


K₂-CO₂

Your key to decarbonization

CO₂ capture systems with Hot Potassium Carbonate (HPC) for glass furnaces

Confidential



INDUSTRIOUS[®]
corporation

Since 2017



since 2002



Metal Fabrication

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INDUSTRIOUS[®]
global technologies

formerly Tri-Mer Global Technologies

since 2018



*Air Pollution Control and
Waste Heat Recovery*

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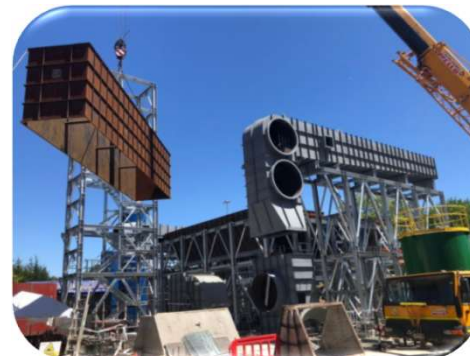
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INDUSTRIOUS[®]
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since 2021



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K2-CO₂

Your key to decarbonization

since 2022



CO₂ capture

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K2-CO₂: the turnkey provider of the first **integrated** solution for emission compliance, heat recovery, and CO₂ capture, Sequestration and/or Use

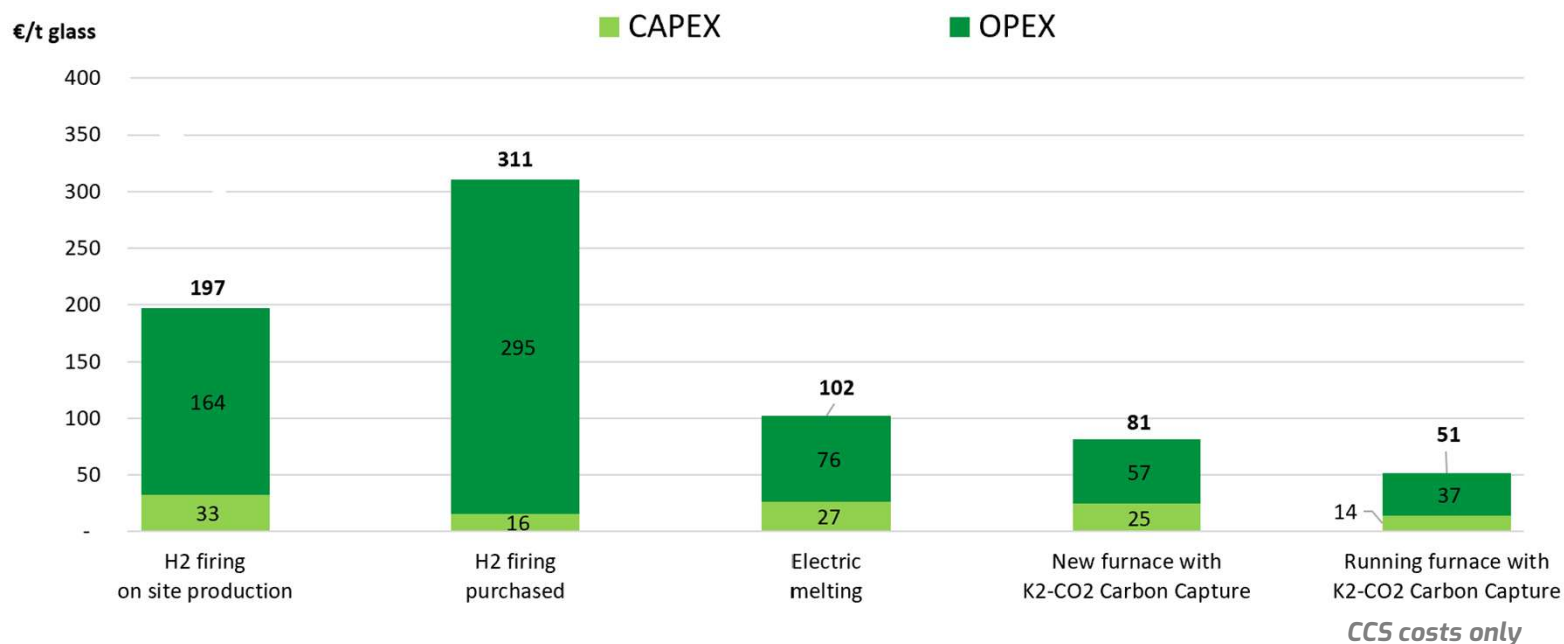
- designed and optimized for the **glass industry**.
- Limited electricity dependency
- Adapted for both new plant and running furnaces

