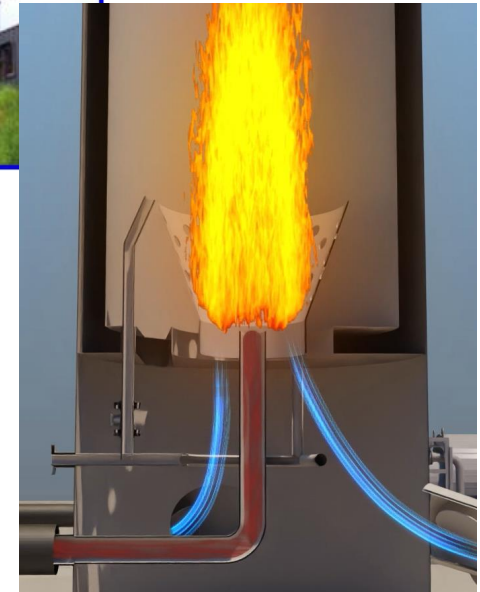


**Smart TO with CSB Technology as
replacement of Flare Systems
to cut your CO₂ emissions by 75%**

Flare Systems

- Most Flare Applications are built for three main scenarios:
 - The **purge scenario**, which is the most prominent case
 - The **design case**, which mostly occurs only periodically, but regularly
 - One or several **emergency Cases**
- **Enclosed Flares** are used to
 - conceal the flame from direct view
 - Achieve better destruction efficiency
 - Reduce noise emissions
 - Reduce radiative emissions



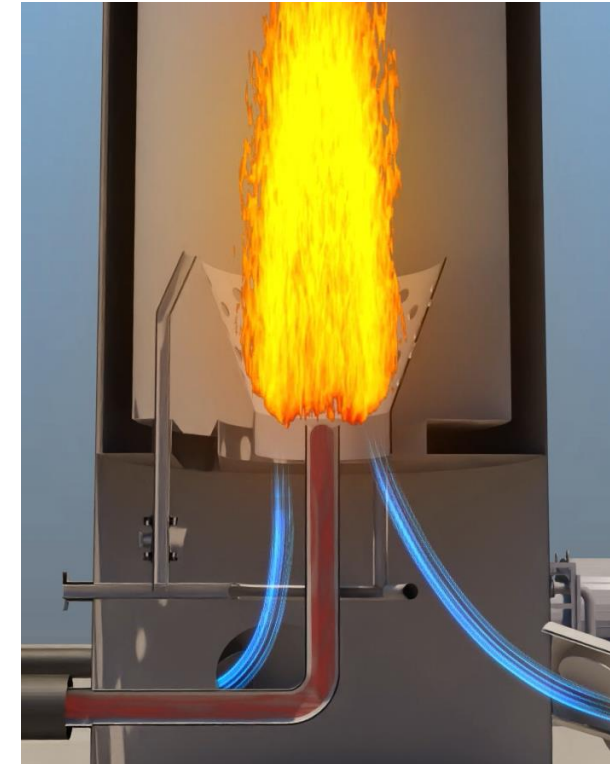
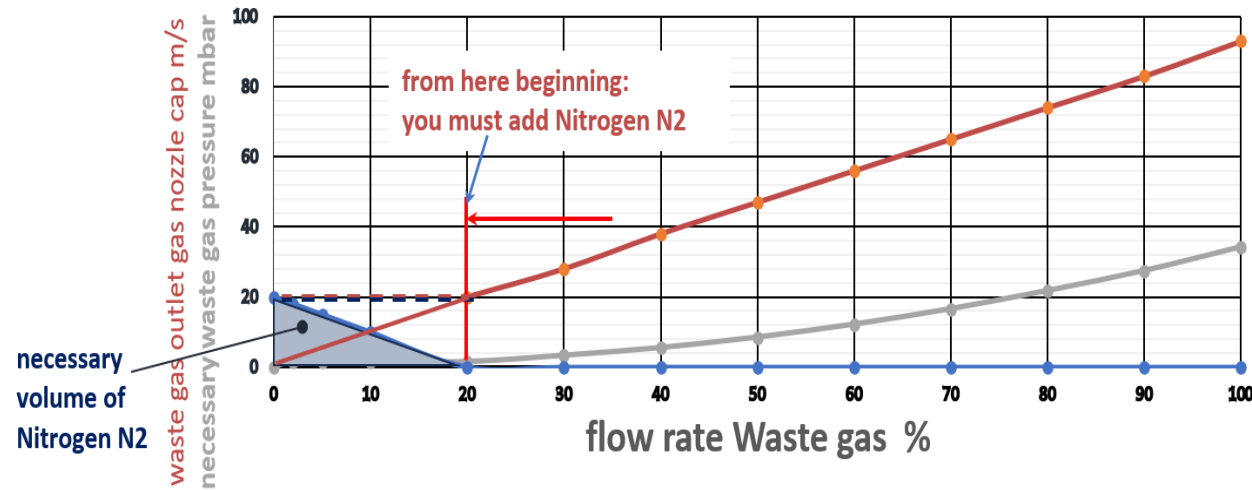
Flare Systems

