BUILDING SUSTAINABILITY INTO

NATIONAL NUCLEAR SECURITY REGIMES

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**Abstract**

The fundamental underpinning of nuclear security is a State’s national nuclear security regime, consisting of the legislative and regulatory framework, responsible institutions and organizations, and nuclear security systems and measures. To be truly successful, the nuclear security regime must be sustainable – reliably effective both now and in the future. The recently published IAEA Implementing Guide Sustaining a Nuclear Security Regime provides useful guidance on this topic. The paper complements this guidance by offering suggestions on how to build sustainability into the nuclear security regime – sustainability by design.

The fundamental goal is to create a nuclear security regime that institutionalizes nuclear security within the government of the State, competent authorities, licensee and other operating organizations, and civil society, so that effective nuclear security becomes self-sustaining. The paper describes several building blocks for this approach, including the following:

1. Building nuclear security into the permanent organization of the government – so that nuclear security is vested and weighted as a vital interest both within competent authorities for which nuclear security is a primary mission (such as the regulatory body) and within the sub-units of competent authorities for which nuclear security is one among many missions (such as law enforcement);
2. Appointing regulatory body leadership (such as governing board or commission chairs and members) to fixed multi-year terms – so that they gain an understanding of nuclear security and its importance and provide stability and continuity;
3. Developing nuclear security champions within the senior staff of regulatory bodies and other competent authorities, including designated successors with defined succession plans, so that that nuclear security becomes a continuous high priority and does not suffer lapses when senior staff depart;
4. Professionalizing nuclear security through the establishment of degree and certification programs and the development of qualification requirements for licensees and other operating organizations – so that nuclear security specialists perform to well-defined levels of competency and nuclear security becomes an attractive long-term career path for talented individuals;
5. Cultivating an appreciation of nuclear security fundamentals in professional societies and trade associations of related fields (such as health physics) – so that those of their members with nuclear security roles (such as radiation protection officers) take nuclear security seriously and are motivated and equipped to perform these roles well;
6. Benchmarking and reporting on performance – to provide transparency, to provide an incentive for effective performance, and to identify and address gaps and weaknesses;
7. Establishing effective nuclear security as an enduring, apolitical, consensus-based norm – so that the nuclear security regime receives a consistently high level of attention and support, regardless of changes in leadership within the government, competent authorities, or operating organizations.

## INTRODUCTION

The fundamental basis for nuclear security is each State’s nuclear security regime, consisting of its legislative and regulatory framework, responsible institutions and organizations, and nuclear security systems and measures – covering nuclear material and other radioactive material, whether it is under or out of regulatory control, and associated facilities and associated activities throughout their lifetimes [1]. A truly successful nuclear security regime must be sustainable – that is, it must function effectively over time by continuing to exist, by continuing to protect against nuclear security threats, and by adapting to changing circumstances, both internal and external, as depicted in Figure 1.



 *FIGURE 1. Sustainability as continuing effectiveness of the nuclear security regime.*

The recently published IAEA Implementing Guide Sustaining a Nuclear Security Regime provides useful guidance on this topic [2]. It provides several useful objectives and implementing actions for sustaining a nuclear security regime at the national and operational levels.

Sustaining the nuclear security regime remains a significant challenge for States and their competent authorities: absent constant vigilance, the nuclear security regime can be subject to a kind of entropy, in which there is a tendency to lose cohesion over time. The question thus becomes whether a State can counter this tendency by building sustainability into the nuclear security regime. How can a nuclear security regime be designed to institutionalize nuclear security within the government of the State, competent authorities, licensee and other operating organizations, so that effective nuclear security becomes self-sustaining? While no nuclear security regime will ever be completely self-sustaining, the building blocks suggested below can complement IAEA guidance to enhance their intrinsic sustainability

## building blocks

The recommended approach can be described as sustainability by design – analogous to the concept of security by design, in which the design of nuclear security systems and measures is integrated as early as possible into the design of a nuclear facility [3]. Similarly, sustainability by design can be thought of as integrating sustainability into the design of the nuclear security regime, through several specific building blocks.

