EUROPEAN COMMISSION

Community Research

SEVENTH FRAMEWORK PROGRAMME

EUROPAIRS

Support Action

Co-funded by the European Commission under the
Euratom Research and Training Programme on Nuclear Energy
within the Seventh Framework Programme

Grant Agreement no. 232651
Start date: 01/09/2009 Duration: 21 Months

www.europairs.eu

Conclusions of the EUROPAIRS Workshop

Brussels, 26th May 2011

Author(s) : A. Bredimas (LGI)
Approval: E. Bogusch (AREVA)

End-User Requirements fOr industrial Process heat Applications with Innovative nuclear Reactors for Sustainable energy supply

EUROPAIRS project – Grant Agreement no. 232651
End-User Requirements fOr industrial Process heat Applications with Innovative nuclear Reactors for Sustainable energy supply

EC Scientific Officer: Panagiotis Manolatos

Document title	***Conclusions of the EUROPAIRS Workshop Brussels, 26th May 2011***
Author(s)	A. Bredimas (LGI)
Number of pages	16
Document type	Deliverable
Work Package	0
Document number	D06
Date of completion	27/06/2011
Dissemination level	Public
Document status	Final

Summary

This deliverable reports on the conclusions of the EUROPAIRS Open Workshop which was held at the end of the project on the 26th May 2011 in Brussels.

Revisions

Rev.	Date	Short description	First author	Task leader	Work package leader	Coordinator
01	27/06/2011	First issue	*A. Bredimas (LGI)*	E. Bogusch (AREVA)	E. Bogusch (AREVA)	E. Bogusch (AREVA)

Distribution list

Name	Organisation	Comments
M. Manolatos, Project Officer for EUROPAIRS	EC DG RTD	
All EUROPAIRS members	EUROPAIRS	
Public		

Table of contents

1. Introduction 4
2. Opening keynotes 5
3. Outcome of EUROPAIRS 6
4. The international context of HTR 8
5. User panel 9
Conclusions 11
Annexe I: Workshop agenda 12
09:00-09:30 Registration and coffee 12
Opening Keynotes 12
Perspectives of Nuclear Cogeneration: outcome of EUROPAIRS 12
10:45 Coffee break in poster area 12
12:45 Lunch break in poster area 12
The international context 12
14:45 Coffee break in poster area 13
User panel 13
17:45 Closing session 13
18:00 Adjourn 13
Annexe II: List of workshop participants 14

