MHI's Experiences & Contributions in HTGR Development in Japan

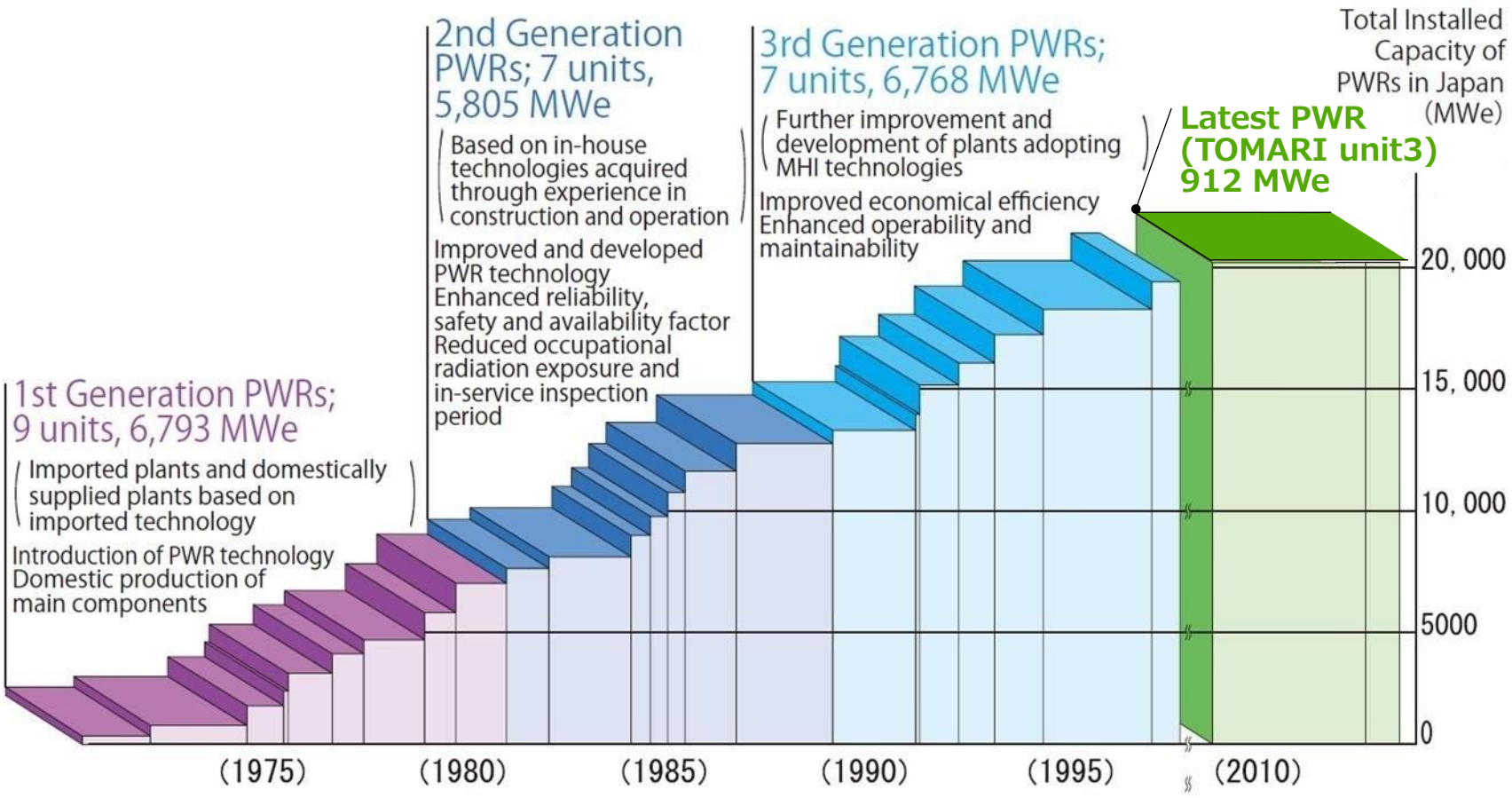
Sep.18, 2019

MITSUBISHI HEAVY INDUSTRIES, LTD.

