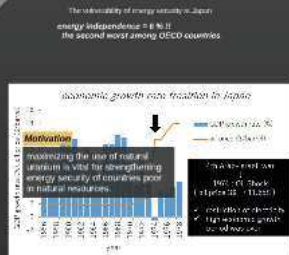


# Development of FBR in Japan, and self-introduction

By: Koei Sasaki  
( Monju, JAEA )

## Energy security



## Motivation

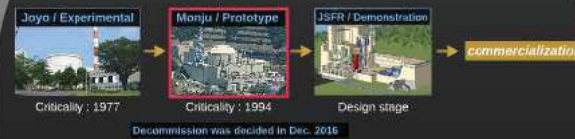


## The efficient use of uranium



## Development

### The history of FBR development in Japan



- Profile
- Name : Koei Sasaki
  - Age : 30 years old
  - Birthplace : Fukuoka
  - Occupation : Maintenance engineer in Monju since 2012
  - Education : Ph.D. in Nuclear material
  - Goal : Contribution to development of energy resource in Japan by using spent fuel / FBR

Thank you for your attention



Depleted Uranium possessed by Japan (2011)

$15,514^* \text{ (ton)} \times 4,560,000,000^{**} \text{ (kWh)} = 70,743,840,000,000 \text{ kWh}$

FBR unlimited cycle case

[ References ]

\* MEXT (Ministry of Education, Culture, Sports, Science and Technology) reported in Aug. 2012.

\*\* Atomic Energy Commission "7th FBR meeting material" in Jul. 1997.

\*\*\* In case of LNG power generation cost is 13 yen / kWh.

\*\*\*\* Global note <http://www.globalnote.jp/>

9 trillion US \$  
worth of natural gas generation\*\*\*

The world's yearly  
electric power consumption  
(2012)

19,710,362,000,000 kWh\*\*\*\*

**x3.5**



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= rou

Costing  
Fuel S  
T-3.5 (



Fast Breeder Reactor



**U238**  
**99.3% of Natural Uranium**



Prezi

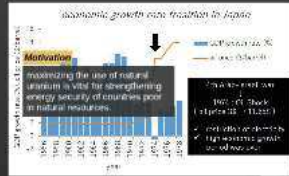


# Development of FBR in Japan, and self-introduction

By: Koei Sasaki  
( Monju, JAEA )

## Energy security

The vulnerability of energy security in Japan  
energy independence = 0 % !!  
the second worst among OECD countries



## Motivation

### The efficient use of uranium



15,514\* (ton) × 4,560,000,000\*\* (kWh)  
Deployed Monju assumed by Japan (2012) FBR unlimited cycle case



U238  
99.3% of Natural Uranium

## Development

### The history of FBR development in Japan



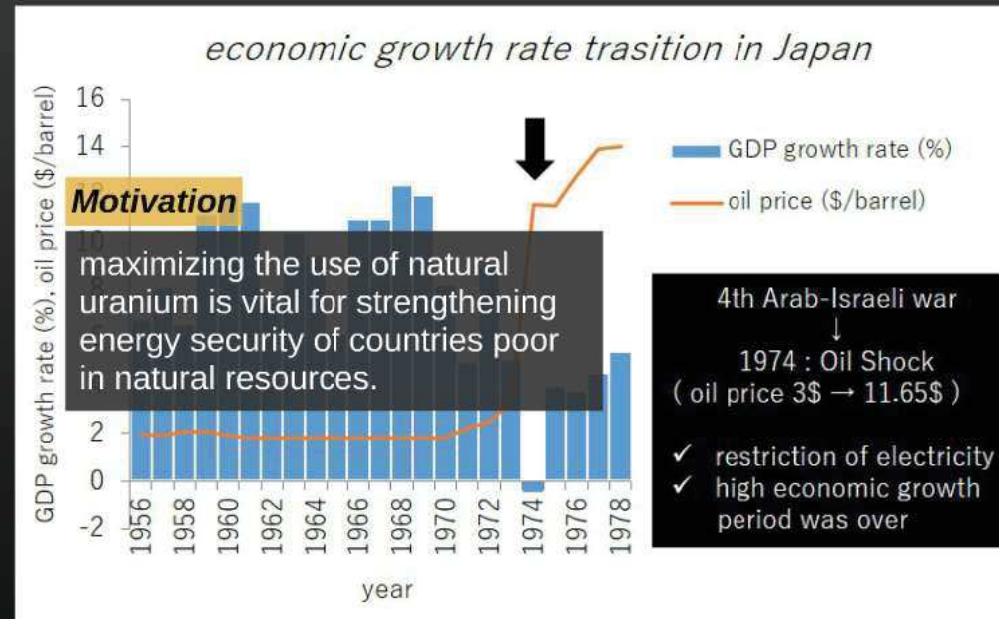
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The vulnerability of energy security in Japan

