



**Solar Heat for Industrial Processes
towards Food and Agro Industries
commitment in Renewables**

Solar Heat for Industrial Processes

Webinar 3, 17/06/2021



Christophe DUMAS



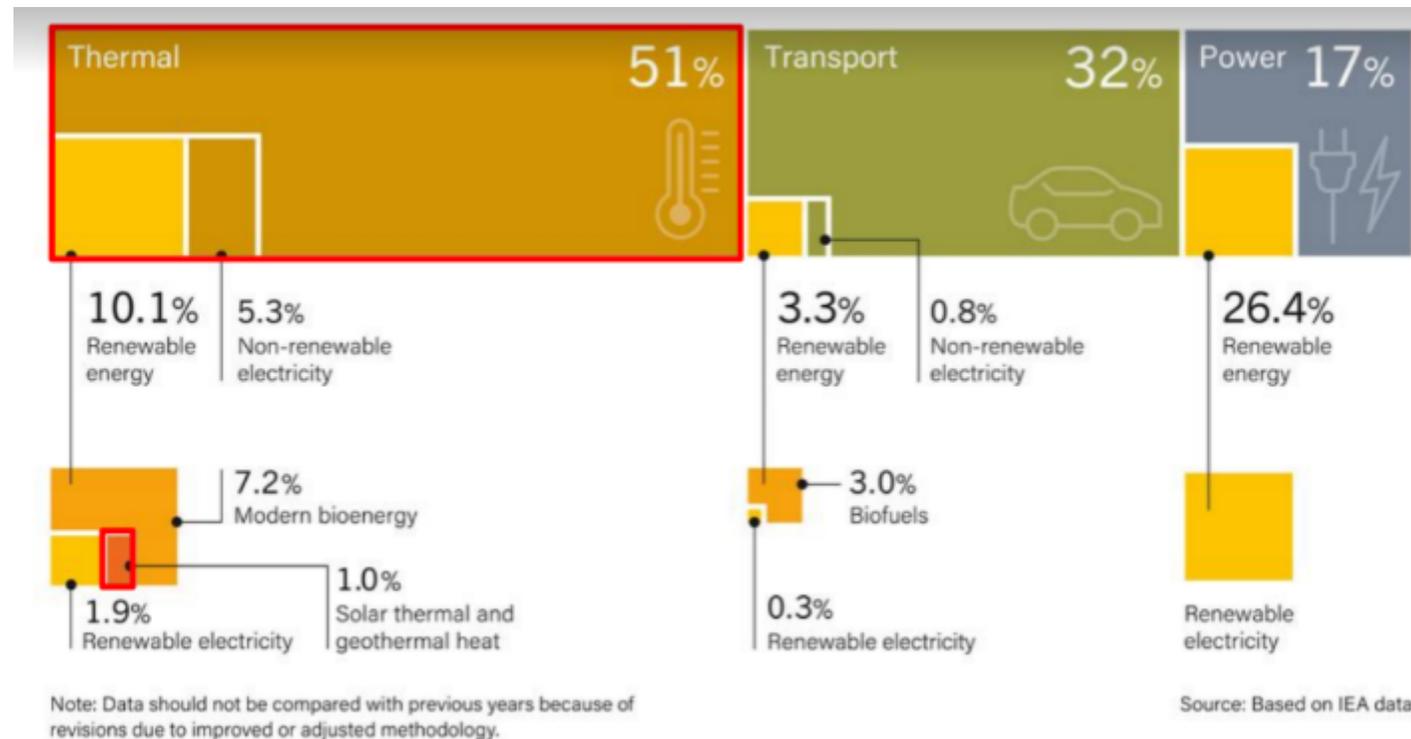
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The energy needs in industry

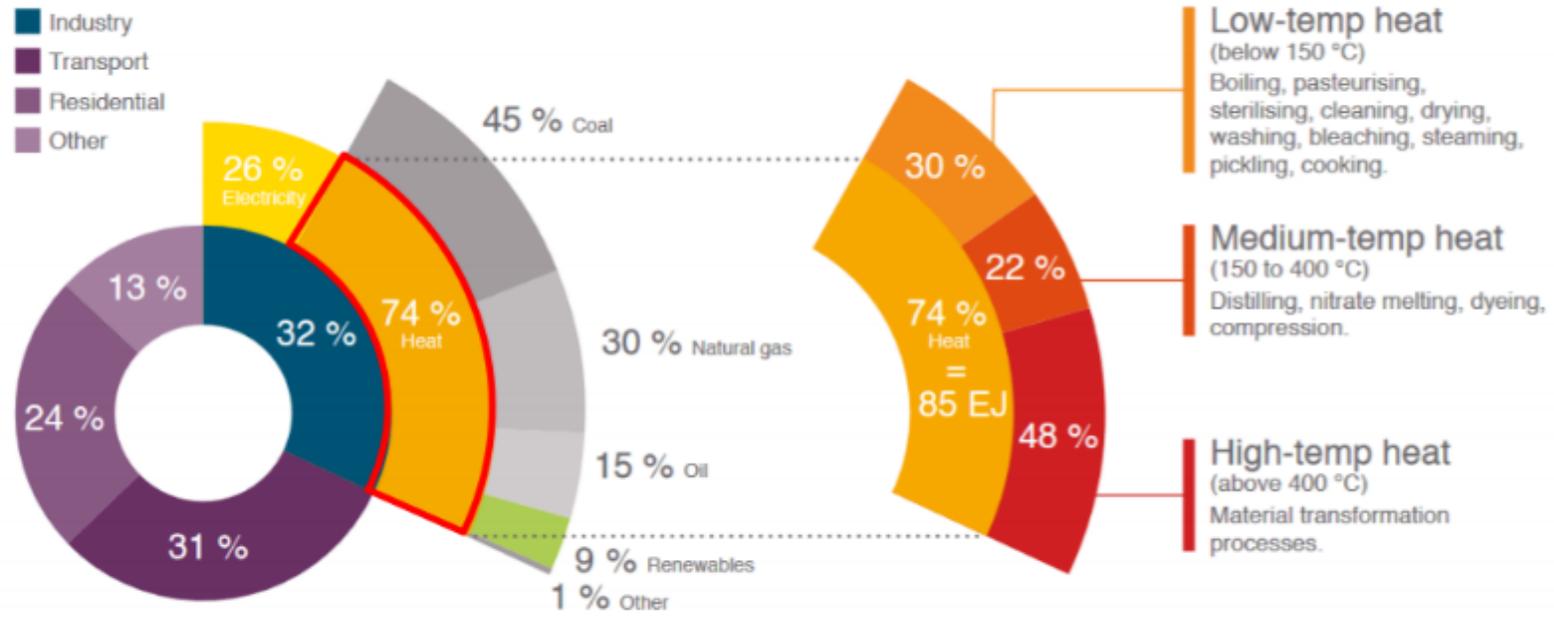
The global trend has been for electricity to transform the energy sector, while:



