



CENTRE FOR RESEARCH AND TECHNOLOGY HELLAS
Institute for Solid Fuels Technology and Applications



“Cleaner Fossil Fuels”

**“Promotion of Cleaner Fossil Fuels
Technologies in Europe and Asia”**

Dr George Skodras and Ing. Panayiotis Amarantos

Brussels – Belgium, May 2004

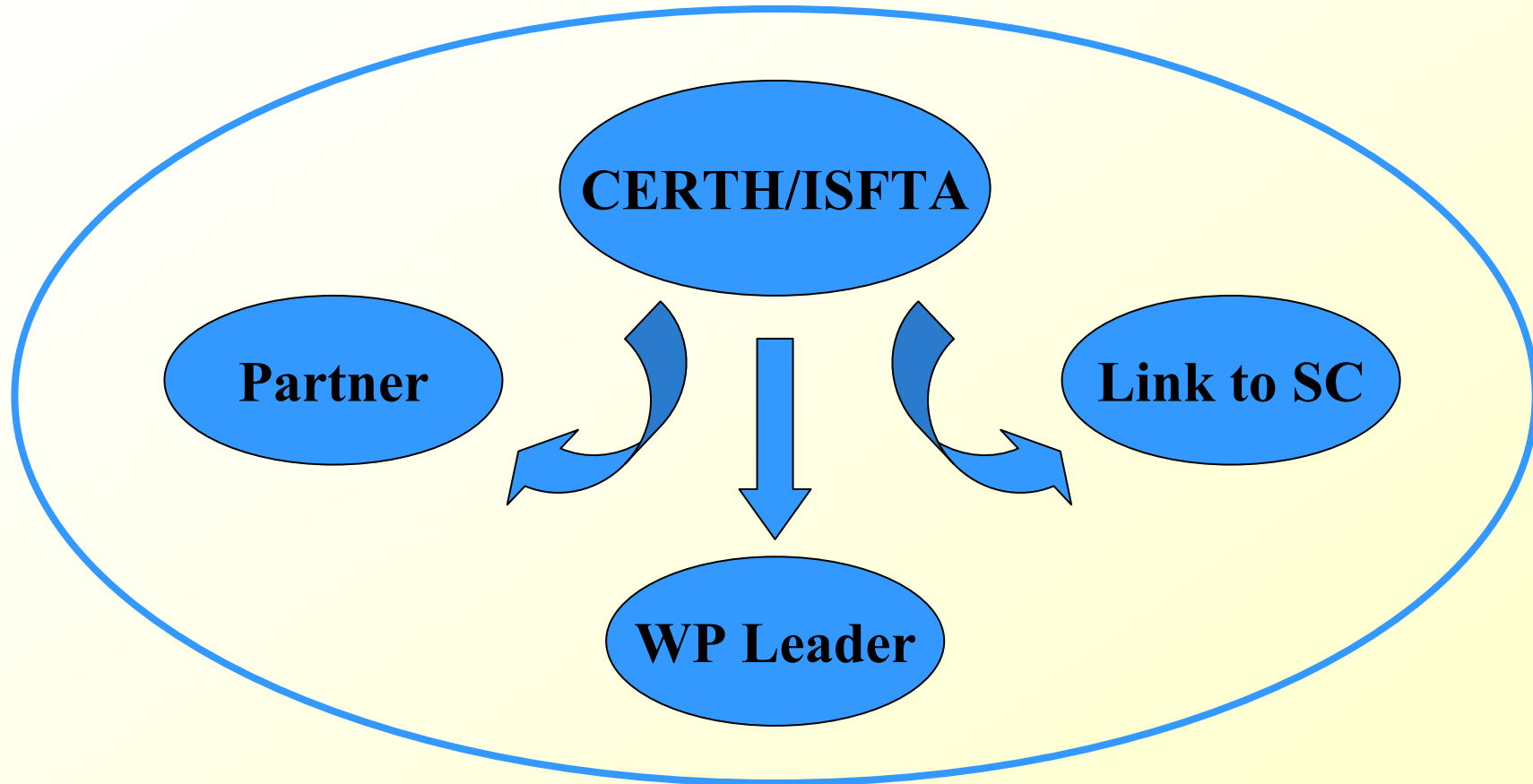


□ Contents

- Role of CERTH / ISFTA
- Target Area
- Targets & Objectives
- Activities & Results



- X₁: Participations in the Events**
- X₂: Synthesis of the Participants**
- X₃: Distribution of the Material**
- X₄: Number of Recipients**
- X₅: Request for Further Information**
- X₆: Internet Dissemination**





Partners

- BSREC (BG)
- CERTH/ISFTA (GR)
- EERI (Ee)
- EXERGIA (GR)
- GIEC (Cn)
- ICTAF (II)
- OVM-ICCPET (RO)
- SEC (BG)
- TERI (In)
- ZERI (Cn)

Subcontractors

- EEC (Ge)
- ESC (Ar)
- ESMC (Az)
- VTI (Ru)

