



Big Data for Government Symposium

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Data solutions at EERE

by
Robert Bectel
US Department of Energy
Office of Energy Efficiency and Renewable Energy

What We Did and Still Do Today

- We develop, deploy and manage specialized data sites on-premise which tend to be:
 - Hard to discover
 - Domain specific
 - Not customer centric
 - Not extensible (no API's)
 - Resource (time & money) intensive
 - Hard to understand if your were not a specialist in the specific topic!

We build statues on islands!



Ian Parker 2006

Easter Island

- It takes 18 Hrs 24 Min to get there
- And costs more than \$3,000 in air fare.
- It's closest neighbor is Pitcairn Island – 2075km to the west.



GMT 2006 Jul 21 06:38:30 CMC - Martin Walser

km
0 1000 2000

Open Data Memo 1313

- On May 9th, 2013, President Obama issued the executive order making “Open and Machine-Readable” the new default for government information.
- Fundamentally transforms the way in which Federal Government creates, aggregates and manages data.
- Find a clear set of instructions for ***what*** to do posted on the official Project Open Data website on GitHub - <http://project-open-data.github.io/>
 - Create and maintain an Enterprise Data Inventory (Inventory)
 - Create and maintain a Public Data Listing
 - Create a process to engage with customers to help facilitate and prioritize data release
 - Document if data cannot be released
 - Clarify roles and responsibilities for promoting efficient and effective data release



Driving Information to Data.Gov

The screenshot shows the Data.Gov website interface. At the top, there is a search bar and navigation links for DATA, TOPICS, IMPACT, APPLICATIONS, DEVELOPERS, and CONTACT. Below this is a blue header for the ENERGY section, featuring a lightbulb icon and the word ENERGY. Underneath the header is a sub-navigation bar with links for Updates, Data, Apps, Maps, Challenges, and Resources. The main content area has a blue background and contains a paragraph about discovering data and resources on key energy topics. Below this is a HIGHLIGHTS section with a title 'APIs from the Energy Information Administration' and a 'View this Dataset' button. The description states that the EIA collects statistics on energy generation, distribution, and consumption, and their new APIs provide easy access to this data. A 'More Highlights' link is also present. The UPDATES section follows, featuring a tweet from Project Open Data (@ProjectOpenData) dated December 23, 2013, announcing the winners of the American Energy Data Challenge. The tweet includes a link to the challenge website. Below the tweet is a link to 'Pursuing Open Data at the Department of Energy' with a byline for Charles Worthington dated December 13, 2013.

DATA TOPICS ▾ IMPACT APPLICATIONS DEVELOPERS CONTACT

ENERGY

Updates Data Apps Maps Challenges Resources

Discover data and resources on key energy topics like alternative fuels, green buildings, efficiency, and managing energy in your own home.

HIGHLIGHTS

APIs from the Energy Information Administration

[View this Dataset](#)

The Energy Information Administration collects statistics on energy generation, distribution and consumption in the United States. Their new APIs provide developers easy access to EIA's extensive data on electricity, petroleum, natural gas, and more.

[More Highlights](#)

UPDATES

 Project Open Data
@ProjectOpenData
December 23, 2013

.@ENERGY has announced the winners of Contest #1 in the American Energy Data Challenge. Check out the great ideas: <http://energychallenge.energy.gov>

[Pursuing Open Data at the Department of Energy](#)
December 13, 2013 *By Charles Worthington*

Open Data Public Access Plan

- The Department proposes a model for ensuring public access to unclassified scholarly publications that provides the public with access to the best available version of the article via the Public Access Gateway for Energy and Science (PAGES)
- The Office of Energy Efficiency and Renewable Energy (EERE) will ensure specific research data are submitted to the Open Energy Information Platform (OpenEI). All publicly accessible data on OpenEI will be integrated with the Public Data Listings on energy.gov and data.gov.
- This integration will include use of the Project Open Data metadata schema to describe each dataset supporting broader use and understanding of information in private or non-profit sectors



What We are Starting To Build...

