



Challenges for a TSO supporting both the regulator and industry

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INTRODUCTION

- A typical **TSO supporting both the regulator and industry** is a TSO in a relatively small country that has only a few nuclear power plants in operation or in construction.
- The challenges met by such a TSO are reflected and discussed mainly using the VTT Technical Research Centre of Finland (VTT) as the example case.

BACKGROUND AND CURRENT OPERATIONAL ENVIRONMENT

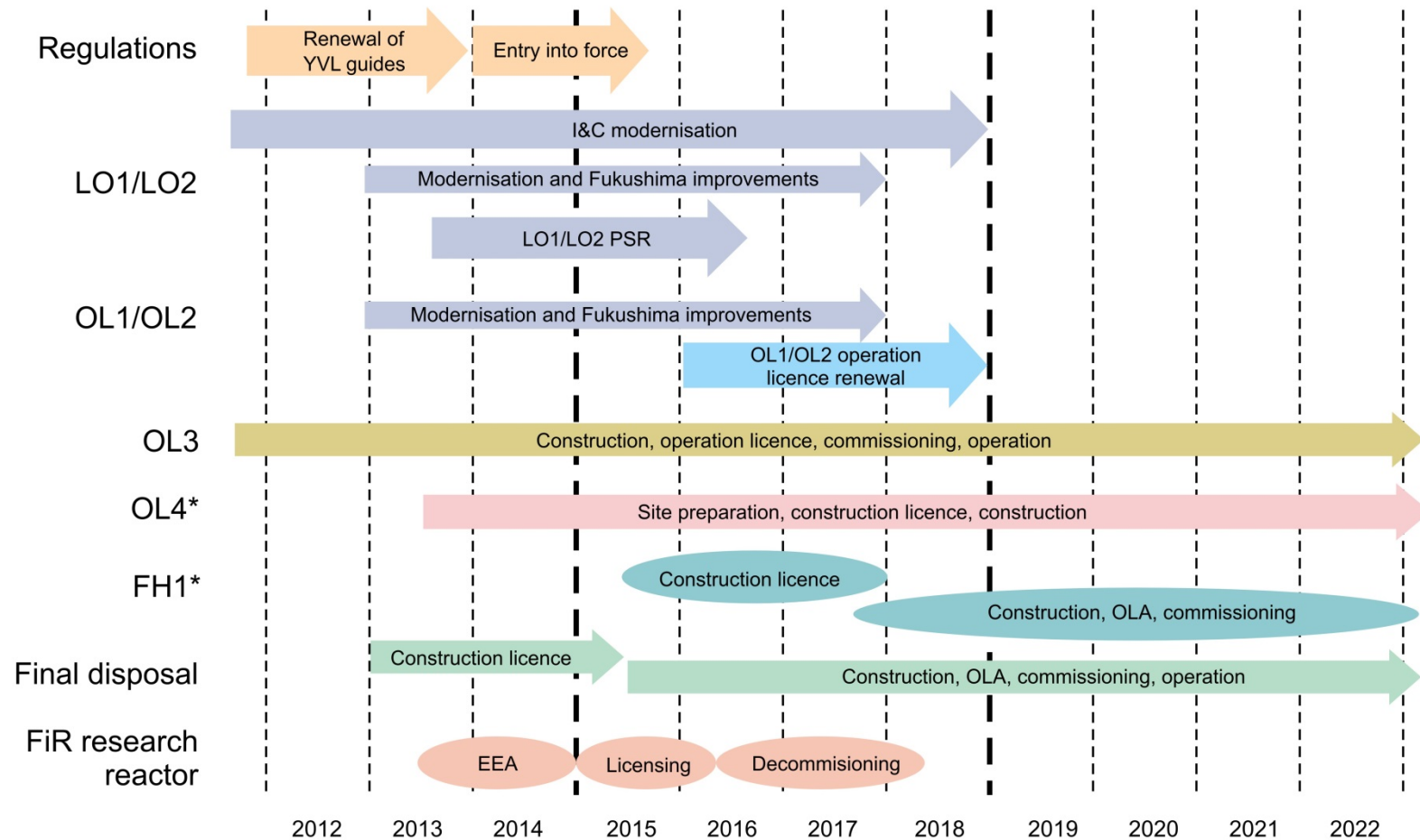
Changes in the TSO role

- In Finland the TSO role of VTT was born along with the construction of the first four Nuclear Power Plant (NPP) units in the country during the late 1970' and early 1980's.
