



The Visit of the High Level Guangdong Province Delegation to KEPA

Athens, Hellas – 21st October 2004

PROCEEDINGS



Energy Policy and Development Centre (KEPA)
National and Kapodistrian University of Athens (NKUA)

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THE ESTEEMED DELEGATION OF GUANGDONG PROVINCE OF CHINA

Zhong Yangsheng	Executive Vice Governor, Guangdong Provincial Government
Li Miaojuan	Deputy Director – General, Development and Reform Commission of Guangdong Province
Chen Zhiying	Secretary of General Office, Guangdong Provincial Government
Xie Zuoqun	Director, Infrastructure Industrial Department of Development and Reform Commission of Guangdong Province
Kong Yunlong	Director of Foreign Capital Administration and International Communication Department of Development and Reform Commission of Guangdong Province
Zhang Shanming	Deputy General Manager, China Guangdong Nuclear Power Holdings Co Ltd
Zheng Weiping	Division Head, China Guangdong Nuclear Power Holdings Co Ltd
Tang Zhengrong	Officer at Foreign Affairs Office, China Guangdong Nuclear Power Holdings Co Ltd
Jian Yiming	Director of European Representative Office, China Guangdong Nuclear Power Holdings Co Ltd

AGENDA

10.00 – 10.10	Welcome Address, <i>by Prof. Dimitrios MAVRAKIS</i>
10.10 – 10.15	Reply <i>By Mr. Zhong Yangsheng, Executive Vice Governor, Guangdong Provincial Government</i>
10.15 – 10.35	Brief Presentation of KEPA's Activities <ul style="list-style-type: none"> • A quick Outline of the EU Energy Policies • KEPA's International Activities
10.35 – 11.05	KEPA's Involvement in Clean Energy Projects <ul style="list-style-type: none"> • Climate Change Policies <i>by Mrs. Popi KONIDARI, Research Fellow</i> • EU Hy-Com Demonstration Project <i>by Prof. Dimitrios MAVRAKIS</i> • The Floating Solar Chimney Project <i>by Prof. Christos PAPAGEORGIU</i>
11.05 – 11.15	Comments of the Guangdong Delegation - Discussion
11.15 – 11.30	Small farewell Reception

PRESENTATIONS

Welcome Address

*by Prof. Dimitrios Mavrakis
Director of KEPA*

It is a privilege and a great pleasure for me, as the Director of the Energy Policy and Development Centre (KEPA) of the National and Kapodistrian University of Athens (NKUA) to welcome the high level delegation of the Guangdong Province of P.R. of China in our premises.

I recall, on this occasion, my two official visits in China. The first was during the autumn of 1982 in the frame of the Hellenic-Chinese program for scientific exchanges. It was during this mission when I had visited Guangdong and was officially received by the Governor of your Province and had the opportunity to visit some most remarkable county places.

My second visit took place on the occasion of the European Union-China Energy Cooperation Conference organized in the frame of the E.U. energy policies Commissioner's visit in China in October 1996. In this Conference I had the honor to chair the session of Electricity that included the topics of production, renewable, new plants, old plants rehabilitation and networks.

KEPA's main interests are focused on energy and environmental policy issues and its activities cover a wide spectrum of topics from energy interconnections to energy market development and Kyoto protocol mechanisms.

We are also analyze the socio-economic issues related to the development of energy corridors linking the hydrocarbon reserves of the broader Caspian Sea region with the consumption centers of the European Union.

Further to that we participate actively in the E.U. efforts to shape a viable energy future supporting the processes for embodiment of hydrogen as a fuel of the future and of RES (floating solar chimney) as alternative hydrogen and electricity production sources.

KEPA promotes international cooperation and receives the acknowledgement of regional international organizations such as BSEC and regional energy centers as BSREC as a reliable partner. It has lately undertaken the responsibility of establishing a network linking the energy policy centers and institution of the BSEC countries with those of E.U.

As about the needs and the energy perspectives of the Guangdong province we are aware that your province has one of the most powerful economies of P.R. of China.

The fact that you are far away from your country's huge coal reserves justifies your efforts to cover your needs with nuclear units, natural gas and Renewable Energy Sources (RES) in addition to your needs in oil.

As I have already mentioned we have certain experience on energy market development and we are at the stage of promoting innovative solutions on clean energy topics that may be of your interest as well.

Especially the clean energy sector has two elements that their combination may prove very promising in securing considerable amount of energy in comparative acceptable prices in the near future, with zero emissions.

