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STAKEHOLDER INVOLVEMENT THROUGHOUT THE LIFE CYCLE OF NUCLEAR FACILITIES

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The Agency's Statute was approved on 23 October 1956 by the Conference on the Statute of the IAEA held at United Nations Headquarters, New York; it entered into force on 29 July 1957. The Headquarters of the Agency are situated in Vienna. Its principal objective is "to accelerate and enlarge the contribution of atomic energy to peace, health and prosperity throughout the world''.

STAKEHOLDER INVOLVEMENT THROUGHOUT THE LIFE CYCLE OF NUCLEAR FACILITIES

FOREWORD

One of the IAEAs statutory objectives is to "seek to accelerate and enlarge the contribution of atomic energy to peace, health and prosperity throughout the world". One way this objective is achieved is through the publication of a range of technical series. Two of these are the IAEA Nuclear Energy Series and the IAEA Safety Standards Series.

According to Statute Article III, A.6, the IAEA Safety Standards establish "standards of safety for protection of health and minimization of danger to life and property." The safety standards include the Safety Fundamentals, Safety Requirements, and Safety Guides. These standards are written primarily in a regulatory style, and are binding on the IAEA for its own programmes. The principal users are the Member States, regulatory bodies and other national authorities.

The Nuclear Energy Series comprises reports designed to encourage and assist R&D on and practical application of, nuclear energy for peaceful uses. This includes practical examples to be used by Member States, owners and operators of utilities, implementing organizations, academia, and government officials; among others. This information is presented in guides, reports on technology status and advances, and best practices for peaceful uses of nuclear energy based on inputs from international experts. The IAEA Nuclear Energy Series complements the IAEA Safety Standards.

This report demonstrates the importance of stakeholder involvement throughout the life cycle of nuclear facilities, including operating reactors, temporary spent fuel storage facilities and final radioactive waste repositories. It explains how involving stakeholders in decision making processes, even for those stakeholder groups that do not have a direct role in making those decisions, can enhance public confidence in the application of nuclear science and technology. Additionally, this report presents general guidance on stakeholder involvement. It does not provide detailed procedures for developing and implementing stakeholder involvement programmes, and specifics regarding stakeholder involvement for particular types of nuclear facilities. It does, however, list references to publications that provide such details.

This publication is intended to assist those responsible for planning, designing, constructing, operating or decommissioning a nuclear facility. In addition, regulatory organizations and other authorities overseeing nuclear activities or managing nuclear facility licensing processes are often seen as the main source of independent information for the general public; therefore, stakeholder involvement can demonstrate capability and trustworthiness of regulatory organizations as well.

CONTENTS

SUMMARY

This report demonstrates the importance of stakeholder involvement throughout the life cycle of all nuclear facilities; including operating reactors, temporary spent fuel storage facilities and final radioactive waste repositories and follows what is defined in the IAEA Safety Standards GS-R-3 where the stakeholders' expectations (identified as "interested parties" in GS-R-3) shall be taken into consideration "in the activities and interactions in the processes of the management system, with the aim of enhancing the satisfaction of interested parties while at the same time ensuring that safety is not compromised" [1].

This report explains how involving stakeholders in decision making processes, even for those stakeholder groups that do not have a direct role in making those decisions, can enhance public confidence in the application of nuclear science and technology. In addition, this report presents general guidance on stakeholder involvement. It does not provide detailed procedures for developing and implementing stakeholder involvement programmes, and specifics regarding stakeholder involvement for particular types of nuclear facilities. However, this publication references reports that provide such details.

This publication provides assistance to those responsible for planning, designing, constructing, operating or decommissioning a nuclear facility. In addition, regulatory organizations and other authorities overseeing nuclear activities or managing nuclear facility licensing processes are often seen as the main source of independent information for the general public; therefore, stakeholder involvement can demonstrate capability and trustworthiness of regulatory organizations as well.

The role of stakeholder involvement at different stages of a facility's life cycle is discussed, with suggestions on developing the components of a comprehensive stakeholder involvement plan. Included is guidance on focusing communication with certain stakeholders, applying various stakeholder involvement techniques and introducing messages such as ethical issues in support of nuclear facilities, including the need for sustainable energy resources and responsibility to future generations.

The printed version of the report does not include examples. Instead, the Nuclear Communicator's Toolbox (http://www.iaea.org/nuccomtoolbox/index.html) will store good practices and lessons learnt that can be accessible to all readers and will be updated on a regular basis based on the new case studies that are submitted by users to the following email address: toolbox@iaea.org.

1. INTRODUCTION

1.1. BACKGROUND

In recent years, much has been written regarding stakeholder involvement in the decommissioning of nuclear facilities and radioactive waste management. Progress can be seen in what previously were seemingly intractable situations. Increased interest by a number of Member States in the siting and construction of new nuclear generating capacity has broadened the potential for application of best practice in stakeholder involvement. It is fair to say that siting and other decisions in the past were not always examples of what would now be regarded as appropriate stakeholder involvement.

The OECD/NEA Forum on Stakeholder Confidence defines stakeholder involvement as:

"[A]n integral part of a stepwise process of decision making. At different phases, involvement may take the form of sharing information, consulting, dialoguing, or deliberating on decisions. It should be seen always as a meaningful part of formulating and implementing good policy. Stakeholder involvement techniques should not be viewed as convenient tools for 'public relations', image-building, or winning acceptance for a decision taken behind closed doors."[2]

It is now generally acknowledged that appropriate stakeholder involvement can enhance public confidence [3]. Indeed, examples abound of past instances where a lack of communication/involvement led to public concerns and reactions that extended far beyond those immediately involved in the situation [4]. A widely accepted philosophy in the early years of nuclear technology was, generally, that the less the public knew, the better, or that the issues were too complicated for the general public to understand. Simple often bland reassurances were all that were employed to allay fears regarding nuclear facilities. A number of high profile events, such as the Three Mile Island accident in 1979 and the Chernobyl accident in 1986, demonstrated the flaws in this way of thinking [5].

Some of the most important aspects of stakeholder involvement are to find out the real concerns of the stakeholders, act upon them and treat them with respect. It is also important in encouraging public understanding of relatively minor issues and thus preventing the issue from escalating into a situation that erodes public confidence. This confidence by the general population is improved if issues raised by the public are taken seriously and are carefully and openly evaluated and discussed. It is also the case that continuing opportunities for dialogue can serve as a basis for open communication when incidents or problems occur [3].

1.2. THE INTENDED AUDIENCE FOR AND USE OF THIS PUBLICATION

This report will assist those responsible for planning, designing, constructing, operating or decommissioning a nuclear facility, or for initiating a nuclear technology related programme. In addition, it is intended for those in regulatory organizations and other authorities overseeing nuclear activities or managing nuclear facility licensing.

This publication demonstrates the importance of stakeholder involvement throughout the life cycle of all nuclear facilities; including operating reactors, temporary spent fuel storage facilities and final radioactive waste repositories. It explains how involving stakeholders in decision making processes, even for those stakeholder groups that do not have a direct role in making those decisions, can enhance public confidence in the application of nuclear science and technology. In addition, this report presents general guidance on stakeholder involvement. It does not provide detailed procedures for developing and implementing stakeholder involvement programmes, and specifics regarding stakeholder involvement for particular types of nuclear facilities. This report does however list references to publications that provide such details.

Recommendations regarding design and implementation of an open and transparent stakeholder involvement programme are not provided as rigid templates but rather as frameworks in which specific local and national strategies can be developed, taking cultural and sociological factors into consideration.

1.3. DEFINITION OF STAKEHOLDER

It is important to recognize that the definition of 'stakeholder' used in a particular situation can influence how (and even if) suitable stakeholder involvement is carried out. A broad definition of a stakeholder is anyone who feels impacted by an activity, whether physically or emotionally. It should be recognized that this definition makes it difficult to identify all relevant stakeholders in particular circumstances, as some stakeholders may be self-selecting and situational.

