



Introduction of Japan Coal Energy Center (JCOAL)

WYOMING/JCOAL FUTURE OF COAL WORKSHOP 2017
GILLETTE, WYOMING, USA
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Japan Coal Energy Center (JCOAL)





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1. Introduction of JCOAL
2. Future of Coal in Japan



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2. Future of Coal in Japan



About us

- Established in 1990, with its origin back to 1948
- Supervision by METI
- Coordinating between governments and between the public sector and the private sector in close collaboration with international and domestic partners including 140 members companies
- Line of business : all energy and coal related issues

Facilitation and promotion of cleaner utilization of coal



Coal Center



Power plant



Cement plant

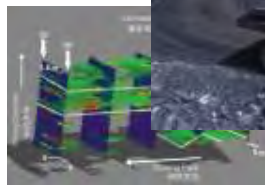


Iron works



Chemical plant

Mining & Preparation



Exploration



Coal utilization technology development

JCOAL's Activities

Government of Japan

Coal Division, Natural Resources and Fuel Department, Agency for Natural Resources and Energy, Ministry of Economy, Trade and Industry (METI)

JOGMEC Japan Oil, Gas, and Metals National Corporation

NEDO New Energy and Industrial Technology Development Organization

JICA Japan International Cooperation Agency

Coal Producing Countries
Coal Using Countries

International Agencies
(World Coal Association(WCA), IEA, etc.)

JCOAL as "One-stop Shop for Coal"

Information Collection & Sharing and Advisory Activities

- Follow-up of Clean Coal Policy and Policy Recommendations
- Enhancement and exploration of JCOAL's Interorganizational Network
- Enhancement of Organizational Framework of Updated Information Collection and Sharing for Further Development

Programs for Coal Resources Development

- Coal Resources Survey
- Coal Stable Supply
- Human Resources Development

Promotion of Clean Coal Technology Development

- Coal Utilization Technology Development
- Coal Ash Utilization Technology Development
- Other R&D

Programs for Public Relations and Human Resources Development

- Coal-related Public Relations Activities

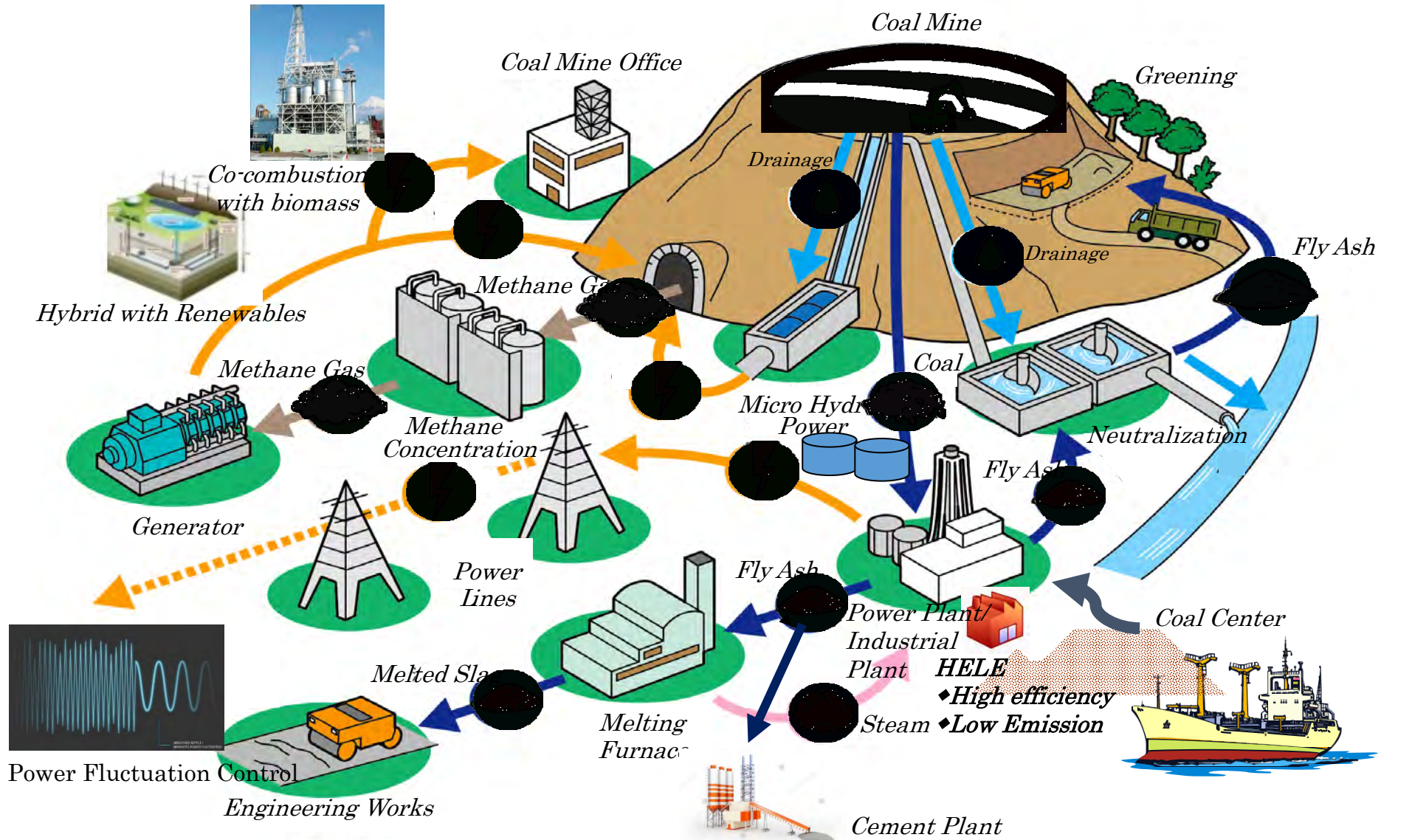
Strategic Promotion of Priority Projects

