Meeting Minutes

April 19, 2023

GWAC Members

Ron Bernstein, GWAC Chair and President RBCG, LLC

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

Ron Ambrosio, Independent Energy Transformation Professional

Andrew Bordine, VP Energy Mkts & Innovation, Anterix

Ron Cunningham, IT Enterprise Architect, American Electric Power

Paul De Martini, Managing Partner, Newport Consulting

David Forfia, Principal Consultant, Utilicast

Ahlmahz Negash, Sr. Power Analyst, Tacoma Power

Mark Ortiz, Lead Architect, Schneider Electric, New GWAC member

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

Aaron Snyder, Dir. of Grid Technology Consulting, EnerNex

Leonard Tillman, Partner, Balch & Bingham, LLP

Jeff Morris, Dir. State Gov. Relations, Schneider Electric

James Mater, Quality Logic

Ken Wacks, Home, Building & Utility Systems

GWAC Friends

Robert Bass

Philip Court

Sean Crimmins, EPRI

Larisa Dobriansky

Ben Ealey, EPRI – guest speaker

Alex Ghanem

Xinkun Nie

James Orenstein

Mark Ortiz

Robby Simpson

Aaron Smallwood, SEPA

Seemita Pal, PNNL

Anant Venkateswaran

David Wollman, NIST

GWAC Associates & Emeritus

Rahul Bahadur, Sr. Mgr. R & D, VMWare, Inc.

Marc Costa, Director of Policy and Planning, The Energy Coalition

Mark Knight, 1898 & Company

GWAC Members and Assoc. not present

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

Mark Paterson, Managing Dir., Lead Systems Architect, Strategen

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PNNL Support

Susan McGuire, GWAC Coordinator

Ron Melton, PNNL Administrator

Jaime Kolln, PNNL

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Ron M opened the meeting at 10:08am and played the Proprietary notice

GridWise® Architecture Council

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PowerPoint Slide Show - [2023 APR GWAC DRAFT Meeting slides]

Conferences and Events

Date	Event	Location	Attend	Speak	Topic
May 2 – 3, 2023	NEEA Efficiency Exchange (EFX) 2023	Portland, OR	Marc Costa, Hayden Reeve	Marc, Hayden	Energy Efficiency
May 16 -17, 2023	Microgrid Knowledge	Anaheim, CA	Kay Aikin, Jaime Kolln		
June 24 – 28, 2023	ASHRAE Summer Meeting	Tampa, FL	Ron Bernstein	Ron	Interoperability, Integration Design, Cyber Security, Enterprise to Building Automation
Jul 16 – 20, 2023	IEEE PES General Meeting	Orlando, Fl	Ron A, Ron M, Others	Ron M	Meeting the Energy Needs of a Dynamic World
Sept. 11-14, 2023	RE+ Solar Power International	Las Vegas, NV			SEPA
Sept. 12 -14, 2023	T&D World	Sacramento, CA		Aaron S	Future distribution grid
Nov 6 - 9, 2023	ISGT Latin America	San Juan, PR			Disaster recovery and network transformation in times of climate Change

Introduction

Marc Costa mentioned an upcoming meeting, "California Climate and Energy Forum," to be held in Santa Rosa, CA in mid-June. They are looking for speakers on grid topics. Marc will be presenting.

Action: add this meeting to the conference list. Marc provided the URL:
https://eecoordinator.info/about-the-forum-2023/

Jaime Kolln noted the upcoming GridForward 2023 meeting to be held in October at the Skamania Lodge in the Columbia River Gorge. This meeting was formerly called Smart Grid Northwest. Acton: add this to the list. https://gridforward.org/conference/gridfwd-2023/

Ron Melton, Jaime Kolln, and Paul DeMartini will attend the IEEE *ISGT Latin America* in November to be held in San Juan, Puerto Rico.

Farrokh Rahimi said that he is interested in attending. The meeting link is: https://ieee-isgt-latam.org/

Jaime noted that Ron Bernstein and Ron Cunningham have provided the MP4 recordings of their panel presentation from the AHR Expo.

