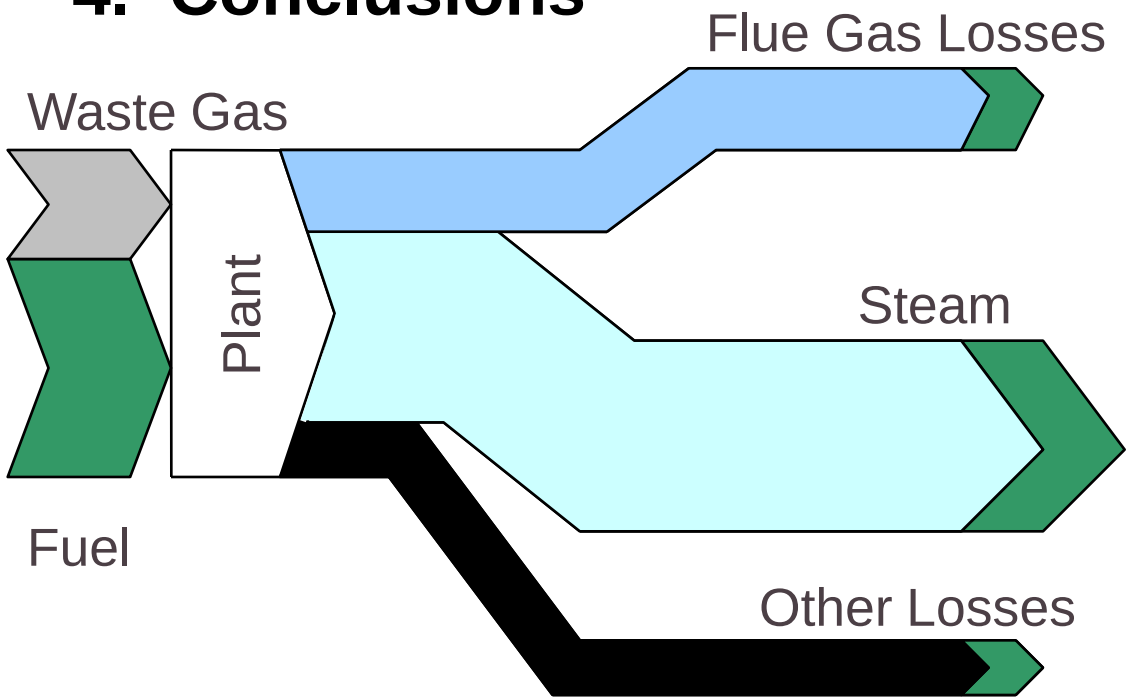
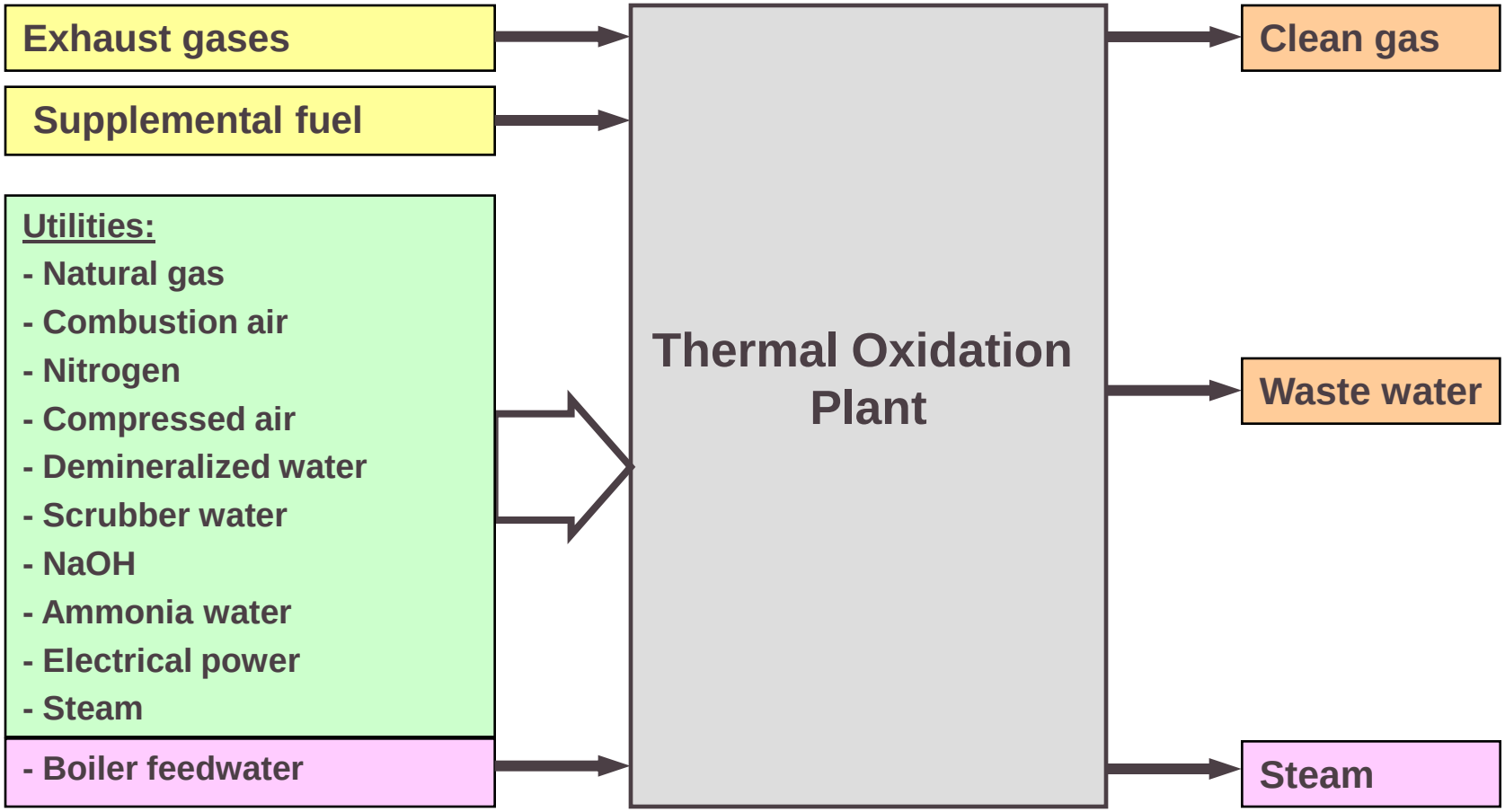
Energy Efficiency of Thermal Waste Gas Oxidation plants

