

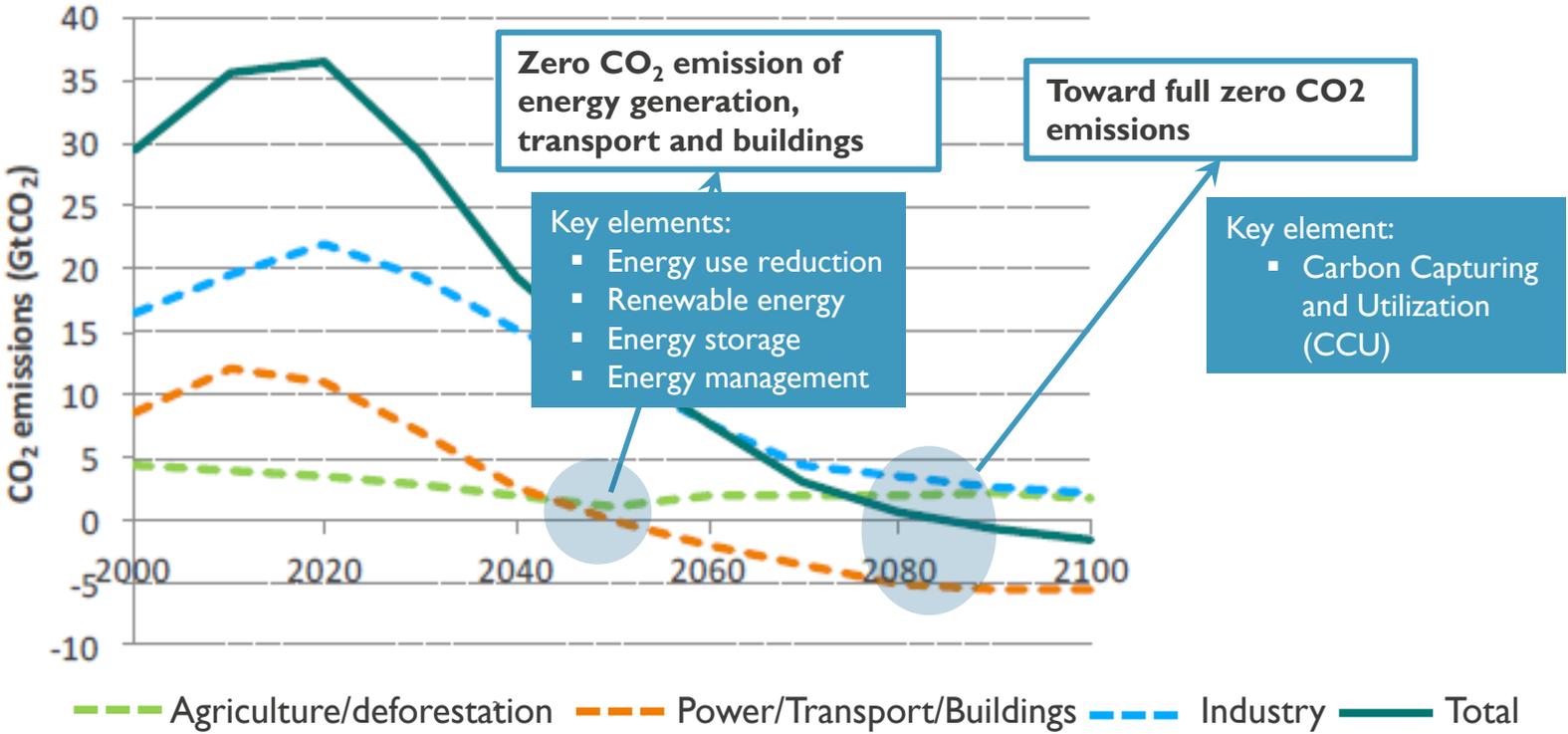
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INTRODUCTION TO ENERGY SESSION PTW HI 2020