- In particular, for the two Loviisa VVER-440 type plant units there was a need of independent analysis tools and expertise both on the regulatory side and on the side of the plant owner.
- During the past four decades the challenges to VTT as a TSO have changed due to changes in the domestic and international operational environment,
 - such as changes in VTT funding structure from a governmentally funded organisation to an organisation with only 25 percent or less in the near future from the governmental budget.

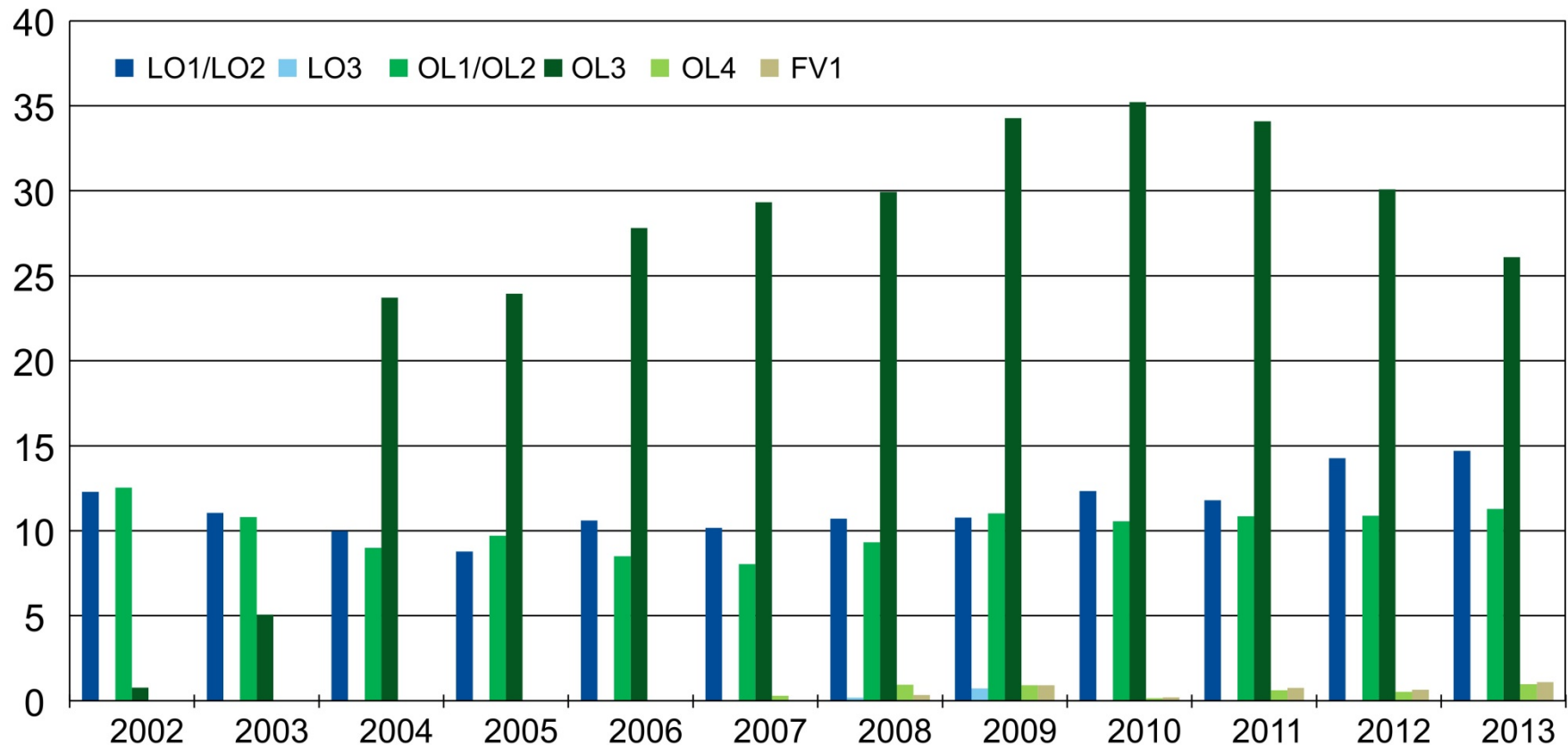
Need of TSO Services (1)

