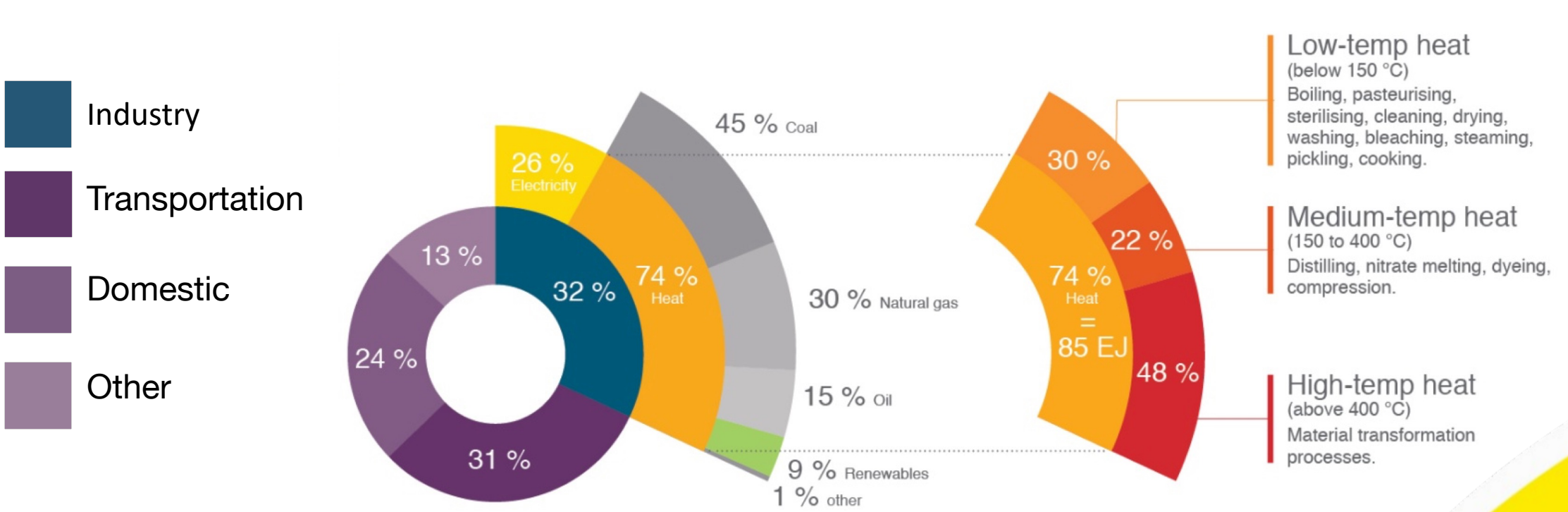
IDHELIO

Concentrated solar power
Heat Storage

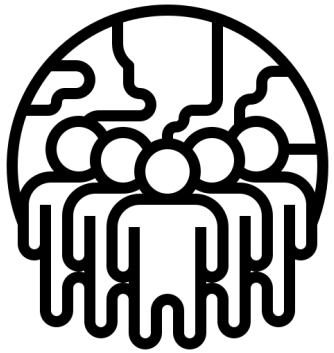
Process heat : a major global challenge

Heat accounts for ¾ of the energy needs of industry = 600 billion €/year



World heat demand for industry – source IRENA

Heat: an unavoidable industrial change



A real challenge for society

Energy independence and geopolitics

Energy transition for the environment

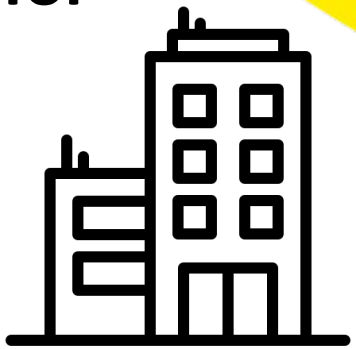
Budget control

A triple challenge for business

Rise of electricity consumption… and cost

Need to decarbonize

Risks related to energy price volatility



The Benefits of Solar applied to Decarbonization of Industry

A "zero emissions" guarantee **No CO_2, no particle, no NOx**
No logistical constraint for supplying the site
Long term stability of the energy cost
Extensive use of local materials with a low environmental footprint
Value creation for the industrial site
Mature and quickly deployable technologies
Possibility of being coupled with other energies