J. POORTMANS

GLOBAL CHALLENGE

FROM REDUCING CO₂-EMISSION TO RE-USING IT



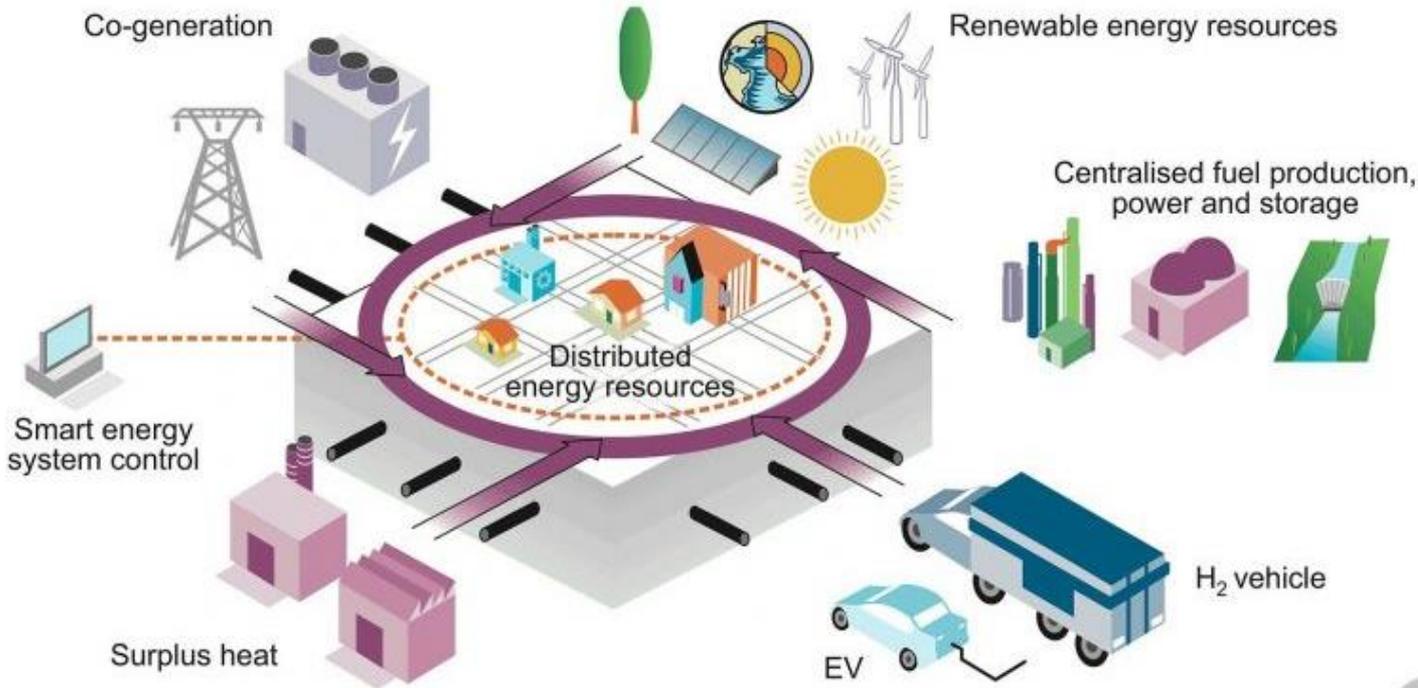
PV HAS BECOME THE CHEAPEST SOURCE OF ENERGY

SOLAR ELECTRICITY GENERATION COST IN COMPARISON WITH OTHER POWER SOURCES



ENERGY EVOLUTION

INTERACTING DISTRIBUTED ENERGY VECTORS



ENERGY TECHNOLOGY TRENDS



Building integrated photovoltaics (BIPV) as a viable option among renewables

In the face of the urgent need to renovate and decarbonise the existing building stock, special focus is on building skins, such as roofs and facades, to make them more materials, but also to generate energy. This is essential to act years away.

