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La Lettre des Entretiens Européens

Investing in nuclear

Rapprocher - Débattre - Fraterniser

Edito

A societal choice and commitment !

Claude Fischer
Director
Les Entretiens Européens

A nuclear renaissance is sweeping across the world, while Europe's main challenge is to stay in the race! The fear of the risks associated with this technology has pervaded our attitudes and faced with the (ideological and irrational) offensive of the anti-nuclear lobby, industry and States have acted defensively, almost apologising for still being leaders. Nuclear energy has revolutionised access to electricity… Where is the European political will to share a collective choice as in the days of EURATOM ?

The precautionary principle prevails at the expense of risk taking that fosters investment and innovation. On the world market, China takes over from a Europe in the doldrums. There will be no long-term investment without risks. These risks will of course have to be controlled. This is the role of Member States and the EU, which should not leave power to a short-sighted and volatile market but must anticipate and organise regulation, plan and mobilise societies to take up the challenge and make an informed choice! Market liberalisation in the past 20 years has seen a decline of nuclear industry in Europe, and of industry generally. And competition has been a poor substitute for industrial policy.

Investment in nuclear energy **is not an economic but a societal choice** among the great challenges of our time: climate, demography, the future of technologies for sustainable development and prosperity for all. Nuclear energy is also hundreds of thousands of jobs in SMEs and SMIs across Europe, innovative high-added-value technologies, an export advantage… Does Europe want to keep its nuclear industry, and if so, how will it make the best of it ?

Europe has the largest fleet of reactors (131) in the world. This fleet will have to be renewed. The need is massive: build new power stations, decommission others, enhance safety, create waste management centres, keep up R&D, train people… These are significant and long-term investments: they will need **firm guarantees and investor partnerships...** States alone cannot provide everything: they need to work with private or public companies, which are waiting for policy decisions - and public procurement - and define common policies that promote investment. Currently, weak policies in Europe hamper the commitment of companies and investors.

Funding is just one issue among others and will be solved if projects are implemented and the European market encourages them… Currently, our internal market deters long-term projects and we no longer control our common future… States are tempted into retrenchment and renationalisation of their energy policies, while we need mutualisation and cooperation more than ever. These are the issues that will be debated in the course of the Entretiens Européens.

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Les Entretiens Européens
October 20, Brussels

" Investments in nuclear energy in Europe. Building a long-term framework to allow the upgrading and financing of projects"

With the support and the participation of

Controling nuclear energy to preserve our prosperity

One year ago in Paris, nearly 200 signatory States to the UN Framework Convention on climate change validated an agreement committing them to contain tolerable global warming until the end of the century to well below + 2 °C relative to pre-industrial levels. They intend even to pursue their efforts in order to limit the temperature rise to 1.5 °C.

This binding commitment calls upon the world to drastically reduce and then eliminate greenhouse gas emissions generated by human activity. It is a virtual condemnation of the use of fossil carbon fuels. Humans find themselves confronted with an unprecedented challenge: to extend to an exploding world population the conditions for sustainable development while at the same time forgoing the energies that have powered the industrial revolution for two centuries and have been the source of extraordinary human progress.

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Electricity – the most modern and versatile form of energy we use - will have to be completely decarbonised. Currently, only 32 % is: half on account of hydroelectricity produced by large dams, one third thanks to nuclear energy, and the balance thanks to other renewable energies. This is why all major industrial and industrialising countries (with the sole exception of Germany) use nuclear energy and will broaden its use while at the same time investing in the development of renewable energies.

A new industrial policy

The European polity, in one of the most critical moments of its history, as the very survival of the union project is being challenged, is deeply divided, a.o. on nuclear energy. The particular situation of the United Kingdom, the EU's second largest economy, is not the least of all paradoxes. After being the driving force for electricity market deregulation twenty years ago, the British government now embodies the new path for Europe to follow: it combines tough public regulation, a decisive commitment to support private partners in their long-term projects and profitability guarantees for the huge investments they are prepared to make in decarbonised electricity generation.

At the same time, the British public have unfortunately opted to dissociate themselves from the political, economic and monetary integration project that - still ? - unites the continent. In no way does Brexit make the energy policy on the far side of the Channel any less relevant. A dozen new nuclear power stations will be built, the construction of the first two has been confirmed by EDF, which finances them, and approved by the European Commission, which has validated this new type of industrial policy after a thorough public enquiry. This policy is stimulating an unprecedented effort by hundreds of companies and subcontractors, the academic and scientific world, vocational training organisations, local communities, and enjoys broad support by public opinion. The renewable energy, nuclear energy and fossil energy decarbonisation « lobbies » have even jointly signed a manifest supporting the new policy !

Update market conditions

European industrialists now hold all the cards: as they successfully did some forty years ago, they now have a few decades to manage a nuclear capacity renewal programme of over 100 GW within binding deadlines and budgetary limits. At a time when our fellow citizens are pressing them to really care for our future, European institutions would be well advised to update the operating conditions of the electricity market hampered by notorious dysfunctions mainly resulting from disorderly public intervention by governments. In Germany alone, they amount to nearly €2 billion per month !

Sixty years ago, the proponents of a

political Europe were dreaming of peace and progress. Being visionaries, they started with energy: coal and steel, used to make canons, and nuclear energy, the greatest discovery of their time. Let us beware of the disillusion of a shared dream now reduced to a sort of energy disunion. In the eye of history, our generation would be accountable for failure. Our grandchildren, quite rightly, could not forgive us. Inversely, we can build a better future for them right away, protected from climate threats. Harnessing nuclear energy is part of the answer.

Jean-Pol PONCELET
Former Minister, Director General, Foratom

Discover the high lights of the Forum

At the 11th European Nuclear Energy Forum (ENEF) on 3 and 4 October in Bratislava, over two hundred stakeholders of the sector discussed the place of nuclear energy in the European Union. After opening speeches by the Slovak and Czech Prime Ministers, three round tables examined investment priorities, PINC 2016 and the new market framework, and the preparation and response capacity to emergency situations.

Gerassimos Thomas, deputy director general at the European Commission's DG Energy reaffirmed the Commission's priorities: in the short term, ensure the safety of power stations, and in the long term, ensure supply security and nuclear waste management. He notes the Member States' will to preserve their energy mix sovereignty and the generally positive reception of PINC (although a follow-up has sometimes been requested). « We all agree to decarbonise our mix, and nuclear energy has a place in the debate » he declared. He stressed that we need to keep our technological leadership and preserve our competitiveness. Long-term investments are vital for the industry:

Gerassimos Thomas recognises the lack

of signals enabling operators to commit to the long term. Investment priorities need to be defined, he concluded.