IDHELIO: a simple solution using mirrors, air and natural rock

Fresnel mirror solar concentrator

10 KW at 10 MW

Stratified heat storage
In a bed of natural rock through which air passes

1 at 100 MWh

Concentrated solar plant by linear Fresnel mirrors with its heat storage, implanted at Fruit Gourmet

IDHELIO: high temperature for decarbonization needs of industrial heat

Innovative solutions protected by a patent

Concentrated solar energy
+ air

HÉLIO PROD

High temperature storage
+ Natural rock

HÉLIO STORE

A 100% reduction in fossil fuel consumption potential

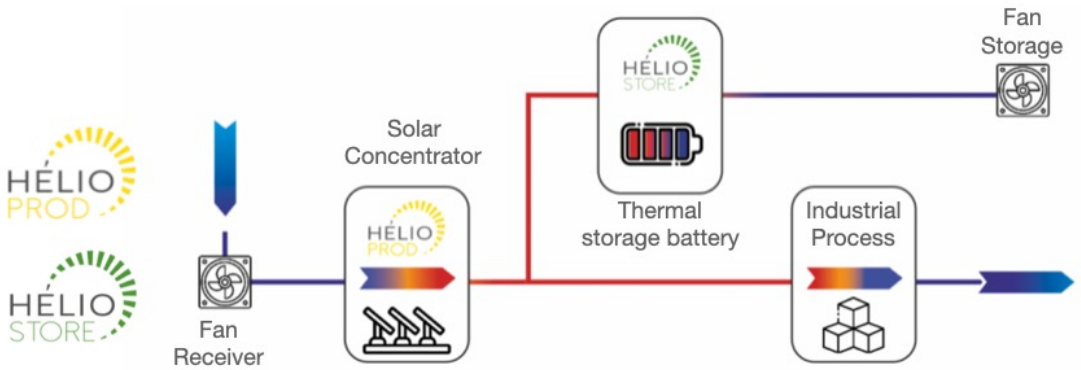
24-hour solar heat production

Several years of feedback & data acquisition

A wide range of applications

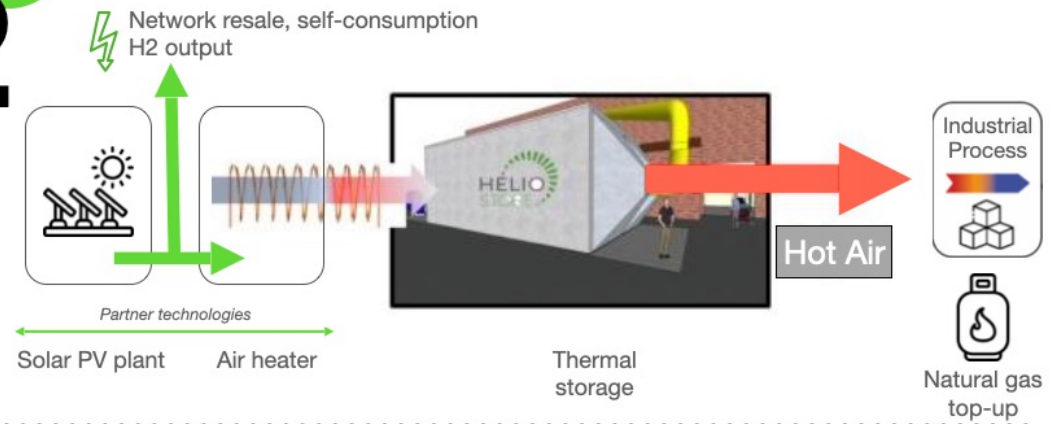
1 Production of high temperature hot air

