

# Demonstration and Commercialization of Innovative Energy Storage Technologies

Opportunities at the Department of Energy's Office of Clean Energy Demonstrations and Loan Programs Office

Thermal-Mechanical-Chemical Energy Storage Workshop

Gretchen Kittel

Acting Director, Outreach and Business Development, DOE LPO

August 3, 2022

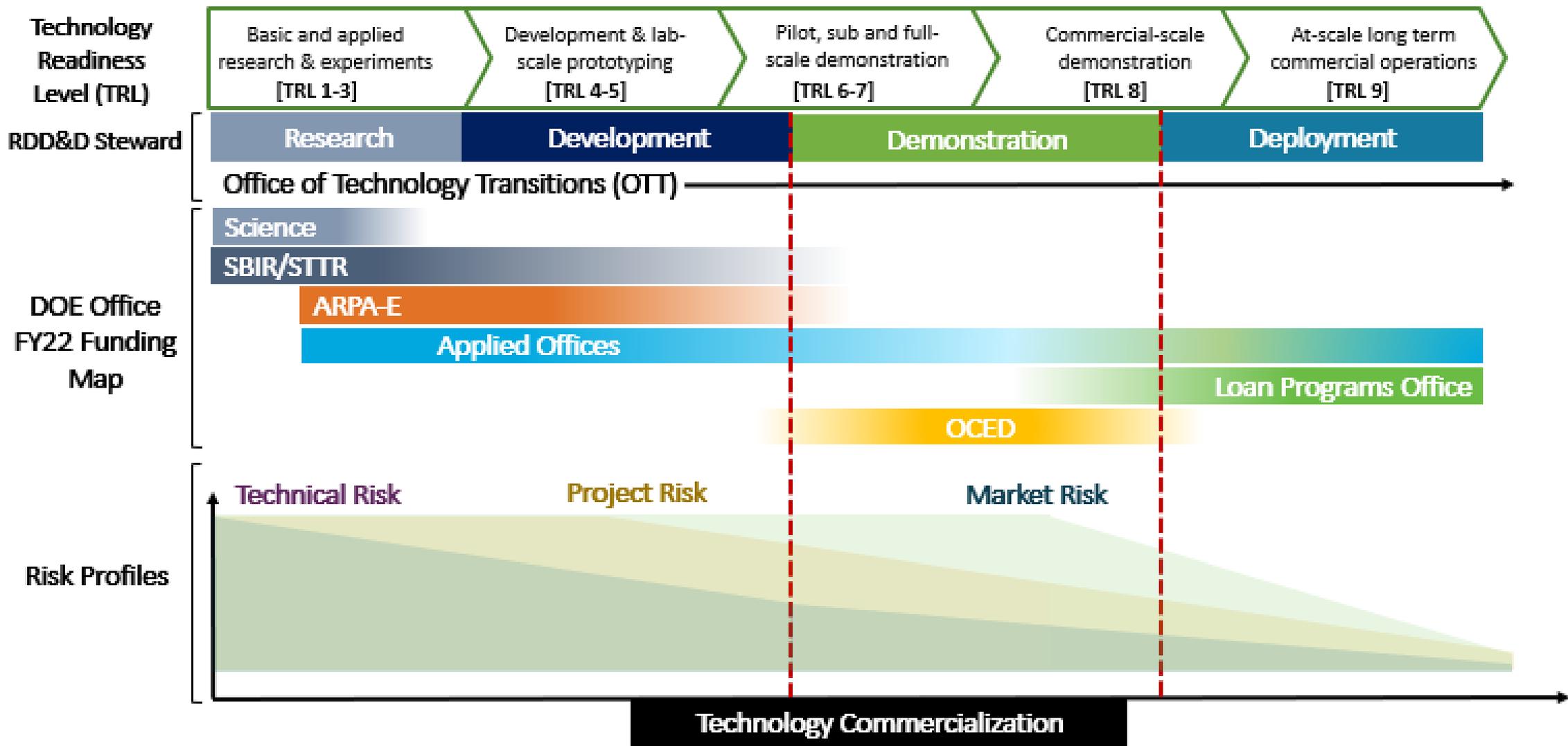
# Agenda

---

- **What OCED & LPO Do** | RD&D Roles at DOE • Missions • LPO's Bridge to Bankability
- **LPO's Portfolio** | Recent Application Activity • LPO's Impact • LPO's TMCES Experience
- **Current OCED Offerings** | Current Scope • Upcoming Funding Opportunities
- **LPO Financing** | LPO's Programs • Why LPO • Working with LPO



# DOE Roles Across Research, Development, Demonstration & Deployment (RDD&D) Continuum





---

Deliver clean energy technology **demonstration projects at scale** in partnership with the private sector **to accelerate deployment, market adoption, and the equitable transition** to a decarbonized energy system.

