



A but maybe H?
**– Prospects for nuclear energy in Poland in the
context of European experiences**
report

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The media are constantly attempting to spark public interest with tales of new plans to build nuclear power plants in Poland. As a result, more and more companies are contemplating investments into this type of energy. And rightly so, as the experiences of European countries show that it is worth it.

Procesy Inwestycyjne Sp. z o.o., the ETA Association and the E. Kwiatkowski Institute organised a debate which – through presentation of nuclear solutions implemented in various European countries – aimed to provide an opportunity to view economic development in the context of the opportunities that nuclear energy allows for.

Representatives of firms and institutions from European countries in which nuclear power plants have been set up presented the phases of their construction and activity in a step-by-step manner, and also discussed how the development of nuclear energy influences the local economy in their countries.

As investments relating to the construction of nuclear power plants often requires social acceptance, the debate also allowed its participants to become acquainted with the nuances of atomic and thermonuclear technologies, which were presented by experts from this field, who presented the results of research from Polish reports and European agendas.

The following issues were touched upon during the debate:

- Atomic and thermonuclear technologies;
- Technologies of the future: ITER-TOKAMAK, polywell technologies, Hyper laser systems;
- Support for and opposition to atomic energy – Poland and Europe;
- Poland's energy policy for the period up to 2030 – the country's energy balance and investments in nuclear power plants as a strategic means of closing this balance;
- European leaders of nuclear energy – presentation of solutions implemented in neighbouring countries.

The debate was closed with a panel discussion: „Atomic energy – is it worth it”, in which all of the participants and speakers of the debate took part. Issues discussed during this session included the prices of energy in Poland and Europe, the energy security of the country, the feasibility of investments in atomic energy from a business and social standpoint (new jobs and a chance for economic development), and the necessity of legislative changes and training personnel for atomic energy.

Thus, the debate „A but maybe H? - Prospects for nuclear energy in Poland in the context of European experiences” opened a discussion as to the opportunities arising out of development of nuclear energy in Poland.

The participants of the event were greeted by Ms. Marina Coey, President of the Management Board of Procesy Inwestycyjne sp. z o.o., who also chaired the debate.

Firstly, Ms. Coey presented the speakers, in the order of their presentations:

1. Zbigniew Kamieński, Director of the Nuclear Energy Department, Ministry of the Economy;
2. Professor Krzysztof Źmijewski, Secretary General of the Social Consultancy Council of the National Programme for Reduction of Emissions;
3. PhD Andrzej Strupczewski, Institute of Atomic Energy;
4. PhD Ludwik Pieńkowski, Environmental Laboratory of Heavy Ions, Warsaw University
5. PhD Stanisław Latek, Press Officer of the President of the National Atomic Energy Agency, Advisor to the President for Information and Communication;
6. Derek Taylor, Advisor to the European Commission, DG TREN
7. Marc Bondiou, Science and Technology Attaché, Embassy of France
8. Peter Tuominen, Development and Communications Manager, Fortum Finland
9. PhD Holger Tietze-Jaensch, Institute for Safety Research and Reactor Technology, Dept. for Nuclear Waste Management, Head of Product Control Office for Reprocessed Waste
10. Mr. Gunnar Haglund, Counselor, Embassy of Sweden

As well as thanking the strategic partners of the event:

- Towarowa Giełda Energii S.A.
- Wartsila Sp. z o.o.
- RWE Polska S.A.
- Infovide-Matrix S.A.
- Landis + Gyr Sp. z o.o.
- Dalkia Polska S.A.

- Globema Sp. z o.o.
- Polkomtel S.A.

Ms. Coey also thanked the partners of the debate - Fortum Polska S.A. and the monthly publication „Nowa Energia” for fulfilling the role of media patrons.

Following this, Ms. Coey surrendered the floor to **Mr. Zbigniew Kamiński, Director of the Nuclear Energy Department in the Ministry of the Economy**, who began his presentation by reminding his audience of a few relevant facts:

1. The Resolution of the Council of Ministers of 13 January 2009 on initiation of works on nuclear energy;
2. Creation of the Department of Nuclear Energy;
3. On 19 May Ms. Hanna Trojanowska was made the Plenipotentiary of the Government for Nuclear Energy issues.

He also indicated the place of nuclear energy in Polish energy policy and the energy-mix, highlighting that:

- Introduction of nuclear energy does not decrease the level of conviction as to the fact that energy efficiency should be treated as a priority;
- There is no collision between the development of nuclear energy and of RES in Poland, as the scope of desired diversification of energy sources is very broad for both of the aforementioned types of energy.

Director Kamiński cited reasons for which nuclear energy should be developed in Poland. These are above all: climate protection factors (as nuclear energy is clean energy), and economic factors, as the nuclear option is the cheapest source of electric energy. He also highlighted that *„In the world and in Europe we are observing a renaissance of nuclear energy, even in countries that had an almost complete ban on this type of energy. Let us take a look at Sweden, which turned its back on nuclear energy only to return to it years later. And our Western neighbours – Germany? They know that is a real programme for eliminating nuclear energy were to be created, they would need to move towards coal-powered energy. Perhaps towards CCS, but that technology is still at the testing stage. In Poland, we are still only at the beginning of this road, but the first electricity from a nuclear power plant could flow as early as in 2020.”*

The Director of the Nuclear Energy Department also turned the attention of the participants of the debate to the fact that countries that have not thus far implemented nuclear energy need 10-15 years to prepare for this. What, therefore, should be done?