Agenda

1. **Introduction**
2. **Systematic approach**
3. **Optimazition options**
4. **Conclusions**



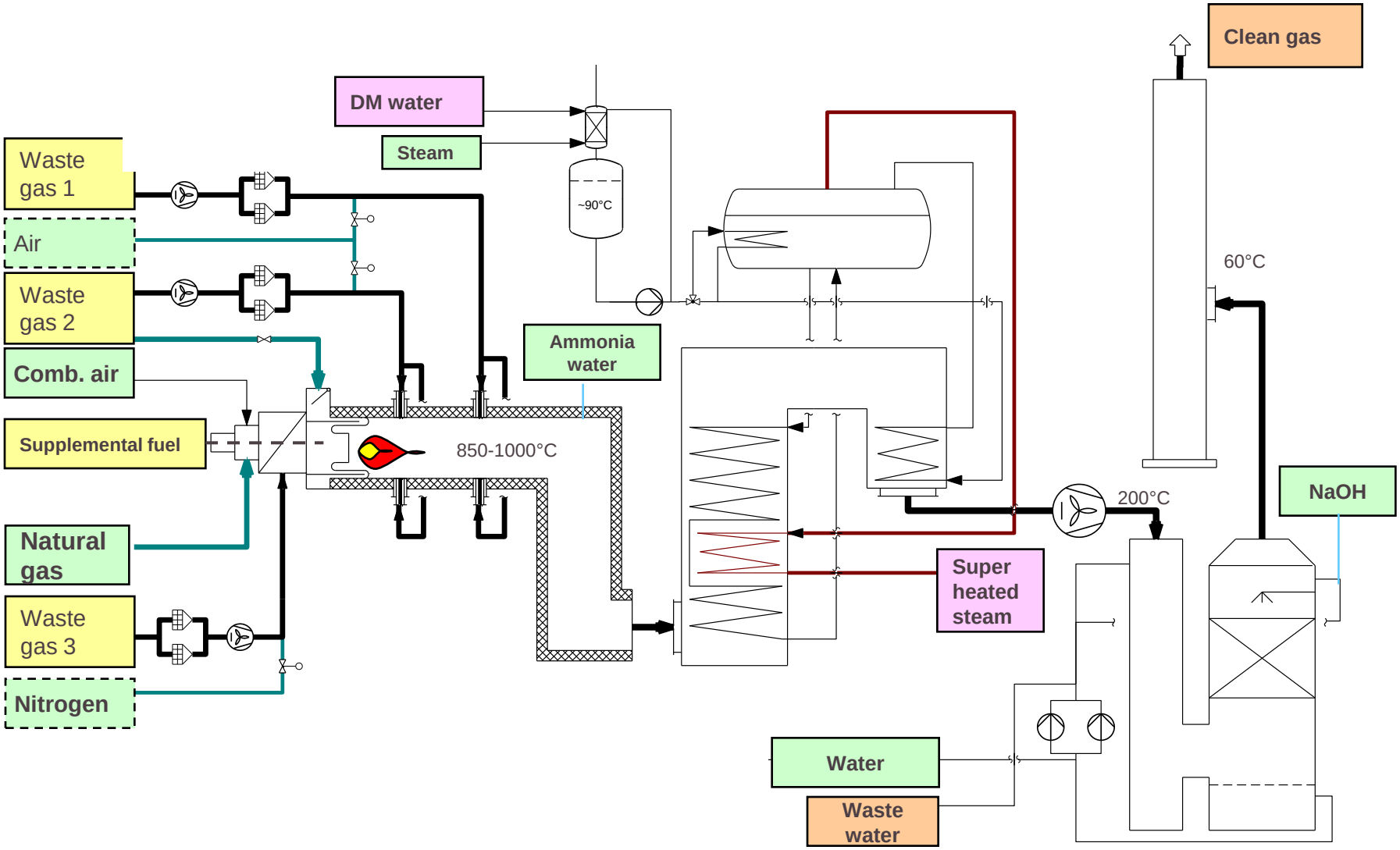
Schematic sketch of a Thermal Oxidation Plant



Target: Efficient disposal solution

⇨ Minimize use of Energy and utilities

Schematic sketch of a Thermal Oxidation Plant



Approach in the energy efficiency check

1. **Observation of processes and equipment**

   → Functionings and specifications of equipment as well as processes requirements should be clarified

2. **Check and analysis of actual operation situation**

   → Define the actual operation load(min, norm, max) for representative period (i.e. summer/winter)

