

Scaling DOE's Collective Genius

Through Enterprise Data Management

DOE Data Days | October 24th, 2023

Robert King
Chief Data Officer | U.S. Department of Energy

Rob King, DOE Chief Data Officer

PREVIOUS ENTERPRISE DATA LEADERSHIP EXPERIENCE



**Inaugural CDO
(2020-2023)**

Established a data-centric culture with an enterprise data strategy and related D&A ecosystem



**Inaugural CDO for Mission Support
(2016-2020)**

Consolidated and normalized data to drive advanced enterprise analytics & decision making

Focusing on “Below the Surface” Infrastructure for Confident Decision-Making

**Enterprise Analytics &
Dashboards**

Enhanced Data Access

Quality Data for AI

Improved Decision Making

Data Governance

Data Storage & Access

**Data Quality
Management**

**Data Inventories and
Catalogs**

Data Literacy

**Analytical Tools and
Products**

**Curated Data
Pipelines**

**Master Data
Management**

Value Proposition of Data Management

Data is not 0s and 1s, but a critical asset to the mission of every organization. We must prioritize data as a strategic asset, like our physical and financial assets, to better achieve our goals across DOE.

TODAY'S CHALLENGES

50%

of a data
scientist's time is
spent data
wrangling

30%

of revenue lost
because of poor
data quality

TOMORROW'S OPPORTUNITIES



Prioritize value
creation with DOE
data

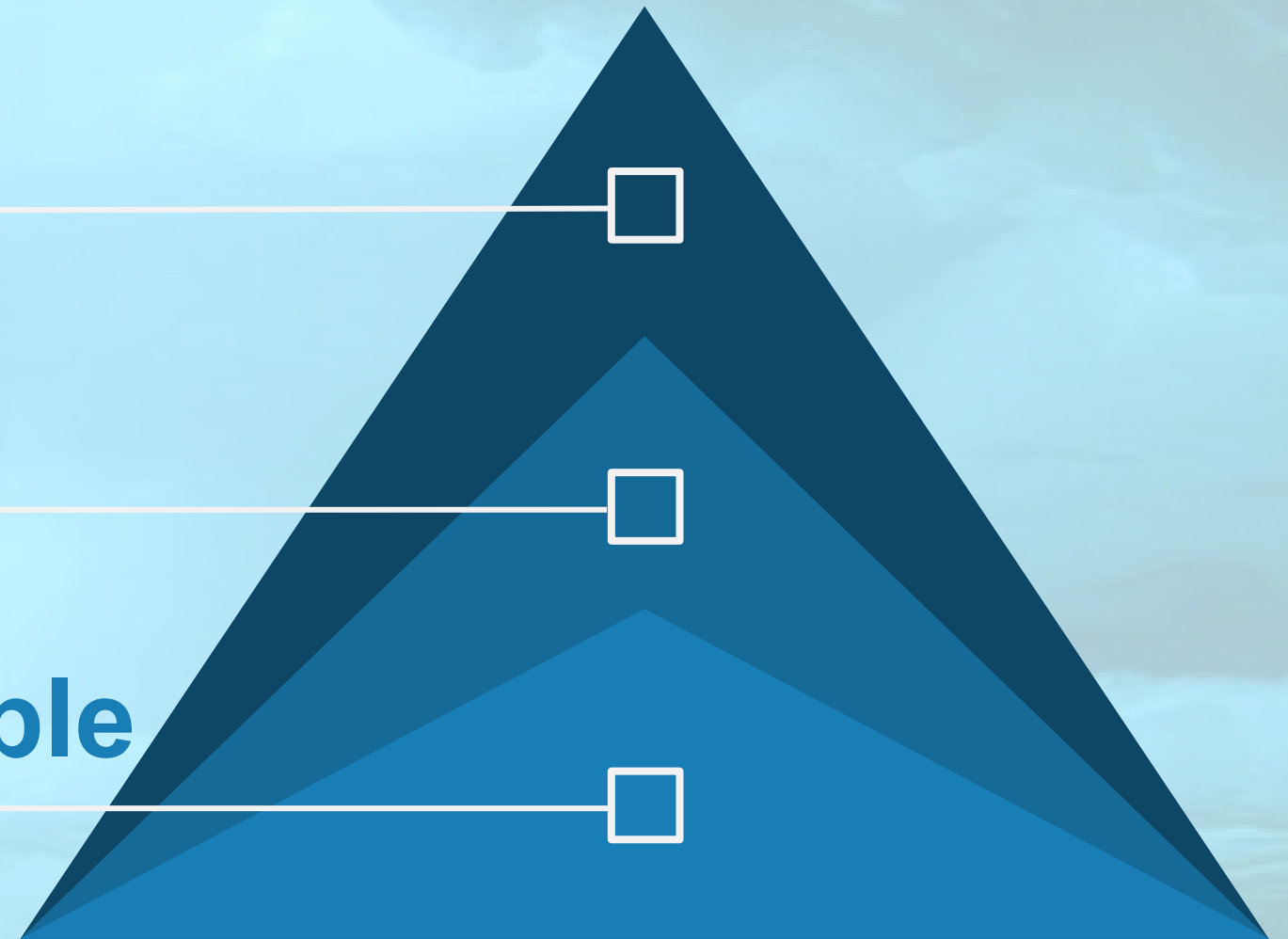
"Instant Impact – A Rapid Approach for Showcasing Data Value." Bugembe, Mike. Forbes, March 23, 2023.
<https://www.forbes.com/sites/mikebugembe/2023/03/23/instant-impacta-rapid-approach-for-showcasing-data-value/?sh=5b739ca174cb>

Defining Value-Led Data Management

Data breaks down barriers

Data is a force multiplier

Data unlocks the art of the possible



How CDOs Deliver Value

CDOs must find opportunities to drive cross-organization partnerships, establish domain architectures, and identify opportunities that allow the entire organization to collaborate, integrate, and innovate in meaningful ways.





DATA PRACTITIONERS

*are the connective tissue for transforming the
delivery of the DOE mission*

ENERGY • ENVIRONMENTAL • NUCLEAR

Data needs the same dedicated focus that technology has enjoyed, if we truly want it to achieve its full potential. Now is the time to embrace the next generation in the data journey that must be focused on how to best manage our abundance of data and put it to work for the business.