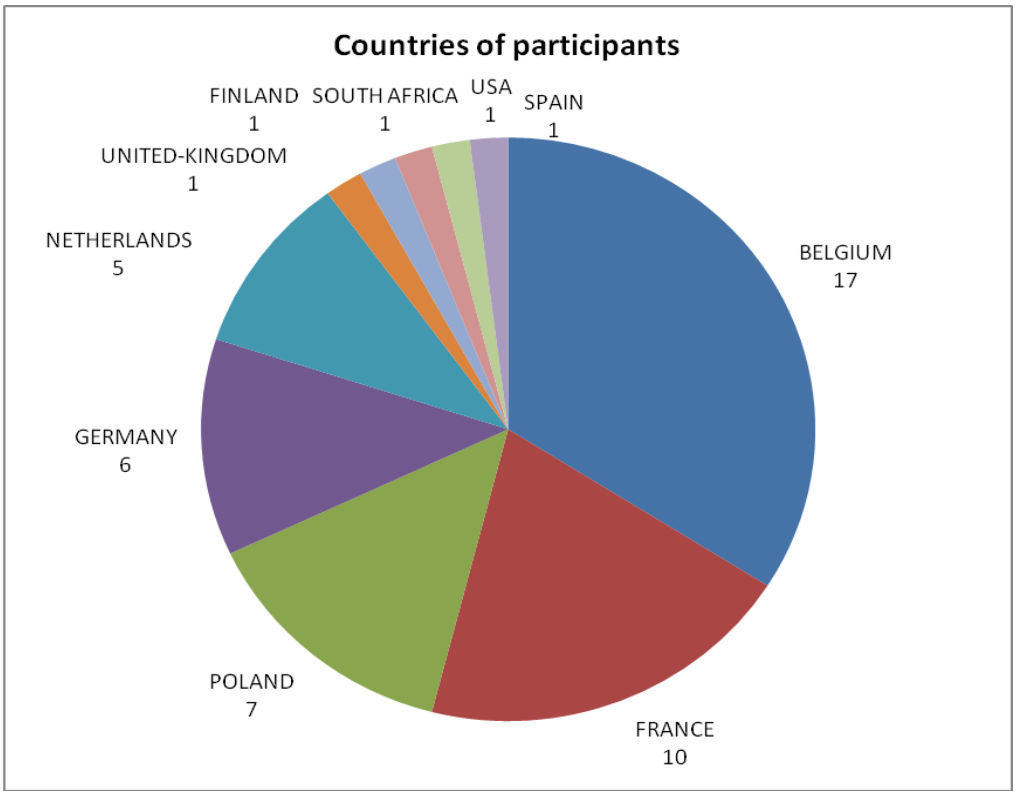
1. Introduction

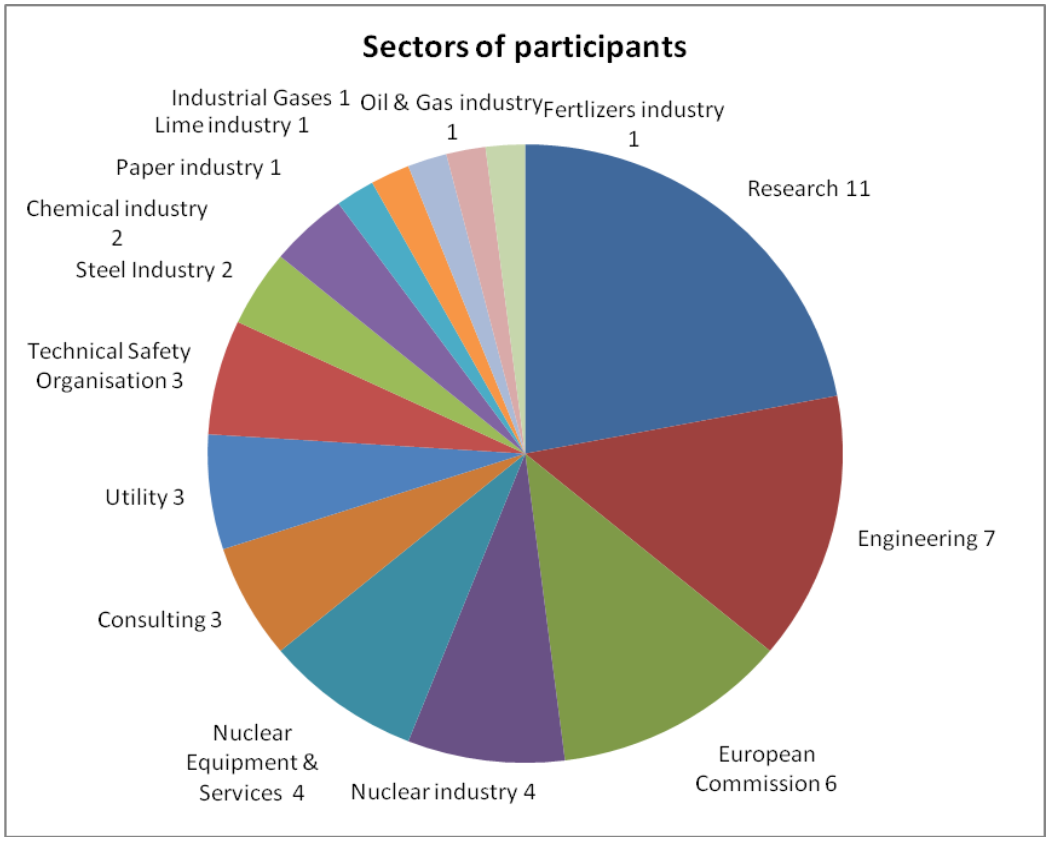
This document presents the results and conclusions of the Open Workshop of the EUROPAIRS project which was held on the 26th May 2011 in Brussels at the Charlemagne building of the European Commission. The agenda of the workshop can be found in Annex I.

