

Sustainable Capacity Building for Nuclear Programme - the Finnish Experience

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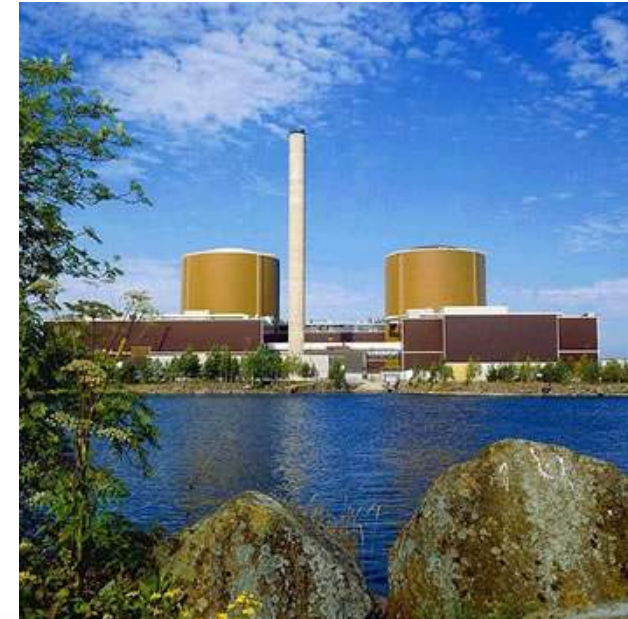
STUK

Nuclear power plants in Finland



Olkiluoto NPP (TVO)

- 2 operating units - ABB BWRs
- EPR under construction
- EIA done for Olkiluoto 4



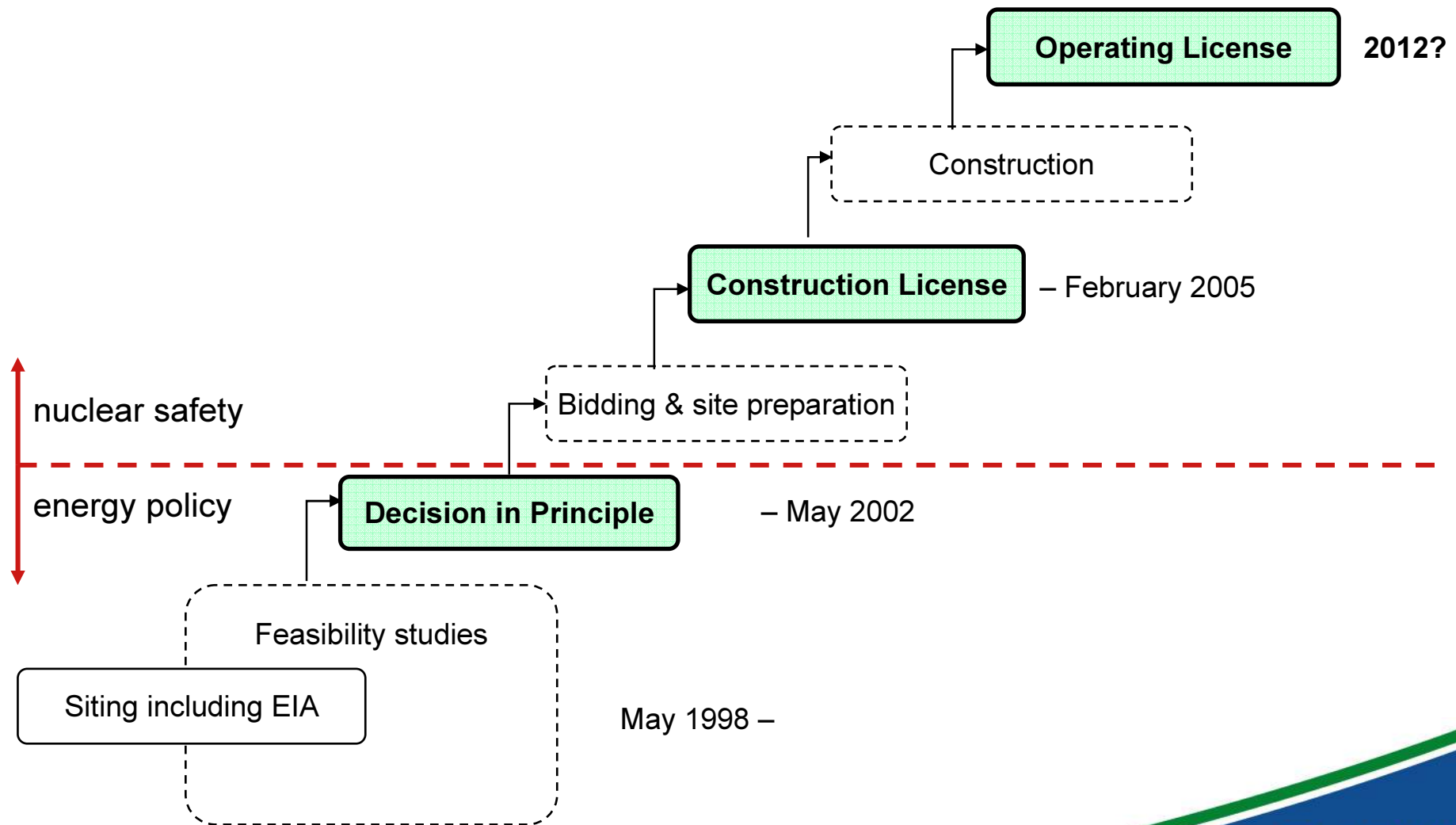
Loviisa NPP (Fortum)