MHI Nuclear Business - PWRs in Japan

MHI is the sole PWR vendor in Japan which constructed all 24 PWRs.

– Total installed capacity = 20,280 MWe



MHI Nuclear Business - PWRs in Japan

MHI has been contributing to the restart of PWRs in Japan
– 9 PWRs have restarted thus far.

SHIKA 1 2

1 HIGASHIDORI

1 2 3 ONAGAWA

1 2 3 4 KASHIWAZAKI-
5 6 7 KARIWA

1 2 3 4 5 6 FUKUSHIMA- Ⅰ

1 2 3 4 FUKUSHIMA- Ⅱ

2 TOKAI

1 2 3 4 5 HAMAOKA

1 2 SHIMANE

PWR	BWR	Status
N	–	; Restarted
N	N	; Approved (prepare for restart)
N	N	; Under review
Dotted line		; To be decommissioned

➢ Number in □/ ○ indicates the unit number of the plant site.

MHI Nuclear Business - Business Domain-

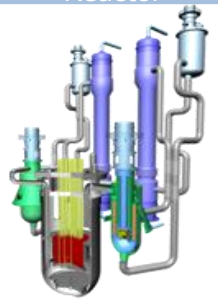
Comprehensively contributing to nuclear fuel cycle

PWR (Japan)

Fuel

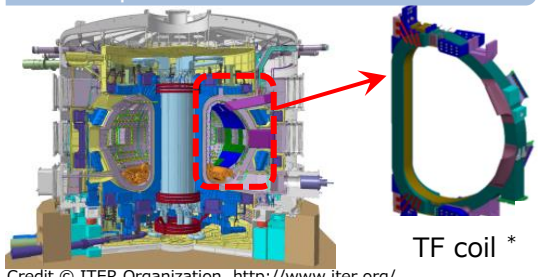
Mitsubishi Nuclear Fuel Co., Ltd.

Fast Breeder Reactor



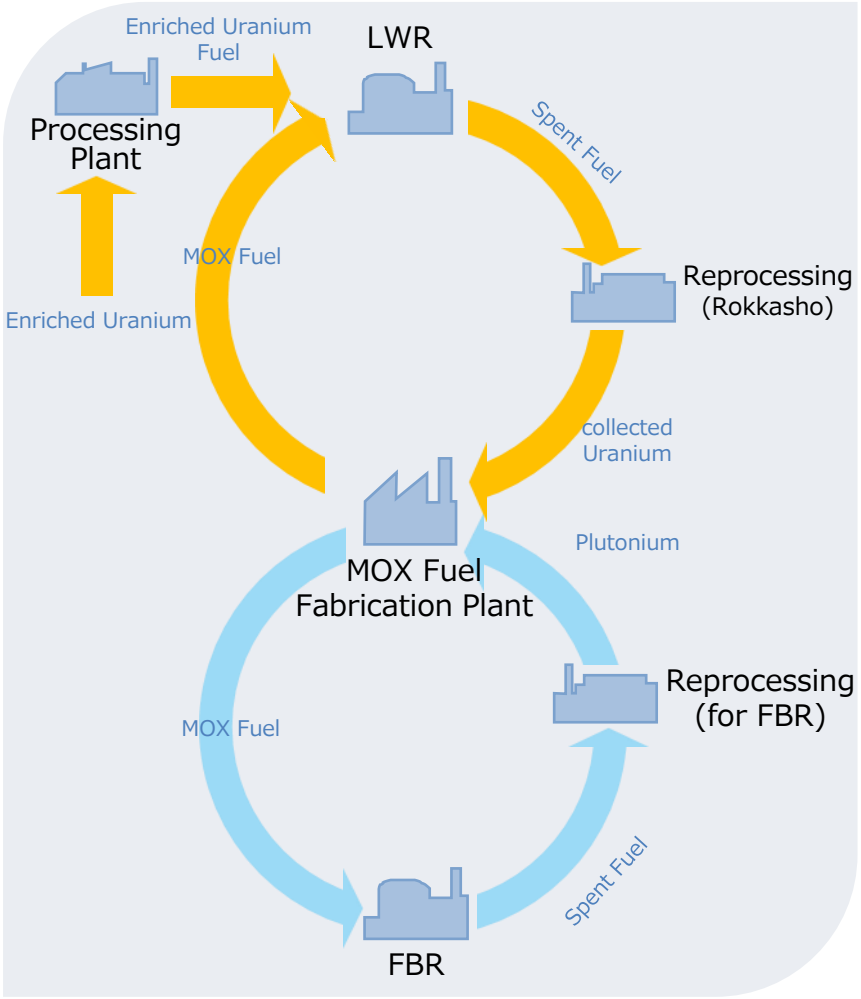
ref:"JAEA-Research 2006-042", 2.1.1-4, p. 69 (2006)

