Slovak legal system for ensuring feasible nuclear back-end system implementation

Part 1: Description of the current status

by Martin Macášek, Vladimír Slugeň and Michal Šnírer

In the 70-plus years of peaceful uses of nuclear energy, the nuclear industry has reached a mature awareness of its importance, influence and responsibility for and towards the world. Not only does it dutifully regulate itself in technical aspects, making the use of nuclear energy stricter and safer by any and all means possible, it also establishes policies, backed by legislation, for its decades-long activities. Thus, the industry has recognised the need to systematically approach and solve the issue of complete dismantling of its (previously operating) facilities and final disposal of the operational and decommissioning waste (including spent nuclear fuel (SNF))¹. This sought end state must be reached both by technical means as well as by creating a sound system for today’s continuous accumulation of funds, needed for the future implementation of the selected technical solution (including final disposal of SNF).

Strictly perceived through the perspective of implementation, all existing nuclear facilities can be decommissioned by today’s technical means. As is usually the case with large-scale infrastructure projects, money is the issue. Each country sets up different systems to ensure financing and implementation of these projects. The adoption of various nuclear back-end strategies results from each country’s different legal system, economic ability and the national nuclear industry’s historic development.

The Slovak Republic currently has ten nuclear facilities in two different locations – Jaslovske Bohunice and Mochovce – owned by two different companies, Jadrová výrobcová spoločnost, a.s. (JAVYS) and Slovenské Elektrárne, a.s. (SE). The facilities range from nuclear power reactors under construction (two units), nuclear power plants in operation (two, each with two units) and undergoing decommissioning (two, with three units in total), as well as non-reactor facilities for radioactive waste (RAW) treatment, storage and disposal (four) and SNF storage (one). An overview of these facilities is provided in Figure 1:

¹ In accordance with the terminology used in the Atomic Act, this article uses the term “spent nuclear fuel”. However, legislation reacts more slowly and has yet to incorporate the commonly accepted situation that the material referred to as SNF is, as perceived by the owner-operator, still an energy source that can potentially be converted into MOX fuel or used in the future in GenIV reactors. Until its owner-operator declares that this material (SNF) is indeed a non-usable product of the fission reaction, one should respect the operator’s ownership rights to this material, including the right to convert it to whatever form deemed valuable for future use. Thus, the more appropriate term would be “irradiated fuel”. But, because the Slovak legal system does not use this term, this article continues to use the term SNF.
Each facility will be safely decommissioned once it stops operation. The natural exception from this rule represents the National RAW Repository in Mochovce, which, by default, will not be decommissioned. Instead, once its operations are shut down, it will be closed and institutional surveillance will be established.

The Slovak Republic established its nuclear back-end system (NBES) through three different legislative acts and one governmental decree:

- Atomic Act (Act No. 541/2004 Coll.), which regulates the primarily technical (i.e. nuclear and radiological) safety of the operation of nuclear facilities, their decommissioning, as well as transport of RAW and SNF and overall management of nuclear facilities.

- Act on Radiation Protection (Act No. 87/2018 Coll.) (Act on RP), which regulates activities leading to radiation exposure of the workforce, as well as of general public.

- Act on the National Nuclear Fund (Act No. 308/2018 Coll.) (NNF), which ensures long-term financial safety and stability for implementation of the NBES over a fifty-to one hundred-year time span. Also, it creates a system (including its financing) for the education of future generations of experts necessary for NBES activities. The Act on the NNF is organically linked with both previous acts.

- Governmental Decree No. 387/2015, which approved the National Policy and National Programme on Treatment of Spent Nuclear Fuel and Radioactive Waste in the Slovak Republic (hereinafter "National Policy" or "National Programme"). The National Policy and National Programme were designed in the framework required by Council Directive 2011/70/Euratom. The National Policy and National Programme thus represent a long-term plan for safe and financially stable NBES activities in the Slovak Republic.

2. The current National Policy and National Programme are based on its predecessor, approved by the Slovak Government in 2008 and 2014 respectively. The Slovak Republic is currently preparing a new revision of the National Policy and National Programme, which is to be approved in 2021.

This legislative framework aims to provide a sound and functional system, taking into account technical, fiscal and legislative conditions, to ensure safe and timely implementation of all NBES goals.

**Act No. 308/2018 Coll. on the National Nuclear Fund**

Of the three acts described, the Act on the NNF has the greatest impact on the feasibility of NBES implementation. Passed by the Slovak Parliament in 2018, it represents a direct continuation of the two preceding acts from 1994 and 2006. Therefore, it follows up on the NBES financing scheme that was set up in 1994 by the first Act on the National Nuclear Fund (Act No. 254/1994 Coll., in effect 1995-2006).

