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New Considerations Relating to Screening and Scoping within the Environmental Impact Assessment Process. Public Participation and Socio-economic Aspects in Decommissioning of Nuclear Power Plants.

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1. Introduction

This report has been prepared under Work Package 6 (WP6) of the Co-ordination Network on Decommissioning of Nuclear Installations (CND) under contract No. 0508855 (FI60) of the European Commission's Research and Technological Development (RTD) Division with a consortium of European nuclear organisations. The work was carried out by ENRESA (Spain) acting as the Work Package Manager supported by DECOM a.s. (Slovak Republic), NRG (The Nederlands), REZ (Czech Republic) and AF-Colenco AG (Switzerland).

An environmental impact assessment (EIA) identifies and assesses a project's likely significant environmental effects and enables proposals in order to eliminate or mitigate the potential impacts of the activities. As a main part of its body, the methodology supporting this process also includes the involvement of the public in the project decision-making process in an active and effective manner.

Aware of these issues, in the past few years European and international organizations have taken a leading role in consolidating environmental legislation. Nowadays with a more and more consolidated legislation in Europe, the consciousness appears of the importance of covering aspects related to communication and involvement of the public. Great efforts are taken in this direction in order to precisely identify the stakeholders, and especially the public as one of these, to improve the way of integration in the process from the early stages, not only because it is mandatory under the European Union framework but also for minimizing future misunderstanding and for taking those actions that are considered to be relevant for the people in the surroundings.

On the other hand, in a decommissioning project the main concerns for the public in the surroundings of an industrial area are those related to the socio-economic aspects involved in the loss of the industrial activity and the impoverishment of the area. These concerns are usually not considered in the environmental impact assessment process but are crucial to understand the needs of the public in those areas, putting pressure on local administrations to control and participate closely in the process.

This report covers these aspects by reviewing the "state-of-the-art" of the environmental impact assessment process in terms of public participation, especially in the screening and scoping phases. It also includes a review of the socio-economic aspects affecting the development of decommissioning projects of nuclear power plants. Finally, it comprises an analysis of selected projects in different countries including attempts of public participation put into practice through several public participation procedures.

2. State-of-the-art (screening, scoping, public participation and socio-economic aspects) of the environmental impact assessment process

2.1 General considerations

As mentioned before, this report reviews the "state-of-the-art" of the environmental impact assessment process in terms of public participation, as interpreted in regulations and in the implementation of decommissioning activities, along the period of implementation of the activities and especially in stages such as screening and scoping. The report also comprises a review of the socio-economic aspects that mainly affect decommissioning projects of nuclear power plants. Finally, the collected information is put into practice by analysing different projects in several countries as case studies of public participation procedures.

An environmental impact assessment is an accurate, critical and objective assessment of the likely effects of a development, including environmental, social or economic change [1, 2]. An environmental impact assessment is a decision-informing process, as well as a decision-making process, which most of the time is mandatory. In the case of nuclear power plants decommissioning, an environmental impact assessment is mandatory under the European

Council Directive 97/11/EC, Article 4, Annex I for nuclear power stations and other nuclear reactors whose maximum power exceeds 1 kW of continuous thermal load [3, 4]. In the case of other types of development, an environmental impact assessment has to be considered as it might not be required [5, 6, 7].

The environmental impact assessment process identifies and assesses a project's likely significant environmental effects to inform decision-making; allows consideration of the environment early in the decision-making process on a proposed project; and enables proposals to be modified in view of potential impacts in order to eliminate or else mitigate these [5, 6, 7]. This process is divided into sub-processes which allow elaborating a fully completed report. These sub-processes are: screening, scoping, environmental impact evaluation, environmental impact statement (EIS) preparation, environmental impact statement review, environmental impact statement decision and environmental impact statement declaration. The first two processes, screening and scoping aim to identify and assess the new development while collecting documentation and information from different participants and creating a discussion forum for these topics.

2.2 Screening

Screening is the process performed at the very first stage, in which a decision is taken on whether or not an environmental impact assessment is required for a particular project [8]. An environmental impact assessment should be implemented when the activity to be performed has a potential for significantly affecting the environment due to nature, size or proposed location of the activity. In the case of the decommissioning of nuclear power plants, the European Council has developed a Directive which is mandatory for all European Union countries under the general nuclear or radiological protection legislation [3, 4]. Public participation is highly recommended at this stage, in order to get the public involved in the decision-making process, especially when dealing with nuclear-like activities, due to the little affinity of the public in relation to this matter. Besides, a decommissioning project may imply the performance of certain activities that can give rise to exposure of workers.

2.2.1 Main stakeholders

In the screening stage, the stakeholders involved are not as many as in the scoping stage. Only a few stakeholders, the most representative ones, are involved. It is not an easy task to identify these few representatives within the majority of possible stakeholders; however, it is the only way to make this process relatively smaller than the scoping process. Identification is not the same as in the scoping phase. It is not mandatory, but highly recommended.

2.2.2 Alternatives

Alternatives are identified and chosen in a more informal way. In this way, the stakeholders have an idea of how the process is going to proceed. This is due to the nature of the activity; the decommissioning activities do not have many alternatives to choose from; it is either to decommission or not. So at this stage, while asking the stakeholder, the decision of the alternative to be chosen has already been taken. The focus is on the way of implementation, on the policies adopted to minimise the impact on workers, the public and the environment, and on the involvement of the public in the process.

2.3 Scoping

The scoping process identifies the content and the extent of the environmental information to be submitted to the competent authority under the environmental impact assessment procedure, in other words, to establish the information that will be submitted to the competent authority [9]. After this information is obtained, a scoping report is circulated

amongst consultees to verify that it is complete. In this case, consultees are the competent authorities and the general public.

During the scoping process, it is mandatory to have a "public information procedure" which considers a period usually not lower than 30 days for public comments. Involvement of public participation should be integrated in the legislation (public representatives have to be informed and consulted). In addition, there has to be an identification of the potential stakeholders, an agreement on decision-making procedures and criteria, as well as a provision of information and alternatives to be examined. Moreover, the information to be given to each stakeholder at each stage of the process has to be identified and all activities have to be published: the alternatives that have to be compared with agreed decision making criteria, the public information on the agreed decision-making criteria and the remaining alternatives, the scoping for impacts of the remaining alternatives, the draft scoping report, and the discussions and the agreements relating to the draft and final scoping reports.

While in the screening process public participation is recommended, during the scoping process it is necessary to take into account that all stakeholders must have the opportunity to discuss all the project stages. Previous to developing, evaluating or organising studies and reports, legislation reviews, best practice documents, environmental impact assessments, impacts not considered before, workshops and commissions, stakeholders have to be involved in the processes, especially in those countries where public participation is mandatory.

There are potential overlaps between screening and scoping. Information which is used in making a screening decision may subsequently be used at the scoping stage. If a decision is made (environmental impact assessment required) information about preliminary assessments may also be used for the scoping process.

The guideline for scoping recommends to follow the next steps: first all potential stakeholders have to be identified at the outset of the project (mandatory at this stage, differing from screening); once stakeholders have been identified, the decision making procedures and criteria should be agreed. After definition of the decision-making procedures and criteria, feasible alternatives should be outlined and alternatives not meeting the decision-making criteria should be rejected. Information regarding agreed decision-making criteria and alternatives to be examined is provided to the stakeholders. Then the remaining alternatives are scoped for impacts and a draft scoping report is produced for public consultation, defining the scope of the environmental impact assessment. At last, the final scoping report should integrate the outcome of the public scoping meetings, as well as any input obtained from independent consultants. It should justify how the public input was taken into account and it should be made publicly available.

2.3.1 Main stakeholders

In general, the group of stakeholders should include individuals who represent the majority of affected individuals and groups and even the public in other affected countries. Access to information has to be transparent. Information should be easily available and understandable and accessible at all stages. Potential stakeholders are understood to be the relevant parties in the environmental impact assessment. These are roughly the general public, the developers and the relevant authorities.

The general public is considered to be one or more natural or legal persons in accordance with the national legislation, or in practice, their associations, organizations or groups. Among this general public can be found local residents (who may experience adverse or beneficial effects in the vicinity of the proposed project, especially those who work in the power plant to be decommissioned); local community groups, including conservation groups, home-owner groups, senior citizen organisations, religion groups; local business groups, including industrial, commercial and service groups; often potential beneficiaries of a project; commercial associations; trade unions. There may also be independent experts,

who may act on behalf of public groups to provide specialist views on aspects of the development project; educational institutions, which may be interested for academic reasons, or may wish to become involved in the debate; non-governmental organizations which often provide an important link between individual citizens or citizen groups and authorities or project proponents. They may be active at national or local levels and represent environmental or other issues.

Two types of stakeholders may be considered: internal stakeholders, who are the ones involved in the decision-making process, and external stakeholders who are the ones most affected by the potential outcomes of the project, either directly or emotionally. Both groups are equally important. Examples of nuclear issues with stakeholder interests are, among others: debates on the incorporation of nuclear energy in the national energy plan; development of legislation defining nuclear energy; decisions to install a new nuclear power plant, a fuel cycle installation or a high level waste repository [10, 11].

Relevant or competent authorities may be identified from the local to the international level, i.e., representatives from the local City Hall, the Ministry of Environment, etc. or even from the European Union (in the case of a decommissioning project within the European Union or when potential trans-boundary effects might exist). Finally, other potential stakeholders are the developer and the media, who may have a very important role in the public participation process.

One of the stages within the scoping process is to select one of the decommissioning alternatives and to outline why this alternative was chosen. The selection of an alternative has to be performed as fast as possible since any delay creates a period of uncertainty and economic slowdown of the area.

2.3.2 Alternatives

In general, there are not many alternatives to choose from, since in a decommissioning project, dismantling can either be implemented or not. Within this range, immediate decommissioning can be selected as an option, or deferred decommissioning with safe enclosure during a specific period of time (commonly restricted to the reactor area), or the zero alternative option, which is, basically, to do nothing except further maintenance and surveillance of the plant. This would be illegal in some countries, however. In addition, in case of contamination or spread of part of the radiological inventory, the alternative could be to decommission the installation and rehabilitate the impacted area. The radiological inventory and its safe storage/disposal condition is a decisive element when choosing the selected alternative, together with the disposition of the required budget to carry out the decommissioning project.

2.4 Public participation

As indicated before, every project which requires an environmental impact assessment also needs to have a programme of public participation, to be performed at least in the scoping stage. Especially when talking about activities relating to nuclear power, public involvement is essential for the proper development of the activity. Public participation is recognised as essential for sustainable development. Europe lives in a democratic system whether through elected representatives or through direct participation. In any case, public participation is essential for these processes to succeed.

The public concerned is the public affected or likely to be affected by, or having an interest in the environmental decision making, including non-governmental organizations promoting environmental protection, etc., who shall be deemed to have an interest. To address this concern, public participation or involvement (which is the spectrum of interactions between project proponents and third parties at any stage in an environmental impact assessment)

should be created. In case an environmental impact assessment has insufficient public participation, the assessment could be faulty.

Effectiveness of public participation in an environmental impact assessment can be measured in terms of levels of satisfaction felt by all participants. National requirements should aim to ensure that public participation is a central aspect of the assessment process. These requirements should be reinforced, where necessary, by the competent authority making it clear what their expectations are in terms of this involvement.

In addition, public involvement should not only inform the public but also give an opportunity to influence the decision making process. Public participation should be started early in the environmental impact assessment process (when it can be effective and have an impact in defining the project's design). It should be interactive; continuous throughout the environmental impact assessment; a two-way process, including feedback; socially inclusive (taking care to facilitate participation of social groups prone to exclusion, such as minorities and low-income groups, which at the same time might have a disproportionate impact as compared to average society); transparent and honest.

The general objectives of public participation in an environmental impact assessment are to legitimate decisions; to identify the public's concerns and values regarding the proposed development; to collect more accurate and representative (technical) information about the local conditions from the public, and the needs and concerns of the affected population; to reflect the public's concerns in the terms of reference; to identify alternatives and/or design mitigation and compensation measures; to assist in the review of the documentation; to inform the public about actions, consequences and decisions; to improve overall decision making as well as gaining support; and to obtain feedback (and take this feedback into account) on the quality of the proposals, hence avoiding or reducing conflicts, with the consequence to reduce costs.

Good practices to follow are, for instance: while stakeholder analysis (recognition of stakeholders to be consulted), or similar, allow targeting of audiences, all sectors of the public should be encouraged to participate (i.e., the process should be inclusive); the use of appropriately trained and skilled personnel to design and conduct public involvement programmes will result in much greater rates of success. There is evidence that public involvement can have negative outcomes leading to greater conflict if implemented poorly. Public satisfaction will always be limited where the information and opinions provided appear to leave proposals unchanged.

It should also be determined: the methods to be used; the target audience for each method; the timing of involvement; feedback mechanisms; how the information will be used; and the extent of public consultation and the degree of commitment to the use of the results. This allows effective targeting of methods and discussion issues.

In order to enable effective targeting of methods and discussion issues, timing of involvement and feedback mechanisms, the following factors are very relevant: objective of public participation; required level of participation; expectations of all those involved; extent of expected impacts; size of the affected population; local cultural constraints; educational level and political system; skills of consultees; availability of experienced trainers or facilitators for complex methods; availability of resources; availability of time; existing level of controversy surrounding the subject; differences in language; legal requirements; the particular stage of the environmental impact assessment process; and the specific context which is to be applied.

The methods and techniques used for public participation are many. Some of these can be implemented in different situations and phases of the environmental impact assessment and may be very flexible, such as public hearings, public meetings, and others, or less flexible, such as the Delphi process.

Two groups of methods for public participation may be distinguished: one-way methods (also known as dissemination of information) or two-way methods (also known as pure communication).

Within the first group of methods two types may be considered: the 'information-out' type and the 'information-in' type.

The 'information-out' type is used to convey information to the public, which is not considered to be very adequate to public participation. It includes the use of the media, by newspapers, radio, television, official gazettes, announcing at the site, at neighbouring areas and to the local authorities. Other types of 'information-out' are, among others, printed materials such as brochures, reports, newsletters, displays and exhibits, direct mailings, postings/bulletin boards, consultation papers, open invitation to send comments and request interviews with persons responsible for the decommissioning projects. In addition, electronic mailing (e-mailing) may be used, as well as visual presentations, cd-presentations and internet web sites. These electronic methodologies can be used to display or receive information on a proposed project, for on-line voting and as a forum for debating policy issues and decisions (receiving information should be considered as an 'information-in' methodology, however).

'Information-in' methods are communication processes that help decision-makers to understand the views of the public. The most common 'information-in' types of methods are, among others: surveys, polls and questionnaires, suggestion boxes.

Each type of method is limited in the amount of information that can be communicated and the type of public that can be targeted, however. Moreover, these types of methods present a one-way flow of information and they do not encourage feedback.

Secondly, there are the two-way communication mechanisms, which enhance public participation by identifying key concerns and address these appropriately. These are:

- *Public hearings/public inquiries*: formal methods, usually associated with a legal process, used in some environmental impact assessment systems for projects where there is a high level of public controversy. Due to the formal atmosphere, participants tend to take more extreme and adversarial stance than in smaller meetings since they feel their participation will be more decisive as it will be recorded. However, views presented are unlikely to be representative of the affected public, tending to favour the participation of people from the social elite. The adversarial nature of a public hearing often results in a bad experience by developers, which refrains them from early consultations. On the other hand, public hearing and inquiries provide opportunities for the airing of the public's views. These methods are known to be time consuming and costly, as proceedings may continue over a long period of time. They are generally used in the later stages of the environmental impact assessment process.

  The duties of the public in a public hearing of an environmental impact assessment report are, basically, to control report completeness with the possibility to suggest its retuning to the proponent; to actively participate in the public hearing; to have the possibility to establish a civic association; and also to have the possibility to send a standpoint to the report.

- *Workshops*: small scale meetings where the main stakeholders work to solve issues of concern. Sometimes these workshops are called planning workshops, in which there is a neutral facilitator. The number of participants is limited but can be effective in identifying initial concerns in scoping meetings. They can achieve the interactive function lacking in public hearings. They are effective for the identification of solutions to problems, the scoping of potential impacts and the creation of other plans of action. This method is limited in the number of people who can attend and, if used extensively, workshops can be costly to organize.

- *Open houses*: informal meetings held in a convenient location in the community, encouraging a two-way dialogue through asking questions and the discussion of issues with project staff. People may walk in at any time and the sponsors serve as hosts, distributing information and answering any questions in a relaxed atmosphere. At the end, people are asked to fill in a short questionnaire on their views about the project.

  Open houses have the advantages of giving the public an opportunity to establish an open dialogue with the developers. Due to their informality, they may prove inefficient if the developers do not have a willingness to alter their plans. Open houses may prove to be expensive as they need the provision of trained staff over extended periods, and they only reach those willing to attend. Comprehensive consultation programmes feature two or more public open houses. It appears that open houses are best used in the earlier stages of an environmental impact assessment.

- *Public meetings*: less formal procedures than public hearings or inquiries but with the same main structure; a formal presentation to the public followed by an opportunity to make and respond to questions. They might not be able to express details or technical information or get in-depth of views from the public; however they are capable of addressing a large number of people and allow for immediate feedback. Nevertheless, such events may be easily dominated by small groups of particularly vocal individuals.

- *Community advisory committees (also known as citizens' advisory committees)*: groups of selected people who represent the public's interests in decision-making. They allow the authorities and developers to deal with a single group representative of a whole community. This method will be less appropriate in situations with a strong tradition of representative local democracy. It is very effective for two-way dialogue and can be easily set up early in the environmental impact assessment process.

- *Citizen's juries (also known as planning cells)*: a group of citizens (12 to 16 ordinarily) randomly selected to study a specific issue and paid. The jury is presented with the relevant information, which should come from several points of view through witnesses, giving the public the opportunity to develop their understanding of relevant issues through dialogue with experts. The jury creates a report which is handed to the commissioning body and this, has to publicise findings and recommendations.

  This method is highly interactive and an effective way for obtaining informed citizen input into the decision-making process. They are interactive and thus suitable for dealing with complex issues; however, they are expensive, time-consuming to organise and only involve a small number of people at a time. It has the same general approach as *consensus conference*, although this is more formal than *citizen's juries*. It was first set up in the United States of America and in Germany and has been developing for the last 25 years.

