

# Ariston CHP activities

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**Ariston Thermo Group**

# Ariston Thermo Group



One of the world's leading companies in heating



**1.2** billion euro total sales

**6.5** million products per year  
(plus 35 million components)

**6,800** employees

**46** million euro R&D and investment

**250** people in R&D



We offer a complete range of heating and hot water products, systems and services to provide the **maximum degree of comfort with the minimum use of energy.**

# Enatec Stirling technology: Ariston choice for entering the early CHP market

## 1° Generation Product

- **Floor Standing Model**
- **Project milestones**
  - Lab Testing Prototypes: Q4 '08
  - Field Tests Prototypes: Q3 '09

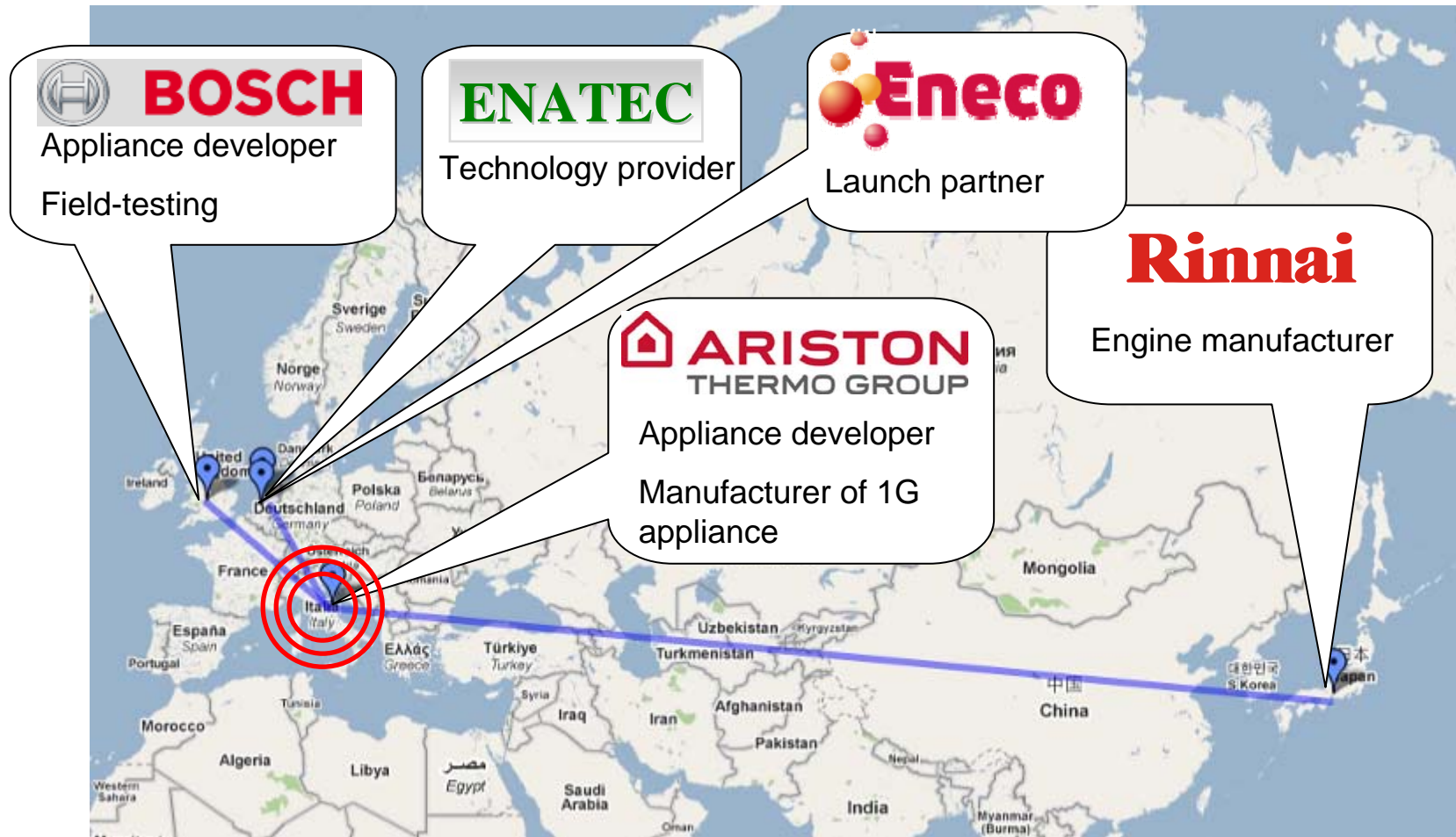
## 2° Generation Product

- **Wall hung model**
- **Technical specifications:**
  - Reduction in size, weight, noise
  - Increased electrical efficiency
- **Lab test 2010, Field trial 2011**



	Ariston CHP-1
Product type	Combi Storage mCHP appliance
Electricity generator	Free-piston Stirling engine
DHW	105 L - Stratification type
Size	600 x 600 x 1850 - floor standing
Weight	250 kg (packaged)
Fuel	Natural gas
Nominal gas input	29.5 kW (with integrated booster burner)
Electric output	1.0 kW - 230 V - 50Hz G83 compliant
System efficiency	> 107% - at 30% part load Gaskeur HRe

# Big players working together...



- Partners in the technical development.
- Coordination for introduction into the market.