International Thermonuclear Experimental Reactor(ITER)



TF coil *

Credit © ITER Organization, http://www.iter.org/



*TF(Toroidal Field)coil: Produce magnetic field to confine the plasma particles

PWR (overseas)

Nuclear Fuel Cycle

Reprocessing Plant

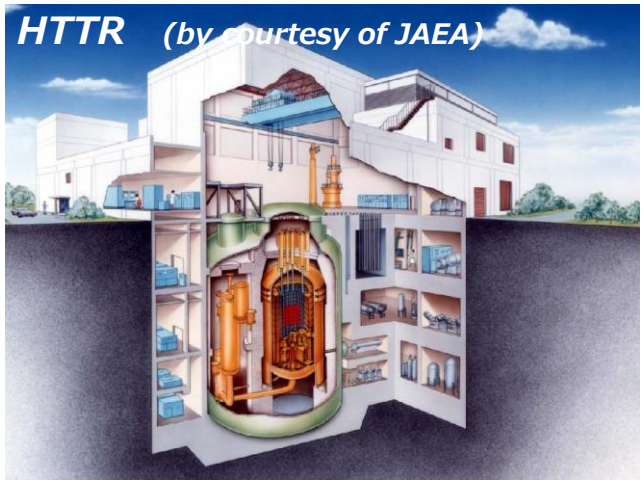
Intermediate Spent Fuel Storage

Dry cask storage

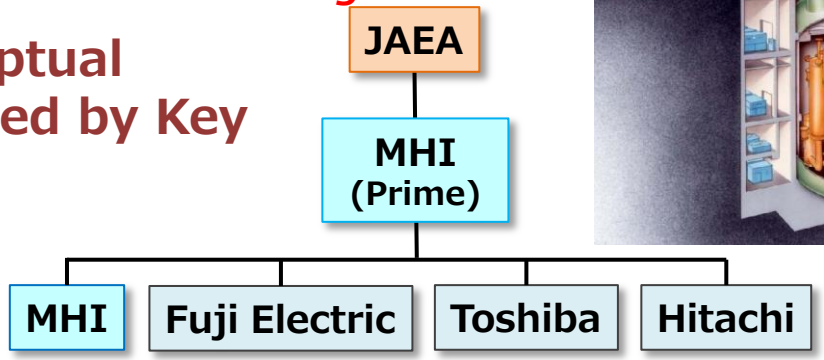
MHI's Experiences in *HTTR**

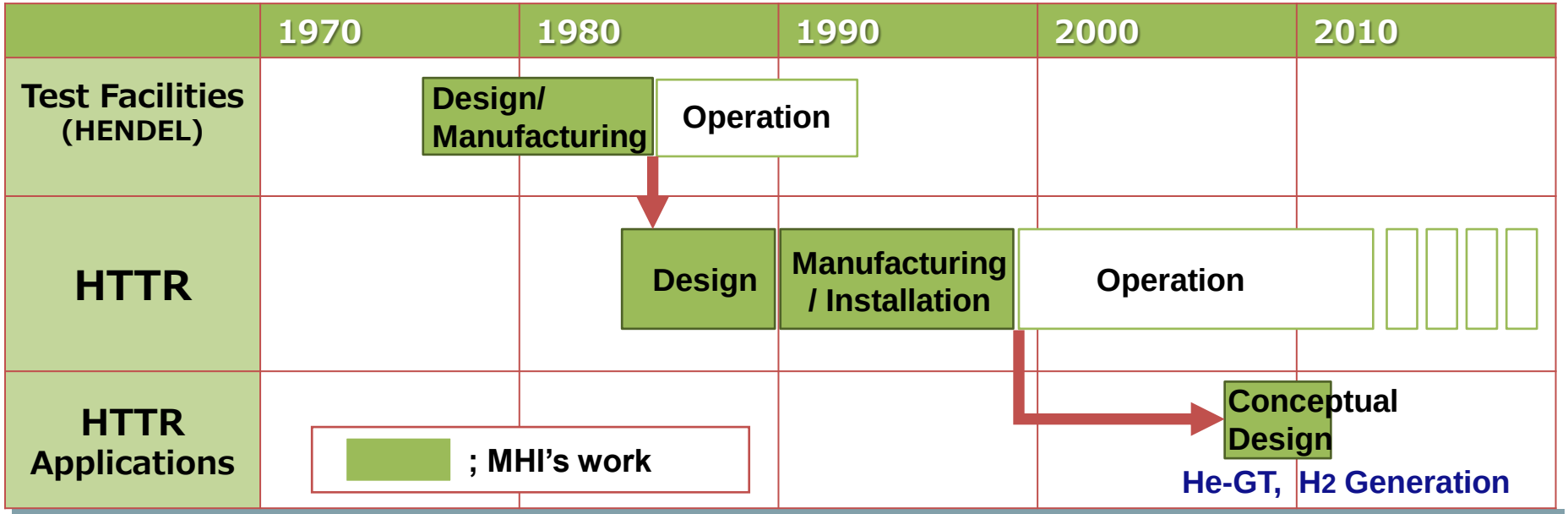
**HTTR (High Temperature Engineering Test Reactor) is the first HTGR in Japan constructed by JAEA*

- **MHI was a Prime company among the participated venders**
- **Supporting for Conceptual & Basic Design followed by Key Components supplier**