- *Alternative dispute resolution (ADR)*: a conflict management strategy which encompasses mediation, arbitration and facilitation, as well as solving disputes through negotiation and avoiding adversarial processes designed to reach agreement and consensus between the parties involved. There are two types, the non-binding methods (mediation, negotiation, facilitation) whose assistance is provided to reach a solution, and binding methods (arbitration, adjudication) in which decision-maker rules on the issues. These methods help discover co-operative relationships and mutual interests.

  Yields costs and time savings, these techniques are best employed when specific controversies need to be solved and not when broad issues are under debate. It is not very common in Europe and it is described as the cornerstone of conflict resolution with its main strategies being negotiation and mediation. It is largely efficient, creates working relationships, encourages joint communication, produces win-win scenarios

and ensures compliance to consensual outcomes. It is also thought to produce decisions that are more acceptable to disputing parties.

- *Consensus conferences*: similar to *citizens' juries*, but less formal. A panel of lay people are recruited through advertisements and briefed on the subject under discussion during two preparatory weeks. Through a dialogue with experts they gain a scientific and technical understanding, after which a report is produced. It involves between 10 and 20 people who prepare questions for the experts. However, attendance is not by invitation only and others who wish to participate are also given the opportunity to ask questions. The process usually lasts for 3 or 4 days with a final report.

- *Participatory rural appraisal (PRA)*: a public participation process based on the principle of empowering the community (achieved through confidence building and capacity building). Its five main elements are: empowerment (knowledge generated by the local population); respect; localisation (extensive and creative of local materials and representations); enjoyment; and inclusiveness. *Participatory rural appraisals* have been mainly used in developing countries, even though they have also been used in some European context.

  Participatory rural appraisals can make use of diverse techniques throughout the appraisal process, such as mapping techniques, seasonal (time-line) analysis, reflection on data, cause-effect analysis, etc... It is a powerful tool for public involvement, which allows them to undertake their own appraisal, analysis, action, monitoring and evaluation of a project, promoting research and action by the local community and priority setting phases of development planning. It comprises a number of visualisation techniques, interviewing and group work methods.

- *Focus groups*: groups used to gauge public opinion. They consist of small grouped discussions between individuals and with a professional leader, offering an informal atmosphere, which encourages participation. They are relatively inexpensive and not very time consuming. However, they only provide qualitative responses, may not be representative of the population and do not bring consensus.

- *Participative social impact assessment and management*: a process using a combination of advertisements in local news media and open houses, in which the public is encouraged to indicate views on specific questions relating to the assessment and management of social impacts of a proposal.

- *Informal consultations*: can be set up using telephone hotlines or other forms of communications. *Informal consultations* provide the opportunity for sharing ideas and the explanation and discussion of detailed and complex information.

- *Requisite decision modelling*: relatively new concept which allows participants to identify interests which are then modelled using a computer programme.

- *Public involvement programme*: a series of meetings and workshops that are arranged for local residents potentially affected by the project. Thanks to this, the public accepts the final decision more readily as a result.

- *Comprehensive consultation programme*: features public open houses where the public can view displays, ask questions and discuss issues with project staff. Monthly liaison committee meetings are used to allow project staff to discuss issues with community members, to provide them with information and to reduce misinterpretation.

- *Consensus-building programme*: a process that allows the public to attend expert meetings, review technical studies and negotiate through the provision of participatory funding.

- *Deliberative opinion polls (involving measurement of opinions before and after information is provided; experts are questioned and deliberation is made in small groups)*: designed in the United States of America in an attempt to get beyond traditional polling methods. It looks at what the public thinks when they are given the time and information to consider the matter more closely. It involves a large number of people (usually over 250) and their views on a particular issue are measured before the poll begins and after they have had a chance to consider the issue. It takes 2 to 4 days. During this time participants deliberate in plenary discussion groups. There is a taking place of constructive dialogue, the empowerment and satisfaction of those involved, and the creation of new and common viewpoints.
- *Community relations programme*: the establishment of a public information centre and a telephone hotline. Usually they are located in the middle of a business area which is to be affected. Telephone hotlines are established within the centre which allows the public to pose questions or make comments on different aspects of the project in their own time.
- *Workbook*: a type of questionnaire where people are asked to give information about the local situation and evaluate different options presented to him/her.
- *Samoan circle*: a process by which discussion of controversial issues is facilitated when large numbers are involved. It is a leaderless meeting very effective with negotiations in controversial issues. While there is no 'leader', a professional facilitator can welcome participants and explain the seating arrangements, rules, timelines and the process.
- Other methods would be, among others: *task forces (advisory groups tending to focus on one specific topic), roundtables and field offices*.

In order to generally communicate with a larger public and to give everyone the chance to express an opinion, several communication initiatives may be used that are targeted at a large public within the municipality, including: door-to-door distribution of a newsletter; monthly article in a municipal information booklet; web site with all information; office window open to the public; availability to request information; information campaigns at local events; local primary schools; campaign for local population at a public library and a federal agency; and the solicitation of response from the public in order to discover whether the population agrees or not. This has to be done to give opportunities to the public to comment in well defined target groups so that the whole society is well represented. Furthermore, the key factors are earliness and approach.

The methods explained above, are used with several techniques that can be classified as either problem-solving techniques or consensus-building techniques.

Problem solving techniques are:

- Brainstorming;
- Charette (a meeting in which, within a specified time, participants work intensely to reach a solution and where the leader’s responsibility is to bring out all points of view from concerned local residents, agency representatives and experts);
- Nominal group process (design to help groups generate creative ideas, information and consensus): participants first generate ideas and then report them to others;
- Simulation game (these are designed to allow people to simulate the implications of particular decisions; they help individuals understand the positions of other parties).

Consensus-building techniques are:

- The Delphi process (for consensus-building among experts, through the use of interactive questionnaires);

- Unassisted negotiation;
- Mediation;
- Arbitration.

In these methods and techniques the topics for consultation within the environmental impact assessment process are discussed which might include: environmental effects of different alternatives; the suitability of a site for development; the details of the nature of particular impacts; the acceptability of different types of impacts; the acceptability of optimisation of mitigation measures; and the acceptability of a type of development. At the same time, developers are gaining information from the public that might be efficient and effective, such as: local knowledge of the environment and social or cultural conditions; explanation of key issues of concern to the public or local preferences; individual personal opinions about a particular project; representation of public rights and interests; and detailed comments on the impacts of the project or alternatives.

In general, the differences between countries, which have to be borne in mind, are historical, political and economic factors, and the process of developing a regulatory framework will inevitably involve national characteristics. The gender, level of education, general attitude towards nuclear energy and the feeling of being informed have to be considered for a good public participation. In any case, being open to the public makes the process transparent. This is mainly due to the nature and the extent of public participation, which varies among states depending upon existing legal, political frameworks and cultural contexts [12].

In public participation, information should be provided in a form easily understandable by non-experts, although more technical documents should also be publicly available. In addition, all relevant documents and materials should be available for inspection free of charge, and the times for inspection have to be flexible. Notifications in public participation have to be made of comprehensive information and have to be accessible to all potential stakeholders. The timing and venues have to be accessible and convenient to stakeholders and there has to be sufficient time to read through the information and to be able to form an opinion. In order to reach complete social inclusion, some special approach to reach minority groups may be required. For instance, in terms of language, there has to be a provision for translators and the translation of certain documents, which is a key for public participation stages.

Once in the stage of deliberation, there will be a series of valid issues such as objective and subjective claims and potential inclusion of socio-economic aspects. In addition, there is a need for social learning comprising an on-going learning process and understanding of other parties' viewpoints. All comments should be taken into consideration, no matter if they are non-scientific or subjective. Experience tells that it is better to allow the public to participate in a more informal manner during the early stages.

Moreover, other practical guidance may be given to decide when the public should become involved. Public participation should begin as early as possible, especially when a controversial development is being considered. It is sensible to allow the public to participate actively in discussions on strategic issues that cannot be meaningfully questioned at environmental impact assessment level events. Open channels of communication with the public should be created. The public needs to be aware of how the developer can be contacted. Local presence, hotlines, free-phones, exhibitions, local people employed to staff a local information office, small informal meetings are methods to bear in mind.

The public's lack of resources is often a reason for non-participation. This is why deciding what to do with public comments and feedbacks is very important. For instance, after a consultation exercise, a summary of comments and responses should be made available to the public in the form of a report. It is also important to decide who carries out a public consultation. Developers should be encouraged to employ trusted and skilled consultants to act as facilitators for more interactive methods. Complex and technical issues should be

explained. The developer should spend time explaining the issues while at the same time being careful not to over-simplify. The lack of trust must be overcome. High risk industries are inherently distrusted by the public and this can lead to ineffective participation. There has to be an on-going relationship between the developer and the public, encouraging the involvement of the apathetic majority in the participatory process that could otherwise be dominated by a vocal minority.

The public may feel that their input will make no difference in the final decision, resulting in participation not being considered. This may be reduced with the aid of evidence from the developer illustrating that previous public participation exercises have been successful in moving towards a consensus. The feeling of the public that they are not sufficiently 'expert' is another main issue which can be avoided by carefully planning meetings that provide participants with more than one opportunity to air their views. Another barrier is the lack of awareness of the potential benefits, particularly on the part of developers. Nevertheless, public apathy may be influenced by the failure of invitation to key events. There is a need for the citizens to have more influence on decision making and to enhance their understanding of public attitudes in controversial issues, which causes a number of participative processes to emerge.

Lessons and recommendations provided from previous general developments indicate the need for optimal use of resources, and the need for a fluid relationship with institutions, with periodic meetings. There is also a need for contacts with the immediate surroundings, and the participation of local newspapers and scientific journals. However, one of the most important recommendations is to follow a policy of transparency, which basically keeps all the stakeholders updated.

Transparency is the outcome of an on-going process which increases the stakeholders' appreciation of related issues and provides them with channels to stretch the implementer to meet their requirements for technical explanations, proof of authenticity and legitimacy of actions. Created to enhance transparency, the so called RISCOM model (see Annex 1), provides a method to generate transparency by creating a loop between the total system and stakeholders in a wider environment, as well as a communication loop to provide cohesion between function and operator [13].

In addition, there is a need to maintain local participation and communications. So, whenever it comes to the end of the activity, the dialogue between locals and companies should not cease.

When dealing with decommissioning activities or others, in terms of legislation for public participation in the European Union, it is important to bear in mind two conventions and one European body, which deals with public participation. One of these conventions is the Espoo (EIA) Convention, which was agreed on 27th February 1991 but only came into force at Espoo, Finland in 1997 [14]. The convention sets out the obligation of parties to assess the environmental impact of certain activities at any early stage of planning. Also, it states the obligation of the Member States to notify and consult each other of any significant environmental impact. The convention also stated that there should be promotion of public information in relevant decision-making processes.

In addition, another very important convention when dealing with these activities is the Aarhus Convention on access to information, public participation in decision-making process and access to justice in environmental matters. It was agreed on 25th June 1998, at Aarhus, Denmark [15]. This convention links environmental rights and human rights, acknowledging the rights of future generations. It states that sustainable development can only be achieved by the involvement of all stakeholders.

On the other hand, there is an important body, called EBRD, i.e., the European Bank for Reconstruction and Development, and nowadays used to help build market economies and democracies in countries from central Europe to central Asia. Within this organisation there is a public information policy which is committed to enabling dialogue with its stakeholders,

including project sponsors and other project stakeholders, governments, business, civil society. Its four main pillars are transparency, compliance with the mandate and accountability to stakeholders, willingness to listen and receptivity to comment and safeguarding the business approach to implementing the mandate.

To sum up, the results of public participation should be: the public expressing his concerns and giving input to the process; the developer and/or competent authorities defining the terms of reference which reflects the public's concern; the developer to design the proposed project taking into account public concern; the public to verify that the environmental impact statement (EIS) has been properly undertaken; the public to express their opinion on the project's acceptability; and decision makers to consider the public. In case the project is potentially controversial, public participation will help reduce overall conflicts.

As indicated several times before, the decommissioning of nuclear power plants indeed needs an environmental impact assessment, and it is mandatory in the whole of the European Union and in other countries. Due to the relationship established with stakeholders, public perception is very similar to a normal industrial project; however, there are many ins and outs to be considered.

Society needs to know the difference between the situation before and the situation after a decommissioning project by accessing the information and there is a need to participate in the decision-making process affecting the area of influence (nuclear area). That is why communication and public participation is essential. Communication with a larger public should be done through a communication coordination committee, which usually is formed by the nuclear companies and the town council, creating a leaflet with basic information of the development. In addition, there are international networks and conferences focusing on society involvement in radioactive waste management.

Public participation does not hand over to the public the decision on the project design nor the final decision. In fact, with the decommissioning case, the decision has already been taken. However, especially in these types of projects, public participation is most needed in order to generate harmony amongst the stakeholders.

Due to their nature, decommissioning projects for exiting nuclear reactors tend not to be as controversial as projects for new developments. Several case studies of controversial projects such as hazardous waste incineration in Garé (Hungary), or a secondary reserve power plant in Liter (Hungary), the municipal waste disposal facility in Siting (Switzerland), or the Hampshire waste management strategy in the United Kingdom, have been widely studied in the bibliography to identify good-practice in public participation and consultation.

Early participation is a key for effective public participation. It provides an opportunity for the public to comment in an open atmosphere the scope of the environmental impact assessment with ongoing public participation through all the process. In addition, early involvement allows identification of key concerns so that they can be adequately integrated and the public can make a considerable contribution to identify and predict the potential environmental impacts of the proposal.

Transparency is a major element of best practice since opaque decision making generates suspicion and promotes conflicts. For example, the project of the Solvay hazardous waste incinerator in Spain allowed very little time for review, and offered no further opportunities for public participation.

On the other hand, in cases where the environmental impact assessment process has been opened to public scrutiny beyond legal requirements, it has helped to reduce conflicts and encouraged consensus-seeking and cooperation amongst the different stakeholders.

In the United States of America, it was found that bringing community leaders, including citizen groups, advocated, to the table, has resulted in public meetings where community questions and concerns can be addressed in a constructive manner.

2.5 Socio-economic aspects

Socio-economic aspects are dealing with the loss of employment or with the economic problems caused by the decommissioning activity. To start with, the election of the different alternatives is a very important socio-economic aspect since it will definitely influence the socio-economic situation in the area.

Once an alternative is chosen, there are three phases to follow, the first one being the permanent shutdown due to legal requirements. This is planned in a way to mitigate social aspects, since the decommissioning of a nuclear power plant involves a direct (employees of the nuclear power plant) and indirect (auxiliary companies and activities linked to the community) loss of employment due to the activity ceasing. In order to mitigate this loss, these employees could be candidates for early retirement. In addition, a migration effect will be created, i.e., a relocation of people with no special ties to the area, especially the younger, better-trained generations. As a result, the main economic factors involved in the first stage of the implementation of the activity is a loss of income, a reduction of the economic activity in the municipal areas affected, a reduction of revenues from the municipal administration (lower investment and reduced activity), and a blocking of the site for other uses.

During the next phase, which is the decommissioning process itself, the training policy is implemented. At this point, the economic impact is positive since the activity can reactivate the economy. This includes the generation of new employment for workers or auxiliary companies from the nearby areas. More revenues from licenses and permits are received, compensations for waste storage are incurred and there will be a promotion of economic, cultural and sporting activities and investments. These will not be as high as the revenues obtained during the operation of the nuclear power plant, however.

After this phase is concluded, the post-closure phase arrives where new economic developments are needed for the area to survive. Here, the solution is to train the former employees and the auxiliary companies and to make a reinsertion of employees in similar positions. Likewise the release of the site allows resulting space to be recovered for new activities. Post-closure may be tackled with guarantees as long as first the necessary efforts are made (see Section 3.1, and Annexes 3 and 4).

Social impacts in nearby areas are greater in areas that have depended strongly on the activity of the facility to be decommissioned. Usually, the local community may oppose to the decommissioning if the nuclear power plant is a major employer for the community. These plants tend to be located in geographically isolated areas and at the same time, economically depressed areas and work-related issues will most likely arise, especially if the community has not engaged in a diversification of economic activities. Regarding environmental concerns, visual impacts of the remaining buildings are the most related ones in addition to issues as exposure of workers. Unlikely to other types of projects, such as waste management projects, decommissioning offers an opportunity for consensus to be reached since it has a low degree of potential controversy.

The socio-economic measures taken in the environmental impact assessment relating to a decommissioning activity are measures to promote employment, the use of available operational personnel, the promotion of subcontracting in the areas around the plant, the motivation of personnel relating to the future loss of employment and secondary factors such as the closure of shops, schools and the impact on the value of property.

Furthermore, a very good technique for public participation is to promote employment. In order to mitigate the loss of employment, which always happens when a nuclear power plant is decommissioned, employees can have early retirement and pay redundancy. In addition, the relocation of people with no special ties to the area, usually the younger, better-trained generation, will provoke a migratory effect. On the contrary, the people who stay in the area should undergo a training policy to reinsert former employees of the nuclear power plant but now as workers in the decommissioning activity. Furthermore, a promotion of

subcontracting companies in the areas around the plant should be done as well, in order not to aggravate the negative impacts of the economic and social aspects of the decommissioning activity, such as the closure of shops, schools and the impact on value of properties, among others.

3. Case studies

In general, Europeans appear to mildly appreciate certain features of nuclear energy. In most countries, the highest share of respondents agrees with the statement that nuclear energy helps to limit global warming. However, at first glance, Europeans do not seem to see nuclear energy as a solution to current or future energy challenges according to the statistics.

The feeling of being informed plays a crucial role when European Union citizens are developing their opinion on the advantages and risks of nuclear energy. Europeans are not well aware of there being a decision concerning the final management of radioactive waste in their country, and similarly Europeans are not very familiar with safety issues related to nuclear power plants. Mass media is the main source of information (television, radio, newspapers) and Europeans think that children are not well informed by school about energy issues. Scientists are considered to be the most trustworthy source of information. After scientists, the most trustworthy source are considered to be non-governmental organisations, then authorities, journalists, governments and at last the European Union itself.

In Europe, nuclear energy is covered by the Euratom Treaty, and specifically by the Article 37. Later, the European Council has issued the 97/11/EC Directive which provides a clarification into the application of this original directive in order to ensure that it has been applied properly [4]. In addition it serves as a trans-boundary context to take account of developments at international levels with a specific reference to decommissioning [16]. Even though Europe has this directive for nuclear issues, the legislative power remains at the national level. The majority would like the authorities to ask the non-governmental organisations for decision-making. However, Europeans are not enthusiastic about personally participating in decision making.

The information for the following countries was prepared mainly from the information collected by the members of the Steering Group of the Co-ordination Network on Decommissioning of Nuclear Installations and from documents available in the public domain.

