



FINAL PROGRAM AS OF 27 APRIL 2022

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TIMETABLE 6TH INTERNATIONAL HYBRID POWER SYSTEMS WORKSHOP

TUESDAY, 26 APRIL 2022		WEDNESDAY, 27 APRIL 2022		
Hybrid Power Systems Workshop Day 1		Hybrid Power Systems Workshop Day 2		
08:00 – 09:00	FOYER			
	REGISTRATION			
09:00 – 09:10	SELVAGENS V / TRACK A			
	OPENING: WELCOME AND INTRODUCTION			
09:10 – 10:50	SELVAGENS V / TRACK A	09:15 – 10:35	SELVAGENS V / TRACK A	
	SESSION 1: KEYNOTE SESSION		SESSION 5A: GRID ASPECTS HP SYSTEMS	SESSION 5B: GRID ASPECTS HP PLANTS
COFFEE BREAK (30MIN)		COFFEE BREAK (30MIN)		
11:20 – 13:00	SELVAGENS V / TRACK A	11:10 – 12:50	SELVAGENS V / TRACK A	
	SESSION 2A: CASE STUDIES HYBRID POWER SYSTEMS		SESSION 2B: CASE STUDIES HYBRID POWER PLANTS	SESSION 6A: GENERAL DESIGN ASPECTS
LUNCH (1H)		LUNCH (1H)		
14:00 – 15:40	SELVAGENS V / TRACK A	13:50 – 15:50	SELVAGENS V / TRACK A	
	SESSION 3A: SYSTEM STUDIES HP SYSTEMS		SESSION 3B: SYSTEM STUDIES HP PLANTS	SESSION 7A: CASE STUDIES
COFFEE BREAK (20MIN)		COFFEE BREAK (20MIN)		
16:00 – 17:40	SELVAGENS V / TRACK A	15:50 – 16:50	SELVAGENS V / TRACK A	
	SESSION 4A: DESIGN ASPECTS HP SYSTEMS		SESSION 4B: DESIGN ASPECTS HP PLANTS	SESSION 8: CLOSING SESSION
19:00	WORKSHOP DINNER BUS DEPARTURE 18:45			

08:00 – 09:00 Registration

All times in the session tables show the on-site time in Madeira (Western European Summer Time/WEST = BST = UTC+1), the highlighted stripes show the starting times of the respective sessions in additional time zones.

04:00 New York | 05:00 Rio de Janeiro | 10:00 Berlin | 13:30 New Delhi | 15:00 Jakarta | 16:00 Beijing | 17:00 Tokyo | 18:00 Sydney

09:00 – 09:10 Welcome

09:10 – 10:50 SESSION 1 – KEYNOTE SESSION

04:10 New York | 05:10 Rio de Janeiro | 10:10 Berlin | 13:40 New Delhi | 15:10 Jakarta | 16:10 Beijing | 17:10 Tokyo | 18:10 Sydney

> Session Chair Thomas Ackermann (Energynautics, Germany)

09:10 – 10:30 Presentations (20 min. each)

- **Renewable Energy dispatch in Madeira Island**
J. Cotrim (EEM – Director of transmission and distribution grid in the Autonomous Region of Madeira, Portugal)
- **EEM's Strategy to Maximize the Integration of Renewables in the Electrical Grid of Madeira Island**
A. Figueira (EEM – Director of studies and planning department, Madeira, Portugal)
- **Development of Specific Grid Codes to Allow Safe Increase of Renewable Generation in Islanded Power Systems**
J. Peças Lopes, C. Moreira (FEUP & INESC TEC, Portugal) (Submission-ID HYB20_19 → HYB22_12)
- **Control Measures for Smoothing PV Power Fluctuations in Madeira Power System**
M. H. Vasconcelos, J. A. Peças Lopes (INESC TEC | University of Porto, Portugal), A. P. Figueira (EEM - Empresa de Electricidade da Madeira, Portugal) (Submission-ID HYB22_57)

10:30 – 10:50 Discussions

10:50 – 11:20 COFFEE BREAK

11:20 – 13:00 SESSION 2A – CASE STUDIES HYBRID POWER SYSTEMS

06:20 New York | 07:20 Rio de Janeiro | 12:20 Berlin | 15:50 New Delhi | 17:20 Jakarta | 18:20 Beijing | 19:20 Tokyo | 20:20 Sydney

> Session Chair João Peças Lopes (University of Porto | INESC TEC, Portugal)

11:20 – 12:40 Presentations (20 min. each)

