

Grid Data Repository



Find public
grid models



Publish your
innovations



Collaborate
with others

Dariush Shirmohammadi

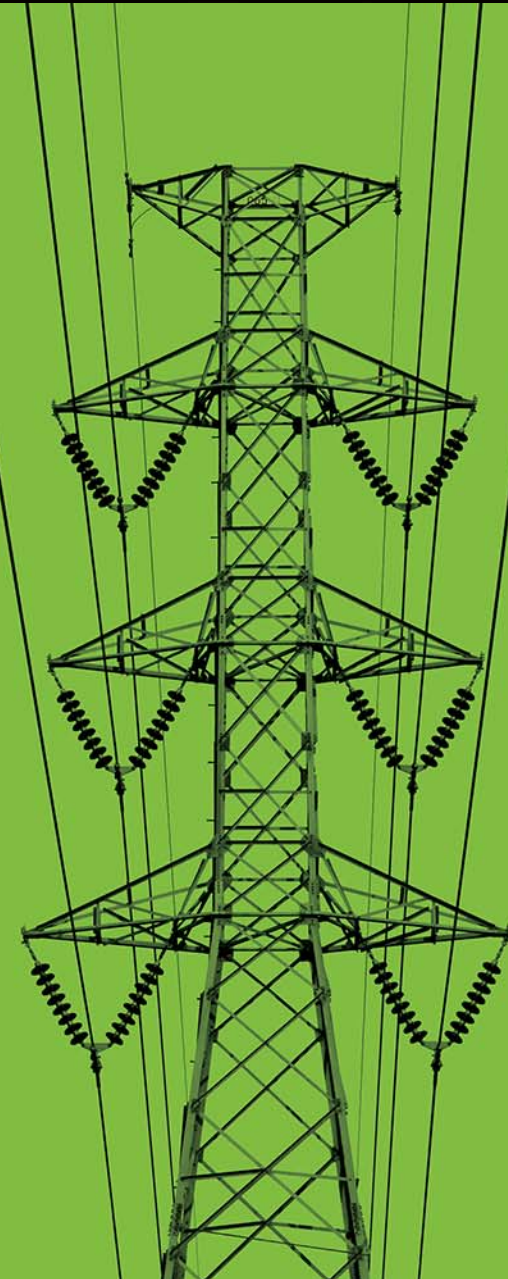
FERC Technical Conference

June 28, 2018

Agenda

- ARPA-E GRID DATA Program
- BetterGrids Grid Data Repository
- The Support Community for the Repository

ARPA-E GRID DATA Program



GRID DATA Program

Generating Realistic Information for the Development of Distribution And Transmission Algorithms

Duration	2016-2018
Projects	7
Investment	\$11M

Goal: Development of large-scale, realistic, validated, and open-access electric power system network models with the detail required for successful development and testing of new power system optimization and control algorithms.

Dataset Creation Pathways

Real Data

- Start with real data, then anonymize, perturb topologies and change sensitive infrastructure asset data as necessary.
- **Risks:**
 - Requires extremely close collaboration with ISOs such that infrastructure is not reconstructable and can be publically released.
 - Datasets may no longer well represent real data.
 - Real data is often messy, incomplete.

