Spinoff ETH zürich

Synhelion
solar fuels

THE PATH TOWARDS AFFORDABLE CLEAN FUELS

12.11.2020, DOE Webinar-Workshop

SYNHELION TECHNOLOGY – THE VISION

Click here or scan the QR code to watch the video.

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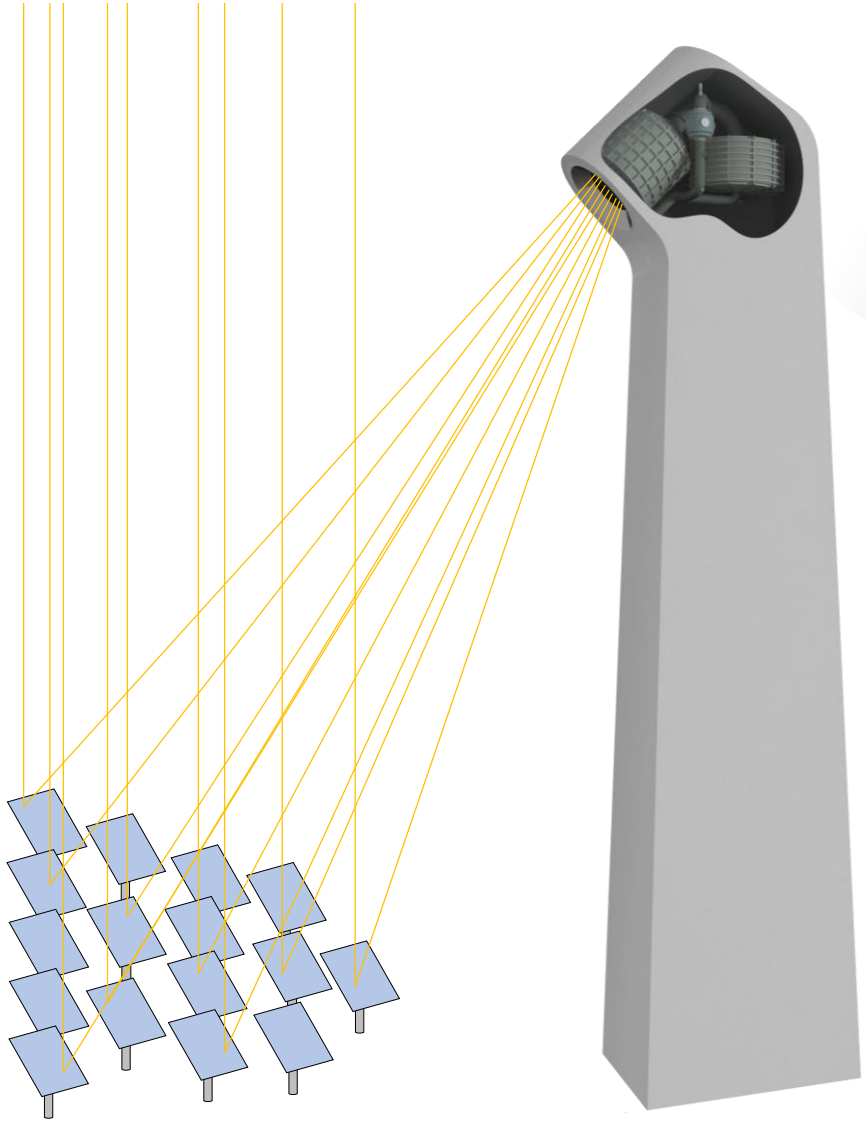
SYNHELION TECHNOLOGY – THE WAY TO MARKET

First to market **solar upgrading** process:

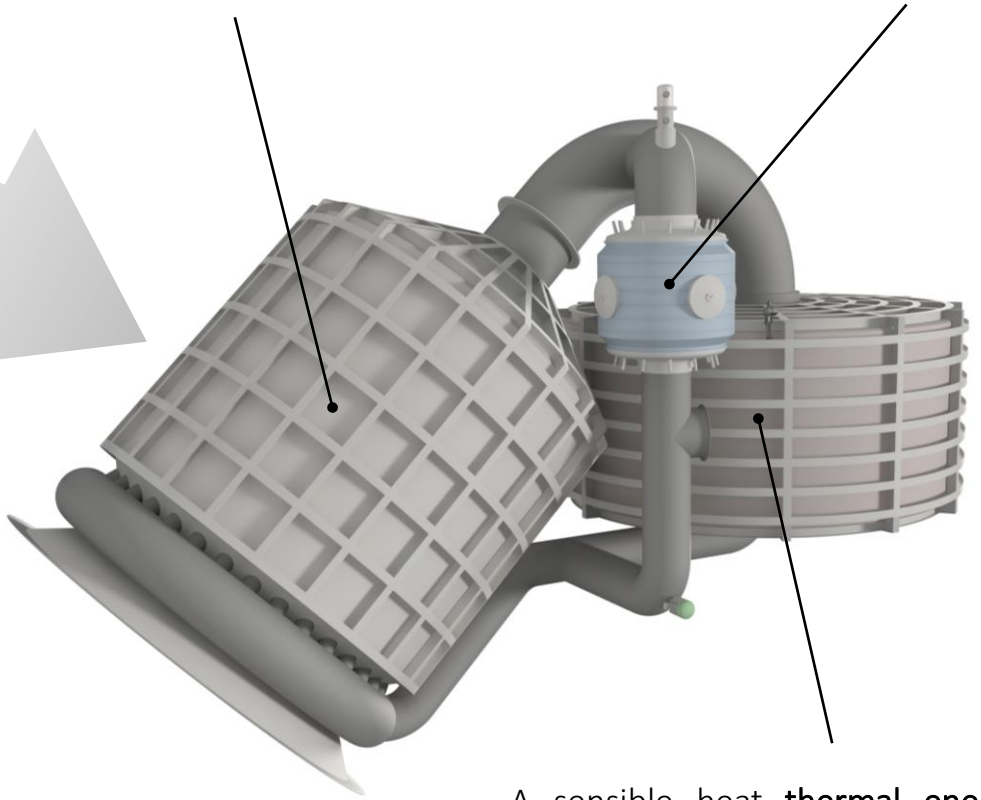
- **Competitive with fossil fuels**
- Up to **50% lower net CO_2** emissions
- Based on industrial reforming technology
- Market ready by 2023

TECHNOLOGY: 3 CORE COMPONENTS



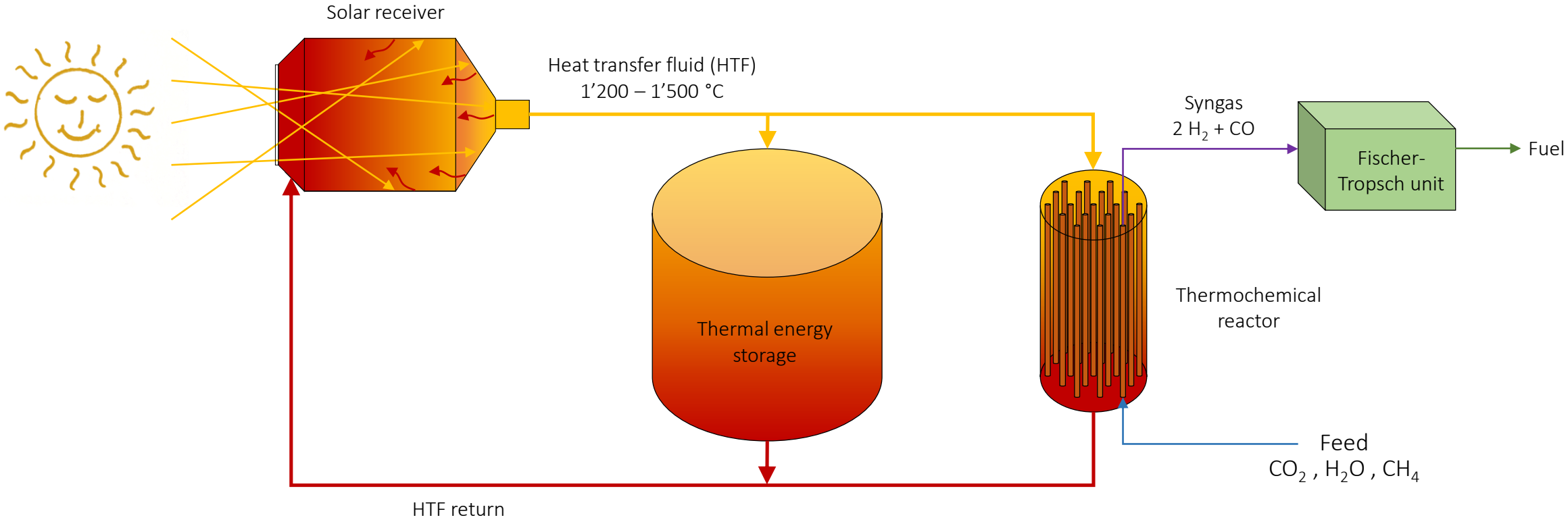
The **solar receiver** efficiently converts the concentrated solar radiation into heat at temperatures up to 1’500°C.