- **The Energy Challenges in Azores**
F. Henriques (EDA – Electricity of Azores, Portugal)
- **The Hybrid Power Plant in Graciosa island - a Pioneer Project in the Azores Islands**
D. Conde Silva (Gracióllica, Portugal), N. Taveira (ENERCON, Portugal) (Submission-ID HYB22_56)
- **Assessment of Renewable Hybrid Power Plants on Greek Non Interconnected Islands and their Contribution to CO2 Reduction by Evaluating the Potential Penetration Rates on Different Islands**
J. Gerstner, L. Leao-Gloria (ABO Wind, Germany) (Submission-ID HYB22_21)
- **Hybrid Power Systems on Indonesian Islands - Progress and Recent Developments**
P.-P. Schierhorn (Energynautics, Germany)

12:40 – 13:00 Discussions

11:20 – 13:00	SESSION 2B – CASE STUDIES HYBRID POWER PLANTS
06:20 New York 07:20 Rio de Janeiro 12:20 Berlin 15:50 New Delhi 17:20 Jakarta 18:20 Beijing 19:20 Tokyo 20:20 Sydney	
> Session Chair	Nicholas Miller (HickoryLedge, USA)
11:20 – 12:40	Presentations (20 min. each)
<ul style="list-style-type: none"> The Case for Co-located Storage in the UK T. Althaus (BayWa r.e., Germany) A Wind Power Plant's Impact on the Grid Frequency: Analysis of Measurements in an Electrically Isolated Island with High Penetration of Inverter-Based Wind Generation H. M. Tróndheim, T. Nielsen (The Power Company SEV, Faroe Islands) (Submission-ID HYB22_10) Hybrid Energy Solutions for Decarbonization of Islands & Remote Areas C. Lenz (Siemens Energy Global, Germany), J. Bandeira Santos (Siemens Energy Unipessoal, Portugal) (Submission-ID HYB22_54) The Impact of Porto Santo's Battery on the Management of the Island's Electrical System D. Vasconcelos (EEM, Portugal) 	
12:40 – 13:00	Discussions

13:00 – 14:00 LUNCH BREAK

14:00 – 15:40	SESSION 3A – SYSTEM STUDIES HYBRID POWER SYSTEMS
09:00 New York 10:00 Rio de Janeiro 15:00 Berlin 18:30 New Delhi 20:00 Jakarta 21:00 Beijing 22:00 Tokyo 23:00 Sydney	
> Session Chair	Peter-Philipp Schierhorn (Energynautics, Germany)
14:00 – 15:00	Presentations (20 min. each)
<ul style="list-style-type: none"> Is Real Inertia Always Better? Synchronous Condensers, Fast Frequency Response, and Virtual Inertia in Isolated Hybrid Power Systems D. Vázquez Pombo (Technical University of Denmark – DTU, Denmark Vattenfall R&D, Sweden), D. Alonso Sørensen (University of the Basque Country Artech, Spain), J. Martinez-Rico (University of the Basque Country Basque Research and Technology Alliance – Eibar, Spain) (Submission-ID HYB22_18) Case Study of a Hybrid Power Microgrid in Rural India K. Arunachalam, A. Nandakumar (FICHTNER Consulting Engineers India, India), K. Ramachandra, A. Sharan (Decentralised Energy Systems (I) – DESI, India) (Submission-ID HYB22_48) Designing a Hybrid Power System for a Remote Telescope in the Atacama Desert I. Viøle, G. Valenzuela-Venegas, M. Zeyringer (University of Oslo – ITS, Norway), Ø. Ulleberg (Institute for Energy Technology – IFE, Norway), S. Sartori (University of Oslo – ITS, Norway) (Submission-ID HYB22_51) 	
15:00 – 15:40	Discussions

14:00 – 15:40	SESSION 3B – SYSTEM STUDIES HYBRID POWER PLANTS
09:00 New York 10:00 Rio de Janeiro 15:00 Berlin 18:30 New Delhi 20:00 Jakarta 21:00 Beijing 22:00 Tokyo 23:00 Sydney	
> Session Chair	John Zack (MESO, USA)
14:00 – 15:00	Presentations (20 min. each)
<ul style="list-style-type: none"> Component Sizing of an Utility-Scale Hybrid Power Plant K. Das, A. Cossu, J. P. Murcia Leon, P. E. Sørensen (DTU, Denmark) (Submission-ID HYB22_19) How Battery Operation affects the Cost of Storage D. Jaber (BayWa r.e. Solar Projects Germany) Energy Management of Hybrid Power Plants in Balancing Market R. Zhu, K. Das, P. Sørensen, A. D. Hansen (Technical University of Denmark – DTU, Denmark) (Submission-ID HYB22_17) 	
15:00 – 15:40	Discussions

