

IEA Wind Task 50 Meeting, Online

Date: 3/29 (Tuesday), 3/30 (Wednesday) – Virtual

Duration: 2-5pm CET



Kickoff meeting: IEA Task 50 – Hybrid power plants

Goal: Task management team wants to get everyone in the same room and on the same page on the task. They introduce the task and the vision toward accelerating the development and deployment of hybrid power plants. They set the pace for the hybrids task and the work packages involved. Participants can introduce themselves and their organization and what work packages they would like to be involved in.

Date: 3/29 (Tuesday), 3/30 (Wednesday) – Virtual

Duration: 2-5pm CET

Day 1

Overview (Kaushik, Jen) – 15 min

- Overview of hybrid plants
- Logistics
- Website
- Format
- A note from the work package leads
 - Work package 1 – Lead – Jen King (NREL)
 - Work package 2 – Lead – Dominic von Terzi (TU Delft)
 - Work package 3 – Lead – Jen King (NREL)
 - Work package 4 – Lead – Kaushik Das (DTU)
 - Work package 5 – Lead – Kaushik Das (DTU)

Lightning talks from the participants (**45 min**) – focused on relation to other IEA tasks and TCPs:

- What type of hybrids your task/TCP cares about?
- What are the biggest challenges?
- What are you hoping to get out of this task?

Break – 15 min

Work package 1 – expectations, goals, etc. – 30 min

Work package 2 – expectations, goals, etc. – 30 min

Work package 3 – expectations, goals, etc. – 30 min

Wrap up – 15 min

Registered Participants/Attendees: Jennifer King (NREL), Kaushik Das (DTU), David Dunn (NREL), Heather Doane (NREL), Stephan Barth (IEA Wind TCP), Seamus Garvey (University of Nottingham), Atle Harby (SINTEF), Ian Baring-Gould (NREL), Katherine Dykes (DTU). Jason Fields (NREL), Gregor Giebel (DTU), Gustavo Ponte (EPE), Eckard Quitmann (ENERCON), J. Basin (NIWE), K. Balaraman (NIWE), Daniel Pombo (DTU), Matthijs Doclo (ENGIE), Anton Kaifel (ZSW - Center for Solar Energy and Hydrogen Research), Florin Ion (AAU), Luis Arribas (CIEMAT), Corinna Möhrlein (WEPROG), Lennart Petersen (Vestas), Martin Yan (GE), Peter Enevoldsen (Vestas), Nis Frededal (Floating Power Plant A/S), Seamus Garvey (University of Nottingham), Darice Guittet (NREL), Genevra Harker-Klimes (Pacific Northwest National Lab / Wind Energy Technologies Office), Samantha Hilliard (TotalEnergies), Dan Houck (Sandia National Labs), Sean Kerrigan (Airborne Wind Europe), Ewan Machefaux (Vestas), Antoine Monterrat (TotalEnergies), Caitlin Murphy (NREL), Antonio Notholt (Reutlingen University), Kristian Petrick (Airborne Wind Europe), George Alin Raducu (Vattenfall Vindkraft DK), Andreas Rettenmeier (ZSW - Center for Solar Energy and Hydrogen Research), Marianne Rodgers (Wind Energy Institute of Canada), Mridul Sakhuja (TotalEnergies), Fatemeh Shahnazian (DTU), Brian Smith (National Renewable Energy Laboratory), Arvind Tiwari (GE Research), Paolino Tona (IFP Energies nouvelles), Richard Tusing (NREL), Dominic von Terzi (TU Delft), Josina Ximenes (EPE), Asma Aziz (Edith Cowan university), Celine Carbonez (Engie Laborelec), Caitlyn Clark (National Renewable Energy Laboratory), Cyril Daniels (ENGIE Laborelec), Luana de Oliveira Berriel (Engie Laborelec), Syed Hamza Kazmi (Orsted), Mihir Mehta (Delft University of Technology), Eldrich Rebello (Wind Energy Institute of Canada), Michiel Zaaijer (Delft University of Technology), Nan Zhao (University College Dublin), Arash Alavi (Sustainable Energy Authority of Ireland (SEAI)), Charbel Assaad (DTU), Krishnan Krishnan (National Institute of Wind Energy), Jon Martinez (Tekniker), Ingrid Munne Collado (ConWX), Stoyan Trenchev (ZSW- Center for Solar Energy and Hydrogen Research), Daniel Vázquez Pombo (Vattenfall AB & Technical University of Denmark), Hong Yue (University of Strathclyde), Rujie Zhu (DTU Wind and Energy System),

Kaushik introduced the meeting and the new Task 50. He briefly presented the objectives of the new task and the work packages (WPs).