Cathryne Clay Doss, first appointed CDO at Capital One

In FY24, How Might We Drive Mission Value Through...

1

Establishing foundations for an enterprise data management program and related architectures

2

Collaborating across DOE to form coalitions with IT, mission, business and data partners to position data to scale our collective genius

3

Conceptualizing innovative solutions for data management & decision-making products



Early Observations as a New CDO: Insights from DOE Partners



**Centralizing
Value-Add Data
Capabilities**



**Identifying Key
Partners for Data
Asset Solutions**



**Streamlining Data
Collaboration**



**Launching Data
Communities &
Skill Development**



**Optimizing
Decision-Making
Forums**



**Clearer Definition
of Data Roles**

Scaling DOE's Collective Genius

1



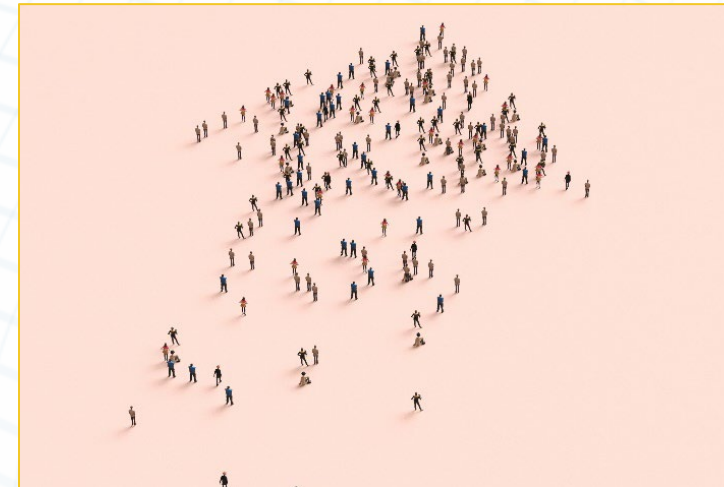
Don't reinvent the wheel
We leverage & optimize what we have within DOE

2



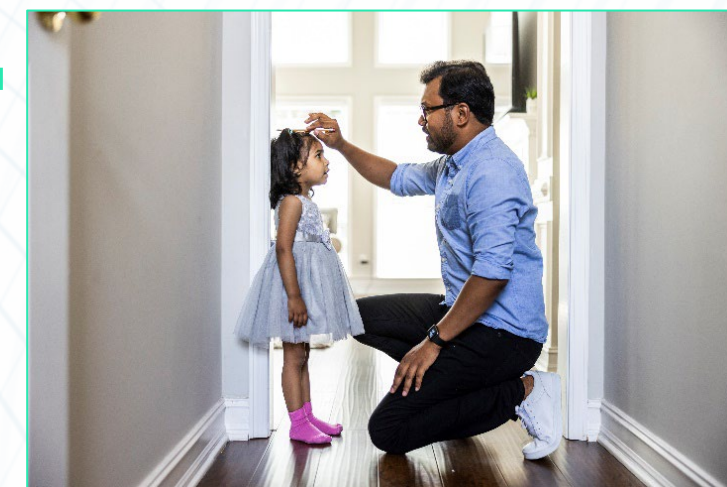
Do no harm
We use data responsibly

3



The whole is greater than the sum of its parts
We realize a collective impact

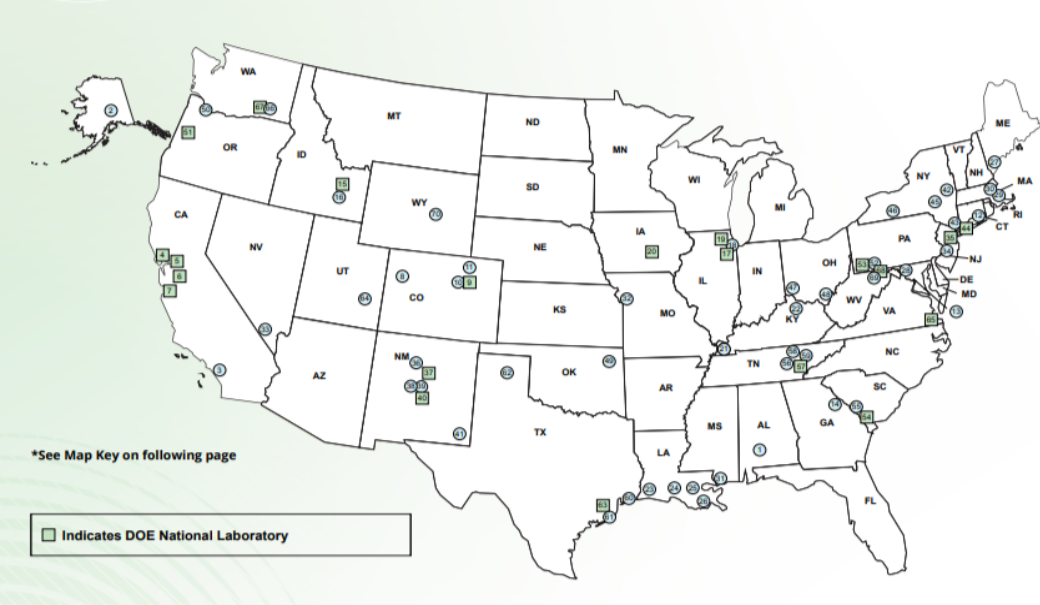
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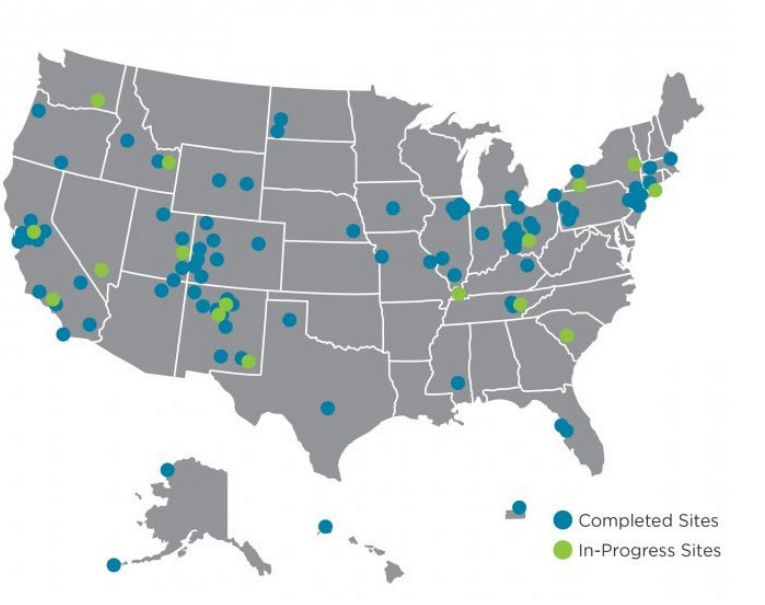
Measure what matters
We use strong data to drive our mission