15:40 – 16:00 COFFEE BREAK

16:00 – 17:40	SESSION 4A – DESIGN ASPECTS HYBRID POWER SYSTEMS
11:00 New York 12:00 Rio de Janeiro 17:00 Berlin 20:30 New Delhi 22:00 Jakarta 23:00 Beijing 00:00 Tokyo 01:00 Sydney	
> Session Chair	Thomas Ackermann (Energynautics, Germany)
16:00 – 17:30	Presentations (18 min. each)
<ul style="list-style-type: none"> • The Impact of Improving Technology on Microgrid Design P. Lilienthal (HOMER Energy, USA) (Submission-ID HYB22_44) • Case Study on the Hybrid Power System of the Galápagos Islands T. Ackermann (Energynautics, Germany) • A Contrast Study of Climate Influence on the Stand-Alone Microgrid System with a Hybrid Renewable Power Storage System D. Wang, M. Grimmelt (University of Applied Sciences Ruhr West, Germany) (Submission-ID HYB22_27) • An Islanded Microgrid Design: A Case Study J. Francou, C. Abbezzot, P. Rasoavonjy, D. Calogine (University of Reunion Island, France) (Submission-ID HYB22_36) • Floating Offshore Wind in Madeira S. Jermy (Wave Hub Development Services Limited (Trading as Celtic Sea Power), United Kingdom) (Submission-ID HYB22_53) 	
17:30 – 17:40	Discussions

16:00 – 17:40	SESSION 4B – DESIGN ASPECTS HYBRID POWER PLANTS
11:00 New York 12:00 Rio de Janeiro 17:00 Berlin 20:30 New Delhi 22:00 Jakarta 23:00 Beijing 00:00 Tokyo 01:00 Sydney	
> Session Chair	Christian Lenz (Siemens Energy, Germany)
16:00 – 17:20	Presentations (20 min. each)
<ul style="list-style-type: none"> • Hybrid Electric Power System Generation: Current Perspectives and Future Trends R. Reis, A. V. Macêdo, F. Almeida Neto (Federal Rural University of Pernambuco – UFRPE, Brazil), B. Souza, W. Neves, J. Leitão (Federal University of Campina Grande – UFCG, Brazil), F. Lopes, H. Braz (Federal University of Paraíba – UFPB, Brazil), P. Camara (São Francisco Hydroelectric Company – Chesf, Brazil) (Submission-ID HYB22_22) • Influence of Business Models on PV-Battery Dispatch Decisions and Market Value: A Pilot Study of Operating Plants J. Seel, C. Warner, A. Mills (Lawrence Berkeley National Laboratory, USA) (Submission-ID HYB22_41) • Keep it Short: Exploring the Impacts of Configuration Choices on the Recent Economics of Solar-plus-battery and Wind-plus-battery Hybrid Energy Plants C. Crespo Montañes, W. Gorman, A. D. Mills, J. H. Kim (Lawrence Berkeley National Laboratory, USA) (Submission-ID HYB22_4) • Vulnerable Operation of Brazilian Northeastern System Under Hydric Crisis and Large Amount of Renewables A. Vitória de A. Macêdo, R. L. de Andrade Reis (Federal Rural University of Pernambuco - UFRPE, Brazil), J. J. de Almeida Lins Leitão, W. A. Neves, (Federal University of Campina Grande – UFCG, Brazil), P. F. Ribeiro (Federal University of Itajubá - UNIFEI, Brazil), P. C. de Souza Camara (CHESF, Brazil) (Submission-ID HYB22_20) 	
17:20 – 17:40	Discussions

19:00 Workshop Dinner

Meeting point: Lobby of VidaMar Resort Hotel Madeira
Meeting time: 18:30 p.m.
Departure of bus: 18:45 p.m.

WEDNESDAY, 27 APRIL 2022

09:15 – 10:35	SESSION 5A – GRID ASPECTS HYBRID POWER SYSTEMS
04:15 New York 05:15 Rio de Janeiro 10:15 Berlin 13:45 New Delhi 15:15 Jakarta 16:15 Beijing 17:15 Tokyo 18:15 Sydney	
> Session Chair	Duarte Conde Silva (Graciosa, Portugal)
09:15 – 10:15	Presentations (20 min. each)
<ul style="list-style-type: none">• Test Infrastructure for the Investigation and Standardization of the Fault-Ride Through Behavior of Electrolysers J. Barthel, L. Beck, G. Quistorf, K. Schalk, N. Denecke (Fraunhofer IWES, Germany) (Submission-ID HYB22_31)• Improvement of the Existing Power Network of Industrial Enterprises through the Hybrid Microgrids N. Rahmanov, A. Mahmudova (Azerbaijan Scientific Research and Design Prospecting Power Engineering Institute, Azerbaijan) (Submission-ID HYB22_43)• Manage your Hybrid Power Energy to the Next Level M. Wollny, P. O. Moix (Studer Innotec, Switzerland) (Submission-ID HYB22_35)	
10:15 – 10:35	Discussions

