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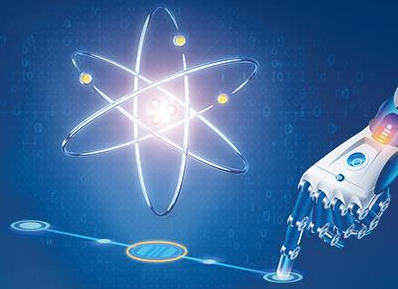

High Temperature Gas Cooled Reactors and their potential uses

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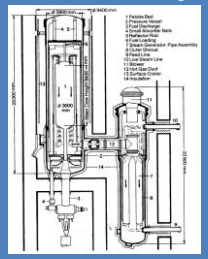
2023

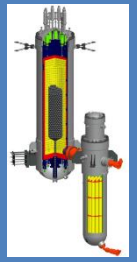
What's HTR (Modular HTR)

Pebble Bed Modular HTRs

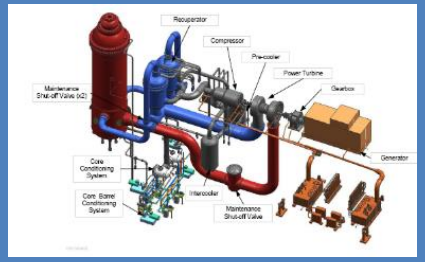
HTR-MODUL
Germany



HTR-PM
China



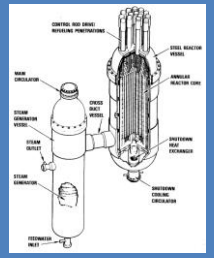
PBMR
South Africa



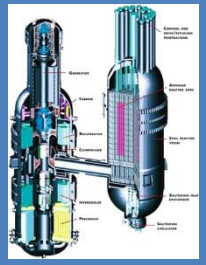
Xe-100
US

Prism Modular HTRs

MHTGR
US

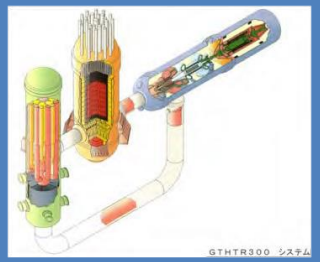


GT-MHR
Russia



SC-HTGR
Framatome

GTHTR300
Japan



High Temperature Gas Cooled Reactor

HTRs in pursuit of Inherent Safety

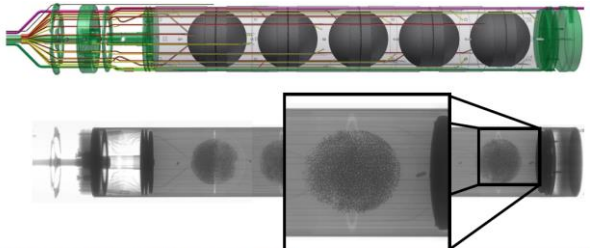
4F

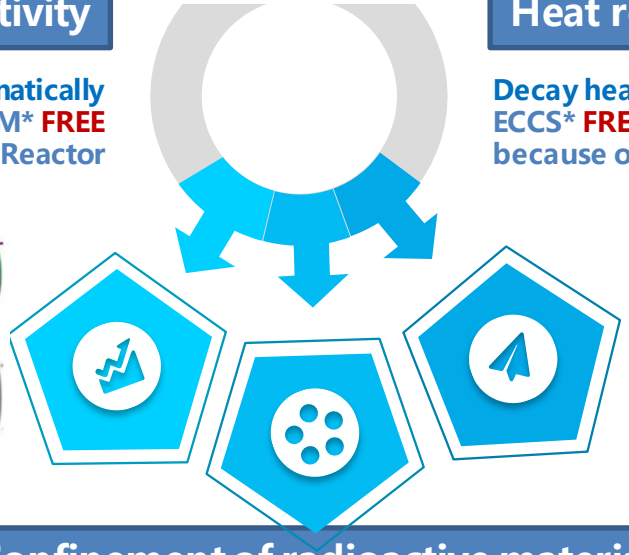
Control of reactivity

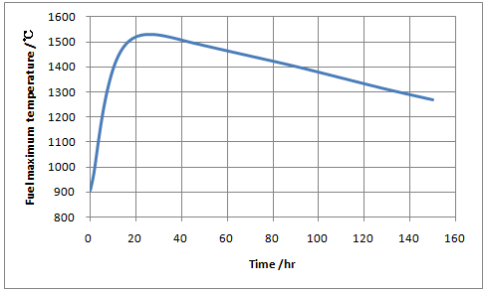
Reactor power controlled automatically
SCRAM* **FREE**
because of Pebble-bed Reactor

Heat removal from the core

Decay heat removed by the law of nature
ECCS* **FREE**
because of SMR







A solution from the HTR-PM Demo Project

Confinement of radioactive material

Core melt-down **FREE**
Large amount radioactivity release **FREE**

*SCRAM = Safety Control Rod Axe Man
a acronym created by Enrico Fermi. It refers to the sudden shutting down of a nuclear reactor usually by rapid insertion of control rods

