Expansion of the Paks Nuclear Power Plant with new units

Investment in the future

Necessity of increasing the Hungarian nuclear capacity

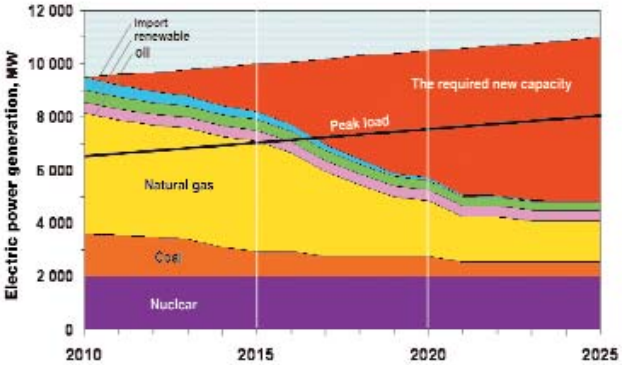
Most of the generating facilities operating in the Hungarian electricity system are morally outdated (due to their lower efficiency and therefore higher environmental pollution when compared to the state-of-art technical standards), as a result a considerable part of them are not competitive in the regional electric power market and their age is beyond the values considered at the design stage and they are expected to phased out in the near future. This and the expected increase of the requirements for electric power will necessitate the commissioning of 5-7,000 MW new generating capacity even with the temporary decline caused by the economic crisis. The increase of utilisation of renewable energy resources expected by the European Union may cover only one part of the new demand, the import cannot be enlarged, what is more, it is expected that imports will decline already over the medium-term. Therefore, the guaranteed supply of electricity and price stability in Hungary also requires the construction of conventional power plant units. Based upon the detailed system analyses, 2-3000 MW nuclear power plant capacity can be installed and utilised in the national system between 2020 and 2030. In base load power plant mode, the calculations show that the nuclear power plant has no competition, this is the only way to ensure the minimum consumer prices as well as the consumer price stability with minimum dependence on the fuel prices in the world market.

Today the world economic crisis does not really seem to end, however, the forecasts of the economic research institutes are in agreement that the economic decline will stop after 2010 with the stabilisation of the financial relations. It is difficult to define that after the crisis there will be a new trajectory of growth in terms of quality or the pre-crisis correlations remain unchanged. On the basis of the mid- to long-term capacity plan of MAVIR (the Hungarian TSO) for 2009, growth with a smaller rate than earlier can be assumed.

On this basis, it is assumed that on the average, 1.5% annual growth is anticipated after 2010 in the net electricity consumption. This is also confirmed by the forecast of independent institutions (e.g., IEA – International Energy Agency) of 1% growth with respect to the electric power consumption in the EU and by all means it is assumed that the increment will be above the average in Hungary as regarding the per capita electricity consumption Hungary is at the last place in the European list of countries.

The situation is going to be aggravated also by the fact that because of the decline of the current export capacities of neighbouring (UCTE and CENTREL) countries, similar problems will arise there, i.e., the shortage cannot be substituted through imports.

The gross peak load of the Hungarian electricity system may increase by about 1,000 MW in accordance with the forecast of MAVIR. As a result, the about 9 GW power plant system should grow to about 11 GW in about 15 years, however, because close to one-half of the outdated power plants should also be renewed, it will be necessary to set up many new power plants – primarily for replacement purposes and to a smaller extent because of the increase of consumption (as it is also shown in the figure derived from the forecast of MAVIR). As a related project, it is also possible to build new nuclear power plant units.



The Teller Project – preparation of the political decision

In accordance with the provisions of 7. para (2) of Act No. CXVI of 1996 on nuclear power, it is necessary to acquire the advance approval in principle of the Parliament for starting the preparatory activity before setting up a new nuclear power plant or the expansion of an existing power plant with a unit incorporating an additional nuclear reactor. The establishment of a nuclear power plant is preceded by an extremely careful process of preparation and licensing taking may years, and minimum eleven years are needed from the

Ede Teller

day of political decision until commissioning. Keeping all this in mind, the Parliament – having approved the document 'Energy policy for 2008-2020' – requested the Government to start the decision-preparatory work related to the new nuclear power plant capacities and to present to the Parliament its proposals in due time regarding the necessity of the project, the relevant conditions, the type and construction of the power plant after the relevant professional, environmental protection and social grounding activities.

