

**EUROPEAN ENERGY
VENTURE FAIR 2006**



**Energy Venture Fair 2006
September 11-12 2006
Zurich, Switzerland**

- **Privately Held company (founded 2003 in Verona, Italy)**
- **Mission:**
 - Optimize the design of Stirling-cycle engines
 - Create high-efficiency, low-maintenance biomass-burning Stirling-cycle engines
- **Status of Development :**
 - First prototype (20 kWe, efficiency >22%) already 90% built, to start testing by Q3 2006
 - An 80 kWe system has already been ordered by the province of Mantua (delivery Spring 2007)
- **Markets:**
 - agricultural (conversion to energy crops)
 - industrial (industrial wood residue valorization, hot exhaust fume recycling)
- **Funding**
 - 3 MLN euro required to go beyond the forementioned proofs of concept

Technology:

- Use of advanced optimization techniques (genetic algorithms) for dimensioning Stirling – cycle engines prior to production.
- Thermodynamically- optimized design.
- Configuration study for maximum thermodynamic efficiency.
- Engine design explicitly targeted from start for biomass fuel use.
- Advanced technical and design solutions
 - operating conditions
 - material research.

Product Uniqueness:

- High fuel-to-electricity transformation efficiency (>22%).
- Unsupervised, automated working mode possible
- Transportability (2 x 40' containers).
- Low maintenance costs.
- No expensive, complex auxiliary systems.
- Limited system costs (~ 1800 € per installed kWe)
- Full prototype tests will be completed by Q3/2006

Enernova Stirling - Market

- **Short-term market** : agricultural industries wanting to convert part of their productions to energetic cultures to take advantage of better returns.
- **Long-term market** : conversion of biomasses to energy
 - E.g.: residues of agro-industrial productions and wood industry.
- **We expect a market for transformation of farming from cultures food to energetic cultures.**
 - As an example, if the 35% of food production in province of Verona was transformed to energetic cultures, there would be the possibility to install about 700 160-Kwe plants in 10 years.
 - Said plants would produce about 110 MWe, corresponding to the power used in residential district of Verona.
- **An important part of the market will be composed of other industries wanting to recycle their high temperature exhaust gases, valorizing them**
 - E.g.: painting plants, ceramic tile industry.

Founders / Management team

- **Alessandro Zuccato**, General Manager, entrepreneur in the high-technology field (biomedical devices, biotechnology)
- **Beniamino Benato**, physicist, ex-director of the Province Of Verona Energy Agency

Other employees:

- **Francisco Yepes Barrera**, Head Programmer, specializing in scientific software and genetic algorithms
- **Ad-hoc consultants** for mechanical drawing, agriculture and material testing

- Enernova Stirling has been founded in 2003
- Investment by founders 500K Euro
- Target date for next round: Q1 2007
- Amount to be raised in first VC round: EUR 3M
- Use of proceeds:
 - going through test phase and proof of technology
 - starting pre-production
 - staffing company
- Future round of financing in 2009/2010
- Exit: trade sale or IPO in 2012

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