1. Adaptation of Polish law, in particular the part thereof relating to investments, to this type of energy;
2. Ensuring the efficient organisation of both the preparatory process, and the further functioning of nuclear power plants;
3. Preparation of personnel for nuclear power by creating new faculties and areas of specialization at universities and education of specialists in prominent foreign institutes and universities;
4. Conduction of a full, transparent information and educational campaign – society must know as much as possible about nuclear energy, as the majority of its fears in this respect result mainly from a lack of knowledge.
5. Conduction of analyses and research relating to the location of nuclear power plants and nuclear waste storage facilities.

In his presentation, Director Kamieński noted: *„Since we now have a Plenipotentiary for Nuclear Energy Issues, it is expected that in two-three days the Ministry of the Economy will know where the first nuclear power plants are to be located. This is not the case – location analyses take time, and we are working to a schedule that is to be completed in 2020. A milestone will be adoption by the Council of Ministers of the Polish Nuclear Energy Programme, which is anticipated to take place in the second half of next year. We would like for new regulations relating to nuclear energy to enter into force on 1 January 2011.”*

Following this, discussion turned to support for and opposition to nuclear energy in Poland: *„We are currently observing enormous interest on the part of local authorities, who would like for the first power plant to be constructed on their territory. This signals a significant change in mentality! The leaders of these areas are expressing not only their will, but also the will and opinions of their voters and the social expectations of the citizens of these areas. Of course, this does not mean that everyone is 100% for this concept, but the majority is. It is true that there are organisations that do not want to talk of nuclear energy at all, due to the assumption that it is something ‘bad’. Let us remember, however, that this is still a zero-emissions means of energy production, which means that it is a positive thing in ecological terms. I also think that experience shows that nuclear energy is safe.”*

To conclude his presentation, Director Kamieński highlighted that the government will conduct full social consultations and will keep the public informed of the status of works on development of nuclear energy in Poland.

A critical view of the nuclear programme was presented by **Professor Krzysztof Żmijewski, Secretary General of the Social Consultancy Council of the National Programme for Reduction of Emissions**, who opened the presentation-based part of the debate by stating: *„There are both supporters and critics of nuclear energy present here today. We live in a democratic state, so everyone can express his or her opinions. Activities relating to nuclear energy in Poland cannot take place without social consultations.”*

In a presentation entitled: „Atom. What? Where? When?” Professor Żmijewski presented various versions of the programme for investments to be carried out by 2030, including cost prognoses. In doing so, he reminded the participants of the debate “when thinking of implementing nuclear energy in Poland, one has to remember the gigantic expenditures that this will bring about. And this in a sector that has annual revenues of 5.7 billion.”

Scenario 1 – ‘fast’

Assumed fast introduction of Energy Law, and foresees that social consultations will take place within 1 month. This short period of time is assumed, as in accordance with the acts on trade unions and employers’ organizations exactly this amount of time is allowed for social consultations. It is also worth remembering that nowadays it is not ministries that prepare the letter of the law, but rather that ministries prepare assumptions that are sent to the Governmental Centre for Legislation, which prepares the actual texts of legal acts. This programme can be carried out, but is very ambitious – calculated to the day.

Scenario 2 – ‘normal’

This scenario foresees 22.75 months of legislative works, including the decision of the President.

Scenario 3 – ‘slow’

The longest – allows for 38 months, counting from 1 January 2009 – the date on which a political decision was made in respect of nuclear energy.

Professor Żmijewski also states that: *„As a specialist I have the right to show facts: the government has promised to construct a nuclear power plant by 2020. In my opinion, and also in the opinion of experienced European experts, this is unrealistic! The preparatory phase alone will last from 5 to 7 years! After this, it will take just as long to build the power plant. Let us also remember that selection of partners, investors and contractors will also take some time. In addition, an investment relating to construction of an atomic power station is subject to 3 ecological appraisals: prior to the request for a location, prior to the application for a construction permit, and also before the handover date. Where can this process be speeded up? I leave that to your appraisal.”*

After this, two programmes for construction of nuclear power plants were presented: ‘Programme 1600’ and ‘Programme 1000’.

- ‘Programme 1600’ is a version of the EPR programme. It would mean that two nuclear power plants, each with two power generation units, would be constructed. Construction of a third unit would take more time, due to legal aspects of this undertaking. This plant would give $3 \times 1600 = 4800$ MW power by 2030.
- ‘Programme 1000’ is a version of the AP 1000 programme. Two power plants, each with three power generation units, would be constructed. The consistency of all preparatory processes is assumed, where possible, which would allow for construction of further units over a period of 10.5 years. The plant would yield approx. 5000 MW of power by 2031.