DOE's Data Community Spans Diverse Mission Areas & Operates Across the US

DOE Welcome Packet, May 2023



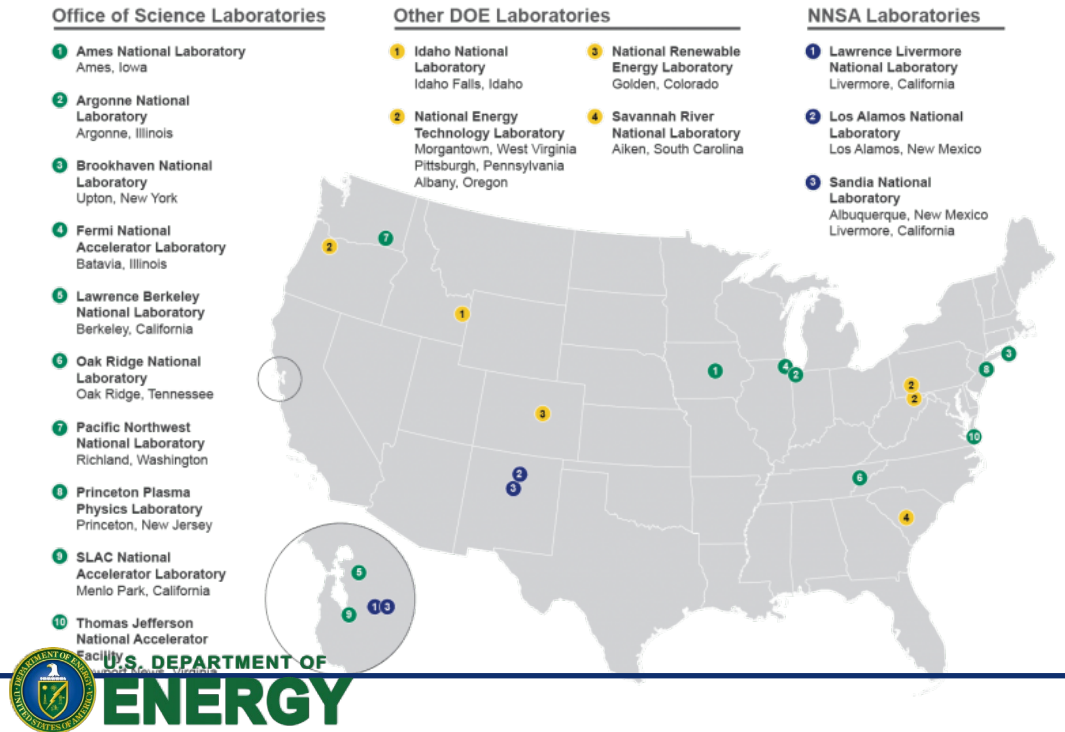
EM Sites



Office of Science Field Operations, June 2019



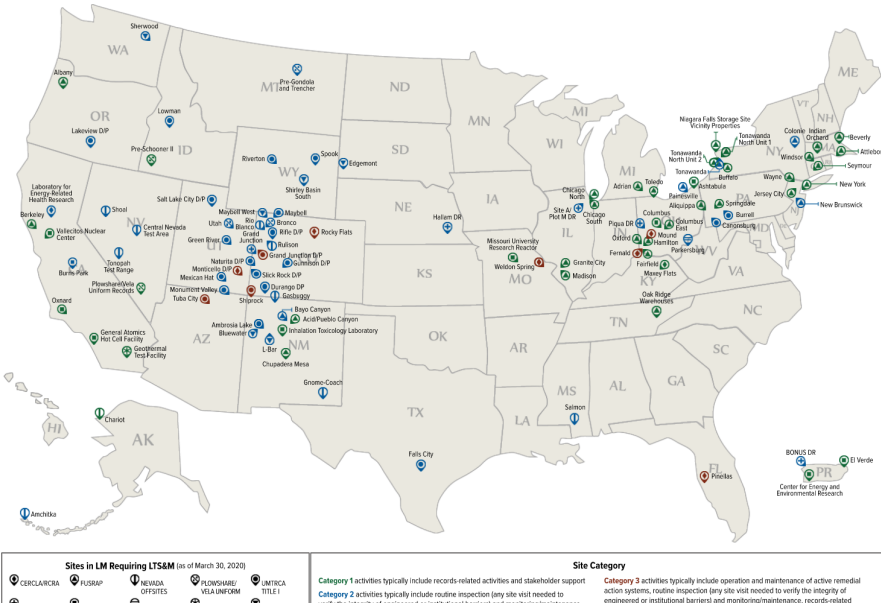
Office of Science Laboratories, Oct. 2011



DOE, April 2021



LM Sites, March 2020



AI to Accelerate Building Our Connective Tissue

(Launch Video Clip – 3 Mins)

NREL

ANL

BES

BNL

WAPA

AMES



DELIBERATIVE | PRE-DECISIONAL | UNCLASSIFIED

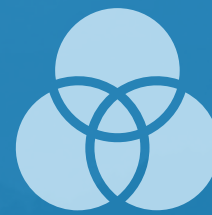
What Value-Led Data Management Can Deliver

Our enterprise data management program will (1) identify opportunities to facilitate meaningful collaboration opportunities across DOE and (2) support program CDOs in their roles, spurring DOE's data excellence, and (3) utilize data governance and stewardship to share data across the enterprise with defined controls.



Empower

Provide organizations with the necessary tools and resources to support a data-focused workforce across the whole of DOE.