---



There are many areas that are mature from a technology standpoint but not mature from an access to capital standpoint — **that's a nexus where there's a clear mandate for LPO to participate.**

— LPO Director Jigar Shah

# LPO

The **U.S. Department of Energy Loan Programs Office (LPO)** finances innovative clean energy and advanced transportation technologies, **servicing as a bridge to bankability for breakthrough projects and technologies**, derisking them at early stages of commercialization so they can reach full market acceptance.

# The Bridge to Bankability

Providing financing for technologies to go the last mile to reach full market acceptance



# LPO's Portfolio

## Derisking Across Sectors

Over \$36.5 billion in innovative clean energy & advanced transportation commitments and loans

### Innovative Nuclear Energy

**\$12 Billion**

First AP1000 reactor in the U.S. (Vogtle)

### Innovative Fossil Energy

**\$3 Billion**

Two CCUS conditional commitments.  
(Lake Charles Methanol, Monolith)

### Wind Energy

**\$1.7 Billion**

Four onshore farms, including one of the world's largest. (Shepherds Flat)

### Transmission

**\$343 Million**

Advanced transmission lines for improved grid reliability. (One Nevada Line)

### Advanced Vehicles Manufacturing

**\$7.92 Billion**

Accelerated domestic electric vehicles manufacturing. (Nissan, Tesla)

### Concentrating Solar Power

**\$5.8 Billion**

Five CSP plants utilizing diverse technologies.

### Geothermal Energy

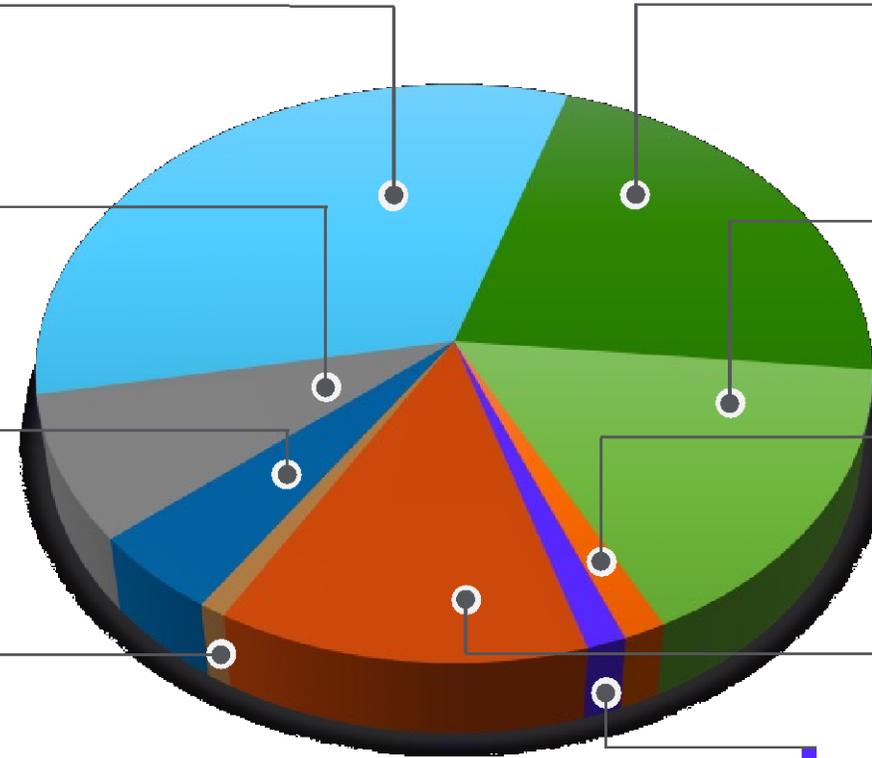
**\$546 Million**

State-of-the-art thermal extraction, revitalizing the sector.

### Photovoltaic Solar

**\$4.7 Billion**

First five utility-scale PV solar projects larger than 100 MW in the U.S.