Although the second Act on the National Nuclear Fund (Act No. 238/2006 Coll., in effect 2006-2018) transposed all provisions of the Waste Directive, some of these changes, along with other amendments, showed that it would be more practical and efficient to prepare a new act, rather than continue to amend the 2006 act. The new Act on the NNF thus incorporates all international and domestic developments and also takes into account the relevant changes in the Slovak Republic. And, most importantly, it contains the same rights and duties of the previous acts, including the accumulated funds for future NBES activities.

The new Act on the NNF’s goal was to improve the then-existing system of responsibility sharing and financial security for implementation of the NBES so as to address the following aims as best as possible:

- to split responsibility for individual steps in the NBES to entities that are bound to execute these steps;
- to explicitly define the Slovak Republic’s ultimate responsibility for all activities in the NBES, including long-term storage, decommissioning and disposal of SNF and RAW. As such, an entity 100% owned by the Slovak Republic was determined to be the only authorised entity to implement all of these activities on behalf of the Slovak Republic, while the financial responsibility to fund all of the NBES activities has remained with the operators of the nuclear facilities;
- define means, conditions and deadlines for transfer of a nuclear facility from the “operating” company to the “decommissioning” company so that safety and economic efficiency remain during the decommissioning stage;
- accumulate additional future decommissioning funds by increasing the group of mandatory contributors to the NNF, such that not only operators of commercial nuclear power reactors contribute, but all other non-reactor nuclear facilities’ licence holders (operators) contribute as well;
- define a new, efficient, transparent and fair formula for setting up and re-evaluating the financial contributions to the NNF (up to 60 years of operation) by all operators, independent of actual market values of wholesale electricity price (as was the case with the prior acts on the NNF); and
- explicitly specify categories of expenses that are eligible to be covered from the NNF for NBES activities.

However, all three systems so far have been set to accumulate necessary decommissioning funds in time (including funds for respective SNF and RAW storage, treatment and disposal) only to 100% of today’s cost estimation calculations, without any margin for error. Accumulation of greater than 100% of today’s estimated decommissioning costs for contingency purposes is still a subject of discussion.
Changes brought by the new Act on the NNF

While drafting the Act on the NNF, the legislature had the challenge of ensuring that whatever changes are made, the continuity and usability of funds accrued by the two previous acts is ensured. The other challenges of the new Act on the NNF were to draft the new legislation so that the regulated subjects would not have major new responsibilities, the role and duties of the NNF would stay the same, and that the continuity with the previously established system would remain.

A few principles remained between all three acts on the NNF. The first is the establishment of the NNF as a “state fund”, which was defined under the first NNF in 1995. The “state fund” is a specific legal entity, established by law and owned by the state. This was selected to ensure its long-term survivability, since the founder is the state. Also, by law, all state funds must keep their finances in the National Treasury, a state bank that handles the state budget as well as the finances of all state agencies and bodies. This structure is meant to guarantee that the funds will not be mismanaged or that the financial institution would go bankrupt or cease to exist.

A second principle that has transcended all three acts is that the costs of the decommissioning-related SNF and RAW management (i.e. storage, treatment and disposal) are considered as part of the whole “decommissioning costs”. The operators are thus bound to estimate not only the costs of the decommissioning and dismantling works, but also of the associated SNF and RAW management and disposal.

There are a number of differences, however, between the previous and current Act on the NNF. The new Act on the NNF clearly distinguishes the responsibilities of nuclear facility operators (as producers of SNF and RAW) and the Slovak Republic, which has the ultimate responsibility for safe management of SNF and RAW, including up until disposal at a dedicated facility, under international treaties. The “polluter pays” principle remains firmly embedded in the system as operators’ responsibility (i.e. the producers of SNF and RAW).

Further, the new Act on the NNF, for the first time, explicitly names the main values and principles of NBES financing, though they were already implemented in the previous acts, just not listed. By naming them as general principles for all aspects of the Act on the NNF, all necessary and consecutive activities are to be understood and implemented accordingly and all entities bound to adhere to them. The principles and values are:

• NBES financing lies with the licence holders whose nuclear facilities produce the SNF and RAW;
• licence holders’ NBES financing duty is fulfilled when they have paid the full overall value for the facility’s decommissioning (including resulting SNF and RAW management and disposal), as set by the NNF for the given facility;
• nuclear facilities’ licence holders are not responsible for the financial management of the NNF;\(^5\)
• the NNF’s duty is to provide financing for NBES implementation in a sufficient amount and in due time, in accordance with the National Programme;
• the NNF manages, allocates and distributes the funds in a non-discriminatory and transparent way; and
• the NNF ensures the appropriate safe optimisation of the funds under its management.