Ron M. said that has completed the script of his talk.

Ron A. is working on his and hopes to have it soon.

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Actions

- GWAC participants who have suggested topics or presenters please let Jaime Kolln, Ron Melton, and Ron Bernstein know and copy Susie.

- Speakers from AHR Expo to record presentations

- Look into speakers for future GWAC meetings. Possible speakers: DOE EERE

- Create a GWAC database of presentations for future talks and a speakers bureau post on the website.

- Create a catalogue of speaker materials with links.

- Add a discussion of the GWAC Mission statement to a future GWAC meeting

James Mater is planning to present at the GWAC meeting in June.

Action: Schedule James Mater to speak in June

Michael Murray with Mission Data will speak at the May GWAC meeting.

Jaime Kolln has asked Chris Irwin, DOE, if he would like to talk with GWAC and he indicated that he is hoping to join the May meeting.

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GWAC

GWAC Projects Matrix

Kay Aikin will submit a blog post soon.

Ron Cunningham said the Future States paper is in final stages and will be cleared in PNNL Information Release

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Ken suggested we note the three GWAC documents that were published internationally with ISO/IEC. Ken will send information about this to Jaime and Susie.

Action: add the 3 ISO/IEC documents to the GWAC history slide

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Jaime noted the GWAC YouTube Channel has been created. We can link to it from the GWAC website.

Lorenzo is looking at integrating DERS in the system. It might be a good topic for a GWAC blog post or video.

Ron Melton said we have had a discussion at the Fall F2F meeting in Atlanta on where BTTF was still somewhat fuzzy. What Lorenzo said may help us get more focused and sharpened.

Paul De Martini noted that EPRI and ICF are working on the future of the grid with DOE's Joe Paladino.

Marc said he could see a tie in with the new Future States/Vision paper. He gave examples from California. He said regulators and utilities are trying to do the right thing – but we're not all thinking about the same things. If we could help people get on the same page and understand each other that could be very helpful. He is learning from this group and should help the regulatory community.

Lorenzo said in the past he saw groups working and not interacting well, which led to groups going in different directions.

Ron M. added that gaps in technology deployment, was a problem.

Paul D. and Lorenzo have discussed this as well. Some at CAISO are still talking about the old school view of the system.

Ahlmahz Negash said she wanted to mention what Marc said – she is reading up on what is happening in California such as income dependent fixed charges. She asked about new rate proposals.

Marc mentioned that with the community behind the meter resources there is a method he would like to tease it out. This group is a good unbiased resource. This might be a good definition or vision of GWAC, an unbiased thought resource.

Ron M. reiterated the thought behind incremental changes vs a focused redirect.

Jaime K. would like to note that California is on the cutting edge and their commission is struggling as is the rest of the country. He suggested that GWAC could present on the GWAC Decision Makers Checklist. He asked that the group consider what we could we recycle and frame? He asked the group to let him know their ideas

Guest Presenter

Jaime introduced Ben Ealey with EPRI who will be giving us an update of work they are doing.

EPRI Annual Maturity Study

DER Protocols & Information Standards

Ben Ealey
Manager, ICT for DER Integration

4/18/2023
GridWise Architecture Council

About Me

- **EPRI (Knoxville, TN)**
  - Manager, DER Data and Connectivity Group
    - DER Gateway Phase 2 Project
    - CEC 15-313 – DNP App Note for DERs

- **IEEE Roles**
  - *Secretary*, IEEE P2030 Smart Grid Interop Model
  - *Member*, SC21 Distributed Generation, Energy Storage and Interoperability Standards Committee
  - *SC21 Delegate*, Energy Storage Coordinating Committee (SC21 & ESSB)
  - *Lead*, IEEE 1547 Interoperability Subgroup
  - IEEE P1815.2 – DNP App Note for DERs

https://www.linkedin.com/in/benealey/

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EPRI's DER & Data Connectivity Program
2022 Summary of Activities

