



## FINAL PROGRAM AS OF 20 MAY 2021

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## TIMETABLE 5<sup>TH</sup> INTERNATIONAL HYBRID POWER SYSTEMS WORKSHOP

TUESDAY, 18 MAY 2021			WEDNESDAY, 19 MAY 2021		
Hybrid Workshop Day 1			Hybrid Workshop Day 2		
08:45 – 09:00	LOG-IN				
09:00 – 09:20	TRACK A				
	OPENING: Welcome and Introduction				
09:20 – 11:00	TRACK A		09:00 – 10:20	TRACK A	
	SESSION 1: KEYNOTE SESSION			SESSION 5A: Grid Codes	SESSION 5B: Storage and Power System Support
11:00 – 11:30 BREAK			10:20 – 10:45 BREAK		
11:30 – 13:00	TRACK A	TRACK B	10:45 – 12:00	TRACK A	TRACK B
	SESSION 2A: Hybrid Power Case Studies I	SESSION 2B: Hybrid Power System Design Options		SESSION 6A: Hybrid Power Plants I	SESSION 6B: Hybrid Power System Technologies
13:00 – 14:00 BREAK			12:00 – 13:00 BREAK		
14:00 – 15:40	TRACK A	TRACK B	13:00 – 14:45	TRACK A	TRACK B
	SESSION 3A: Hybrid Power Case Studies II	SESSION 3B: Forecasting		SESSION 7A: Hybrid Power Plants II	SESSION 7B: Micro-Grids
15:40 – 16:00 BREAK			14:45 – 14:50 SHORT BREAK		
16:00 – 17:40	TRACK A	TRACK B	14:50 – 16:00	TRACK A	
	SESSION 4A: Cellular Hybrid Energy Systems	SESSION 4B: Ancillary Service Aspects / Case Studies		SESSION 8: CLOSING SESSION – PANEL DISCUSSION	
18:00	NETWORKING – BREAKOUT ROOMS				

## TUESDAY, 18 MAY 2021

All times in the session tables show Central European Summer Times (CEST), the pink stripes above each session slot show the starting times of the sessions below in additional time zones.

03:00 New York // 04:00 Rio de Janeiro // 08:00 London // 12:30 New Delhi // 14:00 Jakarta // 15:00 Beijing // 16:00 Tokyo

**09:00 – 09:20 Welcome Thomas Ackermann**

**09:20 – 11:00 SESSION 1 – KEYNOTE SESSION**

> Session Chair **Thomas Ackermann (Energynautics, Germany)**

**09:20 – 10:40 Presentations (20 min. each)**

- **Expert Elicitation on Hybrid Power Plants**  
J. King, V. Gevorgian, E. Lantz (NREL, USA), **K. Das**, K. Dykes (DTU, Denmark) ([Submission-ID 78](#))
- **Standardizing, Replicating and Scaling Hybrid Energy Systems: Lessons from Commercial Project Deployments.**  
**S. Cherian** (Spirae, USA)
- **The Impact of Improving Technology on the Evolution of Hybrid Power System Design**  
**P. Lilienthal** (HOMER energy, USA), **M. Yan** (GE Renewable Energy, USA) ([Submission-ID HYB21-64](#))
- **From Concept to Reality – the World’s Largest Off-Grid Mining Hybrid Power System at Fekola Gold Mine**  
**T. Althaus** (BayWa r.e. Solar Projects, Germany) ([Submission-ID HYB21-51](#))

**10:40 – 11:00 Discussions**

**11:00 – 11:30 BREAK**

05:30 New York // 06:30 Rio de Janeiro // 10:30 London // 15:00 New Delhi // 16:30 Jakarta // 17:30 Beijing // 18:30 Tokyo

