News Release

April 17, 2019

New Energy and Industrial Technology Development Organization

OSAKI CoolGen Corporation

Beginning the World's First Integrated Coal Gasification Fuel Cell Combined Cycle (IGFC) Demonstration Project - Aiming to Both Improve Efficiency of Coal-Fired Power Generation and Greatly Cut CO_2 Emissions -

NEDO and the OSAKI CoolGen Corporation began work on the third step of the Osaki CoolGen Project, namely, the demonstration project of IGFC with CO_2 capture, which combines fuel cell technology with integrated coal gasification combined cycle (IGCC) with CO_2 capture.

In the recently-begun third step, we will combine a fuel cell with the oxygen-blown IGCC demonstration facility with CO_2 capture, to be constructed in the second step scheduled for completion in FY2019, as well as confirm the applicability of coal syngas for fuel cells, and then perform demonstrations aimed at achieving an optimal IGFC system with CO_2 capture. We aim to see a prospect of achieving a net thermal efficiency (HHV) of approximately 47% while capturing 90% of the CO2 on a 500 MW-class commercial unit.

Moving forward, we aim to establish technology that achieves both highly-efficient coal-fired power generation and CO_2 separation and capture and spread that technology both inside and outside of Japan, thus contributing to the global CO_2 emissions control (global warming countermeasures).

Figure 1: Demonstration test facilities layout

(within the grounds of the Osaki Power Station of The Chugoku Electric Power Co., Inc.)

1. Overview

Coal has a high supply stability and outstanding economy, making it a vital primary source of energy to Japan, which has an extremely low energy self-sufficiency rate. Coal-fired power generation is an important energy source covering approximately 30% of generated power.

On the other hand, compared to other fossil fuels, coal also has issues, such as its large amount of carbon dioxide (CO_2) emissions and in terms of the global environment. Coal-fired power generation faces demand for further restraints on CO_2 emissions.

Therefore, the New Energy and Industrial Technology Development Organization (NEDO) and the OSAKI CoolGen Corporation are engaged in the Osaki CoolGen Project, which aims to achieve revolutionary low carbon coal-fired power generation through the combination of integrated coal gasification fuel cell combined cycle (IGFC) technology, the ultimate high-efficiency generating technology, with CO_2 capture technology, in order to greatly reduce CO_2 emissions from coal-fired power generation.

The IGFC demonstration project comprises of oxygen-blown IGCC demonstration (first step), oxygen-blown IGCC with CO_2 capture (second step), and IGFC with CO_2 capture demonstration (third step), and uses a 170,000 kW-class demonstration test facility constructed within the grounds of the Osaki Power Station of The Chugoku Electric Power Co., Inc. to verify the performance, operability, reliability, and economy of the system. In the demonstration tests for the first step, which began in March of 2017, we achieved a net thermal efficiency of 40.8% (HHV), the highest level of efficiency in the world for a 170,000 kW-class demonstration plant, and saw a prospect of achieving a net thermal efficiency of approximately 46% on a 500 MW-class commercial plant. For the demonstration in the second step, we are currently proceeding with construction work on the CO_2 capture unit and we plan to begin test operation around the summer of 2019, then start demonstration tests after that.

Now, we began work on the demonstration project for IGFC with CO_2 capture. We will add a fuel cell to the oxygen-blown IGCC with CO_2 capture in order to confirm the applicability of coal syngas for fuel cells, performing demonstrations aiming at achieving an optimal IGFC with CO_2 capture system. We aim to obtain a prospect of achieving a net thermal efficiency (HHV) of approximately 47% while capturing 90% of the CO2 when applied to a 500 MW-class commercial unit.