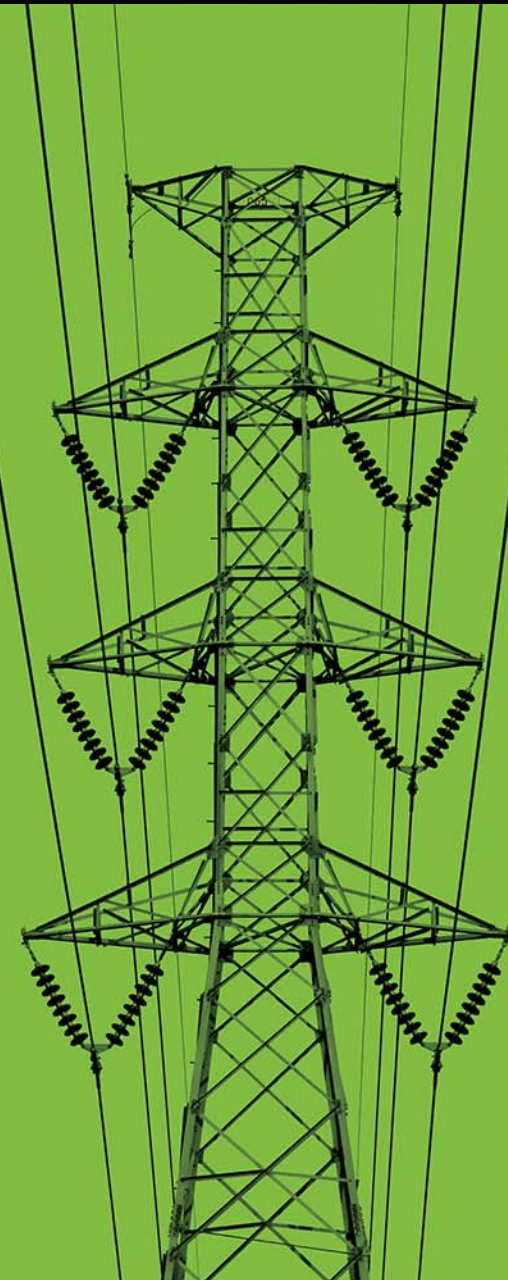
Synthetic Data

- Generate via expert input, geographic/road data and data mining.
- Generate new random graph methods for transmission networks.
- Devise statistical metrics (moments of capacity distributions, degree distributions of networks); validate against real data.
- **Risks:**
 - Validation metrics may be incomplete or misleading. (Leading to lack of realism.)



**Open-access, large, realistic,
validated datasets**

BetterGrids Grid Data Repository




BetterGrids Repository

- **A free library** of public grid model data
- **Supporting research** in grid optimization and reliability
- Enabling grid researchers to **collaborate and share data**
- Supported by a **community of volunteers** led by GridBright
- Funded by the **DOE ARPA-E GRID DATA** Program

Repository Functions

Contribute Models

Find Models



Describe Describe Upload Verify License Complete

Submit: Describe this Item ?

Please fill further information about this submission below.
 Select the keyword(s) associated with this item. Hold down the "CTRL" or "Shift" key to select more than one.

Subject Keywords

- Microgrid
- Operations
- Optimization
- Planning**
- Quadratic Cost Function
- Reliability
- Renewable

Select the data format from the list.

Data Format

Enter the version of the data format.

Data Format Version

Enter the number of buses


Buses

Enter the number of generators

Generators

Enter the number of loads

Loads



Browse Search Help

Search

Search: for

Current filters:

Add filters:
 Use filters to refine the search results.

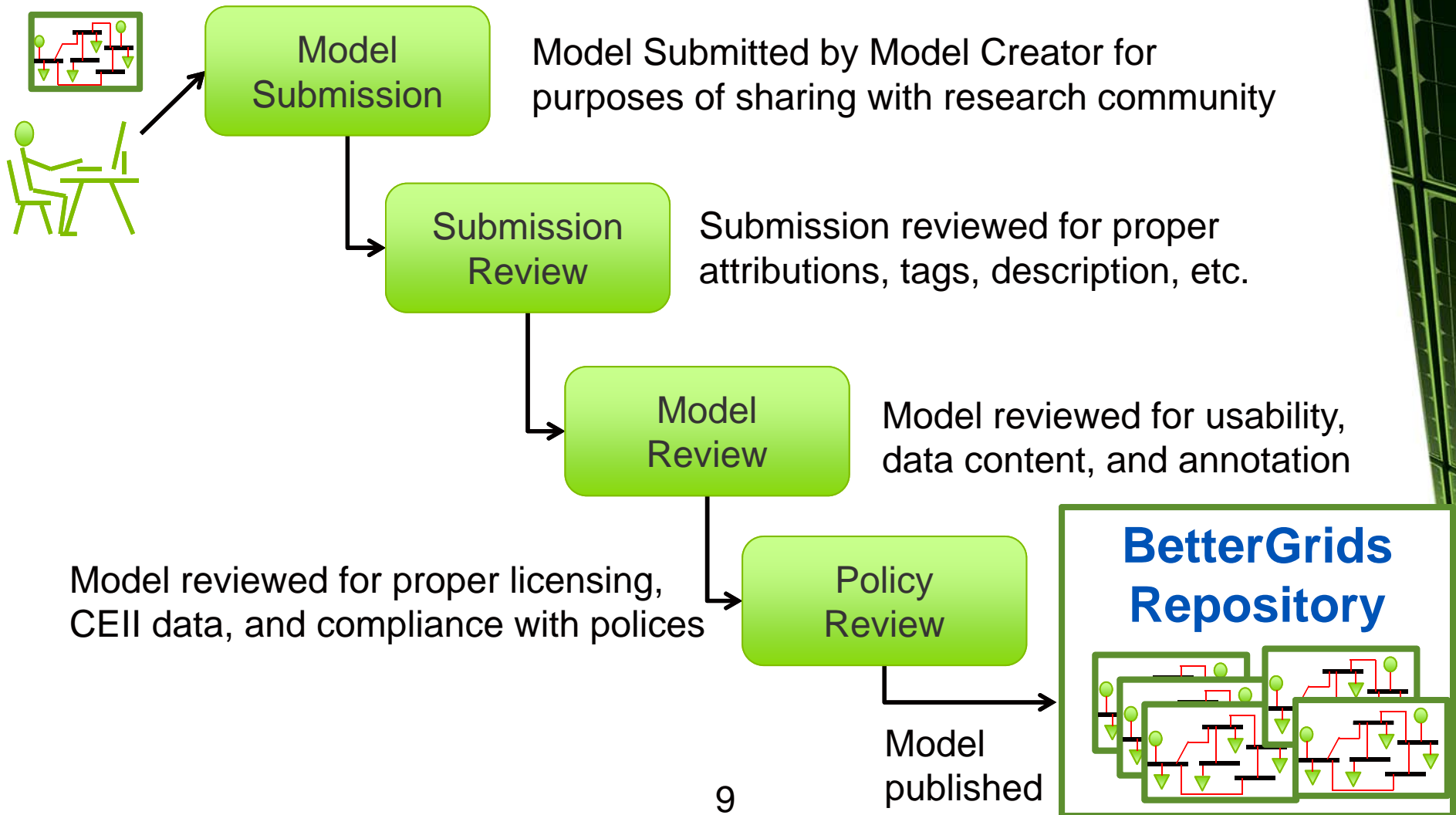
Results/Page | Sort items by In order Authors/record

