EMERGING INNOVATIVE SOLUTIONS FOR THE ENERGY TRANSITION

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CEA LITEN: KEY FACTS

The leading French technological research institute for **Renewable Energy**

951 STAFF

1 512 PATENTS PORTFOLIO

350+ PARTNERSHIPS W/ INDUSTRY

130 M€ ANNUAL BUDGET

14 PILOT LINES OR LARGE INFRASTRUCTURES

KEY RESEARCH ACTIVITIES

ENERGY GENERATION & STORAGE
- Solar energy
- Hydrogen & power-to-X

ELECTRO-MOBILITY
- Batteries
- Fuel cells
- Electrified powertrains

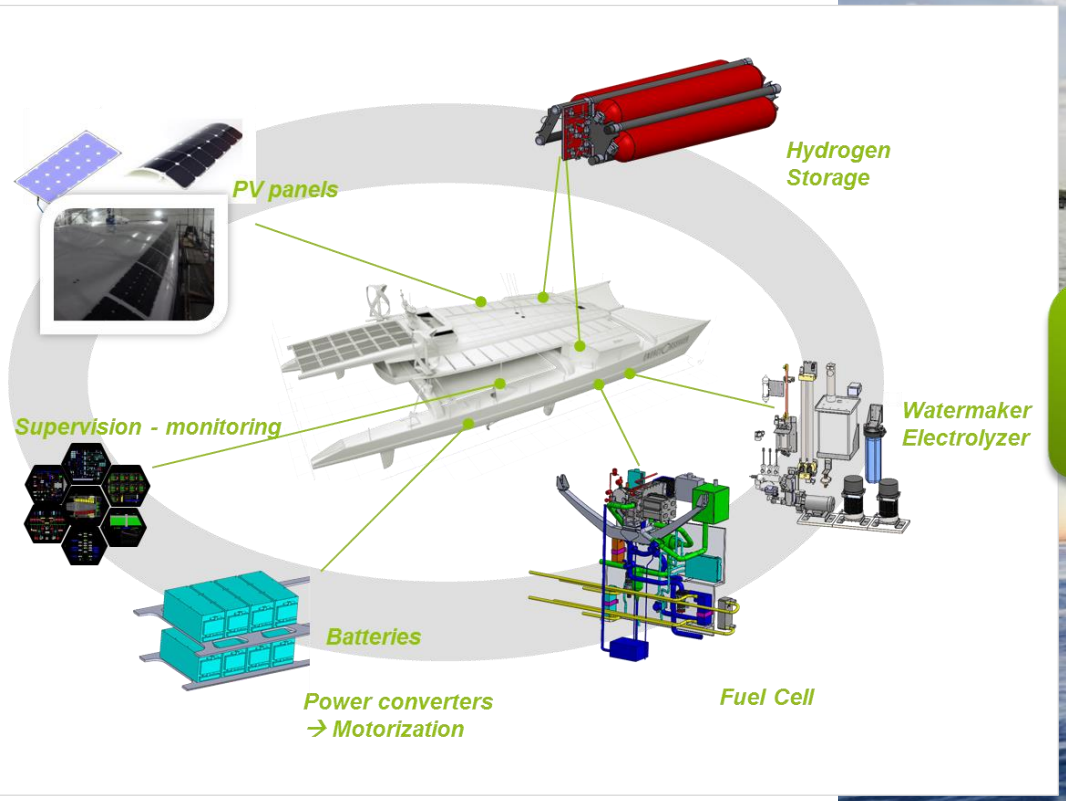
ENERGY EFFICIENCY & SYSTEM INTEGRATION
- Energy-efficient buildings & industrial processes
- Energy grids & sectoral integration

SUSTAINABLE & SMART MATERIALS
- Powder metallurgy & additive manufacturing
- Structural electronics & nano-functionalization
- Recycling

- CARBON FREE
- DIGITALIZED
- DISTRIBUTED

USING A HOLISTIC APPROACH IN RESEARCH & INNOVATION: THE CASE OF 'ENERGY OBSERVER'