- Traditional Flare Systems are widely used in the petrochemical Industry to oxidize vapours and gaseous waste streams from multiple sources
- Most commonly used are **open flares**
- Flare operation is characterized by
 - Very high turndown ratio (maximum emergency flow down to purge flow rate)
 - Strongly fluctuating compositions of waste gases/ vapours



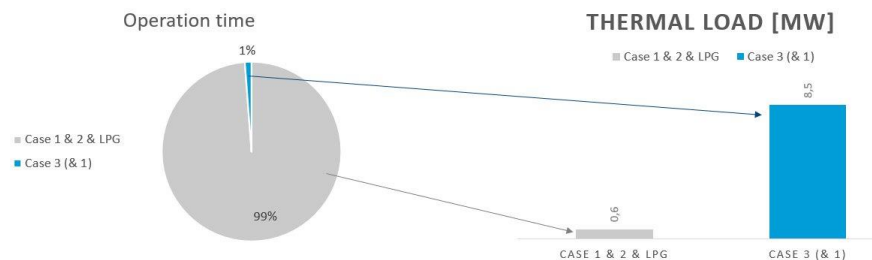
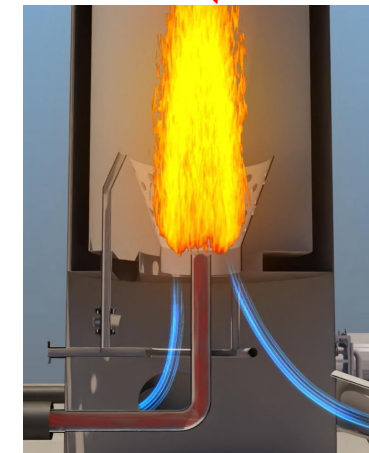
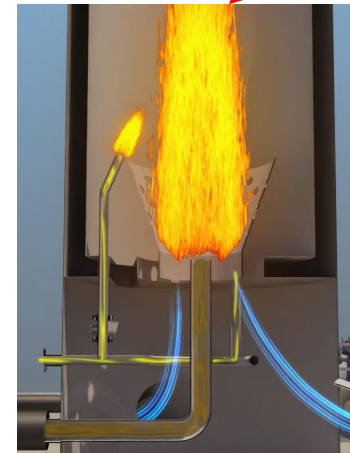
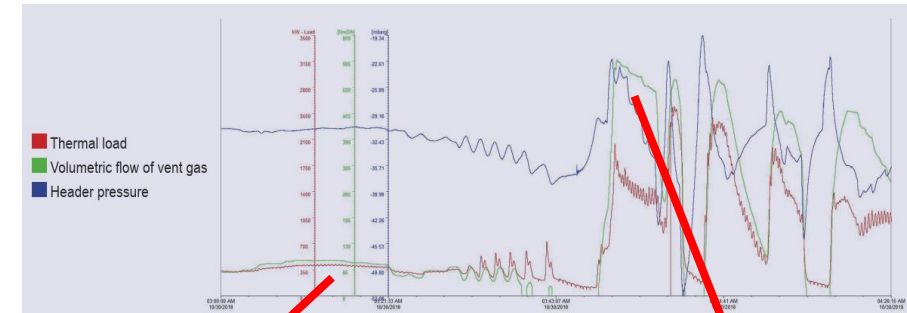
Flare Systems – working principle

- A Flare System is built to safely treat the design case
- At low flowrate, additional medium (mostly inert gases like Nitrogen) is introduced to reach specified velocities needed to achieve sufficient mixing and burnout quality and to prevent flashback



