

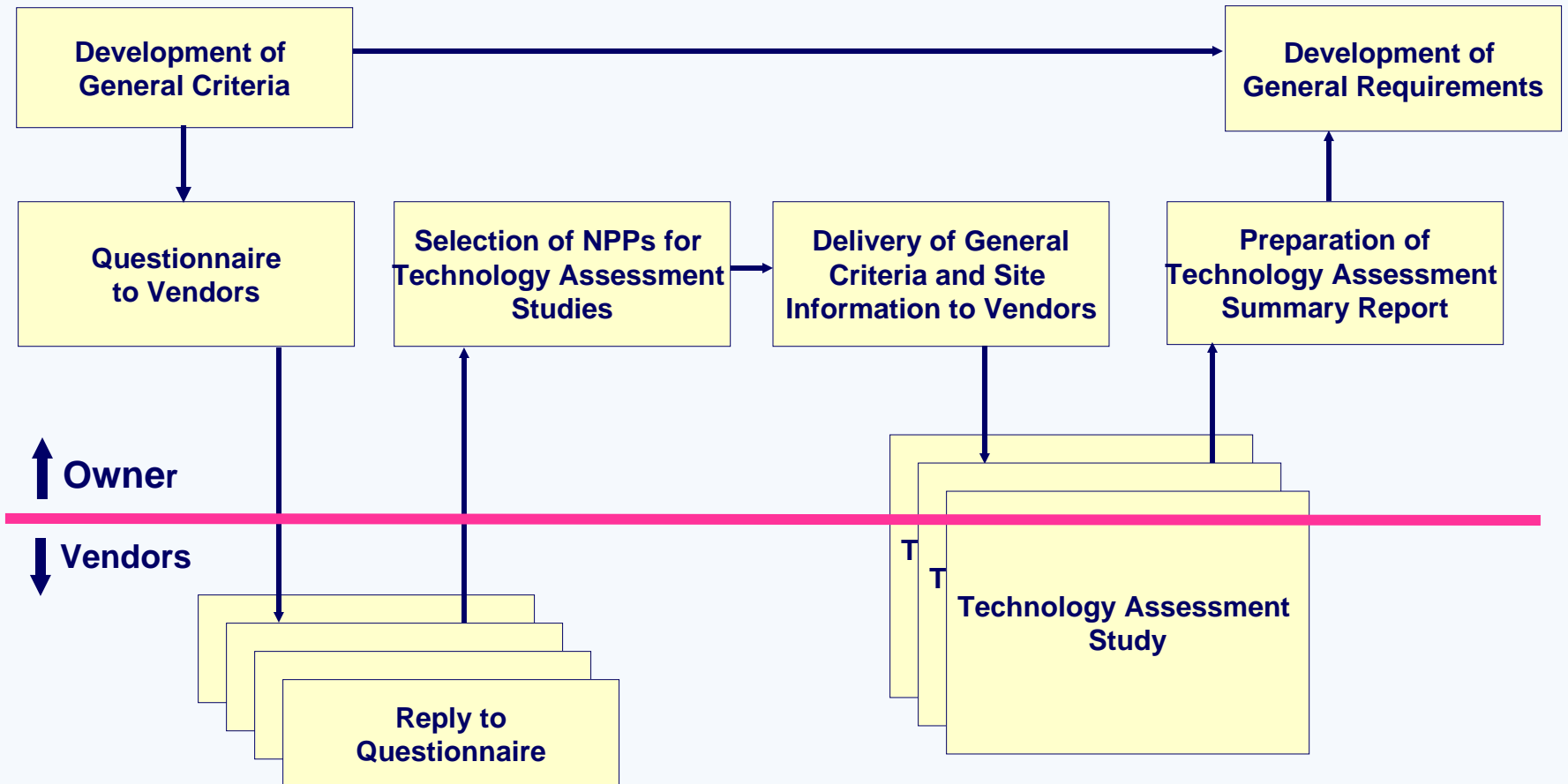
International Atomic Energy Agency

**FORMULATION OF GENERAL
REQUIREMENTS,
PROCESS TO SELECT NPP DESIGN**

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Example of Technology Assessment Process