KEPA investigates the cases of establishing a hydrogen community on Paros-Antiparos islands in the frame of EU FP6 program and at the same time promotes an innovative floating solar chimney with a considerable lower cost per kwh regarding the classic ones and zero

emissions. An invention that allows the construction of considerably higher chimneys with reduced cost and stability risks.

Finally I would like to underline our capacity to function as a focal point for you in Europe on a permanent basis.

We have prepared some topics to present you and we hope to have time to discuss on them either now or in the future.

We, the people of KEPA,
welcome warmly the esteemed
Delegation of the Guangdong
Province of the P.R. of CHINA to
our premises

The AGENDA

10.00 – 10.10	Welcome Address, <i>by Prof. Dimitrios MAVRAKIS, Director of KEPA</i>
10.10 – 10.15	Reply <i>by Mr Zhong Yangsheng, Executive Vice Governor, Guangdong Provincial Government</i>
10.15 – 10.35	Brief Presentation of KEPA's Activities •A quick Outline of the EU Energy Policies •KEPA's International Activities
10.35 – 11.05	KEPA's Involvement in Clean Energy Projects •Climate Change Policies <i>by Mrs Popi KONIDARI, Research Fellow</i> •EU Hy - Com demonstration project <i>by Prof. Dimitrios MAVRAKIS</i> •The Floating Solar Chimney Project <i>by Prof. Christos PAPAGEORGIOU</i>
11.05 – 11.15	Comments of the Guangdong Delegation - Discussion
11.15 – 11.30	Small farewell Reception

The list of participants

Aimilios BOUSSIOS	Energy Project Manager, Lignite Mines Senior Expert
Tereza FOKIANOU	Managing Director , FLOW Energy S.A.
Efstratios KARABATEAS	Greek representative to Mirror Group of the EU technology platform for hydrogen and fuel cells
Dimitrios MAVRAKIS	Director of KEPA
Popi KONIDARI	Research Fellow, Ph.D. candidate
Takis PANAGIOTOPOULOS	President of BOD, C. Vlachopoulos Inc.
Christos PAPAGEORGIOU	Professor of NTUA, external colaborator
Fotios THOMAIDIS	Chemical Engineer, Ph.D. candidate
Alexandra VASILA	Political Scientist, Head of administration and promotion unit
Spyros VASSOS	Director of transmission planning and performance management - PPC

Reply

by Mr. Zhong Yangsheng

Executive Vice Governor, Guangdong Provincial Government

In his reply the Executive Vice Governor of the Guangdong Provincial Government expressed his joy to be in Greece and his thanks for the invitation and warm welcome in KEPA.

In a brief presentation he underlined that the Guangdong Province has achieved an average development rate of 13.4% per annum during the past 20 years, an extraordinary achievement worldwide.

He stressed that although the Guangdong's annual per capita is \$1400, the province constitutes a very strong market force and it is expected that the next 20 years will be a period of quick development for his province leading to a \$7000 - \$10000 per capita income by the year 2020.

Concerning the energy policy issues, he pointed out the increasing demand in electricity due to the high development rates and explained that the aim of their visit to Europe was associated with the energy objectives of its province.

He expressed his interest to have more information regarding the EU energy policies, especially on clean energy policy issues and expressed his intention for cooperation with KEPA on mutual importance topics.

He concluded with the remark that the members of Guangdong delegation that cover the relative to KEPA activities could further investigate the perspectives of cooperation with KEPA.

Brief Presentation of KEPA Activities

A Quick Outline of EU Energy Policies

by Prof. Dimitrios Mavrakis

Energy policy issues are of primary importance for the European Union and therefore they are discussed at all EU political levels, ranging from the Parliament to the Commission and to the Council of energy ministers of EU member states.

Among the EU main energy policy objectives are those of the security of energy supply, the sustainable energy development, the proper function and integration of member state energy markets into the internal energy market, the development of Trans-european Energy Networks, the promotion of the energy industry world-wide, the promotion of Energy RTD. International cooperation on energy issues is of primary importance for EU that strives to maintain and improve its competitive position world-wide.

Energy policy objectives are financed through different types of projects and programmes that include funds allocated by the EU budget and the associated financing institutions like the European Investment Bank (EIB), the European Bank for Restructuring and Development (EBRD) while the private sector is encouraged, through structured proposals to participate in joint efforts.

The Directorate General for Transport and Energy, known as DG-TREN, is responsible for short-medium term policies and projects while Directorate General for Research for mid-long term energy projects with a Research, Technology and Development (RTD) character.