   → Comparison of design and experience data/actual load data

   → Process calculation and analysis

3. **Identification and evaluation of optimization options**

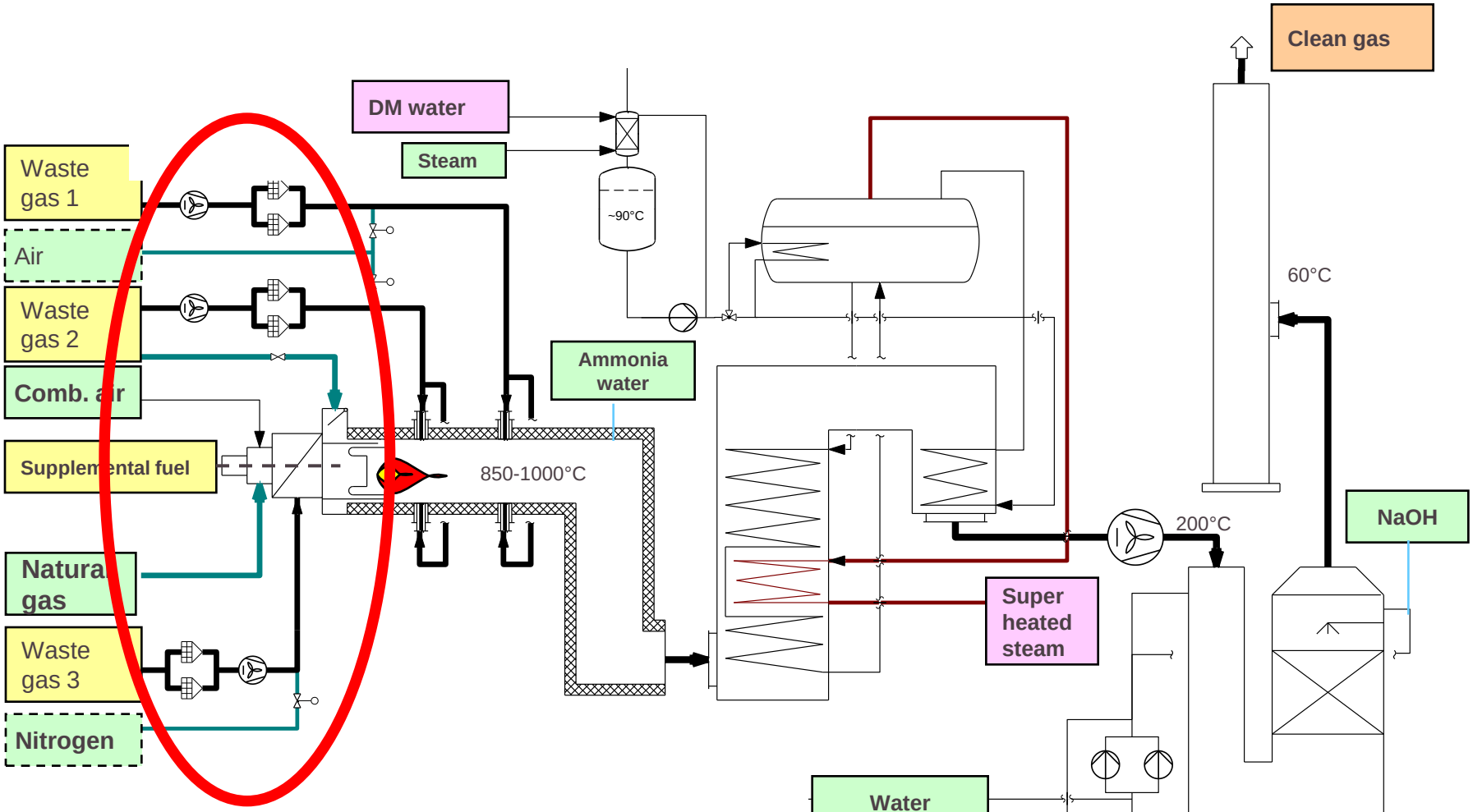
   → Estimation of saving potentials

