SOLAR HEATING & COOLING PROGRAMME
INTERNATIONAL ENERGY AGENCY

SHC Task 68 – Efficient solar district heating systems

https://task68.iea-shc.org/

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BEST Bioenergy and Sustainable Technologies

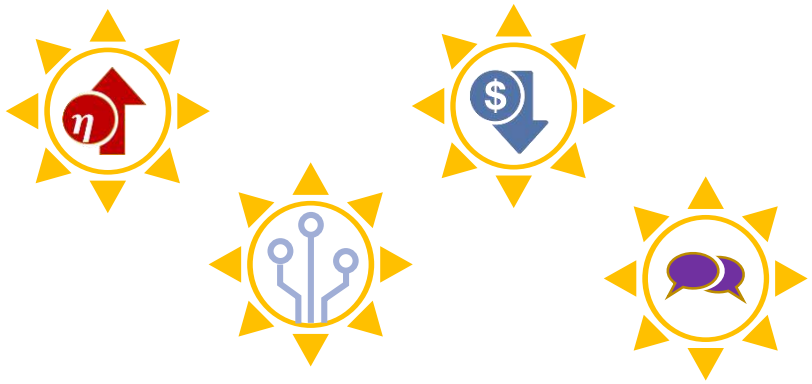
Solar Thermal Workshop by TRI4 Heating & Cooling Office – CET Partnership

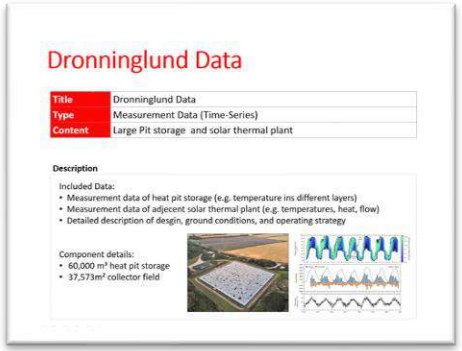
08.05.2024

Agenda

- Task Overview
- Motivation
- Structure
- Some Applications
- Timeline

IEA SHC Task 68





Overview: IEA, TCP, SHC and Task 68

(International Energy Agency, founded in 1974 as a response to the oil crisis)

Technology Collaboration Programme by iea

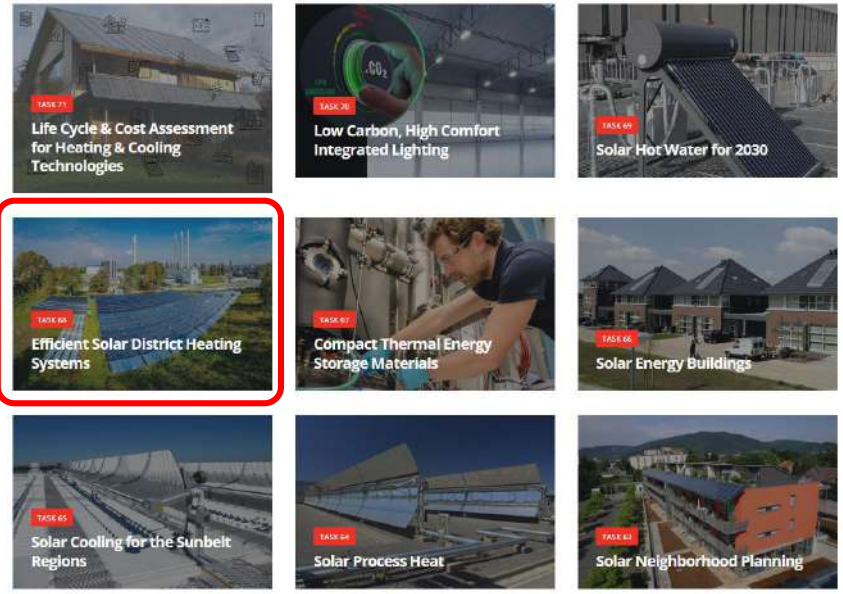
Buildings | Fossil energy | ... | Renewable energy

Solar Heating & Cooling

... | ...