With strong growth in demand for cooling

The energy needs in industry

ENORMOUS GLOBAL HEAT DEMAND IN INDUSTRY



TOTAL FINAL ENERGY CONSUMPTION 2014: 360 EJ (EXAJOULE, see Glossary page 17); IEA [1]

Source : Solar Payback

INDUSTRIAL HEAT DEMAND ON THE RISE

1.7 %

Average annual growth of industrial heat demand until 2030 [4]

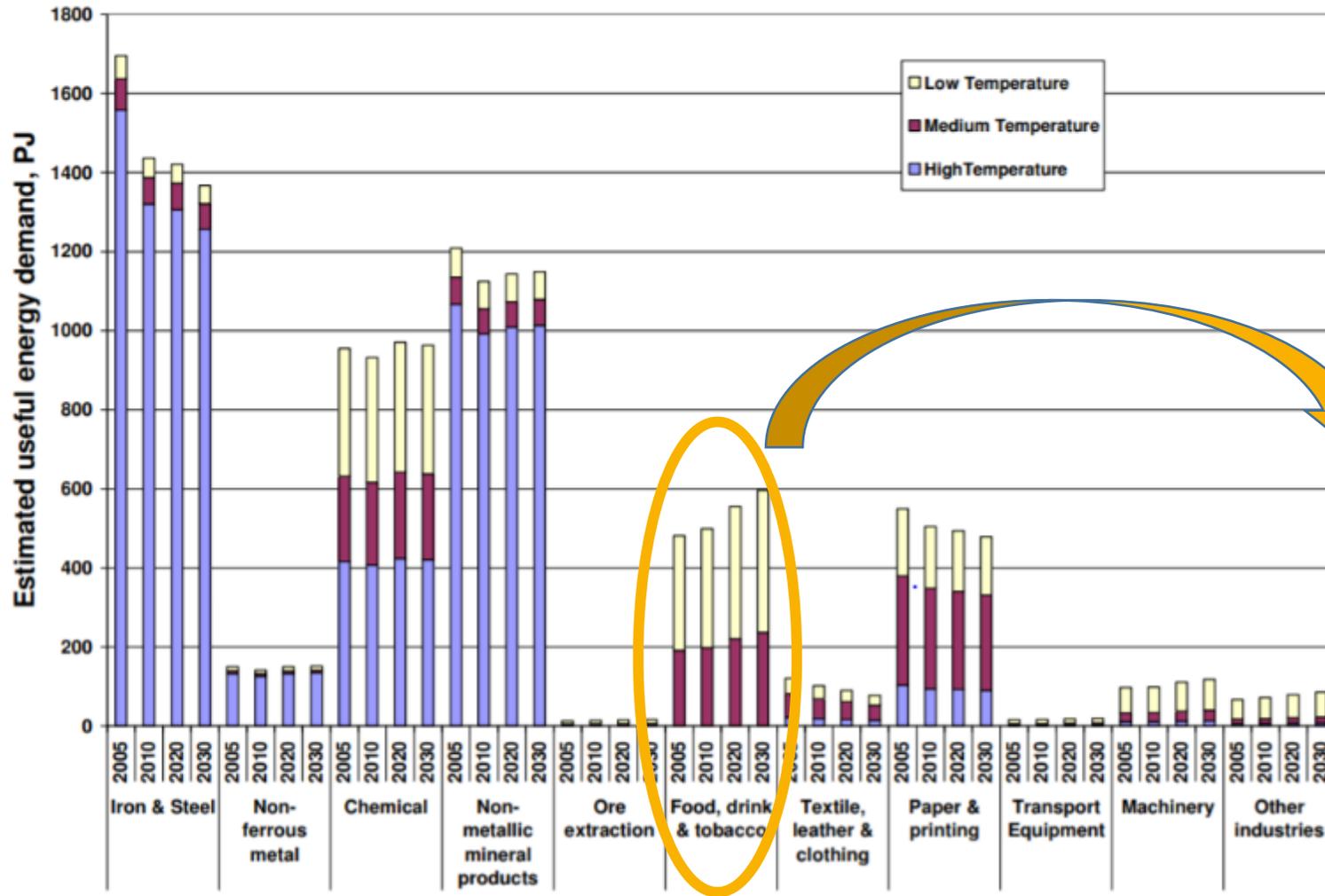
▼

90 %

Met by coal, oil and gas

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Targeting the right industries



Fostering the integration of solar heat in industrial processes - SHIP from agro-food sector, by developing and demonstrating a set of tools and methods for the development of industrial solar heat projects during its whole life-cycle.

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Industrial processes and temperature levels

