



Advancing Contracting in Energy Storage (ACES):
Working Group

Technical Performance Data Standards Section

Appendix 1 Chronology and Historical Resource

**Development of Data Standards
Construction and Operations on the Smart Grid
Energy Storage**

March 25, 2019

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Short History of Data Standards for financing the construction of the Smart Grid

Data Interoperability may be the new buzzword, and to many is a new concept just being introduced, but the foundations have a rich history of individual, public and industry initiatives whose efforts have crated the foundation that makes true data interoperability possible.

Best Practice data standards for energy storage should leverage and synergize the data standards already developed by various efforts so that energy storage is not a “one off” specialty line of data, but an incorporated element of system data from design concept and financing to construction and operations.

Here are the foundations for data standards that started as silo efforts that have matured and can be synergized to enable secure and reliable data exchange across the supply chain, and throughout the ecosystem to support data driven decisions.

Construction	Data from design through construction
Energy Data	Data specific to the Smart Grid supply chain
Financial Reporting	Capital markets, banking, credit, insurance and surety
Government	Polices and regulatory requirements
Electronic Transactions	B2B Electronic commerce
Data Analytics/AI	Leveraging data to streamline administration and improve risk management.
Cyber	Data Interoperability and Data Exchange create vulnerabilities that need to be addressed and managed by anyone working with data standards.

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- 1974 [International Energy Agency](#) established
Organization for Economic Co-operation and Development
- 1981 International Electrotechnical Commission
[Technical Committee 82](#) (TC 82) established to cover solar PV energy systems.
Data standards for Energy Data
- 1989 The [Object Management Group](#) (OMG) is formed
In 2012 OMG will form a joint effort with the Enterprise Data Management
(EDM) Council to establish the Financial Industry Business Ontology (FIBO) as
an industry initiative to define financial industry terms, definitions and synonyms
using semantic web principles.
*Data standards for Financial Reporting, Data Analytics/AI and Electronic
Transactions*
- 1992 [Facility Information Council](#) (FIC) - [National Institute of Building Sciences](#)
The FIC mission was to "improve the performance of facilities over their full life-cycle
by fostering common and open standards and an integrated life-cycle information model
for the A/E/C & FM industry."
Data standards for Construction
- 1995 [Building SMART International](#) founded
Data standards for Construction
- 1998 [XBRL International](#) formed
Data standards for Financial Reporting
- 1999 [Global Compact](#) was launched in Davos
*Long Term Global Mission Statement and Action Plan
Data standards for Government*

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2000 [Surety 2000](#) formed to provide electronic surety bonds.

[ISO and Surety 2000 Corp. in Strategic Alliance to Authenticate Insurers' Surety Bonds Over the Web](#)

Data standards for Government, Construction, Financial Reporting, Data Analytics/AI and Electronic Transactions

Bid Express [E-Bidding, E-Bonding Services Team Up to Save Contractors, DOTs Time and Money](#)

Data standards for Government, Construction, Financial Reporting, Data Analytics/AI and Electronic Transactions

[XBRL announced the first specification for U.S. companies, XBRL for Financial Statements.](#)

Data standards for Government, Financial Reporting, Data Analytics/AI

2002 The Road To Better Business Information: Making A Case For XBRL

[A Conversation With Nasdaq, Microsoft and PricewaterhouseCoopers](#)

Data standards for Government, Financial Reporting and Data Analytics/AI

B612 Foundation formed by Ed Lu (Google Power Meter) to save the earth

Data Analytics/AI

2003 [Trusted and Efficient Financial Reporting](#)

Data standards for Government, Financial Reporting and Data Analytics/AI

2005 [Enterprise Data Management Council](#) (EDM Council) is formed

In 2012 OMG will form a joint effort with the Enterprise Data Management (EDM) Council to establish the Financial Industry Business Ontology (FIBO) as an industry initiative to define financial industry terms, definitions and synonyms using semantic web principles.

Data standards for Financial Reporting, Data Analytics/AI and Electronic Transactions

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CSU Chico announces the [Surety Connection Project](#) for National Prototype for Electronic Surety Transactions.

Data standards for Government, Construction, Financial Reporting, Data Analytics/AI and Electronic Transactions

G8 Summit held in Gleneagles

The Gleneagles Communique

[Climate Change, Energy and Sustainable Development](#)

Data standards for Government, Construction, Energy Data, Financial Reporting, Data Analytics/AI.

2006 [Federal Funding Accountability and Transparency Act of 2006](#) (FFATA).