The IAEA Handbook on Nuclear Law [6] states that:

"Owing to the differing views on who has a genuine interest in a particular nuclear related activity, no authoritative definition of stakeholder has yet been offered, and no definition is likely to be accepted by all parties. However, stakeholders have typically included the following: the regulated industry or professionals; scientific bodies; governmental agencies (local, regional and national) whose responsibilities arguably cover, or 'overlap' nuclear energy; the media; the public (individuals, community groups and interest groups); and other States (especially neighbouring States that have entered into agreements providing for an exchange of information concerning possible trans-boundary impacts, or States involved in the export or import of certain technologies or material)".

The OECD/NEA Forum on Stakeholder Confidence identifies a stakeholder as: "any actor-institution, group or individual with an interest in or a role to play in the societal decision making process" [2].

A useful distinction sometimes used, which touches on the IAEA Handbook on Nuclear Law quotation above, is between 'statutory' and 'non-statutory' stakeholders. This distinguishes between those organizations and bodies that are by law required to be involved in any planning, development or operational activity and those that will be impacted, directly or indirectly, by it.

From a facility or programme proponent or operator's perspective, such 'statutory' stakeholders therefore include: the regulator, local or national planning authorities, various service related bodies (power, water and emergency planning) that will service or be impacted by a development and national and local government entities involved in policy making and implementation.

'Non-statutory' stakeholders include those organizations and individuals who feel in whatever way impacted or affected by an activity (thus some stakeholders in this category may be self-selected). Local communities and non-governmental organizations (NGOs) fall into this group, and recognition of their importance cannot be overestimated. Their adequate inclusion or exclusion, for whatever reason, can contribute significantly to the success or failure of a nuclear facility project.

Other ways of classifying and grouping stakeholders exist, and they vary according to the process and activity involved. A review of the different approaches of stakeholder involvement is included in Ref. [7].

1.4. UNDERLYING PRINCIPLES

Underlying successful stakeholder involvement in nuclear activities and related decision making are a number of basic principles that should be borne in mind and incorporated in all activities.

— Stakeholder involvement is not about blindly following a standardized procedure that may have been suitable for another organization or situation, but rather needs to flexible and varied according to different national laws, norms, and cultures. Given the key steps of decision making processes on national and organizational levels, a stakeholder involvement plan should be developed in consideration of relevant norms and standards.
— Stakeholders will differ from country to country; e.g. the title of 'statutory' stakeholders is based upon law and regulation while 'non-statutory' stakeholders can declare themselves as such. Therefore, national differences are always to be considered when implementing stakeholder involvement.

The following subsections provide further information regarding the above principles.

1.4.1.   Exhibit accountability

Responsibility for the safe operation of a nuclear facility lies first and foremost with the operator. This awareness serves to create strong incentives for achieving a high level of safety and operational performance within the operating organization, which should in turn encourage involvement with the stakeholders who will hold the operator accountable for any safety lapses.

In addition, responsibility for monitoring and ensuring that the operator fulfils this role in safety and operational matters effectively rests upon the regulatory authorities. The public will hold these regulators accountable for performing this function. As such, 'statutory' stakeholders are often directly or indirectly involved in communication to the 'non-statutory' stakeholders and are therefore, also accountable for proper stakeholder involvement with the 'non-statutory' stakeholders. Public expectations regarding communication by both operating organizations and regulators have significantly increased during the last 20 years; leading most regulatory and operating organizations to enhance their stakeholder involvement activities accordingly [8].

This accountability cycle should ensure that all parties communicate their activities clearly and concisely, thereby avoiding accusations of secrecy and obfuscation and helping to develop and maintain trust [9]. Clearly, stakeholder involvement should be considered as a strategic activity, not as an afterthought [10].

Accountability also refers to the importance of following up with clear feedback to those involved as to how and why their contributions have or have not influenced the outcome. Responsible organizations must ensure there are routes for public reporting on final decisions, strategies or implementation plans [11].

1.4.2.   Recognize the purpose of stakeholder involvement

Having recognized the value of accountability in helping to ensure safe and sustainable development and operation of nuclear facilities, organizations can use their stakeholder involvement programme as an important way of demonstrating their compliance with various requirements and regulations. It is important to recognize that the level of interaction varies with regard to the particular stakeholder concerned; such that different methods and tools need to be used as appropriate.

The purpose of involvement is to enable all stakeholders to make known their views and to work together to ensure that these views are addressed/considered. At the same time, it should be recognized that the aim of an effective stakeholder involvement programme is **not** necessarily to gain consensus or 100% agreement, but rather for stakeholders to understand the basis for a decision and thus have greater trust that the decision was appropriate [3].

In most cases, the final responsibility for decision making lies with the respective authorities. However, public involvement in the overall process can be crucial in developing confidence and trust, without which progress can be difficult if not impossible.

This involvement should take place throughout the development and implementation of a nuclear programme. It should be regular and frequent, not only when there is a problem or concern, in order to engender trust and confidence amongst all stakeholders, including national and international communities.

Managers in both the public and private sectors have found that appropriate stakeholder involvement improves the quality and the sustainability of policy decisions.

1.4.3.   Understand stakeholder issues and concerns from the beginning

As explained in Section 3, the first steps in an effective stakeholder involvement process are the development of an appropriate strategy and a plan for implementing this strategy. This requires a comprehensive approach to stakeholder identification and understanding of the issues or concerns affecting them. In no case should a particular stakeholder group's difficulty to comprehend issues be used as an excuse to withhold information. Indeed, reasonable issues and concerns that are presented by stakeholders should be factored into decisions and public explanations following those decisions [3].

Having identified concerns and sensitivities among the various stakeholder groups and how those groups may impact the programme or facility development in question, there is then a need, within decision making processes, to clearly assign responsibilities and roles for stakeholder involvement in these processes. This should include explanations of what decisions are required and how stakeholders can influence them, and if not, why not.

Such clarity is now being incorporated into many national codes of practice and process guidelines, so that there is a transparent accountability trail from the very beginning, designed to reduce the potential for disputes or even legal challenges further down the line. For example, the latest UK Consultation Code of Practice clearly states that:

"It is important that consultation takes place when the proponent is ready to put sufficient information into the public domain to enable an effective and informed dialogue on the issues being consulted on. But equally, there is no point in consulting when everything is already settled. The consultation exercise should be scheduled as early as possible in the project plan as these factors allow [12]".

1.4.4. Build trust

Particularly for nuclear technology related programmes and facilities, emphasis must be placed on trust by the community (local or national) of the organizations and institutions involved in the process. Reliability, responsibility and fairness are attributes that foster trust in those participants in decision making processes.

When members of the public have personal experience or knowledge related to a potential or perceived risk, they make up their own minds. However, when they lack direct experience with a potential risk, they rely on the people they trust [13]. Therefore, an important element in creating trust is the perceived credibility of the responsible organization and of the reviewing agency or agencies [9].

Establishing trust can be enhanced when an inclusive approach to stakeholder involvement is adopted from the beginning of the planning process to help ensure that all those who wish to take part in the process have an opportunity to express their views and have access to information on how public comments and questions have been considered and addressed [14].

As stakeholder involvement becomes more widespread, confidence in the process and trust in the actors taking part tends to increase. However, this trust can quickly be destroyed by unexpected events such as unintended environmental releases or system failures. Trust can be strengthened by demonstrating technical competence and adherence to high standards both in performance and reporting.

1.4.5. Practice openness and transparency

Openness and transparency are the opposites of the 'decide, announce, defend' communication model of the past. Indeed, as was pointed out by Shimomura in 2004, this technique has been replaced in most countries, certainly in the context of radioactive waste management, by 'engage, interact, and cooperate' [11, 15].