- Eco Coal Town Project
- Low Rank Coal Utilization Project
- IGCC, CCS and other CCS-related Projects
- Clean Coal Technology Sharing and Transfer

140 Member Companies

Our Goal to reach :

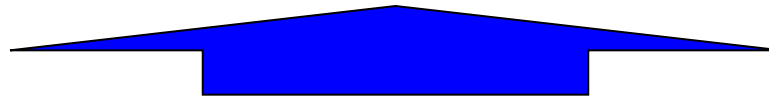
Innovation of Coal Value Chain toward a Circular Economy





Our Engagements

**Toward sustainable energy supply
through optimal utilization of coal and balanced energy diversification**



**Business and project development
for waste treatment and utilization**

Business and project development on CCS and CCUS

Business and project development

Technology and knowledge sharing

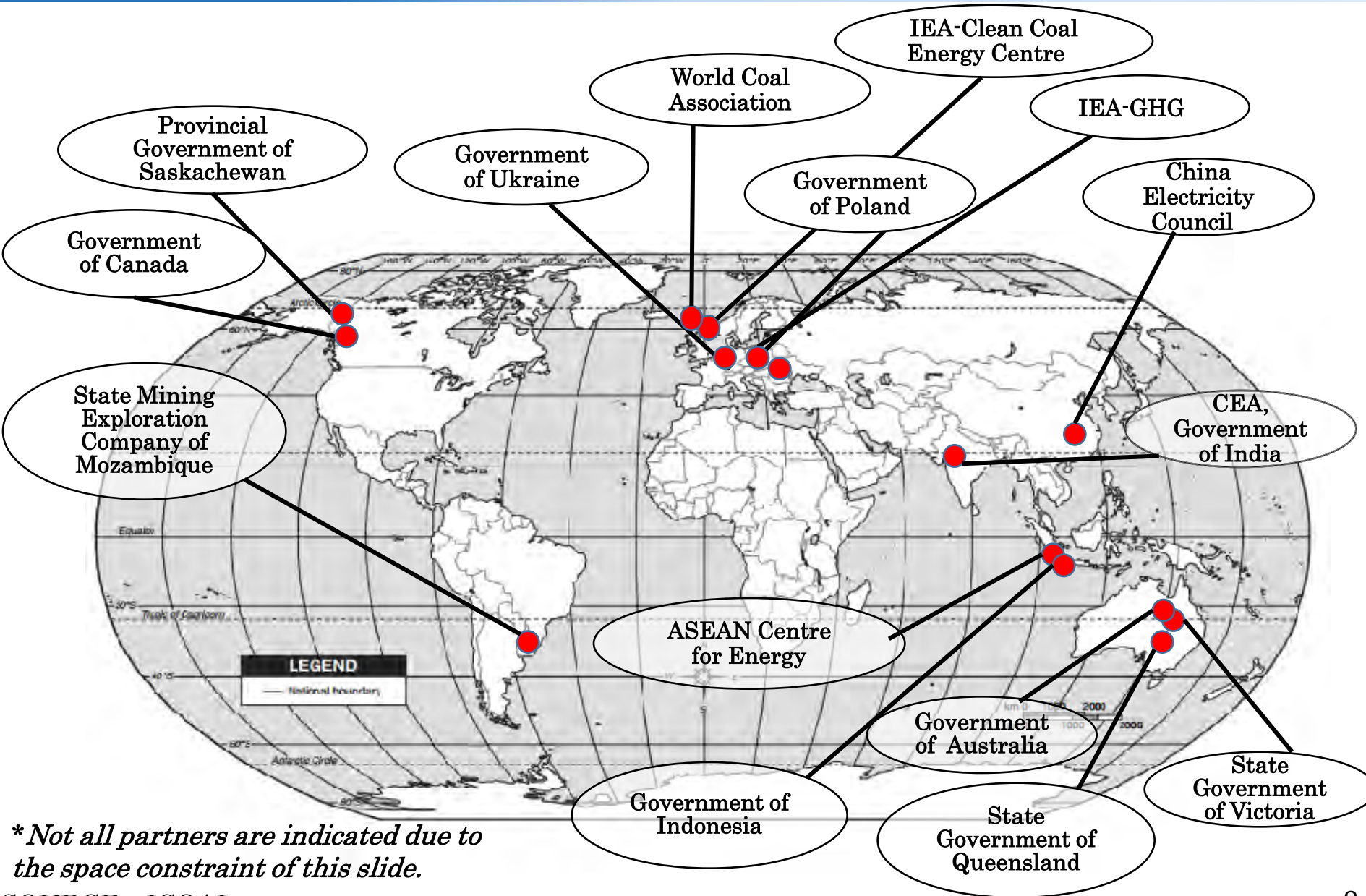
R&D

HRD

**Collection and provision of strategic energy
and coal information**

Surveys and studies on energy and coal issues

Our Network through Partner Institutions



** Not all partners are indicated due to the space constraint of this slide.*



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2. Future of Coal in Japan

Future of Coal Policy in Japan (1)

- Demand for the coal-fired power generation is expected to increase especially in Asian areas.
- At OECD, November 2015, all participating countries reached a basic agreement on new regulation of financial assistance for coal-fired power plant.
- Consistent promotion of Clean Coal Technology is very important considering the result of COP21.
- The Japanese government will actively work on the development of high efficient coal-fired technology.