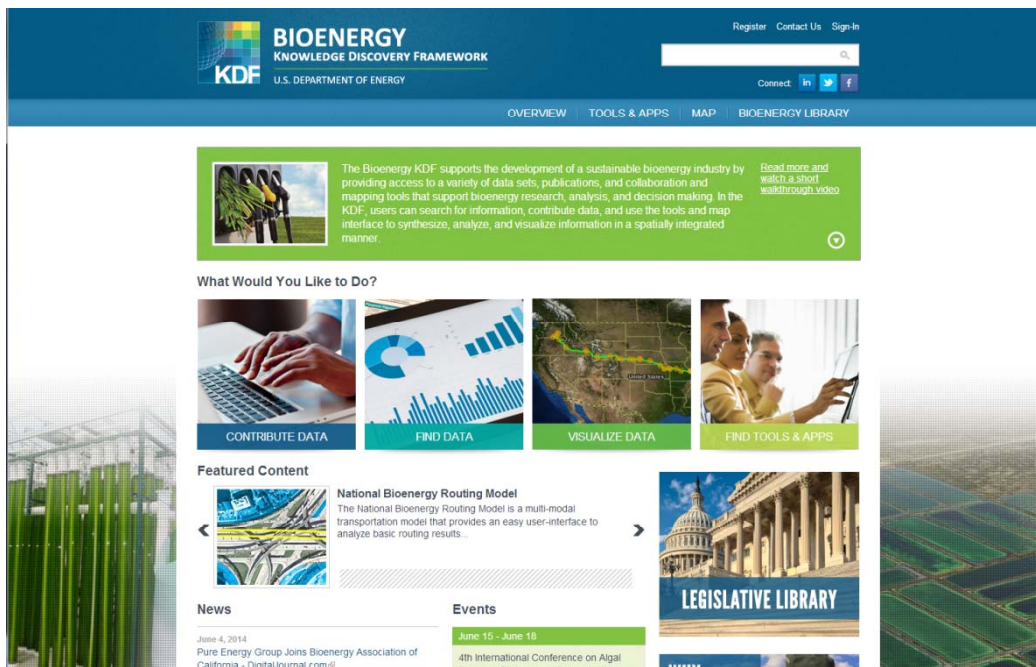
Highly Distributable
Easy to Build
Readily Accessed
Low Cost



BioEnergyKDF.net

The Bioenergy Knowledge Discovery Framework (KDF) is an online collaboration toolkit and data resource that provides access to the latest bioenergy research. In the KDF, users can search the Bioenergy Library to find data sets, publications, and models on a wide variety of bioenergy topics; use the Map interface to visualize, analyze, download, and export geospatial data; and browse the site's collection of specialized Tools & Apps, which can also be launched on the map.

Search
Contribute
Associate
Analyze
Share
Visualize
Collaborate!



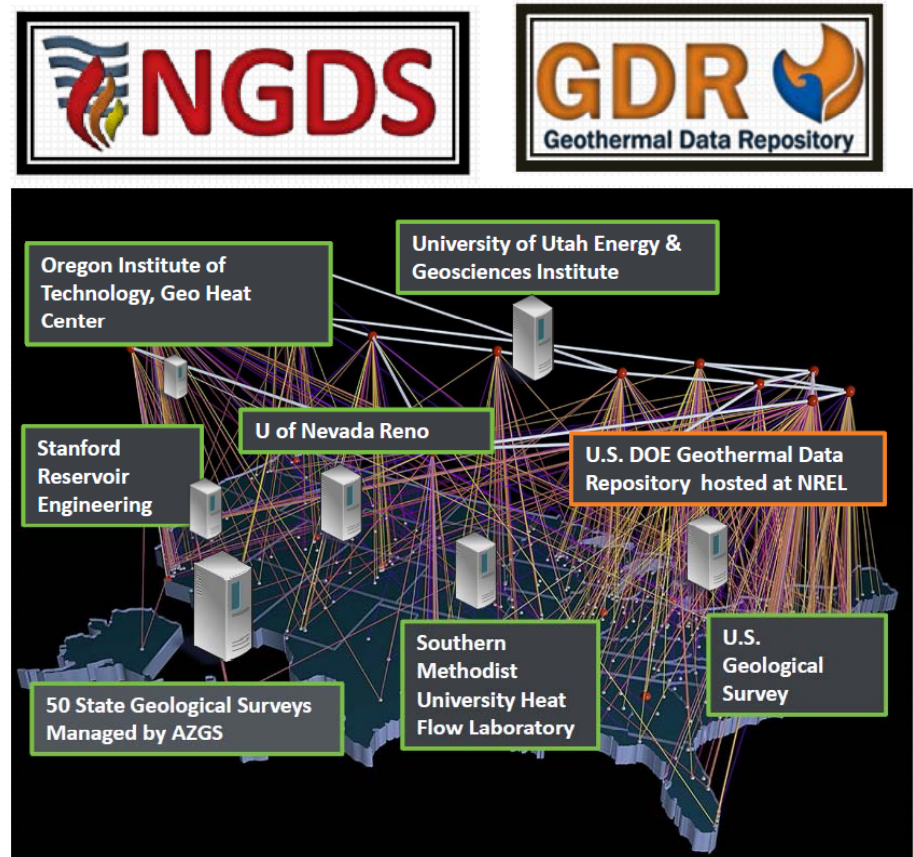
1500+ Spatial Data Sets
1200+ Downloadable data,
200+ Curated Articles
Links to 38 Domain Models
Geospatial & Graphical
Visualization Tools

National Geothermal Data System

The NGDS was built using the US Geoscience Information Network (USGIN) data integration framework to promote interoperability across the Earth sciences community.