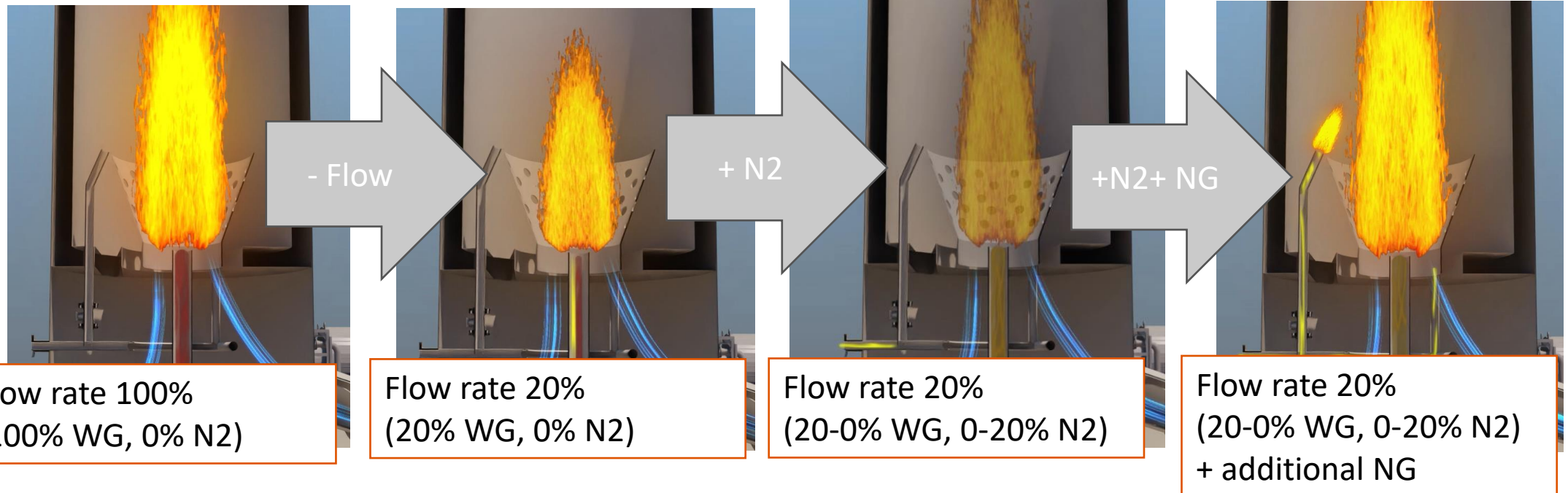
Flare Systems - disadvantages

- While flaring is a suitable option for the design or emergency case, it is very inefficient in low flow scenarios
- In many plants the low flow scenario is present for 90-95% of operation time
- The necessary purge gas (Nitrogen) causes additional costs in the low flow scenario
- Additionally, as Nitrogen needs to be heated to operating temperature, additional auxiliary Fuel (NG) is needed



Flare Systems - disadvantages

- Design flowrate
- Design composition
- Reduced Flow
- Poor mixing
- Danger of flashback
- Reduced Flow supplemented with Nitrogen
- Cooler environment
- Poor burnout
- Addition of auxiliary fuel (mostly NG)
- Complete combustion



Flare Systems vs. Smart TO

- DUMAG has developed a system which addresses the disadvantages of the traditional Flare system
- This proprietary process solution is called „Smart TO“
- Taylormade for the individual application
- Engineering package (licensing package) or delivery of turn key system
- Biggest advantages are
 - **Controlled destruction rate even at lowest flow rates**
 - **Minimized purge gas**
 - **Minimized auxiliary fuel**



