***EPE’25 - List of topics***

**I - FOCUS TOPICS**

**TOPIC 1: ELECTROMOBILITY – THE POWERFUL FACTOR IN REDUCING CO2**

1.a)  Electric Road Vehicles (Light- and Heavy-Duty and their Drivetrain Components)

1.b)  Electric Rail Vehicles (incl. Battery and Hydrogen Green Traction)

1.c)  Electric Aircraft, Aerospace and Drones (incl. Drivetrain Components)

1.d)  Electric Ships (Inland, Sea, Ferries)

1.e)  Electric Off-Road and Non-Conventional Vehicles

1.f)   Power-Electronic Devices and Integration for Electromobility

**TOPIC 2: SMART GRIDS AND RENEWABLE ENERGY**

2.a)  Smart Grids, DC Networks and Components, Hybrid AC/DC Networks

2.b)  Renewable and New Energy Sources

2.c)  Power Electronics and Devices for Grid Applications

2.d)  Railway Network Systems

2.e)  Green Hydrogen and “X”: Electrolyzers and Plants

2.f)  Multi-Vector Power Grids: Electricity, Gas, Heat, etc.

**TOPIC 3: ENERGY STORAGE SYSTEMS**

3.a)  Energy Storage and Management Systems

3.b)  Battery Aging, Reliability, and Safety

3.c)  Smart Charging, V2G, V2H, Charging Infrastructure and Grid Integration for Electromobility

3.d)  Energy Storage for Grid Applications including Industrial Solutions

3.e)  Fuel Cells and Stacks, Electrolyzer Cells and Stacks and Associated Power Electronics

3.f)  Hybridization of Energy-Storage Units for Energy-Transition Applications

**TOPIC 4: DIGITALIZATION: THE POWERFUL FUSION OF AI AND IoT FOR SUSTAINABILITY**

4.a)  Digital Twins and Real-Time Simulation

4.b)  Use of AI in Power-Electronics Applications

4.c)  Cyber-Physical Security

4.d)  Data-Driven and Physics-Based Techniques

4.e)  Machine Learning

4.f)  Evolution of Power Electronics with the Introduction of AI

**TOPIC 5: SUSTAINABLE AND AFFORDABLE POWER ELECTRONICS**

5.a)  Design of Sustainable and/or Frugal Power Converters

5.b)  Dynamic Life Cycle Analysis and Assessment

5.c)  Recycling: Challenges and Methodologies

5.d)  Circular Economy

5.e)  State of Health: Online Monitoring, Failure Diagnosis and Prognosis, Remaining Useful Life Prediction

**TOPIC 6: ENERGY TRANSITION AND SOCIETAL CHANGE**

6.a)  Smart Electromobility and Sustainable Development (Government Policies and Incentives related to E-Mobility Adoption)

6.b)  Energy Efficiency, Environmental Impact and Acceptability of Energy Sobriety

6.c)  Policy Instruments and Institutional Regimes for the Complete Decarbonization of Energy Systems

6.d)  Energy Transition Economy and Social Sustainability of the Energy Transition

6.e)  New Paradigms in the Use of Electrical Energy (New Consumers)

6.f)  Sustainable Power Electronics Engineering Education

**II - POWER ELECTRONICS COMPONENTS AND CONVERTERS**

**Topic 7: Semiconductor Devices and Packaging**

7.a)  Active Devices and Components

7.b)  Integration and Packaging

7.c)  Cooling Circuits and Thermal Management

7.d)  Reliability and Life-Cycle Assessment

**Topic 8: Components linked to Power Electronics**

8.a)  Magnetic Components – Inductors and Transformers

8.b)  Dielectric and Interconnecting Components – Capacitors, Insulators, Cables, PCBs, Bus Bars

8.c)  Electrochemical Components – Batteries

8.d)  To- and from X Components – Fuel Cells/Stacks, Electrolyzer Cells/Stacks and Solar Cells

8.e)  Shielding Components

8.f)  Other Components – Resistors, Fuses, Contactors

**Topic 9: Power Converter Topologies**

9.a)  AC/DC and DC/AC Converter Topologies

9.b)  AC/AC Converter Topologies

9.c)  DC/DC Converter Topologies

9.d)  AC-Grid Connected Converter Topologies

**Topic 10: Converter Modelling, Design and Low-level Control**

10.a)  Converter Design and Optimisation

10.b)  Converter Modelling and Low-level Control, including Gate-Drives

10.c)  EMI/EMC in Power Electronics including HF Phenomena

10.d)  Thermal Optimization and Reliability Considerations

**Topic 11: Measurement, Supervision and Control for Power Converters**

11.a)  Modulation and Control Methods

11.b)  Estimation, Identification and Optimisation Methods

11.c)  Measurement Techniques, Sensors and State Observers

11.d)  Algorithms and Methods for Condition Monitoring and Life-Time Prediction

**III - POWER ELECTRONICS APPLICATIONS**

**Topic 12: Electrical Machines and Drive Systems**

12.a)  Electrical Machines and Actuators

12.b)  System Design and Optimization of Adjustable-Speed Drives

12.c)  Control of Electric Drives

12.d)  Algorithms and Methods for Condition Monitoring and Life-Time Prediction

**Topic 13: Power Supplies and Industry-specific Power Electronics**

13.a)  Power Supplies and UPS

13.b)  Lighting: Solid-State Lighting and Electronic Ballasts

13.c)  Contactless (Wireless) Power Supply

13.d)  Industry-Specific Applications (Cement, Steel, Paper, Textile, Mining, etc.)

13.e)  Applications in Physics Research and Related Areas