

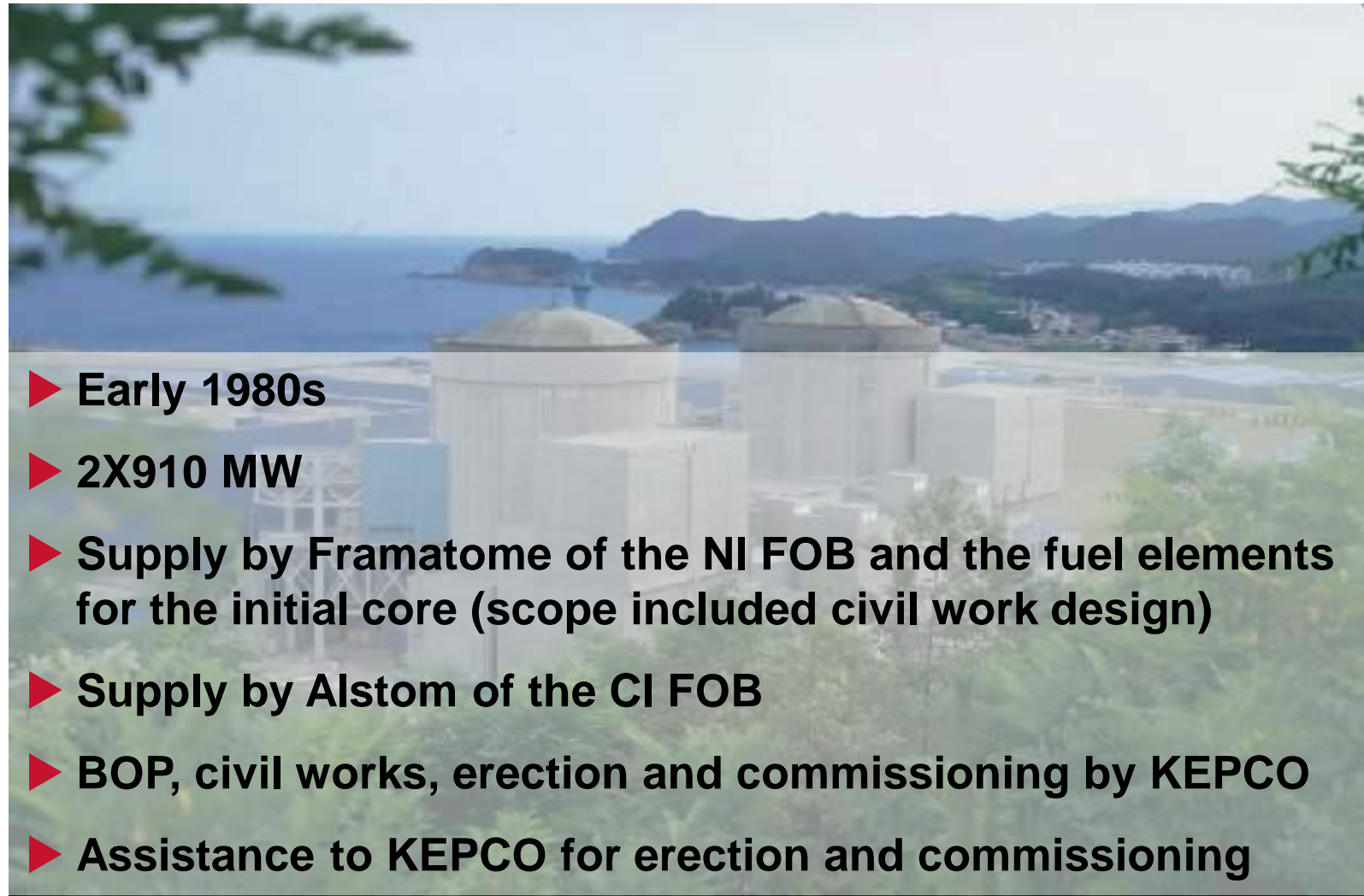
***Localization of supply of products and  
services for nuclear project /program  
based on a global experience***

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# Example 1: ULCHIN Project in KOREA



- ▶ **Early 1980s**
- ▶ **2X910 MW**
- ▶ **Supply by Framatome of the NI FOB and the fuel elements for the initial core (scope included civil work design)**
- ▶ **Supply by Alstom of the CI FOB**
- ▶ **BOP, civil works, erection and commissioning by KEPCO**
- ▶ **Assistance to KEPCO for erection and commissioning**