- NGDS is a data system, not a database
 - Access all Geothermal data from a central interface.
 - Node-In-A-Box
- System is unified by:
 - Catalog and standardized metadata
 - Data access protocols and interchange formats
- The Geothermal Data Repository (DOE-GDR) represents a vital node on the NGDS. GDR is hosted on the Open Energy Information (OpenEI) currently featuring:
 - over 55,000 content pages,
 - more than 600 downloadable data sets,
 - regional gateways on a variety of energy related topics,
 - and numerous online tools such as “Geothermal Prospector.”

To learn more about the NGDS, log on at
<http://geothermaldata.org>.



National Training and Education Resource

NTER is an Open Source Platform for Education and Workforce Development -- nterlearning.org

NTER Consists of a suite of online tools and software that lower costs to create, manage and deliver education and workforce training content to any audience.

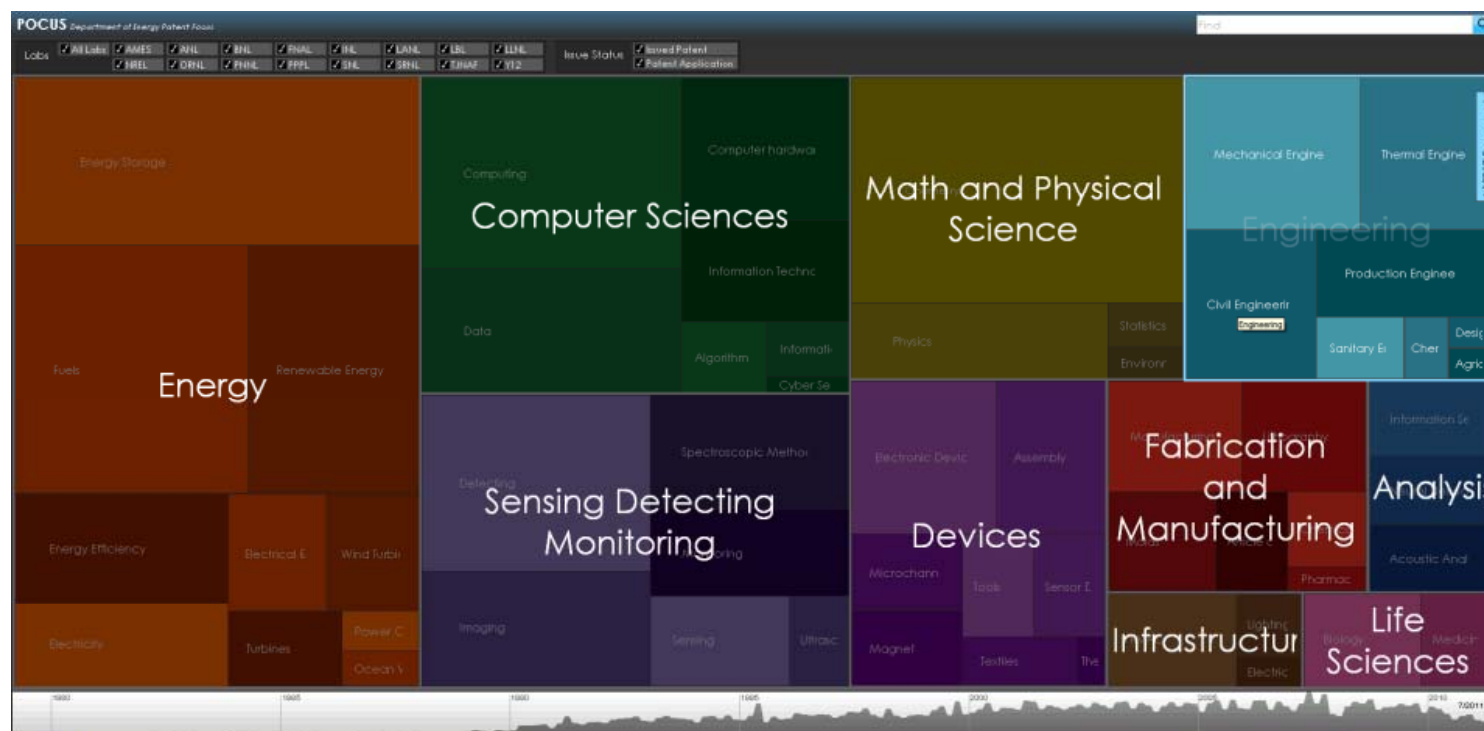
Key Features:

- **Open Source-** customizable, adaptable, no licensing costs
- **Distributed search** across federated network of content sources
- Interactive and immersive **simulation-based 3D training**
- Rapid **content creation platform**
- **Secure** identity management and content sharing
- **Social & Peer Review**
- **NTERMobile** (take your content on the go)



Making Big Data Work for Technology Transfer Through Cutting-edge Visualizations

- The number of data-driven start-ups is growing.
- The **Visual Patent Search Tool** is designed to provide a facilitated search of the patent content contained in the Energy Innovation Portal. (ex. Wireless spread-spectrum telesensor chip with synchronous digital architecture) http://techportal.eere.energy.gov/visual_patent_search



Visual Patent Focus

Visual Patent Search Explore patents with Department of Energy funding on the [Energy Innovation Portal](#)

