Open DC Grid Project

2020 February

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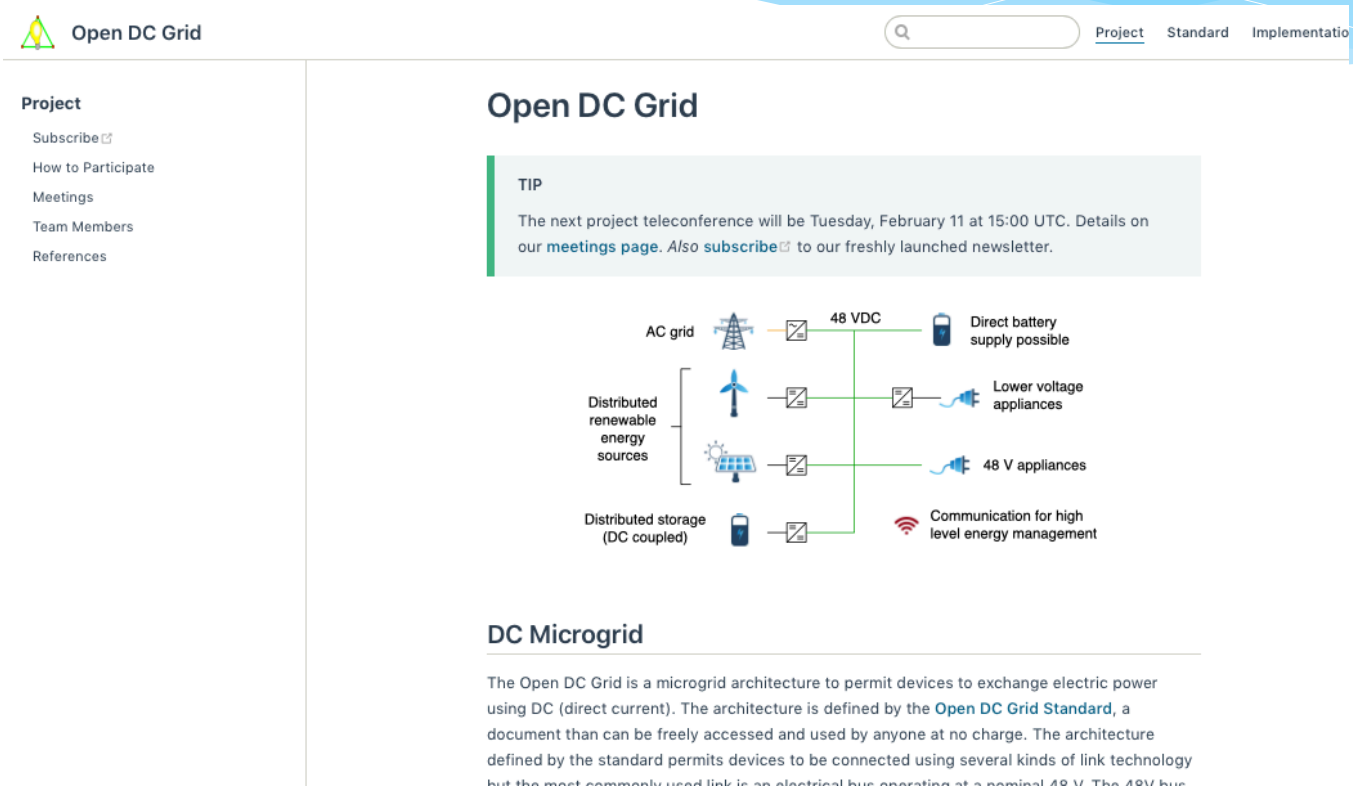
Agenda

- Project Tour
- System Architecture
- 48V Bus Link – Initial Thoughts
- DC-DC Converter Implementation
- Open Issues / Feedback