Stephan Barth presented the mission and vision of **IEA Wind TCP**. He welcomes non-members of IEA Wind to join the TCP.

Seamus Garvey presented **ECES Task** (IEA Energy Storage TCP).

Atle Harby presented **Hydro Power TCP**.

Ian Baring-Gould presented IEA Wind **Task 41 on Distributed Wind**.

Katherine Dykes presented IEA Wind Task 37 on Wind Energy **Systems Engineering**.

Jason Fields presented about IEA Wind Task 43 on **Digitalisation**.

Gregor Giebel presented Task 51 on **Forecasting**.

Jen King presented about WP1 – “Collection of research results and interaction with other projects”. Need to discuss in WP1 the definition of Hybrid Power Plants. Gustavo Ponte- We had this kind of discussion in Brazil and saw the importance of defining different names for each type of combination/hybridization. The conclusions were published here: <https://www.epe.gov.br/sites-pt/publicacoes-dados-abertos/publicacoes/PublicacoesArquivos/publicacao-232/topico-393/Report%20Hybrid%20power%20plants.pdf>

[Please see PDF called Report Hybrid Power Plants_from Gustavo Ponte.pdf uploaded into the Meeting Notes folder on Google Drive]. Eckard Quitmann - Do we include under "HPP" also plants that have significant electrical loads inside, hence are sometime towards the outside grid a

source, and sometimes a load? Dr. K. Balaraman - Are we including Microgrid also in this task? Jen- Microgrids are covered in other tasks, so we are trying to keep the focus on utility-scale systems. Daniel Pombo- I think one of the tasks of this group is to draw the line between systems and plants. I wouldn't dare saying that a grid connected microgrid is the same to a HyPP. Jen: This is a really great point and something we will have to address in the early months of this task. Dan Houck: I think the anticorrelated nature of wind and solar makes a lot of sense over other pairings, but that lessons learned from that could be applied elsewhere. Matthijs Doclo: Could we say that we start talking about hybridization (and not co-location) as soon as the sum of the rated powers of the assets installed exceeds the connection capacity? Anton Kaifel: Suggestion for end uses- also Methane and e-fuels (liquid) should be included, as well as heat in case there is a demand e.g. for process heat in Industry or heating for Buildings. Daniel Pombo: We should establish lines between Hybrid vs Virtual plants (is co-location the only factor?). Similarly, and as it was already mentioned, micro/mini-grid vs HyPP. Asma Aziz: From Australian experience, on grid hybrid power plants is defined in term of response to dispatch command. Till 2021, there was no option of combined dispatch of hybrid plants. The rule has now been amended. We need to consider if hybrid plants are on grid or off-grid. Caitlin Murphy: I support the technology scope of solar, wind, and storage (broadly defined). And I agree with Ian, that lessons learned could be expanded to other technologies, but keeping the scope contained might help make the surveys/discussions/research more concrete. And while I support a broad definition of storage, I think it's worth defining some metrics (e.g., duration ranges that are in scope). Some storage technologies are readily evaluated in our tools today, so we could make a lot of quick progress there. Other technologies (>200hr) would require method development before we can evaluate them with the same rigor. Luis Arribas: Are Virtual Power Plants going to be considered? In that case, not only physical PCC is important, but the regulation and the business model that are applied. Eckard Quitmann: I think "on-grid" versus "off-grid" is not the complete picture. It is rather how much electrical impact a (Hybrid) plant can have to the grid. Is it the only player feeding into this grid (e.g. little island), or is it the dominant player on this grid (remote PCC or big plant compared to the entire synchronous area), or is it rather one out of many players, and therefore has not the dominant role. There are certainly many further possibilities in between. Dan Houck: For defining co-location, what about a meteorological correlation threshold? They don't necessarily have to be right next to each other, but close enough to be strongly influenced by the same meteorology. Min Yan: My experience is for near future, there will also be demand for hybrid with thermal asset (gas engine, gas turbine), using thermal asset to support renewable asset. Ian Baring-Gould: One additional thought for WP-1 - Under task 41 we did attempt to set up some definitions - but could not come up with consensus on the terminology. It may be that we can't come to something that is "agreed" by everybody, but it at least sets a common set that people can reference. Corinna Möhrlein: For WP1 Virtual Power Plant Discussion: may be a good topic for collaboration with the Task 51 Forecasting for the weather driven energy system in the value of forecasting, uncertainty or decision making under uncertainty.

