

Smart Grid Information Clearinghouse (SGIC)

Final Report

For the Period: Sep 01, 2009 - Aug 31, 2014

(www.sgicclearinghouse.org)

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Submitted by:

Saifur Rahman, Principal Investigator

Virginia Tech

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Executive Summary

Since the Energy Independence and Security Act of 2007 was enacted, there has been a large number of websites that discuss smart grid and relevant information, including those from government, academia, industry, private sector and regulatory. These websites collect information independently. Therefore, smart grid information was quite scattered and dispersed.

The objective of this work was to develop, populate, manage and maintain the public Smart Grid Information Clearinghouse (SGIC) web portal. The information in the SGIC website is comprehensive that includes smart grid information, research & development, demonstration projects, technical standards, costs & benefit analyses, business cases, legislation, policy & regulation, and other information on lesson learned and best practices. The content in the SGIC website is logically grouped to allow easily browse, search and sort. In addition to providing the browse and search feature, the SGIC web portal also allow users to share their smart grid information with others through our online content submission platform. The Clearinghouse web portal, therefore, serves as the first stop shop for smart grid information that collects smart grid information in a non-bias, non-promotional manner and can provide a missing link from information sources to end users and better serve users' needs. The web portal is available at www.sgicclearinghouse.org.

This report summarizes the work performed during the course of the project (September 2009 – August 2014). Section 2.0 lists SGIC Advisory Committee and User Group members. Section 3.0 discusses SGIC information architecture and web-based database application functionalities. Section 4.0 summarizes SGIC features and functionalities, including its search, browse and sort capabilities, web portal social networking, online content submission platform and security measures implemented. Section 5.0 discusses SGIC web portal contents, including smart grid 101, smart grid projects, deployment experience (i.e., use cases, lessons learned, cost-benefit analyses and business cases), in-depth information (i.e., standards, technology, cyber security, legislation, education and training and demand response), as well as international information. Section 6.0 summarizes SGIC statistics from the launch of the portal on July 07, 2010 to August 31, 2014. Section 7.0 summarizes publicly available information as a result of this work.

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1.0 Introduction

This project was a cooperative effort among the IEEE Power & Energy Society, EnerNex Corporation and Virginia Tech to design, populate, manage and maintain a public Smart Grid Information Clearinghouse (SGIC) portal. Major contents in the SGIC web portal include:

- **Smart grid 101** – which gives background about smart grid in general
- **Smart grid projects** – which archives information about smart grid projects in the United States
- **Deployment experience** – which is captured under the following topics: use cases, lessons learned, cost-benefit analyses and business cases)
- **In-depth information** – which includes smart grid standards, technologies, cyber security, legislation, education and training and demand response)
- **International smart grid projects** – which archives information about international smart grid projects from countries like the European Union, China and a like.

The project was initiated on September 01, 2009 and lasted for five years. Overall, the SGIC web portal serves as the essential gateway that connects the smart grid community to relevant sources of information that are currently scattered and distributed in the worldwide web.

2.0 Advisory Committee and User Group

The SGIC Advisory Committee and User Group were initiated at the start of the project in September 2009. Names and affiliations of the SGIC Advisory Committee members and the SGIC User Group members are provided in Sections 2.1 and 2.2, respectively. The list of Advisory Committee/User Group meetings is given in Section 2.3.

2.1 SGIC Advisory Committee Members

The SGIC Advisory Committee comprised of 14 members representing government, stakeholders and industry associations, as shown in Table 1.

Table 1. Names and affiliations of SGIC Advisory Committee members

	Name	Affiliation
1	Stacy Angel	EPA - Environment Protection Agency
2	Cynthia Brumfield	UTC - Utilities Telecom Council
3	Dan Delurey	DRCC - Demand Response Coordinating Committee
4	Chris Eisenbrey	EEl - Edison Electric Institute
5	Katherine Hamilton	GridWise Alliance
6	Eric Hsieh	NEMA - National Electrical Manufacturers Association
7	Puesh Kumar	APPA - American Public Power Association
8	Eric Lightner	DOE - US Department of Energy

9	Robin Lunt	NARUC - National Association of Regulatory Utility Commissioners
10	Bob Saint	NRECA - National Rural Electric Cooperative Association (NRECA)
11	Lisa Schwartz	RAP - The Regulatory Assistance Project
12	Matt Wakefield	EPRI - Electric Power Research Institute
13	Sandra Waldstein	FERC - Federal Energy Regulatory Commission
14	David Wollman	NIST - National Institute of Standards and Technology

2.2 SGIC User Group Members

The SGIC User Group comprised 59 members from 45 organizations, as listed in Table 2.

Table 2. Names and affiliations of SGIC User Group members

	Stakeholder Group	Name	Affiliation
1	Research Organization	Keith McAllister	Solar Center, NC State
2		Mark Johnson	FREEDM Systems Center, NC State
3		Austin Montgomery	Software Engineering Inst., Carnegie Mellon University
4		Bob Reedy	Florida Solar Energy Center, University of Central Florida
5		Keith Gossage	National Grid
6		Frank Jakob	Battelle Memorial Institute
7		David Bachus	Battelle Memorial Institute
8		Mark Davis	Battelle Memorial Institute
9		Ryan Hledik	Battelle Memorial Institute
10		Doug Mitarotonda	Battelle Memorial Institute
11	Equipment Manufacturer	Ahmad Faruqui	Brattle Group
12		Matt Wakefield	EPRI
13		Tammy Zucco	ABB
14		Ron Smith	Aclara
15		Cameron Brook	Tendrill
16	Prof & Trade Association	David Mollerstuen	Tendrill
17		John Caskey	NEMA
18		Paul Molitor	NEMA
19		Paul Pietsch	DRCC
20		Joel Hoiland	Utilimetrics
21	Consumer Advocate	Kelly Chrouser	Utilimetrics
22		Stacia Harper	Ohio Consumers' Council
23		Mark Toney	The Utility Reform Network (TURN)
24	Utility	Robert Frazier	CenterPoint Energy
25		Gene Jensen	AEP
26		Scott Osterholt	AEP
27		Mark Coleman	AEP
28		Paula Hughes	AEP
29		Randy Lowe	AEP
30		Scott Osterhold	AEP
31		Dan Rogier	AEP

32		Kevin Spainhour	Duke Energy
33		Bill Yingling	Pepco
34		Mark Godwin	Florida Power & Light
35		Phil Slack	Florida Power & Light
36	Consulting Services	Roy Ellis	Capgemini
37		Michael Groomes	Capgemini
38		David Scott	Plexus
39		Jon Previtali	Sun Edison
40		Brett Francis	Fat Spaniel
41		Robert Wilhite	KEMA
42	Standards Organization	Allan Eustis	NIST
43	Regulator	Jason Christopher	FERC
44		David Kathan	FERC
45		Lisa Schwartz	Regulatory Assistance Project (RAP)
46		Richard Sedano	Regulatory Assistance Project (RAP)
47		Jessica Bian	NERC
48		Chris Haun	NJ Board of Public Utilities
49		Michael Worden	NY Dept of Public Service
50		Karin Hieta	CA PUC
51		Rebecca Tsai-Wei Lee	CA PUC
52	Federal/state legislator	Jeff DeRouen	Kentucky government
53		Jim Gardner	Kentucky government
54		Keith Hay	NCSL
55	Environmental Group	Paul Craig	Sierra Club
56	End User	Lan Tran	Tangible
57	Media	Brett Brune	Smart Grid Today
58		Peter Behr	Climate Wire
59		Vivian Kelly	Interprose Inc.

2.3 List of SGIC Meetings

The following table summarizes SGIC Advisory Committee and User Group meetings since the project inception in September, 2009.

Table 3. List of SGIC meetings

	Meetings	Date
1	Project Kick-off Meeting	Oct 07, 2009
2	1 st Advisory Committee Meeting	Nov 07, 2009
3	1 st User Group Meeting	Dec 07, 2009
4	2 nd Advisory Committee Meeting	Mar 08, 2010
5	2 nd User Group Meeting	Mar 15, 2010
6	3 rd Advisory Committee Meeting	Jun 08, 2010
7	3 rd User Group Meeting	Jun 15, 2010
8	4 th Advisory Committee Meeting	Aug 31, 2010
9	4 th User Group Meeting	Sep 02, 2010

3.0 SGIC Information Architecture and Web-based Database Application Functionalities

In this section, SGIC information architecture and web-based database application functionalities are discussed, including: the SGIC web portal content categories and its structure (Section 3.1); the Drupal content management system, which is used to support development of the SGIC web portal (Section 3.2); the SGIC information architecture (Section 3.3), and functionalities of the SGIC web portal (Section 3.4).

3.1 SGIC Content Categories and Content Organization

3.1.1) SGIC Content

The Clearinghouse's content reflects the top-ten items derived from the discussions among representatives from various smart grid stakeholder groups during the 2nd SGIC User Group meeting on March 15, 2010. The list of the top-ten items is shown in Fig. 1.

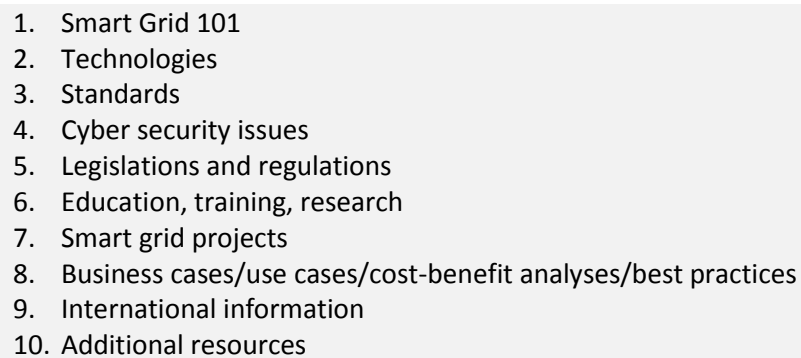
- 
1. Smart Grid 101
 2. Technologies
 3. Standards
 4. Cyber security issues
 5. Legislations and regulations
 6. Education, training, research
 7. Smart grid projects
 8. Business cases/use cases/cost-benefit analyses/best practices
 9. International information
 10. Additional resources

Fig. 1. Top-ten items that stakeholders would like to see on the Clearinghouse

3.1.2) SGIC Content Organization

The Clearinghouse sitemap shown in Table 4 was created based on the above top-ten list. The green numbers from (1) to (10) represent the top-ten items identified in Fig. 1.

- The landing page of the SGIC web portal contains the following information: contact us, smart grid stories (RSS), content submission, calendar, and frequently asked questions (FAQ).
- The top-ten items can be found in the following sections: Smart Grid 101, Projects, Deployment Experience, In-depth Information and International Information.
- There is also a special page called "MySGIC" (not shown in Table 4), which is discussed later in Section 4.4.

Table 4. SGIC site map

Landing page	Smart Grid 101	Projects	Deployment Experience	In-depth information	International Information
<ul style="list-style-type: none"> - Contact Us - Smart Grid stories - Content Submission - Calendar - FAQ 	<ul style="list-style-type: none"> - Smart Grid 101 (1) - Acronyms & Glossary - Smart Grid Resources (10) - NIST Smart Grid Conceptual Model - Consumer Awareness Programs 	<ul style="list-style-type: none"> - Map - ARRA - Others (7) 	<ul style="list-style-type: none"> - Use cases - Lessons learned - Cost-benefit analyses - Business Cases - Performance Data (8) 	<ul style="list-style-type: none"> - Cyber security (4) - Education (6) - Legislation & Regulation (5) - Standards (3) - Technologies (2) 	<ul style="list-style-type: none"> - Map - Africa - Americas - Asia - Europe - Oceania (9)

3.2 SGIC and Drupal Content Management System

3.2.1) Key Drupal Modules Used

The SGIC web portal was implemented using Drupal Content Management System (CMS) to collect the smart grid related information identified above. Drupal is a free and open-source software package, distributed under the GPL (GNU General Public License), which allows web developers to efficiently populate, manage and organize a wide variety of information on a website. In addition to several built-in functionalities available in Drupal, there are also many available add-on modules that can be downloaded freely. The key Drupal modules used in the development of the Clearinghouse web portal are summarized in Table 5.

Table 5. Key Drupal modules used in the development of SGIC web portal

Drupal Modules Used	Description
Aggregator	Aggregate syndicated content (RSS feed)
Backup and Migrate	Backup or migrate the Drupal database
Content	Allow administrators to define new content types
Content Permission	Set field-level permissions for content fields
Favorite Nodes	Allow users to manage a favorite list of contents
Frequency Asked Questions	Manage configuration of questions for a FAQ page
GMap	Display location information on Google Maps
Google Analytics	Add Google Analytic javascript tracking code to all SGIC pages
Image	Allow uploading, resizing and viewing of images
Lightbox2	Overlay images/web page on the current page
Path	Allow administrators to rename URLs
Profile	Support configurable user profiles
Search	Enable site-wide keyword search
Site Map	Display a site map
Statistics	Log access statistics for the site
Views	Create customized lists and queries from the database

3.2.2) SGIC Role-based Permissions

With Drupal, different permissions can be assigned to different users. Permissions allow us to control what users can see or do in the SGIC web portal. In SGIC, the users are classified into two main categories: Anonymous Users and Authenticated Users.

- **Anonymous Users:** This category includes anyone who visits the SGIC web portal without registering their identity. An Anonymous Users can view the SGIC main pages and all subpages, use the search engine, including advanced search and filters, browse and view public-level SGIC contents, as well as access (view) the general public forums.
- **Authenticated Users:** A person can become an authenticated user by registering with SGIC, i.e., providing some required credentials. These include a username (or email), a password, a first/last name and an email address. Once registered, Anonymous Users became Authenticated Users. Authenticated Users can be further classified into four subcategories: General Public, Advisory/User Group, Web Manager and Admin Group.
 - a) **General Public:** A person in the general public category, in addition to viewing public-level SGIC contents, can submit documents, multimedia, project information, and register smart grid-related products. They can also access MySGIC page to view their submission status, and add documents to their favorite, as well as posting comments in general public forums.
 - b) **Advisory Committee/User Group:** A person in the Advisory Committee/User Group category, in addition to the abilities listed in above, can access special forums designed for SGIC Advisory Committee and User Group members.
 - c) **Web Manager:** A SGIC web manager has the same privilege as an Advisory Committee/User Group member. In addition, the web manager can also create new content in the SGIC database and upload files to the SGIC web server.
 - d) **Admin Group:** A SGIC admin group member at Virginia Tech has the same privilege associated with a SGIC web manager with root-level access to the web server and SGIC database. This permits such activities as installation, data back up and updating the site architecture and Drupal modules.

