EERA
European Energy Research Alliance

# EERA Joint Programme on Photovoltaic Solar Energy

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**www.eera-set.eu**

# EERA JP PV

## Ambition of Joint Programme EERA-PV

- Accelerate development of Photovoltaic Solar Energy towards an energy technology that can be implemented at a very large scale by increasing effectiveness and efficiency of RD&D in Europe
- Contribute to development needs of the Solar Europe Industry Initiative regarding cost reduction of solar electricity, in support of the SET plan (performance, lifetime/reliability, manufacturing costs)

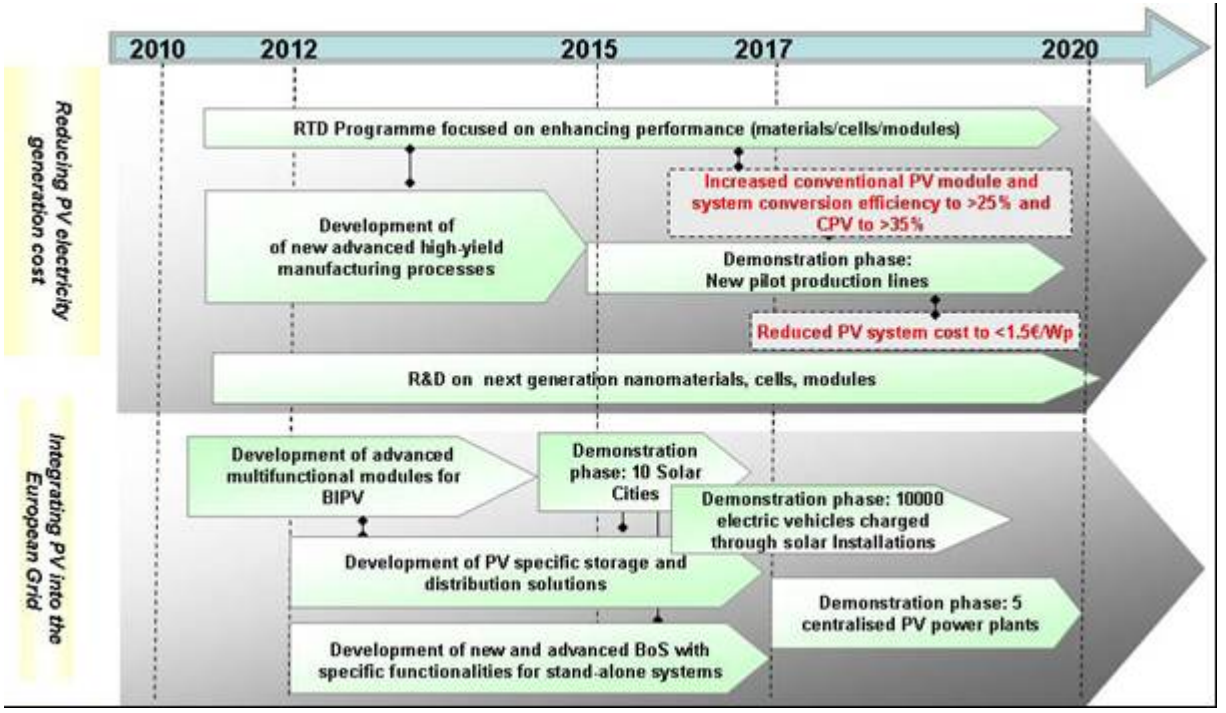
Through alignment of (national) RD&D programmes by:

- ✓ Conducting joint research (joint programming)
- ✓ Sharing of infrastructure
- ✓ Exchange of scientists
- ✓ Complement FP7 (and FP8) programme

# EERA JP PV

## PV technology development 2010 – 2020

**Focus EERA-PV**




Source: EC Technology Roadmap (SEC(2009) 1295, 7 October 2009)

# EERA JP PV

## Structure of the JP: five sub-programmes

- Silicon Materials – Dr Stefan Reber, FhG-ISE
- Thin film PV – Prof Dr Martha Lux-Steiner, HZB
- Organic PV – Dr Peter Sommer Larsen, Risø/DTU
- Module Technology – Dr Paul de Jong, ECN
- Education,Training & Infrastructures – Dr Philippe Malbranche, CEA-INES

*Sub-programmes are based on Strategic Research Agenda (SRA) and Implementation Plan of the EU PV Technology Platform, and in line with SOPHIA Research Infrastructures proposal*

# EERA JP PV

## SP1: Silicon Materials

Main activities 2010-2013

- Improvement of crystal growth for very high efficiency solar cells
- Development of low-cost feedstock and wafers
- Development of high Si utilization approaches to wafers (low g/Wp)