Dominic Von Trezi presented about WP2 – “Reference hybrid plant”. Lennart Petersen: Will WP2 also focus on reference plants that include the electrical balance of plants (EBoP) for various use cases, e.g. on grid, off grid, P2X, perhaps for different locations in the world? Such reference plants may benefit the grid integration studies. Eckard: Very broad, very complex. From grid services to markets depends on local regulations. Katherine Dykes: In task 37 we had similar discussions around the variety of plants and permutations. One thing we decided was to approach things in layers where you could have (like in GIS) layers of complexity added on to create variations of farms for different use cases. Its not a fully solvable problem, but that did help. Also, using the

use cases to drive the definition of the farms was also a helpful step in the process for the task. Ian: It might also be good to remember that we are starting the dialog, not trying to cover the whole development space. For example, the discussion of large scale wind/PV/Hydrogen, but this is not likely something that will be deployed in the next few years, while hybrid wind/PV/battery is being deployed today. We could focus on one of these given what the goals of Task 50 are – understanding the current market or seeing the dialog for future markets. I was not trying to push one option or the other - we should determine where it makes sense to focus and it could well be we want to focus on future plants, because this is where the need for information is, but that means we don't focus on what the market is already doing. Martin Yan: Hybrids plant/system can be of so many different combinations, only limited by imagination. I think it's important to start with some focus with representative hybrid plant/system (major configuration in the interconnection application queue). Florin Iov: Is the scope of WP3 to define architectures for HPP control and energy management? Lennart Petersen: Not sure if it is part of WP3 or WP1, but it will be great to work on definitions of what control functions & services belong to power management and which to energy management. Where does EMS start/stop in comparison to power management? From Jason Fields: As far as scoping goes, Task 43 is also quite broad and we had similar concerns. One of the best ways to figure this out is to set an initial plan, start working and be open to pivots. getting started is the hardest part so kudos to the team here.

Jen King presented WP3 on “Overview of technology and design/operation algorithms”. Jen asked what are the main issues related to design and control of the hybrid plants. Ian: Grid support and grid connected systems Florin: is the scope of WP3 to define architectures for HPP control and energy management? All the WPs need to interact closely. WP1 should decide the scope and focus. Lennart: Not sure if it is part of WP3 or WP1, but it will be great to work on definitions of what control functions & services belong to power management and which to energy management. Where does EMS start/stop in comparison to power management?

Day 2

Recap (Kaushik, Jen) – 15 min

Lightning talks from the participants (1 hour) – related to industry and academia:

- What type of hybrids does your organization care about?
- What are the biggest challenges?
- What are you hoping to get out of this task?

Work package 4 – expectations, goals, etc. – 30 min

Work package 5 – expectations, goals, etc. – 30 min

Discussion/Next steps – 30 min (Kaushik, Jen)

Wrap up – 15 min (Kaushik, Jen)

Jen King introduced the meeting for day 2. She provided the recap for day 1. Immediate next step includes starting up of WP1. **For official participation, email participation confirmation to Jen and/or Kaushik.**

Lightning talks by-

Erik Stensrud Marstein from IFE presented about HPP from perspectives of Norway with special focus on PV but strong interest in Wind PV hybrid as well and therefore for the IEA task.

Asma Aziz presented about ongoing research at Edith Cowan University and shown interest in WP 2,3,4,5

Matthijs Doclo from Engie has shown interest in WP 1, 2, 3, and 4 with focus on PV+ BESS + WIND (+ Hydrogen).

