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# **RETECZA – The Resource-Driven Technology Concept Centre - Fraunhofer Pilot Camp SA**

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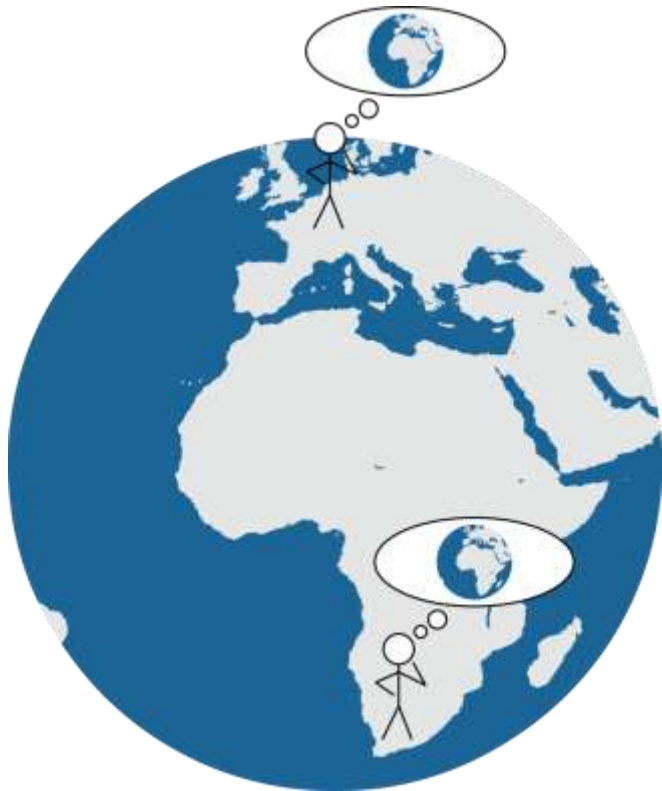
Berlin, January 17, 2012

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# South Africa and Europe – Science and Technology Cooperation

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**The precondition for sustainability:  
»Think global ...«**

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# South Africa and Europe – Science and Technology Cooperation

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**The precondition for success:  
»...act local!«**

**e. g. RETECZA Initiative**

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# South Africa and Europe – The Topics



## SA – RETECZA

- Clean energy
- Clean transportation
- Clean water



## EU – Agenda 2020

- Energy
- Mobility
- Health
- ...

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# South Africa and Europe – New Solutions

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## Solutions should be

- Sustainable
- Resource and energy efficient
- Environmentally friendly
- Easy
- Cheap

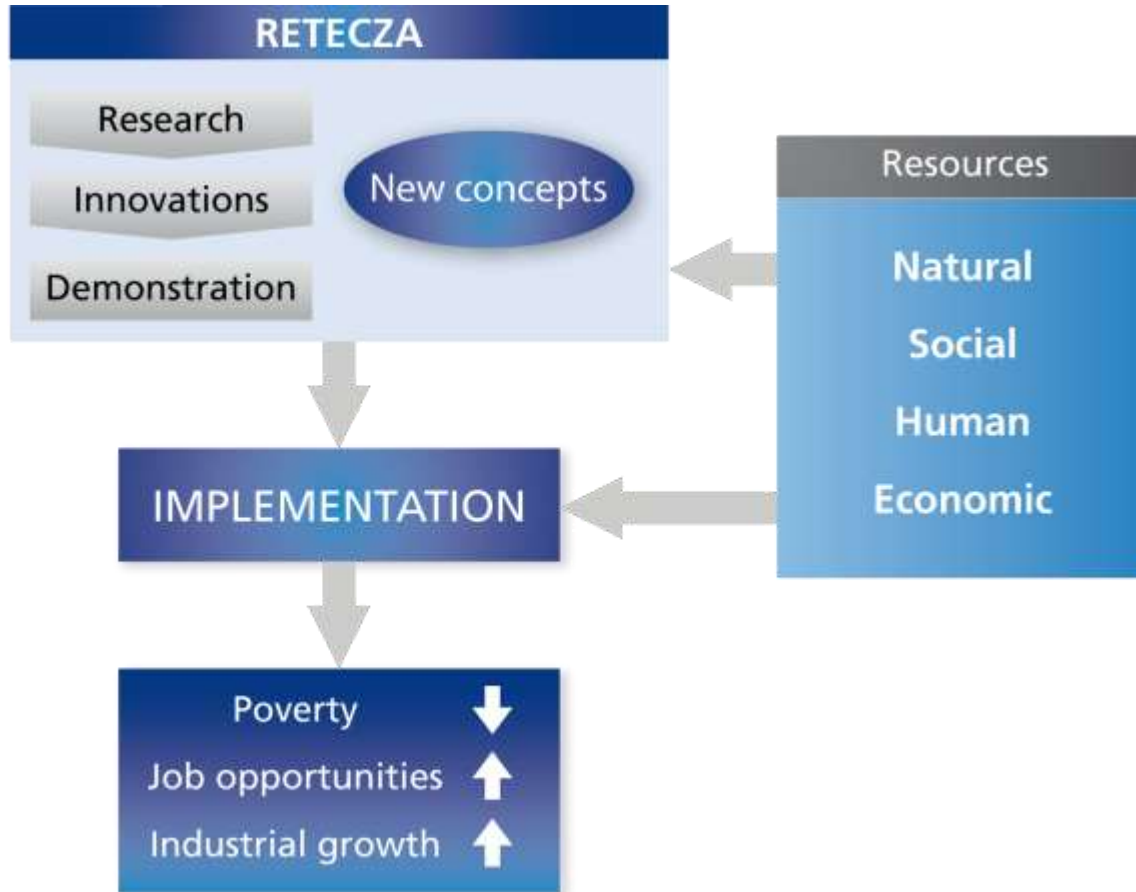
**The idea: »Help people helping themselves!«**