IEA SHC Task 68

Projects (``Tasks“)



VISION

Solar heating and cooling for secure and sustainable energy for all.

MISSION

To bring the latest solar heating and cooling research and information to the forefront of the global energy transition.

Motivation for IEA SHC Task 68

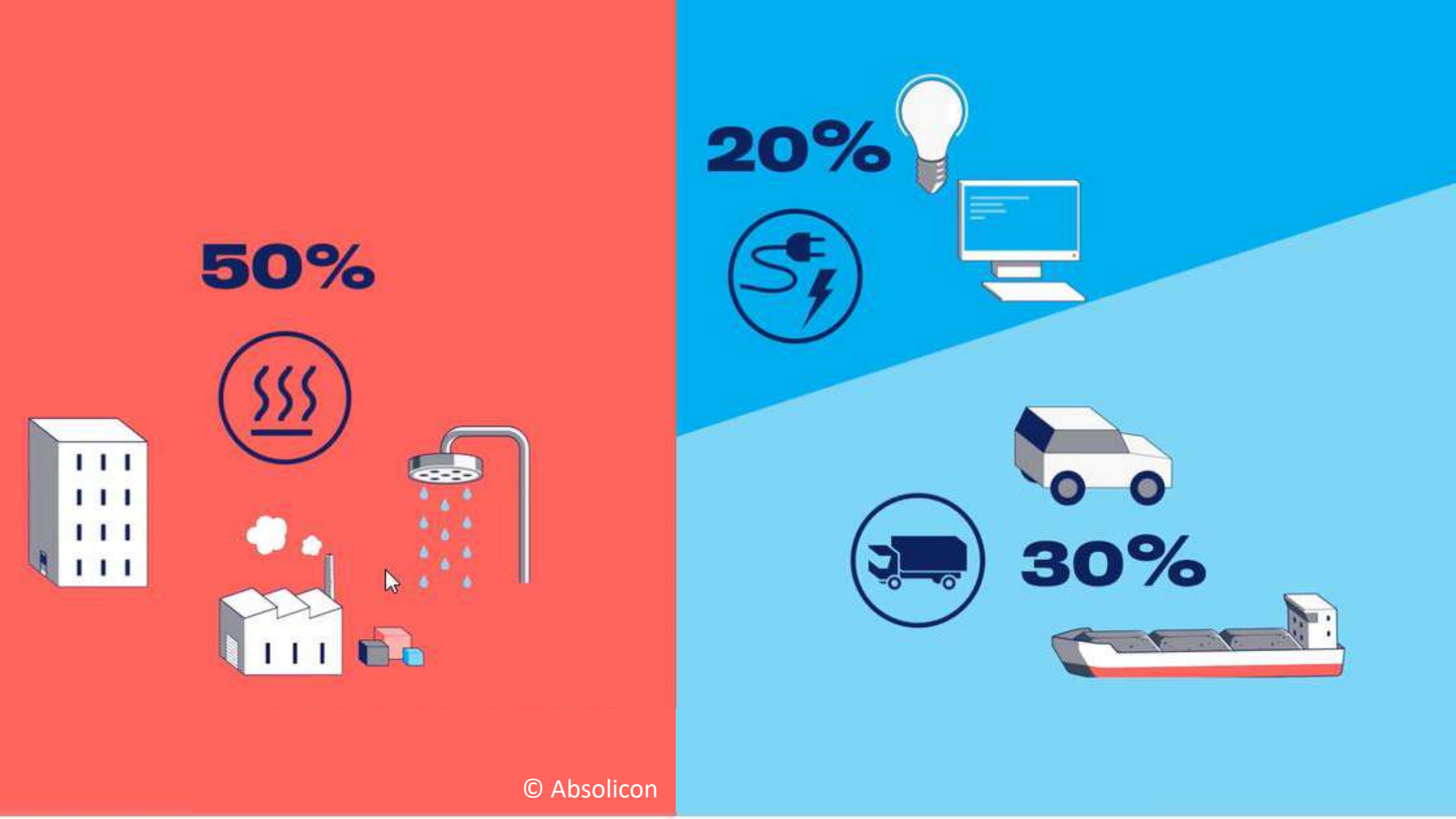
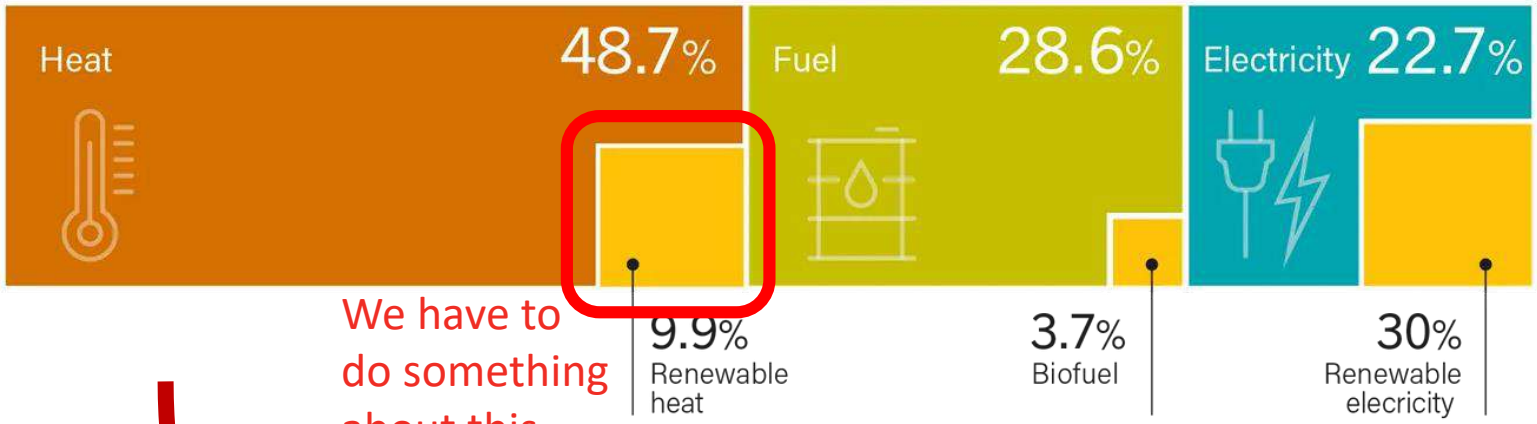


