

**e** se  
la centrale  
termoelettrica  
più efficiente d'Italia  
fosse a Marghera?

Il nuovo impianto assicura un alto profilo di sostenibilità, abbattendo fino al 70% le emissioni di NO<sub>x</sub> e fino al 30% quelle di CO<sub>2</sub>, contribuendo così alla sicurezza energetica del sistema Paese.



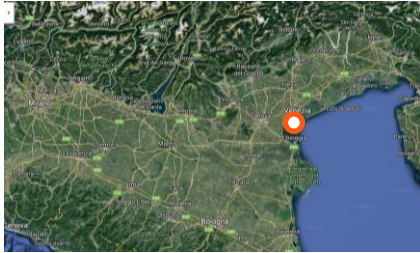
Diventiamo l'energia che cambia tutto.

Paolo Parolini, plant manager

# Marghera Power Plant Overview

Rev. 29/05/2024

# Marghera Power Plant actual configuration



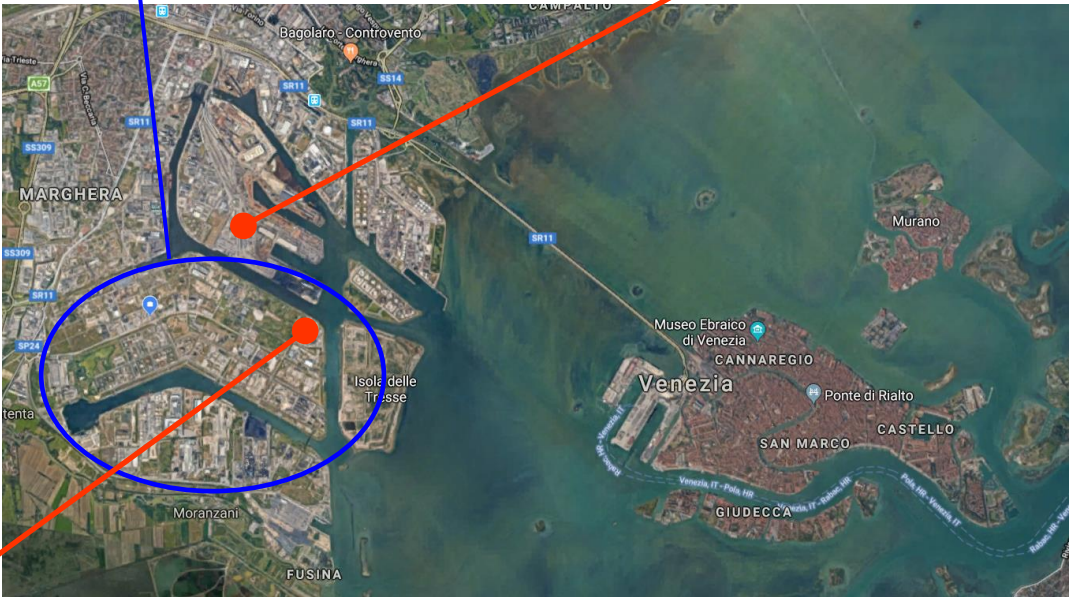
**Porto Marghera  
Petrochemical Area**

**Azotati Site**  
- «Azotati 5» CCGT



## **Levante Site**

- «Levante 5» CCGT
- «Levante 3» CCGT (cold bkup)

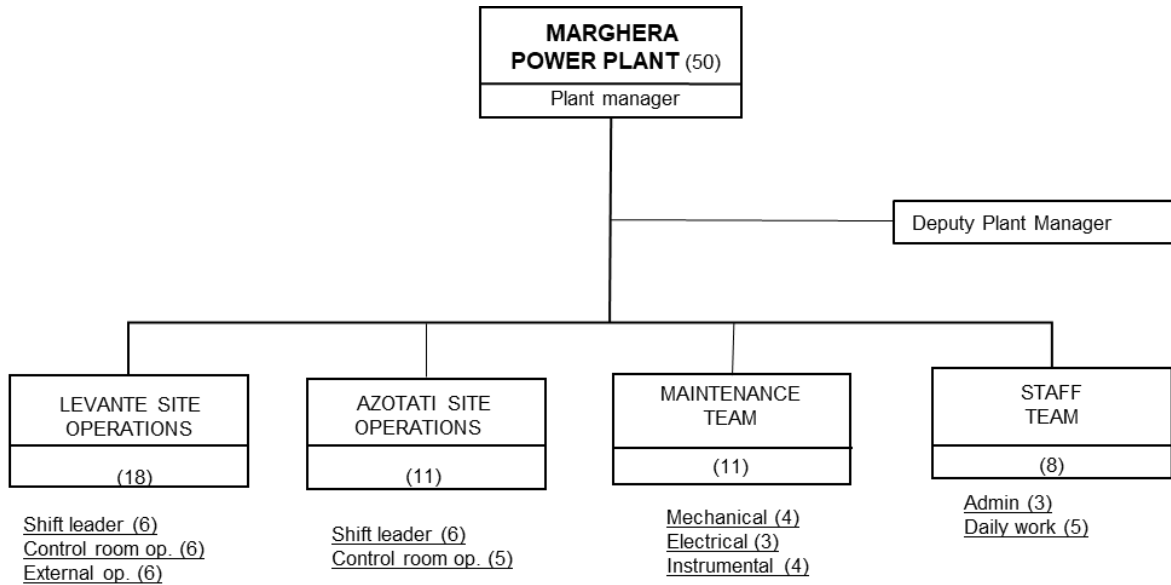


# Porto Marghera Petrochemical

- Area: 4.700.000 m<sup>2</sup>
- Road network: more than 100 km
- Railways line: about 27 km
- 11 companies located with approximately:
  - 3.000 direct employees
  - 1.750 subcontractors
- Main activities: basic chemicals, gases, energy