Fig. 2 depicts a pictorial representation of the SGIC role-based permissions.

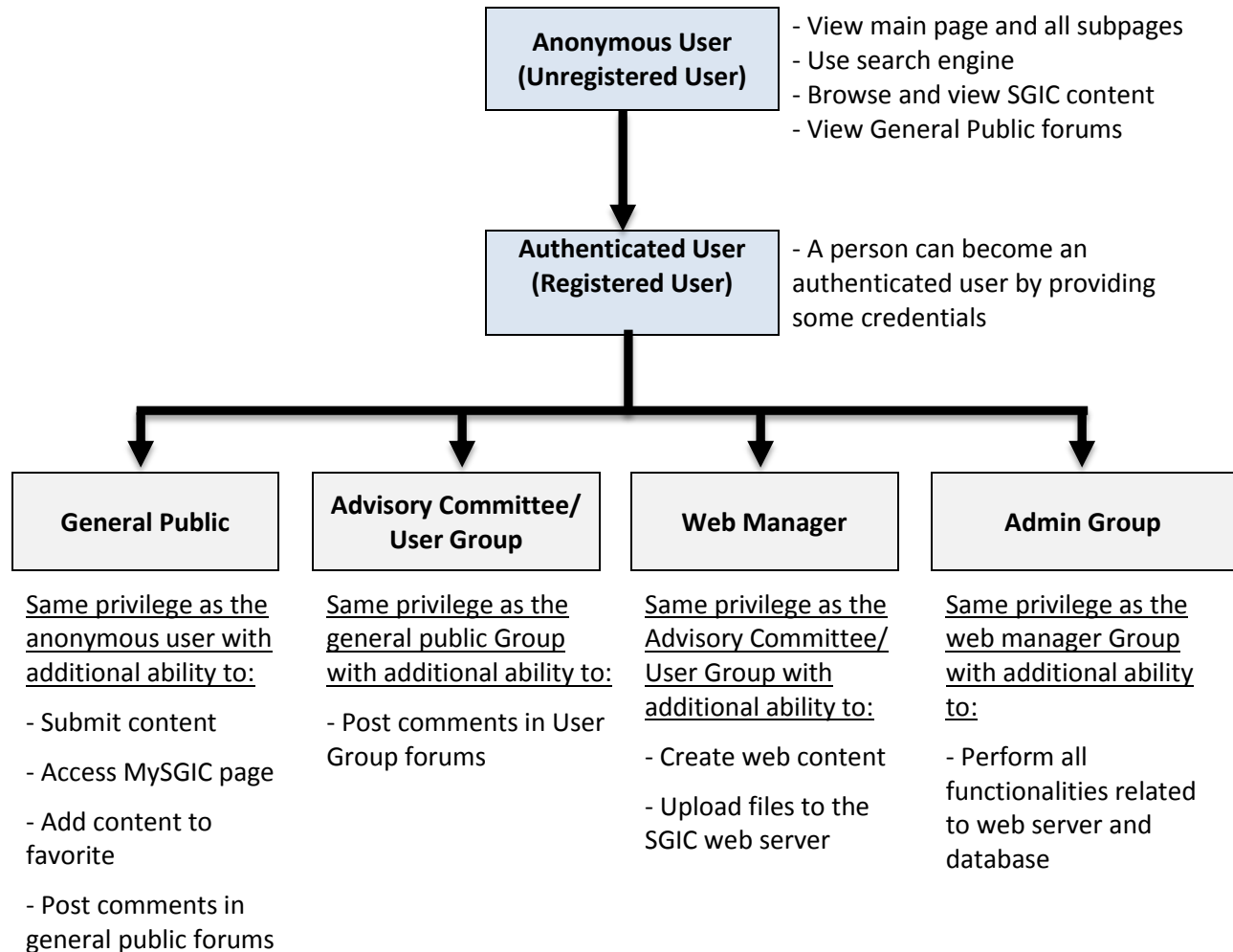


Fig. 2. Pictorial representation of SGIC role-based permissions

3.3 SGIC Information Architecture

3.3.1) SGIC Database Structure

The database for the Clearinghouse's content contains the total of 9 database tables. These database tables are summarized below.

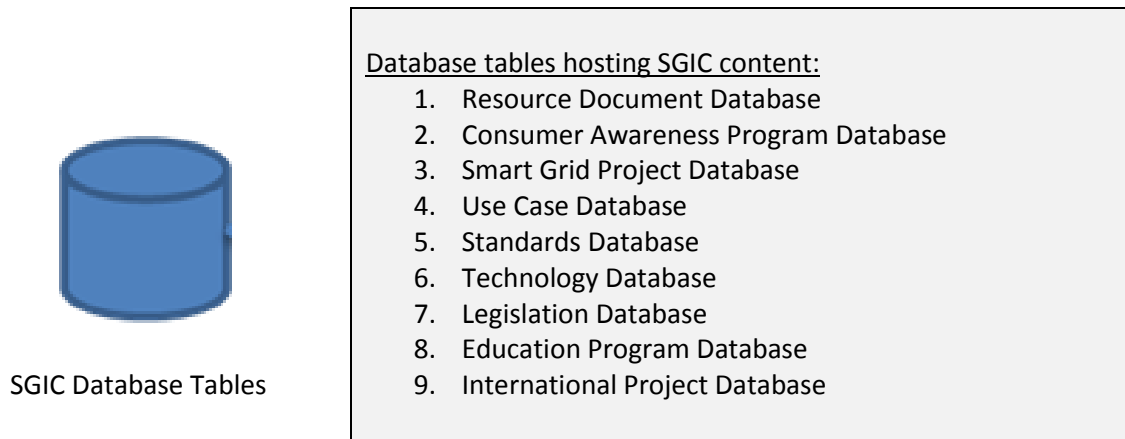


Fig. 3. SGIC database tables

Each database table is explained in detail as follows.

3.3.2) Database Table 1: Resource Document Database

For each **resource document** entry, the following information is entered into the database. Asterisks (*) indicate required fields.

- Title*	(Text field)
- Author*	(Text field)
- Year *	(Content taxonomy field)
- Abstract*	(Text field)
- Source*	(Text field)
- Smart Grid Domain*	(Content taxonomy field)
- Document Classification*	(Content taxonomy field)
- Document Type *	(Content taxonomy field)
- Document URL	(Text field)
- Library URL	(Text field)

Note:

- *Smart Grid Domain* includes Generation, Transmission, Distribution, Customer, Operations, Markets, and Service Provider.
- *Document Classification* includes 101, business case, cost-benefit analysis, demand-response related, international information, lesson learned, cyber security related, education related, legislation related, project related, standards related, technology related and use case related.
- *Document Type* includes audio presentation, book, docket, fact sheet, hearing/testimony, HTML, newsletter, report, short course, slide presentation, technical paper, webinar and white paper.

3.3.3) Database Table 2: Consumer Awareness Program Database

For each **consumer awareness program** entry, the following information is entered into the database. Asterisks (*) indicate required fields.

- Title*	(Text field)
- Organization	(Text field)
- Program Category*	(Content taxonomy field)
- State	(Content taxonomy field)
- Program Description*	(Text field)
- URL*	(Text field)

Note:

- *Program Category* includes U.S. Federal, U.S. Private Sector, State and Local Government, and State Private Sector.
- *State* includes 50 U.S. states, including Washington DC and U.S. Territories

3.3.4) Database Table 3: Smart Grid Project Database

For each **Smart Grid project** entry, the following information is entered into the Database. Asterisks (*) indicate required fields.

- Project Title*	(Text field)
- Lead Organization*	(Text field)
- Company URL*	(Text field)
- HQ City*	(Text field)
- HQ State*	(Content taxonomy field)
- Year Start*	(Content taxonomy field)
- Project Summary*	(Text field)
- Project Contact Information*	(Text field)
- Project Category*	(Content taxonomy field)
- Project URL	(Text field)
- Smartgrid.gov URL	(Text field)
- Year End	(Text field)
- No of Meters	(Text field)
- Sponsor	(Text field)
- Project HQ Latitude	(Text field)
- Project HQ Longitude	(Text field)
- Additional Information	(Text field)
- Reference	(Text field)

Note: - *Project Category* includes Advanced Metering Infrastructure, Transmission Systems, Distribution Systems, Customer Systems, Equipment Manufacturing, Integrated Systems, Regional Demonstration and Storage Demonstration.

3.3.5) Database Table 4: Use Case Database

For each **use case** entry, the following information is entered into the database. Asterisks (*) indicate required fields.

- | | |
|-------------------------|--------------------------|
| - Use Case Title* | (Text field) |
| - Abstract* | (Text field) |
| - Year* | (Content taxonomy field) |
| - Source* | (Text field) |
| - Use Case Library URL* | (Text field) |
| - Document URL* | (Text field) |
| - Smart Grid Domain* | (Content taxonomy field) |

Note: - *Smart Grid Domain* includes Generation, Transmission, Distribution, Customer, Operations, Markets, and Service Provider.

3.3.6) Database Table 5: Standards Database

For each **Standards** entry, the following information is entered into the database. Asterisks (*) indicate required fields.

- | | |
|--------------------------------|--------------------------|
| - Standard No* | (Text field) |
| - Standard Title* | (Text field) |
| - Year* | (Content taxonomy field) |
| - Brief Description* | (Text field) |
| - Smart Grid Domain* | (Content taxonomy field) |
| - Issuing Organization* | (Content taxonomy field) |
| - Link to Document at SDO Site | (Text field) |

Note:

- *Smart Grid Domain* includes Generation, Transmission, Distribution, Customer, Operations, Markets, and Service Provider.
- *Issuing Organization* includes AEIC, ANSI, DHS, IETF, NRECA, OGC, DNP, IEC, IEEE, ISO, LBL, NEMA, NERC, NIST, SAE, UCAIUG and Zigbee Alliance.

3.3.7) Database Table 6: Technology Database

For each **technology** entry, the following information is entered into the database. Asterisks (*) indicate required fields.

- | | |
|------------------------|--------------------------|
| - Technology* | (Text field) |
| - Description* | (Text field) |
| - Applications* | (Text field) |
| - Reference* | (Text field) |
| - Smart Grid Domain* | (Content taxonomy field) |
| - Key Technology Area* | (Content taxonomy field) |
| - Sample Vendors* | (Text field) |

Note:

- *Smart Grid Domain* includes Generation, Transmission, Distribution, Customer, Operations, Markets, and Service Provider.
- *Key Technology Area* includes Advanced Components, Advanced Control Methods, Sensing and Measurement, Improved Interfaces and Decision Support, and Integrated Communications.

3.3.8) Database Table 7: Legislation and Regulation Database

For each **legislation and regulation** entry, the following information is entered into the database. Asterisks (*) indicate required fields.

- Title*	(Text field)
- State*	(Content taxonomy field)
- Legislative Activities*	(Text field)
- Regulatory Activities*	(Text field)
- Utilities and Rate Schedules*	(Text field)
- State-level Incentives*	(Text field)
- Additional Resources	(Text field)
- Reference	(Text field)

Note: *State* includes 50 U.S. states, including Washington DC and U.S. Territories

3.3.9) Database Table 8: Education Program Database

For each **education program** entry, the following information is entered into the database. Asterisks (*) indicate required fields.

- Title*	(Text field)
- Organization*	(Text field)
- HQ State*	(Content taxonomy field)
- HQ City*	(Text field)
- Location*	(Content taxonomy field)
- Training Location*	(Content taxonomy field)
- Program Description*	(Text field)
- Training Level*	(Content taxonomy field)
- Program URL	(Text field)
- HQ Latitude*	(Text field)
- HQ Longitude*	(Text field)
- Program Inception	(Text field)
- Contact Information	(Text field)
- Additional Information	(Text field)

Note:

- *State* includes 50 U.S. states, including Washington DC and U.S. Territories
- *Location* includes Online, Online-Multiple, Multiple and at HQ.
- *Training Location* includes 50 U.S. states, including Washington DC and U.S. Territories
- *Training Level* includes (a) Non-degree program: training and certificate courses; (b) Degree program: community college and higher education.

3.3.10) Database Table 9: International Smart Grid Project Database

For each **international project** entry, the following information is entered into the database. Asterisks (*) indicate required fields.

- Project Title*	(Text field)
- Lead Organization*	(Text field)
- Company URL*	(Text field)
- HQ City*	(Text field)
- HQ Country*	(Content taxonomy field)
- Continent*	(Content taxonomy field)
- Project Summary*	(Text field)
- Project Contact Information*	(Text field)
- Project Category*	(Content taxonomy field)
- Project URL	(Text field)
- Year Start	(Text field)
- Year End	(Text field)
- No of Meters	(Text field)
- Sponsor	(Text field)
- Project HQ Latitude	(Text field)
- Project HQ Longitude	(Text field)
- Additional information	(Text field)
- Reference	(Text field)

Note:

- *Project Category* includes Advanced Metering Infrastructure, Transmission Systems, Distribution Systems, Customer Systems, Equipment Manufacturing, and Integrated Systems.
- *Continent* includes Africa, Americas, Asia, Europe, and Oceania.

4.0 SGIC Features and Functionalities

This section describes the SGIC web portal database application functionalities, including search capability (Section 4.1), browse and sort capability (Section 4.2), website social networking (Section 4.3), MySGIC (Section 4.4), SGIC FAQ page (Section 4.5), online content submission platform (Section 4.6), and security measures implemented (Section 4.7).

4.1 Search Capability

The SGIC team has developed the search and advanced search features. The search feature is accessible using the search box located on the top right of all SGIC pages. The advanced search feature is also available, as shown in Fig. 4. A user can search available SGIC content by content type, such as consumer awareness programs, legislative/regulatory, smart grid projects, and use case.