FIGURE 1. RENEWABLES IN **ENERGY SUPPLY**

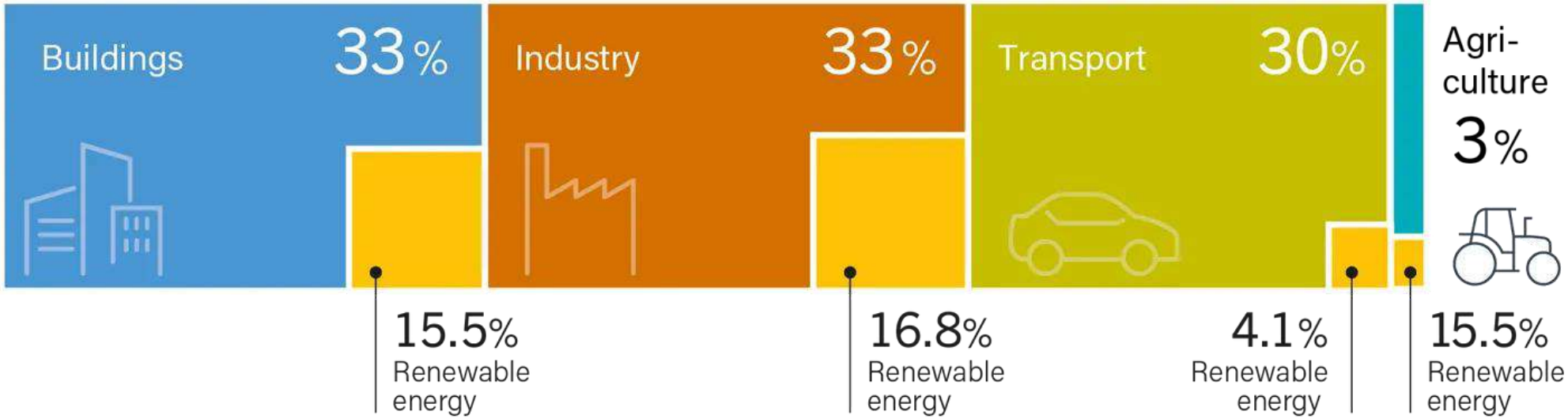
from **RENEWABLES 2023 GLOBAL STATUS REPORT**
https://www.ren21.net/gsr-2023/