Within the **thermochemical reactor**, the heat delivered by the receiver drives endothermic reactions for syngas production.

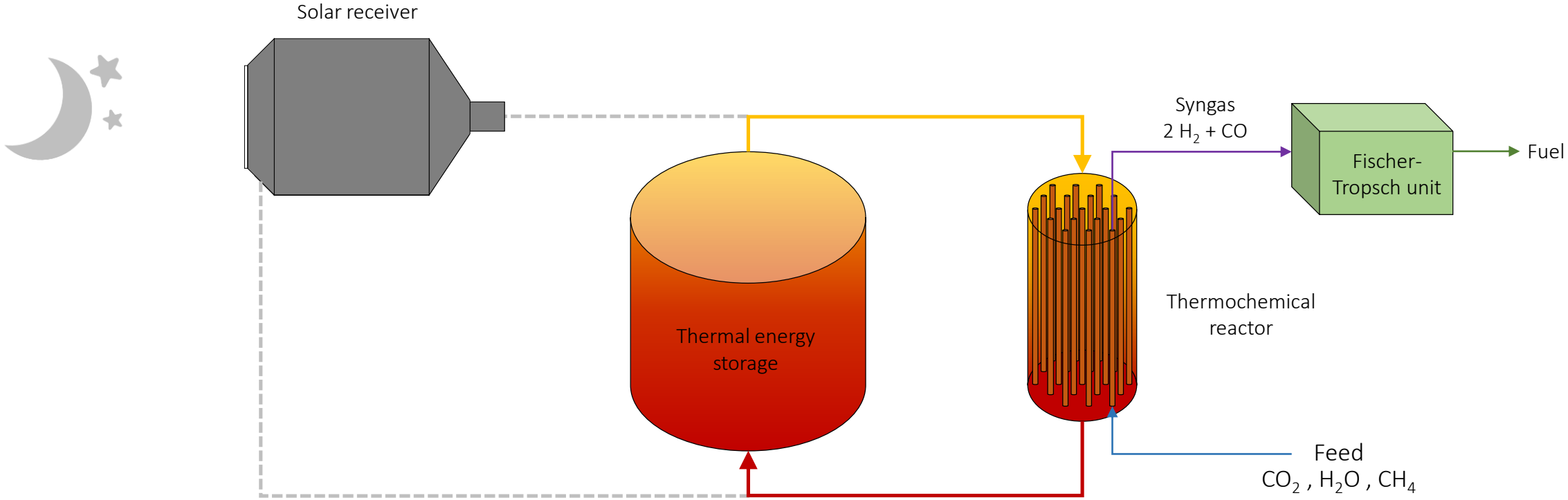


A sensible heat **thermal energy storage** enables continuous 24/7 operation in summer and extended operation in winter.

