

Development of a real-time LNG calorimeter using a coriolis meter

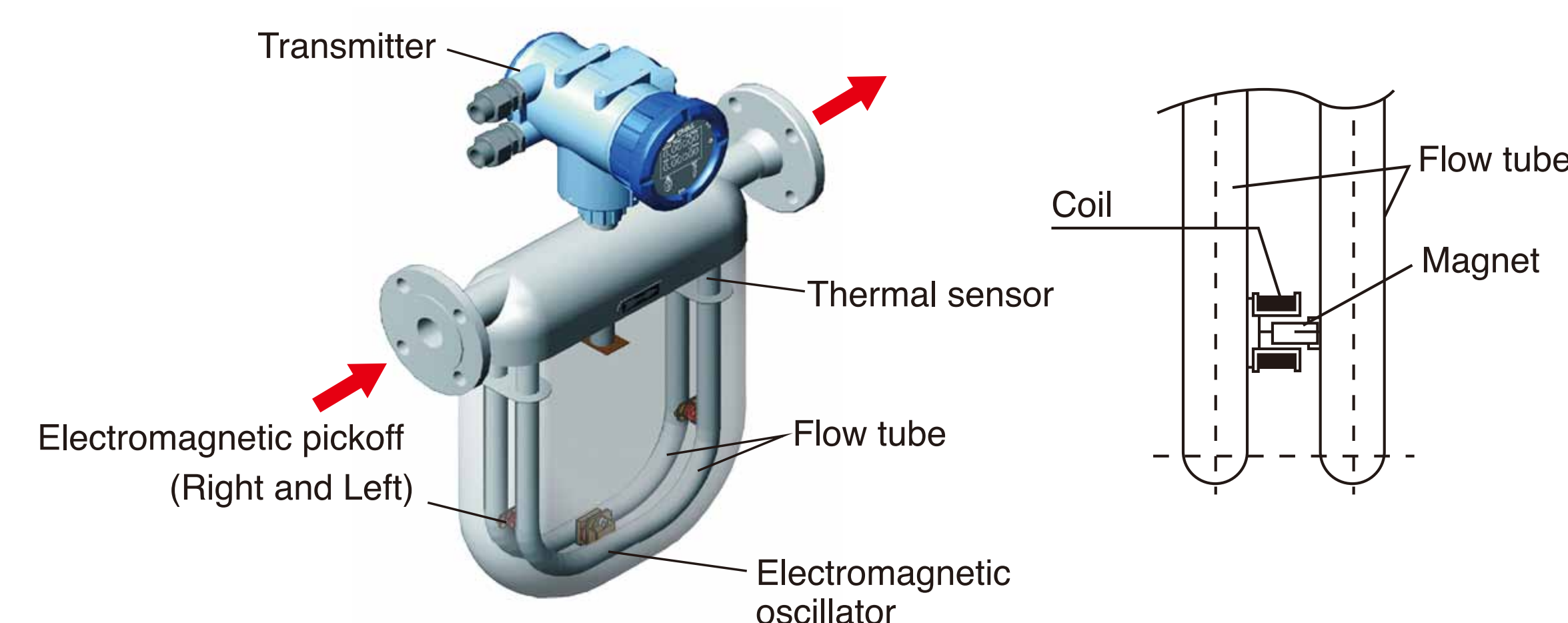
Development of a real-time LNG calorimeter

1 Background / Purpose

Gas Chromatography that was mainly used in conventional LNG calorific value measurement has time delay as a method for controlling calorific values. To bring solutions to this situation, Osaka Gas Co.,LTD and OVAL Corporation jointly developed the **real-time LNG calorimeter**.