Development of the catamaran full energy system

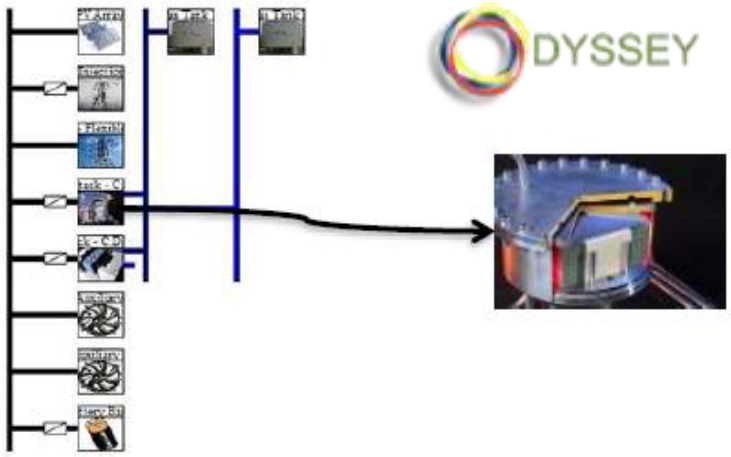


USING A HOLISTIC APPROACH IN RESEARCH & INNOVATION: MODELLING & SIMULATION

Simulation tools and case studies for the optimization of energy systems

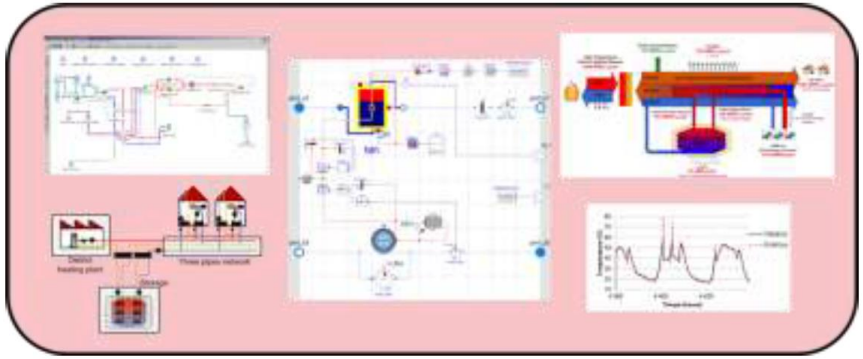
ODYSSEY

Modelling & simulation platform for the optimization of multi-carrier energy systems (Power-to-H_2, Power-to-Gas, Power-to-Mobility, etc.)



PEGASE

Modelling & simulation platform for the optimization of district heating networks (Biomass-to-Heat, Power-to-Heat, Solar-to-Hea Heat-to-Power, Heat-to-Cooling, etc.)



PHOTOVOLTAICS: DRIVER OF THE ENERGY TRANSITION

Performance optimization and cost reduction at the core of our activities

INES INSTITUT NATIONAL DE L'ENERGIE SOLAIRE

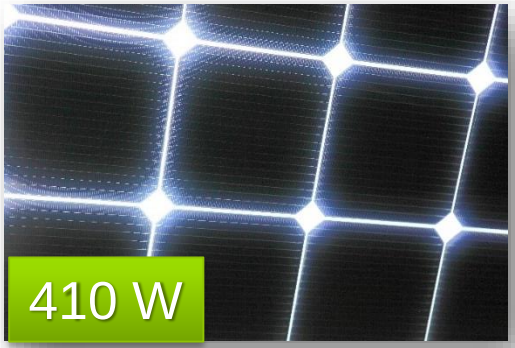
Technology transfer towards industrial partners

enel Green Power

CEA Liten pilot line

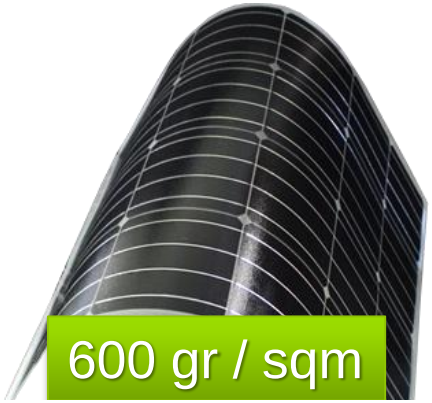
PHOTOVOLTAICS: DRIVER OF THE ENERGY TRANSITION

CEA Liten key achievements in 2018



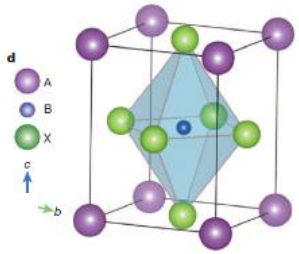
Heterojunction module
72 cells

Heterojunction cells
@ 2,400 wafer/hour throughput



Ultra-light thin module
Thin heterojunction cells & specific module materials

ABX_3



16 % efficiency

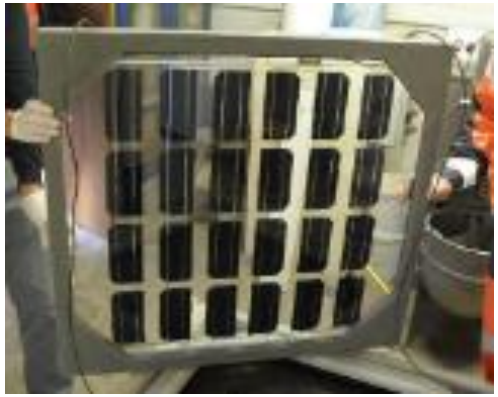
Perovskite single-junction cells

15,9 %

Perovskite 5x5 cm² mini-module

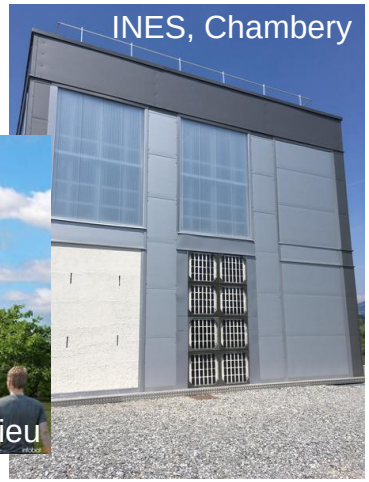
INTEGRATED PHOTOVOLTAICS: HIGH-ADDED VALUE APPLICATIONS

BUILDING INTEGRATED PHOTOVOLTAICS



New renovation process with **fully integrated** cladding with **thermal insulation and photovoltaic production**