In order to ensure this process, the Hungarian Electricity Works started its project named after Ede Teller[1] in 2007. The documents prepared in the project:

Feasibility study

The authors of the 150 pages long study presented that a new nuclear power plant can be built, integrated into the system and operated with economic efficiency in a manner protecting the environment and such a project can be financed. The most important features of the power plant types currently available in the market and suitable for construction were surveyed on the basis of technical and safety requirements and proposals were made as to the types, which are worth considering for the construction planned. The expected environmental and communication impacts of the new units were evaluated, assuming that the new nuclear power plant will be implemented on the already operating Paks site. Analyses were made for integrating the new capacity into the grid and for the safe transmission of the electric power generated. The viability, return and financing of the project as well as the possibilities of risk management were confirmed by analyses of economic efficiency and costs. The possible options of the construction process were reviewed together with the possible procurement options of the equipment as well as the human resource requirements of the investment and operation. Furthermore, a comprehensive analysis has been completed about the licensing of the new units and the social acceptance of the project.

[1] Ede Teller (1908-2003) world famous physicist, outstanding supporter of nuclear power and the nuclear power plant of Paks

Preliminary environmental impact assessment

This document was made in a relatively large volume, over 100 pages, in accordance with the general logical framework of the environmental impact assessments incorporating all the usual elements of contents. It is still regarded as preliminary, because the depth of elaboration was in compliance with the needs to obtain political approval (more detailed documents will be made for obtaining the licence of the environmental protection authority). According to its conclusions, there cannot be any environmental obstacle to setting up the new units of the nuclear power plant as the normal operating environmental impacts are neutral or negligible, while the environmental impact of the failures under the design scope is practically localised on the territory of the nuclear power plant in case of the new type of units meeting the European requirements. The Paks site is suitable for incorporating the new units. The risk of major accidents in the nuclear power plant involving health impact is negligible, with a frequency below 10-7/year. During the construction, operation and decommissioning stages of the units, no such radiological or traditional environmental impacts are expected, which would have a substantial load on the closer or more remote environment of the power plant.

Disposal of the spent fuel assemblies and radioactive waste from the new nuclear power plant units

It is necessary to have a clear in-country concept before setting up the units about the safe disposal of the spent fuel and radioactive waste generated during the operation. The proposals are included in the almost 40 pages of documents, of which two findings are highlighted:

- Preparations are to be made for the construction of an in-country geological storage facility as this will be necessary for the direct deposition of the spent fuel or for the final storage of the high-activity waste recovered from the fuel processed abroad.
- It is necessary to have an active involvement in the international cooperation organised for the closed fuel cycle (to ensure the recycling of the spent fuel and minimising the amount of the high activity waste).

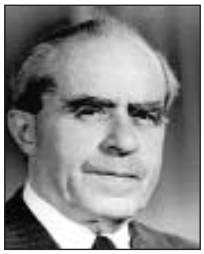
The documents determine that the proposed most convenient choice is such a modern pressure water nuclear power plant to be set up on the Paks site, which already has a licence somewhere, is not a prototype and features a service life expectancy of 60 years. Such units are available in the market.

The implementation time is 11 to 12 years (of which the preparatory stage is 5 to 6 years, including the 3 years of licensing, with 6 years of construction), therefore, in order to connect the units to the grid in 2020 and 2025, respectively, it has become clear that the decision-making

and the start of implementation cannot be delayed for too long. The as early as possible decision was also necessary because there is a growing willingness to build nuclear power plants all over the world and due to the limited delivery capacities, a line up may arise, which may delay the projects and make them more expensive.

