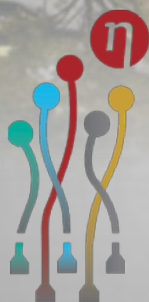


CERTH

CENTRE FOR
RESEARCH & TECHNOLOGY
HELLAS



CPERI

Chemical
Process and
Energy
Resources
Institute

S2Biom Summer School
17th May 2016, NTUA Campus, Athens, Greece



CERTH at a glance



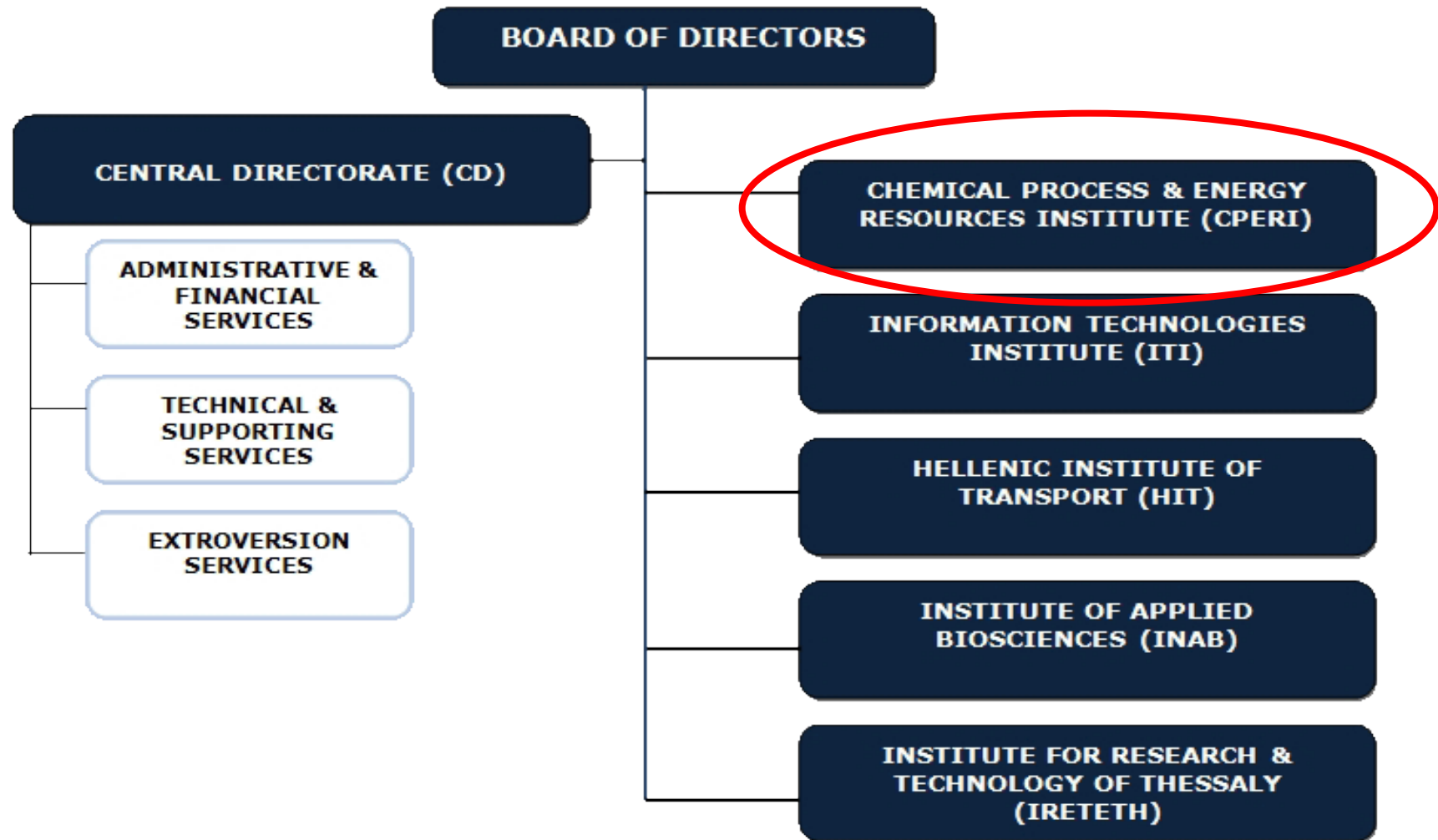
- ✓ **Established:** in 2000 (CPERI existing since 1985)
- ✓ **Personnel :** 600+ with majority engineers and scientists
- ✓ **Annual Turnover:** €21 Million
 - > 30% from bilateral industrial research contracts.
 - > 60% from competitive research projects and
 - < 10% as government institutional funding
- ✓ **Center of Excellence** in latest evaluation of General Secretariat for Research and Technology (GSRT) (CPERI 1st/52 Institutes. Other CERTH Institutes recognized as excellent)
- ✓ **Numerous awards and distinctions** (e.g. Descartes Prize, ERC Advanced Grant, Trading Agent Competition Award and many more)