Activities

- Events
- Technical Reports
- Publications
- Internet Dissemination



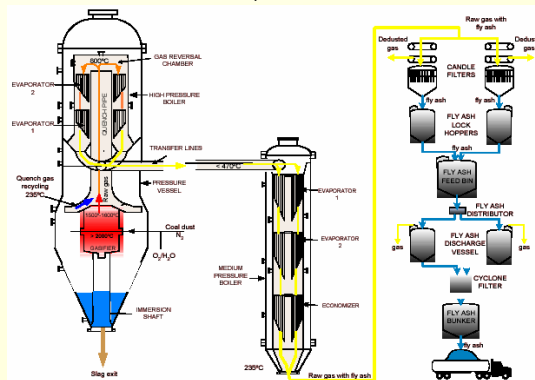
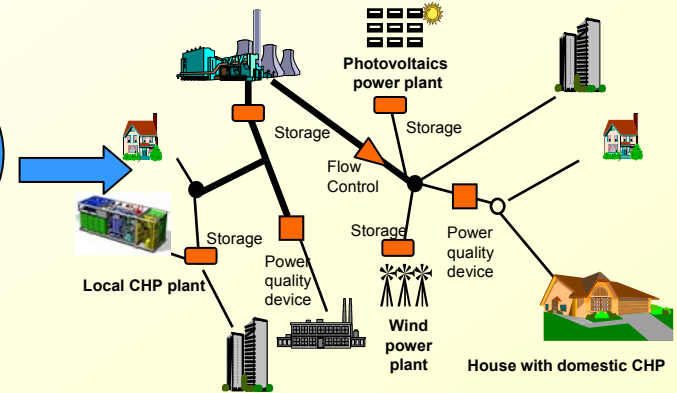
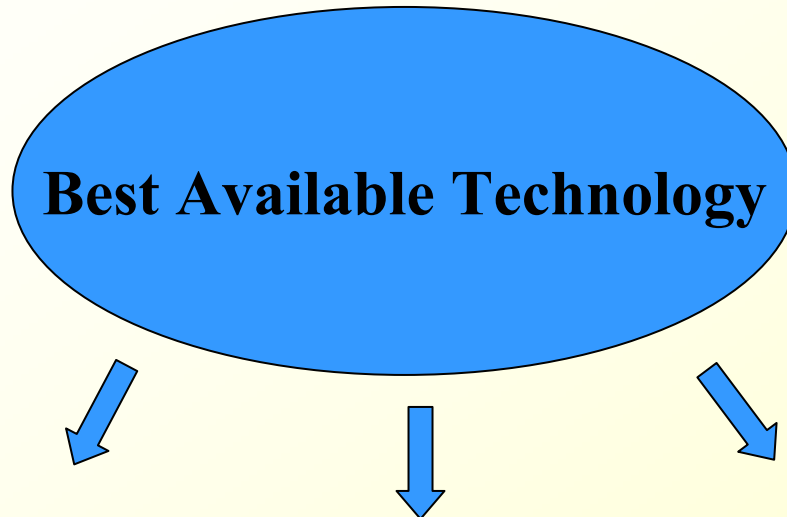
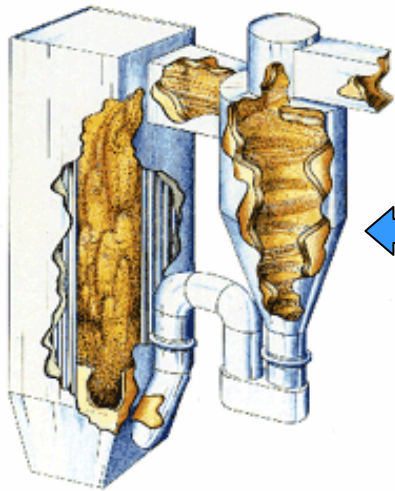
Fossil Fuels



Fossil



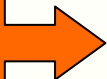
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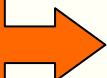
WP Leader: CERTH / ISFTA

WP 3



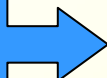
Promotion of CCT Technologies Implementation Options in Existing Coal-fired Power Plants

WP 4



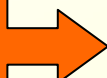
Promotion of Low Temperature Carbonisation Technology

WP 6



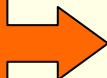
Promotion of Gasification of Low Grade Lignite and Brown Coal

WP 10



Promotion of Decentralised Tri-generation Units Used for the Operation of DHC Systems in Balkan Countries