Discover the ENEF debates on:
https://europa.eu/newsroom/events/european-nuclearenergy-forum-enef-plenary-meeting_fr

Can nuclear power save the climate?

Many of those who work in this industry know that nuclear power does not contribute to greenhouse gas emissions. To be more specific, the nuclear reaction itself – consisting in the exploitation of the energy liberated when a big nucleus splits in two - does not release CO2 emissions.

There is a low level of carbon emissions during operations such as ore excavation (because of the massive vehicles using diesel engines), enrichment, transport, waste management, dismantling… However nuclear energy is so dense that the sector's carbon emissions are fifty times lower by kWh produced than in the coal sector.

The conclusion seems to be obvious: thanks to nuclear energy, we can ensure to our descendants a carbon-free energy, and we might achieve the Paris agreement's target which is to limit the global warming to +2°C between 1850 and 2100 without giving up our way of life.

Indisputable qualities

Nuclear supporters are right when they say that nuclear energy manages to meet new challenges such as lower carbon emissions. Moreover it does not take up too much space, it does not need many importations – imported uranium only weights 2% in electricity production's price – and it is technically under control and historically cheap. Finally, contrary to the idea that antinuclear groups and media are conveying, it is less dangerous for human beings and environment – accidents included – according to doctors, who fall back on a century of expertise on radiations.

But….There is a 'but'

According to the Paris agreement, global carbon emissions should drop by 65% in 35 years. To divide by two thirds CO2 emissions and to keep at the same time a 3% increase of the annual growth rate would supposed to build thousands of nuclear reactors by 2050.

If we wanted to respect the Paris agreement thanks to nuclear energy only, then we would have to build 1.800 GW by 2050 – around five times the current nuclear power stations – just to replace the existing coal-fired plants and up to 10.000 GW to electrify all industrial processes, heating and transports. If the GDP stagnated, we would have to add 3.000 GW more, that is 10 times the current nuclear power station! And… if we wanted to rely on new renewable energies only, then we would have to set up a nuclear park five times more powerful than the current one, and it would be impossible to find enough metals or other materials.

The conclusion is simple: it is impossible to stop the global coal production – which is needed to achieve the 2°C goal – without nuclear power and without economic collapse. But it is also impossible to rely only on nuclear power. There is work to do everywhere!

Jean-Marc JANCOVICI
President of The Shift Project and Associate Carbon 4

What can nuclear energy do against global warming?

A study by Sauvons Le Climat

sauvonsleclimat.org
Idées pour le futur, actions au présent

conducted by André Berger, Francois-Marie Bréon, Barry Brook, Philippe Hansen, Frederic Livet, Hervé Nifenecker, Michel Petit, Gérard Pierre, Henri Prévot, Sébastien Richet, Henri Safa, Michael Schneeberger, Suyan Zhou, Ravi.B.Grover, Claude Gue5, Weiping Liu.

IEG's reference scenarios, likely to limit global warming to 2° (RCP 2.6), are the starting point of this study. They all massively resort to capture, separation and storage of CO2 (CSC) - up to 50 billion tonnes in 2100 - while our knowledge of this process is based merely on a few experiments of a few million tonnes per year, which does not help their credibility.

We have therefore preferred to work on IIASA's («International Institute for Applied Systems Analysis», Austria) three MESSAGE scenarios:

- the « Supply » scenario, characterised by high energy consumption, with 7000 GWe new nuclear power coming on stream between 2060 et 2100,

- the « Efficiency » scenario with a phase-out of nuclear power,

- an intermediary « MIX » scenario.

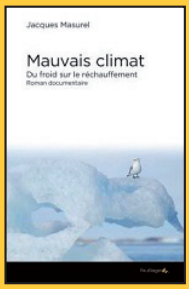
The « Efficiency» scenario requires a 40% reduction of energy consumption, without eliminating the need for CCS of up to 15 billion tonnes of CO2 per year (which will not allow to achieve stabilisation of its atmospheric concentration before 2100).

The "nuclearised" « Supply-N » and « MIX-N » scenarios considerably reduce the interest of CCS and bring down the contribution of intermittent renewable energies to a reasonable level. The Supply-N scenario requires the building of 100 GWe water reactors for an estimated annual expenditure of 250 billion dollars. As of 2050, 400 GWe of fast breeders would have to be built on average every year for an annual cost of 1,200 billion dollars. This corresponds to less than 1% of the Gross World Product and can be compared to the turnover of world electricity production reaching 10,000 billion dollars in 2060.

In view of existing technologies and costs/benefits, we propose therefore to start the development of nuclear energy as of 2020 without waiting for 2060, in order to achieve a nuclear power of 20,000 GWe in 2100. This will require the general use of fast breeders and a significant reduction of fuel reprocessing time, or an increase of CANDU reactors in the global neutron reactor fleet.

« *Mauvais climat* »
Jacques Masurel

A fiction that thrusts us at the heart of the problems raised by climate change a few years after COP 21



PINC debate in Brussels
At the initiative of Entretiens Européens

10 June 2016, at the initiative of ASCPE Entretiens Européens, a round table, organised at the FORATOM head office in Brussels: nuclear industry operators, economists, trade unionists and association representatives… discussed with national and EU institutions about le Nuclear Illustrative Programme (PINC), the first since 2008, unveiled by the European Commission in April.

Maurizio Boella, of DG Energy, presented the Commission's proposals emphasising investments linked to post-Fukushima safety improvements and operational safety of existing installations. He welcomed the debate on such a sensitive issue that needs transparency, all the more as investment projections are difficult to make and as Member States pursue radically different strategies. **Richard Ivens**, of Foratom, expressed the expectations of European industrialists of the nuclear and energy-intensive sector, calling for more clarity from the Commission on the future of nuclear energy in Europe and its place in the energy mix. Although there is consensus about the advantages of the industry, there is a big question mark about its role as a leader in the context of a global revival. Today, nuclear energy competes with subsidised renewable energies and is hampered by market conditions that discourage investment. **Pierre-Jean Coulon**, President of the EESC's TEN Section, stressed the late publication of PINC but welcomed the role that the Committee may be called to play in revitalising a successful and competitive technology providing many jobs and energy security in the regions. The nuclear revival in the UK is part of a d versified decarbonisation strategy, said Nick Butler, professor at King's College in London. How can projects be used best to improve the competitiveness of the industry internally and on export markets? **Claude Fischer** stressed the need for investments, not only to guarantee the safety of installations, but also to build new generation capacities. Industry needs incentives and public guarantees offering long-term visibility to be able to invest, added **Philippe Herzog**. PINC is a first step, but remains largely insufficient: the message of the European Union should be part of a long-term vision.