Total Final Energy and Total Modern Renewable Energy Share, by Energy Carrier, 2020



We have to do something about this

Total Final Energy Consumption and Total Modern Renewable Energy Consumption, by Sector, 2020



Why solar thermal plants?

Heat output of PV ($\eta = 0.2$ to 0.25) with compression heat pumps (COP = 3 to 4) is similar to solar thermal plants ($\eta = 0.8$ to 0.9)

Choose which technology?

PV + Heat Pumps:

- Electric energy is far more versatile than heat
- Heat pumps can be used for heating and cooling
- Small amounts of electrical energy can be stored well in batteries (Li-Ion etc.)

usually a good solution for single-family homes

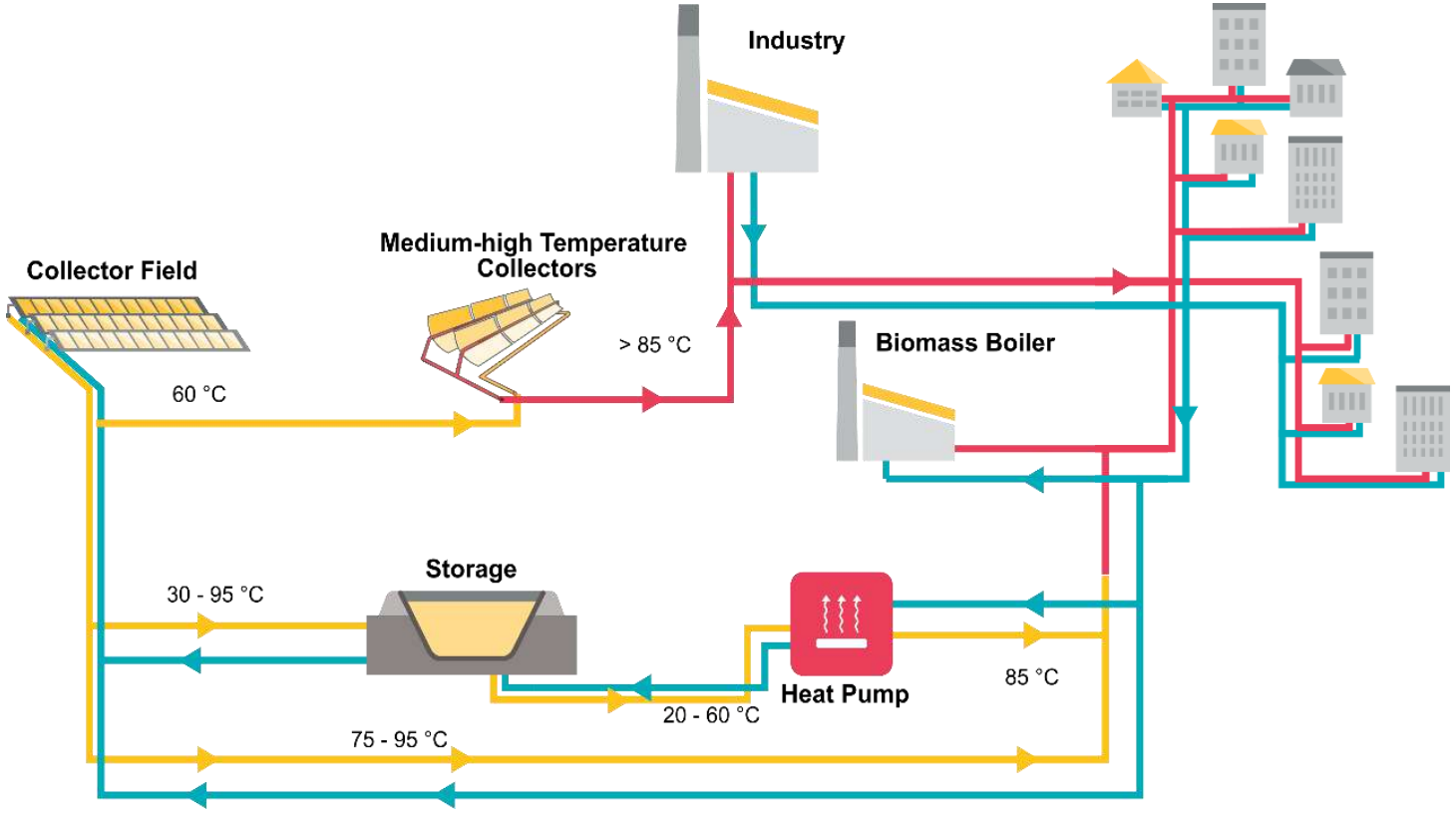
Solar Thermal plants:

- Technology is far less dependent on rare elements, does not involve any (potentially harmful) refrigerants
- Heat storage much cheaper than battery storage; large amounts of thermal energy can be stored well in **seasonal storages**
- Large-scale plants well-suited for integration in **district heating grids**
- Ground heat pumps require **regeneration**
- Leading European manufacturers

Goals and Structure of IEA SHC Task 68

Goals of the IEA SHC Task 68

- **Provide** the **heat most** efficiently **at** the **desired temperature level**
- **Increase digitalization level** for a more efficient **data preparation** and **utilization**
- **Make SDH systems more cost-**efficient and explore **new business models**
- **Raise awareness** for solar technologies and efficiently **disseminate the results**



Solar District Heating Systems

Partners

- **Academic:**
  - Universities
  - Research institutions
- **Company:**
  - Collector manufacturers
  - Consulting companies
  - Engineering companies, system designers / turnkey providers

Participating Countries

Austria	*China*
Denmark	*Germany*
Italy	*Netherlands*
Spain	*Sweden*
Switzerland	*Turkey*

universität innsbruck
UMEÅ UNIVERSITY
DALARNA UNIVERSITY
DTU
TECHNISCHE UNIVERSITÄT DRESDEN
OST Ostschweizer Fachhochschule
HEIG VD
UNIKASSEL VERSITÄT
BEST Bioenergy and Sustainable Technologies
AEE INTEC
AIT AUSTRIAN INSTITUTE OF TECHNOLOGY
solites
TNO innovation for life
DLR Deutsches Zentrum für Luft- und Raumfahrt
Fraunhofer ISE
ISFH
GASOKOL SOLAR EVOLUTION
PlanEnergi
solrico
...
ABSOLICON
CIM-mes Projekt
SOLID solar energy systems
TVP SOLAR
GREENoneTEC 1 SOLAR INDUSTRY
AALBORG CSP - Changing Energy
SHC SOLAR HEATING & COOLING PROGRAMME INTERNATIONAL ENERGY AGENCY

Task Structure

Subtask A: Concepts

- Requirements | Planning | Configuration | Modelling

Subtask B: Data preparation & utilization

- Gathering/Storing data | Auto. Monitoring/Evaluation | Control

Subtask C: Business models

- Financing & Investment schemes | Risks & Barriers | Cost red.