The Workshop gathered 50 participants (see list of participants in Annex II). It has had an international reach with 10 countries represented, of which 8 European countries, the United States and South Africa. A representative from a Canadian industrial park wanted to participate but could not finally join the workshop.

The workshop has had an extensive coverage in terms of sectors. Participants came from research and engineering in various fields (energy, coal, nuclear, oil sciences) as well as the nuclear industry at large (vendor, safety organisations). Heat consuming industries were involved (chemical, paper, lime, industrial gases, fertilizers, oil & gas industries) and other industries in the project networks could not participate in the workshop but asked to be kept informed (glassmaking, ceramics, synthetic fuels, cogeneration, oil and refining). Finally utilities with a strong experience in operating nuclear power plants, in particular in cogeneration mode, were also represented.

All presentations are available on the public website of the EUROPAIRS project: www.europairs.eu





2. Opening keynotes

Setting the scene (W. von Lensa, Forschungszentrum Juelich)

Werner von Lensa introduced the workshop by setting the broader picture of nuclear energy, a natural energy extensively present in the universe and the planet cores, including the Earth.

He recalled the sustainability requirements for Europe are founded on three pillars: economy, ecology and society and highlighted the European dependence on fossil fuels today and the attractiveness of cogeneration for energy efficiency. He presented the general design of high temperature nuclear reactors and concluded by the trilemma for implementing sustainability depending on politics, economy and technology.

European energy policy context (M. Deffrennes, European Commission, DG Energy)

Marc Deffrennes presented the status of the European energy policy. Research and innovation and climate change and energy are listed among the 5 key priorities for Europe by 2020 (European 2020 Strategy).

Low-carbon technologies are broadly supported politically. Key technologies were listed by the European Strategic Energy Technology Plan (SET Plan) but their development still requires funding. A total of 80 bn€ over 10 years was estimated necessary to develop all technologies whereas only 30 bn€ has been secured so far.

The nuclear research strategy was sketched by the Sustainable Nuclear Energy Technology Platform based on three pillars: maintain the competitiveness of current light water reactors in operation in Europe, develop next generation fast neutron reactors as well as nuclear cogeneration.

Nuclear fission is listed as a priority low-carbon technology to develop by the SET Plan and a European sustainable nuclear industrial initiative has been launched for fast neutron reactors. M. Deffrennes estimated nuclear cogeneration is also a key low-carbon technology that would deserve being demonstrated by a dedicated industrial initiative.

3. Outcome of EUROPAIRS

Introduction to EUROPAIRS (E. Bogusch, AREVA)

Edgar Bogusch presented the vision of high temperature nuclear cogeneration which would produce process heat and steam for current industrial applications, with inherent safety and high efficiency rates.

High temperature reactors operate at 700°C (with proven technologies) and up to 900°C. They represent an attractive low-carbon alternative to current cogeneration technologies, based on fossil fuels. He emphasised the advantages of HTR, namely strong safety features and flexibility.

He then presented briefly the EUROPAIRS project, its objectives, its structure, its extensive consortium and its key outcomes, in particular as regards international collaboration with the US counterpart initiative (the Next Generation Nuclear Plant Industrial Alliance).

Study of the industrial heat market (A. Bredimas, LGI Consulting)

Alexandre Bredimas presented the results of the study on the European industrial heat market. This study was critical in absence of any reliable statistics so far. The industrial heat market was evaluated at European level from the CO2 emissions and through a direct calculation and a market survey for large heat intensive industrial sectors.

Industry consumes heat either from cogeneration (so-called “plug-in” market since nuclear cogeneration may replace the existing plants directly) or from internal process boilers and burners (so-called “extensive” market).

Two additional markets were also evaluated, namely the production of base raw materials like hydrogen and oxygen represent an additional heat market (“”polygeneration”) and the nuclear pre-heating which could even replace some internal heat production sources (“pre-heating”).

The key results of the study are that Europe is an attractive heat market with world leading infrastructures and a total consumption of similar to the production of electricity; gas is the reference technology for cogeneration (< 550°C); nuclear cogeneration was proved at low temperatures (< 150°C); 25-30% of the industrial heat is produced by cogeneration, the rest by internal process boilers/burners; the heat market is most significant below 550°¢ and above 1 000°C. Significant heat markets include iron & steel, cement, glass, refinery, chemical industry and district heating.