Gustavo Pires da Ponte from EPE showed interesting studies on value of hybrids in Brazil.

Marianne Rodgers from Wind Energy Institute of Canada demonstrated the Prince Edward Island, Canada HPP commercial HPP. Interested in grid integration and see the value of hybrid to accommodate more renewables.

Eckard Quitmann presented the interest of Enercon in HPP and in the task for seeing hybrid as a key technology for green transition.

Alan Ristow from TotalEnergies showed the company's interest in hybrid power plants demonstrating different use case examples.

David Lingfors from Uppsala University presented ongoing research on hybrids from resource assessment, forecasting and power quality point of view.

Hong Yue from University of Strathclyde presented her ongoing research and shown interest in WP3.

Caitlin Murphy from NREL presented the works on the value of hybrids in US energy system.

Antonio Notholt presented ongoing research and tools developed on Reutlingen University on hybrids and shown interest in WP1, 3 and possibly 4.

Martin Yan presented ongoing works at GE Hybrids.

Ingrid Munne Collado presented relevance of forecasting on hybrids and perspective from ConWX and shown interest in WP3.

Jon Martinez presented ongoing work in Tekniker including Energy Management Systems, Power Management Systems and BESS sizing tool for grid connected HyPP.

Paolino Tona from IFP Energies Nouvelles shown interest in WP 2,3,4 and may be 5 with special interest in energy management systems.

Dan Houck presented ongoing research at Sandia National Labs.

Stoyan Trenchev from ZSW- Center for Solar Energy and Hydrogen Research presented about WINSSENT: Wind Energy Test-site in Complex Terrain and shown interest in extending Wind test site to hybrid power plant test site.

Charbel Assaad from DTU presented his ongoing PhD on sizing of hybrid power plants.

Hannele Holtinnen presented IEA Wind Task 25 – grid integration and showed potential for collaboration with Task 50 especially from market participation, flexibility, and grid integration.

K. Balaraman from National Institute for Wind Energy, India will contact other interested institutions in India for possible interest in IEA Wind Task 50.

Nis Frededal from Floating Power Plant A/S showed interest in wind+wave hybrids.

Kristian Petrick from Airborne Wind Europe will follow the task as observer.

George Alin Raducu And Daniel Vazquez Pombo from Vattenfall showed their ongoing projects on Hybrids as well as shown interest in all WPs of the task.

Florin Iov from Aalborg University presented ongoing research on hybrid power plants and shown interest in all WPs.

Ewan Machefaux and Lennart Petersen from Vestas showed interest in the task either as participant or as observer.

Kaushik presented WP 4 on Electrical Design, Control, and Market/Grid Services. Florin: how to make the control models open source? Jen: how to take care of interoperability? Florin: Are the regulations for market participation in scope? Matthijs: What is interesting about the 'proof' of delivering a service with a hybrid power plant, is that establishing a base-line production curve is not straightforward if there are dispatchable sources such as batteries present.

Kaushik presented WP 5 on Outreach and Collaboration with TCPs, Tasks, and R&D. Possible collaborations to be sought after with EERA, ESI, ESIG, AEMO. There are IEEE standards and guidelines for microgrid or off grid systems, e.g. IEEE 2030.7, IEEE 1547.4. They might be relevant when it comes to off grid HyPPs. Possible interactions with IEEE, DNV, CIGRE, G-PST, Brazilian TSO (to be contacted by EPE), Indian TSO, Svenska Kraftnät and Energinet, also to contact both REE and OMIE (Spanish TSO and Market Operator, respectively), US Grid operators. Can be organised grid operator workshop.

Jen and Kaushik concluded the task kick-off meeting and thank all the participants.

Eldrich Rebello	Martin Yan	Samantha	Fatemeh Shahnazian	Heather Doane
Paolino Tona	Luis Arribas	Bastin J	Alin Raducu - Vattenfall	

Annex

Chat day 1

06:58:50 From Jen King, NREL to Everyone:
As we start, can you rename yourself with your name and your institution?

06:59:20 From Jen King, NREL to Everyone:
In addition, this meeting is being recorded.

07:00:58 From Heather Doane, NREL to David @NREL(Direct Message):
do you want Kaushik to be a host as well? I THINK I can add him.