One challenge to implementing this principle is the natural tension between the goal of transparency with stakeholders and restrictions in disclosure of information which may arise for security reasons, as highlighted by the OECD/NEA Working Group on Public Communication of Nuclear Regulatory Organisations [8].

1.4.6. Recognize the evolving role of and methods for stakeholder involvement

Open and accessible means of stakeholder involvement in existing nuclear programmes has evolved, and these strategies have also become the norm in many areas of waste management facility siting and development. It is fair to say that any future programme involving new reactors or facilities will be expected to follow this trend [16].

Given the timescales involved in developing, constructing, operating and ultimately decommissioning nuclear facilities, which in the case of a new programme can be of the order of 100 years [16], obtaining and maintaining stakeholder support is obviously important. It is therefore vital that engagement with the younger generation forms an important part of any stakeholder involvement process, given that its members will be impacted throughout their lives and are the decision makers of the future.

This perspective will influence the methods and tools used for future stakeholder involvement. These are likely to be different from those used currently. As discussed in Section 3, the use of modern media such as social networking sites and the internet may ultimately become more influential than traditional forms of print or broadcast communication. Already, as indicated by Gauvain et al [8], the traditional mass media are no longer the

major vector for interpretation and transfer of decisions and technical documents to the public by regulators, with web based reporting and consultation now widespread.

2. STAKEHOLDER INVOLVEMENT CONSIDERATIONS DURING THE LIFE CYCLES OF NUCLEAR FACILITIES

2.1. INTRODUCTION

Nuclear science and technology face unique challenges with regard to public understanding and acceptance. It is generally recognized that nuclear applications contribute significantly to society through the generation of electrical energy and in medical and industrial applications. However, some stakeholder groups view these benefits as being outweighed by the issue of nuclear waste or by association of beneficial applications with nuclear weapons. Additionally, the fact that radiation is an invisible hazard; dread of its potential health effects often lead to perceptions by the public that the risks of nuclear energy are much greater than the risks that experts attribute to nuclear energy. Coupled with this is the nature of the nuclear industry as a major, long term political and economic commitment, highly technological and heavily dependent on hard scientific knowledge to deliver energy for consumers [17]. These qualities make clear understanding or outright support by the general public difficult to obtain.

If nuclear programmes are to develop beyond current levels, it is essential that there is a common understanding of the associated issues among all stakeholders; both those immediately affected by proposed or operating facilities and those who simply benefit from them indirectly. Such understanding cannot exist without the availability of balanced information and appropriate stakeholder involvement in the decision making process.

Increased public participation in decisions can promote a greater degree of understanding of the issues and can help to develop appreciation of the actual risks and benefits of nuclear energy as compared to the risks and benefits of other energy sources. In order to develop and enhance public confidence, it is vital to provide suitable opportunities for stakeholders [3].

Of course, effective stakeholder involvement is not in itself a guarantee that a nuclear programme will be successfully implemented or a particular facility developed. However, increasing stakeholder involvement is a necessary condition for sustainability in most Member States that have nuclear power programmes. Governmental support is often dependent on stakeholder confidence, as national governments generally do not press ahead with nuclear programmes in the face of significant public opposition. Government support can be sustained through a positive and supportive political atmosphere, which includes appropriate stakeholder involvement [16].

Two models of decision making can be observed in Member States. One holds that decisions about issues that are national in scope should be made at a national level, whereas another holds that where a national policy disproportionately affects a specific locality, then that locality should be given a disproportional role in related decisions [18]. The transition between national policy decision making and local involvement in decision making is treated differently in Member States. However, stakeholder involvement can be vital in gaining and maintaining public support in either case.

Raising the importance of stakeholder involvement in decision making, particularly with reference to issues concerning waste management, has not long been in use in many Member States [18]. Experience is beginning to remove doubts about the efficacy of this approach [2]. Public consultation with the local community near proposed nuclear facility sites in the decision making process, has provided these communities some degree of control over their future [5]. This will remain true for all nuclear facilities but especially in Member States with little or no prior use of nuclear energy.

It is important to emphasize the different levels of engagement that should be considered for stakeholder involvement. The spectrum ranges from: remaining passive with no engagement; to monitoring stakeholders views; informing; consulting; involving through working directly with stakeholders to ensure their concerns are understood; to collaboration where stakeholders are full partners in finding mutually agreed solutions. In a

stakeholder involvement strategy and plan, it is quite feasible that all of these levels might be used for different stakeholder groups.

2.2. DECISION MAKING STAGES

For the purposes of clarity in this report, decision making processes associated with nuclear facilities and their associated requirements with respect to stakeholder involvement have been divided into four nuclear facility/programme life cycle stages:

(1)   Introduction of nuclear power programmes or new nuclear facilities;
(2)   Operation of nuclear facilities;
(3)   Expansion or extension of nuclear facility operation;
(4)   Planning and implementation of nuclear facility decommissioning.

This sequence reflects the now well accepted principle of 'stepwise decision making' being adopted in most countries with regard to nuclear facility development, during which involvement may take the form of sharing information, consulting, dialoguing, or deliberating on decisions. In many Member States, the process was originally developed as a way of fostering stakeholder involvement in siting and operating waste disposal facilities [2]. It is now being applied to all nuclear facilities, with public involvement an integral part, beginning with listening more to the public and their concerns [10].

The stakeholder involvement approach is in direct contrast to the earlier 'decide, announce, defend (DAD)' approach to making decisions about major projects in the nuclear field. Using a DAD approach, industry and government carry out early steps in private, with little or no public discussion, followed by an announcement of the result of the deliberations and a programme of 'selling' the decision to the public, regulators and planning authorities [19].

Exactly who the decision makers are in each stage will vary country to country depending on national legislation, regulations, and norms. However, often the main decision maker in the first phase is the national government, whose task it is to introduce a nuclear power programme and establish a regulatory body. While the last three phases, encompass a number of decision makers, government ministries, the operator/owner operator, and the regulatory body. Even local authorities may, in the second phase, be regarded as a decision maker, though; normally it is rather one of the main stakeholder groups. All of the above mentioned bodies should continually interact with stakeholders and appropriately involve them in the decision making processes.

In the course of facility construction and operation, the main challenges in terms of public support include meeting expectations for greater quality of life by members of the host community, mitigating construction nuisances, accommodating a growing population through the many years that a facility is in operation and assuring safe operation of the facility [20]. During decommissioning of a facility, these challenges include development of alternative site uses and continued trust and confidence in the operator and regulator developed by the public during operation. The impacts of facility closure on the local community should not be underestimated. Experience shows that, even where a local community was originally against the development of a nuclear facility, they are usually also against its closure, especially if there are no plans for a replacement.

The issue of waste management actually transcends all of these stages in that it causes concerns whenever nuclear facilities of any kind are proposed. The slow progress in developing final disposal facilities in most Member States means that stakeholder discussions will need to address radioactive waste disposal. It should be noted, that while most nuclear facilities have a life time of less than a century, repositories are designed to carry out their function from several centuries to tens of thousands of years. Thus, with regards to stakeholder involvement, these activities require different justification and communication.

It is important to emphasise that stakeholder involvement is now a mandatory component of various international conventions and treaties that detail the role of governments and developers in the strategic environmental assessment (SEA) and environmental impact assessment (EIA), not just for nuclear facilities. Development of a major national policy, such as the introduction of a nuclear programme, is subject to SEA requirements, and specific facilities and activities are subject to EIA requirements. While not all Member States are signatories to the relevant conventions and treaties; such as Aarhus, Espoo, EURATOM or various EU Directives,

many of these instruments incorporate responsibilities to neighbouring countries. As such, many Member States will find themselves obligated to incorporate at least some level of stakeholder involvement during the 4 stages outlined in this section.