The heart of Smart TO: Burner CSB

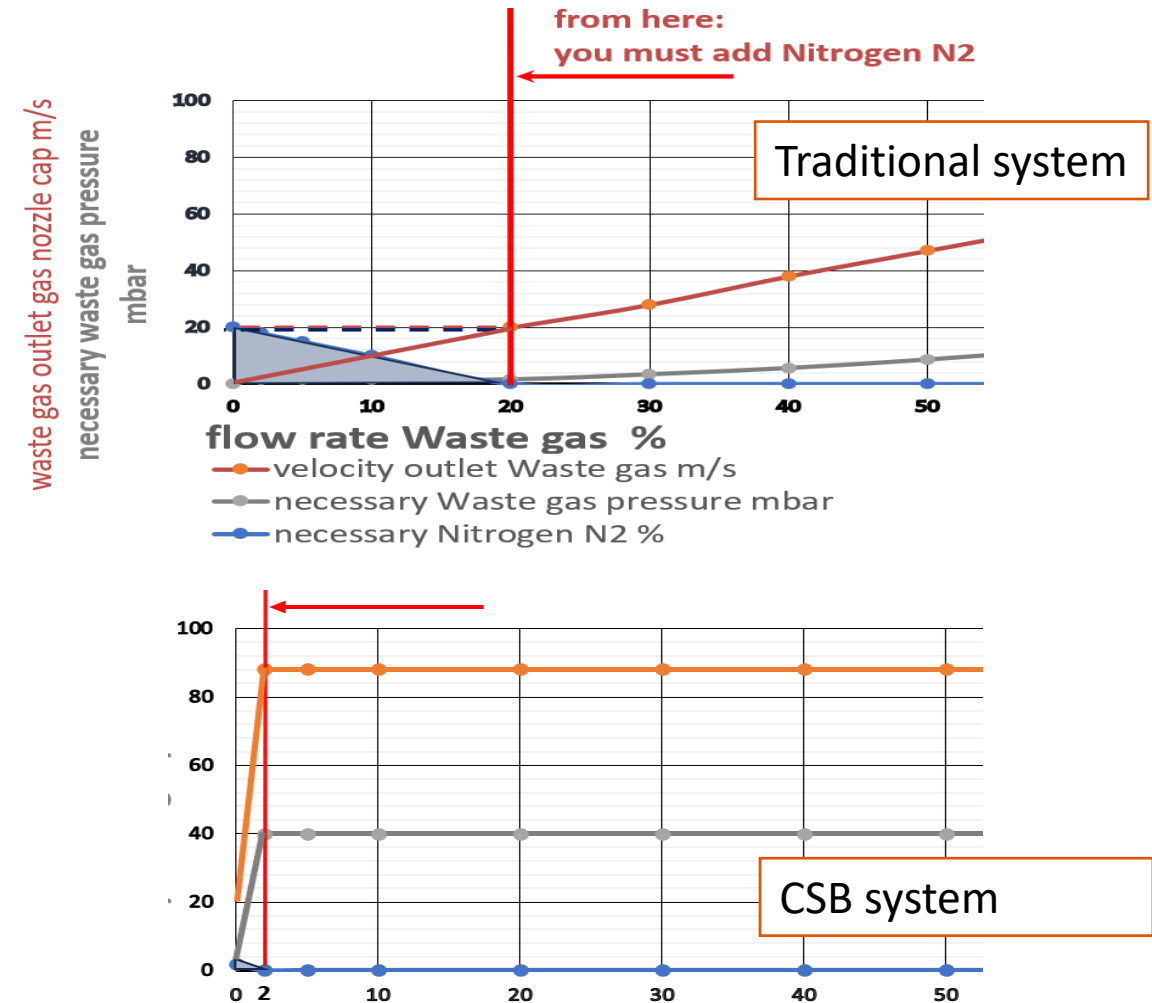


Key features

- highest turn down ratio without compromising safety (up to 1:50)
- works with as little gas pressure as 10mbarg
- Fully automated control and safety monitoring

Result

- even at 2 % of the waste gas flow rate, good mixing is guaranteed and
- flashback is prohibited
- Purge gas amount is minimized (basically only necessary in no flow scenario)
- Significant reduction of fuel gas @ low VOC flow
- Lower fuel demand @ no flow condition