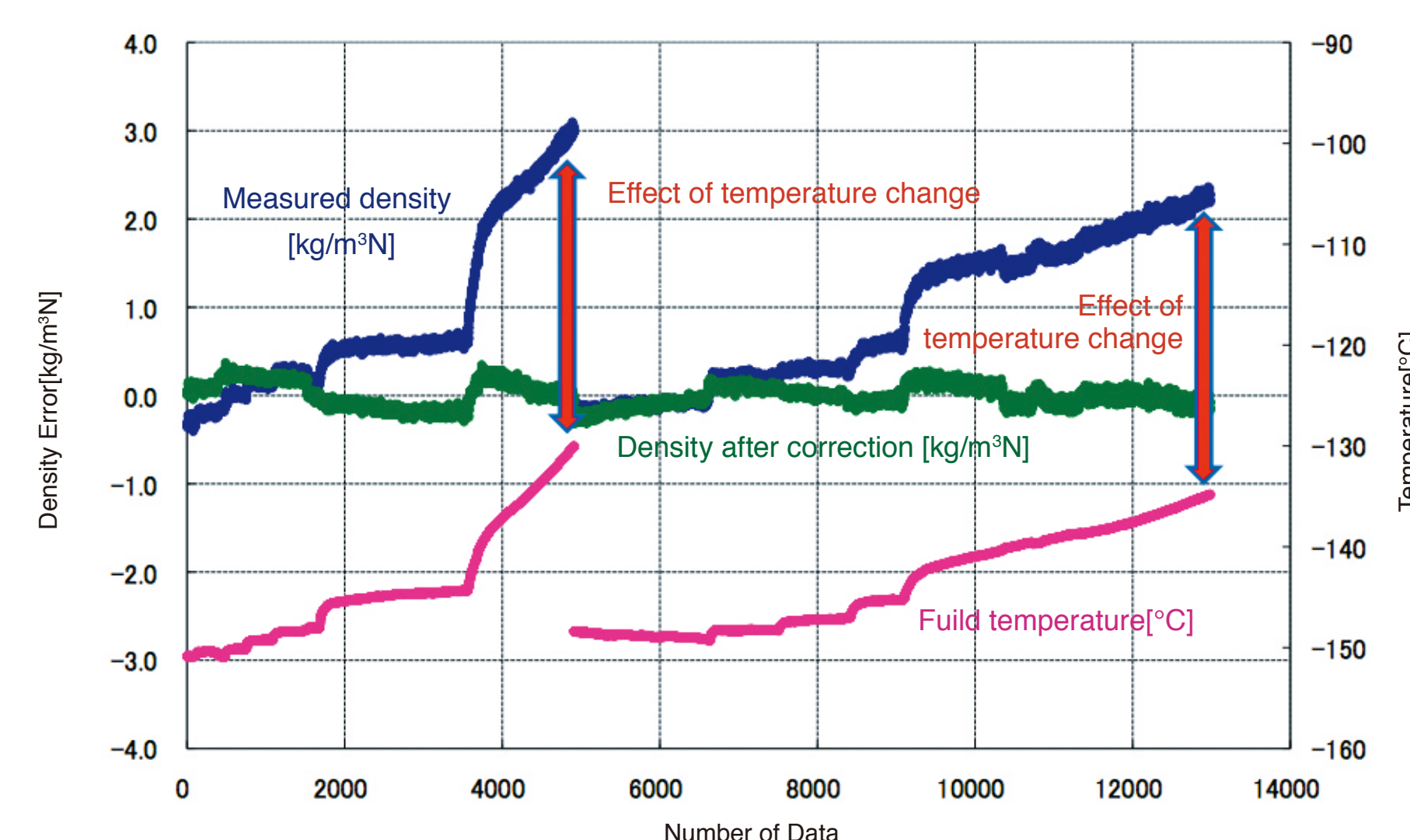
2 Using Coriolis flowmeter in calorific value measurement

Calorific value is calculated from a correlation value of liquid density that is principally measured by Coriolis flowmeter in real time.

