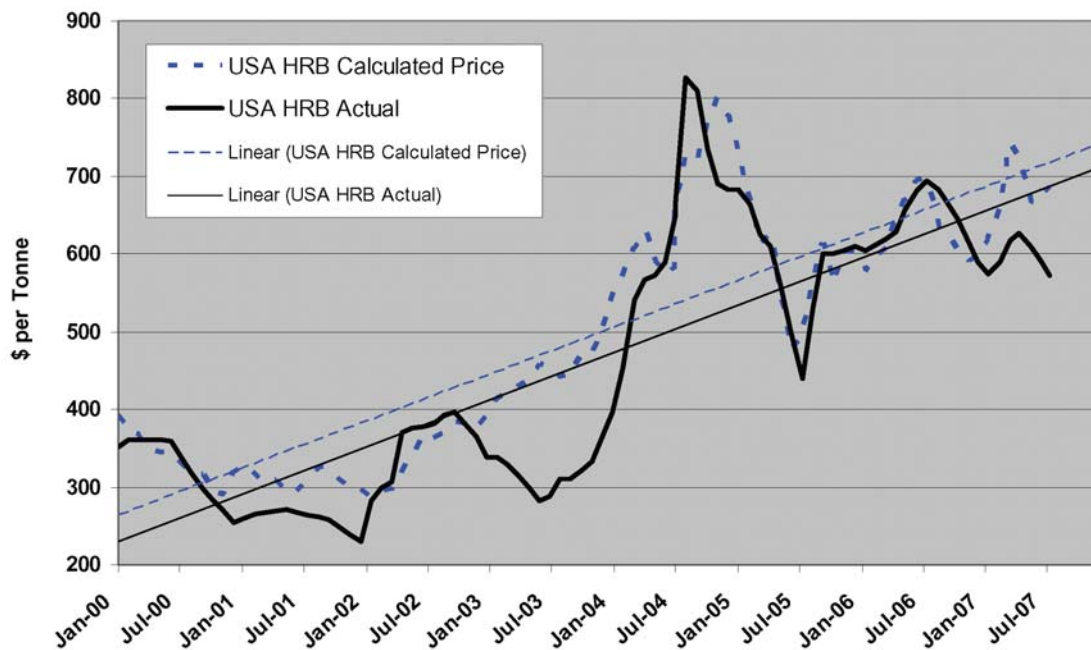


Supplement to the „*Answers*” (Hungary, April 25, 2008) to the ESFRI Working Group ESS Siting Questionnaire (March 7, 2008)

C) Costing points

Impact of above-inflation rise of steel price

The ESS construction costs are most sensitively influenced by the recent above-inflation increase of commodity prices via the 7000 tons of bulk steel contained in the target shielding. In the cost estimate the December 2007 EU price of 585 €/t for Hot Rolled Band (HRB) was used, which amounts to 4.03 M€ for the 7000 tons, i.e. less than 5 % of the construction costs of the target. The figure below illustrates the rather erratic change of steel prices over the past 7 years. On this basis for 2012, a reasonable estimate for the time of purchase, a price increase in the range of 50 % above general inflation can be expected (in comparison: the target portion contingency is 13 M€).



E) Legal, organizational and security points

Duration of licensing procedure

According to the timeline established for the ESS Project in Debrecen, the finalisation of the construction plans in connection with obtaining the prior licences and the final construction permit will require two years. The preparation of starting the licensing process will need about 6 months after the international decision of building ESS in Debrecen, which additional time is needed to build up the project team in charge of licensing and its network of experts. This means that actual construction work can be started on the site 30 months after the site decision.

In order to create an adequate flexible and effective administrative environment reliably ensuring this timeline, the ESS Project will be specified as a **national priority project** pursuant to Act LIII of 2006 on Simplification and Acceleration of the Execution of Investments with National Priority (“**Priority Projects Act**”). This act is aimed at creating an investor-friendly environment for projects of large scale and of national interest supported by the government. The latest example of making use of this legal facility is the recently announced establishment of an 850 M€ Daimler Mercedes production plant in the central Hungarian town of Kecskemét. The Hungarian Government expressed its firm intention to issue in due time the decree classifying the ESS Project as “national priority project”.

