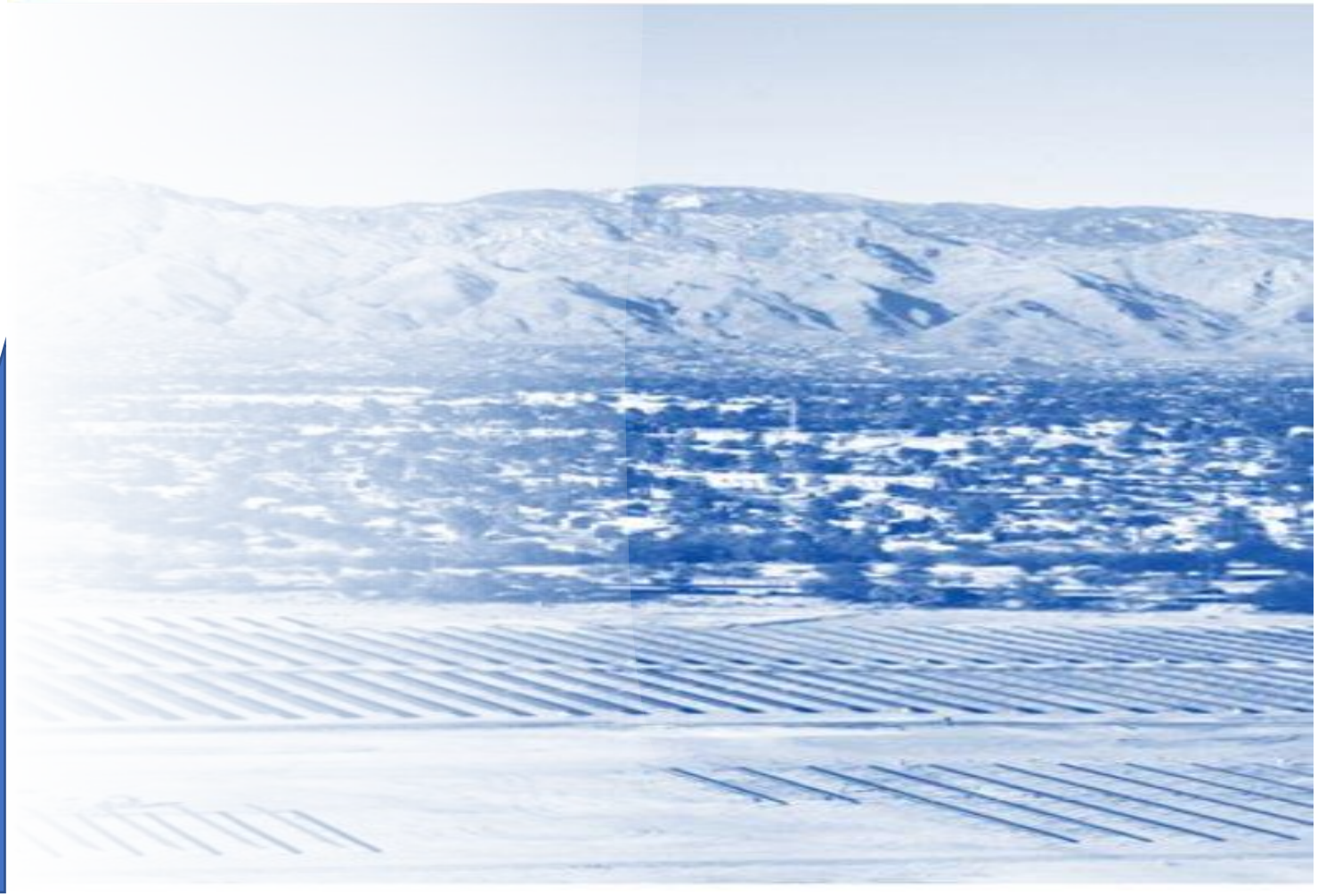
The Air Force Office of Energy Assurance