Home

Enter your keywords:

Search

Advanced search

Containing any of the words:

Containing the phrase:

Containing none of the words:

Only of the type(s):

- ☐ FAQ
- ☐ Smart Grid Consumer Awareness Programs
- ☐ Smart Grid Education
- ☐ Smart Grid International Projects
- ☐ Smart Grid Legislative/Regulatory
- ☐ Smart Grid Projects
- ☐ Smart Grid Related Standards
- ☐ Smart Grid Resource Library
- ☐ Smart Grid Technology
- ☐ Smart Grid Use Case

Advanced search

Fig. 4. Search capability in the SGIC portal

4.2 Browse and Sort Capability, including Categorizing, Cataloging and Displaying the Information

The SGIC team developed the browse and sort capability, including cataloging and categorizing all information collected in the SGIC database tables. This browse and sort functionality is available for all SGIC pages that are linked to the nine (9) database tables.

The table below summarizes the relationship between each SGIC page and its associated database table.

Table 6. Relationship between SGIC pages and database tables

Contents displayed on the following SGIC page...	...are extracted from the following database table.
Home >> 101 >> SGIC Resource Library <u>Note:</u> parts of the resource document database are also resources for the following pages: - Deployment Experience >> Lessons learned - Deployment Experience >> Cost-Benefit Analyses - Deployment Experience >> Business Cases - In-Depth Information >> Cyber Security	1. Resource Document Database
Home >> 101 >> Consumer Awareness Program	2. Consumer Awareness Program Database
Home >> Smart Grid Projects	3. Smart Grid Project Database
Home >> Deployment Experience >> Use Cases	4. Use Case Database
Home >> In-depth Information >> Standards	5. Standards Database
Home >> In-depth Information >> Technologies	6. Technology Database
Home >> In-depth Information >> Legislation	7. Legislation Database
Home >> In-depth Information >> Education	8. Education Program Database
Home >> International Information	9. International Project Database

For example, the table can be read as follow:

- The content displayed on the SGIC resource library page (as well as those on the lessons learned, cost-benefit analyses, business cases and cyber security pages) is extracted from the resource document database;
- The content displayed on the consumer awareness program page is extracted from the consumer awareness program database, and so on.

The ability to sort, categorize, catalog and display the information provided by SGIC is discussed in more details in Section 5.0 when each SGIC page is discussed.

4.3 Web Portal Social Networking

RSS feed and calendar & upcoming events: The team developed the SGIC social networking capabilities, including RSS feed and calendar & upcoming events. These features are available here:

- **RSS**, URL: <http://www.sgicclearinghouse.org/?q=News>

The SGIC team provides live feeds from various smart grid news sources, namely DOE News Releases, SmartMeters.com, SmartGridNews.com, IEEE Smart Grid News, TMCnet.com, EEI, GreenTechMedia and EPRI. In addition, the Clearinghouse also has its own feed that provides information about new content added to the SGIC library.

- **Calendar**, URL: <http://www.sgicclearinghouse.org/?q=Calendar>

The SGIC team provides access to smart grid event calendars from SmartGridToday.com, SmartGridNews.com and IEEE Smart Grid.

Facebook, Twitter, LinkedIn and others: all documents on the SGIC web portal can be shared through Facebook, Twitter, LinkedIn, email and others. Fig. 5 depicts social networking options provided in the portal.

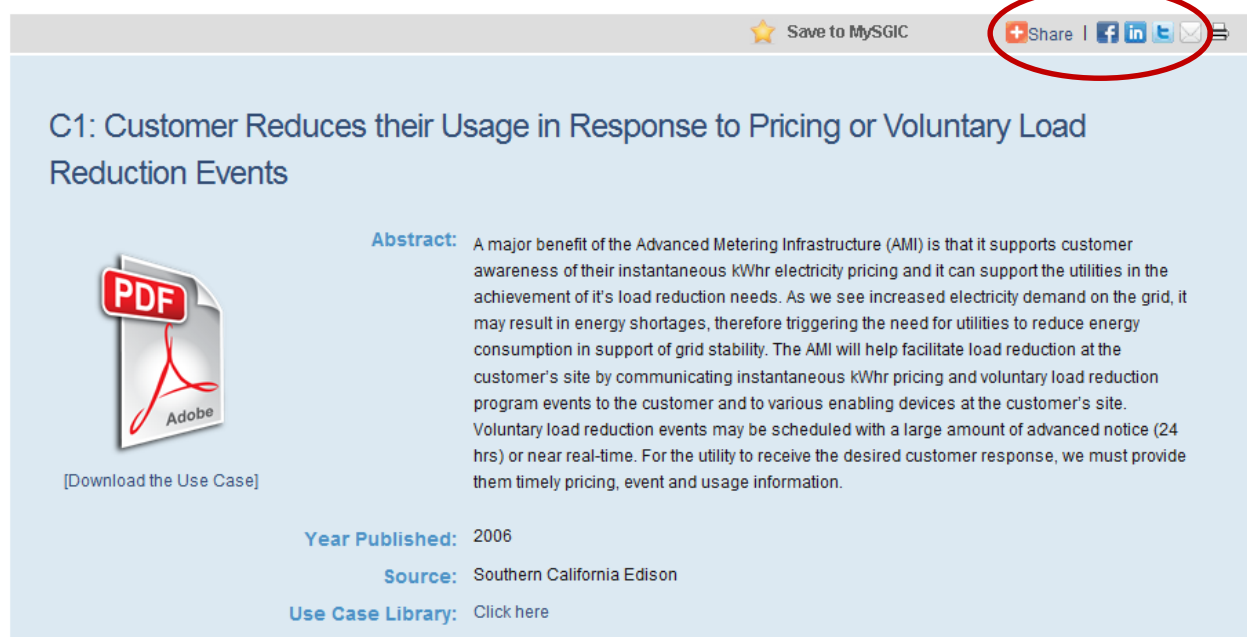


Fig. 5. Web portal social networking

4.4 MySGIC

For authenticated users, all documents available on the portal can be saved to MySGIC page. See Fig. 6. This feature allows users to create their own library of documents.



Fig. 6. Save to MySGIC/favorite

All documents saved by the user are displayed in MySGIC page. MySGIC page also contains history of content submitted by the user, as well as the status of content submission (approved or in review). See Fig. 7.

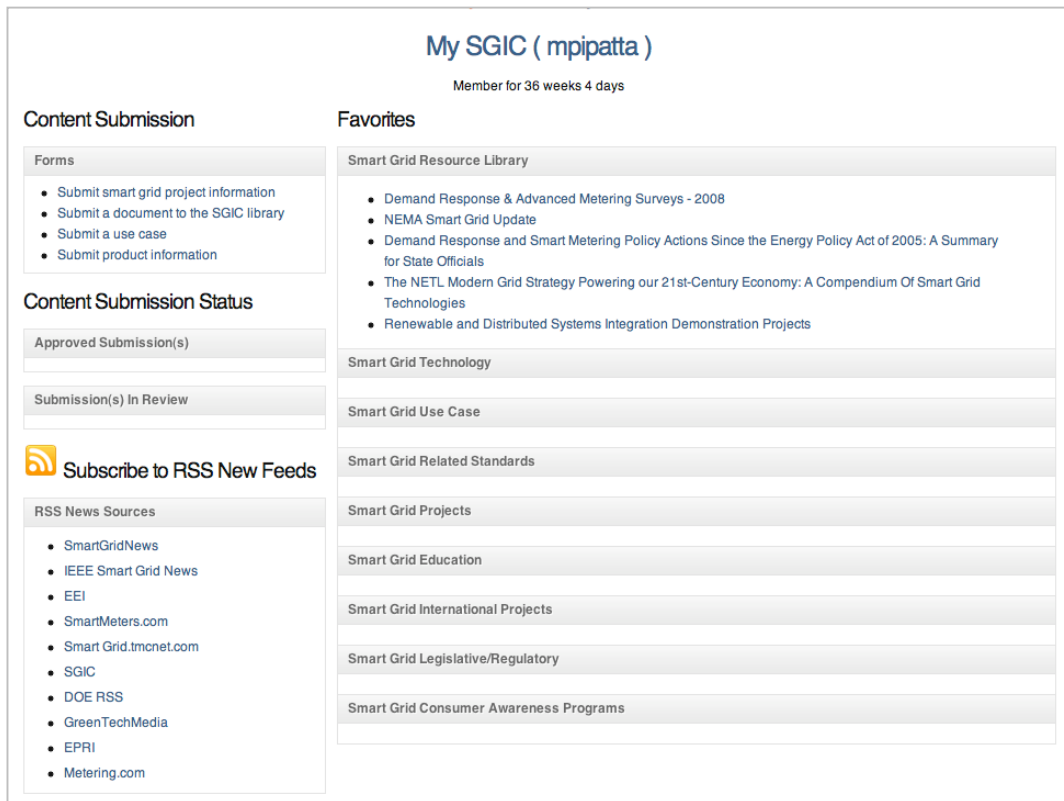


Fig. 7. MySGIC page

4.5 SGIC FAQ Page

The SGIC team created a frequently asked questions (FAQ) page based on questions and comments we received from the public during the beta testing of the site.

The FAQ page is located here: <http://www.sgicclearinghouse.org/?q=faq>.

4.6 Online Content Submission Platform

The SGIC team developed a content submission platform. Only registered users can submit content. As of August 31, 2014, registered users can submit the following information:

- Documents and multimedia (URL: <http://www.sgicclearinghouse.org/?q=node/2080>)
- Project information (URL: <http://www.sgicclearinghouse.org/?q=node/2079>)
- Product registration (URL: <http://www.sgicclearinghouse.org/?q=node/2082>)
- Use cases (link to EPRI's submission site for using the standard template)

Once the content is submitted, users can view their submission status (approved or in review) in MySGIC section.

4.7 Security Measures Implemented

The Clearinghouse was developed based on the current version of the Drupal Content Management System and supporting web applications, namely, APACHE, PHP and MySQL. As such, it is a stable and secure platform. The security measures taken were based on guidelines widely utilized by websites worldwide and were considered “Best Practices” in website security.

The following section summarizes the security measures being implemented* in the development of SGIC web portal (**with assistance from IEEE which maintains a database of over 2.7 million articles and over 5,000 document uploads per month*).

4.7.1) Secure Web Hosting

The SGIC web portal is currently hosted at DreamHost, a commercial webhosting platform with the requisite security protocols. Specifically, DreamHost has implemented “mod_security,” an open-source web application firewall module that provides protection from a range of attacks including SQL (structure query language) injection, cross-site scripting (XSS), denial of service, etc. The SGIC team enabled the mod_security module to take advantage of the available protection measures. DreamHost also has secure sockets layers (SSL) and the matching signed certificate service available for clients wishing to implement secure hosting. SSL was implemented in the SGIC web portal.

4.7.2) Regular Site Maintenance

The SGIC team performed all necessary housekeeping duties including software updates, user account management, and secure configuring of web applications. The SGIC's core system, Drupal, was regularly updated to the newly released version. Key web applications required by the Clearinghouse web portal, such as Apache server, PHP (Hypertext Preprocessor) and MySQL, were maintained and updated regularly.

4.7.3) Security related to Log-in, Access and Session Management

The Clearinghouse web portal utilized the built-in login and authentication interface provided by Drupal. For added security, the following additional features were implemented:

- Strictly enforce password type, length and strength
- Secure password recovery interface with human test, i.e., CAPTCHA
- Secure procedure for handling password retries

4.7.4) Security associated with File Uploads

For file uploads, the SGIC team has implemented the following features to ensure that the file uploaded does not contain malicious payloads and prevent their execution by:

- Only accepting files from registered users uploading via the website.
- Administering the human test, i.e., CAPTCHA
- Scanning all file uploads for viruses.
- Restricting upload to file types with certain extensions, eg., .pdf, .jpg, .gif, .csv, etc. while preventing executable files with extensions such as .exe, .bat, .pl, .sys, etc.
- Preventing files with system names and special characters from uploading
- Renaming uploaded files and storing them at a temporary staging area for moderating
- Changing permission of holding folder for uploaded files to non-executable

4.7.5) Security through Regular Backup and Recovery

As per industry standards, the SGIC team performed periodic in-house backups of both the web server and database in addition to the scheduled backup performed by the hosting provider DreamHost. Additionally, backups and printouts were made available for all configuration settings to facilitate the process during restore/recovery of the portal.

5.0 SGIC Web Portal Content

The following table summarizes the amount of contents available on the SGIC web portal by content category.

Table 7. SGIC content by category

SGIC Content Category	Number of documents
Acronyms & glossary	444
Resource library	
- 101	305
- Business cases	81
- Cost-benefit analysis	284
- Demand response related	348
- International information	169
- Lesson learned	322
- Cyber security and privacy related	240
- Education related	106
- Legislation related	194
- Project related	547
- Standards related	312
- Technology related	1138
Smart grid projects (USA)	200
Smart grid projects (International)	
- Africa	1
- Americas	2
- Asia	8
- Europe	43
- Oceania	17
Use cases	274
Standards	167
Consumer awareness programs	
- Offered by US federal government	6
- Offered by private sector and non-profit organizations	13
- Offered by state and local governments	10
- Offered by state private sector and non-profit organizations	36

5.1 SGIC Landing Page

The SGIC landing page contains links to general smart grid information for consumers, smart grid project maps and descriptions about smart grid technologies. It also provides recent smart grid stories, which are RSS feeds from relevant sources (e.g., DOE, SmartMeters.com, SmartGridNews.com, IEEE Smart Grid News, Smart Grid.tmcnet.com, Renew Grid, GreenTechMedia, and EPRI), as well as links to SGIC content submission platforms and SmartGrid.gov.

SGIC Smart Grid Information Clearinghouse LOGIN

[Home](#) [Smart Grid 101](#) [Smart Grid Projects](#) [Deployment Experience](#) [In-Depth Information](#) [International](#) [My SGIC](#) [About SGIC](#)

Demand Response Potentials

FOR CONSUMERS **SMART GRID 101** **PROJECT MAP** **TECHNOLOGIES**

SMART GRID STORIES
Two New Energy Storage Safety Reports Now Available
DOE RSS - [10/14]
Landis+Gyr Selected for Brazil Smart Grid Project
SmartMeters.com - [10/09]
[Read more...](#)

What can the Smart Grid do for me? **New to the Smart Grid? Visit our 101 page!** **Projects near you? See our map.** **What are the Smart Grid Technologies?**

EVENT CALENDAR **Content Submission Platform** **SMARTGRID.GOV**

Use case
Product registration
Document & multimedia
Consumer awareness program

Contact SGIC team
Smart grid project (U.S.)
Smart grid project (international)

Fig. 8. SGIC landing page

5.2 Smart Grid 101

The Smart Grid 101 tab contains six sub topics, including: 'Learn More', 'Acronyms', 'Resource Library', 'NIST model', 'Consumer Awareness' and 'Educational Videos'. Each topic is discussed in more details below.