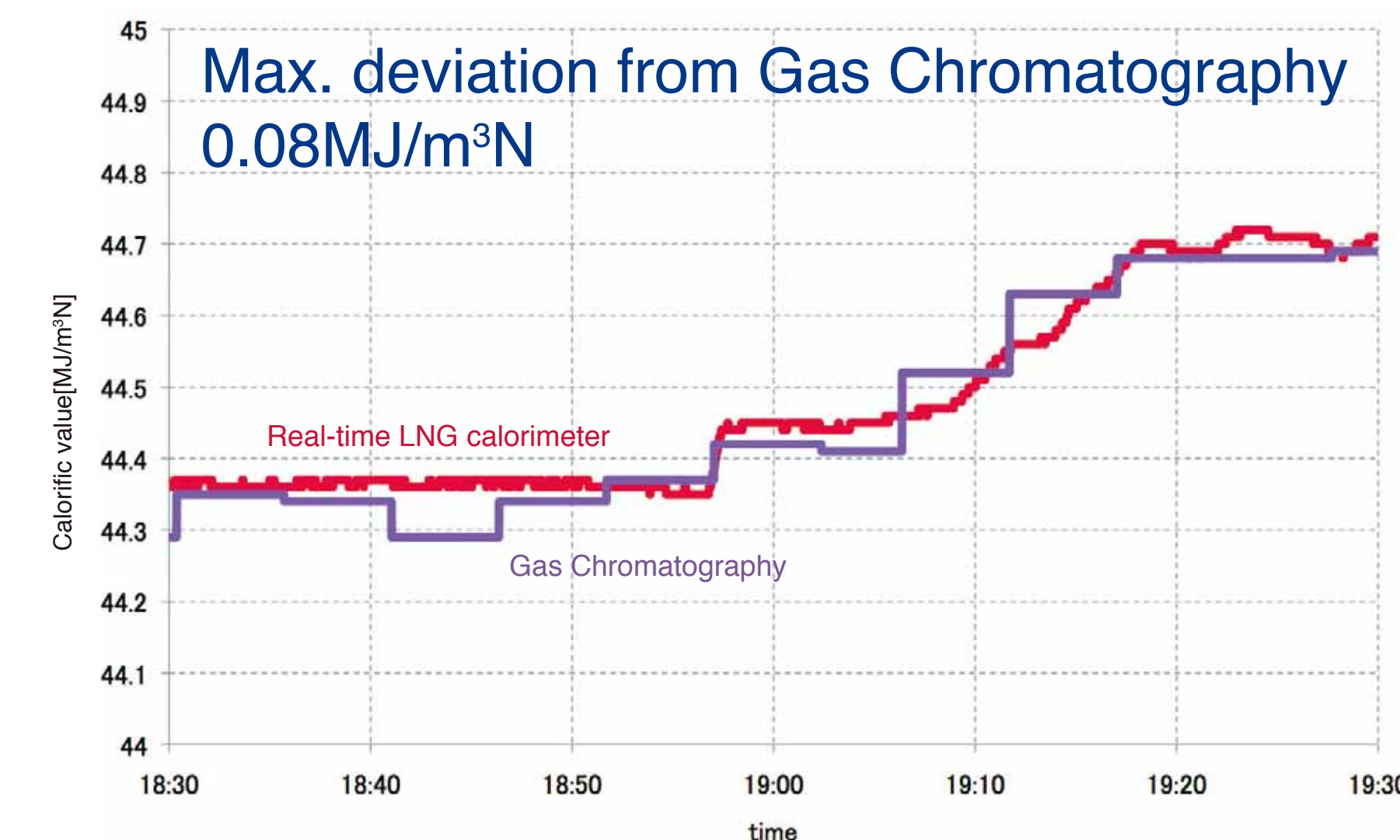


Generally, density measurement can only be applied to ambient temperature liquid. Therefore, a LNG density measurement test at very low temperature was operated at Osaka Gas's Senboku terminal II and showed about the same performance in comparison with Gas Chromatography. The functions as below were implemented as calculation functions of software.

- (1) The function correcting temperature effect at density measurement
- (2) The function calculating calorific value from a correlation value of liquid density