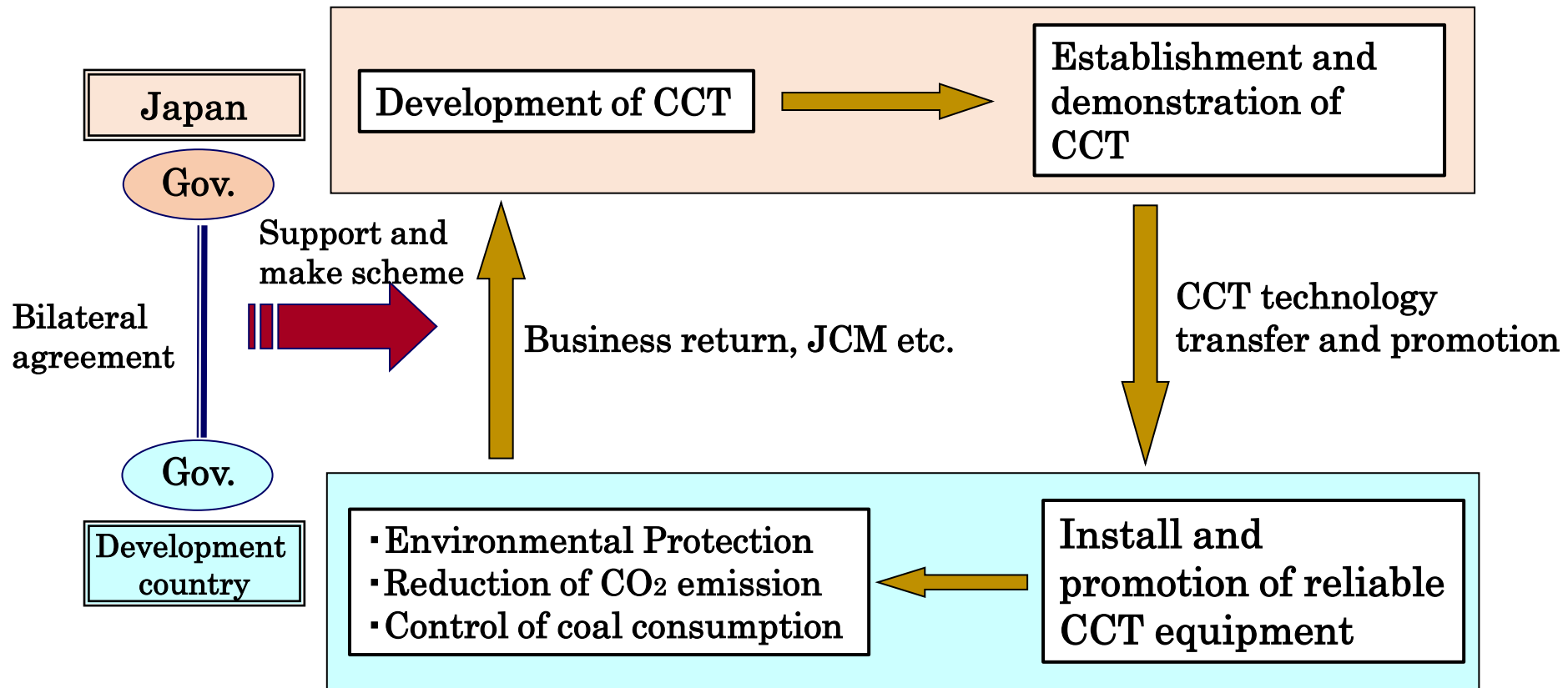
Using Joint Crediting Mechanism (JCM)

- Under the JCM, Japan will evaluate its contributions to greenhouse gas emission reductions or removals in a quantitative manner and use them to achieve Japan's emission reduction.
- Japan has started the JCM with 16 countries and also signed MOU with Philippines for the bilateral agreement on 7th December, 2016.