   → Estimation of invest costs and payback period

4. **Implementation**

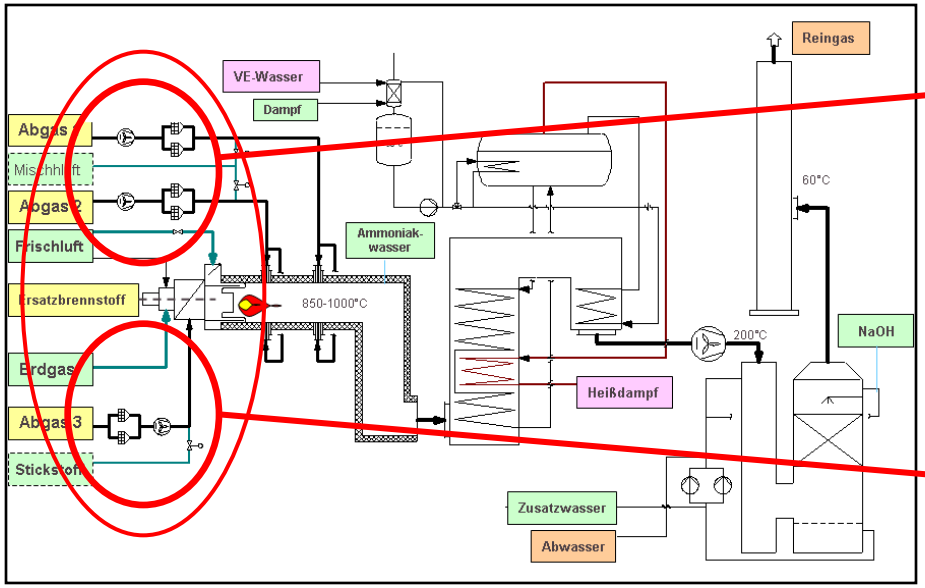
   → Detailed studies, Implementation, check

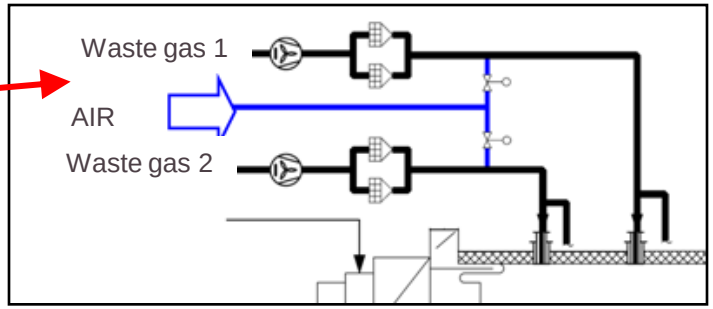
Optimization options: Waste gas connection