Engage

Facilitate strategic partnerships among labs and HQ offices to identify and facilitate shared opportunities.



Elevate

Improve access to information sharing where data can be exchanged securely and efficiently.

Together, we will continuously scale DOE's Collective Genius

Thank You.

Contact Information

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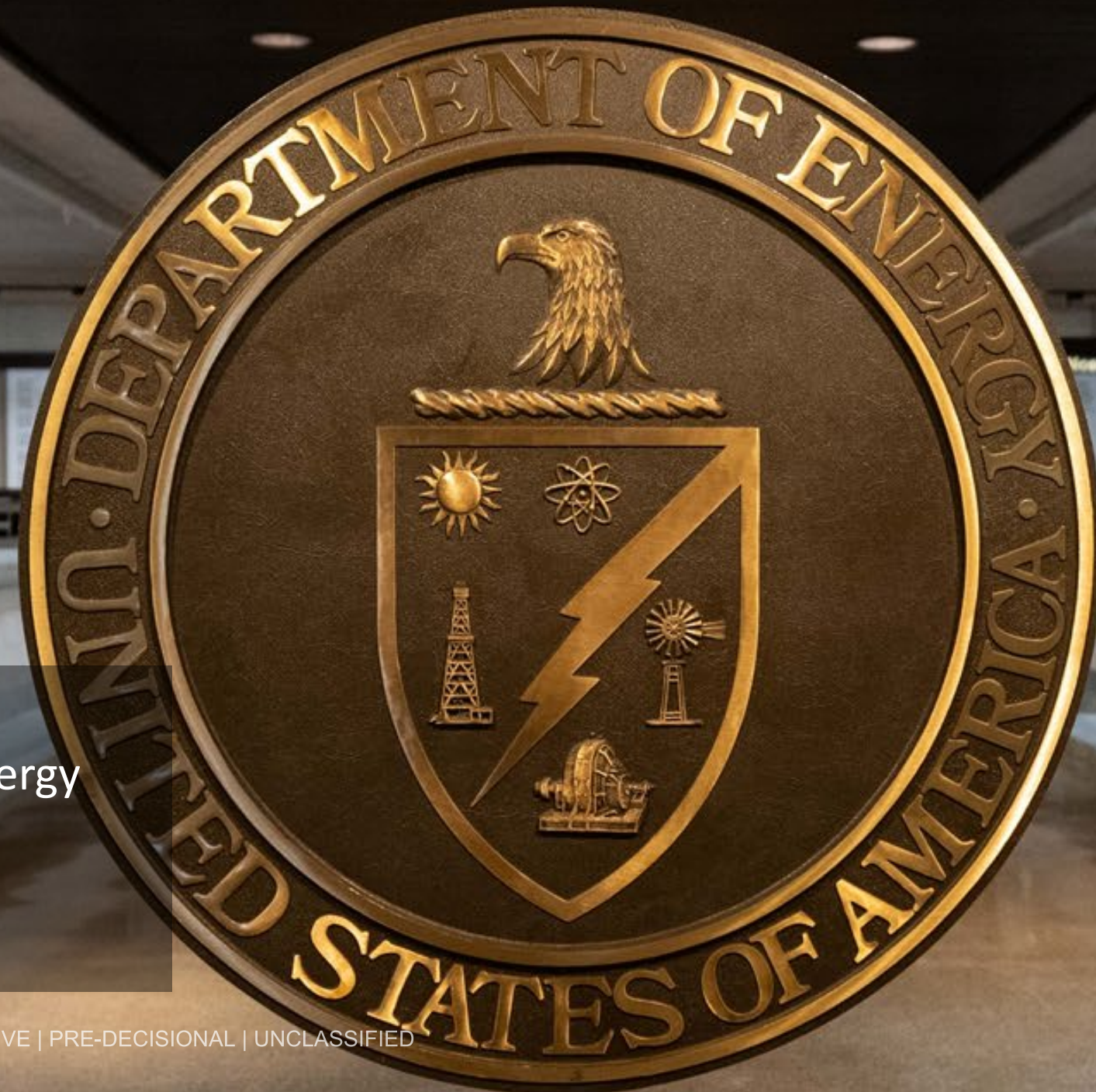
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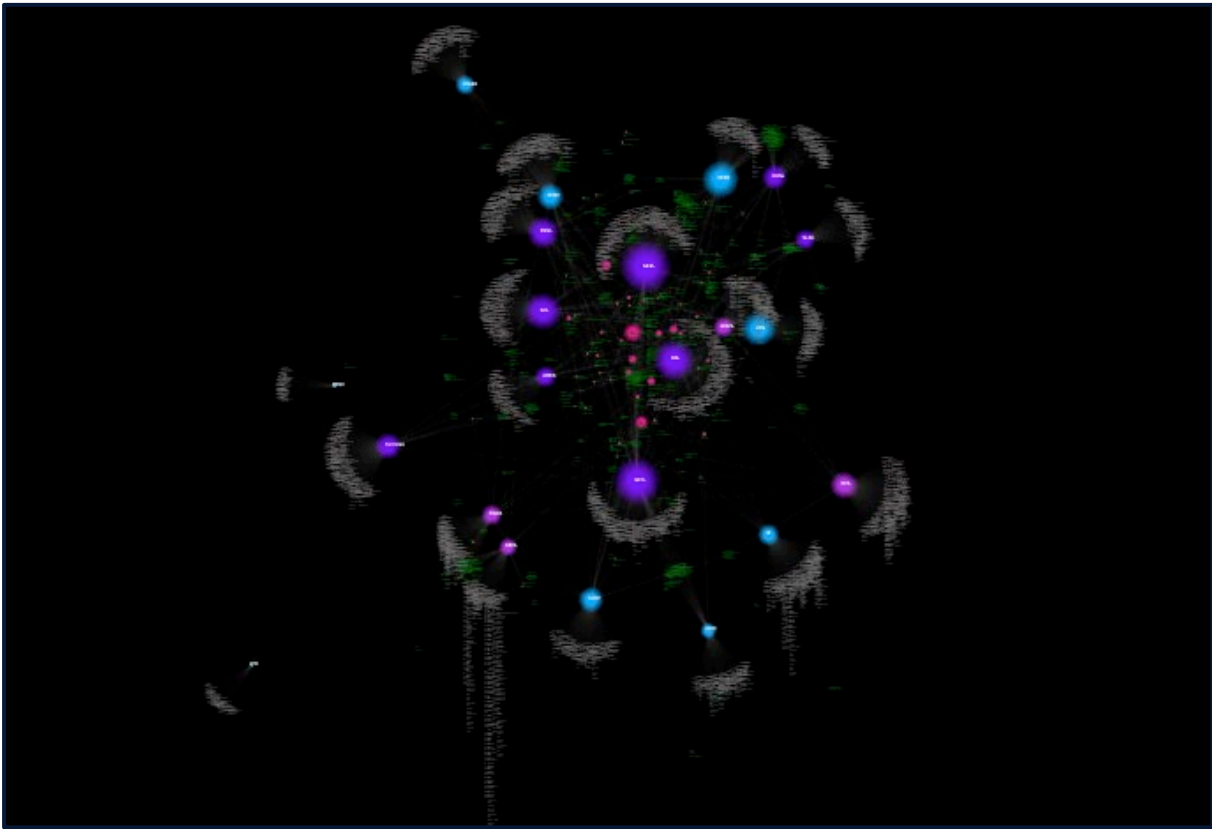
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DEMO