# ULCHIN 1&2 Contract

- ▶ **Ulchin 1&2 are 9th and 10th units of Korean NPP program**
- ▶ **Nuclear Island contract signed Nov. 7, 1980**
- ▶ **It specified:**
  - ◆ **Equipment localization > previous units in Korea**
  - ◆ **Engineering TT through participation of KOPEC engineers to ULCHIN 1&2 design**
- ▶ **Tech. Coop. agreement signed with KOPEC: March 1981**
- ▶ **Localization agreement signed with KHIC (now Doosan): Feb. 1982 (localization for previous units was with HHI)**
- ▶ **Numerous orders placed by Framatome. with Korean companies, involving sub-contracting and Tech. Assistance with French**

# Participation of KOPEC engineers in design

- ▶ **About 30 KOPEC engineers participated in the Framatome offices for periods ranging from 20 to 40 months.**

**Main areas of participation:**

- ◆ **Licensing**
- ◆ **System engineering**
- ◆ **Equipment engineering**
- ◆ **Piping layout**
- ◆ **Electricity (network analysis, layout )**
- ◆ **I&C engineering**
- ◆ **HVAC**
- ◆ **Civil engineering**
- ◆ **Project management**
- ◆ **Scheduling**
- ◆ **procurement (in relation with procurement on behalf of KEPCO)**
- ◆ **QA**

# ULCHIN 1&2 Equipment Localization

- ▶ **Three methods of procurement (suppliers to be approved by KEPCO)**
  - ◆ **Case 1: equipment procured in Korea, entirely manufactured in Korea (in principle w/o Framatome technical assistance)**
  - ◆ **Case 2: equipment procured in Korea under Framatome's detail design and/or incorporating Framatome-supplied components**
  - ◆ **Case 3: entirely imported equipment**
- ▶ **Target of overall percentage of localization of NI equipment based on value: ~38%**

# Localization with KHIC (now Doosan H.I.)

ITEM	CASE
Heavy components (RV, SG, PR, ACC, BIT)	2
BNI Heat exchangers	1
Tanks built in shop	1
Demineralizers	2
Evaporator package	2
Tank built on site	1
Heavy comp. supports	1
Primary piping	2
Heavy handling equipment	2
Solid waste treat. package	2
Filters	2
Ventilation	2
Chillers	2
Fuel racks	2
Heavy tools	1
CRDM aseismic support	1

# Orders placed with other Korean Companies

- ▶ **Emergency diesel generators**
- ▶ **Medium, low voltage and DC switchboards**
- ▶ **Power cables, cable trays, transformers, batteries, panels and miscellaneous fittings**
- ▶ **Silencers, CRDM ventilation shroud**
- ▶ **Miscellaneous handling equipment**

# Technical assistance to DOOSAN

- ▶ **160 man-months of T.A. in Changwon for 5 heavy components, polar crane, fuel racks, primary coolant piping and light boiler work**

Main areas covered	Percentage
Fabrication	30%
D.E. and NDE	30%
Scheduling	20%
Organization, methods, tooling	20%

- ▶ **22 man-months of training of DOOSAN in France in: QA, materials, machining, welding, methods, examination**



# Localization Monitoring

- ▶ **localization was monitored through:**
  - ◆ **formal supplier's approval (both QA and technical) before formal order placement**
  - ◆ **Preliminary tests and/or qualification tests**
  - ◆ **Key Events monitoring before and during performance of the orders**
  - ◆ **surveillance of documentation**
- ▶ **In addition to T.A. QA inspectors and expeditors assigned on permanent basis with KHIC and case-by-case basis with other Korean suppliers**

	<b>KHIC</b>	<b>Others</b>
- QA Inspectors:	<b>256</b>	<b>174</b>
- Buyers/Expeditors:	<b>109</b>	<b>164</b>