Search: photovoltaic

Labs: ☐ All Labs ☐ AMES ☐ ANL ☐ BNL ☐ FNAL ☐ INL ☐ LANL ☐ LBL ☐ LLNL ☒ NREL ☐ ORNL ☐ PNNL ☐ PPPL ☐ SNI ☐ SRNL ☐ TUNAF ☐ Y12

Issue Status: ☒ Issued Patent ☒ Patent Application

Patents COLLAPSE

Sort by Date to find the latest innovations. Date Filed Status

Title	Date Filed	Status	OPEN
METHODS AND APPARATUS FOR MANUFACTURING MONOCRYSTALLINE CAST SILICON AN...	10/19/2011	Patent	OPEN
METHODS AND APPARATUS FOR MANUFACTURING MONOCRYSTALLINE CAST SILICON AN...	10/19/2011	Patent Application	
High-Efficiency, Monolithic, Multi-Bandgap, Tandem, Photovoltaic Energy Converters	9/23/2011	Patent Application	
Thermal Evaporation Sources with Separate Crucible for Holding		Patent Application	
Ultra-High Solar Conversion Efficiency for Solar Fuels and Solar E		Patent Application	
SOLAR ENERGY SYSTEMS	7/27/2010	Patent Application	
AMORPHOUS TIN-CADMIUM OXIDE FILMS AND THE PRODUCTION THEREOF	2/12/2010	Patent Application	

Read the patent title and abstract in the preview pane, or click OPEN to read the full patent details on the Energy Innovation Portal.

METHODS AND APPARATUS FOR MANUFACTURING MONOCRYSTALLINE CAST SILICON AND MONOCRYSTALLINE CAST SILICON BODIES FOR PHOTOVOLTAICS [OPEN](#)

Publication Number: 20120037066

Laboratory: NREL

Inventors:

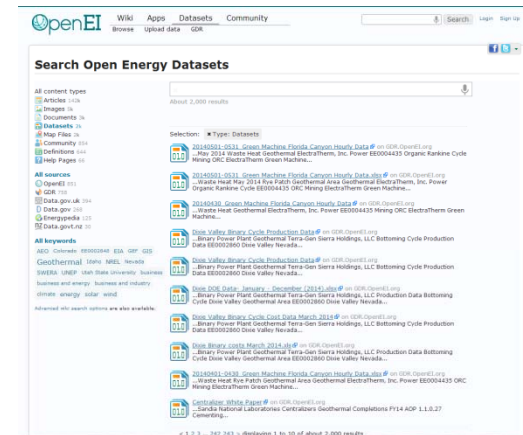
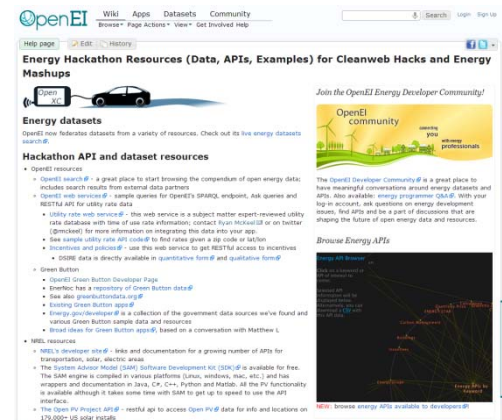
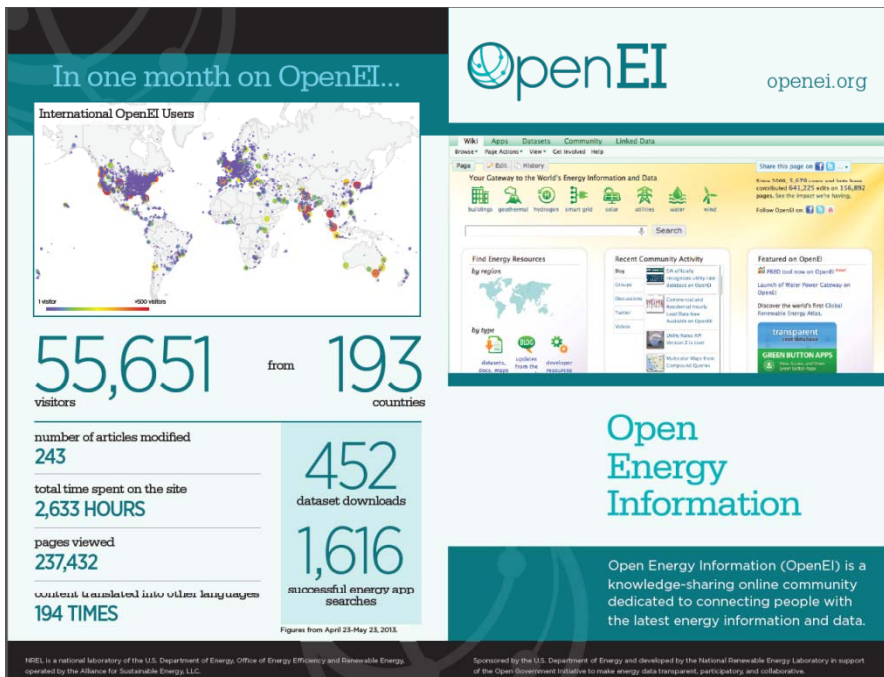
Abstract: Methods and apparatuses are provided for casting silicon for photovoltaic cells and other applications. With such methods and apparatuses, a cast body of monocrystalline silicon may be formed that is free of, or substantially free of, radially-distributed impurities and defects and having at least two dimensions that are each at least about 35 cm is provided.