### Organizational arrangements

Scholars of government have observed that a government’s organization vests and weights specific interests and perspectives:

Organizational arrangements – the existence or absence of specific departments or agencies, the distribution of powers among them, procedures for concurrence or consultation, the skill and forcefulness of key officials – determine whether and how effectively particular considerations will be represented in policy making. . . . An interest can be vested in a number of ways: most vividly, perhaps, by the establishment of a new agency dedicated expressly to that interest. . . . Interests can also be vested by establishing units within existing organizations . . . or by establishing procedures that require existing agencies to take an underrepresented perspective into account. . . . Giving weight to an interest or perspective is a different matter. Weight is power. It may arise from formal authority (to take actions or to make decisions or to impose limits on the actions or decisions of others); from control of resources (mainly budget and personnel); from special competence at some important task; or from linkages to sources of power outside the government, principally money, votes, and publicity [4].

Through primary legislation States can vest the interest in effective nuclear security and give it appropriate weight through such means as:

* Establishing a formal governmental body for coordination among competent authorities having nuclear security responsibilities, with a full-time staff, regular budget, and decision-making authority through a defined process;
* Designating nuclear security regulation as a core mission of the nuclear regulatory body;
* Establishing a nuclear security unit within the nuclear regulatory body, with a stature equivalent to other important regulatory missions, such as nuclear safety;
* Requiring the nuclear regulatory body to take nuclear security considerations into account when making key regulatory decisions, such as siting and licensing;
* Designating or establishing a competent authority with responsibility for nuclear security research and development with a full-time staff and regular budget;
* Designating or establishing an organization with responsibility for nuclear security training, with a full-time staff and regular budget;
* Defining the nuclear security missions of other competent authorities, including the intelligence community, law enforcement, customs authorities, and border protection authorities; and
* Establishing a nuclear security unit within these other competent authorities.

### Regulatory body leadership

Nuclear regulatory bodies are often governed by a board or commission, with a chair and members appointed by the government. The individuals appointed may or may not have specific expertise in nuclear security (or in other relevant disciplines, for that matter). As matter of custom, they may rotate away upon change of government. In some cases, the chair by custom serves only for a year or two, perhaps as the capstone to a career that may have been outside the nuclear field. Greater stability in the leadership of nuclear regulatory bodies, and appointment of a chair and/or one or more other leaders with experience and expertise in nuclear security, can greatly enhance the stability and efficacy of a State’s nuclear security regime – so that regulatory leadership does not have to learn or re-learn the basics of nuclear security and instead place a premium on effective nuclear security as a matter of course. In order to foster such stable and expert leadership, the State could either through specific provisions in primary legislation or as a matter of custom take such steps as the following:

* Require the chair and a plurality of the governing board or commission members to have experience or expertise in one or more nuclear energy disciplines, including nuclear security; and
* Appoint the chair and the governing board or commission members to fixed multi-year terms (at least five years), with the presumption that they will serve their full terms, and not be replaced upon changes in government.

### Nuclear security champions

Effective nuclear security benefits greatly from the presence of one or more nuclear security “champions” within the regulatory body, within other competent authorities such as the cognizant ministry or other operating organization that conducts nuclear research and development and perhaps operates one or more research reactors or manages radioactive waste, and within major licensee and other operating organizations. A champion is a respected, energetic, and often charismatic proponent of effective nuclear security.[[1]](#footnote-2) Often such champions are taken for granted by their managers and colleagues, but in practice it is difficult or impossible to establish and sustain an effective nuclear security regime without their continued advocacy and stewardship. As with other underappreciated assets, the essential contributions of a nuclear security champion may be recognized only when he or she retires or departs: in the absence of a new champion, what was assumed to be a natural degree of progress in nuclear security within the champion’s organization becomes much more challenging to sustain or even erodes.

