

WELCOME ADDRESS

Lucila Izquierdo

General Secretary of External and Institutional Relations

CIEMAT

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Ladies and Gentlemen,

Dear Michel Hugon, Phillipe Savelli, dear participants,

It is my pleasure, as Secretary of External and Institutional Relations of CIEMAT and in the name of its Director General, to welcome all of you to CIEMAT for the 6th OECD/NEA Information Exchange Meeting on Actinide and Fission Product Partitioning and Transmutation.

We are glad that Madrid joins the list of cities that have hosted this series of meetings that started in Mito and have got consecutive success at Argonne, Cadarache and Mol.

We would like to thank the organisers both NEA/OCDE and the European Commission for their invitation for the joint hosting of the meeting by CIEMAT and ENRESA (the Spanish body for radioactive waste management).

CIEMAT is the Spanish Public Organism for Research and Technological Development supported by the Ministry of Science and Technology responsible of finding solutions to improve the use of resources and energy generation systems, to develop alternative energy sources and to solve the problems of the Spanish companies regarding energy and its effects on the environment.

CIEMAT is largely involved in the research on future and present nuclear energy sources through the programmes of Nuclear Fusion and Nuclear Fission, whose activities include many projects related to the back-end of the nuclear fuel cycle.

At CIEMAT we find in Partitioning and Transmutation (P&T) one very interesting element for the Nuclear Waste management. Ideally, it will allow to achieve large reduction on the inventories of long-lived radioactive wastes contained in the nuclear waste, in particular the actinides, reducing the concerns about our use of nuclear energy for future generations. Not to forget the positive effect on the public acceptance of nuclear waste management programmes and the potential capability to produce huge amounts of electricity.

After the participation of CIEMAT in the FEAT and TARC experiments at CERN related to the Energy Amplifier project, already in 1994, the Nuclear Fission Department has initiated a wide P&T research programme in 1997.

This programme includes six main lines: the advanced hydro-metallurgic reprocessing techniques to separate all the Transuranium elements and some long-lived fission fragments from the spent fuel of the present nuclear power plants; the pyro-metallurgic technologies for new ADS fuel recycling; the corrosion of materials in molten lead alloys; the behaviour of materials in extreme irradiation and temperature conditions as expected for the spallation target windows in ADS systems; the computer simulation of transmutation devices and strategies; and the participation on basic experimental research for transmutation and ADS.

All this work is strongly integrated in the international research on P&T, including the participation on 6 contracts of the present 5th Framework Programme of the European Union, and on the activities on OCDE/NEA, IAEA and the European ADS Technical Working Group. In addition, we have established bilateral collaboration agreements directly with CEA and with the ITU through ENRESA. Further contracts with CRIEPI and contacts with several USA laboratories open our activities in the field outside Europe.

Inside Spain, all this research is performed in close collaboration with ENRESA and several Universities distributed over the Spanish geography.

I wish that the efforts of all of you present here, the laboratories and institutions from where you are coming, and the international organisations represented in the room, will make soon the P&T dream promises a reality. In this sense the opportunities of information exchanges provided by OECD/NEA and other forums, and the continuation and increase of the support from the national and international funding agencies, as well as the progressive involvement of industry, are key elements for the success. I am sure that, with your collaboration, this meeting will represent an important step forward in this direction.

I hope that beside the intense work schedule of the meeting you can find some time to enjoy Madrid and the surrounding cities.

I want finally thank all the speakers and poster authors for sharing their work and results with all of us, and for their collaboration in the organisation of the meeting, and to all of you for coming, and I hope, for your active participation on the meeting.

Thank you and welcome to CIEMAT.

WELCOME ADDRESS

Michel Hugon

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Ladies and Gentlemen,

It is a great pleasure for me to welcome you today to this 6th Information Exchange Meeting on Actinide and Fission Product Partitioning and Transmutation.

I would also address more especially my warm welcome to the many young and enthusiastic people, who are starting to work in this very exciting field.

It is the second time that the European Commission co-organises this Information Exchange Meeting with the Nuclear Energy Agency of the OECD. I would like to express here my deep satisfaction of the excellent relationships that we have established with OECD/NEA in the field of Partitioning and Transmutation (P&T), where we share a common understanding. This synergy enables both international organisations to maximise the co-operation in this area between their different member countries and also to invite representatives of China and Russia to participate to this meeting.

I would also like to thank both CIEMAT and ENRESA for hosting this meeting and for the hard preparatory work they have done to make this meeting on its way to a great success.

I am happy that this meeting is taking place in Spain, a country which is very active in the field of nuclear waste management and disposal. Earlier this year, in March, an International Conference on the Safety of Radioactive Waste Management was held in Cordoba and organised by IAEA in co-operation with the EC, the OECD/NEA and the World Health Organisation. From what I heard, it was a great success.

