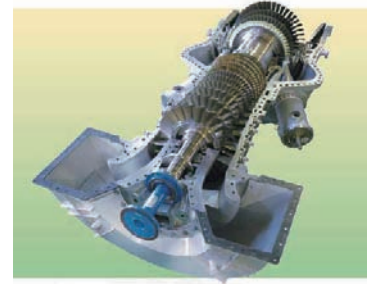


## Gas Turbine Cogeneration System

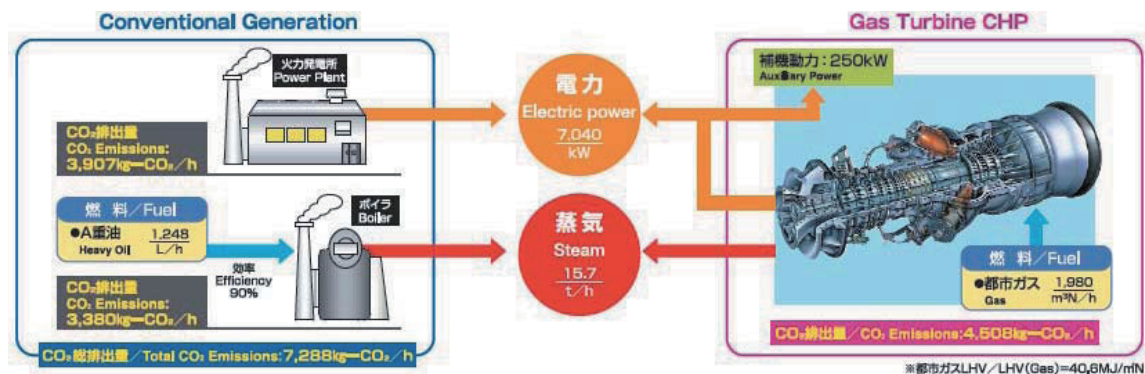
### Features

- ◆ The **world's highest** and latest technology gas turbine cogeneration system
- ◆ High total efficiency is ideal for energy saving and reduction of carbon dioxide (CO<sub>2</sub>).
- ◆ Equipped with **self-developed** M7A-03D gas turbine, which boasts the world's leading electric efficiency.
- ◆ Achieve the lowest emission for environment by adopting DLE (Dry Low Emission) combustion system.



M7A-03D gas turbine

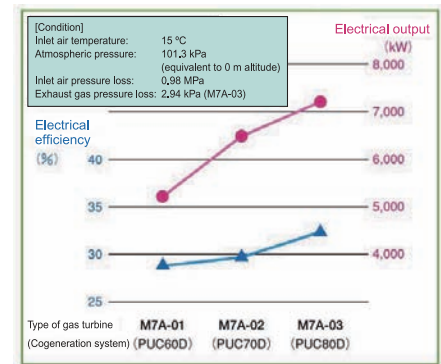
### Basic Concept or Summary



- ◆ The cogeneration system generates two kinds of secondary energy, electric power and heat (steam) from the primary energy, carbon fuel.
- ◆ Realizing high total thermal efficiency with high-efficient electrical output of our Gas Turbine and with utilizing the exhaust heat from Gas Turbine on various method can reduce the usage of carbon fuel compared with the conventional energy system (electric power supply from a grid and steam supply from a boiler).  
⇒ Much effective in reducing fuel cost and CO<sub>2</sub> emission
- ◆ The fuel: city gas and LNG.
- ◆ The DLE (Dry Low Emission) combustion system that operates under the lean premixed combustion method can keep NO<sub>x</sub> emission the lowest and achieve Eco-Friendly.

## Effects or Remarks

- ◆ Up-grading the M7A-01 gas turbine that has been delivered in through the world since it has been released in 1993, with high reliability the M7A-03D gas turbine has been developed.  
Electrical output: Approx. 2,000 kW increase  
Electrical efficiency: Approx. 14% increase
- ◆ Energy-saving: **24% improve**
- ◆ Reduction of CO<sub>2</sub>: Approx. 22,000 tons annually  
Remarks: Comparison with conventional energy system (electric power supply from a grid and steam supply from a boiler burning diesel oil)
- ◆ NOx emission: 80 ppm (O<sub>2</sub> = 0%).



## Installation in Practice or Schedule

- Domestic** Total number of domestic orders for M7A: 64 units (as of March 2010), in which one unit is the M7A-03
- Overseas** Total number of international orders for M7A: 55 units (as of March 2010), in which 10 units are the M7A-03. The first unit was delivered to a German paper company in January 2008.

**Contact:** **Kawasaki Heavy Industries, Ltd.**, Gas Turbine Division  
2-4-1, Hamamatsu-cho, Minato-ku, Tokyo 105-6116  
TEL: 03-3435-2533 URL: <http://www.khi.co.jp/gasturbine/>