5.2.1) Learn More

The 'Learn More' section allows the general public to find out more about smart grid, in terms of a general definition of a smart grid, how it works and its characteristics.

SGIC Smart Grid Information Clearinghouse LOGIN

Home Smart Grid 101 Smart Grid Projects Deployment Experience In-Depth Information International My SGIC About SGIC

Home » Smart Grid 101 » Learn More about Smart Grid

Featured

- What the Smart Grid Means to Americans
- What the Smart Grid Means to American's Future
- What the Smart Grid Means to You and the People You Serve
- What the Smart Grid Means to Our Nation's Future
- What the Smart Grid Means to You and People You Represent
- How the Smart Grid Promotes a Greener Future

Learn More Acronyms Resource Library NIST Model Consumer Awareness Educational Videos

LEARN MORE ABOUT SMART GRID...
Click here to find out more about Smart Grid and view the video.

BROWSE CONSUMER AWARENESS PROGRAMS OFFERED BY...
U.S.
States

GET INVOLVED WITH SGIC...
Click here to submit content or contact SGIC team.

Learn More about Smart Grid

- What is a Smart Grid?
- How it works?
- Characteristics of the Smart Grid
- Smart Grid Videos

What is a Smart Grid?

"Smart grid" generally refers to a class of technology people are using to bring utility electricity delivery systems into the 21st century, using computer-based remote control and automation. These systems are made possible by two-way communication technology and computer processing that has been used for decades in other industries. They are beginning to be used on electricity networks, from the power plants and wind farms all the way to the consumers of electricity in homes and businesses. They offer many benefits to utilities and consumers -- mostly seen in big improvements in energy efficiency on the electricity grid and in the energy users' homes and offices.

For a century, utility companies have had to send workers out to gather much of the data needed to provide electricity. The workers read meters, look for broken equipment and measure voltage, for example. Most of the devices utilities use to deliver electricity have yet to be automated and computerized. Now, many options and products are being made available to the electricity industry to modernize it.

The "grid" amounts to the networks that carry electricity from the plants where it is generated to consumers. The grid includes wires, substations, transformers, switches and much more.

Fig. 9. SGIC 'Learn More' page

5.2.2) Acronyms

The 'Acronyms' section contains a collection of smart grid acronyms, which can be accessed alphabetically using the left navigation bar.

SGIC Smart Grid Information Clearinghouse LOGIN

Home Smart Grid 101 Smart Grid Projects Deployment Experience In-Depth Information International My SGIC About SGIC

Home » Smart Grid 101 » Acronyms

Learn More **Acronyms** Resource Library NIST Model Consumer Awareness Educational Videos

Please use the left navigation bar to access smart grid acronyms alphabetically.

AC

Alternating Current - A type of electrical current, the direction of which is reversed at regular intervals or cycles. In the United States, the standard is 120 reversals or 60 cycles per second. *Source: DOE*

ACEEE

American Council for an Energy-Efficient Economy - A nonprofit, 501(c)(3) organization dedicated to advancing energy efficiency as a means of promoting economic prosperity, energy security, and environmental protection. ACEEE's program areas include energy policy, research, and communications. *Source: ACEEE*

ACORE

American Council on Renewable Energy - A 501(c)(3) non-profit organization based in Washington, D.C. with paying members from every aspect and sector of the renewable energy industries and their trade associations, including wind, solar, geothermal, biomass and biofuels, hydropower tidal/current energy and waste energy. With a focus on trade, finance and policy, ACORE promotes all renewable energy options for the production of electricity, hydrogen, fuels and end-use energy through publishing initiatives and publicizing strategic communications programs. *Source: ACORE*

ACSE

Association Control Service Element - The OSI method for establishing a call between two application programs. ACSE checks the identities and contexts of the application entities, and could apply an authentication security check. *Source: OnlineDictionary*

AEE

Association of Energy Engineers - A nonprofit professional society of over 13,000 members in 81 countries, founded in 1977. The mission of AEE is "to promote the scientific and educational interests of those engaged in the energy industry and to foster action for Sustainable Development." *Source: AEE*

Fig. 10. SGIC 'Acronyms' page

5.2.3) Resource Library

The 'Resource Library' section provides a searchable collection of smart grid related documents and multimedia that the SGIC team proactively acquired relevant contents, reviewed them, created a summary, as well as categorized and cataloged the information. All documents and multimedia are categorized by smart grid domains and document classification.

- *Smart Grid Domain* includes Generation, Transmission, Distribution, Customer, Operations, Markets, and Service Provider.
- *Document Classification* includes 101, business case, cost-benefit analysis, demand-response related, international information, lesson learned, cyber security related, education related, legislation related, project related, standards related, technology related and use case related.

SGIC Smart Grid Information Clearinghouse

Home Smart Grid 101 Smart Grid Projects Deployment Experience In-Depth Information International My SGIC About SGIC

Home » Smart Grid 101 » Resource Library

New Additions

- A Consumer's Guide to Plug-In Electric Vehicles
- Impact of Utility-Scale Distributed Wind on Transmission-Level System Operations
- Residential Off-Grid Solar Photovoltaic and Energy Storage Systems in Southern California
- Clustering Methods and Feeder Selection for PV System Impact Analysis
- Transforming Smart Grid Devices into Open Application Platforms
- Understanding Electric Utility Customers - 2014 Update: Review of Recent Studies
- A Case Study on Drexel Smart Campus Project
- Characterization of Radio Emissions from Advanced Metering Infrastructure Revenue Meters (Smart Meters) in CPS Energy Residential Installations
- Network Model Manager Technical Market Requirements: The Transmission Perspective
- The Integrated Grid Phase II: Development of a Benefit-Cost Framework

Learn More Acronyms **Resource Library** NIST Model Consumer Awareness Educational Videos

Resource Library

The SGIC resource library brings together smart grid related documents published by a group of trusted sources, including APPA, DOE, EEI, EPRI, FERC, GridWise Alliance, GridWise Architecture Council, IEEE, ISOs, NEMA, NERC, NIST, NRECA, electricity utilities, state public utility commissions and U.S. National Laboratories. The library also contains documents submitted by others and have been reviewed for relevance. Documents available in our resource library are in the form of audio presentation, slide presentation, technical paper, newsletter, short course, webinar, fact sheet, report or white paper. Please use the filter below to browse our resource library by smart grid domain and content category. The search results are sorted alphabetically by information source and title. The link from each document title provides a brief description and the ability to download the full document.

Filter

Smart Grid Domain <Any>

Document Classification <Any>

Document Type <Any>

Year From <Any> To <Any>

Apply

Search Results

2000 results

Title	Source	Year
A Case Study on Drexel Smart Campus Project	EPRI	2014
A Case Study on the SMUD Residential Summer Solutions Pilot Project: Sacramento Municipal Utility District Smart Grid Demonstration	EPRI	2014

Fig. 11. SGIC 'Resource Library' page

Browse and sort capability: Users can browse the documents in the resource library using the filter, which enables browsing the contents by smart grid domains, document classification and year. As shown, search results are displayed in the table format, which allow users to sort the content by Title, Source, Year and Document Type.

Display: All documents and multimedia in the resource library are displayed in lightbox, as shown below. Users can see the title, front cover, author, year, abstract and source of the document. Users can also download the document by clicking the image or the download link.

The screenshot displays a document viewer interface. At the top right, there is a 'Close' button with a red 'X' icon. Below it, a toolbar contains a star icon for 'Save to MySGIC', a '+ Share' button, and social media icons for Facebook, LinkedIn, Twitter, and Email. The main content area has a light blue background. The title 'A Systems View of the Modern Grid' is prominently displayed. Below the title is a thumbnail image of the document cover. To the right of the thumbnail, the 'Author' is listed as 'National Energy Technology Laboratory' and the 'Year' as '2007'. The 'Abstract' section follows, providing a summary of the document's content. Below the abstract, the 'Source' is listed as 'DOE - NETL'. At the bottom left, there is a '[Download the Document]' link.

A Systems View of the Modern Grid

Author: National Energy Technology Laboratory

Year: 2007

Abstract: One of the weaknesses in marshalling a coordinated approach to modernizing the electric grid has been the lack of a clear understanding of the electric system's driving forces and levers for change. With the systems view of the modern grid, the NETL Modern Grid Initiative (MGI) team has provided the framework for moving forward. The primary elements of the modern grid's systems view are described in the five major sections of this document:

- Key Success Factors – The broad goals of the modern grid.
- Performance – What the grid must do to succeed.
- Principal Characteristics – What features and functions are essential to meeting performance requirements.
- Key Technology Areas – Which technologies support the desired characteristics.
- Metrics – How progress is measured and compared to the desired level of performance, to ensure that the key success factors are ultimately achieved.

Source: DOE - NETL

[Download the Document]

Fig. 12. Detailed view for contents in the SGIC resource library

5.2.4) NIST Conceptual Model

This page defines the seven smart grid clouds: generation, transmission, distribution, customers, operations, markets and service providers.

SGIC

Smart Grid Information Clearinghouse

LOGIN

Search

[Home](#)[Smart Grid 101](#)[Smart Grid Projects](#)[Deployment Experience](#)[In-Depth Information](#)[International](#)[My SGIC](#)[About SGIC](#)

Home » Smart Grid 101 » NIST Conceptual Model

Related Document(s):

- NIST Framework and Roadmap for Smart Grid Interoperability Standards Release 1.0 (Draft), Sep 2009

[Learn More](#)[Acronyms](#)[Resource Library](#)[NIST Model](#)[Consumer Awareness](#)[Educational Videos](#)

NIST Smart Grid Conceptual Model

Under the Energy Independence and Security Act (EISA) of 2007, the National Institute of Standards and Technology (NIST) has "primary responsibility to coordinate development of a framework that includes protocols and model standards for information management to achieve interoperability of smart grid devices and systems...". See: www.nist.gov/smartgrid/.

NIST has been tasked with building on work that has been previously done within the private and public sectors to create framework using a systems approach to be flexible, uniform and technology-neutral, because no single technology developed will be able to satisfy all requirements for the smart grid. By building a framework based on possible application scenarios a robust model develops, the first release, a high-level conceptual reference model for the Smart Grid, "NIST Framework and Roadmap for Smart Grid Interoperability Standards, Release 1.0".

The NIST Conceptual Reference Model is descriptive, and is intended to be high-level. The NIST conceptual Model can serve as a tool for identifying actors and possible communication paths in the Smart Grid. The figure below provides a high-level grouping of what NIST has deemed as the smart grid domain. The seven Domains in the Smart Grid Conceptual Model include: customers, markets, service providers, operations, bulk generation, transmission and distribution.

Seven smart grid domain in the NIST Conceptual Model:



Fig. 13. SGIC 'NIST Conceptual Model' page

5.2.5) Consumer Awareness

This page provides information about various awareness programs offered by federal and state agencies, as well as those provided by the private sector.

SGIC Smart Grid Information Clearinghouse

LOGIN

Search

Home Smart Grid 101 Smart Grid Projects Deployment Experience In-Depth Information International My SGIC About SGIC

Home » Smart Grid 101 » Consumer Awareness

Featured

- What the Smart Grid Means to Americans
- What the Smart Grid Means to American's Future
- What the Smart Grid Means to You and the People You Serve
- What the Smart Grid Means to Our Nation's Future
- What the Smart Grid Means to You and People You Represent
- How the Smart Grid Promotes a Greener Future

Learn More Acronyms Resource Library NIST Model **Consumer Awareness** Educational Videos

LEARN MORE ABOUT SMARTGRID...
Click here to find out more about Smart Grid and view the video.

BROWSE CONSUMER AWARENESS PROGRAMS OFFERED BY...

- U.S.
- States

GET INVOLVED WITH SGIC...
Click here to submit content or contact SGIC team.

Consumer Awareness Programs

A grid is a network that brings electricity from power stations to consumers. New technologies allow power companies to adjust electrical loads of residential users based on their specific needs - this is called a "smart grid." Smart grid helps consumers to be better informed about their electricity usage and allows electric utility companies to serve customer demand in the most efficient way.

For example, during a hot summer afternoon when AC units are running at full capacity, the smart grid can send information to recalibrate other loads, which helps to alleviate stress on the system as a whole. The Smart Grid Information Clearinghouse (SGIC) is a web portal dedicated to being a comprehensive resource for consumers. Below are various awareness programs offered by federal and state agencies, as well as those provided by the private sector.

- U.S.**
 - Federal Government
 - Private Sector and Non-profit Organizations
- States**
 - State and Local Governments
 - State Private Sector and Non-profit Organizations

Fig. 14. SGIC 'Consumer Awareness' page

5.2.6) Educational Videos

This page hosts educational videos produced by NEMA, "Vids 4 Grids: New Media for the New Energy Workforce" – a series of short videos that demonstrate Smart Grid equipment, explain electrical engineering concepts, and portray careers in electrical manufacturing.

The screenshot shows the SGIC (Smart Grid Information Clearinghouse) website. The header features the SGIC logo in large orange letters, the text "Smart Grid Information Clearinghouse", a "LOGIN" link, and a search bar. Below the header is a navigation menu with links: Home, Smart Grid 101, Smart Grid Projects, Deployment Experience, In-Depth Information, International, My SGIC, and About SGIC. The main content area is titled "Home » Smart Grid 101 » Educational Videos". On the left, there is a "Featured" sidebar with six video thumbnails and titles: "What the Smart Grid Means to Americans", "What the Smart Grid Means to American's Future", "What the Smart Grid Means to You and the People You Serve", "What the Smart Grid Means to Our Nation's Future", "What the Smart Grid Means to You and People You Represent", and "How the Smart Grid Promotes a Greener Future". The main content area has a sub-navigation bar with links: Learn More, Acronyms, Resource Library, NIST Model, Consumer Awareness, and Educational Videos (which is highlighted). Below this is the "Educational Videos" section. It contains a paragraph explaining that the page hosts educational videos produced by NEMA, "Vids 4 Grids: New Media for the New Energy Workforce". It also includes a disclaimer: "Disclaimer: The SGIC portal does not endorse any companies or products mentioned in the videos." Below the disclaimer is the "Dynamic Line Ratings" section. It includes a "Posted date: Aug 30, 2011" and a "Description" paragraph explaining the importance of dynamic line ratings for transmission capacity. At the bottom of this section is a video player titled "Dynamic Line Ratings" showing a man in a blue shirt speaking in front of a large screen displaying a grid map.