07:03:08 From Johan Arnqvist to Everyone:
Hi from Sweden. Thank you very much for organizing!

07:13:43 From Seamus Garvey to Everyone:
The text on the website is quite small and hard to read. 'Might benefit from a larger font.

07:15:56 From Seamus Garvey to Everyone:
In deciding whether to be "participant" or "observer", it is useful to know what the total task budget is expected to be - even though we do not know how many participants there will be finally.

07:17:18 From Asma Aziz to Everyone:
Hi Kaushik, you said if there are 2-3 participants from a country, IEA will ask country representative for finance. Who is country representative?

07:19:37 From Eckard Quitmann to Everyone:
Do we include under "HPP" also plants that have significant electrical loads inside, hence are sometime towards the outside grid a source, and sometimes a load?

07:21:21 From Asma Aziz to Everyone:
thanks Kaushik

07:29:17 From Gustavo Ponte - EPE to Everyone:
we had this kind of discussion in Brazil and saw the importance of defining different names for each type of combination/hybridization. The conclusions were published here: <https://www.epe.gov.br/sites-pt/publicacoes-dados-abertos/publicacoes/PublicacoesArquivos/publicacao-232/topico-393/Report%20Hybrid%20power%20plants.pdf>

07:30:49 From Antonio Notholt to Everyone:
@Gustavo: Great starting point! I agree the first step is defining the concepts.

07:34:10 From Michiel Zaayer, TU Delft to Everyone:
@Gustavo: Interesting work! I get a 'web Page Blocked' error for your link. Do you hear that more often?

07:34:40 From Hong Yue (University of Strathclyde, UK) to Everyone:
Change a browser

07:34:54 From Michiel Zaayer, TU Delft to Everyone:
Been there, done that ;)

07:35:17 From Daniel Pombo, DTU-Vattenfall to Everyone:
there you have it

07:35:33 From Michiel Zaayer, TU Delft to Everyone:
Thanks Daniel!

07:36:03 From Ingrid to Everyone:
thanks Daniel!

07:36:07 From Gustavo Ponte - EPE to Everyone:
Thank you @Daniel for sharing the file!

07:36:10 From Dr. K. Balaraman, DG, NIWE, India to Everyone:
Are we including Microgrid also in this task?

07:37:47 From Jen King, NREL to Everyone:
Microgrids are covered in other tasks, so we are trying to keep the focus on utility-scale systems.

07:38:45 From Dr. K. Balaraman, DG, NIWE, India to Everyone:
Since microgrid is also hybrid power plant - Grid connected microgrid is evolving for providing grid services

07:39:54 From Daniel Pombo, DTU-Vattenfall to Everyone:

I think one of the tasks of this group is to draw the line between systems and plants. I wouldn't dare saying that a grid connected microgrid is the same to a HyPP.

07:40:56 From Heather Doane, NREL to Caitlyn Clark, NREL(Direct Message):
can you see this video

07:40:57 From Heather Doane, NREL to Caitlyn Clark, NREL(Direct Message):
ok

07:42:07 From Jen King, NREL to Everyone:

This is a really great point and something we will have to address in the early months of this task

07:43:29 From Kaushik Das (DTU, IEA Wind Task 50) to Everyone:

If you are interested in involvement on Microgrids/minigrids/behind the meter/hybrid systems are being very much covered in our ongoing IEA Wind Task 41 - Distributed Wind. Please contact Ian-Baring Gould.

07:51:35 From Heather Doane, NREL to Caitlyn Clark, NREL(Direct Message):
now can you see Seamus?

08:11:54 From Peter Lilienthal to Everyone:

I have to leave for an emergency matter, but want to let everyone know that UL is releasing a new version of HOMER, HOMER Front, specifically for utility-scale "front-of-the-meter" hybrid projects.

<https://www.homerenergy.com/products/front/index.html>

08:37:40 From Gregor Giebel (DTU, T51 OA) to Everyone:

Sorry, I have to leave - other IEA matters... :) If you're interested in forecasting (some of you are in Task 51 already), send me a mail, and we'll take it from there: grgi@dtu.dk.