Emerging Technologies Reports

- **IoT Protocols to Integrate DERs**
  Identify high-priority applications for IoT technologies in utility-centric DER applications.
- **Decomposing FERC O2222**
  Assessment of the impact of FERC O2222 on utility IT and OT systems.
- **DER Interoperability Needs for 2030**
  Developing tools and resources for utilities to specify protocol requirements and validate their implementation.
- **ICT Networks to Integrate DER Technologies**
  Perspectives on the comm networks that integrate DERs.
- **DER Gateway Reference Architecture**
  Reference architectures based on EPRI's DER Gateway requirements specifications.
- **Demand Flexibility for Reliability & Resilience**
  Study on the grid improvements and updates needed to support demand flexibility

Training Materials

- **ICT for Monitoring, Management, and Configuration of DERs**
  The Value of a Grid-Connected DER, ICT Fundamentals for DER, ICT Maturity, Private Long-Term Evolution (LTE) Network, Standards to Streamline Grid Interoperability. Standards and Architecture to Integrate DERs

Guidebooks

- **EPRI Protocol Reference Guidebook – 6th Edition**
  Assessment of Info and Protocol Standards for DER, EV, and Demand Response Technologies
- **DER Interoperability Guidebook – 2022 Edition**
  Info and Case Studies to Support Utilities in Achieving Interoperability with DER and DR Technologies

Webcasts

IEEE 1547 Action Required
Reading Between the Lines

EPRI's recommended actions for utilities on DER interoperability.

FERC Order 2222
Importance of ICT Standards

EPRI's perspectives on ICT stds and architectures for FERC Order 2222.

DER Gateways
Applications of DER Gateways

Sneak peak at findings from EPRI + partner utilities on this new tech.

DER Data and Connectivity Task Force – May
Mid-Year Overview
FERC O2222, DER Profiles, IoT and Role in DERs, Standards Speed Dating, and Guidebook Updates

DER Data and Connectivity Task Force – December
End-of-Year Overview
2022 Results, Southern's Managed Charging Pilot, EPRI's Storage Data Guidelines, 2023 Topic Prioritization

EPRI Annual Maturity Study – 7th Year
Protocols & Information Standards

- Standards and protocols, the keystone to interoperability

- Standards are rapidly evolving, difficult to track

- Maturity can impact success

- EPRI evaluates protocols against six key criteria to determine maturity & gaps
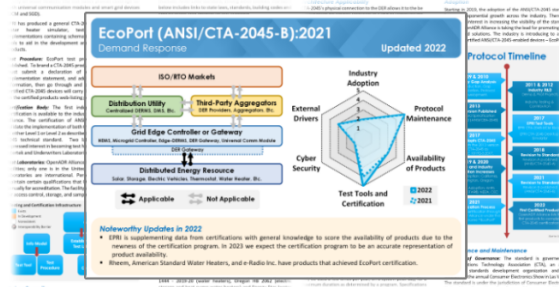
Protocol Reference Guide 6th Ed. (2022)
3002024179

Public, Free Version
3002023419

An annual assessment of common DER info and protocol stds

This gives us a chance to track the maturity of these protocols and what gaps are, where industry is going.

Communication Protocols in the PRG

Application Focus	Standard Name	Technical Name
Demand Response	Modular Communications Interface for Energy Management	EcoPort (ANSI/CTA-2045:2018)
	Open Automated Demand Response	OpenADR / IEC 62746-10-1:2018
DER Group Management	Standards for Information Exchanges Between Electrical Distribution Systems	IEC 61968-5:2020
	Standard for Smart Energy Profile Protocol	IEEE 2030.5-2018
Electric Vehicle	Open Charge Point Protocol	OCPP
	Road vehicles - Vehicle to grid communication interface	ISO/IEC-15118:2019
	Standard for Smart Energy Profile Protocol	IEEE 2030.5-2018
Energy Storage Smart Inverters (e.g. solar, storage, and energy storage)	Communication Protocols for Intelligent Electronic Devices at Electrical Substations	IEC 61850 Series and IEC 61850-7-420:202
	DNP3 Profile for Communications with Distributed Energy Resources	IEEE P1815.2 (DNP3) & DNP AN2018-001
	SunSpec Modbus	SunSpec Modbus
	Standard for Smart Energy Profile Protocol	IEEE 2030.5-2018
	MESA-DER	MESA-DER
	MESA-Device	MESA-Device

Other standards covered at lighter level (e.g. EEBus, ICCP, OpenFMB, MATTER, IEC 63110)

Standards classifications – this format was chosen to be easily understood, not as technically correct.