**11:30 – 13:00 SESSION 2A – HYBRID POWER CASE STUDIES I**

> Session Chair **Peter-Philipp Schierhorn (Energynautics, Germany)**

**11:30 – 12:30 Presentations (20 min. each)**

- **Hawaii’s Innovative PPA Structure for Hybrid Solar PV and Energy Storage Projects**  
**N. Miller** (HickoryLedge LLC, USA) ([Submission-ID HYB21-06](#))
- **Renewables for Refugee Settlements: Sustainable Energy Access in Humanitarian Situations**  
**A. Vaid**, E. Taibi (IRENA, Germany) ([Submission-ID HYB21-24](#))
- **Decarbonizing Unije Islands thanks to a Proper Exploitation of Renewables via PV-Battery and PV-Desalination Hybrid Energy Systems**  
**S. Barberis** (RINA Consulting, Italy), R. Abrams, Q. Tabart (RINA Tech UK, United Kingdom), M. Mimica, G. Krajacic (University of Zagreb, Croatia), D. Jardas (Regional Energy Agency Kvarner, Croatia) ([Submission-ID HYB21-82](#))

**12:30– 13:00 Discussions**

11:30 – 13:00	SESSION 2B – HYBRID POWER SYSTEM DESIGN OPTIONS
> Session Chair	Eckard Quitmann (Enercon, Germany)
11:30 – 12:30	Presentations (20 min. each)
	<ul style="list-style-type: none"> <li>Increasing Renewable Contributions in Island Utility Grids H. Bitaraf, J. Glassmire, P. Astorga (Hitachi ABB Power Grids, USA), N. Beneby, S. D Boutilier (Emera Caribbean, Barbados) (Submission-ID HYB21-44)</li> <li>Innovative AC/DC-coupled PV-Wind-Battery Micro-Grid System for a Manufacturing Facility in Germany G. Megersa (Vensys, Germany) (Submission-ID HYB21-xx)</li> <li>First Project Experience and Case Study about our Hybrid Controller for Energy Systems in Africa M. Gast (Phoenix Contact Electronics, Germany) (Submission-ID HYB21-34)</li> </ul>
12:30 – 13:00	Discussions

## 13:00 – 14:00 BREAK

08:00 New York // 09:00 Rio de Janeiro // 13:00 London // 17:30 New Delhi // 19:00 Jakarta // 20:00 Beijing // 21:00 Tokyo

14:00 – 15:40	SESSION 3A – HYBRID POWER CASE STUDIES II
> Session Chair	Petra Piclová (ComAp, Czech Republic)
14:00 – 15:20	Presentations (20 min. each)
	<ul style="list-style-type: none"> <li>A Low Carbon Energy System Model Approach for Energy Planning in Madeira Island F. Sousa Pereira, C. Santos Silva (TU Lisbon, Portugal) (Submission-ID HYB21-85)</li> <li>How to Efficiently Procure Battery Energy Storage Systems for Hybrid Energy Systems through a Tender Process J. Badeda, J. Gerstner, M. Dittmayer (ABO Wind, Germany), S. Heinrich (Rolls Royce Solutions Berlin, Germany), B. Sternkopf (Energy Storage Consultant, Germany) (Submission-ID HYB21-15)</li> <li>The Hybrid Power Grid of Cape Verde: A Reference System for the Renewable Transition D. Vázquez Pombo (DTU, Denmark   Vattenfall R&amp;D, Sweden), D. Alonso Sørensen (University of the Basque Country, Spain   Artech, Spain), E. Fonseca (ELECTRA, Cabo Verde), H. Andrade (Cabeólica, Cabo Verde) (Submission-ID HYB21-79)</li> <li>Off-Grid and Grid-Tied Microgrid Operation: Seamless Transitions at the MASERA Microgrid Testbed R. Migne (EDF R&amp;D, Singapore), B. Prestat (EDF R&amp;D, France), E. Hestin (Socomec, France) (Submission-ID HYB21-13)</li> </ul>
15:20 – 15:40	Discussions

14:00 – 15:40	SESSION 3B – FORECASTING
> Session Chair	J. Charles Smith (ESIG, USA)
14:00 – 15:20	Presentations (20 min. each)
	<ul style="list-style-type: none"> <li>Recommended Practices for Optimal Selection of Short-term Renewable Power Production Forecast Solutions J. Zack (AWS Truepower, USA), C. Möhrten (WEPROG, Denmark), G. Giebel (DTU, Denmark) (Submission-ID HYB21-07)</li> <li>Development of an AI Based Load Prediction Algorithm and its Implementation into an Open Source Energy Management System N. Reiners, (Fraunhofer ISE, Germany), E Schüftan (University of Münster, Germany) (Submission-ID HYB21-35)</li> <li>Control Optimization and Sizing of Energy Storage for PV Systems Using Probabilistic Forecasts P. Besson, W. Mahmoud, D. Raynaud, G. Tremoy, E. Escudero-Ramos (Steadysun, France), T.-P. Do, F. Bourry (CEA-INES, France) (Submission-ID HYB21-41)</li> <li>Short-term Industrial Load Forecasting for Battery Energy Storage System Simulation Z. Wu, T. Blank, S. Bischof, M. Weber (Karlsruhe Institute of Technology – KIT, Germany) (Submission-ID HYB21-65)</li> </ul>
15:20 – 15:40	Discussions