Based upon the decision-preparation documents above, the Government submitted a proposition to grant its in-principle approval, which was accepted by the Parliament with a majority of votes of 95.4% by means of its Resolution[2] No. 25/2009. (IV. 2.) OGY on 30 March 2009:

Yes:	*330*	*95,4%*
No:	*6*	*1,7%*
Abstention:	*10*	*2,9%*
Voted:	*346*	*100,0%*
Not voted:	*39*	



András Lévai

The Lévai Project – the continuation

For the implementation of the resolution of the Parliament, the project identified by the name András Lévai[3] was established in the beginning of July, 2009.

The aim of the project is to perform the preparatory work for the new units to be set up on the Paks site, the acquisition of the full scope of licences and the steps of the concrete implementation. The main issues related to preparation and implementation:

- the expected ownership structure of the new units, the setting up of the company for implementing the project,
- possibilities of financing of the project, the preferred method of financing,
- defining the unit size, type and the optimum commissioning, which can be integrated into the regional electric power system with economic efficiency and meeting the technical-safety requirements of the EU,
- scope of potential suppliers for implementation, the basic principles of selection,
- preparation and implementation of licensing, with special regard to social acceptance,
- preparation of the region and of the national economy for the implementation of the project.

Until the tenders for delivery are evaluated – presumably by the end of 2012 – seven working committees work on the project:

- preparation of the financing background, setting up the project company,
- implementation of the delivery tender,
- further elaboration and supplementing of the technical analyses,
- licensing tasks,
- legal tasks,
- social acceptance, tasks of communication with the citizens,
- tasks of economic organisation.

The so-called in-house concept of preparation was completed through synthesising the preliminary analyses carried out in the working groups, which was approved by the Board of MVM in its session held in Paks on February 26, 2010 [4], also granting approval for the foundation of the wholly owned shareholding company for the preparation of expansion.

The concept[5] spells out the following:

- The project shall be so implemented that even after financing it remains majority held by the state (MVM). Financing shall be prepared accordingly.
- The project company shall be preferably established – with the as early as possible involvement of the future minority co-owners – leveraging on the capabilities of the integrated MVM Group and the nuclear know-how of the Paks Nuclear Power Plant Ltd. – retaining the operating reliability and standard of operation of the existing equipment.
- The 1,000-1,600 MW unit category suggested by the preliminary analyses can be integrated into the Hungarian electricity system, the necessary grid development can be added, however, further analyses are needed under the Lévai Project to provide the optimum reserve for the case of outages – with the related size of the preferable unit – as well as the system of cooling water supply, the details of grid connection.

[2] The Parliament grants its preliminary approval in principle pursuant to Section (2) of Para. 7 of the Act CXVI of 1996 on nuclear power - in compliance with the provisions of Section 12. f) of the Resolution No. 40/2008. (IV.17.) OGY on the energy policy for the period of 2008 to 2020 - to start the preparatory activity for setting up new unit(s) on the site of the Paks nuclear power plant. This Resolution becomes effective on the day it is published.

[3] András Lévai (1908-2003) member of the Hungarian Academy of Sciences, university professor, had an essential role in the foundation of the nuclear technology in Hungary and as Deputy Minister in charge of energy, in the establishment of the Paks nuclear power plant.

[4] Resolution No. 46/2010. (II. 26.) of the Board

[5] The essence of the concept can be found on the webpage of MVM http://www.mvm.hu/engine.aspx?page=showcontent&content=paks_koncepcio_sajtokozlemenyek_20100226

These analyses shall be completed as soon as possible – preferably within 2 years – to adjust to the licensing procedures of the authority. When selecting the unit type to be specified for the tender invitation, in the interest of licensing, implementation and the future operating efficiency it is necessary to take into account the local experience, the expertise and the European authority licences existing for the equipment type.