Manon TANGUY
Energy Policy Officer, ASCPE

The European Union at the forefront of safety

- Directive 2009/71/Euratom establishing a Community framework for the nuclear safety of nuclear installations
- Directive 2011/70/Euratom establishing a Community framework for the responsible and safe management of spent fuel and radioactive waste.
- 2003/122/Euratom, amended by Directive 2013/59/Euratom

Questions to Massimo Garribba

Why did it take 8 years to publish a new version of the PINC – outside of the Energy Union? Investments in safety and security are at the heart of the document: what about investments in new generating capacities? Which vision does the Commission have on nuclear's future and its place in the European mix?

The Commission publishes a new version of the PINC every 6-12 years, based on Article 40 of the Euratom Treaty. The Commission felt that 2016 was the right moment to bring forward a meaningful analysis of investments, which would not have been possible prior to that. In the 8 years since the last PINC update in 2008[1], much has happened in the nuclear market, and the Commission focus itself on safety issues.

In 2009 the Commission proposed a directive[2] on nuclear safety, following which it shifted attention to radioactive waste management, and another one in July 2011 on management of radioactive waste and spent fuel[3]. Following the accident at Fukushima-Daichi in Japan, the Commission, together with the European Nuclear Safety Regulators' Group (ENSREG), conducted so-called stress tests which led to some recommendations from national regulators to the nuclear power plant operators. The Commission strengthened the Nuclear Safety Directive in 2014, to ensure the avoidance of radioactive releases, after having the radiation protection directive[4] of 2013 amended.

All of this legislation needed first to be absorbed by operators and Member States, and its effects quantified also in terms of investment needs. Nuclear energy can play an important role in several dimensions of the Energy Union, provided that the highest standards of safety, security, waste management and non-proliferation are ensured, as well as the diversification of nuclear fuel supplies. It can in particular contribute, for the Member States that choose to use or pursue it, to the achievement of a secure and low-carbon energy supply.

Massimo GARRIBBA
Director of Nuclear Energy, Safety and ITER, DG ENER, European Commission

[1] Previous PINCs were published in 1966, 1972, 1984, 1990, 1997 and 2007, updated in 2008.

[2] Directive 2009/71/Euratom establishing a Community framework for the nuclear safety of nuclear installations

[3] Directive 2011/70/Euratom establishing a Community framework for the responsible and safe management of spent fuel and radioactive waste.

[4] 2003/122/Euratom, amended by Directive 2013/59/Euratom

The EESC's opinion: a mixed statement

The EESC finds that the 2016 PINC is lacking a comprehensive strategy in relation to the European energy mix, clear analytical processes and methodology, guidelines which could be very helpful to Member States when making decisions about the role of nuclear power in their energy usage.

We welcome the emphasis on high safety standards and on the safe decommissioning of spent nuclear facilities, as well as on the back-end of a reactor's lifecycle which deals with waste management and decommissioning, regulated by the EU's Directive for the Management of Radioactive Waste and Spent. The attention devoted to continuing research is also lauded.

However, the draft PINC is greatly weakened by all that is left unwritten. The EESC's opinion strongly recommends that revisions and additions be made :

- the competitiveness of nuclear power and the attendant economic aspects;

- security of supply, with reference to the Euratom Supply Agency (ESA);

- climate change and carbon targets, highlighting the fact that nuclear power now accounts for half of the EU's low-carbon electricity;

- public confidence, in particular its effect on the political acceptability of nuclear energy;

The EU's Energy Union strategy aims is to support breakthroughs in low-carbon technologies by coordinating research. The Commission should include in the PINC an analysis of the investment needs for nuclear power if all the Energy Union's goals are to be met for a secure, affordable and sustainable energy. The EESC recommends that the Commission take into account a potential supply of electricity from fusion power plants post-2050. The European Fusion Development Fund (EFDA) roadmap describes how to move from experimentation to viability. It would be helpful if the PINC had a roadmap (like the European Fusion Development Fund (EFDA) has) describing how to move from experimentation to viability.

The 2016 PINC requires strategic vision. It would also gain from an analysis of the potentially far-reaching consequences of the UK's vote to leave the EU. The significance for the Euratom Treaty is unclear. Though Euratom is governed by the EU's institutions, it is a separate legal entity.

Pierre Jean COULON
Director of the TEN section, EESC

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Nuclear energy needs long-term contracts

EDF uses specialised outside companies to provide a large share of its recurrent and exceptional maintenance operations.

EDF's industrial policy aims at having an adequate panel of qualified companies allowing healthy competition while guaranteeing sufficiently profitable contracts for incumbents

The specificities of the nuclear industry and its high level of excellence at the service of the safety of the installations require that all actors have perfect proficiency of work methods and solid skills.

As this know-how is acquired over time and through experience, EDF has actively developed long-standing partnership relations with supplier companies working on our installations.

By offering visibility through long-term contracts, EDF enables its suppliers to invest in methods, organisation, tools and, above all else, in competence and commitment.

Partnership and trust

Nuclear logistics service contracts are concluded for a duration of up to 7 years, to provide durable cooperation between a client and a service provider.

This enables both sides to search for and implement material and organisational innovations at the service of nuclear safety.

More recently, the development of the concept of « Productivity Partnership » aims at jointly searching for improvements and progress to reduce costs. The economic gains achieved are shared fairly between EDF and its partner. This approach is utterly inconceivable without a durable contractual relation.

EDF also needs to fully assume its responsibility as a nuclear operator and hence its role as a principal contractor. This is why, in accordance with European directives, long-term contracts also have an end. The market can be consulted again and there can be healthy emulation between competitors in a whole range of fields such as commercial performance, technical and technological innovation, organisation and work methods, etc.

The nuclear industry is a whole made of operators, investors and goods and service providers. Their history is intertwined and so is their future.

Dominique MINIÈRE
and Philippe SASSEIGNE

Group Executive Director DPNT
and Director of Nuclear Production
Division (DPN).

Hinkley Point C and the revival of new nuclear in Europe

The decision of the UK Government to approve the construction of two EPR reactors was an historic moment. It has relaunched nuclear in Europe and confirmed its role in the battle against global climate change. Once again the Hinkley Point C project was scrutinised and the robustness and fairness of its agreements was demonstrated.