2.2.1. New nuclear power programmes or facilities

A proposal to develop a nuclear power programme or site a nuclear facility will inevitably result in considerable debate, first nationally then locally when specific sites have been identified, but also often with neighbouring countries.

Communicating benefits and risks

For any country considering or operating nuclear power, open communication with all stakeholders, including decision makers, public, media and neighbouring countries, should address all of the issues of nuclear power benefits, nationally and locally, as well as the risks, commitments and obligations. This honest approach is essential in order to build and maintain trust and confidence in a nuclear power programme [21].

Relationships established during this early stage of programme or facility development can prove invaluable later during operation and subsequent decommissioning. Mutual trust between partners strengthens the sense of community and encourages open and honest communication.

In the case of new generating capacity, the contribution to a national energy policy of greater independence from imported oil and gas is usually a primary point [22]. The issue of a safe and sustainable strategy for waste management is important to be addressed during this phase. Recent demonstrable successes in decommissioning and waste management may increase public confidence [21].

Siting

The issue of specific facility siting can be extremely contentious. Even when a satisfactory level of public support for a nuclear power programme has been developed, locations for new reactors can be as difficult to site as waste storage or disposal facilities. Initial points raised by a facility proponent often stress benefits that will accrue and stimulate the local economy directly and indirectly. The benefits to the area can include jobs, tax revenues, economic output, labour income and incentives to the local community [23].

For all facilities, but in particular for storage and disposal facilities, it is becoming more common for interested communities to be invited to volunteer their locations for potential development (provided they are geologically/logistically suitable) as opposed to making top-down imposed siting decisions. In many cases, communities are being presented with potential benefits, both social and financial, and are able to decide whether or not to come forward. It is important that these are presented as benefits in recognition of the service the local community is providing to the national community, rather than as some form of impact mitigation or bribe, although all too often this is how the benefit will be described by opposition forces. In addition, though frequently used, the word 'compensation' is dangerous in describing the support/benefit package, since in many cases it creates an image that harm has been done, which needs to be compensated. However, provision of these benefits does not remove the need to recognize and respond to the community's reactions with respect to perceived impacts such as effects on property values and other forms of potential stigmatization [24].

This increasing use of voluntary processes in turn requires the development of decision making processes that incorporate comprehensive local stakeholder involvement, so as to provide for local participation in those aspects of the process that most affect them, and in which they can have some influence on the outcome. The subsequent emergence of plans about which local stakeholders were unaware can cause irreparable damage to relationships and, in a moment, destroy hard won trust that has taken months, even years, to build [25].

Communication involvement and partnerships

In general, public involvement is best achieved in this stage primarily through open and honest dialogue between proponents of the nuclear programme (Government, the owner/operator) and other stakeholders. Certain high profile opinion leaders/formers may tend to be the most active and vociferous, but all concerned citizens

should be provided with relevant information and have opportunities to participate in the dialogue [16]. In fact, while high profile opinion leaders cannot be ignored, there is often considerable benefit to be gained working consistently with more local, often low profile, community groups and organizations, to gain their understanding and trust (and therefore 'marginalizing' the high profile opinion formers, who may not even be from the local area or even the country, but still have their own 'anti-nuclear agenda'). Another important aspect of decision making in this stage is that all stakeholders should be clear as to what their involvement can achieve and how their opinions will be taken into consideration. This refers to the issue of trust raised previously, but encompasses trust in the process itself, not just in the organizations involved.

Such early dialogue can result in the development of strong partnerships between developer and host community [26] and can overcome many of the concerns that will undoubtedly be expressed by some individuals and organizations. In New Mexico, for example, community leaders in Carlsbad continued to support the Waste Isolation Pilot Project low level waste repository after it began operation in 1999 by serving as project advocates. They proactively keep lines of communication open with each new US Secretary of Energy and with New Mexico's congressional delegates and state elected and appointed officials [27].

Indeed, many repository siting programmes now incorporate local partnerships, whereby the proponent and local community interests join together to examine all aspects of the proposal and present a joint profile to the general public with regard to facility location, community development measures, and in some cases, certain aspects of facility design. There are even examples of waste management implementing bodies proposing to involve local stakeholders in joint studies and in interpretation and review of ongoing site investigations [28], assessment of the potential impacts on human health and environment, and the development of plans for monitoring these issues during facility operation and final closure [29].

In some Member States, committees representing a range of local community interests including local government, schools and business and environmental groups have been formed to assist impact assessment and impact management activities. Experience suggests that these local committees can have continuing value during facility construction and operation phases to help with implementation of impact management measures [14]. In reality when such nuclear facilities become operational, there is often a growing sense of pride and 'ownership' of such facilities by their communities over time, especially if they are developed in previously 'disadvantaged' areas (in the economic and/or technological sense).

Inter-organization coordination

As discussed in Section 3, use of techniques such as opinion polling to assess levels of community support and regular meetings with local and national opinion leaders and decision makers is essential, as is involvement of neighbouring communities and/or countries, especially where international conventions and obligations apply.

During the process of deciding whether to introduce a nuclear power programme or develop nuclear facilities, it is necessary for the organizations involved to coordinate their activities with regard to communication, while at the same time demonstrating a degree of independence so as to engender trust in their announcements and deliberations. The owner/operator organization and the regulatory body should each develop their own information and education programmes and engage in public dialogue as they form and begin to exercise their responsibilities through their stakeholder involvement programmes [16]. The regulator's role as an independent and competent body is important to establish and communicate. It is vital for the regulator to publicly demonstrate independence from political or industry influence in its decision making and deliberation.

An important aspect of the communication process for a regulatory body is in the area of licensing and authorizations. It is becoming increasingly important for such bodies to develop clear avenues for stakeholder involvement in licensing processes. Many regulators incorporate public comment sessions in their deliberative meetings. This approach can be hampered by difficulties in public access to documents or in having suitable security clearance for attendance when sensitive security issues or information are being considered [30].

Involvement process and expectations

Because issues relating to programme development tend not to be site specific, at least in the early stages, policy decisions are often made between applicable authorities and affected stakeholders that may not include significant representation from the general public [18]. It is often only when specific sites are being considered that

local stakeholders become involved. Experience has shown that local stakeholder involvement should be planned at the earliest stages of site investigation in order to avoid a perception that a nuclear facility is being forced upon a local community without an opportunity for their input.

Clear criteria establishing how and when a programme or facility siting process can move from one step to the next are essential to public acceptance of the decision making process, and good communication of the constraints on the process is also crucial [31]. There needs to be clarity on the scope for decision making, and identification of the point in the process when specific decisions are finalized and not subject to being revisited. This reinforces the importance of accountability in the decision steps and clarification of how stakeholders' views are taken into account and when and if decisions are changed or amended in light of them [18]. This is an important underlying principle to bear in mind in any involvement process, as suggested in Section 1.

As most of the additional reactors and facilities are built on the same territory or in the vicinity of the existing NPPs, one of the most important points to keep in mind at the very beginning of the nuclear facility site selection process is **not** to promise the locality that there will be no need for future extensions and/or expansion. Later, if additional needs are identified it will be difficult to change these statements and explain why they no longer apply.

2.2.2. Operational phase of nuclear facilities

Once the difficulties of gaining public support for the siting of a nuclear facility have been overcome and it has begun operation, there is a tendency for the owner/operator to reduce the level of stakeholder involvement. Experience has shown that it is important that stakeholder involvement processes developed during siting and commissioning phases are continued and potentially expanded, taking into account lessons learned during these phases regarding which groups merit the greatest amount of involvement and which communication techniques work best with various stakeholders.