# Marghera Levante organization chart

BU Power Asset  
 Thermoelectric BU  
 Thermoelectric Mngmnt Dir.  
 Thermoelectric Mngmnt- Area 2



# Marghera Levante site timeline

Overcapacity, low energy demand, mothballing or decommissioning old CCGTs, REN developing

1965

1972

1992

2001

2006

**1965: operation of the first group:** boiler + steam turbine (the "traditional plant" configuration) to meet the demands of the thermal (200 t/h of steam @18bar/270°C) and electrical energy (160MW) of the Petrochemical plant, at that time entirely owned by only one company (Montedison). Plant is heavy oil only fuelled.

**1972:** the plant is doubled (2 boilers, each one with its steam turbine) to provide 320 MW of electricity and 400 t/h of process steam. Heavy oil.

**1992:** first repowering of the plant, with the **installation of the first Italian CCGT, composed by 2 gas turbines GE Frame 9E (128 MW each one) with their Heat Recovery Steam Generators (HRSG)**. The plant (576 MW) is connected with domestic main **natural gas** pipelines. Use of heavy oil is strongly reduced. Steam export capacity to external client is unchanged (400 t/h).

**2001:** the second repowering was completed: one **Siemens class F gas turbine, V94.3A2** (rated power 255 MW) with its HRSG (Alstom). Upgrade of the steam turbines was made to meet new steam characteristics. Other fuels than natural gas are abandoned. Overall power plant capacity is now 766 MW

**2006:** one of the 2 traditional boilers become "cold reserve", the other one was completely dismantled.

# Marghera Levante site timeline

CAPACITY MARKET start

2019

**2019: third Levante repowering was started**, with installation of the newest H series Ansaldo GT36 turbine, plus HRSG and AEN steam turbine. **Dismantling of steam turbine TV1**

**2021:** dismantling of the 1992s GTs and old boiler starts

**2022:** End of steam export to external clients. **The commissioning of the newest part of the plant was started.** The 2001 CCGT becomes "cold reserve"

2021

2022

**30/10/2023**

**Commercial Operations Date:** end of the commissioning and start of Commercial Operations of the so called "Production Unit Levante 5": 780 MW only for the Electric Market

**COMMISSIONING MANAGEMENT**

AEN responsibility  
Power Island only

Edison supervises AEN  
commissioning / start up  
activity

EDISON responsibility  
BOP / existing plants

Edison start up crew integrated  
to existing Marghera O&M crew

# EHS CERTIFICATIONS

Edison, Thermoelectric Business Unit is certified:

- EMAS
- ISO 50001
- ISO 14001
- ISO 45001

Edison S.p.A. organization is compliant to D.Lgs. 231/2001.



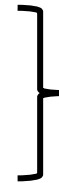
# Marghera Power Plant actual configuration

Today Marghera integrated power plant consists of 3 different combined cycle production units, installed in 2 different sites: **Azotati and Levante**

➤ **TGA gas turbine – 510 MW**

*AEN GT36 (heavy duty H class GT)*

➤ **TVB steam turbine– 261 MW**



**Production Unit «Levante 5»  
(2022)**

➤ **TG5 gas turbine – 255 MW**

*AEN V94.3° (heavy duty F class GT)*

➤ **TV2 steam turbine– 140 MW**



**Production Unit «Levante 3»  
(2001 – cold backup)**

➤ **TG3/4 gas turbine – 206 MW**

*GE LMS 100 (Aeroderivative GT)*

➤ **TVB steam turbine– 33 MW**



**Production Unit «Azotati 5»  
(2010)**



# MARGHERA Turbines and plants technical data

UP LEV5

- TGA: 510 MW gas turbine, Ansaldo GT36, H Class, combined with 50THR-12-65 generator (H2 cooled),
- Ansaldo Boilers HRSG: 474 t/h @173barg, 76 t/h @ 36barg, 47 t/h @4 barg,
- TVB: 261 MW condenser steam turbine, Ansaldo Energia RT30, combined with 50TRX-L56 generator (air cooled)

UP LEV3

- TG5: 255 MW gas turbine, Siemens V94.3 A
- Alstom HRSG: 265 t/h @120barg, 57 t/h @ 25barg, 45 t/h @ 3barg
- TV2: 140 MW condenser steam turbine, Tosi W21R

UP AZO5

- TG3/TG4: 103 MW gas turbine, General Electric LMS100
- CEI INSTEAM HRSG (102 bar, 30 bar, 20 bar)
- TVB/TVC: 25 + 8 MW condenser steam turbines

