



IK4  TEKNIKER  
Research Alliance

## Activity to Renewable Energy Sector

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2013



- **Mission:**  
“**IK4-TEKNIKER** is a **technology centre** staffed by people who are committed to promoting the **ability to innovate** on the part of our **customers** and increase their technological capital to help them become more **competitive** through the generation and application of **scientific and technological knowledge.**”
- Founded in 1981 as a privately-owned, not-for-profit technology centre.
- Member of the IK4 Research Alliance technology platform.
- Specialized in Manufacturing.



# IK4

## Research Alliance

### What is IK4?

We form a **Private Alliance of 9 R&D Centres** and our mission is to **generate, capture and transfer scientific and technological knowledge** so that we can contribute **towards improving the competitiveness of the business base in our area** through **innovation**, in a global context underscored by competitiveness.



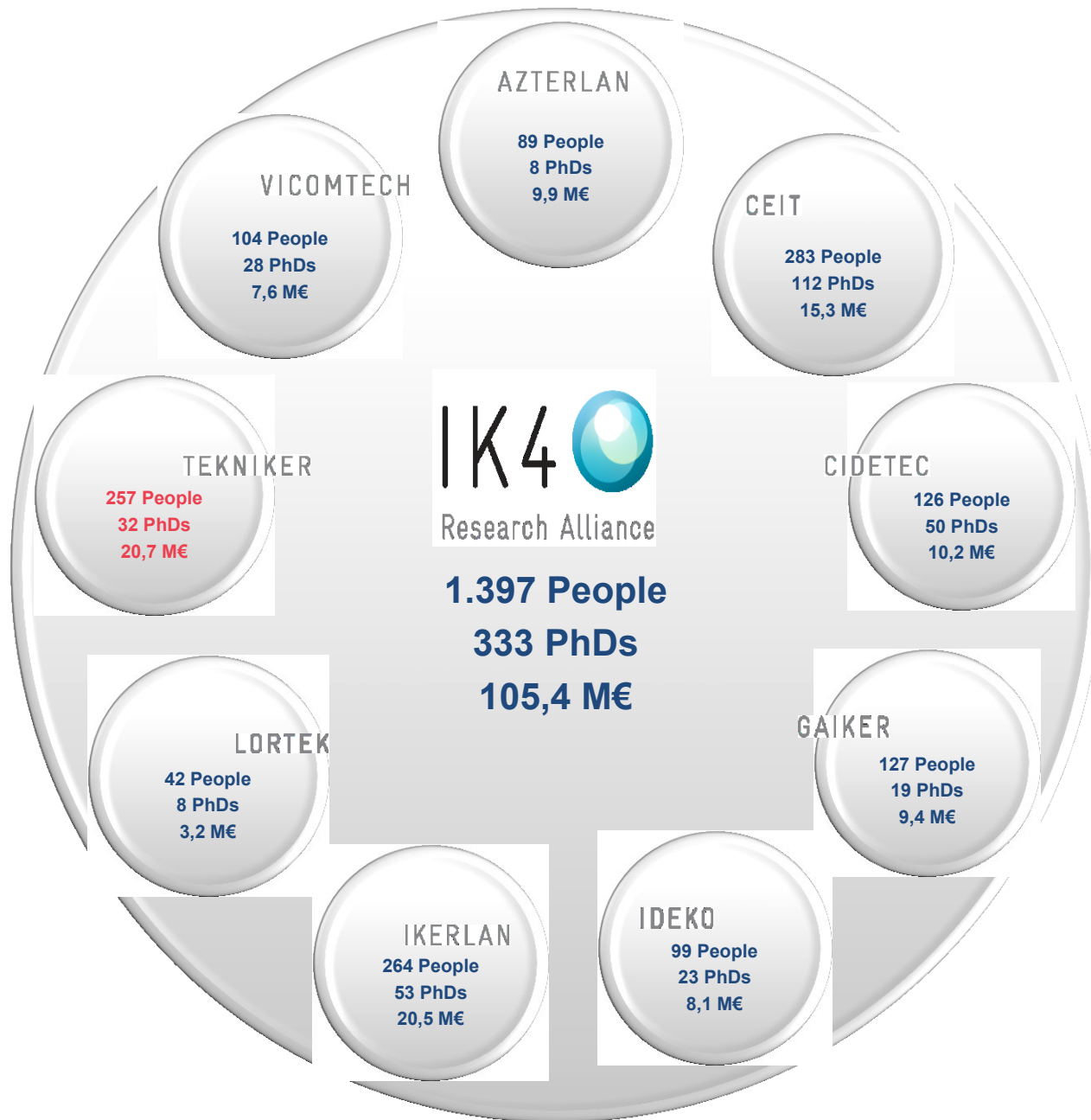
AZTERLAN  
CEIT  
CIDETEC

GAIKER  
IDEKO  
IKERLAN

LORTEK  
TEKNIKER  
VICOMTECH

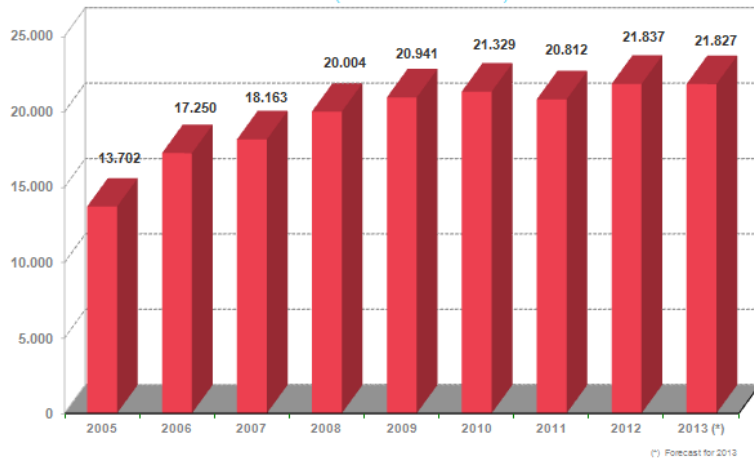
## IK4 ALLIANCE CENTRES

### BASIC FIGURES

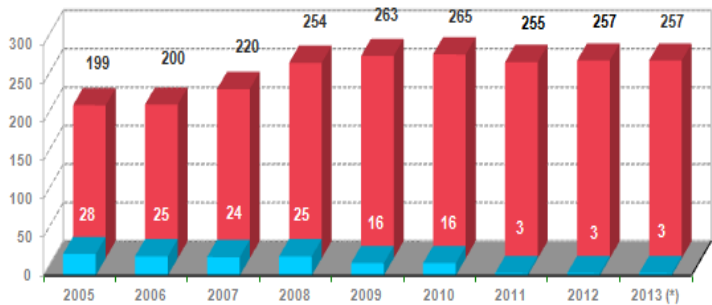
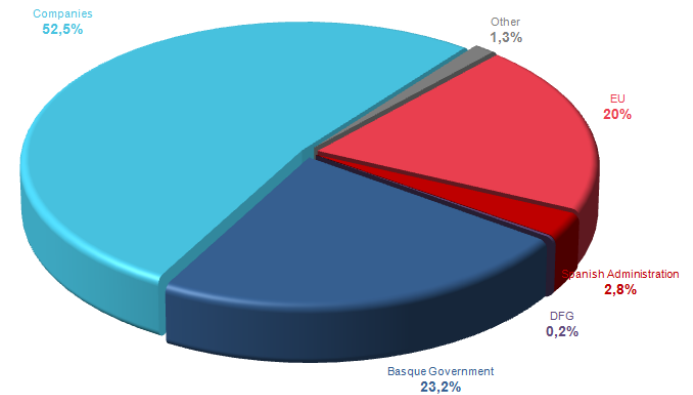


