

**liten**  
cea tech



**THE 4 CONDITIONS TO ACCELERATE  
CLEAN ENERGY SOLUTIONS IN EUROPE**



- The leading public French institute for **energies & materials**

## SOLAR BUILDING



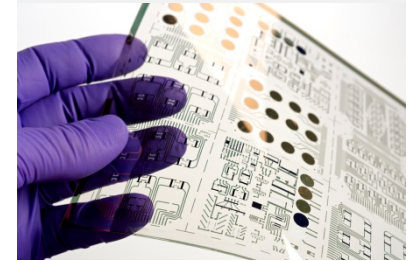
## ELECTROMOBILITY



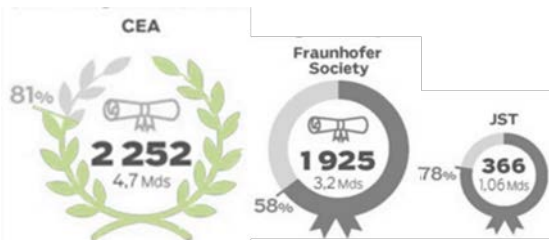
## THERMAL BIOMASS H2



## NANOMATERIALS LARGE SURFACE ELECTRONICS



### TOP 3 GLOBAL INNOVATORS



Patents application from 2008 to 2013  
Acceptance percentage and annual budget (dollars)

Source : Reuters & Thomson Reuters – Top 25 Global innovators - 2016

### KEY FIGURES

#### 1 100 MEMBERS OF STAFF

30% of staff/industrial backgrounds

#### 1 160 PATENTS

230 patent applications 2014

#### > 350 INDUSTRIAL PARTNERSHIPS

#### BUDGET 160 M€

#### RESEARCH CONTRACTS

40% institutional

60% industry

#### 12 PLATFORMS

### KEY DRIVERS

ENERGY EFFICIENCY

RENEWABLE & LOW CARBON ENERGY

EFFICIENCY OF MATERIALS

## THE 4 CONDITIONS TO ACCELERATE CLEAN ENERGY SOLUTIONS IN EUROPE

- 1 Need to concentrate and coordinate research
- 2 Need to address different domains and vectors
- 3 Need to have early demonstrations of technologies
- 4 Need to cross energy and numeric fields

- Initial investment are necessary to build R&D platform to accelerate technology transfer: e.g. of pilot lines in RTO
- These platforms have to be shared among different industrials, on all the value chain (from material to technology integration)
- Forces have to be coordinate between fundamental research and RTO avoiding duplication
- Don't forget that we need fundamental physics to control part of processes!



EXAMPLE OF TECHNOLOGY  
PLATFORM AT CEA-LITEN

- The energy grids will combine different vectors: electricity, heat and gas (H2)
- We will less and less forget than half of the energy today is used to produce heat
- These systems used very simple technologies: e.g. for Heat storage
- H2 is one of the vector that could support the deployment of renewable energies
- H2 could contribute to decarbonized natural gas grid by renewable gas
- H2 could transport energy from one continent to another
- H2 components are less CAPEX intensive than batteries

▶ RENEWABLE ENERGIES PRODUCTION

▶ RENEWABLE ENERGIES INTEGRATION ON TERRITORIES

▶ ENERGY EFFICIENCY IN BUILDING AND FACTORIES

▶ MOBILITY

▶ AERONAUTICS / AEROSPACE

GLOBAL  
SYSTEMIC  
APPROACH



▶ Sensible Heat Storage at CEA

### 3 Need to have early demonstrations of technologies

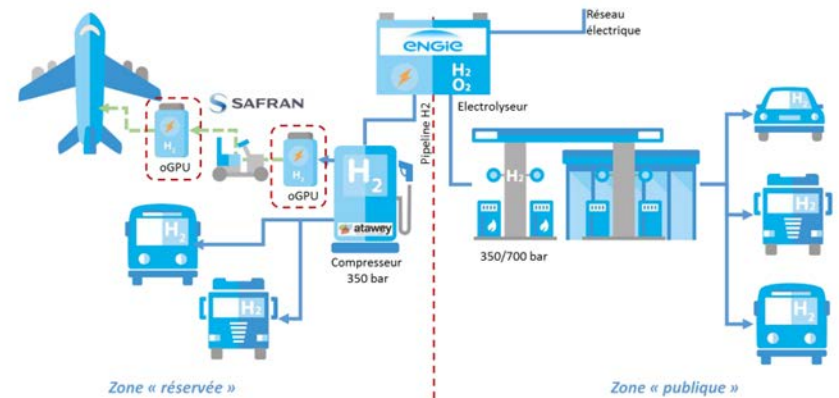
- We need to demonstrate technologies and discover new usages or business models
- All the actors have to take part to demonstration plans
- Its a way to accelerate ambitious roadmap



ENERGY OBSERVER



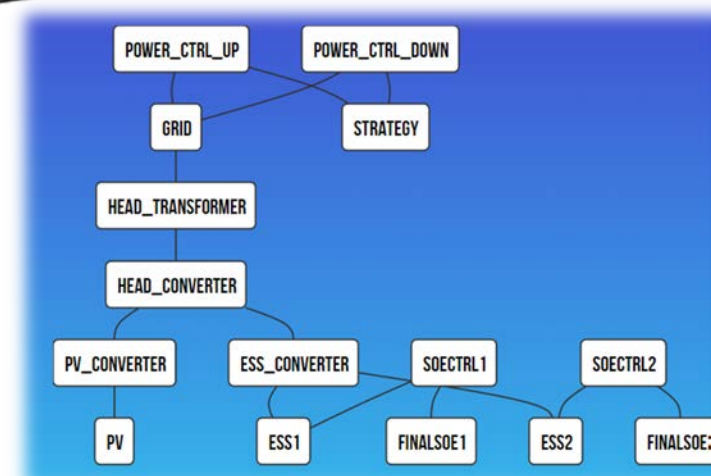
H2 INFRASTRUCTURE IMPLEMENTATION



- We need to develop advanced models with different objectives:
  - Choose and size the right technology (e.g. Fuel Cell vs Li-ion batteries)
  - Real time EMS



**SPIDER:**  
System modelling  
and simulation



**MORE:**  
Energy management – Optimal sched

