



Developing nuclear supply chain and resources for Nuclear Power Plants

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AGENDA



EDF who we are



EPR subcontracted scopes and localisable scopes



EPR Supply chain capacity



On going localisation works in the region



01

EDF, Electricité de
France

WHO WE ARE

Unrivalled nuclear operating experience with safety as an overriding priority



BORN IN 1946



Public initiative to nationalize and merge 300 private companies Generation/Transport/Distribution/Sales



EDF, THE WORLD'S LEADING NUCLEAR OPERATOR

56 reactors in operation
61,4 GWe
1 reactor in final commissioning



13 reactors in operation
7,8 GWe
2 reactors under construction



2 Reactors in operation



EDF, SAFETY APPROACH



SAFE BY DESIGN

The highest level of safety from a GENIII+ architecture:
• robust to accident scenarios
• reinforced protection against external hazards

+ 50,000 people working in the nuclear field

71 reactors in operation in the world

6 + 8 optional ones to be built in France

Near zero carbon solutions

EDF reactors

Large Size Reactors

(1650 MWe)



The world reference for high energy demand



Mid Size Reactors

(1200 MWe)



EPR medium power adaptation



Small Size Reactors

(< 700 MWe)



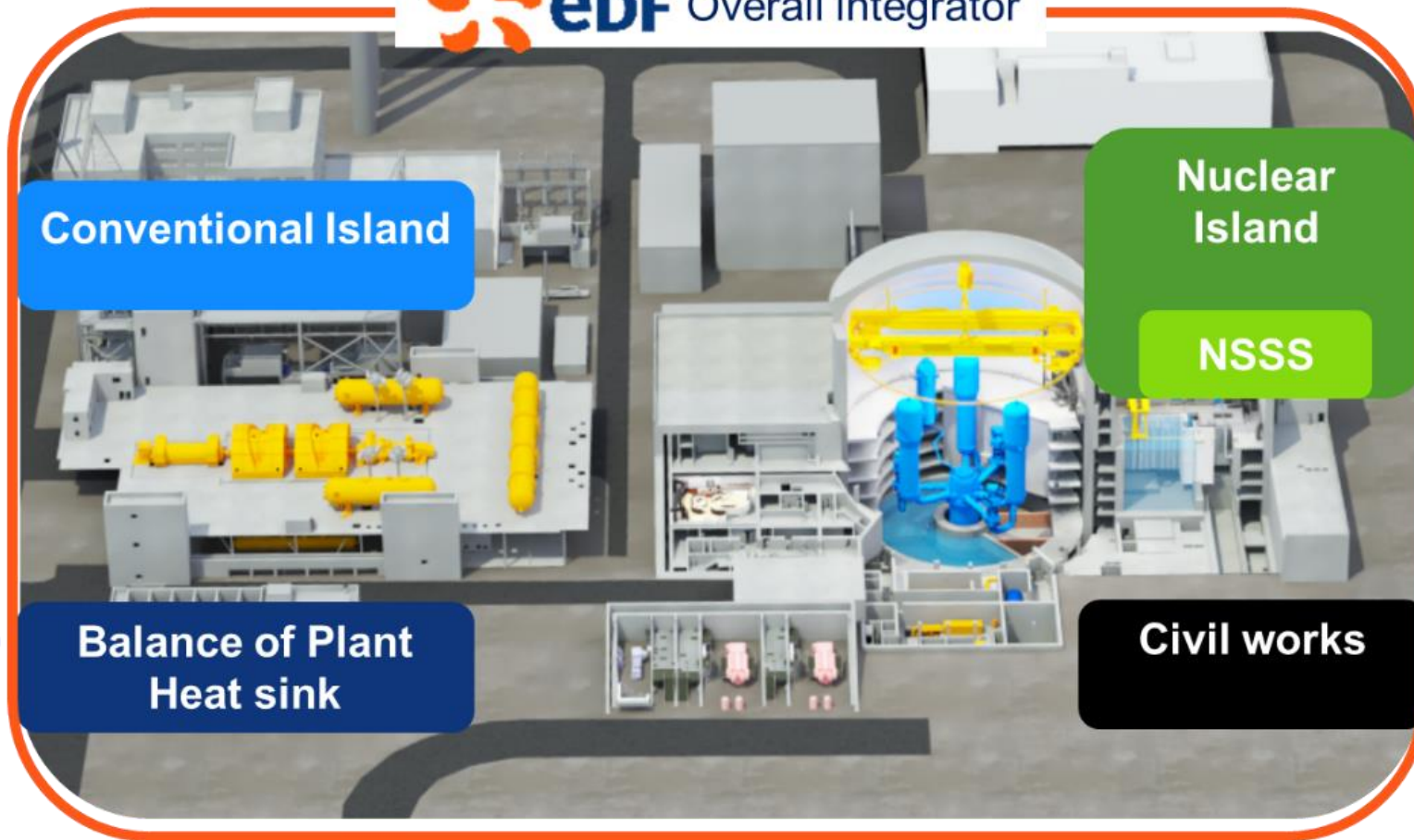
Replacing fossil fuel capacities, powering remote and industrial intensive areas