3.1 Spain

3.1.1 General aspects

In Spain, nuclear plant decommissioning requires an environmental impact assessment under the European Council 97/11/EC Directive, which has been transposed under the Royal Decree Law 9/2000. In addition, the Decree 1836/1999 (Nuclear Plants Executive Regulations) establishes the development control process for reactor decommissioning, as other relevant legislation. With respect to the consent, there are two separate consent processes: one for the nuclear safety aspects and another for the environmental impact assessment process. The competent authorities are the Ministry of Industry and Energy, responsible for nuclear safety aspects, and the Ministry of the Environment, responsible for the environmental impact assessment process, specifically. There are no mandatory requirements for the environmental impact assessment process up to the submission of the environmental impact statement. In addition, there is no specific guidance for developing an environmental impact assessment for reactor decommissioning. The public can review and comment upon the environmental impact statement, once the developer has submitted a notification of a proposal. These comments must be taken into consideration by the competent authorities when making a decision.

In summary, in Spain, there is no standardized guideline with respect to public participation at the screening process, but within the scoping phase public comments on notification are collected. However, it is only in the phase of reviewing the environmental impact assessment report that the public reviews this environmental impact assessment report, and public hearings are organised for continuous projects.

3.1.2 Vandellós-I decommissioning project

In view of the decommissioning of the nuclear power plant Vandellós-I, a commission was created (an institutional organization which reviews the environmental impact assessment) in order to interact with the implementer during the whole decommissioning process, with participation of the 5 closest municipalities (called 'nuclear area'), environmental authorities, representatives of non-governmental organisations, business associations, tourism interest associations, neighbouring groups. They elaborated technical reports and held periodical meetings to solve controversies and concerns. Moreover, there was a continuous official on-going dialogue. In addition, COWAM (Community and Waste Management) was created in Europe in 1999, and its aim is to create a guideline to decision-making on the search of a location for radioactive waste disposal. In Spain, COWAM ESPAÑA was set up in order to warrantee a democratic, transparent and participative process in decision-making criteria on locations for the disposal of radioactive waste [17].

The main practice used for public participation in this decommissioning activity comprised an official public participation procedure (environmental impact assessment publicly available during 30 days for public comments). The developer had to undertake an extensive participation and consolidation initiative with the local government. After the consulting period, a brief copy was sent to more than 100 local organizations for comments (recognition in the early process). A local newspaper has been produced on a regular basis and there was extensive coverage of the work on site on local radio and television. There was an on-going dialogue with representatives from the local government. Moreover, there were touring mobile exhibitions which had a very positive effect on the communication with all villages in the local area. In conclusion, it was learnt from this experience that for future projects, the scoping procedure has to be extensive and exemplary and based on an agreement.

The social impacts of the Vandellós-I decommissioning project on the local people have shown a little descent in demographic stability, job losses or retirement and anticipated retirement. On the other hand, the economic impacts have been the loss of municipal income as taxes, revenues and compensations and the temporary loss of land development.

In addition, a training policy has been established to reinsert former employees in the decommissioning activities in order for the area to survive. There was also a post-closure training management, which was mainly performed by local administrations and the University, in this case the Universitat Rovira I Virgili, in the specialization for students and teachers (see Annex 3).

Companies involved in the decommissioning process or nuclear power plants, have to ensure that sufficient information is provided and that the emergency plans are disseminated. They have been seeking to diversify the economic activity of the area, so that the local economy would not stall after closure. This is the reason why, in the alternatives considered, and due to a public agreement, the alternative chosen was the demolition of the unnecessary buildings and the static confinement of the reactor case (complete sealing of the reactor containment) since it is environmentally benign. A consequence of it could be observed in the expression of the need to dismantle and the desire to have a non-nuclear power plant on the site as a replacement (see Annex 3).

3.1.3 CIEMAT (PIMIC, integrated plan for the improvement of CIEMAT´s installations)

Another Spanish example is the development of information and communication by the Research Centre for Energy, Environment and Technology (CIEMAT). For the decommissioning project of a research reactor and some obsolete facilities belonging to the nuclear cycle, an environmental impact assessment was also mandatory. During the scoping stage, 21 different associations were called for participation from which only 11 answered. Participation and consultation of the local government was organised and there was an on going dialogue with their representatives.

People from the area of influence do not work at the site (but workers are considered in many cases to be members of the public), so there is no big impact on employment related to the decommissioning project. However, there is a desire to have access to information and a need to participate in the decision-making process. An “Information Committee” with representatives from the surrounding neighbourhood, workers, and local and national authorities has been created to cover this necessity of information. Besides other communication/information practices are continuously carried out through the CIEMAT web site, newspapers, magazines, visits to the facilities, meeting the information requirements of any stakeholder.

Because the CIEMAT is situated very close to the university, there are periodical bilateral meetings between the two parties. Other methods used to enhance public participation and perception are: transparency, periodical information, local leaflets, internal report sessions with general seminars and external report sessions, both managed by a committee, and five screens with real time radiological information (see Annex 4).

3.2 Belgium

3.2.1 General aspects

In terms of legislation, the protection of the public and the environment from the hazards of ionising radiation was outlined in the Law of 29 March 1958. This law had subsequently been modified several times. The detailed stipulations of this law are given in the Royal Decree of 28 February 1963 and this Decree can be considered as the primary legislation on nuclear matters in Belgium. This Decree that provides the general regulations regarding radiation protection of workers and the population describes the responsibility of the licence holder of a nuclear installation covering civil liabilities.

Belgium transposed the EC Directive 97/11/EC of 3 March 1997 on Environmental Impact Assessment (EIA) into the national statutory by Royal Decree of 20 July 2001, C-2001/00726.

It should be noted that Belgium is a federal country, in which some authorities have been allocated to the federal government (nuclear matters, for example) and others to the regional authorities (environmental protection, for example). As such, the federal government is the body who deals with nuclear and radiological aspects. For environmental protection, regional authorities are the authorising bodies and require an environmental impact assessment.

In Belgium, during the screening phase, public comments can be given on limited impact reports. Afterwards, during the scoping phase, public involvement becomes obvious. But it is only during the review of the environmental impact report that a public review is organised and a public hearing is possible if more then 25 complaints are received. The public participates through a permit process involving a 30 day public inquiry.

3.2.2 Short-lived waste disposal project in Dessel

For the Belgian low-level and short-lived waste disposal project in Dessel NIRAS/ONDRAF developed a methodology aiming to involve people and local authorities in the search for a solution for the long-term management of Belgian low-level and short-lived waste. In a representative local partnership, local players were working on a tailor-made disposal project. The technical aspects were incorporated into a global project opening up new perspectives for the municipality in question, thanks to the social effects.

A consultation platform, where key potential partners were identified was formed. There was a partnership which was funded and had the purpose of conducting research in the field, where there was a forum for structured project negotiation and consultation and communication and information to local inhabitants was encouraged. The ultimate goal was to develop an integrated disposal project integrating technical and social implications. The

phases that involved this project were: start-up stage, research stage, development stage, decision stage.

There was a day-to-day operation and coordination staff and working groups were organised to discuss implementation and design, environment and health, safety, and local development [18, 19].

An internal communication cell was formed with 10 interested members (representative delegation of the local area) developing new ideas in the field of communication and coordinating logistics for particular initiatives. As the general public did not have the scientific knowledge, specialists had to explain everything. A total of 83 people were involved in STOLA-Dessel, mainly volunteers from the surrounding area. Three quarters of the working group members represented one of the partners participating in the General Assembly. The other members were individuals from Dessel who accepted the invitation to participate.

Apart from this, the members received independent advice from experts of universities and engineering consultancies. Working groups critically analysed and assessed the disposal concept proposals.

3.3 Slovak Republic

3.3.1 General aspects

The Slovak republic does not have a tradition of insight into an open public debate on nuclear issues due to its historic connection to the Soviet Union. The public is well aware of the importance of effective energy supplies for the enhancement of the economy and it is the duty of the local municipality to inform the public about the intended activity [20]. The public can establish a civic association and through such associations, public standpoints can have a great significance in the screening process.

The Atomic Act requires the operator to perform an environmental impact assessment process before the start of decommissioning. The Slovak environmental impact assessment legislation is based on the act No 24/2006 Coll. on environmental impact assessment. The act establishes the responsibility of the Ministry of the Environment to evaluate the proposals, which can influence the environment. The scope of the evaluation includes all new nuclear facilities and also the changes exceeding 50 % of the former extent of activity (e.g., decommissioning). The act also establishes the responsibility of the Ministry of the Environment to give the statement to the proposals for decommissioning options before the start of decommissioning. Direct and indirect impacts resulting from decommissioning and new activities related urban structure, health, living conditions and public acceptance are assessed [21].

The environmental impact assessment process includes hearings of citizens in local and neighbouring municipalities, local initiatives and actions taken by public institutes. Local authorities, individual citizens, and public institutions may express their comments and opinions in public hearings as written statements. A positive statement from the safety authorities (nuclear regulatory and radiation protection authorities, the Ministry of the Environment) is a binding prerequisite for the acceptance of decision by the government. The licensing authority has to take into account the result of the environmental impact assessment process.

The regulatory body in this process issues the statement to the environmental impact statement and the environmental impact assessment documents before siting and decommissioning of all nuclear installations including radioactive waste management facilities. The statement is based on the assessment of documents issued in accordance with the environmental impact assessment act and in the case of decommissioning it also has to be

completed in order to meet the requirements on the contents of the conceptual decommissioning plan.

There are two major nuclear sites where are situated all nuclear installations in the Slovak Republic. Both are located in regions with average density of population. The existence of several nuclear power plants in the same area mitigates some social and economical consequences to the population and the personnel. From the historical point of view the nuclear power plants of the VVER type used to have much more personnel than western type pressurised water reactors because of the management of maintenance and supporting work (refuelling, inspection). The approach to keep as much as possible of the operational personnel for decommissioning purposes is also typical for VVERs. In such case, the major societal impacts are connected with the end of operation and occur prior to decommissioning. The reduction in workforce will take place over a period of some five years [21].

There are 5 nuclear units in the Slovak Republic at present; all of them are of the Russian VVER-440 design. Three operating units are installed at the Jaslovské Bohunice nuclear power plant. One of these (V-1 Nuclear Power Plant, Unit 2) has been shut down in December 2008, the other two (Nuclear Power Plant V-2, Units 3 and 4) have been upgraded recently and keep operating. The other two operating reactors are located at the Mochovce nuclear power plant (EMO, Units 1 and 2). The construction of two more units at the Mochovce nuclear power plant has been suspended in the 90s for financial reasons. Recently, the new owner (ENEL) decided to finalize these until 2013. In addition to the three reactors at the Jaslovské Bohunice site, there are two other reactors at this site that have been shut down earlier. The Nuclear Power Plant V-1 (Unit 1) was phased out in December 2006. Today, this unit is under preparation for decommissioning. The next one is a pilot reactor, called A-1, which is nowadays under preparation for the second stage of decommissioning [22].

3.3.2 Decommissioning of the V1 Nuclear Power Plant in Jaslovské Bohunice

The Slovak Republic undertook a commitment to shut down the Units 1 and 2 of the Jaslovske Bohunice V1 Nuclear Power Plant in 2006 and 2008 respectively through the adoption of Resolution No. 801/99 of the Slovak Government. This was a condition for fulfilling the Accession Agreement of the Slovak Republic to the European Union.

In the early 2000s, on the basis of the Government Resolution, studies were elaborated that focused on the social impacts and the stabilisation of employment in the Nuclear Power Plant V-1. The aim was to minimize the impact on the national budget and develop a proposal of territorial economy development for the Trnava region (Bohunice site) after the year 2005.

Based on the decision about the permanent shutdown of the V1 Nuclear Power Plant, the Bohunice International Decommissioning Support Fund (BIDSF) was created as compensation by the European Union. Administrator of the fund is the European Bank for Reconstruction and Development (EBRD). Financing is provided in the form of grant contracts, in which frame definitions of project extents are introduced. The project for the environmental impact assessment for the decommissioning of the V1 Nuclear Power Plant is coded as B6.2 in the framework of the BIDSF. Within the environmental impact assessment process for the decommissioning of the Nuclear Power Plant V1, a public consultation and disclosure plan (PCDP) was elaborated and implemented. Its main goals were to provide a brief description, explanation of the legal requirements, identification of key stakeholders, to plan the strategy and the timetable, to prepare all the reporting and/or documentation and to prepare a comment/complaint mechanism [23]. According to the public consultation and disclosure plan, a public involvement process had to be carried out in accordance with the Slovak act on environmental impact assessments and the act on free access to information. These legislative documents are in compliance with the European Council directives as well

as with the European Bank for Reconstruction and Development Environmental Policy and the European Bank for Reconstruction and Development Public Information Policy.

3.3.3 Decommissioning of the A-1 Nuclear Power Plant in Jaslovské Bohunice

The Nuclear Power Plant A-1 at Jaslovské Bohunice (150 MWe HWGCR) was in operation from 1972 to 1977. It was permanently shut down in 1977 after two accidents in the primary coolant system. Significant damage and corrosion of the fuel cladding during the operational accident and during spent fuel storage at the Nuclear Power Plant A-1 resulted in the production of abnormal radioactive wastes (containing alpha nuclides) and in the contamination of parts of the nuclear power plant. The first phase of decommissioning ended in 2007 and will be followed by a second phase of continual decommissioning. This structure is also applied in the environmental impact assessment process which proceeded in 2 stages:

- The first stage of decommissioning of the A-1 Nuclear Power Plant was characterized by the removal of spent nuclear fuel and the treatment and conditioning of all liquid radioactive wastes. The environmental impact assessment process for this stage was the first opportunity when the public was informed on the problems about untypical waste streams containing alpha radionuclides. Works in this stage were performed in the period 1994-2007.
- The second stage of the decommissioning plan for the A-1 Nuclear Power Plant presumes that works will start in 2008 (the duration of all stages is estimated to be 22 to 48 years depending on the implemented variant). Environmental impact assessment documents evaluated several decommissioning strategies (variants) which differed by timing and scope of the decommissioning/dismantling activities [24]. Finally, the "continual decommissioning variant" was approved to be implemented for this purpose [25].

3.4 Slovenia

3.4.1 General aspects

The main producer of all categories of radioactive waste in Slovenia is the nuclear power plant Krško. The only practical experience in the decommissioning of nuclear facilities in Slovenia is limited to the decommissioning activities at the Žirovski Vrh Uranium Mine. The first programme on mine close-out, prevention and remediation of the mining consequences was prepared only two years later. Unfortunately, the programme is not supported by sufficient financial resources; therefore, the progress of decommissioning and remediation is much slower than expected [26].

The public institution responsible for selecting a site for low/intermediate level waste disposal is the Slovenian Radioactive Waste Management Agency (ARAO). The Agency was founded in 1991 by the Slovenian Government to provide conditions for final disposal of all radioactive wastes. The first site selection for low/intermediate level waste in 1990-1993 failed because of inadequate public participation as a main reason. Nowadays, repository siting is planned according to a mixed procedure which follows the International Atomic Energy Agency (IAEA) recommendations. It combines expert assessment and local initiatives and proposals.

3.4.2 Low/intermediate level waste repository

The following case study describes the situation of the procedure for defining a site for a low/intermediate level waste repository in Slovenia. This ongoing case shows that openness, transparency and a well arranged mediation/participation process can help to find a non-confrontational resolution to such a complicated issue as site selection for radioactive waste

disposal undoubtedly is. Valuable lessons were learned from the previous site selection process, which failed in the early 90s.

The first siting procedure for the permanent repository of low and intermediate level radioactive waste took place from 1990 to 1993. In that time, a technical approach was selected and several potential sites were announced without public involvement in the procedure. The public objected strongly and the procedure was stopped. Local residents were particularly enraged; they believed the government wanted to put the hazardous waste in their community because the region was less developed and poorer than elsewhere in the country. Public opinion polls showed that most Slovenians realise that the country needs a low/intermediate level waste repository, but at the same time most of them do not want to live near it. A slightly more positive attitude has been perceived in recent years due to better public information [27].

All the analyses showed that the conflict between the environmental and waste management interests and the interests of local communities to expel any kind of waste from their environment is profound. Almost no willingness to cooperate was present on the side of the public, and the government reacted by completely withdrawing from the process for several years. Meanwhile, a new procedure and some legislative measures to support public acceptability of the low/intermediate level waste repository were prepared. An intense public information and communication campaign was also organised.

After the failure of the first site selection for the low/intermediate level waste repository, a detailed analysis of the experiences showed that the main reason for the failure was inadequate public participation. Information about the project was insufficient, public participation in the process was not established and representatives of local communities were not regularly informed about the results [27].

The analyses also revealed that the site selection process had insufficient political support. A waste management policy that could have provided the needed link between the politicians and the investor did not exist. In fact, the period of the site selection process coincided with the time of tremendous changes that occurred in Slovenia in the late 1980s and early 1990s. The changes in the political, social and economic system, in combination with the growing opposition to the peaceful use of nuclear energy, would require a different approach to the problem.

The main characteristic of the new process is the mixed mode approach that combines technical criteria with volunteer siting. In order to avoid having the process rejected at the end, the Slovenian Radioactive Waste Management Agency (ARAO) applied the strategy that no intermediate decision or advancement of the process could be made without public consent. This is achieved through public presentations and workshops for the general public and non-governmental organisations supported by local media and other informational activities [27].

The mixed procedure is divided into four stages [28]:

- Conceptual and planning stage (1999): participatory workshops for professional public.
- Area survey stage (2005): invitation to local communities, collecting applications.
- Site characterization stage (2007): participatory workshops, building local partnerships.
- Site confirmation stage: harmonization of interests of local communities and interested public.

The siting process is integrated with the administrative planning procedure for adopting a detailed plan of national importance. It also includes the process of strategic impact assessment and environmental impact assessment where the public has a right to participate. There is a plan to include a mediator into these activities as well.

Further activities planned in the new siting process are an exhaustive data mining from different sources to assess the public opinion; and interviews with Slovenian Radioactive Waste Management Agency officers, mediator, local decision makers, individuals from local partnerships to discuss their experiences and the acceptability of the proposed framework [29].

3.5 Sweden

3.5.1 General aspects

In Sweden, the European Council Directive 97/11/EC has been transposed under the Environmental Code 1998, which has clarified public participation procedures. For the moment there is no written and nationally agreed policy on decontamination and decommissioning [30]. The intention of the licensees in Sweden is to dismantle the shut-down reactors after the establishment of a final repository for low and intermediate level decommissioning waste. This repository is supposed to be available from 2020 on. The Swedish Act on Nuclear Activities states the responsibility of the licensee to dismantle a reactor that is no longer used. At the same time, in order to be able to decommission a reactor, the responsible operator needs a permit from an Environmental Court according to the Environmental Code.