A clear and stable market framework

It took ten years to reach this point with many milestones achieved. These included planning consent, the development of a supply chain, agreements with trades unions, design approval, organisation approval and financing. None of this would have been made our investment possible without being underpinned by the stable and clear regulatory framework established in the UK. The fundamental reform of the electricity market was designed to deliver secure and affordable supply and tackle carbon emissions – in line with the European Union's energy objectives. This effective policy framework rests on three pillars: the Capacity Market, the Carbon Price Floor and Contracts for Difference. The Government's consistent approach to policy has been a critical factor in giving investors the confidence they need to commit. The strength and independence of the UK nuclear regulator has also been a key feature of the British context.

Diversity as a condition for security

Hinkley Point's go-ahead is also good news for industry in the UK and France and good news for the ten member states who support the option of developing new nuclear to replace existing capacity. European industry will have an opportunity to successfully compete in a global new nuclear market, benefiting from experience gained in new build projects and the new partnerships formed to develop them.

During the recent vigorous debate on the UK's energy future, supporters of various present and future technologies suggested that their favoured electricity source was a panacea for the UK's needs. In reality, interconnectors, batteries, small modular reactors, gas, renewables, large scale nuclear and decentralised energy will all be needed. That was a point recognised by the British Government which said that "diversity and diversity alone" was the foundation of energy security.

Investing immediately

EDF invests or is developing a very wide range of low carbon technologies as well as new nuclear. For example, we have recently won a contract to provide 49MW of battery storage to support the National Grid. In northern Europe, batteries can play a role smoothing out short term imbalances in electricity demand over hours and minutes. However there is no prospect of cost effective battery storage to store electricity for days, weeks or months. Development of new technologies is crucial. However in the fight against climate change we cannot gamble of the hope of future technologies, rejecting the tools we have today for the hope of those we could have tomorrow. The key for policy-makers is getting the right mix to create an energy system that works well for consumers. There is no secure and affordable solution without the reliable and low carbon base-load electricity that nuclear offers.

For an accessible energy

As well as security and climate change, affordability is of course a critical objective of energy policy. There are costs associated with being first of a kind and restarting a dormant new build industry. Even so Hinkley Point C is already competitive with all other future UK energy choices when the costs of intermittency and carbon emissions are included, as they should be.

It is the aim of the nuclear industry to work hard to bring down costs for following projects. Experience shows the series benefits of a new nuclear programme. That happened in France when the country built 58 reactors. There are significant advantages in EDF's 30 year partnership with CGN in China. Their participation in the world's largest civil nuclear programme and the direct experience of building EPRs at Taishan will provide the UK with significant benefits.

We are ready

This first-hand knowledge of EPR construction at Taishan (which testing programme is running smoothly) and Flamanville, now on track, has been integrated into the Hinkley Point project and has given both partners confidence in the design's successful construction.

We have prepared the way, the project and the site. We are now moving into the construction and delivery of Britain's first nuclear plant since 1995. The teams are motivated, the partnerships are strong. We are ready to deliver.

Paul SPENCE
Director of Strategy and Corporate Affairs
EDF ENERGY

New in the West

Jacques PERCEBOIS,
Professor Emeritus,
Montpellier University,
answers our questions

How much does nuclear power cost?

The cost price of the nuclear in France – 58 Pressurized Water Reactors (PWR) – is estimated at 50 euro per MWh and 60 euro if we integrate the costs of the big shroud. The cost price of the new reactors is slightly more expensive: between 90 and 110 euro per MWh but they are lead compounds and the cost will decrease as we will build new reactors. For the record, the current price of the electricity market is estimated at 40 euro per MWh so productive investments are not profitable since the European market is in situation of overcapacity.

What are the advantages of the nuclear power compared to its competitors?

Nuclear electricity presents several advantages: that is a low-carbon electricity, a national one, and its cost is predictable on a long term scale (at least 60 years). Competitors (coal, wind and solar) can be cheaper on a short term scale but their cost can vary significantly when oil and gas prices raise and this volatility has a substantial cost for the consumers. Storage and back up costs for intermittent electricity increase the cost price. Moreover the price of the carbon will rise in the future.

Which incentive mechanisms could help to its revival?

Nuclear power is an energy with very high fixed costs. Nuclear power plants have a long lifetime so they need profitability long-term guarantees. However the electricity market does not send good signals to the investors. It is myopic and it does not permit to take optimal long-term decisions. The Uk has understood this and has created an incentive system at Hinckley Point, "CfD", Contract for Difference: if market prices are higher than what was expected, the producer shall repay the excess to the consumer, and otherwise, it is the consumer who finances the difference.

Why is the U.K. returnig to nuclear power?

The U.K. has learned the limits of «market» and, after being the champion of liberalism, practices a «re-regulation» for the production of electricity. He has defined a long-term energy policy, with priority to «low carbon» energy in its electricity mix: a nuclear base, a renewable supplement (wind, hydro, biomass, solar) and gas for the semi-base and the peak power. With incentives to revive nuclear energy, the government has set a «floor price» of carbon. France should look to the West, and Europe should draw inspiration from the UK!

Rosatom in Western Europe: Strengthening Partnerships

Over the past few years, Rosatom has stepped up its presence in the global market, becoming one of the main players in the international nuclear industry. With an export portfolio of 110 billion $, the company is rolling out projects in several of the world's regions and is aiming to further strengthen its presence in Europe.

Rosatom is a European company and is contributing to Europe's nuclear industry. We have had links to Western Europe for many years, on the basis of fruitful cooperation. The first contract was signed in 1971 with the Atomic Energy Community for the supply of enriched uranium. In 2015, according to ESA's annual report, the volume of uranium delivered to countries in the EU rose to over 4000 tonnes. At present, the region has 18 Russian-designed central units in operation. Out of the 11 reactors built in Europe (including in Russia) since the beginning of the century, 10 are Russian-designed - VVER of which 9 were built by Rosatom. Out of the 30 units planned for the next decade, 19 are projects by Russian companies, and several of them are being built in Turkey, Belarus, Hungary, Finland and Russia.

Over the next 20 years, the majority of reactors in operation will reach the limits of their operational lives. To satisfy therefore the ambitious objectives of transitioning to a carbon-free economy, any major decrease in nuclear's share of the energy mix must be avoided and there must be **guaranteed growth in three key markets.**

Extending the lifespan of power stations

Rosatom is offering the latest technology to modernise power stations which will not only extend their lifespan by 20 years but, with innovation in the fuel sector, will increase their power capacity by 110%. A first Russian-French consortium has been created to modernise two units (5 and 6) at the Kozloduy nuclear power plant in Bulgaria, and a contract to modernise the four units at the Paks plant in Hungary is currently being carried out.