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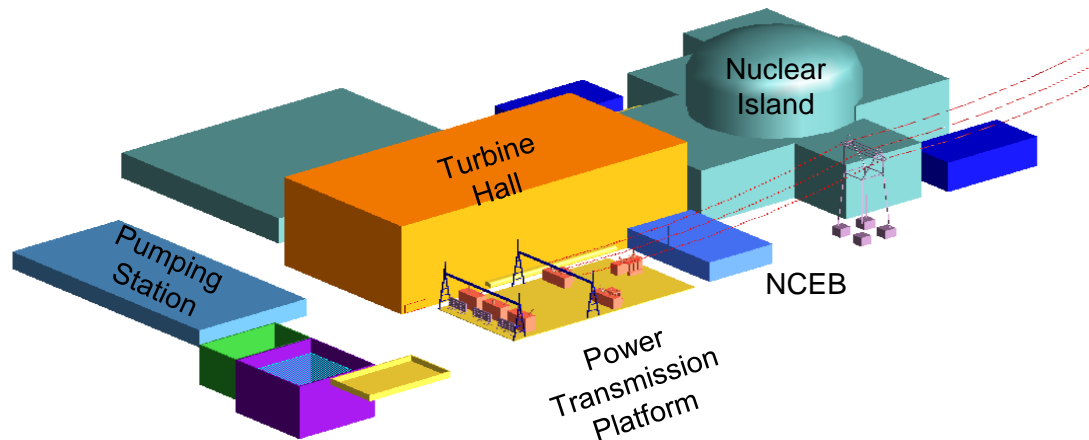
EPR subcontracted
scopes and
localisable scopes

FULL SCOPE OF SUPPLY WITH EDF'S MAIN PARTNERS



EACH EDF'S PARTNER HAS ITS OWN SUPPLY CHAIN, COORDINATED WITH EDF

MAIN CATEGORIES OF SCOPES



Nuclear Island (NI) – Conventional Island (CI) – Balance of Plant (BOP)

- Project Management
- Engineering
- Equipment supply
- Installation
- Civil works
- Commissioning

- Site preparation & infrastructure (Clearance / leveling & roads, drainage, water...)
- Site camp
- Marine works
- Buildings

**NI: A COMBINATION OF “NUCLEAR SAFETY” AND “NON-SAFETY” EQUIPMENT AND SYSTEMS
CI & BOP: SIMILAR TO CONVENTIONAL POWER PLANTS AND IN THE OIL&GAS INDUSTRY**

NUCLEAR ISLAND : MAIN EQUIPMENT

Mechanical Equipment

- Heat exchangers
- Pressure vessels & tanks
- Pumps/compressors/filters
- Valves
- Large & Small-bore piping with associated supports (1000t)



Electrical Equipment

- Cable trays
- cables
- LV/HV switchboards
- Transformers
- Emergency Diesels



Handling Equipments

- Monorails
- Slewing cranes 2 to 20 T
- Polar crane & Gantry cranes



HVAC Equipments

- Ductwork
- Air handling units
- Chillers
- Fan, Damper, filters, coils....



NUCLEAR ISLAND : INSTALLATIONS WORKS

Equipment type
EM1: Heavy Lifting Equipment >40 Tons Capacity
EM2: Main Primary Components
EM3: Auxiliary Equipment
EM4: Auxiliary Piping
EM5: H.V.A.C.
EM6: Piping and Equipment Insulation
EM7: Tanks built on Site / Pool Liners
EM8: Electrical Equipment and I&C
EM9: Instrumentation
EM10: Light Lifting Equipment <40 Tons Capacity

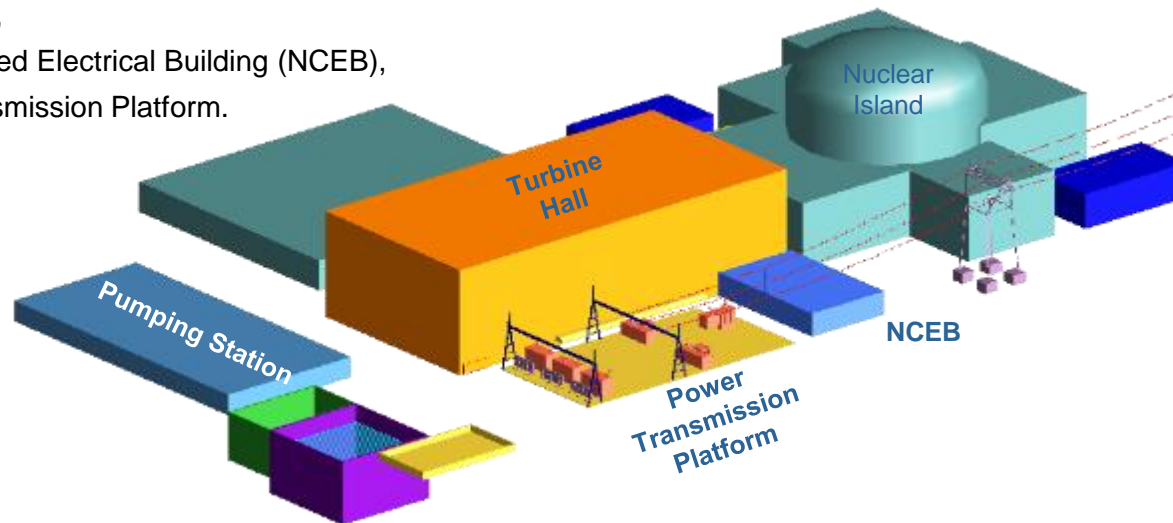
CONVENTIONAL ISLAND SCOPES

■ CI / BOP scope

- Wide range of buildings with multiple functions
- Most Structures, Systems and Components (SSC) are subject to conventional codes and standards

Conventional Island (CI)

- ▶ The CI corresponds to all SSC directly involved in the electricity production and transmission to the grid:
 - ◆ Turbine Hall,
 - ◆ Non-Classified Electrical Building (NCEB),
 - ◆ Power Transmission Platform.



