

CO₂OLHEAT

Supercritical CO₂ power cycles demonstration in Operational environment Locally valorising industrial waste HEAT

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Project coordinator

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Project summary

Funding source	H2020_LC-SC3-CC-9-2020				
Budget	€18.8 mil (€14 mil financed by the EU)				
Duration	48 months (June 2021 – May 2025)				
Start TRL	TRL5/6				
End TRL	TRL7 with roadmaps to TRL9				
Partners	RIFE SIEMENS COCIOY Den-Minded Baker Supervision Den-Minded Baker Baker Supervision Den-Minded Baker Su				
	EINEX Brunel University London Dispersion Lingegneria				
EN	ENGICE CEIsa				

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Project Objectives/Impact

Development and demonstration of a **2MW highly flexible** sCO_2 WH2P power block with a heat source T>400°C and efficiency η_{NOM} >23%

Development of sCO2 power cycle components: turbomachinery, heat exchangers

Development of **control systems enabling flexibility enhancements** (related to part load, lower WH temperatures) and **power grid interoperability**

Replication

Technical

Replication of CO2OLHEAT concept in **6 applications**: aluminium, steel, glass, CSP, waste incinerator, CCGT

Wide dissemination and creation of a pan-European sCO2 WG



Demonstrate **economic** and **replication** feasibility, **environmental** impact and **social** acceptance





The cycle



Nominal point





	Temperature [°C]	Pressure [bar]	Density [kg/m3]	Enthalpy [kJ/kg]	Entropy [kJ/kgK]
1	33	85,0	670,35	294,5	1,3037
2	59	215,0	752,06	318,4	1,3218
3	189	214,0	291,26	577,1	1,9914
4	360	210,5	177,16	800,0	2,4064
5	333	162,2	144,64	774,8	2,4143
6	333	162,2	144,64	774,8	2,4143
7	276	89,0	88,835	723,2	2,4351
8	69	88,0	202,84	464,5	1,8364

Electric Generator

High-Temperature Recuperator

Initial design concepts







Site Integration (Pre-FEED)





Pre-FEED study revealed that high integration and material costs exceed the project budget. Need for other demo sites in the energy intensive industry for easy integration and additional funding

What do we need

- Easy accessible side
- Enough footprint
- Full auxiliaries: electricity, cooling, compressed air
- Enclosure
- Additional funding
- "Clean" and sufficient exhaust gas to reduce the size and costs of the WHRU



WHRU size as a function of mass flow and exhaust gas temperature



What do we offer

- Strong consortium
- Robust thermodynamic cycle
- Best in class turbo machinery manufacturers
- 2 MW WH2P cycle
- Integration within existing infrastructure
- Full technical and operational experience of a sCO2 cycle
- Exploitation of a 2 MW power plant after the DEMO has ended



2 MW power cycle, able to produce more than 17000 MWh electrical power per year and a revenue/saving exceeding 3 MEURO (pay back<5 years)









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