Source: R&D Centres as of the end of 2012

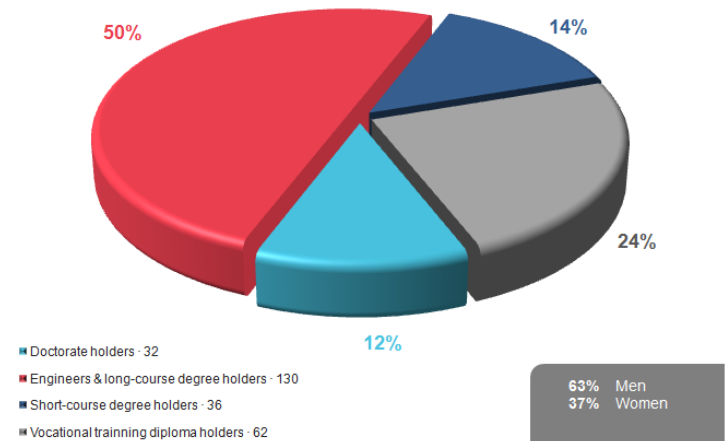
TREND IN INCOMES  
(Thousands of Euros)



INCOME



WORKFORCE



■ Trainees ■ Recruited Personnel

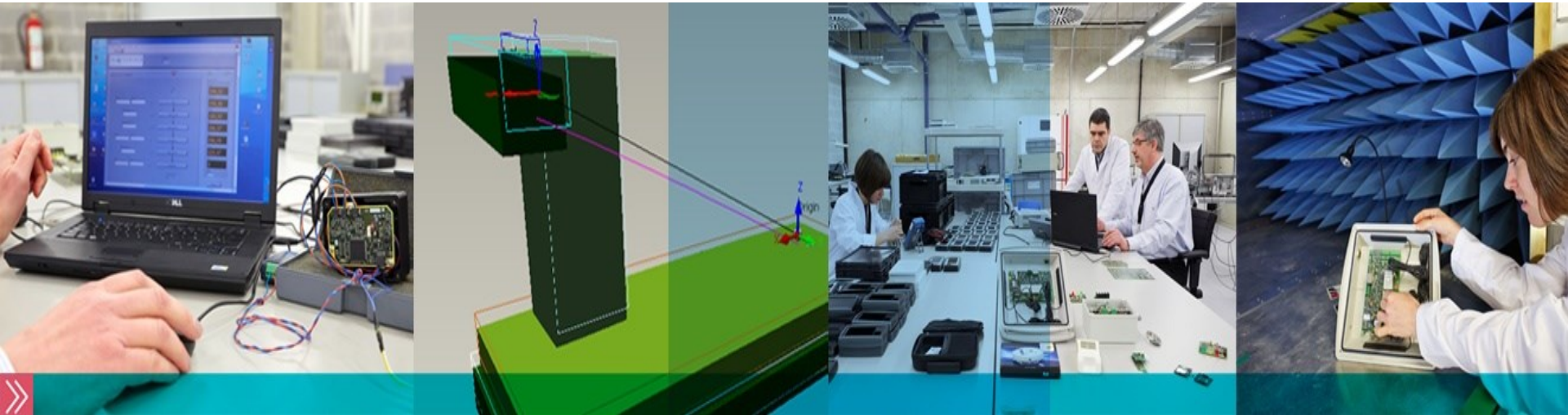
(\*) Forecast for 2013



- **Conventional manufacturing processes** (milling, turning, etc.) and **non-conventional ones** (laser, ultrasound, PECM...).
- **On a macro, micro scale** (micromilling, micro EDM, diamond tool turning), and **nano** (pico and femto laser, clean room technologies, NIL).
- **Mechatronics and precision engineering:** Machines and special equipments design and manufacturing (machine-tool, PVD, scientific equipment, chemical reactors). From the conceptual design to the turnkey delivery.
- **Industrial production management and innovation** (production models, lean manufacturing, competitive intelligence, innovation).