Data standards for Government and Financial Reporting

[XBRL US formed](#)

Data standards for Government and Financial Reporting

2007 [Energy Independence and Security Act of 2007](#)

Created the Smart Grid Interoperability Panel

Data standards for Government, Energy Data and Data Analytics/AI

[International Energy Agency](#)

[International Standards to Develop And Promote Energy Efficiency and Renewable Energy Sources](#)

2008 [Alfred Berkley named as XBRL Chairman with the following statement:](#)

“In 2008, we’ll continue working to improve the taxonomies by bringing in more technical expertise and we’ll engage a broader spectrum of market participants to set the stage for faster adoption of the standard.”

Data standards for Government, Financial Reporting, Data Analytics/AI and Electronic Transactions

National Institute of Building Sciences - Building Smart Alliance

[agcXML Development Project](#)

Data standards for Construction and Data Analytics/AI

Electronic Transactions and Financial Reporting – Application for Payment

[PDF format becomes International Organization for Standardization \(ISO\) standard](#)

Data standards for Construction

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Environmental Protection Agency (EPA) [National Action Plan for Energy Efficiency Vision for 2025: A Framework for Change](#)

US Cyber Command established
Cyber for the Smart Grid

2009 San Francisco Mayor Gavin Newsom
[Executive Directive 09-06: Open Data Executive Directive - DataSF](#)
Data standards for Government and Data Analytics/AI

[SunSpec Alliance](#) founded
Data standards for Energy Data, Financial Reporting, Data Analytics/AI and Electronic Transactions.

[iAutomate, Surety2000 Streamline Electronic Bid Bond Data](#)
Data standards for Construction, Financial Reporting and Electronic Transactions

[Code for America](#) founded

[Google introduces Power Meter](#) to leverage data management to reduce energy use: Google's mission is to "organize the world's information and make it universally accessible and useful," and we believe **consumers have a right to detailed information about their home electricity use.** We're tackling the challenge on several fronts, from policy advocacy to developing consumer tools, and even investing in smart grid companies. We've been participating in the dialogue in Washington, DC and with public agencies in the U.S. and other parts of the world to advocate for investment in the building of a "smart grid," to bring our 1950s-era electricity grid into the digital age. Specifically, to provide both consumers and utilities with real-time energy information, homes must be equipped with advanced energy meters called "smart meters." There are currently about 40 million smart meters in use worldwide, with plans to add another 100 million in the next few years.

But deploying smart meters alone isn't enough. This needs to be coupled with a strategy to provide customers with easy access to energy information. That's why we believe that open protocols and standards should serve as the cornerstone of smart grid projects, to spur innovation, drive competition, and bring more information to consumers as the smart grid evolves. We believe that detailed data on your personal energy use belongs to you, and should be available in an open standard, non-proprietary format. You should control who gets to see your data, and you should be free to choose from a wide range of services to help you understand it and benefit from it.

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2010 [Berkeley Earth formed](#)

Data standards for Energy Data and Data Analytics/AI

[California Public Utilities Commission](#)

[California Solar Initiative \(CSI\) Research, Development, Deployment and
Demonstration](#)

[Integrated Energy Project \(IEP\) Model](#)

2011 Rep. Darrell Issa introduces the [DATA Act](#) in the House of Representatives.
Sen. Mark Warner introduces the DATA Act in the Senate.

*Data standards for Government, Financial Reporting and Data
Analytics/AI*

[U.S. Chief Technology Officer Introduces Green Button](#)

In September 2011, U.S. Chief Technology Officer, Aneesh Chopra challenged utilities across the country to develop “Green Button” a means of providing detailed **customer energy usage information available for download** in a simple, common format. Through utility industry support for Green Button, **consumers would be able to make better informed decisions about their energy consumption**. Standardizing on the data format could result in innovative applications that might transform the way people use energy.

*Data standards for Energy Data, Financial Reporting and Data
Analytics/AI*

2012 XBRL Challenge

Tracy Gateway Business Park XBRL Challenge

[Improving Access to Surety Credit for Small and Emerging Companies](#)

[Protocol for Uniformly Measuring and Expressing the Performance of Energy Storage](#)

[Systems](#) – First Edition - Pacific Northwest National Laboratory and Sandia
National Laboratories

2013 [Federal Open Data Policy](#)

Newly-generated government data is required to be made available in open, machine-readable formats, while continuing to ensure privacy and security.

Data standards for Government, Financial Reporting and Data Analytics/AI

Basel 239 Requires banks to provide data on outstanding loans for risk analysis.