- 2 operating units - VVERs
- EIA done for Loviisa 3

Fennovoima Ltd

- EIA done for 3 alternative sites for a new plant

Licensing Steps - Olkiluoto 3 schedule



Changes in the regulatory environment in Finland

- Nuclear renaissance in Finland
 - one NPP under construction
 - three applications for the Decision in Principle
 - co-operation initiatives from many countries
 - fast growing of STUK`s organization
- Increased demands from the society
 - effectiveness
 - openness and transparency
 - media and NGO attention
- Retirements of the most experienced experts in near future
- Lessons learned from OL 3 being introduced into Finnish nuclear safety regulations
- International harmonisation of nuclear safety requirements

Challenges

- Resource management
- Organising the work
- Maintaining national competence
- Learning from OL 3 experiences
- Licensing of new sites
- Development of safety regulations

Resource Management

- STUK's strategy and long-term action plans (2008-2011) of each division renewed in the beginning of this year
- Action plans include for example basic principles for
 - development of activities
 - knowledge management
 - resource management
 - actions to promote well-being of the staff
- In addition separate long-term resource plans are made and updated yearly
- Use of TSOs and consultants for short-term activities an important part of RM
- Changes in the safety regulations and practices need to be considered, too
 - safety classification
 - inspections in lower safety classes

Resource Management

Short-term RM

- as a part of the yearly planning process the work of each inspector is allocated to different projects for each quadrant of the year
- work-load of inspectors is followed in several ways

Long-term RM

- long-term plan aims to take into account future tasks and retirements, updated yearly
- replacement recruitments typically 1-2 years in advance
- essential issue is the scheduling of new NPP projects
- in addition to oversight activities, resources are needed for renewing safety regulations

Resource Management

- Net-budgeting is a pre-requisite for flexible practices
- Long-term plan does not yet take into account resources needed for construction of more than one NPP at the same time
- Three main sources in recruitments
 - Technical Universities
 - Technical Research Center of Finland (VTT)
 - conventional industry
- National research programs (SAFIR 2010) produce experts into the nuclear field in Finland