**\$504 Million**

**Hydrogen**

Conditional commitment for first-of-its-kind clean hydrogen production and storage facility. (Advanced Clean Energy Storage)



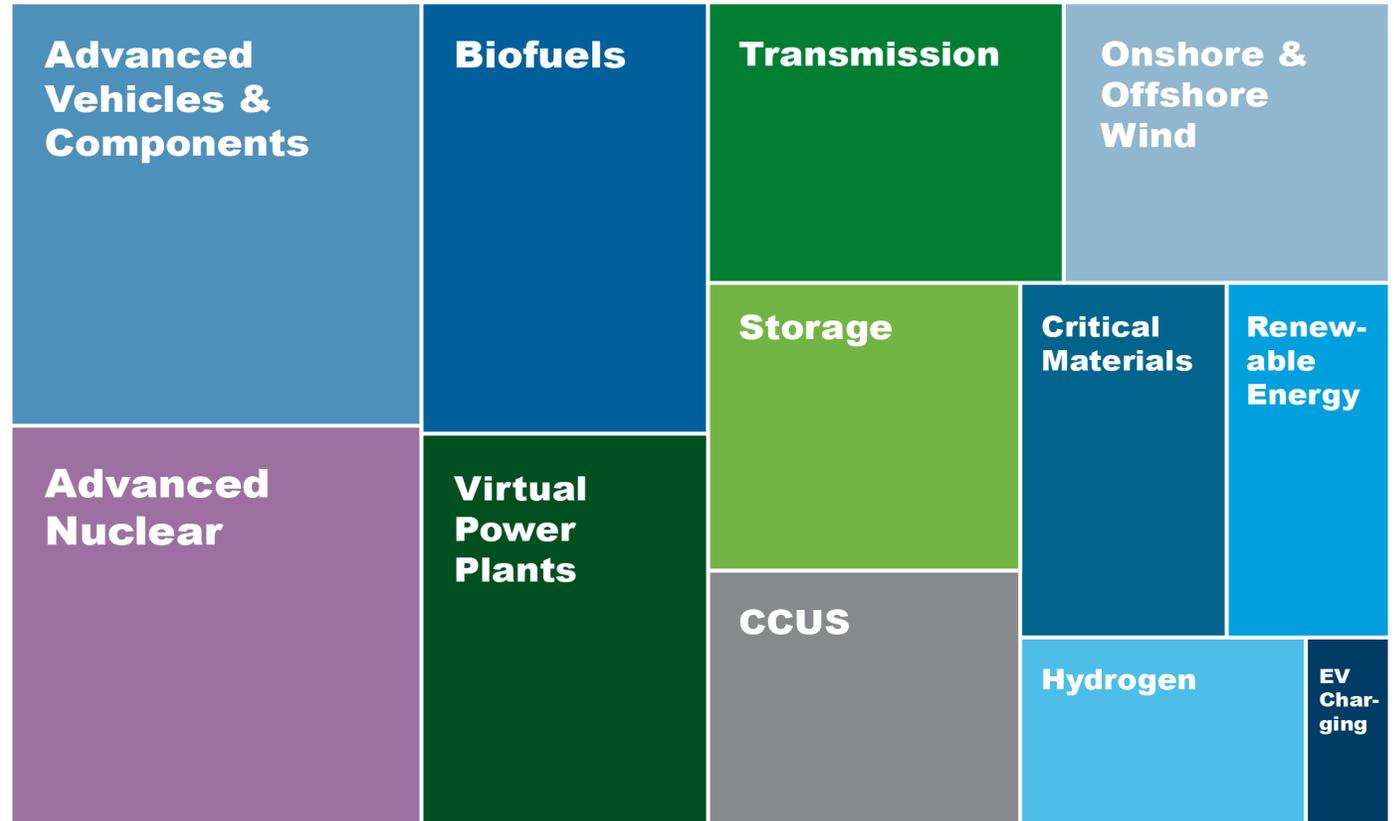
## \$80.8 BILLION

CURRENT AMOUNT OF LOANS REQUESTED  
BROKEN DOWN BY LPO TECH SECTORS

### Notes

All data updated through July 31, 2022. For more details and a list of technology areas of interest within each LPO tech sector, see: [Energy.gov/LPO/MAAR](https://energy.gov/LPO/MAAR)

- 1) Active applications include applications that have been submitted by the project sponsor(s) through LPO's online application portal and that are the subject of active review and engagement by LPO and the applicant.
- 2) Individual requested loan amounts are estimated and potential, subject to change, and not necessarily representative of final financing terms. **Requested loan amounts in current active applications do not affect available LPO loan authority.** Figure rounded down to the nearest \$0.1 billion.
- 3) Current rolling average of new active applications per week over the previous 24 weeks. Figure rounded down to the nearest 0.1 application per week.



