GridWise® Architecture Council

Meeting Minutes

December 11, 2024

GWAC Members

Ron Bernstein, GWAC Chair and President, RBCG, LLC

Kay Aikin, Founder, CPO, Dynamic Grid/Introspective Systems

Ron Ambrosio, Independent Energy Transformation Professional

Lorenzo Kristov, Principal, Electric System Policy, Structure, Market Design

Mark Ortiz, Lead Architect, Dist. Energy Sys., Schneider Electric

Farrokh Rahimi, Executive Vice President, Open Access Technology International, Inc.

Aaron Snyder, Dir. of Grid Technology Consulting, EnerNex

Leonard Tillman, Partner, Balch & Bingham, LLP

GWAC Associates & Emeritus

Ron Cunningham, Emeritus

Ken Wacks, GWAC Emeritus

GWAC Friends

Larissa Affolabi

Hani Alarian, CAISO

Ward Camp

Larisa Dobriansky, General Microgrids, Inc.

Nicholas Domich, Pacific Gas & Electric Co.

Peter Fitzgerald, INS Engineering

Don Hammerstrom

Anthony James

Prabhu Karthikeyan

Prabhu Karthikeyan, Landis +GYR

Jeff Katz

Yashar Kenarangui, Xcel Energy

Volkmar Kunerth

Alaa Mahjoub, Independent Digital Business Advisor

James Orenstein

Harry Peterson, Siloxit

Hayden Reeve

Tim Schoechle

Julie Stroba, INS Engineering

PNNL Support

Jaime Kolln, PNNL GWAC Administrator

Susie McGuire, GWAC Coordinator

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Jaime reviewed the agenda for today's meeting. This meeting will feature a roundtable to review some pertinent activities with no featured speaker. He noted that noted that last month the council voted not to allow recording bots during GWAC meetings.

Aaron Snyder asked about the electric vehicle paper. He is presenting talk on that topic later today at his company. It is a brief summary of an EV project that he has participated in. He offered to present it at today's meeting.

Jaime thought it was very relevant to GWAC white paper.

Chair Ron Bernstein gave a motion to approve the November meeting minutes.

Ken Wacks commented that he has no suggested edits this month.

Ron Ambrosio seconded the motion to approve the November meeting minutes.

There were no objections, or abstentions and the minutes were approved.

Ron Bernstein thanked Susie and said he will have the video of Alaa Mahjoub's talk from last month soon for Susie to post on the GWAC site.

Ron B. mentioned an Army microgrids specification project that attended a presentation on. It is on the topic of interoperability controls and the implementation of microgrids on Army bases. GWAC has had a presentation on this by one of his contacts and there was also a presentation on it at the RE+ GWAC Symposium. He is hoping to get a copy of the specifications document and share it with the GWAC. It will highlight some grid interaction issues that they found.

After the GWAC presentation at AHR Ron Bernstein is arranging a group no host dinner with GWAC attendees, Design Light Consortium staff as well as some Army Corps of Engineers contacts who will be at AHR. Jaime would like to be sure we have a slide on that so that attendees who are interested can join them.

We have had a couple projects on this. It's a good example of interoperability. Ron will share it with GWAC when it is final. He also said some of his Army contacts will be at the AHR and they are planning to attend the dinner with GWAC and the DLC contacts.

Jaime suggested we try to get one of the contacts to be a GWAC monthly speaker sometime this year. Ron B said after the 2 pilots are complete, around the July timeframe should work for them.

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GRIDWISE Architecture Council

Agenda

Call to Order and Roll Call

- Welcome

GWAC Administrative Business

- Minutes
- Upcoming events
- GWAC Accomplishments

Action Items

- Call for Council Members is open

Future Activities

- GWAC Strategic Outreach Plan
- **Round Table – What's new for 2025?**
- AHR Expo
- Planning 2025 GWAC Tutorials

Work Product Status Reports

- Working Party Status Update
  - Next Big Thing Slide Deck
  - Grid Arch for Regulators White Paper
  - Applying Grid Architecture Concepts to Bridge Back from the Future Grid
  - Grid Architecture Concept Model for Transportation Electrification
- Liaison Reports

New Business

Jaime asked the GWAC to review the conference list and suggest

Kay Aikin is planning to attend the RE+ Microgrids in May and would like to add it to the conference list. It will be held in New Orleans March 19 – 20, 2025 at the New Orleans convention center. It is the week before DistribuTech.

Farrokh mentioned the IEEE Energy & Policy Forum, April 14 – 17, 2025 in Washington DC. And also, the IEEE EESAT 2025 which will be January 20 – 21, 2025 in Charlotte NC.

Jaime noted GWAC speakers are Sean Chandler, GWAC, to present on blockchain and Matt McDonald would like to present. Jaime noted that there are GWAC presentation templates on the GWAC Website for those speaking on behalf of GWAC. If anyone has trouble using Teams to retrieve the templates just ask Susie or Jaime to send it to you. Please suggest other speaker names so we can fill the calendar.

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GRIDWISE Architecture Council

Conferences and Events

Date	Event	Location	Attend	Speaker	Topic
Jan. 20 – 24, 2025	IEEE ESSB/EESAT and EPRI ESIC	Charlotte, NC			
Jan. 21 – 23, 2025	IEEE PES Grid Edge Technologies Conf	San Diego, CA	Kay Aikin, Jaime Kolln, Farrokh Rahimi, Shawn Chandler		Shawn will give a talk on 5G and 5G communication
Feb. 10 – 12, 2025	AHR Expo and ASHRAE Winter Conf	Orlando FL	Ron Bernstein	Ron Bernstein	Grid Arch/Future States GWAC/DLC Mixer proposed
Mar. 24 - 27, 2025	DistribuTECH	Dallas, TX	Forfia, Rahimi, Jaime Kolln		
Mar. 26, 2025	Smart Energy Summit	Dallas, TX	Ken Wacks		Co-located with DTECH
April 14 – 17, 2025	IEEE Energy & Policy Forum	Washington DC (?)			Formerly ISGt
July 27 – 31, 2025	IEEE PES General Meeting	Austin, TX	Farrokh Rahimi, Jaime Kolln		
Sept. 8-11, 2025	RE+	Las Vegas, NV	Jaime Kolln		GWAC Tutorial?

Jaime called out the 2 2024 papers championed by Seemita and Ron c

GRIDWISE Architecture Council

GWAC Accomplishments

2024 – Future Electric Power Industry and Grids – Now What Again is Our Destination? (NEW)

2024 – A Practical Introduction to Common Grid Architecture Techniques (NEW)

Ron Cunningham commented about the next steps at the end of the Future States report (not the appendix), that section explains how the authors did the assessment – tips of the trade. He was wondering if it should be a white paper – follow on or addendum on the techniques we did to assess the materials and refactoring and that kind of thing. Is it still relevant to the Council. It excluded the appendices.

Aaron suggested a post or a series of posts on LinkedIn rather than a full paper. He suggested posting once a week for 4 weeks and include the GWAC logo and a title page.

Ron said agreed but thought that a post a month might be better for him.

