



Conference SPIL 2020



**Compact Urea Hydrolyser
An Integrated Equipment for Efficient
Flue Gas Cleaning in Small Incineration Plants**



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**Process engineering and
Research**



What do we do?

Designing of systems for energy utilization of waste covering:

- **Combustion of various materials:**
Municipal solid waste, industrial liquid and gaseous waste...
- **Heat exchange and utilization**
Waste heat recuperation for steam generation, thermal oil heating...
- **Flue gas cleaning**
DeNO_x, DeSO_x, DeDiox, DeDust

What do we offer?



Case study, strategic assessment

Feasibility study

Waste management consultancy

Operational tests and documentation

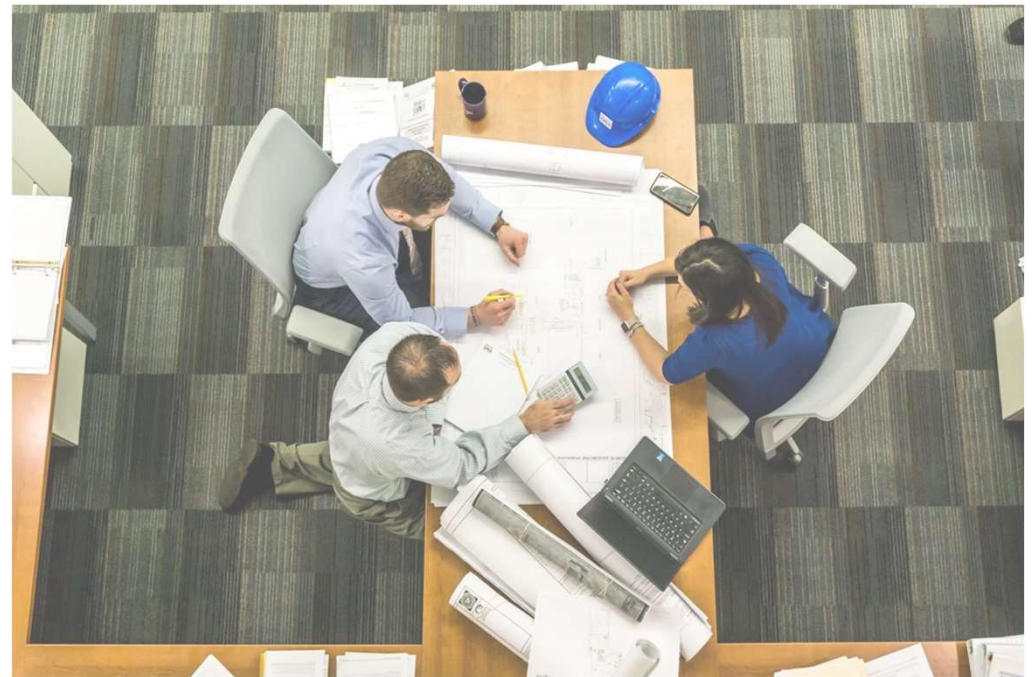
Project management

Algorithms and software engineering

Material and energy balance calculations

Commissioning and operator training

Service of an equipment



Why do we do that?

Fossil fuel depletion and climate change

Continuous **emission limits tightening**

Increasing of **waste disposal** price

Increasing of **energy and power** price

Water cost increase

Many **inefficient** and **outdated** plants



Latest products:

EVECONT



- Built in 2019-2020
- Waste utilization at the place of the origin – 300 kg/h
- Processing of non-recyclable plastic waste
- Highly automated operation
- Environmentally friendly energy source
- Modular character of the plant enables quick and cheap tailor-made solution



Latest products:

EVEMED

- Modernization of incineration plant processing hazardous waste from nearby hospital
- Turnkey contract
- Nominal capacity is 350 kg/h
- Fully automated operation
- Environmentally friendly waste abatement in comparison with landfilling
- Economically viable solution



And many other:



 EVECONT – plastic non-recyclable waste

 EVELINE – biomass and municipal solid waste

 EVEMED – hospital and hazardous waste

 EVELABEL – clever maintenance system

 Flue gas cleaning– DeNO_x, DeSO_x, Dediox, DeDust, VOC, heavy metals...