Mission

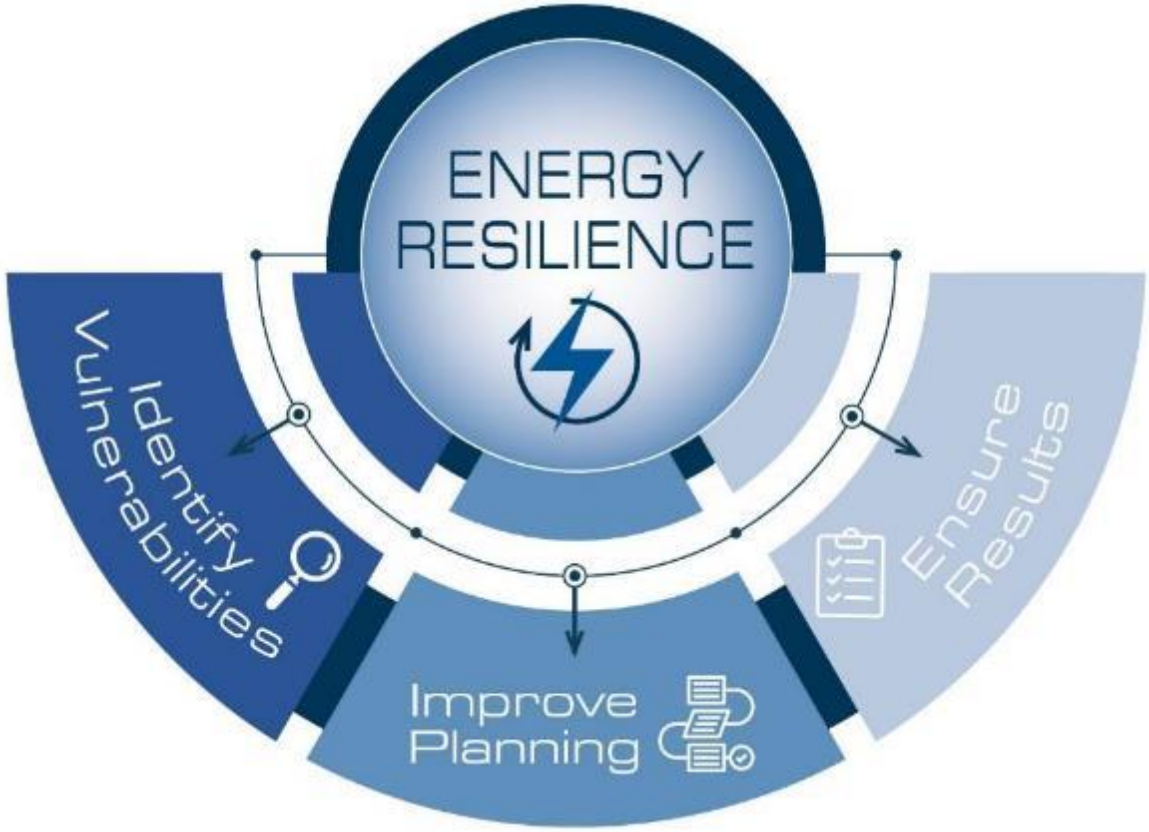
Assure Air Force mission readiness through identification and development of impactful energy resilience solutions.

Vision

To secure Air Force warfighter superiority with the world's most resilient infrastructure.



Executing Energy Assurance



With energy resilience at the core, the Department of the Air Force is aligning every installation energy effort with mission needs