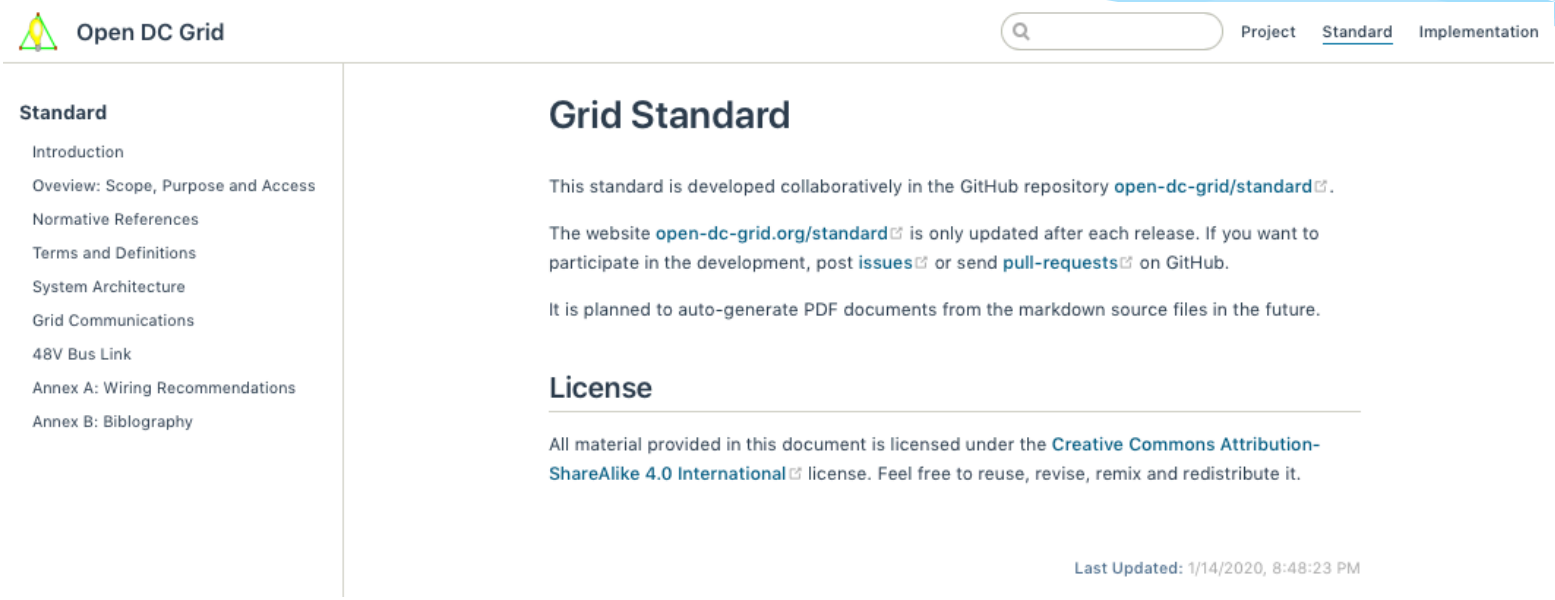
Web Site Project Page

https://open-dc-grid.org



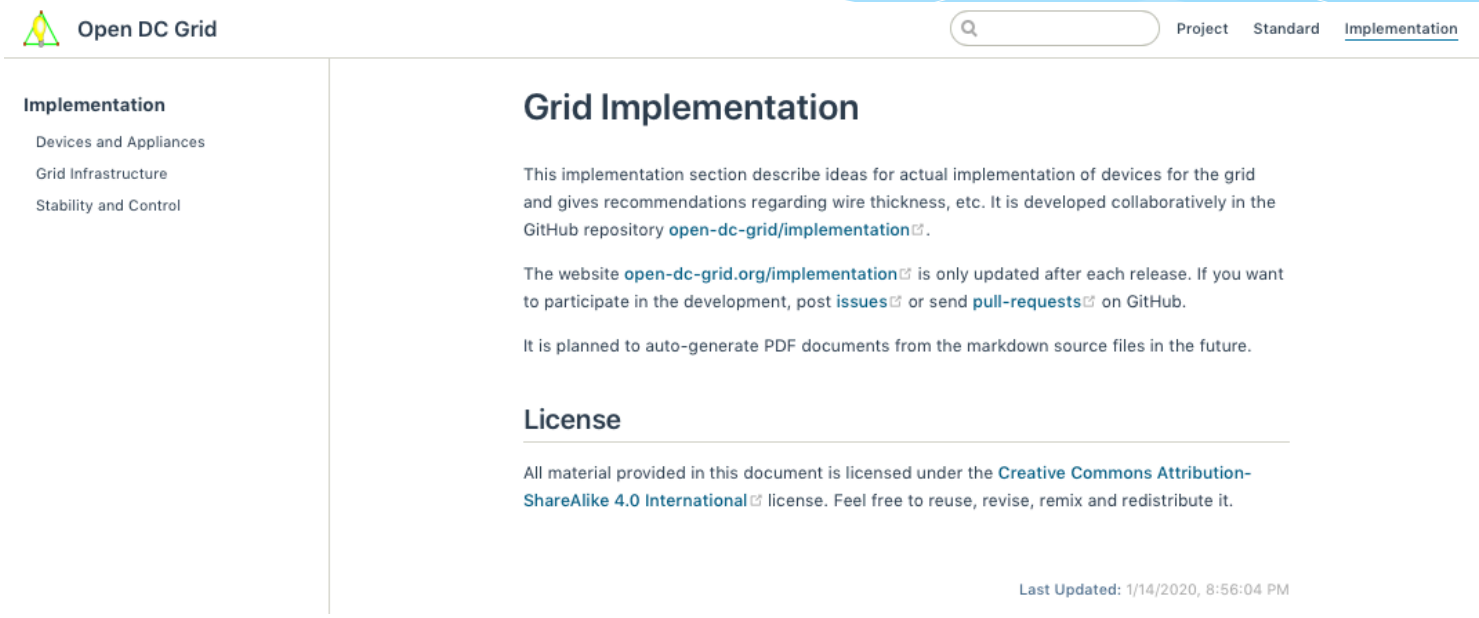
Web Site Standard Page

https://open-dc-grid.org/standard/



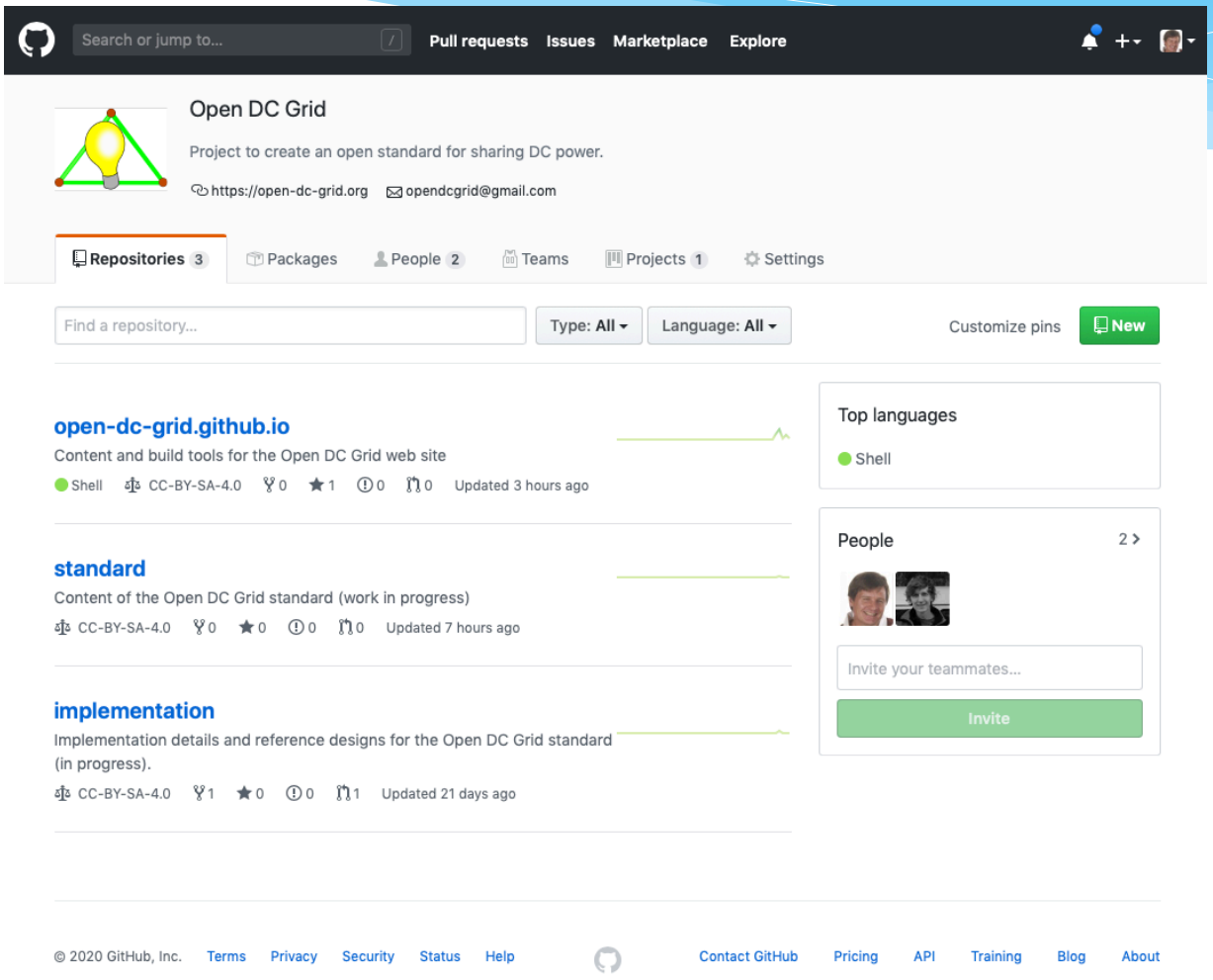
Web Site Implementation Page

https://open-dc-grid.org/implementation/



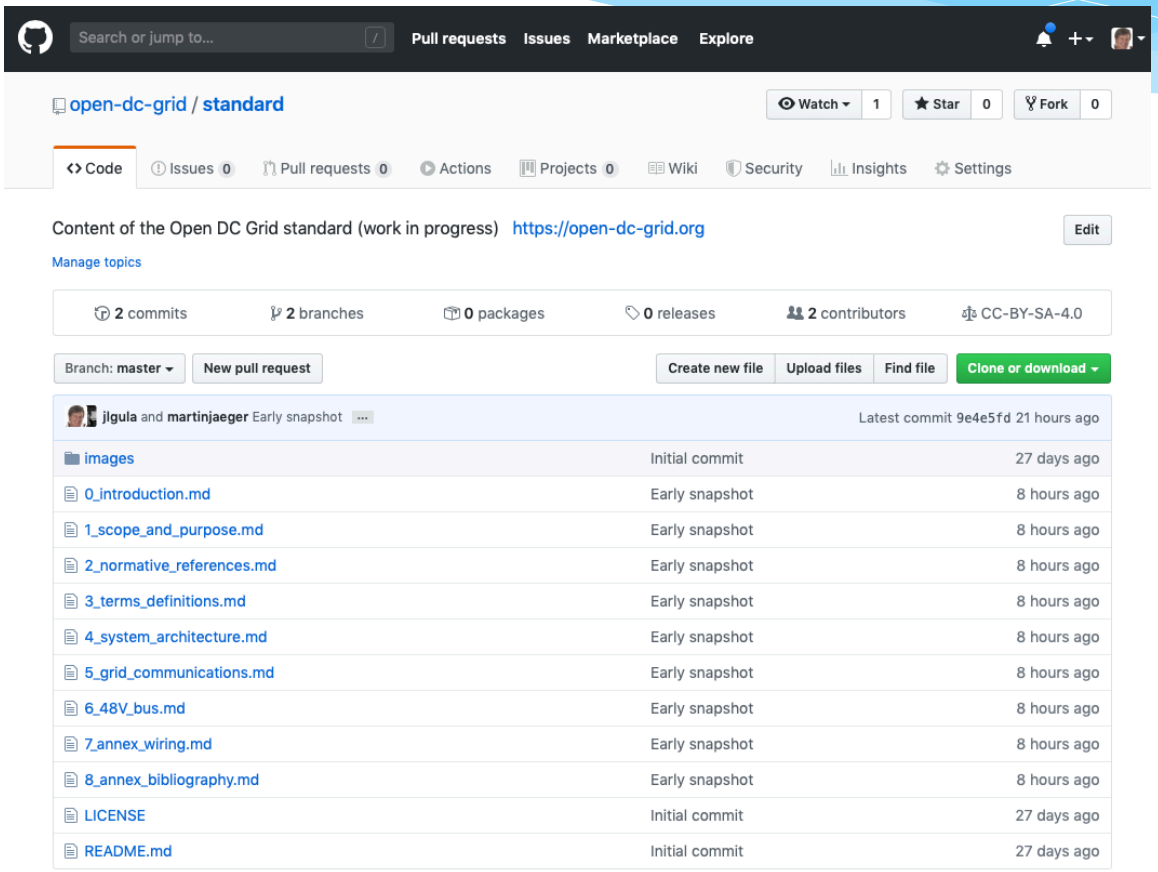
GitHub Project Page

https://github.com/open-dc-grid