TECHNOLOGY: FROM SUN TO FUEL



TECHNOLOGY: SEAMLESS THROUGH THE NIGHT

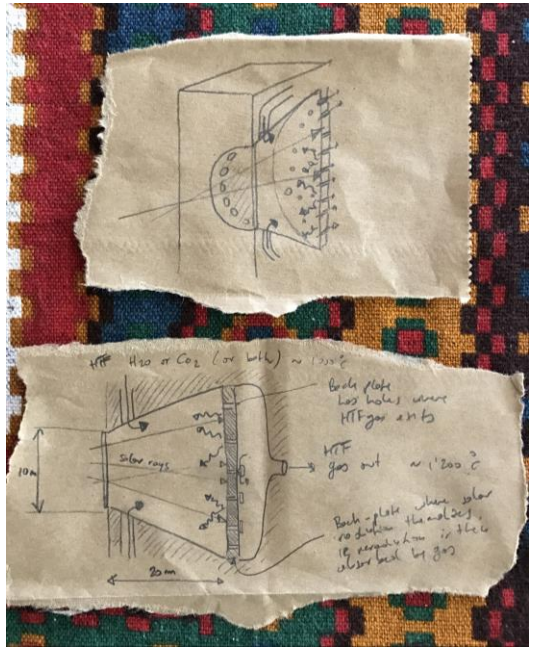


A RECORD-BREAKING PATH TO MARKET

ETH zürich

PREC Professorship of Renewable Energy Carriers

2014
World's first solar kerosene from H_2O and CO_2 in the lab.

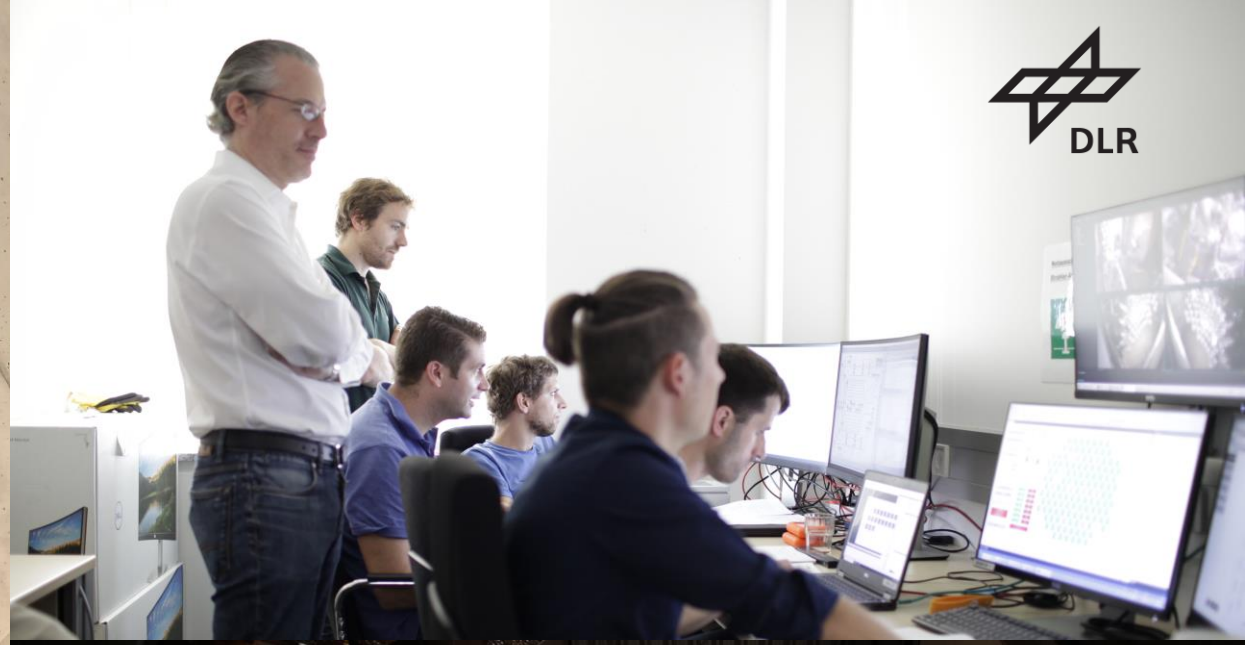


2017
We conceived and patented a completely novel high temperature solar receiver concept.

2019
We built and commissioned a 250kW prototype of our solar receiver to be tested at DLR Synlight – the world's largest artificial sun. We were the first to use the full power of the facility.

