

TOSHIBA

Expectation to HTGR Deployment

Toshiba Energy Systems & Solutions Corporation

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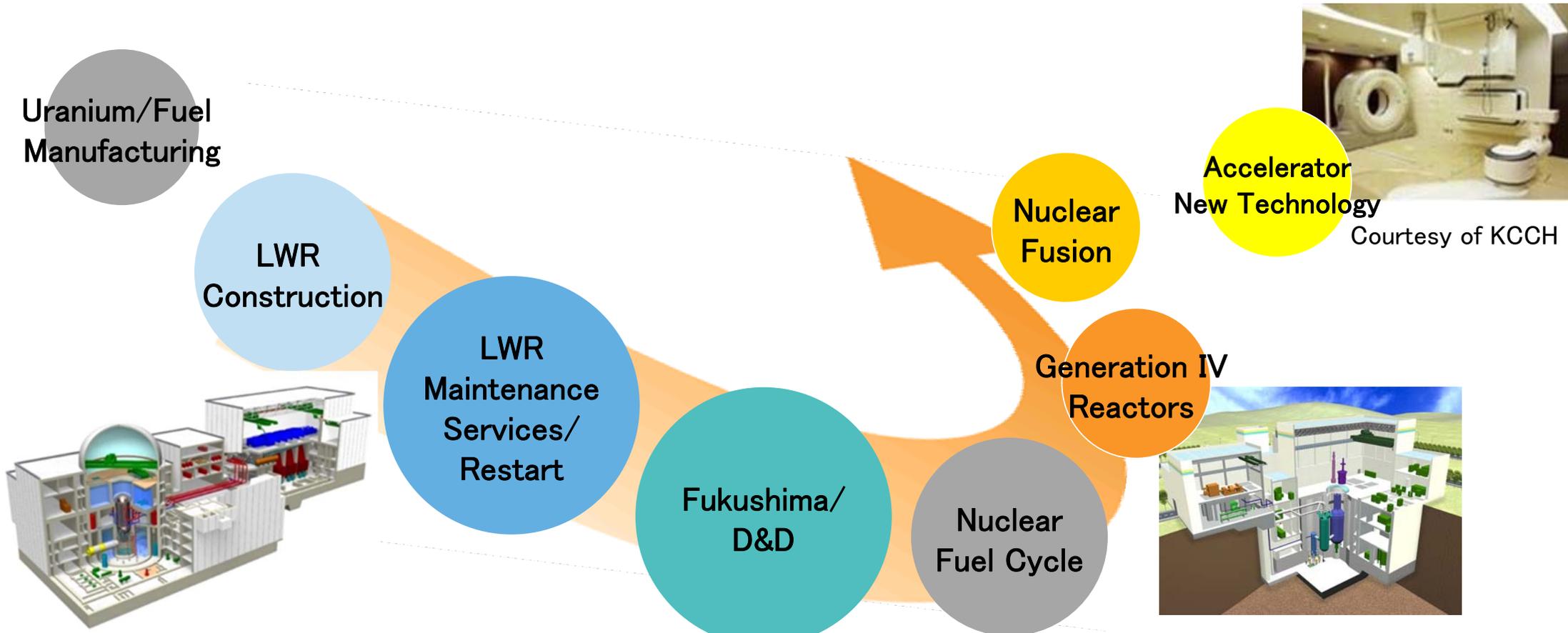
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1. Business Domain of Toshiba Nuclear



Covering from nuclear power plants to next generation energy development

2. Technology of Toshiba Group on HTGR

Toshiba participated in the construction of HTTR

And provided key high temperature components

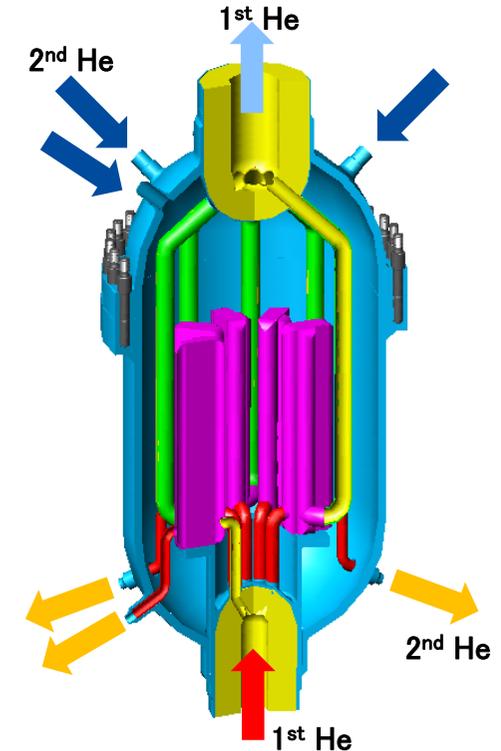
- Intermediate Heat Exchanger (IHX)
- TRISO fuel
- Reactivity Control System etc.