## 15:40 – 16:00 BREAK

10:00 New York // 11:00 Rio de Janeiro // 15:00 London // 19:30 New Delhi // 21:00 Jakarta // 22:00 Beijing // 23:00 Tokyo

### 16:00 – 17:40 SESSION 4A – CELLULAR HYBRID ENERGY SYSTEMS

> Session Chair **Wolfram H. Wellssow** (University of Kaiserslautern, Germany)

16:00 – 17:20 Presentations (20 min. each)

- **Cellular Energy Systems – An Approach to Planning and Operating Future’s Hybrid Energy Systems**  
**F. Flatter**, C. Trossen, **W. Wellssow** (University of Kaiserslautern, Germany) (Submission-ID 73)
- **Regulatory and Policy Aspects for a Cellular Design of Electricity Markets**  
**A. Schinke-Nendza**, G. Blumberg, A. Khalid, C. Weber (University of Duisburg-Essen, Germany) (Submission-ID 74)
- **Initial Case Studies Conducted on Cellular Energy Systems at the District Level**  
**B. Uhlemeyer**, M. Becker, J. Garzón-Real, T. Müller, M. Zdrallek (University of Wuppertal, Germany) (Submission-ID 71)
- **The Problem of Resilience in Multi-Carrier Cellular Systems: Responsibilities and Regulation**  
**G. Hawker**, K. Bell (University of Strathclyde Glasgow, United Kingdom) (Submission-ID 77)

17:20 – 17:40 Discussions

### 16:00 – 17:40 SESSION 4B – ANCILLARY SERVICE ASPECTS / CASE STUDIES

> Session Chair **Nicholas Miller** (HickoryLedge, USA)

16:00 – 17:00 Presentations (20 min. each)

- **Frequency and Voltage Analysis of the Hybrid Power System in Suðuroy, Faroe Islands**  
**H. M. Tróndheim** (The Power Company SEV, Faroe Islands | Aalborg University, Denmark | University of the Faroe Islands, Faroe Islands), L. Hofmann (Leibniz University Hannover, Germany), P. Gartmann, E. Quitmann (Enercon, Germany), F. Faria da Silva, C. Leth Bak (Aalborg University, Denmark), T. Nielsen (The Power Company SEV, Faroe Islands), B. A. Niclasen (University of the Faroe Islands, Faroe Islands) (Submission-ID HYB21-54)
- **Integrated Control System for the Energy Supply of Isolated Communities in Cuba, Using Hybrid Systems**  
**L. Arribas**, J. Domínguez, J. M. Sánchez, L. de Diego, L. F. Zarzalejo, I. Herrera (CIEMAT, Spain), A. Rodríguez, A. Curbelo (CUBAENERGÍA, Cuba), O. Escalona (CUBASOLAR, Cuba) (Submission-ID HYB21-18)
- **Energy Storage in Oil and Gas a Spinning Reserve Application**  
A. Habib, **G. B. Singh** (Solar Turbines, USA) (Submission-ID HYB21-81)

17:00 – 17:40 Discussions

12:00 New York // 13:00 Rio de Janeiro // 17:00 London // 21:30 New Delhi // 23:00 Jakarta // 00:00 Beijing // 01:00 Tokyo

## 18:00 NETWORKING – BREAKOUT ROOMS

**Room 1: DISCUSSION OF PROJECT EXPERIENCE**

**Room 2: MODELLING/SIMULATION OF HYBRID SYSTEMS**

## WEDNESDAY, 19 MAY 2021

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03:00 New York // 04:00 Rio de Janeiro // 08:00 London // 12:30 New Delhi // 14:00 Jakarta // 15:00 Beijing // 16:00 Tokyo