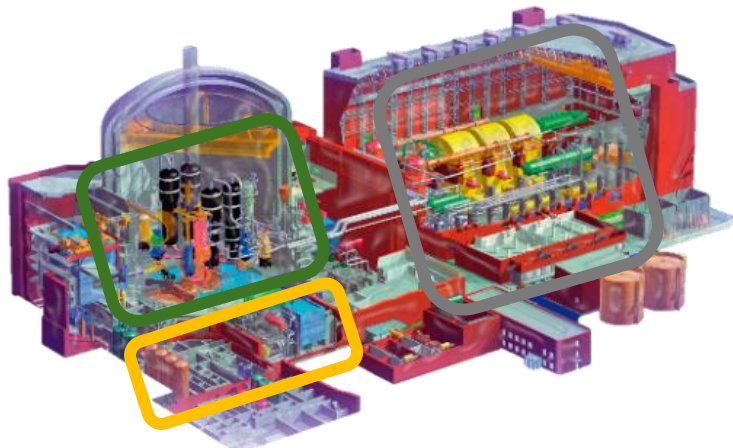
Balance of Plant (BOP)

- ▶ The BOP corresponds to all support SSC necessary for the NPP operation:
 - ◆ Pumping Station/Outfall Building,
 - ◆ Galleries,
 - ◆ Auxiliary boilers,
 - ◆ Demineralization plant + tanks,
 - ◆ Gas storage (CO₂, N₂, Hydrogen...),
 - ◆ Chlorination building.

CI AND BOP PACKAGES ARE MOSTLY EPC CONTRACTS

A GRADED APPROACH FOR THE PURCHASING STRATEGY

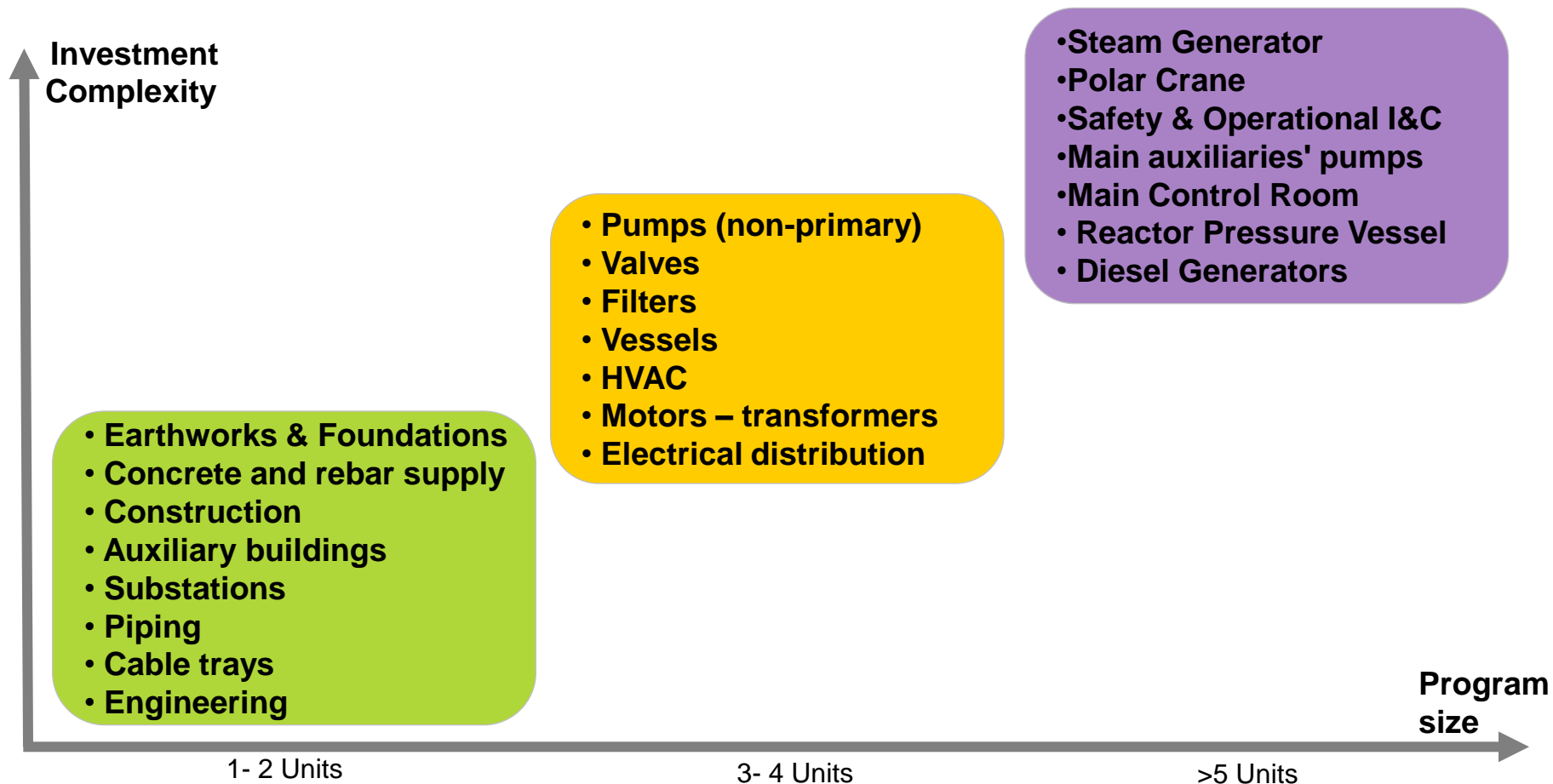
- According to the safety grade of the component, **the Purchasing strategy towards the suppliers market is graded :**