- **Physical and chemical treatments and processes** to modify the structure and composition of the surfaces of materials (NIL, PEO, SOL-GEL, PVD, laser texturing, etc.) designed to obtain new functionalities, a new appearance or improve properties.
- **Materials and surfaces for energy:** PECM, HTF, Molten salts, absorbent layers, etc.
- **Tribological systems**, their design, characterization and optimization.
- **Industrial fluid use control.**



- **System regulation and control** (machine tools, chemical plants, wind energy, actuators, converters).
- **Automation of processes and means.**
- **Magnetic levitation.**
- **Electronics** (wireless communications, plug and play devices, power harvesting).
- **Information systems** (data mining, health monitoring, diagnostics and prediction, semantics).
- **Cognitive systems** (2D and 3D vision, image processing, positioning and navigation, human-machine interaction).





- **From the innovative idea to a high added value product.**
- **Integration of heterogeneous technologies** (optics, nanotechnologies, mechanics, materials) into a single solution in order to develop advanced solutions.
- **Product design and industrial-scale production.**



Some of the industrial sectors where we offer solutions with results:

- **Machine tool and equipment**
- **Renewable energies**
- **Scientific equipment**
- **Electronic products and ICTs**
- **Automotive**
- **Aerospace**

# VALUABLE ASSET

FOR COMPANIES AND SOCIETY





**Although the value of IK4-TEKNIKER is knowledge, and knowledge resides in people,**

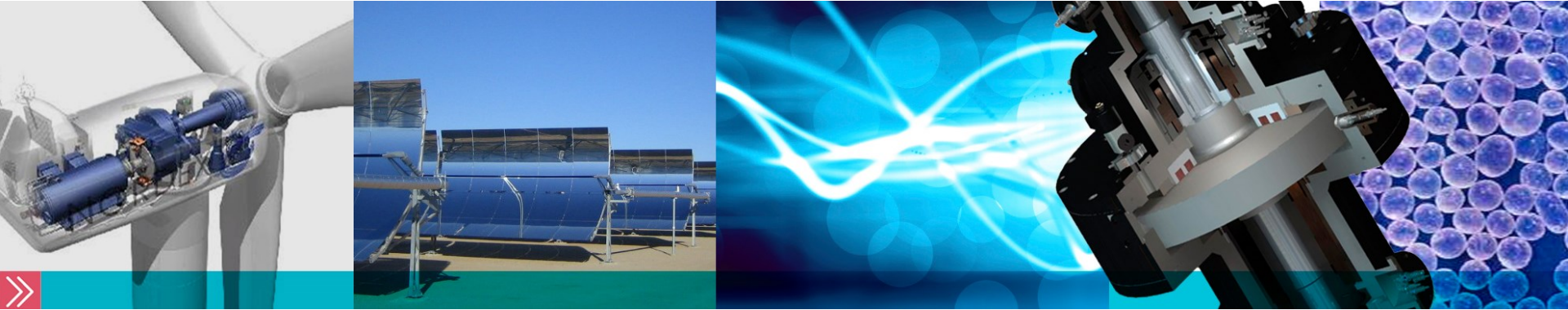
**THE NEW FACILITIES ARE GOING TO PROVIDE A MUCH MORE FERTILE CONTEXT FOR CREATIVITY AND THE GENERATION OF TECHNOLOGY:**

- Over 27,925 m<sup>2</sup> of construction, which is almost three times the area of the previous premises.
- 12 new laboratories and workshops fitted out and equipped to meet the most demanding requirements.
- Large, flexible spaces with controlled temperature, humidity and vibrations.
- Space and equipment to cater for the assembly of large-sized machinery and tools.
- A hazardous testing facility in the form of a bunker with full insulation guaranteed.
- A tour of IK4-TEKNIKER's facilities provides an overview of its technological capabilities.