Viability conditions of nuclear cogeneration (N. Delannay, Tractebel Engineering)

Nicolas Delannay presented the viability and boundary conditions of coupling high temperature nuclear cogeneration with industrial processes, a key outcome of EUROPAIRS WP1. Nuclear cogeneration is close to maturity but design choices have to be consolidated.

The key challenges are the licensing requirements for the coupled sites and tritium releases, the heat transport technologies and the suitable coupling interface for industrial applications. He presented some solutions against tritium releases (intermediate heat cycle) and for the transport of heat (steam generators and gas to gas heat exchangers).

N. Delannay recommended a step-by-step secure strategy. On the near term, a demonstrator should address existing markets and rely on mature technologies. On the long term, promising technologies should be investigated and developed by integrating the experience feedbacks of the first realisations.

Licensing and safety aspects (O. Baudrand, IRSN)

Olivier Baudrand presented the analysis of the licensing and safety analysis. It was found that current safety approaches based on defense in depth apply to the coupling of a nuclear cogeneration plant and an industrial facility.

Key aspects will have to be proven for a demonstrator project: definition of the barriers and isolation devices, integration of the external hazards induced by the coupled process, consistency of the emergency planning of the nuclear plant and industrial facility and the criteria from Health authorities as regards the delivery and use of a potentially contaminated fluid to an industrial and consumer environment.

To limit these licensing risks, he recommended to separate completely the sites and to integrate intermediate circuits instead of a direct coupling.

Preliminary cost study (A. Bredimas, LGI Consulting)

Alexandre Bredimas presented the results of the preliminary study on cost aspects for nuclear cogeneration. Cogeneration projects face numerous uncertainties from the cogeneration plant, the end-user, the coupling, the site and the general energy, environmental, political and industrial contexts.

Nuclear and gas were found to have uncertainties appearing at different project phases. In the case of nuclear energy, construction concentrates the highest risk and to a lower extent dismantling while risks are very low during operation. On the contrary, gas cogeneration has the highest risk during operation, in particular with the fuel price volatility and the CO2 emissions taxation.

He presented an illustrative example of a simple cost estimation for 2 different HTR designs against a gas combined cycle and boiler. Nuclear cogeneration from HTR was found to have potentially a competitive advantage over gas, already at current prices.

In order to support the economic evaluation of a demonstrator, a vital step for the deployment of nuclear cogeneration, he recommended carrying out a detailed cost estimation of every HTR design and cogeneration schemes, together with a full sensitivity analysis; an assessment of the impacts of economies of scale and sizing; a risk analysis on the external aspects; an evaluation of project financing options; the investigation of innovative business models and the development of detailed business cases.

Roadmap to industrial demonstration (S. de Groot, NRG)

Sander de Groot presented the draft roadmap for the industrial demonstration of nuclear cogeneration in Europe. The roadmap considered a plug-in market where an existing cogeneration plant would be replaced by a large nuclear one to benefit from scale economies, the use of known technologies as much as possible, and the production of electricity as a mean for flexibility and additional revenues.

The roadmap spans the reactor preparation (primary and secondary systems, fuels, materials, site analysis) and construction, the licensing, safeguards and waste provisions and the coupling with the industrial facility (heat transport, distribution, storage and grid connection). The roadmap targets a commissioning of a demonstrator by 2020.

A prototype was found to cost approximately 2,5 bn€. Critical aspects are the reactor pressure vessel, the fuel manufacturing capacity in Europe and the licensing. International cooperation was recommended. The roadmap should be further detailed and updated as necessary.

4. The international context of HTR

International activities in HTR development (M. Fütterer, JRC-IE)

Michael Fütterer presented the international status of HTR development programmes. Early designs of high temperature nuclear reactors have been demonstrated in the past: Dragon (UK), Peach Bottom (USA), Fort Saint Vrain (USA), AVR (Germany), THTR (Germany), plus several design studies carried out on additional reactor and heat transport concepts. Nuclear cogeneration at low temperature was also demonstrated in several countries for industrial heat production, district heating and water desalination.