EnergyCollaboratory

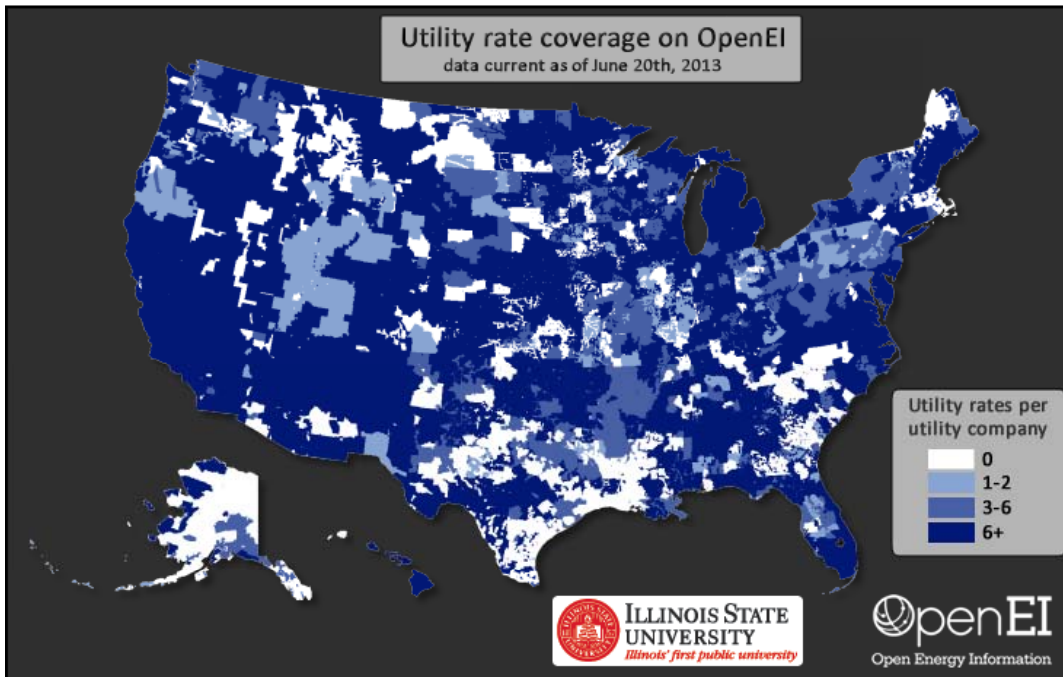
Energy Storage

1985 1990 1995 2000 2005 2010

Open Energy Information –
OpenEI.org



Utility Rate Database



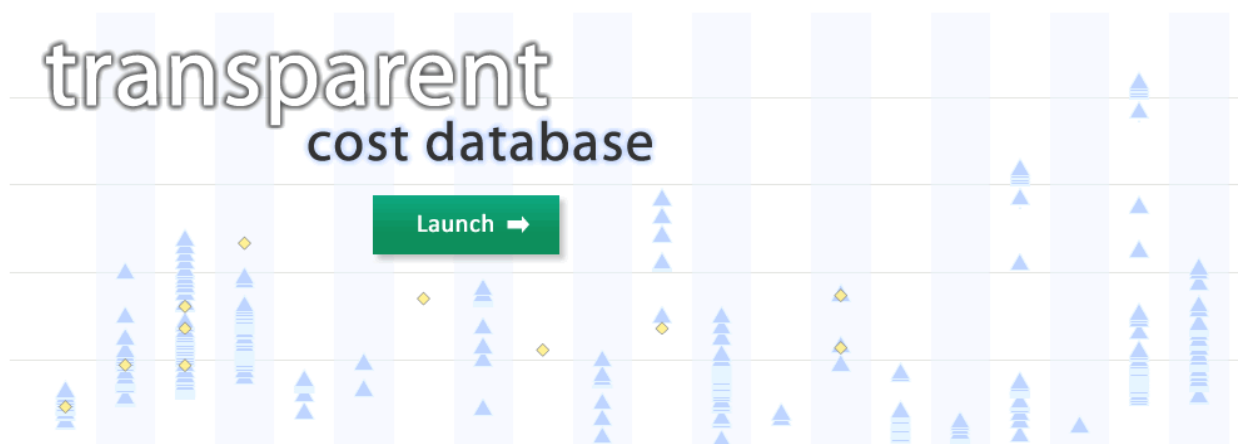
Used by:

- NREL's System Advisor Model.
- OpenPV
- IMBY

The Utility Rate Database (URDB) is a freely available database of rate structure information from utilities in the United States. You can search for your utilities and rates to find out exactly how you are charged for your electric energy usage.

