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NUCLEAR DEVELOPMENTS IN HUNGARY

THE HUNGARIAN NUCLEAR DEVELOPMENT PROGRAMME

1. Why Hungary is pro nuclear?

- **Energy mix according to National Energy Strategy (gross electricity production + net import)*** (%):

	2010	2020	2030 Nuclear-Coal-Green (most likely - planned scenario according to Government)
Nuclear	37	33	54
Natural gas	29	42	39
Renewables	7	12	16
Coal	14	5	5
Import	13	9	-14

* National Energy Strategy 2030, prepared by the Hungarian Government, July 2011, p.77.

- Nuclear energy provides 37% of electricity consumption in 2011.
- Hungary is currently a net electricity importer (13 % of consumption comes from import).
- **Hungary is one of the most dependent EU state on Russain natural gas import** (77% of consummed gas is import, 80% of import comes from Russia). Aim of Hungary: terminating energy dependency.
- Growing energy demand and relatively smaller growth of supply.
- Renewable energy will grow (from 7% to 12% by 2020 and 16% by 2030) but in itself will not be sufficent to resolve growing demand. Hungary is not particularly rich in natural resourcers suitable for the production of renewable energy.
- Nuclear energy is not a politically sensitive issue: there is no strong opposition against nuclear energy within population, current Government enjoys strong political backing.

- **Conclusions:**
  - In the long-term energy strategy of Hungary, nuclear energy will keep its importance. According to National Energy Strategy (2011) the most likely scenario is that the proportion of nuclear energy will be increased by 2030 to 54% and Hungary becomes a net electricity exporter.
  - **There are two nuclear projects running in line with the Government's strategy:**
    1. **extension of the lifetime of the existing four blocks (altogether 2000 MW) by 20 years;**
    2. **construction of two new blocks of 1000 MW-1600 MW capacity each.**
  - Following Fukushima Government repeatedly emphasises its continuing support for lifetime extension and the construction of two new blocks.

2. Paks nuclear power plant: the sole Hungarian nuclear power plant

- **Owner**: Hungarian State (through Hungarian Power Companies Ltd., in Hungarian: MVM Zrt.).

- **Total capacity**: 2000 MW.

- **Blocks:**four VVER-440 PWR type blocks built by Soviet Union, and the blocks started operation between 1982 and 1987.

- **Lifetime:** originally 30 years, expected shutdown:
    - in lack of extension: between 2012 and 2017;
    - with extension: between 2032 and 2037.

3. Life cycle extension project

- **Project:** extending the service life of the nuclear power plant units by another 20 years beyond the planned operation lifetime (extension to 2032-2037).

- Current standing of the project:
  - environmental licence already issued in 2006;
  - approval of the Service Life Extension Program by the Hungarian Atomic Energy Authority in 2009.

- Expected time-frame of licensing:
  - extension licences are expected to be gradually issued for the four blocks in 2012-2017.

4. Construction of new blocks

- Construction of two new blocks besides the existing four blocks in Paks, 1000-1600 MW capacity each, with an expected lifetime of 60 years.
- **Overall timeframe:** 11-12 years, expected start of operation in 2020 and 2025.
- **Political decision:** Hungarian Parliament granted its – almost unanimous – consent to the concept and the commencement of preparatory works in 2008/2009.
- **Preparation phase is currently running:**
    - Definition of the appropriate type, size of the blocks is underway.
    - Construction tender
        - being prepared and expected to be issued in 2012;
        - potential bidders will have 6 months to prepare their bids;
        - expected deadline for evaluating the bids: early 2013;
        - expected start of the construction: end of 2013.

- **Potential investors**

  - **Atomstrojexport**
    (Russian, offering AES-2006; 1150 MW);
  - **Westinghouse**
    (USA-Japan, offering AP1000; 1000 MW);
  - **Areva**
    (France, offering EPR; 1600 MW);
  - **Areva-Mitsubishi Heavy Industries joint venture**
    (France-Japan, offering ATMEA 1; 1000 MW).

- **Key considerations of the project**:

  - **Ownership:** Paks NPP and the project will remain in majority State ownership.
  - **Block size:** 1,000-1,600 MW.
  - **Block type:** G3 pressurized water reactor, already licensed in an EU member state.
  - **Costs:** EUR 2,000-3,000 / kW; EUR 2-4.8 billion / block.
  - **Financing**: own sources of the Hungarian Power Company Ltd and external sources (involving investors, issuing shares).
  - **Technical requirements:** based on EUR (European Utility Requirements for LWR Nuclear Power Plants).

EFFECT OF FUKUSHIMA: EMPHASIS ON SAFETY ISSUES

1. Historical safety record of Paks

- **2003 incident**
    - INES (International Nuclear Event Scale) level 3 incident (serious incident) in Unit 2 reactor.
    - Cause of the incident: inadequate cooling of the fuel elements in cleaning tank.
    - The reactor remained out of service for over a year, finally resuming commercial electricity production in September 2004.
- **2009 outage incident**
    - INES 2 incident in 2009;
    - a self-powered neutron detector (SPND) was dropped when the wire rope holding it broke during an outage;
    - all staff was evacuated, but no member was exposed beyond the permitted daily radiation dose.