Two test reactors are currently operated in Japan (HTTR, 30 MWth) and in China (HTR-10, 10 MWth). Countries which are known to carry out a HTR programme are the USA (focusing on electricity and hydrogen production), China (electricity), Japan (cogeneration), South Korea (hydrogen) and South Africa (cogeneration). Europe is in a status quo phase. Russia and Kazakhstan may have also development programmes.

China is further building a 2 x 250MWth demonstrator dedicated to electricity generation at high efficiency called HTR-PM. The construction is at the stage of pouring the first concrete. Japan has a strategy of demonstrating on the one hand the reactor technology and on the other the hydrogen production processes in order to manufacture both small (50 MWth) and large (600 MWth) reactors. South Korea focuses on hydrogen production and has constituted a large industrial alliance. M. Fütterer presented also the work on HTRs at the Generation IV International Forum (GIF) and the IAEA.

He concluded by recommending an international R&D cooperation and securing a structure (possibly a public-private partnership) for the demonstration of HTR in Europe.

US NGNP Status (D. Hittner, Areva)

Dominique Hittner presented in more details the status of the US Next Generation Nuclear Plant programme (NGNP). First, the 2005 Energy Policy Act promotes advanced reactors for electricity and/or hydrogen production in view of a demonstrator commissioning by 2021. The Nuclear Regulatory Commission has been processing licensing pre-applications. The programme is conceived as a public private partnership with cost share.

A NGNP industry Alliance was created in 2006 with a large industrial base to work with the US government towards the commercialisation of HTRs. The project has already achieved significant resukts. Conceptual design studies were completed, including economic assessment. The next steps are to select an industrial consortium partner for the US DoE to negotiate a public private partnership and begin the design work by 2012. There are still divergences between the US DoE and the alliance about cost sharing in time.

The NGNP programme has achieved significant results but much still remains to be done.

South African context (J. Fick, NWU)

Johan Fick presented the status of the South African HTR programme. Although PBMR, the national engineering company which was in charge of the programme was curtailed due to the financial crisis, South Africa still has a leading experience and competence in HTR.

He presented the opportunity for nuclear energy to produce hydrogen for the synthetic fuel production pursued by South African energy giant SASOL. The process is today based on fossil fuels and would emit significant amounts of CO2. The required nuclear capacity could be as large as forty 600 MWth reactors. He encouraged a European-South African partnership to develop jointly nuclear hydrogen production plants based on high temperature reactors.

5. User panel

Chemical industry (T. Baaten, BEC)

Ton Baaten presented the possible applications of nuclear cogeneration in the chemical industry. First, the chemical industry has very strict service quality requirements. It requires large thermal capacities and a high utilisation rate, at a limited distance and with a very high reliability. HTR have therefore to compete with the current reference technologies based on gas (boilers or cogeneration).

Second, the site characteristics are important. A chemical production site operates several production plants, usually owned by several companies. Energy is crucial but not core for the chemical industry. The lifetime compatibility is also to be taken into account.

He posed the question of the safety and acceptance of nuclear energy. After the Fukushima accidents and in front of the negative public acceptance, nuclear cogeneration may have to convince many stakeholders, including the heat end-users, their clients, their shareholders, the authorities, the site neighbours, etc.

Finally, the economic aspects of nuclear cogeneration are crucial. He recommended on the short term the replacement or addition of heat capacities at existing industrial sites and on the longer term to consider the production of hydrogen.

Fertilizers industry (R. Grzybek, ZAK)

Ryszard Grzybek presented how nuclear energy could be used in the fertilizer industry. Most of the fertilizers are based on ammonia which is today produced from air and water. Yet, most of the CO2

emissions of the industry are related to this phase. It demands indeed a significant energy, today supplied by fossil fuels.

He provided some illustrative figures. 1 ton of ammonia emits 1,2 tons of CO2. A 400 000 t/y ammonia production plant will buy around 150 M$/y of natural gas. Due to the ongoing policy to tax CO2 emissions and the volatility of natural gas prices, the European industry is facing severe risks and uncertainties.

He recommended using nuclear energy to produce hydrogen. The consumption of natural gas and its related CO2 emissions could then be avoided, bringing a significant advantage to the industry.

