



## Innovation in solar collectors and their standards

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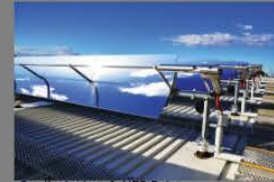
Brisbane, 27th March 2014



**SOLEM**  
CONSULTING

# Solar Collectors

Concentrating collectors



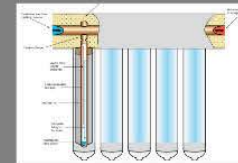
Credit: Author & NEP Solar

Photovoltaic Thermal (PVT)



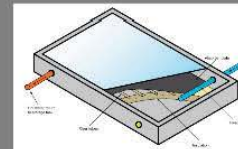
source: Solimpex

Evacuated tube



source: Sustainability Victoria

Flat plate

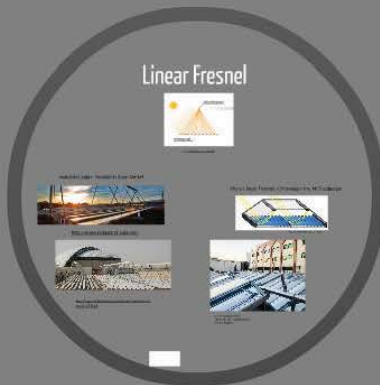
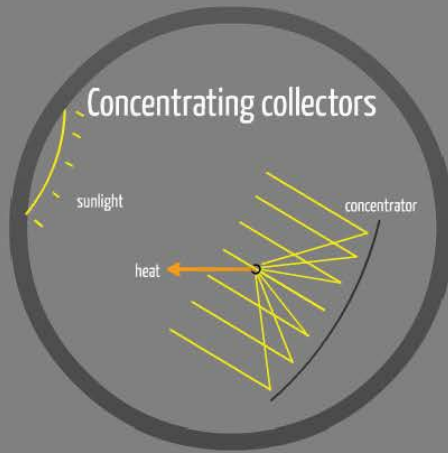


source: Sustainability Victoria

Air collectors



source: solaricetec.com



### Micro Urban Solar Integrated Concentrators (MUSIC)

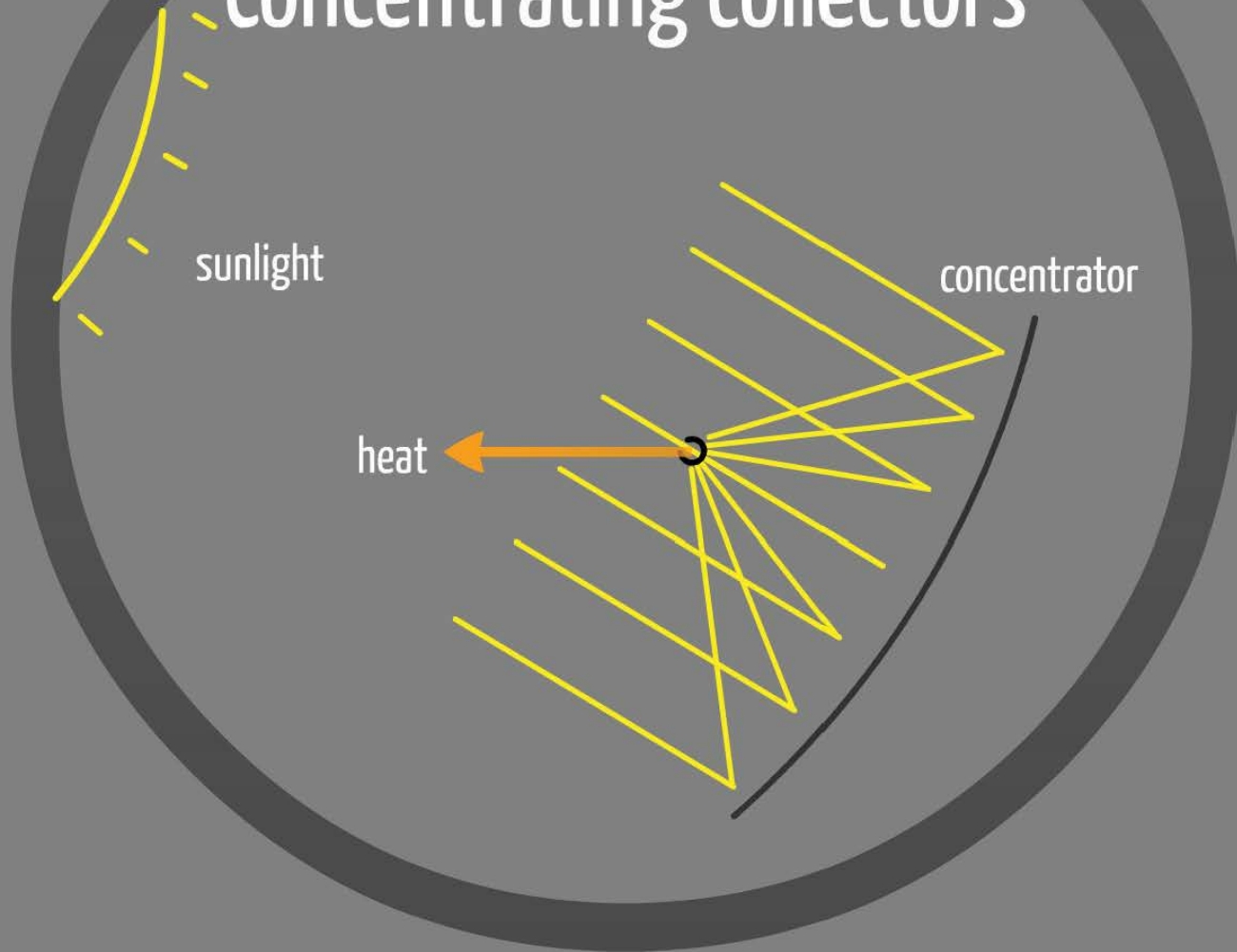
Industry and ARENA funded research project to develop a flat plate concentrating collector.