There will of course be continued involvement of statutory stakeholders such as regulatory bodies and government agencies, as the safe operation of the facility will be subject to strict, ongoing inspection and review. As mentioned, these processes themselves are increasingly being opened up to involvement by external stakeholders, both national and local. These efforts should be encouraged. Transparent oversight of operating nuclear facilities is an excellent way to demonstrate independent regulation and should develop and increase stakeholder confidence in competent authorities. Difficulties can arise regarding the treatment of security related issues in terms of stakeholder access, but if openness is encouraged and authorities strive to involve stakeholders when possible, then the public is more likely to accept the need to keep security related information confidential [32].

Stakeholder involvement and communication on a regular basis during facility operation should include updates on safety levels and other performance related issues; such as power output level or refuelling outage schedules. This can take place via stakeholder groups established as representatives of the community and through responsible authorities. It is important to remember that many facility staff will also be members of the local community, and can be good community 'ambassadors'.

Development of long term projects such as improved roads, hospitals or emergency response facilities are increasingly common, especially if they enhance nuclear operations while benefiting the local community in other ways. Many facility operators see these as an important part of their social responsibility efforts to be good neighbours [33]. Facility operators also often support local communities through support for local businesses, sports and education [23]. Distribution of local taxes or community support grants can effectively be delegated to community groups or special committees.

2.2.3. Expansion or extension of nuclear facility operations

There is now increased interest in many Member States in extending the operating lives of existing reactors and other nuclear facilities, increasing the rated power output from those reactors or building additional reactors at existing plant sites. In several cases this will require amendments to existing legislation which had previously mandated closure after specified operational periods. Decisions of such magnitude often involve extensive consultation by national governments or operators with the full range of stakeholders. Stakeholder involvement approaches used during the development phase of a nuclear programme may bear little resemblance to current best practices in some Member States, especially those that began nuclear developments several decades ago.

If the project is focused on expanding the capacity of existing sites, then it will be important to demonstrate that initial justifications for facility siting remain valid, or that from all perspectives, including technical, and socio-economic, the expansion of facilities at the site is acceptable. The increased economic benefits from such an expansion will often outweigh other local concerns, especially because the benefits from an existing reactor are tangible, not just conceptual as they were during initial facility deliberations. On the other hand, difficulties in developing acceptable waste disposal facilities have the potential to cause elevated concerns, given that it may be necessary to implement interim management solutions such as on-site storage, possibly contrary to original plans. Other issues and arguments used in the development of new nuclear programmes, especially independence of energy supply, will likely feature large in any discussions of extension or expansion. The ability of nuclear generation to offset growing emissions of greenhouse gases is also an issue frequently discussed.

Although communication of the benefits from economies of scale and use of existing infrastructure, which can make existing sites more attractive than wholly new ones, will likely predominate, evolving issues such as potential future rise in sea level, which has become widely discussed given the coastal location of many facilities in many Member States, should receive careful consideration.

National experience with nuclear power and national perceptions of environmental considerations may cause differences regarding acceptance between local and national stakeholders. In some countries, public perception may be heavily influenced by the lack of practical and affordable alternatives and observations that nuclear power has made valuable contributions to raising living standards in other countries [21].

As in all cases, when communicating the rationale for extended or expanded nuclear facility operation, care should be taken not to present misleading or oversimplified facts, which could impact the credibility of all stakeholder involvement measures.

2.2.4.   Decommissioning of nuclear facilities

The impacts of closure at the end of a nuclear facility's design life are both national and local, and open dialogue and communication should be established between the operator, regulator and local stakeholders early in the process. Decisions regarding closure of nuclear facilities, particularly reactors, are usually taken as part of national energy policy. In most countries, local communities have a role in the decision to choose a site for a new facility; in several countries, municipalities have a formal right of veto. Local communities typically have less power in the case of a decision to close a facility, and don't have the right of veto [20]. However, the impact upon the host community can be such that subordinate decisions regarding site reuse, decommissioning and cleanup processes and local economic diversification can assume major importance. Involvement of all stakeholders is therefore essential.

The trust and confidence developed between all parties during facility operation needs to be maintained during the decommissioning process. Shared decision making on site reuse and economic impact mitigation is an excellent way of encouraging maintaining this trust [20]. Providing accurate and easily understandable information on a regular basis is a fundamental premise, using a range of communication techniques discussed in Section 3. It is also important for local communities to be able to depend on the regulatory authorities for providing information in addition to and independent of that from the owner/operator.

Closure of a facility results in decisions regarding waste management that may be beyond the influence of local stakeholders. What to do with accumulated wastes and those resulting from decommissioning, is an integral part of a national strategy; in some cases sufficient storage or disposal facilities may not exist at the time of closure. The site may then become an interim storage facility, which may be a cause for concern by the local population. Although continued use of the site will offer some employment opportunities, this is likely to be on a smaller scale than was the case during facility operations. Open and honest communication between the Government, the waste owner and the local community about the developing situation will be crucial. Decisions that can be made locally are likely to include participation in monitoring of potential health impacts from decommissioning activities and of the socio-economic impacts from reduction in employment and local purchasing [20], together with agreement on future use of the site.

Local oversight of decommissioning and cleanup activities is now a feature of stakeholder involvement at closed nuclear faciltiy sites in a growing number of Member States, and there is an abundance of experience providing best practice evaluation — what makes good involvement and how mistakes can be avoided. For example, there is a movement towards establishing groupings of affected communities into national and

international bodies able to share their experiences in support of communities newly impacted by facility closure, such as Nuclear Legacy Advisory Forum (NuLeAF, UK), Associación de Municipios en Áreas con Centrales Nucleares (AMAC, Spain), Energy Communities Alliance (ECA, USA) and Group of European Municipalities with Nuclear Facilities (GMF, Europe). National agencies, facility operators and waste owners would do well to maintain good communication with these bodies in order to demonstrate their intention to have open and constructive relations with their local communities.

3. IMPLEMENTING STAKEHOLDER INVOLVEMENT PROGRAMMES

3.1. INTRODUCTION

This section provides a brief overview of the steps and issues that should be common to implementing stakeholder involvement programmes for any nuclear facility or programme. These steps are:

— Develop a strategy for stakeholder involvement;
— Develop plans for implementing this strategy;
— Ensure that the capacity to effectively implement these plans are is available;
— Implement these plans;
— Continually monitor the effectiveness of these actions and look for ways to improve.

Each of the following subsections provides further information regarding the above steps.

Section 4 provides references and links to other resources related to details regarding of stakeholder involvement programmes for specific nuclear facilities or that provide procedures or lessons learned that should complement the information in this report.

It has long been realized that clear communication to implement stakeholder involvement is the vital link between nuclear facilities and the public. A clear communication policy is the key to credibility, which must be earned, not assumed. It is possible to overcome mistaken assumptions or misunderstood information about nuclear technologies with open and honest communication that exhibits a number of key characteristics: "early, simple, candid, consistent, accurate, factual, understandable, continuous and credible" [5].

It is insufficient to communicate only what the nuclear industry thinks should be communicated; it is vital to listen to all stakeholder concerns and respond in a timely way. Many controversies over technology, environment and health related questions have a basis in risk perception, and the nuclear industry cannot afford to ignore the need to communicate about all issues — both perceived and real. When the industry instead remains silent, industry leaders implicitly abandon the stage to others who may be less well informed or potentially selective about their presentation of information because of opposing interests [34].

As a result of past mistakes [4], most in the nuclear community now acknowledge that nuclear communication is a specialized field that should be placed in the hands of trained communications experts, working in consultation with technical experts from the nuclear area. Poorly managed communication can lead to an antagonistic environment in which nuclear professionals lose their most important resource, namely the trust of political authorities and the public [29]. It is now recognized that frequent, clear and candid communication is essential even before a facility has been sited or constructed and continuing throughout facility operation to final decommissioning and closure in order to gain, and maintain, the trust and confidence of the surrounding community [9].