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**Stage-STE: General presentation of IK4-TEKNIKER**



- **Solar Thermal Electricity**
- **PV Solar Energy**
- **Wind Energy**
- **Energy Storage:**
  - Flywheels
  - Thermal Energy Storage
  - Redox flow batteries (VRB)

**Renewable Energy**

≈ 20% of total income



- **Development of new components**

- Collectors design: Structure, drives, controls and tracking sensors
- Stirling engines:
  - Thermodynamic and kinematic design, new control strategies, improved sealing systems
- Surface and coatings. ([PDF](#))
  - Receivers: Selective and antireflective coatings
  - Reflectors: enhanced reflectivity and self-cleaning
- Development of specific production systems for the sector (e.g. coating chambers, or Sol-gel processes)
- Custom made systems for geometric characterization and precision assembly



- **Heat transfer and storage**

- Thermal fluidic simulation
- Development, characterization and monitoring of Heat Transfer Fluids (HTFs)
- Design and characterization of Phase Change materials (PCMs) for energy storage at different temperature ranges ([PDF](#))
- Nanotechnology for improving thermal properties of storage and transfer materials.
- Chemical and structural analysis of molten salts.





- **Operation and maintenance**

- Autonomous heliostats or troughs (wireless)
- Predictive maintenance based on HTFs ([PDF](#))
- Detoxification of water contaminated by HTFs ([PDF](#))
- Autonomous systems for solar field inspection (receivers, reflectors, leaks, ...)
- Geometric and precision assembly characterization
- Ad-hoc sensors (reflectivity/soiling, tilt, ...)
- New O&M strategies

## Partners

- Abengoa Solar
- Torresol Energy
- Aries Ingeniería y Sistemas
- Samca Renovables
- Rioglass Solar
- Sener,
- ACS-Cobra,
- PSA-Ciemat
- CENER.

## Associations

- European Solar Thermal Electricity Association ([ESTECLA](#))
- Asociación Española para la Promoción de la Industria Energética Termosolar ([PROTERMOSOLAR](#))
- EERA Joint Programme on Concentrated Solar Power ([CSP](#))
- International Solar Energy Society ([ISES](#))
- Plataforma Tecnológica de la Energía Solar Térmica de Concentración ([SolarConcentra](#))
- Subcomité para la normalización de Sistemas de Energía Solar Termoeléctrica ([AENOR](#))
- Asociación Solar de la Industria Térmica (ASIT)
- Plataforma Tecnológica Europea de Energía Solar Térmica ([ESTTP](#) - RHC)

## Main projects

- CONSOLIDA ([CENIT](#))
- TC-Gran (Etorgai)
- Other industrial projects (Confidential)
- HITECO New solar collector concept for high temperature operation in CSP ([EU](#))
- MAINBOT Mobile robots for inspection and maintenance activities in extensive industrial plants - Application to Concentrated Solar Power plants ([EU](#))
- STAGE-STE Scientific and Technological Alliance for Guaranteeing the European Excellence in Concentrating Solar Thermal Energy (EU)
- EUROSUNMED Euro-Mediterranean Cooperation on Research & Training in Sun Based Renewable Energies (EU)
- NECSO Nanoscale Enhanced Characterization of Solar selective coatings ([EU](#))
- ETORTEK (GV) Solar Energy Storage Systems
- EMAITEK (GV) Modeling and control of Solar Thermal Systems

### Thermal Storage

- Thermal-mechanic simulation
- Enhanced nano fluids (thermal capacity, conductivity, absorptivity, latent heat, ...)
- Design and application of new PCMs (organic and inorganic)
- Inorganic and hybrid PCMs microencapsulation
- Development of low melting point salts
- New HTFs (hybrid ionic liquids)
- Characterization and accelerated aging of PCMs, molten salts and HTFs
- Porous adsorbent/absorbent materials