<Organization>

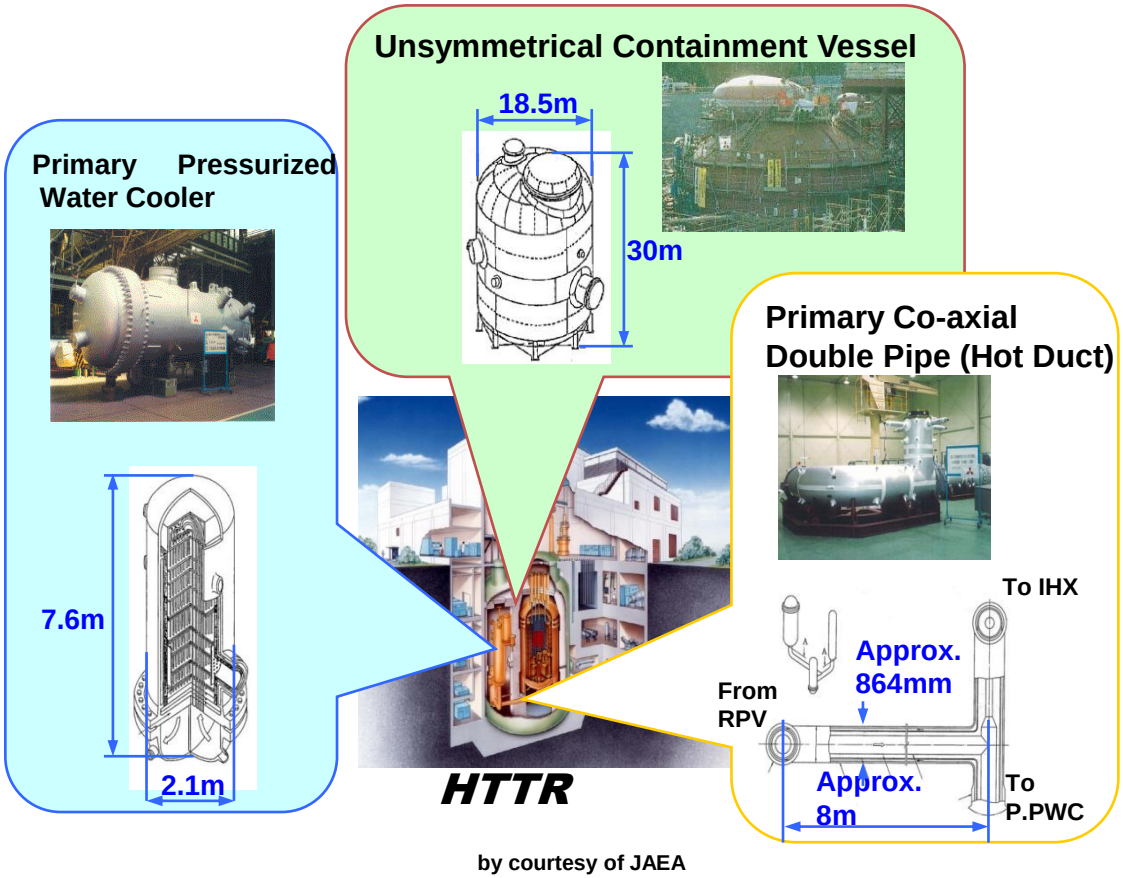




MHI's Experiences in *HTTR*

Key Components supplier for *HTTR*

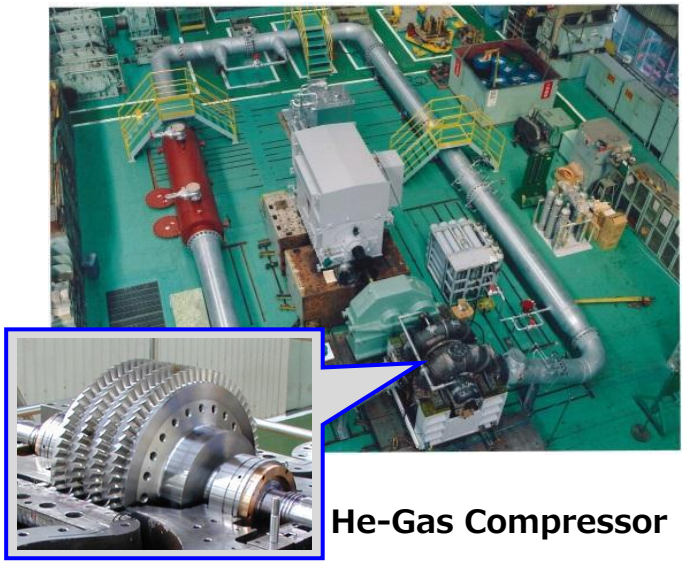
- Conceptual & Basic Design support for JAEA
- Detailed Design & Manufacturing for Key Components