General Considerations

- **During the Technology Assessment, the General Criteria will be expanded with additional details and formulated into the General Requirements.**
- **Requirement compilations URD and EUR can be utilised at least as a reference in establishing the General Requirements. National regulatory requirements, site and other local conditions as well as owner's own requirements may call for changes to requirements included in those compilations.**
- **It is advisable to write the General Requirements so that they can be utilised as such or with minor modifications in the preparation of the Bid Invitation Specifications.**



Technology Assessment vs. NPP Design Selection

- **The final selection of NPP design takes normally the forms of the preparation of bid invitation and bid evaluation (Bidding Process).**
 - **The results of the Technology Assessment can be utilized in the preparation of the Bid Invitation Specifications (BIS) and in the bid evaluation.**
 - **The involment of a supplier candidate (a Bidder) already in the Technology Assessment phase enhance his knowledge about the project and the ability to prepare and present his best possible bid.**
- **The selection of NPP design can be made also based on negotiated approach without a Bidding Process.**
 - **In those cases, the Technology Assessment has a vital signifigance for the Owner in the selection and negotiation process and in preparing a proper supply contract.**



Objective of Bidding Process

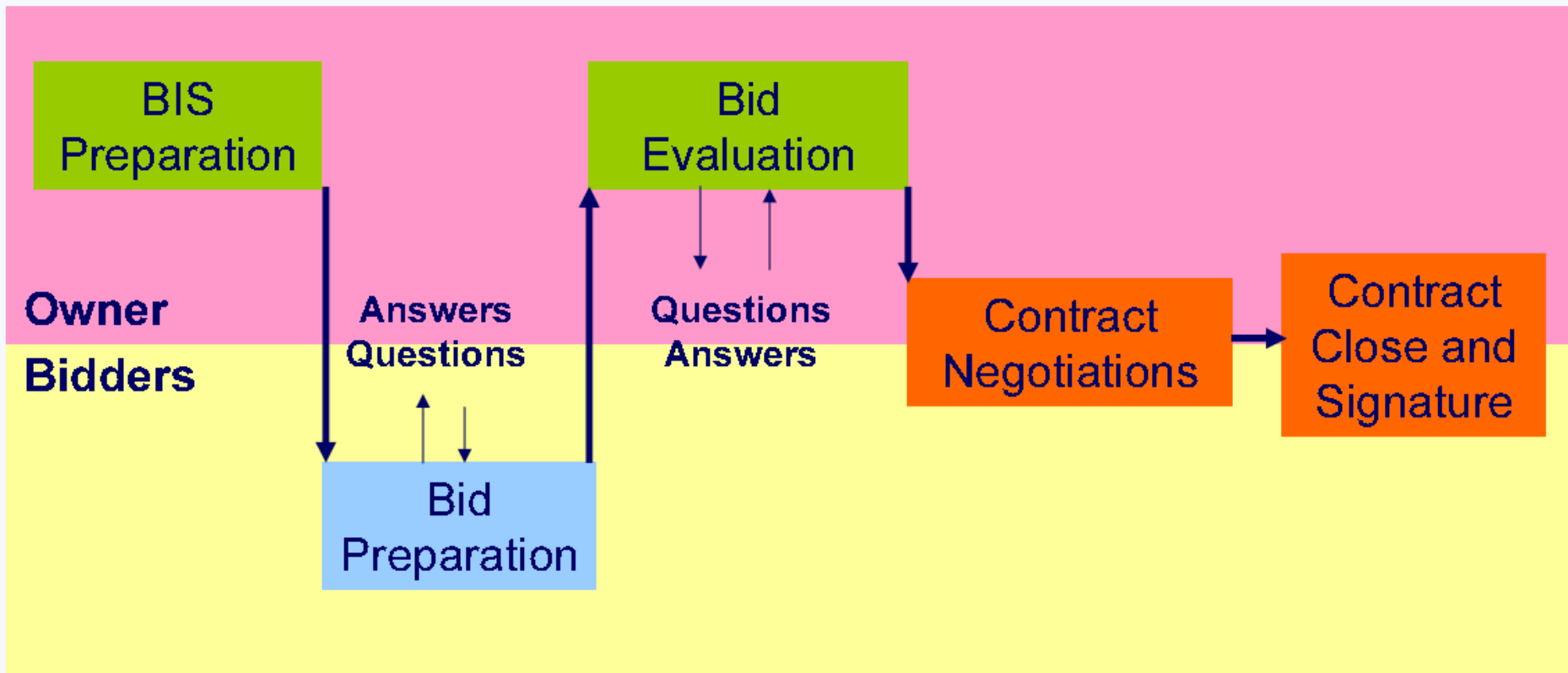
The fundamental objective of the bidding process is to sign with the successful Bidder (supplier) a delivery contract that enables to construct an NPP that fulfills Owner's needs in the best possible way.