Oil industry (J. Ruer, SAIPEM)

Jacques Ruer listed the opportunities of nuclear cogeneration in the oil industry. First, nuclear steam may be used to operate unconventional oil fields by the steam assisted gravity drainage. The market for unconventional oil is large; as an illustration, the reserves of Venezuela and Canada are equivalent to the Saudi Arabia ones.

Second, nuclear cogeneration could be used in refineries in replacement of fossil fuel firing and also to supply nuclear hydrogen. Yet, some challenges are to be addressed, in particular the co-location of hazardous processes and the impact of nuclear safety on the already complicated safety procedures of refinery operators. Furthermore, cogeneration plants are already used and amortised; replacing them would impact the refinery operation and incur additional costs.

He estimated that nuclear energy may be used to displace a fraction of the fossil fuels consumption in the oil and gas industry and may further become a prime source of energy. Yet, he perceived several barriers to the massive introduction of nuclear energy in oil.

Steel industry (G. Griffay, ArecelorMittal)

Gerard Griffay presented the potential applications of nuclear energy in steelmaking, a major CO2 emitter in Europe. He suggested using nuclear energy for capturing and sequestrating carbon by amine scrubbing. Indeed, the production of 1 ton of rolled coil by the blast furnace route emits 1,8 tons of CO2 from coke and coal firing and lime production.

The nuclear assisted CCS could be used in current blast furnaces, electric arc furnaces and direct iron reduction plants.

The steel industry is working on low-carbon steel production processes (ULCOS consortium) which with a long term timeframe compatible with nuclear demonstration programmes. He estimated therefore that synergies between the steel and nuclear industries could make sense.

Polish case (J. Cetnar and L. Pienkowski, AGH)

Jerzy Cetnar presented the general context of Poland, very much dependent on fossil fuels, particularly coal and oil. Nuclear energy is increasingly perceived as a solution against these dependence and their related CO2 emissions.

He estimated that nuclear cogeneration could be used in Poland to replace current coal power plants and produce synfuels from coal. He noted that the large R&D effort could be rewarded with a large market.

He recommended a development programme for nuclear assisted synfuel production, using existing technologies adapted with nuclear input on the short term and nuclear electrolysis on the longer term. He listed different strategies for the system integration, using nuclear oxygen and hydrogen.

Ludwik Pienkowski followed up with the presentation of the HTR programme in Poland. He recalled how Poland positioned on clean coal technologies with the European Institute of Innovation and Technology KIC in Warsaw and nuclear energy with a first dedicated strategic program in 2010.

He presented the Gen4Syn project, led by AGH, under evaluation at the time of the workshop. The project gathers 13 partners and aims at making a pre-feasibility study of the HTR industrial demonstration, launching a European cooperation, advancing in Gen IV reactor physics and nuclear heat applications. He estimated that Poland was a very attractive country to build a HTR demonstrator.

Utilities (A, Ehlert, EON and J. Ikonen, Fortum)

Andreas Ehlert presented the position of E.ON as a leading nuclear utility. He introduced the R&D internal R&D structure of E.ON and emphasised that E.ON's core business is the operation of plants. He estimated that the long term technology development is the task of vendors and academia.

He listed the key questions for E.ON as regards HTR. First, he wondered what would be the business model as well as the practical implementation of a nuclear cogeneration project, He presented the results of an internal evaluation of the different reactor concepts from both Gen III and IV generations and highlighted the attractiveness of HTR, especially as regards safety and simplicity. He finally offered the assistance of E.ON to a RD&D programme for HTR.

Jani Ikonen presented the project of Fortum to build a third nuclear power plant in Loviisa, with an application in district heating for Helsinki in replacement of fossil fuel. The required thermal energy would be 11-12 TWh per year. The project can be implemented using a current boiling water reactor but is of interest as regards nuclear cogeneration.

Finnish safety authority STUK provided a positive statement on the preliminary safety assessment. Yet, several questions still remains, in particular the environmental impact assessment of the heat transport tunnel, the economic cooperation with heat producers in Helsinki and the political support.

Conclusions

Dominique Hittner draw the main conclusions of the workshop. He emphasised that HTR is at an important step of its development and that a European nuclear cogeneration industrial initiative is necessary.

