Shaping the future of energy with digital twins and direct current

DC world congress / expo: *8 major thematic will explore how the integration of direct current and digital twins is revolutionizing the* ***flexibility and sustainability of the global energy landscape.***

0 – Opening Conference with Global Institutional Representatives :
What role does Direct Current play in the energy transition and in redefining the global energy landscape ?

1- DC Grid :

1.1- **The DC revolution is now**. Buildings, cities, territories: Where should we start?

1.2- Power Grid **Black-out**. How will **DC Grids** enable **territories** to be resilient and guarantee continuity of service for vital functions?

1.3- **Local Energy Loops**: How a DC network (DC Grid) allows optimizing collective self-consumption by more than 20% while providing installations with high resilience in case of a blackout.

2- Technologies

2.1- Why DC now and how is power electronics, especially **Solid State technology**, profoundly disrupting the electricity sector?

2.2- How can **PoE** (Power Over Ethernet), **SPE** (Single Pair Ethernet), and **FMP** (Fault Managed Power) technologies revolutionize the electrical and IT wiring of buildings? What are the economic, environmental, and functional advantages? Feedback and perspectives.

2.3- **Energy harvesting / Elevators**: How to recover braking energy during descent to power elevators with direct current during ascent?

2.4- **Energy harvesting / Robots**: How to recover the braking energy of robots to power equipment in direct current and optimize their energy consumption? Example from the German automotive industry.

3- Production & Energy Storage

3.1- What key role does **electricity storage** play in the rise of **renewable energies**? What solutions are available for which typologies and what is the ROI? What advantage is there in switching to **DC**?

3.2- How can **bidirectional vehicles** become an essential link in grid balancing (**Vehicle-to-X**)? What consumption models? Perspectives.

3.3- Can **DC** revive the **hydrogen sector** and energy storage using fuel cells?

3.4- Why must **generators switch to DC**? What are the economic and environmental impacts?

3.5- **DC Grid**: Which **type of energy storage** should be prioritized and at what scale (house, apartment building, residence, neighborhood, etc.)?

4- Electrical demand flexibility and energy efficiency

4.1- How can direct current and **DC grids** provide a short-term response to **network congestion** challenges? Concrete examples from around the world.

4.2- **Power efficiency** in the service of flexibility — or how, thanks to direct current **(DC)**, to dynamically adjust the power consumption of equipment to the available capacity without service interruption?

4.3- How can the **management of electrical demand flexibility** become a true **economic driver** for equipping any type of building and implementing an ad hoc data management system? Feedback, ROI analysis, and perspectives.

4.4- How **to equip all buildings** in record time to address **flexibility challenges** (Flex Ready). Which flexibility models yield what savings or potential revenues? What role for aggregators, and what issues surround data governance?

4.5- **Energy demand flexibility and collective self-consumption**: What challenges do cities and communities face? How does the **digital twin** become an **essential tool**?

4.6- How does collective **self-consumption** provide a response to **network congestion** challenges, and how does the use of a **DC network** enable at least **20% energy optimization** while ensuring service continuity for installations?

5- Smart Building & Smart City

5.1- **Buildings and territories:** How can DC be integrated into existing architectures? Towards **hybrid** AC/DC, global/local, centralized/decentralized **networks**?

5.2- **Public lighting:** How can municipalities **reduce their energy bills** by more than **75%** by combining DC networks and energy storage? How can this network become the backbone of the Smart City by integrating energy and data?

5.3- **Indoor lighting:** Why switch now to a DC lighting network combining data and power? Which technologies should be used for what benefits, and how can we transition to a fully digital lighting control model?

5.4- Why should the **HVAC industry** consider a rapid **transition to DC**? Where to start? What are the economic and environmental benefits? Overview of stakeholders who have made the switch and their feedback.

5.5- **Direct Current Data Center** (**DC DC**) : The answer to an economic and environmental emergency. Overview of ongoing projects and established ecosystems for very short-term benefits.

6- Transport, Mobility & Smart Grid

6.1- **Mobility and Building Convergence**: How does the **electric vehicle** (EV) become both a **mobility and Smart Grid enabler**? The **role of DC** in driving this transition. Current situation and short- to medium-term outlook.

6.2- How can a **PV installation** be optimized with direct **DC vehicle** charging?

6.3- **Electric vehicle charging:** Why should users **maintain control** over their charging stations? What is at stake for fast charging, and why is it time to adopt **bidirectionality**?

6.4- How can **DC** contribute to the **decarbonization of rail and maritime transport**? How could the infrastructures have established form an **urban DC network**? Overview of ongoing projects worldwide.

7- Safety of DC networks and installations

7.1- **HV DC – MV DC – LV DC:** Overview of international installation standards and norms

7-2 Are **protective devices for goods and people** (circuit breakers, fuses) ready to be integrated into **DC** installations?

7.3- **DC network cables and architectures**: How to select the right cable size and type to ensure service continuity and system efficiency? What reduction in copper mass can be achieved?

8- Operational insights: Presentation of 10 concrete projects each day to provide a comprehensive overview of the progress of direct current worldwide.