E.x.: Direct air injection into a drying tunnel



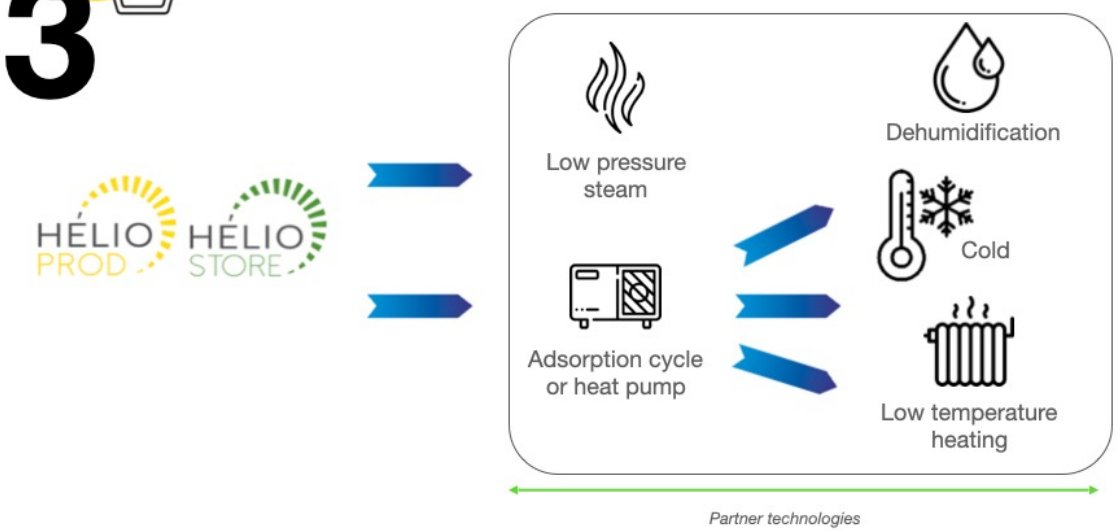
2 Thermal storage of green electricity

E.x .: preheating the air of a brick kiln up to 450°C with a >75% of the solar coverage rate