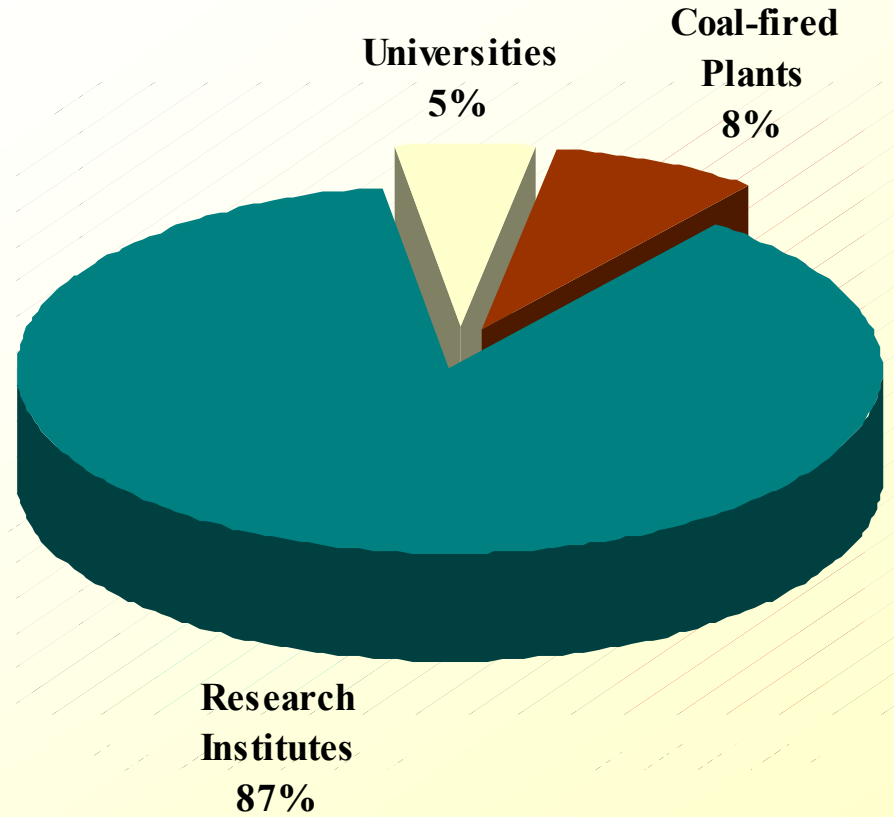
WP 16



Transfer of Technologies for NG Transportation, Storage and Utilisation for Developers and Suppliers



WP3: Promotion of CCT Implementation Options in Existing Coal-fired Power Plants



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WP3: Promotion of CCT Implementation Options in Existing Coal-fired Power Plants



Reports

- 15 Country Reports on *the current situation of the solid fuel-fired power plants and the implementation possibilities of Clean Coal Technologies* for:
Bulgaria – F.Y.R.O.M. – Serbia & Montenegro – Romania – Georgia – Czech Republic – Hungary – Slovakia – Slovenia – Estonia – Latvia – Lithuania – Poland – India – China
- Integrated Report on *the current situation of the solid fuel-fired power plants and the implementation possibilities of Clean Coal Technologies* for the above countries – including *analysis and identification of renovation options*
- Short Report on *the current situation of the power plants in Azerbaijan*
- Report on *Electric power industry of Russia – Coal sector*



WP3: Promotion of CCT Implementation Options in Existing Coal-fired Power Plants



Publications

- Kakaras E., Grammelis P., Skodras G. and Vourliotis P., “*Experience on Combustion and Co-combustion of Greek Brown Coal in Fluidised Bed Facilities*”, Thermal Science – An International Journal, 2003, 7(2), 33-42
- Grammelis P., Skodras G. and Kakaras E., “*Thermal Exploitation of Wastes with Lignite for Energy Production*”, Journal of Air and Waste Management Association, 2003, 53(11), 1301-1311
- Skodras G., Grammelis P., Kakaras E. and Sakellaropoulos G.P., “*Evaluation of the Environmental Impact of Waste Wood Co-utilisation for Energy Production*”, Energy – The International Journal, in press (EGY 1225)
- Skodras G., Karlopoulos Ev. and Kakaras E., “*Financial Support Possibilities for Clean Coal Technologies – An Overview*”, submitted to Technika Chronika, Scientific Journal of the Greek Technical Chamber
- Kakaras E., Grammelis P., Skodras G. and Vourliotis P., “*Experience on Combustion and Co-combustion of Greek Brown Coal in Fluidised Bed Facilities*”, in 17th International Conference on Fluidised Bed Combustion, Proceedings, Jacksonville, Florida, USA, May 18-21, 2003
- Skodras G., Diamantopoulou Ir. Orfanoudaki Th. Natas P. and Sakellaropoulos G.P., “*Toxic Pollutants Removal from Flue Gases by Commercial Activated Carbons*” submitted to Fuel Processing Technology