Results 1-6 of 6 (Search time: 0.001 seconds).

Item hits:

Issue Date	Publisher	Title	Version	Data Format	Feeders	Loads	Buses	Generators
12-Mar-2013	Edinburgh Test Case Archive	39 bus New England test case with realistic cost data	1	MatPower	-	46	39	10

Model Curation



Knowledge Base

- Answers to common questions (FAQ)
- Includes short write-ups on common tasks
- Training videos

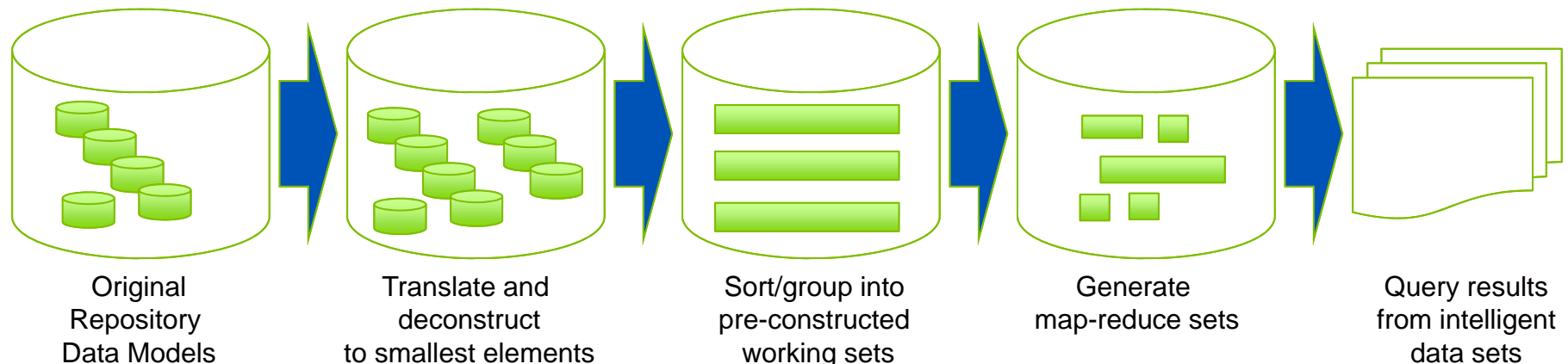
Semantic Search Capabilities

Challenge

- Researchers often look for grid models with unique electrical conditions
- With a large number of models (100s-1000s) that are very large (10,000-1,000,000 nodes/buses) manual cataloging is impossible
- Unique model conditions can't be found with traditional file/database searches

Solution

- Construct a database of the models that "understands" the equipment & organization of the models so that it can be intelligently searched
- Achievable by translating & pre-processing the data, storing it in a NOSQL/graph database, and searching using big data techniques