HTTR succeeded in heat transfer from primary helium gas of 950 deg.C by using IHX

Toshiba established design methods and manufacturing technologies through analysis & mockup test



Tube Bundles of IHX (HTTR)



Innovative Conceptual Design of IHX

2. Technology of Toshiba Group on HTGR

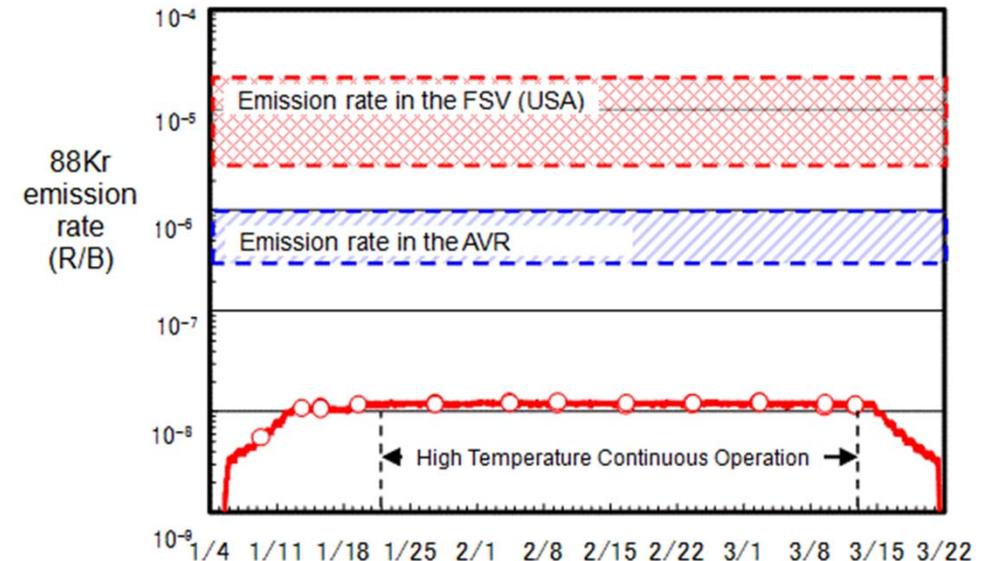
Toshiba group has about 40 years R&D experience concerning HTGR fuel.

- Establishment of HTTR fuel fabrication technology & facility for mass production.
- Fabrication of many irradiation campaigns test samples and first & second loading fuel (0.9 tU each) for the HTTR.

The fuel of the HTTR has excellent confinement ability of fission product which is the highest performance in the world