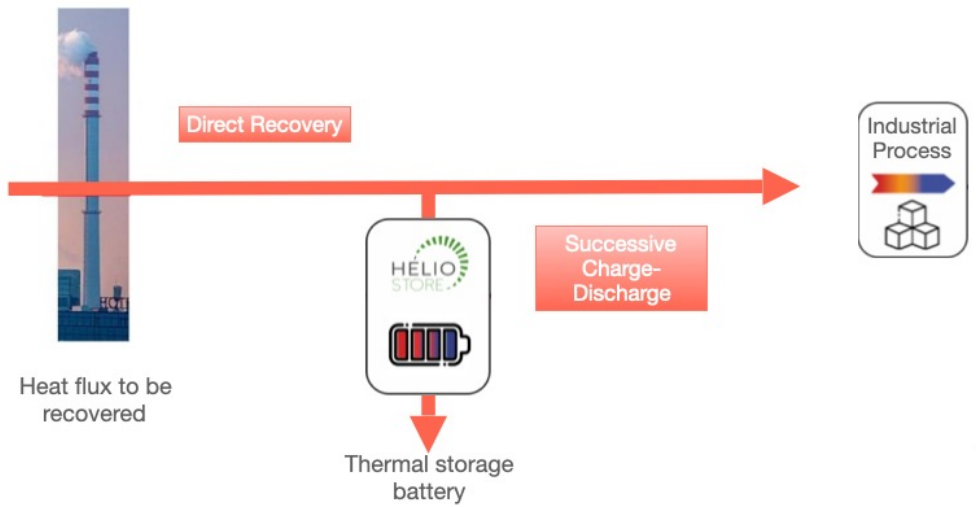
3 Production of steam and solar cold

Ex.: heating, cooling and dehumidification of a horticultural greenhouse



4 Thermal storage of waste heat

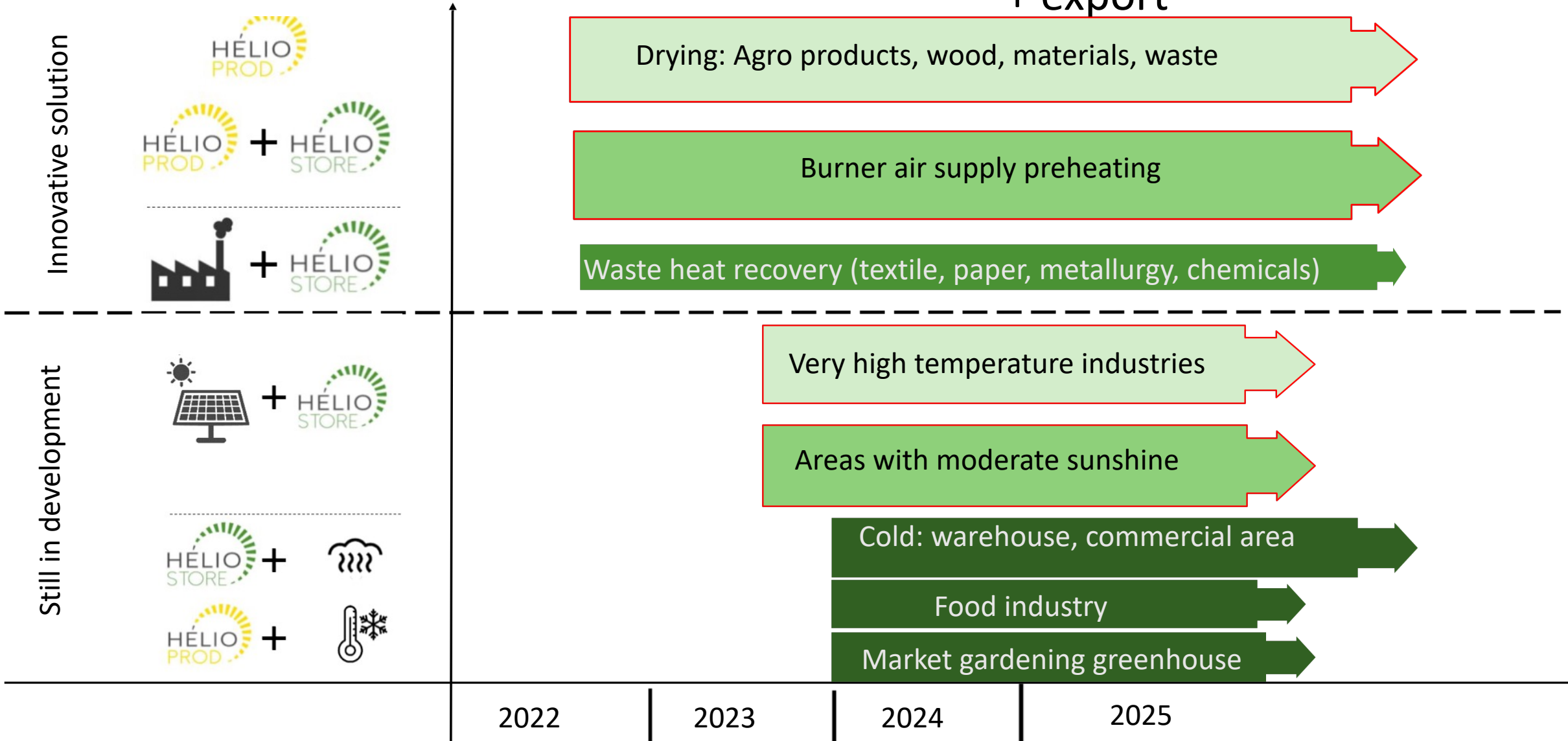
E.g.: heat recovery/storage in a high-temperature kiln and recovery in a drying tunnel