Research Partners

- HET Geerd
- JRGW
- Emap
- CSIRO
- Fraunhofer
- Arizona State University
- University of Tulsa
- University of California (Merced)

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# Concentrating collectors



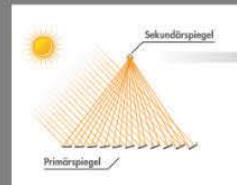
# Solar Trough collectors



NEP Solar - Charlestown Square  
Solar Cooling Project



# Linear Fresnel



<http://www.industrial-solar.de/>

Industrial Solar - Industrial Solar GmbH

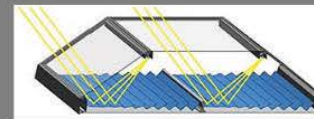


<http://www.industrial-solar.de/>



<http://www.imitteistand.de/themen/presse.html?boxid=374564>

Micro Linear Fresnel - Chromasun Inc. MCT collector



Source: <http://www.chromasun.com/>



Source: SunWater Solar  
Abu Dhabi Solar Cooling Project  
Solem Designed

## Micro Urban Solar Integrated Concentrators (MUSIC)

Industry and ARENA funded research project to develop a flat plate concentrating collector.

### Research Partners

- RMIT (lead)
- UNSW,
- Rheem,
- CSIRO,
- Fielders,
- Arizona State University,
- University of Tulsa,
- University of California (Merced)

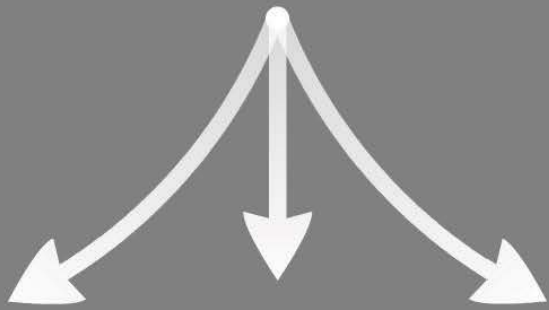
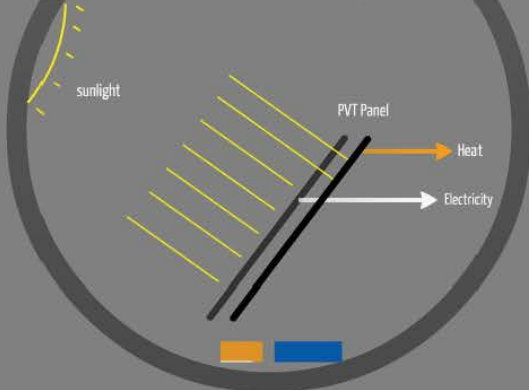
**WATCH THIS SPACE**