Quality Grading	Component status	QA requirements	HSE requirement to be considered
Safety grade 1&2 (NUC)	Products and services safety related	Iso-9001 completed by specific requirements ISO-19443	Environmental programm ISO-14001 Health and Safety OH SAS 45001 or equivalent
Standard grade 3 (ISO)	Products and services safety related or important for construction and/or operation	ISO-9001	
Not Classified (NC)	Other product and services	ISO 9001 ou équivalent	

Quality requirements understanding is key including Codes & Standards

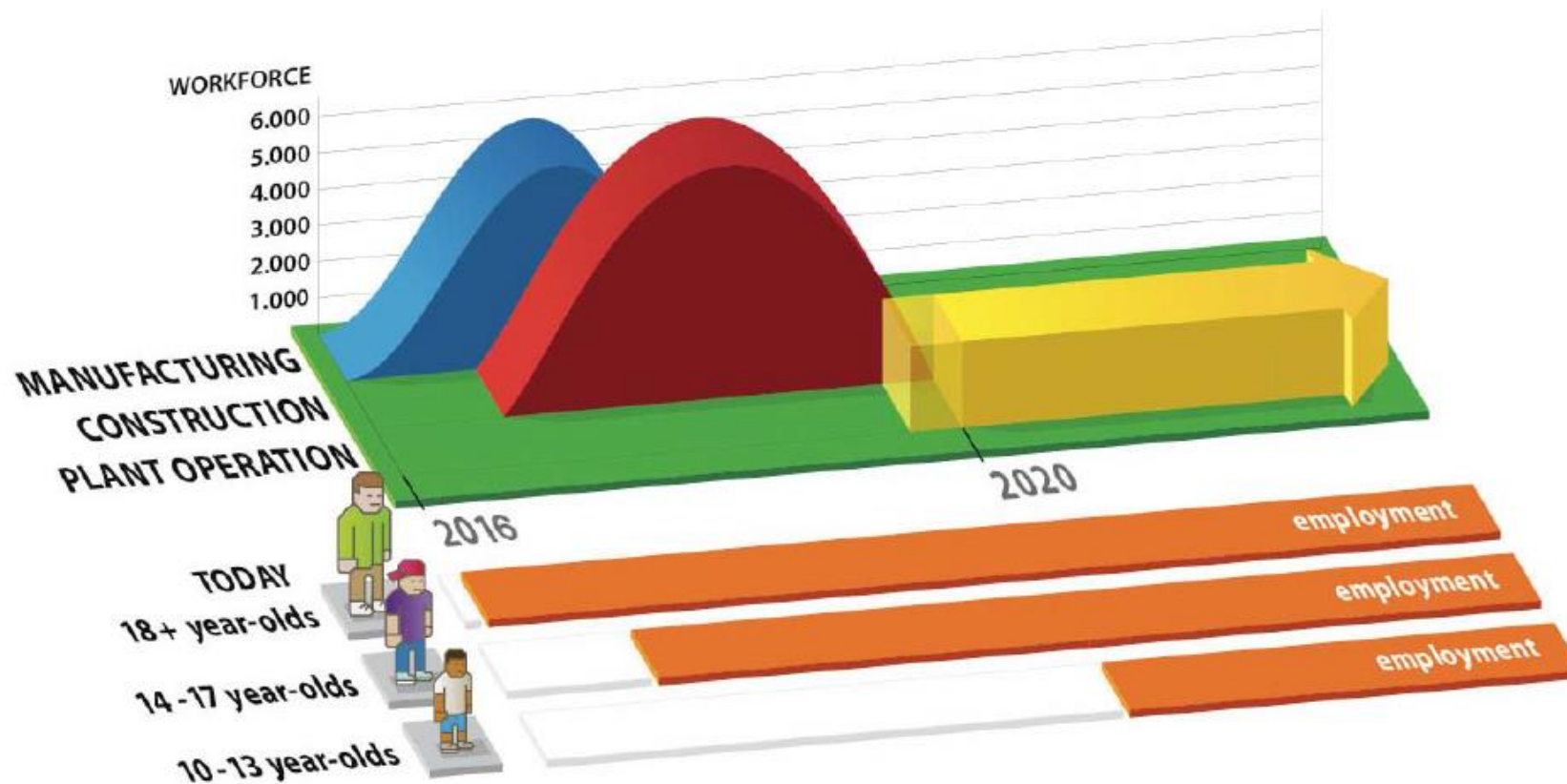
POTENTIAL SCOPES OF LOCALISATION



**Localisation is proportional to the size of the NPP country program
And the maturity of the local industry**

WORKFORCE TO BE SECURED DURING CONSTRUCTION

EMPLOYMENT OPPORTUNITIES IN NUCLEAR NEW BUILD FOR AN EPR TWIN UNIT PLANT



RESSOURCES HAVE TO BE CARREFULLY PLANNED AND TRAINED

 03

- EPR Supply chain capacity and scale-up plan



FRENCH AND EUROPEAN NUCLEAR INDUSTRY CAPACITY



The French nuclear industry is ready to deliver new nuclear construction programmes