# Atmospheric Emissions: daily limits

LEVANTE						AZOTATI	
TG A [mg/Nm <sup>3</sup> ] O <sub>2</sub> al 15%		TG 5 [mg/Nm <sup>3</sup> ] O <sub>2</sub> al 15%		GVA [mg/Nm <sup>3</sup> ] O <sub>2</sub> al 3%		TG 3/4 [mg/Nm <sup>3</sup> ] O <sub>2</sub> al 15%	
NO <sub>x</sub> norm.	CO norm.	NO <sub>x</sub> norm.	CO norm.	NO <sub>x</sub> norm.	CO norm.	NO <sub>x</sub> norm.	CO norm.
<b>30</b>	<b>30</b>	<b>40</b>	<b>35</b>	<b>80</b>	<b>50</b>	<b>50</b>	<b>30</b>
<b>10</b>	from 27/12/24						

File: Limiti emissivi impianti

## Marghera plants efficiency (no cogeneration)

<b>UP Levante 5</b>	<b>771 MW</b>	<b>62,3%</b>
<b>UP Levante 3 (cold bkup)</b>	<b>379 MW</b>	<b>53,9%</b>
<b>UP Azotati 5 (Closed Cycle)</b>	<b>239 MW</b>	<b>44,5%</b>
<b>UP Azotati 5 (Open Cycle)</b>	<b>206 MW</b>	<b>40,5%</b>

# Plant FLEXIBILITY: H against F class GT

Parameters	UP Levante 5 (H class GT)	UP Levante 3 (F class GT)
P min÷max (Combined Cycle)	<b>260÷771 MW (33÷100%)</b>	170÷350 MW (48÷100%)
GT load ramps (up/down)	<b>100 MW/min</b>	30 MW/min
Ramp time: P min->max	<b>5 min 6 s (511 MW)</b>	6 min (180 MW)
<b>Start time in CC</b> (from barring to Pmin)		
Hot start	<b>0,6 h</b>	2,0 h
Cold start	<b>2,0 h</b>	7,5 h

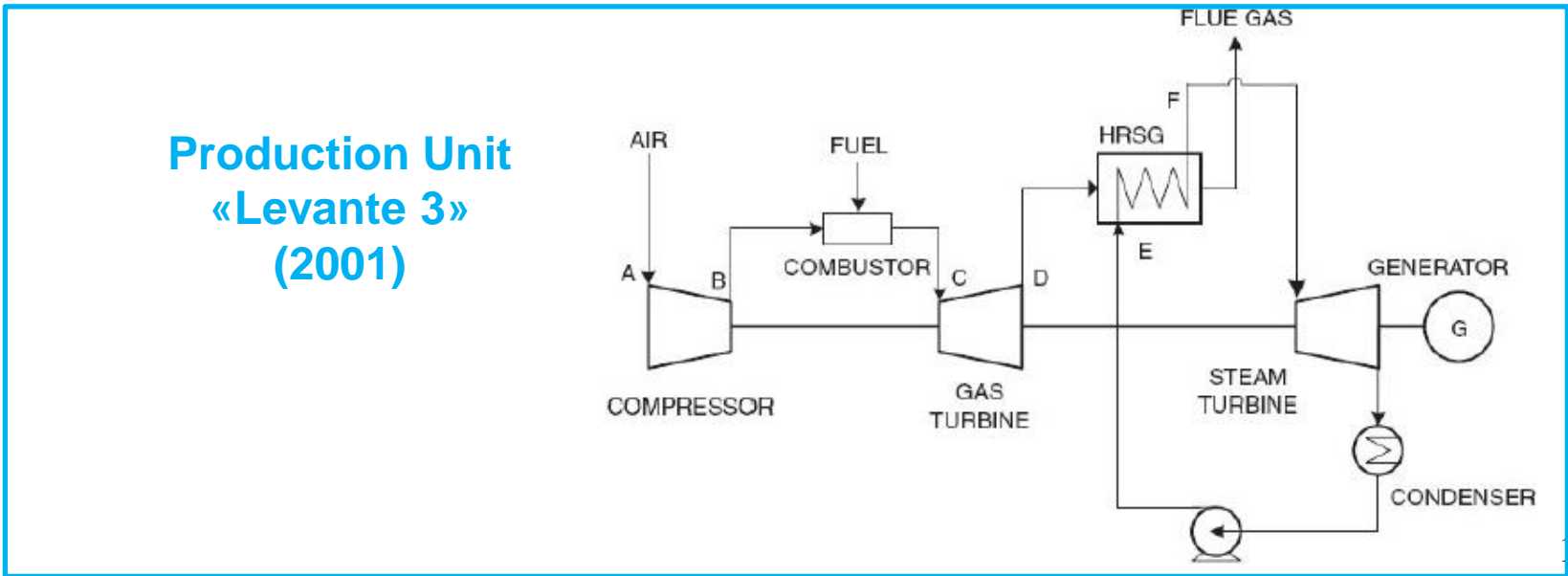
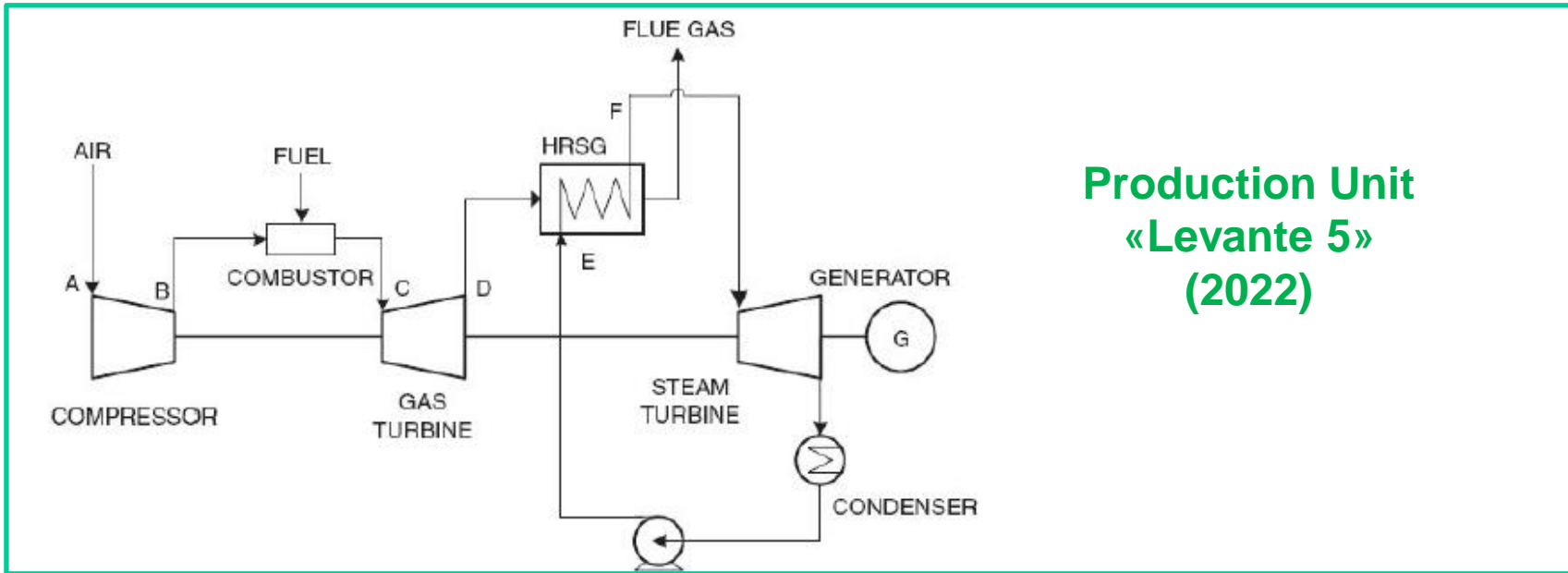