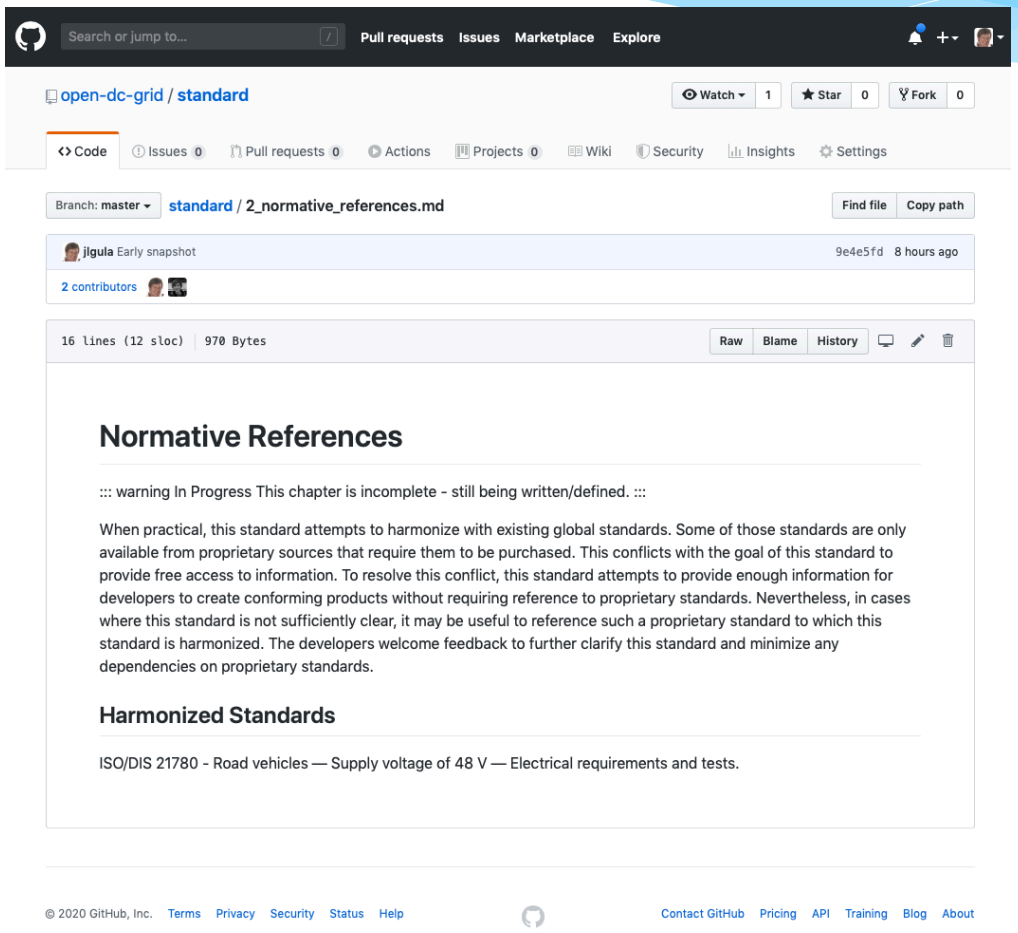
Repository "standard"

https://github.com/open-dc-grid/standard



Normative References Page

https://github.com/open-dc-grid/standard/blob/master/2_normative_references.md



2_normative_references.md

Note: standard written in markdown

2_normative_references.md

```
# Normative References
::: warning In Progress
This chapter is incomplete - still being written/defined.
:::


When practical, this standard attempts to harmonize with existing global standards.
Some of those standards are only available from proprietary sources that require them to be purchased.
This conflicts with the goal of this standard to provide free access to information.
To resolve this conflict, this standard attempts to provide enough information for developers to
create conforming products without requiring reference to proprietary standards.
Nevertheless, in cases where this standard is not sufficiently clear, it may be
useful to reference such a proprietary standard to which this standard is harmonized.
The developers welcome feedback to further clarify this standard and minimize any
dependencies on proprietary standards.

## Harmonized Standards

ISO/DIS 21780 - Road vehicles – Supply voltage of 48 V – Electrical requirements and tests.