Fig. 15. SGIC 'Consumer Awareness' page

5.3 Smart Grid Projects

Categorizing and Cataloging the Content: The SGIC team proactively searches for smart grid projects both ARRA and non-ARRA funded projects. The team reviews and creates the project summary. All project entries are categorized by project category.

- *Project Category* includes Advanced Metering Infrastructure, Transmission Systems, Distribution Systems, Customer Systems, Equipment Manufacturing, Integrated Systems, Regional Demonstration and Storage Demonstration.

Browse and sort capability: Project database is displayed in various formats including the map view (see Fig. 16) and the list view (see Fig. 17).

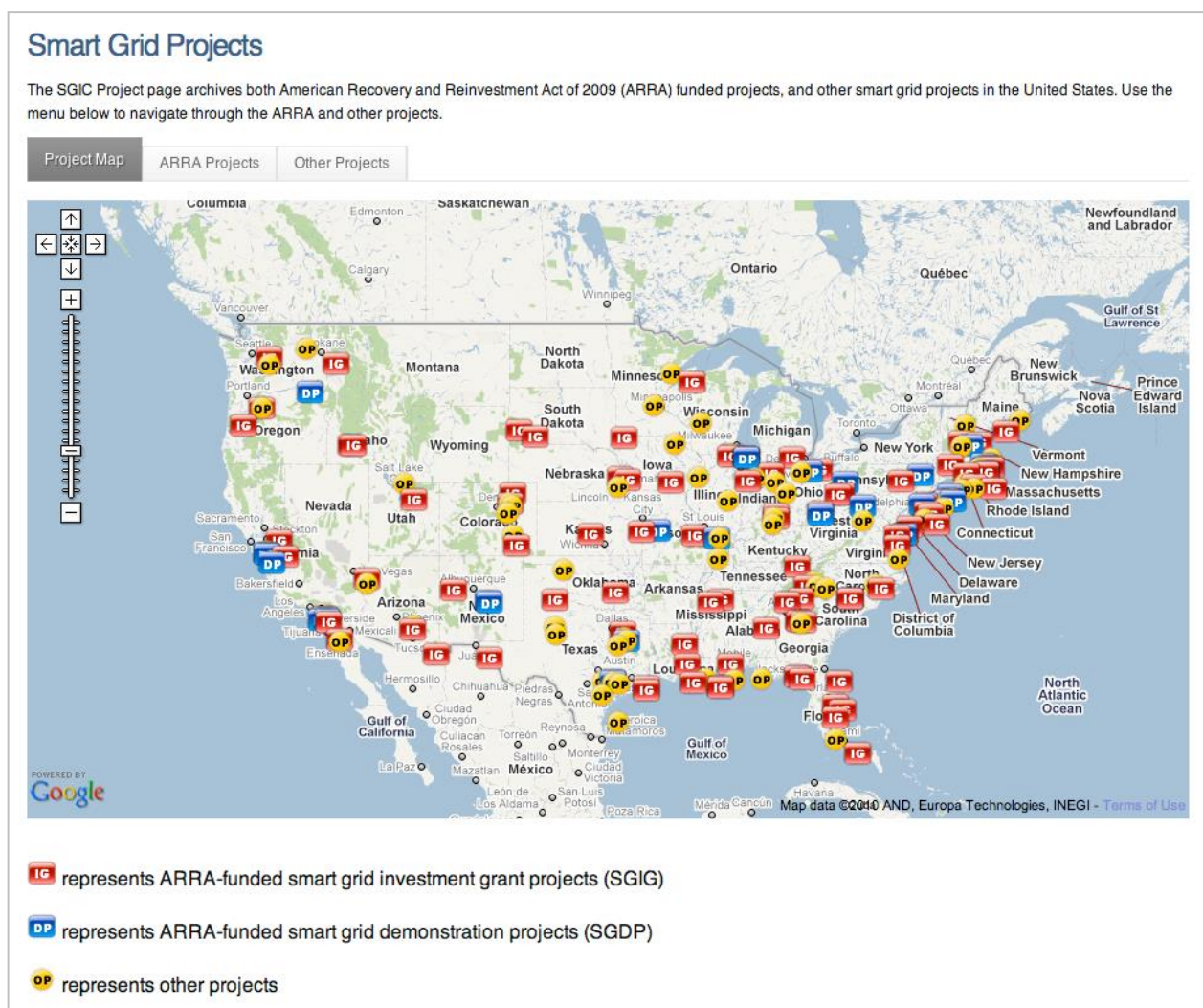


Fig. 16. Map view

The list view allows users to browse the projects by state and by project category. As shown in Fig. 17, search results are in the table format, which allow users to conveniently sort the projects by Project Title, Lead Organization, HQ City and HQ State.

The screenshot displays the 'ARRA Funded Projects' page. On the left is a sidebar titled 'Related Resources on Smart Grid Projects' containing a list of links. The main content area has a header with three tabs: 'Project Map', 'ARRA Projects' (selected), and 'Other Projects'. Below the header, the title 'ARRA Funded Projects' is followed by a descriptive paragraph. A 'Browse Smart Grid Projects' section contains a filter box with dropdowns for 'State' and 'ARRA Project Category', both set to '<Any>', and an 'Apply' button. Below the filter is a 'Search Results' section showing '132 results' and a table of project data.

Project Title	Lead Organization	HQ City	HQ State
44 Tech Inc. Smart Grid Storage Demonstration Project	44 Tech Inc.	Pittsburgh	Pennsylvania
ALLETE Inc., d/b/a Minnesota Power Smart Grid Project	ALLETE Inc., d/b/a Minnesota Power	Duluth	Minnesota
Amber Kinetics, Inc. Smart Grid Storage Demonstration Project	Amber Kinetics, Inc.	Fremont	California
American Transmission Company LLC II Smart Grid Project	American Transmission Company LLC	Waukesha	Wisconsin
American Transmission Company LLC Smart Grid Project	American Transmission Company LLC	Waukesha	Wisconsin
Atlantic City Electric Company Smart Grid Project	Atlantic City Electric Company	Mays Landing	New Jersey

Fig. 17. Browse and sort features for the SGIC project page (list view)

Display: All projects are displayed in lightbox, as shown below. Users can see the title, project map, lead organization, HQ location, project contact information, project category, project summary and additional information. The project URL, if available, will also be displayed.

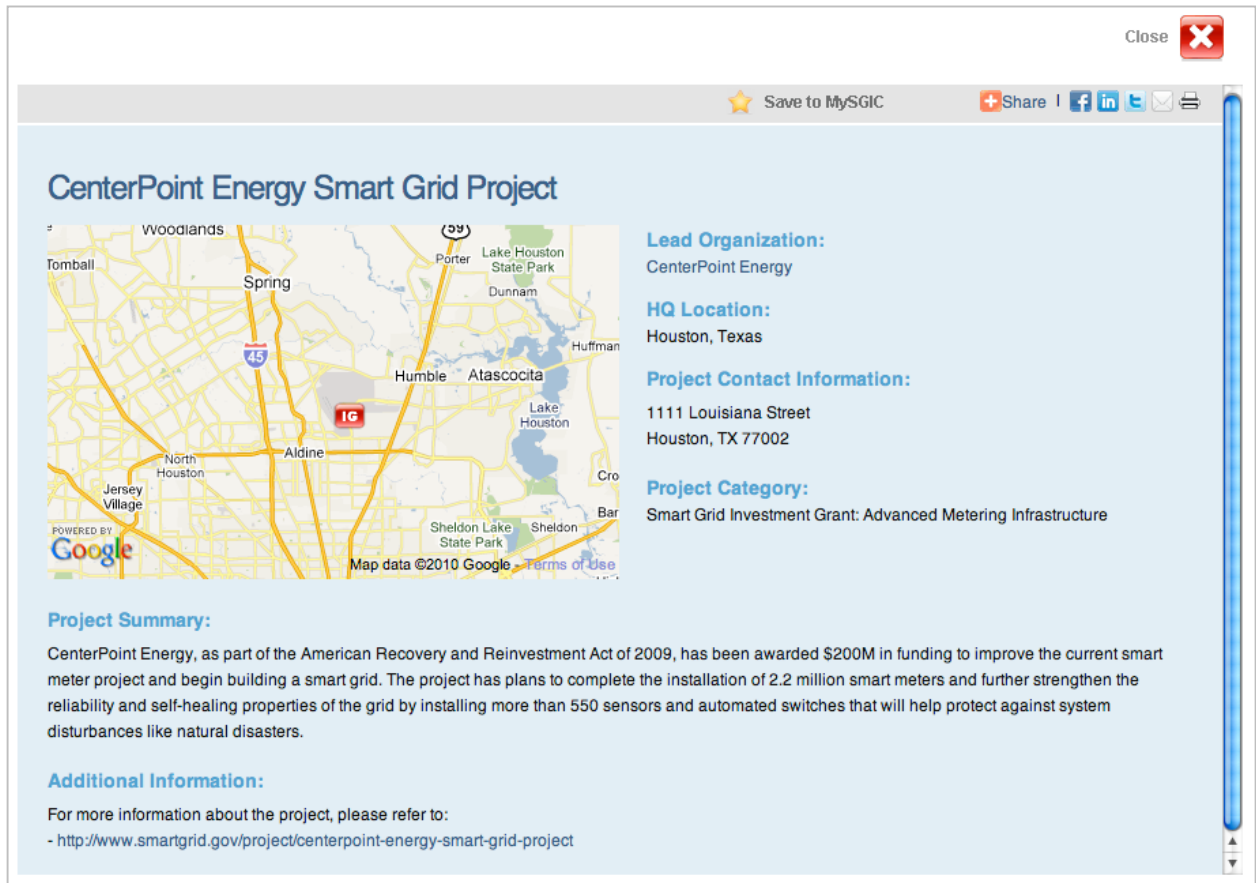


Fig. 18. Detailed view for contents in the smart grid project database

5.4 Deployment Experience

The Deployment Experience tab contains four sub topics, including: 'Use Cases', 'Lessons Learned', 'Cost-Benefit Analyses', and 'Business Cases'. Each topic is discussed in more details below.

5.4.1) Use Cases

Use Cases are the description of smart grid applications that defines the important actors, systems and technologies, and their requirements that are part of the smart grid applications. SGIC web portal provides links and synopses to available smart grid-related Use Cases from trusted sources, such as EPRI Intelligrid and Southern California Edison (SCE).

Use Cases

Lessons Learned

Cost-benefit Analyses

Business Cases

Performance Data

Related Resources on Use Cases

- PNM/EPRI Smart Grid Demonstration High-Penetration Photovoltaics through Grid Automation, Energy Storage and Demand Response - 2009 Oct.
- Design and Operation of an Open, Interoperable Automated Demand Response Infrastructure for Commercial Buildings
- Architecture Concepts and Technical Issues for an Open, Interoperable Automated Demand Response Infrastructure
- Reference Model for Control and Automation Systems in Electrical Power
- NISTIR 7628 Draft 1 - Smart Grid Cyber Security Strategy and Requirements
- JCP&L/FirstEnergy EPRI Demonstration Host Site Project - 2009 Oct.
- JCP&L/FirstEnergy EPRI Demonstration Host Site Project - 2009 Jun.
- Smart Grid Demonstrations - Contributing to Industry Standards and Interoperability

Deployment Experience: Use Cases

Use Cases are the descriptions of smart grid applications that define the important actors, systems and technologies, and their requirements that are part of the smart grid applications. The Smart Grid Information Clearinghouse (SGIC) provides links and synopses to available smart grid-related Use Cases from trusted sources, such as EPRI Intelligrid and Southern California Edison (SCE). Use the tool below to browse available Use Cases by smart grid domain and year. The search results are sorted alphabetically by information source and title. The link from each Use Case title provides a brief description and the ability to download the full document.

Please note that all Use Cases available in the Clearinghouse are subject to Terms and Conditions set forth by the original repository owners, i.e. EPRI and SCE.

Filter

Smart Grid Domain

<Any>

Year From

1980

To

2010

Apply

Search Results

203 results

Title	Source	Year
Adaptive Transmission Line Protection	EPRI Use Case Repository	2010
Advanced Distribution Automation with DER Function	EPRI Use Case Repository	2010
AGC Frequency Control	EPRI Use Case Repository	2010
Alarm Management	EPRI Use Case Repository	2010

Fig. 19. Browse and sort features for the SGIC use case page

Categorizing and Cataloging the Content: For each use cases, the SGIC team created a summary, as well as categorized and cataloged the information. All use cases were categorized by smart grid domains.

- *Smart Grid Domain* includes Generation, Transmission, Distribution, Customer, Operations, Markets, and Service Provider.

Browse and sort capability: Users can browse use cases using the filter, which enables browsing by smart grid domain and year. As shown at the bottom of Fig. 19, search results are provided in the table format, which allow users to sort the available use cases by Title, Source, and Year.

Display: All use cases are displayed in lightbox, as shown in Fig. 20. Users can see the title, abstract, year published, source and link to original use case library. Users can also download the use case document by clicking the image or the download link.