<http://www.rmit.edu.au/aeromecheng/research/music>

<http://arena.gov.au/project/micro-urban-solar-integrated-concentrators-music/>



# Photovoltaics-Thermal (PVT)



## Flat plate PVT

Solimpeks - PowerTherm and PowerVolt



www.solimpeks.com.au



www.solarpanel.com.au



## Concentrating PVT (CPVT)

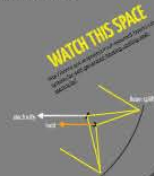
Cogenra Solar T14



## Beam Splitting concentrating PVT

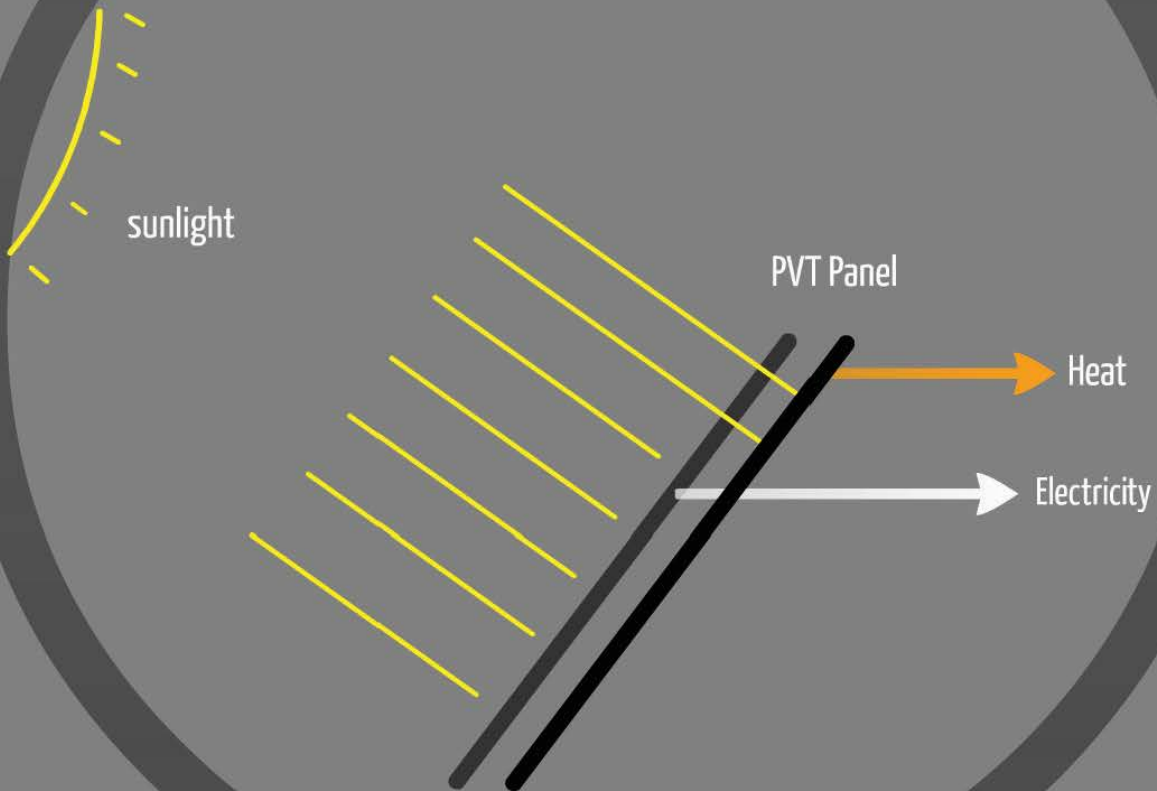
ARNEA Funded research project to split the solar radiation spectrum allowing cool PV operation and high thermal temperatures.