Current research:

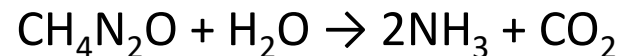
Compact Urea Hydrolyser

EVESTER – Sterilization of hospital equipment with the flue gas heat

EVESLUDGE – Recovery of phosphorus from wastewater sludge

Compact Urea Hydrolyser

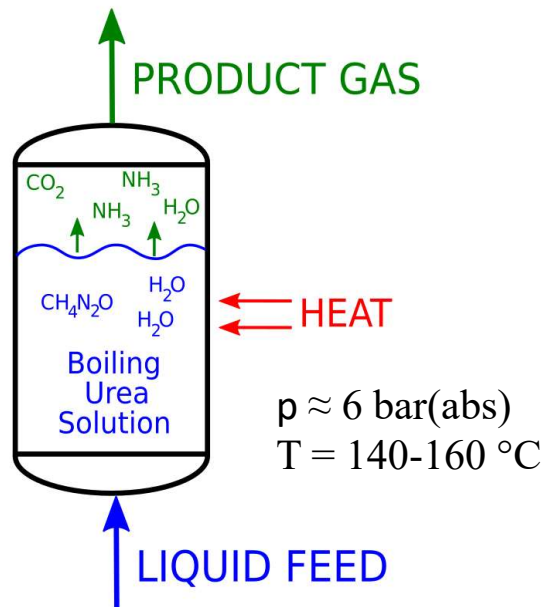
- All incineration plants produce flue gas, which mostly contains concentration of NOx above emission limit → DeNOx technology is employed.
- DeNOx technology:
 - SCR or SNCR.
 - Commonly used reagent is Urea or Ammonia.
 - Urea is easy and safe to handle, while Ammonia is very effective for NOx removal.
- Gaseous Ammonia can be generated from Urea solution by hydrolysis reaction:



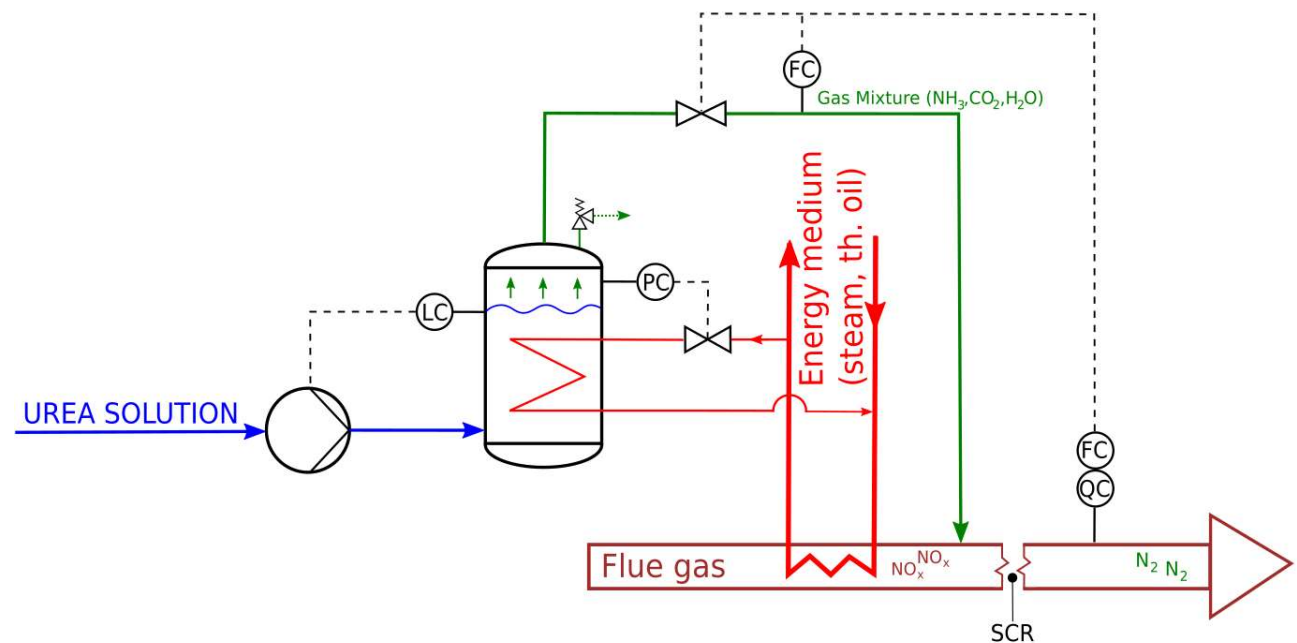
- This way the Ammonia can be generated in the plant immediately before its injection to the flue gas. This way we achieve very high DeNOx removal efficiency, and simultaneously we avoid handling and storage of Ammonia as a dangerous substance.