*ECCS = Emergency Core Cooling System

HTRs' potential markets in China

Supplement to LWR NPPs
Replacement of coal-fired plant

HTR's targeted Markets

Electricity

Co-generation

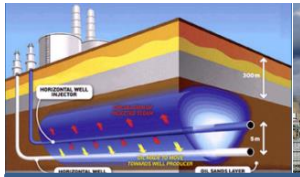
Electricity, Heat, Steam and Water

Hydrogen

Coal liquefaction

Water desalination

District heating



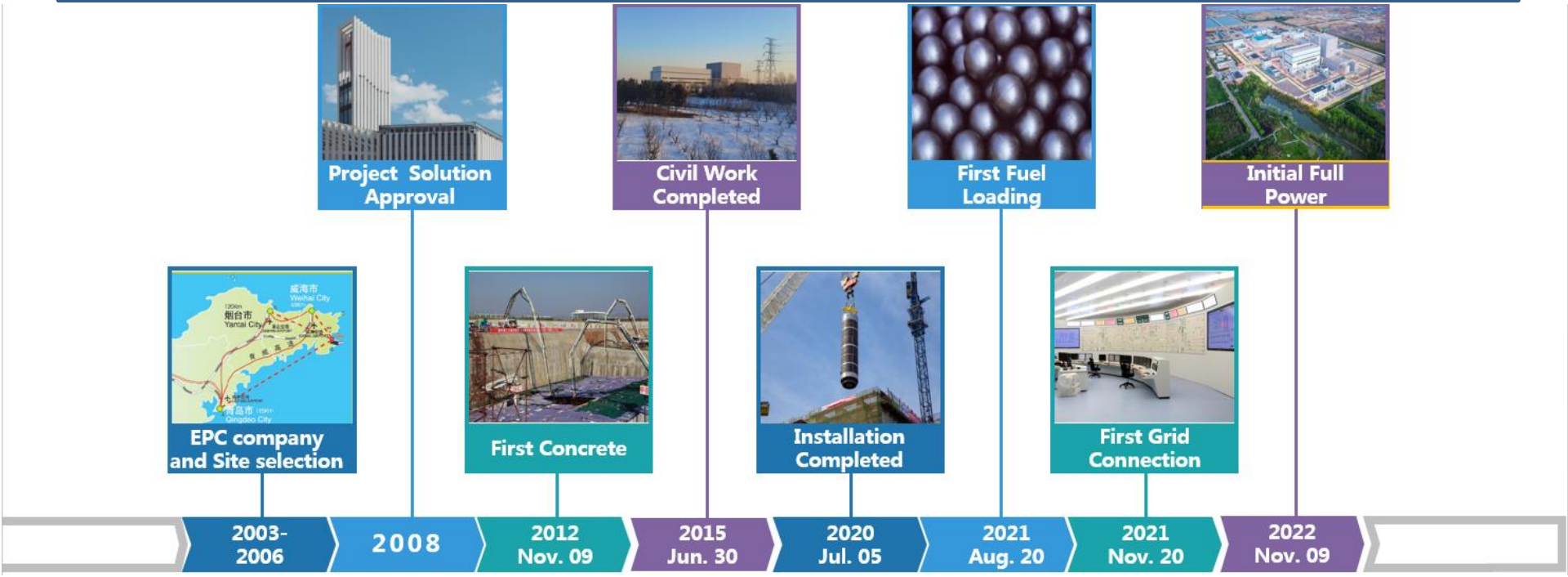
Oil recovery

Petroleum refinery

Transportation

Steel Making

HTR example of electricity production (HTR-PM Demo Project)



HTR example of electricity production (HTR-PM Demo Project)

Main Parameters	
Rated Power, MWe	211
Rated Power per Module , MWth	250
NSSS* Modules	2
Diameter of the Core, m	3
Height of the Core, m	11
Primary Coolant	Helium
Primary loop Pressure, MPa	7
Helium Outlet Temperature, ℃	750
Helium Inlet Temperature, ℃	250
Fuel Enrichment, %	8.5
Steam Pressure, MPa	13.24
Steam Temperature, ℃	566

*NSSS: Nuclear Steam Supply System

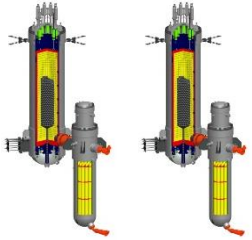
Residential Requirement
2 Million

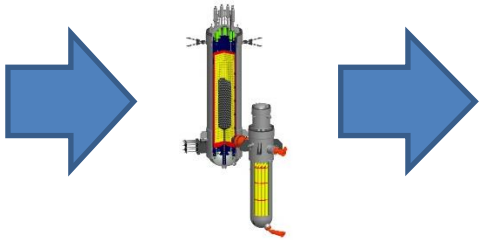
Electricity per Year
1.4 billion kWh

CO2 Emission Avoided
900,000 tons

HTR example of co-generation (HTR-PM600)