```

Example of change to standard

* Create login on GitHub
* Fork repository standard
* Clone to your machine
* Create a new branch
* Make changes to local copy
* Push changes to your account
* Select "Create Pull Request"

* *Many GUI tools easier*

```
Jamess-iMac:WS3 Jim$ git clone https://github.com/jlgula/standard.git
Cloning into 'standard'...
remote: Enumerating objects: 26, done.
remote: Counting objects: 100% (26/26), done.
remote: Compressing objects: 100% (23/23), done.
remote: Total 26 (delta 6), reused 20 (delta 1), pack-reused 0
Unpacking objects: 100% (26/26), done.
Jamess-iMac:WS3 Jim$ cd standard
Jamess-iMac:standard Jim$ git checkout -q -b new
Jamess-iMac:standard Jim$ git push origin new
Total 0 (delta 0), reused 0 (delta 0)
remote:
remote: Create a pull request for 'new' on GitHub by visiting:
remote:      https://github.com/jlgula/standard/pull/new/new
remote:
To https://github.com/jlgula/standard.git
 * [new branch]      new -> new
Jamess-iMac:standard Jim$ ed 2_normative_references.md
970
$a
Another reference.
.
w
989
q
Jamess-iMac:standard Jim$ git add 2_normative_references.md
Jamess-iMac:standard Jim$ git commit -m "Added new reference"
[new 9df1fa4] Added new reference
 1 file changed, 1 insertion(+)
Jamess-iMac:standard Jim$ git push origin new
Enumerating objects: 5, done.
Counting objects: 100% (5/5), done.
Delta compression using up to 8 threads
Compressing objects: 100% (3/3), done.
Writing objects: 100% (3/3), 303 bytes | 303.00 KiB/s, done.
Total 3 (delta 2), reused 0 (delta 0)
remote: Resolving deltas: 100% (2/2), completed with 2 local objects.
To https://github.com/jlgula/standard.git
   9e4e5fd..9df1fa4  new -> new
Jamess-iMac:standard Jim$
```

Publishing Tools and Admin

* Markdown files are the "source code" of the standard
  * Can be edited on any text editor
  * Many tools visualize markdown as formatted text eg. Atom editor
* Open DC Grid Standard published as web site and PDF
  * VuePress compiles the files to a web site
  * Pandoc compiles the files to a PDF
* A local version of the web site can be created with additional tools like yarn
* Revisions use semantic versioning like a.b.c
  * a revisions are incompatible changes
  * b revisions are compatible enhancements
  * c revisions are minor corrections
  * Everything prior to 1.0.0 subject to major changes
  * There may never be a 2.x.y

System Architecture

Note: just beginning definition

* Microgrid is a wired network of devices
  * Single administrative control to manage energy flow
  * Can potentially operate independently from national AC grid
* Devices connected with wired links between ports
* Ports can source power, sink power or both
* Links can be many types such as:
  * 48V bus
  * USB-C
* Energy flows between devices at slow time scale (5 min?)
* Power flows across links with fast changes (ms)
  * Power management is a link concern
  * Links can be self-configuring with no administration required
* Microgrids can be hierarchical – no pico, nano etc
  * Potentially difference administrative policies at each level of hierarchy

48V Bus Link

Note: just beginning definition

* Managed version of P2030.10
* Arbitrary wiring topology
  * Peer-to-peer, star, spine and branch, tree etc
* Voltages harmonize with ISO 21780 (36V – 52V)
  * P2030.10 extension 52V – 58V OK
* No overall link current limit in standard – wiring issue
* Earthing TBD – possibly multiple isolated domains
* Over-current and over-voltage protection required (details TBD)
* Multiple forms of physical communications
  * CAN bus – hardwired
  * Power line networking (IEEE 1901.2?)
* Bus has single logical master for power control
  * Any node can potentially assume master role – 1st to join
  * Sources sample voltage and comm to request to join (bootstrap?)
  * Loads normally request before consuming power
  * Provision for static dumb load if administratively configured

Next Meeting

- Next Meeting:
  - 10 March 2020 – note moves to 1400 UTC
  - FreeConferenceCall.com meeting ID: jlgula
- Sharing Portals
  - Web site: https://open-dc-grid.org/
  - GitHub: https://github.com/open-dc-grid