# Turbines and plants technical data (Levante site)

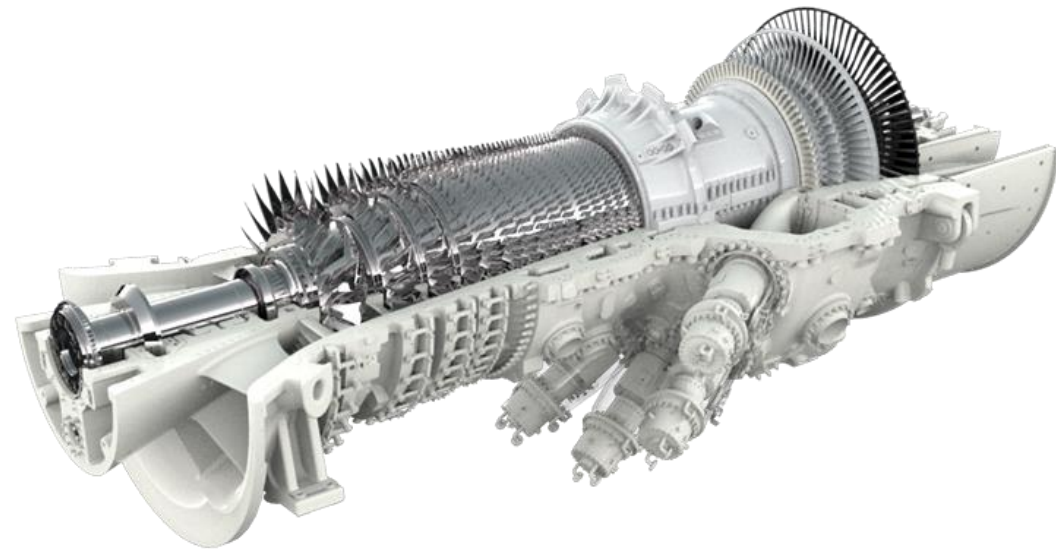
## Levante shared utilities:

- **Interconnection with natural gas main domestic pipeline (Snam RG).**  
Also shared with Azotati site,
- Electrical substation (220 kV interconnection with Terna),
- 2 x 22.000 m<sup>3</sup>/h + 3 x 900 m<sup>3</sup>/h sea water cooling pumps,
- Sea water biofouling treatment system (ClO<sub>2</sub>),
- Compressed air production and treatment system,
- Auxiliary steam generator (GVA) for plant utilities: 12,1 MWt, 15 t/h max @18 bar, 260°C (Bono Energia),
- **Demineralised water plant with a potential output of 800 m<sup>3</sup>/h.** Also shared with Azotati site.

# Today Levante plant (simplified layout)



# Ansaldo Energy H CLASS GT36 GAS TURBINE (AKA «Montebianco»)



Ansaldo GT is **Hydrogen ready**: it can use H<sub>2</sub> (up to 50% in volume) mixed up with natural gas. This mode can improve power plant environmental performances.