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# RETECZA – The Mission



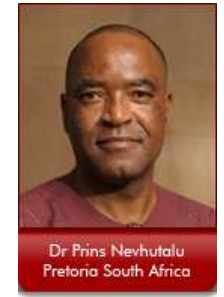
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# RETECZA – An International Unique Academia Industry Public Partnership Initiative – a Section 21 NPO



- Georgia TEC University, USA
- Tshwane University of Technology, South Africa
- Department of Science and Technology, South Africa
- Next Generation Vehicles Consortium, Sweden
- University of Western Cape, South Africa
- Fraunhofer Institute for Surface Engineering and Thin Films, Germany



# RETECZA – The Aims



The venture aims to harness South Africa's research and innovation capacities to fight **poverty** and to contribute to **sustainable development** especially in the areas of



- **Next generation transportation**
- **Next generation energy supply**
- **Green building and construction / water purification**



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# RETECZA – The Projects

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## Next Generation Clean Transportation

- Development of novel technologies to construct future transportation systems like lightweight engine, hydrogen storage, alternate engines, hybrid body etc.
- Demonstrator »Hydrogen Bicycle« developed

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# RETECZA – The Projects



## Next Generation Clean Transportation

Parameter	Designation	Value
Specification		
Output FC power	$P_{out}$	500 W
Operating time at MAX load	$t_{OP}$	5 hours
Reference Data		
FC efficiency	$\eta$	0.4
Theoretical energy equivalent / $H_2$	$\epsilon$	3 kW*h/m <sup>3</sup> $H_2$ STP
H storage capacity of MH alloy	$X_H$	0.15 m <sup>3</sup> $H_2$ STP / kg
Heat effect of $H_2$ absorption / desorption by MH alloy	$Q_s$	40 kJ/mole $H_2$
Allowed packing density of the MH alloy	$\rho_{MH}$	3 kg/dm <sup>3</sup>

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# RETECZA – The Projects

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## Next Generation Clean Transportation

The first technology demonstrator, a hydrogen powered tricycle was launched at the second annual RETECZA conference in June 2010 by Ms Naledi Pandor, South Africa's Minister of Science and Technology.