As far as the International Scientific Cooperation (INCO) is concerned a budget of €285 million has been allocated, as part of the 6th Framework Programme (FP6) (2002-2006), for funding RTD activities with foreign countries.

In this respect it is important to underline the emphasis that EU gives on issues related to the Clean Energy development, that among others include the issues of Renewable Energy Sources, New Energy Carriers, such as Hydrogen and the Kyoto Protocol Mechanisms.

The Guangdong Province research scientific community, in the frame of EU – Chinese cooperation, may benefit direct from these programme and from all relevant EU programmes as well, by establishing bonds of cooperation with respective EU institutions from the EU member states (Universities, Institutes, etc) and jointly participating in all periodic calls published by EU in its web sites.

A high volume of information regarding detailed description of the EU energy policy strategies, objectives, priorities, funding opportunities together with international calls for participation to EU programmes are accessible through the internet (<http://europa.eu.int>)

KEPA's International Cooperation Activities

Investigation of
the Socio-Economic impacts
associated with the EU – Caspian
Energy Corridors
and the Hydrogen Society

Prof. Dimitrios Mavrakis
Director of KEPA

1

The vision

The improvement of EU security and
diversification of energy supply by
facilitating the development of energy
corridors linking EU with the broader
Caspian Region in the perspective of
the Hydrogen Society

2

The aim

To strengthen bonds of cooperation
between the EU and the BSEC scientific
communities promoting social acceptability
and economic development through the
development of the energy corridors and
the intermediate energy markets linking
them

3

The aim

To identify and couple EU and BSEC¹
potential partners on socio-economic
issues related to energy corridors and
markets linking them

1 The Black Sea Economic Cooperation Organization is consisted of the
following twelve (12) countries:
**Albania, Azerbaijan, Bulgaria, Georgia, Hellas, Moldova, Romania,
Russia, Serbia and Montenegro, Turkey, Ukraine**

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The objectives -1

- The study of the socio-economic factors affecting the transportation of natural gas alongside the proposed corridors
- The development of social acceptance tools and methods for introducing Hydrogen alongside the proposed corridors
- The optimization of energy routes inside the EU – Caspian corridors

5

The objectives -2

- The study of socio-economic implications on intermediate energy markets due the development of new energy corridors
- The development of climate and environmental policy tools and models
- The promotion and dissemination of RTD outcomes at regional level

6

Proposed areas of cooperation -1

- Energy and pipeline geopolitics
 - Optimization of pipeline routes
 - Provision of reliability of gas supply system in the conditions of probabilistically uncertain and insufficient information
 - Development of a model for operational and forward planning of a Unified Gas Transportation System
 - Design of fuzzy regulators of gas supply regimes

7

Proposed areas of cooperation -2

- Environmental concerns and model analysis
 - Design, implementation, evaluation of climate policy instruments
 - Mathematical modeling affecting oil and gas transportation process
 - Simulation of environmental impacts caused by oil and gas pipeline and maritime transportation

8

Proposed areas of cooperation -3

- Hydrogen Communities, Hy – Com
 - Socio-economic studies for the inclusion of Hydrogen perspective in the natural gas planned pipelines and infrastructures
 - Dissemination of Hy – Com outcomes to the BSEC region through participation and active involvement of the scientific potential of the region

9

The momentum -1

- Political endorsement
 - The Energy Ministers of the 12 countries constituting the Organization for Black Sea Economic Cooperation support regional cooperation with EU
 - The BSEC working Group on Energy has accepted the proposal of KEPA for the establishment of networks of cooperation with EU in the frame of FP6

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The momentum -2

- Administrative support
 - The BSEC secretariat (PERMIS) has disseminated through the BSEC Ministries of Foreign affairs the KEPA's invitation to relevant institution to participate in the proposed network
 - A number of institutions have responded while much more intend to join the network

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The momentum -3

- Financial support
 - Given the limited budget, the BSEC Project Development Fund has approved KEPA's proposal to finance a minimum of preliminary actions leading to FP6 proposals. KEPA has been acknowledged as leader of the proposed network

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The momentum -4

- The so far BSEC partners
 1. Energy Policy and Development Centre – Hellas
 2. Geotechnological Problems of Oil, Gas and Chemistry - Azerbaijan
 3. Black Sea Regional Energy Centre – Bulgaria
 4. Institute of Power Engineering Academy of Science
 5. Institute of Power Studies and Design – Romania
 6. Energy Saving and Energy Management Institute – Ukraine
 7. International Institute of Energy Policy and Diplomacy – Russian Federation
 8. Bogazici University – Turkey
 9. IBS Research and Consultancy – Turkey
 10. National Technical University of Athens - Hellas