Over a decade of success in building a bridge to clean energy commercialization

## Renewables Innovation

Financed large-scale, innovative wind, geothermal, and transmission projects across the West.

## Advanced Auto Manufacturing

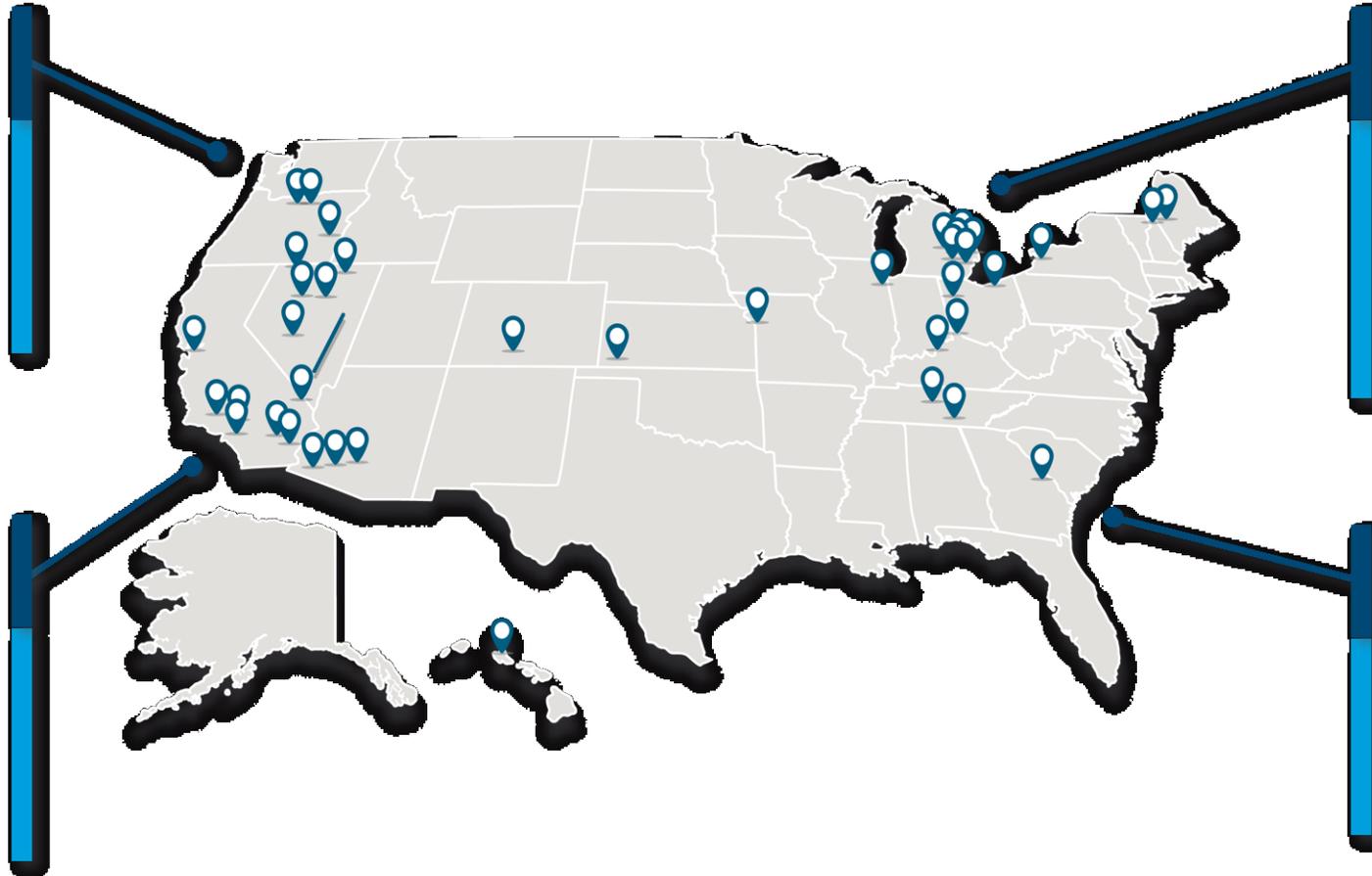
Financed the upgrade of advanced auto manufacturing facilities across the Midwest, creating tens of thousands of jobs.