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Project Planner

carbon management

Submit

Recommended Partner Organizations

National Energy Technology Laboratory (NETL)

Relevant Ares of Interest

- carbon management
- hydrogen with carbon management
- carbon transport & storage

Office of Clean Energy Demonstrations (OCED)

Relevant Ares of Interest

- carbon management

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Organizations that mention carbon management2

National Energy Technology Laboratory (NETL)

Office of Clean Energy Demonstrations (OCED)

Related DOE Contract Numbers11

DE-NA0002839

AC02-05CH11231

AC02-05CH11231

AR0001227

FOA-0002250

1847334

80NSSC18K0170

602757

AC05-00OR22725

AC05-00OR22725

AC05-00OR22725

Related Subjects30

37 INORGANIC, ORGANIC, PHYSICAL, AND ANALYTICAL CHEMISTRY

CO2 reduction

precise sulfur doping

compositional dependent electrocatalysis

formic acid

CO2 electrolyzer

54 ENVIRONMENTAL SCIENCES

soil organic carbon

Research & Sponsor Orgs17

Kansas City Nuclear Security Campus (KCNSC), Kansas City, MO (United States)

USDOE National Nuclear Security Administration (NNSA)

National Energy Technology Laboratory (NETL), Pittsburgh, PA, Morgantown, WV, and Albany, OR (United States)

Lawrence Berkeley National Laboratory (LBNL), Berkeley, CA (United States). National Energy Research Scientific Computing Center (NERSC)

USDOE Office of Fossil Energy (FE)

Related Authors32

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Nguyen-Phan, Thuy-Duong

National Energy Technology Lab. (NETL), Pittsburgh, PA (United States); National Energy Technology Lab. (NETL), Pittsburgh, PA (United States). NETL Support Contractor

Ellis, James E.

National Energy Technology Lab. (NETL), Pittsburgh, PA (United States); National Energy Technology Lab. (NETL), Pittsburgh, PA (United States). NETL Support Contractor

Nagarajan, Anantha Venkataraman

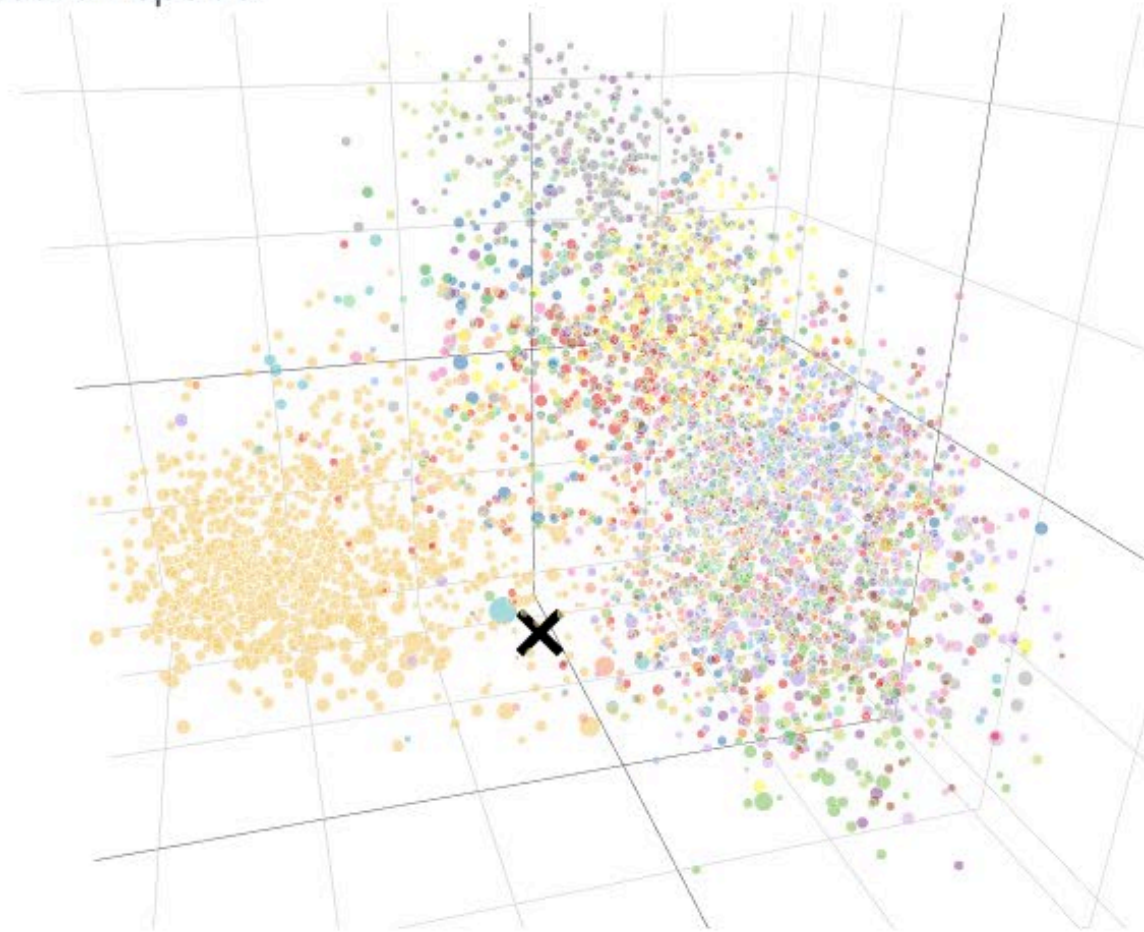
National Energy Technology Lab. (NETL), Pittsburgh, PA (United States); National Energy Technology Lab. (NETL), Pittsburgh, PA (United States). NETL Support Contractor; Univ. of Pittsburgh, PA (United States)