Several markets in constant evolution

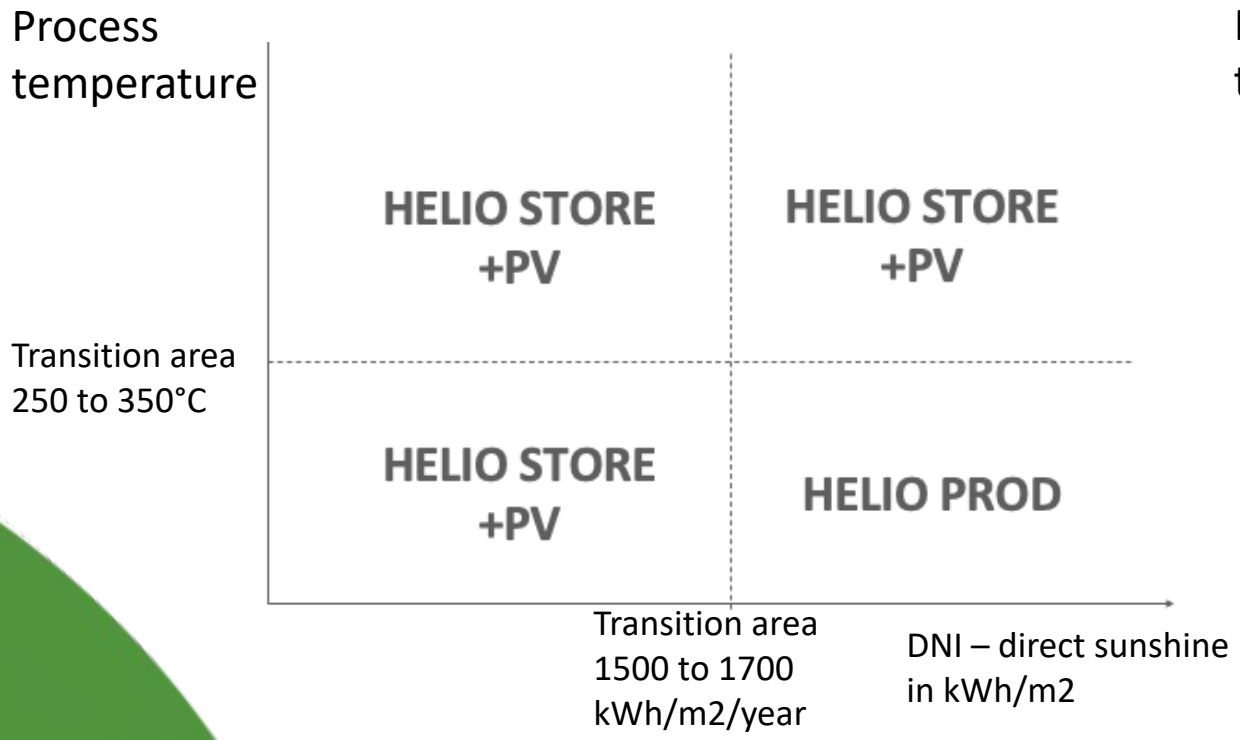
French market = €1 billion

Objectives : 5% part of the local market + export

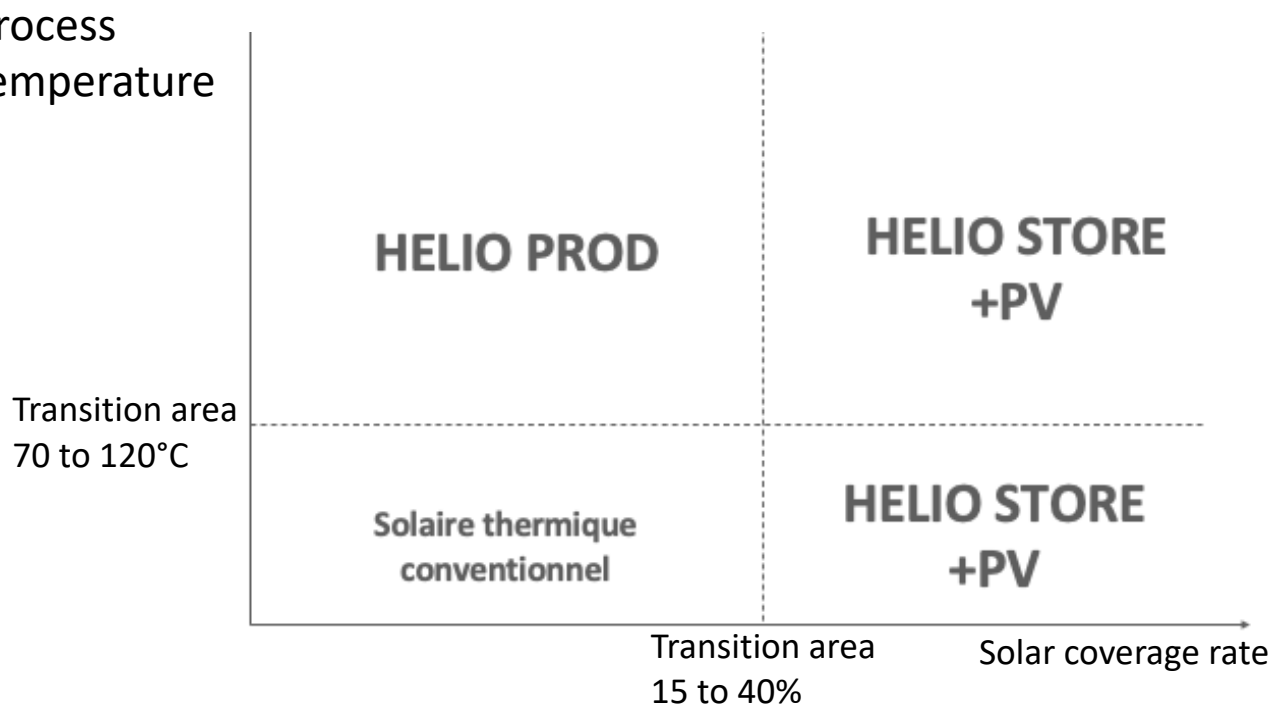


Selection matrices for IDHELIO solutions

Process temperature and Solar irradiance



Process temperature and % carbon reduction



An attractive economic model for renewable heat

HÉLIO PROD

Fresnel concentrator
€55 MWh +/- €15