The Nuclear Power Inspectorate (SKI) participates throughout the process and determines whether an environmental impact assessment is required or not. The proponent must also consult with the County Administrative Board; the environmental impact assessment is then prepared, including consultation with the government, the public and private organisations and individuals. The Nuclear Power Inspectorate regulates nuclear safety requirements and would be the competent authority for an environmental impact assessment. The County Administrative Board determines general environmental acceptability and the Radiation Protection Institute (SSI) regulates radiological protection requirements. A public screening exercise is required to determine the need of an environmental impact assessment. This is followed by a public scoping exercise. General guidance on environmental impact assessment is given in the legislation and by the competent authorities; however, there is no specific guidance for environmental impact assessments for reactor decommissioning. The developer must consult the County Administrative Board (CAB) and affected private parties. Afterwards the County Administrative Board will decide if an environmental impact assessment is required. The developer must then consult with other government authorities, municipalities and organisations as well as the general public in order to define the scope of the environmental impact statement.

In general, during the screening stage, the applicants must consult with affected ‘private parties’ and the County Administrative Board before the board makes a screening decision. Then, during the scoping stage, the public is consulted on the contents of the environmental impact assessment report, and during the review of the environmental impact assessment report there is the time for possible opportunities for public review of this environmental impact assessment report.

The main methodology used in Sweden is the TASCOI methodology (Transformation, Actors, Suppliers, Customers, Owners and Interveners), where it has to be looked at the transformation, the actors, the suppliers, the customers, the owners and the interveners, by explaining them.

Sweden has deep historic conflicts on the utilization of nuclear power. In addition there is a great social movement against nuclear power, which has been sustained for almost 30 years now. There are many citizen groups and environmental organizations that are in disagreement about nuclear power [20]. In any case, there is a common understanding that the generations that have benefited from nuclear power should finance and take care of the wastes both from operations and decommissioning [30]. Nevertheless, there is a waste

network, a network that coordinates groups of citizens at places which have been considered as sites for nuclear waste management in order to promote exchange of knowledge and experience between local groups. Moreover, local authorities and public interest groups have access to public founds to facilitate their participation in the project evaluation process.

The waste network promotes trust when there is a high likelihood that the participants will meet again in a similar setting, when the interaction takes place face-to-face in regular meetings over a reasonable period of time and people have a chance to get to know each other, when participants are able to secure independent expert advise, and the participants are free to question the sincerity of the involved parties. In addition, trust is promoted when citizens are involved early in the decision-making process, all available information is made freely accessible to all involved, when the process of selecting options based on preferences is logical and transparent and the decision-making body seriously considers the outcome of the participation process. And last but not least, trust is promoted by giving some control of the format of the discourse [31].

The loss of competent personnel, the inevitable degradation of closed facilities and the issue of understanding and keeping relevant documentation are considered when planning the decommissioning activities.

3.5.2 Barsebäck

The first reactor, Barsebäck 1, was closed on November 30, 1999, and the second, Barsebäck 2, ceased operations on May 31, 2005. Due to the operator's appeal against this decision, the closure was postponed. The decommissioning of Barsebäck 1 will await the construction of a storage facility, scheduled to be ready by 2020. The plant is kept in a phase of care and maintenance preceding dismantling.

In terms of public concerns, the Swedish government was influenced by Denmark wanting to shut down the power plant, whereas the Barsebäck community would prefer continued safe operation [32].

3.6 Czech Republic

3.6.1 General aspects

In the Czech Republic, provisions for the environmental impact assessment process (plans assessment) and the strategic environmental assessment process (conceptions assessment) at the policy level were established in the first Environmental Impact Assessment Act No. 244/1992 Coll. of the Czech National Council.

Important changes in strategic environmental assessment and environmental impact assessment provisions are contained in Act No.100/2001 Coll. on Environmental Impact Assessment, as amended by Act No. 93/2004 Coll. Consolidated Version. This Act is fully in conformity with the Directive 2001/42/EC of the European Parliament and the Council on the Assessment of the Effects of Certain Plans and Programmes on the Environment. The new procedural requirements for strategic environmental assessments/environmental impact assessments laid down in this Act are more extensive and detailed than those contained in the first Environmental Impact Assessment Act (244/1992 Coll.). They still apply to policies and strategies as well as to plans and programmes as required under Article 3 of the Strategic Environmental Assessment Directive 2001/42/EC.

Within the scope of the environmental impact assessment process, the objects of compulsory assessment consist of plans for constructions, activities and technologies listed in Annex No. 1 of Act No.100/2001 Coll. and changes therein in compliance with Article 4(1)(c). The Ministry of Environment in compliance with the provisions of Article 21 or the regional authority in compliance with the provisions of Article 22 of this Act provide for assessment of these plans. Within the frame of the strategic environmental assessment process, the

objects of compulsory assessment comprise also conceptions listed in Act No. 100/2001 Coll., Article 10(a) and Land-Use Planning Documentation, the assessment of which is carried out in accordance with the provision of Article 10(i) of the Construction Act.

Participation of individuals in decision-making processes includes participation in administrative procedures, holding of a referendum, strategic environmental assessment and environmental impact assessment. Decision-making should be moved as close as possible to those who are directly affected by the intended activity (the principle of subsidiarity). Therefore, major groups of citizens were identified.

The main instruments for public participation at the national level consist of legislative measures and the institute of the referendum and local referendum, the institute of the ombudsman, the possibility of making comments on the part of the public in the areas of creation of economic and legislative instruments, subsidy policy, etc. The environmental law and the law in general (administrative law) in their valid form already contain all three instruments - the procedural triad - on the basis of which the Aarhus Convention is constructed [15]. In particular, public participation in the decision-making of administrative authorities is included in the general regulations of the administrative law.

The important parts of public participation within the frame of the environmental impact assessment/strategic environmental assessment process are:

- Access of public to the information (environmental impact assessment and strategic environmental assessment information systems can be accessed on the web site of the Ministry of the Environment and the Portal of the Public Administration);
- Active and continuous information of the public;
- Public hearing both in the environmental impact assessment and the strategic environmental assessment process;
- Quality settlement of public suggestions;
- Identification of target groups at the very beginning of the strategic environmental assessment process;
- Analysis of requirements for various information, which should be submitted to different groups;
- Information on the environmental impact assessment/strategic environmental assessment process and practical experiences.

3.6.2 Dukovany Interim Store of Spent Fuel

Historically, the Dukovany Interim Store of Spent Fuel (ISSF) was the very first facility in the Czech Republic subjected to the environmental impact assessment process [33]. The intention met with high opposition of the local population and non-governmental organisations. Immediately after making public the plans for building an interim store in the Dukovany Nuclear Power Plant, non-governmental organisations organised pressure measurements forcing the Government to enter into the process, and its negotiations with the mayors terminated in a compromise. In its Decision No. 213/1992 Coll. the Government undertook to limit the interim store capacity to only 600 tons. Moreover, the Ministry of Environment signed an agreement that the plan of the interim store construction will be assessed according to the new Act No. 244/1992 Coll. of the Czech National Council on the Environmental Impact Assessment. This agreement was rather valuable, as at the moment of the beginning of the land use procedure, this Act did not yet come into force. The attempts to test the new Act in practice and to involve the local population were behind the whole approach.

Finally the legally prescribed public hearing about the environmental impact assessment report took place and the minimum environmental effects of the dry Interim Store of Spent

Fuel in containers have been proved. The interim store operation and its commissioning ended on 8 March 2006.

Examples of the last strategic environmental assessment and environmental impact assessment processes in Czech Republic are [34]:

- The spent fuel store in the Nuclear Power Plant Dukovany;
- The spent fuel store in the Nuclear Power Plant Temelin;
- The project for a deep geological repository.

3.7 United Kingdom

3.7.1 General aspects

In the United Kingdom, the European Council Directive 97/11/EC has been transposed under the Nuclear Reactors Regulations of 1999 (environmental impact assessment for decommissioning). Some parts of the overall decommissioning strategy may require separate environmental planning permission from the local planning authority. Additionally, all activities on a nuclear licensed site are regulated under the health and safety legislation.

The requirements for an environmental impact assessment are separate from the nuclear site licensing process although both processes are regulated by the same authority leading to co-ordinated and consistent regulation. Therefore, separate consent must be sought from the local planning authority (usually the county council) for aspects of the development requiring significant changes to structures or land use since it is responsible for any associated planning applications.

The Health and Safety Executive is responsible for determining environmental acceptability of the decommissioning proposals and for more general site operations. There are no mandatory requirements for the environmental impact assessment process up to the submission of the environmental impact statement and some general guidance on environmental impact assessment is available through Environment Department reports and good practice guides. Specific guidance from the Health and Safety Executive on environmental impact assessments for reactor decommissioning is available from 2000.

The first opportunity for participation is after the environmental impact statement has been produced. So there is no public involvement what so ever during the screening and scoping phase. Some cases may involve consultation beyond the minimum requirements, e.g., by stakeholder dialogues, public meetings, ‘surgeries’ and wider advertisement. In addition, the environment agencies are responsible for consultation on any variations of radioactive discharge and waste disposal authorisations involved.

The evaluation criteria used in the United Kingdom are based on transparency, legitimacy equality of access, being able to speak, a deliberate environment, openness of framing, developing insight into a range of issues where new meanings are generated, inclusive and best knowledge elicited, producing acceptable/tolerable and useable outcomes/decisions, improvement of trust and understanding between participants. They are also based on developing a sense of shared responsibility ad common good [31].

In general, there is a lack of basic information concerning radioactive waste management in the public domain, which is shared by many people. In order to avoid this lack of information there is television coverage and better leaflets and brochures. However, the communication of risk is better done face-to-face. Generational issues have to be overcome. For younger generations the internet will be the mostly used tool, whereas the older generations will be reached easier via written information or television/radio coverage. If requested, for a press release reporters can be supplied with more in depth scientific information. Public workshops are mostly organised during the summer and during national stakeholder group meetings.

3.7.2 Transfynydd

As an example, the Transfynydd case study may demonstrate the different public participation methodologies used. The nuclear power station in North Wales was closed in July 1993 and the alternatives considered were: early site clearance in 20 years approximately, deferred site clearance (building retained until further instructions) or mounding (removing non-radioactive buildings and burying the station). Deferred site clearance was chosen.

The stakeholders involved in the project were the Transfynydd station employees and trade union representatives, people living within a radius of approximately 25 to 30 km from the station, and local authorities (competent authorities), the district council and the two bordering districts councils.

Consultation was established at 3 levels: within the local community liaison council and to the local authorities, a touring exhibition, and questionnaires. An information package and personal counselling was offered beforehand, in order to get as much input from the local population as possible [35].

Local employment was a major concern for the local population: Further main concerns were the visual impact and the radiation doses. During the scoping phase, the public consultation had already identified the topics of consent. The alternatives were considered in an earlier and unrelated public consultation exercise, based on which the preferred strategy was defined. Public participation was based on the distribution of several copies of the environmental impact statement and a non-technical summary provided in English and Welsh, and all the letters (or comments) received were acknowledge and dealt with.

The lessons learnt indicated that the project management team must be carefully selected, that during the scoping stage more public involvement would have been a benefit and that attention should be given to focussing on key issues [35].

3.8 France

3.8.1 General aspects

France has the most formalised environmental impact assessment system in the European Union, though there is no transposition of the European Council 97/11/EC Directive. However revised legislation is in preparation. Impact assessment studies are also required for radioactive releases under Decree 77-1141. Besides general legislation in relation to basic nuclear installations, the technical and administrative aspects of decommissioning are specified in Decree 4/5/95. Much of the decommissioning work can be carried out under the site licence that applied during normal operations. A new consent is only required if radioactive releases increase or if the nature of the site is altered.

The Regulatory Authority for Nuclear Safety (DSIN) is responsible for reviewing the environmental impact assessment as part of the consent procedure and prepares the Authorisation Decree, including environmental and technical specifications for approval by the Ministries of Environment, Industry and Health. Because environmental impact assessment requirements are specified under a range of sector regulations, the environmental impact assessment process requirements vary between different types of projects. Guidance has been prepared on technical and methodological issues regarding decontamination and decommissioning (D&D) radioactive effluent discharges.

The environmental impact assessment would normally not include economic or social issues. In addition to the requirements that the environmental impact statement should be publicly available, public involvement is performed through a “public inquiry” procedure via a “local information commission” which is at the same time reinforced at national level by a

"national commission for debate". Nonetheless, the real process of public participation only begins with the submission of an environmental impact assessment report.

3.8.2 Underground research laboratories

The creation of an underground research laboratory (URL) in France was a key requirement of the 1991 Waste Act, which entrusted ANDRA for research in deep geological formations. The law contains several provisions aimed at a more transparent and equitable siting process. One of these is the requirement that local officials and the public from the affected sites have to be consulted prior to any site investigations or to decisions about the construction of the underground research laboratory. A mediator was charged with leading of public involvement prior to the selection of the sites for the underground research laboratory. The principle objectives of the mediation mission were:

- providing information to the public,
- open dialogue, and
- facilitation of decision.

In fact, the siting process for the underground research laboratory began in January 1993 and finally, some 30 sites had volunteered for consideration by December of that year. Ultimately, the following potentially suitable sites for the underground research laboratory were recommended:

- a clay geology in north-eastern France on the border of the Meuse and Haute-Marne Departments (the Bure clay site);
- a clay geology beneath the Marcoule nuclear site in the south of the country in the Gard Department; and
- a granite geology in the Vienne Department in western France.

Surface-based investigations at these sites, including drilling of boreholes and geophysical measurements, were completed in April 1996. Following this, ANDRA was authorised to submit requests for the installation and operation of an underground research laboratory at each of the three sites in May 1996. The reviews of the submissions were performed by the competent Ministry in line with public hearings and local consultation. The public hearings at the selected sites took place from January to May 1997. Later on, the government decided that investigations should continue at the Bure clay site. A decree about this was issued in August 1999 allowing ANDRA to commence construction of the Bure underground research laboratory, providing for the establishment of a Local Information Committee at Bure. The construction of the underground research laboratory started in August 2000.

The selection process for a granite site was initiated with a geological screening process that began in February 1999. This resulted in the identification of 180 areas across all the country by July 1999. As a result of further screening, the number of potentially suitable sites was narrowed down to seven in February 2000. Initially, it was planned that the selection process for granite host rock would be completed by the end of 2003. However, later on the process was stopped; the main reason for this was to seek consensus through consultation with the communities nearby to the identified geologically suitable sites. A government delegation sent to consult the problem with the local people, was strongly opposed in all visited communities [36].

In 2005, the government decided to call for a wide public debate on radioactive waste management orientations. This was organized from September 2005 to January 2006 by the National Committee for Public Debate (CNDP). During the public debate specific requests emerged concerning the integration of all waste categories within a consistent management policy, the improvement of governance and the creation of incentive measures in support of the repository project in terms of regional development [37].

3.9 Germany

3.9.1 General aspects

The order on the licensing procedure for facilities according to Nr. 7 of the Atomic Law requires that the potential for significant environmental impact must be considered. A detailed permit application must be submitted for each separate part of the decommissioning process. The Ministry of Environment of the federal state where the reactor is located would be the competent authority. As a result, licensing lies with individual state governments. There are no mandatory requirements for the environmental impact assessment process up to the submission of the environmental impact statement. A document on rules for the decommissioning of facilities accounting to Nr. 7 of the Atomic Law has been adopted as an auxiliary document for the licensing procedure. Should an environmental impact assessment be required at the screening stage of one of the decommissioning phases then the proposed project must be publicly notified two weeks in advance of publication of the environmental impact assessment documentation. A public hearing must then take place, led by the competent authority and open to all persons who submitted comments.

3.9.2 Greifswald

The main case study for Germany is Greifswald, one of the largest decommissioning projects in the world. The alternative chosen was immediate dismantling within three phases: a post-operational phase, a dismantling phase and a site restoration phase [38].

There was local concern about employment, which was a significant driver in formulating the decommissioning strategy. The measures used in the social strategy to reduce the number of employees were, among others: no major contractors, the creation of a retirement scheme, privatization or outsourcing, the creation of an education programme about decommissioning and about a better position on the labour market, dismissal with economical support and re-industrialization of the site [39]. During the scoping stage, a short description of the project and supporting documentation was provided. In terms of liaison with the competent authority and public participation, a “Nuclear Engineer Group” was created with 13 members in order to advise on all aspects, such as authorities. However, opportunities were limited to the “Nuclear Engineer Group” and to the local authority [35].

Hence, there was no formal public participation. Therefore, an opportunity to the general public to express their views and/or have a say in the decision making process was not provided, something which was thought to be impossible under the EC Directive. The lessons learnt from this experience were that one single person/organisation should not take full responsibility and that in future the environmental evaluation should identify alternative decommissioning strategies.

3.10 Other countries

At the date of the present report, in almost all European Union countries the 97/11/EC Directive has been transposed into local legislation, providing in general the opportunity for public participation in decommissioning projects [40]. Some remarks can be made relating to the situation regarding public participation in other countries:

- In Denmark for example, before the environmental impact statement is submitted, a public scoping exercise must be undertaken, although there is no formal definition of the consultation exercise in the scope of the environmental impact statement. The second opportunity where public participation is considered is during the review of the draft environmental impact statement. Finally, a project of national importance would be the subject of hearings in the vicinity of the proposed project.