09:15 – 10:35	SESSION 5B – GRID ASPECTS HYBRID POWER PLANTS
04:15 New York 05:15 Rio de Janeiro 10:15 Berlin 13:45 New Delhi 15:15 Jakarta 16:15 Beijing 17:15 Tokyo 18:15 Sydney	
> Session Chair	Kaushik Das (DTU, Denmark)
09:15 – 10:15	Presentations (20 min. each)
<ul style="list-style-type: none">• Optimized Energy Management of a Solar and Wind Equipped Student Residence with Innovative Hybrid Energy Storage and Power to Heat Solutions L. N. Palaniswamy, N. Munzke, C. Kupper, M. Hiller (Karlsruhe Institute of Technology –KIT, Germany) (Submission-ID HYB22_46)• Online Economic Control of Grid-Connected Co-Located Wind Turbine and Battery by Balancing Damage and Generation A. Anand (TU Munich – TUM, Germany) (Submission-ID HYB22_59)• Reactive Metals as Energy Carriers: An Aluminum-based Hybrid Energy Storage Case H. Ersoy, M. Baumann, M. Weil, S. Passerini (Karlsruhe Institute of Technology –KIT, Germany), L. Barelli (University of Perugia – UNIPG, Italy) (Submission-ID HYB22_52)	
10:15 – 10:35	Discussions

10:35 – 11:10 COFFEE BREAK

11:10 – 12:50	SESSION 6A – GENERAL DESIGN ASPECTS
06:10 New York 07:10 Rio de Janeiro 12:10 Berlin 15:40 New Delhi 17:10 Jakarta 18:10 Beijing 19:10 Tokyo 20:10 Sydney	
> Session Chair	John Zack (MESO, USA)
11:10 – 12:30	Presentations (20 min. each)
•	Variable Renewable Generation and Flexible Demand F. Sioshansi (Menlo Energy Economics, USA) (Submission-ID HYB22_5)
•	Overview of the Recently Released Second Version of IEA Wind’s Recommended Practices for the Implementation of Renewable Energy Forecasting Solutions J. Zack (MESO, USA), C. Möhrten (WEPROG, Denmark), G. Giebel (DTU, Denmark) (Submission-ID HYB22_29)
•	Balancing Security – Sustainability and Economy J. Barcelona (Rolls Royce Power System Iberica, Portugal)
•	Adding Tidal Stream Generation to Balance the Grid Mix and Create a Cost Effective Solution For Net Zero Generation In The Faroe Islands - The Case Of Minesto M. Edlund (Minesto, Sweden) (Submission-ID HYB22_61)
12:30 – 12:50	Discussions

11:10 – 12:50	SESSION 6B – GENERAL GRID ASPECTS
06:10 New York 07:10 Rio de Janeiro 12:10 Berlin 15:40 New Delhi 17:10 Jakarta 18:10 Beijing 19:10 Tokyo 20:10 Sydney	
> Session Chair	Luan Leao Gloria (AboWind, Germany)
11:10 – 12:30	Presentations (20 min. each)
•	Hybridization with Floating Solar Plants in Reservoirs of Hydroelectric Power Plants C. A. de Miranda Aviz (Aviz Consultoria, Brazil), P. S. Pereira (Conprove, Brazil) (Submission-ID HYB22_47)
•	Analysis and Performance of a Grid Connected PV System for Harmonic Compensation from Non-Linear Industrial Loads L. Teodosio da Costa, W. L. A. Neves (Federal University of Campina Grande, Brazil), F. B. Costa (Michigan Technological University, USA), J. F. B. de Freitas Filho (Federal University of Campina Grande, Brazil) (Submission-ID HYB22_34)
•	Hybrid Solar PV, Wind and Biomass Gasification Microgrid for Research and Training Use. Case study: CUBAENERGÍA, in Cuba A. Rodríguez Rosales, A. Curbelo Alonso (CUBAENERGIA, Cuba), L. Arribas (CIEMAT, España), J. de D. Bornay (BORNAY AEROGENERADORES, Spain), J. Domínguez (CIEMAT, Spain), R. Sosa Cáceres (CUBAENERGIA, Cuba), O. Escalona (CUBASOLAR, Cuba) (Submission-ID HYB22_30)
•	Positive Sequence and EMT Domain Modeling of Grid Forming Hybrid Plants for Transmission Studies B. Graham (Electric Power Research Institute, Ireland), D. Ramasubramanian (Electric Power Research Institute, USA) (Submission-ID HYB22_3)
12:30 – 12:50	Discussions