Example Queries

Query

Search for models with greater than 5,000 buses with over 10,000 miles of total line length of 69kV and greater

Search for models that have over 100 PV loads

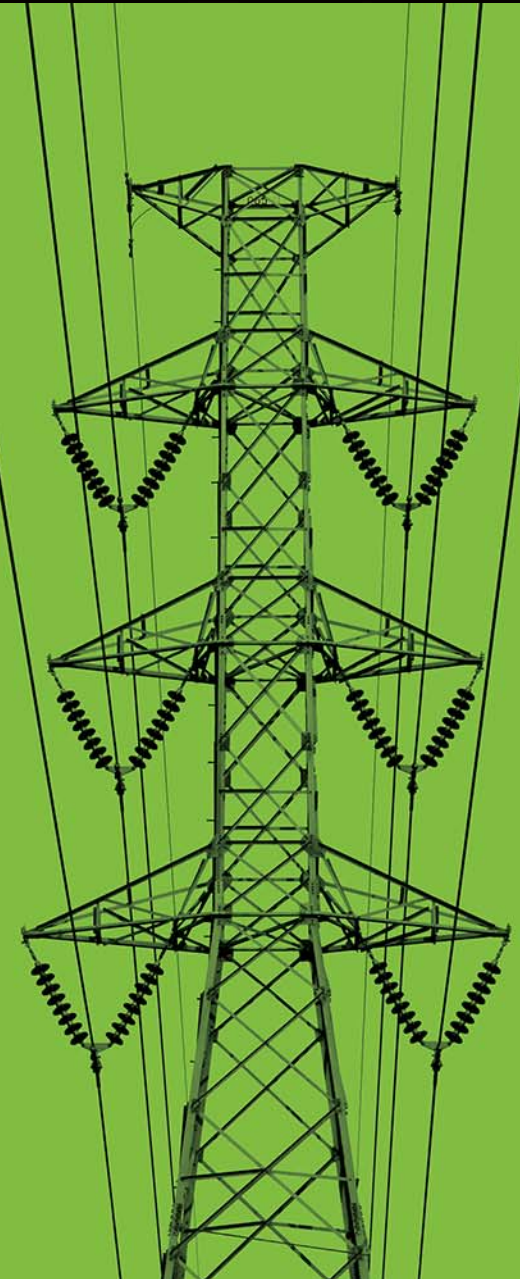
Search for models that have over 10 PV loads on a single 4KV circuit

Search for models with 10 or more feeders fed from the same substation that have more than one voltage regulator per circuit

Search for models with more than 100 wind plants and solar plants connected at 34kV or lower

Search for models with the sum of distributed generation total kW capacity of PV plants over 100kW is 100mW or greater

The Support Community for the Repository



BetterGrids Foundation, Inc.