## Utility-Scale Solar

Financed 11 utility-scale solar projects across the Southwest, catalyzing the industry in the U.S.

## Advanced Nuclear Energy

Financed the construction of the first new nuclear reactor in the U.S. in 30 years.



### LPO experience with non-battery energy storage projects include:

- Molten salt thermal energy storage
- Flywheel energy storage
- Hydrogen electrolysis and storage

**HYDROGEN**

**ADVANCED CLEAN ENERGY STORAGE**

**LOAN GUARANTEE**  
**\$504.4 MILLION**  
JUNE 2022

**FINANCED BY**  
U.S. DEPARTMENT OF  
**ENERGY**

**LPO**  
Loan Programs Office

H<sub>2</sub>

The infographic features a blue header with the word 'HYDROGEN'. Below it, the title 'ADVANCED CLEAN ENERGY STORAGE' is prominently displayed. To the right, a map of North Dakota is shown with a location pin. A starburst graphic contains the text 'LOAN GUARANTEE \$504.4 MILLION JUNE 2022'. The bottom section includes the U.S. Department of Energy logo, the LPO logo, and the chemical formula H<sub>2</sub>. The background shows a stylized industrial facility with a flag on top.

### Other technology areas of interest include, but are not limited to:

- Compressed air energy storage
- Hydrogen production and storage
- Pumped storage hydropower

**ADVANCED FOSSIL**

**MONOLITH**

**LOAN GUARANTEE:**  
**CONDITIONAL COMMITMENT**

**FINANCED BY**  
U.S. DEPARTMENT OF  
**ENERGY**

**LPO**  
Loan Programs Office

The infographic features a blue header with the words 'ADVANCED FOSSIL'. Below it, the title 'MONOLITH' is prominently displayed. To the right, a map of North Dakota is shown with a location pin. A starburst graphic contains the text 'LOAN GUARANTEE: CONDITIONAL COMMITMENT'. The bottom section includes the U.S. Department of Energy logo, the LPO logo, and the text 'FINANCED BY U.S. DEPARTMENT OF ENERGY'. The background shows a stylized industrial facility with a flag on top.

LPO provides **loans and loan guarantees** to projects that have demonstrated potential to **accelerate the decarbonization** of the U.S. economy, focusing on those that combine **clean energy technology** with **effective financial models**.

### Innovative Clean Energy

#### Loan Guarantees

Title 17 Program

- **Innovative Clean Energy | \$3.0 Billion**
- **Innovative Fossil Energy | \$8.5 Billion**
- **Innovative Nuclear Energy | \$10.9 Billion**

### Advanced Transportation

#### Loans & Loan Guarantees

ATVM & Title 17 Programs

- **Manufacturing | \$17.7 Billion** in ATVM loans
- **Deployment | Eligible for the same \$3.0 Billion** in Innovative Clean Energy loan guarantees as above

### Tribal Energy

#### Loans & Loan Guarantees

TELG Program

- **Tribal Energy Projects | Up to \$2.0 Billion**

Loan guarantees for the deployment of innovative energy projects at commercial scale

### Eligibility

**The Title 17 program can consider innovative clean energy projects that:**

1. Use innovative technology.
2. Reduce, avoid, or sequester greenhouse gas emissions or air pollutants.
3. Are located in the U.S.
4. Provide reasonable prospect of repayment.

### Loan Guarantee Features

- LPO can offer 100% guarantee of U.S. Treasury's Federal Finance Bank (FFB) loans or partial guarantees of commercial loans.
- Senior secured debt priced competitively with commercial rates.
- DOE can serve as sole lender or as a co-lender.
- Structures may include project finance, structured corporate, corporate or warehousing lines.

The unique value of working with LPO for clean energy technology financing

**LPO loans and loan guarantees** are differentiated in the clean energy debt capital marketplace in **three primary ways:**



### Access to Patient Capital

that private lenders cannot or will not provide.



### Flexible Financing

customized for the specific needs of individual borrowers.