# Example 2: LING AO 1&2 Project in CHINA



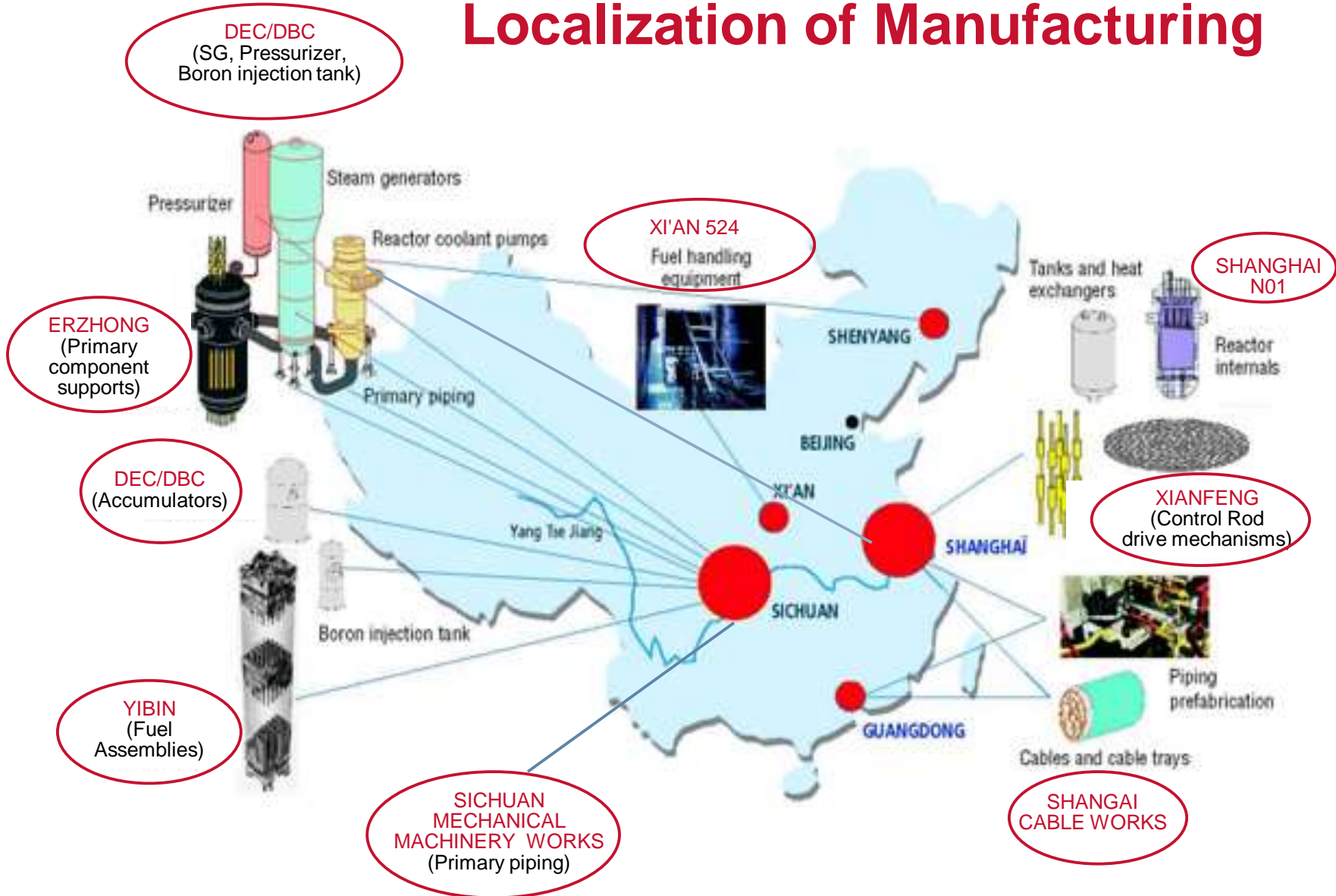
***Supply of NI FOB by Framatome***

***Supply of CI FOB by ALSTOM***

***Erection and civil Works by Huaxing with technical assistance by Framatome and ALSTOM***

***Commissioning by GNPJVC with technical assistance by Framatome and ALSTOM***

# Ling Ao 1&2 Project Localization of Manufacturing



# Localization at DEC/DBC For Ling Ao unit 2

## ▶ Scope

- ◆ 1 complete Boron Injection Tank
- ◆ 3 complete Accumulators
- ◆ 1 complete Pressurizer
- ◆ 1 complete Steam Generator
- ◆ 2 Steam Generator Upper Parts and final assembling

## ▶ Documentation

- ◆ Number of documents transmitted by Framatome :1220
- ◆ Number of documents prepared by DBC :2250

