

## FOR OPTIMUM SAFETY TECHNOLOGIES: UNDERSTANDING RELATIONS BETWEEN THE DIFFERENT NATIONAL AUTHORITIES AND THE TECHNICAL SUPPORT ORGANIZATIONS.

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**Abstract.** TSOs describe expert independent organizations, which provide supports for government, regulatory authorities, utilities and industry. The TSO must dispose different competences and objectives in order to deliver to the four independent authorities the technical and scientific knowledge. This comprehensive knowledge, from TSO, should perform through the research and development activities (R&D). Concerning the government, TSOs consider the R&D on the management procedures to characterize the links, to differentiate roles to prevent the overlapping efforts, and finally to build a central data bank in nuclear technologies for the other three authorities. For regulatory organizations, R&D are involved in the regulatory requirements and surveillance processes. On the other side R&D, in case of utilities, activities should focus on the improvement of safety operations for nuclear power and its new generations, and for other nuclear/radiological facilities. Finally, the forth TSOs has R&D targets that should concentrate mainly on material, efficiency, and durability of different equipment and parts involved in the nuclear activities during manufacturing.

### 1. Introduction

Nuclear power contributes only 6% of the world's primary energy consumption and 16% of global electricity generation. The main improvement of the future is to increase the safety margins of this technology and to face different challenges. In order to enhance nuclear safety, it is necessary to establish technical and scientific support organizations (TSOs) in the field of nuclear safety. Such organizations, whether gives advices to the nuclear regulatory body or to the utilities, are providing the technical and scientific basis for safety decisions and activities. At present, TSOs are playing important functions in technical backup for all areas of nuclear and radiation safety and explore appropriate approaches and means to face current and expected challenges in nuclear and radiation safety.

Technical and scientific support organizations (TSOs) are providing the necessary scientific approaches and support in the development of nuclear field by the considering R&D measures. The R&D activities need not be directly connected to the authority in consideration. The Convention on Nuclear Safety and other international agreements, as well as national acts and ordinances, set out the responsibilities of licensing and supervisory authorities [1].

Technical and scientific support organizations (TSOs) provide government, regulators, utilities (operators and applicants), and industry with technical and scientific services at all phases of the nuclear power plant life cycle, from building the plant within the budget to safely operating and maintaining the plant over its lifetime. The safety and economics of nuclear and/or radiological installation are greatly affected by the attribute of such TSOs.

According to the national legislations, Government can be the parliament, responsible ministry for nuclear activity, or the president of the country. TSO for government (TSO GOV) can be represented by technical consultant commissions. On the other hand, the typical definition of a regulatory body is “an authority or a system of authorities designated by the government of a State as having legal authority for conducting the regulatory process” [2]. However, organization, structure and approaches of the regulatory process could vary in; 1) Different legal and political aspects in different countries, 2) Particular features of key safety-critical industries and 3) Differences in maturity of the same industry in various countries. A system of technical support organizations for regulatory bodies (TSO REG) has been established in many countries, especially in the nuclear power sector. These organizations were established as permanent partners of a regulatory body and given specific scientific and technical regulatory tasks; independent safety assessors, companies with a considerable experience in the safety analysis, could be recruited for assessment of specific systems and for applied research in safety as well [3].

The operator’s responsibility is to show that a power plant and its operation meet the safety requirements. As a condition for operation nuclear power plant, the operator has to be competent and prove its specialized knowledge; thus it has to have expertise concerning the various issues related to plant operation and safety. A TSO for utility or operator (TSO UTI) is usually involved when specialized knowledge or an independent view is needed or useful. Further, manufacture is involved in safety of the nuclear and radiological activities. They provide all the different parts and equipment during the installations of these activities according to the safety requirements. A major task for TSOs is to keep update technological developments, emerging concerns and new designs. Thus there is a need to participate in R&D projects, often at the international level. Tasks that can help in the maintenance and transfer of knowledge include operating experience feedback and periodic safety reviews, both of which are quite useful for improving the safety of existing installations. The efficiency of equipments, material types, and different alloys involved in the manufacturing of nuclear installations represent safety keys for this industry. TSO for the industry (TSO IND) is considered the oldest type of these organizations. The research and development conducted by TSO IND knows as an essential part of any industry.

This paper tries to explain, the point views of authors, the various invisible relations between the four authorities and their TSO's.

## **2. Legal Frames of TSOs**

Each TSO for any authority should have a legal frame, which works as protected umbrella to provide independency from the other authorities and TSO's and arrange their financial. This legal frame should describe the legal status of a TSO under international practice to be determined primarily by the organization for which it performs technical work. In this regard, it is important to distinguish TSOs from ‘contractors’ that provide services to licensees or operators in the design, manufacture, construction, installation, maintenance or safety analysis of facilities or other activities. For purposes of nuclear law, a contractor possesses the same status as the licensee or operator that has engaged its services [4].