BIDDING PROCEDURE OPTIONS

- **Negotiated bids (the supplier has been selected in advance);**
- **Bids submitted as closed proposals (technical, economic and financial) and negotiated between the owner and each bidder separately not releasing information to other bidders;**
- **Open bids, e.g. public bid opening ceremony in the presence of all bidders.**



Main Stages of Bidding Process



General Considerations for BIS

- In the BIS the Owner should provide comprehensive relevant information on all aspects which may affect the project and that he should clearly express his requirements, conditions and wishes or expectations.
- On the other hand, the Owner should refrain from being too restrictive in his demands and retain some flexibility.
- The Technology Assessment provides valuable information for those considerations.



OBJECTIVES OF THE BIS

- **The primary objective of the BIS is to provide information to the bidders**
 - **owner's expectations and requirements**
 - **conditions and circumstances under which the supplier will have to perform his tasks**
 - **information required and the form of presentation of this information in the bids**
 - **bid evaluation criteria**
 - **proposals for contractual arrangements with the successful bidder**



EXAMPLE OF BIS STRUCTURE (1/2)

- **Information provided by the owner**
 - **Invitation letter**
 - **Administrative instructions to the Bidder**
 - **General information on the project and national infrastructure**
 - **Scope of supply and services**
 - **Project implementation**
 - **General technical requirements and criteria**
 - **National participation and technology transfer**
 - **Bid evaluation criteria**
 - **Commercial conditions**
 - **Draft contract**

EXAMPLE OF BIS STRUCTURE (2/2)

- **Information requested from the bidders**
 - **General information from the bidder**
 - **General technical aspects**
 - **Technical descriptions**
 - **Scope of supply and services**
 - **Alternatives and options**
 - **Project structure and implementation scenario**
 - **Training**
 - **Project schedule**
 - **National participation and technology transfer**
 - **Guarantees and warranties**
 - **Deviations and exceptions**
 - **Commercial conditions**
 - **Financing support**
 - **Risk assessment and management.**

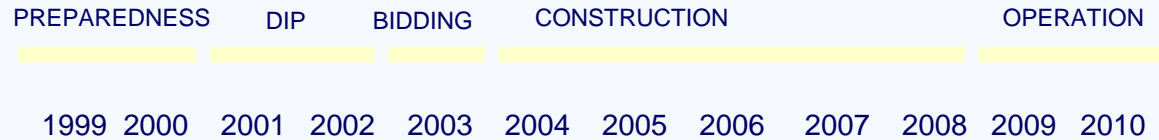
Bid Evaluation

- **Technical bid evaluation are**
 - **to evaluate the bids with regard to scope and limits of supply and services as well as the technical design features of the NPP offered.**
- **Economic bid evaluation**
 - **to establish the plant costs (Capital investment costs including interest during construction, Nuclear fuel cycle costs, Operation and maintenance costs, Waste management costs, Owner's costs) and to rank the available bids with the help of an economic figure of merit.**

Case Study: FIN5 Bidding Process

Olkiluoto 3 Overall Schedule (Original)

Stage:



LICENSING

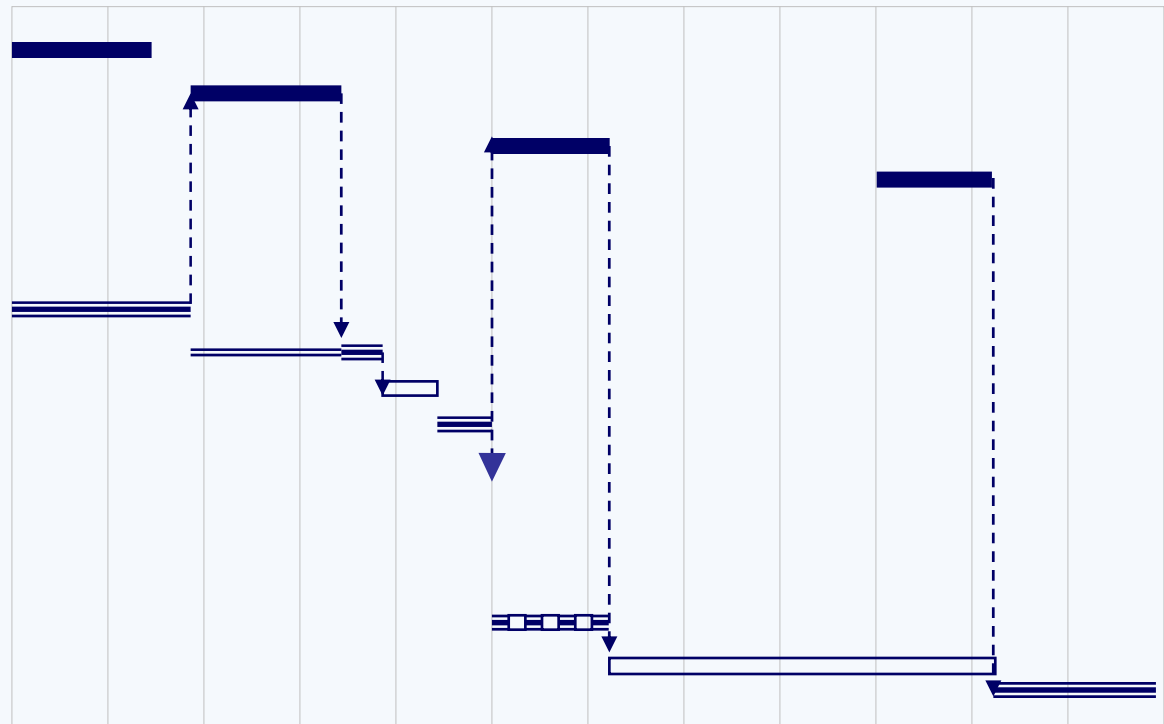
- Environmental impact assess.
- Decision in principle (DIP)
 - Construction licence
 - Operating licence

PROCUREMENT

- Feasibility studies
 - Bid request
 - Bids
 - Bid evaluation
 - Main contracts

IMPLEMENTATION

- Site preparations
 - Construction
- Commercial operation



Bid Invitation Specifications (BIS)

SCOPE OF FIN5 BIS

- **Nuclear power plant with boiling or pressurised water reactor**
 - **thermal power max 4300 MWth**
 - **electrical power between 1000 and 1600 MWe**
 - **location either Loviisa or Olkiluoto**
- **Manufacturing of the fuel for first core**
- **Training simulator**



OBJECTIVES OF FIN5 BIS

- **The objective was to draw up the BIS as generic as possible:**
 - **Plant concept specific adaptations were kept to the minimum.**
- **The BIS provided the Bidders the liberty to select such plant and delivery alternatives that they considered most competitive for the FIN5 project.**
- **The BIS were compiled in such a way that they provided a basis for the actual contract documents, while being an outline of the Bid.**



FIN5 BID OPTIONS

- **Base Bid**
 - **Complete Plant with Nuclear and Turbine Island**
- **Alternative Bids**
 - **Nuclear Island only**
 - **Turbine Island only**
- **Negative option for civil works**
- **In all cases, the responsibility for coordinating the supplies as well as functionality and licensability of the complete plant belongs to the Nuclear Island supplier**