- The regulation to ensure the background of licensing, the scopes of tasks of the participating authorities and their cooperation shall be harmonised as soon as possible in the already operating framework. Acquiring the final consent of the society, fulfilling the conditions specified by law, observing the deadlines and enhancing the value of the site, the processes for site and environmental licensing which are the condition to implementation shall be started immediately, regardless of the type of the unit.
- The activities above shall be carried out so that the requests for proposals can be issued within 2 years. The delivery deadlines shall be adjusted to the optimum time for commissioning. When selecting the suppliers, efforts shall be made to maximise offset and the involvement of the Hungarian suppliers and entrepreneurs. This may promote the preparation and development of the Hungarian industry and may reinforce the political and social support.
- Financing shall be primarily carried out in the framework of corporate financing by the owners of the project company, however, efforts shall be made at maximising the supplementary funding in the course of preparing the financing by export credit guarantee and purchasing of drawing rights. In order to maintain the financing capabilities of MVM Zrt. the profits generated by the existing activities shall be reinvested to the greatest possible extent.
- The precondition for the successful implementation of the project is the establishment of professional and HR background, especially in this regard the development of vocational training to acquire special competences and university education. The launching of a focused programme tailored for this objective should be considered.
- In order to ensure the transparency of the project, the advisors - financial, legal and others - shall be selected in a transparent manner.
- The operation of the four units of the Paks nuclear power plant, the preparation and implementation of the service life extension shall be continued at the current high level.

What shall be investigated and implemented in the course of the Lévai Project?

Examinations and preparations shall be made in the working groups in the following areas in compliance with the concept approved by the MVM Board:

Financing background, preparation of the project company

The capital investment is expected in the order of 2-4.8 billion EUR in case of establishing one unit of 1,000 to 1,600 MW – by considering a specific investment cost of 2,000 to 3,000 /kW, also taking into account the risk of increase of implementation costs.

The calculation and more exact definition of the investment costs have been made based upon data in the public domain (typically showing the specific investment expenses). In the course of the Lévai Project it is necessary to review the investment estimates – with special regard to defining the calculations of return and financing - in the course of which it is also suggested to directly involve the potential suppliers.

The power plant implementation, as of necessity, can be financed from several resources. The relevant funding sources for the power plant development can be as follows:

- own funds (the own financing capability of the MVM Group)
- external resources (involving professional, financial investors, issuing shares)

The sale of the electricity generated, as the basis of revenue, determines the return of investments, and as such, the possibility of financing and the availability of the various funding sources. As a major capacity shortage is expected in the coming decade due to the continuously growing consumption requirements and the planned closing of the existing in-country power plants, the selling of the electricity generated at competitive prices will be ensured in the market.

The detailed financing concept shall be elaborated, in the course of which the potential funding sources (own and external resources) will be reviewed and the financing of the project can be ensured by means of their appropriate structuring.

In the course of the preparation for the expansion, the various licences shall be prepared by and requested for a project company majority held by the state (MVM Zrt.) in charge of operation. Minimising the risks of licensing can be enhanced by inviting strategic investor partners having experience in the practice of nuclear licensing and project preparation. By inviting partners, the majority of state ownership cannot be jeopardised.

Preparation and implementation of the supplier tender

The supplier and the type of the units to be set up – in line with the international practice – shall be selected through a tendering procedure. This is a complex process consisting of several stages (inviting of tenders › arrival of tenders › processing of tenders › announcing

the winner › detailed negotiations › contract). The objectives include: gaining information from the potential suppliers, the overview of the supply (technical-safety indicators, economic parameters), seeking and finding the best supplier, preparation of the technical contents of the supplier contract regarding which special attention shall be devoted to the international tendencies and the local endowments.

The process is essentially determined by the type of nuclear power plant, the technology to be applied in the course of the expansion as well as the technical requirements to be specified for the equipment. At this stage primarily 3rd (or 3+) generation unit types are available in the commercial market of nuclear power plants. The 3rd generation types were designed in the 1990s through the further development of the 2nd generation units operating today all over the world. Important objectives were the significant decrease of probability of the major accidents and the substantial decrease of consequences of the eventual accidents as well as the improvement of economic efficiency.