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carbon management

Submit query

Search space



Top matches

Implications of "peak oil" for atmospheric CO2 and climate

P.A. Kharecha, J.E. Hansen (NASA GISS and Columbia Univ. Earth Institute)...

Unconstrained CO2 emission from fossil fuel burning has been the dominant cause of observed anthropogenic global warming. The amounts of "proven" an...

64% match

physics.a0-ph

Hydrocarbon anions in interstellar clouds and circumstellar envelopes

T. J. Millar, C. Walsh, M. A. Cordiner, R. N'i Chuim'in and Eric Herbst...

The recent detection of the hydrocarbon anion C6H- in the interstellar medium has led us to investigate the synthesis of hydrocarbon anions in a var...

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astro-ph

The unusual hydrocarbon emission from the early carbon star HD 100764: The connection between aromatics and aliphatics

G.C. Sloan, M. Jura, W.W. Duley, K.E. Kraemer, J. Bernard-Salas, W.J. For...

We have used the Infrared Spectrograph (IRS) on the Spitzer Space Telescope to obtain spectra of HD 100764, an apparently single carbon star with a ...

61% match

astro-ph

A multi-transition molecular line study of candidate massive young stellar objects associated with methanol masers

M. Szymczak, A. Bartkiewicz, A.M.S. Richards...

We characterize the molecular environment of candidate massive young stellar objects (MYSOs) signposted by methanol masers. Single pixel observation...

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Selected Record

Implications of "peak oil" for atmospheric CO2 and climate

P.A. Kharecha, J.E. Hansen (NASA GISS and Columbia Univ. Earth Institute)

Unconstrained CO2 emission from fossil fuel burning has been the dominant cause of observed anthropogenic global warming. The amounts of "proven" and potential fossil fuel reserves are uncertain and debated. Regardless of the true values, society has flexibility in the degree to which it chooses to exploit these reserves, especially unconventional fossil fuels and those located in extreme or pristine environments. If conventional oil production peaks within the next few decades, it may have a large effect on future atmospheric CO2 and climate change, depending upon subsequent energy choices. Assuming that proven oil and gas reserves do not greatly exceed estimates of the Energy Information Administration, and recent trends are toward lower estimates, we show that it is feasible to keep atmospheric CO2 from exceeding about 450 ppm by 2100, provided that emissions from coal, unconventional fossil fuels, and land use are constrained. Coal-fired power plants without sequestration must be phased out before mid-century to achieve this CO2 limit. It is also important to "stretch" conventional oil reserves via energy conservation and efficiency, thus averting strong pressures to extract liquid fuels from coal or unconventional fossil fuels while clean technologies are being developed for the era "beyond fossil fuels". We argue that a rising price on carbon emissions is needed to discourage conversion of the vast fossil resources into usable reserves, and to keep CO2 beneath the 450 ppm ceiling.



64% match

physics.ao-ph

summarize the conclusion

 Submit query

The conclusion suggests that high-end SRES scenarios assume that, without climate mitigation policies, large amounts of unconventional or 'undiscovered' resources will replace dwindling conventional reserves. The resulting atmospheric CO2 levels in 2100 in the SRES scenarios range from ~540 ppm to ~970 ppm, excluding carbon cycle feedbacks. Model simulations suggest that carbon cycle feedbacks under a high-end emissions scenario (A2) can yield an additional 20-200 ppm of CO2 by 2100.

Relevant sources

7b). Although this latter scenario represents relatively moderate 'BAU' cases, it relies heavily on the assumption that carbon-positive substitute fuels cannot or will not be developed in the future to replace declining conventional fuel reserves, e.g., due to a rising price on carbon emissions (see Discussion). 3.5 Comparison with IPCC-SRES and EMF-21 scenarios In contrast with all of the above scenarios, peak total emissions in the four SRES scenario families (IPCC, 2000) range from ~12 Gt C yr⁻¹ in 2040 (B1 marker scenario) to a staggering ~28 and 29 Gt C yr⁻¹ in 2100 (A2 and A1F1 marker scenarios, respectively). Time-integrated 21st-century emissions for these SRES marker scenarios range from ~970 Gt C (B1) to ~1900 and 2100 Gt C (A2 and A1F1). Thus, it is clear that the high-end SRES scenarios implicitly assume that, in the absence of climate mitigation policies, massive amounts of unconventional or 'undiscovered' resources will become viable substitutes for dwindling conventional reserves. Resulting atmospheric CO2 amounts in 2100 in the SRES scenarios range from ~540 ppm to ~970 ppm, excluding carbon cycle feedbacks (IPCC, 2001b). Model simulations suggest that carbon cycle feedbacks under a high-end emissions scenario (A2) can yield an additional 20-200 ppm of CO2 by 2100 (Friedlingstein et al., 2006)

(b) Resulting atmospheric CO2 from this scenario, compared with the baseline ('high-end') BAU scenario from Fig. 4a.

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Query a DOE Document

Ask questions about large sets of documents and instantly get helpful answers with references to the original information.

Original Sources
FY2024 Functional Offices Evaluation Plan
2020-2025 LM Strategic Plan

Select source documents

☐ FY2024 Functional Offices Evaluation Plan

☒ 2020-2025 LM Strategic Plan

Tell me about the partnerships with tribal nations.