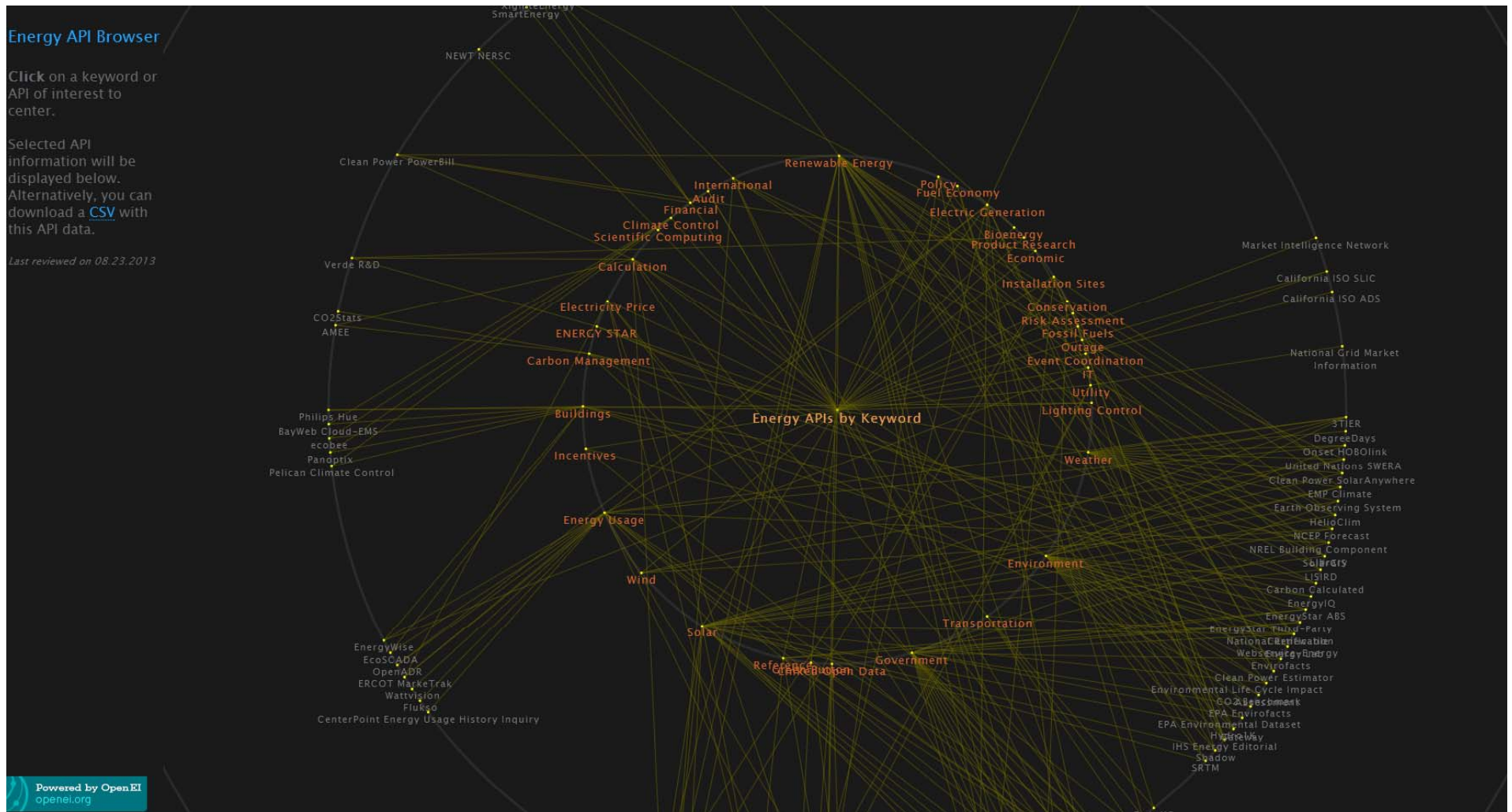
Transparent Cost Database

The **Transparent Cost Database** collects program cost and performance estimates for [U.S. DOE EERE](https://www.eere.energy.gov) technologies in a public forum where they can be viewed and compared to other published estimates. The database includes literature on technology cost and performance estimates (both current and future projections) for vehicles, biofuels, and electricity generation. All data are downloadable for full transparency.



The world has the ability to contribute cost data via OpenEI and compare that data to other sets.

An Energy API Browser!