Internal and external communication is equally important. Effective internal communication can help to build a team that clearly understands the different yet equally demanding roles of experts (remembering also that all industry staff are potentially 'spokespersons' for the industry and so need to be well informed, even 'trained', themselves). Effective external communication can present the expertise of the organization to broad external

audiences. Good communication cannot guarantee success, as safe nuclear management is the basis on which public confidence is built. But as suggested by Fischhoff [10], communication can reduce the risk of needless conflict that arises when otherwise acceptable nuclear events are not understood by the public, when they do not see problems being addressed or when people feel their opinions or concerns are not being treated respectfully.

3.2. DEVELOP A STRATEGY FOR STAKEHOLDER INVOLVEMENT

Strategies for stakeholder involvement should include:

— A clear goal for the programme;
— Well-defined and measurable objectives for achieving the goal;
— Identification of the issues to be addressed and an indication of priorities.

A well-defined goal is one that is neither too vague nor too broad, and that can be clearly understood by all involved in implementing the programme. Objectives should then be developed as to how to achieve this goal. They need to be clear and measurable, as they will serve as one of the principal means for measuring results of the stakeholder involvement programme.

The objectives will vary depending on which of the stages of the nuclear life cycle discussed in Section 2 is involved and which organization is developing the programme. In the case of a new facility or new nuclear programme, for example, one of the objectives of an owner/operator might be public acceptance of the site selection or acceptance of nuclear power as a superior option to fossil fuels. On the other hand, an organization operating an existing nuclear facility will wish to demonstrate clearly to the public that it is acting in full compliance with relevant safety regulations, that its staff is competent and knowledgeable and that its activities benefit both the local and national community.

A regulatory body's objectives at the programme development stage might be greater public understanding of the decision steps involved for the project to progress. During facility operation, a regulator may have an objective to ensure that the regulatory body is viewed as effective in protecting public health and safety and is body that the public can consult as an independent and trustworthy expert.

Because these objectives will differ for each of the organizations implementing a stakeholder involvement programme, development of each organization's strategy will require close coordination with other involved organizations. This is especially useful in terms of integrating certain elements of the communication plans, including messages and techniques. For example, it is common for a programme of events or meetings to be arranged with expert speakers from the various government, regulatory and owner/operator groups to reinforce the interrelated nature of responsibilities of the various groups as well as demonstrate consistency of messages [35].

A well-structured and thoroughly implemented communication and involvement plan during the development stage of the project can create a general sense of public confidence in nuclear science, thereby increasing the chance that strong relationships between the industry and the public can become extremely beneficial during the operational lifetime of a facility [33]. It is not uncommon for a series of communication and involvement plans to form individual parts of a long term strategy that may last for many years, with well-defined goals at various stages.

An important aspect in developing a strategy is knowing the knowledge and opinions of the general public and other stakeholder groups regarding the nuclear facility/programme being considered. Thus, the use of opinion polls and surveys should be considered. This also highlights the importance of having the right mix of skills in the team that will be involved in the stakeholder involvement programme from the beginning. In the past, nuclear technology professionals have taken the lead in such programmes, and have underestimated the need for including professionals in social sciences such as communication, opinion surveys and organizational psychology as members of the team. The effectiveness of the programmes has suffered as a result.

3.3. DEVELOPING A STAKEHOLDER INVOLVEMENT PLAN

Once a strategy has been developed, there are several important steps to be included in the plan developed to implement this strategy. They include:

— Identify and prioritize stakeholder groups to be considered;
— Identify the issues and means of engagement that are considered most important for each stakeholder group;
— Identify the tools and approaches that will be used;
— Design an evaluation component;
— Assign ownership of plan elements;
— Allocate sufficient resources to accomplish the actions;
— Identify the competencies that will be needed by those who will be responsible and how these competencies will be developed and ensured.

The remainder of this subsection provides some lessons learned regarding considerations for such plans.

Timing is essential to successful integration of stakeholder involvement in a nuclear project's decision making processes. If stakeholders do not have the opportunity to provide early input, they may believe that their participation was superficial or that their interests were ignored or worse, that they were being patronized. The public and other stakeholders need to be provided initial information about a project and its related implications and decisions before their input is sought; otherwise, stakeholder input may fail to address questions that would prove useful to the decision making process. The plan should be updated as necessary but at least annually to reflect changes in the project, the decision process and evolving stakeholder populations [36].

3.3.1.   Identify and prioritize stakeholder groups to be considered

Stakeholders will vary from country to country as various forms of government determine differing levels and types of involvement by stakeholders. Each stakeholder group will have specific information needs and expectations, which may be addressed in different ways depending on the stakeholder profile and the issue under consideration. This is why it is crucial to fully understand each stakeholder segment in terms of their self-stated (or underlying) purpose, their interest or concerns (not always explicitly expressed) related to the respective nuclear facility, their expectation of information and involvement in decision making and the communication techniques best suited to them.

Given the timescales associated with the life cycles of nuclear facilities, it is possible to develop long term relationships with the various stakeholders and develop levels of trust and confidence in the information that is provided [9]. Of course during the different stages of a facility's life cycle, different stakeholders will assume varying importance. When a nuclear programme is under discussion, national stakeholders will tend to be more important, whereas once sites have been identified; local stakeholders become a primary focus.

It is advisable at the very beginning to draw up a list of the stakeholders and groups that are expected to be the focus of the plan. The list should identify the main stakeholder groups that should be targeted at that particular nuclear life cycle stage. A comprehensive plan will also include stakeholder groups that may not be primary focus but may be secondary audiences, especially if their support or accurate understanding of nuclear matters is instrumental in influencing the primary stakeholders. One way to achieve this is to identify 'strategic' stakeholders, whose support of or opposition to a development would be significant, or who have particular information or expertise to offer, including certain NGOs and technical groups such as engineers or labour unions academics or other 'respected' figures, as well as national bodies and business groups. When a facility at a specific or proposed site is involved, certain 'community' stakeholders will also need to be included, for example, interested individuals, local businesses or representatives of residents associations, clubs or faith groups.

After developing a complete list of potential stakeholders, it can also be valuable to perform a comprehensive stakeholder mapping, showing how the various stakeholder groups interact or influence one another.

There are various ways of identifying and prioritising stakeholders. The different stakeholders that have been recognized as important in any communication programme concerning nuclear issues will be different from country to country and from life cycle stage to life cycle stage, but should be expected to include at least the following:

Government leaders — local and national

Decisions concerning development of nuclear programmes and nuclear facilities involve major expenditure and public interest. Such decisions are the preserve of political leaders and as such it is important to enable them to come to a balanced and sensible understanding of the many issues involved. Members of the public look to their

representatives to make sound judgements based on being well informed. The public also wants to see that decisions made by government leaders are without undue bias or influence. Even when briefings, meetings or site visits are closed to the public, there should be public awareness that such meetings are being conducted, what decisions are being discussed and when an open forum is not feasible, why that is the case, and if/when the conclusions of such meetings will be made public.

The establishment of local committees is an efficient way of interacting with local politicians and government officers. This allows regular and timely communication of operational matters in an open forum that ensures information is well understood by other stakeholder representatives at the same time it is presented to authorities in charge.

News media

In many instances the general public claims greater trust in the media than in government officials or other so-called 'experts'. It is essential to recognize that while some in the media may have particular views that they attempt to communicate, others merely reflect the information they are given. The importance of the rolling news cycle is also key in planning communication activities with this particular audience. It is crucial to have credible and skilled communicators available to interact at short notice and to follow up as needed. It is often important to distinguish between the national media and the local media, who may have different requirements and expectations.