- In Austria, environmental impact assessments are currently regarded under the federal act concerning environmental impact assessment and public participation (697/1993), which was amended in 2000. The environmental impact assessment act establishes a consolidated permit process which supersedes all other permit requirements. Moreover, the environmental impact assessment process incorporates the requirements of all other permitting processes such that all permits are granted simultaneously by a single authority (this competent authority is the provincial government) and no statutory requirements exist on the environmental impact assessment process. The contents of an environmental impact statement are specified in the Austrian legislation and publicly available guidelines; however, there is no guidance specific to reactor decommissioning. Opportunities for public participation occur during the scoping stage, following the submission of the environmental impact statement, during the expert review phase and, finally, following publication of the expert review of the environmental impact statement. In addition, there is a special right of standing to citizen groups; when they get more than 200 signatures they have the right to appeal.
- In Finland, a new consent for the site must be sought if there is a substantial change in the operational environment. The Regulatory Authority for Nuclear Safety (STUK) reviews the environmental impact assessment on behalf of the Ministry of Trade and Industry. However, there is no general or decommissioning-specific national guidance on environmental impact assessments so far. The public participation requirements for environmental impact assessments for nuclear power plant decommissioning projects have not yet been specified beyond the minimum requirements specified in the European Council Directive on environmental impact assessments. Therefore, during the screening stage no public participation initiatives are taken. During the scoping stage public comments are possible on assessment schedule (this is the time when public hearings are held), and during the review of the environmental impact assessment report, the public can review this environmental impact assessment report.
- In The Netherlands the European Council 97/11/EC Directive has been transposed under the Environmental Impact Assessment Decree of 1999. The other relevant legislation is the Nuclear Energy Act. A permit is required under the Nuclear Energy Act and all relevant government departments must be consulted. The competent authorities are the Ministry of Housing, Spatial Planning and Environment, to whom the proponent publishes a Notification of Intent, describing the proposed activity and alternatives. An environmental impact assessment commission can add comments to this document when advising the competent authority, thereby establishing the scope of the environmental impact assessment.

  In addition to the information in the legislation and publicly available guidelines, guidance is provided by a commission of the European Union for each project (where the environmental impact statement must be sent). The public is notified of the intention to prepare an environmental impact statement and may submit comments to the competent authority and the environmental impact assessment commission. Public hearings are organised to explain the contents of the environmental impact statement and the draft decision and provide an opportunity for public input. The results of the hearings are sent to the competent authority and to the environmental impact assessment commission, who are obliged to take them into account in their report.

  The first opportunity for public involvement occurs during the scoping process. A deeper involvement occurs when the environmental impact assessment report is made available for comments. The public receives information at several key stages, and the public involvement in the Netherlands is generally regarded as working well.
- In Switzerland, the Nationalen Genossenschaft zur Entsorgung radioaktiver Abfälle (NAGRA) has the responsibility for implementing in the coming years the plan for the disposal of radioactive waste. The selection of repository sites will be made following

a sector plan for deep geological repositories approved by the Federal Council on 2 April 2008, in accordance with the Nuclear Energy Act and the Spatial Planning Act.

The sector plan approach allows effective coordination of all aspects of a repository that has impact on spatial planning and ensures early involvement of the cantons, local communities and the authorities of neighbouring countries, as well as the public and interested organizations.

The conceptual part of the plan was therefore presented in early draft form to the cantons and even neighbouring countries for their opinion. Organizations and members of the public were also given the opportunity to participate in workshops and focus groups. The Federal Government contacted the affected cantons at an early stage and formed a committee of cantons. This committee supports the Federal Government throughout the entire site selection process and has the power to make recommendations. Neighbouring countries are also informed in each stage. The affected communities in the siting regions are continuously involved in the cooperation activities. The public is informed about the process at regular intervals.

These consultation phases, during which the cantons, interested organizations and the public have three months to submit their opinions on the proposals, take place in every stage of the sector plan process.

For the following stages, regional participation gives the public the possibility to be involved and to voice their concerns. Even at the end of stage three, there is a possibility to call for a national referendum on the granting of a general license by the Federal Council and ratification by the Parliament.

4. Best practice guidance for public involvement in decommissioning of nuclear power plant activities

Decommissioning activities provoke some scepticism among the public due to, among others, the loss of employment, but not as much as for the construction of a new nuclear power plant since decommissioning of a facility is, basically, a restoration of the previous area into its natural form, which can be seen as an environmentally friendly action. Therefore, to achieve good public participation procedures, many things have to be borne in mind. Most important are cultural, economic, environmental and social factors.

A basic legislation and recommendations within the European Union framework, with the transposition of the European Directives into the local legislation of each country in order to gather all the national characteristics (bearing in mind the differences between political, environmental, cultural and economic characteristics of the different Member States), appear to be the pillar that supports further actions of public involvement in decommissioning projects.

The most important lesson obtained from every single decommissioning project is the need for public involvement performed at early stages of the environmental impact assessment, more exactly, during the screening phase, where public participation may be less formal than during the review of the environmental impact assessment. This early involvement will provide identification of key concerns about the decommissioning project that may be easily integrated in the environmental impact assessment.

In order to have a neat public participation, the decommissioning project itself has to be transparent and legitimate. An example of hesitant decision making was the Solvay hazardous waste incinerator in Spain which provoked some disconcert among the public due to the little time for public comments.

Furthermore, information should be provided in a form easily to understand by non-experts, although more technical comments must be available as well. Independent specialist advice may be useful, so that the public can understand the technical issues in an objective way. In order to reach the whole of the society, giving the information in several languages has been proven to be a very good technique. Also, this information must be free of charge and there has to be flexibility in schedule to access it with no problems.

In terms of providing information, methods chosen for implementing public participation have to be carefully selected according to the individual characteristics of the area. For instance, in the case of risk communication, it is best to do it face-to-face. It has to be interactive and a two-way process and it also has to be continuous throughout the environmental impact assessment. In addition, public apathy might be influenced by the failure of invitation to key events. Therefore, a lot of care needs to be put into this matter, making sure that procedures are socially inclusive, and participation of social groups prone to exclusion, such as minorities and low-income groups, is facilitated.

There has to be a commitment from the developers. In fact, recognising that a decision was based on an agreement between all concerned parties, rather than a prescriptive list, shows values of recognizing the worthiness of legitimate interests and contributions. This is essential for the public, because most of the time they feel that their input is not recognized due to its non-technicality. Moreover, there has to be some change in society where public participation is further developed, since people usually prefer not to participate in the decision making process. In order to implement these objectives, the project management team must be carefully selected. The members have to be honest (legitimacy is something that the public takes into account) which at the same time improves relations.

Techniques to involve the public more in order to give an incentive to public participation could be, for instance, the acknowledgement of the positive impacts of the decommissioning activities, such as new revenues from the government. So the public will see that it is not

only a matter of problems that have to be mitigated. Another technique is to carefully show the difference between before and after the project, which may be very important for example relating to the overall visual impact.

Implementation of public participation is not an easy task and varies among people. The gender, the level of education, the general attitude towards nuclear energy, or the feeling of being informed will influence public participation. As a result, the people implementing a public participation programme have to be trained to have the right skills. For instance, in order to overcome generational issues, information destined to the younger should be published in electronic sources, whereas for the older generation, information should be provided via radio or television. Likewise, for press releases, where information may be biased, meetings may be organised with reporters and scientists, so that reporters get a technical view of the development and may potentially put forward a more objective article. This is mainly due to the fact that people are very reluctant to nuclear power issues because they have not seen the big scene of the situation, and the media act in the same way.

Furthermore, a very useful tool in implementation of public participation is the internet. The internet can be used in both ways, as a one-way method or as a two-way method. Forums can be created, where the general public can read the opinion of other people among the general public, or the viewpoint of a developer, etc. In addition, it is a source of information which can be updated at any time and anywhere. It is very important to use the internet along with other methods chosen.

No single person/organisation should take full responsibility of the situation. This is why a deep involvement should exist with stakeholders, such as universities, institutions, governments, etc. Besides, the environmental evaluation has to identify alternative decommissioning strategies, and for future decommissioning activities, it is important to create a specific guideline for decommissioning, as it would be a great help to the better development of the project.

In addition, being open to public scrutiny beyond legal requirements has helped to reduce conflicts and encourage consensus and cooperation.

Finally, one of the main characteristics of the decommissioning activities already performed and which have ended up with good results is that groups or committees have been created. It is known, than when community leaders (leaders of citizen groups) are brought to the table, community questions and concerns are better addressed than when they are not there. As an example, in Spain the National Association of Municipalities Affected by Nuclear Power Plants (AMAC), the so called ‘nuclear area’ was created as a result of the decommissioning process of Vandellós-I. Technical reports and periodical meetings to solve controversies were presented and there was continuous extra official on-going reporting.

It is important to enhance the creation of civic associations organized by the public since it serves as a way to present public standpoints which have a great significance in the screening process.

Similarly, in Germany a nuclear engineer group was created to advice stakeholders of all technical aspects, and in Sweden a waste network that coordinates groups of citizens in affected areas to promote exchange of knowledge and experience between these local groups. These measures promote trust between the affected parties.

5. Conclusions

Over the years, the European Council jointly with other international organisation has produced a multiplicity of Directives, Regulations and Guidelines dealing with various aspects of nuclear safety for the protection of the public and the environment. Under this framework the environmental impact assessment has been consolidated as an important procedure previous to projects that might affect the environment in order to reduce the impacts. Almost all Member States that have integrated the European Council Directive 97/11/EC in their legislation are aware of the necessity of involving stakeholders in the decision making process and are looking for the best way to collect the provided concerns to the project.

Public participation is essential for the well-being of any project, especially in the case of the decommissioning of a nuclear power plant. Methodologies must be carefully selected according to the individual characteristics by trained and skilled people and communication among all affected parties is essential (a great deal of it could be done through the internet).

Decommissioning of nuclear power plants affects significantly an area, since nuclear power plants are usually found in geographically isolated areas, where the economic situation is well below the level of the mean national economy. So, shutdown of the plant and consequent decommissioning is a very important factor, which most likely will affect the majority of the people in the nearby areas. Several techniques for public participation have been explained in depth. The right technique for a specific situation should be chosen in order to develop a public participation programme suitable for each decommission project.

It has been seen that screening and scoping are two phases of an environmental impact assessment which are very important and determinant for the welfare of the decommissioning project. Throughout the analysis of different case studies, it is now known that public participation has to start as soon as possible, preferably in the screening stage and continue throughout the scoping stage, since in most of the countries it is mandatory. The method most commonly used among the different projects is the creation of a institutional association which, commonly, reviews the environmental impact assessment. Such associations are very important since they integrate all possible concerns, interests, or suggestions from the stakeholders of a certain decommissioning project.

Furthermore, a decommissioning activity does involve socio-economic changes in the area, such as loss of employment, closure of commerce, etc. Measures to avoid these problems, or alleviate the problems caused by such, should be taken for the well functioning of the decommissioning activity. These changes are quite similar among countries and comparable with locations where there is already a repository or a nuclear installation. The example of Würenlingen shows that the presence of the interim storage facility has led neither to people moving out of the area nor to a loss in value of land or property. As part of a written survey, two-thirds of the farmers in the area who responded said that the interim storage facility had had no impact on their turnover.

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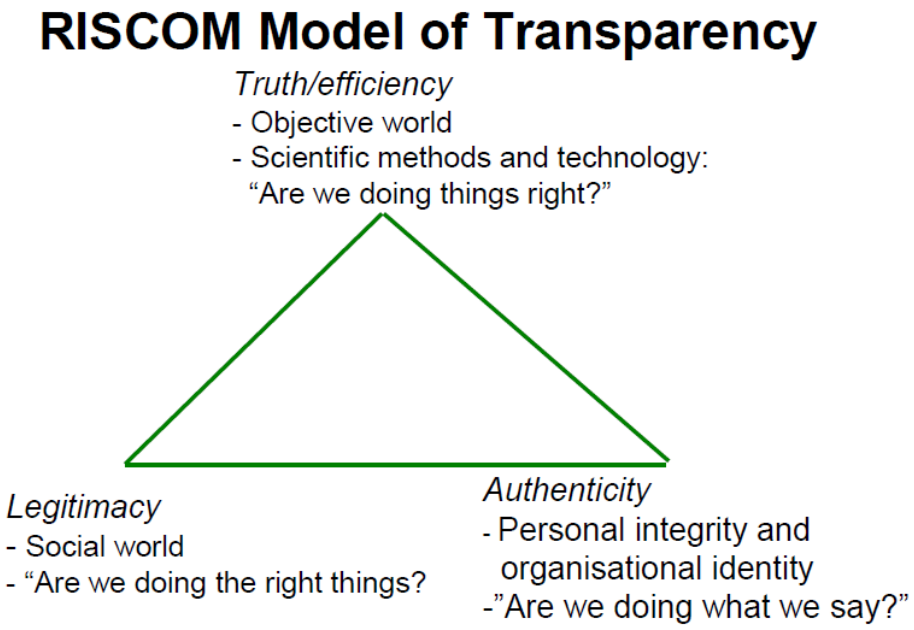
Annex 1: The Riscom model

The Riscom model (a risk communication model for dialogue in complex and controversial matters) was developed by Clas-Otto and Raul Espejo in collaboration with Kjell Andersson and the first implementation was in 2001 in Sweden. It is based on the diagram below and it is thought that authenticity builds trust and legitimacy, thus reducing the stakeholder demands for technical details.



In addition the Riscom model provides a transparency forum format which contributes to increase the quality of the decision-making process.

Furthermore, the Riscom project has been developed into the European Union Riscom II project which was started in 2004. This Riscom II model was created to enhance transparency and public participation in nuclear waste management. It has been created from the development of a theoretical basis (Riscom model …) and implementation and practical tests [41, 42, 43].

Annex 2: The COWAM network

In 1999 a group of representatives from local communities, authorities and experts prepared and proposed a project to the European Commission Research Directorate. The objective was mainly to improve the decision-making process in nuclear waste management at the local and regional levels.

COWAM stands for Community Waste Management and its aim is to make a specific effort to give European local communities and non-governmental organisations the opportunity to represent their own views in COWAM.

The first seminars were held in the Oskarshamn municipality (Sweden), in the Conseil Général de la Meuse and the Comité Local d'Information et de Suivi (CLIS) (France), the Genossenschaft für nukleare Entsorgung Wellenberg (GNW) (Switzerland) and the Asociación de Municipios en Áreas de Centrales Nucleares (AMAC) (Spain). These seminars had the purpose to set up a connective learning process based on existing experiences of decision-making processes with regard to nuclear waste. (See Figure A.2.1)

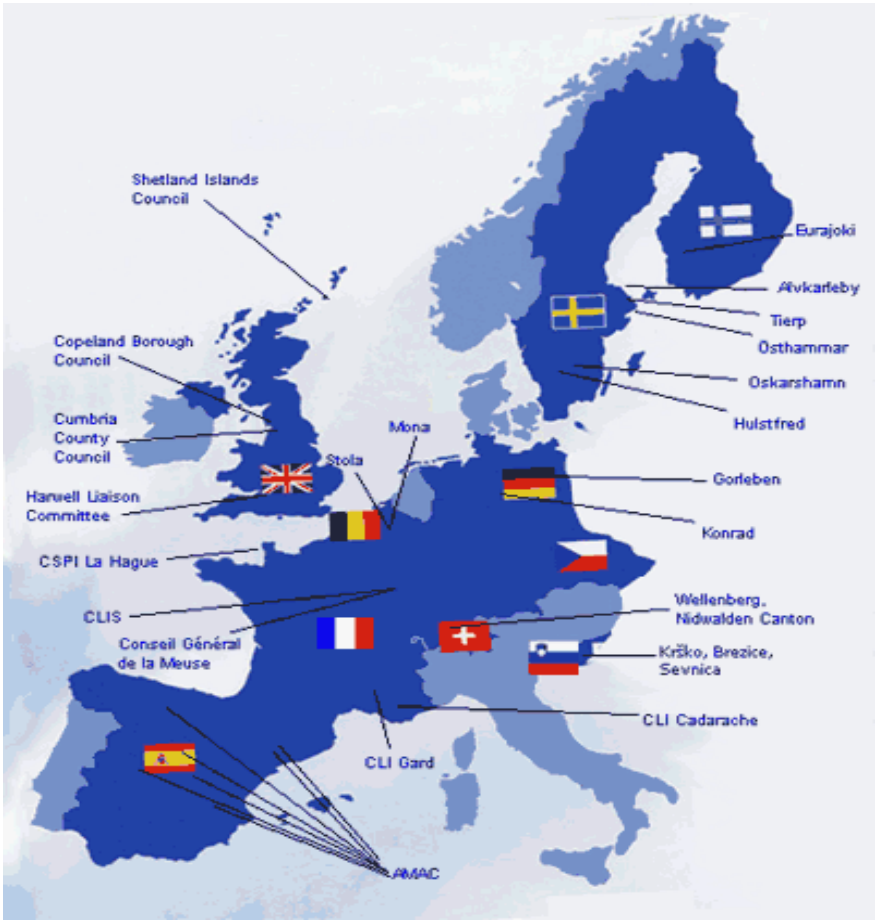


Figure A.2.1: Participants in the COWAM Network in the different EU countries

In 2004, a second COWAM group was brought together to investigate the range of governance issues in radioactive waste management with a "cooperative research nature". A specific methodology was developed and tested as part of the project.

COWAM has 5 thematic groups:

- Work Package 1: "local democracy group"; to share knowledge about local committee building which aims to identify best practices in applying local democracy to nuclear related issues in Europe.

- Work Package 2: “influence of the local actors on the national decision-making process”; clarified in:
  - Effective mechanism for local players to influencing the national decision-making process;
  - Key conditions for legitimate decision-making in terms of relationships and distributions of power between local and national players at different stages of the decision processes.
- Work Package 3: “quality of the decision-making process”; to generate recommendations and implementation of a robust decision-making process or judging an existing decision-making process.
- Work Package 4: “long term governance”; to identify, to discuss and to analyze the institutional, ethical, economic and legal considerations raised by the existence of a site for long term waste storage or deep geological disposal. The main issues are: ethical stakes, continuity and sustainability of surveillance, and efficiency of financing schemes.
- Work Package 5: participants that were involved in three annual national sessions where they had the opportunity to reflect on the meaning of the ongoing thematic governance research in their national and local contexts.

Likewise, in 2007 (to 2009) COWAM in practice was created:

- To contribute to make actual progress in the governance of radioactive waste management (RWM).
- To follow up and analyze 5 national processes of radioactive waste management governance: Spain, United Kingdom, Romania, Slovenia and France.
- To support stakeholders, particularly local communities, directly in their engagement.
- To capture the learning from that experience for the 27 Member states of the European Union.

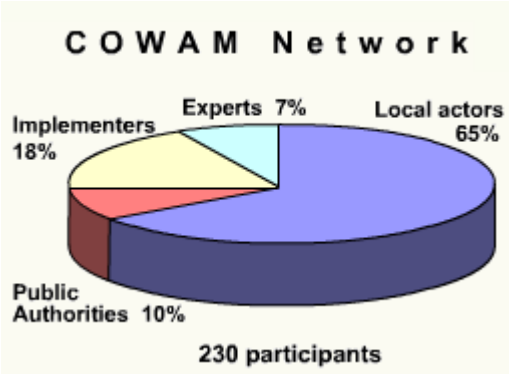


Figure A.2.2 Participants in the COWAM Network as percentage mean

Nowadays COWAM is a network comprising 230 delegates from 10 European countries: Belgium, Czech Republic, Finland, France, Germany, Slovenia, Spain, Sweden, Switzerland, and the United Kingdom. Thirty local communities are involved in the network (see Figure A.2.2). Local communities and non-governmental organizations represent 65 % of the audience, which also comprised national authorities (10 %), implementers (18 %), and experts (7 %) (See Figure A.2.3). This network was designed in order both to strengthen local players’ involvement in nuclear waste management, and to build shared understanding with others, i.e., national authorities and implementers [44, 45, 46].