A new capacity market

Building new energy capacities in the EU opens up a new market where Rosatom plays a leading role with a certain competitive advantage: the group offers 3+ generation plants, as well as integrated solutions. Currently the Russian company

is the first in the world to offer 3+ generation 1200 reactors.

An interconnected electricity market

One other promising market for the EU is in importing electricity from nuclear plants in neighbouring countries. Rosatom is planning to sell electricity from the plant currently being built in the region of Kaliningrad, which would contribute not only towards diversifying the energy mixes of Central and Eastern European countries but would see participation from local companies. This cross-border commerce of low carbon electricity will require long-term contracts with energy intensive firms, which will attract investment for nuclear energy and renewables in the region, whilst reducing the need for subsidies. Faced with the continued growth in energy demand and the importance of environmental affairs, Rosatom is offering the countries of the EU an open approach in the supply chain, with mutual interests and the strengthening of partnerships with the sector's Western companies.

Andrey ROZHDESTVIN
Director of Rosatom France

The nuclear policy in Japan after Fukushima

Takanori Uehara, Ambassador of the Japanese Mission to the European Union, made a statement on the 4th of October during the European Nuclear Energy Forum in Bratislava.

The Japanese government and TEPCO (Tokyo Electric Power Company) have jointly authorized a medium and long term roadmap, giving the highest priority to safety. For example, the examination of the inside of the reactors is on the way thanks to the use of our technology for the removal of fuel. But the decommissioning work and the contaminated water management will take 40 years, and they will require an international cooperation expertise.

Lessons learned from the accident

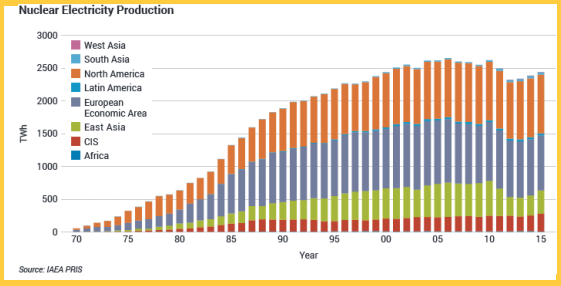
The Nuclear Regulation Authority (NRA) developed new regulatory requirements and strict evaluations for natural disasters. One of the most important lesson learned from the accident is avoiding the trap of the so-called "safety myth". After having implemented this changes, Japan has opted to continue using nuclear energy and is aiming for a 20 to 22% nuclear part in the electricity production in 2030. It is an important power source: stableness of supply and efficiency, low and less fluctuating operational costs, and no CO2 emissions during operations. Out of the 43 current reactors in Japan, 23 should restart and 3 have already been re-launched.

International cooperation

We recognize that contributing to the improvement to the world's nuclear safety by sharing the experience learned is our responsibility. We expect more international discussions to take place. The first international forum on decommissioning was held this year in Fukushima, with a total of 641 specialists from 15 countries (including the member states of the EU), in order to share our top level research progress and methods, communicating with local society.

You can find the complete intervention of Takanori Uehara on the ENEF website:: https://europa.eu/newsroom/events/european-nuclear-energy-forum-enef-plenary-meeting_fr

The world renaissance: comparison Europe/World



Trends in Nuclear dismantling and waste management

Any industry is responsible of its wastes and brownfields legacy. 157 reactors in the world have been shutdown; only 15 of them are dismantled. In spite of more than 60 years of nuclear history, only a few countries have shown that they have a clear policy of treatment and disposal of the whole range of their nuclear wastes. Nuclear industry must improve demonstrating to the public that we are mature enough to take care of our wastes and legacy. On the long term, public acceptance will occur for new nuclear reactors at the condition that the industry can demonstrate that we are able to dispose of the old reactors once shutdown.

In fact, what is the real situation?

People have been speaking of nuclear wastes and reactors dismantling since decades without showing a clear willingness to actually do it. In the US, besides the huge work of cleaning the former military sites, there have been good examples of dismantling of reactors in the last 30 years (Fort Saint Vrain, Shoreham, Maine Yankee,...). The spent fuel is generally left on the site in an ISFSI (Independent Spent Fuel Storage Installation). But there is also in US a trend to go to "SAFSTORE", unloading the spent fuel in a ISFSI and having the plant as it is in a "safe mode" for decades. Most of the time, the real reason is just pushing the problem on the right, waiting for better days (which may never come, by the way...)

In the US, the issue of the spent fuel disposal also exists. After the decision of the Obama administration to close the Yucca mountain project, no final spent fuel repository exists any more. Also, the centralized interim storage (CIS) has been delayed for decades by DOE administration. Private sector is now showing some interest in order to replace the deficient government administration.

In Europe, there are many different cases. The Northern countries (Sweden, Finland) are showing a great determination in their policy to treat properly the waste and legacy issue (Interim spent fuel installation, HLW geological disposal, dismantling of reactors). In Germany, under public opinion pressure, the trend is to dismantle quickly reactors, but the country is struggling with the acceptance of final repositories. Spain has started a voluntary policy to dismantle their reactors (José Cabrera) but is now struggling with their spent fuel disposal for political reasons. Italy has been waiting for decades because of politics and lack of repository. France has a comprehensive policy of reprocessing but is unclear on their willingness to dismantle UNGG reactors. Eastern countries policy is totally financed by others (EU, EBRD...). Asia is also showing great diversity of solutions between Japan (reprocessing official solution but delayed dismantling of reactors) and Taiwan (SAFSTOR planned)

In this environment, decision of investment by nuclear companies into this market is not obvious. Dismantling is considered as an "ever emerging market". Flexibility is more than ever the word to keep in mind by industrials.

Yves BRACHET
Senior Vice President Decommissioning, Demantling, Reclassement and Waste Management

Westinghouse

Towards a dismantling market?

According to the scenarios of the IEA (International Energy Agency), the nuclear capacity will have to increase by 12 GW per year by 2050 if we want to maintain global warming under +2°C and restore, close or replace 200 reactors (out of 434 reactors currently operational), mainly in the USA, Russia and Europe.

Europe is a leader in the nuclear sector and it must become one in the dismantling sector as well. Indeed, Europe has more than 60% of the 140 currently closed reactors in the world: 29 in Great-Britain, 27 in Germany, 12 in France, 4 in Bulgaria, 4 in Italy, 2 in Lithuania, 1 in the Nederland, 3 in Slovakia, 2 in Spain, 3 in Sweden.