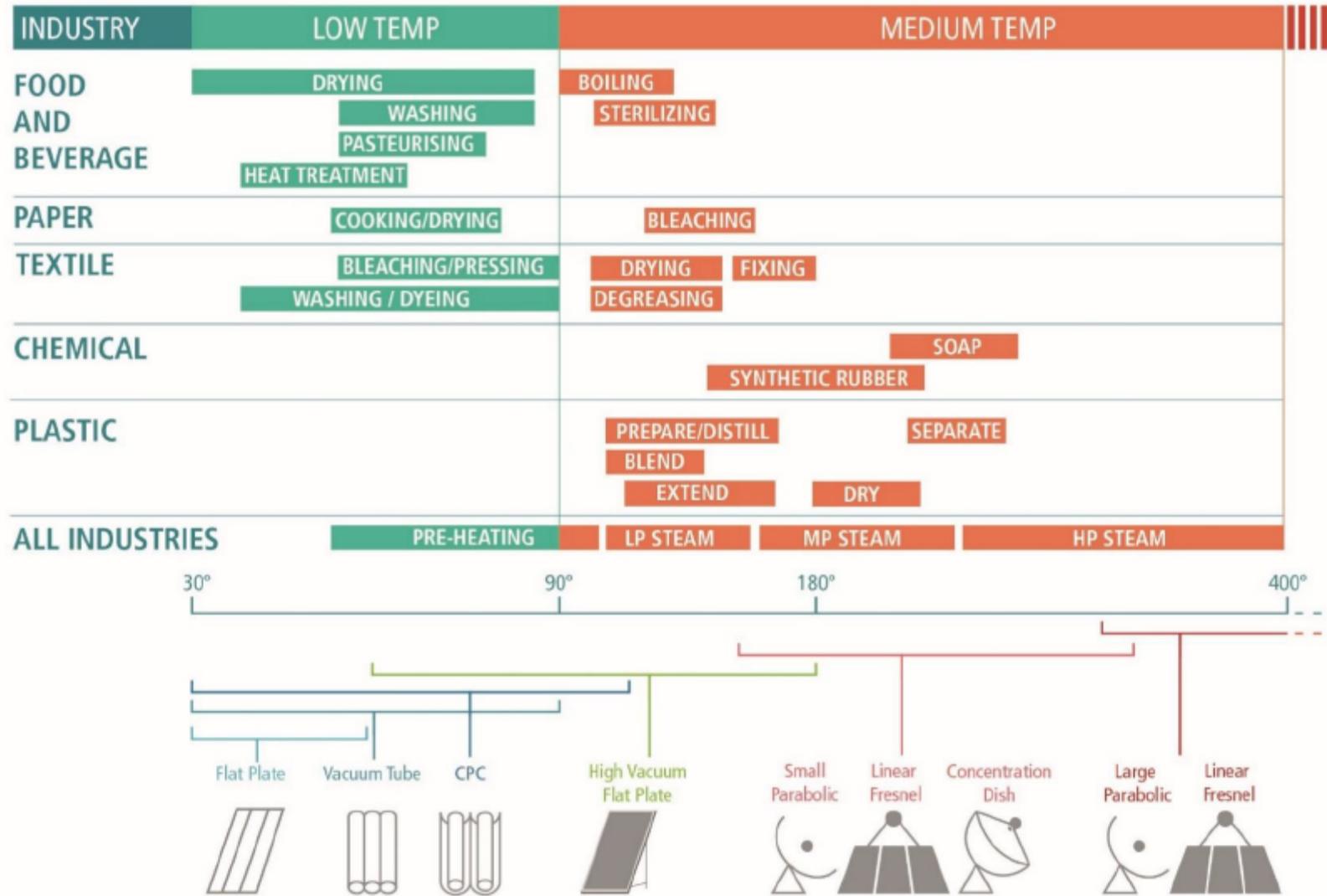
| Industrial Sector | Unit operation | Temperature range (°C) |
|-------------------------|----------------------------------|------------------------|
| Food | Drying | 30-90 |
| | Washing | 60-90 |
| | Pasteurising | 60-80 |
| | Boiling | 95-105 |
| | Sterilising | 110-120 |
| | Heat Treatment | 40-60 |
| Beverages | Washing | 60-80 |
| | Sterilising | 60-90 |
| | Pasteurising | 60-70 |
| Paper Industry | Cooking and Drying | 60-80 |
| | Boiler feed water | 60-90 |
| | Bleaching | 130-150 |
| Metal Surface Treatment | Treatment, electro-plating, etc. | 30-80 |
| Bricks and Blocks | Curing | 60-140 |

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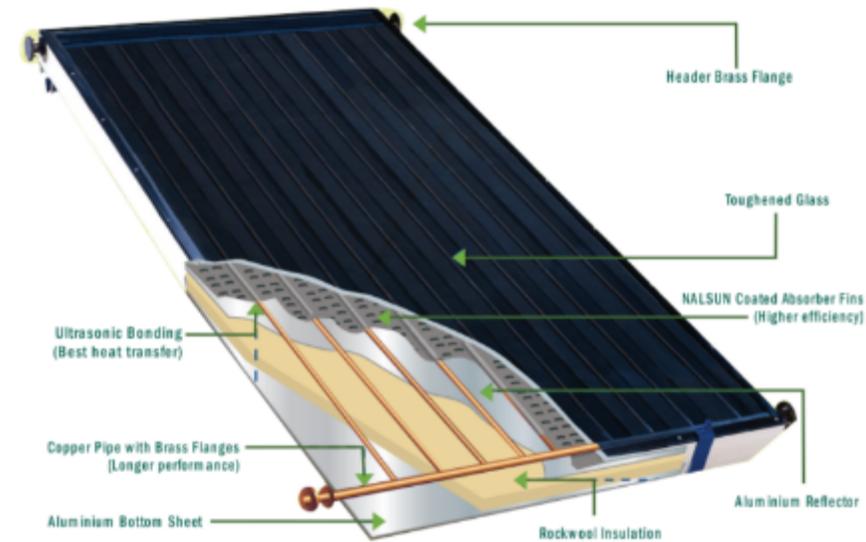
Industrial processes and temperature levels

| Industrial Sector | Unit operation | Temperature range (°C) |
|------------------------|----------------------------------|------------------------|
| Textile Industry | Bleaching | 60-100 |
| | Dyeing | 70-90 |
| | Drying, De-greasing | 100-130 |
| | Washing | 40-80 |
| | Fixing | 160-180 |
| | Pressing | 80-100 |
| Chemical Industry | Soaps | 200-260 |
| | Synthetic rubber | 150-200 |
| | Processing heat | 120-180 |
| | Pre-heating water | 60-90 |
| Plastic Industry | Preparation | 120-140 |
| | Distillation | 140-150 |
| | Separation | 200-220 |
| | Extension | 140-160 |
| | Drying | 180-200 |
| | Blending | 120-140 |
| Flour By-products | Sterilising | 60-90 |
| All Industrial Sectors | Pre-heating of boiler feed water | 30-100 |
| | Industrial solar cooling | 55-180 |
| | Heating of factory buildings | 30-80 |

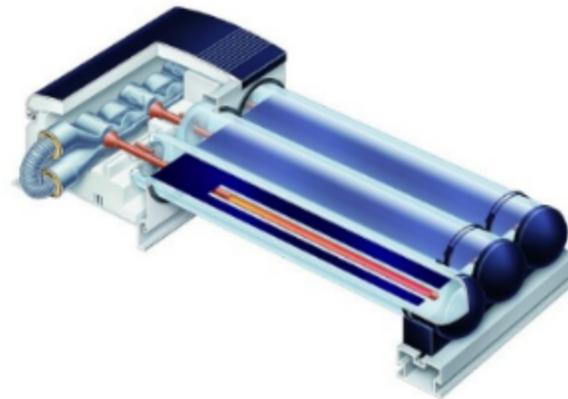
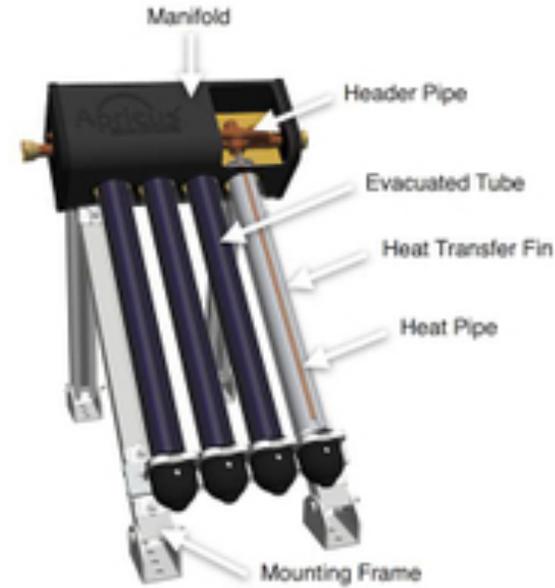
The Solar technologies vs temperature level