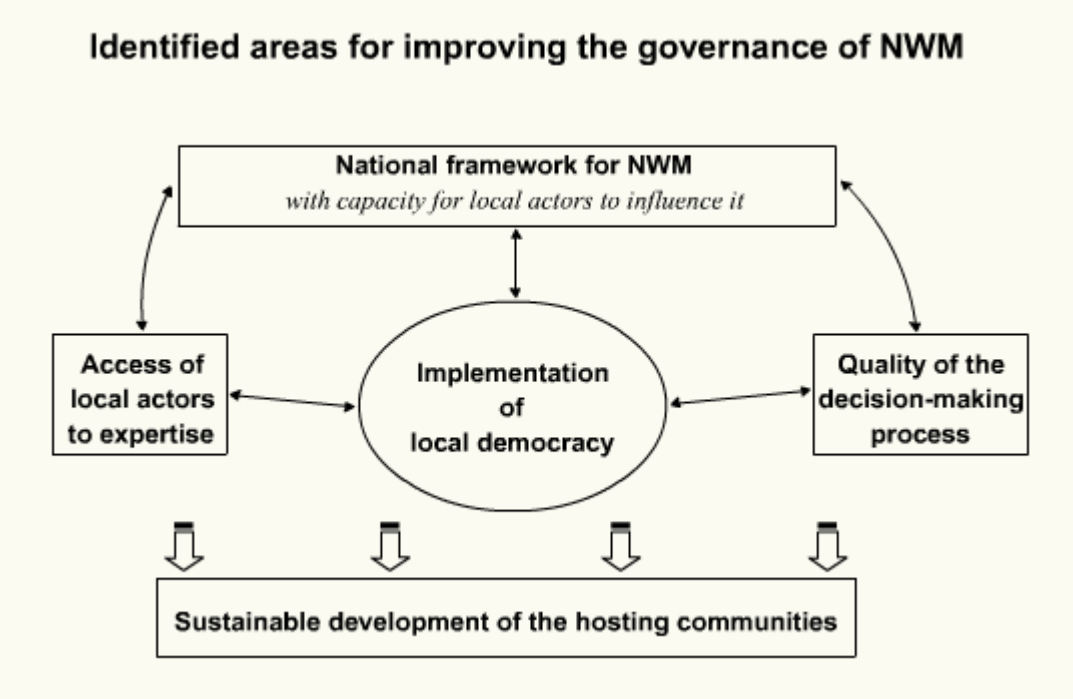


Figure A.2.3 Diagram of the COWAM objectives

Annex 3: Vandellós-I decommissioning project case study (Spain)

Screening and scoping processes, public perception and public relation, and socio-economic impacts in the Vandellós-I decommissioning project

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Verified by: Juan L. Santiago, Head of Projects Department of ENRESA

1. Introduction to the case study

General overview of the decommissioning process

1.1 In Spain, decommissioning is considered as the safe removal of a facility from service and the reduction of residual radioactivity to a level that permits termination of a closure license. The Ministry of Economy will issue a closure license when it is certified by the Regulator that all conditions established in the decommissioning license in relation to the decommissioning works and the management of the resulting wastes have been achieved.

1.2 The framework of reference for nuclear installation decommissioning work in Spain is based on Royal Decree 1836/1999 of December 3, 1999 which approves the Nuclear Installations Regulation. This Royal Decree includes a chapter specifically dealing with decommissioning of nuclear installations. In addition, a generic corpus of standards specifically developed to different aspects of such work by the European Union and in international conventions have been subscribed by Spain.

1.3 The Spanish standards define a technical-administrative procedure for the approval of a decommissioning plan proposed by ENRESA, by the Nuclear Safety Council (CSN) and the Ministry of Economy. Subsequent to this, a positive evaluation is required from the Ministry of the Environment, by means of an environmental impact statement, following a period of public consultation. It is at this point that the site is temporarily transferred from the owner company to ENRESA, the organisation responsible for performance of the decommissioning work. Such transfer is lasting until the decommissioning operations are completed and the site is returned to the original owner.

General overview of the environmental impact assessment process

1.4 The Spanish environmental impact assessment legislation is based on the Royal Decree RDL 9/2000 of October 6, 2000 on Environmental Impact Assessment, which complies with European Council Directive 97/11/EC. This Royal Decree modifies the Royal Decree RDL 1302/1986 of June 28, 1986 on Environmental Impact Assessment and the specific procedures set in Royal Decree 1131/1988 of September 30, 1988 (which approves the Environmental Impact Assessment Executive Regulations of Royal Decree RDL 1302/1986).

1.5 Besides, there are several pieces of environmental impact assessment legislation in the 17 different Autonomous Communities (see the Spanish site at www.penelope.uni-bremen.de). Environmental competences are transferred to the autonomous regions.

1.6 The sector (nuclear energy) permitting process runs parallel (with no formal link) to the environmental impact assessment process in Spain. No additional public participation provisions are made; it is only stated for the case of preliminary authorisations (prior to the installation of a nuclear power plant) that a public participation exercise required for the sector legislation (RD 1836/1999), should be the same as the public participation for an environmental impact assessment. Nevertheless, it does establish a 30-day consultation period (only for preliminary permits though).

1.7 As mentioned, a decommissioning permit requires the presentation of an "Environmental Radiological Impact Study" including a "Radiological Environmental Impact Monitoring Programme"; it also requires the presentation of a pollution monitoring programme. This requirement is additional to the environmental impact assessment.

1.8 The starting point of the environmental impact assessment process is not clearly defined in the Spanish sector legislation. Although the environmental impact assessment requires an analysis of alternatives, in practice the environmental impact assessment usually begins when an alternative has already been identified.

1.9 As mentioned before, the decommissioning of a nuclear power plant requires a "Decommissioning permit" and a "Shut-down statement".

1.10 In order to apply for the "Decommissioning permit" a decommissioning plan must be presented to the Ministry of Economy (the specific contents of the required documents are stated in Art. 30 of the Royal Decree RD 1836/1999). The Ministry of Economy then passes the documents to the Nuclear Safety Council in order to get their opinion on the application. The opinion of the Nuclear Safety Council is binding in the case they deny an application or in the case of established conditions for a positive application.

The role of the environmental impact assessment in this process is:

- The applicant submits a summary with the project's major characteristics to the competent environmental authority as well as to the sector authority.
- The environmental authority then may consult people, institutions and administrations likely affected by the public for their opinion. When the environmental authority is the Ministry of Environment and the project is likely to have an impact on the conservation of fauna and flora, protected natural areas or forests, the National Institute for Nature Conservation will be consulted.
- The opinions obtained from the consultations are transferred to the applicant.
- The applicant must present an environmental impact statement (EIS) according to the requirements established in Arts. 7-12 of the Royal Decree RDL 9/2000.
- The consultations are carried out by the sector authority following the sector permitting process. In case public consultations are not provided for in the sector permitting process, the environmental authority allows 30 working-days inviting for comments from the public.

Before the environmental impacts declaration is made, the sector authority presents its opinion to the environmental authority.

Description of the decontamination and decommissioning project: VANDELLÓS-I D&D

1.11 Vandellós-I is a 497 MW gas graphite type nuclear power plant located in the Province of Tarragona. Its construction began in 1967 and it started operating in 1972. Its design was very similar to the French plant at St. Laurent des Eaux.

1.12 In 1989, a fire in the turbine house led to the final shutdown of the reactor. The responsibility for the site was transferred from the utility to ENRESA in February 1998. Since then, main decommissioning activities of Vandellós-I have been undertaken, following post operational clean-out, the conditioning of spent fuel and the treatment of operational wastes including the graphite components from fuel elements.

These activities extended to the conclusion of the stage 2 interventions, foreseen for the end of the year 2002. During this stage, the reactor shroud has been confined, demolition and backfilling operations performed, the facility prepared for the period of latency and a large part of the site (about 80 %) released. Following dismantling to stage 2 there will be a

waiting period – although not yet defined. This period is estimated at some 30 years - followed by total dismantling of the remaining parts of the plant (stage 3).

This will leave the site completely free for subsequent unrestricted use. On completion of the latency period, around the year 2027, the last level of dismantling will begin. This will imply the total release of the site and its return to the owner, HIFRENSA.

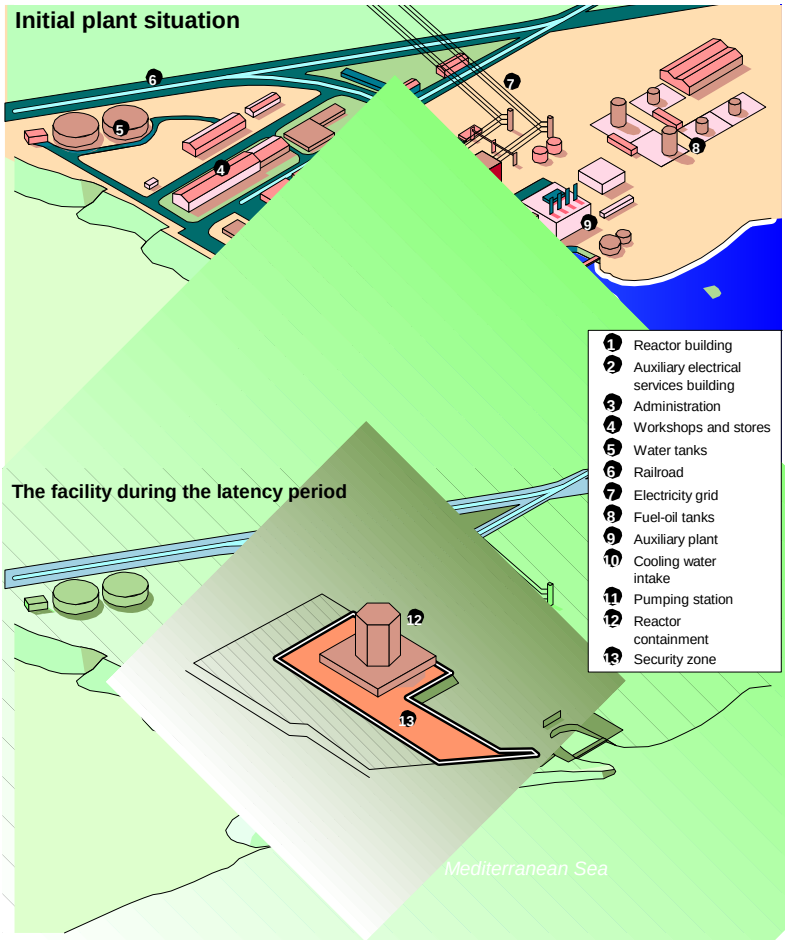

Figure A.3.1

Description of the environmental impact assessment process carried out in the decontamination and decommissioning project of VANDELLÓS-I

1.13 As mentioned before, environmental impact assessment considerations arose from European Council Directive 85/337/EEC which was deemed to apply to nuclear power plant decommissioning operations. The environmental impact statement was submitted to the Ministry of the Environment, Industry Authorities and the Local Authority. The environmental impact statement was prepared by a multidisciplinary team with engineering, geological, hydrological and environmental capabilities.

In 1997, the submitted environmental impact statement was accepted by the Ministry of the Environment and this decision, together with other authorisations from the Nuclear Safety Council (CSN) and the Ministry of Industry and Energy, led to the regulatory consent to begin decommissioning.

1.14 The environmental impact assessment process consisted of:

- June 23, 1995: The Ministry of Industry and Energy (now Ministry of Economy) informed ENRESA that "The dismantling and decommissioning plan of Vandellós-I" needed an environmental impact assessment.
- July 5, 1995: ENRESA forwarded a preliminary environmental impact statement to the Ministry of Energy and the competent environmental authority to consult about the most significant aspects to deal with in the environmental impact assessment.
- September 5, 1996: ENRESA presented the environmental impact statement to the environmental authority.
- December 14, 1996: The environmental authority opened the "public information procedure" during a 30 working-day period.
- February 24, 1997: The environmental authority notified ENRESA that no comments were obtained to be taken into consideration in the environmental impact statement.

1.15 The baseline for the environmental impact assessment was the state of the Vandellós-I site after full removal of the spent fuel from the plant. However, when the environmental impact assessment work started in 1994, two fuel elements were still on the site (the last shipment was in 1997).

1.16 The technical alternatives considered during the planning stage were based on radiation dose considerations and on the decommissioning experience on gas graphite reactor systems outside of Spain, particularly in the United Kingdom, France and the United States.

Four alternatives of a general nature were considered, out of which the first was selected:

- Demolition of the unnecessary buildings and static confinement of the reactor case.
- Demolition of the unnecessary buildings and dynamic confinement of the reactor case.
- No demolition of buildings and static confinement of the reactor case.
- No demolition of buildings and dynamic confinement of the reactor case.

The static confinement consisted of completely sealing the reactor containment. The dynamic confinement consisted of keeping the confinement of the containment through a depression produced by an induced ventilation system in a closed circuit.

1.17 Once the first alternative was selected, the environmental impact assessment work continued according to the detailed and agreed scope of work. A check list, matrices and expert panels were used as appropriate to evaluate the environmental impact of the proposed activities.

1.18 Concerning the mitigation of radiological impacts, reference was basically made to the safety report included as part of the application for the nuclear license. The measures considered were the implementation of previously existing procedures (during operation) such as the radioactive effluents control procedure, the procedures for radiological monitoring controls and accident prevention procedures.

1.19 Minor mitigation measures were proposed to reduce exposure to noise and dust particles by confinement of the crushing machine and sprinkling of water to reduce dust concentrations. It was also proposed to insulate the open areas where materials were to be stored in order to prevent soil and groundwater contamination. Canals were also considered to divert water flows for their subsequent analysis and treatment (if necessary). Procedures were developed for the handling of hazardous materials if these were encountered.

1.20 An environmental monitoring plan was proposed which considered mainly the monitoring of noise levels and dust particulate concentrations, as well as the definition of corrective measures to take if unexpected impacts were encountered. This plan also considered the monitoring of possible leachates from open-air storage areas.

1.21 The environmental radiological monitoring plan was also included as part of the application for the nuclear license and involved sampling and measurement of radioactivity in several

components of the surrounding environment, as a natural continuation of the operational phase. The only exception to this was the need for 5 yearly integrity checks on the hermetically sealed vessel.

2. Screening & scoping stages in the environmental impact assessment process

Screening stage

2.1 A screening procedure is necessary, according to the environmental impact assessment directive, to determine if an environmental impact assessment is required for nuclear facilities, for changes or extensions relating to the nuclear aspects. As an environmental impact assessment for the decommissioning of nuclear installations is mandatory according to the environmental impact assessment directive, no formal screening phase took place in the Vandellós-I decommissioning project.

Scoping stage

2.2 In Vandellós-I decommissioning the scope of the environmental impact statement was jointly agreed among ENRESA, the Ministry of Industry and Energy, the Nuclear Safety Council and the Ministry of Environment.

2.3 The legislation establishes that the environmental impact statement must be made publicly available for 30 days (prior notification in the Official Gazette) and that the public must be given an opportunity to submit their comments to the competent environmental authority. On the one hand the official public participation procedure was followed and, on the other, the developer (i.e., ENRESA) has undertaken an extensive participation and consultation initiative with the local governments.

2.4 The environmental impact statement was submitted to the competent authority in August 1996. It was then made available for public consultation with a previous notification in the Official Gazette; no major opposition comments were submitted. Consultations were undertaken as well with other relevant sector authorities. The completed environmental impact statement was distributed to more than 100 local organisations for comment.

2.5 Apart from the "official" consultations undertaken by the competent authority, ENRESA has maintained an on-going dialogue with representatives from the local governments. A commission which would interact with the implementer during the whole decommissioning process was set up early in the project. The commission was formed by the 5 mayors of the municipalities included in the so-called "nuclear area" (i.e., those municipalities which lie within a 10 km radius of the nuclear power plant), environmental authorities, representatives of non-governmental organisations, business associations, tourism interested associations, neighbouring groups, etc. The commission elaborated technical reports, which were submitted to ENRESA and discussed in periodical meetings (every three months) in order to solve any controversies and concerns.

2.6 Members of this commission belonged to the national Association of Municipalities Affected by Nuclear Power Plants (AMAC) and to a similar association but with representation only of those municipalities where power plants are situated (COMUN). Both associations are members of a European network of similar associations, Group of European Municipalities with Nuclear Facilities (GMF). This initiative has proved to facilitate a smooth and transparent decommissioning process, and helped in meeting the needs and concerns of the affected municipalities.

2.7 These organisations ensure not only that information is provided to the population regarding the nuclear power plants and the dissemination of emergency plans, but are also concerned with the socio-economic issues around an nuclear power plant, seeking to diversify the economic activity of the area (so that the economy will not stall with the closure of the

nuclear power plant), and provide advice to affected workers on alternative schemes (e.g., early retirement, favourable severance schemes, employment in other nuclear power plants).

3. Social factors

General overview

3.1 The decommissioning of a nuclear installation produces a social impact in the area in which the facility is located, which is greater when the area has depended strongly on the activity of the decommissioned facility. However, the dismantling phase cannot be separated from the overall process of decommissioning of a nuclear installation. A complete evaluation of the impact should analyse the following three phases:

- Permanent shutdown;
- Decommissioning period;
- Post-closure.

Permanent shutdown

3.2 There are two scenarios related to the permanent shutdown of an installation: scheduled and non-scheduled. In the first case, actions may be planned to mitigate the social aspects, while in the second (non-scheduled permanent shutdown) the situation becomes more complex. In both cases the consequences are similar, but have a different degree of impact.

3.3 The social impact of the decommissioning of an installation is marked by a loss of employment (direct and indirect). Direct loss of employment arises from the fact that activity ceases at the installation and that there is less activity during decommissioning. Although the individual impact of this loss is not particularly high (normally non-traumatic methods such as early retirement and paid redundancy are applied), the overall effect is not insignificant and may be summarised in two ways: demographic slump in the area and indirect loss of employment.