Weight: 570 t, length: 13 m

Turbine Inlet Temperature: 1420°C

Temperature After Turbine: 650 °C

Natural gas consumption: 125.000 Sm<sup>3</sup>/h @ 40bar  
@515MW

Air intake:

- Air inlet→ 4.000.000 Nm<sup>3</sup>/h @515MW
- Filtration stages: 3;
- Filters installed: 864 (clean room filtration); :



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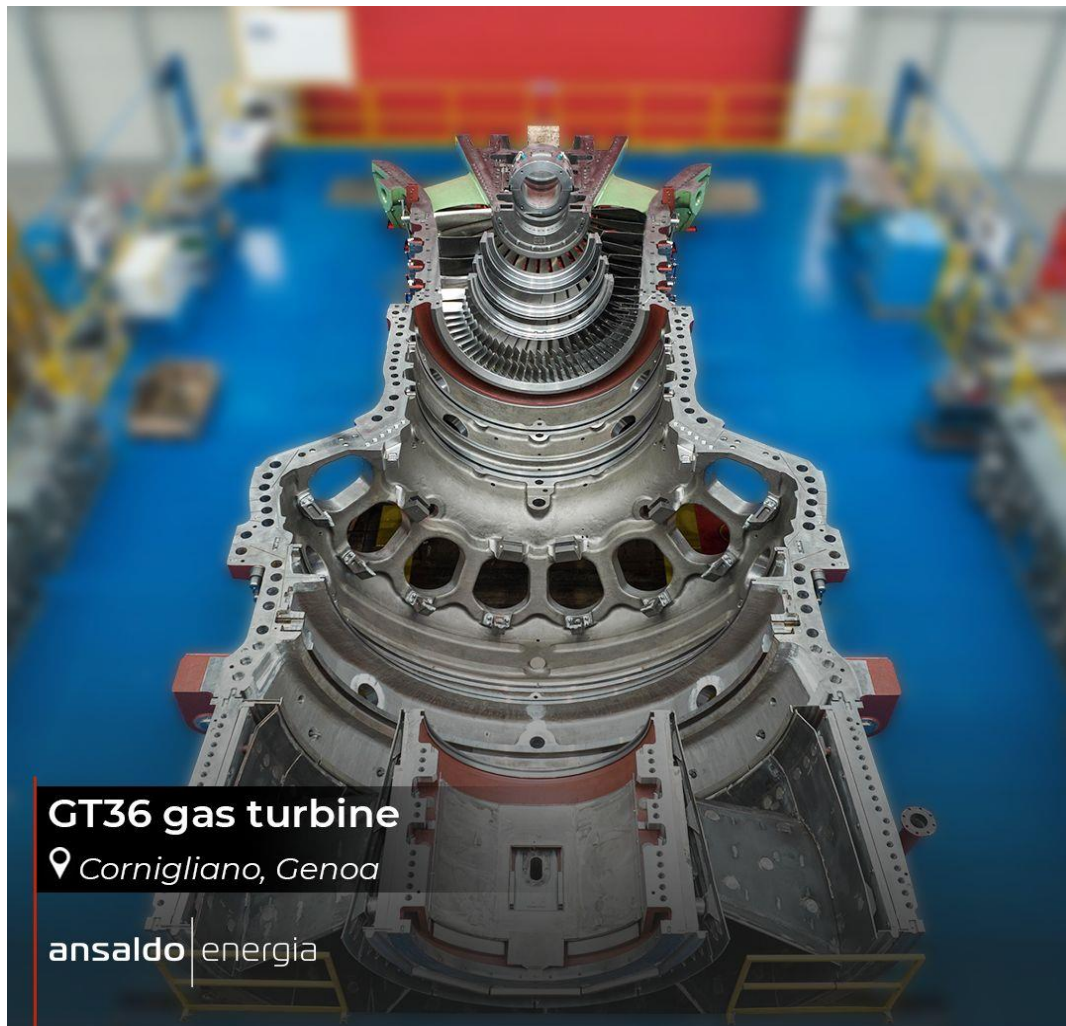
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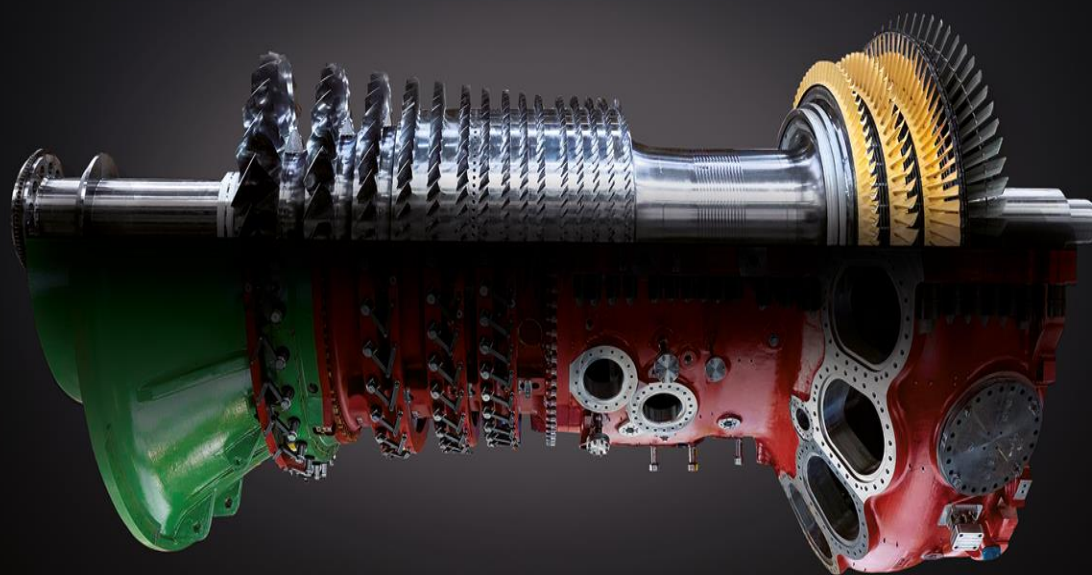
Natural gas consumption: 125.000 Sm<sup>3</sup>/h @ 40bar @515MW