„Each of these programmes is, however, only feasible once a properly functioning act on Atomic Law is set in place. And in Poland we will not build illegally, will we? – with these words the Secretary General of the Social Consultancy Council of the National Programme for Reduction of Emissions concluded his presentation.

Differences between atomic and thermonuclear technologies, i.e. the letters ‘A’ and ‘H’ in the title of the debate, were explained to the participants of the debate by **dr. Andrzej Strupczewski of the Institute of Atomic Energy.**

Doubts that are expressed in discussions on the topic of atomic energy usually oscillate around such issues as: harmful radiation, dangers in case of a breakdown, lack of uranium in Poland and the issue of radioactive waste. In his presentation entitled „Should Poland build atomic power stations or wait for thermonuclear stations?” dr. Strupczewski expressed the view that the normal activity of atomic power stations is actually very safe. He compared the level of radiation (over a period of a year) and showed that there is a greater risk of radiation if one were to move from Zakopane to Wrocław than if one lived right by a nuclear power plant. He also highlighted, by means of a graph, the costs of loss of health in relation to the type of energy produced in a given location in European countries. These costs are lowest in relation to countries where energy is produced in nuclear power plants.

In respect of the issue of energy security, dr. Strupczewski attempted to dispel fears as to Poland’s dependency on uranium supplies. According to his view, a power plant with a capacity of 1000MWe requires only one wagon of fuel per year (in contrast, a coal-burning power plant with the same capacity requires 3 million tons of coal). Such a small amount of fuel can be stored for many years, which allows for suppliers to be changed if needs be. In addition, nuclear power plants supply energy at a stable price that is independent of price fluctuations on the global market.

Dr Strupczewski highlighted that „people are afraid of breakdowns in nuclear power plants and the resulting radiation. Their first thought is the explosion in Chernobyl. But there is a significant difference: the RBMK reactors that were used in Chernobyl were based on solutions used in army reactors. After the breakdown, their power increased rather than decreased, they did not have security covers and were used in breach of security regulations. The reactor that will be constructed in Poland will switch off in case of a breakdown, even if its operators make a mistake”. He also used the example of an EPR reactor manufactured by AREVA to present the system of barriers allowing for security to be maintained in the case of loss of two or even three individual barriers.

As for radioactive waste – the best thing would be to recycle it, as with everything in the XXI century. Diffraction material is used in new atomic fuel, and the products of diffraction are sent for storage, but only for a few hundred years. After that, they become harmless.

Therefore, arguments for construction of nuclear power plants include:

- Elimination of CO2 emissions, protection of the environment and human health;
- A high level of safety;
- Energy security – an abundance of fuel materials (uranium, thorium) and multiple suppliers
- Cheap electricity.

Therefore, is it worth waiting for the thermonuclear synthesis reaction (H)? It is true that it creates the prospect of unlimited sources of energy – safe and without radioactive waste, but there will be a bit of a wait for thermonuclear energy. And the difficulties that we may face are still unknown. In light of the presented facts, dr. Strupczewski appealed for action, and swift action, in the direction of development of nuclear energy, which is cheaper and safer and therefore worth it.

At this point, Professor Żmijewski commented „Atomic energy will be worth it in Poland, that's for sure, but only when there is direct financing rather than financing on the basis of loans.”

Regardless of the type of energy that we choose, it is vital for experts to work in power plants. **Dr Ludwik Pieńkowski of the Environmental Laboratory of Heavy Ions of Warsaw**

University discussed the issue of training of personnel, in a presentation entitled “Where to find experts for atomic energy in Poland.” „*Atomic energy is an expensive investment: it requires a strategy spanning at least several tens of years, therefore the knowledge that these people obtain will be of great use to society!*” – highlighted dr. Pieńkowski. “*Experts are needed: engineers, chemists, physicists, sociologists, finance specialists, lawyers – and this is a task for universities and research institutes. How can we ensure that there is the right number of specialists, constantly available over tens of years? Above all we need an attractive job market and a programme that will connect scientific circles and attract modern technologies, which will be integrated with industry and coal-based energy.*”

Dr Pieńkowski discussed the current strategy for development of nuclear energy in Europe, which is based on three types of reactors:

- Light water reactors (LWR) – currently available technology;
- Fast reactors (copying; in Europe France is the leader of the project);
- High-temperature reactors (HTR) – for production of electric energy, process heat and hydrogen.

He also appealed for opening of nuclear energy to other branches of industry and creation of nuclear-coal synergy. The framework for this would be created in Poland by:

- support for the nuclear energy programme and construction of nuclear power plants;
- initiation of the first European HTR installation at the beginning of 2020;

The programme would be based on European experiences in respect of HTR and coal sources, as well as on the needs of the chemical industry in Poland and Europe.

In summary of his presentation, dr. Pieńkowski pointed out that:

1. Recruitment of personnel for nuclear energy in Poland requires accumulation of knowledge through support for universities and institutes, as well as execution of ambitious, integrated research programmes that demonstrate new technologies.
2. In Poland, coal-based and nuclear energy should be combined. This is a chance for Poland.

