Valorising waste heat for enhanced energy efficiency

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SOME MILESTONES IN THE HISTORY OF THE ORI MARTIN GROUP

The **Heatleap project** was developed in the **Brescia factory of the ORI Martin Group**.
ORI Martin is a **modern steel plant** with an **electric furnace**, considered one of the most advanced companies in technological and innovative terms.

1934-40

O.R.I. MARTIN foundation (Brescia) by Mr. OGER MARTIN

1961

New E.A.F. (35 ton capacity)

1973

ORI MARTIN SUD Foundation (Ceprano) for rebar production (production ceased in Feb. 2018)

1995

Specialization in quality & engineering steels

TRAFILATI MARTIN foundation (y1996, Cologne) for cold finished bright bars

2010

New curved CC machine (Danieli)

2018

Acquisition of **FERROSIDER S.p.A** (Ospitaletto - BS)

2019

Acquisition of **TRAFILERIA LARIANA** (Lecco)

2022

New Garret line for coils

1950

First E.A.F.

1965

Curved CC machine & wire rod-bars rolling mill

SIDERURGICA LATINA MARTIN foundation (Ceprano) for pre-stressed concrete strand production

1986-88

New Danieli wire rod rolling mill

First annealing furnaces

First drawing coil to bar

2008

Revamping of wire rod rolling mill

2016

Acquisition of **NOVACCIAI** (NO) specialized in cold finishing of bars

2019

Acquisition of **SAPES** (TN) specialized in cold and hot forging

2021

Ferrosider becomes O.R.I. MARTIN Spa

GREEN MILESTONES IN THE HISTORY OF THE ORI MARTIN GROUP

1950 — **EAF** Installation

1998 — **First EAF Consteel** Installation in Europe

2015 — **First I-Recovery** plant in Italy

2019 — **First Sustainability Report** (ORI Martin Brescia Plant)

2020 — **HeatLeap Plant**

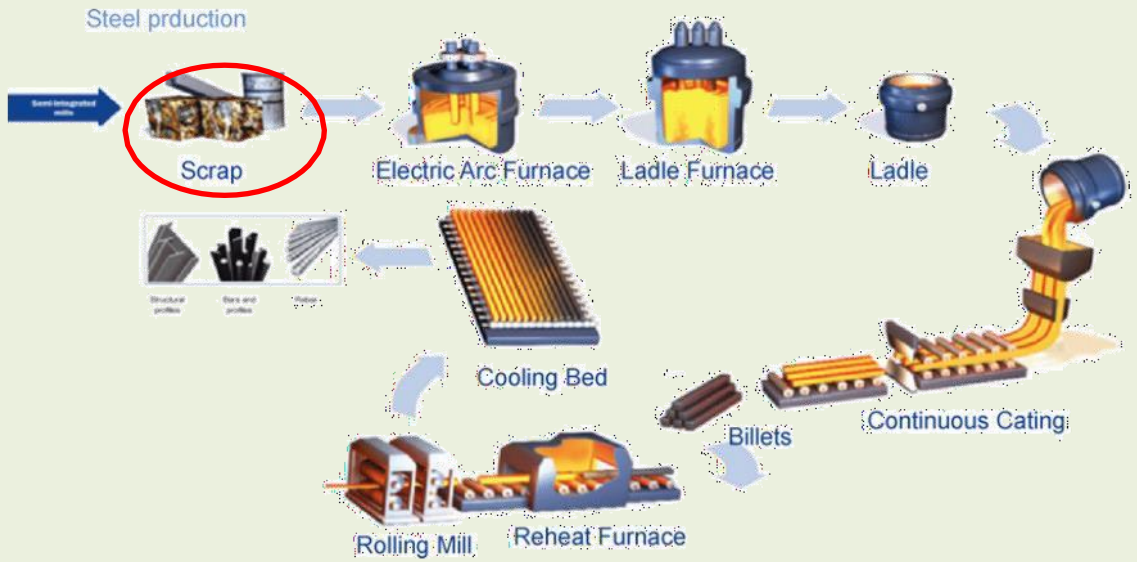
STEELMAKING PROCESS – CO2 EMISSIONS

The production of steel can be done through the integral cycle with Blast Fournace using coal and iron ore. Or with an electric furnace, EAF, using recycled scrap.