As you all know, P&T aims at reducing the inventories of long-lived radionuclides in radioactive waste by separating them from the waste and then transmuting them into radionuclides with a shorter lifetime. However, there will be always a need for appropriate geological disposal for the existing high level waste and the waste containing the long-lived radionuclides, which cannot be transmuted. Nevertheless, the techniques used to implement P&T could alleviate the problems linked to waste disposal. P&T is still at the research and development stage, which will require long lead-times.

There has been a renewal of interest in P&T worldwide at the end of the eighties (OMEGA programme in Japan, SPIN programme in France). Meanwhile, sufficient progress has been made in accelerator technology to consider as feasible the use of accelerator driven systems (ADS) for waste incineration. Proposals to develop ADS have been made during the nineties by the Los Alamos National

Laboratory in the USA with the ATW (Accelerator driven Transmutation of Waste) programme, by CERN in Europe with the Energy Amplifier (EA) and by JAERI in Japan. In addition, there is a number of research activities on ADS going on in several EU countries (Belgium, France, Germany, Italy, Spain, Sweden), Czech Republic, Switzerland, Korea and Russia.

The interest for P&T in the EU is reflected in the increase of funding in this area over the last three EURATOM Framework Programmes, 4.8, 5.8 and about 26 million € for the 3rd, 4th and 5th Framework Programmes respectively. Research work is also carried out at the Joint Research Centre of the EC, mainly at the Institute for Transuranium Elements in Karlsruhe.

Ladies and Gentlemen, I would also like to take this opportunity to inform you about some recent thoughts about the future energy supply in Europe that has been developed by the European Commission. At the Industry-Energy Council on 5 December, the Vice-President of the Commission in charge of Energy and Transport, Ms. Loyola de Palacio, presented a Green Paper entitled “Towards a European Strategy for the Security of Energy Supply” in order to launch a debate.

The starting points are:

- If no measures are taken, in the next 20 to 30 years, about 70% of the Union's energy requirements will have to be covered by imported products (today 50%). The energy dependence of the Union will be increasingly alarming. This will affect all sectors of the economy.
- The fight against the climate change is difficult: inversion of the trends is more difficult than it appeared to be three years ago. Thus, while the Union stabilised its emissions of greenhouse gases in 2000, the forecasts of the European Environment Agency consider that they will increase by 5.2% between now and 2010.

The Green Paper offers for discussion a plan for a long-term energy strategy, in 5 main fields:

- A genuine change in consumer behaviour and energy consumption.
- A truly alternative transport policy.
- Doubling the share of renewable energies from 6 to 12% in the energy balance between now and 2010 (financial measures).
- Solutions at the Community level (e.g. reinforced strategic oil and gas stocks, a fiscal policy for energy to steer towards more environmentally friendly sources).
- To analyse the medium-term contribution of nuclear power taking into account the phasing out decisions of the majority of the Member States and issues related to waste management, global warming, security of supply and sustainable development.

It is proposed that the European Union must retain its leading position in the field of *civil* nuclear technology, in order to retain the necessary expertise and develop more efficient fission reactors and enable fusion to become a reality.

Research on the technologies of waste management and their practical implementation under optimum safety conditions has actively to be continued. This applies to geological disposal as well as to partitioning and transmutation.

Ladies and Gentlemen, our work these coming days are thus of great interest. I wish you all a very fruitful and successful meeting as well as a nice stay in Madrid.

Thank you for your attention.

WELCOME ADDRESS

Philippe Savelli

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Ladies and Gentlemen,

It is a real pleasure for me to welcome you to this 6th Information Exchange Meeting organised by the OECD Nuclear Energy Agency (NEA).

Back in 1988, the Japanese government asked the NEA to launch an international information exchange programme on partitioning and transmutation (P&T). At that time, only a few countries were really active in this field. In the 1960s and 1970s, preliminary studies and experiments had been conducted in the USA, Japan and within several European countries, as well as the European Commission. The conclusions of some of the assessments published in the late 1970s and early 1980s clearly stated that the transmutation of minor actinides was considered theoretically possible, but that it was not obvious whether the potential long-term risk reduction for the waste disposal site was overall beneficial, because of the increase in short-term risks for the workers. Those studies also concluded that there were no obvious direct cost or safety incentives for P&T of actinides for waste management purposes. However, it was recognised that further investigation of advanced reprocessing techniques for conditioning of plutonium and minor actinides would be valuable.

A second phase of interest in P&T emerged at the end of the 1980s, partly based on the growing awareness of the difficulties in licensing large nuclear waste repositories and certain delays in the related R&D projects. There was a need to re-examine the validity of the P&T option in the light of the more recent results. This led Japan, France, USA and other countries to start new studies, complemented by an experimental R&D programme.