- Partners:
- ANU
  - Chromasun
  - NEP
  - UNSW
  - CSIRO
  - RMIT





# Photovoltaics-Thermal (PVT)



# Flat plate PVT

## Solimpeks - PowerTherm and PowerVolt



source: [solimpeks.com.au](http://solimpeks.com.au)

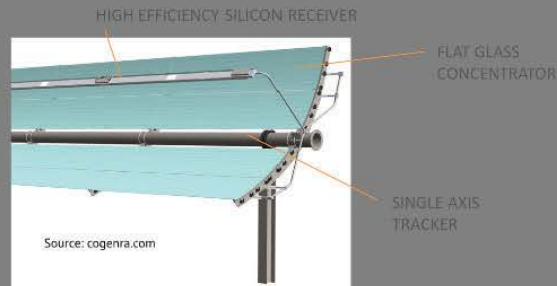


source: [solimpeks.com.au](http://solimpeks.com.au)



# Concentrating PVT (CPVT)

## Cogenra Solar T14



# Beam Splitting concentrating PVT

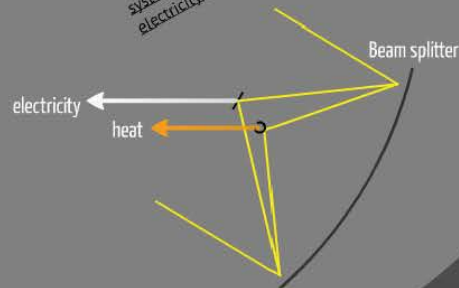
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- Chromasun
- NEP
- UNSW
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- RMIT

**WATCH THIS SPACE**

<http://arena.gov.au/project/roof-mounted-hybrid-cst-system-for-self-generated-heating-cooling-and-electricity>



But what about the market?

Where can these innovations be sold?

# Domestic hot water



source: [greenlawchina.org](http://greenlawchina.org)



source: [solahart.com.au](http://solahart.com.au)

# Industrial process heat



39,000 m2 flat plate field in Chile CODELCO copper mine

source: [renewablesandmining.com/wp-content/uploads/2013/07/REM-codelco-case-study.pdf](https://renewablesandmining.com/wp-content/uploads/2013/07/REM-codelco-case-study.pdf)



De Bortoli Winery with solar process heating  
source: [apricus.com.au](http://apricus.com.au)



Lataria Engiadinaisa SA Dairy in Switzerland  
source: [nep-solar.com](http://nep-solar.com)



# Solar Cooling



UWC-SEA building solar cooling project in Singapore by SOLID

source: [www.solarnovus.com](http://www.solarnovus.com)



Echuca Regional Health solar cooling system with Greenland tubes

source: [ecogeneration.com.au](http://ecogeneration.com.au)