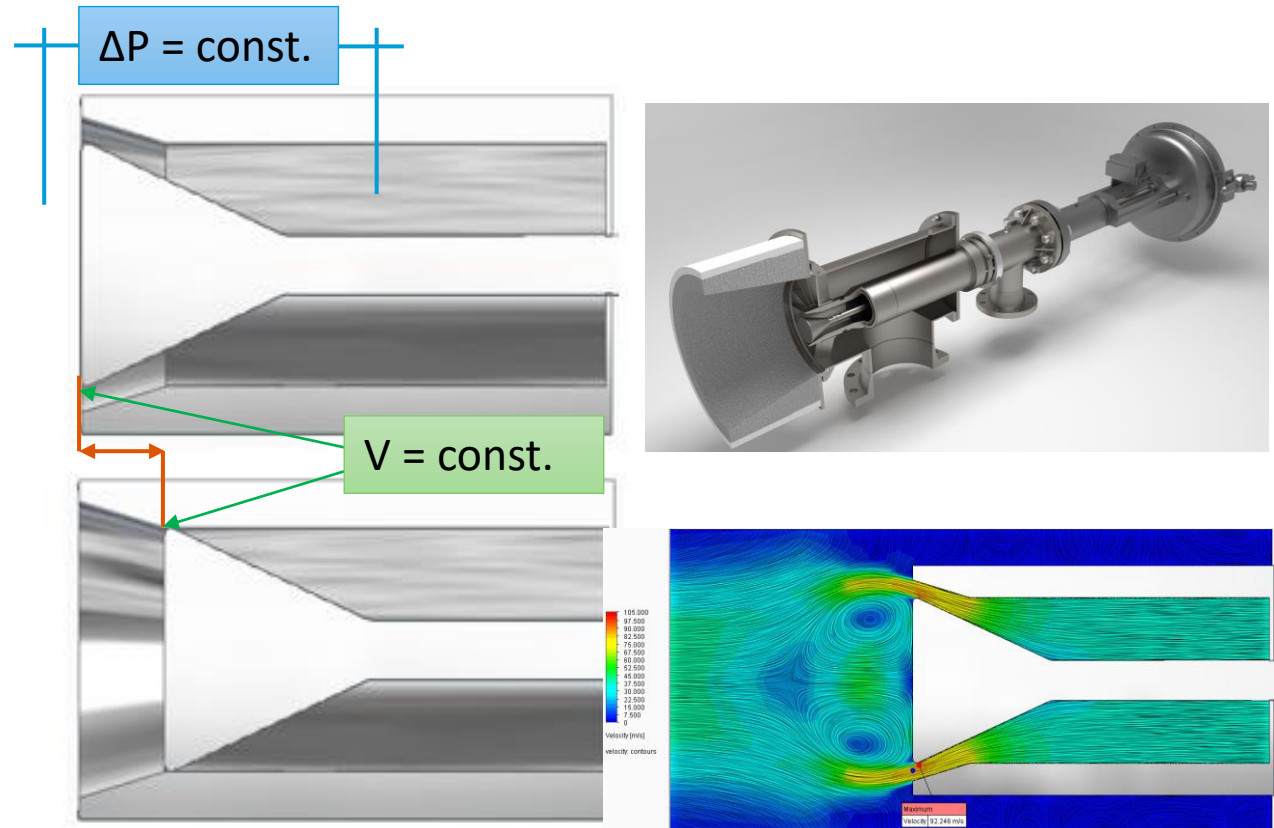


Burner CSB

Working Principle

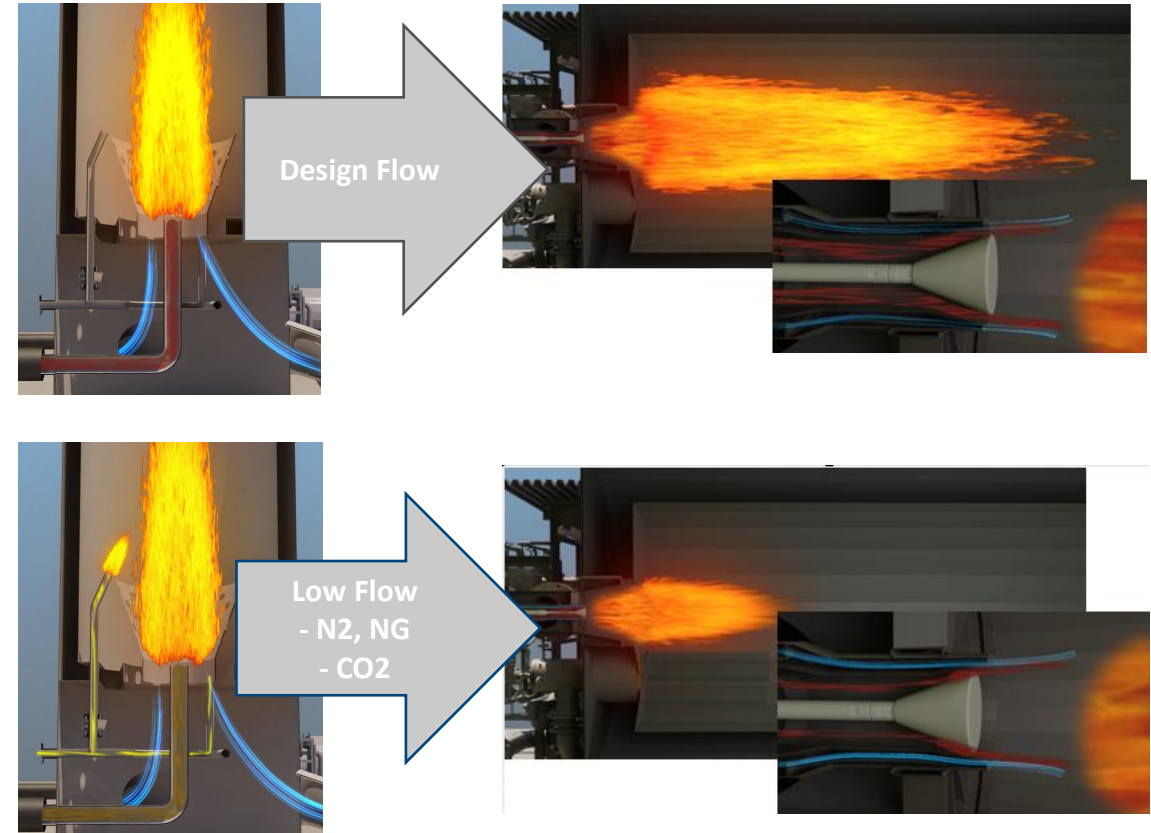
- constant pressure control
- The inner cone is moved → different annular areas between the inner and outer cones
- constant outlet velocity of the waste gas over whole control range (up to 1:50)

Those properties allow CSB burners to fulfill the safety requirements of TRGS 724 as it doesn't allow for backfiring.



Advantages of the Smart TO / CSB

- Taylormade Solution with integration of best available technologies
- Optimal control, operation @3-6% O₂ possible
- Minimized losses
- Optimized mixing
- >99,99% DRE in ALL cases
- minimized NG consumption in idle and standby operation
- Useage of Energy with extensions
- reductions of up to 90% of Nitrogen, 75% of NG are possible and 75% of CO₂.