Protocol Evaluation Methodology

Key Criteria

- Overview of the Protocol
- Relevant Data and Information Models
- Adoption
- Governance and Maintenance
- Devices and Technologies
- Implementation
- Test Tools and Certification
- Cyber Security
- External Drivers in Adoption
- Relevant EPRI Reports and Projects

Maturity Model

- Market Penetration
- Protocol Maintenance
- Availability of Products
- Test Tools and Certification
- External Drivers in Adoption
- Cyber Security
- Industry Adoption

Architectural Applicability

Protocols can be applied in one or more areas within the greater communication architecture. The Architecture Overview describes where the protocols are most often applied in the field.

Maturity Tracker

	Score	Justification	5	4	3	2	1
Market Penetration	2	Adoption is mostly focused on a handful of vendors.	Widely adopted		Moderately adopted.		Zero adopters
Protocol Maintenance	3	The protocol is being active maintained by the industry. Efforts are underway to establish maintenance and certification.	Quickly Maintained		Maintained		Stagnant
Availability of Products	2	A handful of devices are available. Limited UL certification exists for the handful available.	Products Widely Available, 100s of models		Some Products Available, 10s of models		No products available
Test Tools and Certification	3	Tools are available but no certification.	Test tools and certified devices are available.		Test Tools OR Certification		No Test Tools or Certification
External Drivers in Adoption	5	Not required by any regulatory bodies but it fits the requirements for IEEE 1547.	Included in Most Applicable Grid Codes, Energy Star, or other Requirements		Included in One or Some Applicable Grid Codes, Energy Star, or other Requirements		Not include OR Excluded in Grid Codes, Energy Star, or other Requirements
Cyber Security	5	Standard requires cyber security features for certification.	Well defined in standard with versions and conformance testing.		Mentioned with versions.		Security is not mentioned.
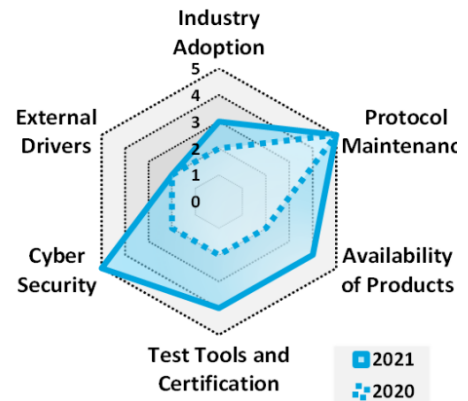
Architectural Applicability
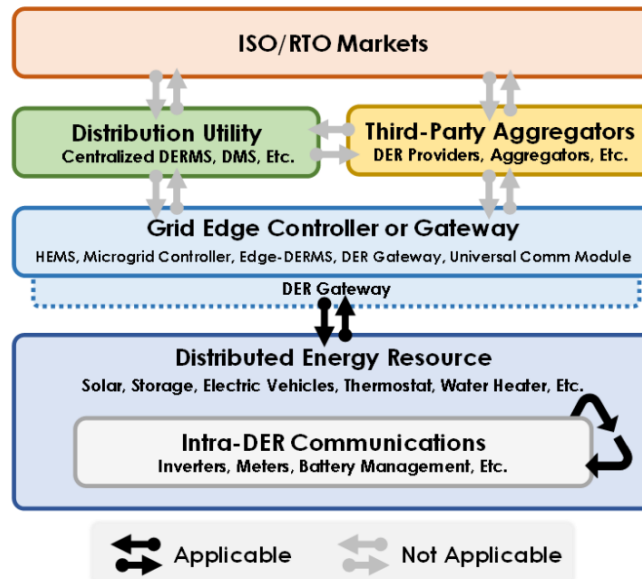
Protocol Timeline