- Air intake:
  - Air inlet→ 4.000.000 Nm<sup>3</sup>/h @515MW
  - Filtration stages: 3;
  - Filters installed: 864 (clean room filtration); :

# Ansaldo Energy H CLASS GT36 GAS TURBINE (AKA «Montebianco»)



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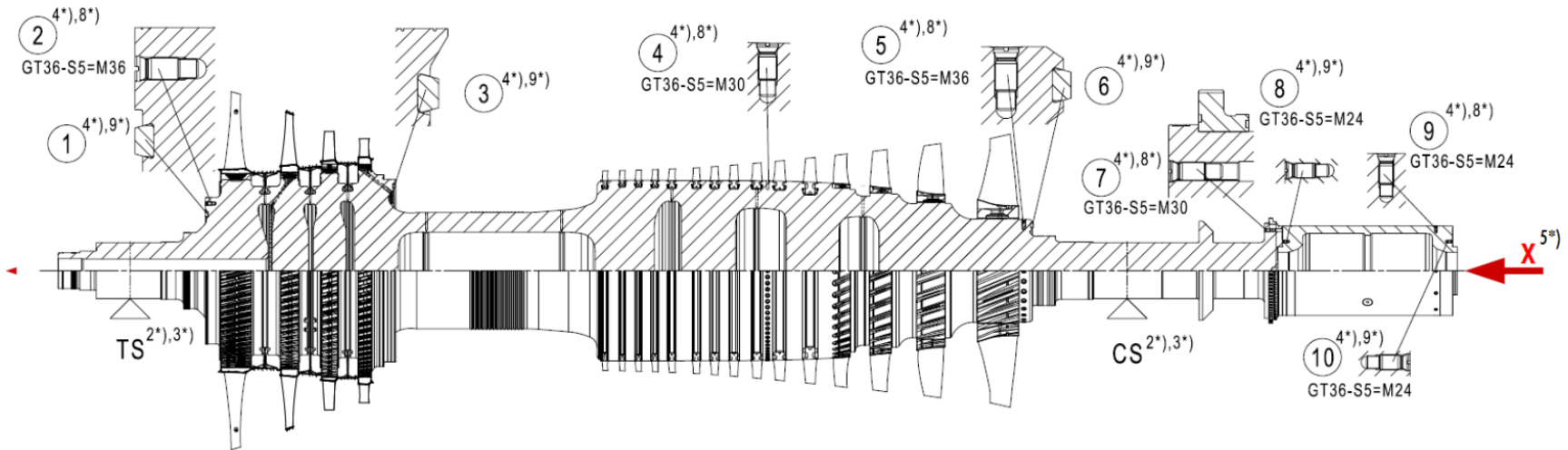


# Ansaldo Energy H CLASS GT36 GAS TURBINE Rotor handling (example)



# Ansaldo Energy H CLASS GT36 GAS TURBINE

## Rotor details – balancing planes



# Ansaldo Energy H CLASS GT36 GAS TURBINE

## Main characteristics

### HEAVY DUTY GT

- Single shaft
- Cold end drive design
- Can combustor

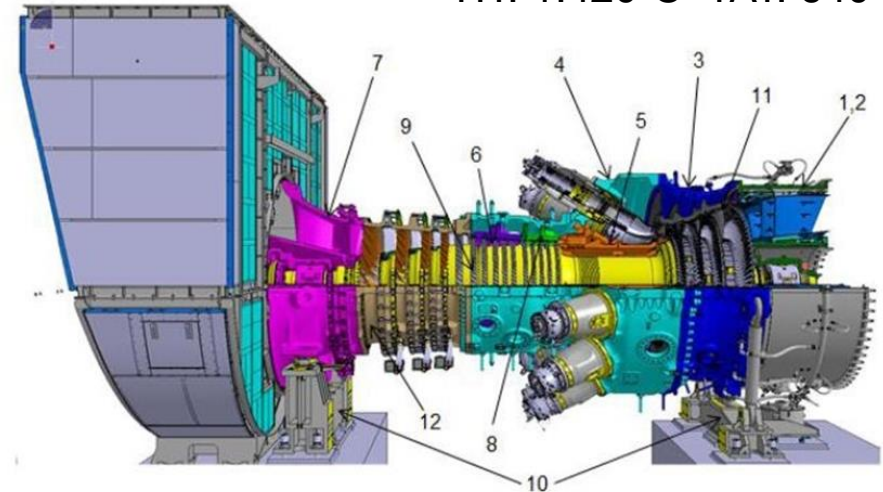
### DEVELOPED ON

- Several generation of proven technology
- Mainly Alstom GT26 more than 2,000,000 fired hours