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Invitation

We are looking for EU partners in the frame of FP6 “Socio – economic tools and concepts for energy strategy”

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Contact us

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KEPA's Involvement in Clean Energy Projects

Brief Introduction to Climate Change Policies

by Mrs Popi Konidari

Research Fellow, Ph.D. Candidate

Climate policy - Clean energy

Popi Konidari MSc.
Research Fellow – PhD candidate of NKUA



1

Environmental Policy Group

- Research on
 - Mitigation and adaptation strategies
 - Climate policy instruments
 - Analysis
 - Assessment of performance
 - Exploration of interactions
 - Elaboration of criteria and indices



2

Clean Energy Policy Instruments

- Kyoto Protocol mechanisms
 - Joint Implementation (JI)
 - Clean Development Mechanism (CDM)
 - International Emissions Trading (IET)
- Regulatory standards
 - Energy efficiency
 - Emissions
- Promotion of Renewable Energy Sources



3

CDM

- International projects aiming to assist
 - Developing countries to evolve
 - Developed countries to comply
- Participation
 - Developing countries
 - Kyoto Protocol Annex B countries
- Function
 - Certified Emission Reductions (CERs)



4

Potential Benefits

- Low cost energy
 - More efficient energy facilities
- Infrastructures and technologies
 - Production and transportation of low GHG emission fuel
- Energy conservation
- Growth of province economy
 - Job opportunities



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Cooperation

- Exploration of potential CDM projects
 - Social-economic impacts
 - Policy interactions
- Evaluation of climate policy options
 - Urban environment

Contact point

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EU Hy – Com Demonstration Project
by Prof. Dimitrios Mavrakis

**Investigation of
Socio – Economic aspects
for the establishment of
a Hydrogen – Community
on the Greek islands of
Paros – Antiparos**

Prof. Dimitrios Mavrakis
Director of KEPA

Energy Policy and Development
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1

The Vision

**A society using Hydrogen as
clean energy carrier**

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2

The Aim

The development of a hydrogen
community on the Paros – Antiparos
island cluster with world – wide
demonstration potential

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3

The Objectives – 1

- Analyze the socio-economic factors affecting the local communities
- Identify and bring together potential stakeholders
 - EU scientific community
 - Local authorities and social partners
 - Private sector (Industry and investors)
 - International community

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eposec@kepa.uoa.gr

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The Objectives – 2

- Develop a master plan:
 - Compatible to EU perspectives
 - Acceptable by the local communities
 - Attractive to all potential stakeholders
 - Open to international cooperation

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eposec@kepa.uoa.gr

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The Objectives – 3

- Investigate the terms for implementation of existing EU Technologies for Hydrogen production, storage and use as energy carrier for:
 - Power generation
 - Heat (Commercial and residential use)
 - Transportation (Vehicles and small ferries)

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An overview of Paros – Antiparos island cluster -1

- Located in the middle of the Aegean Sea, 96miles South – East from Athens (2h 45min by ferry – boat, 20min by plane)
- Mother place of Cycladic Civilization (3200 – 2000 B.C.)
- Paros (209 Km²) and Antiparos (34Km²) are separated by a 0.5 miles channel

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An overview of Paros – Antiparos island cluster - 2

- High wind and solar potential
- Seasonal power fluctuations due to high tourism density
- Fuel oil power station with 10% annual rate of demand increase.
- Annual power consumption 170 GWh (2003)

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Advantages of choosing the cluster of Paros – Antiparos islands – 1

- The islands have soaring potential for clean energy
- The scale difference in magnitude of the two islands allows the gradual implementation of Hy – technologies
- The small distance between them allows the test of Hy – technologies for maritime transportation
- Success in these two islands may be spread easily to the neighboring Cycladic islands

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Advantages of choosing the cluster of Paros – Antiparos islands – 2

- The high density of tourism makes them ideal for demonstrative purposes
- The mild climate make them ideal for all year round open air works
- The existing tourist infrastructure allows the development of international activities all year round.

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Obstacles

- Lack of political momentum
- Lack of socio – economic studies
- Lack of the necessary scientific critical mass
- Local societies are not aware of potential advantages
- Difficulties in attracting private investors

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Momentum developed ...