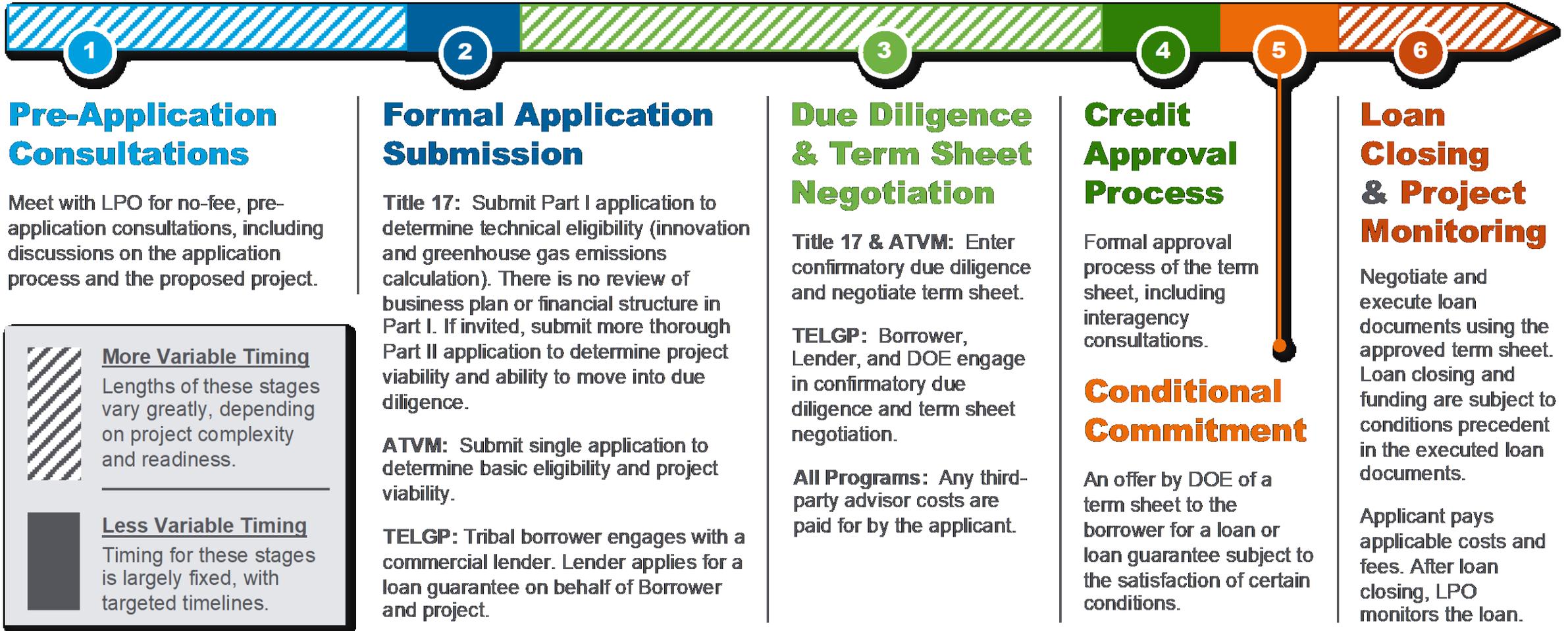


### Committed DOE Partnership

offering specialized expertise to borrowers for the lifetime of the project.

# The LPO Loan Transaction Process

LPO engages early with applicants and remains a partner throughout the lifetime of the loan



# OCED Scope

- **Regional Clean Hydrogen Hubs (\$8 billion)**
- **Energy Storage and Resilience**
  - Upgrading Grids Demonstrations (\$5 billion)
  - Energy Storage Demonstration and Pilot Grants (\$355 million)
  - Long Duration Demonstration Initiative and Joint Program (\$150 million)
- **Location-specific Demonstrations**
  - Energy Improvement in Rural and Remote Areas (\$1 billion)
  - Clean Energy Demonstrations on Mine Land (\$500 million)
- **Advanced Reactor Demonstrations (\$2.5 billion)**
- **Carbon Capture**
  - Carbon Capture Demonstrations (\$2.5 billion)
  - Carbon Capture Large-Scale Pilot Projects (\$937 million)
- **Industrial Emissions Demonstrations (\$500 million)**