Subtask D: Use Cases and Dissemination

- Demos | Awareness | Market overview | Best practice

Technologies / Components

Systems

- Medium to high temperature SDH – directly by solar
- Medium to high temperature SDH – indirectly by solar (e.g. solar + heat pump / biomass / waste heat …)
-

Subtasks lead by

solites

SOLID solar energy systems

TNO innovation for life

ABSOLICON

Some Applications in IEA SHC Task 68

SOLAR THERMAL: Dronninglund Solar District Heating

26 MW
(37 500 m²) solar collectors

Heat storage
60 000 m³

Since 2012, solar thermal provide 50 % of the heat for the 3 500 people in Dronninglund

Open data set:
https://www.sciencedirect.com/science/article/pii/S0038092X22009252

Reports in Subtask B

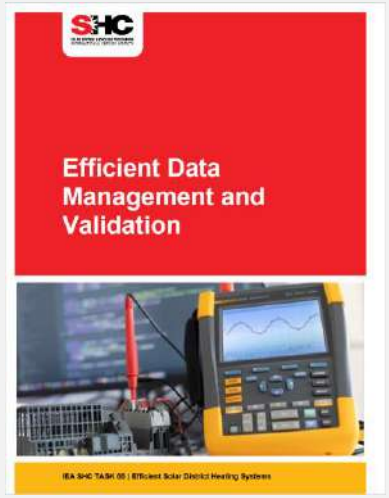
(based on a presentation by Lukas Feierl, SOLID)

Subtask B: Data preparation & utilization

- Gathering/Storing data | Auto. Monitoring/Evaluation | Control

Report RB1

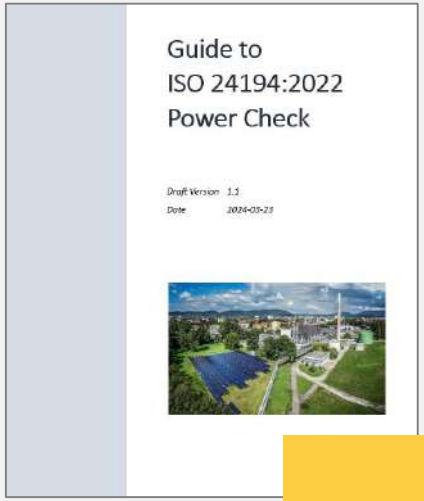
Recommendations to Data Management



published

Report RB2

Check collector performance Guide to ISO 24194



preliminary

Report RB3

Recommendations on System Control

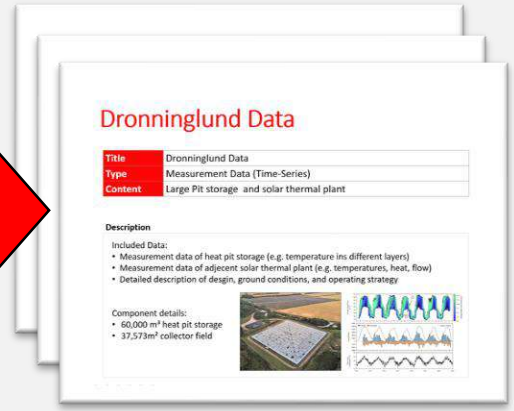
Aim: Joint Paper on Open Data

Content:

- Available public datasets
- Potential use cases, based on plant life cycle

Report RB4

Open data and potential use cases



Control strategies

on **component** level

on **system** level

Subtask B: Data preparation & utilization

- Gathering/Storing data | Auto. Monitoring/Evaluation | Control

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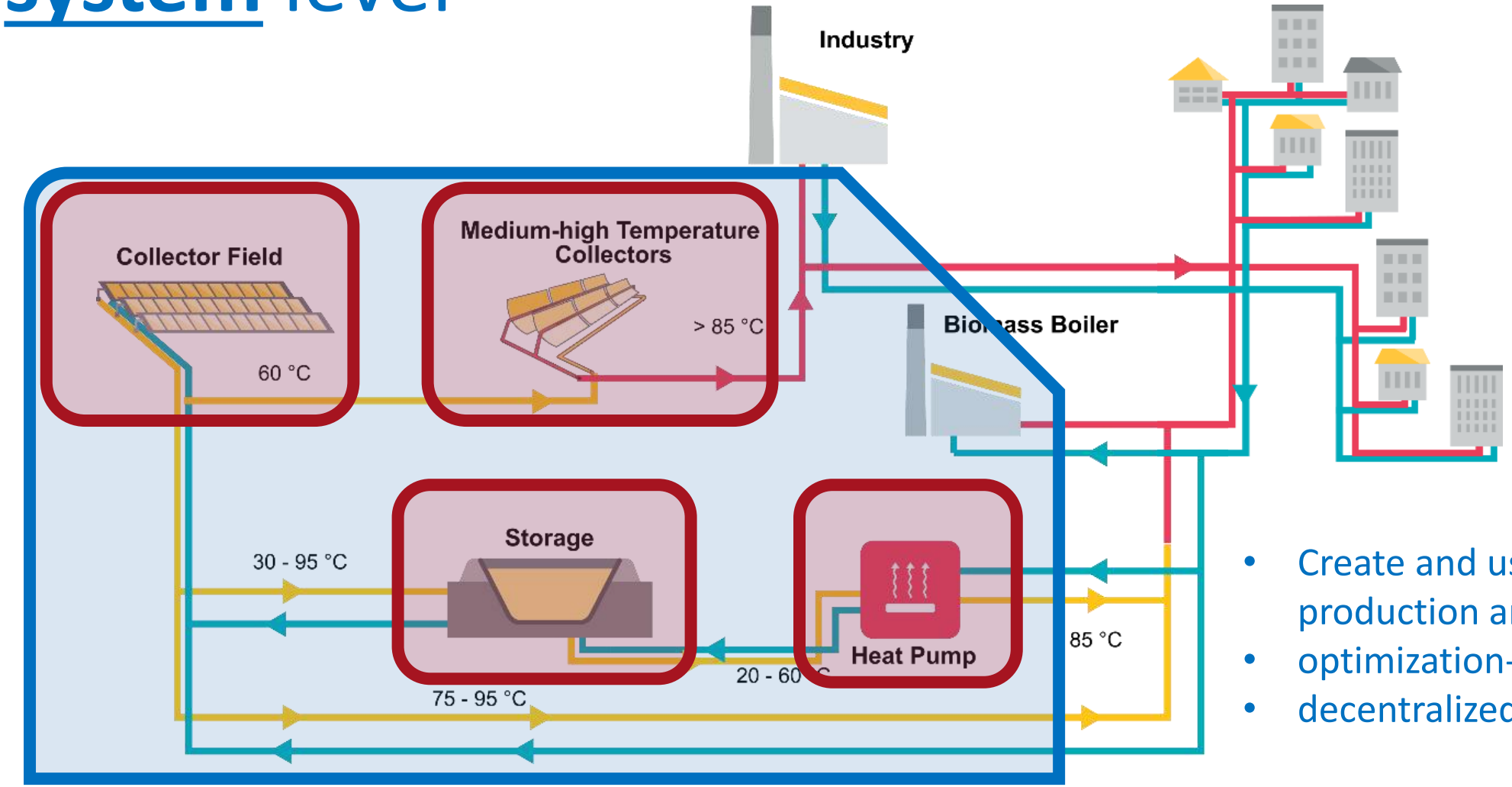
Bioenergy and Sustainable Technologies



- Create and use forecast of production and demand,
- optimization-based control,
- decentralized systems

Timeline

Timeline: Task Meetings

Follow-up activities planned → get in touch

Jan. 2021 – Mar. 2022	April 2022	Nov 2022	June 2023	Oct 2023	Apr 2024	Aug 2024	Feb. 2025
Preparation	Kick-off Meeting	2nd Task Meeting	3rd Task Meeting	4th Task Meeting	5th Task Meeting	6th Task Meeting	Final Task Meeting

Attached to the conference
26th – 30th August 2024
Limassol, Cyprus

EuroSun2024

A Conference of

ISES International Solar Energy Society

SHC SOLAR HEATING & COOLING PROGRAMME INTERNATIONAL ENERGY AGENCY

Hosted by

Cyprus University of Technology

ΕΔΗΕ - Κύπρου - 1990

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