by courtesy of JAEA

R&Ds for *HTTR Applications*

a) He-Gas Turbine Generation



He-Gas Compressor

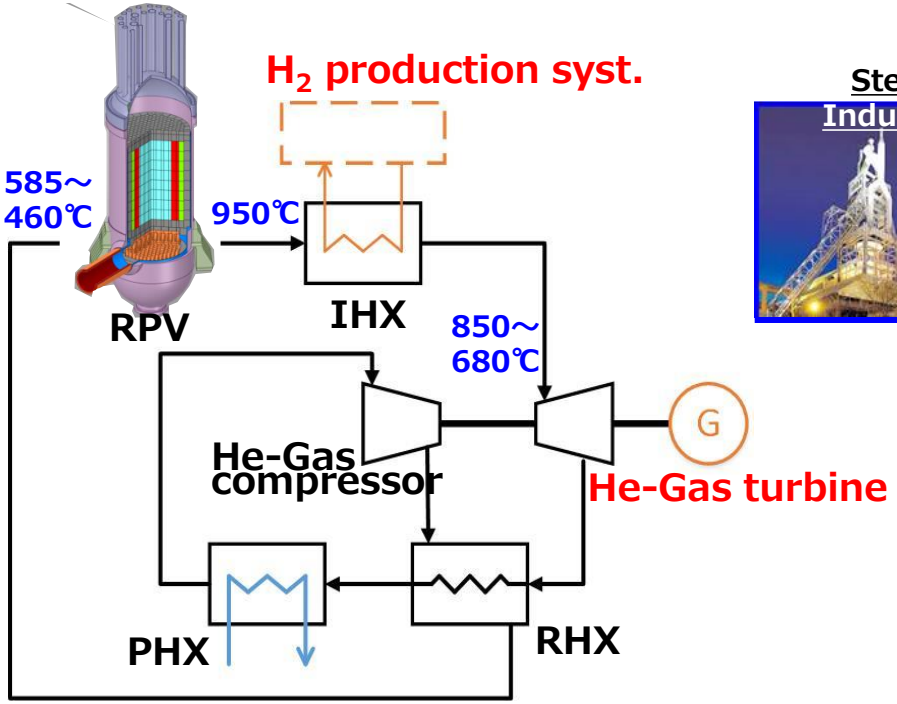
b) Hydrogen Production

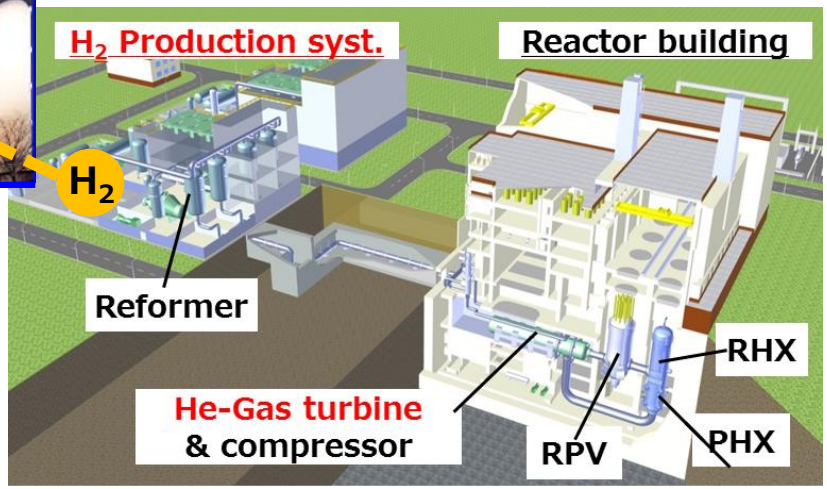
High temp. isolation valve

MHI Advanced HTGR in *NEXIP**

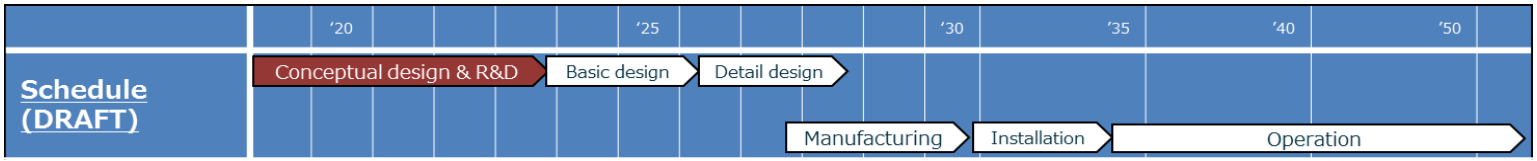
**NEXIP (Nuclear Energy × Innovation Promotion) is a new program funded by METI.*

- **Co-generation plant** to achieve both **Hydrogen production** and **Efficient power generation** with **Ultra-Safety**.
- **Large scale & Efficient Hydrogen Production** is much-anticipated, especially in Steel industry for **de-carbonization Iron-making process**.





HTGR + Hydrogen production plant



Conclusion

- MHI has started to develop HTGR technology since the 1970's under the leadership of JAEA .
- Through the experiences of *HTTR* development and its applications, MHI has been building up a wide variety of technology for HTGR in both designing and manufacturing.
- In 2019, based on the experiences, MHI has just started to develop the Original Advanced HTGR using METI's NEXIP program to meet with the coming Hydrogen needs.

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