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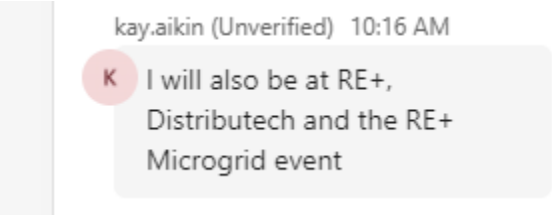
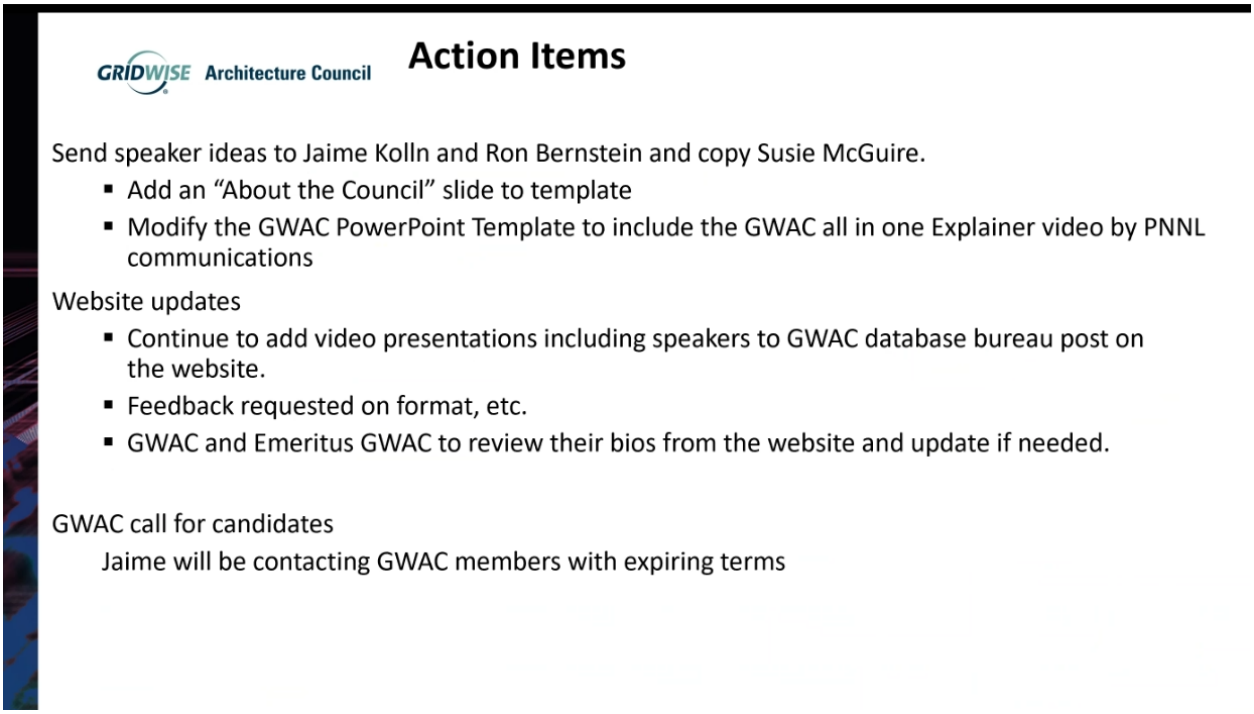
Jaime appreciated Aarons many social media promotion ideas for the GWAC.

Aaron said as we repost our GWAC items it socializes the products throughout the industry.

Stephan MacDonald suggested a rewrite of the 2020 Trans Energy FAQs is needed. Jaime asked him to send him an email about his concept of a rewrite and we could team him with a GWAC member and others to take a refresh on as a new work product.





Matt McDonald and Shawn Chandler are future speakers. We are looking for more. Jaime would like some additional name suggestions as we move into 2025.

Jaime mentioned the templates are located on the GWAC Teams site. We can send them to presenters as needed. We will have a version with an embedded 3 in 1 GWAC Explainer video which will be large. We can send with Mass Transit tool.

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Reminder to GWAC Members, Associates and Emeritus to update their bios. Please encourage Emeritus members to send in their updates.

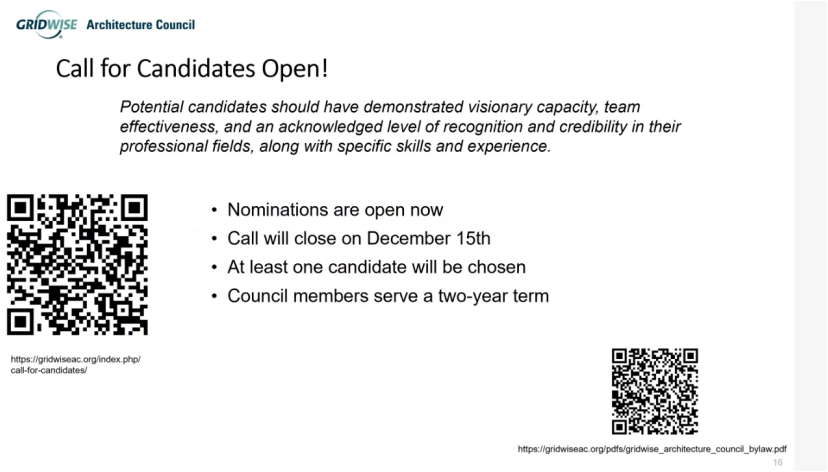
Jaime mentioned a pending upgrade to the GWAC website.

Jaime also mentioned the Call for Candidates and the objective of getting a mix of industry participants.

The video shown is helpful for recruiting new candidates. It is posted on the GWAC website.

Jaime introduced Julie with INS Engineer – she said hello, she is listening and learning at our meeting today.

Kay welcomed her – she works for a company in Maine but lives in Washington state.



https://www.youtube.com/watch?v=nUrhPpSkZMo

Jaime extended the posted the due date to January 17, a one-month extension.

GRIDWISE Architecture Council

Candidacy Submission Guidelines

The GridWise® Architecture Council (GWAC) conducts membership renewal each year. As a guideline, roughly one-quarter of the membership is refreshed each year with new members. Member terms last two years. The Architecture Council seeks candidates to represent interests in several areas.

While existing members willing to renew their membership have the advantage of being familiar with the Council, the Nominations Committee's job is to develop a slate of candidates that best meets the desired attributes specified for a Council with balanced representation.

Desired Attributes

We are looking for qualified candidates with experience in one or more of the following areas:

- Complex, system of systems theory, architecture, requirements, and design methodology.
- Electric utility strategic planning, management, operations, and market interactions.
- Electric power system automation and energy management systems.
- Distributed energy resource aggregation and integration (e.g., generation, storage, and load for demand-side participation).
- Building technologies and grid integration including, residential and commercial building automation and system integration, including consumer appliances, building controls, building energy management systems, electronics, and electric vehicles.
- Legislative, regulatory, and economic electricity policy.
- Incorporation of environmental externalities into system operations, including energy efficiency and sustainability aspects.
- Telecommunication wide-area networking (e.g., metering, SCADA, remote management systems).
- Consumer and consumer advocacy (includes industrial/commercial energy acquisition and management).

Jaime briefly reviewed the Call for Candidates page for new GWAC candidates. He noted that a letter of support is needed from employers but for those who are self-employed a letter from the organization is needed to show proof that the level of commitment (time) is understood.

Jaime read the GWAC Mission and Vision statement which was recently refreshed.

Jaime also noted that the DOE provides administrative support to the GWAC, but the GWAC itself is an independent organization and can determine its own mission aside from the current DOE administration.

Jamie said the Council will determine its own direction.

Kay noted that efficient and affordable energy is needed.

David Katz, Canada, commented that NARC includes Canada. He suggested bringing in a Canadian perspective to the GWAC. He noted that land use regulations there prioritize for food over wind power.

Yashar is finishing his PhD in economics. He has talked with various smart grid companies, some of his research is on work in Washington state. He doesn't see DERS going away. He stressed the importance of DERs.