- The TSO service needs of the domestic regulator are fairly predictable, but there is a large variation between the years:
 - During the time of modernisation projects or periodic safety reviews of the operating plants the regulator needs TSO services.
 - During the intervals between these activities the need of TSO services is quite low.
 - During the construction and operation licence application periods the need of TSO services is high, but when the licences are granted the need decreases drastically.

Estimated timing of licensing processes of nuclear installations in Finland



STUK's oversight of Finnish NPPs in man-years/NPP



- The figure reflects also the workload of the TSOs of the regulatory body

Need of TSO Services (2)

- When the TSO expertise is needed, it is needed in a wide scale of technical expertise areas and using various experimental facilities.
- However, this demand by the regulator is not sufficient to ensure the existence of the expertise at VTT.
- Thus, VTT needs to support also the domestic nuclear operators as well as to continue to enhance operation with foreign regulators and industry.

CREATING AND MAINTAINING TECHNICAL COMPETENCE

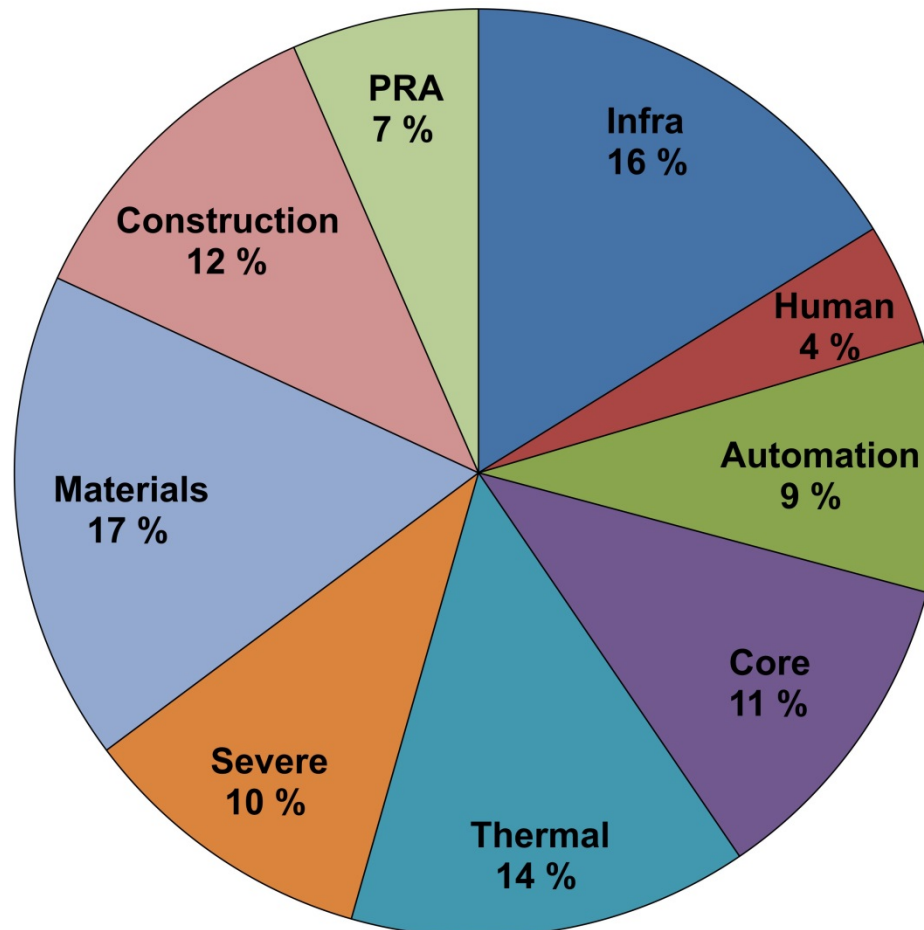
Role of National Research Programmes

- One of the major challenges for a TSO is to create, maintain and enforce the required competences that consist of experts, tools and facilities.
- In Finland the national research programmes in reactor safety and waste management have a key role in ensuring that the country possesses the required competences.
- These programmes are based on the Nuclear Energy Act and their formal duty is to ensure that the regulator has access to the required competence and tools in Finland.
- In practice these programmes serve the entire nuclear community by fostering new experts, developing new methods and maintaining the key competencies.

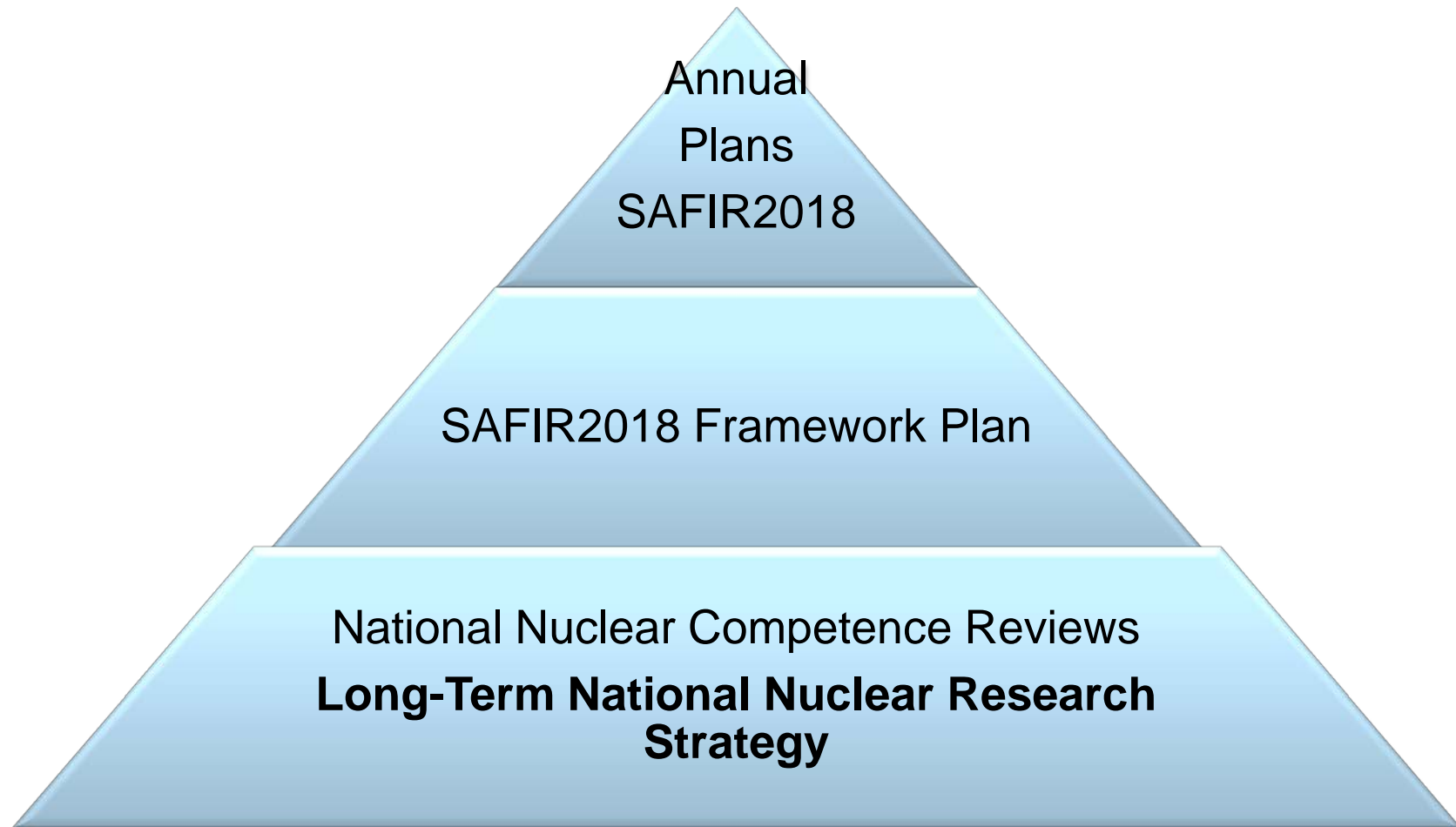
Role of National Research Programmes in Reactor Safety: All Key Players Together