➢ Provides a visual of the major milestones

➢ Gives an overview of the timeframe between milestones

➢ Provides as deeper understanding of the *progress/hurdle*

➢ Supports the maturity and adoption assessment

External Drivers in Adoption

▪ Tracking activities, regulations, etc that may impact adoption

▪ CTA-2045/EcoPort Example

| Entity / Source	Title
Northwest Energy Efficiency Alliance	Advanced Water Heater Specification
Consortium of Energy Efficiency	CEE Residential Water Heating Specification
Air-Conditioning, Heating, & Refrigeration Institute	AHRI 1380 (I-P) Demand Response through Variable Capacity HVAC Systems in Residential and Small Commercial Applications
	AHRI 1430 Standard for Demand Response for Electric Water Heaters
Environmental Protection Agency's ENERGY STAR® Program	ENERGY STAR® Program Requirements Product Specification for Residential Water Heaters Eligibility Criteria Version 3.3 Draft 2
Oregon State	House Bill 2062 – 2021 Appliance Energy Efficiency Stds
Washington State	House Bill 1444 – 2019-20 Appliance Efficiency Standards
California Energy Commission	Appendix JA13 Qualification Requirements for Heat Pump Water Heater Demand Management Systems
	Express Terms, 2022 Energy Code, Title 24 Parts 1 and 6

Latest Additions

▪ **Incorporating Profiles**
  – CSIP, SunSpec for IEEE 1547-2018, SunSpec V2G Profile, SEPA EV Profile

▪ **Protocol Harmonization**
  – Architecture Proximity
  – Capability-Based Proximity

▪ **Testing and Certification**
  – Tracking key activities for T&C
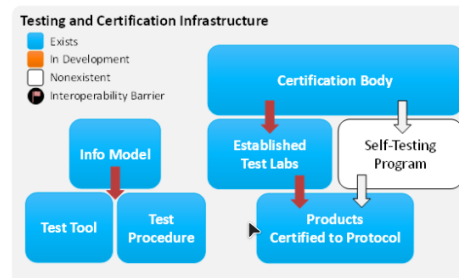
Latest changes by utility member request.

Maturity Trends

▪ Semantic interoperability, a big change in the status quo

▪ Interoperability between standards is not guaranteed

▪ Protocol maturity varies by device domain

▪ Grid codes are driving DER standards adoption for generators

▪ Profiles are on the rise – a key tool for precision & adoption

▪ Testing continues to show that features of products can be a barrier to interoperability

▪ More work needed on scalability for grid-edge applications

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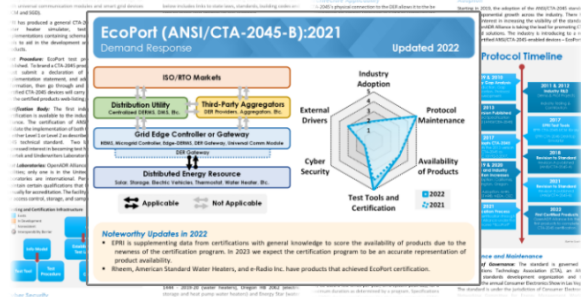
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Post Talk Discussion

Regarding 1547, Ben E. noted that with operating standards in parallel regarding how to integrate, we really don't fully understand how they might be interoperable.

Ron A. mentioned that profiles have been a double-edged sword in standards work. He added, that trying not to break interoperability for the broad community when profiles are added, has been a concern.

Ben agreed with him.

Marc said in his experience the API is not public. He said the mac address will call the API. He said, "if it is not a company's core mission there is a problem."

Ben said there can be a barrier in how you implement. He said with 1547, it needs to be addressed at some level. Variations can become issues.

Ken said he chairs the committee that developed the CTA 2045 standard. He asked who was not responding on this?

Marc said it was his contact, but he was speaking in terms of vendor support.

Ken commented that DSOs don't do testing.

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TESC Conference 2024

Ron M. said there is a new suggestion to hold TESC 2024 in conjunction with SEPA's RE+ 2024.