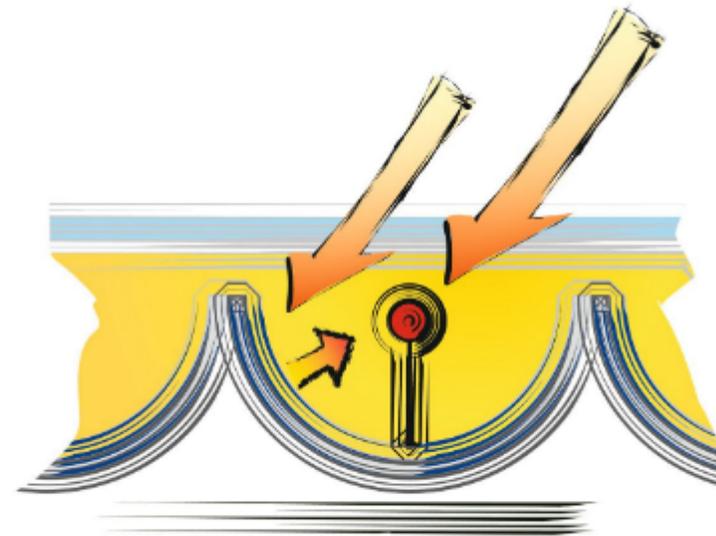


SHIP2FAIR Flat Plate



SHIP2FAIR Vacuum tube





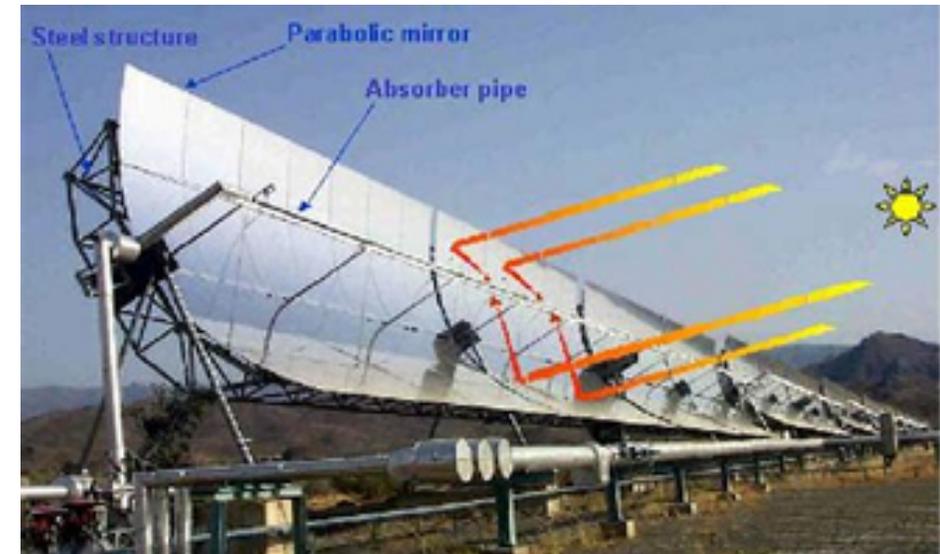
SHIP2FAIR

High Vacuum Flat Panel



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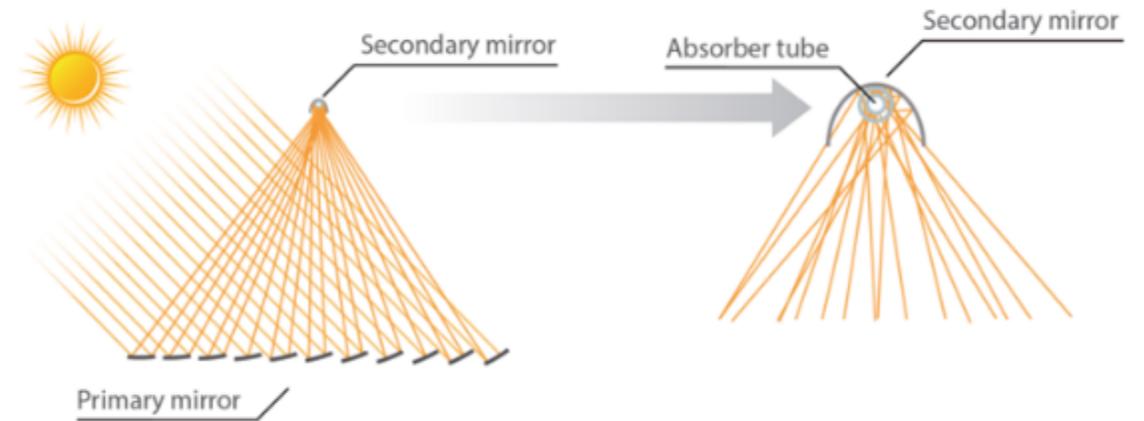
Parabolic Through





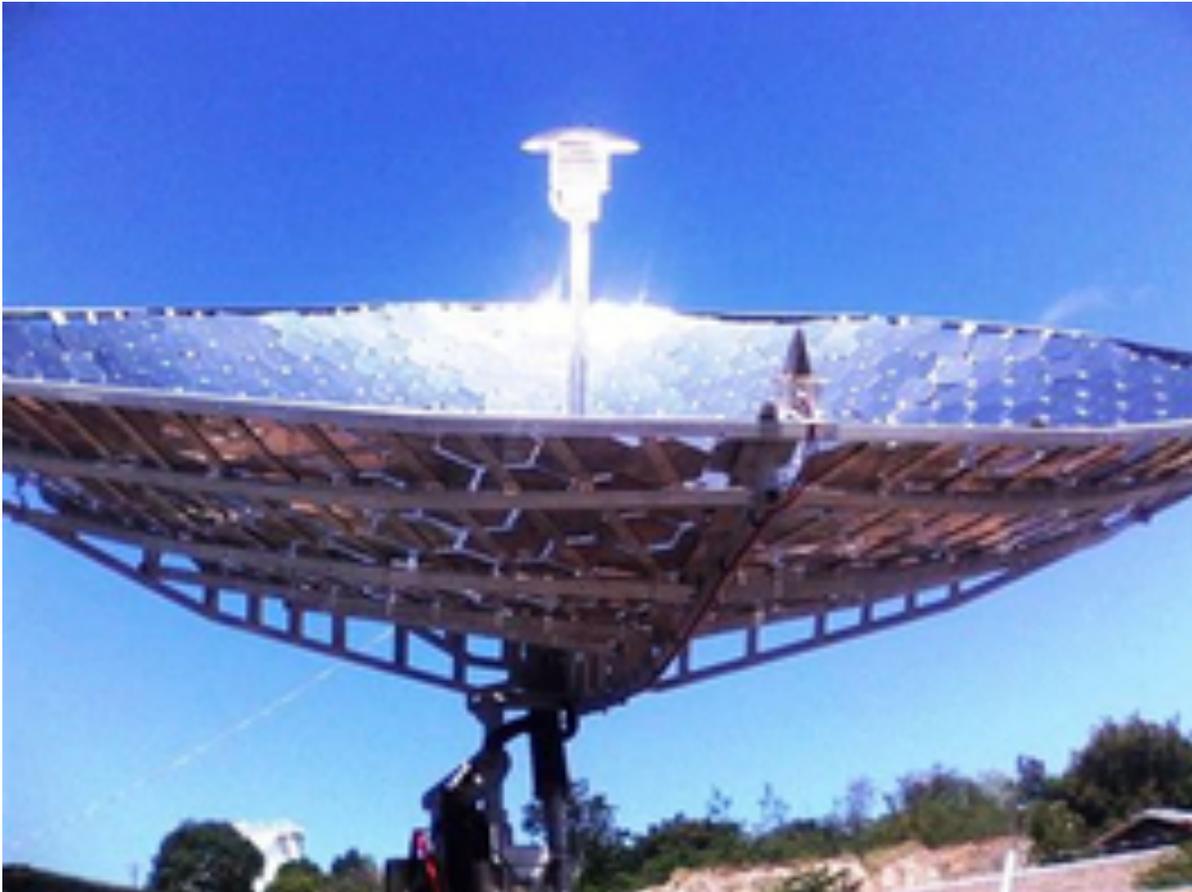
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Linear Fresnel