In the early 1990s, new assessment reports were published by France and the USA, as well as studies conducted under the auspices of IAEA or EC. The Nuclear Energy Agency undertook a systems study in early 1996 and published the *Status and Assessment Report on Minor Actinide and Fission Product Partitioning and Transmutation* in April 1999. It is worth emphasising four of the main conclusions of this report:

- P&T will not replace the need for appropriate geological disposal of high level waste.
- The recycling of plutonium and minor actinides could stabilise the transuranium nuclide inventory. However, multiple recycling of transuranium nuclides is a long-term venture for which it may take decades to reach equilibrium.

- Partitioning methods for long-lived radiotoxic elements have been developed on a laboratory scale and could be very useful to condition separated long-lived nuclides in appropriate matrices or in irradiation targets. These matrices could be selected to be less soluble than glass in geological media.
- Last but not least, fundamental R&D for the implementation of P&T needs long lead-times and would require large investments in dedicated fast neutron spectrum devices, extension of reprocessing plants and the construction of remotely manipulated fuel and target fabrication plants.

During the 1990s, we also noticed a renewed interest in accelerator driven systems (ADS). Today, as the participation in this meeting shows, several countries active in P&T emphasise the ADS-line. We have seen increasing international activity, especially in Europe; a growing number of bilateral and multilateral co-operations have been established. Examples of these are the collaboration of Japanese institutes with European Joint Research Centres, the 5th Framework R&D projects sponsored by the European Commission, the Technical Working Group in Europe under the chairmanship of Carlo Rubia, the ISTC activities with our Russian colleagues and the foreseen increased collaboration between USA and France.

It was in response to this emerging interest that the NEA launched new studies under the auspices of its Nuclear Development and Nuclear Science Committees. Both committees have, together with the NEA Data Bank, developed several well co-ordinated activities, covering a diverse set of issues related to P&T, such as nuclear data and benchmarks, partitioning techniques and also more strategic systems studies. Today, more exchange with the NEA Radioactive Waste Management Committee is sought and we view Session II (The Nuclear Fuel Cycle and P&T) of this meeting as a welcome step in this direction. A new Working Party on Scientific Issues in P&T has been launched and, in fact, held its first meeting yesterday here in Madrid. Other Working Parties and Expert Groups, as well as specific Workshops and Information Exchange Meetings will remain part of our work programme and they will be tailored in response to your demands. In addition, our P&T activities are now organised as a horizontal project and in that respect, a single NEA web page on P&T will announce all our projects and programmes in the future. A separate presentation in Session I this morning will cover our activities more in detail.

Ladies and Gentlemen, in the light of these past and ongoing developments, I consider it appropriate to raise two items that I regard as important for future activities on P&T.

The first is the increasing importance that nuclear power could play in response to the need for a more sustainable energy development. During the debate on climate change in den Hague two weeks ago, some delegates indicated that nuclear should be recognised as part of a future energy mix. It is for example encouraging to note that the European energy and transport commissioner, Ms. Loyola de Palacio, recognises this role of nuclear, despite some EC countries having embarked on a nuclear phase-out strategy.

If the concern for our future would be translated into a continued demand for nuclear energy, several of the developments discussed in this meeting could help reply to some of the questions regarding nuclear energy. The public would only accept an increased use of nuclear, if today's concerns about safety, waste and proliferation could be satisfied. P&T is one approach that could contribute to the sustainability of nuclear energy.

A second item relates to the assessment of P&T and especially the question of objectives and indicators to be applied. Society demands more clear objectives and indicators before embarking on

developments. This will surely become the case if society accepts increased reliance on nuclear energy. Society claims an economically viable energy resource, showing an excellent safety level, dealing in an efficient way with waste and other residuals and finally respecting the environment in the short and long term. Therefore, nuclear, and clearly also P&T, will have to face this kind of evaluation. We consider that an honest reflection on applicable objectives and criteria would be a worthwhile undertaking in the future.

In this context, we are all aware of the declining trend in nuclear education and availability of infrastructure. In today's context of deregulation and increasing competitive pressure on the utilities and on research institutes, P&T will have to face this additional challenge of limited resources and infrastructure. However, a positive factor is that the different P&T projects have presented new and challenging scientific problems that are attracting young scientists to enter the nuclear field.

This Information Exchange Meeting is again in co-operation with the European Commission and I wish to thank them for their valuable support. I believe that the co-operation we have established is a good example of how scarce resources can be shared, based on mutual understanding.

In ending my talk, I would first of all like to thank CIEMAT and its Director-General Dr. Felix Yndurain Muñoz, as well as ENRESA and its President Dr. Antonio Colino, who are jointly hosting this meeting and have ensured the success of, what I am convinced, will be a very enjoyable stay here in Madrid.

Ladies and Gentlemen, may I wish you a fruitful meeting. The numerous participation gives me confidence that the scientific programme has captured your interest and that these Information Exchange Meetings respond to your wishes. I am glad that we can also welcome participation from non-OECD countries. I invite all of you to help us shape our activities in the future and your advice or comments will certainly be taken into account and be reflected in our future programme of work.

Thank you for your attention.