David Forfia noted that there are 16.5 months until RE+ 2024. He suggested that if GWAC does decide to go with SEPA we should make the change soon to be able to reserve rooms for the meeting. He added that if it were to become more than a single conference relationship, then GWAC would need to return to an annual schedule in the future or switch to biannual. He cautioned that GWAC would then lose IEEE support.

David suggested that we should have the first TESC 2024 organizing meeting in May.

Action: Schedule a TESC 2024 Organizers meeting.

Next TE Conference – Potential Locations:

- Needs
  - A no-cost or low-cost venue will keep down registration costs
  - The facility host will be listed as a sponsor
  - Attendance aim is 150 minimum
- Suggested Venues
  - SCE may have a venue in Westminster or at UCLA, or near Los Angeles, Anthony James is checking
  - ~~Portland General Electric could let us use the Portland WTC again~~
  - PG&E – Paul DeMartini has made an intro. No response from PG&E - Jaime will follow up
  - Wayne State, Detroit, MI, Masoud Nazari, IEEE is a contact
  - AEP Facility, Ohio, Ron Cunningham will check
  - Seattle City Light, Ahlmahz Negash will check
  - PNNL, Discovery Hall, Richland WA. Attendee security issues are a concern.
  - ~~NIST in Washington DC may be an option *if* the remodel is done in early 2024. Attendee issues are a concern. David Wollman is the contact.~~
  - SEPA/RE+ combination

Paul D. noted that the Grid Edge conference this year was very successful, and it is a TE centered group.

Ron M. agreed and added that it is very aligned well to GWAC. Their next meeting is in 2025.

Grid Architecture White Paper

- Working Group: Seemita Pal, Ron Cunningham, David Wollman, Ron Bernstein, Ahlmahz Negash, Larisa Dobriansky, David Forfia, Kay Aikin, Aaron Snyder, Ron Ambrosio, Lorenzo Kristov, Farrokh Rahimi, Rahul Bahadur, Gerald Gray, Mark Paterson, Timothy Schoechle, Jeffrey Morris, Leonard Tillman, Andrew Bordine, Chris Villarreal, Ron Melton

- White paper draft will be uploaded for review of working group today on Teams site. Please review and provide feedback so that we can finalize for publication. Seemita will email the draft to those who do not have access to Teams channel – please let her know.

- Next steps
  - Please provide feedback before next GWAC meeting
  - Any feedbacks will be addressed; final version will be run through PNNL's approval process and then finally published
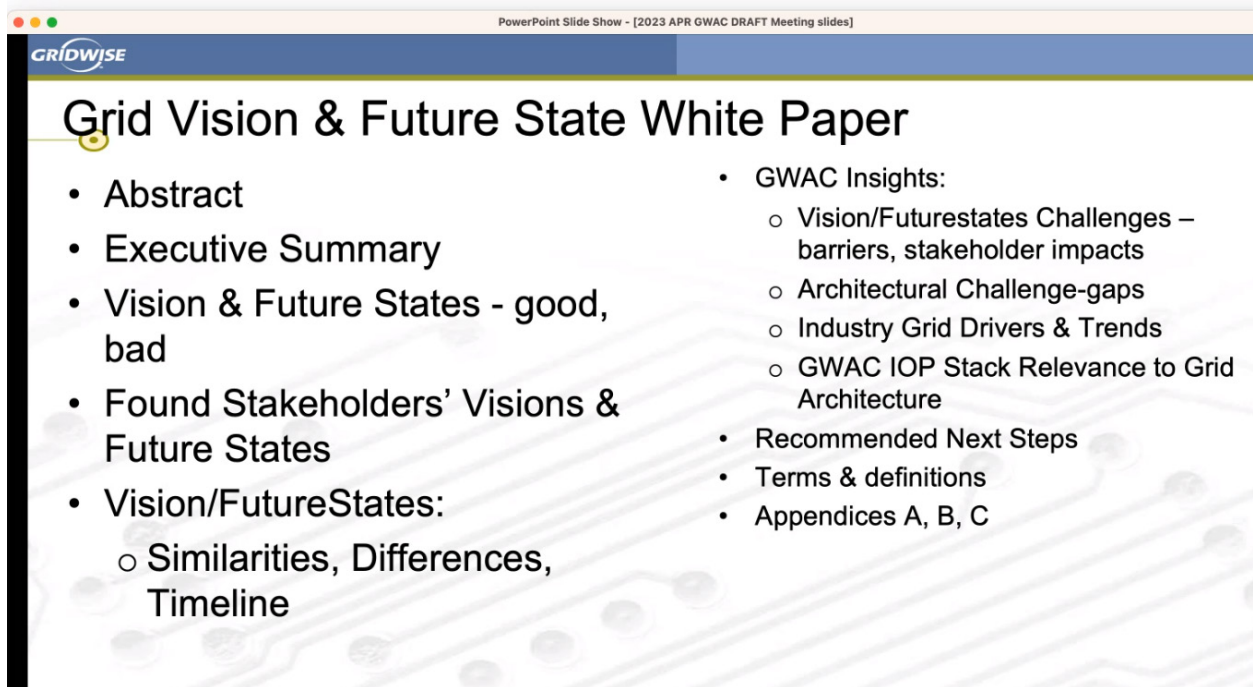
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GWAC Grid Architecture