The research areas of SAFIR2014 programme and their funding share in 2014



Basis of National Research Programmes



TSO INDEPENDENCE TO SUPPORT BOTH THE REGULATOR AND INDUSTRY

Independency and Confidentiality

- The major challenge for a TSO supporting both the regulator and industry is to **avoid conflicts of interest and simultaneously maintain the impartiality and transparency**.
- The four primary principles applied at VTT to maintain the independency and confidentiality as a TSO are condensed into four short slogans:
 - 1) Not the same analyses,
 - 2) Not the same people,
 - 3) Not the same equipment and
 - 4) Not the same software.

Not the same analyses

- It means that if VTT is supporting the regulator in the safety review of a new build VTT will not be the main or one of the primary TSOs for the plant owner were it even 100 % by different experts using different analysis tools or experimental methods.
- The acceptance of nuclear power is a sensitive matter in many countries and consequently such a 'VTT versus VTT' case would not be accepted by the general public.

Not the same people

- It reflects the general ethical rule that one is not allowed to review and accept one's own work.
- In the practical TSO activities it means that if an expert has carried out a certain analysis for the regulatory side, the same expert will not carry a confirmatory analysis in the next stage for the plant owner using the same or even different tools and methods.

Not the same equipment / software

- If there is an equally reliable analysis tool or experimental method available the alternative tools or methods are used in the assignments for the regulator and the industry.
- This should always be reflected against the fact whether the alternative tool or method really is equally reliable and whether the staff experience is sufficient to use it.
- The fact is that in many areas the same analytical tools and experimental methods are used both by the regulator and by the industry.
- **In addition to the above principles** the TSO must have **management and data systems and organisation structure and safety culture** that enable it to maintain absolute confidentiality of the customer data and project results as well as required level of confidentiality in interactions with the customer.

TSO FUNCTIONS IN OPERATING ORGANISATIONS

TSO assistance in new plant licensing

- **Regulatory body:** Independent safety assessment and analyses during the plant licensing process
- **Plant owner:** Safety assessment and analyses that are independent from the analyses provided by the plant vendor in order to make sure that the plant will meet its design and/or performance criteria
- **Vendor:** Local TSO expertise to ensure that the plant safety features and the safety analyses provided to the safety authority fulfil the requirements and acceptance criteria of the country where the plant is being built.