2. EU stress test

• The specifications, scope and modalities of stress tests are determined by the European Nuclear Safety Regulators Group (ENSREG) and the Commission, involving the Member States and the Western European Nuclear Regulators Association (WENRA).

• Key issues in Hungary - initiating events

- earthquake;
- low or high water level of the Danube;
- bad weather conditions;
- inner causes (technical degradation, faulty planning or design, human omission or fault of maintenance).

• Progress Report of the Hungarian Atomic Energy Authority is generally optimistic, but certain concerns are indicated (e.g. potential subsidence – i.e. moving into a lower level – of the ground in case of earthquake, fire station of the site is not qualified for earthquake resistance).

HUNGARIAN LEGAL FRAMEWORK OF NUCLEAR ENERGY – AT A GLANCE

1. Hungary is part of most of the relevant international treaties including

- e.g. IAEA Vienna Convention on Civil Liability for Nuclear Damage (21 May 1963);
- e.g. IAEA Convention on Physical Protection of Nuclear Material (3 March 1980);
- e.g. IAEA Convention on Early Notification of a Nuclear Accident (26 September 1986);
- e.g. IAEA Convention on Nuclear Safety (17 June 1994);

but excluding certain treaties on nuclear damage liability issues:

- Convention on Supplementary Compensation for Nuclear Damage (22 July 1998);
- Optional Protocol Concerning the Compulsory Settlement of Disputes to the Vienna Convention on Civil Liability for Nuclear Damage (14 October 1999);
- Paris/Brussels Convention on Third Party Liability in the Field of Nuclear Energy (29 July 1960).

2. Hungary is part of the EU, EURATOM directives, regulations are applicable:

- e.g. Council Directive 2009/71/Euratom establishing a Community framework for the nuclear safety of nuclear installations.

3. Key legislation is the Atomic Energy Act (116 of 1996)

4. Key state responsibilities

- Parliament:
    - The Parliament's preliminary approval is required for the commencement of preparatory work for the establishment of a new nuclear facility or radioactive waste disposal facility.
- Government:
    - The Government's preliminary approval is required to the acquisition of the ownership title and the transfer of use of an existing nuclear facility.

- **Hungarian Atomic Energy Authority** (HAEA):
    - Full scope regulatory tasks including licensing, monitoring, law enforcement, international cooperation.
- Minister of National Development:
    - Responsible for subordinated legislation applicable to the Hungarian Atomic Energy Authority.
- **Minister for National Resources (minister responsible for health):**
    - Various licensing tasks relating to health and safety including ownership of radioactive materials, construction of nuclear facilities, radioactive waste disposal facilities, decommissioning of facilities, etc.

CHANGES IN THE LEGAL REGIME SINCE FUKUSHIMA: REVISION OF THE ATOMIC ENERGY ACT

1. Revised set of definitions

- **Nuclear facility**: broad scope, includes enrichment plant, nuclear power plant, fuel production factory, reprocessing plant, spent fuel storage facility, research reactor facility. New definition is in line with 2009/71/Euratom directive.
- **Nuclear power plant**: facility generating electric energy though regulated nuclear chain reaction.
- **Spent fuel** means used nuclear fuel that is removed from the power plant, but which can be – in principle – reprocessed out of the power plant. (Reprocessing means the extraction of remaining uranium and plutonium from the spent fuel.)
- **Radioactive waste** means radioactive material which is not subject to (further) reprocessing but which cannot be treated as ordinary waste due to its radiating nature.
- **Nuclear safety:**
    - operational conditions, preventing accidents, and mitigating the consequences of accidents in all life cycles of nuclear facilities
    - as a result of which the defence of the employees and the population against ionising radiation from nuclear facilities can be accomplished.

2. New set of general principles

• Reflect the highest level of IAEA (International Atomic Energy Agency) nuclear safety requirements and also the result of discussions within WENRA (Western European Nuclear Regulators' Association).
• The principles are worked out in more details in the new Nuclear Safety Regulations (112/2011.(VII.4.) Government Decree).
• Revised safety principles include:

- **general precondition of the use of atomic energy: advantages to the society should be greater than risks of endangering people, environment and physical assets;**
- independent Regulator (Hungarian Atomic Energy Agency);
- management committed to safety principles at both the Regulator and the Licence Holders;
- primary responsibility for safety at the Licence Holders;
- user of atomic energy ensures ***reasonable protection*** against radiation**;**
- the user of the atomic energy ensures the ***highest reasonably achievable safety level*****;**
- preparedness for extraordinary events.