The concept of Building integrated photovoltaics (BIPV) refers to the capacity of the photovoltaic (PV) system to be multi-architectural appearance of the system --, and energy integrated to interact with the building and district energy system to maxim



Global EV battery market to grow by \$15.7 billion through 2023
January 1, 2020

U.S. Home Energy Storage Market Achieves Record Growth in Third Quarter 2019

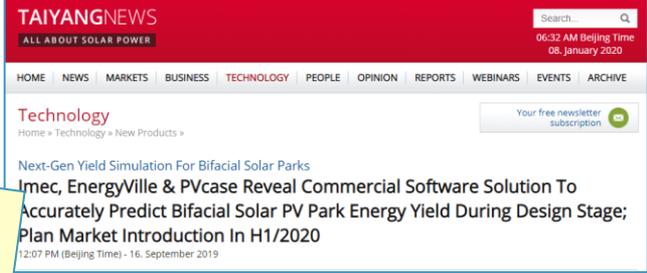
NeoVolta Positioned for Strong Growth in the Home Solar Battery Market

December 02, 2019 08:00 ET | Source: NeoVolta Inc.
SAN DIEGO, Dec. 02, 2019 (GLOBE NEWSWIRE) -- NEOVOLTA INC. (OTCQB: NEOV) – During the third quarter of 2019, the U.S. residential energy storage market saw record growth with 38.1 megawatts installed. That marks a 32% increase over the 2019.

Digitalization of energy flows enabling 'prosumers'



Assure good financial return
Accurate PV energy yield simulation/forecasting for power plants



Electrical Vehicles and improved Energy Storage

Power-to-X: The secret to a 100% renewable energy system?
By turning renewable electricity into fuel, power-to-X could free transport, heating and industrial process from fossil fuels – once costs fall.

Power to Molecules

IMEC-VISION ON SOLVING THE CO₂-PROBLEM IN A NUTSHELL

**Using imec's expertise in
semiconductor technology and ICT**

**Enabling radical innovation in electricity generation,
energy storage and circularity**

**Pave the way towards a decentralized energy system built
around an active prosumer**

INNOVATION EXPLOITING IMEC'S SEMICONDUCTOR EXPERTISE

Technology
Innovation

Decarbonisation of **Power Generation**

- **Photovoltaics**: largest renewable source
- Preparing for TW_p-deployment
- Focus on reliability and energy yield



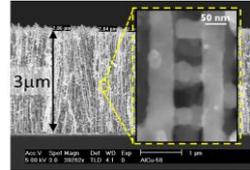
Decarbonisation of (person) **Transport Sector**

- **Solid-state Li-ion batteries**
- Safe and reliable storage
- Solving intermittency issue / **daily basis**



Power-to-Molecules (highly modular approach)

- **Electrochemistry for H₂ & synthetic fuels (CCU)**
- Seasonal storage & large transport (trucks, airplanes, ...)