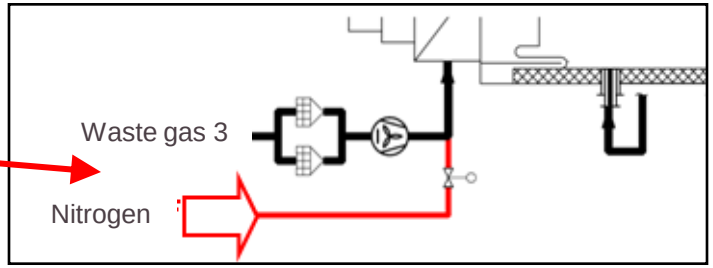


Savings in nitrogen and natural gas

Optimization options : Waste gas connection



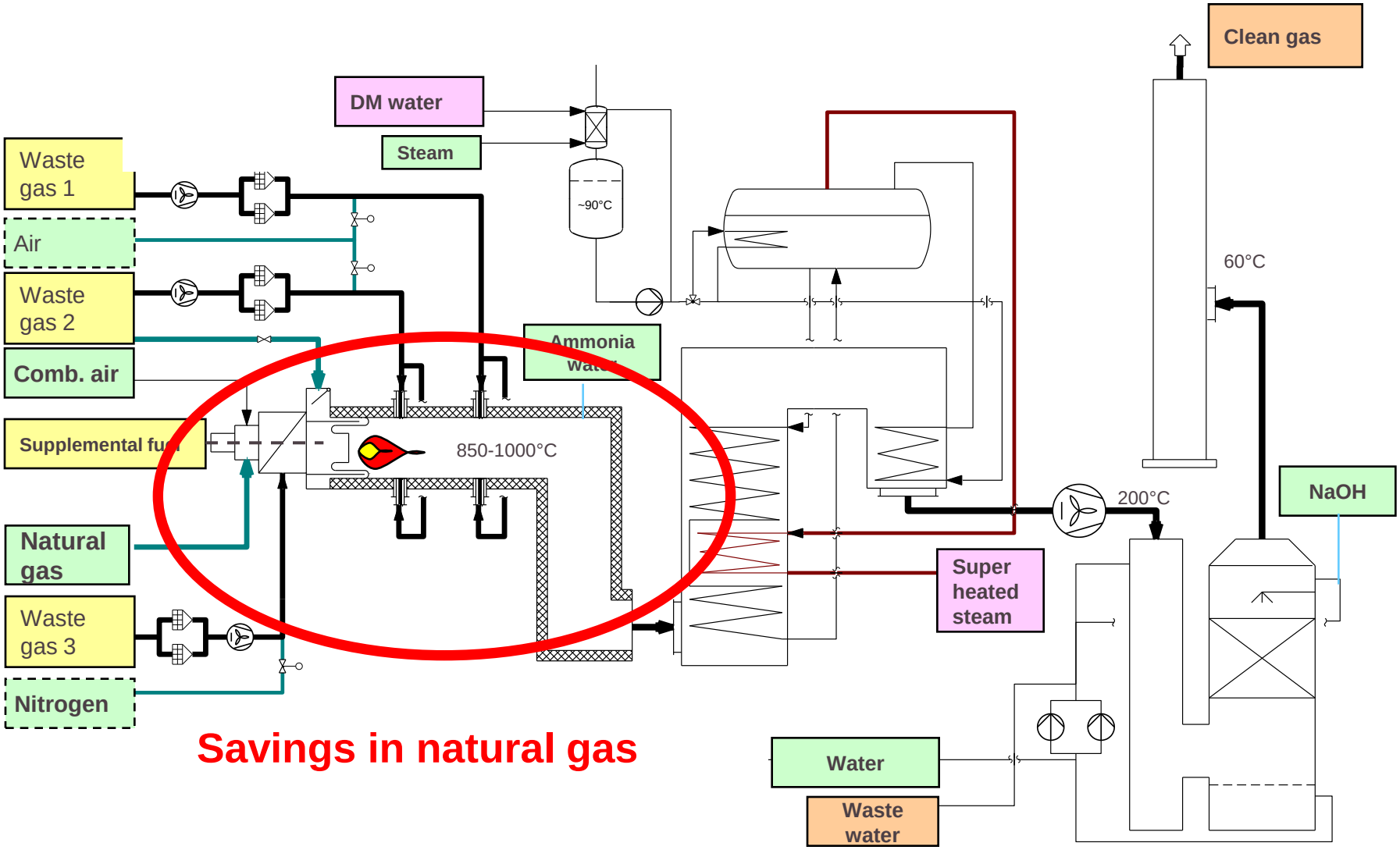




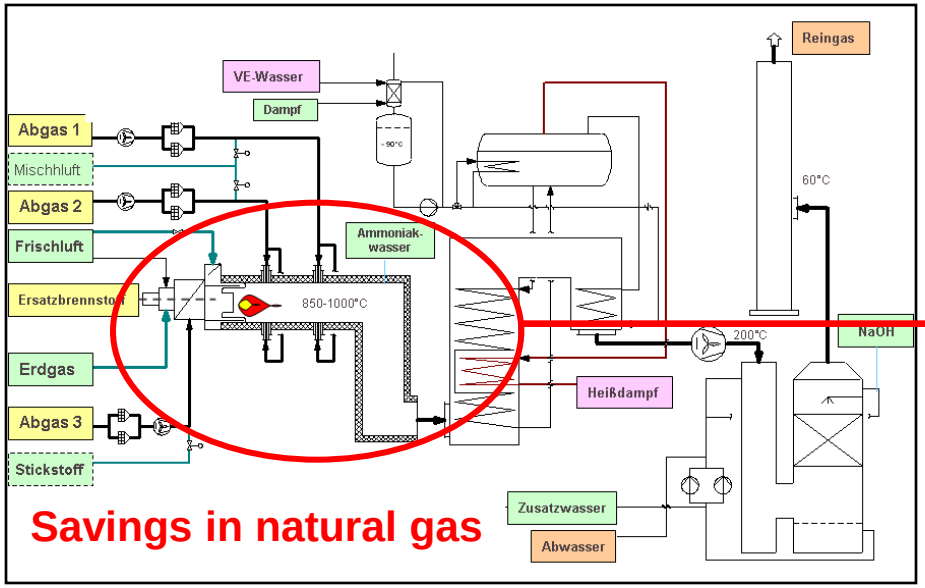
Savings: Nitrogen and natural gas