- Deliberations with national stakeholders have resulted Eol from:
 - Paros and Antiparos Municipality Majors
 - Land owners from Antiparos
 - Private investors and SMEs
 - Greek scientists
- International cooperation
 - Expression of interest from the scientific community of the BSEC countries
 - Contacts with the Guangdong Province of P.R. of China

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Invitation

We invite EU Research Institutes and all potential stakeholders to join us in all stages of implementation and demonstration of a Hy – Com program on the Greek islands of Paros – Antiparos.

Energy Policy and Development
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Contact us

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The Floating Solar Chimney Project

*by Prof. Christos Papageorgiou
External Collaborator of KEPA*

Clean Energy Production

The Energy Policy and Development Centre (KEPA) promotes the implementation of a comparative to conventional fuels, low – cost power production, based on the development of

a Floating Solar Chimney.

An invention of
Prof. Christos Papageorgiou,
external collaborator of KEPA

Solar Air Turbine Power Stations with Floating Solar Chimneys

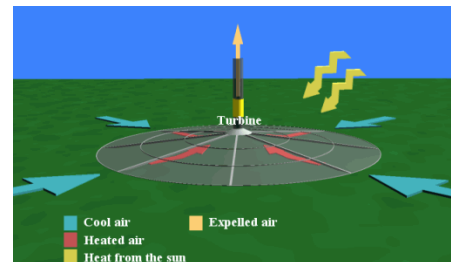
The ultimate invention for Solar Power

Prof. Christos Papageorgiou - NTUA

What Is a Solar Turbine Power Station (STPS)

- A large cyclical solar collector.
- A very tall solar chimney in the center.
- One Air Turbo generator with vertical axis inside the solar chimney or several horizontal axis Air Turbo generators around the base of the chimney.

A 3-D indicative presentation of the STPS



The Australian Solar Tower Project (Concrete solar chimney)

- Rated Power ~200 MW
- Annual production ~700 GWh
- Solar Collector Diameter 6000 m-7000 m
- Solar Collector area max 38 Km²
- Height of solar chimney 1000 m
- Chimney's internal diameter ~130 m

The cost factor

- The major problem for the concrete solar chimney Solar Power Stations is their cost.
- Under conservative estimations the construction cost of Australian Solar Power station it will be 700 mUSD.
- This means 3500 USD per rated KW
- In order to build competitive STPSs their chimneys must be tall and cheap

What Is a Floating Solar Chimney (FSC) - The Basic Shape.

A lighter than air construction composed

by:
A set of Lifting balloon rings

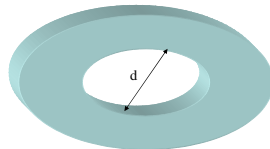


Fig.1

What Is a Floating Solar Chimney (FSC) - The Supporting rings.

- With intermediate Supporting rings

(mainly for sub-pressure encountering).

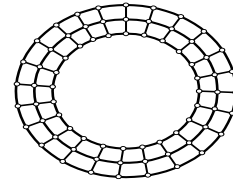


Fig.2

What Is a Floating Solar Chimney (FSC) - The base with an accordion type end.

And a heavy inclined base with an accordion type end.

(For wind encountering)

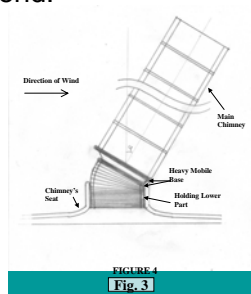
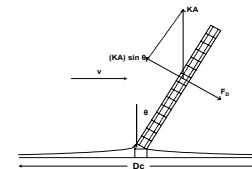


Fig. 3

Encountering external winds.

The decline angle of FSC under external winds



Construction cost of a STPS of a Given Power Output.

COST ASSUMPTIONS

- Solar Collector estimated cost 17 USD/sq.m.
- Air Turbines cost 40 USD/KW(rated KWx1.25)
- Gear box, Electric Generators, Power Electronics, Electric Equipment and Transformers for Grid Connection 80 USD/KW (rated KWx1.25)
- Floating Solar Chimney cost depends on diameter d, Height H, Maximum Sub pressure acting on its' wall, and the prices of basic materials (fabric, Al, NH₃, He, composite ropes e.t.c)
- For market values of basic materials the FSC of d=70m and H=3500m (shape 3, Al, NH₃) will cost 21,5 mUSD.

Resulting Conclusions

- Large STPSs with FSCs up to 3500m (100 MW to 500 MW) have estimated construction costs **1000 USD/kw** for Py=1600kwh/sq.m/y and **750 USD/kw** for Py=2300 kwh/sq.m/y.
- The average energy production per year, for the STPSs, is not less than 3000 Kwh per Kw of rated Power of the STPS.

