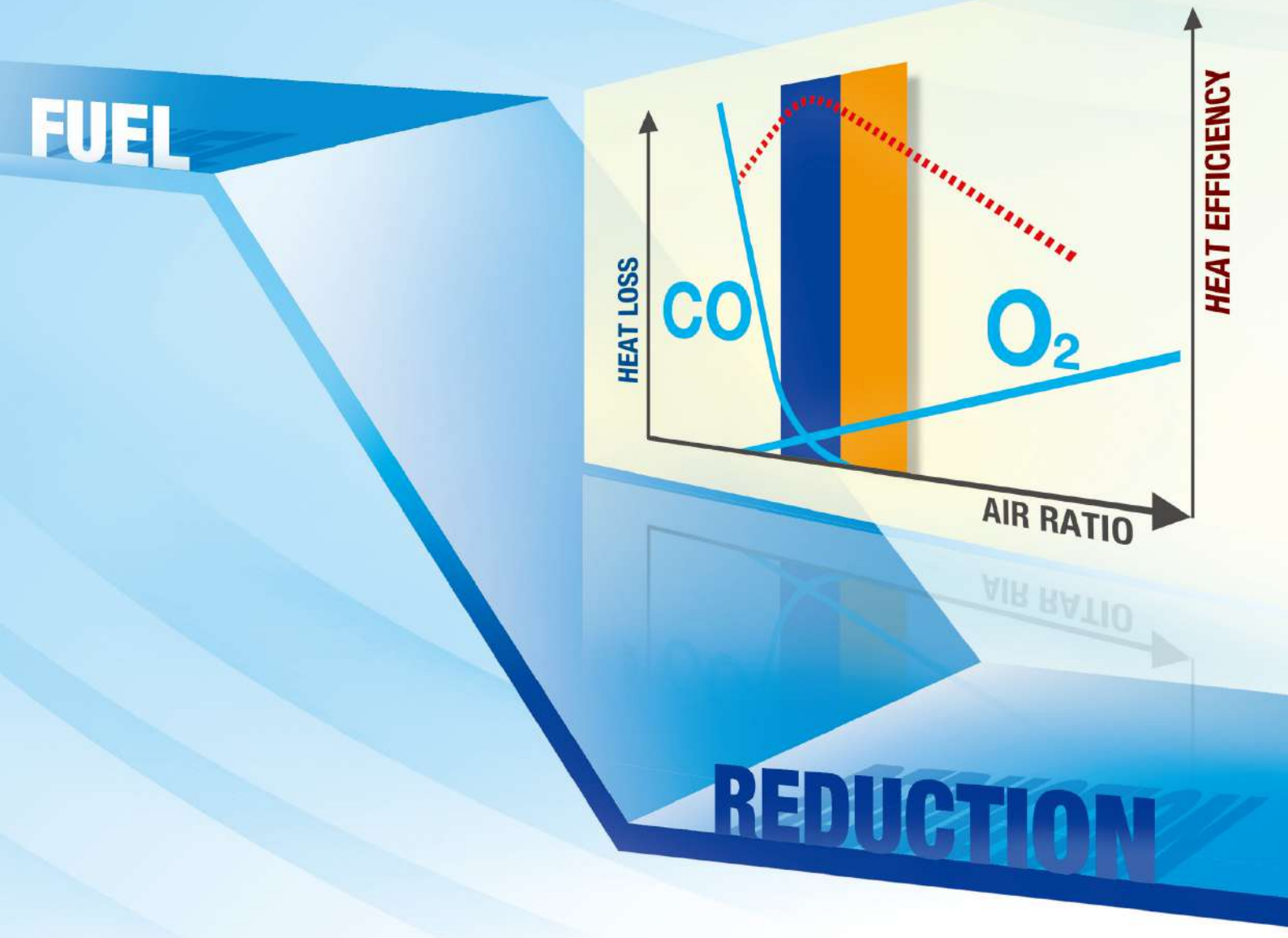
Fuji Electric

Innovating Energy Technology

Boiler combustion solution

Ultra-low excess air ratio combustion control reduces fuel cost up to 1%



11Z1-E-0056

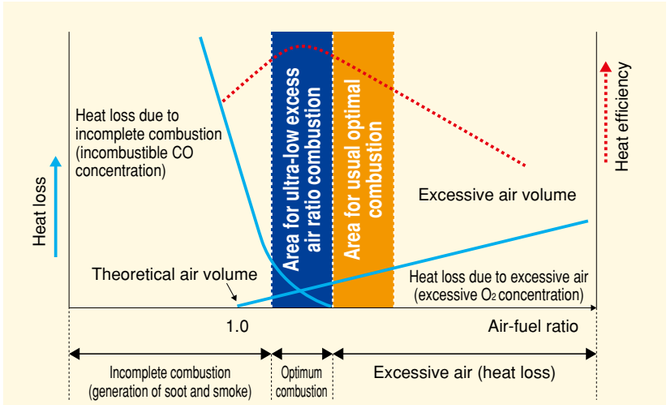
The world's first practical solution for significantly reducing fuel costs
Welcoming the next generation of boiler combustion control!

Patent pending

Fuji Electric's "Boiler Combustion Solution" optimizes the boiler combustion of its customers, while contributing to cost reduction and global environmental protection.

◆ What is the "area for ultra-low excess air ratio combustion"?

Conventional common control systems detect the O_2 concentration in boiler exhaust gas and control the air-fuel ratio (ratio for theoretical air volume) to ensure the required concentration (represented by the ■ portion in the diagram on the right). It is possible to reduce heat loss by further lowering the air-fuel ratio, but just as it was confirmed earlier, Fuji Electric has been able to develop a practical combustion control solution in the "area for ultra-low excess air ratio combustion" (represented by the ■ portion in the diagram on the right) for continuously generating CO in regularly minute amounts in the exhaust gas.



◆ Control in the "area for ultra-low excess air ratio combustion" is achieved via our uniquely developed logic

We have adopted a boiler exhaust gas sensing technology that uses our proprietary combustion calculation and laser-based CO analyzer to achieve the world's first practical control in the "area for ultra-low excess air ratio combustion" to maximize combustion efficiency. We have packaged this technology in a solution that reduces energy loss and maximizes boiler performance.

Maximizes heat efficiency via our unique combustion calculation

