



THE CYPRUS  
INSTITUTE

# Herwig Schopper and the Founding of the Cyprus Institute

**Costas N. Papanicolas**  
Cyl President

CERN, 15<sup>th</sup> Sept, 2009



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[www.cyi.ac.cy](http://www.cyi.ac.cy) or  
Wikipedia

## **Herwig Schopper & the Cyprus Institute**

- Member of the Founding –Planning team that planned the and launched the Cyprus Institute
- Member of its Board of Trustees
- Chairman of its Scientific Council
- Member of the Executive Committee of the Board

**This activity of Herwig  
concerns the present and the future!**

**Few words about ..**

**The Cyprus Institute ([www.cyi.ac.cy](http://www.cyi.ac.cy))**

## **Research & Education**

A research/educational institution suited to a knowledge economy, exploiting Cyprus «gateway» niche, sound infrastructure. A European institution, for the Eastern Mediterranean based in Cyprus.

A non Governmental institution devoted to advancing peace and prosperity in the region using science and technology.



# THE CYPRUS INSTITUTE



## **Circa 2000:**

The Cyprus Development Bank (led by J. Joannides, A. Mouskos) asked me to assemble a team of Academics to “Assess the feasibility and viability of a Research University in the Eastern Mediterranean”

*A US type (non governmental, small, high quality) university, in the E. Mediterranean, adopted in Europe.*

## **PLANNING -COORDINATING TEAM**

**Ernest J Moniz** (MIT; former US undersecretary of Energy)

**Guy Ourisson & H. Curien** (Academie des Sciences, France)

**Costas N. Papanicolas** (Chair of CY Accreditation Council & Athens Univ.)

**Frank T.H. Rhodes** (President Emeritus of Cornell)

**Herwig Schopper** (Former DG of CERN)

**John Ioannides** (CEO of CDB) and **E. Nikolaidou & A. Stamatis** of CDB.





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# Early Planning days (at the French Academy)



## **STRUCTURE :**

**Operating (“owned”) under the stewardship of the Cyprus Research and Educational Foundation.**

**Governed by an International Board of Trustees**

**Academic and Research Units**

- The Research Centers
- The Graduate College
- The Undergraduate College

**It is being developed top down:**

**Research, graduate education, undergraduate education**



**The Research  
Centers:**

**\*Energy, Environment and Water**

**E.J. Moniz, P. Crutzen, K. Khaduri**

**Biological Sciences & Human Health**

**H. Varmus, M. Schwartz, F. Kafatos**

**Economic Development and Conflict Resolution  
Management and Finance**

**J. Sachs, C.DeMatte, G. Constantinides**

**\*Technology and Archaeology**

**H. Lechtman, J.P.Mohen, D. Michaelides**

**\*\_Computation - Based Science and Technology**

**J. Negele, V. Jongeneel, E. Housits**

**Launched**

**Information, Communication and Computation**

**E. Bloch, J. Routti, D. Tschritzis**



## Asymptotic Profile

### SIZE : Students, Faculty & Staff

Students	2000	undergraduates
	500	research graduate students
	500	professional degree students (MBA, etc.)
Faculty	200	including 150 in science & technology
Research staff	100	(not including postdocs)
Administrators	20	
Support staff	150	

### Costs (in Millions of Euros):

Basic instructional, research, and administrative plant:	250 M - 350M
Research equipment:	150 M - 200 M
Dormitories and faculty housing: self-sustaining but require up-front financing	
Annual operating expenses:	75M



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# June 2002, Convocation



## Chronology & Milestones

- Aug 2001 Official Launching of Research Phase
- Jun 2002 Convocation of International Scholars, Vision and scope endorsed.
  
- Jun 2003 Detailed 2 year plan approved by Cyprus Gov.
- Feb 2004 CREF Established
- Jan 2005 Cyprus Institute established
  
- Jan 2006 Agreement on EEWRC with RPF and MIT signed
- Jun 2006 Athalassa Campus given to Cy
  
- June 2007 Cyl and C2RMF (Louvre) Agreement
- Sept 2007 Cyl and Univ. of Illinois Agreement
- Dec 2007 Launching of Research Activities





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# Convincing the Cyprus Government -2005









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## Current Status:

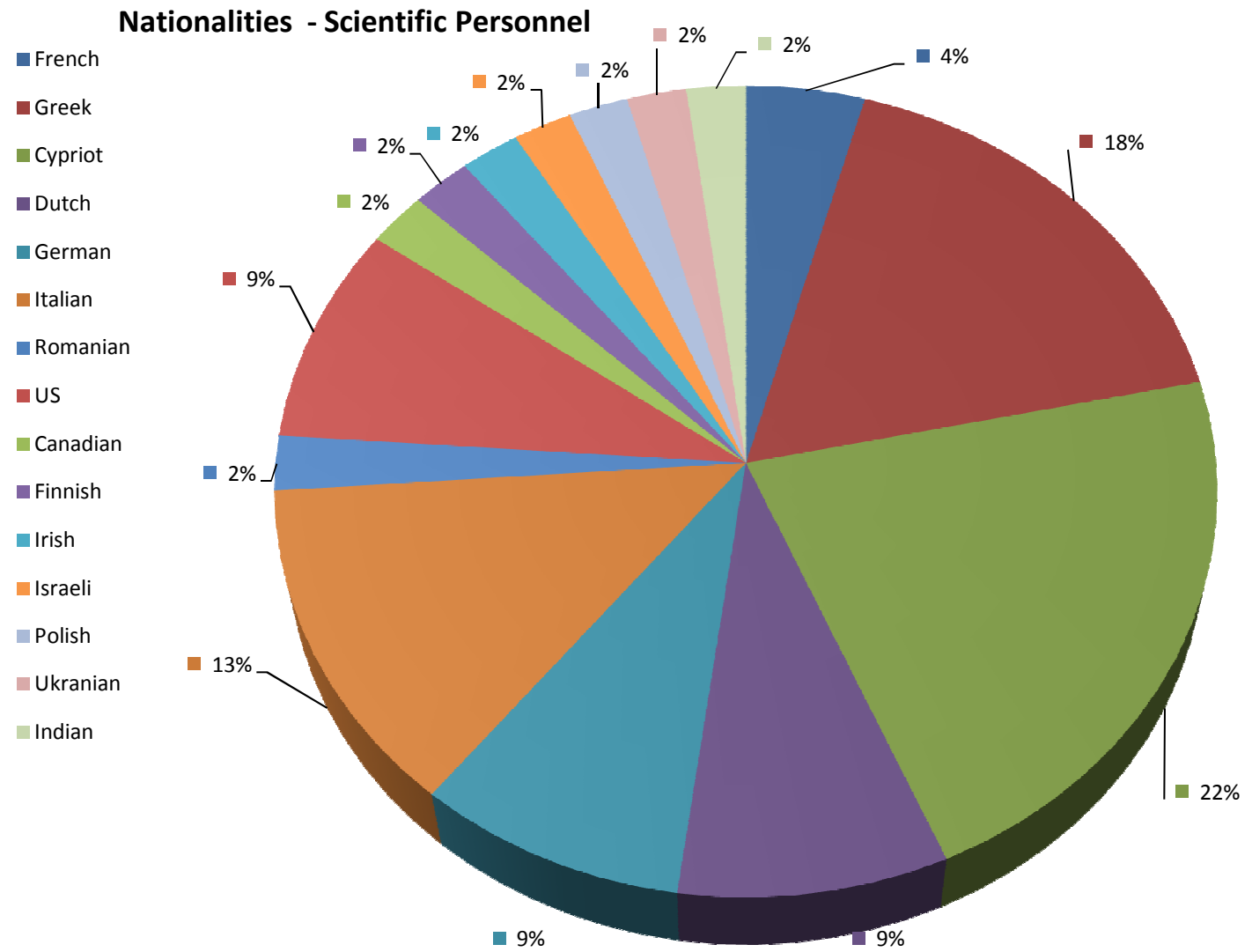
- **An International establishment, partnered with leading Institutions in the world, pursuing “regional problems of global significance”**
  - **Research has begun in earnest**
  - **Doctoral Programs about to begin**

- HE President of the Republic of Cyprus Mr. **Demetris Christofias** (Honorary Chairman)
- **Prof. Bruce Alberts** F.President of US Academy of Sciences, Editor in chief of “Science”
- **Prof. Philippe Busquin** EU Parliament, Former EU commissioner for research
- Prof. **Edouard Brezin** - Professor at ENS (Chairman)
- Mr. **Glafkos Clerides** - Former President of the Republic of Cyprus.
- Prof. **Richard Cooper** - Harvard Univ. , Former Undersecretary of the State Dep.(USA)
- Baroness **Susan Greenfield** – Oxford Univ. UK
- Prof. **Hany Helal** Minister of Education, Egypt
- Mr. **Dakis Ioannou** - International Businessman
- Mr. **John G. Joannides** - Former CEO, Cyprus Development Bank
- Prof. **Joshua Jortner** - Israeli Academy and Tel Aviv University
- Dr. **Petros M. Kareklas** - Permanent Secretary, Ministry of Defence of Cyprus.
- **Prof. Linda Katehi** Chancellor University of California (Davis)
- Ms **Edmee Leventi** - Ambassadors of Cyprus to UNESCO
- Dr. **Andreas Moleskis** - Permanent Secretary, Planning Bureau of Cyprus
- Prof. **Ernest J. Moniz** – MIT, Former Undersecretary for Energy (USA)
- Mr. **Andreas Mouskos** – Former MP, Former Chairman, Cyprus Development Bank
- Prof. **Costas N. Papanicolas** – President of the Cyprus Institute
- Prof. **Ismael Serageldin** - Director, Library of Alexandria, Egypt
- **Prof. Herwig Schopper** - University Hamburg, Former Director General of CERN
- Prof. **Constantine Stefanis** - Athens University, Former Minister of Health, Greece
- Prof. **Khaled Toukan** – F. Minister of Education of Jordan. President of JAEC
- Dr. **George Vassiliou** - Former President of the Republic of Cyprus