3. Tasks of the Regulator (Hungarian Atomic Energy Authority)

- Main tasks include licensing and control role in connection with
  - safety of nuclear facilities;
  - nuclear non-proliferation (spread of nucleat weapons, fissile material, and weapons-applicable nuclear technology and information, to nations which are not recognized as "Nuclear Weapon States");
  - registration and import of nuclear materials;
  - protection of nuclear facilities and materials;
  - transportation and storage of nuclear materials.

- Comprehensive supervisory role of the Regulator includes
  - licences and approvals;
  - continuous analysis and assessment (feedback from operational experiences, formation of various technical indicators, fact collection and assessment of on-line available data);
  - control checks;
  - enforcement procedures.

- **Most current significant specific** tasks of the Regulator include:
  - evaluation of life cycle extension programme of the existing 4 blocks in Paks, licensing of the life cycle extension;
  - supervision of the long term treatment of fuel rods damaged in the 2003 incident in Paks;
  - supervision of the newly introduced equipment-supervisory and maintenance procedure (US ASME standard);
  - licensing of the construction of new blocks;
  - introduction of supervision, based on risk management (enabling efficient allocation of resources).

4. New licensing rules relating to transformation

- **Transformation:** means final intentional change in the physical conditions, the organisational or management structure, the technical documentation or internal rules of the nuclear facility.
- **Practical relevance:** transformation normally occurs during the annual stoppage/maintenance. In addition, the life cycle extension of power plant blocks involves intentional changes amounting to a transformation.
- **There will be a new simplified system of licensing:** instead of several phases of licensing, there will be only one licence required to transformation. Preliminary licence will no longer be required for transformation.
- In case of transformation ***the focus of the Regulator shifts from licensing to control***. This results in increase level of autonomy for the Licence Applicant/Licence Holder. Only those phases of the transformation require licence which involve intervention in the currently operating system – and thus have an impact on safety. Prior preparatory phases not requiring connection to the operating system (e.g. production, purchase of system units) are not subject to licence, but are under the supervision of the Regulator.

- The above described licensing regime of transformation is in line with the recommendations of the IAEA to simplify the licensing regime of nuclear facility transformation.

- The above ***new regime of licensing does not apply to the construction and development of new nuclear facilities***, in which cases the purchase, production of systems units will continue to be subject to licensing.

5. Independent experts

- Whenever legal rules applicable to atomic energy require the involvement of experts, ***only those experts may be involved who are registered and licensed for such activity***.
    - E.g.: In case of activities involving a significant impact on nuclear safety of nuclear installations, in the course of the licensing procedure the applicant must submit an independent expert opinion. (Section 13(2)).
- Licence of independent experts is issued by the Hungarian Engineer Chamber, Atomic Energy Department. Detailed requirements will be laid down in subordinated legislation – not yet issued.
- Such experts must be independent and impartial, their remuneration may not depend on the findings contained in their expert opinion.
- ***Non-EEA (European Economic Area) experts*** may only render such expert services if their expertise for the given issues are **acknowledged by the Regulator on a case by case basis**.
- ***EEA resident experts will also have to be registered in the nuclear expert registry kept by the Hungarian Engineer Chamber*** (under the same conditions as Hungarian experts).

6. Physical protection of nuclear materials and nuclear facilities

- The rules reflect the amendment to the IAEA Convention on the Physical Protection of Nuclear Material (New York, 1980) and the guidance of the IAEA on the physical protection
- Physical protection means the aggregate of those defence means (including regulation, technical facilities and manpower) which are aimed at guarding against (deterring, detecting, delaying and averting) theft and sabotage connected to nuclear facility, nuclear and radioactive materials.
- The director of the Regulator will issue best practices guidance on how the rules of physical protection can be implemented by Licence Holders.
- Division of responsibilities for physical protection:
    - ***up to the level of "design basis threat"*** it is the Licence Holder's responsibility to ensure physical protection. The level of "design basis threat" is established by the State;
    - ***beyond the level of design basis threat*** it is the State's responsibility to ensure physical protection.
- Once the level of "design basis threat" is established, the Regulator will order the Licence Holders to prepare physical protection plan.

7. Storage of spent fuel and radioactive waste

- Licence for the operation of a nuclear plant can only be given if it is certified by the Licence Applicant that the safe storage of the spent fuel and radioactive waste can be ensured (Section 38(1)). Safe storage means storage which is in line with state of the art science findings, international expectations and experience.

- The ***cost*** of temporary and final ***storage*** of spent fuel, the final storage of radioactive waste and the dismantling of the nuclear facility ***shall be borne by the Licence Holder*** through payment into the Central Nuclear Financial Fund.

- The ***Central Nuclear Financial Fund*** is a central governmental fund.

- ***Tasks*** related to temporary and final storage of spent fuel, the final storage of radioactive waste and the dismantling of the nuclear facility ***are actually carried out*** by Radioactive Waste Management Non-profit Company, which is a ***governmental organ***.

THANK YOU FOR YOUR ATTENTION!

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