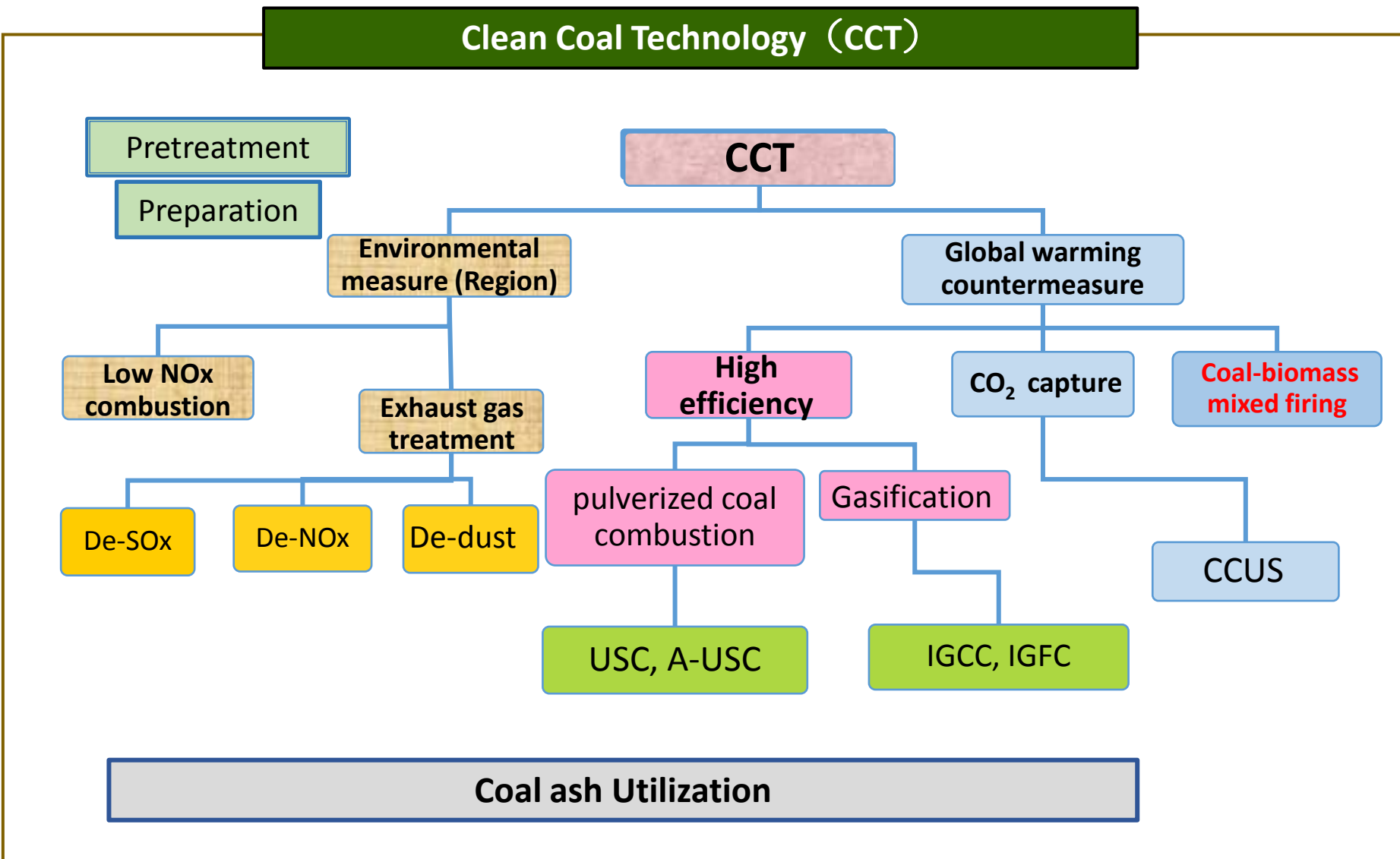
Future of Coal Policy in Japan (2)

Action to ;

- ✓ Increase of electricity demand in development countries
- ✓ Protection of regional environment and global warming



Clean Coal Technology (CCT)