# Personnel Development

## RESEARCH PERSONNEL NATIONALITY BREAK-DOWN





# Cyl Campuses







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# Research Activities



## II. Research Center Development

Research Centers are the “fundamental” building Units of The Cyprus Institute. When adequate number of them is established, the Graduate College will commence operations providing structured Graduate Education. Seven Research Centers are in our developmental plan.

**Energy, Environment and Water R.C.**

**Science and Technology in Archaeology R.C.**

**Computation based Science and Technology R.C.**

**Biological Science and Human Health R.C.**

**Economic Development and Conflict Resolution R.C.**

**Technology Management and Finance R.C.**

**Information, Communication and Computation R.C.**



- **Energy, Environment and Water (EEWRC)**
  - Fully operational, Collaboration Agreement with MIT signed in 2006, Founding Director hired in 2007
  - Enterprise plan revised in 2008, five-year budget approved
- **Computation-based Science and Technology (CaSToRC)**
  - Enterprise Plan reviewed by SAB and approved by the Board (2009)
  - Collaboration Agreement with Univ. Illinois in place
  - Search for Founding Director initiated
- **Science and Technology for Archaeology (STARC)**
  - Enterprise Plan approved pending scientific review (2009)
  - Collaboration Agreement being discussed and drafted
  - Functionally operational



## **Strategic -Flagship Projects**

Programs of Regional significance, defining Cyl

### **Climate Change Impact study (CIMME):**

Understand in detail and high resolution the impact of Climate Change in the Eastern Mediterranean and Middle east.

Propose measures for adaptation

**Cogeneration of electricity & desalinated seawater using concentrating solar power**

## Three Phases:

1. Conduct a Research and Development Study containing a techno-economic assessment study of the current status of technology in the co-production of electricity and desalinated water.
2. Construct a Pilot Plant ( 4 MWe) to test, demonstrate and optimize the concept and the technological choices.
3. Refine the design and guide the implementation (by industry) of 20 - 60 MWe co-generation plants



## **Funded by:**

**The Government of Cyprus**

## **Coordinator:**

**The Cyprus Institute (Cyl)**

## **Partners:**

- Massachusetts Institute of Technology (MIT)
- University of Illinois at Urbana Champaign (UIUC)
- Electric Authority of Cyprus (EAC)
- Cyprus Energy Regulatory Authority (CERA)
- Cyprus University of Technology (CUT)
- Water Development Department (WDD)
  
- Jordanian University for Science and Technology
- National Energy Research Center (Jordan)



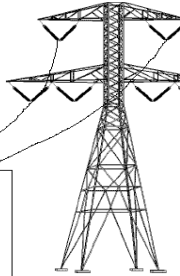
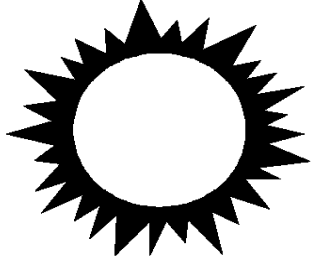
# Concentrated Solar Power (CSP)

- Reflectors concentrate the rays of the sun onto a heat collecting element
- Heat is then used to make steam and using a turbine produces electricity