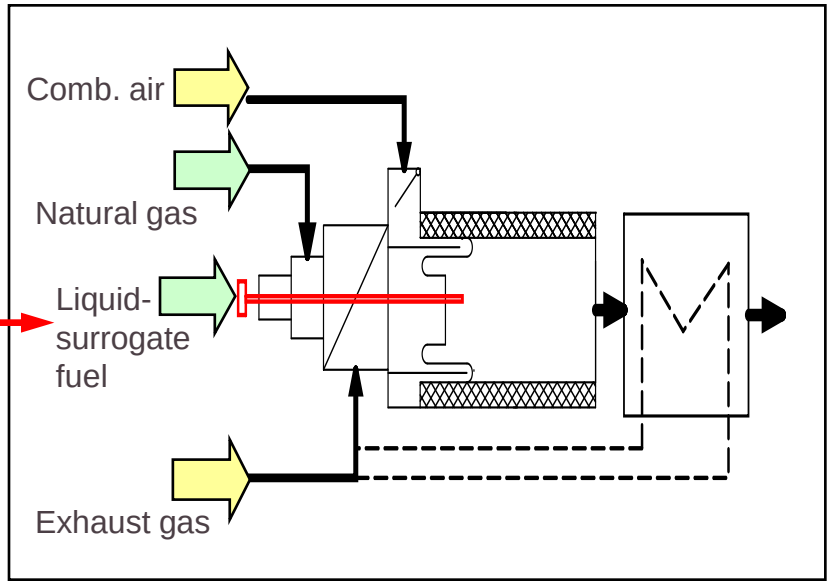
- Optimization of waste gas ejector for dynamic flame arrester (after checking of maximum/ minimum waste gas quantity
- Injection of natural gas (if exhaust gas contents no O2)
- Use of regulation valves instead of On/Off-Valves