### MAINTENANCE-ORIENTED DESIGN

- Quick release piping arrangement
- Accessibility to S1N, S1B, S1S and S4B without rotor removal

TIT: 1.420°C TAT: 640°C



- |                             |                             |
|-----------------------------|-----------------------------|
| 1 Exhaust gas diffuser      | 2 Exhaust gas housing       |
| 3 Turbine housing 2         | 4 Turbine housing 1         |
| 5 Rotor cover               | 6 Compressor vane carrier 1 |
| 7 Compressor intake housing | 8 Compressor vane carrier 2 |
| 9 Rotor                     | 10 Base frame               |
| 11 Turbine vane carrier     | 12 Compressor housing       |



# Ansaldo Energy H CLASS GT36 GAS TURBINE (AKA «Montebianco»)





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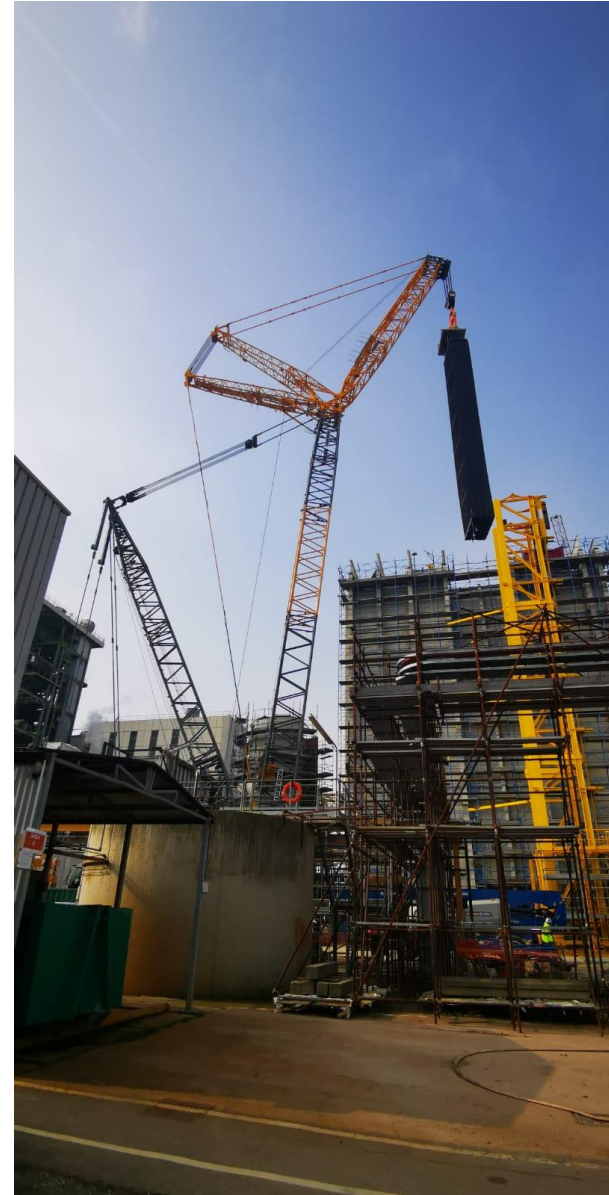