Effect of temperature change for density measurement

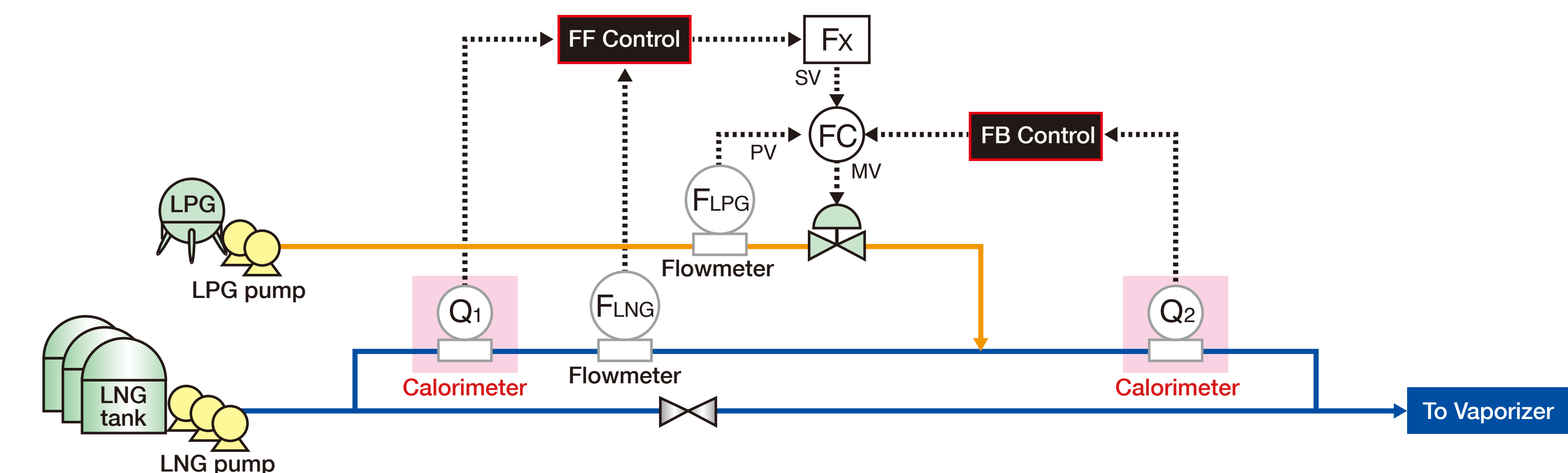


Comparison between Calorimeter and Gas Chromatography

Introduction of LNG calorific value regulator system by using real-time LNG calorimeter

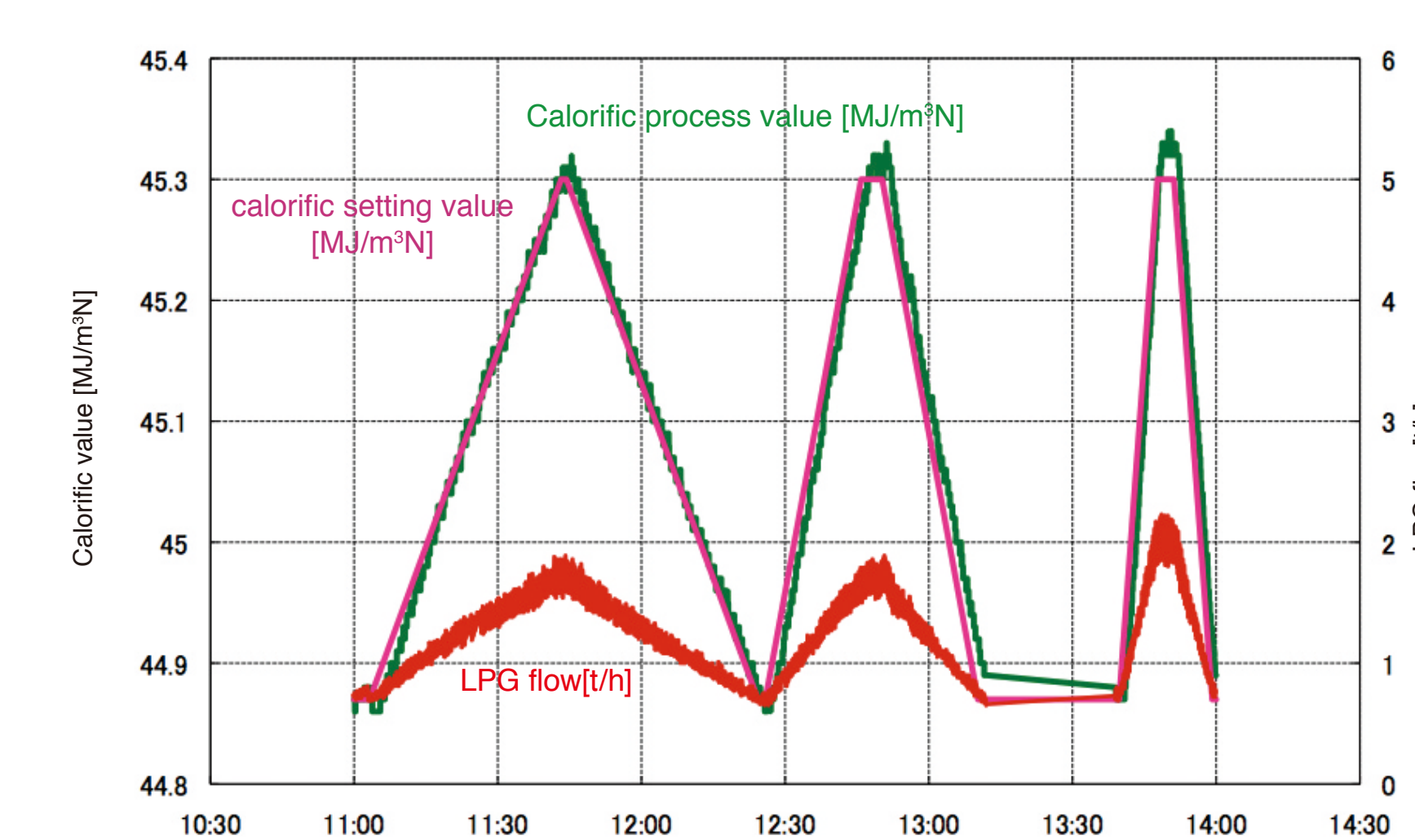
1 Outline of LNG calorific value regulator system

- LNG calorific value regulator system by using real-time LNG calorimeter was installed at Osaka Gas's Senboku terminal II.
- Calorific value regulator is operated by adopting feedforward control in combination with feedback control.