The issue of support for and opposition to development of nuclear energy in Poland still evokes many emotions. The first of the speakers of the debate to touch upon this topic was **dr. Stanisław Latek, Press Officer of the President of the National Atomic Energy Agency, Advisor to the President for Information and Communication.** To start, he indicated the increasing role of society in the governmental decision-making process. Previously, it would have been enough to provide adequate information. Presently, however, it is vital that the participation of society in the entire decision-making process is ensured. This enriches this process, but also significantly increases democratic legitimization of the decision that is finally made.

In the contemporary world, social standpoints are as relevant to the state as technological development and economic competitiveness. That is why a condition of development of nuclear energy in Poland is and will be social acceptance. *“Polish society unfortunately does not have a proper view of nuclear energy”* according to dr. Latek. *“This results from a lack of basic knowledge on this topic. Research that is commissioned by the National Atomic Energy Agency every two years shows that only 3% of Poles knows how many reactors there are in neighbouring countries, whereas only 30% know how a nuclear power station works.”* That is why a programme for social education on this topic should be put in place along with the first stage of implementation of a strategy for development of nuclear energy in Poland. Countries in which nuclear energy is highly developed spend enormous amounts of money on education and social information on the topic of nuclear energy. The governments of these countries predestine the equivalent of approximately 1% of investment costs to this aim and build information centres in which one can obtain complex information as to all aspects of the functioning of nuclear power stations. Poland should follow these examples.

According to PENTOR research, carried out in December 2008, almost 50% of Poles (47%) is of the opinion that Poland should build a nuclear power plant in the near future. 38% of Poland's inhabitants is against construction of such a power plant, whilst one in 7 Poles does not have an opinion on this topic. The concept of construction of a nuclear power plant in Poland is more often supported by men than women (61% as opposed to 35%). Individuals over 60 years of age seem the most opposed to the concept of construction of a nuclear power plant, and support for such initiatives increases along with individuals' level of education.

Following this, dr. Latek discussed the most frequent reasons for opposition to the construction of nuclear power plants in Poland. These are:

- Fear of the consequences of power plant breakdowns;
- Association of nuclear energy with the breakdown in Chernobyl;

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- A lack of information about the dangers and benefits associated with nuclear energy;
- The problem of storage of burnt-out fuel and radiation-generating waste;
- Association of nuclear energy with the dropping of bombs on Hiroshima and Nagasaki;
- High investment costs;
- Fear of radiation and radiation itself.

Reports elaborated on this basis of research carried out by the National Atomic Energy Agency also shows that society's fear of nuclear energy also results from:

- The falsely construed connection between nuclear weaponry and civilian nuclear energy;
- A false picture of nuclear reactor breakdowns;
- Excessive fear of radiation-generating waste;
- The belief that the world is moving away from nuclear energy;
- The vision of renewable energy sources as a universal remedy for increasing demand for energy;
- A lack of familiarity with the psychological aspects of risk perception.

Dr Latek also presented tables showing research that was carried out in EU countries and in the US, relating to the issue of support for and opposition to nuclear energy over months and years.

Furthermore, he highlighted that the results of research can often be influenced by the way in which questions are posed and the context in which they are places, as well as by the possible answers that the tested group of individuals has to choose from.

To finish, dr. Latek appealed to the decision-makers of our country to take factors into account when planning an educational campaign: where to start, how to convince people of the need to develop nuclear energy in Poland and how to break the NIMBY ('not in my back yard') syndrome. He also gave several practical pointers (which included those devised by Professor Andrzej Kraszewski):

- The fears and arguments of critics should not be disregarded;
- A broad, complex educational campaign should be carried out as soon as possible;
- One should honestly say where the risk is and what is being done in order to limit it;
- Investors should offer the citizens of towns and areas that border on land on which nuclear power plants are located specific benefits that improve their quality of life;
- Consultations, debates, disputes should be fair and relate to specific (rather than ideological) issues; in this respect, it is not necessary for an agreement to be reached – the will of the majority should decide.
- The role of the moderators of public debates should not be underestimated.

This topic was also discussed from the perspective of the European Commission, by its representative **Dr. Derek M. Taylor, Energy Advisor, DG TREN**. In his presentation, entitled „Nuclear Energy and Society”, based on the results of “Eurobarometer” (public opinion) surveys carried out by the European Commission over the past 40 years (from 1970) , he reviewed the topic of the social support for nuclear energy. Over the years, this research has related to varying aspects of this type of energy, but, in particular, nuclear safety and radioactive waste. The latest research had been carried out in 2007. The main conclusions that result from this research are:

- If asked, the majority of people say that they are interested in nuclear energy;
- People are aware of the fact that they are poorly or very poorly informed when it comes to nuclear energy.

Furthermore, it is clear from the surveys that:

- Three-quarters of the people knows little or nothing of nuclear energy;
- A large number of people believe that there are active nuclear power stations in their country, even if that is not the case;
- The majority of society increasingly realizes the benefits brought about by nuclear energy, which are connected with combating global warming, limitation of dependence on energy imports and stabilization of energy prices;
- However, only 40% of society believes that radioactive waste can be safely stored;

Dr Taylor then went on to present questions from questionnaires relating to nuclear energy that were distributed in EU countries (including Poland). The questions that they contained related to how their subjects agreed with opinions such as:

- Nuclear energy helps to limit global warming;
- Nuclear energy helps limit dependence on import of fuels such as gas or oil;
- Nuclear energy ensures low and very stable energy prices.

