

整合式工業燃燒設備節能技術計畫

執行單位

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計畫主持人

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- 工業燃燒設備會使用『油』與『電』兩類能源，因此提升燃燒設備能效需在此兩方面著手。對此，本計畫提出新型節能程序，可分別改善燃燒設備的燃燒端效能與利用廢熱產電，以提高能源使用效率，實現工業節能/節電效果。

已申請專利有：

1. 選擇性吸收膜及輻射熱回收發電器
2. 熱能吸收裝置及熱能回收系統
3. 致冷加熱裝置
4. 熱電轉換裝置及其應用系統
5. 熱能回收裝置
6. 整合式燃燒裝置節能系統
7. 熱電轉換裝置及選擇性吸收膜
8. 熱電模組
9. 用於輻射熱回收發電的熱交換裝置
10. 熱電裝置



鍋爐氫氣助燃系統



5kW模組化熱電發電系統



3kW熱輻射發電系統

本計畫提出一套新型節能程序，可分別改善燃燒設備的燃燒端效能與用電端需求，達成減少燃料用量及降低對電網之用電量，進而實現工業節能/節電目標。本計畫以三大方向進行開發：(1)開發氫氣助燃系統與NO_x減量技術。(2)開發模組化熱電發電技術，並建立10 kW以上流體式熱電發電系統。(3)完成氫氣輔助燃燒與熱電系統於中小型鍋爐或加熱爐之燃燒設備示範驗證，減少燃燒設備總能耗 $\geq 5\%$ 。本計畫完成鍋爐兩種注氫方式測試，可達到NO_x減量4~9%，亦在貫流式鍋爐導入氫氣助燃系統，目前已運轉362天，鍋爐油水比從12.50提升至13.16，節省燃料5.28%。此外，本計畫也完成10 kW流體式熱電系統設計，並於輪胎廠及鋼鐵廠成功建立kW級熱電系統示範案例。



氫氣助燃NO_x減量技術



5 kW模組化熱電系統(輪胎廠)



3 kW熱輻射發電系統(鋼鐵廠)

The Integration Technology for Energy Saving of Industrial Combustion Equipment

Execution Unit

Industrial Technology Research Institute

Project Director

Yu-Li Lin

This project proposes an innovated energy saving process by enhancing the efficiency of combustion equipment and generating electricity from its waste heat, respectively. It would improve the overall efficiency of energy consumption on industrial combustion equipment and achieve the fuel/electricity savings.

patent applied :

1. Selective absorber film and radiation heat recovery electricity generator
2. Heat absorbing device and heat recycling system
3. Cooling and heating device
4. Thermo-electric conversion device and its application system
5. Heat recycling device
6. Integrated combustion device with power saving system
7. Thermo-electric conversion device and selective absorber film
8. Thermo-electric module
9. Heat exchanger for thermo-electric conversion from radiant heat
10. Thermo-electric device



Hydrogen-enhanced combustion system for boiler

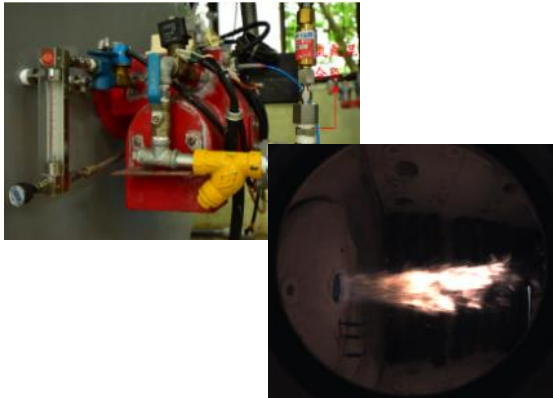


5kW modulable thermoelectric generator



3kW thermoelectric generator for thermal radiation

This project proposes an innovated process for the energy saving of industrial combustion equipment. The integrated technology would not only improve combustion efficiency but also recover its waste heat to reduce power usage of combustion equipment. The project includes: (1) Develop Hydrogen-enhanced combustion system and NOx reduction technology (2) Develop modulized thermoelectric technology and establish a 10kW or higher thermo-electric generator system; (3) Complete the testing/verification of the integrated energy saving system on midsize boiler or industrial furnace and reduce total energy consumption 5% or more. The project has completed two types of hydrogen injection testing on boiler and achieved ~4 to 9% of NOx reductions. The Hydrogen-enhanced combustion system on boiler has also been continuously operating for more than 362 days. The boiler oil/water ratio has been increased from 12.50 to 13.16 with 5.28% of energy saving. In addition, the project has completed a 10kW thermoelectric generator and successfully demonstrated cases for the tire and steel factories.



The NOx reduction by hydrogen-enhanced combustion technique



5kW modulable thermoelectric generator



3kW thermoelectric generator for thermal radiation