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Two TG Group Companies Recognized for Achievement of Energy Conservation Law Energy Benchmarks

On September 30, 2013, TonenGeneral Sekiyu K.K. (head office: Minato-ku, Tokyo; president: Jun Mutoh; “TonenGeneral” herein) was cited for the second consecutive year on the website* of the Ministry of Economy, Trade and Industry’s Agency for Natural Resources and Energy for having achieved energy benchmarks (EBM) based on the Law Concerning the Rational Use of Energy (Energy Conservation Law).

Evaluation was based on reported results for fiscal year 2012 of 25 refineries** belonging to the 14 Petroleum Association of Japan member companies and their group companies. Of these companies, TonenGeneral was the only company in the industry that achieved the benchmark as a refiner.

Calculations based on information on the website indicate that if all the oil refineries in Japan refined the same volume of crude as TonenGeneral’s refineries, the volume of crude consumed by the three TonenGeneral refineries would be 15 percent less than the industry average. It also means that the company can expect a cost reduction of approximately 15 billion yen per year

In addition, oil refineries in Japan generated a total of 38M tons in CO₂ emissions in 2011, however, operational efficiency of refineries nationwide on par with that of TonenGeneral refineries would reduce CO₂ emissions by about 5.7M tons (15 percent) annually***.

Tonen Chemical Corporation, a 100 percent subsidiary of TonenGeneral Sekiyu, was also cited on the above website as the only one out of nine manufacturers of petrochemical base products to have achieved the benchmark.

Since the Great East Japan Earthquake of 2011, the importance of the effective use of energy has increased along with the significance of energy conservation efforts.



TonenGeneral Sekiyu pursues effective, integrated operations at its Kawasaki Refinery, where the refinery and the chemical plant are located adjacently.

As an industry leader in energy conservation, the TonenGeneral Group will continue its initiatives to lower energy costs throughout society.

(*) Agency for Natural Resources and Energy website (Japanese): <http://www.meti.go.jp/press/index.html>

(**) Some refineries were unable to provide complete data for regular reports in 2012.

(***) TonenGeneral estimates

Reference

- The energy benchmark (EBM), an indicator announced by the Japanese government to encourage voluntary energy conservation efforts in the business and industrial sectors, was finalized by the Plant Criteria Subcommittee of the Comprehensive Energy Survey Committee's Energy Conservation Working Group on March 31, 2009.
- The following sectors have been asked to submit regular reports for benchmarking since 2010: 1) blast furnace ironworks, 2) electric furnace steel manufacturing, 3) special electric furnace steel manufacturing, 4) electric power supply and 5) cement manufacturing; and the following since 2011: 6) paper manufacturing, 7) cardboard manufacturing, 8) oil refining, 9) petrochemical base product manufacturing and 10) soda chemicals.
- EBMs have been set in accordance with the respective views of each industry. The EBMs for the refining industry and the petrochemical base products manufacturing industry have been established based on the following industry views.

(Refining)

1. Demand

As feedstock for fuel and petrochemicals, oil products are essential for people's daily lives and for industrial activity, and the refining industry must provide a stable supply of oil products to meet demand. The volume of oil products produced fluctuates with demand, and this has a great impact on the industry's energy consumption.

2. Facility configuration

Oil products span a wide range from heavy oil to diesel, and production must be adjusted in accordance with demand. However, as individual distillates cannot be produced in isolation, a variety of distillates is produced simultaneously. If the recent demand trend toward lighter products continues, additional heavy oil cracking units will be needed. Therefore, the optimal facility configuration for each refinery will differ according to product profiles and types of crude refined, and energy consumption volumes will differ as a result.

3. Benchmark indicator

Due to the characteristics of the refining industry described above, an energy efficiency index reflecting the production and facility configurations of the various refineries is desirable as an industry benchmark. Thus, the benchmark indicator is obtained by dividing the actual volume of energy consumed by the standard energy volume.

$$\text{Benchmark indicator} = \frac{\text{Actual volume of energy consumed}}{\text{Standard energy volume}}$$

$$\text{Standard energy volume} = \sum (\text{unit coefficient} \times \text{unit throughput volume})$$

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- The standard energy volume above is the total of the products of the coefficients and throughput volumes deemed appropriate for the different refining units (all units owned by refinery: atmospheric distillation unit, vacuum distillation unit, catalytic reformer, indirect desulfurization unit, catalytic cracking unit, hydrogen production unit, boiler unit, etc.) and is the amount of energy normally consumed for that facility configuration and throughput volume. Therefore, the benchmark indicators shown by the ratio of the standard energy volume and the actual volume of energy consumed reflect the facility configurations and throughput volumes of the different refineries. In addition, as the

coefficients for the different units are derived from worldwide averages (172 refineries) of energy volume consumed per throughput volume, evaluation by energy efficiency indicators using this standard energy consumption is recognized in the oil industry worldwide.

5. The Ministry of Economy, Trade and Industry has set the target for the Energy Conservation Law as 0.876, one standard partial difference (0.046) from the 2008 Japan average (0.922). TonenGeneral's reporting for 2012 indicated a figure of 0.800, significantly lower than the industry average, indicating a high rate of efficiency.

(Petrochemical base products)

1. Views concerning establishment of benchmark
In the chemical industry, a wide range of products are manufactured, from inorganic to organic substances, and even for similar products, there may be differences in the volume of energy consumed depending on factors such as grade and manufacturing process. Therefore, in establishing a benchmark for the chemical industry, not only the products, but the manufacturing processes as well must be considered. However, for any one manufacturing process, there is an enormous number of products, and in addition, there are some processes that have only been adopted by one manufacturer. Therefore, it is unrealistic to set benchmarks for large numbers of products according to the processes by which they are manufactured.

Accordingly, selection of subjects for benchmarking is based on the following criteria: 1) a high rate of energy intensity, 2) similar manufacturing processes, and 3) the potential for energy conservation in the manufacturing processes.

2. Benchmark indicator
Based on the above, a benchmark indicator for the petrochemical industry has been formulated for the cracker (a facility that dissolves naphtha, a raw material of petrochemical products, to produce base products including ethylene and propylene), which has the highest energy consumption rate of all facilities in the manufacturing process.

Specifically, the volume of energy consumed by the ethylene production facilities is divided by the ethylene production volume (the sum of the ethylene production volume, the propylene production volume, the butadiene content of butane-butene distillate and the benzene content of fractionated gasoline).

$$\text{Benchmark indicator} = \frac{\text{Volume of energy consumed by ethylene production facilities}}{\text{Ethylene production volume}}$$

3. The Ministry of Economy, Trade and Industry has set the target for the Energy Conservation Law as 11.9GJ/t, one standard partial difference (0.5GJ/t) from the 2008 Japan average (12.5GJ/t). TonenGeneral's reporting for 2012 indicated a figure of 11.5GJ/t, significantly lower than the industry average, indicating a high rate of efficiency.