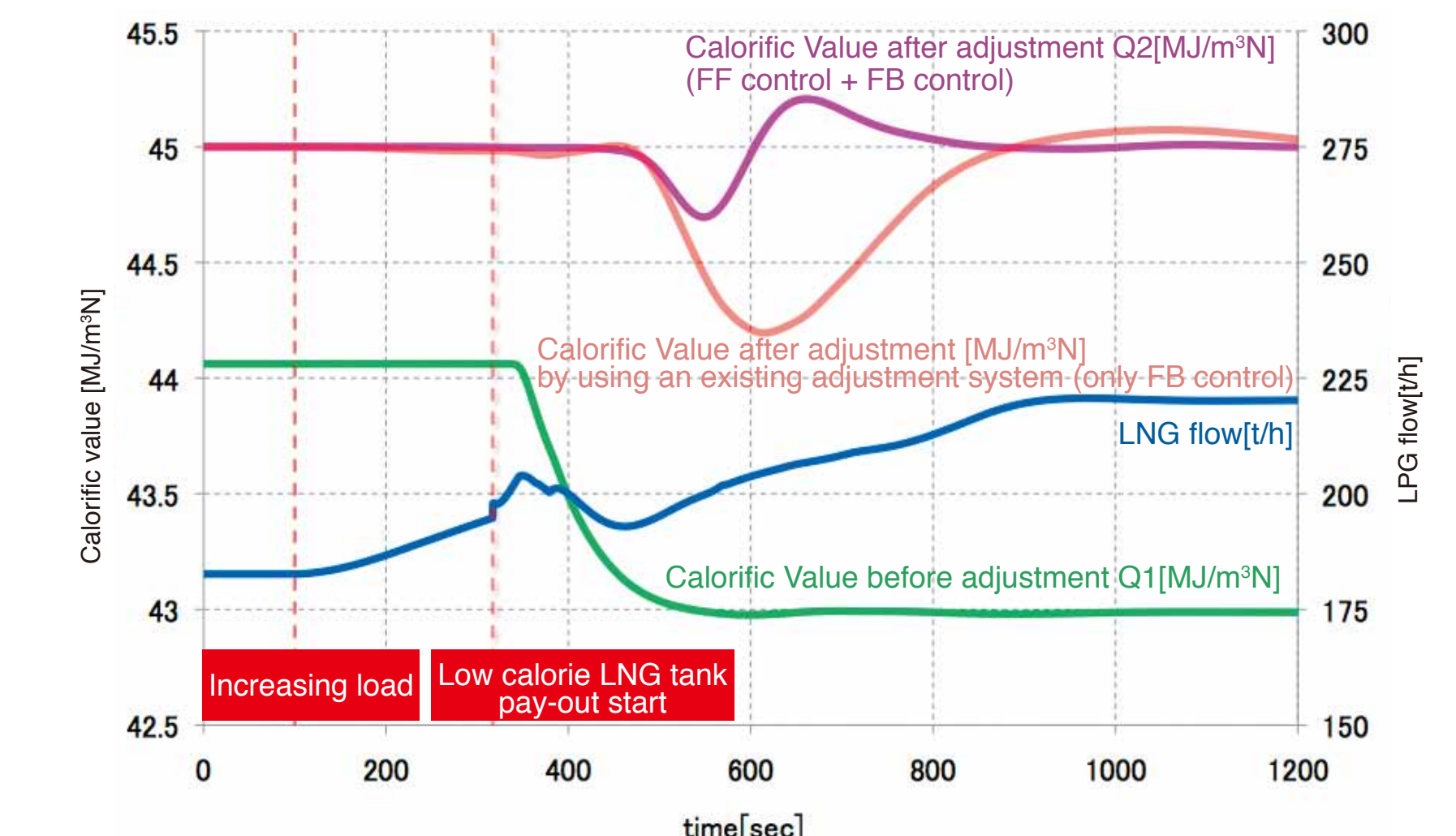
2 Result of trial run for LNG calorific value regulator system

The system was carried out a field trial run during commissioning as well as the simulation that assumed future acceptance LNG diversification. In both cases, it was ensured a superior controllability.



[Field trial run]

Confirming the process value controllability at changing calorific setting values



[Simulation]

Confirming the calorific regulator value controllability at low calorie LNG

These facilities have been in operation since April 2013.