# Ansaldo Energy H CLASS GT36 GAS TURBINE (AKA «Montebianco»)



# New Ansaldo HRSG Assembling GVRA



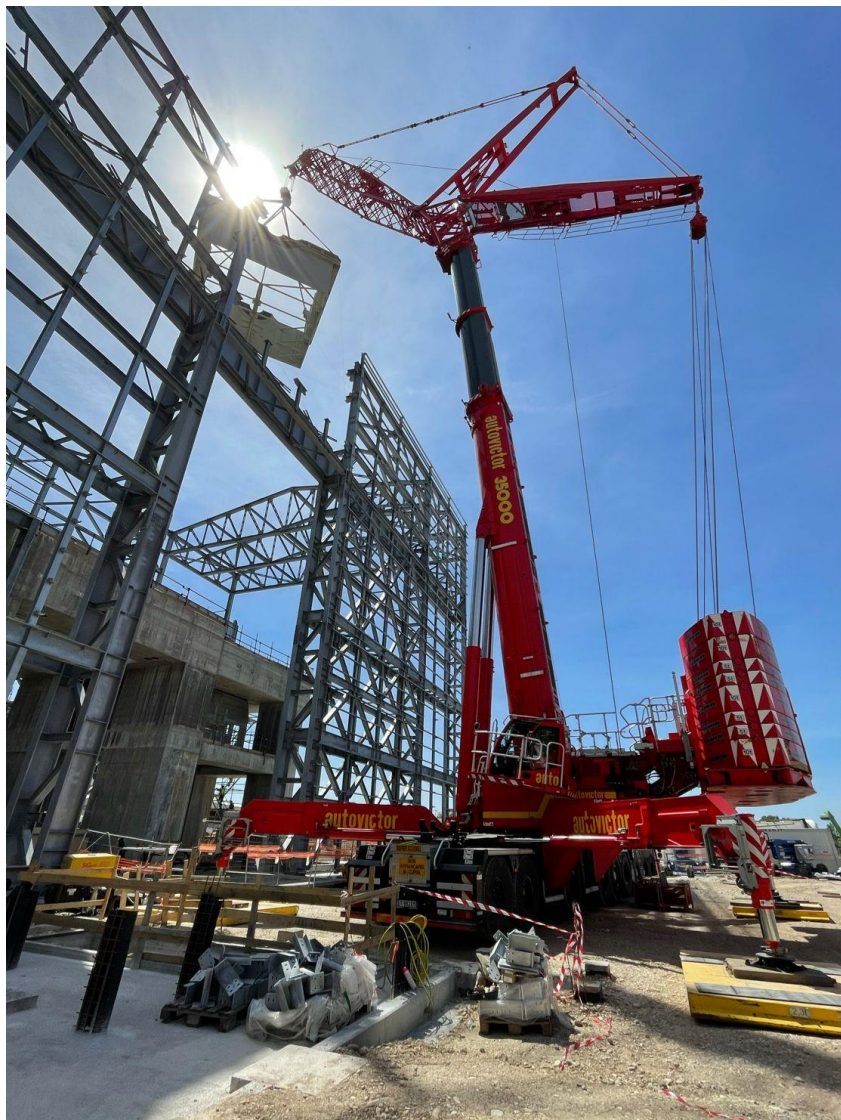


# New Ansaldo HRSG Assembling GVRA



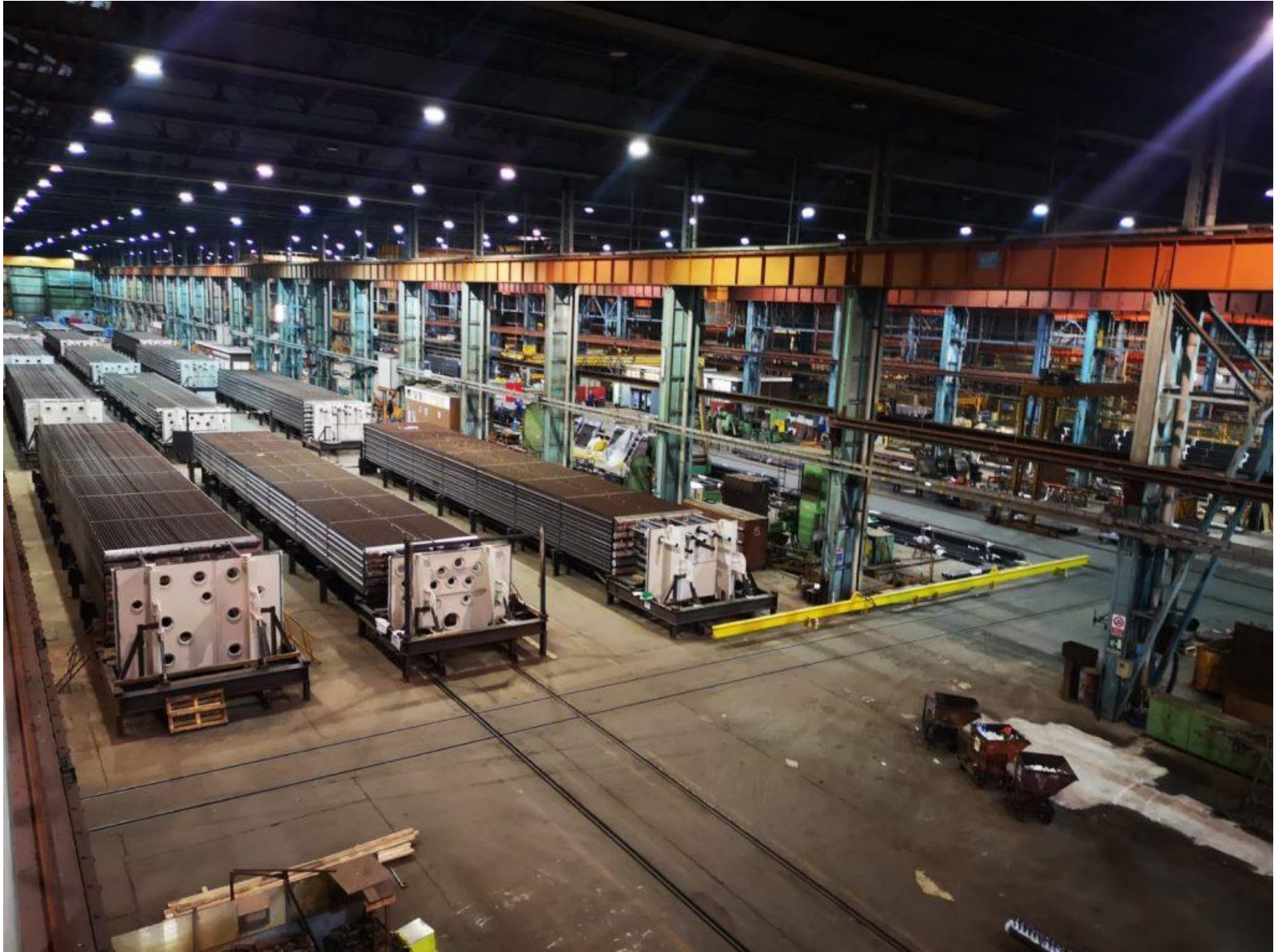


# New Ansaldo HRSG Assembling GVRA





# Inside Ansaldo HRSG





# Thanks!

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