James Orenstein - has been involved with community solar, block chain and TE. He will be at DTECH. HE noted that Texas PUC has a lot of changes coming to interconnection policies. He said he is really looking forward to the presentation by Sean Chandler.

Jaime noted that Matt McDonald may present on DSO in the near future.

Jeff Katz gave a brief overview of his history with the GWAC. He was a member from 2007 to 2014. He is a former CTO for IBM and at the time worked closely with Ron Ambrosio. He is a senior member of IEEE and was a part of the work group to develop the P2030 standard on smart grid interoperability; he served as chair of the first task force. He has organized a Conference on Cyber Security and on a precursor of data science. Smart Grid as IOT, Smart Grid Architecture and Smart Grid Cyber Security. During that time, he worked closely with Jeff Taft. He raised the issue of new ideas regarding Nuclear Energy.

Jaime said it is another tool in the tool belt. We can keep it in mind as we look at other DERs. He noticed that Amazon and other companies are looking at investing in nuclear energy.

Lorenzo commented that a nuclear plant is not decentralized. He sees GWAC as pursuing more distributed systems.

Ron A. commented that the need for "centralized" will not go away. He said the type of centralized energy such as nuclear, or fossil is still going to be there. We need to look at how to architect for both centralized and decentralized.

Lorenzo agreed with Ron A. but added that centralized is not the focus of the GWAC.

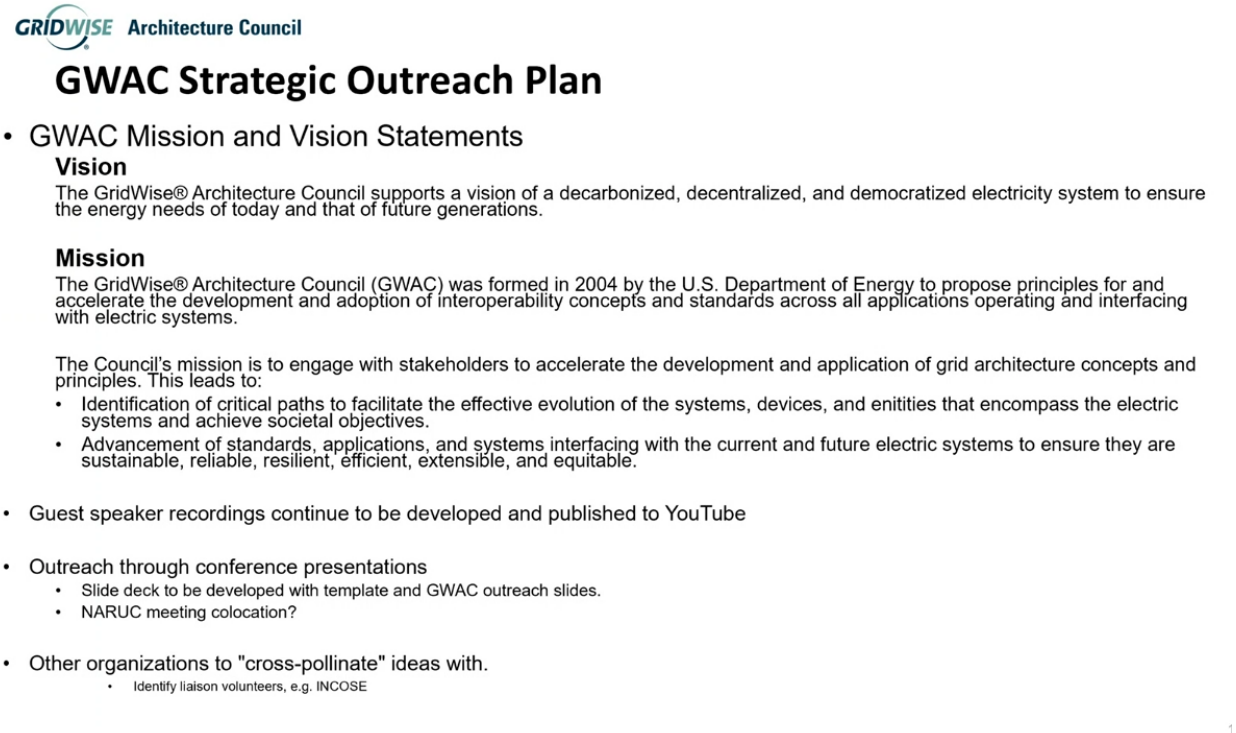
Jamie said that modern small nuclear reactors, SMRs, are less centralized that reactors of the past.

Ward Camp is an Emeritus member on the call today. He is working in Connecticut on a pilot program to gather information from appliances, using the same sensors to statewide activities. He sees the importance of the ability to have a good, distributed intelligence platform for the utilization of data. The utilization of data is still siloed and centralized; he is looking at how to take it up to DSO levels. He works for a company that has strong Canadian ties and he is interested in what they are doing. He appreciates the efforts of Canadians in the area of resilience and reliability.

Jaime suggested that Ward talk with GWACs Mark Ortiz who is looking at data curation and related challenges in that area.

GWAC Tutorial

Jaime invited the group to attend the GWAC tutorial panel presentation AHR and also to participate in the no host dinner with the ASHRAE group that Ron Bernstein is arranging.