*energy independence = 6 % !!  
the second worst among OECD countries*



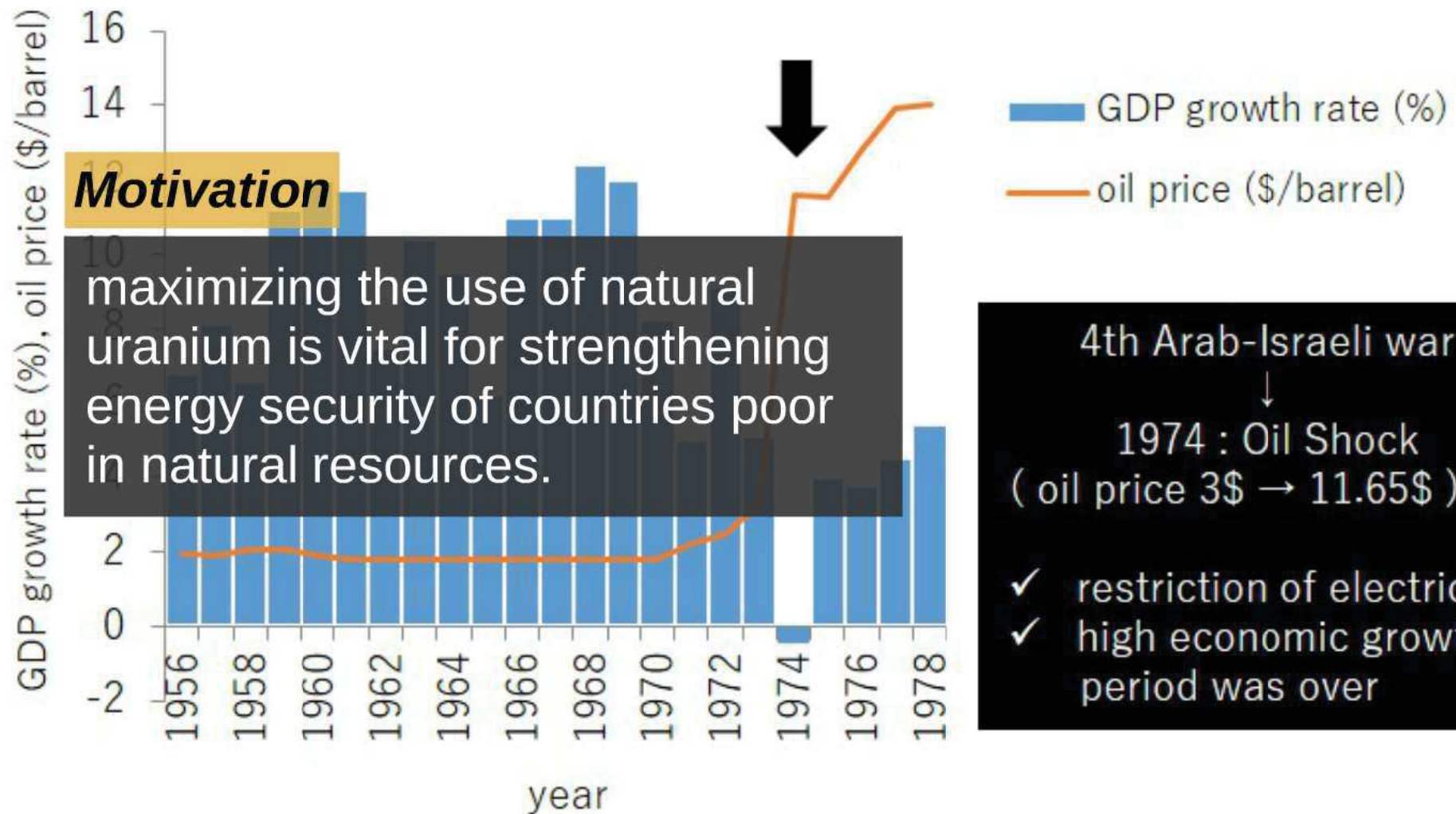
The vulnerability of energy security in Japan