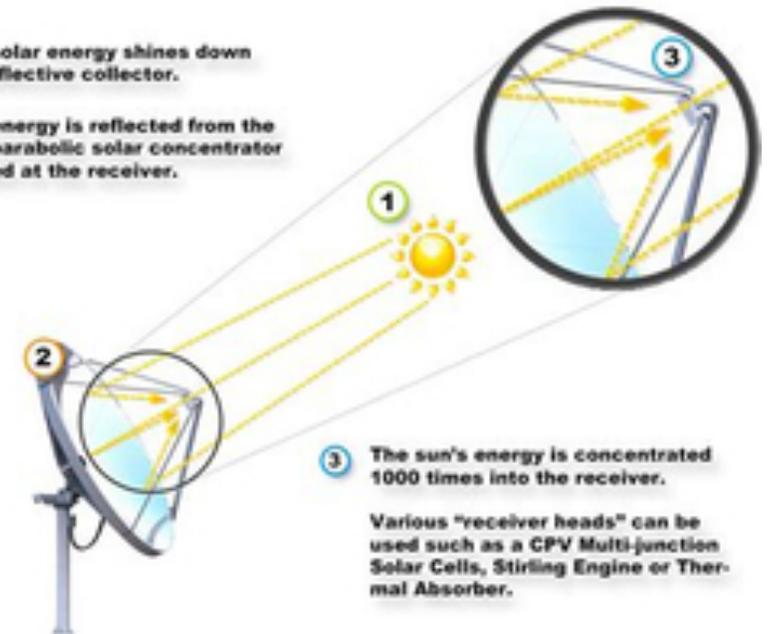


INDUSTRIAL SOLAR
renewables onsite

SHIP2FAIR Dishes



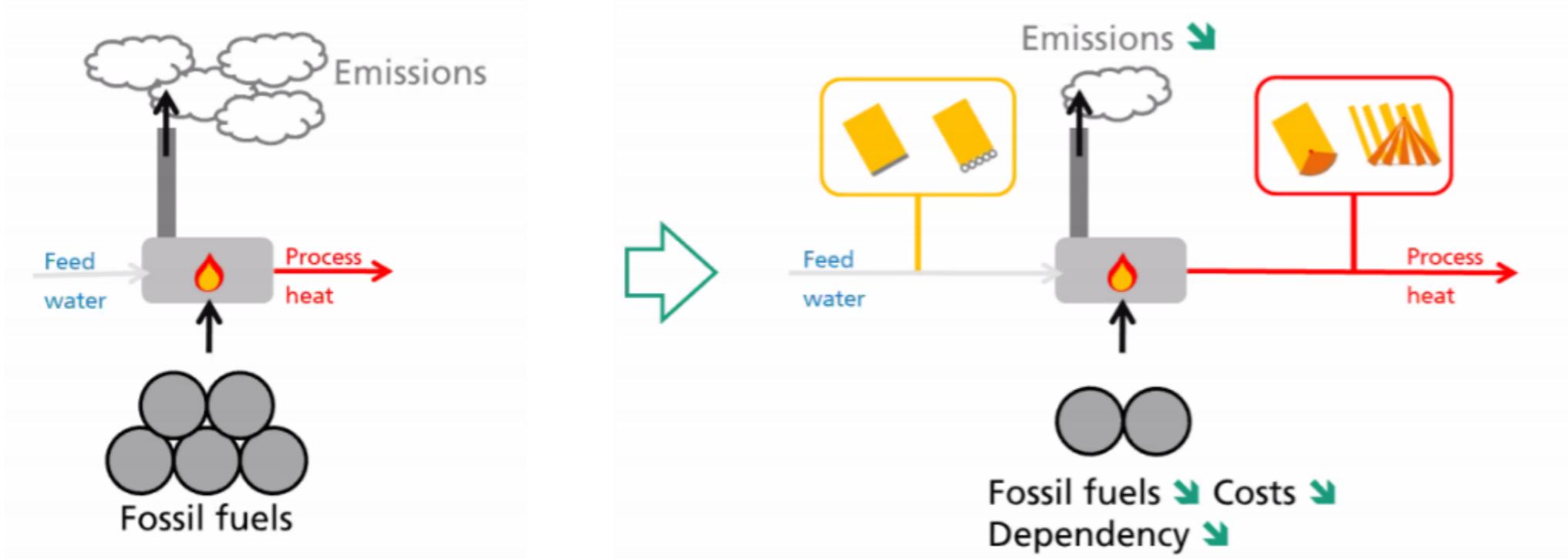
- 1 The sun's solar energy shines down onto the reflective collector.
- 2 The sun's energy is reflected from the reflective parabolic solar concentrator and directed at the receiver.