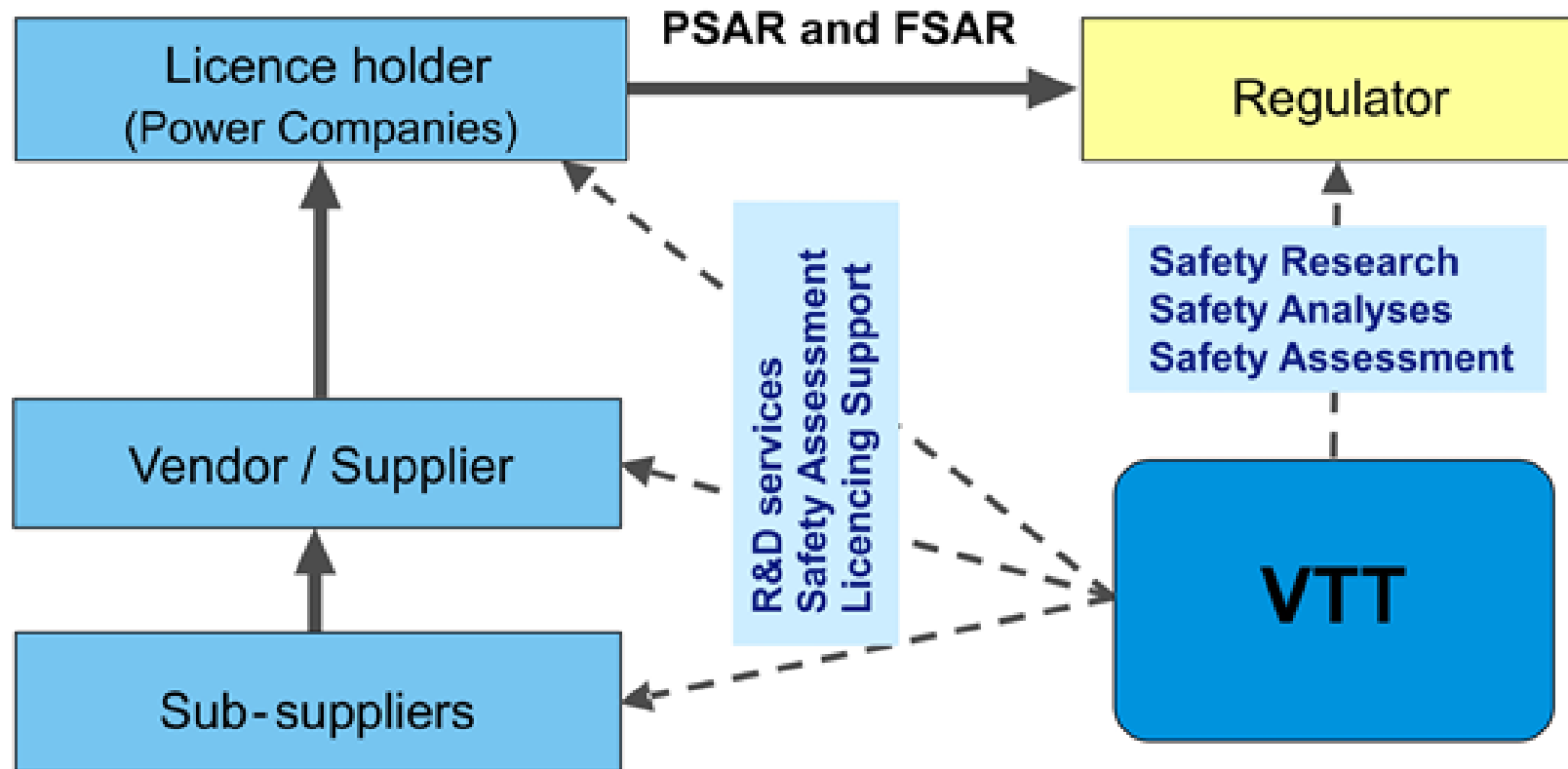
TSO assistance in operating plants

- **Regulatory body:** Independent safety assessment and analyses in license renewal, periodic safety review and/or in design changes and modernization projects.
- **Plant owner:** TSO to perform the required analysis for the license application or to verify that the plant changes / new components will meet their design/performance criteria.