Blast Furnace/ Basic Oxigen Furnace

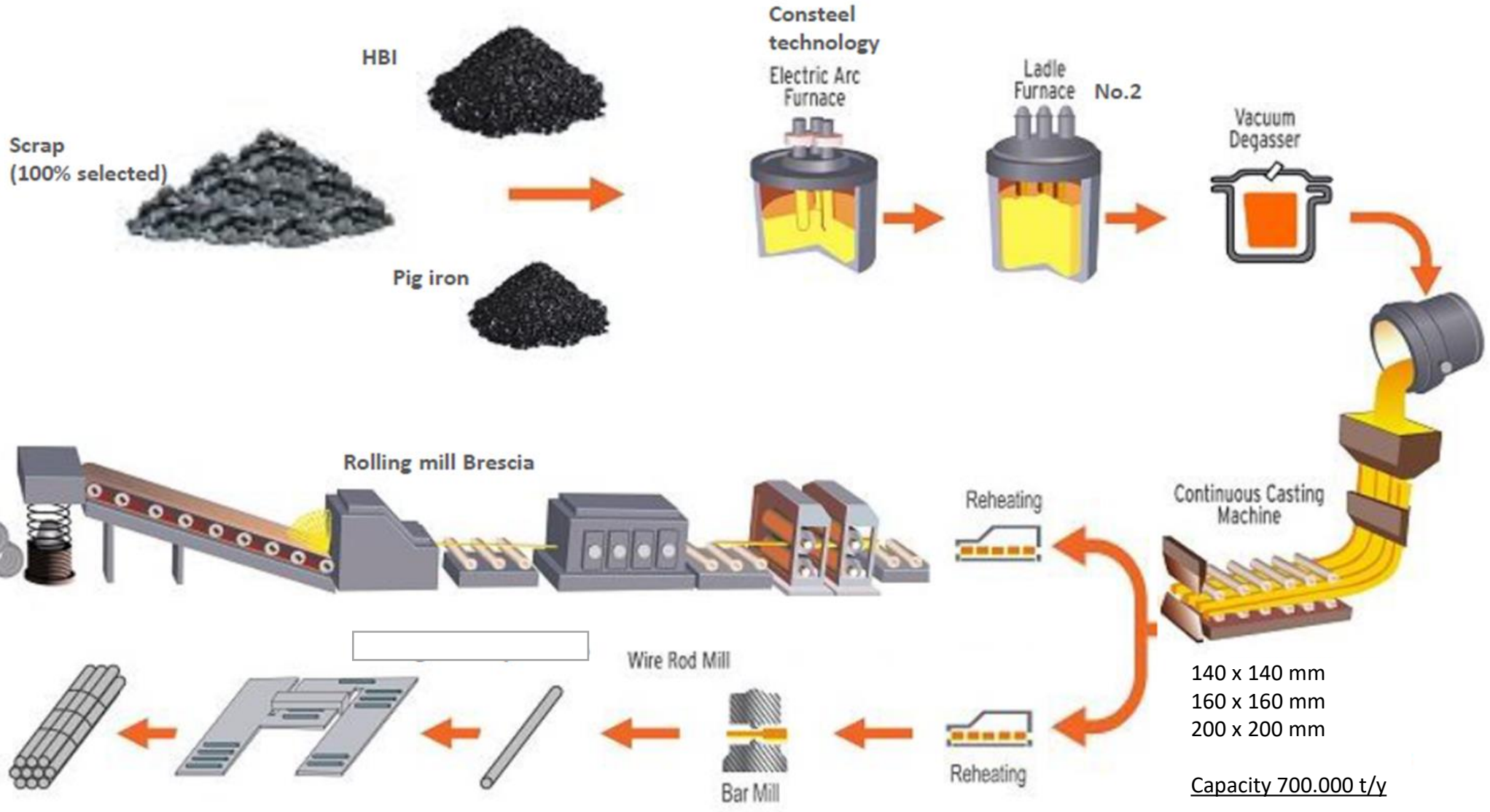
- **Iron ore** and **Coal** are the main materials (**75%**) and just 25% steel scrap are used in the BOF
- The amount of **CO2 emission** of per ton crude steel from the BF-BOF steelmaking is about **2000 kg**

Electric Arc Furnace



- **95% metal scrap recycling** is used in the EAF. Perfect example of a **circular economy** process.
- The amount of **CO2 emission** of per ton crude steel from the EAF steelmaking is **about 400 kg.** Compared to BOF**,** the use of **EAF** permits:
  - **90% natural resource saving**
  - **80% of co2 reduction**