***energy independence = 6 % !!  
the second worst among OECD countries***

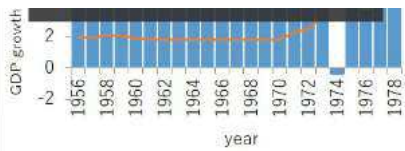


*economic growth rate transition in Japan*

## *economic growth rate transition in Japan*







on price 3\$ → 11.65\$ )  
 ✓ restriction of electricity  
 ✓ high economic growth  
 period was over



# The efficient use of uranium



Depleted Uranium possessed by Japan (2011)

$$15,514^* \text{ (ton)} \times 4,560,000,000^{**} \text{ (kWh)} = 70,743,840,000,000 \text{ kWh}$$

FBR unlimited cycle case

9 trillion US \$ worth of natural gas generation\*\*\*

**x20**

The world's nuclear spent fuel = roughly 300,000 ton.

Costing of Spent Nuclear Fuel Storage, IAEA No. NF-T-3.5 (2009)

The world's yearly electric power consumption (2012)

19,710,362,000,000 kWh\*\*\*\*\*

**x3.5**

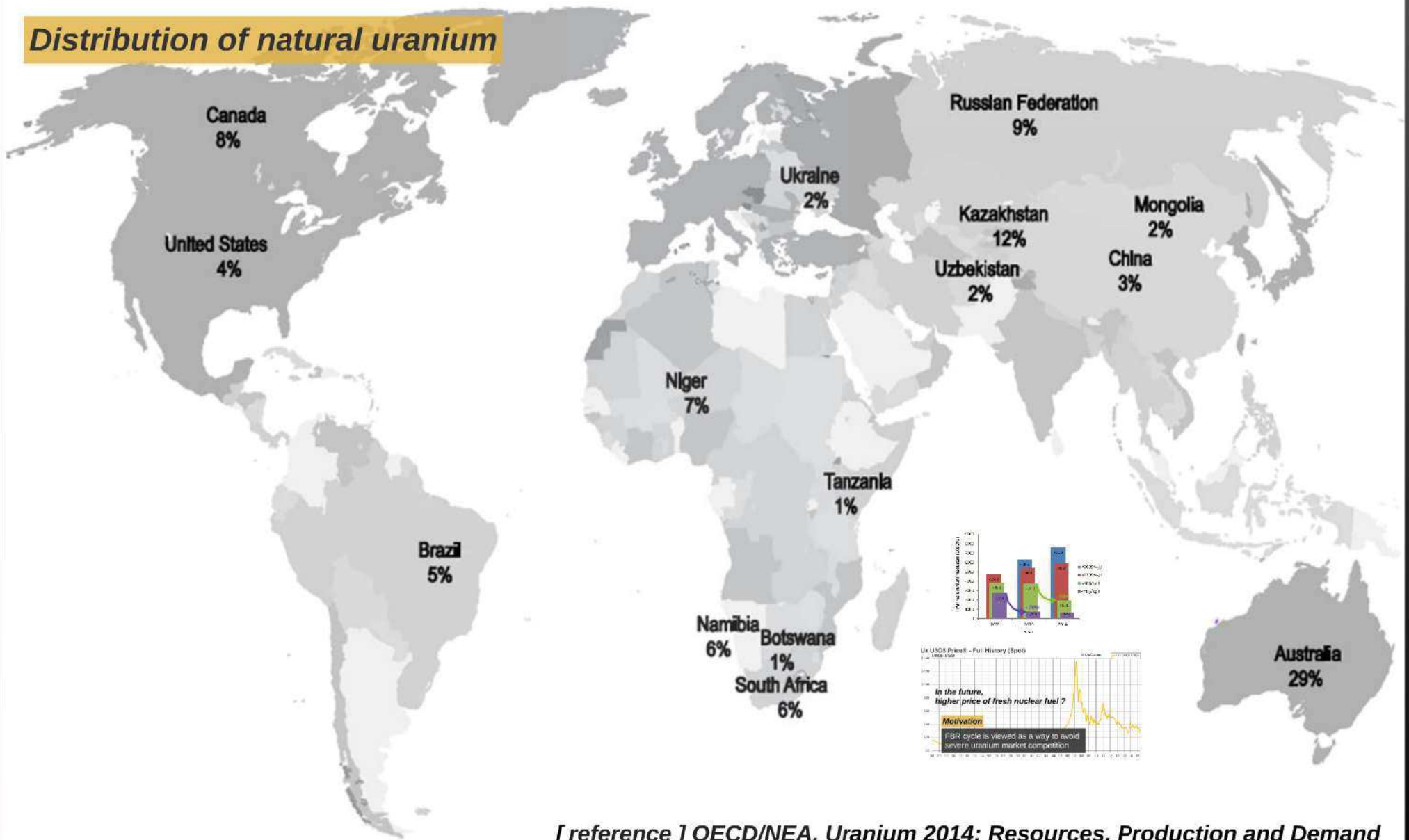
[ References ]