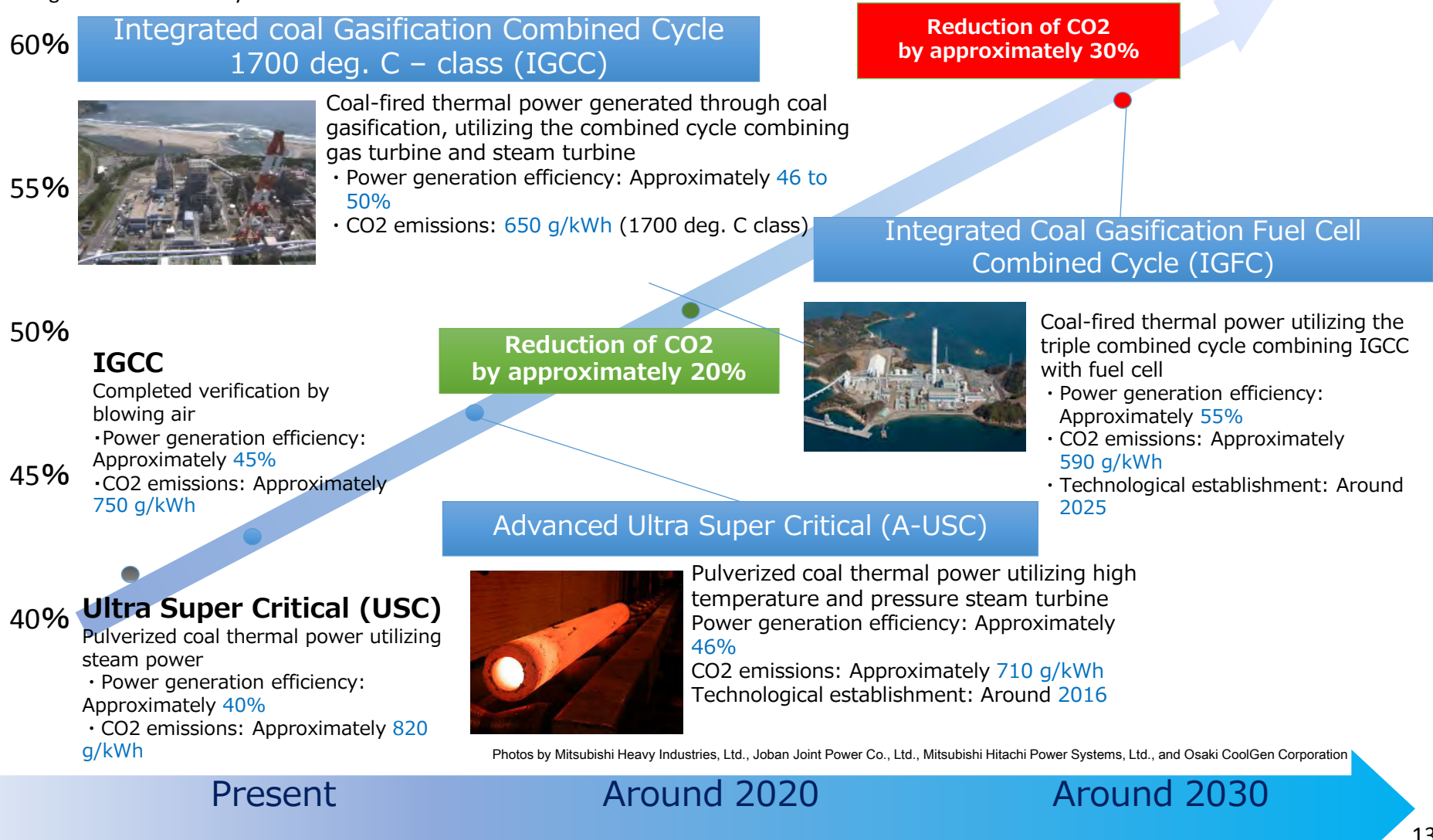




Japanese Government published Advanced CCT Development Roadmap in June 2016

Development of Next-Generation Coal-Fired Power Technologies

Power generation efficiency



Integrated coal Gasification Combined Cycle 1700 deg. C - class (IGCC)



Coal-fired thermal power generated through coal gasification, utilizing the combined cycle combining gas turbine and steam turbine

- Power generation efficiency: Approximately 46 to 50%
- CO2 emissions: 650 g/kWh (1700 deg. C class)

Reduction of CO2 by approximately 30%

Integrated Coal Gasification Fuel Cell Combined Cycle (IGFC)



Coal-fired thermal power utilizing the triple combined cycle combining IGCC with fuel cell

- Power generation efficiency: Approximately 55%
- CO2 emissions: Approximately 590 g/kWh
- Technological establishment: Around 2025

Reduction of CO2 by approximately 20%

Advanced Ultra Super Critical (A-USC)



Pulverized coal thermal power utilizing high temperature and pressure steam turbine

Power generation efficiency: Approximately 46%

CO2 emissions: Approximately 710 g/kWh

Technological establishment: Around 2016

IGCC
Completed verification by blowing air

- Power generation efficiency: Approximately 45%
- CO2 emissions: Approximately 750 g/kWh