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# RETECZA – The Projects



## Next Generation Energy Supply

- Development of state-of-the-art VAWT Vertical Axis Wind Turbine
- Downstream applications for water purification and reticulation
- Production of hydrogen to support off-grid renewable energy supply

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# RETECZA – The Projects

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## Next Generation Energy Supply

VAWT Vertical Axis Wind Turbine

→ Manufactured with new  
composite materials

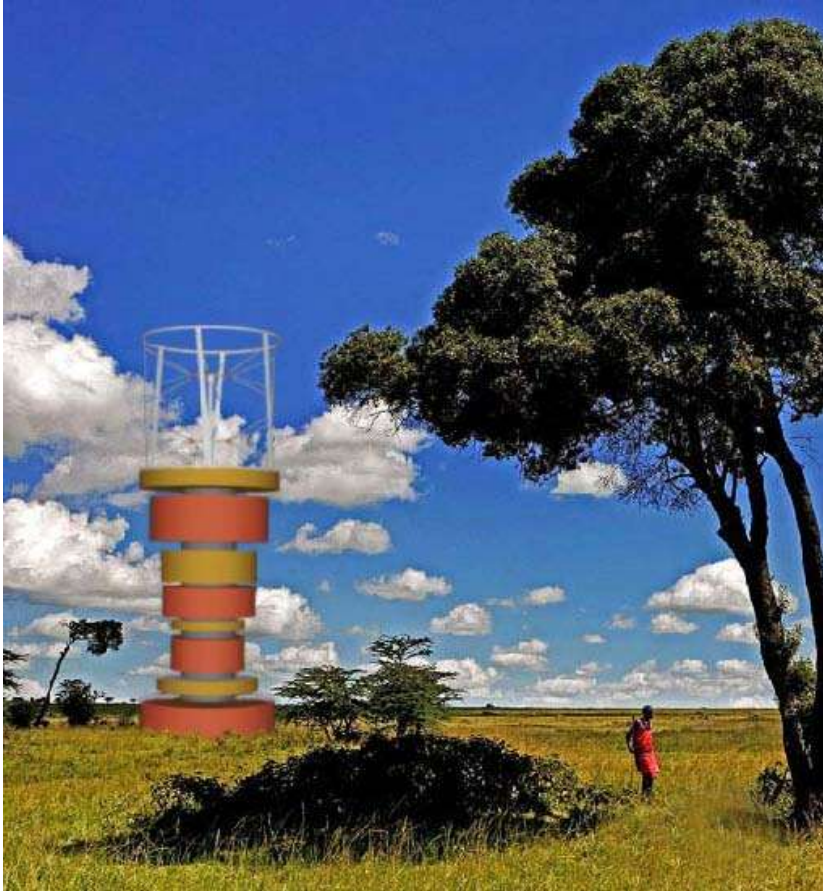
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# RETECZA – The Projects



## Green Building and Construction

- Self preserving energy
- Clean water supplies
- Sustainable living environment
- Housing / buildings: Use of materials which are energy-efficient, recycable, durable, and lightweight

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# RETECZA – The Projects

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## Green Building and Construction

- Cost effective utilization of coal ash
  - Autonomous housing
- Implementing sustainable and viable development in order to solve the pressing problem of low-cost living

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# RETECZA – The Projects

## Green Building and Construction



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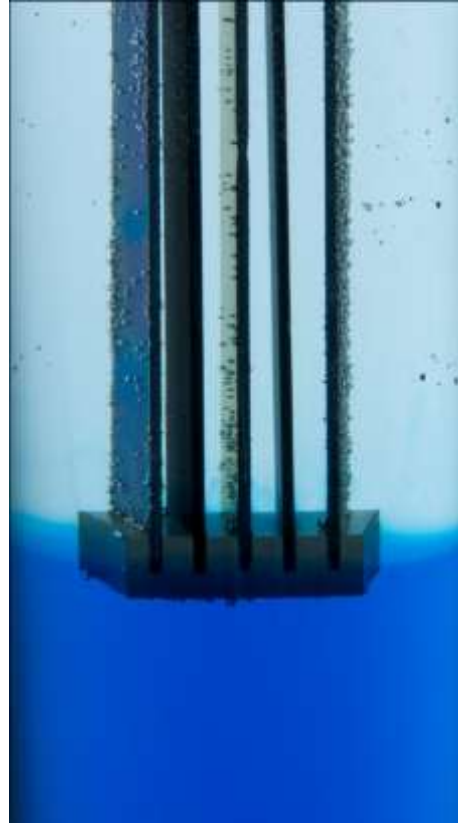
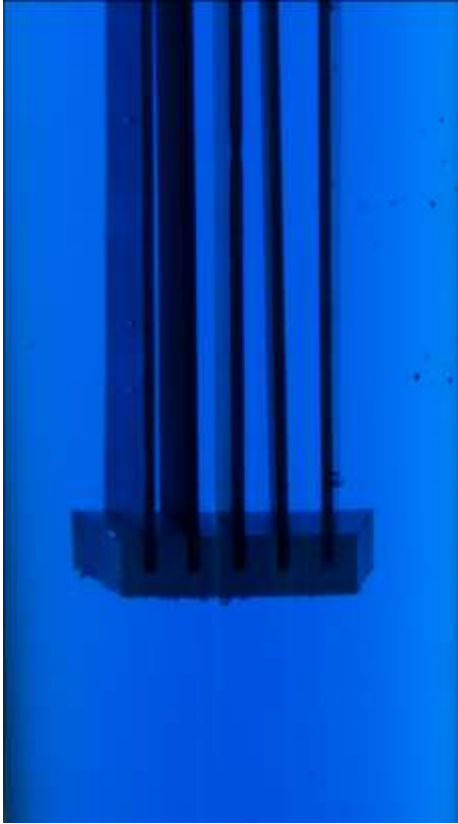
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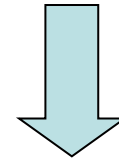
# RETECZA –