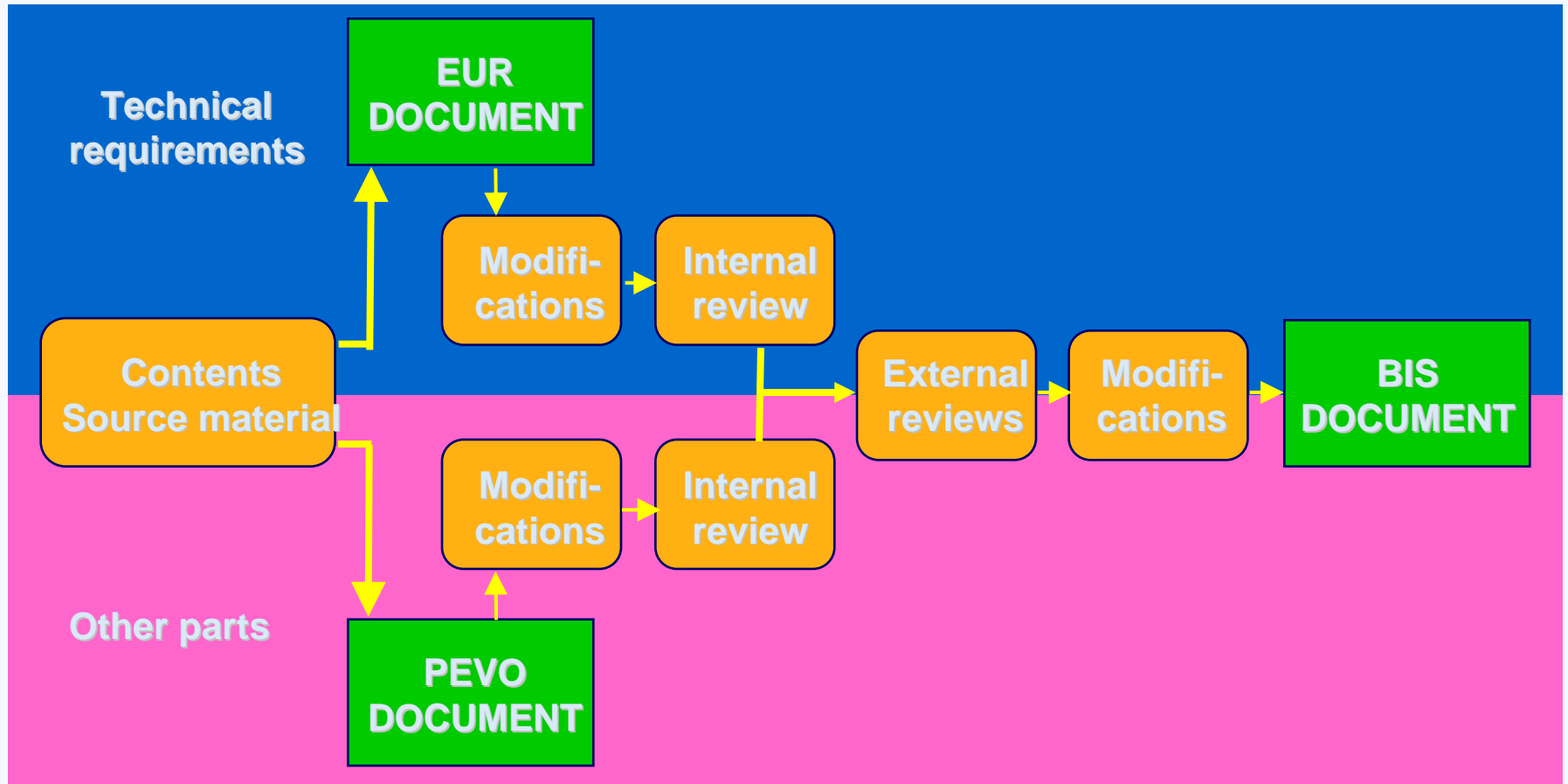


REFERENCE MATERIAL FOR FIN5 BIS

- **The technical requirements were specified by using the EUR document as a reference.**
- **Other parts of the BIS were based on the documentation developed by the Finnish nuclear utilities (PEVO documentation) in the beginning of 1990s or were entirely novel.**



EXAMPLE OF PREPARATION PROCESS FOR BIS (FIN5)



APPLICATION OF EUR DOCUMENT IN FIN5 BIS

- **While EUR defines the requirements for a European standard NPP, the BIS for a Finnish NPP had to be adapted to**
 - **the Finnish licensing requirements**
 - **the local conditions**
 - **the experiences gained while operating the existing units.**
- **This implied several modifications to the EUR text.**



EXAMPLES OF SPECIAL SAFETY REQUIREMENTS IN FINLAND

- **Design event classification**

- large primary-to-secondary circuit leak: no radioactive releases to atmosphere are allowed through steam line safety/relief valves
- anticipated transients followed by a failed fast reactor shutdown (ATWS) have to be addressed as a design basis event