STEELMAKING PROCESS IN ORI MARTIN - ROUTE



Capacity 500.000 t/y

140 x 140 mm
160 x 160 mm
200 x 200 mm

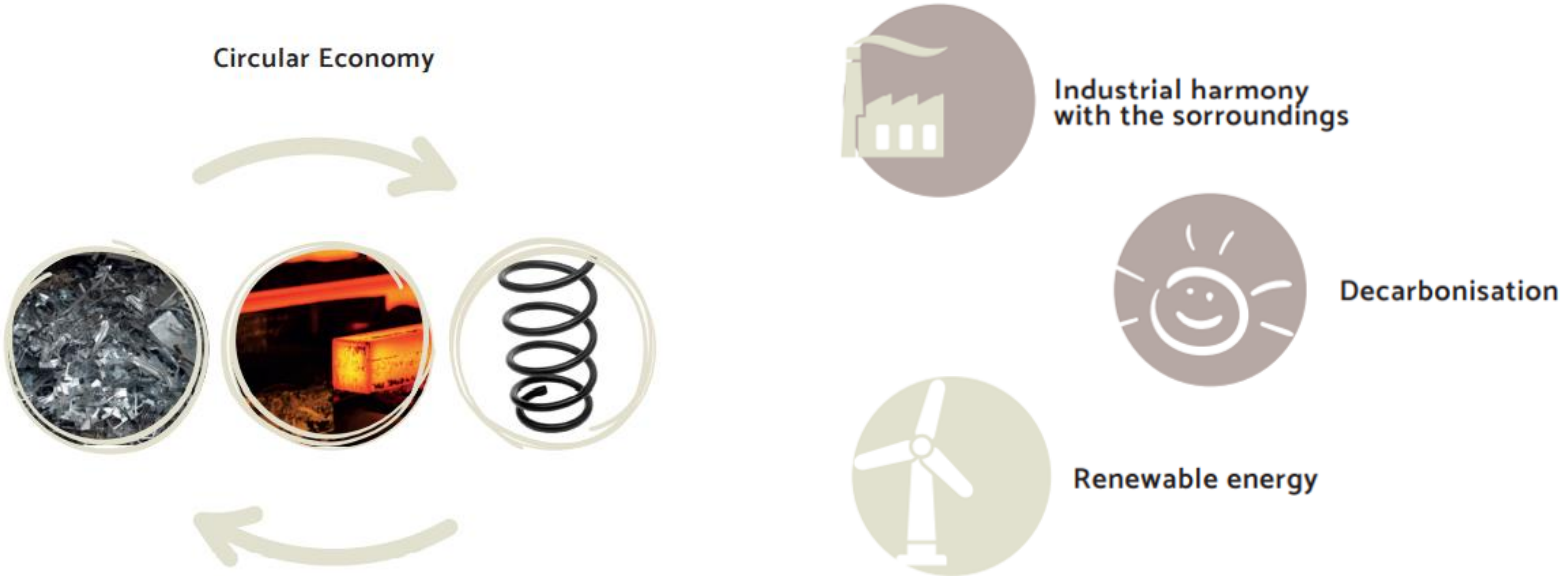
Capacity 700.000 t/y

SUSTAINABILITY FOR ORI MARTIN GROUP

ORI MARTIN IS IN THE CITY WALLS AND "THINKING SUSTAINABLE" FOR US IS NORMAL

- CIRCULAR ECONOMY
- RESOURCE OPTIMIZATION
- ENERGY EFFICIENCY
- ENVIRONMENTAL IMPACT REDUCTION
  - CARBON FOOTPRINT
  - EPD
  - SUSTAINABILITY REPORT
- INDUSTRIAL SYMBIOSIS WITH THE TERRITORY
- DECARBONIZATIONS

ORI MARTIN Brescia Plant



EAF CONSTEEL® TECHNOLOGY

ORI MARTIN USES **CONSTEEL TECHNOLOGY**, WHICH ALLOWS THE **CONTINUOUS LOADING OF THE SCRAP INTO THE ELECTRIC FURNACE** THROUGH A SPECIAL MECHANICAL CONVEYOR **THAT ALLOWS THE PREHEATING OF THE SCRAP WITH GREATER ENERGY EFFICIENCY.**

FURTHERMORE, THIS TECHNOLOGY BRINGS CONSIDERABLE ADVANTAGES RELATED TO THE ENVIRONMENTAL IMPACT

- ✓ REDUCTION OF EAF DUST DISPERSION
- ✓ SCRAP PRE-HEATING AND REDUCES ELECTRICITY CONSUMPTION
- ✓ REDUCTION OF NOISE: ACOUSTIC IMPACT REDUCTION
- ✓ BETTER CONTROL OF THE RADIOACTIVITY OF THE INCOMING SCRAP