09:00 – 10:20	<b>SESSION 5A – GRID CODES</b>
> Session Chair	Eckehard Tröster (Energynautics, Germany)
09:00 – 10:00	<b>Presentations (20 min. each)</b>
	<ul style="list-style-type: none"><li>• <b>Comparison of European and Indian Grid Codes for Utility scale Hybrid Wind Power Plants</b> A. Hansen, K. Das, P. Sørensen (DTU Wind Energy, Denmark), P. Singh, A. Gavrilovic, S. O. Bade (Suzlon, Germany) (Submission-ID HYB21-60)</li><li>• <b>The Role of Grid Codes in Isolated Power Systems</b> P.-P. Schierhorn, N. Martensen (Energynautics, Germany) (Submission-ID HYB21-63)</li><li>• <b>New Actors on Stage – Upcoming Grid Code Requirements for Storage Systems</b> B. Schowe-von der Brelie, S. M. Ali, F. Kalverkamp (FGH Research Association, Germany) (Submission-ID HYB21-30)</li></ul>
10:00 – 10:20	<b>Discussions</b>

09:00 – 10:20	<b>SESSION 5B – STORAGE AND POWER SYSTEM SUPPORT</b>
> Session Chair	Thomas Ackermann (Energynautics, Germany)
09:00 – 10:00	<b>Presentations (20 min. each)</b>
	<ul style="list-style-type: none"><li>• <b>Anytime, Anyplace, Anywhere? Understanding the Geographic Constraints of Renewable Plus Battery Hybrid Energy Systems</b> W. Gorman, C. Crespo Montañés, A. Mills, J. Hyungkwan Kim, D. Millstein, R. Wiser (Lawrence Berkeley National Lab, USA) (Submission-ID HYB21-84)</li><li>• <b>Hydro Power Plant Hybridization with Battery Energy Storage System for Frequency Primary Control</b> G. Païs, L. Vinit, T. Delaplagne, M. Montaru (University Grenoble Alpes   CEA, France), J. L. Drommi (EDF-CIH, France) (Submission-ID HYB21-14)</li><li>• <b>Back to the Future: Implementing Small Scale Solar Thermal Generation with Storage</b> R. Mierisch (3S Power, Australia), H. Mackenzie (HARD software, Australia) (Submission-ID HYB21-56)</li></ul>
10:00 – 10:20	<b>Discussions</b>

**10:20 – 10:45    BREAK**

<b>10:45 – 12:00</b>	<b>SESSION 6A – HYBRID POWER PLANTS I</b>
> Session Chair	Thomas Ackermann (Energynautics, Germany)
<b>10:45 – 11:45</b>	<b>Presentations (20 min. each)</b>
	<ul style="list-style-type: none"> <li>• <b>Reliable Validation and Commissioning of Hybrid Power Plants</b> P. Lund, M. Rajczyk Skjelmoose, M. Feldthaus Fyhn, M. A. Cova Acosta, B. Yin, K. Nayebi (Vestas Wind Systems, Denmark) (Submission-ID HYB21-83)</li> <li>• <b>The First Utility Scale Hybrid Plant in Europe: The Case of Haringvliet</b> D. Vázquez Pombo (Vattenfall R&amp;D, Sweden   DTU, Denmark), G. A. Raducu, N. Styliaras, O. Sahin, S. Thanopoulos, J. Funkquist, E. Shayesteh (Vattenfall R&amp;D, Sweden) (Submission-ID HYB21-17)</li> <li>• <b>Carbon-Free Sites: Self-Supplying Solar Construction Sites</b> P. Hussinger (BayWa r.e. Power Solutions, Germany) (Submission-ID HYB21-50)</li> </ul>
<b>11:45 – 12:00</b>	<b>Discussions</b>