WP3: Promotion of CCT Implementation Options in Existing Coal-fired Power Plants



Publications

- Skodras G., Diamantopoulou Ir., Amarantos P., Orfanoudaki Th. and Sakellaropoulos G.P., “*Study and Mathematical Modelling of Mercury Adsorption on Activated Carbons*”, 4th Greek National Conference in Chemical Engineering, Proceedings (ISBN 960-418-011-8), pp. 1025-1028, Patras, Greece, May 29-31, 2003
- Dragos L., Macavescu M., Girjoaba M. and Ionel I., “*Coal Drying in Fluidized Bed Using Flue Gas*”, 4th International Symposium on “Fluidised Beds in Energy Production, Chemical and Process Engineering, and Ecology”, Proceedings (ISBN 960-86076-1-2), pp. 55-58, Thessaloniki, Greece, April 3-4, 2003
- Amarantos P., Skodras G. and Kakaras E., “*FBC Utilisation Prospects in Decentralised Cogeneration Units in Caucasus Region Countries*”, 4th International Symposium on “Fluidised Beds in Energy Production, Chemical and Process Engineering, and Ecology”, Proceedings (ISBN 960-86076-1-2), pp. 191-200, Thessaloniki, Greece, April 3-4, 2003
- Dragos L., Flueraru C., Scarlat N. and Macavescu M., “*Romanian Experience and Possibilities for Fluidised Bed Combustion of Coal and Co-combustion of Biomass and Petroleum Wastes*”, 4th International Symposium on “Fluidised Beds in Energy Production, Chemical and Process Engineering, and Ecology”, Proceedings (ISBN 960-86076-1-2), pp. 205-212, Thessaloniki, Greece, April 3-4, 2003
- Kakaras E., Tumanovsky A.G., Koukouzas N., Karlopoulos Ev. And Kotler V.R. “*The Implementation of Technological Methods for suppressing Nitrogen Oxides at the Russian Coal-fired Power Plants*”, accepted at 5th European Conference on Coal Research and its Applications, 6-8 September 2004, University of Edinburgh

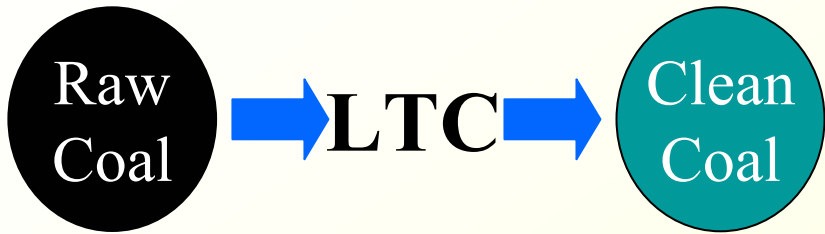




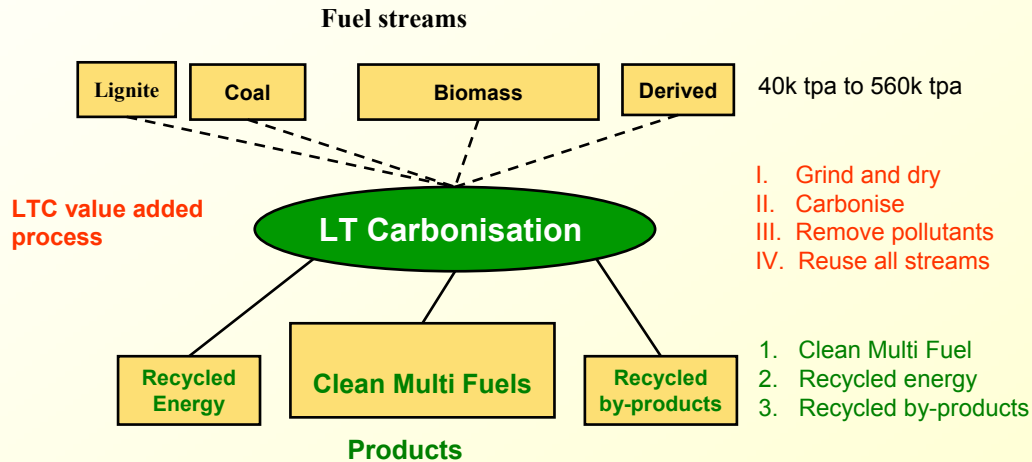
- X₁(Participations in the Events): 294**
- X₂(Synthesis of the Participants)**
 - National and EU Authorities: 5**
 - Research Institutes: 99**
 - Universities: 34**
 - Industry & Energy Utilities: 115**
 - Private Companies: 26**
- X₃(Distribution of the Material): newsletters, post mailing, e-mails, web-sites**
- X₄(Number of Recipients): 670**
- X₅(Requests for Further Information): 27**
- X₆(Internet Dissemination): 10 web-sites**



Promotion of LTC Technology



- Investigation of the pre-treatment conditions
- Assessment of the advantages of LTC
- Dissemination of the results





WP4: Promotion of the Low Temperature Carbonisation Technology



Reports

- Report on *“Thermal Pretreatment: Conditions and Effects”*
- Report on *“Assessment of Advantages of Low Temperature Carbonisation Method”*
- Report on *“Present Status of Low Temperature Carbonisation”*
- Report on *“Survey of Various Carbonisation Technologies”*
- Report on *“Properties, Yields and Utilisation of Low Temperature Carbonisation Chars”*