Design features:

- Efforts made at increasing the inherent safety, primarily through the application of passive protection systems. These units fully satisfy the target values of ≤ 10-6 /year specified for the frequency of zone damage and ≤ 10-7 /year specified for high radioactive discharge by the potential European operators intending to satisfy the needs of the licensing authorities.
- In the course of design, efforts were made at standardising the equipment, simpler construction and the use of fewer components in the hope to have a faster licensing procedure and shorter implementation time.
- The design life expectancy of the units is typically 60 years. With the improvement of maintainability and shortening the time of general overhauls and refuelling the capacity utilisation factor was improved to a value above 90%.
- With the improvement of fuel a higher level of burnout and more favourable fuel utilisation were achieved, this also leads to a smaller amount of radioactive waste.

It is clearly concluded from the joint assessment of the world trends and the national professional experience with nuclear power plants that a 3rd generation pressure water nuclear power plant should be constructed in Hungary. There are several models and suppliers present in the market of this nature, among which the technical and safety assessment identified the following as promising models (in alphabetic order):

- AES-2006 (VVER) model, supplied by Atomstroyexport of Russia
- AP1000 model, supplied by the American-Japanese Westinghouse-Toshiba,
- ATMEA-1 model, developed/manufactured by the French–German–Japanese Areva-MHI

EPR model, supplied by the French–German Areva.

Each of these multinational corporations have recognised competence and relevant experience in building nuclear power plants. Moreover, the supply is relatively balanced, there are no prominently good or poor versions. Each possible model is sufficiently safe and technically advanced according to the analysis conducted so far as well as the references.

The tender can also be invited with a breakdown into major packages (e.g., nuclear island, turbine island) or for complete, turnkey delivery, depending on the strategy of implementation. The RFT shall be made according to the structure generally applied in the international practice in case of major projects of the energy industry, which is also well-known for the potential suppliers.

With respect to the technical requirements, the starting point must be the comprehensive system of requirements specified by the European utility corporations for 3rd generation light water reactors, i.e., the EUR (European Utility Requirements for LWR Nuclear Power Plants). The part of the technical requirements above this is constituted by the national/international licensing requirements, local conditions (site, energy system, climate, etc.) and the requirements originating from the operating experience.

Among the evaluation criteria incorporated in the future tender invitation the engagement of the national suppliers to the greatest possible proportion shall be a key requirement. Therefore, it is extremely important to collect the data of the potential national suppliers (company, contact person, specifications of deliveries and services by professions and activities, equipment, capacities, delivery deadlines, import components, references, features of quality assurance system) and publication in an annotated list. The offset programmes offered by the suppliers (e.g., investments in Hungary) shall also constitute a key criteria of decision-making.

According to the preliminary information, the professional investors have somewhat different preferences as to types. Some of them would be pleased to participate in the Paks investment project regardless of the kind of supplier or model, however, others clearly stated that they would give more or less preference to certain versions. Therefore, the composition of the project company may also have an impact on the weighting among the selection criteria applied in the course of assessment of the tender. Therefore, the complex system of safety, technical, financial and political criteria may also be shifted even to the direction of an econom-

ic-policy decision. The technical professionals do not have a negative appreciation of this situation as they are convinced that the country may benefit from any of the modern nuclear power plants listed above.

Tasks of technical-economic analyses

The analyses carried out in the Teller Project were detailed sufficiently to acquire the political support, however, for further progress they must be complemented, deepened, what is more, certain elements must be repeated (primarily to take into account the impacts of the financial-economic crisis which took place in the meantime).

The change of the supply and demand of electricity in Hungary as well as the situation currently and also in the future in the regional markets will influence the issue of expanding the nuclear power plant.