- \* MEXT (Ministry of Education, Culture, Sports, Science and Technology) reported in Aug. 2012.
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- \*\*\* In case of LNG power generation cost is 13 yen / kWh.
- \*\*\*\* Global note <http://www.globalnote.jp/>



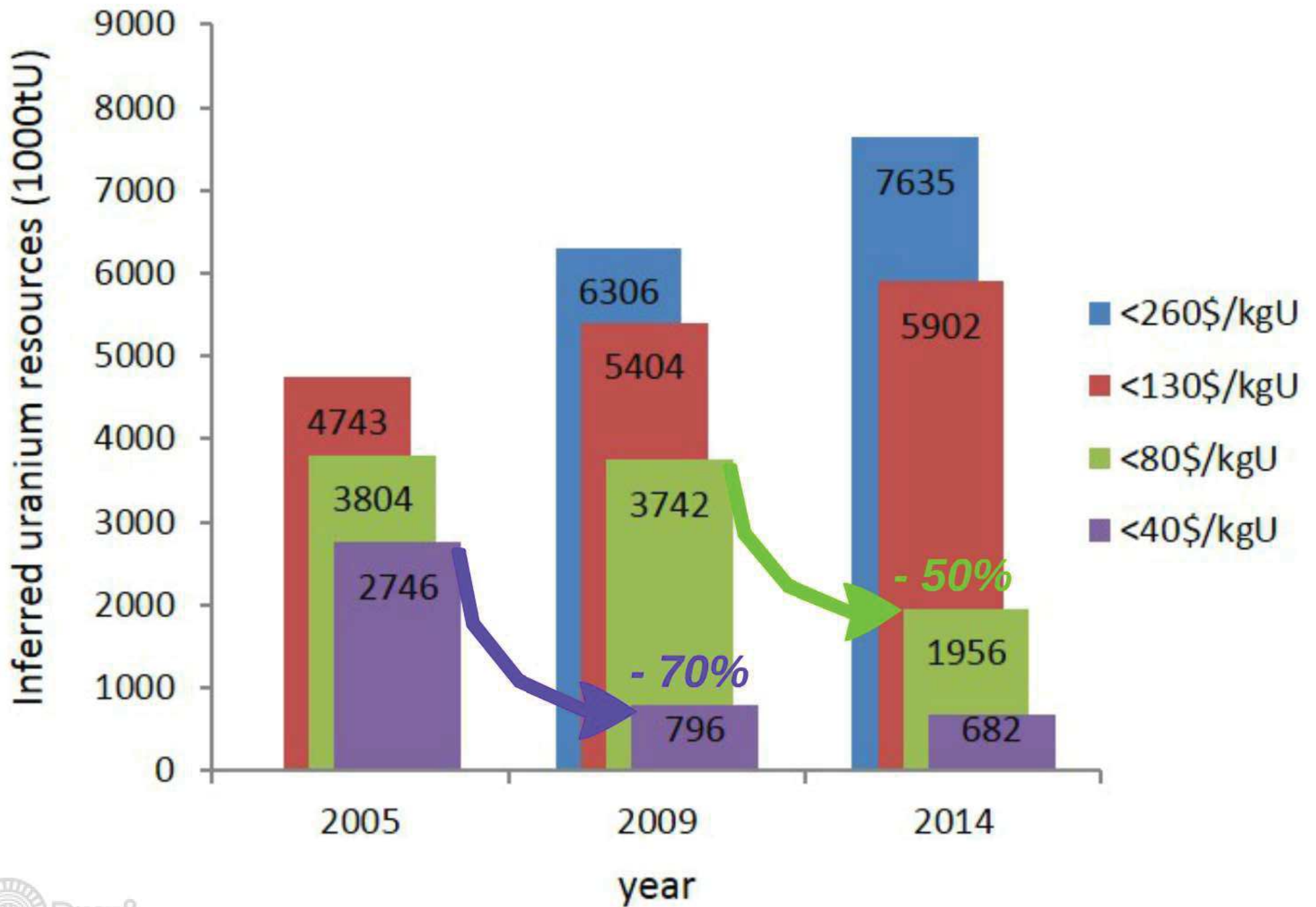
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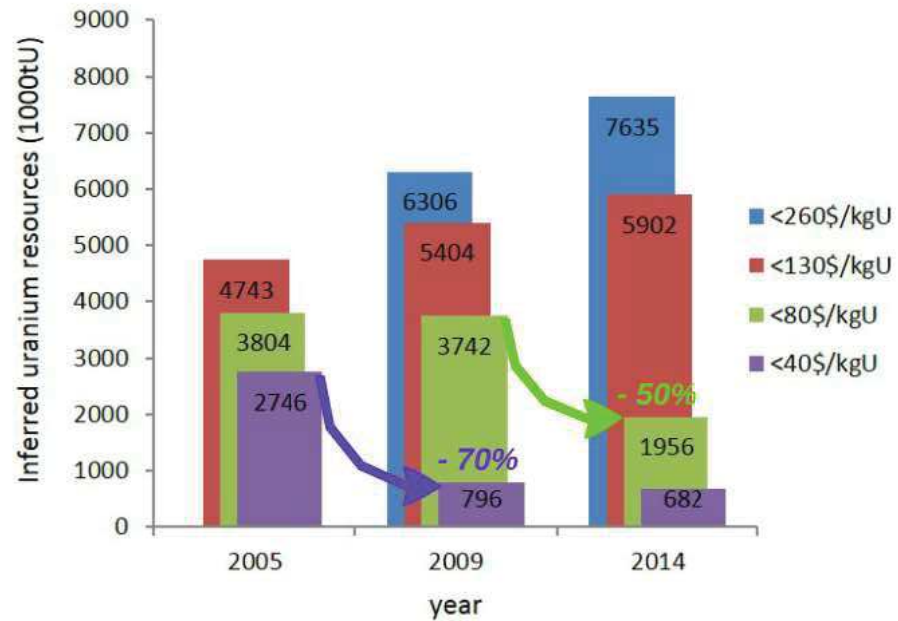
## Distribution of natural uranium