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Reactor

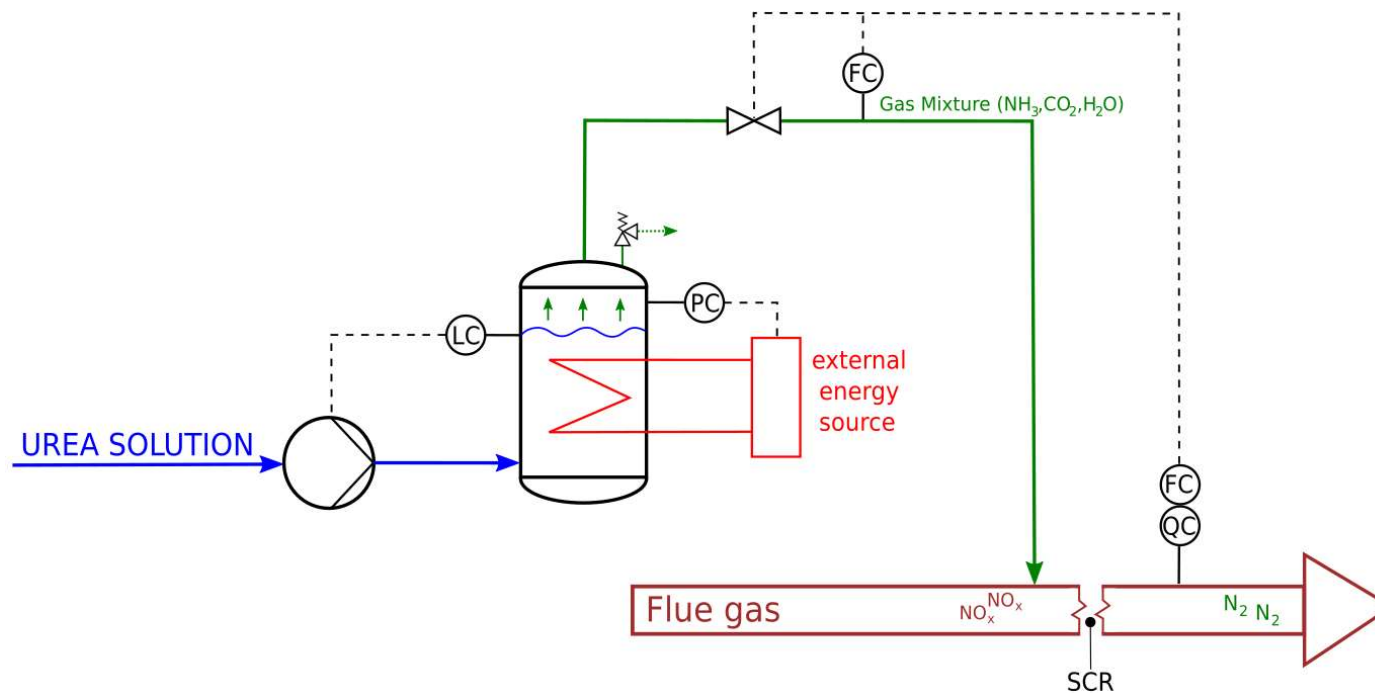


Urea Hydrolyser integrated to the plant



Compact Urea Hydrolyser

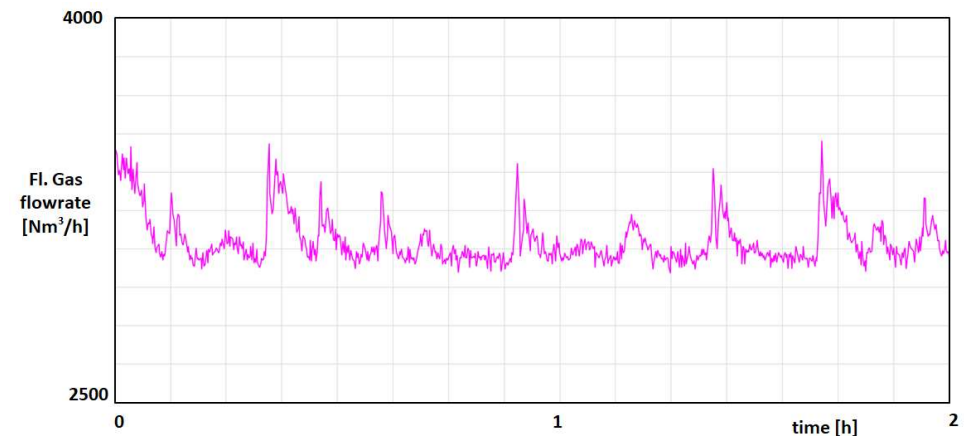
Urea Hydrolyser using external source of energy



Compact Urea Hydrolyser

Requirements on the unit:

- High removal efficiency of NO_x
- Fully automated operation
- Long service life of the equipment
- Low operation and maintenance costs
- Economically reasonable purchase cost
- Quickly adjustable amount of generated ammonia → Low Ammonia slip