Try example ▾

✕ Clear text

Submit query

Result

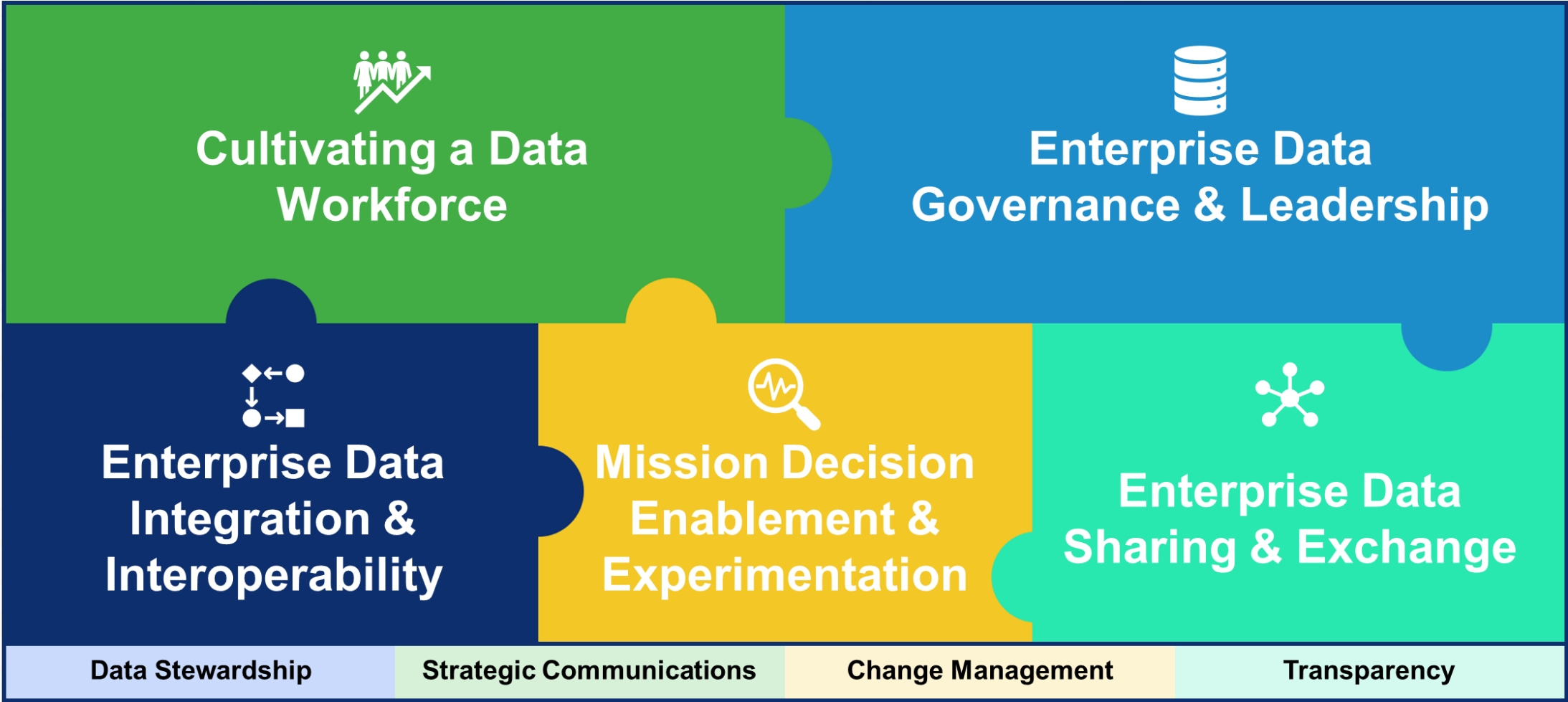
Short answer
The partnerships with tribal nations involve two-way communication, collaboration on site inspections and environmental monitoring, and financial support for oversight of activities on their lands.

Long answer
LM is committed to meaningful, two-way communication with tribal nations, working closely with an array of Native American and Alaska-Native stakeholders who are partners in their commitment to long-term monitoring and surveillance. They routinely collaborate on site inspections and environmental monitoring, document review, natural resources management, and community outreach. LM conducts long-term stewardship and maintenance on sites located on or near multiple tribal and Alaska-Native communities. Cooperative agreements and grants for affected tribes provide financial support for technical oversight of LM's activities on their lands. They also work closely with the State and Tribal Government Working Group (STGWG), part of the National Conference of State Legislatures. STGWG is composed of states and Native American tribes and engages directly with DOE on issues related to the cleanup of the nuclear weapons complex.