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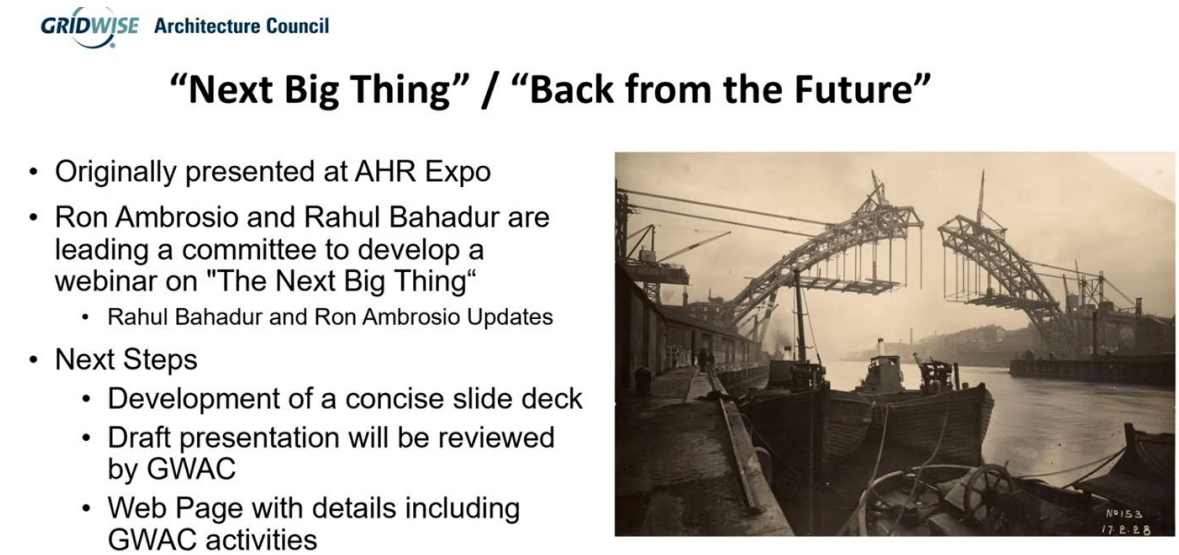
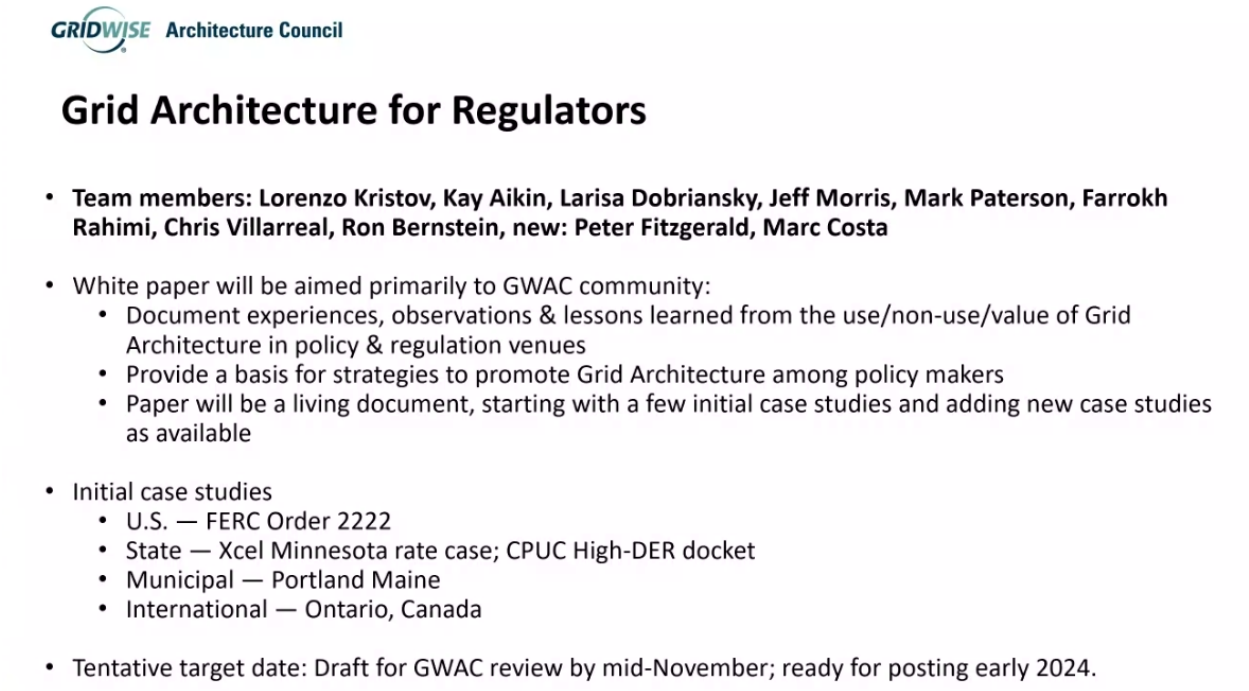
Jaime noted that GWAC will participate with RE+ again this fall. Jaime and Ron Bernstein have had preliminary conversations with Aaron Smallwood.



Ron Ambrosio said that the work group has revised comments a second time from feedback sent by Kay, Marc, and Aaron. Changes have been discussed and incorporated as the committee felt appropriate. Rahul Bahadur is also helping to lead this. Their target was a 45-minute talk so that with Q&A it would be one hour to fit the timeslot for AHR's educational seminars. They have increased to one hour of content and are now working on the last clean up edits. They will have it ready very soon for the Council to review it and collect comments. Jaime suggested a dry run. Ron A. said it may need to be a separate meeting since it is one hour but that sounds good.



Lorenzo met with Marc Costa met last week and determined where they want to go and how to approach it. Meetings will resume in January. They are discussing the audience and what they are trying to accomplish. Often content is perceived as too complex. They want to offer Grid Architecture as a tool and methodology for decision makers. They recognized as a team that they need to come up with a problem statement to help the finalization of the paper. If anyone has ideas on this, they are invited to join the work group.

Jaime said a checklist, similar to DMC, could be helpful to people with limited time and attention spans. He said the DMC rewrite gave perspective for various audience members. He thought one for regulators and one for utility people who may present to a regulator would both be helpful.

Ron Ambrosio liked the idea of a different message for different audiences.

Ken agreed that something to inform both regulators and utilities would be valuable.

A Doodle Poll that Marc sent out to determine the meeting time went out. Jaime did receive it.

Kay said they need to modify the Target Date since they are moving into 2025.

Lorenzo said "soon" might be a better date.

GRIDWISE Architecture Council

Applying Grid Architecture Concepts to Bridge Back from the Future Grid

Building on the previous GridWise Architecture Council work products, this document attempts to provide a roadmap for operators, planners, developers, integrators, and policy makers as guidance to develop interoperable systems that will architect the grid of the future as described in the future states. This paper will include discussions of motivating participation of customer owned assets and opportunities for avoided costs by working toward a long-term vision rather than only short-term needs. This document will be completed in FY24.

- Committee : **Mark Paterson**, Marc Costa, Ron Ambrosio, David Forfia, Kay Aikin, Lorenzo Kristov, Farrokh Rahimi, Aaron Snyder,
- 2:00 PM PT/ 5:00 PM ET Thursday 2 times 1st and 3rd Thursday of the month

Kay gave an update on the status of the paper. The original concept has moved from 20 to 30 pages now.

Kay had sent to Jaime and Mark Paterson on December 10.

Aaron asked if it could go out to all of GWAC. Kay said yes. Aaron said that will help GWAC to be prepared for the final review.

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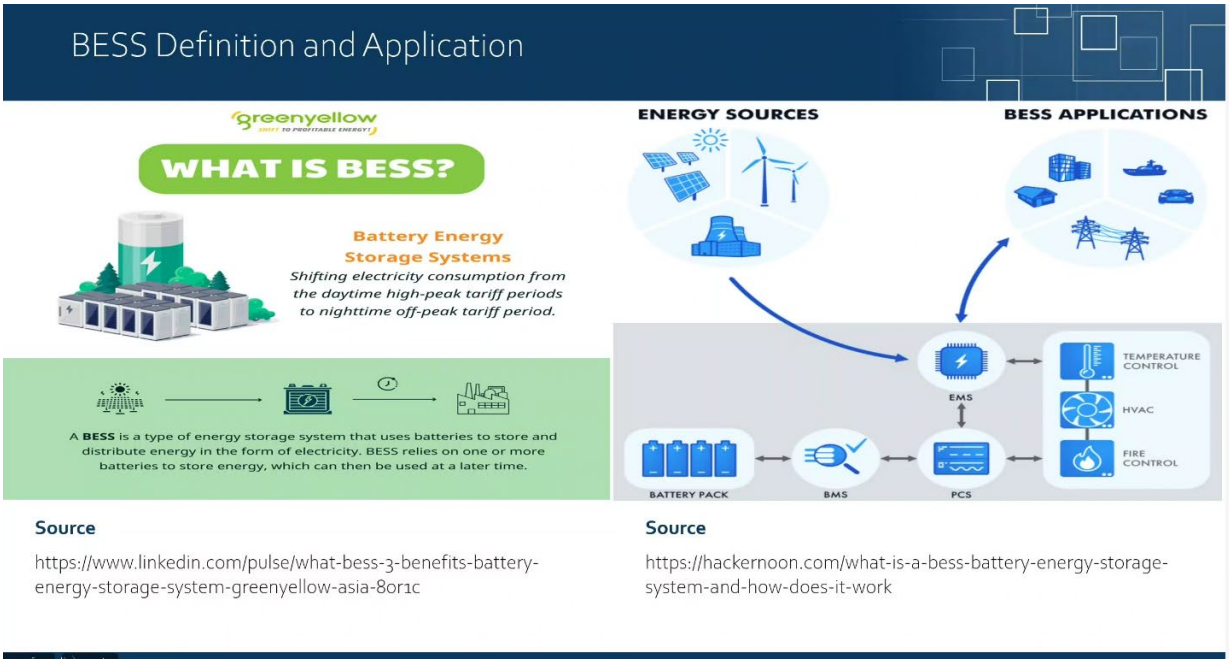
GRIDWISE Architecture Council

Grid Architecture Concept Model for Transportation Electrification

Analyze various visions of the electrification of fossil fuel-based systems and identify areas where GWAC concepts could provide architectural value to bridge and coordinate between customer and grid objectives. Electrification will introduce dependencies such as those seen in the transportation sector due to electrification. Grid Architecture will be used to describe the touchpoints (for example through sector coupling) that will require collaboration. GMLC reference cases will be included. This activity will take place in FY24 and be completed FY25.