3.4 Demographic slump in the area.

The reduction in employment leads to the relocation of people who are no longer going to work in the installation and who have no special ties to the area. This is especially affecting the younger, better trained generations, which have to look for work in other places. As a result, there is a migratory effect in the opposite direction from that occurring on the implementation of the facility.

3.5 Indirect loss of employment.

Not only the activities directly related to the installation are reduced (auxiliary companies, refuelling work, etc.), activities linked to the community (commerce and services) are equally affected.

3.6 In the case of the Vandellós-I nuclear power plant, where the transition period between permanent shutdown and the start of the decommissioning works has taken ten years, the direct loss of employment resulted in the disappearance of almost 300 jobs in a community of some 4,000 inhabitants.

Decommissioning period

3.7 With the start of the decommissioning works, a new stage begins, which may mean new activity for the area of influence of the nuclear installation. This does not have the characteristics of a nuclear power plant construction and operation project (less time and lower costs) but for a number of years (5 years in the case of dismantling of the Vandellós-I nuclear power plant) it provides new impulses for the area.

3.8 The social impact of the decommissioning period is marked by the change occurring in society needs compared to when the nuclear power plant was built. The most remarkable aspect of this change is the desire to access information and the need to participate in the decision-making process affecting the area of influence.

3.9 During the licensing process, the decommissioning project is subject to public hearings, negotiation with the local administrations and informative meetings with the media and the population of the area. This promotes participation by society and the local administrations throughout the entire process of project approval.

3.10 During the decommissioning period a commission (of an informative nature) was created, made up of representatives of the company in charge of dismantling, the administrations of the area of influence and other representative bodies. The purpose of this commission was to track the evolution of the dismantling process and receive information on it.

The following aspects were dealt with by the commission:

- Compliance with the conditions agreed on in the license (permit).
- Work progress, evolution of contracted personnel, etc.
- Waste management, materials accounting.
- Safety (training and accident rates) and environmental surveillance.
- Events.

The commission has proved to be a valid instrument for participation by the stakeholders in the area of influence in the dismantling project.

3.11 In addition to this policy of communication, also highly important is the training policy, which serves not only to prepare the workers who are going to participate in the dismantling activities but also helps to improve the knowledge and skills of people who might in the future undertake similar work in the same area.

Post-closure

3.12 The completion of the decommissioning works means the end of the activity. All incentives arising from having hosted a nuclear installation disappear and new alternatives are needed for the area to survive. Planning for the future must be based on the training of people and on the preparation of the companies and entrepreneurs in the area.

3.13 As regards training, advantage should be taken of the available resources to prepare the people participating in dismantling for their reinsertion in the job market, in positions similar to those they have been occupying. Likewise, advantage should be taken of training courses for the participation of other people in the area who do not have a job or who wish to improve their knowledge.

3.14 There are three areas of training management:

- The local administrations, through agreements with other administrations (for training fund management) and with the companies responsible for dismantling (for the management of local employment), may generate job profiles that serve not only to provide work during the dismantling phase but also to offer alternatives in other sectors during and subsequent to dismantling: construction and services.
- The university, taking advantage of its collaboration in dismantling, may create a specialisation for both its teachers and students in areas implying a high level of technology and providing expectations for the future and growth: the management of conventional and non-conventional wastes or environmental aspects.
- Companies, through their own needs for training of the personnel working in dismantling, may promote the creation of groups of experts in a field as innovative as

dismantling, thus allowing for the creation of stable jobs. Furthermore, offering internships and scholarships to students allows for the professional orientation of the best-trained people in the area.

4. Economic factors

Permanent shutdown

4.1 The economic impact of decommissioning is closely linked to the social impact. Loss of income (due both to direct and indirect effects) has an important effect on the area of influence of the installation. This is due to the following:

- Reduction in economic activity in the municipal areas affected, caused by the disappearance or decrease of activities formerly carried out during the operation of the facility: services (maintenance, cleaning, subcontracting), refuelling outages and indirect activities (commercial and services).
- Reduction in revenues for the municipal administrations (taxes, rates and economic compensations), causing in turn a reduction in the activity of these administrations: lower investments and reduced activity.
- Blocking of the site for other uses, with the impossibility of promoting alternative activities.

4.2 The negative impact of decommissioning makes it necessary for the time lag between permanent shutdown and decommissioning to be as short as possible, as this is a period of uncertainty and economic slowing down in the area.

Decommissioning period

4.3 The economic impact during the dismantling phase is clearly positive. It cannot be compared to the activity that occurs as a result of the construction of a nuclear power plant, but it does significantly reactivate the local economy. The most important economic impact is the generation of local employment, both direct and indirect. This generation of employment arises from both the direct contracting of workers and from the contracting of companies in the area.

4.4 In the case of the dismantling of the Vandellós-I nuclear power plant, a total of 1,800 people were employed during the period 1998-2001, with a peak figure of 400 workers simultaneously on site. The composition of this employment was 65 % local and 35 % from other areas.

4.5 The following table shows the latest data on employment and on the companies that have participated in the dismantling process.

	Local	Provincial	Remainder	Total
Employees (current)	194		112	306
Companies (Nov. 1999)	40*	48	38	126

4.6 Indirect employment, which is more difficult to quantify, arises from increasing activity in the area, especially in the services sector.

4.7 The other pillar supporting economic activity is the contribution made by dismantling to the local administrations, which, among other things, materializes through the following:

* In order to achieve this participation, a local business association was set up, which facilitated the participation of local companies in the bidding and subcontracting processes.

- Revenues from licenses and permits. Given the budget and activities involved in dismantling, these revenues are important.
- Compensation, in the form of a fee, for waste storage. In the case of the Vandellós-I nuclear power plant, the latency period is extended.
- Agreements with the administrations of the area to promote economic, cultural and sporting activities and investments in equipment.

4.8 In summary, the dismantling phase means an increase in economic activity and the promotion of employment and communication.

Post-closure

4.9 The completion of decommissioning means the end of the activity. All the incentives arising from having hosted a nuclear installation disappear and new economic alternatives are needed for the area to survive. The successful completion of decommissioning implies having plans for tomorrow that channel the local economy towards activities which allow the standard of living to be maintained.

4.10 As regards the preparation of companies and entrepreneurs in the area, advantage should be taken of the economic resources contributed by dismantling to the local administrations in order to promote economic activities, either through the strengthening of existing sectors (services, light industry, tourism, farming, etc.) or through the creation of new activities relating to the environment or to dismantling itself.

4.11 Finally, the release of the site allows the resulting space to be recovered for new activities. The released site may house a wide variety of companies requiring space and services, since advantage may be taken of all the infrastructures (electricity lines, water supplies, cooling systems, etc.) already existing at the site.

4.12 Consequently, the post-closure phase may be tackled with guarantees as long as the necessary efforts are first made by both those responsible for dismantling and by the administrations, in order to plan the diversification of activities in the area of influence of the installation.

5. Public perception/public relation

5.1 ENRESA as a management company operated under an optimal use of the resources, with a minimum of own human resources at the Vandellós site. ENRESA personnel was working on site in key positions, and maximum support from the head office (in Madrid) was provided. The organisational structure adopted by ENRESA at the Vandellós-I site included a communication department in charge of the dissemination of information.

5.2 ENRESA had applied a policy of transparency, aimed at keeping the different social players informed as to the activities carried out at Vandellós-I. The establishment of channels of communication with the institutions, the media and the public opinion has been one of the priority objectives of the project, a philosophy that impregnated all the activities carried out by ENRESA at the plant and in the surrounding area.

5.3 At the institutional level, ENRESA promoted fluid relationships with the representatives of the area, be they from political parties, public institutions, associations or organisations of different types. In this respect, periodic meetings were held with the main public institutions in the area surrounding Vandellós-I and visits were received at the site by governmental and international organisations and panels and groups interested in obtaining information on the different aspects of dismantling.

5.4 ENRESA also had frequent contacts with the media from the immediate surroundings of Vandellós-I, through the organisation, in collaboration with the Professional Association of Journalists of Tarragona, of meetings and seminars providing information on the different activities carried out as dismantling progresses.

5.5 The information on the activities performed at Vandellós-I was complemented with the publishing of various news items relating to the performance of dismantling in the publications issued by ENRESA. A local newsletter has been produced on a regular basis and there was extensive coverage of work on site on local radio and television. In this respect, there was especially ample tracking of the works performed in "Estratos", a scientific journal published with the collaboration of relevant specialists and aimed especially at the professional sectors and at the members of the public interested in energy issues, waste management and the environment.

5.6 The need to publicise the proposed work to the local population was recognised early in the process. A touring mobile exhibition was purchased and has been used with considerably good effect to communicate with all villages in the local area.

5.7 At the same time, the organisation of visits for the general public was especially significant in the Vandellós-I project. The objective was to provide the population living around the site with the necessary information on the activities performed during the dismantling of Vandellós-I, and to allow them to see such activities for themselves by way of a complete visit to the different points of interest of the plant.

5.8 At the end of 2002, the number of visits was 1,000 with near 20,000 visitors. Of these, more than 50 % have been from educational centres - secondary schools, professional training centres and universities - the rest coming from national and overseas official organisations, the media, sector companies and other institutions.

5.9 On-site training was obligatory for both the workers of recently contracted companies and those with long experience of the plant. In this respect, one of the basic training supports at Vandellós-I consisted of refresher courses, organised periodically for workers from all levels of responsibility. Since the beginning of level 2 dismantling, more than 6,500 people have attended the 1,164 courses organised by the plant communication and training service. These have included more than 3,200 classroom hours and 18,800 man-hours.

5.10 Due to the wide possibilities of relation offered to the public potentially involved in the process, the perception of the public as one of the main stakeholders was totally favourable to the project.

6. Analysis and conclusions

6.1 Lessons learned/outstanding issues

Consideration of the process as a whole

Dismantling of a nuclear installation cannot be viewed separately, but should be part of the whole process consisting of the following three phases:

- Permanent shutdown;
- Decommissioning (latency period if it exists); and
- Post-closure.

In this sense at Vandellós-I early fluid relationships, regarding economic activity and the promotion of employment and communication, were promoted with the institutions, the media and the public, covering both activities carried out by ENRESA at the plant and in the surrounding area.

Scoping process

The process of conducting the environmental impact assessment, presenting the results to the public and acting on the discussions, seems to have worked very well in this case. In this sense, the scope of the Vandellós-I environmental impact assessment process was extensive and exemplar, regarding the results obtained. It was based on an agreement among all the concerned parties rather than a prescriptive list, showing the value of recognising the worthiness of legitimate interests and contributions.

The process involved all the stakeholders to participate not only in the definition of the scope of the environmental impact statement process, but effectively in the entire process of decommissioning and dismantling.

Socio-economic factors

The economic impact of decommissioning is closely linked to the social impact, and both are related mainly to the post-closure activity. The loss of direct and indirect income as a result of the reduction in economic activity and blocking of the site during the decommissioning process created the perception/reality of a period of economic uncertainty.

As is widely recognised, the decommissioning of a nuclear installation will have a strong social and economic impact in its area of influence. Due to this, it is necessary to prepare and manage an effective policy of communication allowing the entire process to be undertaken openly and with minimum social conflict. It has to be remarked that the economic impact during the dismantling phase is clearly positive, significantly to reactivate the local economy.

Work should be developed with the support and collaboration of the local population and the administrations involved in the process (state, regional, local, regulators, etc.). Administrations should co-operate both in information-related aspects, in speeding up the acquisition of licenses and permits, and in regulatory aspects in order to minimize the impact of decommissioning.

From the very moment when the decision of closing a nuclear installation is taken, the planning of alternative actions for the area should commence in order to avoid or minimize the social and economic impact that might occur.

Public relation

The relationship established with the public enables to legitimate and support decisions; to get a valuable input of technical information from the public; to identify the key concerns of the population affected by the works; and to avoid or reduce conflicts and therefore save time and money.

Public participation in the project occurred as early as ENRESA took place and control of the site, preventing from any negative impacts to develop, promoting transparency and interactivity, providing all relevant information to all participants, and completely justifying the decisions taken. All public concerns and comments (related to objectives, normative or subjective perceptions) were taken into account given all the representative groups the opportunity to participate in and to influence the process. It resulted to be very effective and had an enormous impact on avoiding conflicts.

Experience has shown that public participation in decontamination and decommissioning projects can bring substantial benefits in eliminating or reducing conflicts and enhancing the quality of activities, processes, and decisions.

On the other hand, the lack of relation with the public can bring the idea of manipulation.

Public perception

As a result of the relationship established with the stakeholders of the project, the perception was very similar to an industrial project, more related to the pure operational safety.

The perception of the public to decontamination and decommissioning projects is totally different from the perception to nuclear issues related to energy production. In fact, the decommissioning of a facility implies under the public point of view the elimination of the facility and the recovery of the site for other uses.

In this sense, it is generally acceptable, and it was the Vandellós-I experience, that the public will be one of the main supporters of the different activities especially if they are well informed and involved in the decision-making processes.

6.2 Recommendations for the future

Stakeholders and especially the public of the surroundings of an installation that is going to be decommissioned are one of the key elements of the successful implementation of every decommissioning project. Environmental benefits (advantages) or socio-economic losses are the main issues that have to be dealt with, providing solutions if possible, and if not, acting as a way of channelling of presented demands to the interested parties.

Some questions have to be considered before putting the public participation strategy into practice: Who should be allowed to participate (definition of participants who will represent the stakeholders)? When should participation started? How much power should they have (voting)? What are advantages/drawbacks of allowing them to participate? What are the costs? Which methodologies and techniques should be used? What are the real possibilities of intermediation in the socio-economic impacts that will appear? Etc.

Of course, there are no generic answers to all these questions, but it is a good exercise to think about these in order to minimise the risks of having problems in future.

As a generic point, the elaboration of a small guideline with recommendations and best practices on how to involve and integrate the public, derived from case studies and academic literature, can undoubtedly be a great help.

Annex 4: Decommissioning of research facilities at CIEMAT (PIMIC Project) (Spain)

Screening and scoping processes, public perception and public relation, and socio-economic impacts in the PIMIC decommissioning project (CIEMAT)

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1. Introduction to the case study

General overview of the decommissioning process

1.1 In Spain, decommissioning is considered as the safe removal of a facility from service and the reduction of residual radioactivity to a level that permits termination of a closure license. The Ministry of Economy will issue a closure license when it is certified by the Regulator that all conditions established in the decommissioning license in relation to the decommissioning works and the management of the resulting wastes have been achieved.

1.2 The framework of reference for nuclear installation decommissioning work in Spain is based on Royal Decree 1836/1999 "Spanish Regulation on Nuclear and Radioactive Facilities (RINR)" of December 3, 1999 which approves the Nuclear Installations Regulation. This Royal Decree includes a chapter specifically dealing with decommissioning of nuclear installations. In addition, a generic corpus of standards specifically developed to different aspects of such work by the European Union and in international conventions have been subscribed by Spain.

1.3 Nuclear facilities are understood as nuclear reactors, factories that use or reprocess nuclear fuel and installations for the treatment or final storage of nuclear waste. Radioactive facilities are understood as those which contain sources of or equipment that produces ionizing radiation or radioactive materials.

1.4 The Spanish standards define a technical-administrative procedure for the approval of a decommissioning plan proposed by ENRESA, by the Nuclear Safety Council (CSN) and the Ministry of Industry. Subsequent to this, a positive evaluation is required from the Ministry of the Environment, by means of an environmental impact statement, following a period of public consultation. It is at this point that the site is temporarily transferred from the owner company to ENRESA, the organisation responsible for performance of the decommissioning work. Such transfer is lasting until the decommissioning operations are completed and the site is returned to the original owner.

General overview of the environmental impact assessment process

1.5 The Spanish environmental impact assessment legislation is based on the Royal Decree RDL 9/2000 of October 6, 2000 on Environmental Impact Assessment, which complies with European Council Directive 97/11/EC. This Royal Decree modifies the Royal Decree RDL 1302/1986 of June 28, 1986 on Environmental Impact Assessment and the specific procedures set in Royal Decree 1131/1988 of September 30, 1988 (which approves the Environmental Impact Assessment Executive Regulations of Royal Decree RDL 1302/1986).

1.6 Besides, there are several pieces of environmental impact assessment legislation in the 17 different Autonomous Communities (see the Spanish site at www.penelope.uni-bremen.de). Environmental competences are transferred to the autonomous regions.

1.7 The sector (nuclear energy) permitting process runs parallel (with no formal link) to the environmental impact assessment process in Spain. No additional public participation

provisions are made; it is only stated for the case of preliminary authorisations (prior to the installation of a nuclear power plant) that a public participation exercise required for the sector legislation (RD 1836/1999), should be the same as the public participation for an environmental impact assessment. Nevertheless, it does establish a 30-day consultation period (only for preliminary permits though).

1.8 As mentioned, a decommissioning permit requires the presentation of an "Environmental Radiological Impact Study" including a "Radiological Environmental Impact Monitoring Programme"; it also requires the presentation of a pollution monitoring programme. This requirement is additional to the environmental impact assessment.

1.9 The starting point of the environmental impact assessment process is not clearly defined in the Spanish sector legislation. Although the environmental impact assessment requires an analysis of alternatives, in practice the environmental impact assessment usually begins when an alternative has already been identified.

1.10 As mentioned before, the decommissioning of a nuclear power plant requires a "Decommissioning permit" and a "Shut-down statement".

In order to apply for the "Decommissioning permit" a decommissioning plan must be presented to the Ministry of Economy (the specific contents of the required documents are stated in Art. 30 of the Royal Decree RD 1836/1999). The Ministry of Economy then passes the documents to the Nuclear Safety Council in order to get their opinion on the application. The opinion of the Nuclear Safety Council is binding in the case they deny an application or in the case of established conditions for a positive application.

The role of the environmental impact assessment in this process is:

- The applicant submits a summary with the project's major characteristics to the competent environmental authority as well as to the sector authority.
- The environmental authority then may consult people, institutions and administrations likely affected by the public for their opinion. When the environmental authority is the Ministry of Environment and the project is likely to have an impact on the conservation of fauna and flora, protected natural areas or forests, the National Institute for Nature Conservation will be consulted.
- The opinions obtained from the consultations are transferred to the applicant.
- The applicant must present an environmental impact statement (EIS) according to the requirements established in Arts. 7-12 of Royal Decree RDL 9/2000.
- The consultations are carried out by the sector authority following the sector permitting process. In case public consultations are not provided for in the sector permitting process, the environmental authority allows 30 working-days inviting for comments from the public.

Before the environmental impacts declaration is made, the sector authority presents its opinion to the environmental authority.