The subjects were also asked questions like:

- Should the current level of nuclear energy, as compared to all other energy sources, be decreased, kept at the same level, or increased?
- When you think of nuclear energy, what comes to mind first? (possible answers: benefits, risk, no opinion);

They were also asked whether they think that nuclear power plants are active in their country, whether they are worried by nuclear waste and whether they agree that radioactive waste can be stored in a safe way. It became apparent, that there are great differences in the results of research carried out in various European countries.

On the basis of the results of questionnaires, Dr. Taylor summarised the general level of knowledge possessed by society. It is unfortunately generally poor: people do not believe that they are well informed as to issues connected with nuclear energy, and only a small percentage of society has knowledge on this issue. He also turned attention to the fact that the people that are most negative in respect of nuclear energy are those that have the least information, especially when they are asked about nuclear safety and radioactive waste.

The Advisor to the European Commission also reminded the participants in the debate of the provisions of the Environmental Impact Assessment (EIA) Directive and Strategic Environmental Assessment (SEA) Directive, which describe the studies and reports that must be undertaken before the construction of nuclear power plants, facilities for the storage or disposal of nuclear fuels and radioactive waste and the various other nuclear facilities. Whenever a project or strategy could result in an impact on the environment an EIA or SEA needs to be undertaken that involves informing the concerned public, listening to their views and involving them in the decision making process. This is a legal requirement and failure to do it would result in the company or the responsible authority being taken to court.. The European legislation has been very strongly influenced by the three pillars of the Aarhus Convention: access to information on the environment, the participation of society in making

decisions relating to the environment and access to judicial institutions. The combination of these three elements means that society must be informed of all plans, programmes and projects that could impact on the environment, and must have the opportunity to participate in decision-making processes connected with these plans, etc.

To conclude his presentation, Dr. Taylor appealed for the most complete information to be made available to the public and for society to be included in the decision-making process. “Leaders of public opinion should listen to this opinion, but should lead it rather than allow it to lead them. Politicians should not stop at the assumption that society is “*very interested*’ in nuclear energy” – he highlighted. “*It is also worth remembering the three needs of society, needs for the future: clean air, reasonable prices and security of energy supply.*”

The next point of the programme was introduced by **Ms. Marina Coey**, who stated: „*Today we have the pleasure of hosting the representatives of countries that have developed nuclear energy. Their leaders will share their experiences with us and speak of their nuclear energy programmes and solutions that have been implemented in these countries.*”

The first to speak was **Mr. Marc Bondiou, Science and Technology Attaché, representative of the Embassy of France**, who presented the achievements of his country in respect of nuclear energy.

To begin, Mr. Bondiou thanked the organizers of the debate for the invitation to participate in an event devoted to a highly important topic, made even more accurate since the decisions made by Poland about the diversification of fuel sources and development of nuclear energy, which were announced by Prime Minister Donald Tusk on 14 January 2009. “*France can and wants to be a close partner for Poland in the process of implementing the Polish nuclear programme.*”

Over 30 years ago, after the first fuel crisis, France made the decision to produce the majority of its electricity on the basis of nuclear energy as a means of increasing national energy-related independence. Thanks to this decision, 78% of national energy production originates from nuclear sources. Taking into account nuclear energy and the one produced on

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RES, France has a 50% energy independence factor. France has also one of the lowest CO2 emissions levels among all European countries. Thus, nuclear energy has proved itself to be a strategic, technological and economical choice.

Given climate changes, Europe has decided to introduce a sustainable energy policy, which fulfills the requirements of stability, safety and integration on a regional level. Nuclear energy is therefore a key of success, and includes benefits such as non emission of green house gases, independence towards energy prices, expenditures linked to national economy.

Mr. Bondiou also presented the standpoint of France, its desire to participate in the processes of nuclear energy development in Poland and its willingness to offer its assistance in the implementation of the Polish atomic programme. This partnership can be based on the Polish-French cooperation included in the strategic partnership document signed in 2008. This cooperation can concern a lot of subjects :

- Legal issues;
- Creation and implementation of the necessary public institutions;
- Human resources training and management for technicians, trainers, civil servants;
- An efficient means of waste utilisation that will not provoke a negative response on behalf of the public;
- Cooperation in the scientific fields to create a research background for fourth generation reactors;
- Experiences related to the social acceptance of the introduction of nuclear energy in the country.

France is also interested in the promotion of nuclear energy inside the European Union, as a way to implement an independent and stable energy policy. Same interest is in the participation of Poland to international institutions - Euratom, the Sustainable Nuclear Energy Technology Platform, and the International Atomic Energy Agency – which are all sources of knowledge and experience for nuclear energy.

