International cooperation : a key for a sustainable nuclear development

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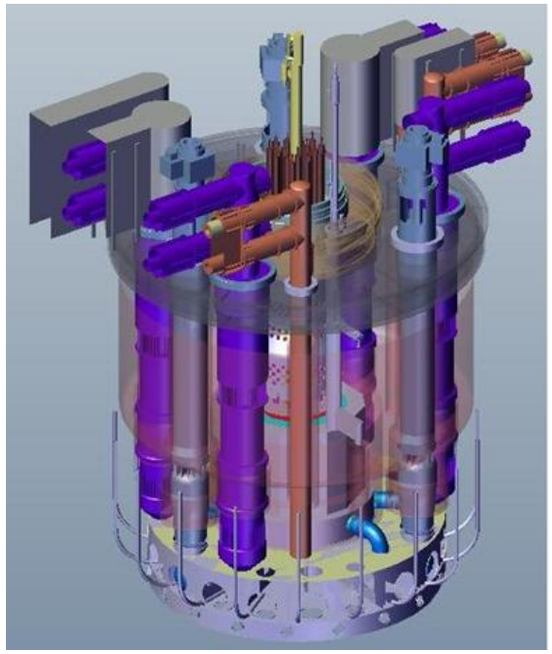
What are the drivers for international cooperation ?

- Nuclear research facilities are more and more expensive to build. Around 800 research reactors were build, and less than 1/3 are still operational.
- Still, new research reactors are needed, for developing GEN IV reactors, optimizing Gen III, and ensuring the safety of Gen II through life extensions programs.
- The requirements for safety demonstration are more and more stringent, and some nuclear reactors are built in many countries : VVER, EPR, AP1000...

- For cost sharing reason, either on the building phase but also operational phase....
- For producing the best possible technical results, able to satisafy the most stringent safety requirements...
- To prepare the future of nuclear energy, in order to make the best choices by having access to a lot different options...

→ International cooperation is essential

Example of international cooperation : ASTRID



R&D Institutes	Industrial partners	Countries
EDF	JAEA + MHI + MFBR	Japan
AREVA	AREVA	Russia (Rosatom)
PSI	EDF	USA (DoE)
CNRS (NEEDS)	COMEX Nuclear	
IGCAR	ALSTOM	
DOE	TOSHIBA	
ROSATOM	BOUYGUES	
NNL	ROLLS-ROYCE	
JAEA	JACOBS	
EURATOM (European projects)	ASTRIUM	
	ALCEN	

- about 250 staff
- 28% of preliminary design

Example of cooperation : Jules Horowitz Reactor

Jules Horowitz Reactor (JHR) : future irradiation reactor under construction at Cadarache

- **Objectives**
  - **Provide experimental irradiation possibilities in support of current and future nuclear fleet** (studies on the behaviour of materials and fuels under irradiation)
  - **Produce radioelements for medical purposes** (25% to 50% of European requirements)

- **Organisation**
  - CEA: owner, nuclear operator and contracting authority
  - International consortium: research centres & industrials

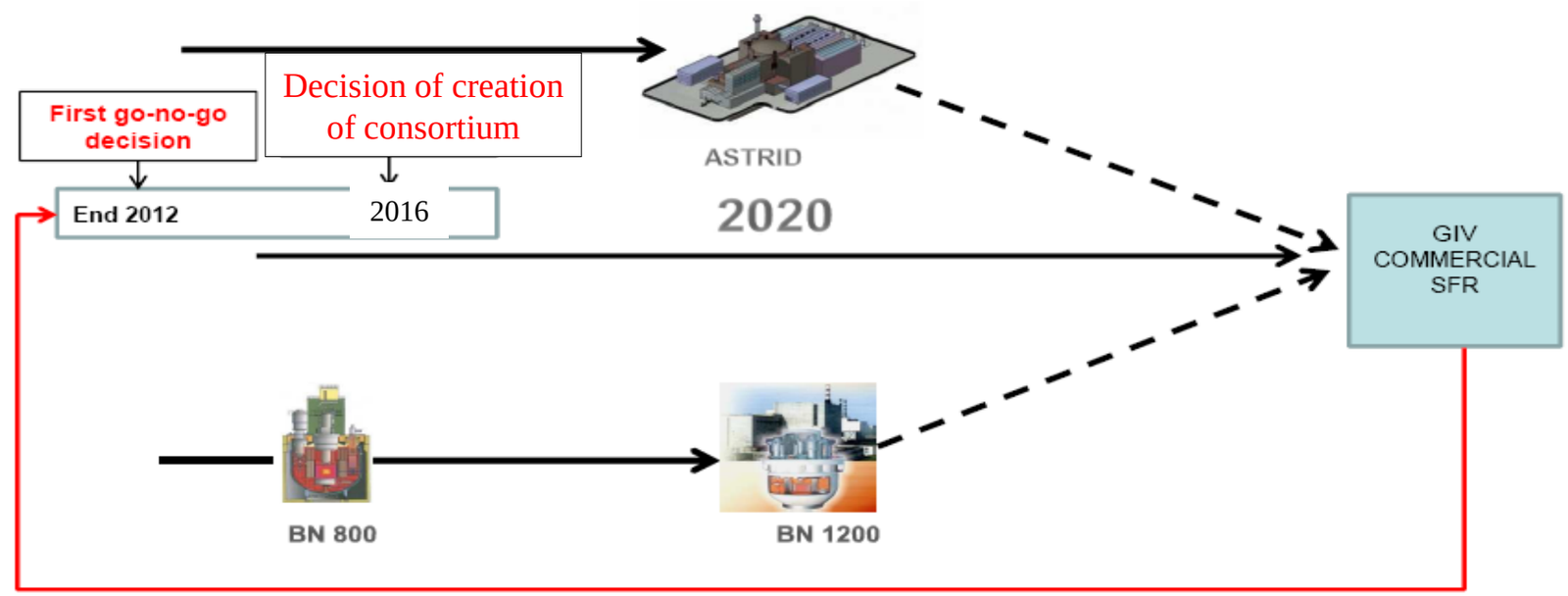
JHR consortium members	Contribution
EDF (France)	*20%*
AREVA (France)	*10%*
EURATOM/JRC (UE)	*6%*
SCK•CEN (Belgium)	*2%*
NRI (Czech Republic)	*2%*
CIEMAT (Spain)	*2%*
VTT (Finland)	*2%*
Vattenfall (Sweden)	*2%*
DAE (India)	*3%*
IAEC (Israel)	*2%*
NLL (United Kingdom)	*2%*
CEA (France)	*Remainder*
JAEA - associate partner (Japan)	