Seemita said that the GWAC Grid Architecture paper is complete except for the acknowledgement. She will post it in GWAC TEAMS today and then she would like GWAC comments. If she can get the comments in the next month, she will have the final version ready for PNNL review by the next meeting.

Farrokh reminded Seemita that he doesn't have TEAM access. It was also noted that Aaron Snyder and David Wollman, along with Rahul Bahadur, Larisa Dobriansky and Mark Ortiz don't have Teams access. Jaime K. will work with Aaron Snyder on TEAMS access.

AU industry and defense: Two Australian documents previously sent by Mark Paterson – Ron C. and Ron M. are working to find both documents. Paul D. said he may have that document and he and Ron C. will talk offline.

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Liaison Reports

Dave Wollman – NIST, sent the recent NIST newsletter has an update on Smart-Grid at NIST.

Sean Crimmins with EPRI is currently licensing work to consultants. He said that a standard for business capabilities would be helpful to EPRI. He asked anyone connected with a large consulting company to please connect to him about opportunities with EPRI.

He also said that for Grid Model Data Management, there are a lot of public work opportunities. He said that for those who are working with vendors in distribution space, please reach out to him.

ISO/IEC Ken Wacks – the next semi-annual meeting will be May 9 by Zoom. All ballots have been approved. Ken reviewed Energy management agent – customer-controlled energy management onsite in homes and buildings (Apartment buildings and complexes). We have a new, important standard where we enter into AI, narrowly focused on energy management.

Four positive ballots have passed so far.

IREC Ken Wacks– a reminder that the customer grid edge committee holds meetings every other week. Contact Ken for information to join the meetings, they are open to all.

https://irecusa.org/our-work/customer-grid-edge/

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Upcoming GWAC Meetings

Date	Topic or Speaker	Format	Other
May 17, 2023	GWAC Meeting – 10:00am to 12:00pm PT Michael Murray (Mission Data)	Online	
June 21, 2023	GWAC Meeting - 10:00am to 12:00pm PT James Mater (Quality Logic)	Online	
July 19, 2023	GWAC Meeting - 10:00am to 12:00pm PT	Online	PES GM – Reschedule to July 12th?
August 16, 2023	GWAC Meeting - 10:00am to 12:00pm PT	Online	
September 20, 2023	GWAC Meeting - 10:00am to 12:00pm PT	Online	
October 3-4, 2023	GWAC Face to Face Meeting?	In Person	EnerNex (Knoxville)

October 2023 GWAC F2F

Aaron Smallwood asked about lead time and commented that his group will review the idea of TESC at RE+ and try to get it locked down in time for the May GWAC meeting." Next meeting is May 17.

Ron Ambrosio told the group that he is migrating to a new email, and he put the address in the meeting Chat.

David Forfia gave the motion to adjourn.