2019
World's first carbon-neutral fuels from air and sunlight.

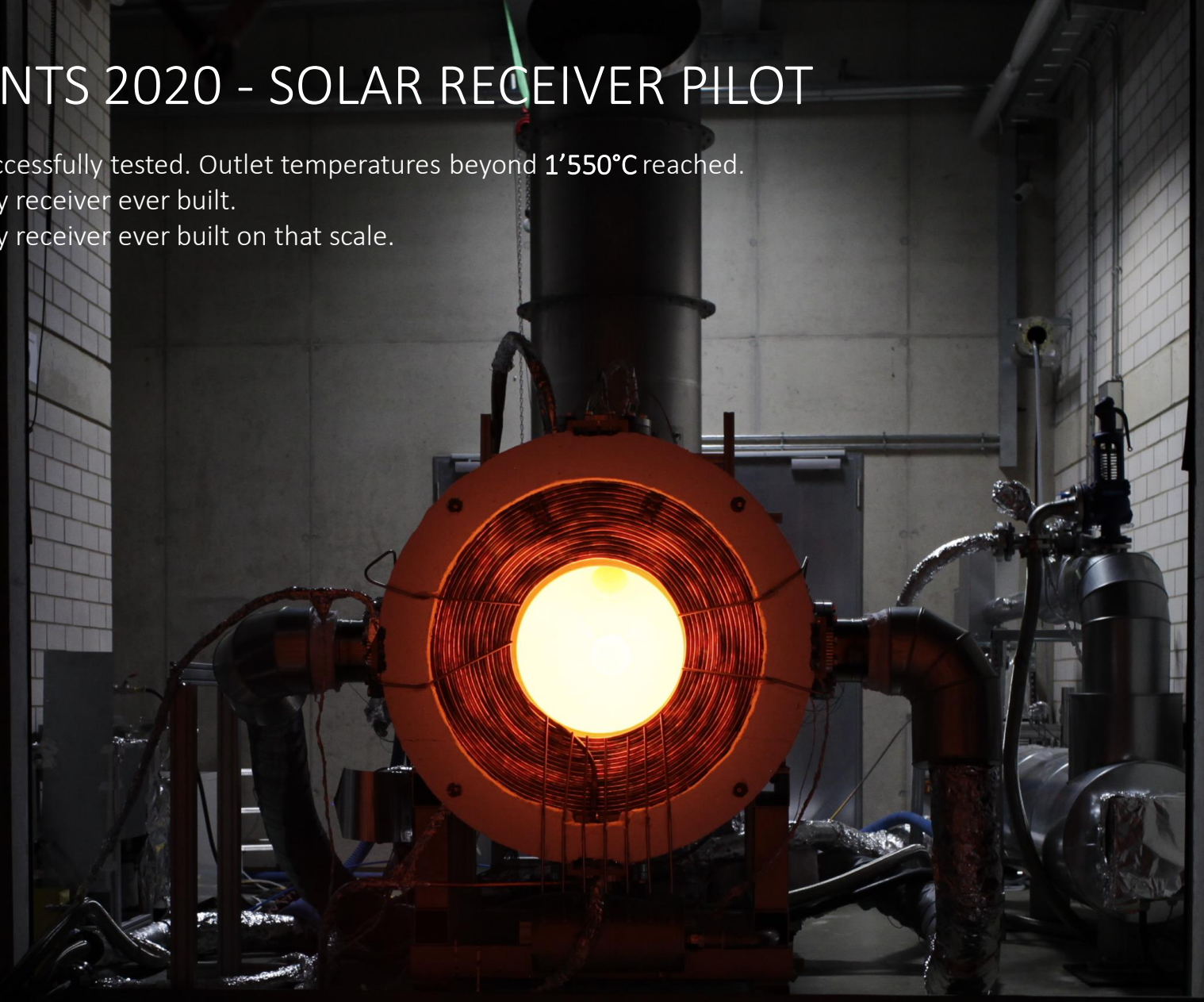
RECEIVER PILOT TESTS



ACHIEVEMENTS 2020 - SOLAR RECEIVER PILOT

250kW receiver pilot successfully tested. Outlet temperatures beyond **1’550°C** reached.

- 350°C more than any receiver ever built.
- 550°C more than any receiver ever built on that scale.