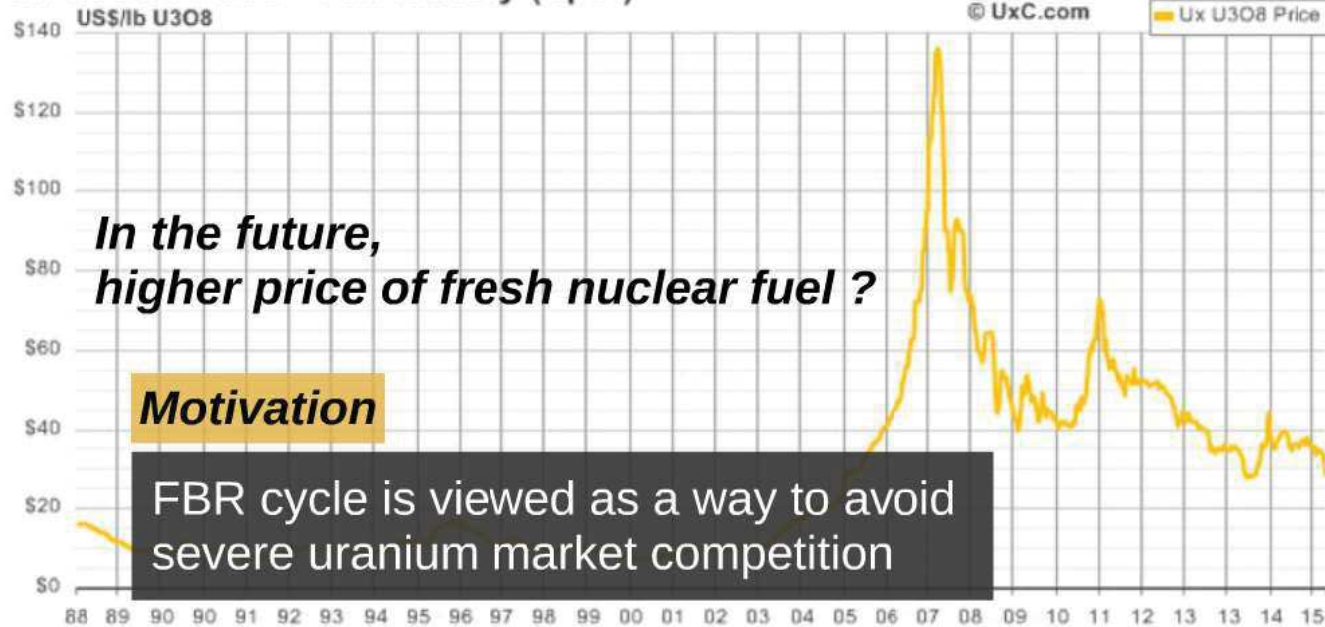
[ reference ] OECD/NEA, Uranium 2014: Resources, Production and Demand



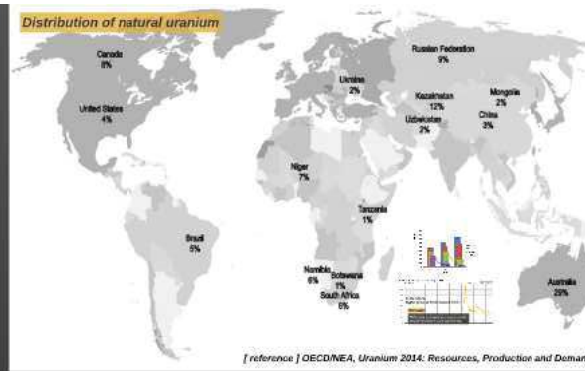




### Ux U3O8 Price® - Full History (Spot)



# THE CHALLENGE of



Depleted Uranium possessed by Japan (2011)

$$15,514^* \text{ (ton)} \times 4,560,000,000^{**} \text{ (kWh)} =$$

FBR unlimited cycle case

9 trillion US \$  
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The world's yearly  
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**×3.5**