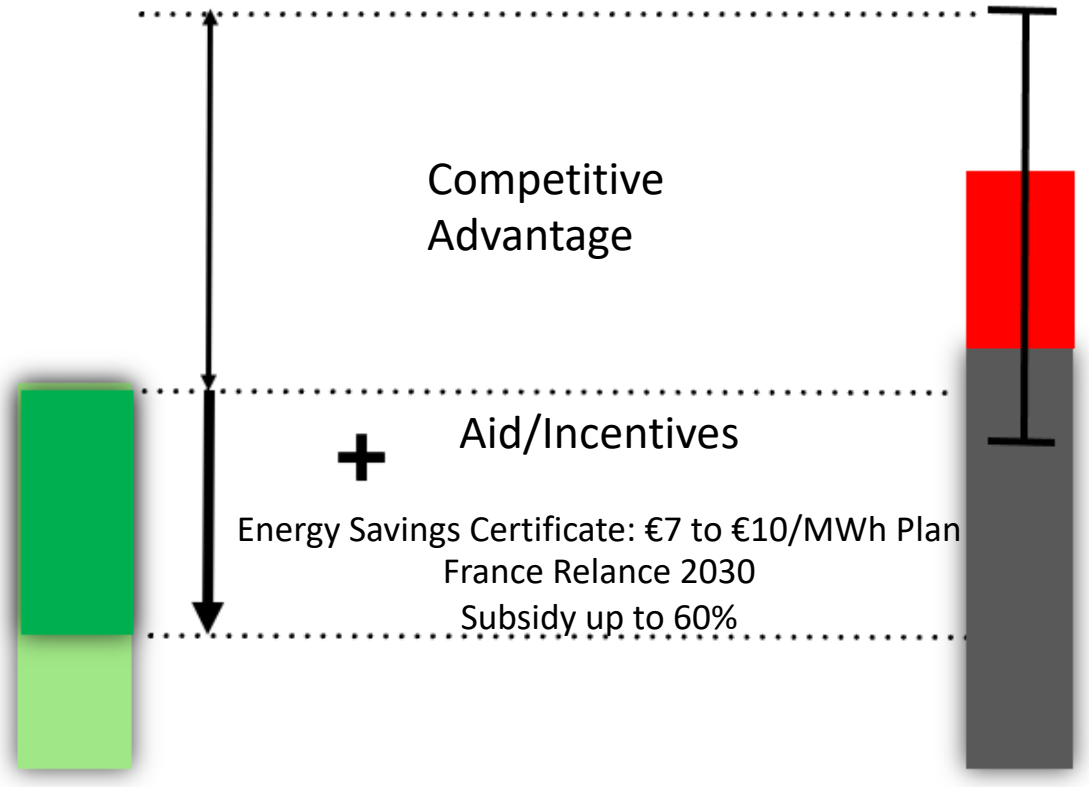
HÉLIO STORE

+

Photovoltaic

Cost of PV: 35 to 50 €/MWh

Hot air generator
+ Storage: €10 to €20/MWh



Carbon tax
€25/MWh
(+/- 10)
Base 75 to 150
€/Ton CO2

Natural gas
€80/MWh
(+/- 20)

Cost prices with IDHELIO

55 €/MWh

(+/- 15 €/MWh)

Fossil fuel prices

105 €/MWh

(+/- 30 €/MWh)

Financial scheme to ease investment decisions

IDHELIO

Engineering turnkey sale

Free pre-diagnosis
Feasibility study
Or
Performance contract

Solution of
solar decarbonization

Final customer

Operating company / Third-party funder

Sale Heat

A first industrial reference

HELIO PROD concentrated solar power plant

- A peak power **of 136 kWth,**
- A thermal **storage battery** with a 1.4 MWh th capacity
- Hot air production up **to 250°C**

Implanted as a **parking shade at** the **FRUIT GOURMET** company (Lot et Garonne) for the **drying and pasteurization process** of fruits