Our team:

- has a **20-year** background in Glass Industry
- Based in **Italy** and in the **USA**
- Worldwide experience in **turnkey** systems delivery



Comparison with alternative glass decarbonization techniques 80% total furnace CO₂ reduction



Calculation assumptions:

- Container glass, 350tpd
- $CO_{2,in} = 411\text{kg/t}_{glass}$; $CO_{2,out} = 80\text{kg/t}_{glass}$
- All power from renewable sources
- 60% Cullet and no electric boosting considered
- 12h H₂ Storage
- CAPEX Depreciation on 20 yrs
- Utilities costs projections at 2030
- EE cost 80€/MWh, NG cost 17€/MWh

Capture Process based on **Hot Potassium Carbonate (HPC)** CO₂ absorption:

- consolidated know-how
- optimized for flue gas coming from glass furnace
- Safer and cheaper than amines

Our rules

No changes to the manufacturing process

RULE no. 1

The most efficient air pollution control is integrated, **ensuring continuous compliance**

RULE no. 2

Multiple stages of heat recovery minimize power consumptions, footprint and **eliminate the external heating and cooling needs**

RULE no. 3



Hot Potassium Carbonate (HPC) process:



- consolidated know-how with our partner



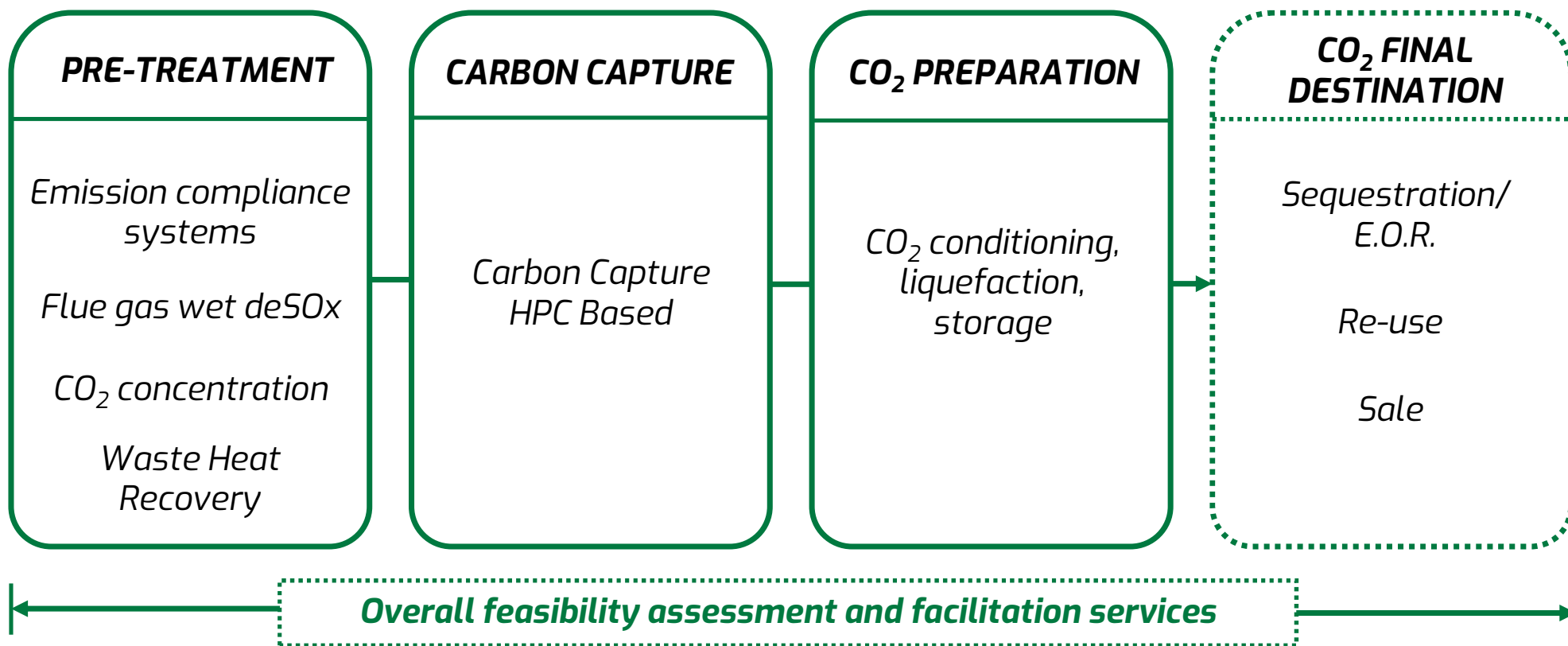
- Exclusive licensor for the HPC-based CO₂ capture process in glass
- Process developed since the 50s
- More than 400 applications worldwide.