Finally, Mr. Bondiou expressed satisfaction, on behalf of his country, on the fact that a Plenipotentiary for Nuclear Energy Issues has been appointed within the Ministry of the Economy. He congratulated Poland for the choice of nuclear energy which is a decisive step on the road to reducing CO2 emissions and thanked the organizers of the event once again for their invitation.

Following this presentation, **Mr. Peter Tuominen, Development and Communications Manager of Fortum Corporation, Finland**, took the floor.

“Construction of nuclear energy is undoubtedly a challenge for Poland. In Finland there was a long consultation process so that people could get to know what nuclear energy is about and decide whether it is the type of energy that they wanted to see developed in their country” – said Mr. Tuominen.

It takes time for decisions to be made as to the development of nuclear energy. However, this time is quickly running out, especially in light of the following facts:

- There are 146 active reactors in Europe;
- The average lifespan of one reactor is 23 years;
- Over 18% of reactors are now over 30 years old.

Also in Poland it is important to take into account that it will take time to carry out current plans for construction of nuclear power plants.

Mr. Tuominen presented Finnish experience in respect of construction of nuclear power plants to the participants of the debate. In Finland, people trust the government and believe in scientific authorities. This is the reason for social and political support for nuclear energy. However, this support is also based on reliable scientific opinions. Therefore, it is worth placing emphasis on science, research into nuclear energy and preparation of skilled personnel.

The representative of Fortum presented the phases of the process of construction of a nuclear power plant in Finland (on the basis of the example of Fortum’s Loviisa 3 reactor), and turned the attention of the participants of the debate to the fact that the preparatory process alone takes a long time and is very costly. For example, it takes two years to collect all of the necessary opinions and ecological permits. Finnish law also sets out strict requirements as to the decision-making process – first political decisions, and then technical ones:

- Political decision of the government and parliament;

- Declaration/ consent of the council of the town in which the nuclear power plant is to be constructed;
- Construction licence from the Finnish government;
- Local permit;
- Permit from the ecological authorities;
- Permit for initiation of activity.

„When planning the construction of a nuclear power plant, one must be a realist” – emphasized the representative of Fortum and highlighted that „this process takes some time and is expensive!”

Mr. Tuominen also discussed the issue of storage of radioactive waste as a key factor in obtaining social and political acceptance for nuclear energy. He demonstrated solutions that are used in Finland and admitted that the methods that are used today – storage of waste in cavities deep underground – is unfortunately very expensive.

In conclusion of his presentation, Mr. Tuominen highlighted that *„the only road to success in the case of long-term investments such as nuclear power plants is to understand how many resources need to be used for this to be achieved, and how many rigorous safety requirements must be complied with. For such projects to be successful it is also vital that public opinion is heard and respected.”*

The next presentation, made by **Dr. Holger Tietze-Jaensch, Institute for Safety Research and Reactor Technology, Dept. for Nuclear Waste Management, Head of Product Control Office for Reprocessed Waste** was devoted to the topic of „Germany’s policy in respect of nuclear energy (2000 – 2020).

Dr Tietze-Jaensch began his presentation by discussing an outline of the German Nuclear Energy Programme, which encompasses such issues as:

1. Gradual limitation of nuclear energy production;
2. Responsibility and a schedule of actions;
3. The German Federal Environmental Protection Agency (UBA): energy prognoses;
4. A programme for removal of radioactive waste:
 - a) To the Konrad waste disposal site – low- and medium-activity waste (LAW/MAW);
 - b) High-activity waste: re-processing vs. direct disposal;
 - c) High-activity waste: search for disposal sites and appropriate geological formations;
5. Safety of disposal sites and criteria for acceptance and redemption;
6. Prospects and prognoses.

In Germany, it is the Ministry of the Environment that decides on issues connected with nuclear energy, and its departments are responsible for all phases of execution of the nuclear energy programme, such as: administrative process, storage of waste, security of supply, etc.

The public opinion of our Western neighbours concentrates in particular on issues relating to the safety of radioactive waste. People do not know much about transportation or storage of such waste, therefore their fears are of a psychological nature. In order to convince them of the safety of nuclear energy, they must be assured of this safety, must be shown that the applied methods of waste treatment and management are safe. Solutions applied in other countries cannot be copied to be applied in Germany because of each site's specific local and geological conditions.. Each decision relating to nuclear energy and every solution must be preceded by individual research, which allows these solutions to be adapted to the specific local requirements and the needs regarding the German energy mix.

Dr. Tietze-Jaensch presented means of storage of radioactive waste in deep layers of the earth and discussed the principles of their placement, which are based on:

- Strict adherence to legal regulations (Atomic Law, the Regulation on Protection from Radiation, Water Use Law, the Regulation on Protection of Ground Water and Federal Mining Law);
- Full, complete assessment of the safety of storage facilities and definition of criteria for their acceptance;

- Definition of the relevant characteristics of waste storage facilities and their specification;
- Control of product quality;
- Supply and placement of waste in storage facilities.

He also highlighted that transportation of radioactive waste across the country is currently highly controversial in Germany, and that what's more – sending this waste to other countries (e.g. France) for reprocessing was obligatory in the past and has recently been deemed illegal without any change in technology and practice.