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\(^5\) This is executed by and is the responsibility of the Board of Governors of the NNF.
All nuclear facilities are now required to contribute to the NNF (not just nuclear power reactor facilities), fixing a financial and legislative omission. The Slovak Republic now has a unified approach to all nuclear facilities and further increased the assurance of sufficient financial means for decommissioning and RAW (and SNF) treatment and disposal, when the need arises.

There was a level of industry-wide uncertainty present in the previous acts on the NNF, as they did not set exact rules for the calculation of mandatory contributions to the NNF and the amount was set by Parliament via amendments to the previous acts on the NNF. However, the new Act on the NNF made a major change by stating that the amount of mandatory contributions (the main source of NNF income for financing of future NBEs activities) will be calculated jointly by the Board of Governors of the NNF and representatives of the concerned nuclear facilities. These calculations must be made according to planned future activities and their scope. Also, the structure of the costs must be in accordance with the National Policy and National Programme. Based on the calculations made, the amount of contributions is published by Government Resolution. This has increased transparency in the process, as well as ensured expert input in setting the contributions.

For better use of the accumulated funds, the new Act on the NNF specified in greater detail the structure and scope of eligible expenses that can be financed from the NNF. In addition to “standard” activities (like decommissioning; management (and, if eligible, disposal) of SNF, RAW and institutional RAW and radioactive materials of unknown origin; purchasing land for research and construction of repositories; and payment of the decommissioning company’s third party liability insurance), the new Act on the NNF defined a relatively revolutionary new eligible expense: use of NNF funds for “support in education, increasing of qualification and mastership for the purpose of maintaining and accumulating knowledge and to support research and development”\(^6\) (for decommissioning activities in the future). In order to maximise the legal certainty envisioned under the new Act on the NNF, it has explicitly stated that drawing on the NNF resources is limited to only those activities defined in the National Policy and National Programme. Naturally, these activities can be financed only up to the limit of the accrued funds.

Through the Act on the NNF, the National Policy and National Programme have thus become the key strategic, economic, legal and technical tools for all concerned parties (especially regulatory bodies and operators/owners). They also outline the end-state of the current nuclear facilities and their sites, thus defining not only today’s shape, but also the future shape of the nuclear industry in the Slovak Republic.

**Act No. 87/2018 Coll. on Radiation Protection**

The Act on RP was passed by Slovak Parliament early in 2018 to incorporate all national, but primarily EU, legislative changes, which took place since 2007, when the previous Act on Radiation Protection was approved. The new Act on RP continues to provide a holistic legislative framework for radiation protection in all areas related to the use of ionising radiation.

The Act on RP is organically intertwined with the Act on the NNF. The main impact that the Act on RP has on the Act on the NNF is that the Act on the NNF stipulates that “positions of the relevant authorities in the field of radiation protection” are an inseparable part of the National Policy and National Programme. Additionally, the acts take a co-operative approach on emitters where a human exposure is anticipated or with radioactive materials of unknown origin. For example, the Act on RP requires that every applicant requesting permission to handle high-activity emitters is legally obligated to first put down a deposit with the NNF to cover all potential costs related to collection, sorting, storing, treatment and disposal of unused high-activity emitters when it becomes

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radioactive waste. This obligation can be omitted only if the applicant provides at the time of the request the following:

- a contract for the return pickup of the emitter by its producer or importer; or
- a contract for commercial insurance to cover expenses for the emitter’s liquidation and disposal in the case of insolvency of the applicant at the time when the emitter will cease to be in use or should it become “abandoned”; or
- a contract for disposal of the emitter with an entity licensed to collect, sort, store, treat and dispose unused institutional RAW at the time such emitter will become unusable.\(^7\)

The Act on RP thus provides provisions for the NNF to step in as the last resort in terms of protection of human health and environment against ionising radiation if there is need to seek out, treat and dispose of such emitters safely. Also, if the emitter’s owner is unknown, the cost of its safe treatment is borne by the Slovak Republic through the use of funds accumulated in the NNF. But, to balance the owner’s responsibility of ensuring proper handling and later disposal of highly active emitters, the Act on RP stipulates that once the owner hands over the emitter to an entity licensed to treat such emitter, or returns the emitter to the producer or importer, the NNF must return the deposit in full. An exception to this rule is that the deposit will not be returned (but also a new deposit will not be required) if the owner (or importer) exchanges the old emitter for a new emitter of equal type.