The application of this act vastly accelerates the administrative actions to be completed. The provisions to expedite the legal procedures to settle challenges and appeals against decisions of the licensing agencies are particularly significant and illustrative:

- The appeal against the decision of the first instance administrative authority must be decided in an extraordinary procedure within a maximum of 30 days.

- All judicial supervisory procedures against the decision of the second instance fall within the exclusive competence of the Metropolitan Court. In order to speed up the official communication between the parties and the court, the submissions in the court procedures must be filed in electronic form and any delivery will be made electronically. The claim cannot be changed following the expiry of the deadline for filing an application for judicial supervision. The procedure cannot be stayed.

- Deadlines for the judicial supervision have also been shortened: e.g. applications must be forwarded to the court by the administrative body dealing with the case within 3 days; the court must check the applications within five days; further information or documents must be requested by the court within 8 days, which can be extended by 8 days.

- If a hearing is requested by any of the litigating parties, the first hearing must be held within 30 days of the filing of the application. If the claim is to be decided without holding a hearing or, in case of a hearing, there is no need for an evidentiary procedure, the court will decide within 30 days of filing. The decision of the Metropolitan Court will be final and only an extraordinary application for judicial review (extraordinary appeal) can be submitted to the Supreme Court. The Supreme Court can set a deadline of a maximum of 15 days for filing a response to the extraordinary appeal and has to decide the case within 90 days following the submission of the response to the extraordinary appeal.

In such a framework, as experience with recent projects show (including extension of nuclear power plant) the duration of the licensing process is primarily determined by the time required for the preparation of the technical documents. This is being done in steady consultation with the licensing authority, in order to timely assure accuracy and completeness of the submitted documentation. The above stated 24 months expected duration of the licensing procedure of ESS is based on examples with comparable technical documentation needs.

F) Environment and socio-economic points

F2 What are the local environment / infrastructure?

o Specific features and measures that make this infrastructure sustainable

The city of Debrecen as well as the institutions and companies active in the city possess all the capacities and skills, which make the city suitable for hosting ESS.

Building construction and civil engineering capacities: The regional (county) Chamber of Commerce has registered over 50 companies, the annual capacity of only the six most important construction companies exceeds the amount of 250 million € with nearly 2000 employees.

Schools: Debrecen is a city of schools with great traditions, the city has the secondary educational institutions that make possible to prepare the proper professional assistance required by ESS. The vocational schools are ready to launch groups and classes based on the special curriculum that is in accordance with the specialised demand of ESS. It is partly due to the ESS plans that the secondary bilingual (English) healthcare and chemical education has already been launched. From the 2009/2010 semesters, five of the city's secondary schools are prepared to provide international baccalaureates in English, French, German, Italian and Spanish, to complete the foreign language education cycle starting at kindergarten.

Professional training: special knowledge can be obtained within the framework of higher professional training and adult training, such as nuclear electronics, dosimetry, and scope of duties related to physical, chemical and medical laboratory work. At university level ESS conform electronics, electrical engineering, mechanical engineering, physics, material science, chemical, biological, environmental science, medical biology and informatics are in current practice and will be widened.

Professorship and PhD schools: ESS will be invited to join the master's education programme and the work of the doctorate schools within most universities in Hungary providing PhD degree. Tutoring, launching special courses, providing laboratory training and opportunities for experiments, etc. should be joint activities of ESS and the universities (basically the Debrecen University, DU). Along this line renown scientist working at ESS will be invited as guest professors to give them the opportunity to join the local university education, in this respect the Hungarian university system is completely open, in particular DU is fully committed. Also, the Institute of Nuclear Research (ATOMKI) of the Hungarian Academy of Sciences is ready to participate in training of experts for ESS. The expertise of the staff and the laboratories of ATOMKI provide excellent opportunities in many fields: radiometry, dosimetry, radiation protection, nuclear electronics, nuclear detectors, data acquisition, data evaluation, environmental analytical methods, radioisotope techniques, etc.

ATOMKI is host for the ESS start-up: From today or Day-1 ATOMKI is prepared to provide quality resources and established infrastructure in order to build up the core team and necessary structure for ESS in the technical preparation phase.