By pursuing an optimal solution via our combustion calculation, we have achieved automatic control in the "area for ultra-low excess air ratio combustion" for continuously generating CO in regularly minute amounts in the exhaust gas. The solution minimizes boiler heat loss, while reducing fuel consumption.

Real-time detection of exhaust gas CO concentration

Sensing of the CO concentration in the exhaust gas generated from a boiler is implemented in real time via our newly developed high-speed response laser-based CO analyzer. This technology accurately grasps operating conditions to achieve advanced control.

Response to sudden load fluctuations caused by boiler behavior

Generation of black smoke from smokestack is prevented by implementing control via excess air at the time of boiler load fluctuations. Furthermore, even when there are sudden load fluctuations, block control is implemented to ensure that the CO concentration in the exhaust gas does not exceed the configured limit.

Priority control compliant with exhaust gas regulation values

When restrictions are imposed on the CO concentration in the exhaust gas by environmental regulations, etc., control can be implemented to prioritize applicable rules and ensure a value below the restriction.

◆ Improved boiler fuel costs up to 1%

Improving the combustion efficiency has greatly contributed to cost reduction by enhancing boiler performance, while also reducing fuel costs up to 1%. This solution also contributes to protecting the global environment since it leads to reduction in greenhouse gases.

Yearly savings of approx. 140,000 USD when consuming 50 t/h of heavy oil

Eco-friendly through mitigation of greenhouse gases

Estimated benefit of fuel reduction (Unit: ten thousand USD per year)