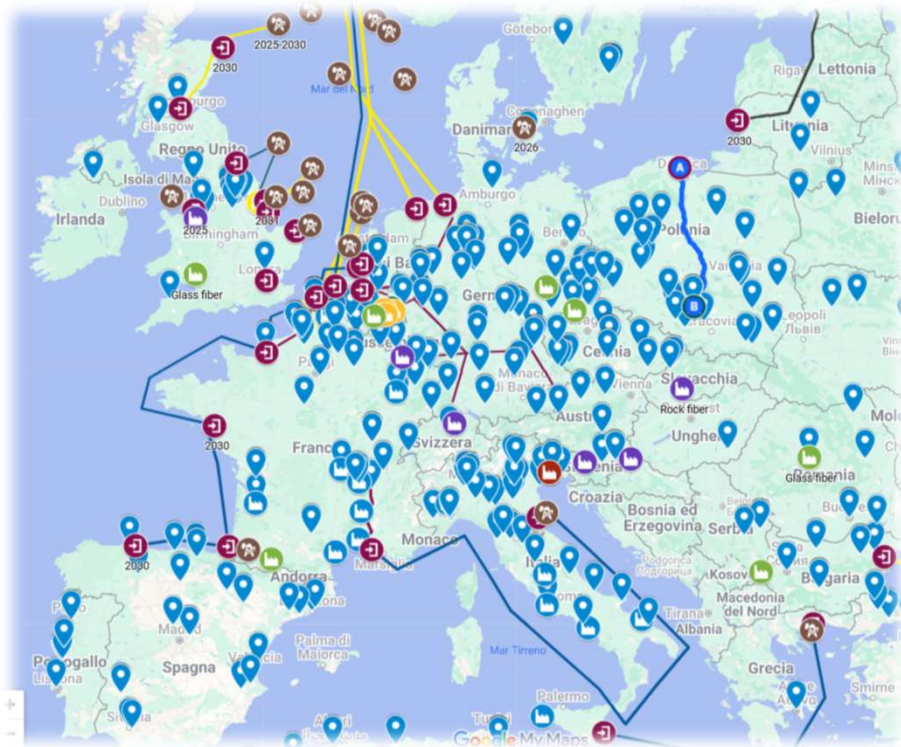


		HPC (K₂CO₃)	Amines
H&S	Volatile	No	Yes
	Hazardous	No	Yes
	Hazardous liquid waste	No	Yes
OPEX	Solvent cost	€	€€-€€€
	Degradation with O ₂ and heat	No	Yes
	Solvent Degradation	Lower	Higher
	Power consumption	Higher	Lower
	Thermal energy consumption	Lower	Higher for standard MEA, comparable for proprietary blends
CAPEX		Lower	Higher