Data standards for Government, Financial Reporting and Data Analytics/AI

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[Financial Industry Business Ontology \(FIBO\)](#) established
Data standards for Financial Reporting and Data Analytics/AI

XBRL 2013 2National Convention – Data Forum – [Beyond Corporate Financials](#)
Data standards for Financial Reporting and Data Analytics/AI

Energy for Future Presidents: The Science Behind the Headlines
Richard Muller – Berkeley Earth - Energy Data

2014 [Digital Accountability and Transparency Act of 2014](#) (DATA Act)
Senate and House pass the [DATA Act](#).
[Senator Mark Warner](#) and Assemblyman Darrell Issa
Data standards for financial reporting

DOE Data By Design Contest
[Construction Performance Measurement Dashboard using XBRL](#)
Data standards for Financial Reporting, Energy Data and Data Analytics/AI

Smart Grid Interoperability Panel establishes [Priority Action Plan 25](#)
*Data standards for Financial Reporting, Energy Data, Data Analytics/AI and
Electronic Transactions.*

DOE - Pacific Northwest National Laboratory - Sandia
[Codes and Standards for Energy Storage System Performance and Safety](#)
Data standards for Energy Data

Associated General Contractors of America establishes [Construction Open Standards
Alliance \(COSA\)](#)
Data standards for Construction

[The PDF Guidelines for Construction is published](#)
Data standards for Construction

Energy Efficiency Standardization Coordination Collaborative of the American National
Standards Institute (ANSI)
[Standardization Roadmap: Energy Efficiency in the Built Environment](#)
Data standards for Energy Data

State and Local Energy Efficiency Action Network
[Energy Efficiency Finance Programs: Use Case Analysis to Define Data Needs
and Guidelines](#)

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2015 Seventeen [Sustainable Development Goals](#) adopted at the [UN Sustainable Development Summit](#).

*Long Term Global Mission Statement and Action Plan
Data standards for Government*

[XBRL US Launches Pilot to Improve Surety Bond Processing through Data Standards](#)

BEDES: [Creating A Common Data Language for Building Energy Performance](#)
Data standards for Energy Data and Data Analytics/AI

[DOE SunShot Outreach - Solar Data and Informatics](#)
Data standards for Energy Data and Data Analytics/AI

[Solar Big Data and Informatics RFI -DOE SunShot](#)
Data standards for Energy Data and Data Analytics/AI

[Solar Bankability Data to Advance Transactions and access \(SB-DATA\) Funding Opportunity](#)
Data standards for Energy Data and Data Analytics/AI

United Nations Global Sustainability Index – [2015 Corporate Social Responsibility and Sustainability report](#)
Data standards for Financial Reporting and Data Analytics/AI

[Task Force on Climate-Related Financial Disclosures \(TCFD\) founded](#)
Data standards for Financial Reporting and Data Analytics/AI

[American Renewable Energy Standards and Certification Association \(ARESCA\)](#)
Data standards for Energy Data and Data Analytics/AI

[Sandia Report Precursor Report of Data Needs and Recommended Practices for PV Plant Availability, Operations and Maintenance Reporting](#)

Google launches [Project Sunroof](#)
[Google's Project Sunroof calculates solar cost](#)
YouTube: [Introducing Project Sunroof](#)
Data standards for Energy Data and Data Analytics/AI

[California Public Utilities Commission](#)
[Integrated Energy Project \(IEP\) Model](#)
[Release of IEP Model Version 2.0](#)

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2016 DOE announces \$4 Million for Projects [Launching the Orange Button Solar Energy Data Initiative](#)

Data standards for Energy Data, Construction, Government, Financial Reporting, Electronic Transactions and Data Analytics/AI

[Protocol for Uniformly Measuring and Expressing the Performance of Energy Storage Systems](#) – 2016 Update - Pacific Northwest National Laboratory and Sandia National Laboratories

Data standards for Energy Data, Financial Reporting and Data Analytics/AI

Sandia Report (Richard Baxter) – [Energy Storage Financing: A Roadmap for Accelerating Market Growth](#)

Data standards for Energy Data, Financial Reporting and Data Analytics/AI

Electric Power Research Institute Report

[Reducing Risk, Increasing Lifecycle Value: Optimizing The Photovoltaic Plant Design and Development Process](#)

Data standards for Energy Data, Financial Reporting and Data Analytics/AI

[XBRL Surety Work in Process Taxonomy](#) and [Data Standards in Surety Underwriting](#) published.