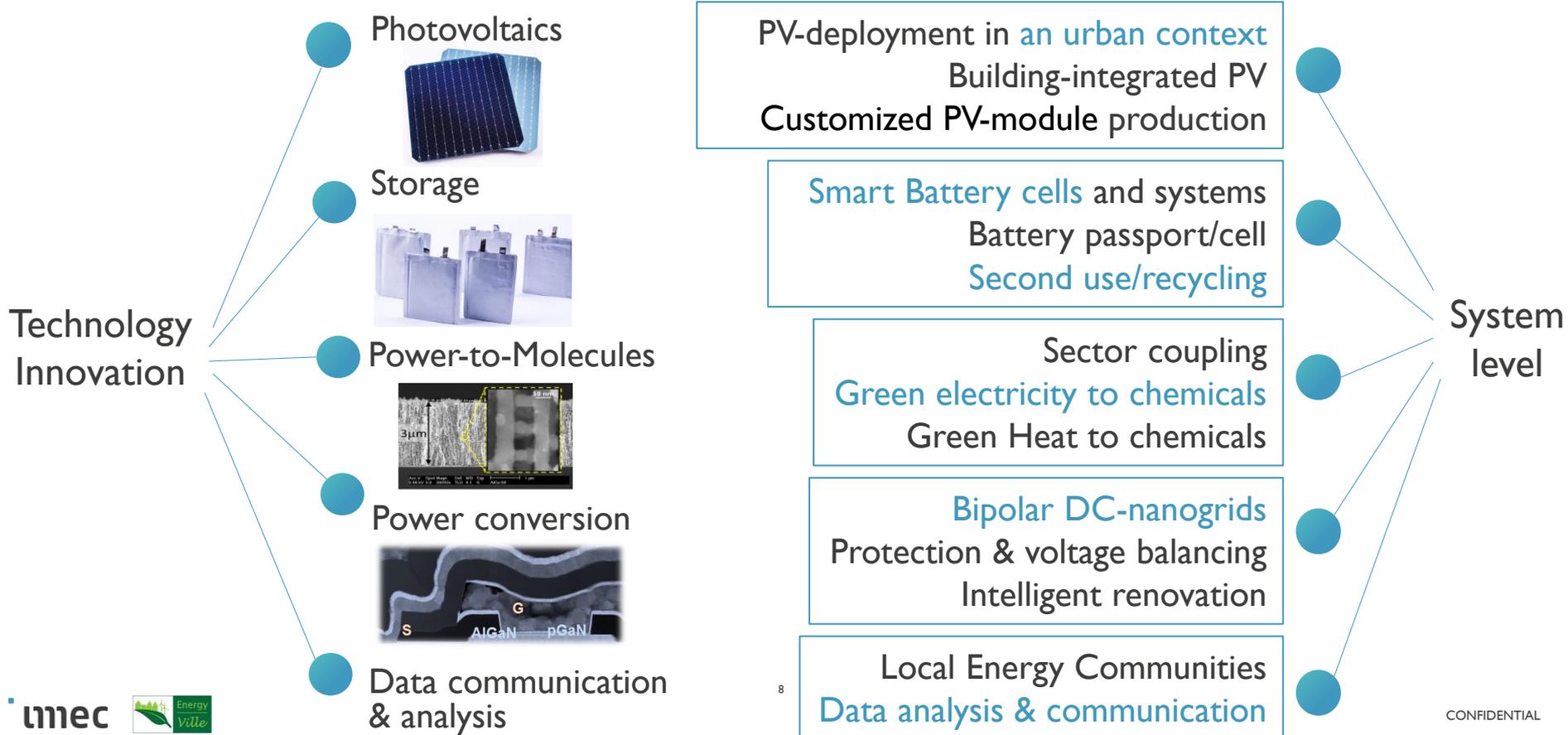


Efficient **devices for power conversion**

- **GaN-based power devices**
- Low losses in medium-power applications
- Miniaturization