The new units must be integrated into the Hungarian system of electric power generation and its regional environment. The framework for the examinations required for this purpose is provided by the long-term and continuously updated Network Development Plan made by the TSO (MAVIR). As at the time of the preliminary examinations no technical data of sufficient depth and detail were available about the unit models to be considered, therefore, a detailed submission of Connection Plan level and contents shall be made considering earlier examinations and analyses in more detail and taking into account all conditions, which will also cover further examinations:

- tests of capacity delivery in normal operating conditions and at the time of failures,
- examinations of system balance and transient stability,
- calculations of short circuit,
- analysis of the route of new transmission lines for feasibility, their integration with the National Master Plan,
- analysis of the installation of the eventual Paks-II sub-station with respect to the required rearrangement of transmission lines, area requirements and route corridor.

The versions for cooling the units (fresh water from the River Danube, cooling towers, eventual hybrid solutions) shall be investigated in a complex study with a view to find technical-economic optima.

Licensing tasks

The essential condition of establishment of the new units includes the preparation of licences of authorities, foundation documentation of the licence applications, implementation of the procedures and obtaining the licences. The process of the licensing can be divided into three main sections: obtaining the licences before implementation, being the precondition of it, licensing of implementation and licensing of operation.

In the current stage of preparation of the project, the foundations shall be prepared for the site licence and for environmental protection and these licences shall be acquired and the dosage restriction shall be determined and approved for the new power plant. This is a complex, multi-stage licensing and the monitoring by the authority is primarily focused on the protection of the environment, based upon decrease of the government and ministers. Simultaneously, preparations shall be made for the implementation stage of licensing.

The schedule of implementation, what is more, the feasibility of the new units depend on obtaining the site and environmental protection licences. The environmental protection licence also means social acceptance, as the will of the citizens can be manifest in this procedure under organised frameworks. These licences constitute the precondition of implementation and of the implementation licences, they determine the critical path for the project in the first three years. Obtaining these licences exponentially increases the value of the site. Such data and evaluations may be created in the course of preparation of the licences for the site and environmental protection, which are inevitable for the compilation of the invitation for tenders and the technical preparation of the project.

From the aspect of preparing the site and environmental protection licences the point has a key importance that the Parliamentary Resolution on the approval in principle designated the Paks site as the site of construction. Therefore - contrary to a green-field project - the preparation of the licences before implementation and their details as to contents can and shall be determined by processing the information available and its comparison with the effective legal regulations.

The scope and critical questions of the investigation and licensing of the site are well-known: a site which is relatively well-explored and acceptable as far as environmental risks are concerned, shall be analysed, described and rated according to the modern, international standards at the state-of-art scientific level. Despite the available large volume of geological, seismic, geographic and meteorological data about the site, in certain areas the foundation of the site licence requires large volumes of fieldwork and theoretical considerations. Therefore, substantial geological and geophysical field analyses will be required to preclude the risk of permanent displacement of the surface qualifying the suitability of the site and to determine the foundation of design related to the site. Great care is also required in describing the risk of earthquake and the ground stability. The proper definition of the design base is extremely important as it is clearly known that the subsequence reinforcements and modifications are extremely expensive and complicated. This was experienced also with regard to the earthquake related safety of the nuclear power plant, the assessment of

load-bearing capacity of the ground (settlement of structures) but also regarding the low water level. When providing the founding information for the licence it is to be taken into account that the new units essentially will also operate at the end of the 21st century, and until that time substantial changes may take place in the economic-geographic environment as well as the climate. This latter aspect has a special importance when grounding the concept of cooling.

The four units of the Paks nuclear power plant operating on the Paks site as well as the interim storage of the spent fuel cells have the licences necessary for their operation, there is also an environmental protection licence for extending the service life of the nuclear power plant. The existing licences and the underlying documents thereof include substantial amount of information, which are continuously complemented by the results of the monitoring programmes conducted on the site. The preparation of the environmental protection licence and the obtaining of the licence will still be an extremely difficult task, in view of the complexity of the task and the expected interest within this country and abroad.

