



ENEA PV-C Activities



APOLLON KICK-OFF WORKSHOP

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ENEA TER-ENE-FOTO



Seventh Research
Framework Programme





Italian Agency for New Technologies, Energy and Environment

ENEA is the wider Italian public organization operating in the fields of energy, the environment and new technologies to support Country's competitiveness and sustainable development

Activities are carried out by **five Departments** which operative units are distributed in 11 Research centres:

DEPARTMENTS

- Advanced Physical Technologies and New Materials
- Biotechnologies, Agro-industry and Health Protection
- Energy Technologies, Renewable Energy Sources and Energy Saving
- Nuclear Fusion and Fission and Related Technologies
- The Environment, Global Changes and Sustainable Development

11 Research Centres ~ 3200 employees



ENEA CENTERS location



Italian Agency for New Technologies, Energy and Environment



ENEA PORTICI RESEARCH CENTRE

PV R&D Activity

- **cSi Technology**
 - **high efficiency cSi for concentration**
Conventional Cost effective cSi at ENEA Casaccia
- **Thin films**
 - **thin Si and Si-Ge alloy, seed layers, SHJ, TCO, ARC and optical selective coatings**
- **PV Concentration**
 - **Development of PV-C systems & components**
- **PV Systems, BOS e Building integration**
 - **Development of systems, components & qualification/certification**
- **New technologies**
 - **III Generation, Organic Solar cells**

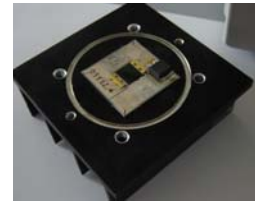


- 4 buildings
- 3.700 m² laboratories
- 400 m² clean rooms
- 120 employees/~45 on PV



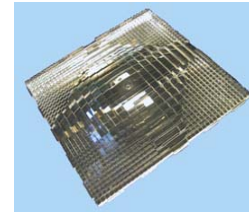
PV-C ENEA PhoCUS Project Photovoltaic Concentrators to Utility Scale

- Robust high efficiency c-Si Solar cell technology:
- Concentrating type: refractive optics able to be integrated into module point focus/ 200 X
- Peak power: 5 kWp (diffuse generation and utility scale)
- Two axis heliostat (32 m²). High tracking accuracy (+/-0.2°)
- System target cost ~4.1 €/Wp .- based on a production of 5 MWp/year (2002)



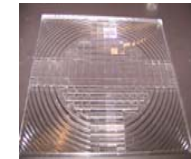
ENEA Solar Cell

Series	Isc (A)	Voc(V)	FF (%)	ET (%)
1	0.0481	0.643	83.54	20.63
23	1.0351	0.723	81.74	22.63
56	2.8336	0.742	77.5	22.60
101	4.8328	0.752	72.7	20.36
154	6.9344	0.759	67.59	19.05



ENEA PMMA
Prismatic and hybrid prismatic-fresnel lens

Nopt ~80% without ARC



16.4% eff
DNI Power 840 W, Tcell= 40°C
(eff 17.8 % lens parquet apertura area)



ENEA PhoCUS PV-C Module



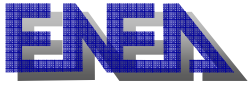
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ENEA Main Activities in Apollon Project

- **WP1 Optimisation of existing material and monolithic and discrete MJ cells**
 - WP leader
 - Optimisation of cSi cells (in coll. with NAREC)
 - AR for long term stability

- **WP2 Advanced MJ Solar cells**
 - Growth and characterisation Epitaxial Ge/Si by PECVD

- **WP3 Development of Point Focus System**
 - Development of small area prismatic lens and paracet to increase optical efficiency
 - Development in collaboration with CESI RICERCA, CRP, Tecnalìa RBTK of the tracking devices for the module integrated position sensitive sensor and MPPT

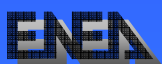


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ENEA Main Activities in Apollon Project

- **WP5 Testing and Performance Evaluation**
 - Lens and mirror Testing
 - Solar cell Testing
 - Module characterisation
 - Round-Robin test plan on outdoor module testing.

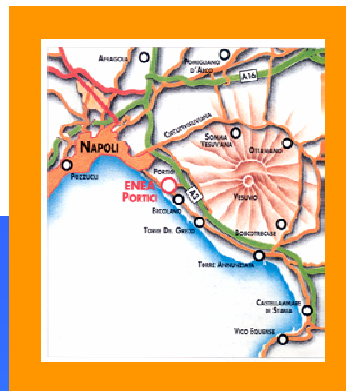
- **WP7 Dissemination of the Project Results**
 - ENEA having a decades-long experience in the field will support all consortium initiatives for the dissemination and/or exploitation of project results, and management of intellectual property



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