HTTR Fuel



HTTR operation experience @950 deg.C

3. Concept of High Temperature Gas Cooled Reactor

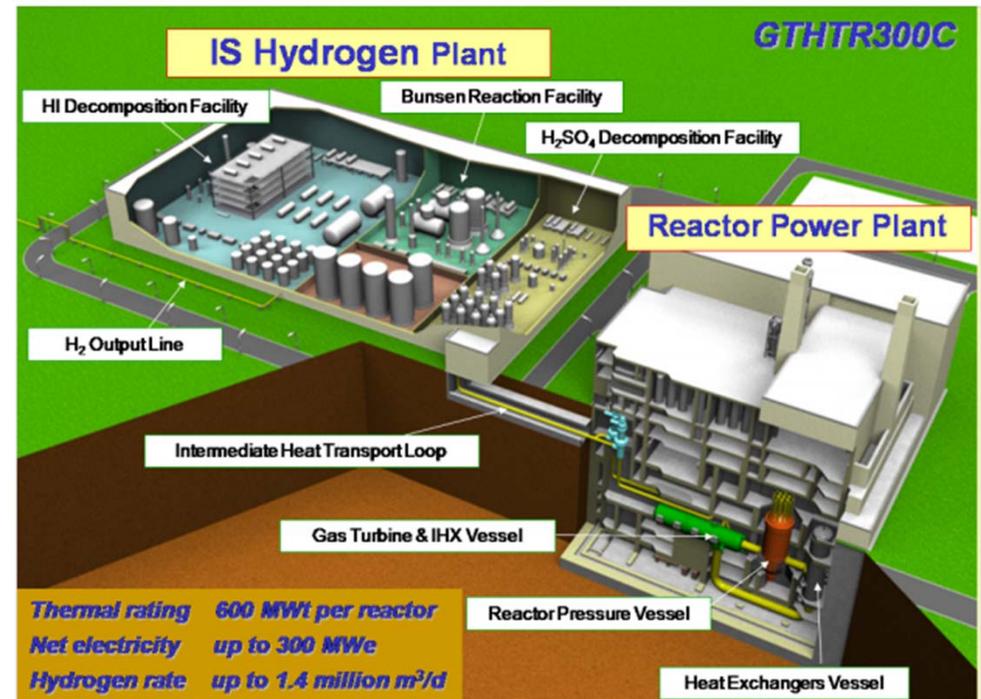
Conceptual Design with JAEA

Small HTGR for Electricity & Steam



HTR50S

Hydrogen Plant

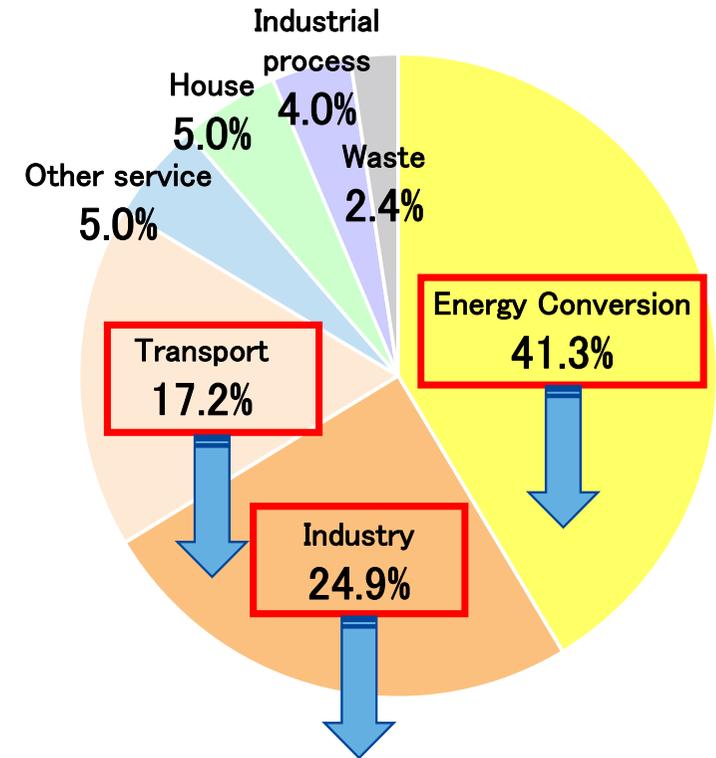
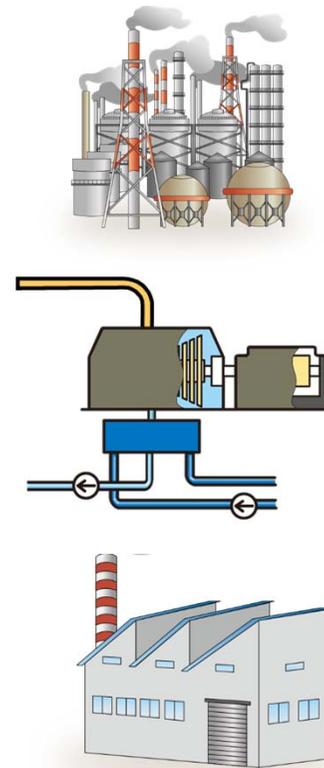
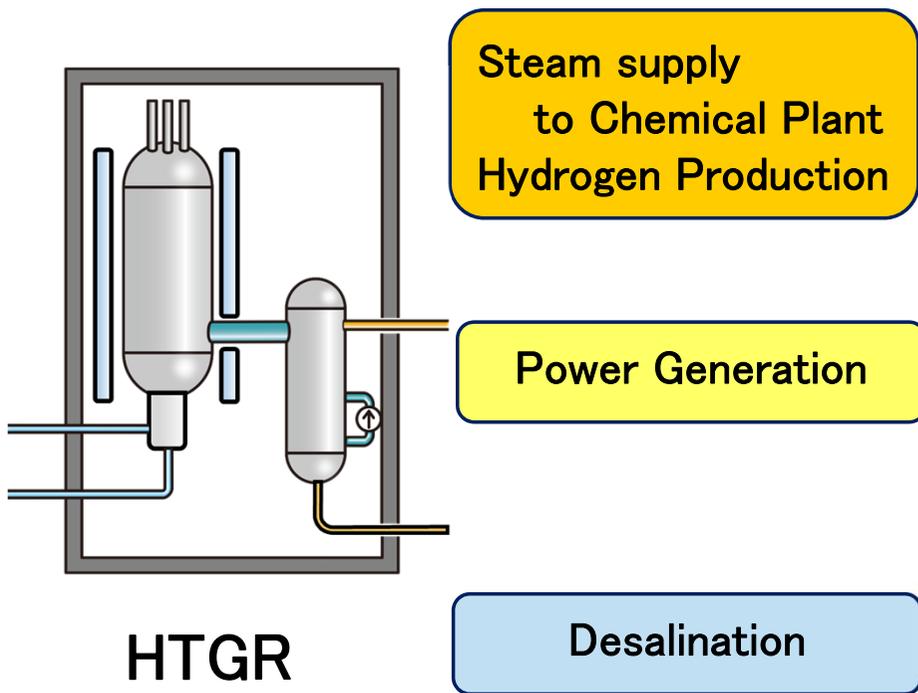


GTHTR300C

Quoted from JAEA website,
Partially corrected for this presentation

4. Expectation to HTGR Deployment

- Inherent and Passive Safety
- Various Heat Application
- Reduction of CO2 emission



CO2 emission ratio in Japan (2017)
Total 1190M (ton)

<http://www.nies.go.jp/whatsnew/20190416/20190416.html>

5. Conclusion

- **HTGR**
 - provides both electricity and process heat with industry
 - contributes to CO₂ emission reduction
- **To Deployment of HTGR**
 - In case of introducing HTGR for process heat, Government-led strategy and scheme would be required.
- **Construction of commercial plant is expected in the near future by training of engineers and developing technology in HTTR**

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