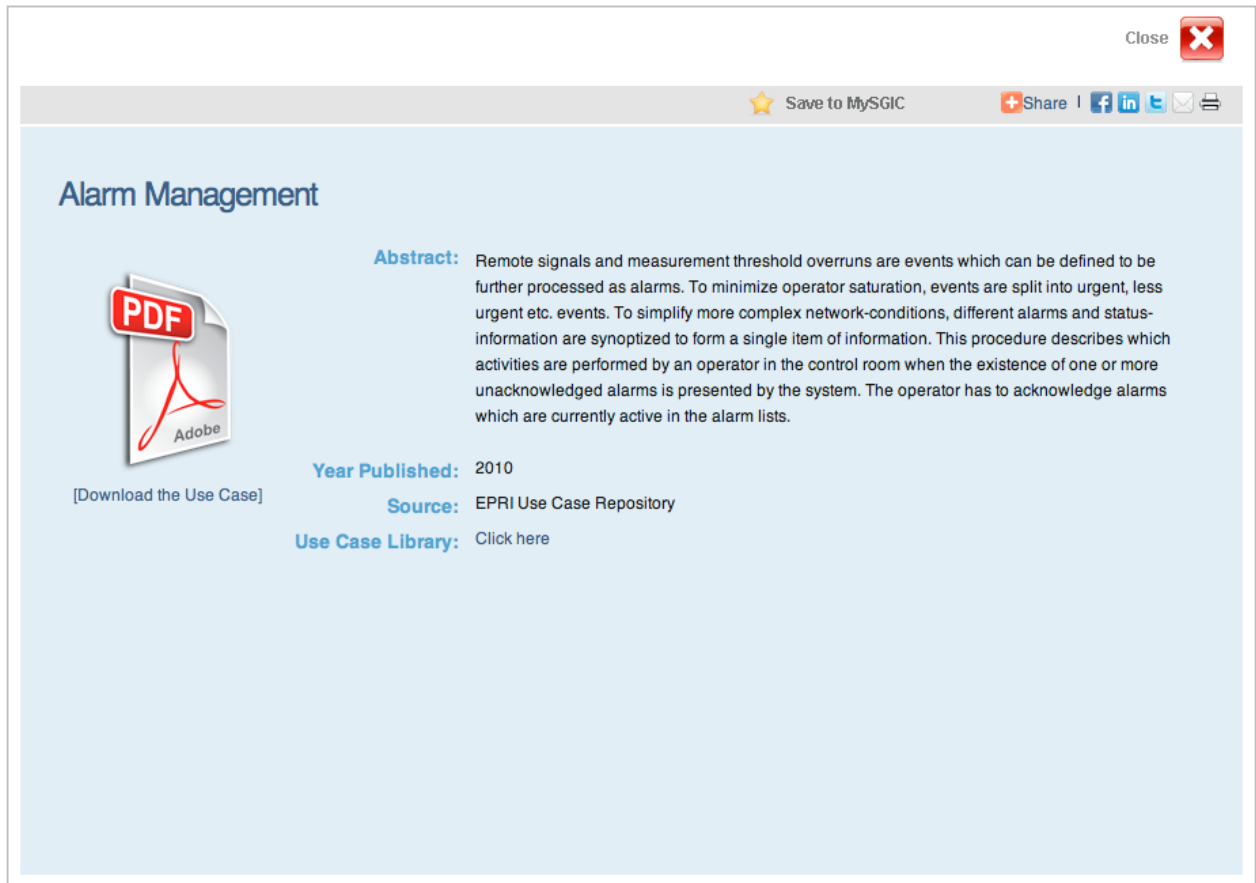


Fig. 20. Detailed view for contents in the use case database

5.4.2) Lessons Learned

Lessons Learned documents were collected from the group of trusted sources to provide information on field experience. This information includes "best practices" and "faults and fixes" that can provide experience, guidelines, and pointers from past and present deployment of smart grid technology. Lessons learned documents were categorized by smart grid domain (i.e., Generation, Transmission, Distribution, Customer, Operations, Markets, and Service Provider), document type (e.g., audio presentation, book, report, slide presentation, etc.) and year. The search results are sortable alphabetically by title, information source, year and document type. The link from each title provides a brief description and the ability to download the full document.

Use Cases

Lessons Learned

Cost-Benefit Analyses

Business Cases

Deployment Experience: Lessons Learned

The Smart Grid Information Clearinghouse (SGIC) collects Lessons Learned from the group of trusted sources to provide information on field experience. This information includes "best practices" and "faults and fixes" that can provide experience, guidelines, and pointers from past and present deployment of Smart Grid technology. Use the tool below to browse available Lessons Learned by smart grid domain and year. The search results are sorted alphabetically by information source and title. The link from each title provides a brief description and the ability to download the full document.

Filter

Smart Grid Domain

<Any>

Document Type

<Any>

Year From

<Any>

To

<Any>

Apply

Search Results

322 results

Title	Source	Year	Document Type
Program Impact Evaluation of the 2004 SCE EnergySmart Thermostat Program	SCE	2005	Report
2005 Smart Thermostat Program Impact Evaluation	SDG&E	2005	Report
2007 Energy Watch and Time-of-Day Programs Annual Report	Idaho Power	2008	Report
2010 Load Impact Evaluation for Pacific Gas and Electric Company's Smart AC Program	Freeman, Sullivan & Co.	2011	Report
2010 Smart Grid System Report: Report to Congress, February 2012	Energy.gov	2012	Report

Fig. 21. Browse and sort features for the SGIC lessons learned page

5.4.3) Cost-Benefit Analyses

Cost-Benefit Analyses documents were collected from the group of trusted sources. Similar to lessons learned documents, cost-benefit analyses documents were categorized by smart grid domain (i.e., Generation, Transmission, Distribution, Customer, Operations, Markets, and Service Provider), document type (e.g., audio presentation, book, report, slide presentation, etc.) and year.

5.4.4) Business Cases

Business Cases were collected from the group of trusted sources to capture the logic behind moving forward on a smart grid project. Business Cases provide the justification for supporting a business need. Similar to lessons learned documents, the SGIC team created a summary, categorized and cataloged all

business cases documents by smart grid domain (i.e., Generation, Transmission, Distribution, Customer, Operations, Markets, and Service Provider), document type (e.g., audio presentation, book, report, slide presentation, etc.) and year.

5.5 In-Depth Information

The in-depth information tab contains six sub topics, including: ‘Standards’, ‘Technologies’, ‘Cyber Security’, ‘Legislation’, ‘Education and Training’ and ‘Demand Response’. Each topic is discussed in more details below.

5.5.1) Standards

The SGIC standards page provides information and links to smart grid-related standards from various Standards Development Organizations (SDOs).

Categorizing and Cataloging the Content: The SGIC team proactively searched for smart grid related standards, created a summary, categorized and cataloged the information. All standards were categorized by smart grid domains, and issuing organizations.

- *Smart Grid Domain* includes Generation, Transmission, Distribution, Customer, Operations, Markets, and Service Provider.
- *Issuing Organization* includes AEIC, ANSI, DHS, IETF, NRECA, OGC, DNP, IEC, IEEE, ISO, LBL, NEMA, NERC, NIST, SAE, UCAIUG and Zigbee Alliance.

Browse and sort capability: Users can browse standards using the filter provided, as shown in Fig. 22. The filter enables browsing the contents by smart grid domains, issuing organizations, and year. As shown at the bottom of Fig. 22, search results are in the table format, which allow users to sort the standards by Number, Title, Issuing Organization and Year.

Display: All standards are displayed in lightbox, as shown in Fig. 23. Users can see the standard number, title, year, brief description, issuing organization, standard information details, and issuing organization’s logo. Users can click the image or the link to go to the standards page available at the issuing organization’s site.

Standards
Technologies
Cyber Security
Legislation and Regulation
Education

Related Resources on Standards

- Rest of World Standards Activities
- Demonstrating the Capacity Benefits of Dynamic Ratings in Smarter Distribution Networks
- Smart Grid Technology Integration
- Decreased Time Delay and Security Enhancement Recommendations for AMI
- Linking Continuous Energy Management and Open Automated Demand Response
- Phase 1 Results: Establish the Value of Demand Response - Appendix
- Scenarios for Consuming Standardized Automated Demand Response Signals
- Demand Response and Advanced Metering Infrastructure in California: A Problem, a Solution, and a Program
- Benefits of Demand Response in Electricity Markets and Recommendations for

Smart Grid Related Standards

Please use the tool below to browse standards from various issuing organizations that have been identified to be relevant to smart grid. These standards can be browsed by smart grid domain, issuing organization, and year. The search results are sorted alphabetically by issuing organization. The link from each standard number provides a brief description and standard information detail.

Browse Standards

Filter

Smart Grid Domain

<Any>

Issuing Organization

<Any>

Year From

1980

To

2010

Note

☒ All
☐ List of standards identified by NIST

Apply

Search Results

119 results

Number	Title	Issuing Org	Year Published
AEIC Guidelines v2.0	SmartGrid/AEIC AMI Interoperability Standard Guidelines for ANSI C12.19 End Device Communications and Supporting Enterprise Devices, Networks and Related Accessories	AEIC	2010


Fig. 22. Browse and sort features for the SGIC standards page

Close

Save to MySGIC
Share

ANSI C12.1-2008

American National Standard for Electric Meters Code for Electricity Metering



[Link to the Document at SDO site]

Number:

ANSI C12.1-2008

Standard:

American National Standard for Electric Meters Code for Electricity Metering

Year:

2008

Brief Description:

ANSI C12.1-2008 establishes acceptable performance criteria for new types of AC watt-hour meters, demand meters, demand registers, pulse devices and auxiliary devices. It describes acceptable in-service performance levels for meters and devices used in revenue metering.

Issuing Organization:

ANSI

Download:

Standard Information Detail

Fig. 23. Detailed view for contents in the standards database

5.5.2) Technology

The SGIC technology page provides examples of smart grid technologies grouped into five key technology areas: integrated communications, sensing and measurement, advanced components, advanced control methods and interfaces and decision support.

Categorizing and Cataloging the Content: The SGIC team proactively searched for smart grid related technologies, created a summary, categorized and cataloged the information. All technologies are categorized by key technology areas.

- *Key Technology Area* includes Advanced Components, Advanced Control Methods, Sensing and Measurement, Improved Interfaces and Decision Support, and Integrated Communications.

Browse and sort capability: Users can browse technologies using the filter provided, as shown in Fig. 24. The filter enables browsing the contents by key technology areas.

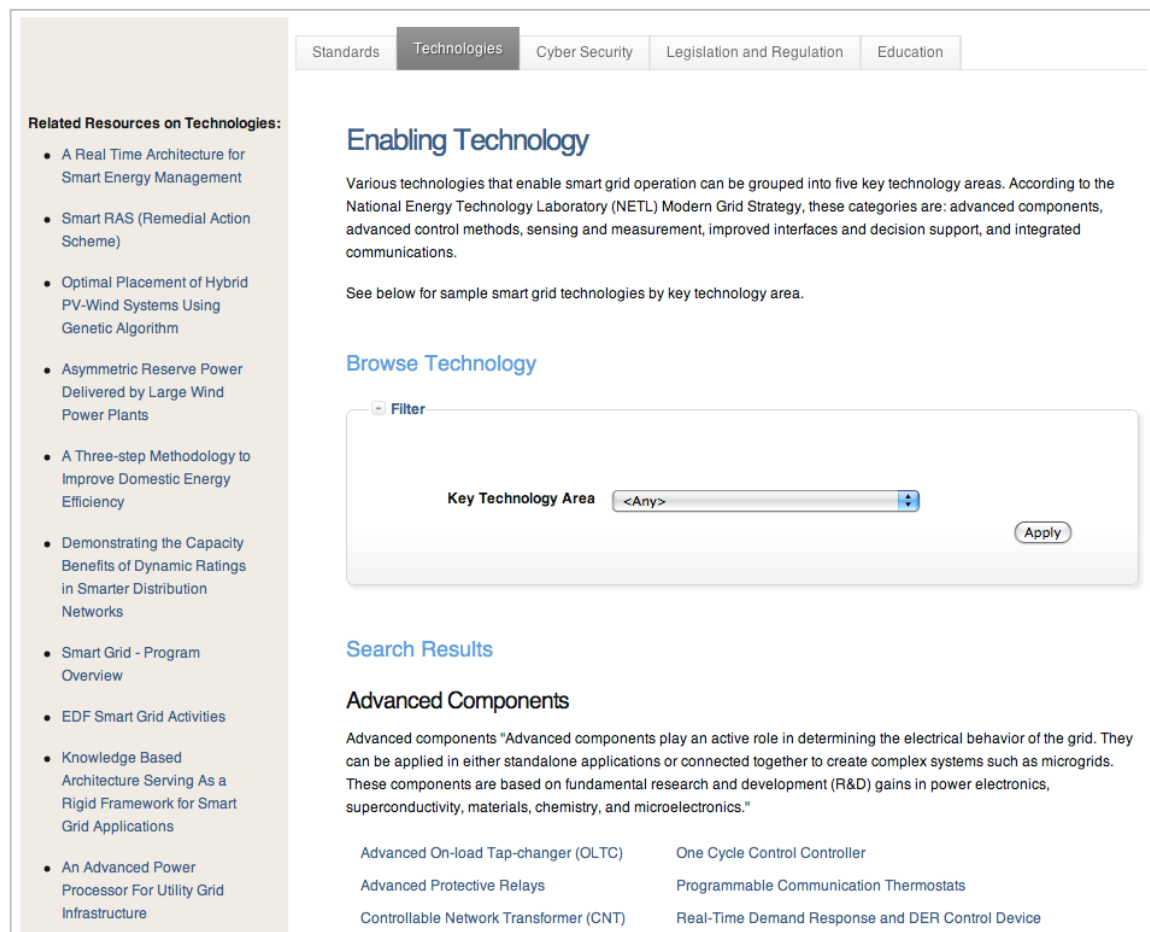
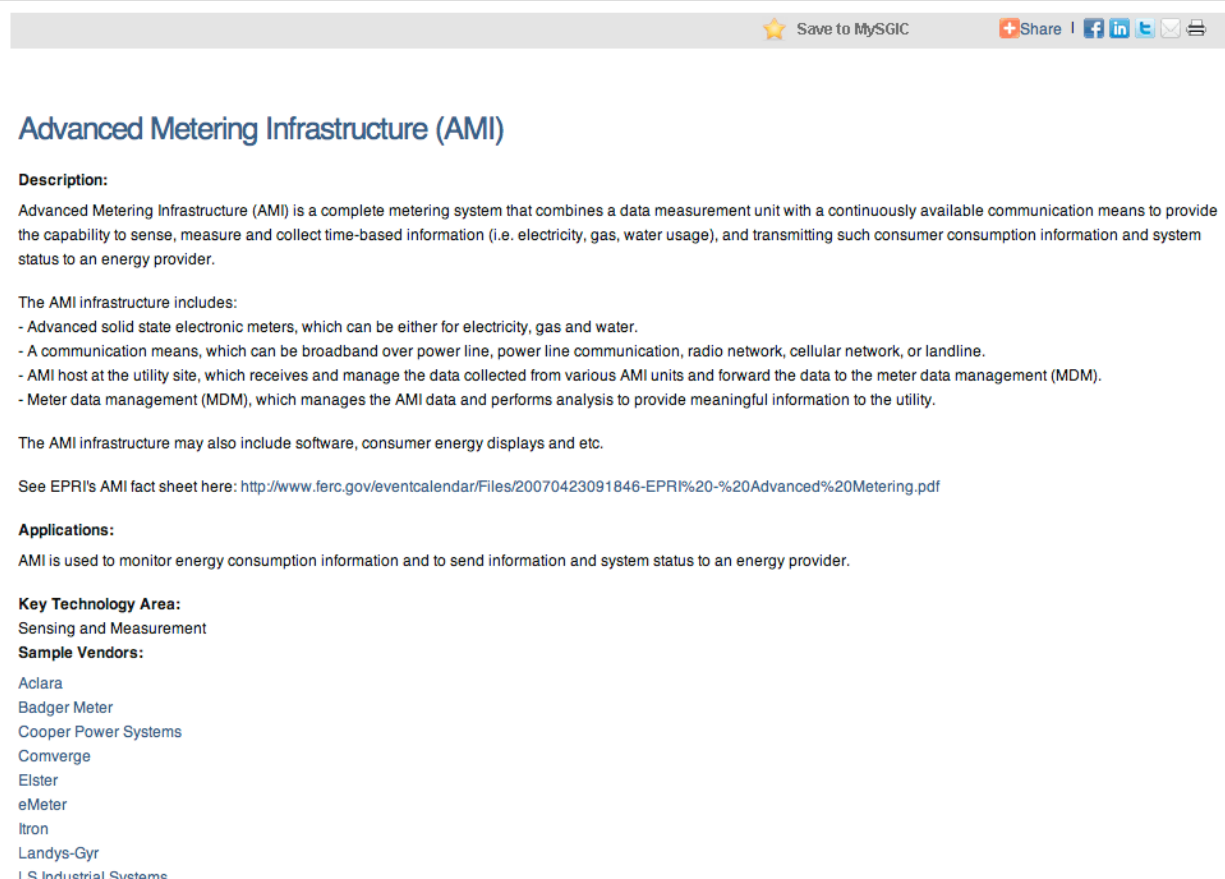


Fig. 24. Browse and sort features for the SGIC technology page

As shown at the bottom of Fig. 24, search results are displayed in the grid view format. This allows users to see all technologies under a particular key technology area.