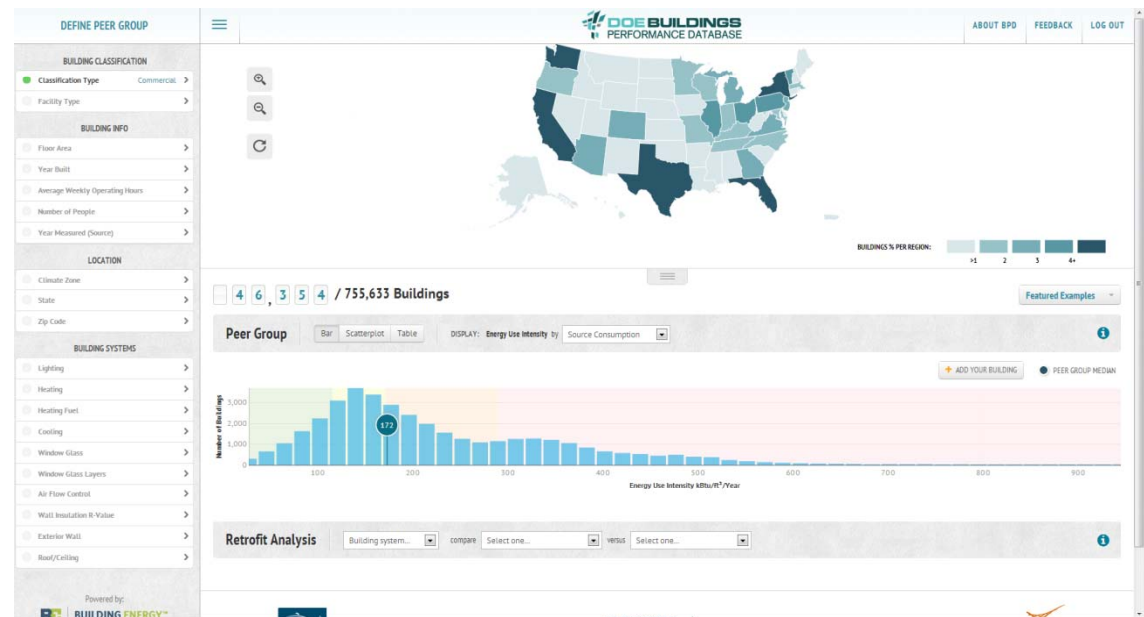


<http://en.openei.org/apps/api-browser/>

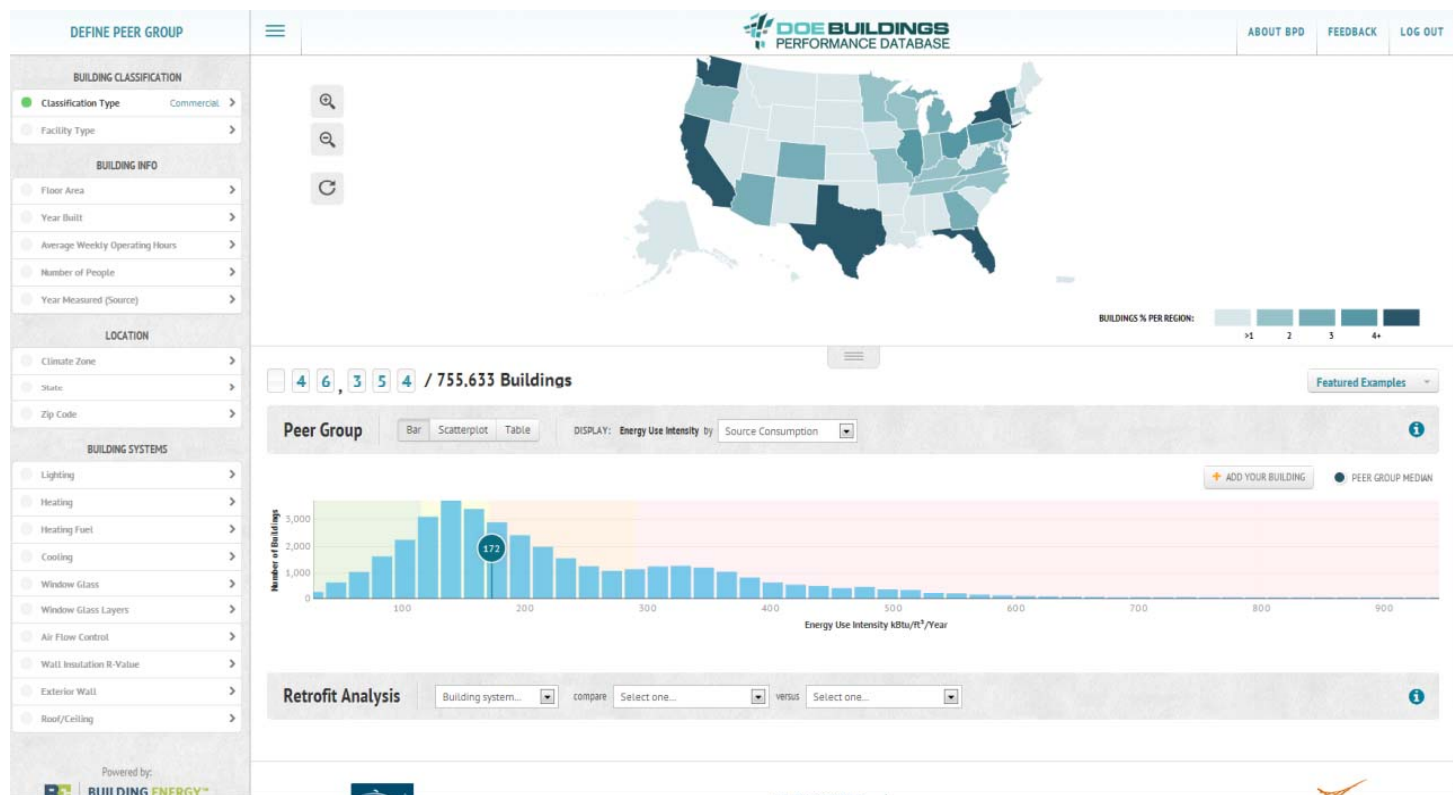
Building Performance Database

- The BPD contains *actual data* on hundreds of thousands of existing buildings -- not modeled data or anecdotal evidence.
- The BPD enables statistical analysis without revealing information about individual buildings.
- The BPD cleanses and validates data from many sources and translates it into a standard format.

<https://bpd.lbl.gov/>



Building Performance Database Analysis Application, Built on an API



Front end
powered by API



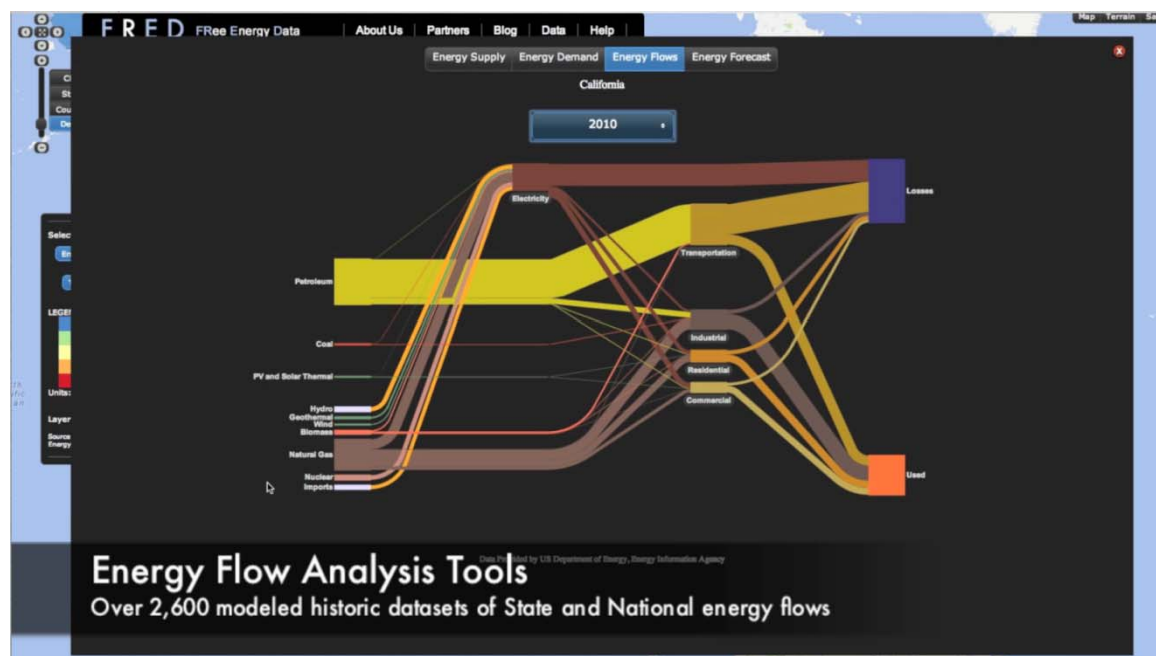
Free Energy Data – FRED

Decision Support for Energy Planners

- **FRED (Free Energy Data)** was developed by a team at PNNL, NREL, PSI, UK Climate Group and more, to help energy planners meet the challenges to make better policy decisions and help accelerate our path towards a cleaner energy future. At its heart, FRED is an open-source, on-line software providing users with simple, intuitive ways to visualize and understand masses of complex energy data from DOE EIA and many others.

<http://www.youtube.com/watch?v=K3oJESMAik0&feature=youtu.be>

- Millions of Data Records
- 50 Years of Historical Supply and Demand Data
- 25 Years of Forecast Data
- 12 Spatial Analysis Maps
- 100 Energy Supply & Demand Charts
- Over 2600 modeled energy flows.
- [http://en.openei.org/wiki/FRee_Energy_Data_\(FRED\)](http://en.openei.org/wiki/FRee_Energy_Data_(FRED))



How To Contact Me

- **Email:** robert.bectel@ee.doe.gov
- **LinkedIn:** <http://www.linkedin.com/in/rbectel>
- **Twitter:** <http://twitter.com/rbectel>
- **Phone:** 202-586-9290