I-RECOVERY PYTHAGORAS PROJECT

European Project Nov. 2013 – Oct. 2017

IRECOVERY® TECHNOLOGY PERMITS IN **EFFECTIVE RECOVERY OF EAF OFF-GAS THERMAL ENERGY**. THIS ENERGY IS THE BIGGEST FRACTION OF THE PRIMARY ENERGY INPUT IN THE EAF PROCESS TYPICALLY WASTED AWAY.

The iRecovery® system consists in:

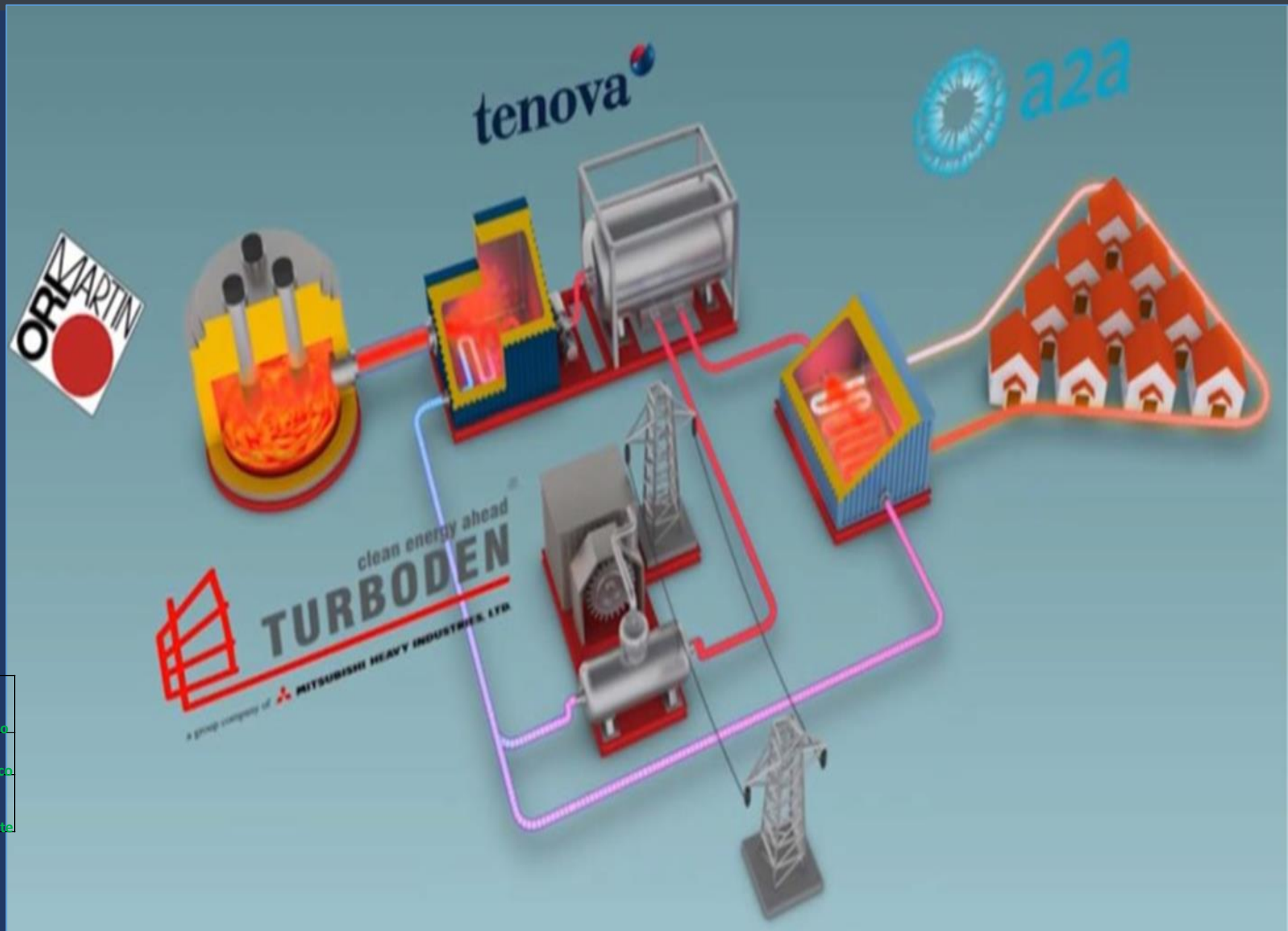
- ✓ ***a Heat Recovery for Steam Generation with a radiant***
- ✓ ***Evaporative Cooled System, and convective section***
- ✓ ***the Waste Heat Boiler, which can completely process the waste gas from approximately 1700°C to 200°C.***