- 15-20 page whitepaper
- Committee: Jaime Kolln, Ron Cunningham, Farrokh Rahimi, Mark Ortiz, David Forfia, Aaron Snyder, Lorenzo Kristov, Bhaskar Mitra, Paul DeMartini
- Request for Transportation Electrification/VGI business case documentation
- 1:00 PM PT/ 4:00 PM ET, 2nd and 4th Tuesday of the month starting in January

Jaime invited Aaron Snyder, EnerNex to present in lieu of the paper update and introduced him as today's presenter.



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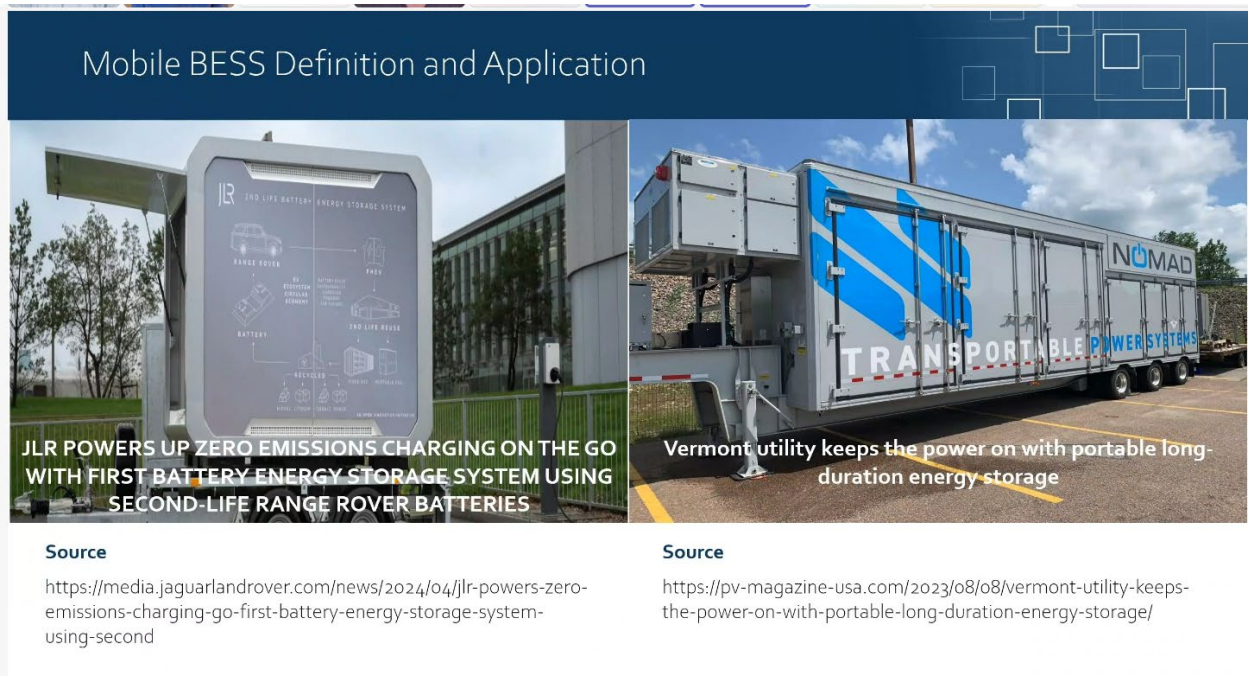

Left hand side is a 2nd life system. After they are no longer useful in a vehicle they can still be used.

There are about 3M on the road in the US today:

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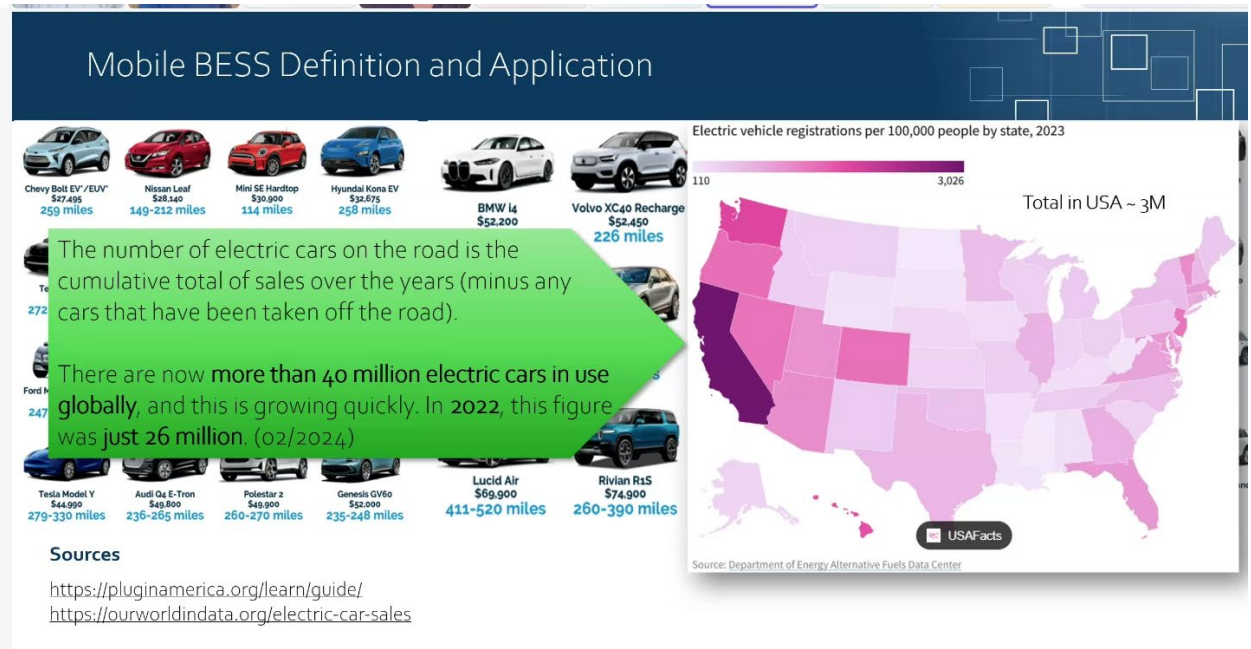
There are about 40M worldwide. Use has doubled in last two years.

US distribution is not evenly spread out.