A comparison between STPSs and other Power Stations.

Power Station	Investment Cost in €/KW		Fuel Cost	Maintenance Cost
	Year 2000	Year 2010		
Gas combined cycle	745	587	Natural Gas (+)	Average
Coal Supercritical	1970	1303	Coal (-)	Above Average
Coal Gasification	2631	1805	Coal (-)	Above Average
Nuclear P.S.	3632	3574	Uranium (+)	Above Average
Biomass P.S.	2638	2198	Biomass (+)	Above Average
WIND P.S. (3000 h/year)	996	911	Zero	Below Average
Solar Turbine P.S. (3000 h/year)	750(2004)	550	Zero	Below Average

Hydrogen Production with STPS

- STPS units could combined with respective electrolysis units forming “Autonomous Hydrogen Production Units”
- An “Autonomous Hydrogen Production Unit” of 100 MW could produce about $7 \cdot 10^6$ Kg of Hydrogen per year
- The investment cost for this unit will not exceed the amount of 120 mUSD

Inventor's Vision.

- The time has come to build and use Solar Turbine Power Stations with floating solar chimneys as a cost effective method of producing Electric Power by the sun.
- The proposed combination of STPSs with FSCs is a sustainable energy production system completely friendly to the environment.
- The proposed technology can be the beginning of the end in using harmful fuels to the environment and avoiding global warming.
- The proposed technology can be the power vehicle towards a hydrogen era.

Contact us

For further information or technical inquiries about the Floating Solar Chimney contact us at KEPA:
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Comments of the Guangdong Delegation

In the discussion that followed the aforementioned presentations, the members of the delegation expressed their interest to create a communication link with KEPA while the director of KEPA undertook the task to send the proceedings of the meeting by e-mail as a first step to establish this communication.

GREEK PARTICIPANTS

Aimilios Boussios, Energy Project Manager, Lignite Mines Senior Expert.

He is an expert in issues of energy projects and one of the best experts in Greece concerning matters of lignite mines. He has spent many years as director general of the Greek Public Power Company in issues of planning and executing energy projects.

Tereza Fokianou, Managing Director, FLOW Energy S.A.

She comes from the oil exploration and research area and has great experience in natural gas issues since she was responsible for the import of natural gas in Greece. She has many contacts with the corresponding companies and services in the EU and especially with the oil companies located in London.

Efstratios Karabateas, Greek representative to Mirror Group of the EU technology platform for hydrogen and fuel cells.

He has a historical presence in the RES sector, since he developed the first village with solar energy in Greece, for an EU program. Thus he is aware of the technology and the problems for the attraction of investments in order to implement such a project. Mr Karabateas has recently agreed to participate in a program concerning the development of a hydrogen society, aiming to apply all the European hydrogen technologies in Greece.

Dimitrios Mavrakis, Director of KEPA.

He is an Assistant Professor at the National and Kapodistrian University of Athens (NKUA). He is the Director of KEPA, which deals mainly with energy and environmental policy issues. He has a recognized contribution in promoting regional cooperation on energy policy issues in S.E. Europe. He is considered as the founder of the Regional Electricity Market in S.E. Europe. He was in charge for the Hellenic team of the INTERACT project.

Popi Konidari, Research Fellow, Ph.D. candidate.

Mrs Konidari handles issues of emissions trading, the clean development mechanism and other Kyoto protocol mechanisms. She is at the end of her PhD studies, has many good cooperation relations concerning these matters and is one of the few experts in Greece able to handle such problems easily.

Takis Panagiotopoulos, President of BOD, C. Vlachopoulos Inc.

He comes from the enterprises area. He is involved in informatics issues and recently has invested in clean energy. He has good relations with investment and financial contacts in Central Europe. His intention to participate in the procedures of the hydrogen society to be developed in the Paros – Antiparos island complex, provides sufficient guarantees that the EU funds for the project will be properly utilized.

Christos Papageorgiou, Professor of NTUA, External collaborator.

He is an external collaborator of KEPA. His academic interests include solar chimney power stations, wind power systems, electromagnetic applications for propulsion systems and electromagnetic theory and quantum mechanics.

Fotios Thomaidis, Chemical Engineer, Ph.D. candidate.

Mr Thomaidis is a researcher of KEPA involved in issues of energy corridors and especially in the natural gas transportation from the Caspian Region to the EU.

Alexandra Vasila, Political Scientist, Head of administration and promotion unit.

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