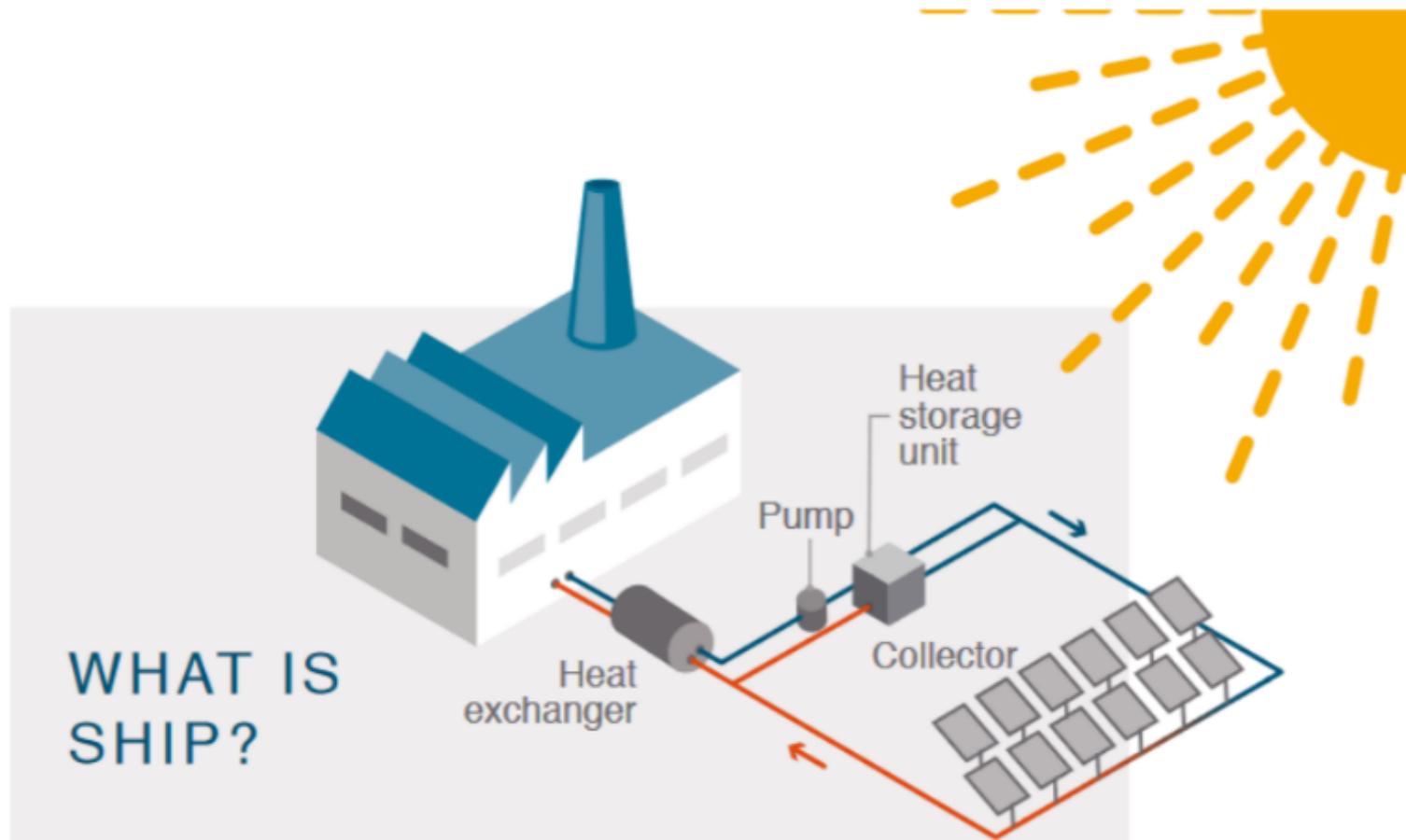
Dish requires dual axis tracking

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Why SHIP?