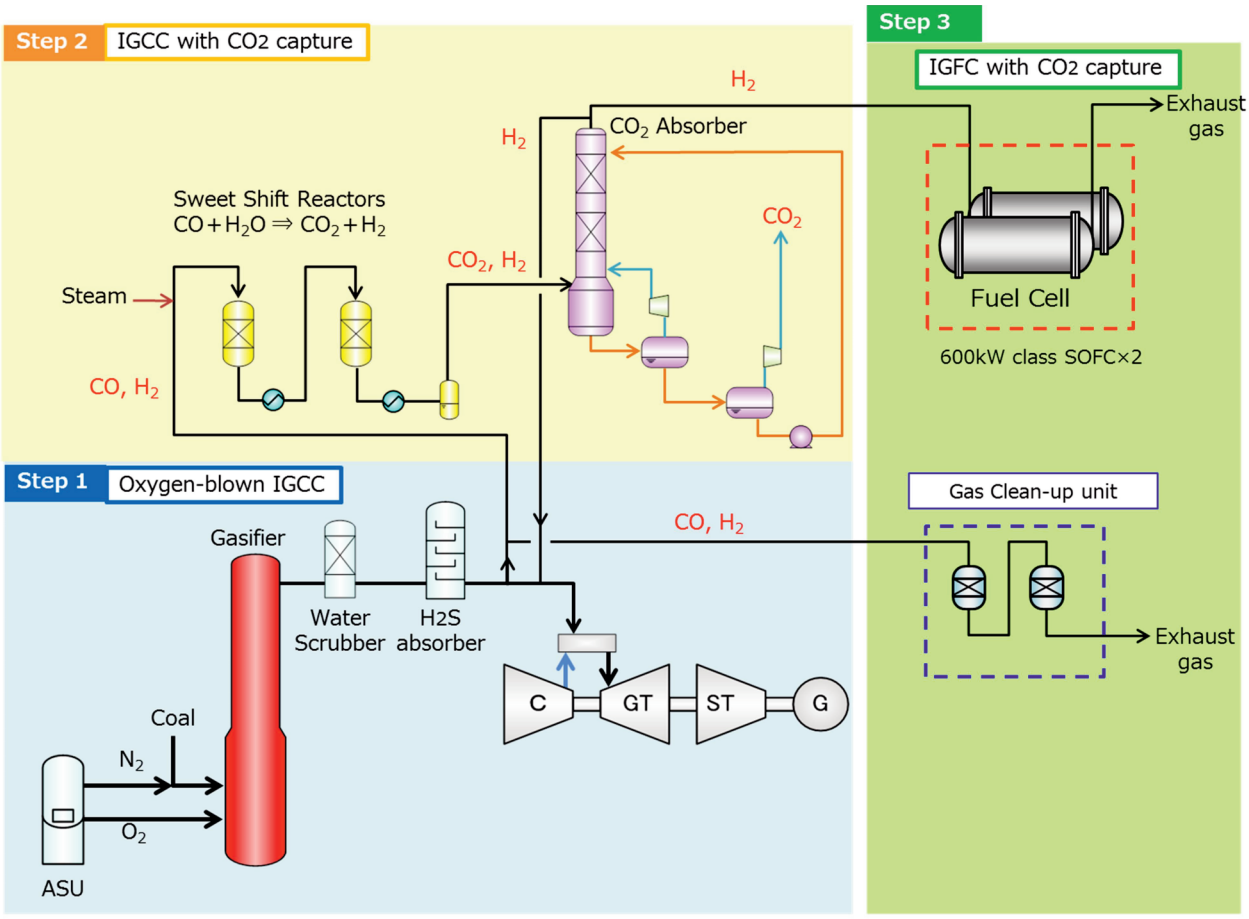

Figure 2: Outline of demonstration test system

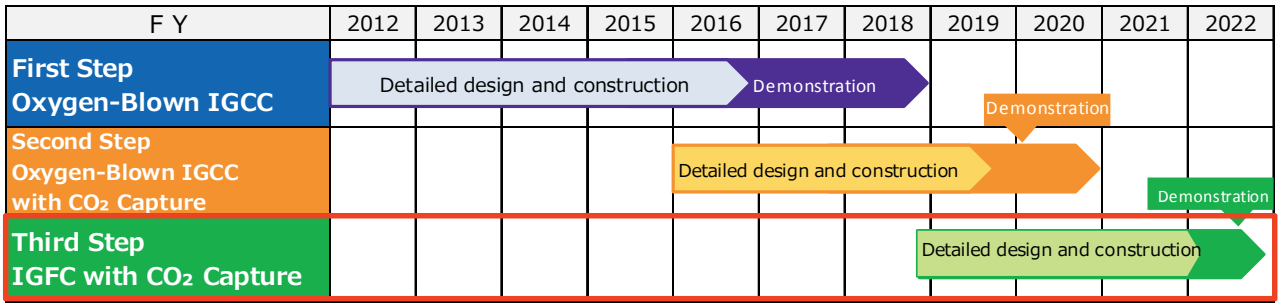

Figure 3: Major schedule of demonstration tests

2. Project contents

[1] Project name

Technical development of next-generation thermal power generation, etc. / Integrated coal gasification fuel cell combined cycle demonstration project / CO_2 separation and capture IGFC demonstration

[2] Overall project funding (Planned)

7.33 billion yen (Subsidy rate of 1/2)

[3] Period

FY2018 to FY2022

[4] Content of research and development

In order to greatly reduce CO_2 emitted from coal-fired power generation, we will perform demonstration tests combining integrated coal gasification fuel cell combined cycle technology, the ultimate high-efficiency generating technology, with CO_2 separation and capture to obtain a prospect of achieving a net thermal efficiency of approximately 47% (HHV) as an IGFC commercial unit (500 MW-class) with CO_2 separation and capture.

[5] Subsidized party

OSAKI CoolGen Corporation

3. Inquiries

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