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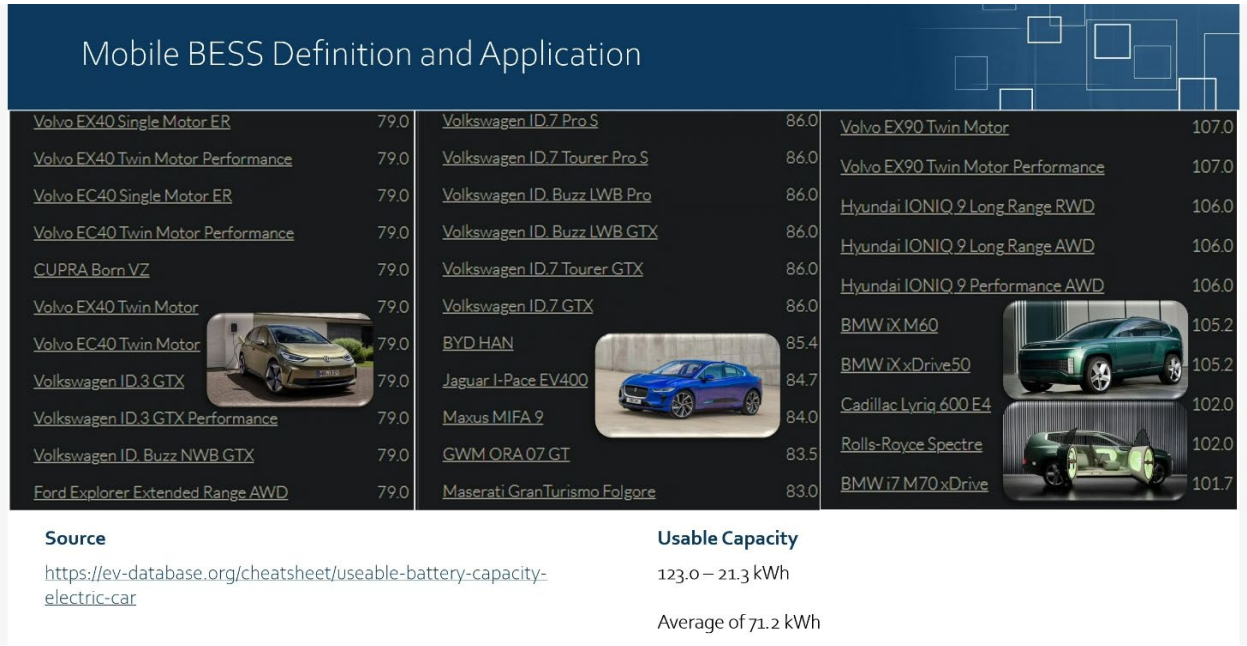
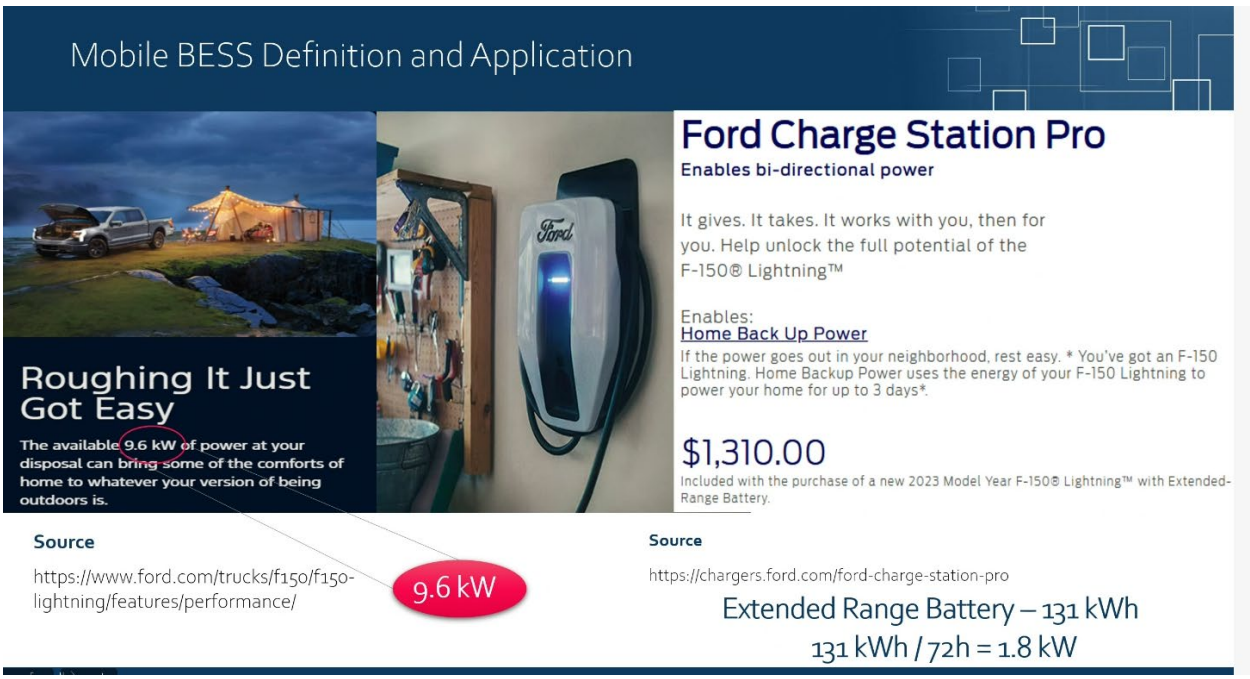


Values shown are in KW hours represent the capacity of the batteries.



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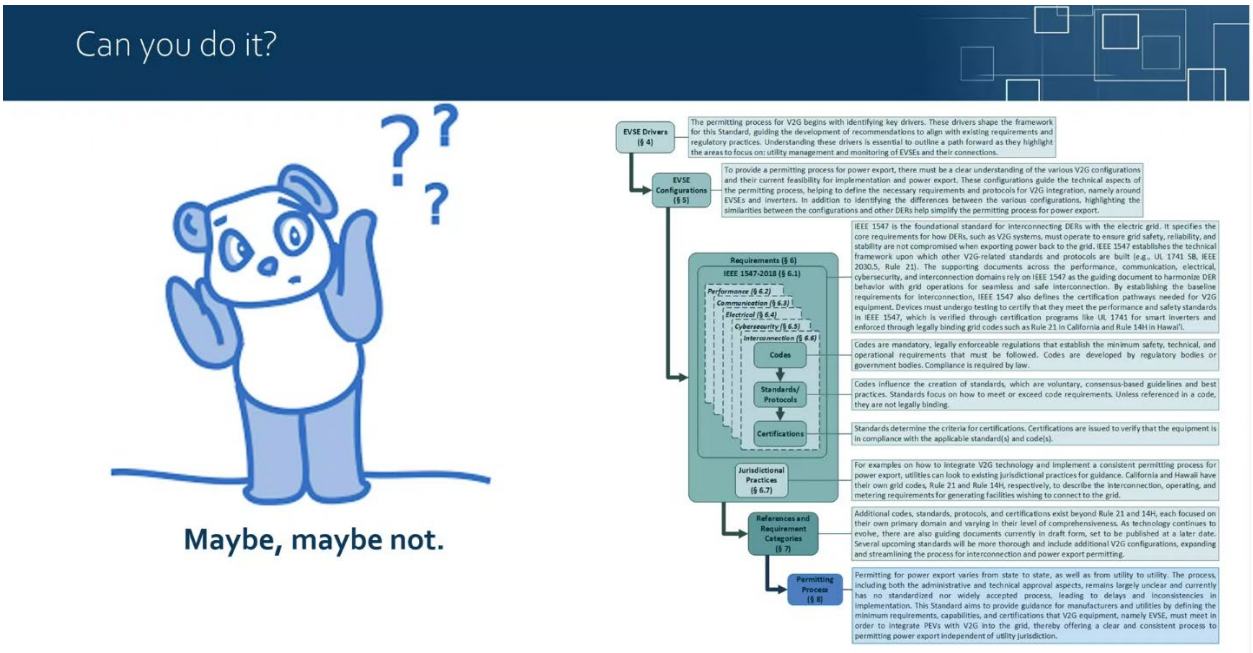
Batteries are sized based on the maximum capacity, but likely people will not use them to 0. When using a battery say for camping, the user must leave enough energy to start the vehicle to leave the site.