In one example, the US NRC has recognized the need to improve its interactions with the media, and a 2003 task force report suggested that the Commission should "make more effective use of interviews, meetings with editorial boards, letters to the editor, appearances on news programs, human interest pieces and frequent proactive use of press conferences" [32].

Academic/researchers

This group is generally identified as having a high level of credibility with the public, and is often approached by the media because their advice and comment is seen as independent from the regulator or owner/operator. Developing methods of two-way communication with this stakeholder group can be a useful way to incorporate well-argued science based discussions into practical energy policy business decisions being made and considered by other stakeholder groups. In addition, relationships with educators can ensure that academic programs support the needed knowledge base of current and future members of the nuclear workforce.

Medical and health professionals

This is another group frequently seen by the public as a most reliable source of information. In reality, they often lack detailed knowledge of the impacts of radiation on health [29]; particularly given the evolving nature of scientific conclusions on this question. It is essential therefore to engage this group to allow them to develop knowledge and confidence in the information and the individuals providing it. Medical professionals can also provide the owner/operator with insights into potential concerns that should be managed to prevent them being overstated in the public's view.

Special and public interest groups, consumer groups, other non-governmental organizations

Involving such groups in public discussions and allowing their comments to be widely disseminated offers good opportunities for clarification of incorrect statements and assumptions while demonstrating a willingness to take into account opposing views. During initial stakeholder identification exercises, it can be useful to determine special interest groups that would be supportive of primary attributes of the nuclear programme, such as jobs, taxes or energy independence, and those that primarily oppose nuclear technology programmes based on their own goals. While environmental organizations have historically fallen into this latter category and may continue to do so, in an increasing number of Member States their concerns over climate change are increasingly making them proponents of safe nuclear power generation.

Citizens

Throughout the life cycle of the nuclear facility, the local community can be the most important stakeholder [9]. Members of the local community exert influence on local and national politicians and can be an important group in terms of support for developing new facilities or extending existing ones. Establishment of local liaison groups allows representatives of local interests to be supplied with regular information.

Employees and suppliers

Employees are typically very important stakeholders, not in helping to ensure project success but also as informal spokespersons for projects. Suppliers have similar characteristics as stakeholders.

Informal opinion makers

Informal opinion makers including local natural authorities, reputable persons, employers, barbers, barkeepers, sportsmen, firemen, etc. may significantly affect the opinion of the community.

3.3.2. Identify the issues and means of engagement for stakeholder groups

In any communication programme it is essential to have consistency between what is said to different audiences, but also to recognize the emphasis on certain aspects of the message or complexity of what is said between different groups. Wherever possible, messages should be consistent and part of a regular programme, and those involved should be prepared to respond to stakeholder input in a manner that builds mutual respect [9].

One useful approach is to first address the major public issues in the country concerned or region of the State. Looking initially at relative public concern over issues of energy supply, national independence, economic conditions or growth, or the use of natural resources can help determine the degree of emphasis on certain messages as part of a given society's focus on national policy, particularly energy policy, during various nuclear life cycle stages.

3.3.3. Identify the tools and engagement techniques that will be used

If careful consideration has first been given to the steps above in identifying the goal and objectives of the programme, and then, in identifying and prioritizing stakeholders and the issues of primary importance to each group, the task of selecting the most effective tools and engagement techniques is greatly facilitated. A variety of engagement techniques and tools should be used so that they address the issues in mutually reinforcing ways. Each of them has a unique set of advantages and disadvantages in terms of cost, speed of delivery, control of messages and other factors.

Some of the more traditional engagement techniques include printed or electronic materials such as brochures or dedicated project newsletters produced by the owner/operator or articles in newspapers and magazines. Materials produced by project managers offer the greatest degree of control of content; however, they can be costly to produce and distribute and may not be viewed as being as objective as the same information written and published by news media. In contrast, a news release requires little time or money to develop, but the organization has less control as the news media almost certainly will adapt the message as part of its news distribution.

The spectrum of printed or electronic materials is almost limitless — billboards, banners, television or newspaper advertising or news releases, internet sites and videos are just a few of the methods for reaching a particular audience with a certain message. Most of these are intended primarily to provide one-way information. But they can sometimes be used in conjunction with other tools that allow for two-way communication. For example, internet sites often allow for questions to be raised then answered. Social networking tools are particularly interactive; Facebook, Twitter, YouTube, etc., blogs and forums are widely used by young people. A brochure may offer a telephone number that an interested citizen can call for additional information. Many of these printed or electronic tools might be provided in advance of a public meeting to help ensure meeting participants are better prepared to participate in the discussion.

In terms of meetings, there is also a wide range of meeting types and interaction techniques that can be used to carry out a communication plan, and these can also feature different formats depending on whether the intention is merely to inform or to encourage dialogue; such as input into the decision making process.

Hearings (sometimes called inquiries) are used in many countries as a means of soliciting the opinions of, and/or communicating proposed decisions to various stakeholder groups. They are usually conducted by the respective regulatory organization although they often include presentations by the owner/operator, other government agencies or similar organizations with nuclear programme responsibilities. Hearings are useful in communicating both the purpose and status of the nuclear programme as well as the decision making process itself. Most regulatory agencies, as mandated by national laws, conduct hearings in relation to license applications or miscellaneous authorizations. Formal hearings are also now increasingly being held in accordance with regulations governing the conduct of environmental impact assessments as these are mandated under the terms of the Aarhus Convention, although these can differ in their degree of detail from country to country.

References [2, 3, 5, 11, 37] provide information on techniques for particular stakeholders and situations. As these documents illustrate, meeting formats and interaction techniques are continuously evolving, with practitioners striving to develop new ways of involving stakeholders. It is important to recognize that no one type of meeting format in itself will successfully communicate the intended messages to all stakeholders; a variety need to be used. A project presentation to a large group meeting or open-invitation public meeting will serve to make information about the programme available to more people. This can work well in combination with smaller, discussion-style meetings with specialists in a particular subject area such as energy policy, emergency planning, and economic development or workforce training. These two examples illustrate the strategy of building general awareness of some groups while building engagement leading to project support by others.

In the same way that meetings can be effective because they require personal involvement by participants, many Member States rely on a strategy of focused interactions with stakeholder groups conducting facility tours and/or developing visitor centres to illustrate plans for a project or the safety of an activity through first-hand experience. Experience has shown this to be one of the most effective ways to build confidence in the safety of nuclear technology and put issues like handling of nuclear waste into proper perspective. One disadvantage of this technique is the required dedicated resources both for the visits and any required follow-up, which can be significant.

Even if nuclear plant staff cannot accommodate site tours on a regular basis, the idea of open days for employees or those in the locality is worth considering. They help demonstrate a degree of openness and a willingness to explain the plant's processes to the public. There is often a great deal of interest, and careful planning is necessary to ensure that the very large numbers of people that might attend can be accommodated efficiently and comfortably. The positive impact achieved can make the expense and effort extremely worthwhile.

Additionally, where a prospective owner/operator has no operating nuclear facility of its own, one successful approach has been to arrange for national or local opinion leaders such as government leaders, heads of community groups or representatives of potentially impacted individuals to visit other operating facilities within the same country or in another country if necessary. Such visits are now commonly part of the 'community empowerment' measures introduced during efforts to site radioactive waste storage or disposal facilities [38]. They frequently incorporate interaction with local community residents and stakeholder groups so as to allow real experiences from facility operations to be communicated.

Another effective way to introduce interested stakeholders to the operation of a nuclear facility is through a visitor centre, as mentioned above. In some cases these centres have become important educational aids to schools and community groups. A centre can be expensive to build but can offer ongoing dividends not only in improving understanding of nuclear technologies but also in building community relationships by offering meeting or special event space for other groups at the centre.

Technical events (seminars, courses, workshops, meetings) organized at the potential site and offering free participation of locals, their representatives or their independent experts.