Display: Technologies are displayed in the format shown in Fig. 25. Users can see the technology title, description, application, and sample vendors. Users can click on a vendor name, which will open the vendor's web page.



The screenshot shows a web interface for a technology database. At the top, there is a navigation bar with a star icon labeled "Save to MySGIC" and a "Share" button with social media icons for Facebook, LinkedIn, and Twitter. The main content area has a title "Advanced Metering Infrastructure (AMI)" in blue. Below the title, there is a "Description:" section with a paragraph about AMI. This is followed by a list of components included in the AMI infrastructure. Then, there is an "Applications:" section with a paragraph. Below that, there is a "Key Technology Area:" section with the text "Sensing and Measurement". Finally, there is a "Sample Vendors:" section with a list of vendor names. The interface is clean and professional, with a light gray background and clear typography.

Advanced Metering Infrastructure (AMI)

Description:

Advanced Metering Infrastructure (AMI) is a complete metering system that combines a data measurement unit with a continuously available communication means to provide the capability to sense, measure and collect time-based information (i.e. electricity, gas, water usage), and transmitting such consumer consumption information and system status to an energy provider.

The AMI infrastructure includes:

- Advanced solid state electronic meters, which can be either for electricity, gas and water.
- A communication means, which can be broadband over power line, power line communication, radio network, cellular network, or landline.
- AMI host at the utility site, which receives and manage the data collected from various AMI units and forward the data to the meter data management (MDM).
- Meter data management (MDM), which manages the AMI data and performs analysis to provide meaningful information to the utility.

The AMI infrastructure may also include software, consumer energy displays and etc.

See EPRI's AMI fact sheet here: <http://www.ferc.gov/eventcalendar/Files/20070423091846-EPRI%20-%20Advanced%20Metering.pdf>

Applications:

AMI is used to monitor energy consumption information and to send information and system status to an energy provider.

Key Technology Area:

Sensing and Measurement

Sample Vendors:

- Aclara
- Badger Meter
- Cooper Power Systems
- Comverge
- Elster
- eMeter
- Itron
- Landys-Gyr
- LS Industrial Systems

Fig. 25. Detailed view for contents in the technology database

5.5.3) Cyber Security

The SGIC Cyber Security page brings together background information and training courses that are related to cyber security in the smart grid environment. Similar to other documents, all cyber security-related documents were categorized by smart grid domain (i.e., Generation, Transmission, Distribution, Customer, Operations, Markets, and Service Provider) and year.

5.5.4) Legislation

SGIC summarizes U.S. legislation and regulations at both federal and state level.

Categorizing and Cataloging the Content: The SGIC team proactively searches for legislation and regulation related activities at both federal and state levels. There is no category for activities at the federal level. Activities at state level are categorized by state.

Browse and sort capability: Users can browse legislation and regulation activities as shown in Fig. 26.

Related Resources on Legislation and Regulation

- Demonstrating the Capacity Benefits of Dynamic Ratings in Smarter Distribution Networks
- Smart Grid - Program Overview
- EDF Smart Grid Activities
- Cyber Security and the Smart Grid: American Recovery and Reinvestment Act (ARRA)
- Demand Response & Advanced Metering Surveys - 2008
- Phase 1 Results: Establish the Value of Demand Response
- Application for Approval of AMI Deployment Activities & Cost Recovery Mechanism
- Guidelines for AMI Business Case Analysis
- Updated Preliminary Advanced Metering Infrastructure (AMI) Business Case Analysis
- Demand Response and Smart Metering Policy Actions Since the Energy Policy Act of 2005: A Summary for State Officials

See additional documents in the Resource Library...

Smart Grid-Related Legislation and Regulation Activities

The Smart Grid Information Clearinghouse (SGIC) is intended to provide a comprehensive source of information on U.S. legislation and regulations at both federal and state level.

Activities at the Federal Level:

The smart grid-related legislation and regulation activities at the federal level are listed below.

- [Energy Independence and Security Act \(EISA\) of 2007 \[Public Law 110-140-Dec 19, 2007\]](#)
- [American Recovery and Reinvestment Act \(ARRA\) of 2009 \[Public Law 111-5-Feb 17, 2009\]](#)
- [Energy and Water Development and Related Agencies Appropriations Act, 2010 \[Public Law 111-85-Oct 28, 2009\]](#)
- [FERC Smart Grid Policy \[Docket No. PL09-4-000\]](#)

Activities at the State Level:

To obtain smart grid-related legislation and regulation activities at the state level, please click the state name listed below.


Alabama	Illinois	Montana	Rhode Island
Alaska	Indiana	Nebraska	South Carolina
Arizona	Iowa	Nevada	South Dakota
Arkansas	Kansas	New Hampshire	Tennessee
California	Kentucky	New Jersey	Texas
Colorado	Louisiana	New Mexico	Utah
Connecticut	Maine	New York	Vermont
Delaware	Maryland	North Carolina	Virginia
District of Columbia	Massachusetts	North Dakota	Washington
Florida	Michigan	Ohio	West Virginia
Georgia	Minnesota	Oklahoma	Wisconsin
Hawaii	Mississippi	Oregon	Wyoming
Idaho	Missouri	Pennsylvania	

Fig. 26. Browse and sort features for the SGIC legislation and regulation page

As shown at the bottom of Fig. 26, activities at the state level are displayed in the grid view format by state. Users can click on the state name to learn more.

Display: Legislation and regulation activities are displayed in the format shown below. Users can review the activities by state, including legislative and regulatory activities, as well as utilities and rate schedules, state-level incentives, additional resources and references.

★ Save to MySGIC
Share [f](#) [in](#) [t](#) [e](#) [p](#)



- Alabama**
- Alaska
- Arizona
- Arkansas
- California
- Colorado
- Connecticut
- Delaware
- District of Columbia
- Florida
- Georgia
- Hawaii
- Idaho
- Illinois
- Indiana
- Iowa
- Kansas
- Kentucky
- Louisiana
- Maine
- Maryland
- Massachusetts
- Michigan
- Minnesota
- Mississippi
- Missouri
- Montana
- Nebraska
- Nevada
- New Hampshire
- New Jersey
- New Mexico
- New York
- North Carolina
- North Dakota
- Ohio
- Oklahoma
- Oregon
- Pennsylvania
- Rhode Island
- South Carolina
- South Dakota
- Tennessee
- Texas
- Utah
- Vermont
- Virginia
- Washington
- West Virginia
- Wisconsin
- Wyoming

Alabama

Legislative activities

No legislative activities on smart grid have been identified for Alabama.

Regulatory activities

Alabama's Public Service Commission (PSC) began looking at Distributed Generation in the form of standby generator capacity prior to 1996. Time-of-use rates, hourly and interruptible accounts were evaluated as early as 2000. By 2006, Alabama Power, one of the largest electric suppliers in Alabama, had moved to real-time pricing for industrials, followed by critical peak pricing for residential consumers in 2008, but with time-of-use service only offered to a limited group of businesses. Starting in 2009, Alabama went from only demand-based rates for industrials to residential customers having access to direct load control. [2, 3]

"In June 2007, the Alabama Public Service Commission decided not to adopt PURPA Standard 14 ("Time-Based Metering and Communications") as enacted in EPACT 2005. Its decision, which followed its Staff's May 2007 recommendations, states that EPACT 1252 is unnecessary as Alabama Power Company (1) already offers TOU rates to "all available customer classes, as required by the standard in Section 1252"; (2) provides "appropriate meters, as also required" by EPACT 1252; and (3) is deploying smart meters." [1]

The demand response for industrials started with measuring only the fifteen minute capacity at the meter and allowing the customer to control their capacity between a set maximum and a minimum that is based on the previous eleven months.

Direct load control allows for 50% cycling of controlled equipment during the summer at the company's discretion up to 120 cycled hours per year.

Time-of-use rates break the cost for electricity into periods on a seasonal basis with either on-peak, intermediate, or off-peak pricing.

The real-time pricing is based on the quoted hourly price available to the consumer eight hours in advance of the day the power flows.

The standby generator capacity allows the utility to take control of the consumer's generator and fuel supply for up to 240 hours per year.

Utilities and Rate Schedules

Alabama Power

- Alabama Power Residential Rates
- Alabama Power Business Rates

See the National Rural Electric Cooperative Association (NRECA) for information on consumer-owned Cooperatives:
<http://www.nreca.org/AboutUs/OurMembers.htm>

State-Level Incentives

Alabama has production incentives for renewable energy generation for both commercial and residential production as well as a state loan program for schools and the local government on renewable energy generation.

More information can be found in the Database of State Incentives for Renewables & Efficiency (DSIRE):
<http://www.dsireusa.org/incentives/index.cfm?re=1&ee=1&spv=0&st=0&srp=1&state=AL>

Additional Resources

State Energy Office:

- Alabama Department of Economic and Community Affairs Energy Division

State Authority Dealing with Energy Regulation:

- Alabama Public Service Commission
- Docket Search: <http://www.psc.state.al.us/SearchOrders.asp>

Code of Alabama

Database of State Incentives for Renewables & Efficiency (DSIRE): <http://www.dsireusa.org/incentives/index.cfm?re=1&ee=1&spv=0&st=0&srp=1&state=AL>

References

[1] Demand Response and Smart Metering Policy Actions Since the Energy Policy Act of 2005: A Summary for State Officials, Prepared by the U.S. Demand Response Coordinating Committee for The National Council on Electricity Policy, Fall 2008. URL: http://www.ee.energy.gov/DocumentsandMedia/NCEP_Demand_Response_1208.pdf

[2] Alabama Power Business Electricity Pricing. URL: http://www.alabamapower.com/pricing/al_rates.asp

[3] Alabama Power Residential Electricity Pricing. URL: <http://www.alabamapower.com/pricing/bestpricing.asp>

Fig. 27. Detailed view for contents in the legislation and regulation database

5.5.5) Education and Training

The SGIC education page displays DOE-sponsored workforce training programs. All programs are categorized by training locations and training types.

- *Training Location* includes 50 U.S. states, including Washington DC and U.S. Territories
- *Training Type* includes (a) Non-degree program: training and certificate courses; (b) Degree program: community college and higher education.

Users can browse educational training programs using the filter, as shown in Fig. 28. The filter enables browsing the contents by training locations and training types.

The screenshot displays the SGIC Education page. At the top, there are navigation tabs: Standards, Technologies, Cyber Security, Legislation and Regulation, and Education (which is selected). Below the tabs, the page is titled "Education" and contains a paragraph explaining the DOE-sponsored workforce training programs. A "Browse Educational Materials" section features a filter interface with two dropdown menus: "Training Location" and "Training Type", both currently set to "<Any>". An "Apply" button is located to the right of the filters. Below the filter interface, the "Search Results" section shows a table with 54 results. The table has four columns: Project Title, Organization, HQ State, and Location. The results list four training programs: Ameren Services Company Smart Grid Workforce Training, Austin Community College District Developing and Enhancing Workforce Training Programs, Bismarck State College (BSC) Developing and Enhancing Workforce Training Programs, and Centralia College Smart Grid Workforce Training.

Project Title	Organization	HQ State	Location
Ameren Services Company Smart Grid Workforce Training	Ameren Services Company	Missouri	Multiple
Austin Community College District Developing and Enhancing Workforce Training Programs	Austin Community College District	Texas	At HQ
Bismarck State College (BSC) Developing and Enhancing Workforce Training Programs	Bismarck State College (BSC)	North Dakota	Online
Centralia College Smart Grid Workforce Training	Centralia College	Washington	Online, Multiple

Fig. 28. Browse and sort features for the SGIC education page

As shown at the bottom of Fig. 28, search results are displayed in the list view format. This allows users to sort all programs by Title, Organization, HQ state and Location.

Display: Education programs are displayed in the format shown below. Users can see the program title, organization offered the program, training locations, contact information, program description, training level, URL to the program (if available), as well as the map showing training locations.