Description of the PIMIC decontamination and decommissioning project: CIEMAT Research Centre

1.11 Since its beginning as the Junta de Energía Nuclear (JEN), the Research Centre for Energy, Environment and Technology (CIEMAT) has been one of the top research centres in Spain. The old Junta de Energía Nuclear, created in 1951, had as many as 60 nuclear and radioactive facilities to develop nuclear energy for peaceful uses, basic investigation and medical applications of ionizing radiation.

The Junta de Energía Nuclear included, among other facilities, research reactors, particle accelerators, hot cells, isotope laboratories, test laboratories, fuel manufacturing and

reprocessing plants, irradiation plants, and radioactive waste treatment and conditioning plants.

1.12 For over twenty years, the CIEMAT Research Centre has built and dismantled nuclear and radioactive facilities in several phases:

- 1951-1979: Construction and operation of nuclear and radioactive facilities. 59 facilities were built: experimental reactors (JEN 1 and 2 and Coral); installations for manufacturing fuel elements, for isotope production, for irradiated fuel and radioactive waste management, metallurgical hot cells, etc.
- 1980-1984: Operation and shutdown of facilities. 13 facilities, pilot plants and laboratories were shut down.
- 1985-1998: Installation, shutdown and decommissioning of installations. The complex of facilities is reorganized and nine installations are shutdown, among these, the Coral reactor and the uranium treatment plant. In this stage, the Centres' nuclear facilities (JEN 1 and 2 reactors), the facility for the fabrication of fuel elements, hot cells and radioactive waste storage installations are shutdown and partly decommissioned.
- 1999-2009: The Integrated Plan for Improvement of CIEMAT Facilities (PIMIC) project. CIEMAT continues being remodelled and decontamination and decommissioning of shutdown and obsolete nuclear and radioactive facilities is ongoing, as is the restoration of grounds and zones of influence.

1.13 In January 2000, the Integrated Plan for Improvement of CIEMAT Facilities (PIMIC) started up as an orderly continuation of previous activities, with a view to the recovery of unproductive facilities and the modernization of the Centres' general infrastructure. The Integrated Plan for Improvement of CIEMAT Facilities includes, among other objectives:

- Modernisation of buildings and facilities, conditioning these to the new needs.
- Improving and fixing up infrastructure.
- Dismantling of shutdown and obsolete facilities and cleansing zones.
- Elimination of any residual contamination resulting from previous activities, recovering the totality of the infrastructures for non-nuclear uses.

1.14 The Integrated Plan for Improvement of CIEMAT Facilities project consists of two integrated projects: the decommissioning project and the rehabilitation project, the first one with the participation of ENRESA and the second one carried out directly by the CIEMAT. For its management and execution, the complete project has the following CIEMAT institutional offices and support units:

- A Safety, Radiological Protection and Environment Committee (COSPRYMA).
- A Safety and Health Committee.
- An ALARA Committee.
- Various technical support units.
- An Integrated Plan for Improvement of CIEMAT Facilities Coordination Committee which coordinates the execution of the project and is made up of the Director General of the CIEMAT, the Project Director and CIEMAT and ENRESA representatives.

1.15 Currently, at CIEMAT there are a total of 20 operative radioactive facilities and 6 non-operative facilities (4 nuclear and 2 radioactive) in the process of dismantling and decommissioning.

The most relevant installations under the Integrated Plan for Improvement of CIEMAT Facilities project are the following:

- JEN-1 3MW – Experimental material testing reactor (IN-01).
- Storage of radioactive liquids (IN-07) from the fuel reprocessing process.
- Conditioning of radioactive liquid waste (IR-16), treatment and management of low and medium-activity radioactive liquids.
- Irradiated fuel pilot reprocessing plant M-1 (IR-18).
- Fuel fabrication plant for a research reactor (IN-03).
- Metallurgical hot cells (IN-04).
- Radionuclide metrology laboratory (IR-13).

Besides, old facilities for treatment and recovery of uranium ore and contaminated grounds within the CIEMAT area are included in the project.

1.16 ENRESA as a management company operates under an optimal use of the resources, with a minimum of own human resources at the CIEMAT site, coordinating all the subcontracting companies involved in the decommissioning activities. ENRESA personnel is working on site in key positions, and maximum support from the head office (in Madrid) is provided.

Description of the environmental impact assessment process carried out in the Integrated Plan for Improvement of CIEMAT Facilities decontamination and decommissioning project (CIEMAT)

1.17 As mentioned before, environmental impact assessment considerations arose from the European Council Directive 85/337/EEC which was deemed to apply to nuclear power plant decommissioning operations. On December 27, 2001 a preliminary environmental impact statement for the Integrated Plan for Improvement of CIEMAT Facilities was submitted by the CIEMAT to the Ministry of the Environment. The environmental impact statement was prepared by a multidisciplinary team with engineering, geological, hydrological and environmental capabilities.

On October 5, 2005 the submitted final environmental impact statement was finally accepted by the Ministry of the Environment and this decision, together with other authorisations from the Nuclear Safety Council and the Ministry of Industry and Energy in the following month, led to the regulatory consent to begin the decommissioning project.

1.18 The environmental impact assessment process consisted of:

- December 27, 2001: CIEMAT forwarded a preliminary summary of the environmental impact statement to the Ministry of the Environment and the Ministry of Industry to consult about the most significant aspects to deal with in the environmental impact assessment and explaining the main objectives of the Integrated Plan for Improvement of CIEMAT Facilities project. The preliminary study was sent to the Nuclear Safety Council to be consulted about the radiological impacts of the project.
- May 7, 2002: The Ministry of the Environment, after the approval of the preliminary environmental impact statement by the Nuclear Safety Council, opened up a consulting period among the most relevant stakeholders that might be interested in the Integrated Plan for Improvement of CIEMAT Facilities project.
- July 23, 2002: The Ministry of the Environment notified CIEMAT the comments received during the public information procedure and the recommendations about the contents to be taken into consideration on the final environmental impact statement. This notification included the recommendations relating to the radiological aspects coming from the Nuclear Safety Council.
- December 30, 2002: CIEMAT submitted the complete environmental impact statement, including all the comments, for continuing the environmental impact

assessment procedure to the Ministry of the Environment, who sent the study to the Nuclear Safety Council.

- February 5, 2002: The Ministry of the Industry requests from the Ministry of the Environment the continuation of the environmental impact assessment procedure to obtain the environmental impact statement.
- June 20, 2003: The environmental authority, following the favourable resolution of the Nuclear Safety Council, published in the Official Gazette a new "public information procedure" during a 30 working-day period, in which 2366 allegations to the project were presented.
- December 22, 2003: CIEMAT forwarded a new revision of the environmental impact statement answering all the questions of the Ministry of the Environment that sent all the documentation to the Nuclear Safety Council at the beginning of the year.
- July 21, 2005: The Ministry of the Industry sent finally the binding document of the Nuclear Safety Council to the Ministry of the Environment.
- October 4, 2005: The Ministry of the Environment conceded the environmental impact statement to the CIEMAT to commence the Integrated Plan for Improvement of CIEMAT Facilities project, with a small set of conditions mainly related to: noise and dust control, ground water control, environmental monitoring plan and public information.

1.19 The requirement established in the environmental impact statement about public communication and information obliged to develop information and communication channels to different organisms, centres and associations in the neighbourhood in order to inform these about the work scheduled and the foreseen tasks, and the way they were going to be executed. Specifically the creation of an information committee was mandatory. This committee had to include representatives of the communities in the neighbourhood and specifically of the meteorological institute located nearby. Also the communication ways among all the committees had to be perfectly established.

1.20 Among the three alternatives, in the preliminary summary of the environmental impact statement, the final technical alternative considered was based on radiation dose and environmental considerations, and on the future perspectives of use of the Research Centre. This alternative consists of the total dismantling of systems and equipment for the recuperation of the installations for other non-nuclear uses.

1.21 Once the technical alternative was selected, the environmental impact assessment work continued according to the detailed and agreed scope of work. Check lists, matrices and expert panels were used as appropriate to evaluate the environmental impact of the proposed activities.

1.22 Mitigation measures were proposed to reduce exposure to noise and dust particles indoor, considering that almost all activities were going to be implemented inside the buildings. External activities, especially those related with ground restoration, will be executed inside confinements to avoid external dust concentrations. It was also proposed to insulate and cover the open areas where materials were to be stored in order to prevent soil and groundwater from being contaminated; water flows have to be controlled. Procedures have been developed for the handling of hazardous materials such as asbestos.

1.23 An environmental monitoring plan was proposed which considered mainly the monitoring of noise levels and dust particulate concentrations, as well as the definition of corrective measures to be taken if unexpected impacts are encountered. This plan also considers the monitoring of possible leakages from open-air storage areas.

1.24 The environmental radiological monitoring plan was also included as part of the application for the nuclear license and involves sampling and measurement of radioactivity in several

components of the surrounding environment, as a natural continuation of the operational phase.

2. Screening and scoping stages in the environmental impact assessment process

Screening stage

2.1 A screening procedure is necessary, according to the environmental impact assessment directive, to determine if an environmental impact assessment is required for nuclear facilities, for changes or extensions relating to the nuclear aspects. As an environmental impact assessment for the decommissioning of nuclear installations is mandatory according to the environmental impact assessment directive, no formal screening phase took place in the beginning phases of the Integrated Plan for Improvement of CIEMAT Facilities decommissioning project.

Scoping stage

2.2 In the Integrated Plan for Improvement of CIEMAT Facilities decommissioning project, the scope of the environmental impact statement was jointly agreed among CIEMAT, ENRESA, the Ministry of Industry and Energy, the Nuclear Safety Council and the Ministry of the Environment.

2.3 As mentioned before, at the end of 2001 CIEMAT forwarded a preliminary summary of the environmental impact statement to the Ministry of the Environment to consult about the most significant aspects to deal with in the environmental impact assessment and explaining the main objectives of the Integrated Plan for Improvement of CIEMAT Facilities project. With this document, the Ministry of the Environment, after the approval of the preliminary environmental impact statement by the Nuclear Safety Council, opened up a consultation period among the most relevant stakeholders that might be interested in the Integrated Plan for Improvement of CIEMAT Facilities project. 21 different associations, groups, local administrations, non-governmental organizations, etc, were asked in order to know the scope that the final environmental impact statement should have. From this procedure 11 replies were received and their recommendations were considered in the final environmental impact statement.

2.4 Following this closed procedure, and stating that legislation establishes that the environmental impact statement must be made publicly available for 30 days (prior notification in the Official Gazette), the next step was to give the public an opportunity to submit comments to the competent environmental authority. On the one hand the official public participation procedure was followed and, on the other hand, CIEMAT has undertaken an extensive participation and consultation initiative with the local governments.

2.5 The public consultation within the environmental impact assessment process through the Official Gazette did not submit major opposition comments. Consultations were undertaken as well with other relevant sector authorities. The number of allegations was 2,366. This number seems to be large but the number of really different allegations was around 10. All of these were analysed, considered and replied to the submitters.

2.6 Apart from the “official” consultations undertaken by the competent authority, CIEMAT maintained an on-going dialogue with representatives from the local governments. An information committee, which would interact with the implementer during the whole decommissioning process, was set up early in the project in order to inform representatives and reply to the submitters of communities in the neighbourhood and to local authorities.

3. Socio-economic factors

3.1 As is well known, the decommissioning of a nuclear power plant has a socio-economic impact on the area in which the facility is located, which is greater when the area has depended strongly on the activity of the decommissioned facility. However, in the case of CIEMAT, the decommissioning of the research reactor and some nuclear and radioactive installations did not have this impact on the surroundings. The installations had been stopped more then 30 years ago, so that the possible effect on the workers had been diluted. Besides, the public in the neighbourhood does not work on the site. So the local public is not concerned about economic issues related to the loss of employment or the reduction in economic activity.

3.2 With the commencement of the decommissioning works, a new stage began, but the works only affected the public in the sense of pure operational activities. The most remarkable aspect of this process was the desire to access information and the need to participate in the decision-making process affecting the area of influence.

3.3 With the completion of the decommissioning works, a new issue might appear related to the use of the site for other activities. This aspect is up to know clear because the site will continue to remain to CIEMAT. So the future uses of the different areas will be associated to research activities. As a result, promotion of alternative activities is, up to now, impossible.

4. Public perception/public relation

4.1 There are some specific issues that should be taken into account before analysing the CIEMAT decontamination and decommissioning project:

- Location in downtown of Madrid and within the campus of the university.
- Variety of facilities with different types of contamination.
- Limitations in space: the project is confined within a decommissioning area.
- Interactions with the operating Research Centre.
- Social impact and visibility of the project are very significant.
- A great variety of stakeholders with different interests.
- ENRESA is not the operator of the site and is only the management contractor for the decommissioning activities.

4.2 A first task that was considered before starting the project was the definition of the stakeholders involved in the project. The different groups were:

- The public: Due to the location of the site in the centre of Madrid and very near to the university area, both areas were taken into account as target groups to maintain to be well informed. In this sense, periodical bilateral meetings were organized with the two groups, following-up the entire decommissioning task (during the works).
- Institutions: An information committee has been created in order to maintain institutions in contact with the project. This committee is formed by representatives of the Ministry of Industry, the Ministry of Environment, local municipality authorities, the Nuclear Safety Council (CSN), CIEMAT, the University and ENRESA.
- CIEMAT workers: An important group within the public are the CIEMAT workers who develop their activities in installations very near to the decommissioning area. For satisfying their needs of information a health and safety committee was created. At the same time periodical contacts with CIEMAT personnel are executed. The COSPRYMA committee, responsible for analysing safety, radiological protection and environmental issues was created, a representative of the workers being one of the members of the committee.

4.3 ENRESA has not taken the temporary ownership of the installations (as was the case for the Vandellós-I decontamination and decommissioning project). ENRESA works as a main contractor and CIEMAT is the owner of the installation. Therefore, all the public communication and public relation activities are developed by CIEMAT with the help of ENRESA in those cases that are considered. The organisational structure adopted by ENRESA at CIEMAT formally does not include a communication department in charge of dissemination of information, as was mentioned before.

4.4 CIEMAT has applied a policy of transparency, aimed at keeping the different social players informed as to the activities carried out. The establishment of channels of communication with the institutions, the media and the public opinion has been one of the priority objectives of the project, a philosophy that impregnates all the activities carried out at the plant and in the surrounding area.

4.5 Periodical information conferences have been planned as well as an integrated actualisation of the CIEMAT web site with punctual information about progress of the decommissioning and rehabilitation work.

4.6 At the institutional level, CIEMAT promotes fluid relationships with local and national representatives of the area, from political parties, public institutions, associations to other organisations of different types. In this respect, periodic meetings are held with the main public institutions in the area surrounding the site. Contacts with the media are held by the CIEMAT representatives on request.

4.7 Regarding public information and monitoring committees, CIEMAT has created the following committees to keep the concerned bodies and agencies informed:

- The CIEMAT Internal Health and Safety Committee.
- The COSPRYMA Committee, responsible for analysing safety, radiological protection and environmental issues, a representative of the workers being one of the members of the committee.
- An external information committee presided by the Ministry of Industry, Commerce and Tourism and with the participation of the Nuclear Safety Council (CSN), the Complutense University of Madrid (UCM), the Ministry of the Environment (MIMAM), a delegation of the Government, the Madrid City Council, the Madrid Regional Government (CAM) and the Empresa Nacional de Residuos Radiactivos (ENRESA).

  Furthermore, contacts are maintained with other bodies and entities, such as EURATOM (European Union), associations in the neighbourhood and the Consorcio Urbanístico de la Ciudad Universitaria de Madrid.
- Internal report sessions: general seminars (annual) or specific report sessions for CIEMAT personnel.
- External report sessions: for other organizations such as, for example, for the National Meteorology Institute, etc.

4.8 Generically the main information provided to these committees and issues dealt with are:

- Compliance with the conditions agreed on in the license (permit);
- Work progress, evolution of contracted personnel, etc.;
- Waste management, materials accounting;
- Safety (training and accident rates) and environmental surveillance;
- Events.

4.9 Local leaflets have been issued and distributed. The objective is to provide the population living around the site and workers with the necessary information on the activities performed during the Integrated Plan for Improvement of CIEMAT Facilities project.

4.10 Five screens with real time radiological data have been installed inside certain representative buildings and in the access gate to the installations. These screens collect the information provided by the dosimeters along the external fence of the CIEMAT site which are connected to an information system controlling these dosimeters.

4.11 The need to inform the local population and the CIEMAT workers about the proposed work was recognised early in the process. Besides, it was important for the student population around the area because of the existence of the Complutense University of Madrid.

4.12 On-site training was obligatory for workers of recently contracted companies. In this respect, one of the basic training supports consisted of refresher courses, organised periodically for workers from all levels of responsibility.

4.13 In addition to this policy of communication, also highly important was the training policy, which served not only to prepare the workers who were going to participate in the dismantling activities, but also helped to improve the knowledge and the skills of people who might in the future undertake similar work in the same area.

4.14 In general, the perception of the public was totally favourable to the decommissioning project but there were some concerns about the way that activities were performed and about the radiological aspects of a possible accident with external consequences. The commissions that were created also proved to be a valid instrument for participation by the stakeholders in the area of influence in the dismantling project.

5 Analysis and conclusions

5.1 Lessons learned / outstanding issues

Scoping - screening process

The process of conducting the environmental impact assessment in two stages, one focussed on the detection of the main concerns through a prescriptive list of contributors, a second one asking for issues to be included in the environmental impact statement study, seemed to work very well in this case. The process invited all stakeholders to participate not only in the definition of the scope of the environmental impact assessment process, but also effectively in the entire decommissioning and dismantling process.

Public relation - Public perception

The relationship established with the different stakeholders enabled CIEMAT to legitimate and support decisions, presenting the results to the public and discussing actively with local authorities.

Public participation in this project prevented negative impacts to arise and promoted transparency and interactivity, providing all relevant information to all participants, and completely justifying the decisions taken. Public concerns were taken into account giving all the representative groups the opportunity to participate in the process.

Experience has shown that public participation in decontamination and decommissioning projects can bring substantial benefits in eliminating or reducing conflicts and enhancing the quality of activities, processes, and decisions.

The perception of the public to decontamination and decommissioning projects is totally different from the perception to nuclear issues related to energy production. In fact, the

decommissioning of a facility implies under their point of view the elimination of the facility and the recovery of the site for other uses.

5.2 Recommendations for the future

As the Integrated Plan for Improvement of CIEMAT Facilities decommissioning project is still going on, it is a bit too early to clearly establish recommendations for the future.

Annex 5

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