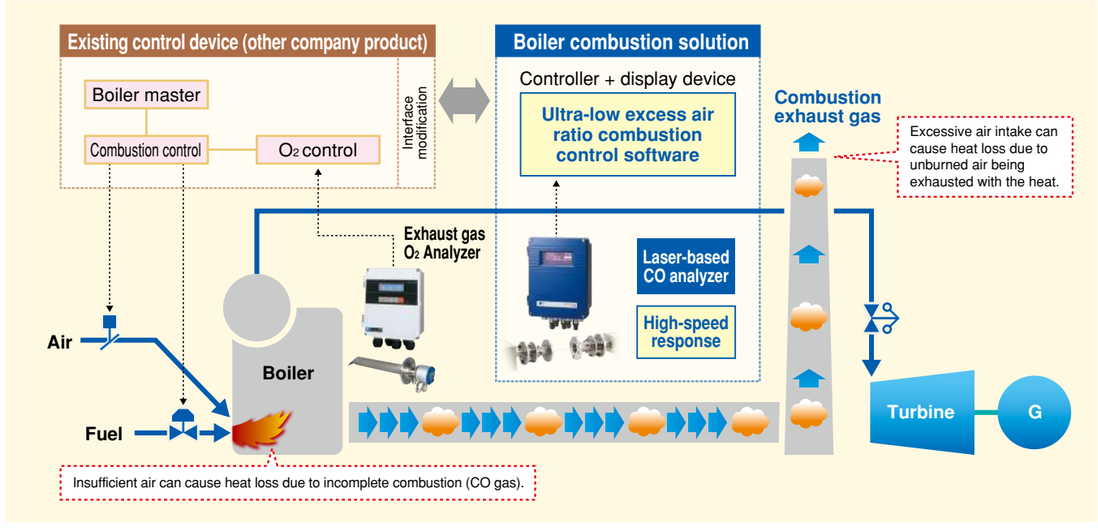
Boiler capacity (t/h)		15	20	30	50	80	100	150	200	300	400	500
Fuel cost savings (yearly)	Heavy oil boiler	4.2	5.7	8.5	14.1	22.7	25.9	42.4	56.5	84.8	113.0	141.3
	LNG boiler	3.2	4.2	6.3	10.6	16.9	21.1	31.7	41.3	63.4	84.5	109.3
	Coal boiler	–	–	3.2	5.3	8.5	10.6	15.9	21.2	31.8	44.3	52.9

*1 The benefit of fuel reduction is estimated based on a 1% fuel consumption improvement. It differs depending on factors such as the exhaust gas temperature and/or the reduction in the amount of the exhaust gas O_2 concentration of utilized boiler.
*2 Fuel prices make use of the following data. Heavy oil: 0.4 USD/ℓ; LNG: 0.46 USD/kg; Coal: 0.11 USD/kg
*3 Boiler operating hours: 7920 hours (330 days a year)

◆ This solution can be utilized on both newly installed and existing control devices

This solution can be adopted for new installations of our control devices, as well as on the existing control devices of other companies. The adoption of this solution can be applied and implemented smoothly with just some relatively simple modifications.

System configuration diagram [E.g. existing control device (other company product)]



We offer free estimates to calculate the benefits of installation for boilers. Please contact us for more information.

Please provide the following data to our sales representative.

Boiler capacity (Boiler outlet steam flow)		[t/h]
Type of fuel Check the box that applies		☐ Heavy oil ☐ Gas ☐ Coal* ☐ Byproduct oil ☐ Byproduct gas ☐ Other [ ]
Fuel composition and ratio		[ ]
Fuel usage	Solid / liquid	[Approx. tons annually]
	Gas	[Approx. km^3 annually (normal)]
Fuel price	Solid / liquid	[Approx. USD/kg]
	Gas	[Approx. USD/m^3 (normal)]
Boiler exhaust gas O_2 concentration		[Approx. %]
Boiler exhaust gas temperature (at air preheater outlet)		[Approx. °C]
Annual avg. temperature at location of boiler installation		[Approx. °C]
Boiler operating hours		[Approx. hours annually]

Note 1) This excludes refuse combustion power generation boilers and circulating fluidized bed boilers.
Note 2) This is applicable to heating furnaces.
Note 3) Please contact us if uncertain.

* Contact one of our sales representatives regarding the applicability of coal fuel, which as of Aug. 2016 is undergoing preparation for demonstration testing.

Fuji Electric

FUJI ELECTRIC FRANCE S.A.S.
46, rue Georges Besse - ZI du Brézet
63039 Clermont-Ferrand Cedex 2 - France
Tél. France 04 73 98 26 98 - Fax. 04 73 98 26 99
Tel. international +33 4 73 98 26 98 - Fax. +33 4 73 98 26 99
Email : sales.dpt@fujielectric.fr
Web : www.fujielectric.fr