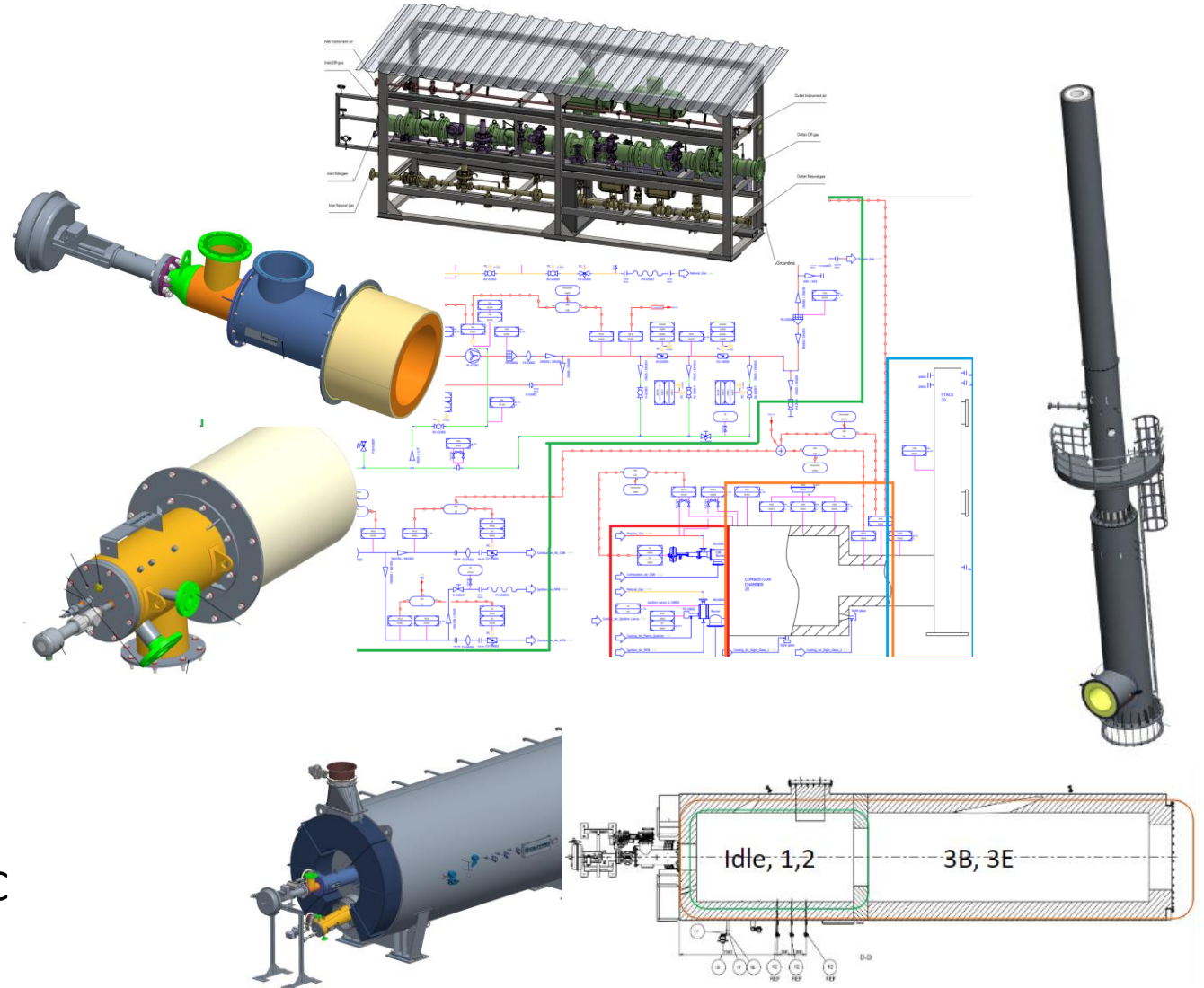


Delivery – key proprietary components

- Please find this complete list attached.
- Scope of DUMAG and local EPC

Smart TO: Standard Hardware

- **Valve and Instrumentation Skid**
 - Premounted
 - Cabled
 - tested
- **Burner Package:**
 - CSB + MFB Burner
 - MFB is a very robust Multifuel Burner with high turn down ratio (1:20)
- **Combustion Chamber**
 - Fibre Lining for highest availability
 - Temperature and Oxygen Control for optimized Operation
 - Individual design for maximum efficiency
- **Stack**
 - Double walled
 - Fibre lined
 - Operation temperatures up to 1100°C