IRECOVERY

- Electricity during summertime (April-October) : ~ 1,8 MW,el (nominal)
- District Heating during wintertime (October-April) : ~ 12MW,th (nominal)

- **Average steam production: 11 ton/h**
- **Average accumulator pressure: 24 bar(g)**
- **Average thermal power to a2a DH: 6 MWth**
- **Average thermal power to ORC cycle: 5,5 MWth**
- **Average net electric power from ORC cycle: 1 MWel**

2016	MWht	110.935		33.613	$tCO_{2\ da\ termico}$
2022	MWhe	18.664		8.521	$tCO_{2\ da\ elettrica}$
			totale	42.135	$tCO_{2\ risparmiate}$



IRECOVERY

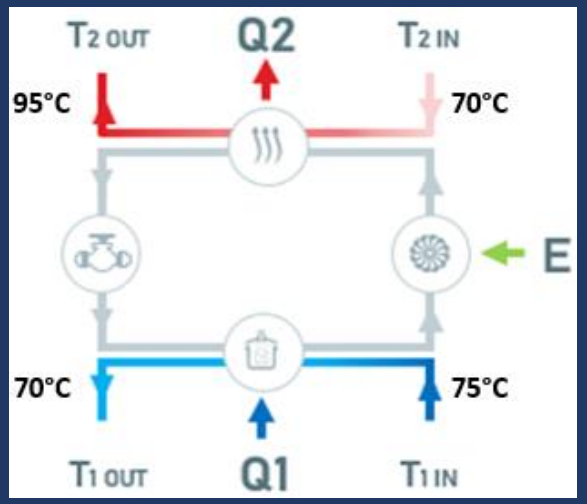
in the period 2016-2022, the iRecovery plant and ORC turbine saved approximately 15,500 tonnes of CO2

- ANNUAL REDUCTION OF 10’000 T CO2
- **52 GWH** ANNUAL HEAT RECOVERY CAPACITY
- **25 MWH** DAILY ELECTRIC ENERGY PRODUCTION IN SUMMER (EQUAL TO 700 FAMILIES’ ELECTRICAL CONSUMPTION THROUGHOUT THE YEAR)
- **26 GWH** ANNUAL THERMAL PRODUCTION IN WINTER (EQUAL TO 2000 FAMILY CONSUMPTION)
- 12 MLN€ TOTAL INVESTMENT