- *Experts* (plus their graduate and PhD students) are ready to participate in the development of ion source and beam diagnostics systems for the ESS, neutron physics, ion and neutron transport simulations. In the first phase a core team of 5 *physicists* and 1 *engineer* could be formed locally.

- *Rooms, laboratories and offices* can be made available for accommodating approximately 50 persons (e.g. the core team in the starting phase, then the first headquarters of the ESS and engineering groups) in well equipped rooms.

- *IT infrastructure of ATOMKI:* 1 Gb/s Internet and 100 Mb/s intranet, up-to-date servers, modern network (optical cables, twisted pair cables, WiFi, etc.), large number of PCs, PC Linux cluster with 24 nodes, video conference, IP telephone, office equipments are available. The qualification level of informatics specialists is quite high.

- *Physics specialized library:* it is located on the area of the ATOMKI. It consists of the libraries of the ATOMKI and the physics departments of the University of Debrecen. The library has good contacts with domestic and international libraries.

- *Capacities* that are available and, upon demand, can be increased in a designed way in a short time: *Mechanical Workshop* - available capacity: min. 3-4000 hours/year (extendable up to 10-15000 hours/year); *Electronics* department and workshop; R&D and production capacities. *Vacuum technique and cryo-technique* capacities (spin-off firm: Vacuum Compactness and Measuring Technique Ltd. with industry references); *Irradiation possibilities, Environmental analytical laboratory; "B" level radiochemistry hot laboratory* for production and handling of radioisotopes and labelling.

- *Administrative capacities:* finances, human resource management, post and telecommunication services, security etc.

F4 What are the specific risks at the site (during construction / operation / decommissioning phases)?

o Security and stability of the supply of utilities

Electricity supply

The electric power supply of the ESS facility will be provided from the 120 kV high voltage grid handled by the E.ON TITÁSZ company. The power supply provides 2 independent cables for the connection, which are suitable to the specified requirements as given in the following table. Each 120 kV cable can provide 150 MW output supply.

The planned electric supply of the plant is completely redundant, in each level possesses independent service and reserve supply. In case of any failure the change between service and reserve supply is automatic and "clear", assuring the continuous electric supply.

The quality of ESS electric power supply					
	Event	ESS requirements*	Hungarian National Standards	Practice	Realization of requirements
1.	Maximum amplitude of the voltage fluctuation	±7%	±7,5% (slow fluctuation of voltage - MSZ EN 50160)	±0%, the automatic voltage controlled transformers hold constant voltage level in the ESS medium level voltage system	met
			±2% (rapid fluctuation of voltage - MEH ÜSZ 87/2008. attachment 4.2. paragraph 3. chart)	Occurrence of unstandardized voltage in the supply network: (2005-2007.years): 1,55*10⁻⁴ % - according to the data of Hungarian Energy Office	met
2.	Frequency fluctuation	±1%	±0,0004% (MEH ÜSZ 87/2008 3.5.2(E) paragraph)	±0,002% according to the data Hungarian Transmission System Operator Company Ltd	met

3.	Current failure (Blackout)	The average quantity per year of blackout more than 600 ms is maximum once a year	—	The Hungarian Electric System works on the base of n-1 reserving principle, the failure of one serial element do not cause any blackout. This is valid for each 120 kV independent cabel. In case of any blackout the system automatically switches over the other 120 kV cabel, occurs with so called "clear" process which is unnoticed for the consumers. Between 2005-2007 there were only 2 breakdowns in the whole 120 kV system of E.ON TITÁSZ Co.	met
4.	Voltage collapse	The quantity of voltage collapse of more than 400 ms or more than ±12% in 2 phases-cannot be more than 3 times a year maximum.	1% (voltage assimetry -MEH ÜSZ 87/2008. attachment 5.2. par. 4.chart)	The ESS system will be realized that, in case of any voltage collapse on any 120 kV cabel, in any phase the system automatically switches over the other 120 kV cabel, occurs with so called "clear" process which is unnoticed for the consumers.	met
5.	3-phase voltage fluctuation	More than ±8% voltage fluctuation cannot exceed 3 occasions in a year.	According to point No. 1.	According to point No. 1.	met
6.	Short-circuit conditions	The short-circuit performance should be larger than 1000 MVA.	—	The background short-circuit performance of the networks on 120 kV is larger than 1000 MVA in the practice. The written information of E.ON TITÁSZ Co. guarantees that the applied networks' short-circuit performance are bigger than 1000 MVA, even in case of minimal working performance.	met

* The original answers to the ESFRI questionnaire on ESS requirements were based on the official letter of E.ON TITÁSZ dated on 3rd March, 2007, while the current supplement is based on the detailed report of E.ON validated by the MVM central (government) electric supply distributor.