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**9 trillion US \$  
worth of natural gas generation\*\*\***

**(kWh) = 70,743,840,000,000 kWh**

**case**

**The world's yearly  
electric power consumption  
(2012)**

**× 2**

**The world's nu  
= roughly 300**



**19,710,362,000,000 kWh\*\*\*\***

**× 3.5**

**Costing of Spec  
Fuel Storage, I  
T-3.5 (2009)**

**g. 2012.**



**9 trillion US \$  
worth of natural gas generation\*\*\***

**= 70,743,840,000,000 kWh**

**The world's yearly  
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**×3.5**

**×20**

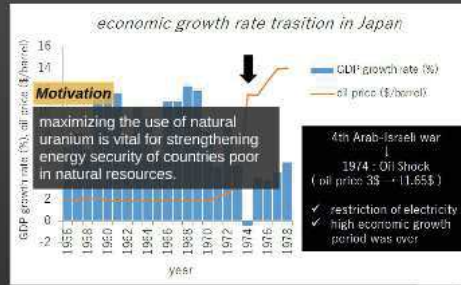
**The world's nuclear spent fuel  
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Costing of Spent Nuclear  
Fuel Storage, IAEA No.NF-  
T-3.5 (2009)



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# Motivation

## The efficient use of uranium



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FBR unlimited cycle case



x20

The world's nuclear spend has increased roughly 300,000 ton.  
 Closing of spent nuclear fuel storage (AEA report 1-15 (2009))

[References]  
 \* MEXT (Ministry of Education, Culture, Sports, Science and Technology) reported in Aug. 2012.  
 \*\* Atomic Energy Commission "7th FBR meeting material" in Jul. 1997.  
 \*\*\* In case of LWR power generation cost is 33 yen / kWh.  
 \*\*\*\* Global note <http://www.globalnote.jp/>



Fast Breeder Reactor

U238  
 99.3% of Natural Uranium





# Development

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## The history of FBR development in Japan



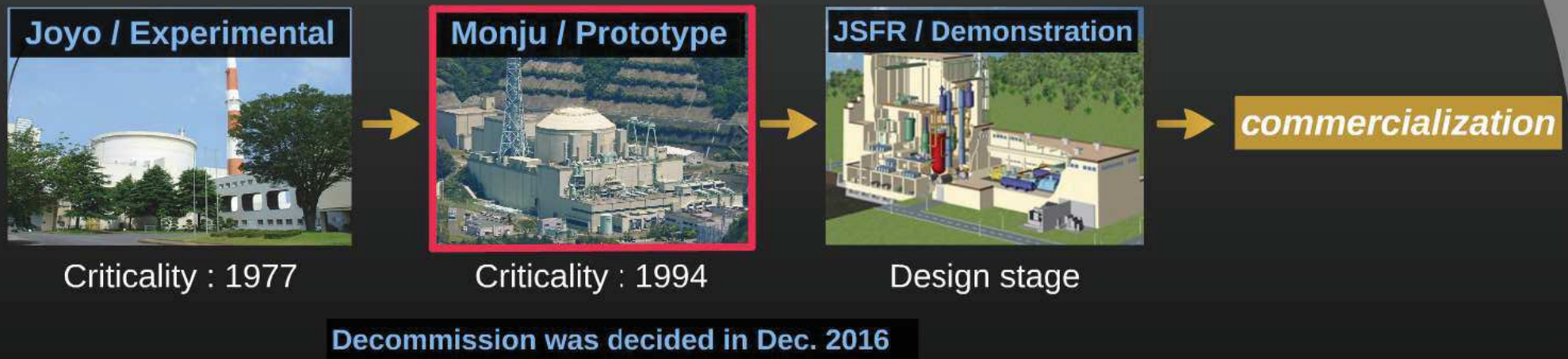
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Prezi

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Prezi



ality : 1977



Criticality : 1994



Design stage

**Decommission was decided in Dec. 2016**

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Prezi