**National Policy and National Programme of the Slovak Republic**

In 2006, Slovak legislation stipulated that the then-NNF, along with other ministries, regulators and operators, must prepare, implement and update the so-called “Strategy for the back-end cycle of the peaceful use of nuclear energy”. Based on the 2006 Act on the National Nuclear Fund, the Slovak Government approved this strategy on 21 May 2008. An update to this strategy was approved on 15 January 2014.

The Waste Directive was incorporated into Slovak legislation by amendments in 2013 to the Atomic Act and the Act on the NNF. The amendment redefined that instead of a national strategy, the European Commission’s unified format of a National Policy and National Programme shall be used. In accordance with the implementation deadline of the Waste Directive, the national strategy was transformed into the National Policy and National Programme, which were both approved by the Slovak Government on 8 July 2015.

As in previous legislation, the Act on the NNF stipulates that the National Policy and National Programme is drafted by the NNF’s Board of Governors (in co-operation with the concerned authorities and licence holders). The Ministry of Economy (as the relevant ministry overseeing national energy policy) reviews it and submits to the Slovak Government for its final and formal approval.

The National Policy and National Programme reflect fundamentals set by international treaties and EC law, which are binding on the Slovak Republic. These fundamentals are also explicitly listed in the Act on the NNF as the National Policy’s principles:

- The Slovak Republic has the ultimate responsibility for management of SNF and RAW that are produced within its territory.
- The Slovak Republic is also responsible for the safe and timely disposal of any and all SNF and RAW inventory sent for reprocessing abroad, including their reprocessing by-products (unless a valid international treaty stipulates otherwise).

\(^7\) Act on RP, No. 87/2018 Coll., Art. 30, para 9.
RAW production is to be kept to a technically feasible minimum amount, both in terms of volume and activity.

Due attention must be paid to all interconnections and dependencies in all activities regarding SNF and RAW production and treatment.

All activities regarding management of SNF and RAW, now and in the future, must be safe. The safety of repositories must be ensured such that no active involvement will be necessary once they reach the end of their operation.

Implementation of all steps is subject to a graded approach.

Costs of SNF and RAW management are paid by the producer.

The decision process in all SNF and RAW activities and management is based on scientific evidence.

Although the Act on the NNF has explicitly defined the principles of the National Policy, it failed to define its goals. The goals are thus currently defined only in the National Policy itself and include: safe and reliable decommissioning, minimisation of RAW, selection of a suitable fuel cycle, safe storage and management of SNF and RAW, ensuring nuclear safety and the polluter pays principle.

The National Policy and National Programme thus include not only treatment of SNF and RAW, but also all other possible aspects connected to the nuclear back-end cycle in the Slovak Republic, including decommissioning of nuclear facilities; handling of institutional RAW and radioactive materials of unknown origin; and construction, operation and closure of repositories.

**Conclusion**

The present Slovak legislation creates a sufficiently robust, but also a sufficiently flexible, system to implement activities of the nuclear back-end cycle. Its most important feature is uninterrupted continuity in accumulation and management of funds, necessary for future nuclear back-end cycle activities, since 1 January 1995. Provision of the realistic and durable conditions stabilises the whole of the Slovak nuclear industry and provides a reasonable sense of stability to all stakeholders: the state, operators and population.

Naturally, a system created to last for a century must continue to evolve and update. The tasks for the immediate future will be to focus on:

- adding the circular economy principle to the list of key principles of the Act on the NNF and thus of the NBES as well;
- legally mandating that all decommissioning cost estimates are prepared in the same format and under the same methodology;
- including missing incentives for cost minimisation;
- fixing the current absence of any financial buffer in estimated decommissioning costs;
- defining a deadline up until which the nuclear facility has to accrue the whole sum for its future decommissioning; and
- inclusion of a more detailed legal call for preparation, construction and operation of the deep geological repository. At the moment, the Act on the NNF only states that the construction of the deep geological repository is eligible for financing, but neither the Act nor the National Programme provides any feasible roadmap. Therefore, the currently calculated costs for its construction and operation has significant margin for uncertainty.
Two years after the implementation of the new Act on the NNF, the relevant stakeholders believe that the changes have fulfilled their purpose and that the new Act creates a solid and workable solution for the industry’s needs. Naturally, the efficiency of the new system is subject to its constant evolution and updating. Although a need for further improvements has already been identified, the overall system is set up in an efficient way, allowing for its future advancement. There is no simple solution to effectuating the improvements, as there are many different considerations for every aspect, depending on the concerned parties. In the planned second instalment to this article, the authors will present their, as unbiased as possible, opinion on some of possible future improvements to the listed areas.