With 95% of its supply chain already in Europe, the EPR is the technology capable of bringing to the European supply chain the activity needed to develop and maintain its capability, sovereignty and value creation

Mapping of the French nuclear industry

+ 200,000 employees

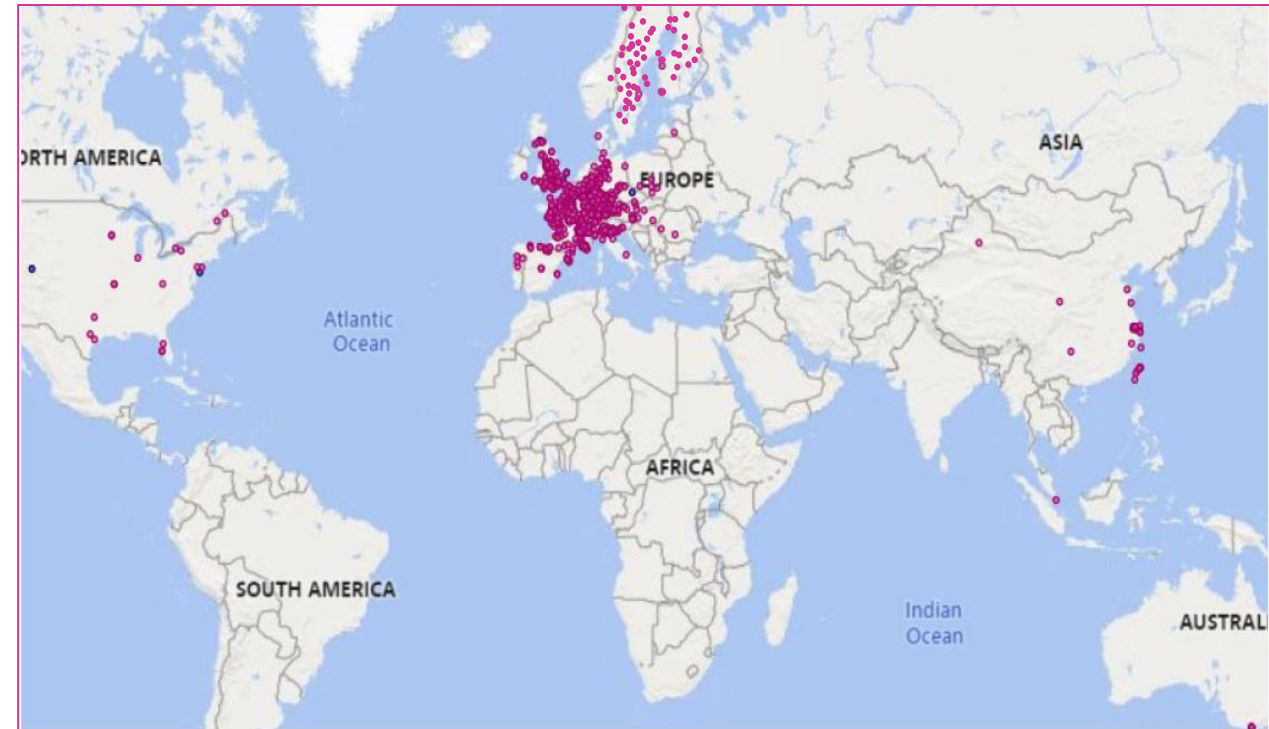
+ 3,000 companies

47,5€ billion sales

970€ million of R&D investment

53,3% of the companies have export activities

+50% of the export sales realised outside of Europe



Source : CSFN study 2019 (Strategic Committee of the Nuclear Industry)

FRENCH NUCLEAR INDUSTRY RAMP-UP : “MATCH” PLAN



A tool for managing the adequacy between needs and resources of the nuclear industry



*Over the next ten years, the French nuclear industry expects to have to **mobilize**, on these operational activities, a new work capacity of the order of **60,000 full-time equivalent recruitments**, half of which **to respond to the growth** of activity (25%) and another **half to respond to the replacement of leaving staff** who will retire or go to other sectors.*

Extrapolated to all of the 220,000 jobs in the nuclear industry, the foreseeable need of around 100,000 full-time equivalent recruitments is a good order of magnitude.