Need of external TSO

- **Regulatory body:** Need of external TSO depends on the structure and size of the regulatory body. In many countries external TSOs are used.
- **Plant owner:** Needs usually a TSO for safety analyses and experiments/tests
- **Vendor:** Needs external TSO mainly for expertise on local conditions or local regulatory requirements

VTT's roles as a TSO serving the regulator or the industry on a case-by-case basis



Independent Safety Assessment

- Comparison with previous experience
 - Good results with experienced experts and proven concepts
- Independent safety analyses or experiments
 - Usually with new concepts or FOA in a country
 - Full set of analyses or a selected set of cases as a confirmatory analysis.
 - Carried out by independent experts preferably using different tools from those used by the vendor.
 - The TSO may need to build an independent plant model for the safety analyses or build a new experimental device describing a particular system or component of the plant.

Example of TSO activities in a new build

- VTT has been one of the major TSO organisations of the Finnish regulatory body STUK during the Olkiluoto 3 (OL3) EPR construction licence application review and has continued to support STUK also during the post construction licence period.
- VTT supported STUK in the OL3 construction licence review in the following areas:
 - independent comparative analysis of transients, DBAs, severe accidents, experimental and analytical studies on airplane crash, assessment of digital I&C systems, evaluation of primary system design: strength analyses, manufacturing technology, materials, primary coolant chemistry, experimental and analytical fire safety studies (cable fires) and review of specific parts of OL3 PRA.

POTENTIAL CONFLICTS OF INTEREST

Potential Conflict of Interest (1)

- *Example 1:* The TSO has to 'select the side' in large projects clearly and early on in order to avoid any doubt of conflict of interest.
- Before that there is a risk for a conflict of interest when
 - Different TSO representatives contact regulator and industry, or
 - Regulator and industry contact different representatives of the TSO
- *Action:* In order to avoid such cases to develop into conflict of interest situations, good and prompt but confidential exchange of information inside the TSO is crucial.

Potential Conflict of Interest (2)

- *Example 2:* TSO acting for the regulator in a PSAR/FSAR review that typically contains thousands of pages of material plus a large amount of supporting material.
- During the review TSO detects that the vendor/plant owner uses as supporting evidence e.g. results of materials tests carried out previously by the TSO in an independent assignment for the vendor.
- *Action:* The TSO should promptly inform the regulator on the detected or potential conflict of interest and leave the decision to the regulator.
- *Decision:* The regulator may draw its own conclusion without TSO assistance or have the assessment of that supporting evidence carried out by another TSO.

LESSONS LEARNED

Lessons Learned

- The role of national research programmes is crucial in fostering new experts for the Finnish TSOs and providing them the possibility to learn the required skills in a forgiving environment.
- It is challenging for a TSO to maintain the critical mass of expertise in a competitive environment.
- Using the same TSO for a long time is an advantage both for the TSO and for the client.
- The changes in the operating environment have created the need to formulate clear rules and practices for avoiding possible conflicts of interest.
- There is a need to develop new capabilities and readiness to act in new type of tasks and new environments and invest in the future.