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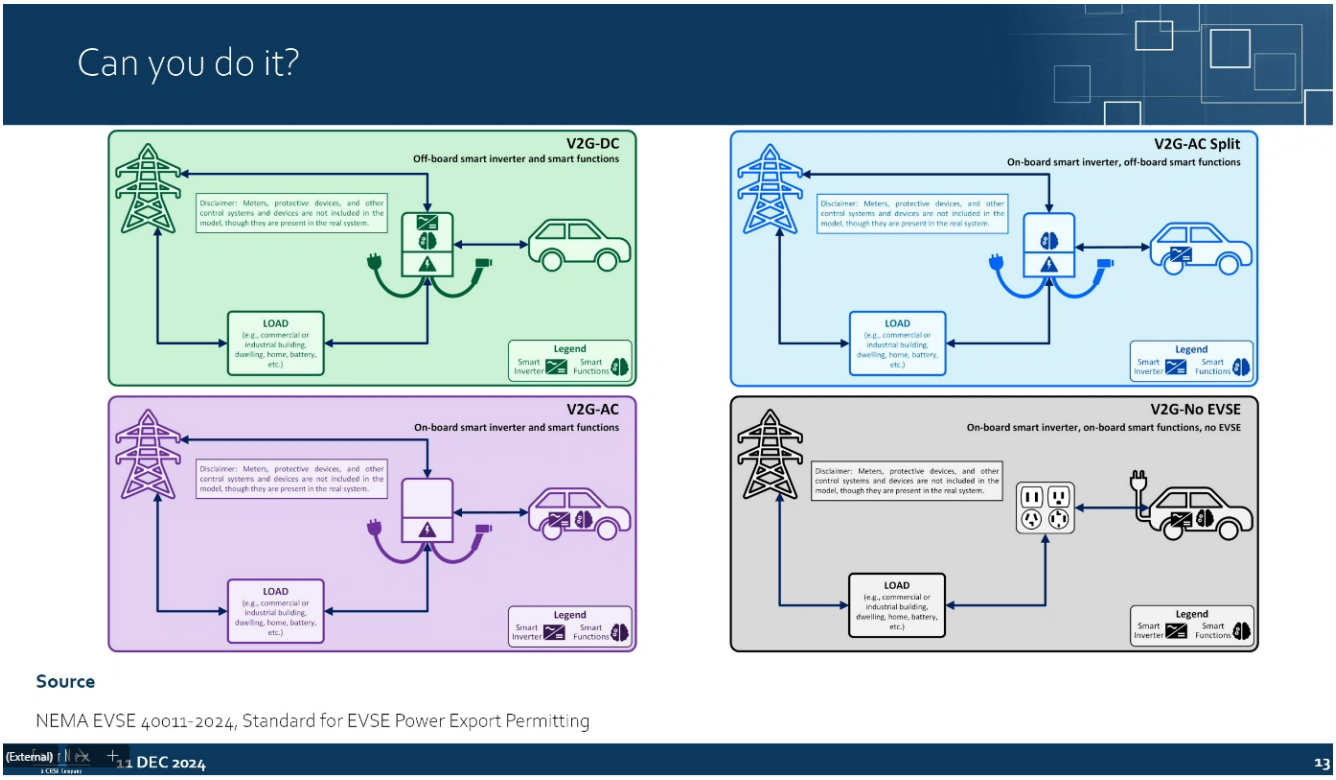

Complexity = cost

If the inverter fails would the car have to be replaced?

Does everyone want this if it is a standard?

Almost every standard is evolving.

Each standard looks from a different way.

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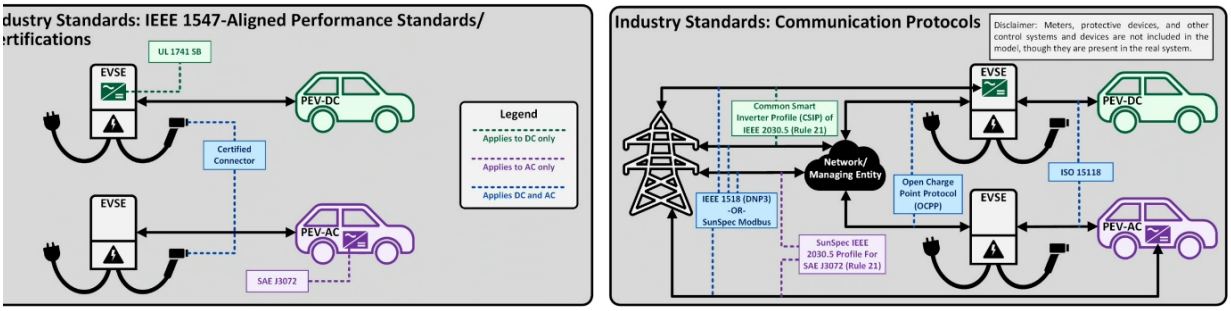
Can you do it?



Do you like standards? What do you need to know? This is the starting list.

UL 1741 SB, SAE J3072, IEEE 2030.5 CSIP, IEEE 1518, SunSpec Modbus, OCPP, ISO 15118.

Also, IEEE 1547.1, 1547.3, 1547.9; NFPA 855, NFPA 70/NEC; UL 9741; SAE J3400.

Source Also, CA Rule 21; HI Rule 14H; MD HB1256.

NEMA EVSE 40011-2024, Standard for EVSE Power Export Permitting

Aaron noted that California has an 8-step process.

Are you in SCE territory?

You = Applicant

Southern California Edison (SCE) V2G-DC Permitting

Those wishing to request interconnection service for V2G-DC systems in SCE territory must follow the specific, well-defined process as stipulated by SCE. Currently, V2G-AC interconnection is not allowed. The full details of the Interconnection Request submission process and subsequent reviews and studies can be found in the Rule 21 Tariff . A high-level summary of the request, approval, and installation process is as follows :

1) Pre-Application (Optional): The applicant can request technical information regarding SCE's electric system around the potential interconnection site. As part of this information request, the applicant must provide details of the proposed site, the line and level voltage being considered, and a non-refundable processing fee. In turn, SCE will provide available system data .

2) Submit Interconnection Request Application: Applicant must complete and submit Rule 21 Exporting Generator Interconnection Request (Form 14-918) along with the following:

a) A single-line drawing
b) Site/plot plan drawing
c) Proof of Site Exclusivity
d) Diagrams, manufacturer's data, written descriptions of the generating facility
e) Non-refundable application fee

3) Obtain "Distribution Service ": Applicant must complete and submit Distribution Service Request to be able to use SCE's distribution system to transport energy from point of interconnection with SCE system to CAISO system.

4) Validation of Technical Data: Upon submittal of the application package, an SCE engineer will perform a validation of all technical data provided and verify that the application package is complete and correct.

5) Review(s) and Additional Studies (if necessary): Once validated, the project goes into review by SCE to identify how the project can be interconnected to SCE's electric system safely and reliably. Depending on project size and complexity, SCE may conduct one or more reviews and studies. Regardless of the study process, all projects must meet or exceed the requirements in §Hh: Smart Inverter Generating Facility Design and Operating Requirements for UL 1741SB. Depending on the results of the review(s), the applicant has the option to request a meeting with SCE to discuss the results of the review/study and the modifications required, if any.