EDF EXCELL RAMP-UP PLAN TO BOOST PRODUCTIVITY AND TO HIRE

■ Fabrication : do well on first time

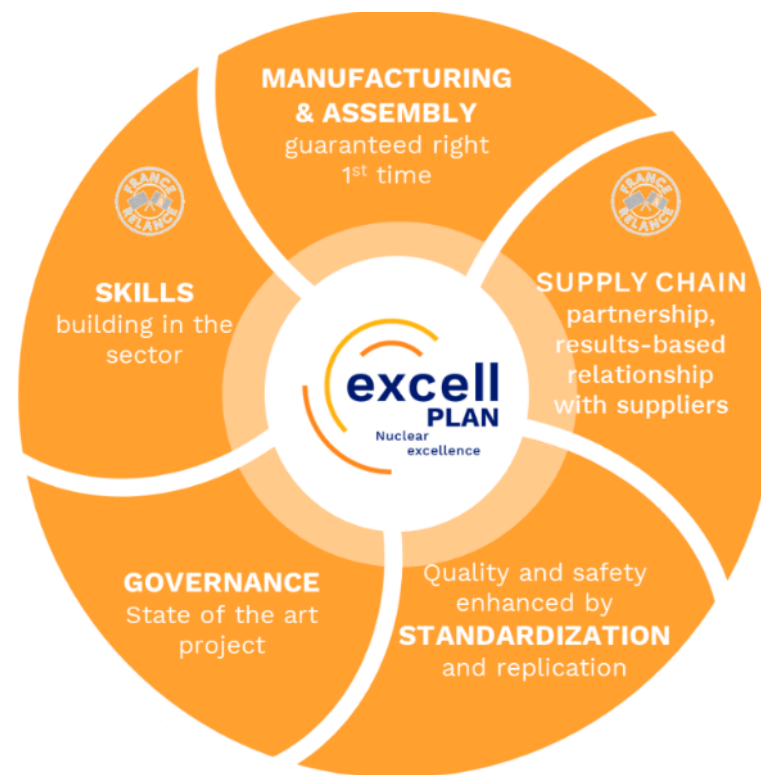
- ISO 19443 : a standard
- Competency : welding
- Governance (state of the art project management)
- Standardisation of specifications : avoid reworks and simplify
- Standard catalogs of equipment, as tier 1 or tier 2, to reduce by 90% the number of commercial references

■ EDF Hiring :

- 6000 new positions per year. Job mobility.
- A new training facility at the heart of Saclay high tech region.
- E-learning

■ New contractual tools with the supply chain :

- Competitive dialogue,
- Standardized fabrication surveillance
- Risk and rewards sharing contracts,
- Conformity matrix.



PRACTICAL STEPS FOR A ROBUST SUPPLY CHAIN

REGULAR TARGETED SUPERVISION AND OVERSIGHT

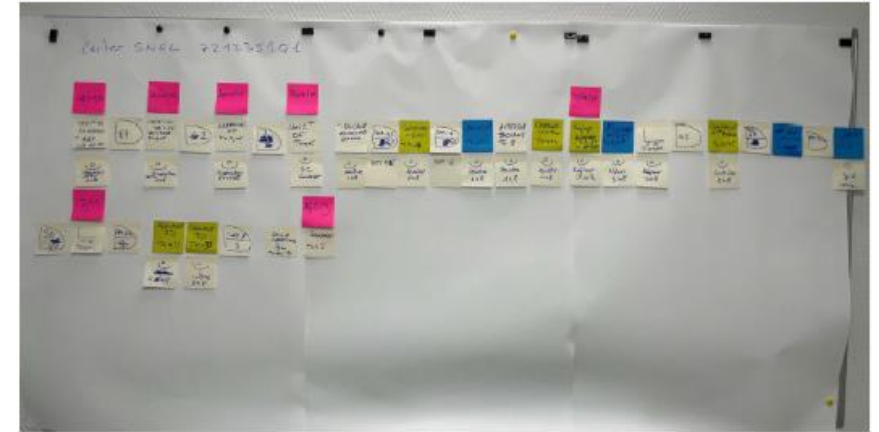
MANUFACTURING EXCELLENCE STRATEGY AT EDF

- ✓ Supervision is based on a **risk analysis** and **focused on high priority activities**, keeping in mind that suppliers remain responsible for their manufacturing and control
- ✓ Supervision takes into account **accumulated project experience**
- ✓ Supervision is performed both at the **equipment** and **plant process** level
- ✓ As much as possible, supervision activities are grouped in **a limited number of visits**, set-up in cooperation with suppliers and taking into account industrial constraints
- ✓ Supervision includes CFSI prevention and detection actions such as **unexpected** visits, repeat inspection (Non destructive or destructive testing) ...