### Associations

- Joint Programme on Energy Storage ([EERA](#))
- [Tarea 42/24](#) de Solar Heating & Cooling de la IEA
- [SolarPaces](#) Working group on TES.
- Red Temática Española de Almacenamiento de Energía Térmica
- Plat. Europea de Química sostenible (SUSCHEM) // Real Sociedad Española de Química (RSEQ)

### Main projects

- **NanoPCM** (EeB.NMP-FP7): New Advanced iNsulatiOn Phase Change Materials
- **POCO** (NMP-FP7): Carbon Nanotube Confinement Strategies to Develop Novel POLymer Matrix COmposites
- **TC – GRAN** (Etorgai): Análisis de sales en sistemas de almacenamiento térmico
- **AMBASSADOR** (NMP-FP7) Absolute Management System at domestic/district level
- **ETORTEK/EMAITEK** (GV) : Desarrollo de micro-encapsulamientos para PCMs
- **DISEMAT** (GV): Diseño de materiales selectivos por modificación química de superficies
- **Ene-HVAC** (EeB.NMP-FP7): Energy efficient heat exchangers for HVAC applications

## • SOLAR ENERGY

- **STAGE-STE (Energy-IRP-FP7):** Scientific and Technological Alliance for Guaranteeing the European Excellence in Concentrating Solar Thermal Energy
- **EUROSUNMED (Energy-FP7):** Euro-Mediterranean Cooperation on Research & Training in Sun Based Renewable Energies
- **[NECSO](#) (NMP-FP7):** Nanoscale Enhanced Characterization of Solar selective coatings (Coordinator)
- **[HITECO](#) (Energy-FP7):** New Solar Collector Concept for High Temperature Operation in CSP Application ([link](#))
- **[MAINBOT](#) (NMP-ICT-FoF):** Mobile robots for inspection and maintenance activities in extensive industrial plants - Application to CSP Plants. ([link](#))
- **AMBASSADOR (NMP-FP7):** Absolute Management System at domestic/district level

## • ENERGY STORAGE AND EFFICIENCY

- **MESSIB (NMP-FP7):** Multi-source energy storage system integrated in buildings
- **NanoPCM (EeB.NMP-FP7):** New Advanced iNsulatiOn Phase Change Materials
- **AMBASSADOR (NMP-FP7):** Absolute Management System at domestic/district level
- **POWER-OM (NMP-FP7):** Power consumption driven Reliability, Operation and Maintenance optimization (Coordinator) .
- **TIBUCON (ICT-FP7):** Self Powered Wireless Sensor Network for HVAC System Energy Improvement - Towards Integral Building Connectivity
- **EnE-HVAC (EeB.NMP-FP7):** Energy Efficient heat exchangers for HVAC applications
- **URB-Grade (EEB-ICT-FP7):** Decision Support Tool for Retrofitting a District, Towards the District as a Service
- **EPIC-HUB (EEB-ICT-FP7):** Energy Positive Neighborhoods Infrastructure Middleware based on Energy-Hub Concept
- **POCO (NMP-FP7):** Carbon Nanotube Confinement Strategies to Develop Novel POLYmer Matrix Composites.
- **FOULXSPEL (Transport-FP7):** Environmentally Friendly Antifouling Technology to Optimize the Energy Efficiency of Ships.
- **FOFDATION (ICT.FoF-FP7):** The Foundation for the Smart Factory of the Future.
- **NANOPIGMY (NMP-FP7):** "More than color: Applying nanotechnologies for the multifunctional ceramic pigments development "-

## • OCEAN ENERGY

- **FOULXSPEL (Transport-FP7):** Environmentally Friendly Antifouling Technology to Optimize the Energy Efficiency of Ships.

**ABENGOA SOLAR**



**AENOR**



**Ciemat**



**MICRORED  
DE DONOSTI**





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