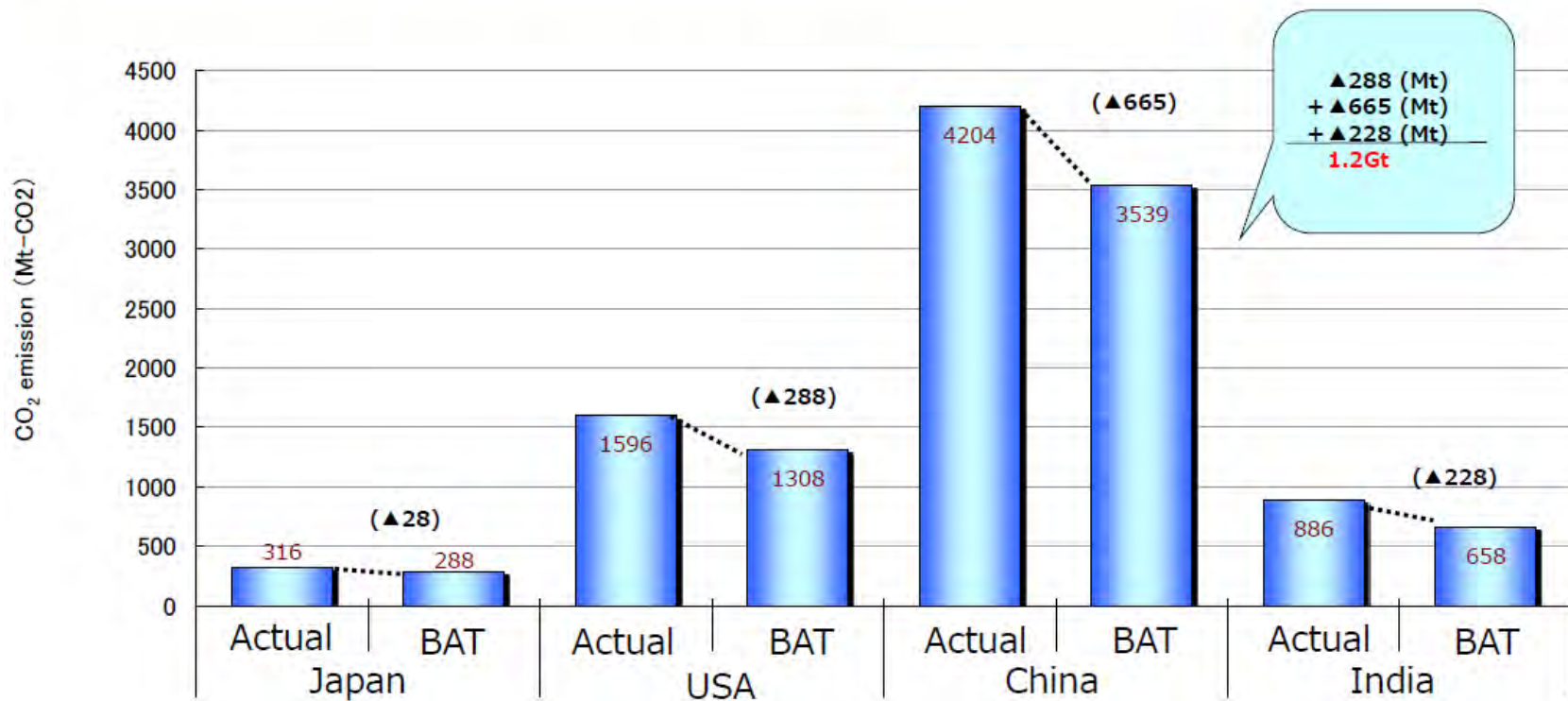
Ultra Super Critical (USC)
Pulverized coal thermal power utilizing steam power

- Power generation efficiency: Approximately 40%
- CO2 emissions: Approximately 820 g/kWh

Photos by Mitsubishi Heavy Industries, Ltd., Joban Joint Power Co., Ltd., Mitsubishi Hitachi Power Systems, Ltd., and Osaki CoolGen Corporation