Air Force Installation Energy: Vision

INNOVATION: PRINCIPLES

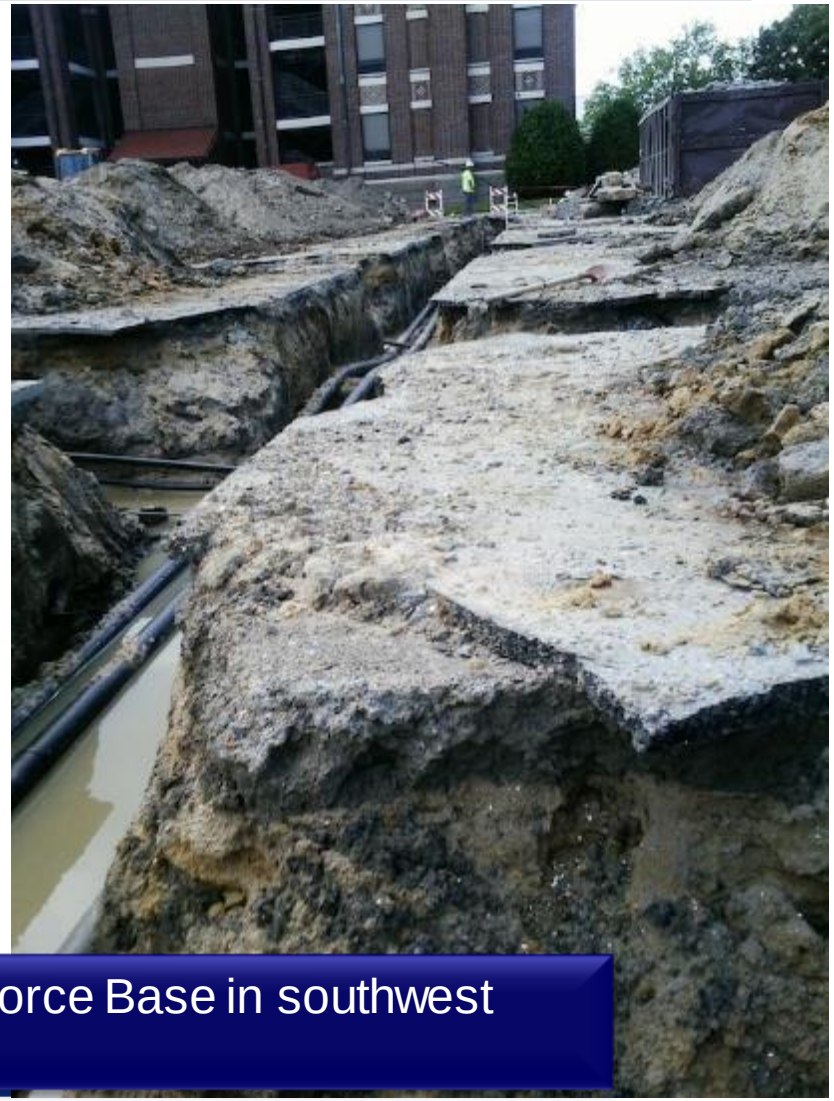
- Resilience and Mission Focused
- Creatively Leverage All Acquisition Tools (e.g., Other Transaction Authorities)
- Leverage and Combine All Appropriate Funding for Comprehensive Solutions (Department of the Air Force, Vendor, Federal Agencies, State, Financiers)
- Move at Commercial Speed
- Long-Term Planning Horizons with Concrete Near- and Medium-Term Milestones (e.g., geothermal pilots)
- Teaming for Success - Air Force, DoD, Federal Government, States, Utilities, Vendors

INNOVATION: PRIORITY PROJECTS

- **Geothermal (#1 Priority)**
- Small Modular Reactors
- Long-Duration Energy Storage
- Green Hydrogen
- Electric Vehicle Support Equipment