This is a challenge for next decades. We have to deal with it as soon as possible and not to leave it to future generations.

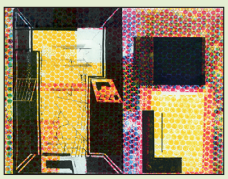
Dismantling represents a real financial windfall for companies that are specialised in the sector. The French Court of Auditors estimates that the French nuclear park represents 18.4 billion euro. In Great-Britain there are 35 nuclear reactors for a 9.000 MW park and the total costs for dismantling are estimated at 103 billion euros – that is around 2.9 billion euros per reactor. In the newspaper Les Echos, the consulting company Arthur D. Little estimates at 220 billion euros the global dismantling market.

Competition will be fierce within this new market and solidarity will be necessary to help countries, such as Lithuania, which had to stop their nuclear reactors in order to join the EU.

Political responsibility and governance

The EU must face this problem. It has forced member countries to close their nuclear power plants and it imposes its own market rules. It tries to take charge of security and waste management and it must assume a part of political responsibility for the dismantling activity without accusing member states. The EU and member states must coordinate their regulations and their budgets in order to share the costs. That is a concern of European public interest. The dismantling has a very high cost. We must clarify responsibilities and build the market in order to find private investors who will contribute to the financing.

Claude FISCHER



Transmitting the memory of radioactive waste sites in scenery

Cécile Massart has been exhibiting since 1994 and published her work "an archived site for alpha, beta, gamma". In 2008, she drew a set of markers and published a book named "COVER". The goal is to make the XX and XXI archaeological layer understandable and appeal to everyone's sense of responsibility. What policy should be adopted for the future? Which heritage do we want to transmit? Concerning the high-level radioactive waste more specifically, Cecile opens new areas of investigation with the "laboratory".

We are proud to have made Cécile's work known by offering "COVER" during Les Entretiens Européens de Budapest in 2010: "For a societal appropriation of nuclear in Europe" and by resuming the nuclear barrels' image in our invitations.

Cigéo, Technical solutions and funding for responsible nuclear waste management

Cigéo is a project designed to develop incrementally over time, as will its financing, giving future generations the possibility to make their own choices, says Pierre-Marie Abadie, CEO of ANDRA, in this article.

Master Operating Plan

The Master Operating Plan proposed by Andra describes the «reference sequence» of the life of the Cigéo project. Its purpose is to clarify the objectives of the industrial pilot phase and to present the choices offered by reversibility. Designed to accommodate 73,600 m3 of long-lived intermediate level waste and 10,100 m3 of high-level waste, Cigéo will store existing waste and the waste produced by nuclear installations until the foreseeable end of their operation and decommissioning. In the reference scenario, all spent fuel is deemed to be reprocessed.

Industrial pilot phase

Over Cigéo's lifetime, storage areas will be extended in successive incremental stages, each about 10 years long. Subject to obtaining a building and operating authorisation for Cigéo, Andra proposes a template agenda taking into account the duration and planned stages of the building and operation of Cigéo until the end (see box on opposite page).

The industrial pilot phase, starting with the testing of the facilities, will last about 10 years, including about 4 years of inactive tests and about 6 years of progressive ramp-up with radioactive waste packages. This pilot phase aims at consolidating the tests performed in the underground laboratory: risk management in operating conditions; performance of the industrial equipment; capacity to recover waste packages from their storage cells; possibility to close and seal storage cells and access galleries; technical and economic optimisation.

Choice provided for reversibility

Reversibility is defined as the capacity to offer future generations different options for long-term radioactive waste management, based both on governance and a set of technical management tools. The cost of the technical provisions of reversibility is included in the project, but if future generations were to implement other options, modify storage architecture or recover already stored packages, they would have to support the costs of their decisions.

Several management tools are offered to future generations:

- « progressive development » with the possibility to slow down or accelerate the construction of Cigéo;
- « operating flexibility » for the flow of packages to be stored, in order to anticipate or delay partial shut-downs;
- « adaptability of installations » to accommodate spent fuel or long-lived low-level waste currently earmarked for subsurface storage;
- « recoverability » with the possibility to reconsider geological storage for some or all of the packages stored.

Incremental financing

The building and operation of Cigéo will spread over more than 120 years. Consequently, financing requirements will also be progressive, with an initial investment in infrastructure (surface installations supporting the construction of buildings or the reception of waste packages) and in the access buildings to subsurface storage areas. The availability of funds is ensured by a funding mechanism financed by waste producers; its features are defined by the Program Act of 2006 on the management of radioactive materials and waste.

Our responsibility is to leave to future generations technical solutions and sufficient funding to ensure safety, for them and for the very long term.

Pierre-Marie ABADIE

An agenda for the construction and the operation of Cigéo

- 2025, beginning of the industrial pilot phase
- 2030, reception of the first packaging radioactive waste, the high-level ones produced by the first vitrification campaigns and already cooled (HA0) and the intermediate-level and long-lived ones
- 2035, after the progressive increase regime, nominal operation after the safety review
- 2070, construction and beginning of operations of the high-level waste's packaging facilities and storage launching
- Works' partial closure and gradual stop of the operations:
  - 2070 for the HA0 storage zone
  - 2010 for the intermediate-level and long lived waste storage works
  - 2145 for the high-level waste storage zone
- 2150, permanent closure operations

Les Entretiens Européens 2015

For a European nuclear waste industry: a safety issue

Eight European countries have exchanged their experiences with Canada at the initiative of ASCPE on 15th October, 2015 with support and participation of the European Commission.

Thanks to these debates we could understand that even if nuclear waste management is the responsibility of the operator and of the state as a last resort, it is first of all a part of nuclear safety as a "European public good" and so it is in the general interest and the responsibility must be shared with citizens and actors.

Find the proceedings in Les Cahiers des Entretiens Européens available in English on our website: **www.entretiens-europeens.org**

Nuclear skills: to a European label for mobility

The global nuclear industry is in an exciting phase of renaissance leading to the creation of opportunities for exciting careers both for highly qualified individuals and for those looking to enter the sector and develop, train and gain qualifications.

The UK has a well-established nuclear programme successfully operating for over 60 years, leading to the development of a nuclear workforce that is highly skilled and knowledgeable. Despite this strong base the UK still faces skills challenges, due to a variety of factors e.g. an ageing workforce/ loss of expertise via retirement; changing nature of the nuclear programme, leading to different skills requirements; lack of diversity; sector image and lack of workforce transferability and mobility.