Whether to use printed, electronic or face-to-face communication in the form of a meeting or event will depend on the size and type of the audience to be reached, the desired results expected from the communication technique, and the resources available including time, money and personnel, and the kind of engagement being sought. Irrespective of which technique is used, it is important to be consistent in the presentation of the key messages and to evaluate the effectiveness of a particular tool to communicate the issues being put forward.

3.3.4. Design an evaluation component

It is important to recognize that even a well-designed plan should be subject to review and open to amendment, based on stakeholder feedback. For this reason, irrespective of the scale of a plan, it is important to include an evaluation component. Effective use of evaluation will allow those responsible for the plan to judge the success of different techniques and approaches throughout the stakeholder involvement programme and should demonstrate where changes and improvements are necessary.

Evaluation, using a combination of objective and subjective measurement, should take place early in the nuclear programme and frequently thereafter. In the initial stages, it is necessary to understand the level of knowledge about the issues by the various target audiences, ideally before initial communication begins or as early as possible in the process. An initial evaluation helps to make the subsequent use of various messages and techniques more focused and productive [34].

Evaluations at some regular interval after certain plan elements are put in place provides proof that the plan is working or that adjustments need to be made [5]. The appropriate frequency — annual, quarterly or monthly — can vary depending upon the circumstances. Regardless of the cycle, a regular commitment to evaluate the effectiveness of the plan based upon its objectives should help to maintain strong and positive relationships with the various stakeholders [9].

A comprehensive programme of opinion research should include a variety of techniques. Written, telephone or electronic surveys are ideal for collecting evidence of an audience accepting a message, but other measures can be applied as well. For example, staff can conduct brief follow-up interviews with opinion leaders after a major activity or after a given point in time for the project such as one-year intervals. The number of inaccurate or biased representations in the media is an indication of success or failure in reaching that audience. An increase in public requests for printed materials or site visits is another measure that general interest or awareness is being achieved.

These examples of evaluation techniques illustrate the need to quantify project support while also collecting deeper insights through qualitative steps such as discussions and interviews with those stakeholders who took part in various aspects of the programme.

One form of qualitative feedback is a targeted focus group. These meetings of invited participants, sometimes randomly selected to represent a larger demographic population, are designed to gauge the response to proposed actions and gain a detailed understanding of people's perspectives, values and concerns, as well as what kind of information they want/need. They can provide a quick means of gauging stakeholder reaction to a proposal. However, because selection of group members may exclude some sectors of the community it is important not to assume opinions can be statistically extrapolated to represent society at large, as they generally can with a well-designed quantitative survey. Experience points to the need for repetition of focus groups if individual groups are not perceived as sufficiently representative or to track trends in public opinion or understanding.

3.3.5. Assign ownership of plan elements

To achieve successful implementation of the plan, it is necessary at the outset to establish where responsibility lies within the organization for implementation of all aspects. In many cases, stakeholder involvement activities in the plan will be delivered by a dedicated staff of communication professionals, with input regarding the message and content provided by technical staff.

As the plan framework is developed into a list of activities to be conducted, it is useful to distinguish between ownership of the approval of products and the actual production or dissemination of those products. Establishing responsibility for various action steps will enable all involved to know both how decisions are to be made and which individuals or groups in the organization will implement those decisions.

3.3.6. Allocate sufficient resources to accomplish the actions

The scale of a stakeholder involvement programme will be dependent on the goals and objectives for the programme. These will in turn impact the selection of appropriate techniques and affect allocation of time and effort to the different stakeholder groups identified. For example, if the goal is only to impart information, implementing the plan will require significantly less time than if the intention is to enter into an active two-way engagement.

Prioritizing stakeholders and issues is vital to determining the allocation of time and finances. This is one benefit of prioritizing audiences discussed in Section 3.3.1, as time or money spent on a high priority stakeholder group may influence a lower priority stakeholder group without additional resources being dedicated to that group.

3.3.7. Develop the competencies needed for stakeholder involvement

Given the recognition that stakeholder involvement is essential throughout the life cycle of all nuclear facilities, organizations in the nuclear field should ensure that the number and competencies of its staff are consistent with their assigned responsibilities [32]. As a part of this, it is important that technical staff called upon to take part in the various activities within the overall plan are selected based both upon their technical competencies and their communication skills. They should be provided with training in effective communication skills consistent with their communication roles, particularly those who interact with the media and the public. Experience has shown that having individuals from the local community involved in engagement with their communities is often more successful than those with similar competencies but from outside the local community. They have knowledge of the local society, its links, preferences, hierarchy and are better accepted by a community than those from outside the region.

An important topic area is risk communication. It has long been recognized that there is a serious imbalance in the perception of environmental and societal risks of nuclear technologies from the lay public and that found in scientific and policy experts [39]. With regard to nuclear power and nuclear waste management, the general public tends to have deep rooted concerns about safety and risk regarding what those who work in the industry consider to be an eminently safe and reliable technology. Training in risk communication should be encouraged for policy makers, implementers and regulators.

3.4. IMPLEMENT AND ADJUST THE PLAN

Stakeholder involvement should be an integral part of the management of nuclear facilities/programmes from their conception through final closure and decommissioning. Thus, implementation of the plan described in Section 3.3 will need to include mechanisms to continually monitor the effectiveness of the programme and make changes and improvements based upon the results of this evaluation. The most important criteria for this evaluation are whether or not the strategic objectives of the programme are being achieved.

Where the evaluation steps identify shortcomings in stakeholder satisfaction or process outcomes, it is important to continue development of new tools and involvement techniques. These can often be developed in cooperation with stakeholders, an approach that is highly recommended, wherever feasible, in the nuclear programme itself may require a through revision of the communication plan. Regardless of the scope of adjustment, nuclear communication with stakeholders must continue to be implemented even while it is continually adjusted in a disciplined and deliberate manner.

This cycle of planning, implementing, evaluating and adjusting can be represented in many ways, such as represented in Fig. 1, Ref. [40]. It emphasises the need for systematic planning, preparation and evaluation.

4. CONCLUSIONS

Decisions regarding any type of nuclear facility have typically received considerable attention of the public and other stakeholders. Regardless of the stage in the life cycle of the nuclear programme — initial consideration, operation, expansion or decommissioning — properly addressing stakeholder needs and concerns improves the probability of programme success. Engaging stakeholders as early as possible and with ongoing attention is essential, including helping stakeholders to understand the extent of their involvement and responsibility in decision making processes regarding these nuclear facilities/programmes.

Fig. 1. A representation of the iterative learning cycle.

Stakeholders will have a range of opinions regarding the proposal, operation, expansion or closure of a nuclear facility, based in part on whether they are national or local in nature and on which of the many perspectives a stakeholder holds: elected officials, business interests, environmentalists, emergency planners, educators, interested citizens, or workers. An Overview of Stakeholder Involvement in Decommissioning [7] points out that there are both legal and moral imperatives to begin a nuclear programme with stakeholder interactions and states that:

"And, when conducted well, the process normally yields indisputable benefits. Both completed and ongoing projects have demonstrated that a properly tailored process that promptly involves all stakeholders, is thorough in its communication, and includes meaningful interaction, should result in better long-term decisions and prevent unnecessary delays."

Although decision making processes vary considerably by Member State, depending on culture, history and governmental structure, it is nonetheless advisable that all entities primarily responsible for nuclear programmes create plans for stakeholder involvement. There is no one ideal model for stakeholder involvement. The stakeholder involvement strategies and approaches depend on the nature of the nuclear facility, the point in its life cycle, cultural and legal norms and other factors.

Continual assessment of the stakeholder involvement programme is necessary to ensure that it continues to achieve its goal and objectives, as well as to determine if these objectives continue to be relevant. Active involvement of stakeholders in evaluation of the programme is strongly encouraged [3].

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