Annexe I: Workshop agenda

Nuclear for Industry:
Perspectives of Nuclear Cogeneration

Open Workshop of the EUROPAIRS Project

Brussels, 26 May 2011

Venue : European Commission, 21 Rue du Champ de Mars, B-1040 Brussels

About EUROPAIRS

A European project grouping nuclear developers, utilities, energy-intensive industries, and safety organisations

Co-funded by the European Commission under the Euratom Seventh Framework Programme

www.europairs.eu

• **09:00-09:30 Registration and coffee**	
• **Opening Keynotes**	
09:30 Setting the scene: about nuclear cogeneration	Werner Von Lensa, FZJ, Germany
09:50 Policy context in Europe	Marc Deffrennes, European Commission
• **Perspectives of Nuclear Cogeneration: outcome of EUROPAIRS**	
10:10 The EUROPAIRS Project: dialogue between nuclear and conventional industries	Edgar Bogusch, AREVA NP, Germany
10:30 The industrial heat market in Europe	Alexandre Bredimas, LGI Consulting, France
• **10:45 Coffee break in poster area**	
11:10 Viability and boundary conditions of coupling high temperature nuclear cogeneration with industrial processes	Nicolas Delannay, Tractebel Engineering, Belgium
11:35 Safety and licensing of a High Temperature Reactor (HTR) in an industrial environment	Olivier Baudrand, IRSN, France
12:00 Preliminary economic assessment	Alexandre Bredimas, LGI Consulting, France
12:15 Roadmap to industrial demonstration	Sander De Groot, NRG, The Netherlands
12:30 Discussion and Q&A with the room	
• **12:45 Lunch break in poster area**	
• **The international context**	
13:45 International activities in HTR development	Michael Fütterer, JRC - Institute for Energy, EU
14:00 The American programme	Dominique Hittner, AREVA Inc, United States
14:15 The South African context	Johan Fick, NWU, South Africa

14:30 Discussion and Q&A with the room	
• **14:45 Coffee break in poster area**	
• **User panel** Moderator: Mathieu Carey, journalist at NucNet	
15:00 Perspectives of nuclear energy in the chemical sector - Decision drivers for energy sources in the chemical industry (BEC) - Requirements of the fertilizer industry (ZAK)	Ton Baaten, BEC, The Netherlands Ryszard Grzybek, ZAK, Poland
15:30 Opportunities and challenges of nuclear energy for the oil industry	Jacques Ruer, SAIPEM, France
15:45 Possible synergies between nuclear cogeneration and the steel industry	Gérard Griffay, ArcelorMittal, France
16:00 HTR projects in Poland - An outlook to the nuclear / clean coal synergies (AGH) - HTR for industry - development case in Poland (AGH)	Jerzy Cetnar, AGH, Poland Ludwik Pienkowski, AGH, Poland
16:30 The utilities' perspectives of nuclear cogeneration	Andreas Ehlert, E.ON, Germany Jani Ikonen, Fortum, Finland
17:00 Discussion and Q&A with the room	
• **17:45 Closing session**	
17:45 Closing speech	Dominique Hittner, AREVA
• **18:00 Adjourn**	