Smart TO: Complete Package 1/2

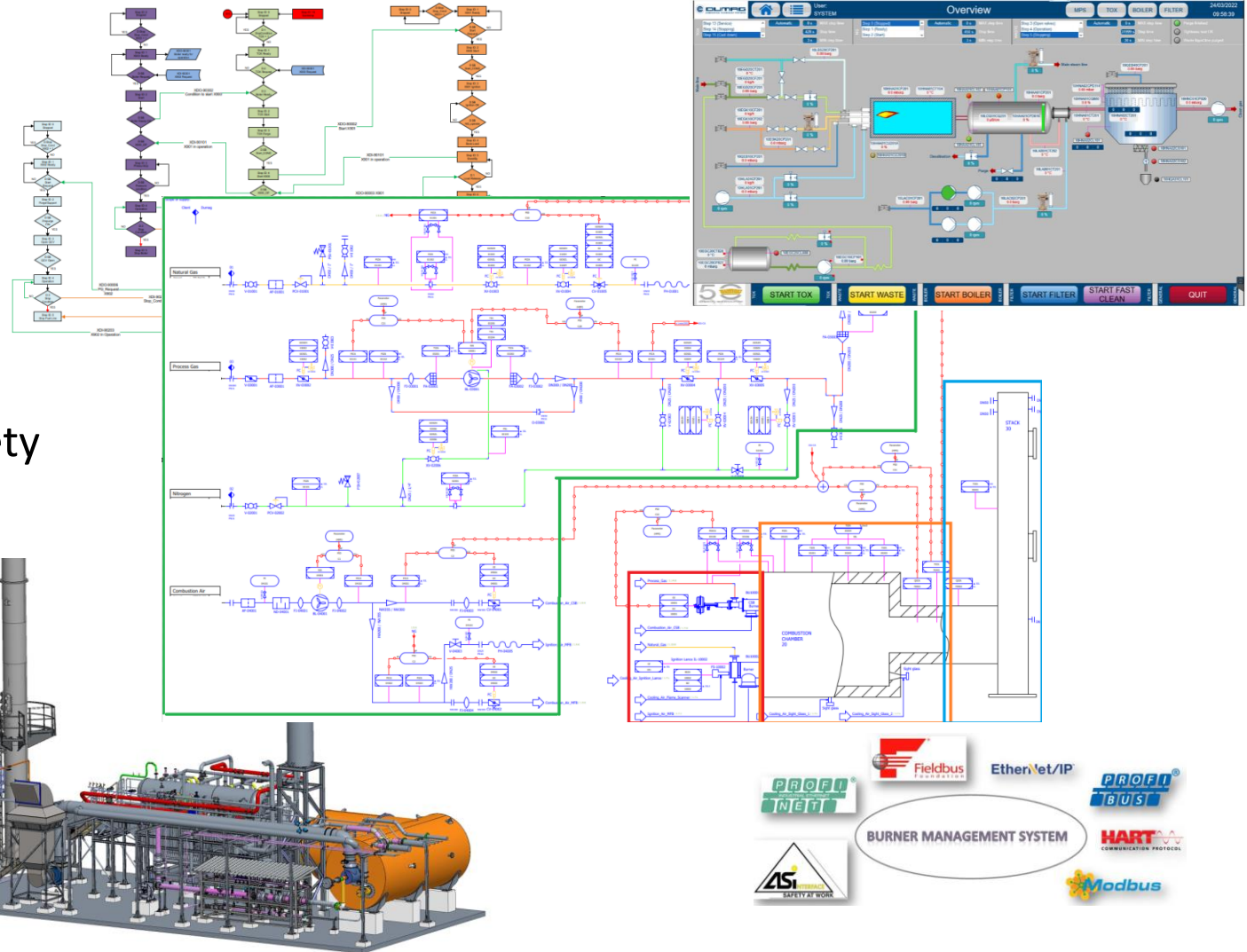


Hardware

- Key Components
- Turn Key System
- Extensions like Boiler, Flue Gas Treatment

Software

- BMS Burner Management System (Safety and Control)
- HMI
- Visualization
- Certified Function Blocks
- Integrations into Plant Control Management