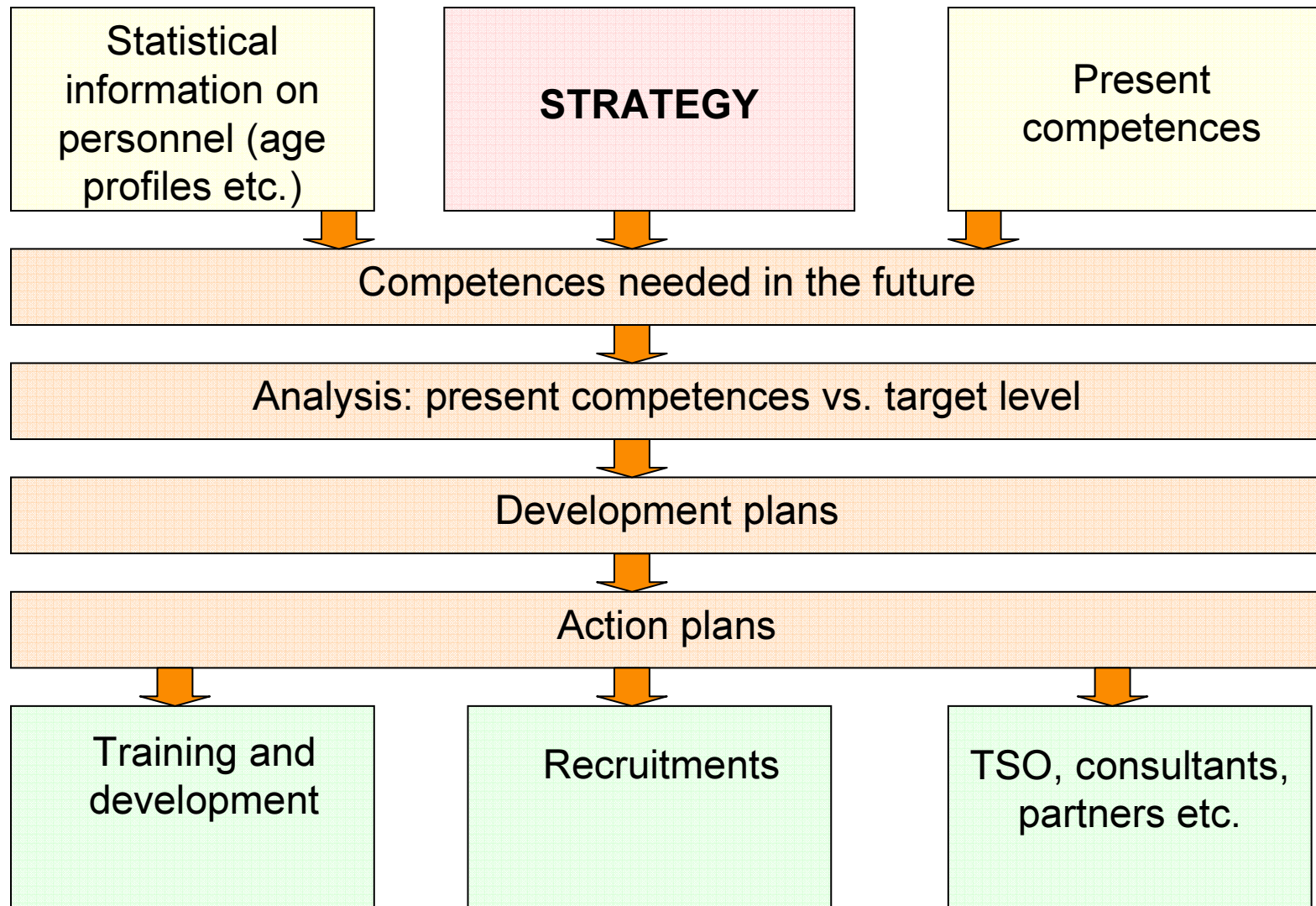
Organising the work

- a project organisation is established for the oversight of Olkiluoto 3 (EPR under construction)
- other major duties in addition to OL 3 include
 - oversight of operating units (project managers , not a project organisation)
 - licensing renewals , PSR`s (projects)
 - plant modernisation projects (e.g. I&C renewal of Loviisa plant)
 - review of DiP applications
 - a small group of senior experts and managers
 - development of safety regulations (YVL Guides)
 - responsible person and a working group for each YVL Guide
- the challenge is to share the working hours of experts to different duties

How to maintain national competence ?