Charlestown Square Solar Cooling

source: author

# Creating a open global market

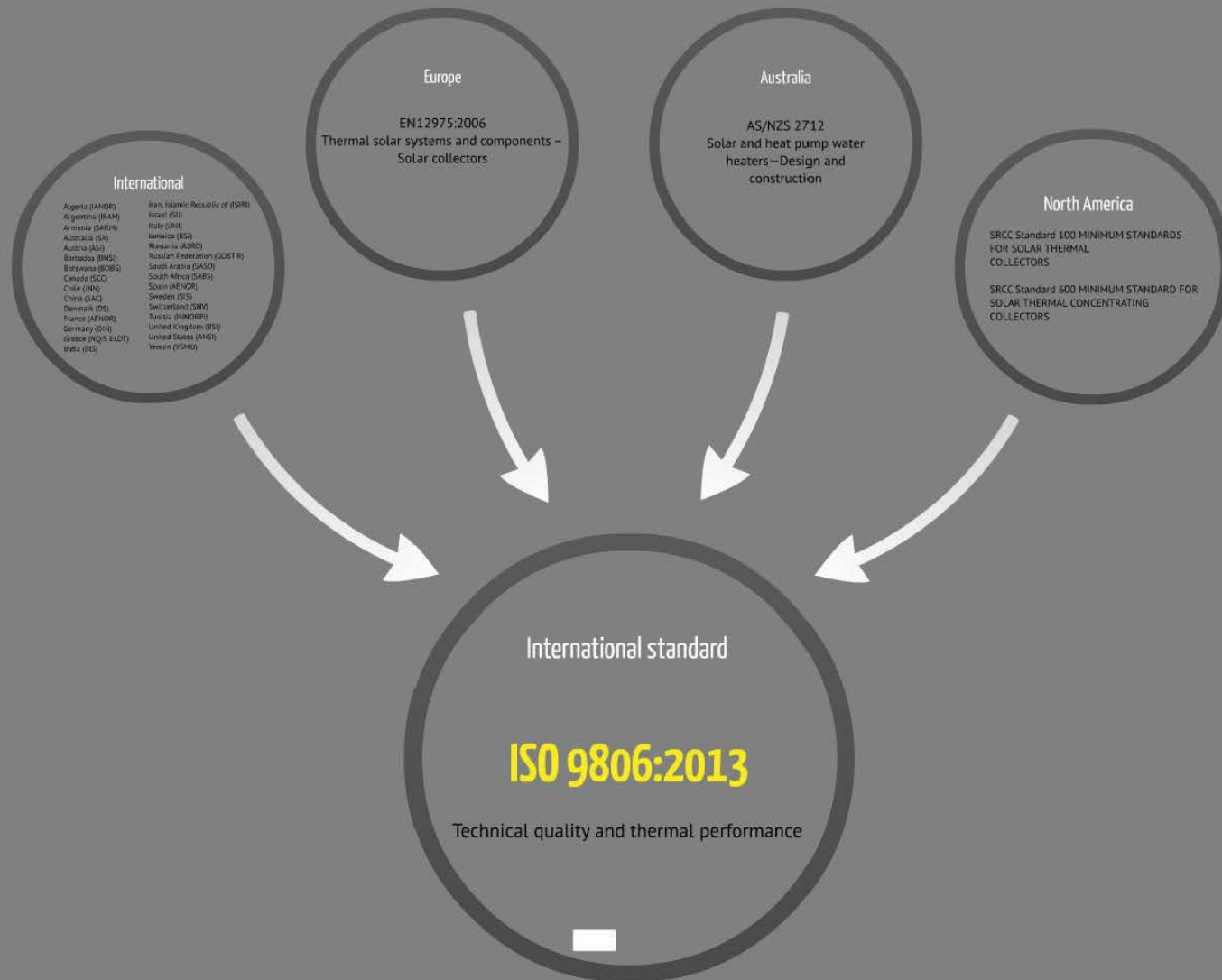
1. Harmonization of National Standards

2. Global program of certification recognition

3. Adoption



# 1. Harmonization of National Standards



# International

Algeria (IANOR)	Iran, Islamic Republic of (ISIRI)
Argentina (IRAM)	Israel (SII)
Armenia (SARM)	Italy (UNI)
Australia (SA)	Jamaica (BSJ)
Austria (ASI)	Romania (ASRO)
Barbados (BNSI)	Russian Federation (GOST R)
Botswana (BOBS)	Saudi Arabia (SASO)
Canada (SCC)	South Africa (SABS)
Chile (INN)	Spain (AENOR)
China (SAC)	Sweden (SIS)
Denmark (DS)	Switzerland (SNV)
France (AFNOR)	Tunisia (INNORPI)
Germany (DIN)	United Kingdom (BSI)
Greece (NQIS ELOT)	United States (ANSI)
India (BIS)	Yemen (YSMO)



Europe

EN12975:2006

Thermal solar systems and components –  
Solar collectors



Australia

AS/NZS 2712  
Solar and heat pump water  
heaters – Design and  
construction

# North America

SRCC Standard 100 MINIMUM STANDARDS  
FOR SOLAR THERMAL  
COLLECTORS

SRCC Standard 600 MINIMUM STANDARD FOR  
SOLAR THERMAL CONCENTRATING  
COLLECTORS



International standard

# ISO 9806:2013

Technical quality and thermal performance





# Scope

1. Concentrating collectors
2. PVT collectors
3. Flat Plate
5. Evacuated tube
6. Air heaters

# Performance testing



Quasi-dynamic  
steady-state



## Mechanical Testing

Pressure tests

High temperature and stagnation tests

Thermal shock tests

Rain penetration tests

Freeze resistance tests

Impact resistance tests



# Adoption

Europe: EN 12975 is being replaced by ISO 9806:2013

Australia: Waiting revision to be acceptable

North America: Awaiting revision to be acceptable

China and the rest of the world are working but we need

**HELP!**





## 2. Global program of certification recognition

International Energy Agency

Solar Heating and Cooling Programme

Task 43 Solar Rating & Certification



[task43.iea-shc.org/](http://task43.iea-shc.org/)

task 43 results: new organisation

Global Solar Certification Network

**Global Mark**

It's a work in progress and we need help



## 3. Adoption

National standards accept new ISO

National certification programs accept international Global Mark.

Get involved!

## Why is this important?

- Solar collectors make up majority of system cost!
- Solar cooling is one market for solar thermal collectors
- Better and cheaper collectors is the goal to enable solar cooling





Thank You!

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Brisbane, 27th March 2014

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