LINKING MATERIAL & COMPONENTS TO SYSTEM LEVEL



COMBINING TECHNOLOGY AND SYSTEM INNOVATION

Technology Innovation

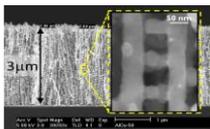
Photovoltaics



Storage



Power-to-Molecules



Power conversion

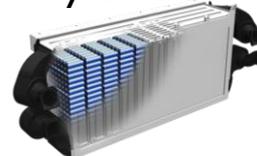


Data communication & analysis

PV-deployment in an urban context



Smart Battery cells and systems



Green electricity to chemicals



Bipolar DC-nanogrids



Local Energy Communities

System level

COMBINING TECHNOLOGY AND SYSTEM INNOVATION

Technology Innovation

Photovoltaics



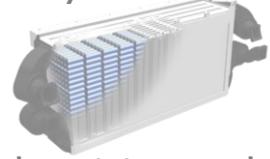
PV-deployment in an urban context



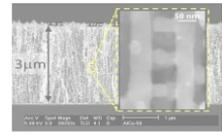
Storage



Smart Battery cells and systems



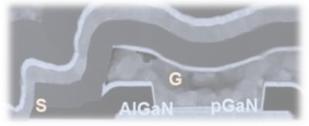
Power-to-Molecules



Green electricity to chemicals



Power conversion



Bipolar DC-nanogrids

Data communication & analysis



Local Energy Communities

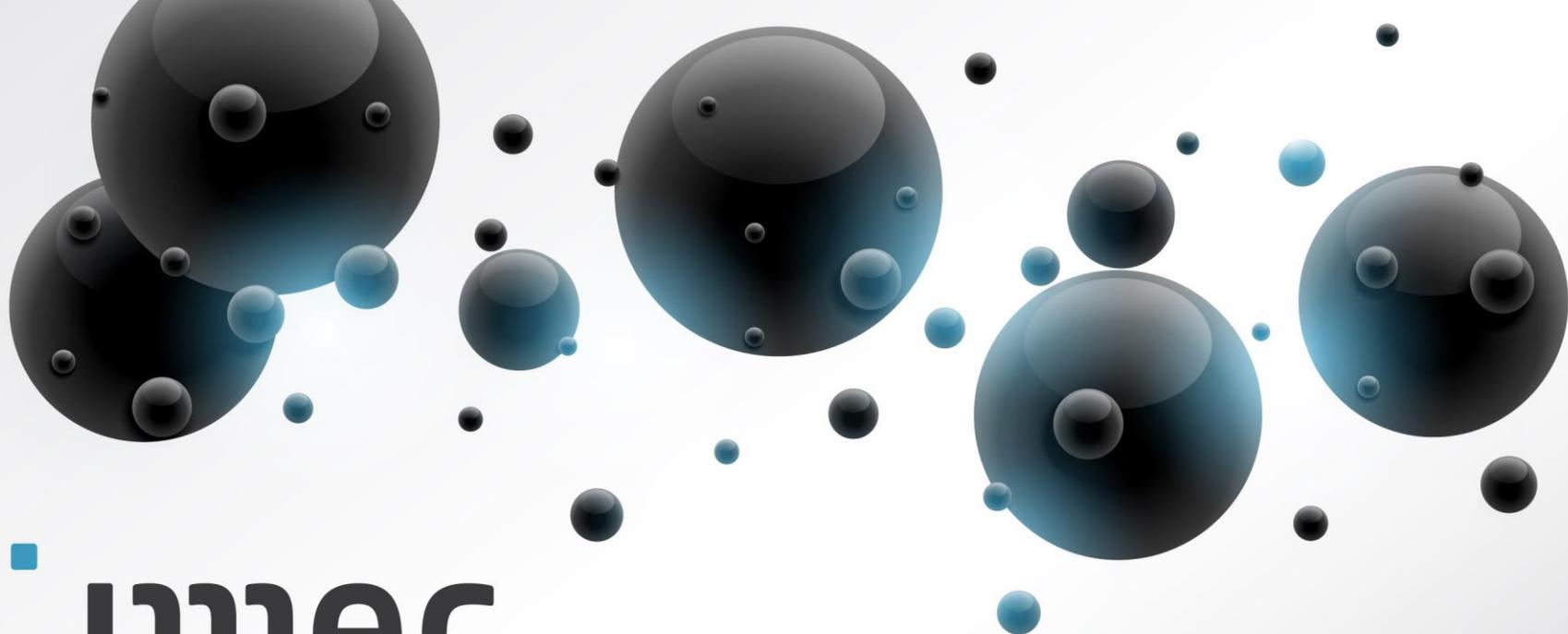
System level

AGENDA

OVERVIEW

Energy

<i>start</i>	<i>end</i>	<i>duration</i>	<i>presentation title</i>	<i>speaker</i>
10:30	10:45	00:15	Introduction	Jef Poortmans
10:50	11:20	00:30	Passivated contacts and advanced module interconnections	Loic Tous
11:25	11:55	00:30	Boosting efficiency with tandem technology	Tom Aernouts Eszter Voroshazi
12:00	12:10	00:10	Renewable Energy System-Technology co-optimisation	Voroshazi
12:15	12:30	00:15	Energy Yield Simulation framework	Imre Horvath
12:35	13:00	00:25	Controlling interfaces in batteries	Fanny Barde Philippe Vereecken
13:05	13:30	00:25	Nanomaterials enabling Power-to-Molecule	Vereecken
13:35	14:35	01:00	Lunch break	



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