CO₂ Reduction Potential by Efficiency Improvement

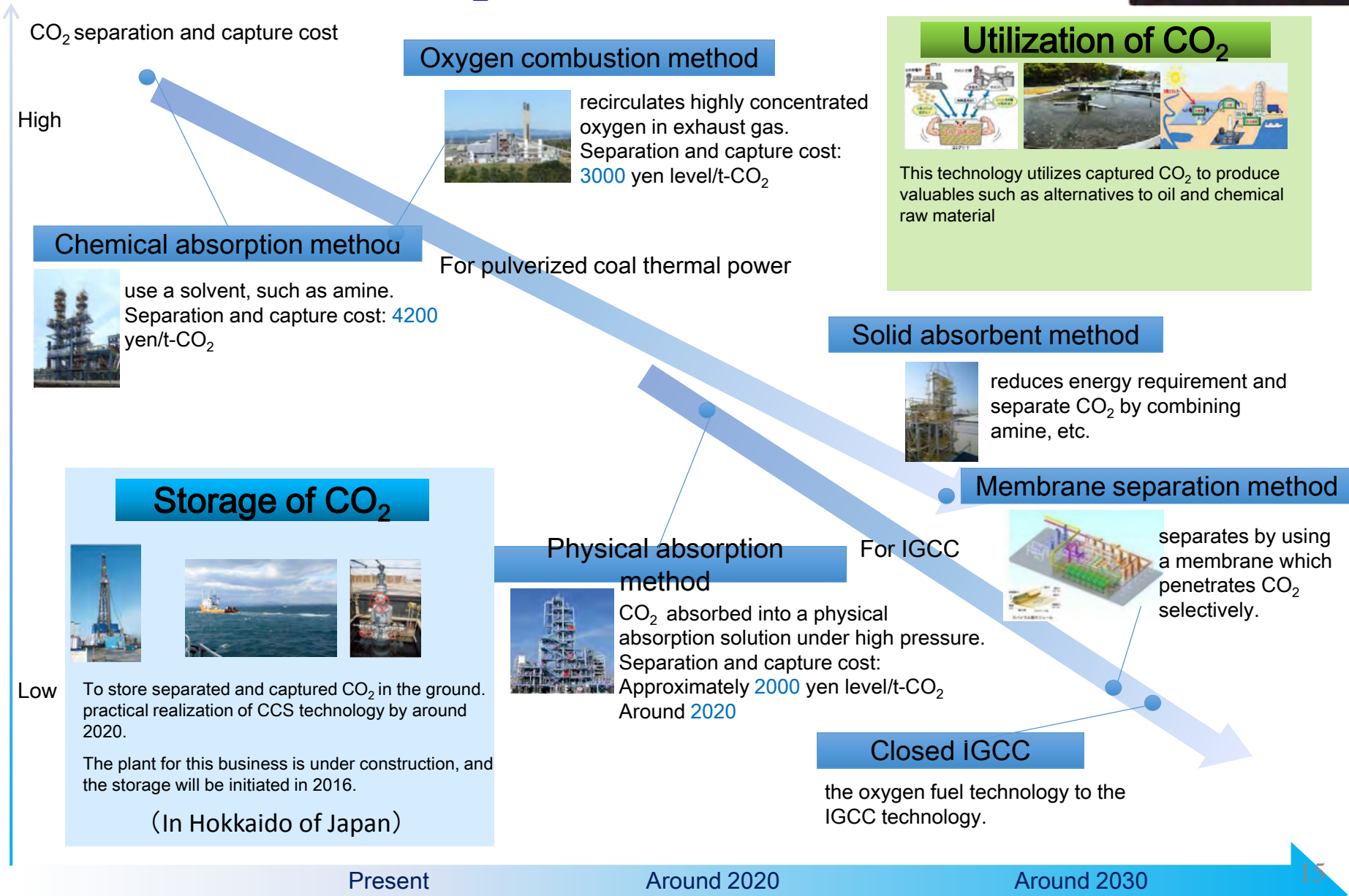
- The CO₂ reduction potential through applying the Japanese USC power plant to existing coal-fired power plants in the USA, China and India is 1.2Gt in total, based on the 2013 data.



Source: IEA World Energy Outlook 2015



About CO₂ low emission as follows



* The cost prospect in the Figure was estimated based on various assumptions at present.

Conclusion

- ① Coal is the low-cost and stable energy resource in the world. Coal is sharing about 40% of power source composition in the world. Therefore, Coal is still important energy in the future.
- ② Coal use has serious issues for SO_x, NO_x and Particulates. It is important for coal use to apply Clean Coal Technologies(CCT).
- ③ Reduce of CO₂ emission is also important issues for coal use in the future. High efficient technologies and CCUS are solutions to reduce CO₂ emission. I consider it is important for JCOAL, Wyoming and US to commercialize zero-emission technologies in cooperation with us.
- ④ Our aim is to accomplish Zero-Emission for Coal. I hope that Japan and US will tackle and lead to Global Warming Issues of Coal in the world with the Future of Coal Workshop between the State of Wyoming and JCOAL.



Thank you for your attention !!