# Where we are today

## 2008/2009 field-test with Eneco:

- 15 C1 and C1+ boilers installed:
  - Unacceptable **noise** level;
  - Reliability of Stirling burner (initial samples).



Development partners worked hard and could find solutions – implemented in C3 boilers.

**We are now pleased with noise level and system reliability.**

## 2009/2010 field-test with Eneco:

- Plan to install 100+ C3 boilers (today: 2 installations)



# What is still missing for market launch?

- 1. Technology still to be proven:**
  - Engine durability
  - System reliability
- 2. Product size and weight**
  - Wall-hung, bigger market
- 3. Engine performances optimization**
  - First generation target is reliability, second generation will focus also on performances
- 4. Product cost**
  - It will be still an expensive technology. Importance of government support and cooperation with utilities.
- 5. Production process to be improved**
  - Design optimization – simplification
  - Testing routines



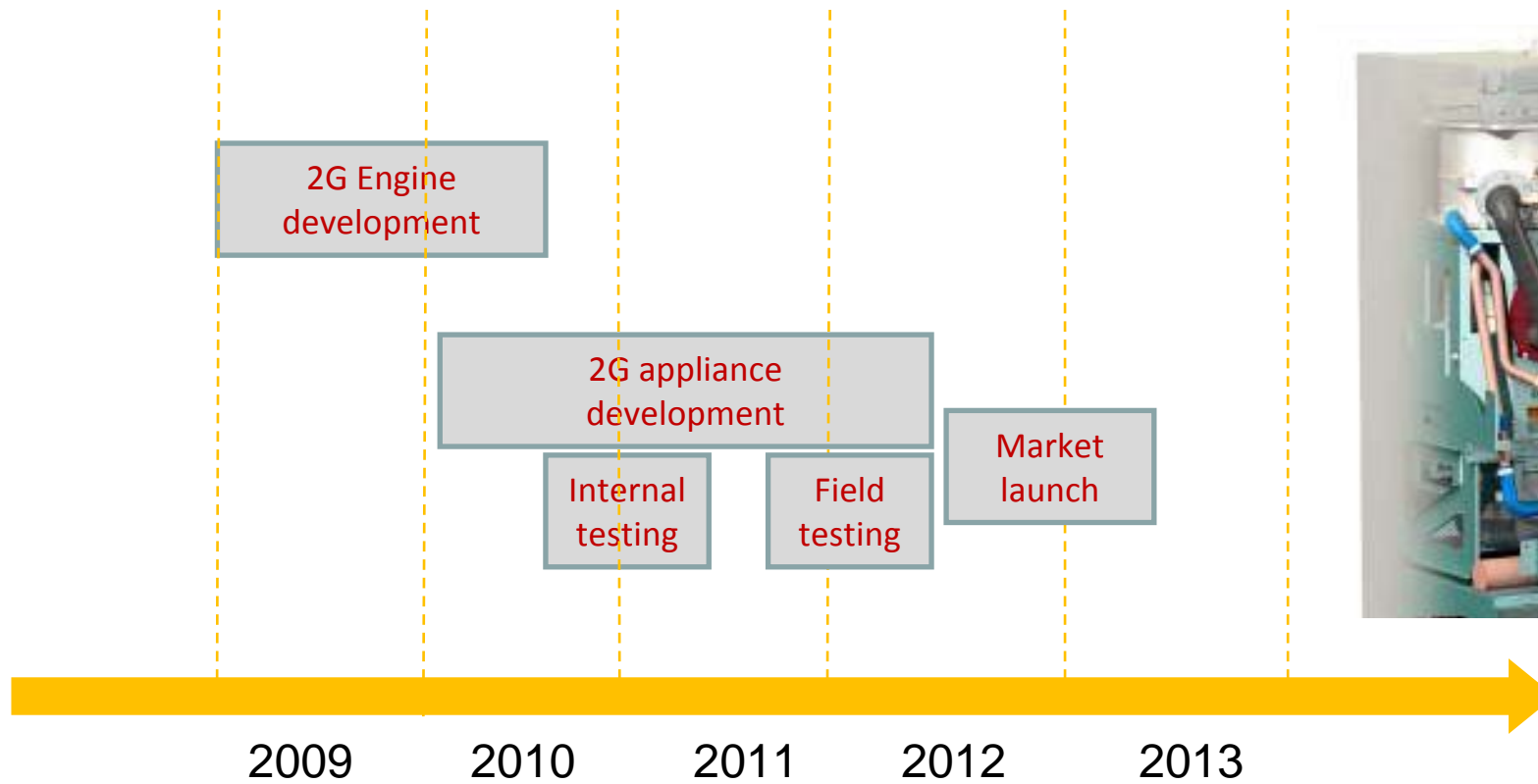
## Careful, controlled diffusion of “First generation” products

Going too fast is a risk for CHP reputation!!!  
Importance of field testing and lab testing.

## Second Generation project

Importance of 1st Gen learning phase to achieve sufficient product maturity.

# Second generation planning



# And what's beyond the Stirling?

## SOFC – Solid Oxide Fuel Cells

- Technology not ready yet, but major efforts in place: they will come.
- Suitable for “distributed generation” (high electrical efficiency).
- Ariston has the lead of Italian funded project “**EFESO**”, involving 15 industrial and academic partners in a 3-years SOFC CHP development.
- Technology partners: Acumentrics corp / SOFC power
- Current activities: utility consortium (lab testing of Acumentrics technology).





# Ariston roadmap on CHP