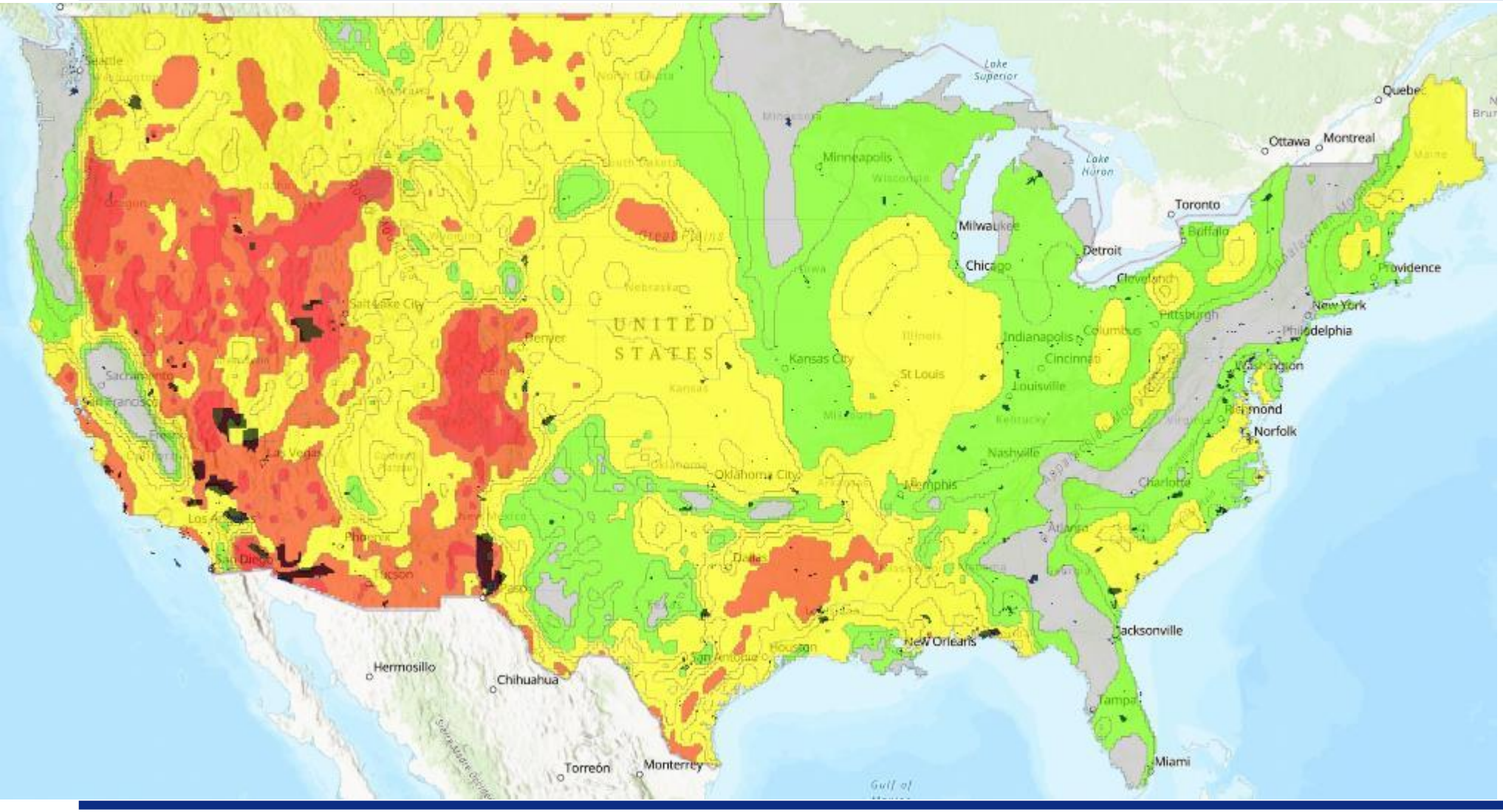
Geothermal Power

- Geothermal power, by its nature, avoids fuel security and supply chain threats and, with the generation technology being located on base, the energy supply is more secure
- Ground-source geothermal technology harnesses the power of the relatively constant temperatures of the earth resulting in baseload resilient energy for the installations available 24 hours a day, 365 days a year
- Geothermal power plants can meet the most stringent clean air standards; they emit little carbon dioxide, very low amounts of sulfur dioxide and no nitrogen oxides
- Emerging geothermal technologies that the Air Force is exploring include:
  - Enhanced or Engineered Geothermal Systems (EGS)
  - *Closed-Loop Geothermal (CLG)
  - Millimeter-Wave Technology Demonstration for Geothermal Direct Energy Drilling (ARPA-E)



*Proposed development of CLG pilot projects at Mountain Home Air Force Base in southwest Idaho and Joint Base San Antonio in southcentral Texas

DoD Geothermal Opportunities



Air Force Projects

Public Private Partnerships for Resilience

Public Private Partnerships are central to DoD's Energy Resilience Strategy

- Energy Resilience is Central to DoD Energy Policy
- Building Distributed Generation (adjacent to or behind-the-fence line) is a priority
- Funding values seen in the budget are primarily for operational energy
- Installation energy is funded as a purchasable commodity through the value in the system
- DoD is not in the utility business; we prefer to have energy experts design, build, own, operate, and/or maintain resilient energy infrastructure at our facilities
- Congress provided DoD numerous acquisition tools to include public private partnerships