In summary:

The detailed analysis of the planned ESS electric power supply system confirms that „electricity supply characteristics *are* significantly better than *those*, which are based on the ISIS specs” and fully meets all the requirements necessary for the safe operation of the facility.

Cooling system

Although the city water supply and sewage capacity available at the site would be sufficient to operate conventional wet cooling towers, for ESS in Debrecen, without a natural river, the dry (or air cooling) approach has been selected. This more environment friendly system has a number of advantages:

- no water consumption and discharge
- no vapor production in the atmosphere

The use of such systems is well established both internationally and in Hungary, where some 6 manufacturers offer air cooling system design, construction and maintenance. This includes winterized systems using environmentally friendly anti-freeze coolants, licensed for discharge in sewage systems. The Debrecen site is adequate for the construction of higher air cooling structures compared to wet cooling towers. The picture shows the 25 MW dry cooling tower of the research reactor of the Budapest Neutron Center.



G) Additional Features

G2: Analysis of the European investment situation and proposal for co-operation

On the Memorandum of Understanding between ESS Hungary and ESS Bilbao

The signatory parties, ESS – Bilbao and ESS – Hungary (represented respectively by J. Urrutia and L. Rosta) are candidates to host the ESS, and committed to catalyse in collaboration the process of establishing and building the ESS facility. The purpose of the agreement is to combine resources and coordinate activities in such a way that the initial phase of the project can be advanced more effectively and in a manner in which both parties benefit from the collaboration.

The Memorandum of Understanding (MoU), signed in October 2007, is aimed at documenting the intentions of the signatory parties concerning their participation and financial commitment to ESS. It also delineates processes to determine criteria for an eventual agreement between the parties on the location of the facility at one of the two sites and the expectations of each partner for exploitation of the initial investment.

This cooperation called into life a common International Advisory Board (IAB), which consists of world's leading experts. The IAB co-chairpersons are Mr. Ian Anderson, Associate Laboratory Director for Neutron Science at Oak Ridge National Laboratory, which operates the SNS spallation source facility in the USA and Mr. József Pálinkás, president of the Hungarian Academy of Sciences. Ferenc Mezei is the common scientific director of the two collaborating ESS site candidate projects.

The Hungarian-Spanish agreement also includes provisions for cooperation after the final site decision. In case of a Hungarian or Spanish site for ESS, the other country will take part in the realization of ESS as a strategic partner: If ESS is built in Hungary the Spanish partner will participate with a share of ~15%, while in case of Spanish site the Hungarian participation can be up to 7-8%. The site country will assure other advantages to the other partner, such as priorities in selling its free research capacity and in contributing as an in-kind supplier in charge of a particular task, in order to help the development of national high-tech industries.

The MoU is of limited validity in time and implies no legal commitment for the construction and operation of the ESS and for the development of a knowledge pole in either country.

Members of the IAB are:

Carlos Alejandre (Spain, ITER)

Viktor Aksenov (Russia, Kurchatov Institute)

Ian Anderson (UK, SNS) - Co-Chairman

Carla Andreani (Italy, Univ. Rome)

Masa Arai (Japan, J-PARC)

Kurt Clausen (Denemark, PSI)

Gabriele Fioni (France, CEA)

John Galambos (USA, SNS)

José Luis Martínez (Spain, ILL)

József Pálinkás (Hungary, Hungarian Academy of Science) – Co-Chairman

Mike Rowe (USA, NIST)

Helmut Rauch (Austria, Univ. Wien)

Helmut Schober (Germany, ILL)

Andrew Taylor (UK, ISIS – STFC)