APPENDIX

Data Management for Our Common Mission

Primary Themes of an Enterprise Data Management Program



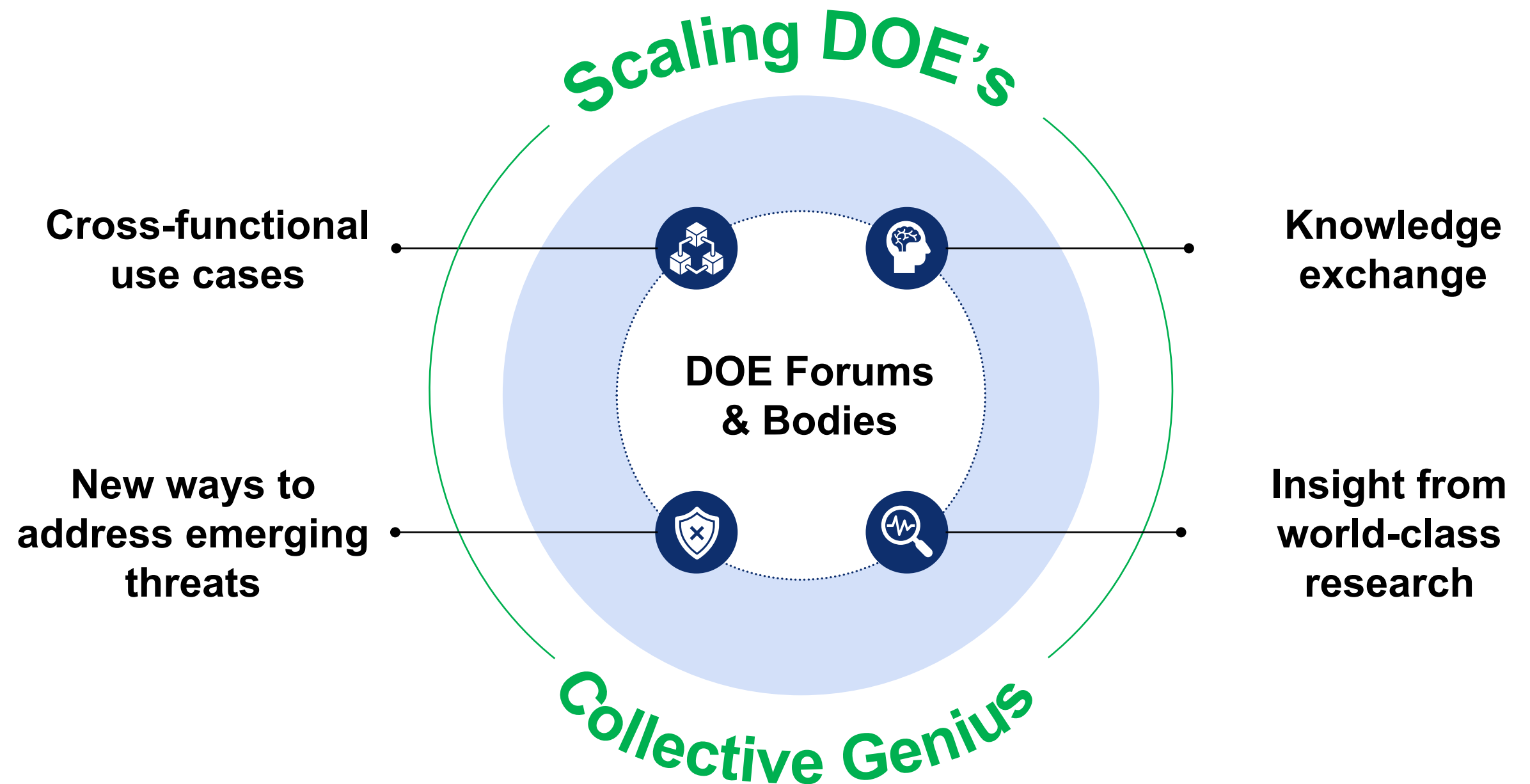
Foundations for Success

Value Proposition

- 1 Improved Decision-Making through Better Access to Data & Analytics Products
- 2 Usable Data to Drive Projects, Programs & Services
- 3 Reducing Data Calls & Associated Resources
- 4 Better Sharing of Data across DOE Organizational Siloes

Collaboration across DOE

In the face of many technological unknowns, one principle stays true: the power of collaboration lies not just in sharing knowledge, data, and resources, but in our collective wisdom to face today's challenges.



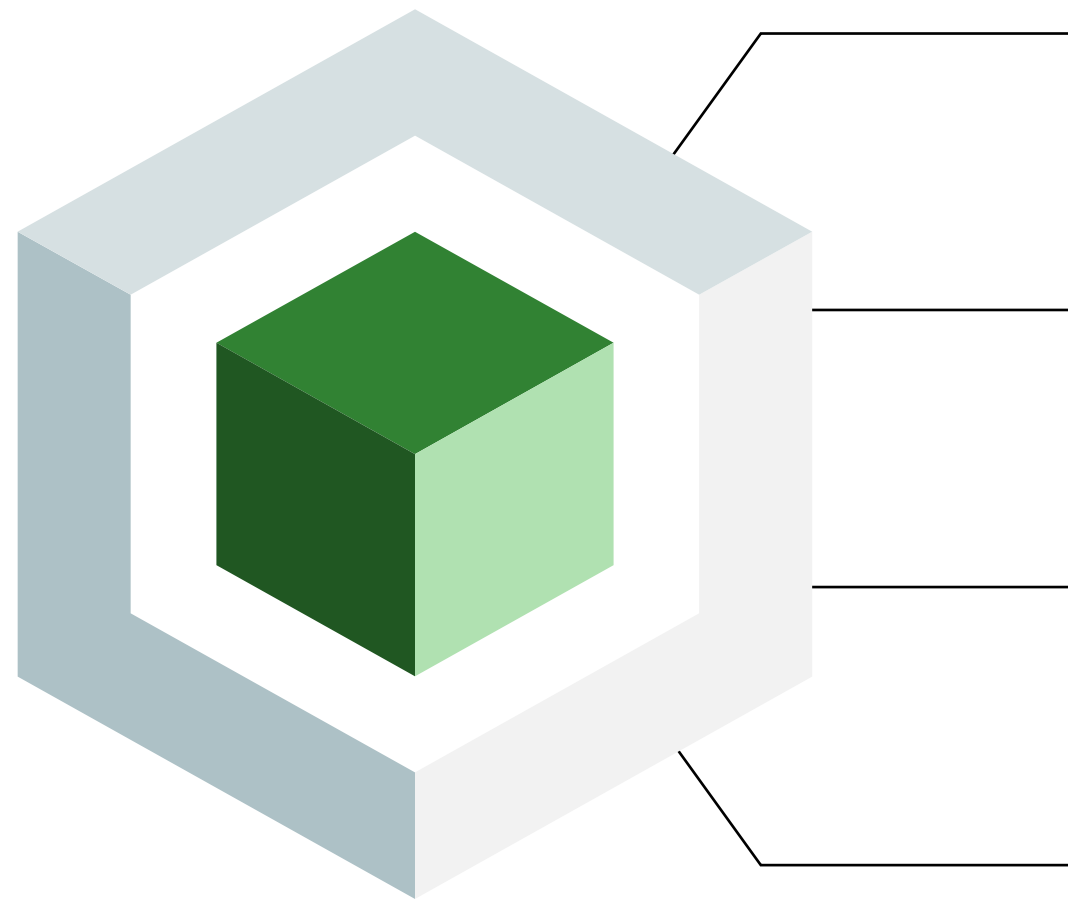
Key Themes from 2022 D3

The 2022 DOE Data Days set the goal of promoting disciplined data management as a means to higher-quality and more efficient research and analysis, discussing cloud and hybrid data management.

Data Management Challenges

“Data, in all its forms and with all its challenges, deserves a starring role in the DOE’s scientific and technological progress”

– *DOE Data Days 2022 Report*



**Cloud and Hybrid
Data Management**

Data Intensive Computing

**Data Access, Sharing, and
Sensitivity**

Data Policy and Ethics