While there is no magic formula for what constitutes a nuclear security champion, they tend to share a common set of characteristics. First, the champion is a tireless advocate of effective nuclear security. Second, the champion is respected for his or her expertise and integrity: senior managers and peers rely on the champion for advice, junior staff rely on the champion for mentorship. Third, the champion is a lifelong learner, aware of the latest developments and innovations in nuclear security, and ready to incorporate them in the nuclear security regime. Fourth, the champion is an inveterate networker with other champions and experts within the State, within other States, and at the International Atomic Energy Agency (IAEA) and other international organizations.[[2]](#footnote-3) Unlike the two previous building blocks, nuclear security champions cannot be cultivated primarily by formal means, such as primary legislation – although establishing by law a nuclear security unit within the regulatory body as recommended in 2.1 could provide a logical home for such champions in that organization. Other, less formal steps to nurture such champions could include identifying actual or potential champions within the organization and

* Recognizing and rewarding them through career advancement and salary increases;
* Involving them in key decisions and interactions with other competent authorities, States, and international organizations;
* Including them in the State delegations to important IAEA meetings and nominating them for participation as experts in IAEA consultants’ meetings and as faculty in IAEA training courses;
* Supporting their temporary assignment as IAEA staff or cost-free expert, while enabling them to return to a senior position with their organization upon completion;
* Designating them as mentors to talented staff at an earlier career stage; and
* Retaining them as a senior advisor for nuclear security after normal retirement age.

### Succession planning

Especially in the early stages of a nuclear security regime and in smaller States, nuclear security experts may be relatively rare. And they are also likely to be in demand. For example, even early career nuclear security staff within a regulatory body might be lured away by other organizations, such as a nuclear energy program implementing organization (NEPIO) building a new nuclear power plant. The regulatory body or other competent authority could face a serious gap in necessary nuclear security expertise with the retirement or departure of key nuclear security staff, including a nuclear security champion as discussed in 2.3, especially if the departure were not anticipated. For a regulatory body, lengthy recruitment of an external replacement or retraining of existing staff without the necessary expertise and experience could undermine the performance of core regulatory functions – such as licensing, inspection, and enforcement – in the interim. Other competent authorities, as well as licensee and other operating organizations, could experience an analogous hiatus. To avoid such situations, regulatory bodies, competent authorities, and licensee and other operating organizations should consider establishing specific succession plans for nuclear security managers and other key nuclear security staff. While a detailed discussion of succession planning is beyond the scope of this paper, the following steps represent a summary of the steps that the regulatory body and other organizations could take to prepare for the departure of key nuclear security staff:

1. Identify key nuclear security positions;
2. Identify capabilities for key positions (knowledge, skills, abilities, and competencies – including both technical skills and softer skills such as leadership and communications);
3. Identify interested staff and assess them against capabilities;
4. Develop and implement strategies for learning, training, development, and the transfer of institutional knowledge to staff selected as potential successors; and
5. Monitor and evaluate the process [7].

### Professionalization

A profession can be defined, in part, as

a disciplined group of individuals who adhere to ethical standards. This group positions itself as possessing special knowledge and skills in a widely recognised body of learning derived from research, education and training at a high level, and is recognised by the public as such. A profession is also prepared to apply this knowledge and exercise these skills in the interest of others [8].

Within the field of nuclear energy, health physics is generally recognized as a profession. The Health Physics Society (HPS) was formed in 1956 as a scientific organization of professionals who specialize in radiation safety with the mission of supporting its members in the practice of their profession and promoting excellence in the science and practice of radiation safety [9]. Originally a United States organization with a few sections in other countries, the HPS in 1964 helped found the International Radiation Protection Association, with 52 associate societies in 66 countries [10]. In addition to joining one of these societies, health physicists can confirm their status as a professional through certification.

