the ENERGY lab

R&D FACTS

RESEARCH & INNOVATION CENTER

Geological & Environmental Systems

EDX: NETL's Data Driven Tool for Science-Based Decision Making

Data Exchange for Energy Solutions

Background and Benefits

In 2011, the U.S. Department of Energy's (DOE) National Energy Technology Laboratory (NETL) initiated the Energy Data eXchange (EDX), an online collection of capabilities and resources that advance research and customize energy-related needs. EDX was developed and is maintained by NETL's Research & Innovation Center (NETL-RIC) researchers and technical computing teams to support private collaboration for ongoing research efforts and tech transfer of finalized DOE-NETL research products. EDX supports NETL-affiliated research by (1) coordinating historical and current data and information from a wide variety of sources to facilitate access to research that crosscuts multiple NETL projects/programs, (2) providing external access to technical products and data published by NETL-affiliated research teams, and (3) collaborating with a variety of organizations and institutions in a secure environment through EDX's Collaborative Workspaces.

In 2010, two energy-related research and development (R&D) efforts supported by NETL researchers illustrated a growing need to change how NETL and its collaborating research partners think about research products and cultivate new research. The first of these R&D efforts involved the increasing uncertainty surrounding safety and risks associated with hydraulic fracturing of unconventional resources. Development of these resources accelerated at an unprecedented pace in 2007 and sparked renewed interest in leveraging products from DOE and NETL eastern and western gas shale R&D programs from the 1970s through the 1980s. However, many of the datasets resulting from those programs were stored in filing cabinets as paper-based assets or on outdated media. This made the discoverability, accessibility, and reuse of valuable data from those studies challenging, if not impossible, to leverage for current R&D needs.

Second, the 2010 BP Deepwater Horizon oil spill (Macondo blowout) in the Gulf of Mexico required a large federal response, including multi-agency teams involving DOE and NETL researchers. This involvement spotlighted challenges that these multi-agency teams experienced in (1) efficiently finding and accessing relevant datasets needed for response analyses and plans, (2) securely sharing data and working together to develop products across multi-agency teams, and (3) ensuring preservation of products resulting from that effort for future use. While the specifics of these two examples are unique, they exemplify challenges NETL research teams face every day. This recognition ignited a desire within NETL to leverage rapidly evolving technology, capabilities, and approaches to information sharing, big data, and computational resources—both public and private—for the benefit of NETL researchers, partners, and public stakeholders.

EDX incorporates a broad set of subsurface information common to CO_2 storage and other energy needs (e.g., shale gas, tight oil, deepwater and ultra-deepwater, and unconventional fossil resources). This set of information includes reservoir data, fluids properties, wellbore data, fault/fracture data, and groundwater data.

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Although some of the information resides in EDX as data derived from NETL research, much of the information exists online, distributed through external databases. In these cases, EDX serves as an online system to facilitate internal access to research that crosscuts multiple NETL projects and programs, with external access to technical products and data published by NETL research teams. In this role, EDX facilitates coordination of both restricted-access and open-access research data.

Ultimately, EDX seeks to improve researcher access to data and resources from a range of sources and offers a venue for the "publication" and dissemination of new datasets and often-inaccessible historical assets. In doing so, NETL is helping to ensure their use for future, yet-to-be-envisioned purposes.

The primary users of EDX are NETL researchers (NETL research teams) actively engaged in work relevant to subsurface, near-surface, atmospheric, and environmental risk issues relating to subsurface CO_2 storage, unconventional and conventional hydrocarbons, and groundwater and air emission impacts. EDX provides access to evaluate and predict what happens in engineered-natural systems while helping accelerate further research.

Contributing to EDX is quick, easy, and streamlined. The process begins with completion of the online submission form to describe attributes, characteristics, and keywords. This information provides the building blocks of EDX and is utilized to compile search results. Providing thorough and accurate submission information will enhance visibility. Datasets physically housed within EDX are provided by users either as links to external websites, or when appropriate, as stand-alone files.

Functionality

EDX past: Version 1 released end of FY12

- Formed the foundation for EDX to serve as a coordination-collaboration platform for NETL
- Focused on improved discoverability of resources and tools for R&D
  - Connected data resources resulting from NETL-affiliated R&D
  - Connected EDX users to publically available, authoritative data resources

EDX present: Version 2 released in FY13

- Brings private sharing capabilities for multi-organizational R&D teams to the EDX platform and to the EDX user community
- Provides the envisioned balance between public-data resource discoverability for mature research products and secure-private research development capabilities

EDX Version 2 Highlights

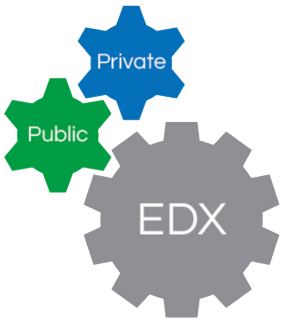
- EDX Version 2 provides advanced coordination, collaboration, and data-visualization functionality
- *Group* functionality enables researchers to share data and information about a common theme, discipline, or interest in an open-access environment
- *Collaborative Workspaces* are an extension of the *Group* functionality and provide NETL research teams with a secure and dedicated workspace to quickly and efficiently share data, ideas, and research techniques
- *Slate* is a *Collaborative Workspace* feature where members can create custom page content for their research
- *EDXtools* provide access to data and information assembled as custom themes, allowing researchers to interact with data
- *EDXwiki* is an energy-focused tool where NETL researchers are able to collaboratively add, edit, and delete an encyclopedia of energy-related content; *EDXwiki* is intended to promote content creation, modification, and deletion at the user level
- *Storage Capacity* was expanded to accommodate EDX growth
- *Geocube* was redesigned using HTML5 and javascript
- *Two Factor Authentication* adds an additional level of security to EDX
- *Correlated Content* is an indexing tool that mines data submissions and suggests additional EDX submissions with similar content
- *Mobile-Friendly User Interface* allows users to easily explore EDX on mobile and tablet devices

EDX Next Steps

Going forward, the EDX team is poised to develop and release Version 3. The priorities for EDX Version 3 include:

- Integrate big data capabilities, underpinned by the HADOOP ecosystem and other open-source big data resources, and advanced multi-organizational coordination and collaboration capabilities into the system
- "Productize" EDX to enable full leveraging of EDX's federated and nodal capabilities in support of multi-organizational connectivity and research support; EDX Prime, the current NETL-hosted and -supported version of EDX, will continue to be the main EDX system and will leverage NETL's inherent governmental capabilities either as part of the EDX product or as part of the EDX collaboration community
- Implement a new NETL Point of Contact (POC) Review Process to allow access for approval managers to review the actual submission on EDX prior to public release
- Continue to connect and coordinate with other DOE computer and information science-related capabilities to enhance both the individual EDX user's experience and options, and to support discoverability of other DOE data and computing R&D resources and capabilities

Registered users interested in options for specialty datasets and customized solutions should contact EDX Support at EDXsupport@netl.doe.gov



We invite you to visit us at
edx.netl.doe.gov

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