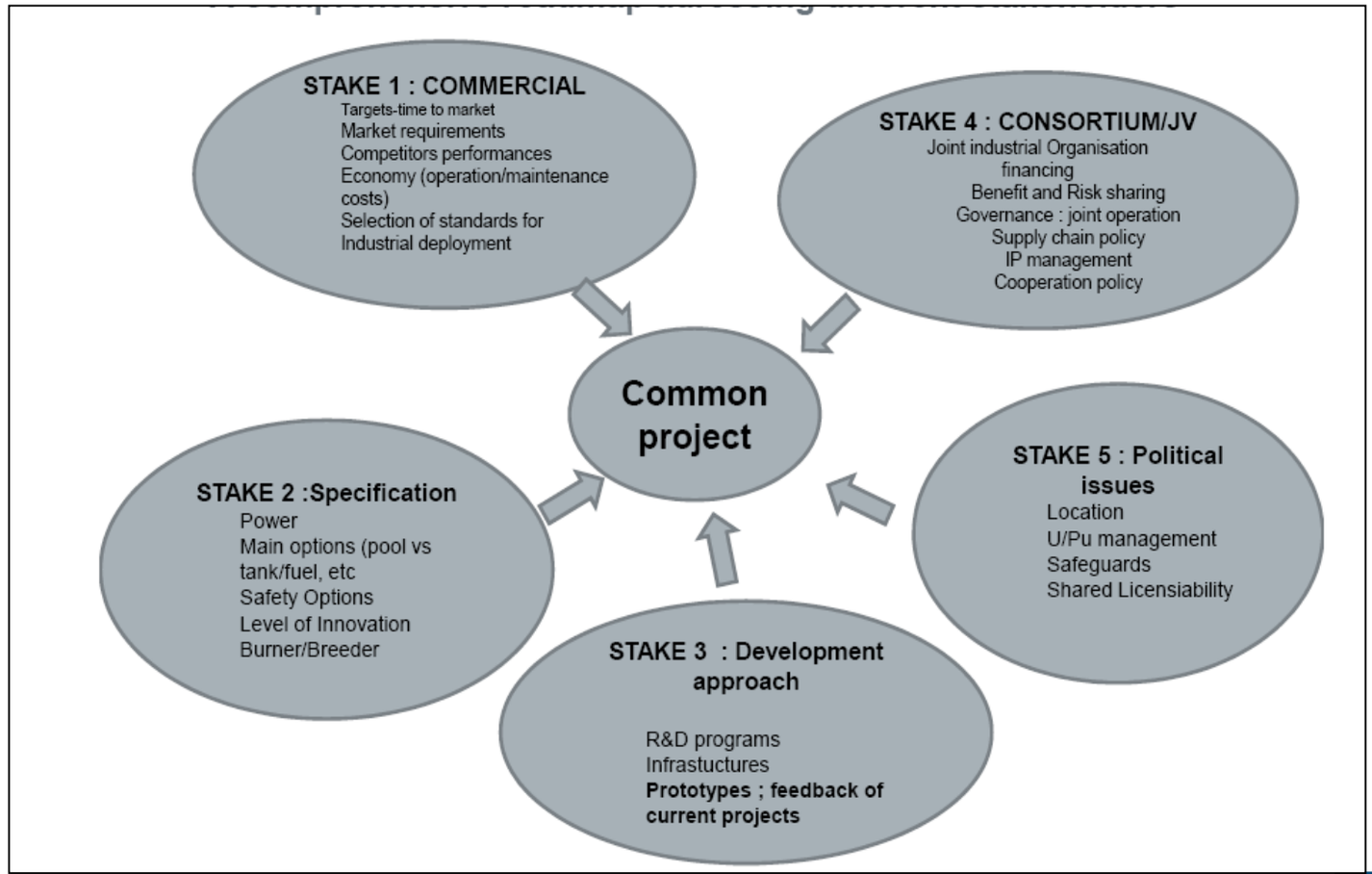
Ambitious coooperation with Russia on GEN IV SFR

An Ambitious Common Objective

Building a Roadmap toward a common commercial Gen IV SFR

Five stakes to be addressed





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