Mission

- ✓ High quality scientific research
- ✓ Emphasis on Research – Development – Innovation (R&D&I)
- ✓ Strong collaboration with the global industry
- ✓ Innovative synergies with universities and research institutes in Greece and abroad



Organizational Structure



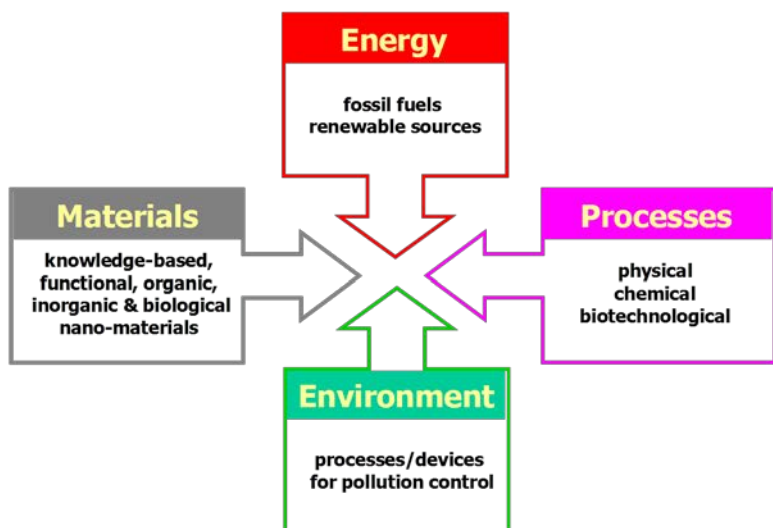


CERTH/CPERI profile



Chemical Process and Energy Resources Institute was established in 2012 by the merger of two existing and long-standing institutes of CERTH:

- Institute for Solid Fuels Technology and Applications (est. 1987)
- Chemical Process Engineering Research Institute (est. 1985)
- **Director: Prof. Emmanuel Kakaras**
- **Combined scientific staff ~ 250 people, Turnover ~ 10 m€/yr**
- **Research and technological areas (among others):**
 - Biofuels, utilization and novel production technologies
 - Co-firing of coal and biomass/waste
 - Small scale biomass boilers
 - Gasification and biorefinery concepts
 - Biomass logistics
 - Clean Coal Technologies, CCS
 - By-products utilization
 - Environmental Fuels and Hydrocarbons, Catalytic processes
 - Production and utilization of Hydrogen – Fuel Cells
- **Involvement in platforms (indicative)**
 - European Platform on Renewable Heating and Cooling, DHC+ Platform





Experiences: Solid biofuels for the small-scale heating application



Standards and analysis of solid biofuels

- Participation in the **FP6 BIONORM II** project
- Involvement in the committee for the adoption of CEN 335 standards by **ELOT** (Greek Standardization Organization)
- Establishment of accredited laboratory (ISO 17025) for characterization of solid biofuels according to EN and other relevant standards:
 - Moisture, volatile, ash, CHN, S & Cl, major & minor elements, ash melting temperature, pellet durability, bulk density, oil content, etc
 - More than 350 samples analyzed to date
- Personnel trained in **Enplus** certification scheme