SYNHELION ROADMAP

2023 | 2025 | 2030 | 2040

Demo phase

Demonstration of solar syngas production at industrial scale

Integration of solar receiver and chemical reactor on solar tower in Jülich, DE

Demo platform with the entire production chain from sun to fuel

1st com. plants

Start of commercial phase

First integrated fuels plant:

- Field size: 8'000 m^2
- Capacity: 1'500 t/y
- Upgrading-based

Capacity ramp-up

Increase of plant size and installation of new plants

Target total capacity: 0.7 Mt/y
Fuel cost target: 1 €/L JET-A1

Toward net zero

Market entry of carbon-neutral pathways and parallel ramp-up of production capacity

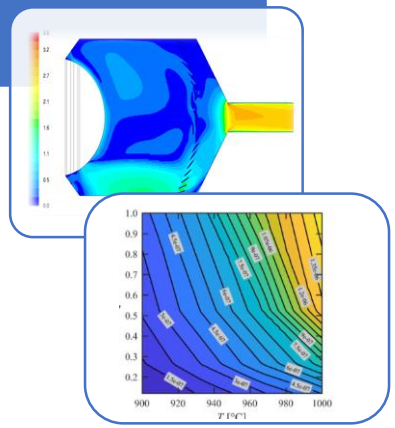
Target total capacity: 40 Mt/y
Fuel cost target: 0.5–1 €/L JET-A1

2021: INTEGRATED SYSTEM ON SOLAR TOWER

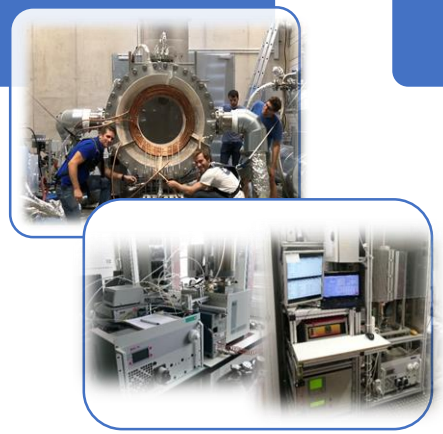

SYSTEM LEVEL ANALYSIS – OUR COCKPIT

Concept

Modeling

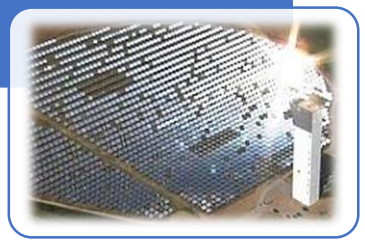


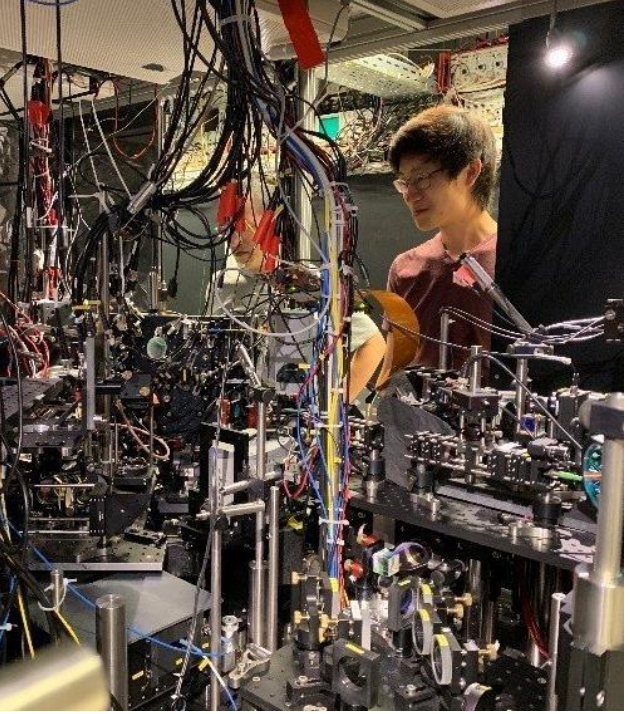
Testing / Validation



Optimization / Scale-up

Integration





KEY RISKS OFTEN OVERLOOKED

- Continuous benchmarking with other technologies / market
- Complexity of approach
- Robustness of technology
- System integration of plant components
- Continuous operation

TEAM AND PARTNERS

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THANK YOU!

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