

China - Greece S&T collaboration

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Collaboration of the Agricultural University of Athens with the Southeast University, Nanjing, in the field of sustainable energy

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RES group

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Organic Rankine Technology



Most suitable for heat exploitation of low to medium source temperatures (~ 80-300 °C)







ORC technology at AUA

Background and expertise

Activities on ORC technology initiated in 2003

5 projects (national and EU funded) ~4.6 million €

Small-scale engines (up to 20 kWe) for low-temperature heat applications (<200 °C). Development of dedicated key components (e.g. expansion machine)

Applications: Biomass-CHP, solar thermal, waste heat recovery in industry (e.g. exhaust gases, waste steam, cooling water)







Development of an autonomous low-temperature solar Rankine cycle system for reverse osmosis desalination

Budget: 1,500,000 EURO financed by EC (FP6-INCO)

Duration: 2 years (2004-2006)

Partnership: AUA, Germany, United Kingdom, Spain

<u>Objective</u>: To design, optimize and experimentally test a small scale low-temperature ORC powered by solar energy. The power produced drives mechanically a RO desalination unit.

Technical specifications	
Operation temperature	~80 °C
Thermal input	100 kW
Power output	2 kW
RO capacity	~0.3 m³/ł





Project web site: <u>www.rosolar.aua.gr</u>





Improvement of performance of solar organic Rankine RO system for RO desalination

Budget: 60,000 EURO financed by Greek government (GSRT)

Duration: 2 years (2006-2008)

Partnership: AUA and Georgia Tech-USA

<u>Objective</u>: To design and optimize a small scale low-temperature ORC powered by solar energy. The power produced drives mechanically a RO desalination unit.









Development and experimental evaluation of two-stage solar organic Rankine cycle system for RO desalination

Budget: 730,000 EURO financed by Greek government (GSRT)

Duration: 3 years (2011-2014)

Partnership: AUA, 2 Greek SMEs and 2 Greek Universities

<u>Objective</u>: To design and optimize and experimentally test a two-stage small scale lowtemperature ORC powered by solar energy. The power produced drives electrically a RO desalination unit.

Technical specifications	
Operation temperature	~140 °C
Thermal input	100 kW
Power output	~8 kW
RO capacity	~2.1 m³/h



Project web site: <u>www.solar-orc-ro.aua.gr</u>





Improving the Performance of Concentrating PV by Exploiting the Excess Heat through a Low Temperature Supercritical Organic Rankine Cycle

Budget: 1,600,000 EURO financed by EC (FP7-SME)

Duration: 2 years (2012-2014)

Partnership: AUA, Greece, Spain, Sweden, Belgium

<u>Objective</u>: To design and optimize and experimentally test a small scale low-temperature supercritical ORC powered by the excess heat of concentrated photovoltaics.

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Technical specifications				
Operation temperature	~95 °C			
Thermal input	41 kW			
Power output	~3 kW		The second	
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Project web site: <u>www.cpvrankine.aua.gr</u>







Development of a small-scale low-temperature Supercritical Organic Rankine Cycle engine with optimised scroll expander and evaporator

Budget: 770,000 EURO financed by Greek government (GSRT)

Duration: 2.5 years (2013-2015)

<u>Partnership:</u> AUA, 3 Greek SMEs and 1 Greek University <u>Objective:</u> To design and optimize and experimentally test a supercritical scroll expander and evaporator.

Technical specifications	
Operation temperature	~100 °C
Thermal input	100 kW
Power output	~7 kW

Project web site: <u>www.supercritical-orc.aua.gr</u>







AUA and SEU, School of Energy and Environment

















































AUA and SEU



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Objective of the Sino-GR proposal









Objective of the Sino-GR proposal

Develop a GR-Sino company to commercially exploit the ORC technology









Thank you for your attention

The GR research team of the Sino-GR proposal

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