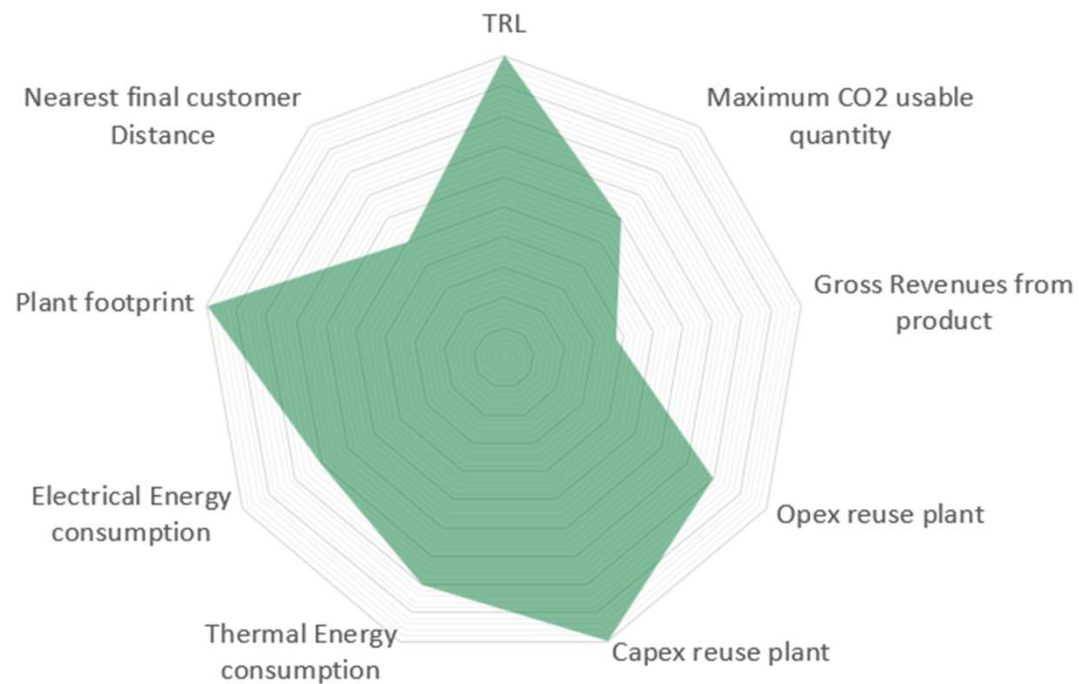
Our **INTEGRATED** approach to CCU/S

We deliver **systems INTEGRATED** with **functionalities** and **services** to facilitate U/S