08:38:03 From Jen King, NREL to Everyone:

Hi everyone, please make sure you fill out the Google form: https://docs.google.com/forms/d/e/1FAIpQLSeqA2kaZJbp_Gif3NEQwCFX8aMwncwCTOFzC34wwT8gsMF8mw/viewform?usp=sf_link so we can make sure to include you in the follow up meetings and work package meetings

08:38:22 From Atle Harby to Everyone:

Please let me know if anyone would be interested in working together with Hydropower TCP for hybrid solutions including Hydropower. You can contact me at atle.harby@sintef.no :-)

08:57:03 From Dan Houck to Everyone:

I think the anticorrelated nature of wind and solar makes a lot of sense over other pairings, but that lessons learned from that could be applied elsewhere.

08:59:08 From Matthijs Doclo to Everyone:

Could we say that we start talking about hybridization (and not co-location) as soon as the sum of the rated powers of the assets installed exceeds the connection capacity?

08:59:45 From Anton Kaifel to Everyone:

Suggestion for end uses: also Methan and e-fuels (liquid) should be included, as well as heat in case there is a demand e.g. for process heat in Industry or heating for Buildings

09:00:33 From Daniel Pombo, DTU-Vattenfall to Everyone:

We should establish lines between Hybrid vs Virtual plants (is co-location the only factor?). Similarly, and as it was already mentioned, micro/mini-grid vs HyPP.

09:00:39 From Asma Aziz to Everyone:

From Australian experience, on grid hybrid power plants is defined in term of response to dispatch command. Till 2021, there was no option of combined dispatch of hybrid plants. The rule has now been amended. We need to consider if hybrid plants are on grid or off-grid

09:04:48 From Caitlin Murphy to Everyone:

I support the technology scope of solar, wind, and storage (broadly defined). And I agree with Dan, that lessons learned could be expanded to other technologies, but keeping the scope contained might help make the surveys/discussions/research more concrete. And while I support a broad definition of storage, I think it's worth defining some metrics (e.g., duration ranges that are in scope). Some storage technologies are readily evaluated in our tools today, so we could make a lot of quick progress there. Other technologies (>200hr) would require method development before we can evaluate them with the same rigor.

09:05:04 From Luis Arribas to Everyone:

Are Virtual Power Plants going to be considered? In that case, not only physical PCC is important, but the regulation and the business model that are applied

09:05:29 From Eckard Quitmann to Everyone:

I think "on-grid" versus "off-grid" is not the complete picture. It is rather how much electrical impact a (Hybrid) plant can have to the grid. Is it the only player feeding into this grid (e.g. little island), or is it the dominant player on this grid (remote PCC or big plant compared to the entire synchronous area), or is it rather one out of many players, and therefore has not the dominant role. There are certainly many further possibilities in between.

09:08:27 From Dan Houck to Everyone:

For defining co-location, what about a meteorological correlation threshold? They don't necessarily have to be right next to each other, but close enough to be strongly influenced by the same meteorology.

09:09:24 From Martin Yan to Everyone:

My experience is for near future, there will also be demand for hybrid with thermal asset (gas engine, gas turbine), using thermal asset to support renewable asset.

09:09:46 From Heather Doane, NREL to Jen King, NREL(Direct Message):

You've got a hand up

09:09:51 From Heather Doane, NREL to Jen King, NREL(Direct Message):

Corinna Mohrlen

09:12:12 From Seamus Garvey to Everyone:

Dominic, we are seeing the wrong screen. We are looking at the screen with the preview of the next slide!

09:12:33 From Seamus Garvey to Everyone:

Did you share the right screen ?

09:15:36 From Ian Baring-Gould (NREL) to Everyone:

One additional thought for WP-1 - Under task 41 we did attempt to set up some definitions - but could not come up with consensus on the terminology. It may be that we can't come to something that is "agreed" by everybody but it at least sets a common set that people can reference.

09:17:15 From Corinna Mohrlen (WEPROG) to Everyone:

for WP1 Virtual Power Plant Discussion: may be a good topic for collaboration with the Task 51 Forecasting for the weather driven energy system in the value of forecasting, uncertainty or decision making under uncertainty

09:22:52 From OnePlus 6 to Everyone:

will WP2 also focus on reference plants that include the electrical balance of plants (EBOP) for various use cases, e.g. on grid, off grid, P2X, perhaps for different locations in the world? Such reference plants may benefit the grid integration studies.