The challenge of the skills needs

Globally with over 440 commercial reactors operable in 31 countries; about 60 more reactors under construction; 254 research reactors and 180 nuclear reactors powering some 140 ships and submarines the global nuclear skills challenge is clearly very significant, presenting both challenges and opportunities.

If the nuclear industry is to meet its future workforce requirements then the issue of mobility and transferability of skills needs to be addressed.

UK employers are working collectively to identify the skills challenges and seeking to implement solutions to address the challenges via the employer led and funded NSAN. Mobility and transferability of skills is a priority issue, with a common language of competency being seen as a way to help address this.

NS4P: a common framework in UK

To develop the Common Competency Framework NSAN have brought together groups of SMEs for each discipline area (e.g. Design Engineering; Nuclear Waste Management…)

NS4P Skills Assured

To facilitate the assessment, recognition and demonstration of achievement of the agreed competencies it was decided that a nationally accessible platform was needed and this has been developed as the NS4P.The is also now available internationally as Skills Assured.

To a European coordination

Across Europe the EU ANNETTE project is seeking coordination among nuclear Education & Training actions and groups. It includes 25 partners & 8 work-packages. NSAN is a partner working on Advance Networking for Nuclear Education and Transfer of Expertise.

The main objective of this work-package is facilitating cross border transfer of expertise by application of ECVET (European Credit System for Vocational Education and Training) and its technical components.

The Skills Assured platform is being piloted as a vehicle to facilitate this process.

The ANNETTE project will be invaluable in proving the concept of mobility and in identifying the hurdles and challenges to be overcome to facilitate successful implementation across Europe.

Jean LLEWELLYN OBE
CEO NSAN National Skills Academy for Nuclear and Nuclear Manufacturing

Cooperation in research and development
Innovating the back-end of the nuclear fuel cycle

There is a lot going on in research and innovation in the the nuclear fuel cycle. In addition to the continuous improvement of existing technologies, particularly fuel processing after use in a reactor and sustainable waste management, more forward-looking innovation drives aim at developing more advanced management options.

One of the current great challenges in research and development (R&D), in addition to better harnessing the energy potential of natural uranium thanks to plutonium recycling, is to further reduce the amount and radiotoxicity of waste.The idea is to extract and transmute certain elements (minor actinides such as Americium) contained in very small amounts in the waste, but main contributors to heat release and potential long-term harmfulness.This objective opens a broad field of research and cooperation, from the development of separation processes down to demonstrating transmutation in a reactor. Large research programmes are underway across the world, particularly in Europe, a leader in this field, with a series of successful programmes since the 1980s and the European SACSESS programme as an emblematic example. These projects have found an extension in the SNETP[1] platform around the Astrid and Myrrha projects aimed at demonstrating the transmutation capacity of fast-neutron reactors.

A reference solution for waste

The other big area of cooperation is the management of final waste. This falls under the responsibility of each country, but represents a challenge whose importance is shared by all and for which exchange is an crucial tool for progress. Particularly for long-lived high-level waste, all concur on the fact that geological storage is the reference solution to guarantee long-term safety, although the type of waste (which varies for instance depending on whether or not a country reprocesses its spent fuel), the way it is processed and the geological context are all factors that will influence how it will be stored. There is bilateral cooperation between all countries and particularly between France, Sweden and Finland, which are more advanced in this field and have already set up subsurface research laboratories.

International cooperation

There is also cooperation between international agencies: the NEA tends to look into more forward-looking issues while the IAEA covers more technical and normative fields. The European Commission provides a legislative framework with the adoption in July 2011 of the European Directive on Radioactive Waste Management, and financial support for R&D projects, particularly via the IGD-TP[2] platform.

François GAUCHÉ
Head of Department
Nuclear Energy CEA

[1] *Sustainable Nuclear Energy Technology Platform*

[2] *Implementing Geological Disposal of Radioactive. Waste Technology Platform*

Towards more flexible new reactors
A future for SMRs?

In the context of the energy transition, market requirements have generated renewed interest in small modular nuclear reactors (SMR). Will they find their place in a time of decarbonised and decentralised energy ? Philippe Pradel, Vice-President of ENGIE NUCLEAR DEVELOPMENT tells us about the genesis of SMRs and their possible future.

Since the 1970s, the industrial development of nuclear reactors (1100 MWe and 1500 MWe with the third generation) was accompanied by research into **small or medium-sized reactors** (50-300 MWe) for particular applications: isolated locations, medium-sized electricity grids not connected to neighbours; cogeneration to use unavoidable energy in heating networks; progressive introduction of an nuclear electricity programme for a new entrant country.

It is obvious that despite often promising market and design studies, these reactors have up to now not found any buyers, mainly for economic reasons (installation, decentralisation and training costs), but also location and implementation time.

Renewed interest

For a number of years, mainly at the initiative of the DOE in the USA, there has been renewed interest in SMRs on account major ongoing developments in the energy landscape and nuclear technology.

On the energy side, three reasons can be mentioned: the need to reduce the use of fossil fuels; **decentralisation of electricity generation** (renewable energies, smart networks, energy storage); the need for operators to be **agile and flexible**, and the problem of financing long-term investments.

On the technology side, two major developments have repositioned the competitiveness and attractiveness of SMRs: 1. the possible use of the **concept of passive safety** for smaller reactors, which satisfies increasing safety requirements and at the same time allows design simplification; 2. the emergence of in-factory **modular construction** capacities, which should reduce overall costs and building time on location. Like the « plug and play » concept, the power station is built entirely in the factory, transported and connected to the grid; the only significant local operation is to connect the station to the electricity network.

Among the many SMR concepts being studied in the USA, Russia, China, South Korea, Japan and also France, two models emerge: terrestrial and transportable SMRs.

- Terrestrial SMRs aim at nuclear **boiler modularity** and need to be installed at a specific location with civil engineering and additional ancillary facilities, turbine-generator unit, network connections…
- Transportable SMRs, completely **decoupled from the operation site**, providing agility, flexibility and **reversibility** while at the same time **reducing overall acquisition time to a minimum** for a new entrant: a concept on a barge (50 MWe) proposed by Russia; a first unit is being finalised.

A submerged concept is currently under study in France (offshore or onshore) but it can support a more important power (160 MWe)

A submerged concept studied in France (offshore or onshore) capable of providing more power (160 MWe)

Industrialisation of these models requires proof of their competitiveness and public acceptability and a regulatory framework for the transport of reactors that IAEA is working on.

If solutions similar to plug and play, with a design completely independent of the installation site, are confirmed, they may be best placed to fully comply with requirements and thereby contribute to a realistic energy transition.