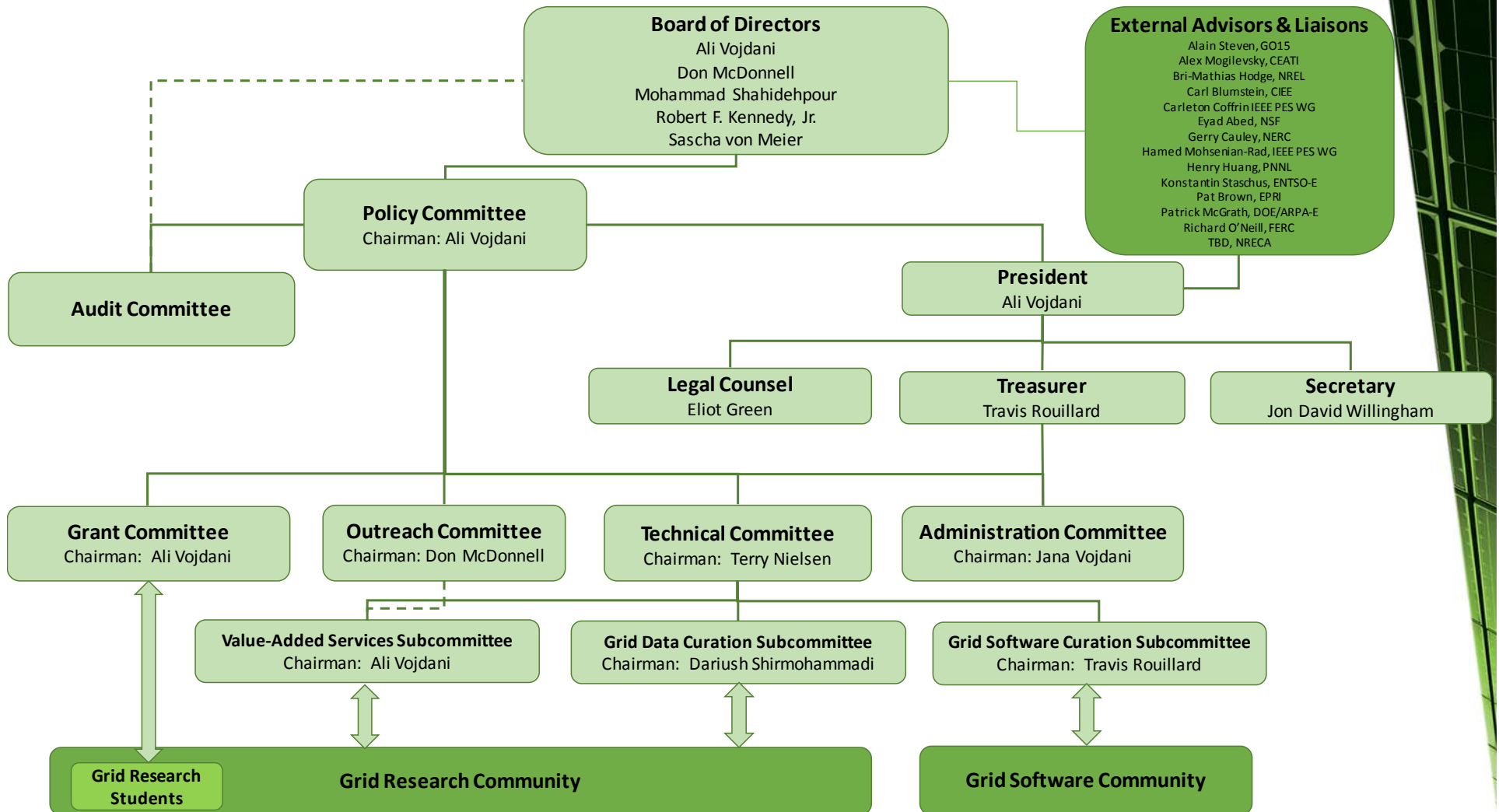
Mission: Operate the GRID DATA Repository in a self-funding manner to support research and education in developing better solutions for grid optimization, control, resiliency, and integration of renewable and distributed resources.

Contributing Organizations*



*Organizations that are participating in various BetterGrids committees and/or have provided valuable input to creation of the GRID DATA Repository.

Organization Chart



Technical Committee Charter

Provide guidance and consultation to the Policy Committee in setting priorities for technical programs and services.

Technical Committee Organization

- Grid Data Curation Subcommittee
- Grid Software Curation Subcommittee
- Value Added Services Subcommittee

Grid Data Curation Subcommittee

- Establish processes related to reviewing, updating metadata, and approving/rejecting of grid data submissions to the BetterGrids Repository.
- The curation processes, roles and approach will be developed by the Grid Data Curation Subcommittee and formally approved by the Technical Committee.

Grid Software Curation Subcommittee

- Direct the detailed implementation of all software and software related services that directly support the mission of BetterGrids.
- Specific software components and services required will be determined by the Policy Committee and directed to the Technical Committee by the President.
- This Subcommittee will be responsible for the establishment and maintenance of software development policies and support processes.

Value Added Services Subcommittee

- Establish policies and guidelines for the implementation of value-added services that should be performed by BetterGrids to make the Repository self-funding.

Community Volunteers

BETTERGRIDS BOARD, COMMITTEES & ADVISORS, JUNE 2017		
COMMITTEE	MEMBERS	ORGANIZATION
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	Kaye Hesemann	GridBright
	Ali Vojdani (Chair)	GridBright

Value-Added Services Subcommittee	Ali Vojdani (Chair)	GridBright
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	Robin Podmore	Incremental Systems
	Terry Nielsen	GridBright
	Travis Rouillard	GridBright
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	Richard O'Neill	FERC
TBD	NRECA	

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- Follow us on LinkedIn (BetterGrids)
- Follow us on Twitter (@BetterGridsOrg)
- Join our discussion group on LinkedIn (BetterGrids)
- Contact us at info@BetterGrids.org to volunteer
- Contribute data
- Propose value-added services
- Spread the word
- Make donations