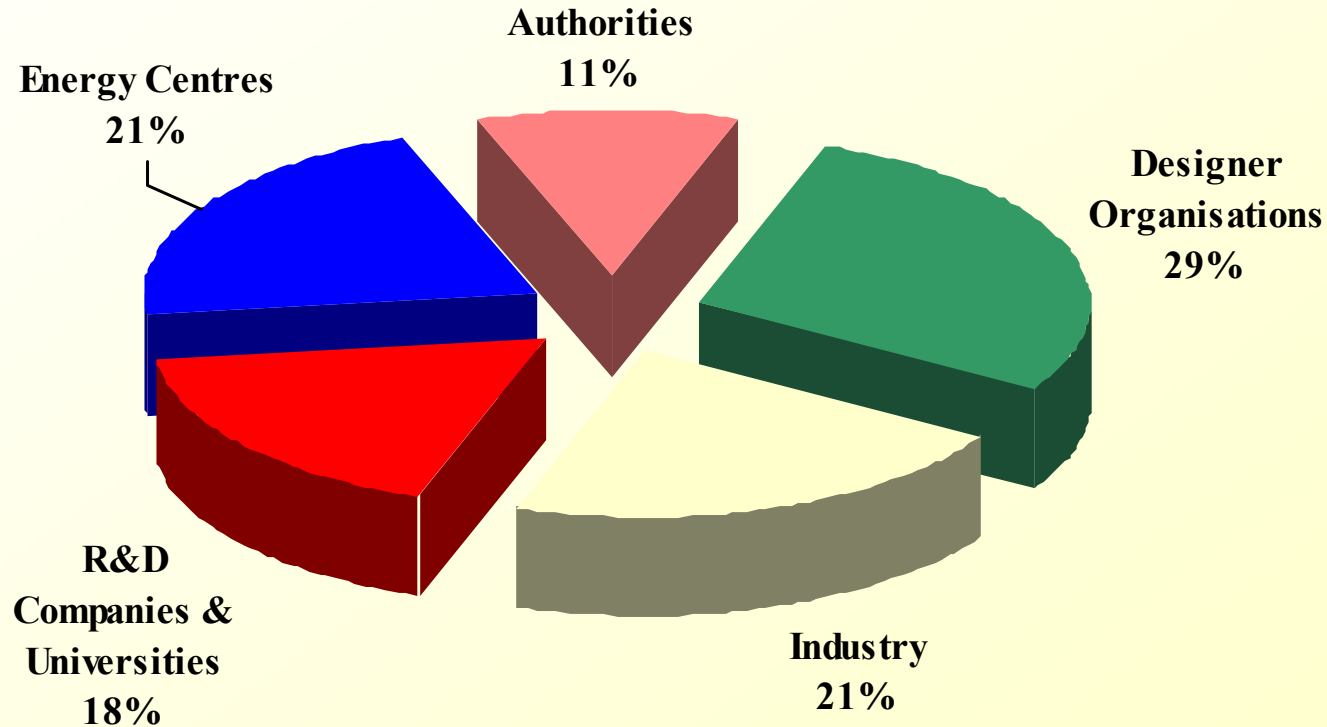
Publications

- Skodras G. and Someus, Ed. *“Clean Solid Fuels Production by Low Temperature Carbonisation for Sustainable Energy Generation”* submitted to Technika Chronika, Scientific Journal of the Greek Technical Chamber
- Skodras G., Sofialidis, D., Faltsi O. Skevis G., Kaldis S. and Sakellaropoulos G.P., *“CFD Simulation of Low Temperature Carbonisation in a Heated Rotary Kiln”* accepted to the 5th European Conference on Coal Research and its Applications
- Skodras G., Sofialidis, D., Faltsi O. Skevis G., Kaldis S. and Sakellaropoulos G.P., *“Modelling Low Temperature Carbonisation of Solid Fuels in a Heated Rotary Kiln for Clean Solid Fuel Production”* submitted to Fuel
- Skodras G. and Amarantos P., *“Advantages of Low Temperature Carbonisation for Clean Coal Production”* submitted to the Bulletin of the Hellenic Association of Chemical Engineers
- Skodras G. and Amarantos P., *“Integration of Low Temperature Carbonisation in Existing Coal-fired Power Plants”* submitted to the Bulletin of Hellenic Association of Mechanical Engineers



Events

- Workshop on “*Promotion of Gasification of Low-grade Lignite and Brown Coal*”





Reports

- Report on *Assessment of quantities and technical characteristics of “Elhovski” basin lignite and their suitability to be combusted with PPG technology*
- Report on *Technical and economic investigation of possible PPG technology implementation for processing lignite from “Elhovski basin”*
- Report on *IGCC Plant, the energy components of the complex and the utilisation of the energy gas for electrical and heat energy generation*