Energy Project Pathways

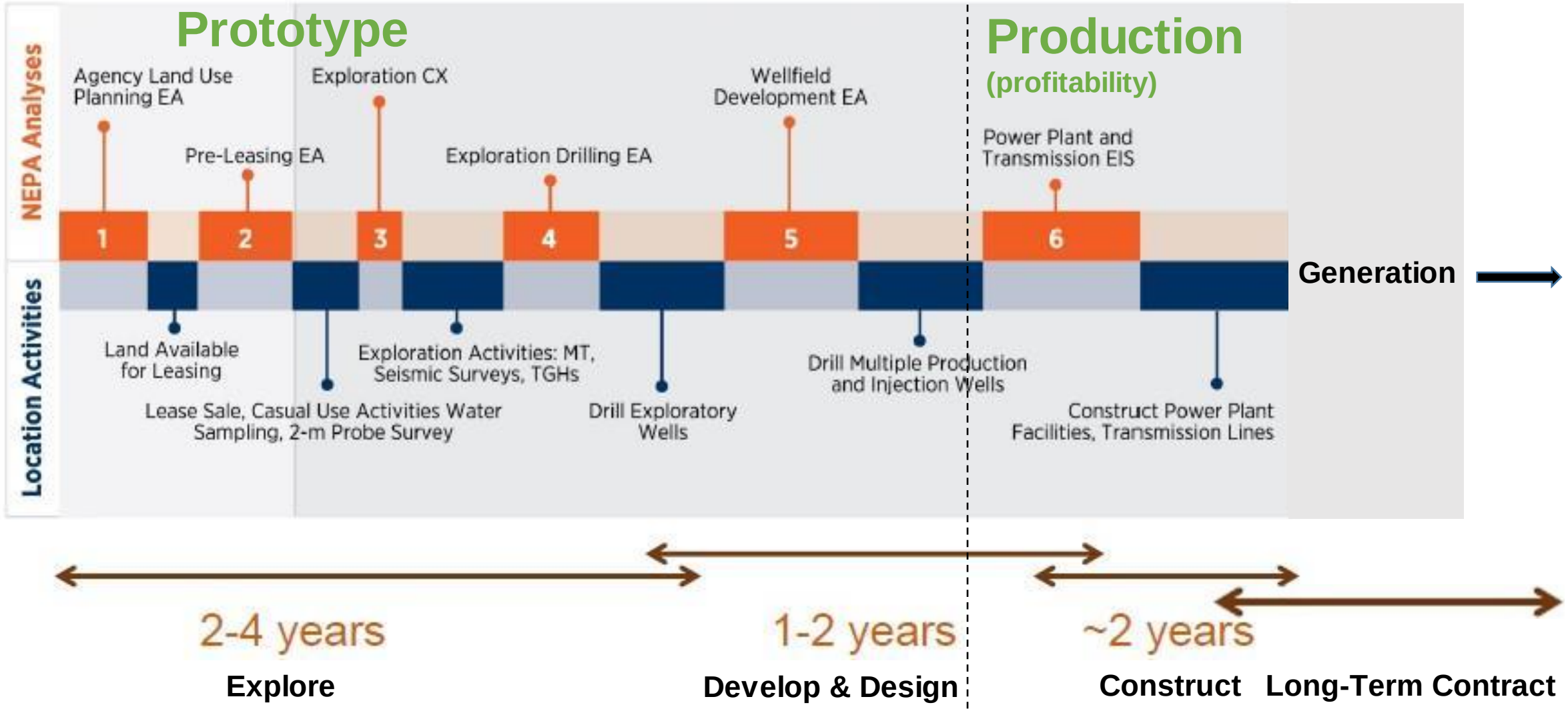
	Resilience	Physical In Kind Consideration	Monetary Payments	Potential Reduced Energy Bill	Reduced Energy Load	Assured Access to Power	Preservation of Military Construction Resources
Other Transaction Authority	✓ DoD Policy			✓		✓	✓
Power Purchase Agreement				✓		✓	✓
Performance Contracts		✓		✓	✓		✓
Land Lease		✓		✓	✓	✓	✓
Military Construction					✓	✓	
Partnerships			✓		✓	✓	✓
Utilities Privatization				✓		✓	✓

10 U.S.C. § 4022 - Authority of DoD to Carryout Certain Prototype Projects (Other Transaction Authority)

- **Leverage Commercial Innovation:** Another pathway that allows DoD to quickly leverage small business and commercial innovation for defense purposes
- **Iterate & De-risk**: Allows industry and DoD to iterate quickly on a project concept/technology to de-risk it before committing to a long-term contract (prototyping is exempt from Federal Acquisition Regulations)
- **Develop Deal Structure Based on Data**: Allows industry and DoD to develop a project concept and deal structure based on data gleaned under the prototype phase
- **Sole-source, Follow-on:** If the prototype is successfully completed, DoD can award a sole-source, follow-on contract, known as a Production Contract.

Given the complexity of developing geothermal projects on federal land, DoD is exploring using the prototyping process

Investment/Opportunity



Partner with the Air Force, Army through DIU

DoD is looking for innovative, executable solutions which increase resilience while addressing climate concerns

Identification

DoD works with industry to bring your installation new technology

Exploration

DoD examines new technologies

Integration

DoD teams with external partners to deploy solutions using creative acquisition pathways

Partner with the Air Force, Army through DIU

DIU will post the upcoming geothermal solicitation at:

https://www.diu.mil/

Contacts

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