## **3. Independence**

The concept of independence has been thoroughly considered by the international nuclear community in different publications [5]. For regulatory bodies, at least six aspects have been

considered important, including: political, legislative, financial, competence, public informational and international [6]. Application of the independence principle regarding TSOs should concern the decision of certain aspects, but with a somewhat different importance. For example, a TSO must possess the required competence and resources to perform its assigned tasks in an effective, efficient and independent manner. Meanwhile, a TSO providing technical advice to a regulatory body cannot have absolute independence from regulatory policy. Therefore, TSOs should be embedded in the framework of authority, and in that framework the functions of TSOs should be clear. A TSO must operate within the boundaries of regulatory authority, keeping limits of the complete freedom of action. In the same time, these TSO's have complete independency from other authorities and TSO's. That dependency implements its professional competence and judgment. In particular, arrangements are needed to ensure that the TSO is “effectively independent of the other different authorities.

#### 4. Relations between TSO's and Authorities.

Technical and scientific support organizations can play various roles including assessing draft regulations. They can also make proposals on how to solve the problems they unearth, as the licensee is responsible for the safe operation of its facilities and must select the appropriate solutions. A major task for TSOs is to keep abreast of technological developments, emerging concerns and new designs. Thus there is a need to participate in R&D projects, often at the international level. Tasks that can help in the maintenance and transfer of knowledge include operating experience feedback and periodic safety reviews, both of which are quite useful for improving the safety of existing installations. When TSOs provide the scientific basis for decisions, they can explain and give credibility to such decisions, taking care to stay independent of political or economic interests [7]. Fig. 1 describes the different authorities and TSO's and the major relation in the system of nuclear activities.

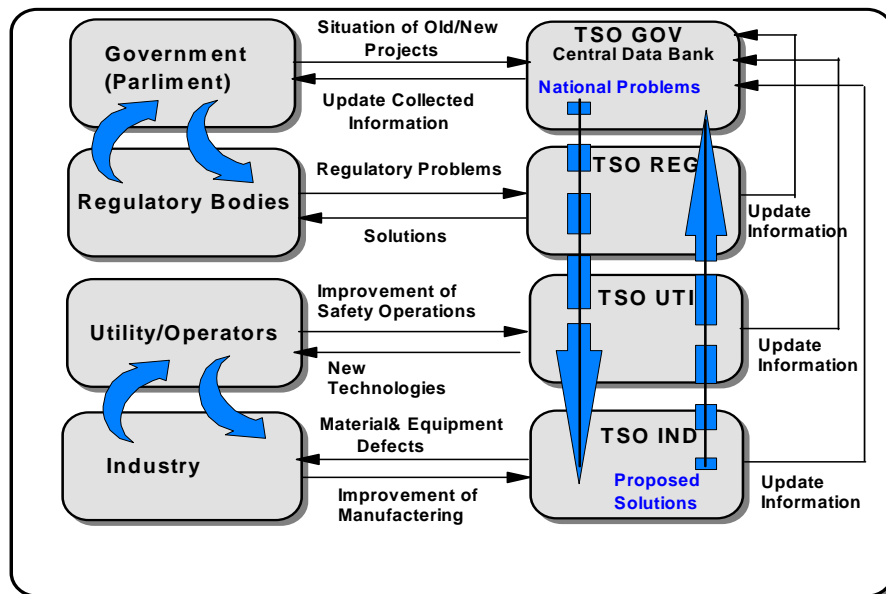
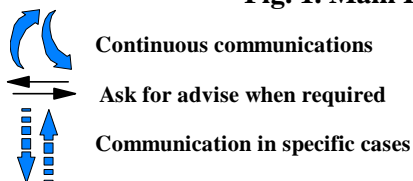


Fig. 1. Main Relations between Authorities and TSO's



Government is represents the central of nuclear needs and technologies. It controls the safety of all the system through the regulatory authorities. It the only authority who has the right to contact all TSO's through the TSO GOV to get the solution of some national problem or/and during establishment of new nuclear technology. National regulatory agencies are responsible for issuing regulations, revision of safety analyses, licensing, and inspections of nuclear installations until their decommissioning. TSO REG can provide support at all stages of the process. The operator's (utilities) responsibility is to show that a power plant and its operation meet the safety requirements. To establish proof of compliance with safety requirements, the operator might involve the manufacturer, the engineering companies or universities as TSO UTI. To operate a nuclear power plant, the operator has to be competent and prove its specialized knowledge; thus it has to have expertise concerning the various issues related to plant operation and safety provided continuously by the industry authorities with TSO IND with more detailed questions have to be answered.

## 5. Conclusions.

TSOs are required to be financially sustainable, profit oriented companies. The scope of its activities is very broad. All various authorities rely on TSOs not only for many of research needs, but also to augment our own staff in completing regulatory licensing reviews and inspections and to assist us with regulatory reviews of expected new reactor applications. The conflicts of different TSO's should be avoided. The clear responsibilities should be defined. That can be realized by laws through legal contracts.

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