Publications

- Skodras G., Kaldis S., Sakellaropoulos G.P., Faltsi, O. and Sofialidis, D., “*Simulation of a Molten Bath Gasifier by Using CFD Code*”, Fuel, 2003, **82**(15-17), 2033-2044
- Orfanoudaki T., Skodras G., Dolios I. and Sakellaropoulos G.P., “*Production of Carbon Molecular Sieves by Plasma-Treated Activated Carbon Fibres*”, Fuel, 2003, **82**(15-17), 2045-2049
- Kaldis S.P., Skodras G. and Sakellaropoulos G.P., “*Energy and Capital Cost Analysis of CO₂ Capture in Coal IGCC Processes via Gas Separation*”, Fuel Processing Technology, 2004, 85(5), 337-346
- Skodras G., Grammelis P. and Kakaras E., “*Co-utilisation of Waste Wood with Poor Quality Coal for Energy Production*” submitted for publication in Technika Chronika, Scientific Journal of the Greek Technical Chamber



Publications

- Skodras G., Diamantopoulou Ir., P. Natas P., T. Orfanoudaki Th., Amarantos P.S., Stavropoulos G.G. and Sakellaropoulos G.P., “*Mercury and PCBs Adsorption on Activated Carbons: Experimentation and Modelling*”, 8th International Conference on Environmental Science and Technology, Proceedings (ISBN 860-7475-24-0), Vol. A, pp. 800-813, (ed. T.D. Lekkas), Lemnos Island, Greece, September 8 – 10, 2003
- Orfanoudaki Th., Skodras G., Dolios I. and Sakellaropoulos G.P., “*Activated Carbon Fiber Modification by Hydrocarbon – Nitrogen RF Discharges*”, in 16th International Symposium on Plasma Chemistry, Proceedings, Taormina, Italy, June 22 – 27, 2003

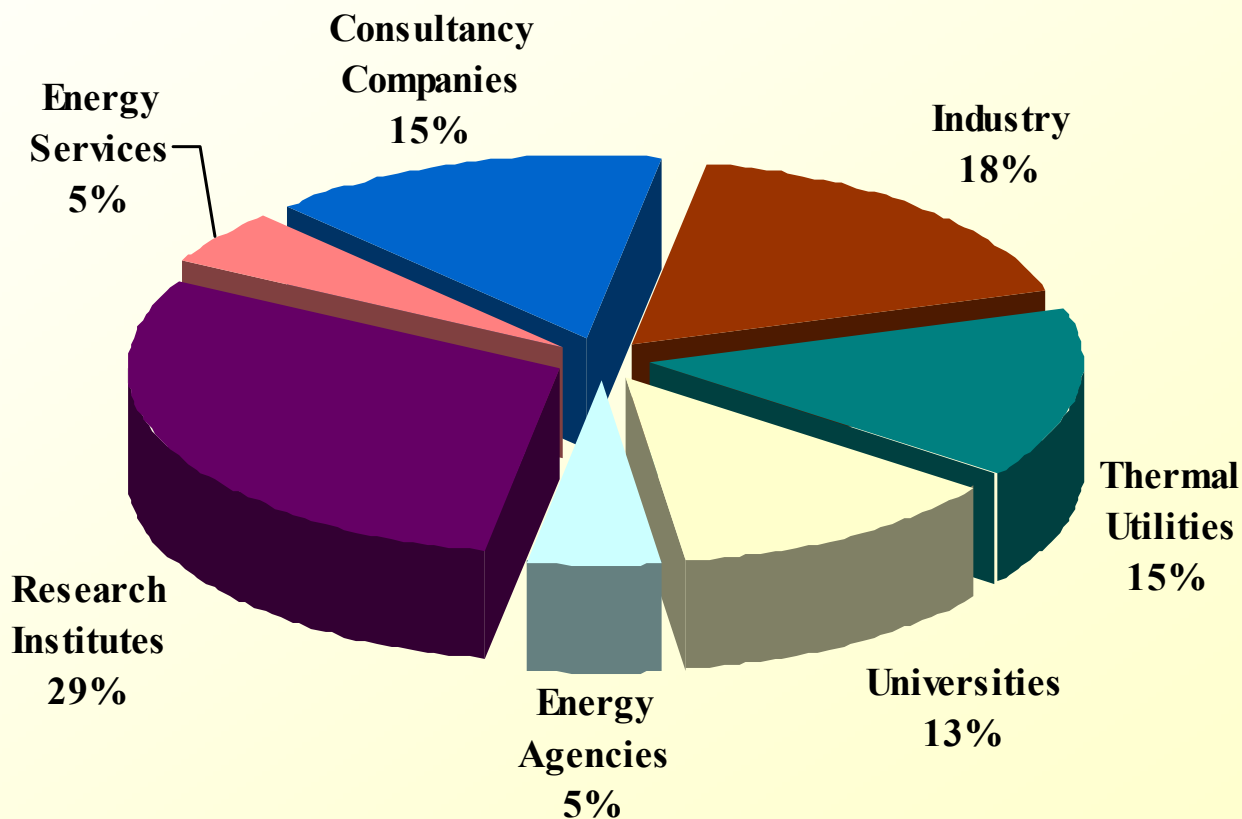


- X₁(Participations in the Events):** **28**
- X₂(Synthesis of the Participants)**
 - National and EU Authorities:** **3**
 - Designer Organisations:** **8**
 - R&D Companies and Universities:** **5**
 - Industry:** **6**
 - Energy Centres:** **6**
- X₃(Distribution of the Material):** newsletters, e-mails, web-sites
- X₄(Number of Recipients):** **130**
- X₅(Requests for Further Information):** **8**
- X₆(Internet Dissemination):** **3 web-sites**