Main results

- High-Q mc-Si wafers enabling >20% cell efficiencies
- Fully specified low cost feedstock allowing cell efficiencies >18%
- Next generation Si ribbons (cells>17%) and wafer equivalents (cells>18%)

# EERA JP PV

## SP2: Thin Film PV

Main activities 2010-2013

- Cell & module concepts for high efficiency
- Advanced transparent conductors
- Advanced module manufacturing
- Processes and equipment design for large-scale production
- Analysis and modelling of materials and devices

Main results

- Strongly improved device performance, enabling module production at 0.5 €/Wp in the long term
- New manufacturing technology for low-cost, high-yield production of large-area thin film modules

# EERA JP PV

## SP3: Organic PV

Main activities 2010-2013

- Building library of materials (absorber, electrode, barrier etc.)
- Defining protocols for fast screening of materials
- Elucidate degradation mechanisms, define common measures of OPV stability
- Improve understanding of device physics and morphology

Main results

- Scientific foundation for improving lifetime and efficiency of OPV towards a viable technology for bulk electricity production
- Common platform to facilitate collaboration between growing number of groups involved in OPV research

# EERA JP PV

## SP4: Module Technology

Main activities 2010-2013

- Development and evaluation of new module concepts and materials (low-cost and/or very high lifetime)
- Development of test methodologies allowing prediction of module lifetime under different climate conditions
- Improving energy yield predictions

Main results

- Technology available for module production at 0.8-1 €/Wp (2013)
- Model for module degradation and lifetime prediction
- Improved energy rating

# EERA JP PV

## SP5: Education, Training & Infrastructures

Main activities 2010-2013

- Identify outstanding R&D facilities and improve access for EERA
- Identify R&D facilities that are missing or need upgrade
- Set-up database of main projects of EERA partners
- Identify new joint projects using these facilities
- Organize staff exchange and education/training

Main results

- Improvement and optimal use of R&D infrastructure in EU
- Exchange programme for scientists/students
- Joint R&D projects

# EERA JP PV

## Governance

- Steering Committee (SC)
  - Joint Programme coordinator + sub-programme coordinators
  - Monitor and evaluate progress
  - Initiate follow-up current activities and expand programme
  - Face to face meetings on quarterly basis (+ conference calls)
- Establish links with existing and emerging initiatives
  - EUPVTP, EII Solar Energy, EIT/KIC, SOPHIA
- SC will follow guidelines laid down in Governance structure EERA ExCo
  - Obligations and rights JP members, JP coordinator and ExCo
  - IPR rules

# EERA JP PV

| Participants Name | Country | Human Resource committed (person months / year) | | | | | |
|---|---|---|---|---|---|---|---|
| | | **Total** | SP1 | SP2 | SP3 | SP4 | SP5 |
| AIT | Austria | **22** | | 6 | | 16 | |
| CEA-INES | France | **58** | 12 | 6 | 6 | 22 | 12 |
| CIEMAT | Spain | **28** | | 9 | 10 | 6 | 3 |
| CRES | Greece | **8** | | | | 8 | |
| CREST | UK | **24** | | | | 24 | |
| ECN | Netherlands | **62** | 16 | 6 | 13 | 27 | |
| EMPA | Switzerland | **24** | | 24 | | | |
| ENEA | Italy | **150** | 12 | 42 | 42 | 42 | 12 |
| EPFL | Switzerland | **24** | | 24 | | | |
| FhG-ISE / ISET | Germany | **100** | 24 | | 24 | 52 | |
| Fyzikalni ustav Akademie ved Ceske republiky | Czech Republic | **21** | | 21 | | | |
| FZ Juelich | Germany | **72** | | 48 | | 18 | 6 |
| HZB | Germany | **132** | | 96 | 24 | | 12 |
| IMEC | Belgium | **60** | 24 | | 12 | 24 | |
| Imperial College | UK | **10** | | | 10 | | |
| IPP | Germany | **21** | | 21 | | | |
| JRC | EU | **6** | | | | 6 | |
| LNEG | Portugal | **t.b.d.** | | | | | |
| Risø/DTU | Denmark | **38** | | | 38 | | |
| SINTEF | Norway | **18** | 18 | | | | |
| University of Gent | Belgium | **3** | | 3 | | | |
| University of Ljubljana | Slovenia | **24** | | 15 | | 6 | 3 |
| VTT | Finland | **17** | | | 17 | | |
| ZSW | Germany | **48** | | 48 | | | |
| *Total* | | ***970*** | *106* | *369* | *196* | *251* | *48* |

Consultation process is yet being finalised

SP1 = silicon materials

SP2 = (inorganic) thin film PV

SP3 = organic PV

SP4 = module technology

SP5 = education and training and use of infrastructures

SINTEF will provide update for SP2, 3, 4, 5 including interest of IFE