Policy of HTGR Development in Japan

‘It is important to continue to promote research and development of technological systems for a High Temperature Gas-cooled Reactor which can be a high temperature heat source for power generation with excellent economic efficiency and hydrogen production based on it.’

Invitation to Cool Earth 50 (2007)
‘We will also enhance the reliability and safety of nuclear energy, and develop advanced nuclear power generation technologies, such as High Temperature Gas-cooled Reactors and small reactors, so that safe and peaceful use of nuclear power will be expanded.’

‘Promotion of effective measures against global warming: advanced nuclear power generation with High Temperature Gas-cooled Reactor or small and medium reactors, solar power generation, a fuel cell, next-generation automobiles, or ultra high energy efficiency technology such as hydrogen-reduction technology in iron and steel making process.’

To develop, demonstrate and deploy innovative technologies for diversifying and advancing nuclear energy use, such as • • • • , and hydrogen production technology using High Temperature Gas-cooled Reactors.

Roadmap for Innovative Technology Development of Nuclear Energy (2008)
- Vision: Nuclear energy supply technology satisfies the requirements from thermal demands
- Candidate of technology: Innovative hydrogen production technology by using nuclear energy
- Content: R&D on High Temperature Gas-cooled Reactor technology, and innovative hydrogen production technology by thermochemical water splitting
- Target: Presentation of prototype commercial system around 2020

Strategy for Technological Innovation (2008)
‘Hydrogen energy system technology’ was selected as one of 23 innovative technologies
- Target: technology development for prevention of global warming in order to achieve sustainable economic growth amid intensified international competition
- Content: Japanese economic growth can be supported by creating alternative clean energy industries (e.g., steel making using hydrogen, fuel cell vehicle) by establishing hydrogen production technology (thermochemical IS process) using nuclear energy (High Temperature Gas-cooled Reactor) without greenhouse gas emission, balancing stable energy supply with the prevention of global warming

Council for Science and Technology Policy
# Technical Roadmap of Nuclear Hydrogen Production by Atomic Energy Commission of Japan (July 2008)

<table>
<thead>
<tr>
<th>Year</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td>Introduction of Commercial HTGR hydrogen production system around 2030</td>
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<tr>
<td>2010</td>
<td>Begin the Pilot-scale test</td>
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<tr>
<td>2015</td>
<td>Begin the HTGR-IS test</td>
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<tr>
<td>2020</td>
<td>Reliability validation Technology demonstration (Presentation of Prototype Commercial System)</td>
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## Development Target:
- **H₂ production cost**: ~20 JPY /m³
- **Efficiency**: Over 40 %
- **Endurance time**: Over 3000 h
- **Burn-up**: 120 GWd/t
- **Power density**: 6W/cc
- **Life extension of structural material** (e.g. Graphite, High-temperature metallic material, etc.)

## Reactor Technology using the HTTR:
- HTTR technology
- Data acquisition for commercialization
- International collaboration: GIF, etc.

## Integration Technology:
- HTGR technology
- HTGR-IS

## Elemental Technology R&D:
- Pilot-scale test

## Pilot-scale Test:
- Engineering scale R&D

## Hydrogen Production Technology by IS Process:
- Technology demonstration
- Achievement of hydrogen production rate of 1000 Nm³/h

## Commercialization and Spread of HTGR Hydrogen Production System:
- Development target for HTGR technology