Compact Urea Hydrolyser

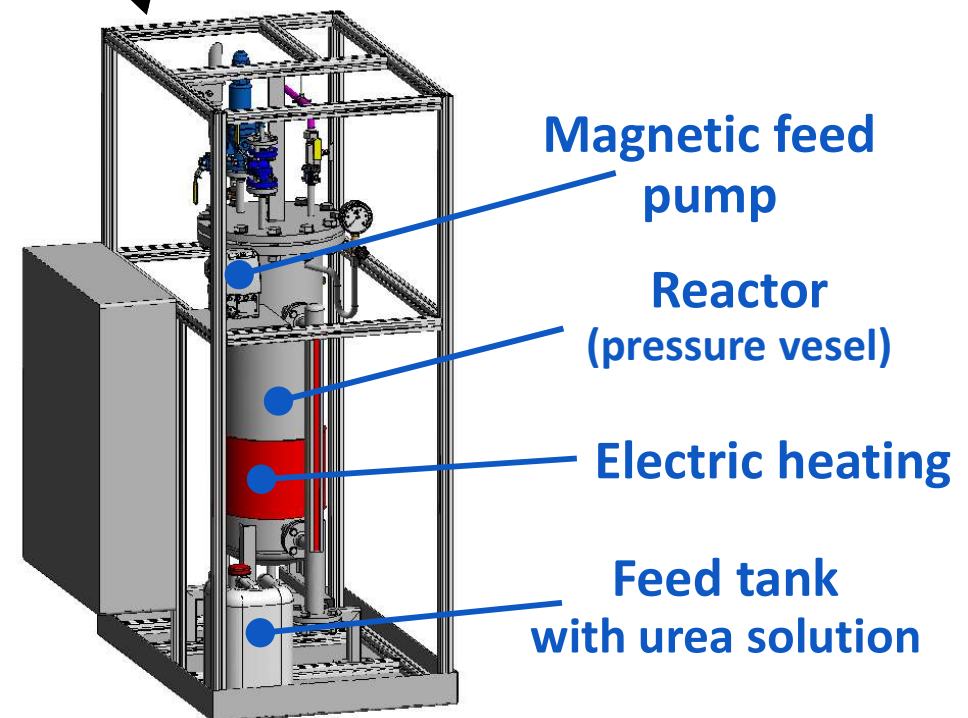
Case study and Experimental unit

Incineration plant parameters:

- Waste capacity 2400 tons/year
- MP steam production: 10 bar, 180 °C, 40 370 tons/year

CUH parameters according the flue gas composition:

- Ammonia production 1,96 kg/h
- Heat duty 5.85 kW → less than 0,2% of plant heat production



Grateful acknowledgment

**LTACH19033 – „Transmission Enhancement and Energy Optimised
Integration of Heat Exchangers in Petrochemical
Industry Waste Heat Utilisation“**



Thank You!