- national responsibility
 - ministries, regulatory body , industry
 - actions will be considered based on DiPs
- review by Nuclear Energy Committee in June 2006
 - adequate resources to universities for basic education essential
 - availability of university level experts not a short-term problem
- national basic nuclear safety courses for newcomers
- national research programs essential
 - ensure national capability to perform different types of accident analyses
 - make possible to participate in international research programs
 - funding based on revision of Nuclear Energy Act (2004)
- competency frameworks to retain corporate memory in generation change established in different organisations

How to ensure adequate resources and competence ?



Lessons learned from OL 3

Generic factors that have affected the Olkiluoto 3 project progress

- original schedule too ambitious
 - underestimation of the time needed for detailed design
- lack of skills in managing a large construction project
 - inadequate designer resources at the beginning
 - choice of subcontractors with limited experience and competence
 - inadequate control of contractors by Areva and licensee
 - inadequate communication between Areva NP and its contractors
 - misunderstanding of the regulatory and licensing system
- manufacturing and construction challenges
 - deterioration of the global manufacturing infrastructure
 - difficulties in qualifying new manufacturing technologies
 - quality problems in construction and manufacturing

Lessons learned from OL 3

- no changes in the licensing process, but for example ...
 - more emphasis on management and organisational issues , including safety culture issues early in the project
 - more emphasis on the readiness of the design and on the implementation of the basic safety principles in the design in the early phases of the project
 - assessment of the project management capabilities (resources , expertise , experience , QA , subcontractor management)
 - making sure that management of licensee and vendor are committed to implement the quality system

Lessons learned from OL 3 are being introduced into Finnish nuclear safety regulations .

Licensing of new sites

- site suitability is assessed based on following topics
 - geology and seismology
 - meteorology and hydrology
 - transport routes (sea, land and air)
 - industrial activities
 - population
- principles of emergency zoning (YVL 1.10)
 - site area , about 1 km radius
 - protective zone , 5 km radius
 - detailed emergency planning area , about 20 km radius
- the possibility to evacuate the protective zone is required
- Finnish regulations are partly based on existing sites
- licensing of new sites causes a lot of public and media attention

Overall reform of Finnish nuclear safety regulations

The Nuclear Energy Act was revised in June 2008

- basic safety requirements were moved from the old Government Decisions to the Act reflecting the new Finnish constitution of 2000
- the Act was completed with physical protection related requirements
- requirements on decommissioning were added
- new Advisory Committee for security issues was established
- no changes were in the licensing process

The new Government Decrees replace the old Government Decisions

- some existing requirements in the YVL Guides were moved to the Decrees
- requirements concerning Management Systems were revised
- experiences from OL 3 project taken into account
 - Design Extension Conditions introduced into Finnish regulations (a new class of accidents)

Design Extension Conditions (DEC)

- DEC A
 - includes conditions in which a common cause failure (CCF) in a safety system is assumed during anticipated operational occurrence (DBC 2) or class 1 accident (DBC 3)
 - as an example
 - failure of reactor scram
 - station black out
 - LOCA together with the complete loss of one emergency core cooling system
 - loss of ultimate heat sink
 - loss of digital I&C system
 - realistic assumptions are applied in accident analysis
 - single failure is assumed in safety systems
- DEC B
 - includes complex sequences and rare external events
 - as an example
 - extreme weather conditions
 - large airplane crash
 - realistic assumptions are applied in accident analysis

Overall reform of STUK's Regulatory Guides (YVL Guides)

Initiated in 2006 and continues until 2011

- structure of the whole system has been re-evaluated
- standard format for single guides has been developed
- consistent terminology / full coherence with the new Government Decrees and between different guides will be ensured
- experiences from OL3 project will be taken into account
- consideration of IAEA safety standards and WENRA reference requirements
- YVL Guides are to be applied as such to new NPPs, application to operating plants or plants under construction is considered case by case (no changes in this policy)

Summary

- the Finnish nuclear energy legislation and the licensing process work well
- attention paid to regulatory effectiveness to avoid unnecessary delays
- adequate resources of the regulator essential (flexibility due to net-budgeting)
- short- and long-term RM compulsory
- maintaining competence a national responsibility
- increased public and media attention due to new build and selection of new sites