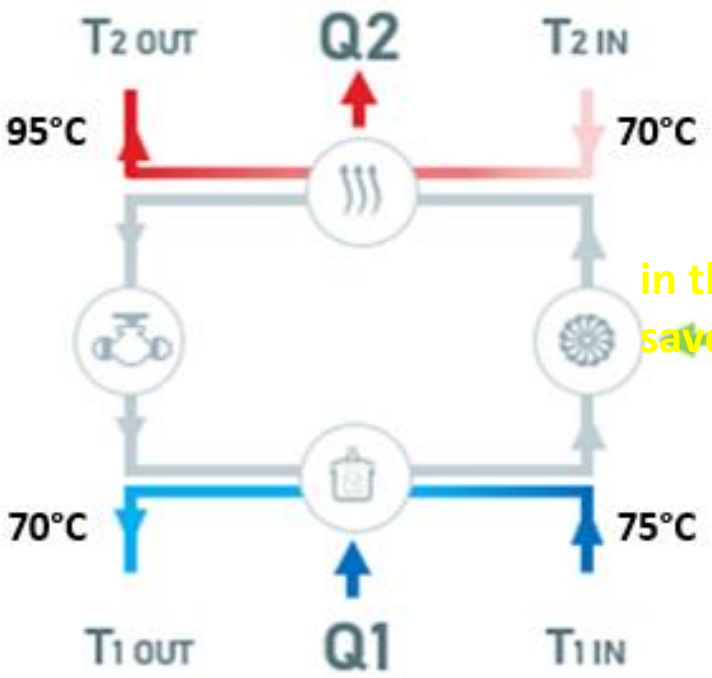
HEAT LEAP

RECOVERY OF
HEAT FROM COOLING WATER
USED FOR THE CONSTEEL® EAF

- 6.5 MLN/€ OF TOTAL COST
- HEAT PUMP OF ~6 MW
- IMPROVING ENERGY EFFICIENCY
- ANNUAL SAVING ABOUT 5.000 TON CO_2



INTERVENTION AREA



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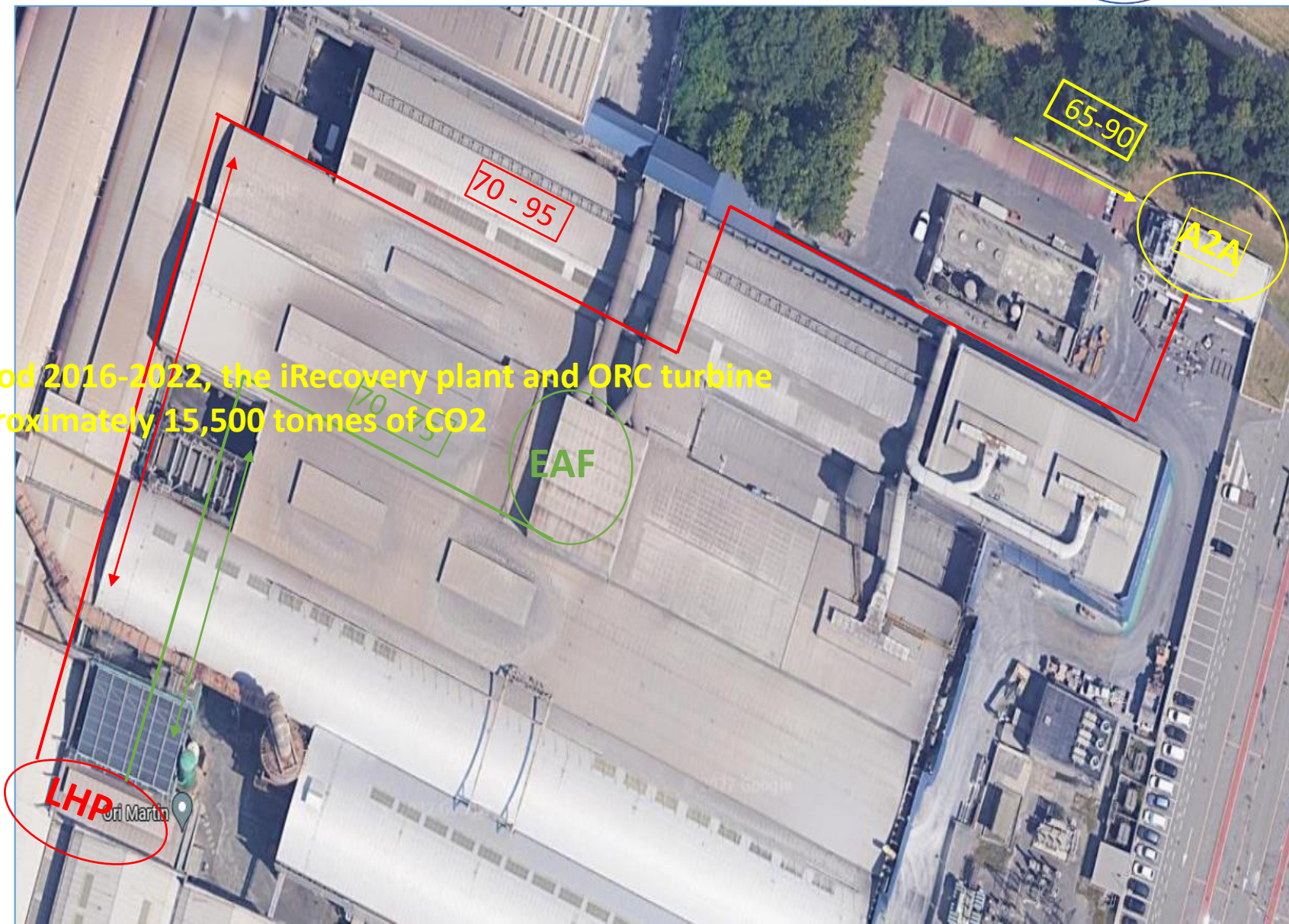

Thank you for your attention

HEATLEAP
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‘Doing good is good for **business’**

Sir Richard Branson
from The telegraph

ORMARTIN GREENSTEEL ®

ORMARTIN ®

Life