Philippe PRADEL

ASTRID, an option for the Generation IV reactors

ASTRID (Advanced Sodium Technological Reactor for Industrial Demonstration) is a nuclear reactor demonstrator project (Generation IV) proposed by the CEA (French Atomic Energy Commission) for the French Government within the 28th of June, 2006 law framework and currently under study.

The aim is not to commercialize the reactor but to use it as a "technologic demonstrator". Its exploitation will be accompanied by a series of experiences in order to improve the Sodium-cooled Fast Reactor (SFR) technology and to prove to industrials the benefits of commercial exploitation of future Generation IV reactors that will use this new technology.

There is a technological breakdown between ASTRID and its predecessors – Phénix and Superphénix – mostly regarding safety requirements. For that purpose a "safety improved heart" and a "low draining heart" have been created. A new technique allowing the visualisation under sodium is another innovation challenge currently under study. This innovation aims to improve reactor's monitoring.

All these technical options have not been decided yet and engineering studies are in progress. They are financed by the CEA industrial partners: Airbus Safran Launchers, Alcen, Areva NP, Bouygues, CNIM, EDF, General Electric, JAEA, MHI & MFBR, NOX, Onet technologies, Rolls-Royce, TOSHIBA, Velan and Technetics, providing 130 million euros. In 2010, 650 million euros had been collected thanks to a "great national loan".

Building a long-term framework to promote and finance nuclear projects

Questions for the debate

To keep up with the requirements of balanced growth and mitigate climate change, all non-carbon sources will be necessary. Nuclear energy is an ally in achieving these objectives, but new investments in nuclear energy need political decisions and a clear and stable regulatory framework.

What will be the share of nuclear energy in the European mix ? The British government has validated the building of two EPR reactors at Hinkley Point, in South-East England. What signal is this decision sending to Europe ? Is a new European energy trend emerging? How will the EU respond and adapt its internal market without discriminating against nuclear energy ?

The Commission has proposed an « illustrative programme » in April this year, focused on investments linked to post-Fukushima safety improvements and on the operating safety of existing installations. **How will it promote investment in new power plant projects ?**

Power plants are highly capital intensive, but the market framework is not adapted to long-term investment: can an industry like nuclear energy - which is not a commodity like any others - be conceived without public incentives and guarantees ? Is specific (EIB-type) financing needed ?

How can a market for long-term contracts be built in parallel to the spot market and to the capacity market ?

Projects look for financing and combine partnerships of direct investors with loans and a capital contribution of the vendor to the financing of the project, or, as in the case of Hinkley Point, with a sovereign Chinese fund entering the capital. In Finland, Rosatom will enter 34 % of the capital of Fennovoima, and even goes further by proposing its BOOT (Build - Own – Operate - Transfer) model, where all risks linked to construction, start-up and initial operation are covered by the vendor against a remuneration guaranteed by a fixed kWh sales price. Japan is reviving nuclear energy needed for its development and seeks to revitalise its industry through exports. **What cooperation could we develop with these countries ?**

Today, the financing of R&D is done in partnerships between countries sharing the same objectives and between public and private stakeholders. Europe is innovative in this field with the Commission's initiatives on the SNETP platform where industrialists are actively mobilised. There are also new initiatives to reinvent operating modes with new business models of cooperative and mutualised R&D. Could they serve as an inspiration for the building of power stations and **enhanced - or variable-geometry - cooperation to propose and finance new projects ? At what scale ?**

These questions will be at the core of the debate at **Entretiens Européens**, organised by ASCPE, in partnership with the European Commission's DG Energie, FORATOM, and many European and global industrial and territorial stakeholders.

Claude FISCHER

Les Entretiens Européens

20th October, 2016 - Brussels

3 Roundtables

- Valuing projects for the fleet's renewing: requirements to achieve the profitability and the financing of investments
- Investing in human capital, R & D and innovation for nuclear's future
- The reform of the European market for long-term investment

Auditions

- Nuclear Energy for climate and growth
- Russia, how do they do?

Conclusions

- Gerassimos Thomas, Deputy Director General in the Directorate-General for Energy at the European Commission

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ASCPE and nuclear power: Les Entretiens Européens in 2015 and 2016

- 10 June 2016: roundtable on the ***Nuclear Illustrative Programme (PINC)*** in Brussels
- 18 February 2016: ***Teachings of the COP21 and perspectives and planned actions for climate*** with Confrontations Europe in Paris
- 3 December 2015: *Debate with* ***James HANSEN, NASA's nuclear physician*** *and screening of* ***"Pandora's Promise" with Robert STONE*** in Paris with the French Nuclear Energy Society (FNES) and Sauvons Le Climat
- 4 November 2015: ***Electricity Market Reform*** with Confrontations Europe in Paris
- 15 October 2015: ***The social Ownership of nuclear waste management in Europe, a safety issue,*** Les Entretiens Européens 2015 in Brussels
- 10 September 2015: ***Nuclear and energy efficiency Financing*** in Paris.
- 24 June 2015: ***COP21: Energy sector's contribution*** in Paris with Confrontations Europe
- 2 June 2015: ***The progress of negotiations on the eve of the COP21*** in Paris with the Intergovernmental Panel on Climate Change (IPCC)
- 29 April 2015: ***Nuclear contribution to the European Energy Union: safety, sustainability and competitiveness*** in Brussels in partnership with FORATOM
- 29 January 2015: ***Energy systems' transformation to limit climate change*** in Paris with Confrontations Europe

Articles and interventions by Claude Fischer

- 29 February 2015: **Nuclear power, an ally for climate**
- 26 September 2015: **European Energy Union evaluation and its coherence with the climate's issue** in Paris at the summer university of Sauvons le Climat
- 15 June 2015: **European Energy Union: a new ECSC for Europe?** In Le Touquet
- 26 May 2015: **Should we build a European dismantling market?** FNES in Prague
- 8 April 2015: **EU's representation on the international stage: towards an Energy Union? Advantages for the operators on a consolidated market** in Paris with the National School of Administration
- 5 March 2015: **Nuclear power and the Franco-British alliance** in Paris with the FNES

Publications

- October 2015: English version of La Lettre des Entretiens Européens: **Nuclear Energy: Special Issue**
- Proceedings of the Entretiens Européens of the 15th of October, 2015, English version: **The social Ownership of Nuclear Waste Management in Europe: a safety issue**
- 6 October 2015: ASCPE and Confrontations Europe answer to the consultation on the new model of electricity market

All these documents, records and slides are available on our website www.entretiens.europeens.org

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