Dr. Tietze-Jaensch pointed out that it is relevant for the future of secured energy to invest in research on integrated and synergized energy production methods and to establish national and European societal networks to define a road-map of energy production networks that will facilitate the implementation of secured energy supply.

Finally, he appealed to the representatives of the government and energy sector that were present at the debate. *“Become aware of your energy-related needs and create a road-map of these needs. Do not leave this to chance and in the hands of some interest biased energy fora.”* He also added: *“politicians may and companies do have specific concepts of energy security which are not necessarily identical.”*

The next presentation focused on the Swedish nuclear energy programme. **Mr. Gunnar Haglund, a Counsellor from the Embassy of Sweden**, started this presentation - entitled „Light and heat in Sweden” - with the words: *„Of all the countries in the world, Sweden has the most developed energy mix, as it has developed both nuclear energy and RES. No other type of energy has divided the Swedish nation as much as nuclear energy.”*

According to the Swedes, the most important aims are energy efficiency and saving. Use of energy in Sweden has been the same for the last twenty-five years, whilst GDP has increased by 80%. The cheapest energy is energy that was never produced!”

Our countries – Sweden and Poland – produce more or less the same amount of energy, but that is where the comparison ends. Poland mainly produces energy from mining fuels. Meanwhile, in Sweden nuclear energy and hydroenergy are used on an almost 50-50 basis, i.e. participate in over 90% in the energy mix. Sweden produces 65-70 TWh of electric energy from nuclear sources on an annual basis.

After the II World War, research was initiated in Sweden in respect of nuclear energy; between 1972 and 1985 12 new nuclear power stations came into existence in seaside areas, which allowed for cooling of the reactors with the aid of water. These were water pressure reactors and boiling water reactors. These investments were mainly financed by the state.

In 1980, a referendum was organised on the future of nuclear energy in Sweden. Society protested against it as a result of fear of radioactive waste and security of installations. As a result of this referendum, the following decisions were made:

- All existing reactors will still be used;
- However, all of them will be closed down by 2010;
- The capacities of other energy installations will be increased;
- The issue of energy efficiency will become a priority.

Today, 10 reactors are active in Sweden. Bearing in mind the resolutions undertaken at the aforementioned referendum, in the second half of the year the government changed its policy and decided that:

- The interim period of activity of the reactors is to be extended;
- The old reactors may be replaced by new reactors;
- The state will not provide funding for nuclear energy investments;
- No new reactors will be constructed in new locations.

„The Swedes are inclined to support their government in these decisions. Mass emphasis on nuclear energy in Sweden has, however, meant that development of other sources of energy has been neglected, which is a shame: - stated Mr. Haglund.

As for heat in Sweden, Mr. Haglund presented the Swedish heating network and the structure of use of fuels involved in production of heat for heating networks and electric energy by means of cogeneration. Almost half of all available heat is produced from timber waste, refined biomass and industrial timber waste. 15 % is communal waste, and 10% results from heat pumps and industrial waste heat. This means that almost 80% of heat in the Swedish heating network, i.e. 40% of total heat, comes from sources that are not used in many other countries across the globe. “*This is called the Swedish energy miracle*” the representative of the Embassy of Sweden summarized with a laugh.

The last point of the conference was a panel discussion, in which all of the speakers and participants of the debate took part.

This discussion was started by **Mr. Kazimierz Grajcarek, Chairman of the Secretariat for Mining and Energy of the Independent and Self-governing Trade Union „Solidarność”**: *“It is sometimes the case in countries that do not yet have a nuclear programme, that this form of energy has to be promoted, and in any case society must be informed of the details of such programmes. There are three groups of Poles: those that are not aware, those that are aware, and those that haven’t received answers to their questions. I belong to the last group, and am most apprehensive of omniscient politicians that repeat over and over that nuclear energy is safe. I believe that the main issue in terms of nuclear energy is not that we need to be provided with information on this topic, but rather that we need to receive answers to our questions. After all, public opinion is there to protect society against madmen who want to force things upon it! Here are examples of questions that I have not received answers to yet:*

- *Is atomic energy cheap, or is it cheap to produce?*
- *What will happen when these „safe, modern nuclear power stations of the XXI century” are suddenly cut off from their electricity supply?*
- *What conditions must be fulfilled by a given part of the country in order for a nuclear power station to be built there?*
- *Where will waste be stored?*
- *What will happen if Ukraine does not support the Climate Package?*

- *We constantly hear that new jobs will be created in connection with construction of nuclear power plants. What will happen if we close coal-powered stations, what will we do with the thousands of people that will lose their jobs?"*

The second speaker to take the floor was **Mr. Józef Naturowicz**, who asked: *„who owns Polish garbage? In light of the fact that we have not managed to establish the answer to this question in spite of one and a half years of efforts to do so, how can we talk of construction of nuclear power plants, bearing in mind that it will take 15 years to do so? After all, the cheapest energy comes from waste! In waste incineration plants only 6% of revenues are gate-fee revenues, and the rest comes from sale of energy. I would like this to be the case in our country, but let us follow the example of those that have already implemented such solutions!"*