Applications from thermal storage

Fatal or intermittent energy

Wind, Photovoltaic
Network surplus
Low-cost electricity

Industrial process
Waste heat

High temperature
Solar Heat

Biomass

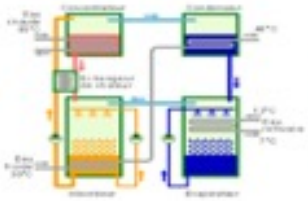
Thermal Storage

HÉLIO STORE

High temperature thermal recovery

Low pressure steam

Dehumidifier



Adsorption cycle or heat pump

Cold

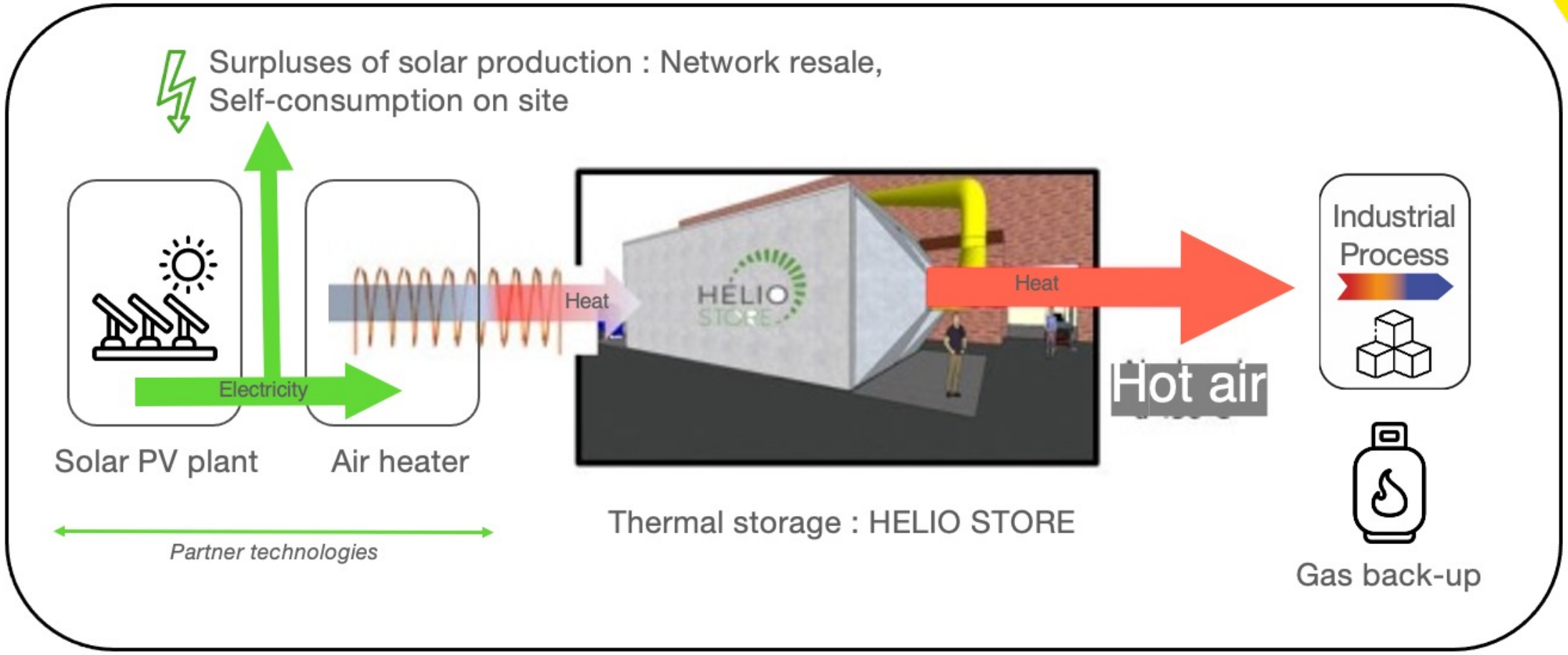
Low temperature Heating

Heat
Air and water

Partner technologies

IDHÉLIO
Concentrer l'énergie solaire
Stocker la chaleur

Thermal storage of green electricity
The process Diagram



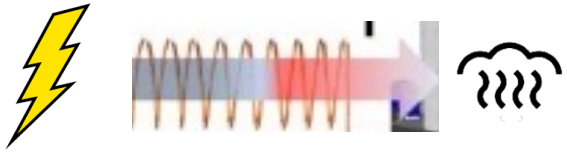
Design example

Thermal requirement :

1 MW 8,600 kg/h at 450°C
24/7 - 365 days a year

Thermal storage :

12 MWh_{th} 75 m^3 at 450°C



Air heater :

2.6 MW

Photovoltaic field :

6.8 MW 7 ha

Performance:

natural gas reduction: 75%
useful heat: 60%
resale of network electricity: 40%

%

Benefits of the solution

- % Solar coverage rate and reduction of CO2 emissions (< 80%)
- € Cost of storage 5 to 10 times cheaper compared to electrical storage
- % Useful energy rate of 100% and useful heat (< 80%)
- € Use of electricity excedent (Summer):
  self-consumption, network resale
-  High temperature air production : allows steam and cold conversion
- € Valorization of other sources of green electricity (wind) or at low cost (during peak production hours)
- € Increase in the residual value of the project

Didier MARTIN | 06 70 60 33 47 | didier.martin@idhelio.com