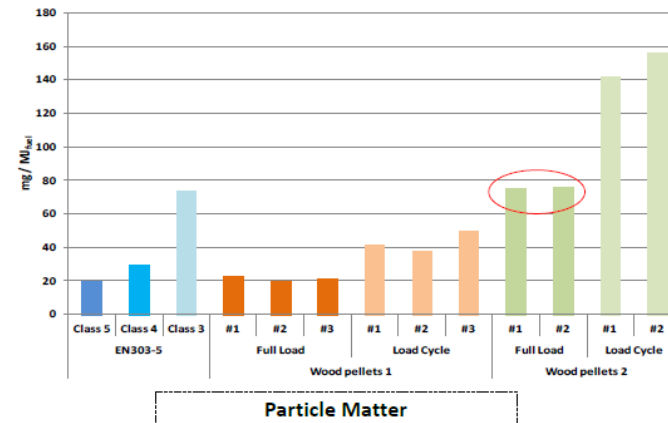
Testing of solid biofuels boilers

- Accredited laboratory for **EN 303-5 type testing**
- Participation in the **FP7 BioMaxEff** project
 - Elaboration of a load cycle testing protocol for estimation of annual efficiency / emissions
 - Field measurements for pellet-fired boiler

Dissemination

- Publication of guidebook for biomass heating (in Greek) through **BioMaxEff**
- Joint study with NTUA on domestic heating costs and environmental impact
- Media interviews, articles, etc

PM emission results from combustion tests at Greek laboratory



Guidebook for biomass heating



BioMaxEff project data

- Project Coordinator: Bioenergy2020+ GmbH (Austria)
- Duration: April 2011 – October 2014
- Budget: €6,726,662
- www.biomaxeff.eu
- Funded by 7th Framework Programme (268217)

BioMaxEff



Certification schemes for Mediterranean biofuels: the Biomassud Plus project



Background

- BIOMASUD certification scheme developed under INTERREG IV project (2013)
- Covers fuels out of scope of wood pellet certification schemes:
 - olive stones, wood chips, almond shells, pinion shells, pine nut shells, hazelnut shells, etc
- Applied by some companies in Spanish, interest for adoption in Italy

Project objectives

- Extension of the BIOMASUD certification system
 - to all Mediterranean countries participating (Spain, Italy, Turkey, Portugal, Greece, Slovenia, Croatia)
 - to other important biofuels used in the residential sector
 - Apply improved sustainability requirements
- Make a quality assessment of solid biofuels markets of the Mediterranean countries
- Measure the emissions and efficiencies of commercial biomass boilers and stoves fired with relevant solid biofuels
- Extend the BIORAISE GIS biomass resources information system to all the Mediterranean participant countries
- Promote and the use of sustainable conditions for biofuels production and use



SELLO DE CALIDAD
Biocombustibles sólidos para uso doméstico

Biomassud Plus project data

- Project Coordinator: AVEBIOM (Spain)
- Duration: January 2016 – December 2018
- Budget: 1,971,610 €
- www.biomassudplus.eu
- Funded by the Horizon2020 (691763)



Large-scale biomass / coal co-firing: the DEBCO project



Motivation

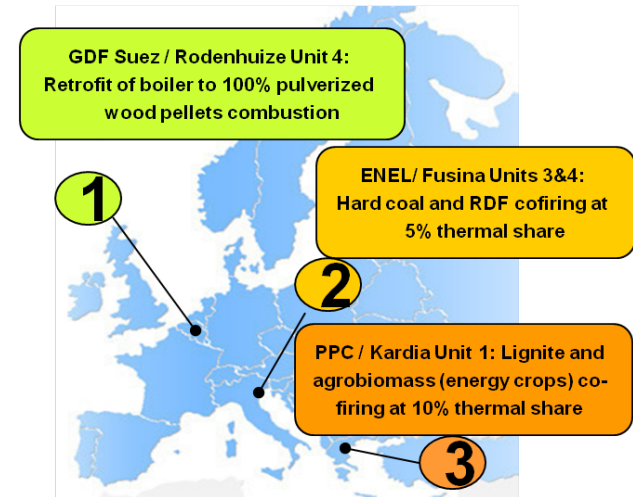
- Co-firing considered to be the quickest and most cost-effective method to reduce the CO₂ emissions from the power sector
- Potential to reduce other emissions of coal-fired PPs(SO₂, NOx)
- Connecting primary sector (forestry, agriculture) with power sector