VTT Centre for Nuclear Safety

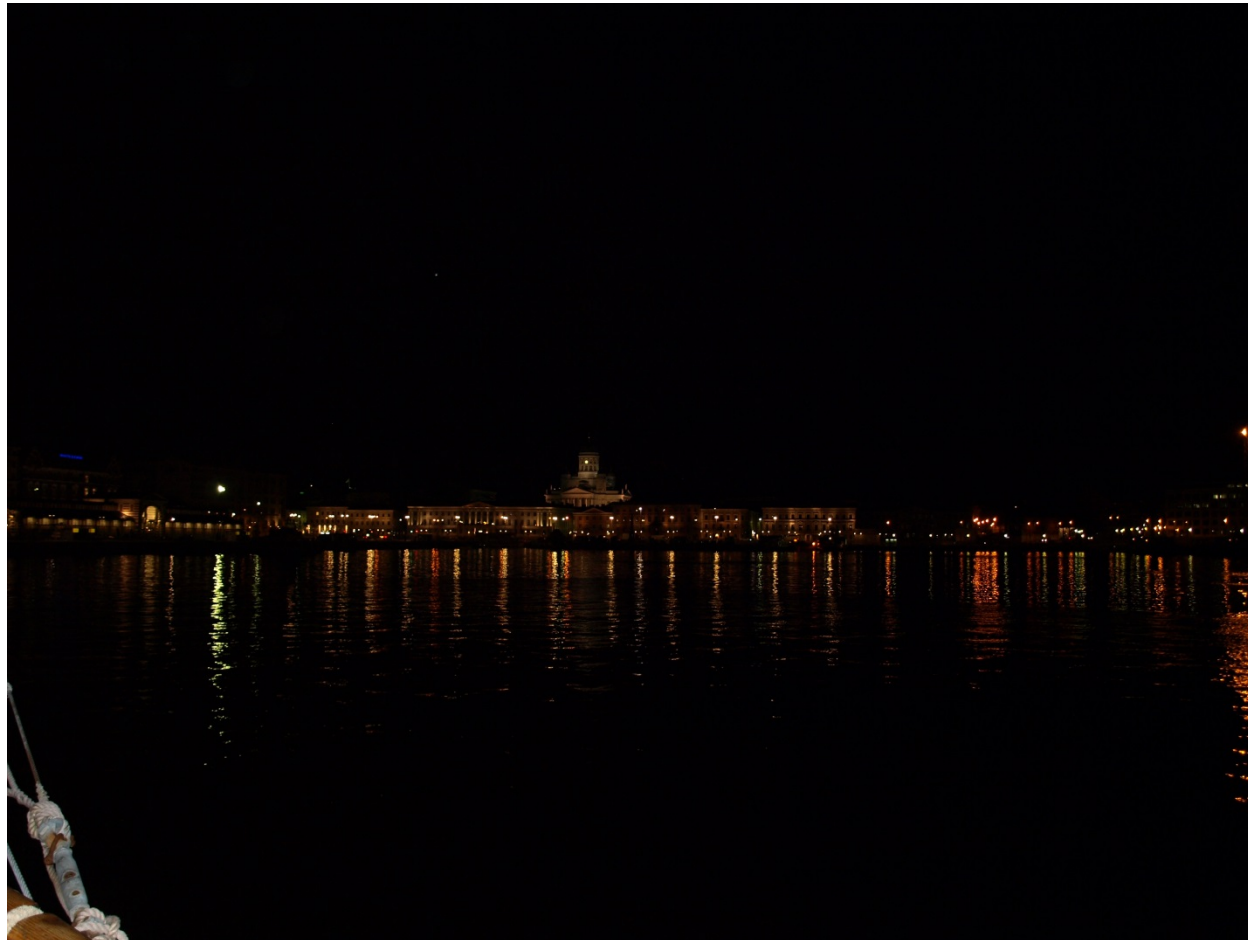


CONCLUSIONS

Conclusions

- It is possible for a TSO to support both the regulator and the industry.
- In a small country this is a necessity, since there are not enough resources to create or maintain separate TSOs for the regulator and the industry.
- In order to avoid conflicts of interest and to continue to support both sides the TSO has to have clear principles of operation.
- The TSO staff must also be aware of these principles and apply them in their daily work.
- Prompt action inside the TSO and informing the client are essential when a risk for a conflict of interest is detected.

Thank You for Your Attention !



Helsinki by night