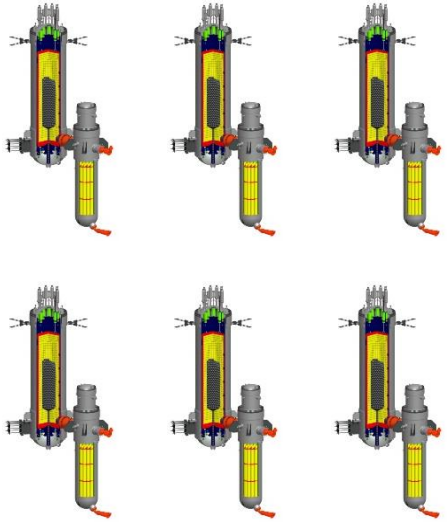
HTR-PM Demo





Standard NSSS Module
HTR-PM type
200 MWth per module

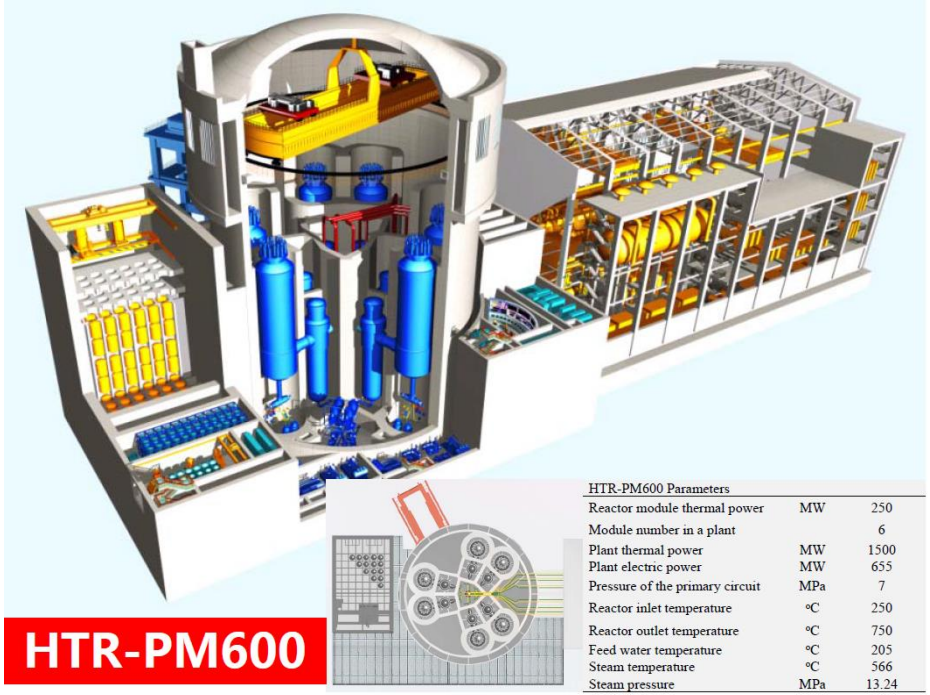
HTR-PM600



HTR example of co-generation (HTR-PM600)

HTR-PM600 project in process

- **Version 1.0**
- **750℃, sub-critical steam turbine, power generation and cogeneration**
- **A real project of 2 x 600MWe HTR-PM600 together with 4 x 1000 MWe HUALONG PWRs:**
  - **Total steam production: 8000t/h, plus electricity production 3300MWe**
  - **Annual reduction of CO2 30 million tonnes**
  - **Cost effectively**



HTR-PM600 Parameters		
Reactor module thermal power	MW	250
Module number in a plant		6
Plant thermal power	MW	1500
Plant electric power	MW	655
Pressure of the primary circuit	MPa	7
Reactor inlet temperature	℃	250
Reactor outlet temperature	℃	750
Feed water temperature	℃	205
Steam temperature	℃	566
Steam pressure	MPa	13.24

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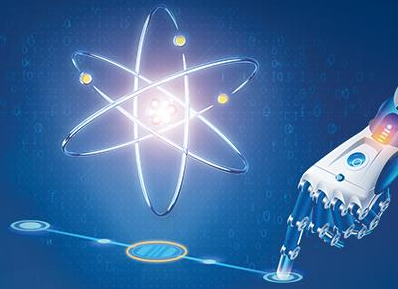

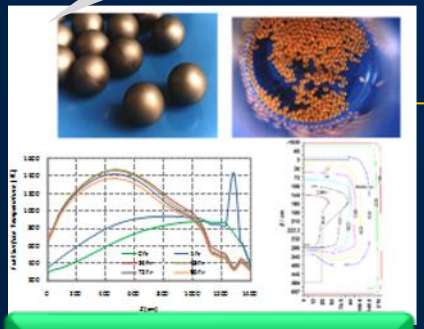

1970s

HTR-10, 2003

HTR-PM Demo, 2023

HTR-PM600

2023

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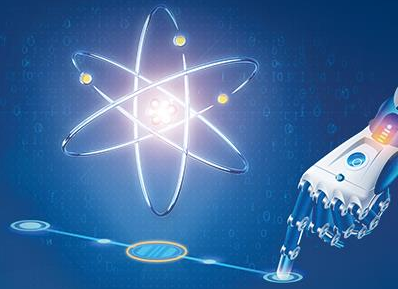

Thanks for your attention

2023