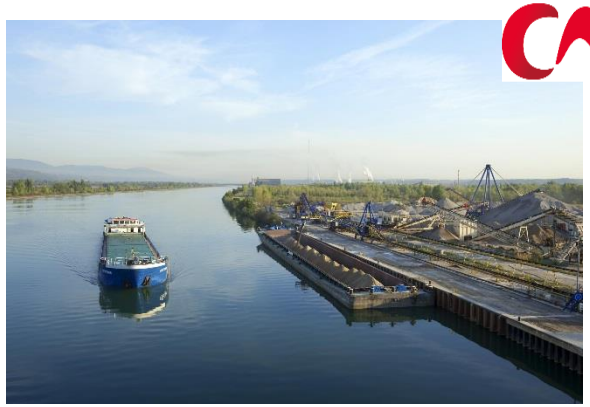
Demonstration sites



http://www.life-conipher.eu/

OTHER INNOVATIVE INTEGRATIONS

Road integrated photovoltaics

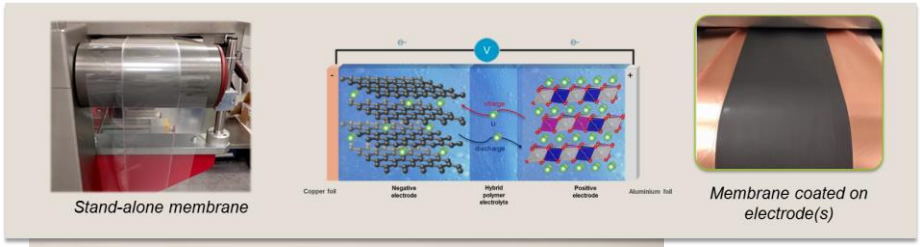


Linear photovoltaic power plant along Rhône river banks

BATTERIES: INNOVATING FROM MATERIALS UP TO SYSTEMS

BATTERY MATERIALS: GEL ELECTORLYTE

SOLVAY
asking more from chemistry®

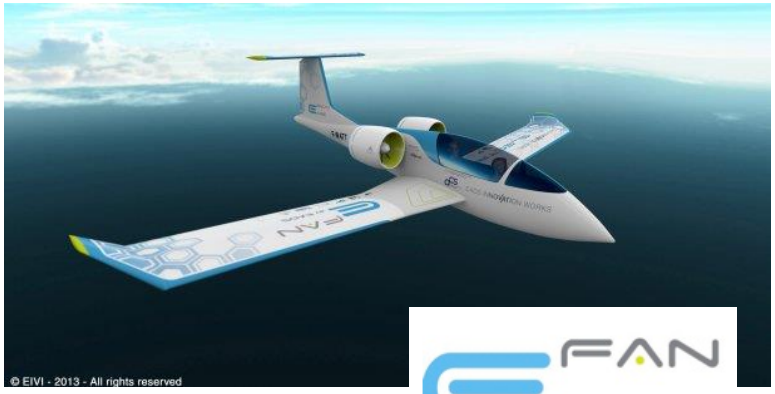


Currently sampling and testing with industrial partners

- Gel polymer electrolyte for improved safety and extended battery lifetime
- A first step towards all-solid-state batteries
- Compatible with current standard production tools

BATTERY SYSTEMS: BATTERY PACKS FOR FULL ELECTRIC AIRCRAFTS

AIRBUS



E-FAN

E-FAN BY AIRBUS GROUP

VAHANA

CARBON-FREE HYDROGEN PRODUCTION

Solid-oxide high-temperature electrolysis

SYSTEM DEVELOPMENT

STACK DEVELOPMENT

BASIC CONCEPTS DEVELOPMENT

In 10 years of R&D :

Performance improvement : **X8**

Lifetime: **> 2500 hours**

Number of cells/stack : **x 25**

1st prototype of integrated system

Demonstrated yield
at system level: **87% PCI**

Cost reduction of stack : **-80%**

Background patent portfolio:
40 patent family

Bonus : Reversible Technology

SYDNEY
1st integrated system

PISTEUR
In demonstration
at a partner

Electrolyzer core
25 cells
Power 3kW

CEA Cell at the state of the art
Characteristics
Working point 1A/cm²
Degradation 2-3% 1000h
Active Surface 100cm²

CONCLUSION

Developing innovative technologies for the energy transition thanks to a close collaboration between Research and Industry

Enabling the deployment of relevant technologies – in terms of performance, safety & cost

Anticipating future needs & use cases with a holistic approach

Supporting the creation and development of new industries across the value chain

Download our last Annual Report!

www.-liten.cea.fr

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