6) Interconnection Agreement Issued: After all reviews, studies, and modifications are complete and technical requirements are satisfied, SCE will provide Applicant with Draft Generator Interconnection Agreement. Applicant must review, sign, and return to SCE.

7) Installation and Testing: Upon executing Interconnection Agreement, the Applicant and their third-party contractor can begin device installation and subsequent commissioning testing, all overseen by SCE. The minimum required commissioning tests are provided in Rule Section L.5: Commissioning Testing, including:

a) Over and under voltage
b) Over and under frequency
c) Anti-islanding function (if applicable)
d) Non-exporting function (if applicable)
e) Inability to energize deadline
f) Time delay on restart after SCE source is stable
g) SCE system fault detection (if used)
h) Synchronizing controls (if applicable)
i) Other interconnection protective functions that may be required as part of the Generator Interconnection Agreement
j) Applicable communication failures
k) Paralleling device failure to open (if applicable)
l) Visual inspection of interconnection equipment and protective settings

Note that additional tests or studies may be imposed (e.g., trip tests, in-service tests).

8) Test Result Review and Verification: SCE will review the results of the commissioning testing and confirm that all criteria have been met. Once commissioning test results are verified, SCE will issue an authorization for interconnection, referred to as "Permission to Operate" (PTO). Only after receiving a PTO may the Applicant, now Producer, begin to export power.

You → Producer

n Snyder (External) | 11 DEC 2024 | 15

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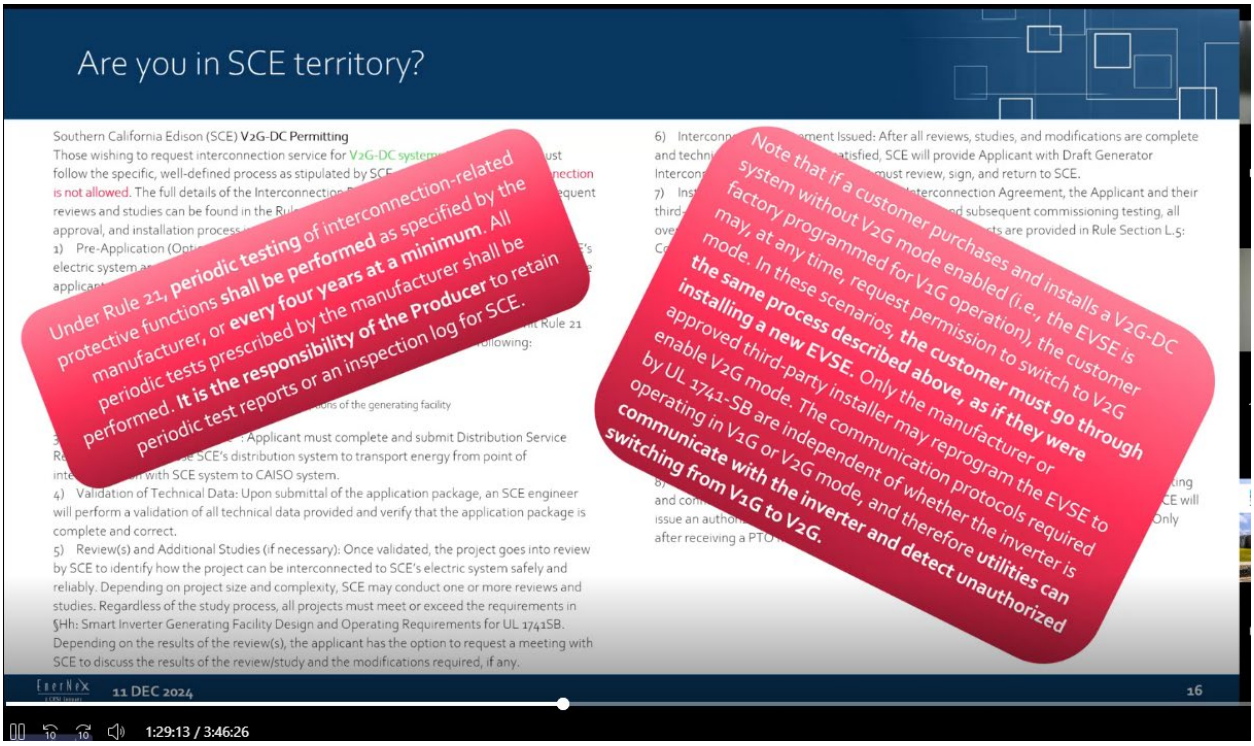

Ron A

GRIDWISE Architecture Council

Liaison Reports

- NIST – David Wollman
- Green Button – Jeremy Roberts
- EPRI – Sean Crimmins
- IEEE PES – Farrokh Rahimi, Mark Siira – SC21, IEEE 2030 Update
- ASHRAE, DLC (Design Lights Consortium) – Ron Bernstein
- ISO/IEC, IREC – Ken Wacks
- SEPA – Aaron Smallwood
- NARUC – Jeff Morris

- *Are there other organizations we should be hearing from?*

ISO IEC – Ken Wacks said they had two more standards published this week on enhancing the residential gateway. We've come up with an architecture for the gateway that includes a single unit, distributed units, and enhanced with cybersecurity protection. So, the gateway serves as a sentry. We are now working on using the gateway as a platform for applications starting with energy management using a standard that was published about a month ago.

Our updated framework for energy management which Ken led the development on, is based on discussions from GWAC and other meetings for integrating DERs with transactive energy and grid scale power. As usual we will be having two group meetings next year; one in spring and one in fall which are expected to be face to face tentatively in Ireland.

IREC – Ken noted has had a series of presentations along the topic of Aaron Snyder's talk today. Ken wanted Aaron to know that he had heard from an engineer located in Simi Valley, California who dealt with Southern California Edison when he put solar on his roof. He also put in a stationary battery, and he has electric vehicles. So, he has experienced all the issues that Aaron presented here today.

From his talk we learned a lot about the installation company that he dealt with and his dealing with a local inspector and with So Cal Edison.

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December 11, 2024

Some of the materials presented were captured and are available at the IREC Customer Grid Edge website. If you are interested just put in IREC CGE and it will take you to our home page. The next meeting will be Friday, December 20th. The featured speaker will be Jackson Wang, the CTO of E Radio. He will talk about consumer metrics, and the electric vehicle equivalent to dollars per gallon. Jackson has been very active in the data side of smart grid; he developed an FM broadcast system to distribute energy prices.

Ken invited everyone to join the one and a half hour meeting at 1:30pm Eastern time this Friday. The meetings are open to anyone in this industry at no charge. On the site we have summaries of most presentations and there is a place where you can sign up to get meeting announcements. David Katz who is on this call today will be one of the January presenters.

Ken thanked GWAC for opportunity to present this information.

Jaime Kolln added that Jackson is a fantastic speaker and does a good job at tying the technology to the business case. Jaime has worked with him on some of the E radio pilots for water heaters, EV chargers, heat pumps and many different things and Jaime added that Jackson is very engaged with this information, his talks are very enjoyable.

Ken said Jackson has been a popular speaker and they try to get him scheduled at least once a year. He has been expanding his data distribution network to manage EV charging.

Larisa Dobriansky suggested adding a liaison in the area of energy storage and V2G, etc. More liaisons in this space could give updates on the progress of this area of technology. She and Jaime discussed some ideas about potential liaisons. She felt the state regulatory agency commissions will need to look more at energy storage in their interconnection processes. So far only five jurisdictions in the US are moving in energy storage in the interconnection process.

Acting chair Ron Ambrosio said that is it for liaison updates and adjourned the meeting.