Activities within the project

- **R&D activities:** fuel characterization, co-firing combustion tests at pilot scale facilities, CFD modeling of furnaces
- **Joint Measurement Campaigns** at three coal fired power plants in Europe during co-firing operation
- **Supply chain investigations** and determination of GHG emissions / costs
- **Techno-economic evaluations** and policy comparisons

Greek case: co-firing at lignite-fired power plants

- Investigations of different supply chain options:
 - Energy crops
 - Straw
 - Imported wood pellets
- Demonstration activities at the 300 MWe Kardia I Unit
 - Energy crop cultivation (cardoona): 400 ha
- Thermal substitution of biomass at 10% thermal share (3 ½ days of testing)



DEBCO project data

- Project Coordinator: ENEL (Italy)
- Duration: January 2008 – December 2011
- Budget: €6,941,512
- www.debco.eu
- Funded by 7th Framework Program (218968)



Cooperation with agricultural cooperatives: the Coop2020 project



Targets

- Demonstration of the economic and environmental viability of a new business model for agricultural cooperatives
 - Application at **at the Cambrils Cooperative (Tarragona, Spain)**
- Cost reduction of the energy consumptions
- Reduction of the environmental footprint



Activities within the project

- Development, testing and Installation of (hybrid) eolic power devices + connection to irrigation
- Sowing and harvesting of four variations of energy crops on test land
- Implementation of energy generation installations (e.g. biomass boiler)
- Implementation of micro Smart grid system + energy savings measures



CERTH's role

- Determination of an energy crop cultivation plan
- Monitoring of the energy crop cultivations
- Physicochemical analysis of biomass samples
- Technical consultant for the implementation of the biomass boiler installation
- Environmental assessment based on LCA principles
- Promotion and local awareness



Coop2020 project data

- Project Coordinator: Cooperativa Cambrils (Spain)
- Duration: June 2014 – July 2018
- Budget: 2,497,961 €
- www.coop2020.eu
- Funded by LIFE+ (LIFE 13 ENV/ES/001513)



Indicative projects (1/2)



BERST: BioEconomy Regional Strategy Toolkit

- Project Coordinator: LEI Wageningen UR (Netherlands)
- Duration: Decemberr 2013 – November 2015
- Budget: 1,276,461.44 €
- <http://www.berst.eu>
- Funded by the 7th Framework Programme (613671)



S2Biom: Delivery of sustainable supply of non-food biomass to support a “resource-efficient” Bioeconomy in Europe

- Project Coordinator: FNR (Germany)
- Duration: September 2013 – August 2016
- Budget: 5,161,511 €
- <http://www.s2biom.eu/>
- Funded by the 7th Framework Programme (608622)

SecureChain: Securing future-proof environmentally compatible bioenergy chains

- Project Coordinator: Internationales Institut für Wald und Holz NRW EV (Germany)
- Duration: April 2015 – March 2018
- Budget: € 1,809,587
- www.securechain.eu
- Funded by Horizon2020 (646457)





Indicative projects (2/2)



EcoLASTANE: Production of bio-based synthetic fibers

- Project Coordinator: AMIQ (Spain)
- Duration: March 2013 – February 2016
- Budget: 2,861,180.50 €
- <http://www.ecolastane.eu/>
- Funded by the 7th Framework Programme (298619)

Archipelago-LNG: Sustainable Maritime Transport with LNG between mainland and islands in the Archipelagos

- Project Coordinator: Region of South Aegean (Greece)
- Duration: October 2014 – December 2015
- Budget: 1,146,180 €
- <http://www.archipelago-lng.eu>
- Funded by the TEN-T Annual Programme (Project No. 2013-EL- 92080-S)



DRYLIG: Competitive pre-drying technologies and firing concepts for flexible and efficient lignite utilisation



Research Fund for Coal & Steel

- Project Coordinator: CERTH (Greece)
- Duration: July 2014 – June 2017
- Budget: 2,207,633 €
- www.drylig.eu
- Funded by the Research Fund for Coal and Steel, Grant agreement: : RFCR-CT-2014-00009



Thank you for your attention!



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