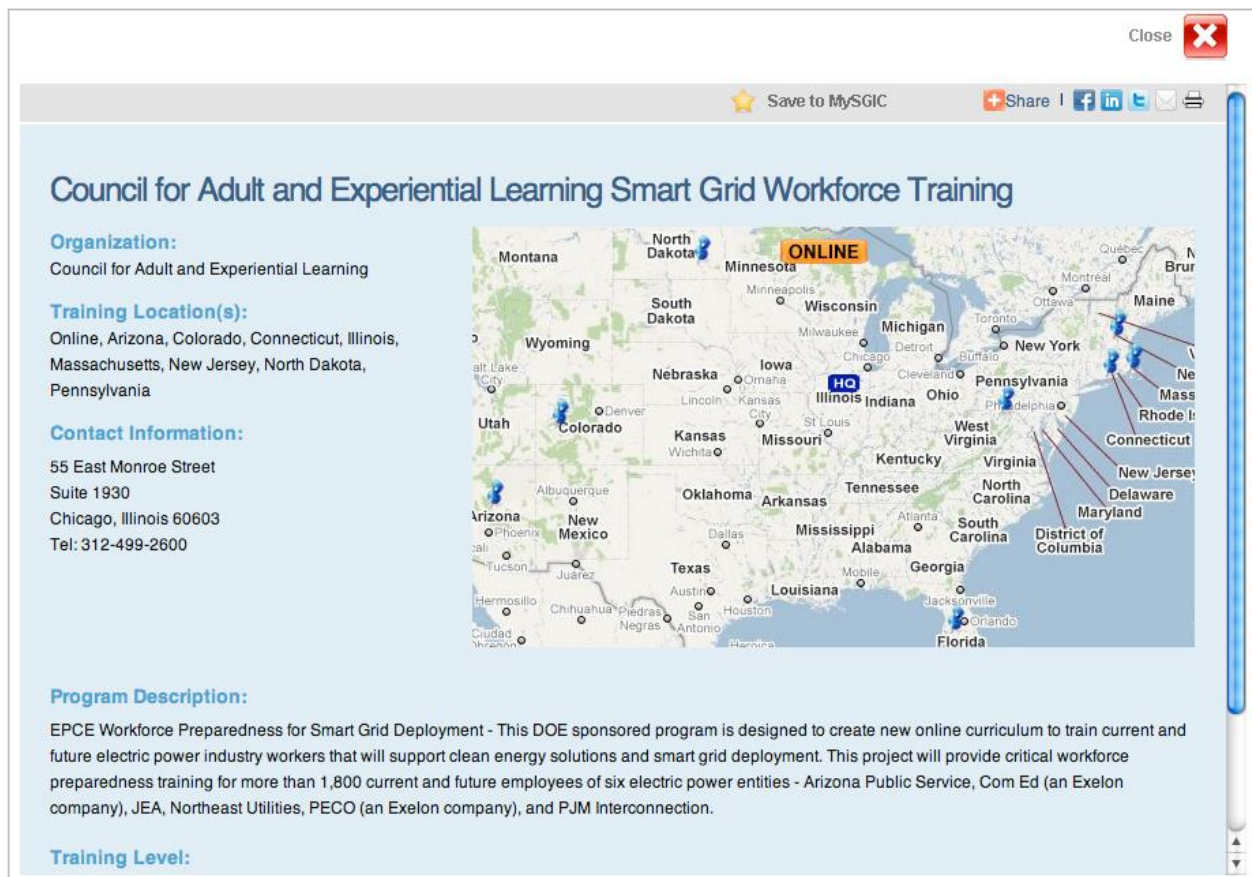


Fig. 29. Detailed view for contents in the education database

5.5.6) Demand response

The SGIC demand response page provides access to demand response-related documents and multimedia. All demand response-related documents were categorized by smart grid domain (i.e., Generation, Transmission, Distribution, Customer, Operations, Markets, and Service Provider), document type (e.g., audio presentation, book, report, slide presentation, etc.) and year.

5.6 International

The SGIC international project page archives information about smart grid projects in Africa, Americas, Asia, Europe and Oceania. The SGIC team proactively searched for smart grid projects internationally. The team reviewed and created the project summary. All project entries were categorized by continent and project category.

- *Continent* includes Africa, Americas, Asia, Europe, and Oceania.
- *Project Category* includes Advanced Metering Infrastructure, Transmission Systems, Distribution Systems, Customer Systems, Equipment Manufacturing, and Integrated Systems.

Project database is displayed in various formats including the map view (see Fig. 30) and the list view (see Fig. 31). The map view enables users to visually see the projects by continent.

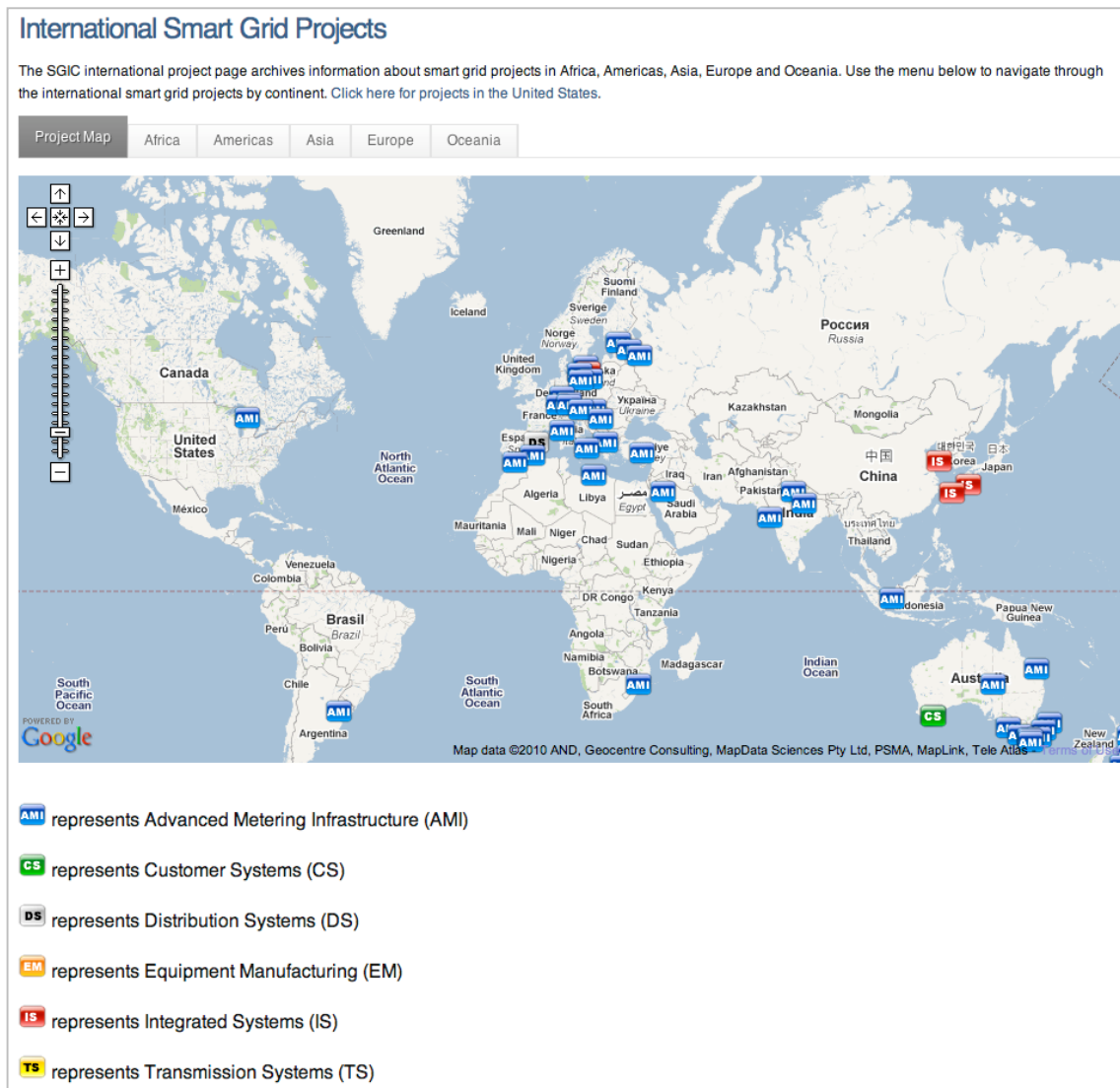


Fig. 30. Map view for international projects

The list view allows users to browse the projects by country and category. As shown in Fig. 31, search results are in the table format, which allow users to conveniently sort the projects by Project Title, Lead Organization, and Country.

Related Resources on International Smart Grid Projects

- [Asymmetric Reserve Power Delivered by Large Wind Power Plants](#)
- [Rest of World Standards Activities](#)
- [Demonstrating the Capacity Benefits of Dynamic Ratings in Smarter Distribution Networks](#)
- [EDF Smart Grid Activities](#)
- [International Smart Grid Action Network Fact Sheet](#)
- [Electric Vehicle Initiative Fact Sheet](#)
- [EDF Smart Grid Development](#)
- [Overview of AMI System Features and Capabilities](#)
- [Smart Meters for Smart Competition: Comment on Current Policy Affecting Interval Metering and Load Profiling for Full Retail Competition in Electricity](#)
- [Present and Future ICT Infrastructures for a Smart Grid in Japan](#)

Project Map Africa Americas Asia **Europe** Oceania

Smart Grid Projects in Europe

This page contains information related to smart grid projects in Europe. The projects can be browsed by country and category. The link from each project title provides a brief description.

Browse Smart Grid Projects

Filter

Country:

Project Category:

Search Results

24 results

Project Title	Lead Organization	Country
Acea Distribuzione smart metering in Rome	Acea Distribuzione	Italy
Amsterdam Smart City	Amsterdam Smart City	Netherlands
E.ON Czech Republic	E.ON Czech Republic	Czech Republic
EDP Distribuciao	EDP Distribuciao	Portugal
ELEKTROPRIVREDA HZ HB MOSTAR	ELEKTROPRIVREDA HZ HB MOSTAR	Bosnia and Herzegovina
Elro Net	Elro Net	Sweden
Endesa	Endesa	Spain
Energie AG	Energie AG	Austria


Fig. 31. Browse and sort features for the SGIC international project page (list view)

Display: All projects are displayed in lightbox, as shown below. Users can see the title, project map, lead organization, HQ location, project contact information, project category, project summary and additional information. The project URL, if available, will also be displayed.

Close

Save to MySGIC
Share
f
in
t
e

Yello Strom Smart Grid



Lead Organization:
Yello Strom GmbH

HQ Location:
Köln, Germany

Project Contact Information:
EnBW Energie Baden-Württemberg AG,
Durlacher Allee 93, 76131 Karlsruhe

International Project Category :
Advanced Metering Infrastructure

Project Summary:

Yello Strom GmbH is run by the EnBW Energie Baden-Württemberg AG, Durlacher Allee 93, 76131 Karlsruhe. With over 1.4 million customers, Yello ranks as one of the top ten electricity companies in Germany. Since 2008, it has offered its customers nationwide a smart meter known as Yello Sparsähler online.

Yello Strom, among Germany's top 10 electricity companies, and Cisco announced the launch of a 'smart grid' pilot. Its aim is to create an intelligent energy system that allows customers to measure and control the power consumption of their electrical appliances, enabling them to reduce their monthly bills as well as carbon emissions, while significantly cutting down on peak-period demand. The smart grid pilot is expected to make more efficient use of renewable energy resources — including solar cells, and a combined heat and power plant — and reduce each local area's reliance on reserve capacity.

In the current pilot, Cisco and Yello Strom have collaborated to enable 70 selected homes and businesses to communicate intelligently with the local power

Fig. 32. Detailed view for contents in the international smart grid project database

6.0 SGIC Statistics

We installed Google Analytics, a website statistics monitoring tool, in the SGIC web portal. The objective was to monitor the user activity and to obtain website statistics. This has helped us to understand user preferences and take corrective actions, whenever appropriate. In this section, we present the SGIC web portal statistics from the launch of the portal on July 07, 2010 to August 31, 2014.

The following is a brief overview:

- There were the total of **605,958 page views**. (See Fig. 33)
- There were the total of **166,554 visits** (61.9% of whom are new visitors).
- The average pages/visit is **3.64**.
- The bounce rate is **51.50%**.
- The average time spent on site is **00:04:12**.

Statistics about top ten countries visiting SGIC web portal are summarized in the table below.

Table 8. Top ten countries visiting SGIC web portal

Country	Visits	Percent
United States	91,617	55.5 %
India	13,126	7.8%
Canada	4,666	2.8%
United Kingdom	3,506	2.1%
Japan	3,158	1.9%
South Korea	3,137	1.9%
Germany	3,114	1.9%
Brazil	2,859	1.7%
China	2,676	1.6%
Australia	2,384	1.4%

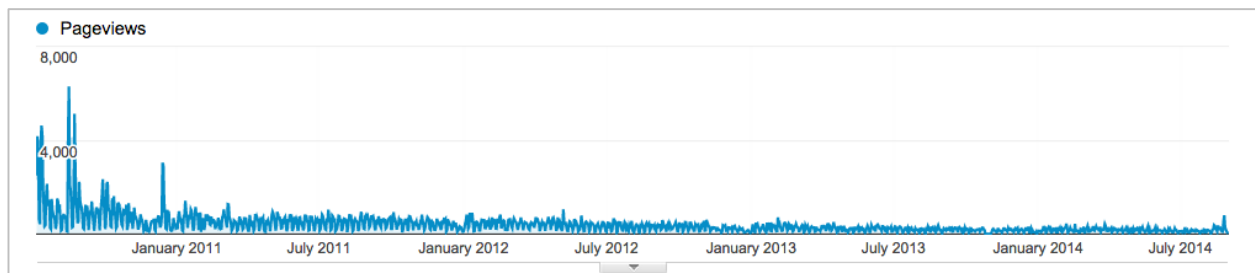


Fig. 33. Number of daily page views from Jul 07, 2010 to Aug 31, 2010 (Total 605,958 page views)

7.0 Publicly Available Information

Results of this work are available from the website at www.sgiclearinghouse.org.

List of publications:

- S. Rahman and M. Pipattanasomporn, "Smart grid information Clearinghouse: Overview of projects and deployment experience," In Proc. IEEE PES Innovative Smart Grid Technologies (ISGT Latin America) Conference, Medellin, Colombia, 19-21 Oct. 2011.
- S. Rahman and M. Pipattanasomporn, "Smart Grid Information Clearinghouse: A content collection and knowledge discovery model," In Proc. 16th International Conference on Intelligent System Application to Power Systems (ISAP), Hersonissos, Greece, 25-28 Sep. 2011.