Events

- OVM-ICCPET attended the Workshop “*CFE OPET – European network for Clean Coal Technologies*”





WP10: Promotion of Decentralised Tri-generation Units Used for the Operation of DHC Systems in Balkan Countries



Reports

- Report on *Decentralised Tri-generation Units, Used for the Operation of DHC Systems in EU Countries*
- Final CD-ROM version
 - Advanced technologies in CHP & CCHP implementations*
 - The current situation in Greece, Bulgaria and Romania*
 - Current situation in EU – market trends*
 - Presentation of European success cases*
 - PC executable application (Client Decision Tool)*



WP10: Promotion of Decentralised Tri-generation Units Used for the Operation of DHC Systems in Balkan Countries



Publications

- Skodras G., Amarantos P. and Kakaras E., “*FBC Utilisation Prospects in Decentralised Cogeneration Units in Caucasus Region Countries*” *Thermal Science – An International Journal*, 2003, 7(2), 17-32
- Stavropoulos G. and Skodras G., “*The Use of Exergy for Evaluating Environmental Impact of Energy Processes*”, submitted to the Bulletin of the Hellenic Association of Chemical Engineers
- Stavropoulos G. and Skodras G., “*Energy Savings at Military Installations – A Case Study*”, submitted to the Bulletin of the Hellenic Association of Mechanical Engineers
- Stavropoulos G. and Skodras G., “*Wood Residue Combustion for Energy conservation*”, submitted to *Technika Chronika*, Scientific Journal of the Greek Technical Chamber
- Skodras G., Panousis B., Amarantos P.S. and Kakaras E., “*Efficient Implementation of DH Technology for Domestic Heating in Greece*”, submitted to *Technika Chronika*, Scientific Journal of the Greek Technical Chamber
- Skodras G., Amarantos P.S., Papadopoulou E. and Kakaras E., “*Utilisation of Landfill-gas for Energy Production – Operational Experience from a 13.8 MW_e Power Plant*”, submitted to the Bulletin of the Hellenic Association of Chemical Engineers