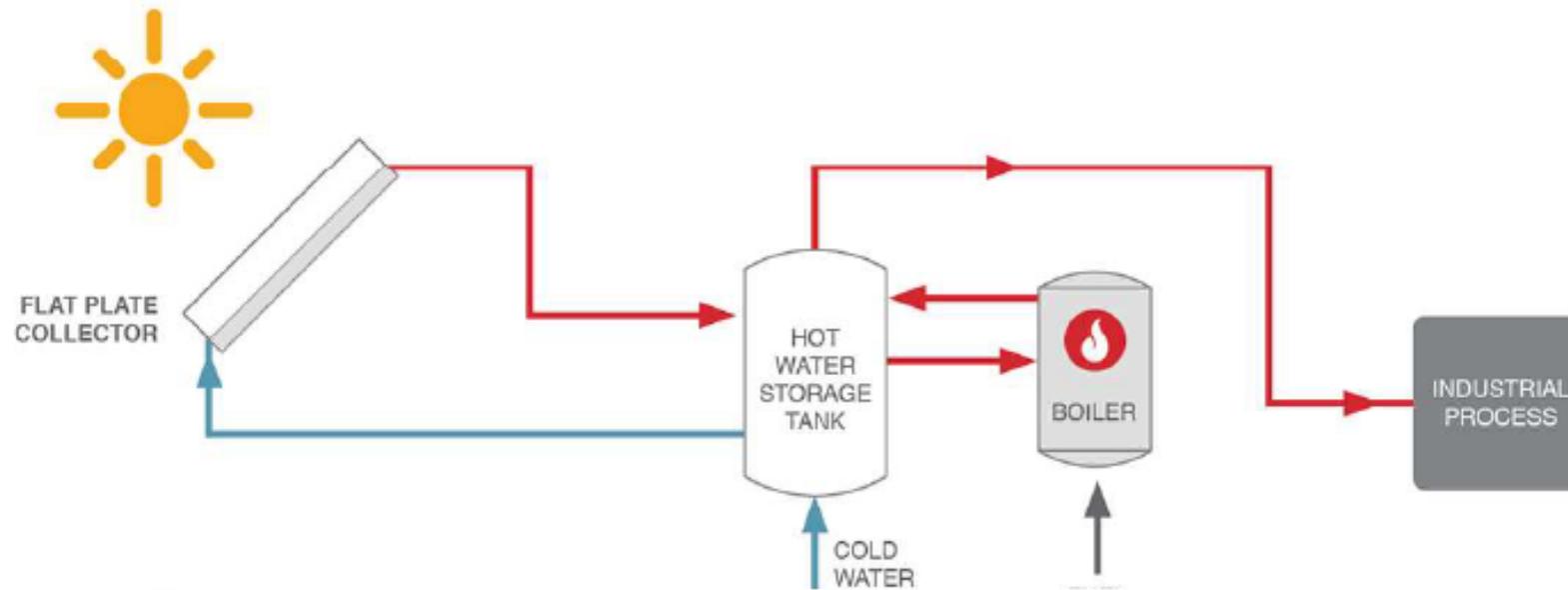


Source : SOLID Solar Heat for Industry



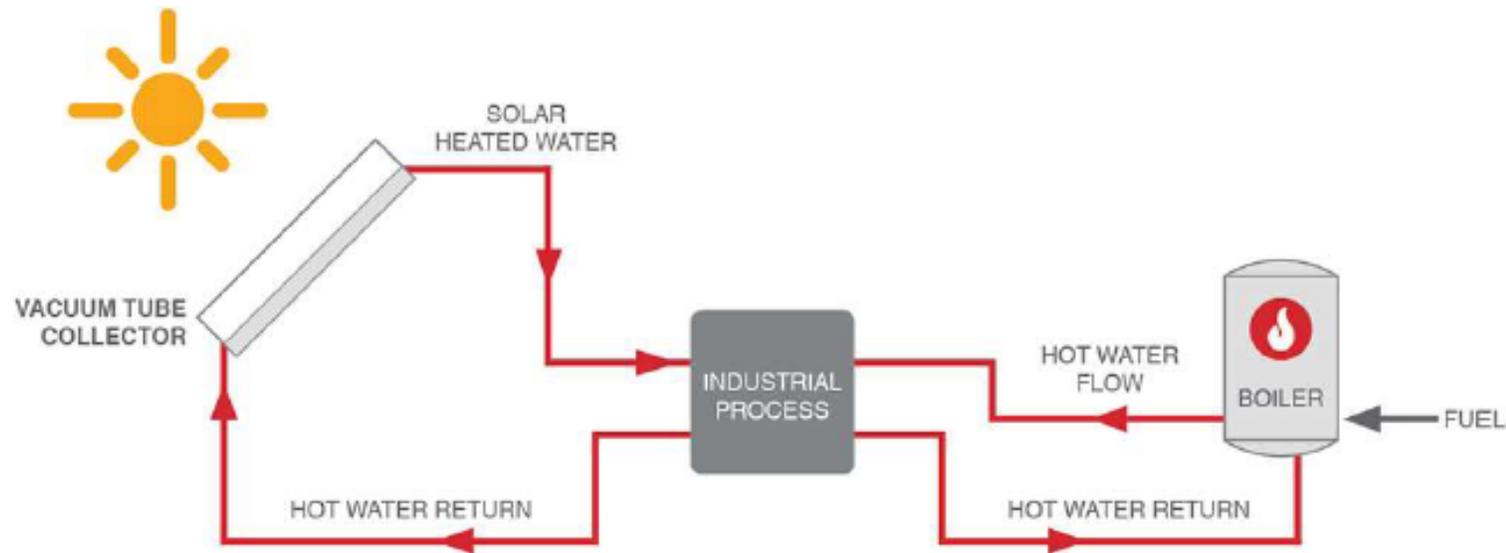
Source : SOLID Solar Heat for Industry

The different ways of integration in an existing process



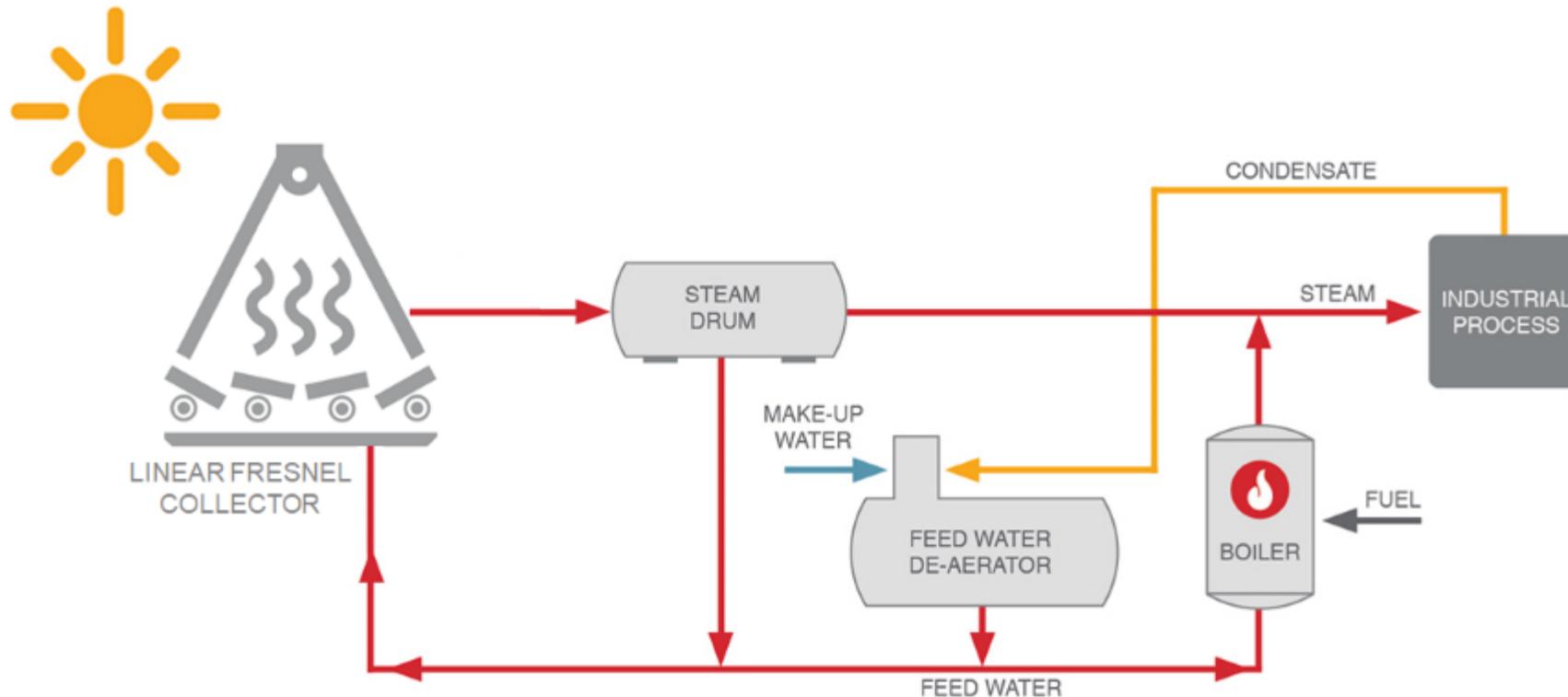
Water Preheating

The different ways of integration in an existing process



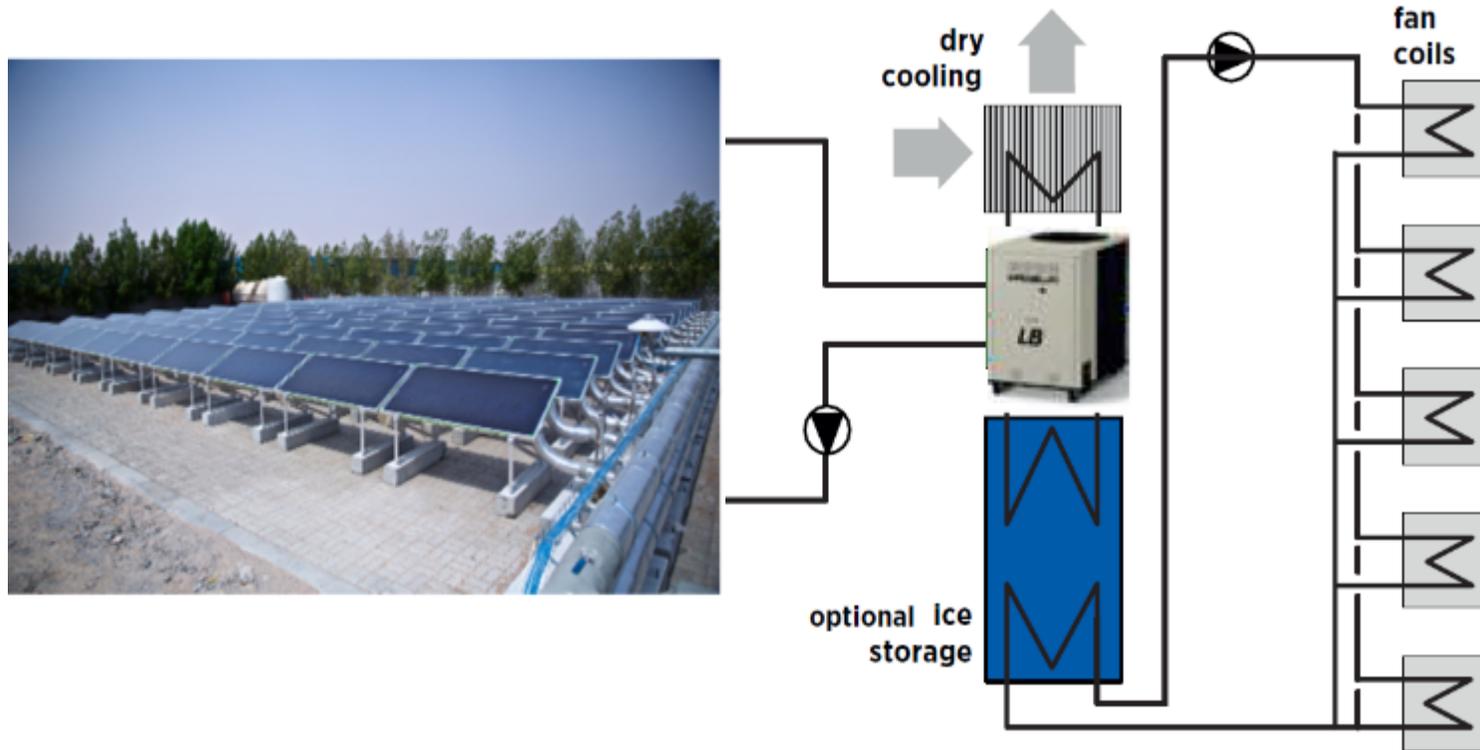
Process Heating

