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# Integrated Project “Performance”

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# Approach

Understanding of

- PV module and system performance
- PV module and system stability

for increased

- transparency for all market actors
- confidence and planning reliability



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# Subprojects:

- 1: Indoor PV module calibration
- 2: Outdoor PV module performance
- 3: PV system performance evaluation
- 4: Modelling and analysis
- 5: Service life assessment of PV modules
- 6: Building integration special issues
- 7: Communication and dissemination
- 8: Standardization process

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# Subproject 1: Indoor PV Module Calibration

Transparency of traceability chain of indoor module measurements: (a) test labs, (b) industry

Adaptation of measurement procedures for new and emerging technologies (thin film cells, multijunction cells, back contact silicon cells, etc.)

Improvement/harmonisation of precision and comparability of characterisation results



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## Subproject 2: Outdoor PV module performance

Bridge the gap between indoor STC measurements and outdoor `real world` measurements for any place in Europe

Determination of annual module energy yield from a minimum set of measured parameters



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## Subproject 3: PV system performance evaluation

Analysis of system performance data towards an understanding of yields and losses

Analysis of system performance data towards an understanding of long term stability

Harmonisation / adaptation of guidelines for plant monitoring and operation surveillance

Assessment of different approaches towards `guaranteed results`



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## Subproject 4: Modelling and analysis

Development of a coherent set of models of PV module and system performance

These models will translate PV module data and PV component data into system performance figures and link to long term data sets of ambient conditions



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## Subproject 5: Service life assessment of PV modules

Develop ageing models based on `real life` stress factors

Develop new accelerated ageing procedures

Facilitate innovation in module technology

Provide manufacturers with service life data for setting their guarantee specifications

Increase planning reliability

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## Subproject 6: Performance requirements for building integration

Assessment of standards and performance requirements for building integrated PV modules towards (a) mechanical stability, (b) electrical safety, (c) fire safety

Suggestions for module technologies which fit into the existing codes of the building industry



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## Subproject 7: Communication and dissemination

Communicate project results to industry, politics and users in a rapidly growing market

Accelerate feedback loops between industry and standardisation processes

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# Subproject 8: Standardisation processes

Contribute to revision of standards

Initiate new standards

Develop a long term vision for European standardisation



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# Project deliverables

Comprehensive knowledge on PV module and system performance and stability of components for the good of the European PV market and industry

Good practice guidelines

Harmonised procedures

Suggestions for technologies and standardisation

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## Core project partners:

Fraunhofer ISE, Freiburg, DE

Joint Research Centre, Ispra, IT

TÜV, Cologne, DE

ECN, Petten, NL

ZSW, Stuttgart, DE

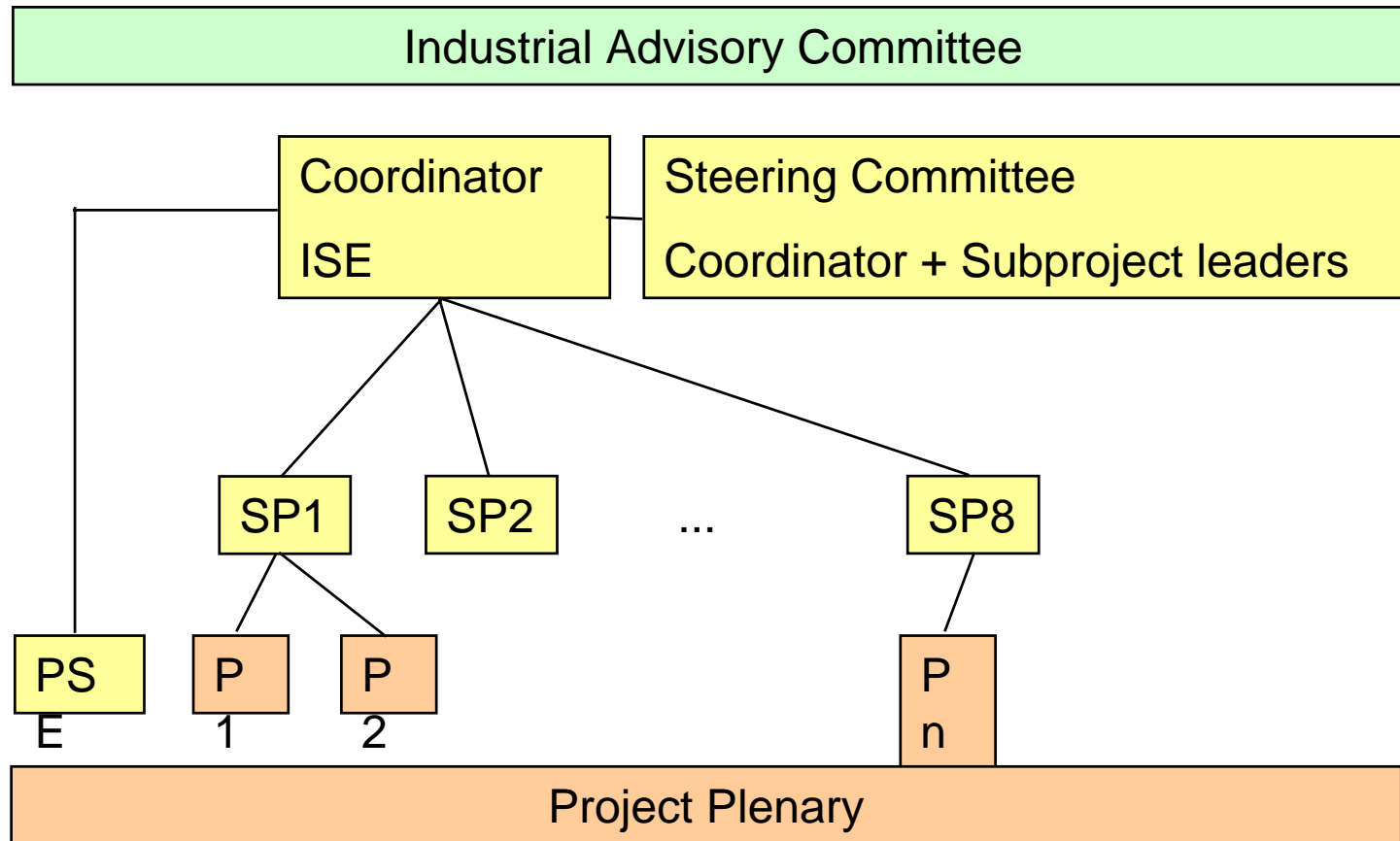
CREST, Loughborough University, UK

EPIA, Brussels, BE

PSE, Freiburg, DE



# Project structure



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# Thank You.



**Fraunhofer** Institut  
Solare Energiesysteme

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