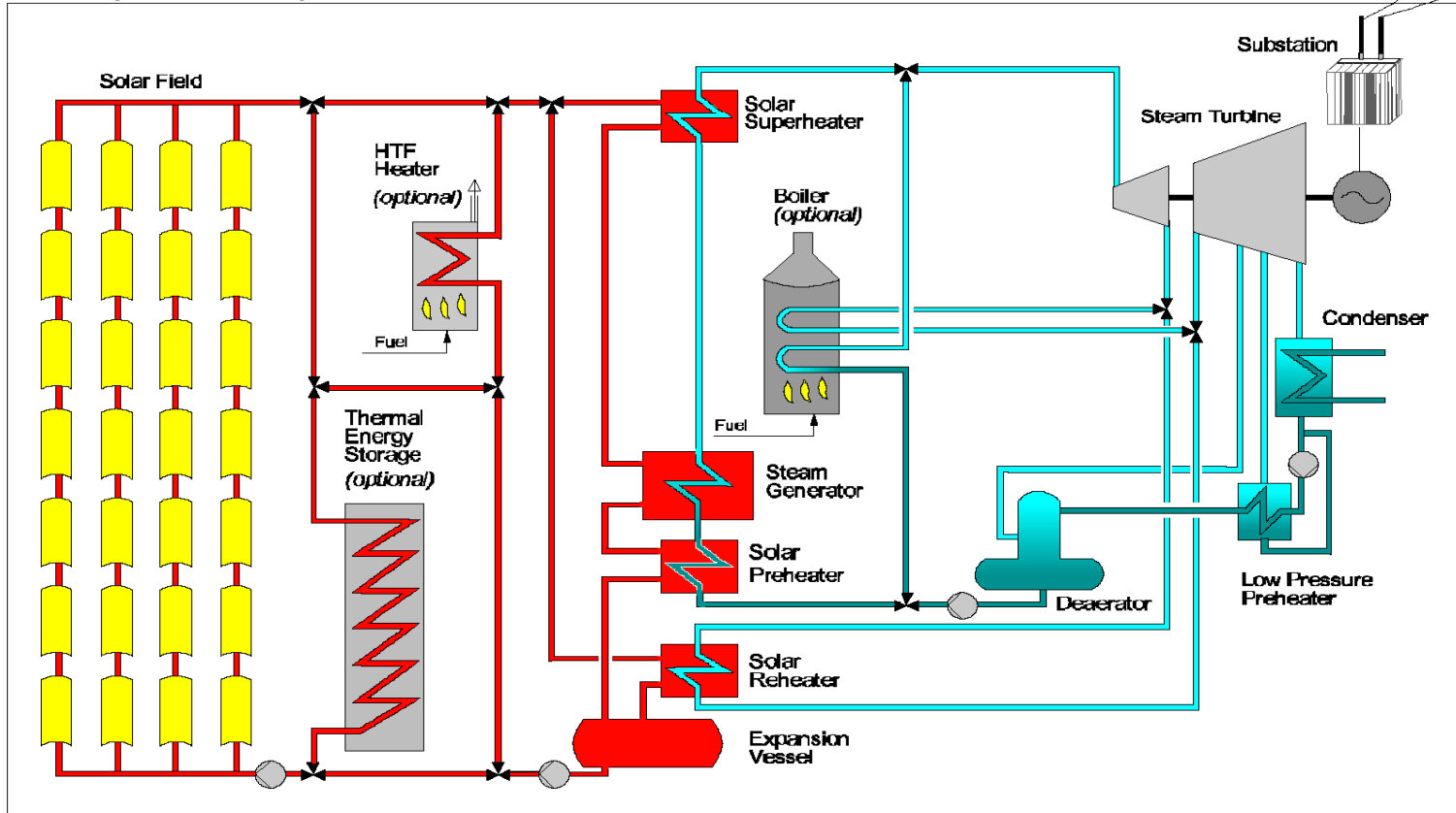




# CSP Power Plant



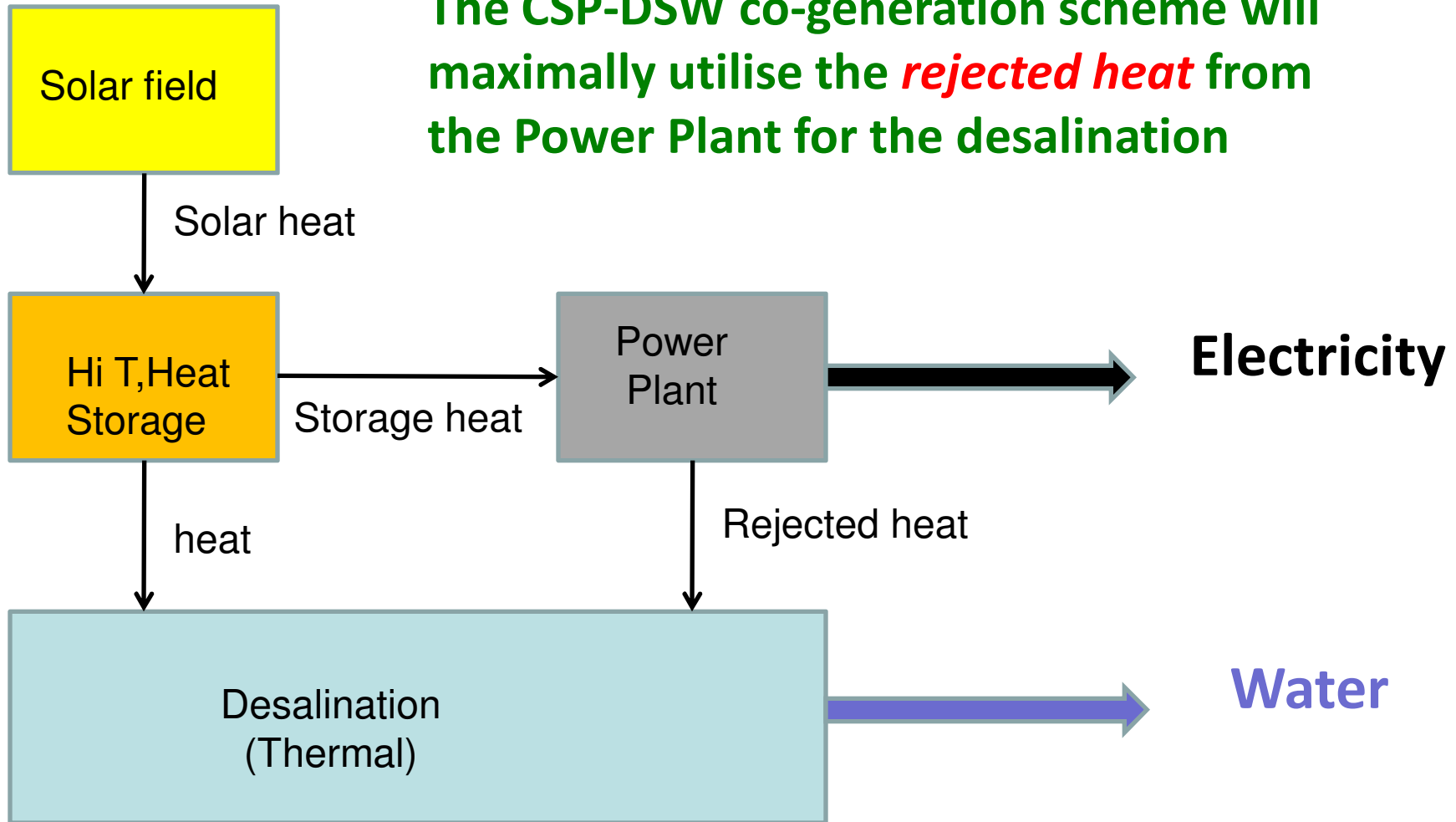
System Boundary



- **CSP Technology has been used with Desalination but in a “serial” way**
- **The CSP-DSW Project will “merge” both processes together**
- **Goal: to create a more efficient, cost-saving and environment-friendly plant co-generating electricity and water w 24/7 operation.**

# CSP-DSW co-generation simplified concept

The CSP-DSW co-generation scheme will maximally utilise the *rejected heat* from the Power Plant for the desalination