# Localization at DEC/DBC

## For Ling Ao unit 2

### ► Fields of T.A.

- ◆ Organization
- ◆ Definition of the investment program
- ◆ Training to RCCM Code and French Standards
- ◆ Training to Quality Assurance Principles and System
- ◆ Training to Document Preparation
- ◆ Pre-qualifications on mock-ups
- ◆ Formal qualifications of processes and personnel
- ◆ Technical assistance during manufacturing
- ◆ Supply of tooling

### ► T.A. and supervision

- ◆ Men x months of technical assistance in France :14
- ◆ Men x months of technical assistance in China :90
- ◆ Men x months of coordination and inspection in China :135

# Common Difficulties Encountered with the Chinese Suppliers

## ► Communication

- ◆ Different culture
- ◆ Different language (not enough English-speaking people at the time, leading to misunderstandings )
- ◆ Long transmission times of documents between China and France

## ► Organization

- ◆ General Cleanliness of the Workshops not Satisfactory for Manufacturing of the Stainless-Steel parts
- ◆ Weak Project management (conflicts between nuclear and conventional activities)
- ◆ Lack of anticipation and coordination
- ◆ Poor scheduling organization (schedules not respected, too many recovery schedules )
- ◆ Underestimation of necessary Technical and Human Resources
- ◆ Operating cash flow needs

# Specific Difficulties Encountered for Heavy Components at DBC

- ▶ **Poor Nuclear Culture at the Beginning**
  - ◆ need of important technical assistance
- ▶ **Two Manufacturing Sites (Zigong, Deyang)**
  - ◆ difficult coordination, lack of efficiency, poor communication means in Deyang
- ▶ **Too Long Time Needed for Approval of the Quality Plans**

# Definition of the localization program

## Clarify The National Objectives

- ▶ **CASE 1 :One or a very limited number of units considered**
  - ◆ **Maximize the Project Economic Return for the Country without Heavy Industrial Investments**
  
- ▶ **CASE 2 :A significant number of units to be ordered along the time**
  - ◆ **Industrial Investments to Include Nuclear Grade are Justified**
  
- ▶ **CASE 3 : Preparing a national NPP program**
  - ◆ **Localization Program will focus on Primary Components and Safety Grade Equipment**



# Preparation of localization program

**Targets should be realistic:**

- ◆ **Clarify the role of the government and the owner in the localization program**
- ◆ **The program preparation has to cover the entire NPP project, i.e., the NI, CI, BOP and Civil Works**
- ◆ **Assess that the overall project schedule allows for the development of a localization program**
- ◆ **Assess the time needed for qualification of industry and contractors**
- ◆ **Assess the cost for local companies entering a new business, i.e., start up costs, first of a kind costs, increase of existing capabilities, additional equipment, additional training of technical and operations staff, etc.**

# Preparation of localization program

## Avoid Key Bottlenecks :

- ▶ **Trainings** to be launched as early as possible
- ▶ **Particularly** to regulatory, codes and standards and Q.A.
- ▶ **Anticipate:** the action plan should mobilize and arm the local industrial tissue early enough
- ▶ **Anticipate:** Human resources ( staffing and hiring )
- ▶ **Anticipate:** Investments funding
- ▶ **Operational cash flows**

# Localization assessment: Include Support Activities

*The supply chain for the project will involve hundreds of local companies, several thousands of local employees working directly or indirectly for the project (hundreds million €) for the basic infrastructure and construction needs*

## ▶ Supplies for Buildings

- ◆ Temporary site offices Buildings
- ◆ Erection of site warehouses and workshops
- ◆ Furniture and furnishings for site offices, Furniture for housing

## ▶ Tooling Supplies

- ◆ Leasing of equipment (generators, compressors, etc.)
- ◆ Supply and management of small tools and consumables
- ◆ Supply and maintenance of IT equipment, photocopy machines, cell phones
- ◆ Help desk services, Printing activities off site contract

## ▶ Site Services

- ◆ Non-destructive testing contracts
- ◆ Post weld heat treatment contracts
- ◆ Management of overall site Safety Training Program (provision of documentation, clerical personnel, reports)

## ▶ Transportation Services

- ◆ Supply of construction vehicles including trucks, miscellaneous equipment
- ◆ Leasing mobile cranes & special purpose vehicles
- ◆ Special transportation contracts

***Thank You For Your  
Attention***

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