- **Severe accidents**

- no high pressure vessel meltdown
- hydrogen management (100% water-metal reaction in the core)
- melt arrest (no direct contact with containment pressure boundary)
- containment integrity against dynamic loads
- containment pressure management in long term

- **Systems design**

- N+2 failure criterion for systems that deal with design basis events
- N+1 failure criterion for systems that deal with severe accidents
- compliance with the so-called "30-minute rule"

- **External threats**

- light aircraft crash as a design basis event and large passenger or military air craft crash as a desing extension event
- microwave and biologic weapon consideration
- blockage of the cooling water intakes



SOME REQUIREMENTS BASED ON LOCAL CONDITIONS

- **Wind loads**
- **Snow and ice conditions**
- **High and low seawater levels**
- **Seawater temperature**
- **Air temperature**
- **NORDEL grid requirements**

SOME OPERATIONAL REQUIREMENTS

- **Technical lifetime**
 - 30 a in general
 - 60 a for components that are difficult to be replaced
- **Manoeuvring capabilities**
 - Startup and cooldown times
 - Power control capability
 - Daily and weekly load cycling
 - Response to grid faults
- **Response to special operating cases**
 - House load operation
 - Turbine tripping without reactor scram,
- **Duration of refueling and maintenance outages**
- **Availability**
- **Fuel cycle flexibility**



CONTENTS OF FIN5 BIS



- Instructions for Bidders
- Terms and Conditions
- Scope of Supply and Services
- Project Implementation
- General Technical Requirements
- Power Generation Plant Requirements
- Nuclear Fuel

FIN5 BIDDING PROCESS

- **Bid competition launched** **September 2002**
- **Bids received** **March 2003**
- **Site selection** **October 2003**
- **Signing of delivery contract** **December 2003**

BID EVALUATION

CONTENTS OF THE PROCUREMENT MANUAL

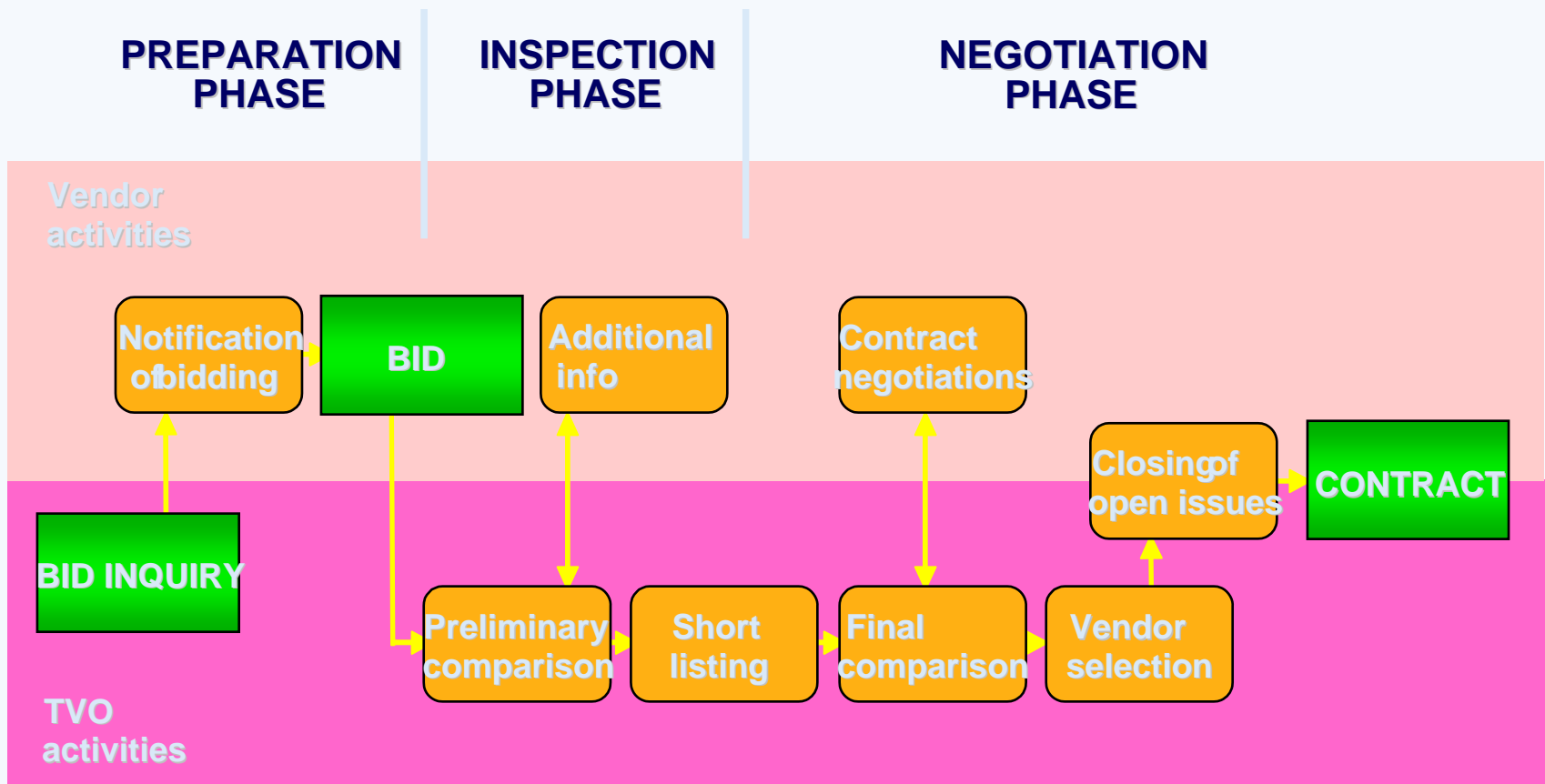
- **Description of the BIS and Bids**
- **Evaluation and procurement process**
- **Evaluation organisation**
- **Evaluation criteria**
- **Instructions for evaluation groups**
- **Contacts with Bidders**
- **Contacts with regulators**
- **Documentation**
- **Reporting**
- **Preparation of Contract Specifications**
- **Security**



