

Wrap-up Ceremony for the Demonstration Project of PV System with TAKREER

On January 11, 2015, JCCP held a wrap-up ceremony at Abu Dhabi Oil Refining Company (TAKREER) in UAE to confirm the results of the joint project on Demonstration of PV System that was completed this fiscal year (FY2014).

The ceremony was attended by a total of 25 members. On the TAKREER side, they included Mr. Jasem Ali Al Sayegh, CEO, and 10 others. On the Japanese side, they included H.E. Mr. Kenji Hirata, Minister and Deputy Chief of Mission, Embassy of Japan in UAE; Mr. Masaya Tsukidate, General Manager, Technical Cooperation Dept., JCCP; Mr. Makoto Abe, Executive Officer, Showa Shell Sekiyu K.K.; and 15 others. The success of the project was verified through speeches and presentations of results by the members, followed by congratulations all around.

Mr. Al Sayegh also expressed his appreciation for the project's success, as well as for all TAKREER-JCCP joint projects that have been implemented to date, such as those for TAKREER Research Centre (TRC), Flare Gas and Water Supply.

1. Project Overview

- Name of project: Study and application of the possible PV system introduction in petroleum company-related facilities in UAE
- Duration: 4 years (from FY2011 to FY2014)
- Counterpart: TAKREER
- Participating company: Showa Shell Sekiyu K.K.

2. Results and Future Development of the Project

(1) FY2011 results

- Initiatives were launched with TAKREER for the development of infrastructure to introduce a photovoltaic power generation system to TAKREER's refinery facilities.
- APV test facility was built at the BeAAT industrial waste treatment facility located near the Ruwais Refinery, and was commissioned at the end of December 2011.



*Speech by Mr. Jasem Ali Al Sayegh, CEO (center)
H.E. Mr. Kenji Hirata, Minister and Deputy Chief of Mission,
Japanese Embassy in UAE (left), and
Mr. Masaya Tsukidate, General Manager,
Technical Cooperation Dept., JCCP (right)*

(2) FY2012 results

- BeAAT PV system
 - Annual power generation: 63,902 kWh (60% more than Japan)
 - Annual insolation: 2,179 kWh/m²
 - Average temperature: 27.8°C
- No clean-array: The DC-PR (Direct Current Performance Ratio) began a long-term decreasing trend in April and reached 45% seven months later. Regular cleaning is thus essential. (As a result of reporting the results of the BeAAT demonstration test to TAKREER and proposing the installation of a small PV facility in the refinery, a 41 kW system was agreed to be installed on the roof of the new electric room at TAKREER.)
- The explosion-proof trial solar panels passed the explosion-proof criteria in an explosion test.

(3) FY2013 results

- BeAAT annual power generation: 66,236 kWh (previous year: 63,902 kWh)
 - This is 65% more than the average annual generation in Japan.
 - Annual insolation: 2,088 kWh/m² (previous year: 2,179 kWh/m²)
 - Average temperature: 27.2°C (previous year: 27.8°C)
- Operational performance recorded a DC-PR value of 86.8%, and surpassed the 80% average DC-PR value in Japan.

- A 41 kW PV system was planned to be installed on the roof of the new electric roof at TAKREER, and was completed in February 2014.

(4) FY2014 (final year) results

- The PV system installed at TAKREER is steadily generating power and is generating the same amount of power as BeAAT. It is operating without any problems as an integral part of the refinery's facility power supply system.
- The following demonstration tests were implemented as a countermeasure for the decline in power generation due to dust, which is a major issue in the Middle East.
 - Automated cleaning (introduction of an automatic cleaning robot to verify its effect in comparison with manual cleaning): Work time is expected to be reduced by around 40%.
 - Anti-fouling paint (comparison of dust effect on painted and unpainted arrays before and after applying the paint, to verify and reduce the amount of dust accumulation): The arrays were painted at BeAAT in June, and the effects of anti-fouling paint are being examined.

[Summary of Results]

1. It was found that Showa Shell Sekiyu (Solar Frontier)'s CIS thin-film solar cell delivers high power generation performance and operates smoothly even in the hot and humid environment of Abu Dhabi.
2. An annual average power generation amount roughly 1.7 times greater than that in Japan was recorded as a difference in solar radiation time.
3. However, as the decline in power generation caused



*Presentation of a commemorative gift
Mr. Jasem Ali Al Sayegh, CEO (right); Mr. Makoto Abe,
Executive Officer, Showa Shell Sekiyu K.K. (left)*

by dust poses an issue unique to the Middle East, follow-ups need to be made of the effects of the cleaning robot and anti-fouling paint that have been introduced as countermeasures to the issue.

[Future Development of the Project (plans)]

1. Follow-up of the countermeasures to the decline in power generation amount caused by dust
The anti-fouling paint, in particular, needs to be re-examined to mitigate dust effect and to improve the disadvantages of applying the paint (as the film is opaque, power output drops → introduction of a transparent film).
2. More data will be collected and analyzed hereafter, to establish a method for the evaluation of installation sites that ensure optimum power generation under hot temperatures and a dust environment.

<by Hironao Naganuma, Technical Cooperation Dept.>