12:50 – 13:50 LUNCH BREAK

13:50 – 15:30	SESSION 7A – CASE STUDIES
08:50 New York 09:50 Rio de Janeiro 14:50 Berlin 18:20 New Delhi 19:50 Jakarta 20:50 Beijing 21:50 Tokyo 22:50 Sydney	
> Session Chair	Thomas Ackermann (Energynautics, Germany)
13:50 – 15:10	Presentations (20 min. each)
<ul style="list-style-type: none"> • Operating Hybrid Energy Systems at Lowest Cost by Implementation of Real-Time Local Market T. Walter (Easy Smart Grid, Germany) (Submission-ID HYB22_23) • Smart Mobile Vaccination Pickup for Sustainable Improvement of Medical Care and Smart Pandemic Control in Africa F. Stortz, J. Went, J. Koschikowski, Md. Nasimul Islam Maruf (Fraunhofer ISE, Germany), B. Lotz, M. Beckett (Fraunhofer IGB, Germany), L. Schäfer, F. Neumann (Fraunhofer IST, Germany), M. Hamann (Stellenbosch University, Fraunhofer Innovation Platform for the Water-Energy-Food Nexus, South Africa) (Submission-ID HYB22_8) • Analysis of the Sizing Factor Inverter in Brazilian Regions of Tropical Semiarid Climate J. F. B. de Freitas Filho, W. L. A. Neves, L. T. da Costa (Federal University of Campina Grande – UFCG, Brazil), F. B. Costa (Michigan Technological University – MTU, USA) (Submission-ID HYB22_33) • Development and Analysis of an Off-grid Solar Food Processing System in Kenya A. Morgenstern, D. M. Subasi, N. Pfanner, N. Reiners, F. Stortz, J. Wüllner, Md. Nasimul Islam Maruf, (Fraunhofer ISE, Germany) (Submission-ID HYB22_7) 	
15:10 – 15:30	Discussions

13:50 – 15:30	SESSION 7B – ANCILLARY SERVICES
08:50 New York 09:50 Rio de Janeiro 14:50 Berlin 18:20 New Delhi 19:50 Jakarta 20:50 Beijing 21:50 Tokyo 22:50 Sydney	
> Session Chair	Dina Jaber (BayWa r.e., Germany)
13:50 – 15:10	Presentations (20 min. each)
<ul style="list-style-type: none"> • New Frequency Control Philosophy for Future Hybrid Power Plants O. Sahin, B. Alahmad, A. G. Raducu (Vattenfall R&D, Sweden), D. Vázquez Pombo (Vattenfall R&D, Sweden DTU, Denmark), S. Kanev (Vattenfall R&D, Sweden) (Submission-ID HYB22_13) • Variable Renewable Energy Participation in U.S. Ancillary Services Markets: Economic Evaluation and Key Issues F. Kahrl, J. H. Kim, A. D. Mills, R. Wisner, C. Crespo Montañes, W. Gorman (Lawrence Berkeley National Laboratory, USA) (Submission-ID HYB22_42) • Hybrid Hydro and Solar PV Microgrid for Rural Electrification N. A. Iliadis (EST RES, Switzerland) (Submission-ID HYB22_60) • Hybrid Power Systems : Carbon Reduction Through Spinning Reserve GB S. Chauhan (Solar Turbines, USA) (Submission-ID HYB22_2) 	
15:10 – 15:30	Discussions

15:30 – 15:50 COFFEE BREAK

15:50 – 16:50	SESSION 8 – CLOSING SESSION
10:50 New York 11:50 Rio de Janeiro 16:50 Berlin 20:20 New Delhi 21:50 Jakarta 22:50 Beijing 23:50 Tokyo 00:50 Sydney	
> Session Chair	João Peças Lopes (INESC TEC, University of Porto, Portugal)
15:50 – 16:20	Panel discussion
<p>Topics addressed: Lessons Learned for Other Islands</p> <p>Panelists:</p> <ul style="list-style-type: none"> - Terji Nielsen (SEV, Faroe Islands) - Duarte Conde Silva (Gracióllica, Portugal) - Fernando Henriques (EDA - Electricidade dos Açores, Portugal) - José Cotrim (EEM, Portugal) 	
16:20 – 16:40	Discussions
16:40 – 16:50	Closing Remarks