GENERAL OBJECTIVES OF THE BID EVALUATION PHASE

- to assure that the bids are in accordance with BIS and to verify the deviations from the BIS requirements
- to calculate overall investment cost, generation cost and other economical factors
- to assess the risks related to the plant alternatives and to the implementation model
- to prepare the delivery contract
- to make preparations for the rapid implementation start and for the construction license application
- to assess the supply ability of the Bidder and its permanence in the future

BID EVALUATION PROCESS



ORGANISATION OF BID EVALUATION

- **The activities were regulated by a Procurement Manual.**
- **The Bid evaluation organisation included about 100 persons, half of them working full- day and half of them part-time.**
- **The evaluation team was divided in eight assessment groups, each responsible for its own discipline. The responsibilities corresponded to the different parts of the BIS (and later Contract Specifications).**



BID EVALUATION CRITERIA

About 20 criteria related to

- **Technical characteristics**
- **Safety and reliability**
- **Economic aspects**
- **Contractual conditions**
- **Bidder's references and experience**



COMMUNICATIONS WITH THE BIDDERS

- **Coordinator was nominated for each Bidder.**
- **Questions to the Bidders were sent by using a special form.**
- **Technical meetings were arranged with each Bidder in accordance with need.**
- **Coordination meetings were arranged with each Bidder regularly.**



REPORTING

- **Regular status reports**
- **Preliminary and final evaluation reports of each evaluation group**
- **Preliminary and final summary reports of the evaluation**
- **Preliminary and final reports of the Bidder Coordinator**



OLKILUOTO 3 TURNKEY CONTRACT

- **The contract was awarded to a consortium consisting of Framatome ANP* and Siemens, led by Framatome ANP**
- **Framatome ANP scope**
 - Complete Nuclear Island (NSSS and BONI)
 - Civil works of the complete NI
 - Responsibility for the overall project coordination as well as functional and technical integration of the complete plant
 - Manufacturing of the first core fuel
 - Training simulator
- **Siemens scope**
 - Complete Turbine Island
 - BOP Systems
 - Civil works of the complete TI
- **TVO scope**
 - site and excavation works
 - infrastructure

*Framatome ANP is now Areva NP



OLKILUOTO 3 CHARACTERISTICS

**Supplier: Consortium formed by
Framatome ANP and Siemens**

Reactor type: EPR (PWR)

Reactor thermal power: 4300 MW

Net electrical power: 1600 MW



Thank you for your attention!