Annexe II: List of workshop participants

	Last name	First name	Company	Sector	Country
Ms.	ANABELLA	Drisaldi	Empresarios Agrupados Internacional S.A.	Engineering	SPAIN
Dr.	ANGULO	Carmen	Tractebel Engineering	Engineering	BELGIUM
Mr.	BAATEN	Anton	BEC	Energy Advisor	NETHERLANDS
Mr.	BAUDRAND	Olivier	IRSN	Technical Safety Organisation	FRANCE
Mr.	BIELSKI	Pawel	ZAKLADY AZOTOWE	CHEMICAL PRODUCTION	POLAND
Mr.	BOGUSCH	Edgar	AREVA NP GmbH	HTR Development	GERMANY
Ms.	BOURHY-WEBER	Claire	AIR LIQUIDE	Industrial Gases	FRANCE
Mr.	BREDIMAS	Alexandre	LGI Consulting	Consulting	FRANCE
Dr.	BRINKMANN	Gerd	AREVA NP GmbH	RS/PT	DEUTSCHLAND
Dr.	CARLSSON	Johan	Joint Research Centre	Energy Systems Evaluation	NETHERLANDS
Prof.	CETNAR	Jerzy	AGH	Research And Higher Education	POLAND
Mr.	CHAUVET	Vincent	LGI	Consulting	FRANCE
Mr.	COLLINS	Robert	Rolls-Royce plc	Power Engineering	UK
Mr.	DE GROOT	Sander	NRG	R&D, Nuclear Services	NETHERLANDS
Ms.	DE LAMBERTERIE	Bertrand	ESTEP	Steel Industry	BELGIUM
Mr.	DEFFRENNES	Marc	European Commission	Research And Development	BELGIUM
Mr.	DELANNAY	Nicolas	Tractebel Engineering	Energy Services	BELGIUM
Ms.	DIERICK	Christian	AGORIA	Nuclear Equipment & Services	BELGIUM
Dr.	DZUBINSKY	Mykola	European Commission	Euratom Fission	BELGIUM
Mr.	EHLERT	Andreas	EON New Build & Technology	Energy	GERMANY
Prof.	FICK	Johan	North West University	Research	SOUTH AFRICA
Dr.	FÜTTERER	Michael	European Commission DG JRC	Research	NETHERLANDS
Mr.	GARBIL	Roger	European Commission	ENERGY EURATOM Research	BELGIUM
Mr.	GRIFFAY	Gérard	ArcelorMittal	Metallurgy	FRANCE
Dr.	GRZYBEK	Ryszard	ZAK S.A.	Fertlizers Production	POLAND
Dr.	HABIB	Ziad	Lhoist Group	Lime / Dolime Industry	BELGIUM
Mr.	HAMPE	Jona	E.ON New Build & Technology	ENERGY	GERMANY

Mr.	HITTNER	Dominique	AREVA	Nuclear Industry	USA
Ms.	HUGON	Michel	European Commission	DG Research And Innovation - Energy - Nuclear Fission	BELGIUM
Mr.	IKONEN	Jani	Fortum, Finland	Power And Heat Production	FINLAND
Ms.	JACKOWSKI	Tomasz	Institute for Nuclear Studies	Nuclear Energy	POLAND
Dr.	LéCRIVAIN	Grégory	Helmholtz-Zentrum Dresden-Rossendorf	Nuclear Safety Research	GERMANY
Dr.	MANOLATOS	Panagiotis	EC - DG/RTD	International Organisation	BELGIUM
Ms.	MORON	Roberto	SOLVAY SA	Chemical & Plastics	BELGIUM
Dr.	PAILLERE	Henri	ALSTOM	Nuclear	FRANCE
Dr.	PIENKOWSKI	Ludwik	PROCHEM S.A. and University of Warsaw	Engenering / Higher Education	POLAND
Mr.	QUENAUT	Johann	Alstom	Power	
Mr.	ROY	Francis	Vinçotte Nuclear Safety	Consulting In Nuclear Safety	BELGIUM
Mr.	RUER	Jacques	SAIPEM-SA	Oil & Gas	FRANCE
Mr.	SEGURADO	Jacobo	Tractebel Engineering	Energy Services	BELGIUM
Mr.	SHIHAB	Sammy	Vinçotte Nuclear Safety	Nuclear Safety Assessments	BELGIUM
Dr.	SYLVIE	Aniel	CEA/SACLAY	Bilateral European Relationship - International Relations Division	FRANCE
Mr.	TARKA	Marek	PROCHEM S.A.	Engineering & Construction	POLAND
Dr.	VAN GOETHEM	Georges	European Commission / DG Research and Innovation	Generation IV And Education & Training	BELGIUM
Dr.	VAN HEEK	Aliki	NRG	Research	NETHERLANDS
Mr.	VERBESSELT	Ludo	LVDV	Pressure Equipment	BELGIUM
Mr.	VERNIK	Jernej	CEPI	International Association	BELGIUM
Ms.	VIALA	Céline	AREVA NP	Nuclear	FRANCE
Dr.	VON LENSA	Werner	Forschungszentrum Juelich	Institute Of Energy & Climate Research	GERMANY
Prof.	WROCHNA	Grzegorz	Institute for Nuclear Studies	Nuclear Research	POLAND