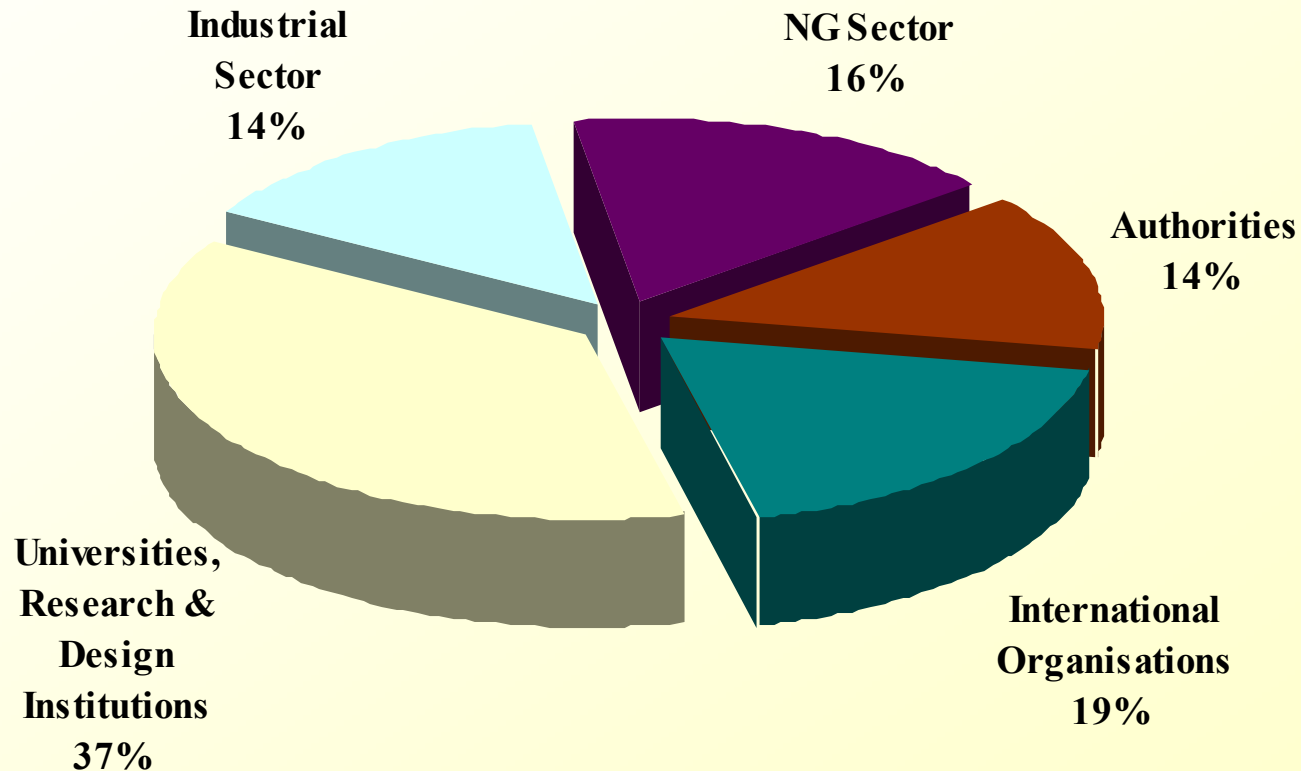


- X₁(Participations in the Events):** **40**
- X₂(Synthesis of the Participants)**
 - Thermal Utilities:** **6**
 - Research Institutes:** **12**
 - Industry:** **7**
 - Universities:** **5**
 - Energy Agencies:** **2**
 - Consultancy Companies:** **6**
 - Energy Services:** **2**
- X₃(Distribution of the Material):** newsletters, CD-ROM, web-sites
- X₄(Number of Recipients):** **190**
- X₅(Requests for Further Information):**
- X₆(Internet Dissemination):** **4 web-sites**



Events

- International Workshop on “*Promotion of Natural Gas Technologies*”





WP16: Transfer of Technologies for Natural Gas Transportation, Storage and Utilisation for Developers and Suppliers



Reports

- Final Report on *Technologies Transfer for Natural Gas*
- Manual for “*NG Technologies and Supply Chains*”
- National Reports on *Short Overview of NG sector* for partner countries

Publications

- Gochitashvili, T., “*Modern technologies for underground storage facilities arrangement*”, Mining Journal N 1-2, Tbilisi, 2003, pp. 58-63
- Gochitashvili, T., “*Caspian gas supply prospects to international market and Georgian gas sector*”, Proceedings of Georgian International Oil, Gas, Energy & Infrastructure Conference, Tbilisi, March 18th–19th, 2004, 9 p
- Stavropoulos G. and Skodras G., “*Energy and Environmental Benefits from Natural Gas Cogeneration: a Case Study*”, submitted to Technika Chronika, Scientific Journal of the Greek Technical Chamber



WP16: Transfer of Technologies for Natural Gas Transportation, Storage and Utilisation for Developers and Suppliers



Presentations

- Gochitashvili, T., “*Prospects of the Caspian Natural Gas Supply to Europe and Probable Impact on the Energy Security of Transit Countries*”, NATO Advanced Research Workshop on *Security of Natural Gas Supply through Transit Countries*, Tbilisi, May 23th–24th, 2003
- Gochitashvili, T., “*New Gas Supply Projects to Europe*”, International Conference on *Caspian Gas, Strategies for Development*, Brussels, November 17th–18th, 2003
- Gochitashvili, T., “*Caspian gas supply prospects to international market and Georgian gas sector*”, Georgian International Oil, Gas, Energy & Infrastructure Conference, Tbilisi, March 18th–19th, 2004



WP16: Transfer of Technologies for Natural Gas Transportation, Storage and Utilisation for Developers and Suppliers



- X₁(Participations in the Events): 43**
- X₂(Synthesis of the Participants)**
 - State Regulatory Agencies & Government: 6**
 - Universities, Research and Design Institutes: 16**
 - International Organisations & Donor Agencies: 8**
 - Industry: 6**
 - Natural Gas Sector: 7**
- X₃(Distribution of the Material): newsletters, post mailing, web-sites – 176 visitors**
- X₄(Number of Recipients): 167**
- X₅(Requests for Further Information): 18**
- X₆(Internet Dissemination): 9 web-sites**





➤ **Reports: 35**

- WP 3: 18
- WP 4: 5
- WP 6: 3
- WP10: 1
- WP16: 8

➤ **CD-ROM: 1 (WP10)**

➤ **Papers: 31**

- WP 3: 11
- WP 4: 5
- WP 6: 6
- WP10: 6
- WP16: 3

➤ **Presentations: 3 (WP16)**

➤ **Workshops Material: 8**

- WP 3: 5
- WP 4: -
- WP 6: 1
- WP10: 1
- WP16: 1

➤ **Web Sites: 15**

- WP 3: 9
- WP 4: 1
- WP 6: 2
- WP10: 3
- WP16: 8
- CFF-OPET



- **Security of the Energy Supply in EU**
- **Environmental Protection**
- **EU Technology Transfer**



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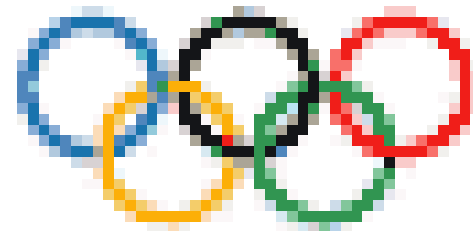


Thank you!

Thank



ATHENS 2004



Valorisation Meeting, May 26 – 27, 2004, Brussels – Belgium