<b>10:45 – 12:00</b>	<b>SESSION 6B – HYBRID POWER SYSTEM TECHNOLOGIES</b>
> Session Chair	Terji Nielsen (The Power Company SEV, Faroe Islands)
<b>10:45 – 11:45</b>	<b>Presentations (20 min. each)</b>
	<ul style="list-style-type: none"> <li>• <b>BayWa r.e. Floating-PV: A Part of the Hybrid Toolbox for Site Constrained Islands</b> C. Gilmour (BayWa r.e., Germany) (Submission-ID HYB21-55)</li> <li>• <b>Overview of the Coupling between Floating PV and Hydroelectric Power Plants</b> S. Di Grazia, G. M. Tina, F. Bontempo Scavo (University of Catania, Italy) (Submission-ID HYB21-28)</li> <li>• <b>Techno-Economic Aspects of Grid Forming Inverters in Small Power Systems</b> P.-P. Schierhorn, P. Gambín Belinchón, J.V.M. Guilmineau (Energynautics, Germany) (Submission-ID HYB21-62)</li> </ul>
<b>11:45 – 12:00</b>	<b>Discussions</b>

## 12:00 – 13:00 BREAK

<b>13:00 – 14:45</b>	<b>SESSION 7A – HYBRID POWER PLANTS II</b>
> Session Chair	Kaushik Das (DTU, Denmark)
<b>13:00 – 14:00</b>	<b>Presentations (20 min. each)</b>
	<ul style="list-style-type: none"> <li>• <b>Technical and Economic Value of Utility-Scale Wind-Storage Hybrid Power Plants</b> M. Mehta, G. van Holthoon, D. Von Terzi, M. Zaayer (TU Delft, Netherlands) (Submission-ID HYB21-67)</li> <li>• <b>Investigation of Cross-Sectoral Energy Concepts for Urban Districts Using Key Performance Indicators</b> A. Hobert, M. Becker, T. Müller, M. Zdrallek (University of Wuppertal, Germany), D. Aschenbrenner (WSW Netz, Germany) (Submission-ID 72)</li> <li>• <b>Design and Optimization of Renewable Hybrid Plants</b> R. Khandelwal (GE Renewable Energy, Germany) (Submission-ID HYB21-43)</li> </ul>
<b>14:00 – 14:45</b>	<b>Discussions</b>

13:00 – 14:45	SESSION 7B – MICRO-GRIDS
> Session Chair	Gulum Megersa (Vensys, Germany)
13:00 – 14:20	Presentations (20 min. each)
	<ul style="list-style-type: none"> <li>• <b>Resiliency in Case of Power Outages for Rural Zones with an Energy Storage System – Correze Resilient Grid: An innovative rural microgrid</b> A. Guettache (ENEDIS, France), <b>E. Hestin</b> (SOCOMECE, France) (Submission-ID HYB21-87)</li> <li>• <b>A Novel Approach to the Microgrid Lifecycle: From Design to Operation</b> <b>I. Syed</b>, H. Shamma, I. Soliman, J. Da Custodia, K. Rama (Enerwhere, United Arab Emirates) (Submission-ID HYB21-38)</li> <li>• <b>Fuel Consumption and Emissions Reduction through Advanced Microgrids Control System</b> <b>P. Piclová</b> (ComAp, Czech Republic) (Submission-ID HYB21-12)</li> <li>• <b>Optimizing Cost Saving Potential of Solar, Battery and Gensets Hybrid Systems for Island Grids using Advanced Hybrid Energy Allocation and Dispatch (AHEAD) Tool</b> <b>R. Sharma</b>, L. Haack (Suntrace GmbH, Germany) (Submission-ID HYB21-76)</li> </ul>
14:20 – 14:45	Discussions

## 14:45 – 14:50      SHORT BREAK

08:50 New York // 09:50 Rio de Janeiro // 13:50 London // 18:20 New Delhi // 19:50 Jakarta // 20:50 Beijing // 21:50 Tokyo

14:50 – 16:00	SESSION 8 – CLOSING SESSION
> Session Chair	Thomas Ackermann (Energynautics, Germany)
14:50 – 15:55	Panel discussion
	<p><b>Topic addressed:</b></p> <ul style="list-style-type: none"> <li>- The Role of Future Hybrid Systems in 100% Renewable-Energy Based Systems</li> </ul> <p><b>Panelists:</b></p> <ul style="list-style-type: none"> <li>- Thorsten Althaus (BayWa r.e., Germany)</li> <li>- Gulum Megersa (Vensys, Germany)</li> <li>- Nicholas Miller (HickoryLedge, USA)</li> <li>- Terji Nielsen (The Power Company SEV, Faroe Islands)</li> <li>- Wolfram-H. Wellßow (University of Kaiserslautern, Germany)</li> </ul>
15:55 – 16:00	Closing Comments