

# C1

## Development of hydrogen fueled linear power/generation system

With this program of research, technologies of hydrogen fueled linear power/generation system for achieving high efficiency and ultra-low emission will be developed by.

- Stabilizing combustion process of hydrogen mixture in linear free piston system.
- Compact design and optimized lay-out of systems compatible to conventional generation system
- Achieving high efficiency & ultra-emission, simultaneously

### Goal

#### Development of commercialize technology by hydrogen fueled linear power/generation system

- Design optimization of 5 kW linear power generation system
- 35% thermal efficiency      ■ Ultra Low Emission Level
- Development of hydrogen fueled linear power/generation system ECU
- Development of free-piston system durability

### Objective

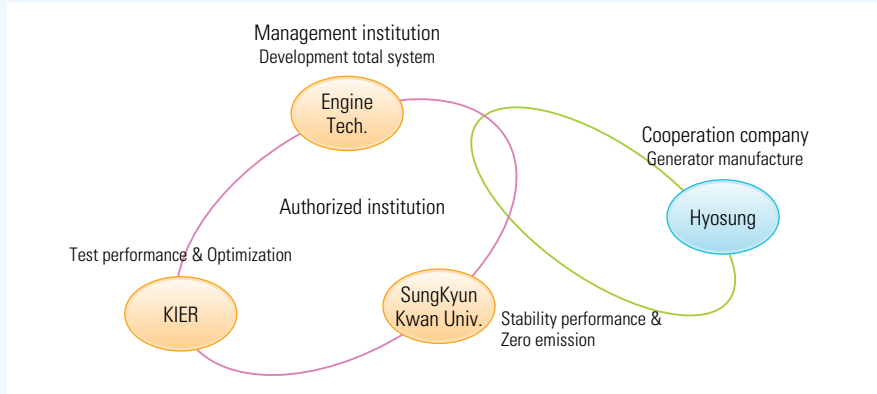
- 1st year
  - Review & improvement for the problem of previous research
  - Search & analysis of new technology
  - Investigation & improvement for commercialization of generator part
  - Concept establishment for final goal achievement and detail design of linear power system
  - Assessment of Reverse uni-flow scavenging type
- 2nd year
  - Establishment of strategy to reduce exhaust emission and increase thermal efficiency of linear power system
  - Final inspection & design for commercialization of generator part
  - Manufacture prototype linear power system
  - Experiment for performance improvement, research of experimental method for insure reliability
- 3rd year
  - Experiment for performance improvement (Continue)
  - Optimization development of control system for stable combustion
  - Development NOx catalyst and seperated lubrication system to achieve Zero-emission
  - Continuity endurance test and reliability verification test
  - Performance Inspection of commercialization generator
- 4th year
  - Packaging design for linear power system commercialization, manufacture of prototype and noise/vibration valuation
  - Assessment of heat balance      • Assessment of total system efficiency and marketability
  - Realization of HCCI combustion system to value efficiency improvement and combustion characteristic test



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Strategy



Outcomes & benefits

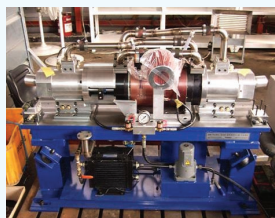
- Contributed the usage of hydrogen as a fuel to solve the energy and environmental problems
- Alternate technologies against reciprocating engine and source technologies with hydrogen fueled power system
- Application of power system with dispersion electric system, GHP(Gas Driven Heat Pump), Co-Gen, Hybrid vehicle and Linear compressor etc

Publications  
(2nd stage)

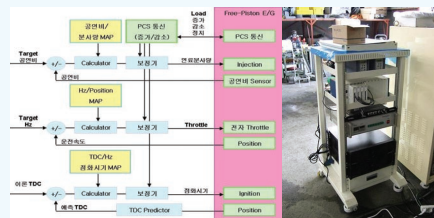
Patent		Theses							Proceedings		
		domestic			foreign			total sum			
domestic	foreign	SCI	Non SCI	sum	SCI	Non SCI	sum		domestic	foreign	sum
1/1			3	3				3	7	2	9

■ Publications

1. Yonggyun Lee et al., The Performance Characteristics of a Hydrogen Fueled Free Piston Internal Combustion Engine and Linear Generator System, International Journal of Low Carbon Technologies, 2008.11
2. Yonggyun Lee et al., The Performance Characteristics of a Hydrogen Fueled Free Piston Engine and Linear Generator System, SET2008, 2008.8



5kW linear power/generation system



Concept of control system and device