In contrast to health physics, nuclear security is less developed as a profession and is not so well recognized as such. For example, the Institute of Nuclear Materials Management (INMM), formed in 1958 to “advance the aspects of nuclear materials management,” initially focused on nuclear material accountancy and did not include nuclear security until the mid-1980s [11, 12]. At least twice, INMM initiated a certification program for “safeguards specialists,” but terminated the last of these programs in 1982 [12]. The World Institute for Nuclear Security (WINS), is now addressing this gap. Founded in 2008, the mission of WINS is to help ensure that “all nuclear and other radiological materials and facilities are effectively secured by demonstrably competent professionals applying best practice to achieve operational excellence” [13]. The online WINS Academy now offers certification as a Certified Nuclear Security Professional (CNSP) for individuals who pass the exams for the WINS Academy Foundation Course and at least one elective course, as well as certification as a specialist in each elective course passed [14].[[3]](#footnote-4)

Greater professionalization of nuclear security could enhance the sustainability of nuclear security regimes in several ways. First, and most obviously, it could develop and renew a cadre of well trained and qualified nuclear security practitioners, both in licensee and other operating organizations and in regulatory bodies and other competent authorities. Second, it could contribute to continual improvement through the sharing of best practices and the development of innovative techniques. Third, it could help attract talented newcomers to the field through the prospect of greater status and recognition. Fourth, it could provide a constituency for effective nuclear security, both nationally and internationally.

To encourage greater professionalization, States through primary or secondary legislation or less formally could take such steps as the following:

* Establish qualification standards for individuals in key nuclear security positions;
* Require that individuals in key nuclear security positions meet the qualification standards through certification;
* Establish and financially support nuclear security degree programs in institutions of higher learning; and
* Encourage and financially support the participation of nuclear security professionals in the events and programs of such organizations as INMM and WINS.

### Nuclear security community

Closely related to professionalization is the concept of fostering a nuclear security community. While nuclear security professionals consist of individuals who have dedicated their careers to nuclear security, a nuclear security community includes both those professionals and others who have important roles in nuclear security together with other responsibilities. The latter could include, for example, nuclear engineers, health physicists, law enforcement officers, and senior managers of regulatory bodies, other competent authorities, and licensee and other operating organizations. It could also include legislators and legislative staff. A nuclear security community exists when such individuals recognize their shared interest in effective nuclear security and see themselves as part of common enterprise for achieving and maintaining excellence in the field, both within their own organizations and, as applicable, within their government or industry. A large and cohesive nuclear security community complements professionalization in sustaining the nuclear security regime by improving the nuclear security literacy of individuals with nuclear security responsibilities, by elevating the importance of effective nuclear security with their organizations, and by broadening the constituencies for effective nuclear security within government and nuclear-related industries. While nuclear security communities tend to emerge and grow organically (rather than result directly from specific policy interventions), States, regulatory bodies, and other competent authorities could contribute to their development through such actions as the following.

* Nuclear security-focused outreach to professional societies whose members have nuclear security roles in addition to their main responsibilities (e.g. radiation protection officers in hospitals);
* Nuclear security-focused outreach to trade associations within the nuclear and related industries (e.g. radioactive source suppliers);
* Support for nuclear security elective courses in degree programs for other related disciplines (e.g. nuclear engineering, health physics);
* Creation of nuclear security internship programs within regulatory bodies and other competent authorities; and
* Rotation of non-nuclear security staff to temporary positions in nuclear security and vice-versa.