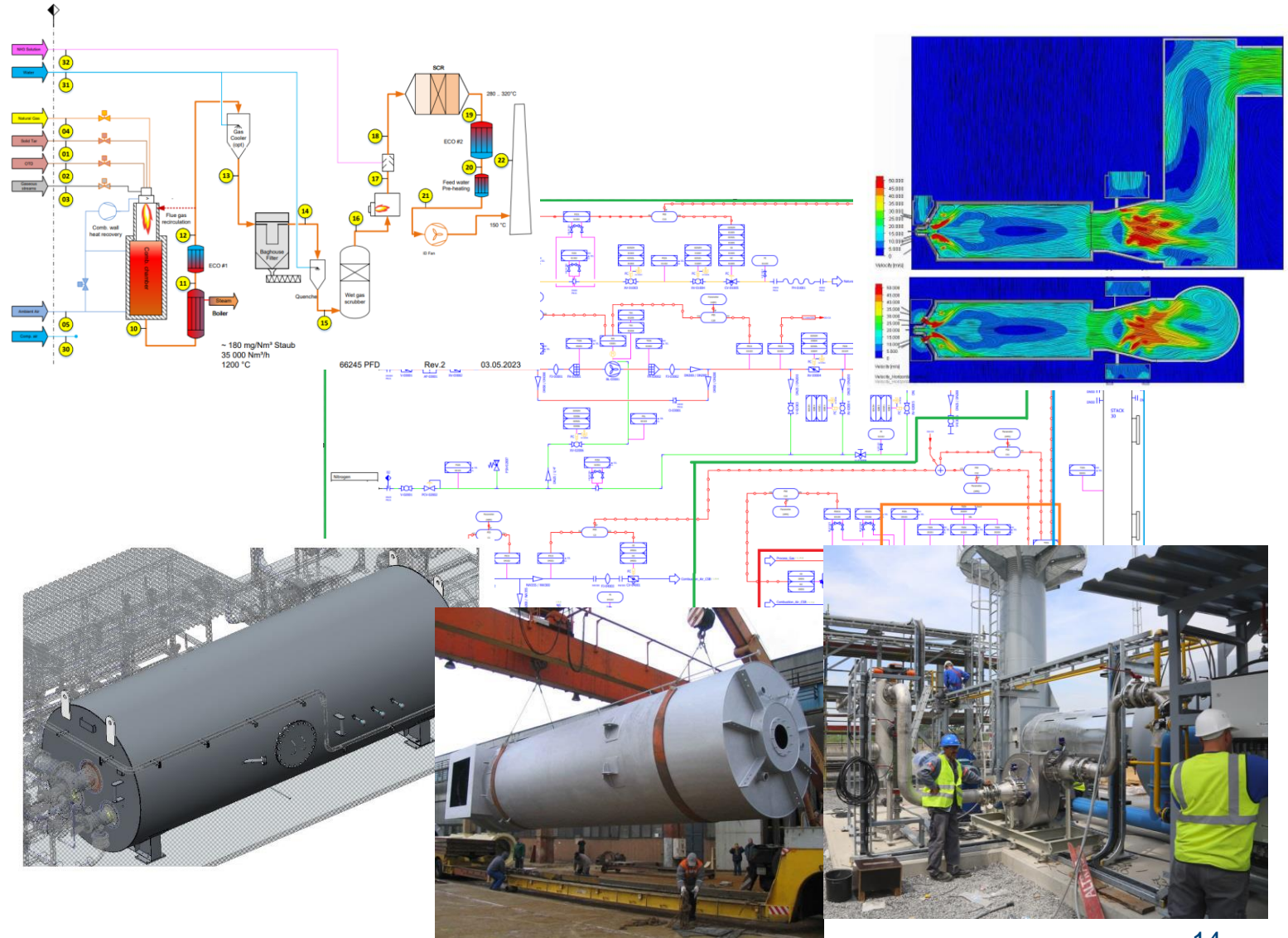
Smart TO: Complete Package 2/2

Engineering

- Process Development
- Project Engineering
- Design
- Electrical Engineering

Services

- Commissioning
- Spare Part Management
- Maintenance



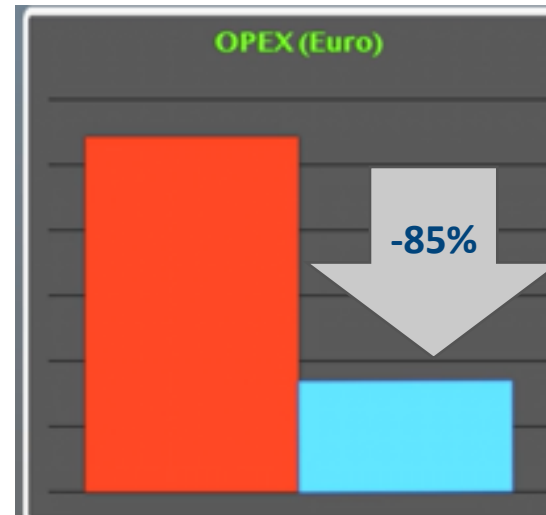
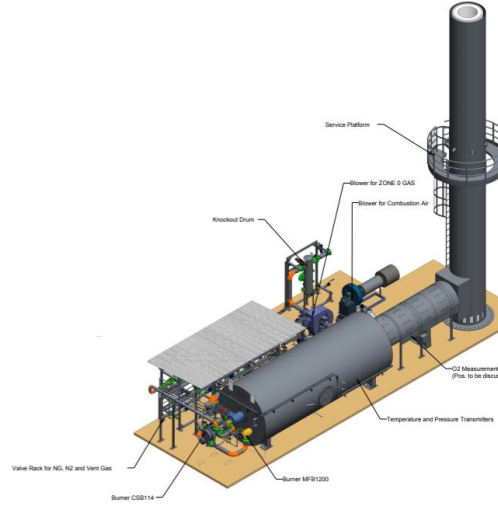
Reference - calculation

- Please find this calculation attached.

Smart TO: Summary

- The Smart TO is DUMAG's energy efficient and smart solution for your waste gas disposal
- Proprietary technology with optimal integration of hardware and control
- DUMAG develops, produces and licenses tailor-made Systems
- With CSB technology, reductions of up to 90% of Nitrogen, 75% of NG are possible and 75% of CO₂.
- **In realized systems, OPEX savings of up to 85% were achieved**

To evaluate your application and any other questions, please contact DUMAG.



-90% N₂
-75% NG



TO SUMMARIZE

-90%

Nitrogen

-75%

Natural gas

-85%

OPEX

-75 %

Co2 Emissions

Get in Contact with us now!

www.dumag.com

[CSB - Thermal Oxidizer with Constant Speed Burner Technology \(youtube.com\)](#)

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