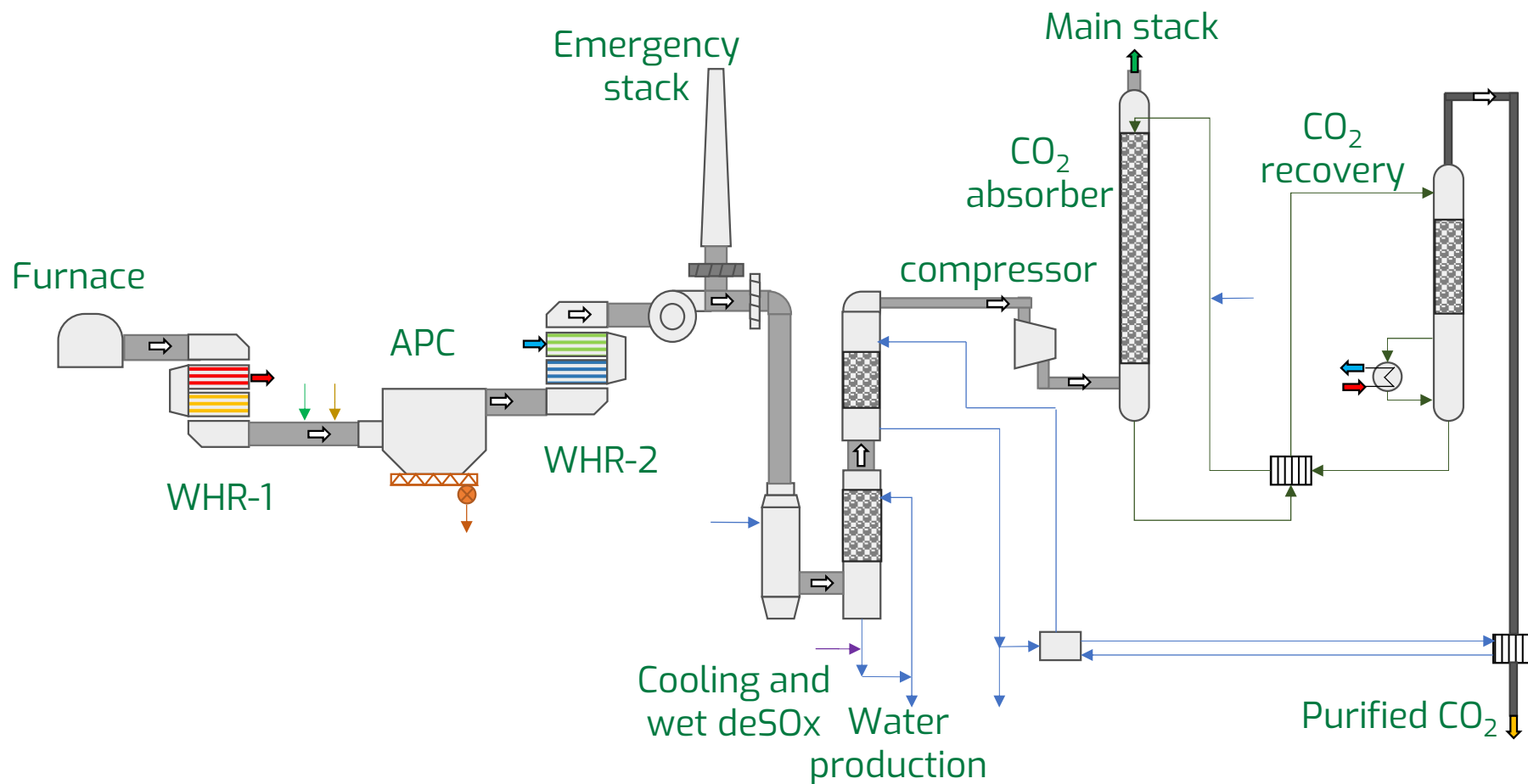
Transport and Storage mapping



Reuse assessment

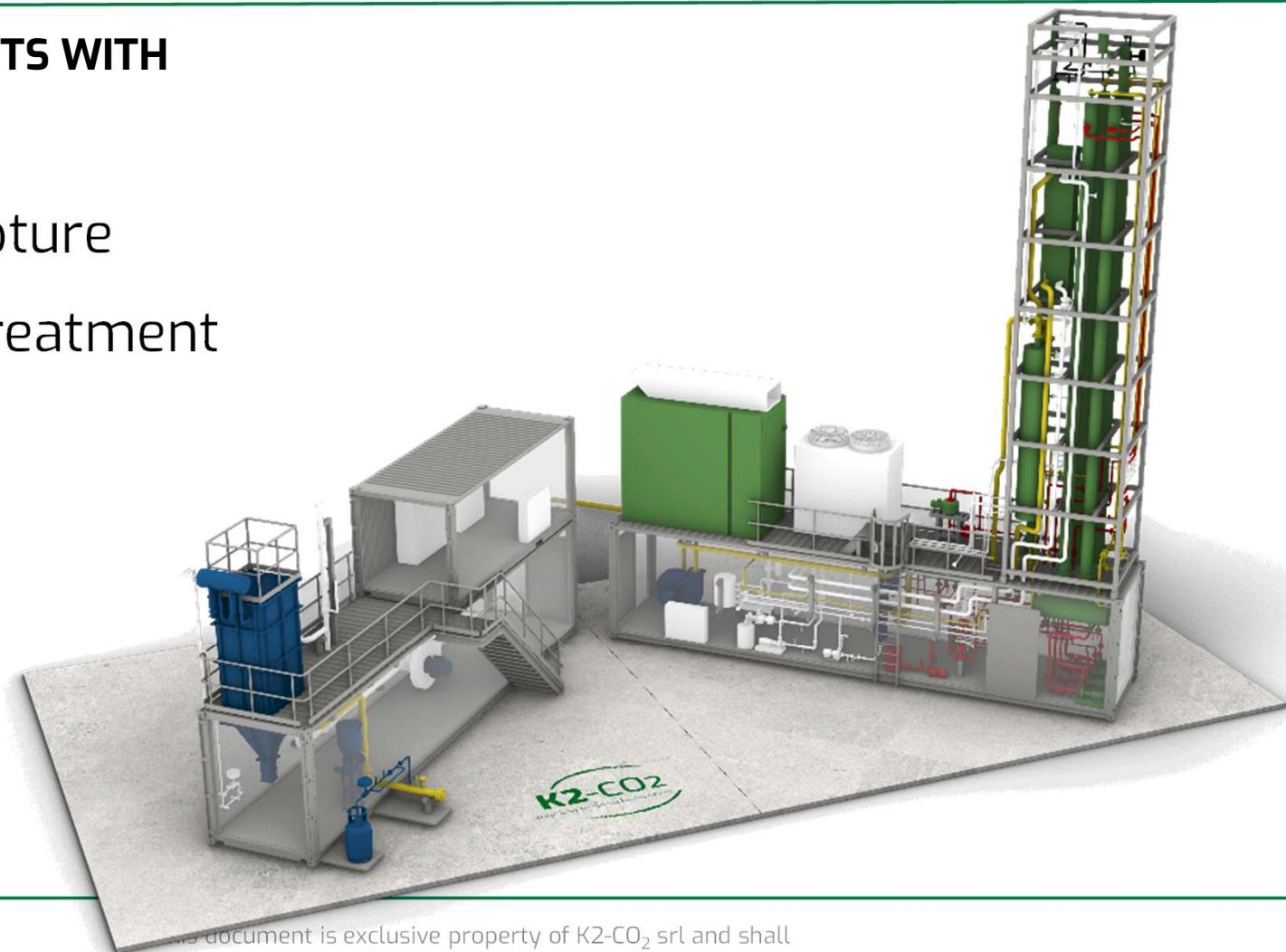
- Capture efficiency up to **95%**
- Process **adapted to optimize** use of power/heat available
- Applicable to **Regenerative and Oxyfuel furnaces**
- Can be connected to **running furnaces**
- Captured CO₂ has **technical or food** grade for sale.

Example of integrated capture Process



YOUR JOURNEY STARTS WITH **DOBBY™**

- 1-2 tpd CO₂ capture
- Includes pre-treatment
- Containerized
- Plug & play



Our first full scale project approved

Project Title: **Glass2LIFE**

Funded by: **LIFE23 EU Programme**

Project location: **Italy**

- Total Budget: **11.199.812 €**
- % EU Co-funding: **60%**

Duration: **42 Months**

Beneficiaries:



> 16.800 tpy of CO₂



> 4.600 m³ of water per year



ENI/SNAM sequestration site
of Ravenna



Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or CINEA. Neither the European Union nor the granting authority can be held responsible for them.



Float glass full scale project recently announced



95% CO₂ capture rate

Food grade CO₂

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Thank you



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