### Self-assessment

As discussed in the Introduction, sustainability refers to the continuing effectiveness of the nuclear security regime over time. There is no way for a State to determine whether its nuclear security regime is in fact sustainable other than by periodic assessment of its effectiveness. Such assessments contribute to sustainability in several complementary ways. First, and most fundamentally, they identify gaps and weaknesses as well as corrective actions to address them. A well-executed self-assessment program thus becomes a self-correcting mechanism to bring the nuclear security regime back onto a sustainable path in the event of lapses. Second, the prospect of assessment provides an incentive for regulatory bodies, other competent authorities, and licensee and other operating organizations to proactively identify and correct problems in order to look good (and avoid reflecting badly) in the national assessment. Third, a process of regular assessments creates a shared and self-fulfilling expectation that the nuclear security regime should be – and will be – sustainable. The State can promote self-assessment in several ways, including:

* Establish a regular national self-assessment process through primary legislation;
* Invite the IAEA to conduct International Physical Protection Advisory Service (IPPAS) and International Nuclear Security Advisory Service (INSSERV) missions, including follow-on missions;
* Complete and regularly update IAEA Nuclear Security Information Management System (NUSIMS) questionnaires;
* Develop and regularly update IAEA Integrated Nuclear Security Support Plans (INSSPs);
* Require licensee and other operating organizations to conduct regular self-assessments through primary or secondary legislation;
* Encourage licensee and other operating organizations to use WINS self-assessment tools.

### National reports

States may consider complementing a self-assessment process with regular national reports on progress in nuclear security. While much nuclear security information is sensitive, such reports could be issued in both unclassified versions (for the general public and whole of government) and classified versions (for legislators, legislative staff, and executive branch officials with appropriate clearances and need-to-know). These reports could provide summarized results of self-assessments as well as broader information pertaining to nuclear security, such as evolution in the threat environment and new developments in nuclear security technology and practices. As with self-assessments, the prospect of national reporting would tend to encourage regulatory bodies and other competent authorities to perform effectively in order to have a good story to tell. In addition, the interagency discussions necessary to reach consensus on important issues where responsibility overlaps – though sometimes painful – can help build the nuclear security community within the government over time. Further, the information in such reports could be used to help educate incoming political leaders when governments change, thus helping to ensure continuity of nuclear security approaches. The public version of such a report can be a useful means of engagement with non-governmental organizations and civil society generally, whose ideas and support are essential to the long-term health of the nuclear security regime. States could require such reports through primary legislation, with specified topics, at regular intervals (e.g. every four years).

### International engagement

While the responsibility for the establishment, implementation and maintenance of its nuclear security regime rests entirely with the State (see [16]), a high level of international engagement can contribute powerfully to the nuclear security regime’s sustainability, in several different ways. First, it signals to the nuclear security community within the State the high priority that the national government places on the topic. Second, it facilitates the transfer of the most current guidance and best practices from international organizations and other States to the regulatory body and other competent authorities within the State. Third, participation in international meetings and other forms of engagement can reinforce the identification of the participating individuals and organizations with their national nuclear security community. Fourth, it can create a similar sense of identification with the *international* nuclear security community, reinforcing the motivation of regulatory bodies and other competent authorities to support the State’s efforts to meet international nuclear security obligations and commitments. States can take many steps to engage internationally on nuclear security, including:

* Membership in the IAEA, with a permanent mission that includes nuclear security expertise;
* Participation in the IAEA Incident and Trafficking Data Base;
* Participation of State experts in IAEA consultant meetings and as faculty in training courses;
* Donation to the IAEA Nuclear Security Fund and to WINS;
* Participation in other international initiatives, such as the Proliferation Security Initiative, the Global Initiative to Combat Nuclear Terrorism, and the Global Partnership Against the Spread of Weapons and Materials of Mass Destruction; and
* Regular reporting the United Nations Security Council 1540 Committee.

### Nuclear security norms

Much of nuclear security is governed by laws and regulations at the national level, and by policies, plans, and procedures at the operational level. The nuclear security regime is a formal system. But is also *more* than a formal system, in that it relies on the observance of enduring, apolitical norms – rules or standards of behavior that are observed not to avoid legal sanctions, but because they are either internalized or enforced through the prospect of social sanctions, such as ostracism [7]. Consider traffic safety. Drivers are licensed, the police conduct patrols, and there are significant fines for driving without a license or under the influence of drugs or alcohol, for speeding, for tailgating, for passing another car without an adequate margin of safety, and so forth. But most drivers (largely) honor these rules even where the prospect of legal enforcement is slight, such as in a remote area or in the early morning hours, because they consider doing so to be a norm. The sustainability of a nuclear security regime similarly benefits from the observance of norms, such as the following:

* While individuals may reasonably differ over specific policies, nuclear security is not exploited for political advantage;
* Positions of nuclear security responsibility are filled based on experience and expertise, not based on connections or as a reward for achievements unrelated to nuclear security;
* When changes in government occur, continuity in nuclear security policies and personnel are preserved to the maximum feasible extent;
* While more cost-effective solutions may always be considered, nuclear security budgets are not cut merely to economize.

This list is meant to be illustrative rather than exhaustive, but these examples should indicate the type of environment in which nuclear security norms are strong. Unlike the other building blocks, most such norms cannot be formally established. However, those key figures who are “present at the creation” of a nuclear security regime can work consciously to create precedents in these matters, modelling good behavior that can be followed by successors and thus embedded in the institutional personality of the nuclear security regime.

## ASSESSING PROGRESS TOWARDS BUILDING SUSTAINABILITY INTO THE NUCLEAR SECURITY REGIME

Table 1 provides a simplified, notional template for assessing the extent to which the 10 building blocks are in place. A more detailed and nuanced assessment template could be developed, with more objective measures, based on the full text of the paper. Because the presence of nuclear security norms is difficult to measure they are not included in this version of the template.

TABLE 1. ASSESSMENT TEMPLATE

|  |  |  |  |
| --- | --- | --- | --- |
|  | 0 = No progress | 1 = Some progress | 2 = Substantial progress |
| Organizational arrangements | Nuclear security responsibilities not assigned within the government | Some nuclear security responsibilities assigned | All nuclear security responsibilities assigned |
| Regulatory body leadership | Regulatory body leadership not required to include nuclear security experience or expertise | Regulatory body leadership required to include nuclear security experience and expertise | Regulatory body leadership required to include nuclear security experience and expertise; formal measures in place for stability of leadership |
| Nuclear security champions | No nuclear security champions identified | One or more nuclear security champions identified | Process in place to recognize, reward, and develop nuclear security champions |
| Succession planning | No succession planning process in place | Succession planning process under development | Succession planning process in place |
| Professionalization | No steps taken to professionalize nuclear security | Qualification standards developed for key nuclear security positions | Qualification standards developed; certification required |
| Nuclear security community | No steps taken to build nuclear security community | One or two steps taken to build nuclear security community (e.g. outreach) | Comprehensive program to build nuclear security community |
| Self-assessment | No self-assessment done | Single self-assessment completed or planned | Self-assessments at regular intervals required and conducted |
| National reports | No self-assessment conducted | Single self-assessment completed or planned | Self-assessments at regular intervals required and conducted |
| International engagement | Little or no engagement other than IAEA membership | Regular participation in nuclear-security related IAEA meetings and events | Regular participation in IAEA meetings and events; participation in at least two other nuclear security initiatives |

## conclusions

Sustaining an effective nuclear security regime is a challenging task for most States, and requires continual attention, effort, and resources. States can increase the likelihood that the necessary attention, efforts, and resources will continue to be available by building sustainability into their nuclear security regimes, to the fullest extent feasible. Use of the building blocks suggested in the paper can help States achieve this goal.

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1. For a similar characterization of the analogous “international safeguards champion,” see [5]. [↑](#footnote-ref-2)
2. In this respect, nuclear security champions are often a “Lois Weisberg” – connected by a very short chain of acquaintance to nearly everyone who is anyone in the nuclear security field. See [6]. [↑](#footnote-ref-3)
3. ASIS International (founded in 1955 as the American Society for Industrial Security, but now an international organization) offers several certifications, including Certified Protection Professional, Associate Protection Professional, and Physical Security Professional [15]. These certifications are widely recognized, but they are not specific to nuclear security. [↑](#footnote-ref-4)