Data standards for Construction, Financial Reporting and Data Analytics/AI

World Economic Forum - [Shaping the Future of Construction -A Breakthrough in Mindset and Technology](#)

Data standards for Construction and Data Analytics/AI

United Nations Global Sustainability Index – [2016 Corporate Social Responsibility and Sustainability report](#)

Data standards for Financial Reporting and Data Analytics/AI

[United Nations Global Sustainability Index Institute](#) Foundation (UNGSII) registered

Data standards for Financial Reporting and Data Analytics/AI

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- 2017 Financial Industries Business Ontology (FIBO) - [Smart Grid Data Interoperability in Support of Surety Based Risk Management](#)

Data standards for Financial Reporting and Data Analytics/AI

[Orange Button Taxonomy Public Review](#)

Data standards for Energy Data, Construction, Government, Financial Reporting, Electronic Transactions and Data Analytics/AI

Construction Progress Coalition - [2017 Open Integration Summit Report](#)

Data standards for Energy Data, Construction, Government, Financial Reporting, Electronic Transactions and Data Analytics/AI

[Baseline to Build On](#) established

Data standards for Construction and Data Analytics/AI

United Nations Global Sustainability Index – [2017 Corporate Social Responsibility and Sustainability report](#)

Data standards for Financial Reporting and Data Analytics/AI

[AB-1223 Construction contract payments: Internet Web site posting](#)

Data standards for Construction, Government, Financial Reporting and Data Analytics/AI

National Efficiency Screening Project [National Standard Practice Manual for Assessing Cost-Effectiveness of Energy Efficiency Resources](#)

- 2018 Orange Button Translate
[Instantly translate your data into the new Orange Button data standard.](#)

Data standards for Energy Data and Data Analytics/AI

[Orange Button Solar Data Exchange](#)

Data standards for Energy Data and Data Analytics/AI

[Orange Button Implementer's Network](#)

Data standards for Energy Data and Data Analytics/AI

Construction Progress Coalition - [2018 Open Integration Summit Report](#)

Data standards for Energy Data, Construction, Government, Financial Reporting, Electronic Transactions and Data Analytics/AI

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President's Management Agenda - [Modernizing Government for the 21st Century](#)
Data standards for Government, Financial Reporting and Data Analytics/AI

[Global Covenant of Mayors for Climate & Energy](#)
[Innovate4Cities](#)

Partnership with Google and Bloomberg Philanthropies. The partnership channels Google's proprietary data and technological capabilities through GCoM's global network of cities and city networks together with Bloomberg Philanthropies' leadership on cities and climate change to drive global action at the local level.

XBRL US Comment – Department of Commerce
[Commerce Dept Cross Agency Priority Goal: Leveraging Data as a Strategic Asset](#)

United Nations Global Sustainability Index – [2018 Corporate Social Responsibility and Sustainability report](#)
Data standards for Financial Reporting and Data Analytics/AI

United Nations Global Sustainability Index - [SCR300 SDG Commitment Report - Empowering investors on both Profit and Impact](#)
Data standards for Financial Reporting and Data Analytics/AI

[Impact Event](#) during the Global Climate Action Summit
Data standards for Energy Data, Construction, Government, Financial Reporting, Electronic Transactions and Data Analytics/AI

2018 Sandia Report (Richard Baxter) – [Energy Storage Financing – Performance Impact on Project Financing](#)
Orange Button Pages 90 – 91
Data standards for Energy Data

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- 2019 Orange Button XBRL CPC [collaboration response](#) to the [U.S. Department of Energy Request for Information: Challenges and Opportunities for the American Solar Industry](#).
Data standards for Energy Data, Construction, Government, Financial Reporting, Electronic Transactions and Data Analytics/AI

[H.R.150 - Grant Reporting Efficiency and Agreements Transparency Act of 2019](#)

The purposes of this Act are to—

- (1) modernize reporting by recipients of Federal grants and cooperative agreements by creating and imposing data standards for the information that grants and cooperative agreement recipients must report to the Federal Government;
- (2) implement the recommendation by the Director of the Office of Management and Budget, under section 5(b)(6) of the Federal Funding Accountability and Transparency Act of 2006 (31 U.S.C. 6101 note), which includes the development of a “comprehensive taxonomy of standard definitions for core data elements required for managing Federal financial assistance awards”;
- (3) reduce burden and compliance costs of recipients of Federal grants and cooperative agreements by enabling technology solutions, existing or yet to be developed, by both the public and private sectors, to better manage data recipients already provide to the Federal Government; and
- (4) to strengthen oversight and management of Federal grants and cooperative agreements by agencies through consolidated collection and display of and access to open data that has been standardized, and where appropriate, transparency to the public.

[California Senate Bill 598 – Open Financial Statements Act](#) Introduced [SB598 – Open Financial Statements Act – Fact Sheet](#)

The bill would establish the Open Financial Statement Commission, consisting of 7 members appointed by the Governor.

The bill would require the commission to contract, through an open and competitive request for proposal process, with vendors possessing the necessary software development expertise to build one or more interactive extensible business reporting format (iXBRL) taxonomies suitable for public agency financial filings and create a software tool that enables a public agency to easily create iXBRL documents consistent with these taxonomies.