NEW PARTNERSHIPS TO BOOST PRODUCTIVITY OF SUPPLIERS

■ Supplier development :

- Value Stream Management : to boost productivity
- Gemba walks : to boost speed up problem solving in Workshops
- Visual Management of the performance : to reinforce Teamwork.
- 5S : to prevent stockpiling of unnecessary information



JOINING THE EDF SUPPLY CHAIN CHANGES THE WAY TO WORK

LOCAL AND REGIONAL RESSOURCES



For a project of this scale, EDF will source and train manpower and expertise from :

- Slovenia, Croatia, Italy : existing nuclear companies but also newcomers*
- The rest of its European supply chain*

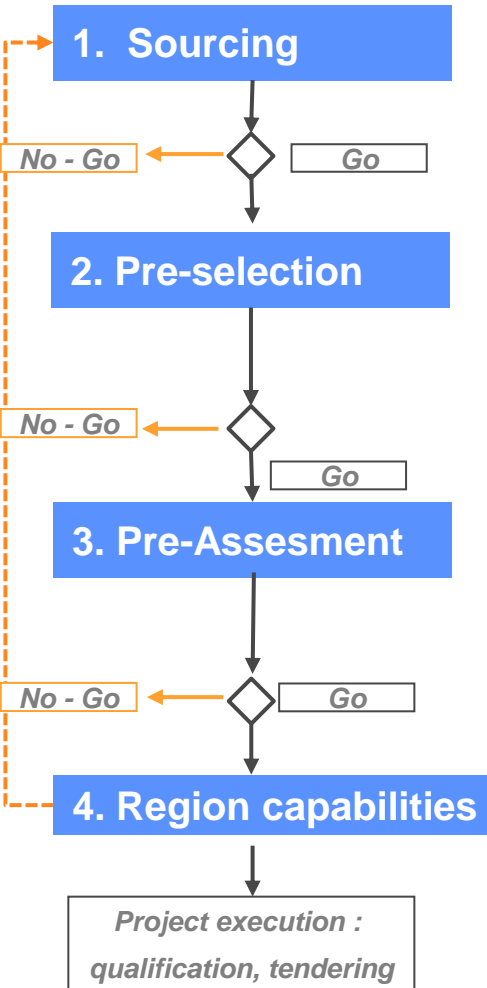
Local manpower is economically sound, brings knowledge of local best practices and top up the necessary amount.

On going localisation
works in the region

■ 04



Key activities for the Project Development phase



1. Sourcing

- Initiate first contact & visits
- Send Request For Information questionnaires (RFI)

2. Pre-selection

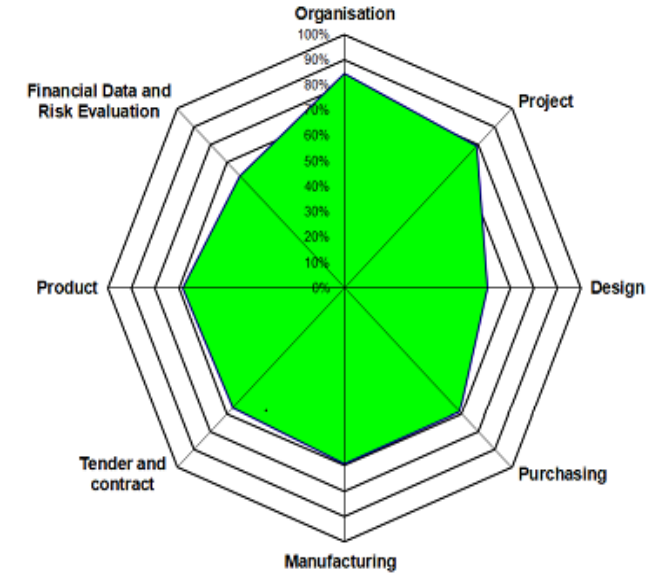
- Preselect suppliers according to RFI feedback analysis
- Suppliers Days
- Suppliers visit, with feedback ← **we are here**

3. Pre-Assessment

- Implement development plan, including technical training courses and workshops
- Carry out product or process qualification tests if necessary
- Send a blank RFQ for detailed technical assessment

4. Evaluation of the country/region capabilities

- Potential localisation rates
- Potential partnerships with existing or new suppliers
- Potential integration in the European supply chain



Exemple of Supplier pre-assessment radar chart



Early engagement with regional Industry



EDF and partners has performed 21 pre-qualification visits at suppliers' premises

Mechanical equipment:



Electrical equipment:



Installation activities:



Zagreb Montaža Group

Cooling Towers:



Engineering



HVAC:



Civil Works:



COOPERATION WITH EACH OTHERS IS ENCOURAGED

52 suppliers

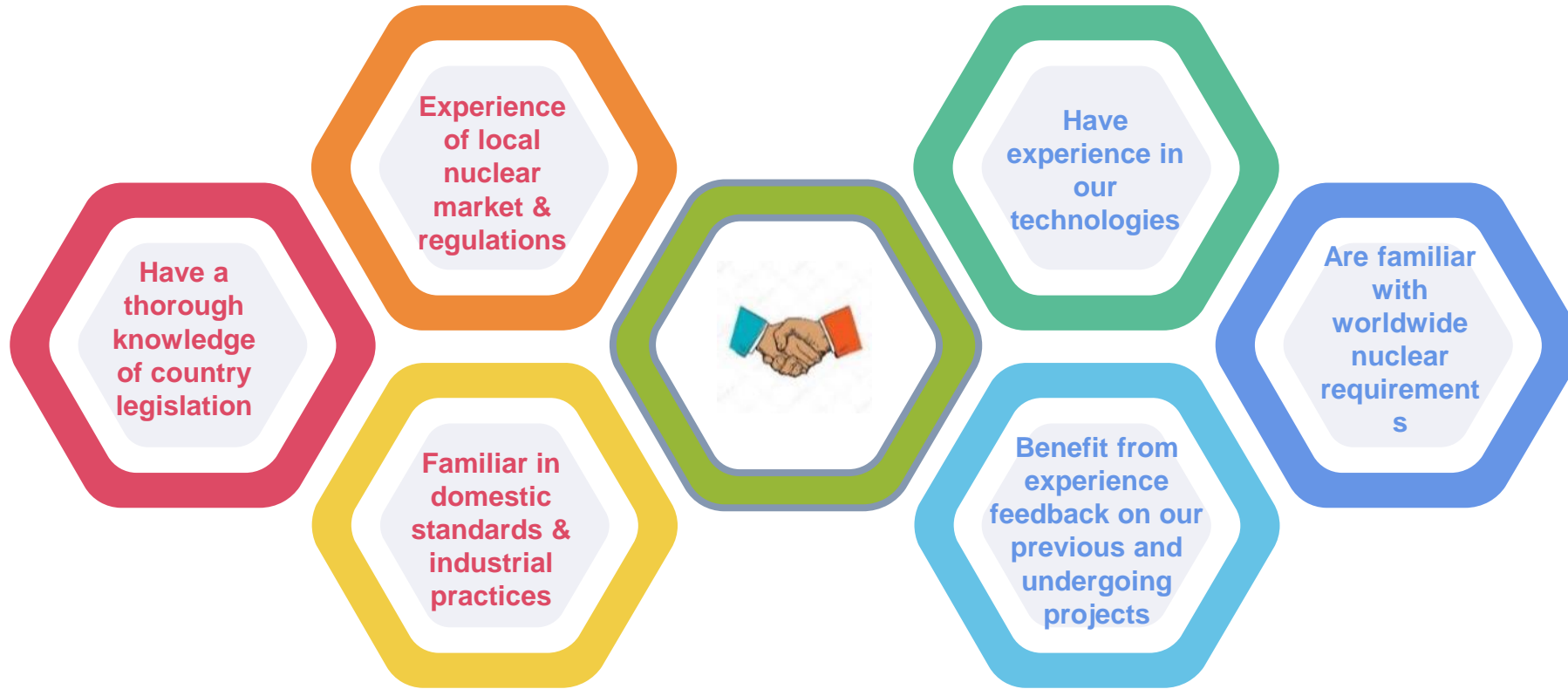
have already been identified since January 2022
Discussions have been initiated with over 30 of them.
21 have been evaluated

Sept. 2023 : Supplier Day in Portorôz, before NENE conference. 60 companies attended

LOCALISATION : PARTNERSHIPS TO SECURE THE SUPPLY CHAIN

Local companies

Experienced suppliers



ORGANISATION OF B2B MEETINGS EVENTS WITH THE SUPPORT OF THE GIFEN

SUPPLIER ACCADEMY : FOR INITIAL TRAINING

Supplier excellence FUNDAMENTALS training module

New Nuclear Power Plant Project
– EDF offer and stakeholders
1/2 day

PWR - EPR and Nuclear Safety
Fundamentals
1/2 day

Requirements for suppliers
1/2 day
standards, quality level, supplier
qualification, tenders, equipment
qualification

Introduction to RCC codes
1/2 day

Support to Supplier PRE-QUALIFICATION training module

Mechanical suppliers:

Detailed application of requirements for
mechanical suppliers
1 week

Understanding RFQ bids in details
Introduction to RCC-M requirements

Electrical suppliers:

Detailed application of requirements for
electrical suppliers
1 week

Understanding RFQ bids in details
Introduction to RCC-E requirements

Technical workshops *2 days*

Mechanical suppliers

Electrical suppliers

Specific RCC training module

Mechanical suppliers:

RCC-M
3 days

Electrical suppliers:

RCC-E
2 days

EXPERIENCE ON HINKLEY POINT C : BUILDING A NATIONAL AND LOCAL SUPPLY CHAIN

- Construction cost spent in the UK > **64%**
- 25,000 job opportunities on site alone
- £200 million annual boost for local economy during construction
- 50 million hours of work on site during construction

HINKLEY POINT C SUPPLY CHAIN



KEY SUCCESS FACTORS FOR A SUSTAINABLE NUCLEAR SUPPLY CHAIN

GOVERNMENT

- Give a clear picture on the program size (fleet approach)
- Plan training programs
- Support factory upgrade and/or new factories investment
- Invest by providing funding solutions

LOCAL INDUSTRY

- Rely on professional organizations
- Have a commitment from companies' top management
- Have a safety culture and project management orientation
- Invest

VENDOR

- Have a culture of transferring skills and being open to partnership
- Have a robust methodology to assess local industry
- Have localization experience
- Develop in-depth knowledge of the local industry

A SUCCESSFUL PROJECT REQUIRES A CONTRIBUTION OF ALL STAKEHOLDERS

THANK YOU!

EDF's proposal goes beyond the technology offering:

- ✓ it is based on fully **European technologies**,
- ✓ it embarks the value of a wider fleet of **EPRs**,
- ✓ and it is combined with a smart localisation process that will leverage the capabilities of the **Slovenian/Croatian nuclear supply chain**.

Additionally, a collaboration with EDF would offer regional companies the unique opportunity to **join an experienced European supply chain, with increased access to other projects and broader cooperations**.