The different ways of integration in an existing process



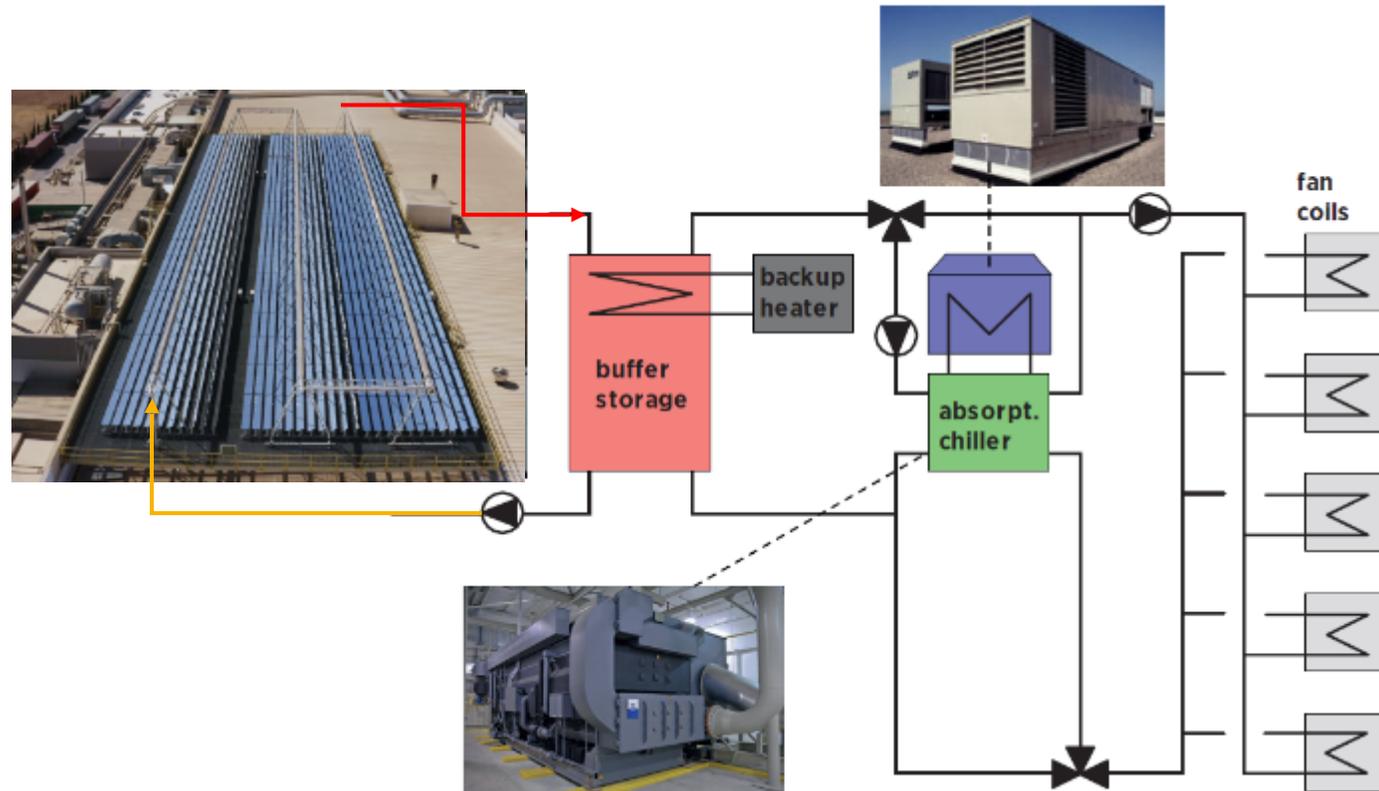
Direct Steam Generation

The different ways of integration in an existing process



Solar thermal cooling (ammonia-water chiller)

The different ways of integration in an existing process



Solar thermal cooling (lithium-bromide-water chiller)



Thank you!

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