The procedure can be divided into two stages: a stage of consultation and impact assessment, the contents and key issues of which will be determined by the authority in the course of the consultation taking into account the points proposed in the consultation document. A specific problem of preparation is that in the consultation period, it is not certainly clear what type of unit will win the tender. On the other hand, as a certain professional conviction it can be stated that there cannot be significant differences among the prospective models and units as far as safety or environmental protection are concerned, as only such units are considered which meet the safety and environmental protection standards. While no major differences are expected, however, the management of several versions can still be a problem of theoretical significance in the course of the process. Proper interpretation will be required by the assessment of the events beyond the design base and the handling of the problem related to several projects on a single site. The international consultations and public hearing sessions require serious preparations, although it can be confirmed that impacts crossing national boundaries are not expected.

Risks shall also be taken into account in the course of licensing. It cannot be precluded that the scope of examinations when grounding the licences may be substantially extended due to professional and/or social pressure. The unexpected changes of legal regulations and the failure of implementation of the prepared and necessary changes may also be a risk of licensing. It is desirable that the new Nuclear Safety Regulations (NBSZ) are published as soon as possible. With respect to the licensing procedures for implementation at the stage and also in the future, it is necessary to redefine the issue of involvement of the specialised authorities, in compliance with the legal regulations concerning the division and localisation of the mandate of the authorities, eliminating the formal mutual involvement and also taking into account the professional competence related to the jurisdictions. It is a condition to the above and in general also to the successful preparation of the project of the new nuclear power plant units that the Government makes certain that each authority and superior authority consider it their task to take care of the preparation and licensing cases of the project within their purveyance as the licensing of implementation of a new unit cannot be included among the routine tasks of the authorities.

Legal tasks

The basic condition of implementation, in addition to obtaining the necessary licences, forming the tender procedure for the procurement of the equipment, includes the elaboration of the project contracts ensuring the framework conditions and guarantees of the implementation, as well as the other documents, their discussion and approval by the stakeholders. In the current stage of expansion, the preparation of the following contracts and documents seem justified:
Contracts and documents related to the foundation of the project company:

- contracts related to licensing,
- contracts related to the investment project,
- contracts related to financing,
- contracts related to operation.

These contracts above shall be drafted by taking into account the special features of nuclear power plants, in greater detail than customary in the usual power plant project, operation, etc. contracts, also clarifying the issues of the special systems, consequences, nuclear damage liability, etc. In view of this circumstance and the complex system of relations resulting from the great number of contracts, the foreign suppliers participating in the project or eventual investors it is necessary to follow the international best practice and to engage a legal counsellor with experience in international nuclear power plant implementation and financing.

Tasks of social acceptance and public communication

The basic principle of communication related to the expansion of nuclear power plant and the essential condition for the success of expansion is the establishment and maintenance of public confidence in the project. For this purpose, publicity shall be managed as a priority both during the preparation of expansion and also in

the implementation stage, together with the open and frank information. The starting condition of the communication is that the expansion of the nuclear power plant is a public affairs with everybody being a stakeholder.

These general principles above do not replace the detailed communication plan, what is more, they justify major communication planning because of the public nature of the subject.

The communication related to the project is based upon four essential pillars:

- The first basic principle and the primary condition for the favourable social environment of the expansion is the maintenance and further strengthening of the favourable perception of nuclear power generation.
- The second basic principle is the objective and proactive communication related to expansion. For this purpose, the fullest possible publicity shall accompany each major step simultaneously with the progress of the project, with limits only presented by business and safety requirements.
- The third basic principle is the mobilisation of the internal resources through the use of communication tools. In this framework, the cause of nuclear power plant expansion shall be made the central issue of the nuclear power plant and also of the entire MVM Group, making certain that the employees identify with the objective and as number one ambassadors of expansion they represent the cause of expansion in their closer and broader environment.
- The fourth basic principle is the winning of the organisations, which can be defined as primary clients in the expansion. Therefore, it is the element of the communication strategy that in the framework of a continuous dialogue, the negative impact of the eventually opposing groups on the implementation of the expansion is minimised.