09:27:37 From Katherine Dykes to Everyone:

Re: WP2 - In task 37 we had similar discussions around the variety of plants and permutations. One thing we decided was to approach things in layers where you could have (like in GIS) layers of complexity added on to create variations of farms for different use cases. Its not a fully solvable problem, but that did help. Also, using the use cases to drive the definition of the farms was also a helpful step in the process for the task

09:29:46 From Ian Baring-Gould (NREL) to Everyone:

It might also be good to remember that we are starting the dialog, not trying to cover the whole development space. For example the discussion of large scale wind/PV/Hydrogen, but this is not likely something that will be deployed in the next few years, while hybrid wind/PV/battery is being deployed today. We could focus on one of these given what the goals of Task 50 are - understanding the current market or seeing the dialog for future markets.

09:30:52 From Katherine Dykes to Everyone:

Good point Ian

09:37:10 From Ian Baring-Gould (NREL) to Everyone:

I was not trying to push one option or the other - we should determine where it makes sense to focus and it could well be we want to focus on future plants, because this is where the need for information is, but that means we don't focus on what the market is already doing.

09:39:45 From Dominic von Terzi to Everyone:

Ian, yes, I agree. we don't want to boil the ocean and need to agree on an impactful but doable scope.

09:44:04 From Florin Iov to Everyone:

is the scope of WP3 to define architectures for HPP control and energy management?

09:45:43 From Ian Baring-Gould (NREL) to Everyone:

@dominic - but we need to do all of this before we do boil the ocean.

09:47:22 From Lennart Petersen (Vestas) to Everyone:

Not sure if it is part of WP3 or WP1, but it will be great to work on definitions of what control functions & services belong to power management and which to energy management. Where does EMS start/stop in comparison to power management?

09:47:23 From Katherine Dykes to Everyone:

@Ian and @Dominic - boiling the ocean via electrolysis count?

09:48:47 From Florin Iov to Everyone:

@Lennart: fully agree!

09:49:02 From Ian Baring-Gould (NREL) to Everyone:

Great point - only very small oceans...

09:53:04 From Martin Yan to Everyone:

Hybrids plant/system can be of so many different combinations, only limited by imagination. I think it's important to start with some focus with representative hybrid plant/system (major configuration in the interconnection application queue).

09:53:40 From mfields to Everyone:

as far as scoping goes, Task 43 is also quite broad and we had similar concerns. One of the best ways to figure this out is to set an initial plan, start working and be open to pivots. getting started is the hardest part so kudos to the team here

09:56:24 From Asma Aziz to Everyone:

Thank you everyone.

09:56:33 From Antonio Notholt to Everyone:

Thanks a lot!

09:56:38 From Antonio Notholt to Everyone:

see you tomorrow!

09:56:41 From Luis Arribas to Everyone:

thank you all!

09:56:41 From Michiel Zaayer, TU Delft to Everyone:

Thanks all!

09:56:41 From Samantha to Everyone:

Thank you !

09:56:44 From Charbel Assaad (DTU) to Everyone:

Thank you!

09:56:44 From Jon Martinez (Tekniker) to Everyone:

See you tomorrow!

09:56:47 From Hong Yue (University of Strathclyde, UK) to Everyone:

Thanks bye

09:56:49 From Corinna Möhrle (WEPROG) to Everyone:

thankyou

09:56:54 From Matthijs Doclo to Everyone:

Thank you Kaushik, Jen!!

09:56:54 From Gustavo Ponte - EPE to Everyone:

Thank you. See you tomorrow

Day 2

06:59:52 From Kaushik Das to Heather Doane(Direct Message):

Good morning Heather

07:00:50 From Heather Doane to Kaushik Das(Direct Message):

Good morning, Kaushik.

07:01:10 From Heather Doane to Jen King, NREL(Direct Message):

The video issue from yesterday should be fixed.

07:01:29 From Jen King, NREL to Heather Doane(Direct Message):

awesome

07:28:38 From Kaushik Das to Everyone:

@Marianne, very interesting plant. Is it an HPP or 3 single technology plants?