## Water Purification Using Diamond Electrodes

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Electrodes coated with  
boron doped diamond



Degradation of organic  
compounds and bacteria

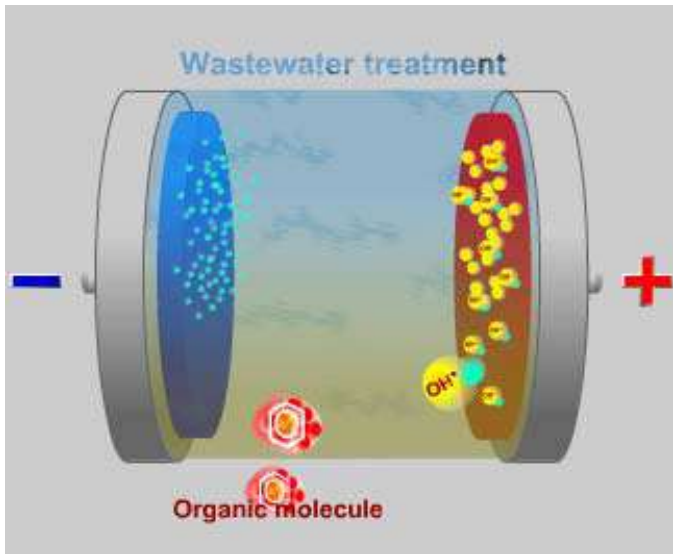
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# RETECZA –

## Water Purification Using Diamond Electrodes



- No dosage of chemicals
- Generation of oxidants from the water itself for disinfection and cleaning by electrical power
- Efficient destruction of pollutants, also highly persistent species
- Water sanitation with low energy input

### Fields of Application

- Disinfection of drinking water, ultra pure water used in production, ...
- Elimination of persistent chemicals
- Treatment of waste water for reuse or discharge

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# Fraunhofer Camps

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Technological engagement for social, economic and ecological advancement in Africa :

- Excellent academic education
- Technical / vocational education
- Applied research
- Domestic product development
- Industrial realization in pilot productions
- Support of enterprise start-ups

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# Fraunhofer Pilotcamp SA, Tshwane University of Technology, Pretoria

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- Improvement of the supply of Remote Areas of SA with clean water
- Realization of adequate living space / housing areas
- Regenerative power technologies
- Regional applied mobility

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# Fraunhofer Pilotcamp SA, Tshwane University of Technology, Pretoria

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Following activities are planned:

- Academic education at TUT
- Technical education at Advanced Tooling Center
- R+D projects
- Pilot production + Small scale production

**Start: Summer 2012**

After an initial phase of 5 years, pilotcamp has reached break-even.



# Fraunhofer Pilotcamp SA, Tshwane University of Technology, Pretoria

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Budget – Financial structure – initial phase:

- Seed money (Fraunhofer)
- Germany – SA + EU, R+D funding
- Germany: BMBF, BMZ
- SA: DST, DHS, Department Rural Development + Land Reform
- Development Bank SA
- World Bank



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**Thank you for your attention!**

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