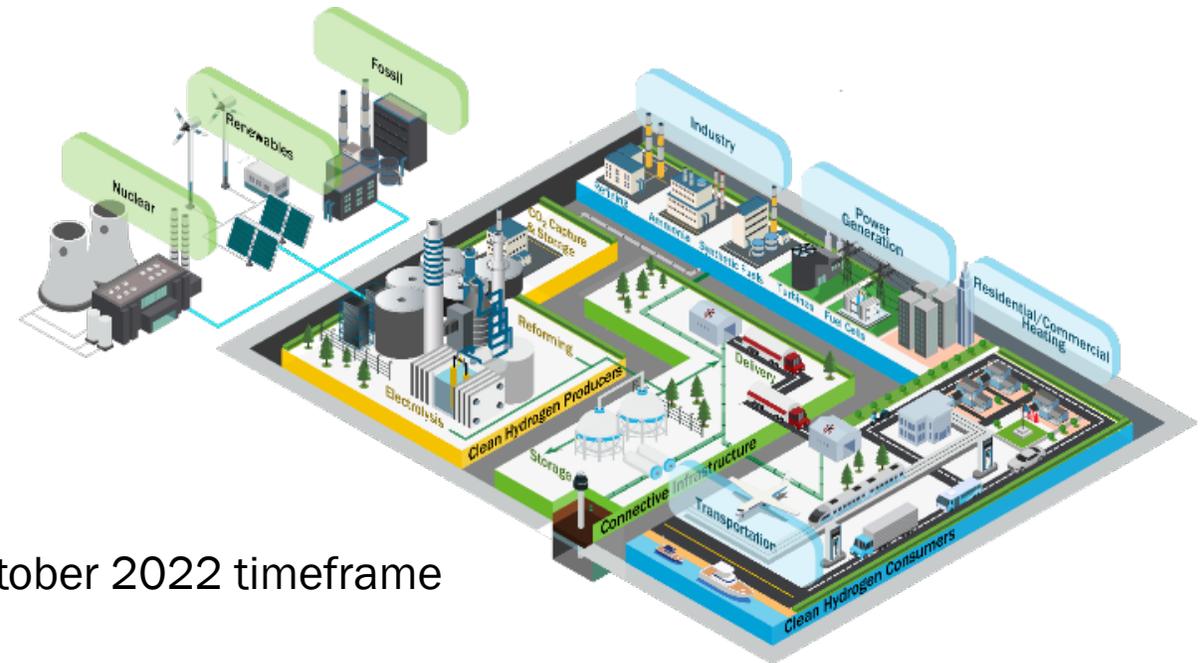
# Regional Clean Hydrogen Hubs (\$8B)

*Building at least four regional clean hydrogen hubs across the country to create networks of hydrogen producers, consumers, and local connective infrastructure to accelerate the use of hydrogen.*

- Feedstock diversity
- End use diversity
- Geographic diversity
- Employment and training

## ***Current Status***

- Issued an RFI in March 2022
- Conducted stakeholder workshops and webinars
- Issued a Notice of Intent on June 6, 2022
- Planning a funding announcement in the September/October 2022 timeframe



# Upgrading Grids Demonstrations (\$5B)

*Demonstrating innovative approaches (1) to improve resilience and reliability of transmission, storage and distribution infrastructure; and (2) to enhance regional grid resilience.*

## *Current Status*

- Conducting stakeholder engagement



# Energy Storage-related Provisions

## Energy Storage Demonstration and Pilot Grants (\$355M)

*Building energy storage system projects to improve grid security and reliability and facilitate more clean energy on the grid, including to:*

- Supply energy at peak periods of demand on the electric grid
- Reduce peak loads of homes and businesses
- Provide ancillary services for grid stability
- Integrate renewable energy resources
- Increase the feasibility of microgrids
- Integrate fast charging of electric vehicles
- Improve energy efficiency

## Long Duration Demonstration Initiative & Joint Program (\$150M)

*Constructing long-duration energy storage technologies at different scales and supporting new, innovative long-duration energy storage technologies become commercially viable. DOE is also collaborating with the Department of Defense under the Joint Program for long-duration demonstrations on government facilities.*

### *Current Status (for both programs)*

- Issued an RFI that closed in mid-June 2022
- Held a webinar on June 7, 2022 and conducting listening sessions July/August 2022



# Let's Talk About Your Project

Contact LPO to see what financing options may be available for your project



Call or write to schedule a no-fee, pre-application consultation: **202-287-5900** | **LPO@hq.doe.gov**



Learn more about LPO and all of its financing programs at: **Energy.gov/LPO**

**Energy.gov/LPO**

## Gretchen Kittel

Acting Director, Outreach and Business Development, DOE LPO  
Gretchen.Kittel@hq.doe.gov

## OCED

dl-oced-engagement@hq.doe.gov