07:29:36 From Asma Aziz to Everyone:

Hi Kaushik, yes you are right. They are still in operation

07:31:39 From Kaushik Das to Everyone:

@Asma, what is the capacity (MW) of Prince Edward Island plant?

07:35:33 From Eldrich Rebello to Everyone:

@kaushik - To answer your question about WEICan - all our generators are behind a single point of connection but only the battery and PV can be islanded right now. the wind turbines are essentially their own system that depends on the grid for operation.

07:37:37 From Kaushik Das to Everyone:

Thanks, Eldrich. Great to have WEICan in the task.

07:44:35 From Asma Aziz to Everyone:

Thanks Eckard.

07:50:40 From Kaushik Das to Everyone:

Dear all, please fill out this form (unless already done so):

https://docs.google.com/forms/d/e/1FAIpQLSeqA2kaZJbp_GIf3NEQWcFX8aMWncwC TOFzC34wwT8gsMF8mw/viewform?usp=sf_link

08:56:32 From Stoyan Trenchev, ZSW to Everyone:

forgot to mention that our Hybrid Power Plant is in the low scale power range. The two turbines have 750 kW nominal power and are connected to a 2.7 MW grid connection point.

If you are interested, you can find more info here:

<https://www.windfors.de/en/projects/test-site/winsent/>

09:02:37 From Eckard Quitmann to Everyone:

have to leave. Bye!

09:04:23 From Florin Iov to Everyone:

@Kaushik: how will you define "open source model of control architecture"?

09:10:38 From Lennart Petersen (Vestas) to Everyone:

How is the work in this IEA Task 50 related and communicated with bodies and organizations that develop grid codes, standards, regulations etc? Do they have a stake in this task?

09:13:35 From Florin Iov to Everyone:

are the regulations for market participation in scope?

09:25:22 From Matthijs Doclo to Everyone:

What is interesting about the 'proof' of delivering a service with a hybrid power plant, is that establishing a base-line production curve is not straightforward if there are dispatchable sources such as batteries present.

09:30:05 From Florin Iov to Everyone:

other organizations should include TSO/DSO from other regions not only Europe

09:30:27 From Katherine Dykes (DTU) to Everyone:

GPST maybe

09:30:38 From Katherine Dykes (DTU) to Everyone:

Also EERA ESI group

09:30:59 From Jon Martínez (Tekniker/EHU) to Everyone:

Is DNV included? It would also be interesting to have them here I guess

09:31:01 From Lennart Petersen (Vestas) to Everyone:

e.g. AEMO

09:31:40 From Katherine Dykes (DTU) to Everyone:

Maybe also some IEEE groups too possible

09:34:30 From Daniel Pombo, DTU-Vattenfall to Everyone:

I have some contacts in Svenska Kraftnät and Energinet (Swedish and Danish TSO)

09:35:11 From Lennart Petersen (Vestas) to Everyone:

There are IEEE standards and guidelines for microgrid or off grid systems, e.g. IEEE 2030.7, IEEE 1547.4. They might be relevant when it comes to off grid HyPPs

09:37:11 From Jon Martínez (Tekniker/EHU) to Everyone:

In my case I could try to contact both REE and OMIE (Spanish TSO and Market Operator, respectively)

09:37:25 From Lennart Petersen (Vestas) to Everyone:

I believe that NREL has the contacts to relevant US operators, e.g. ERCOT and others if relevant for hybrid markets

09:37:57 From Florin Iov to Everyone:

ENTSO-E should be enough for Europe

09:38:23 From Asma Aziz to Everyone:

I will try to get some contacts from India and AEMO

09:39:23 From Rahul Khandelwal to Everyone:

Out of curiosity will we receive the recording of the session ??

09:41:09 From Katherine Dykes (DTU) to Everyone:

Group picture?

09:41:16 From Katherine Dykes (DTU) to Everyone:

Usually its good for task reporting :)

09:41:16 From Asma Aziz to Everyone:

Thanks everyone

09:42:49 From Samantha to Everyone:

Thank you !!!!

09:42:57 From Luis Arribas to Everyone:

thank you