Therefore, the communication programme is a set of activities structured systematically and implemented along the full cycle of the expansion, which covers almost all the sub-areas of communication.

Tasks of economic organisation, system of relations in the region and the locality

The construction and long-term operation of the new units on the Paks site assumes and requires the inclusive and cooperative support of the socio-economic area around the project. The steadily growing democracy in Hungary, which is steadily approaching the European standards and requirements, rightfully expects that the new nuclear project is set up on the basis of the mutual territorial advantages and equal partnership. Therefore, it is an important task to survey the system of relations of the region, and the possibilities with preparations for the acceptance of the future investor and also that the regional players (local-governments, enterprises, institutions, civil organisations) by means of their interests can participate in the process actively and on the basis of performance, and the expansion should also provide an opportunity of growth for them.

The setting up of new units and the provision of the infrastructure background represent a major challenge for the region and for the entire national economy. At the moment, the human resources necessary for the implementation of a project of a such a scale and for the future operation are not fully available at this stage. While the delivery and installation of the technological equipment will be carried out in the first place by experienced foreign manpower having appropriate competences, it is also important that the labour force in this country may be trained in the necessary skills and gain experience, on the one hand, for active participation in additional nuclear power plant projects through the international division of labour, and on the other hand, to be familiar with the details of the technological equipment during operation. It is necessary, as a minimum to analyse the following for the provision of manpower and the accommodation:

- Survey of the manpower requirements of the investment project, with particular regard to the experience of nuclear power plant projects ongoing at this stage, and the HR background of the potential major suppliers in this country.
- Survey of the commissioning and operating staff, training of the required professional and management personnel.
- Preparation of the HR map for the region, mobilisation of the potential manpower.
- Survey of the situation of the relevant secondary and tertiary training and education, definition of the development objectives required for satisfying the expected manpower requirements, achieving the appropriate ratio of enrolment in schools.
- Possibilities of managing the predictable manpower shortage.
- Establishment of the community, infrastructure, health care and logistics background necessary for meeting the requirements of the project construction and operating manpower.

In order to ensure the hosting of the project in the region, it is of essential importance to engage the local and regional enterprises, the national education, research and scientific institutions, with professional preparation, the regional, community and enterprise development and promotion. In the framework of these programmes, the following activities will be carried out:

- survey of the enterprises in the region,

- survey of the enterprises and institution with potential function in the establishment and future operation of the new nuclear power plant unit, establishing a nuclear cluster through their voluntary participation with the aim of promoting the coordinated preparation,
- active engagement of the towns of Paks, Szekszárd and Kalocsa as well as other settlements, partly for the continuous supply of the information required and partly for the optimum provision of the conditions necessary for the success of the project, harmonising the eventually conflicting interests, and the transparent distribution of the financial resources available,
- the overview of the growing possibilities and tasks of the already existing institutions (e.g., Paks Industrial Park, the Social Monitoring and Information Association, etc.), preparation of the changes as they may be required.

A comprehensive study will be made based upon the examinations, analyses and discussions described above, to summarise all the impacts of the nuclear power plant extension in the area and the region with special regard to the medium and long-term impact on economic and social criteria.

Process of establishment, final considerations

As soon as the Lévai Project achieved its objective, that is the evaluation of the tender was completed, the next stage of expansion may start, i.e., the implementation. The contract to be concluded with the supplier selected will determine the scheduling of the main stages of design-building-installation-commissioning in such a way that the Paks-5 and Paks-6 units may be connected parallel with the national grid at the specified dates.

The operation of the Paks nuclear power plant up to this date has clearly confirmed that it was a good decision to invest in nuclear energy at that time. The nuclear power plants provide a well-balanced response to the new challenges and the requirements of sustainable development (reliability and safety of supply, cost-effective operation and low-cost electricity, protection of the climate and environment). It is not by chance that the nuclear power plants have a relatively high public support with slight further increase. Therefore, all considerations suggest that the expansion at Paks promises to be a similarly good decision, and the 'Investment in the Future' slogan can be rightly applied.

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