Following this, **dr. Andrzej Kassenberg, President of the Institute for Sustainable Development** commented: *„I am terrified, as we constantly hear that the government conducts a dialogue with society, and yet does not do so! All it does is inform it of the decisions it makes! The government disseminates propaganda rather than information about nuclear energy! I also think that the government should look at energy as a whole and only then make decisions as to specific parts of it. If it becomes very active in respect of nuclear energy, it will neglect RES etc. And someone must take care of these issues, although we face the problem of a lack of people to do so. As for locations, it is the authorities of specific regions that want nuclear power plants, not the inhabitants of these areas. And this is impermissible! We spoke here of how nuclear energy will increase the number of jobs, right? In doing so, however, it will take people away from other areas of the energy sector, and this is a problem. It really terrifies me that the government is propagating nuclear energy – something that will not show quantifiable results before 2030!"*

At this point, **dr. Pieńkowski** joined the discussion: *„Of course, during our meeting today a lot of questions were raised, and a separate debate is necessary in order to provide answers to these questions. Each of the speakers had a limited period of time for his presentation. I would only like to add that the safety of storage of waste and other issues connected with the safety of nuclear energy depend on the number of procedures that are devised to deal with various unforeseen scenarios."*

Following this comment, **Mr. Zbigniew Hernas** presented the view that *„the West wants to increase the coal economy. The reason for this is the level of energy prices – expensive energy means economic, social and political problems. Salvation could be achieved by means of a nuclear-coal synergy oriented towards production of synthetic methane.”*

Next, **Professor Żmijewski** took the floor, saying: *„I would like to highlight that today’s debate is not propaganda and we do not support nuclear energy – we are trying to conduct an objective discussion on nuclear energy. I am neither for nor against nuclear energy. I am merely a realist. Poland needs regulations on atomic energy, and we are obliged to speak the truth in respect of nuclear energy. As for jobs: it is obvious that biogas plants with capacities of 3000 MWe employ more people than a nuclear power plant with the same capacity. Let us also remember that CCS and RES are technologies of the future, which is we should make sure that the process of preparing nuclear energy is the same as in the case of the Finns: rational, honest and professional!”*

The discussion was joined by **Mr. Peter Tuominen**: *„Poland should invest in RES and accelerate these works. This is worthwhile, and should be carried out quickly, especially in terms of replacing old reactors where necessary and building new ones. I also call for you to ask yourselves: do we believe in climate change? We must treat this issue seriously, because it does exist.”*

Dr. Dmochowski then posed the following questions: *„Has our government made the decision to implement ready-made solutions tested in other countries? And when we start to build nuclear power plants, will there already be personnel that will be able to work in them? And will we have offset agreements? I would also like to turn your attention to the example of the Koreans: they do not have waste storage technology, so they keep this waste within the boundaries of their nuclear power plants – and this is a good idea. Let us remember that there is a difference between the terms ‘storage’ and ‘disposal’. Therefore, let us store our waste until we know what to do with it.”*

Dr. Strupczewski commented: *„Our industrial companies have already made equipment for the power plant in Żarnowiec. Poland can once again prepare for production of parts of nuclear power plant reactors. This will create jobs and increase the level of our technologies. Hundreds or thousands of different businesses will be involved in the construction of nuclear power plants. They will include Polish firms that participated in*

construction of nuclear power plants in Finland. Meanwhile, the reactors themselves are built by only a few firms, including the firms AREVA and Westinghouse, which offer III generation reactors that have been perfected over a number of years and tested. Power plants built in Poland will encompass reactors bought from a company that makes such equipment well. Our companies can certainly make parts of nuclear power plants, but not reactors.”.

The next person to speak was **Mr. Herbert Leopold Gabryś**: *„if we reverse roles and society expects a change in views on nuclear power plants, it will force politicians to discuss this issue. What’s more: when it comes to nuclear energy, lies are incredibly vengeful. I therefore appeal for truth in discussions on nuclear energy.”*

The penultimate speak was Dr. Derek Taylor, who stated: *„In Poland there should not only be an Atomic Law, but also as much information as possible and people to provide answers to questions. As for the costs of energy produced from coal: yes, coal is cheap, but it pollutes the environment. That is why the Commission has come up with the idea of CCS as a means of protecting the environment. There was also discussion on jobs in nuclear power plants: that’s true, but only a small number of these employees have a university education, whereas the majority has a technical background. In addition, I believe that we must look at all energy sources, as they are all necessary in order to ensure energy efficiency.”*

The discussion was summed up by **dr. Tietze-Jaensch**: *„It is time for politicians to provide a response to public opinion. It is also worth making a decision now, rather than waiting. I believe that there is no point in planning construction of only just one nuclear power plant, as this will be cost-inefficient in the context of the entire nuclear process cycle. As for waste: the disposal technologies that are currently available, including those relating to highly active waste, are safe – it is however important for the public to acknowledge this. Moreover, I also strongly appeal for training of personnel – specialists on nuclear energy.”*

The contents of the presentations mentioned in this report, as well as video coverage, are available on the website of Procesy Inwestycyjne sp. z o.o.: www.proinwestycje.pl.