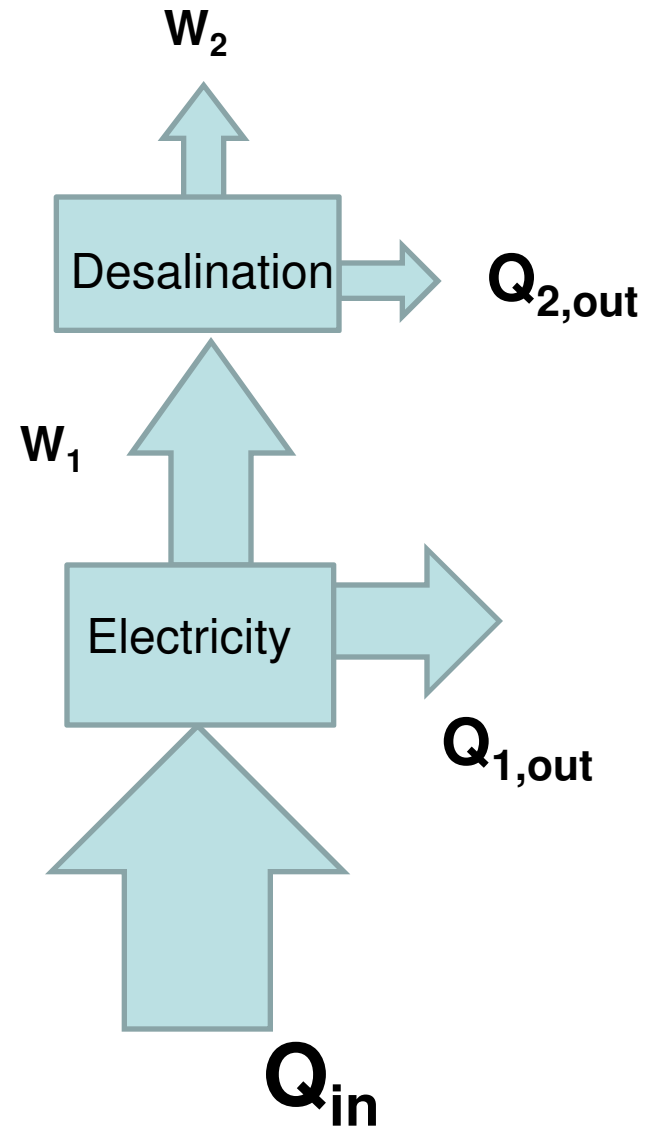




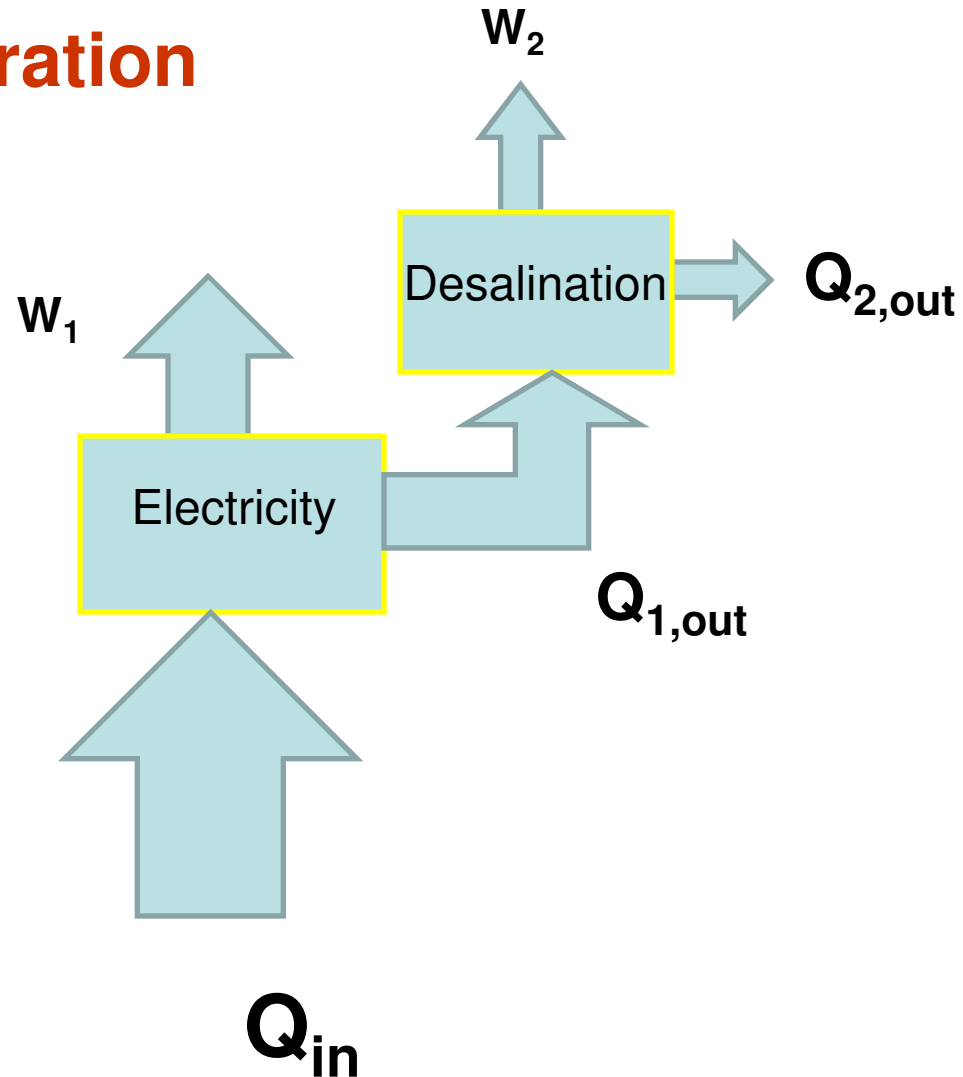
## Serial Configuration

## Maximum Efficiency

$$\eta_{ser.} = \frac{W_2}{Q_{in}} = 1 - \frac{Q_{1,out} + Q_{2,out}}{Q_{in}}$$

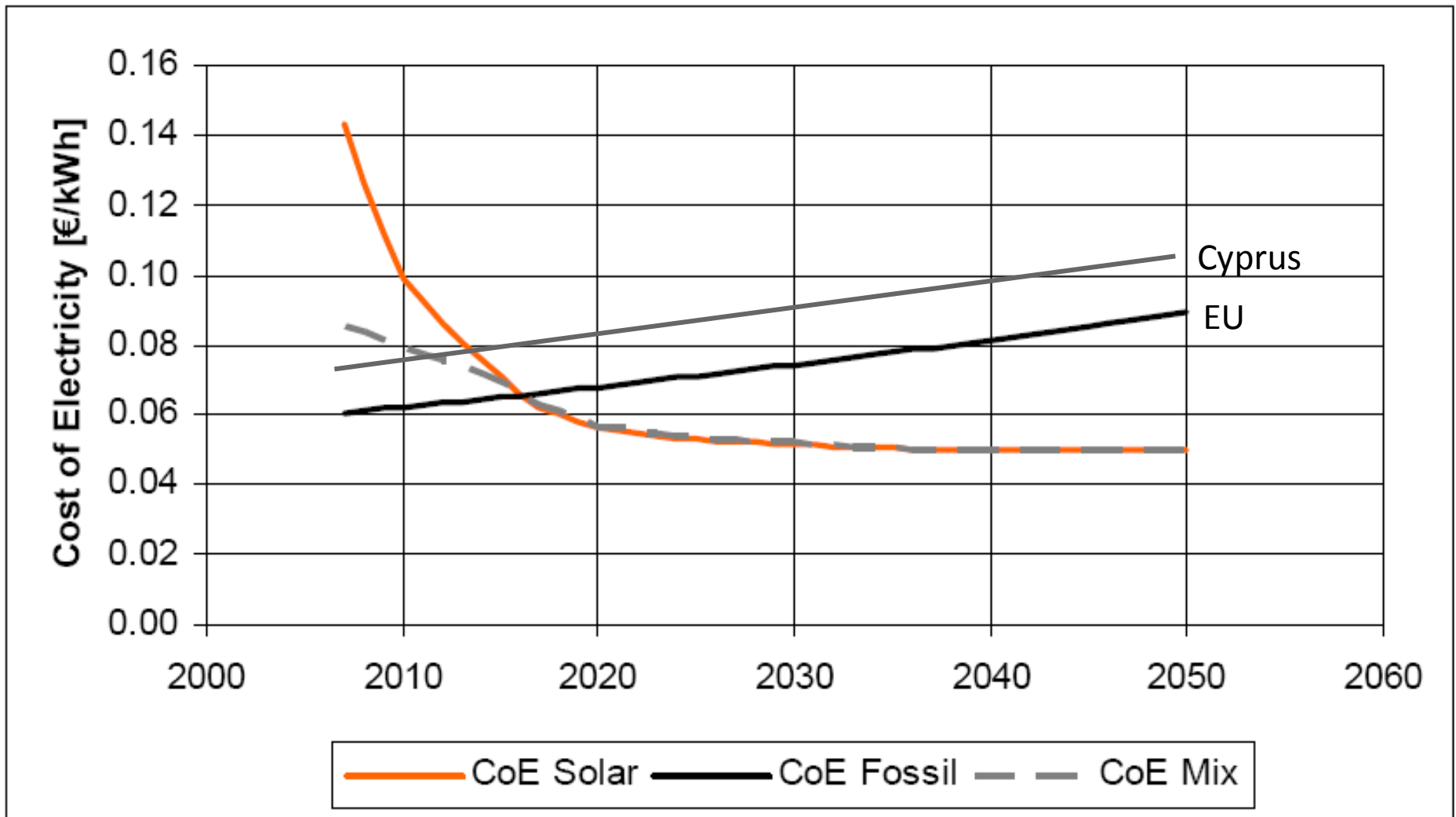


## CSP-DSW Cyl Configuration

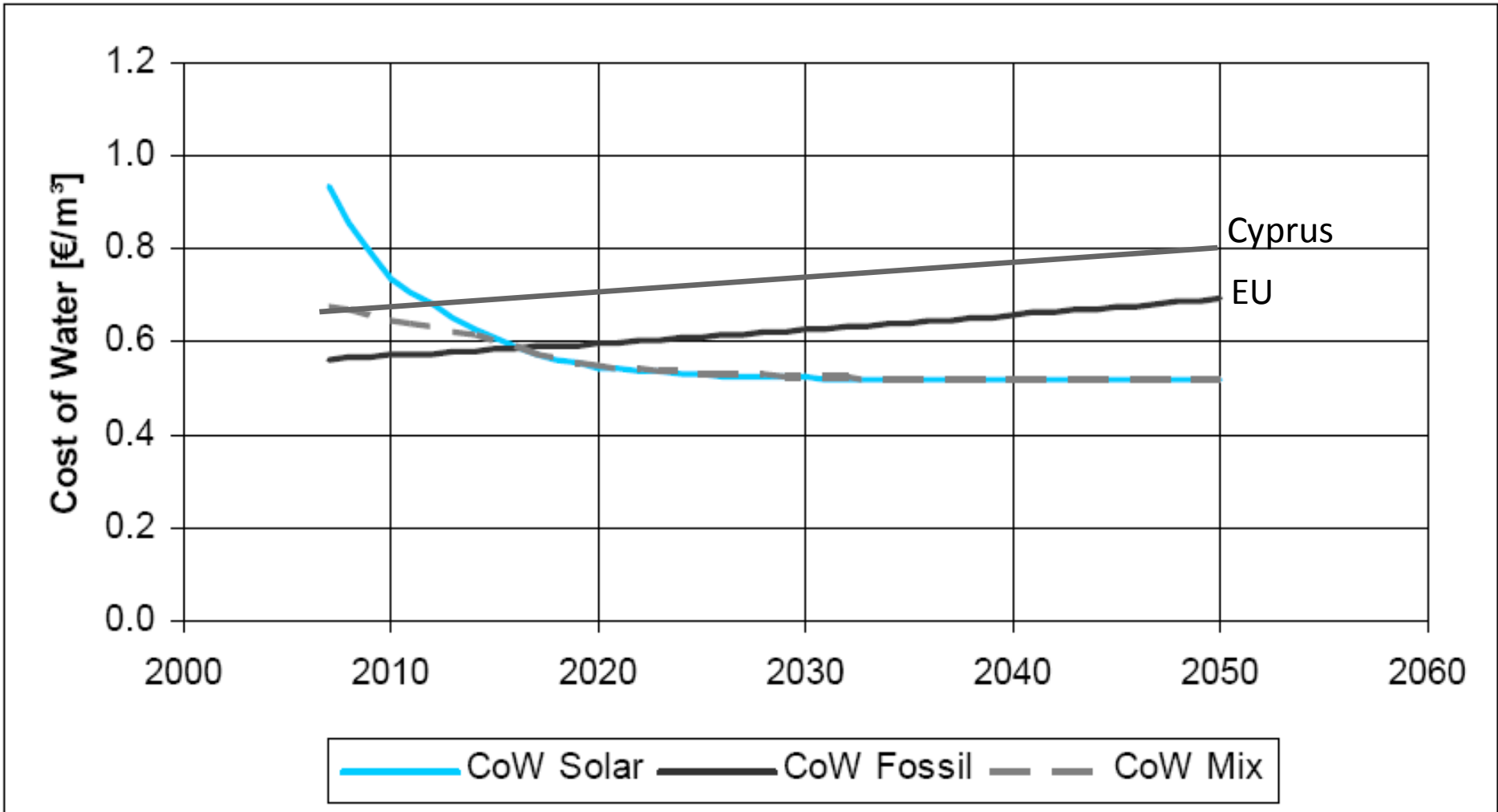


**Maximum Efficiency  
(Carnot):**

$$\eta_{CSP-DSW} = \frac{W_1 + W_2}{Q_{in}} = 1 - \frac{Q_{2,out}}{Q_{in}}$$



Projected cost of electricity (CoE) from CSP, from gas fired power stations and from hybrid systems in the AQUA-CSP reference scenario (prices in real €2007, 25 years economic life, solar irradiance 2400 kWh/m<sup>2</sup>/y, initial fuel cost 25€/MWh, fuel cost escalation 1 %/y, power plant investment 500 €/kW, 7500 full load hours per year). Cost break-even can occur much earlier if fossil fuel costs escalate faster. Cyprus's costs are assumed to be 15% higher as long as electricity is produced from oil (fuel oil or diesel).



Projected cost of water (CoW) from RO using conventionally generated power or solar electricity in the AQUA-CSP reference scenario (RO investment 900 €/m<sup>3</sup>/d, RO power demand 4.5 kWh/m<sup>3</sup>. Cyprus's costs are assumed to be 15% higher as long as electricity is produced from oil (fuel oil or diesel)

## Novelties & advantages of the project

### Higher efficiency in co-production

- This is achieved by using the rejected heat from the electricity production & other subsystems for desalination

### Base load: Operational 24/7

- With the high T heat storage, co-production will continue during night time – bad weather conditions

### Higher operational temperature for the solar collector

- While most CSP plants operate at a Temperature of 500° C, we are aiming for 850° C or higher, aiming at higher efficiency

### CSP “thirst” is turned into an advantage

- Instead of being a big consumer of water it is turned into a net producer of fresh water





# The Pentacomo Site

Cyprus Gov. has allotted 60 he proposed it as “strategic” contribution to UfM/ Med. Solar Plan



# Cyl: Looking Ahead

**Difficult.**

**but so far we have been successful**

# H. Schopper's signature

- The Institute has grown at an impressive rate while at the same time maintaining uncompromising quality standards
- Research activities have started in earnest and competitive funds have been secured, validating the quality of the programs and their viability in a competitive research environment
- All three research centers are developing at a rapid pace and they are considered to be on the right track, as prescribed by their respective enterprise plans.
- The Institute is now ready to proceed rapidly with the planning of its fourth research center (BSHHRC)
- Noticeable achievements confirm the claim of excellence





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# Cyprus Wishes you the Best Herwig!