Optimization options: Combustion Chamber



Optimization options: Combustion Chamber

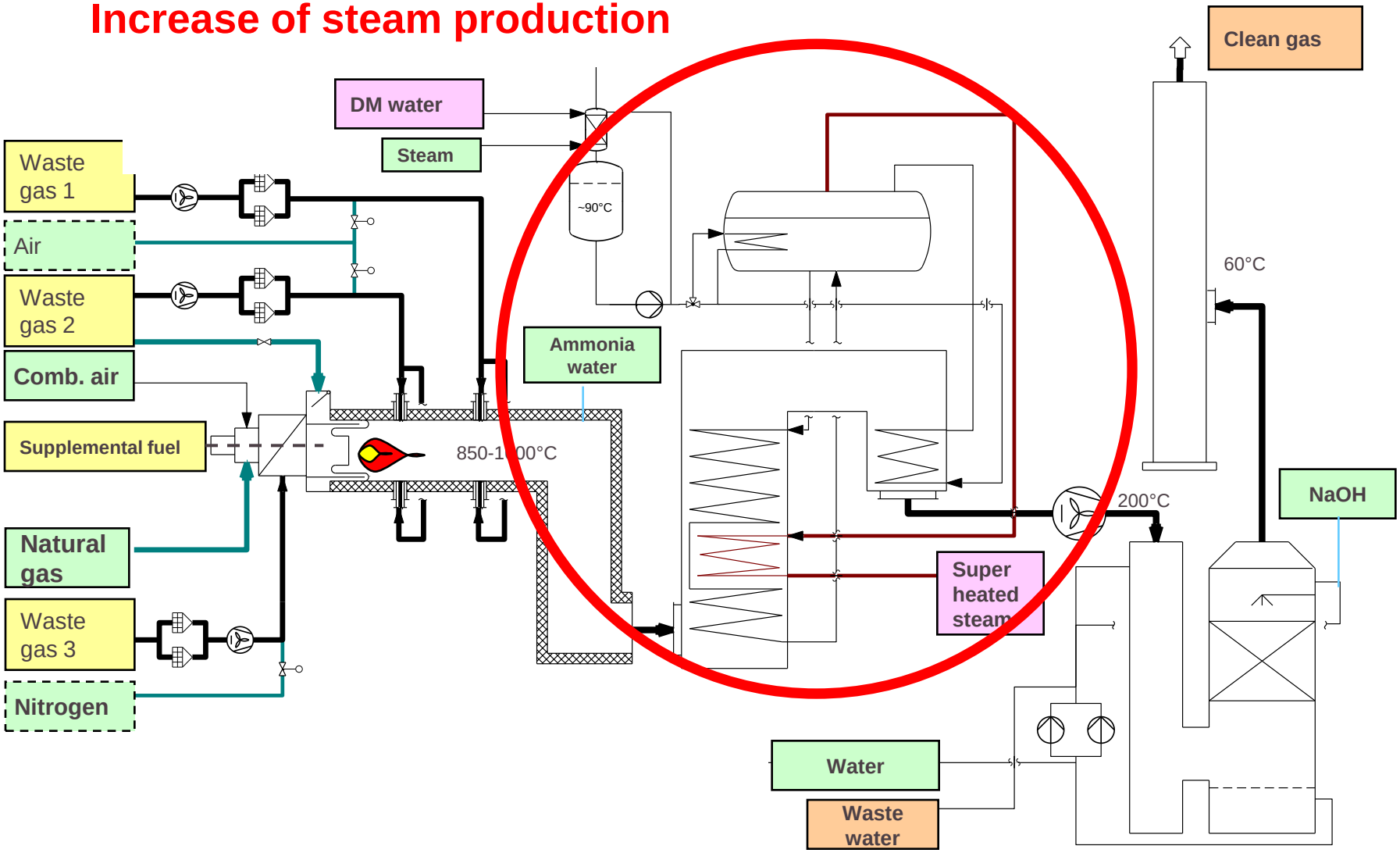




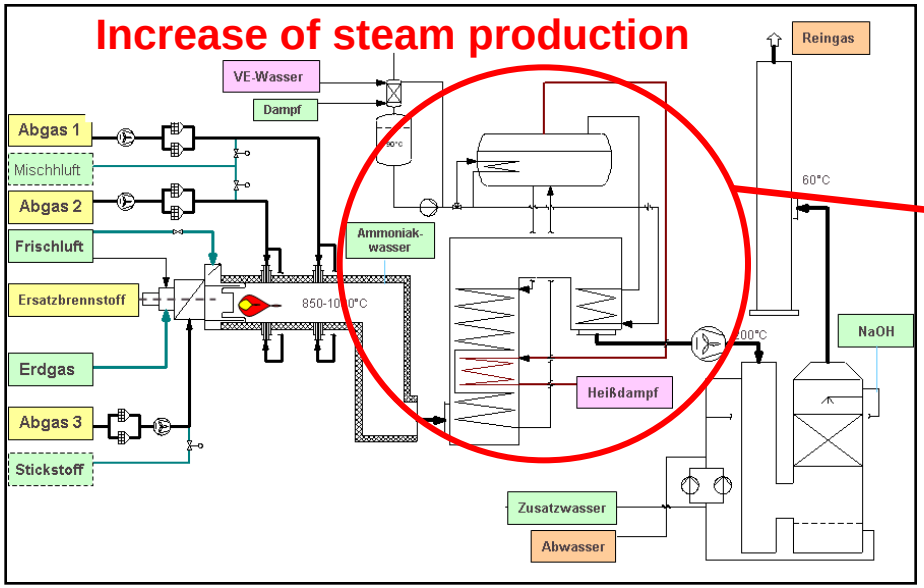
- Reduction of fluegas volume
- Proper insulation
- Preheating of combustion air and/or exhaust gases
- Reduction of fluegasvolume through waste gas concentration
- Use of liquid residues with high heat rates (contaminated solvents, alcohols,etc)

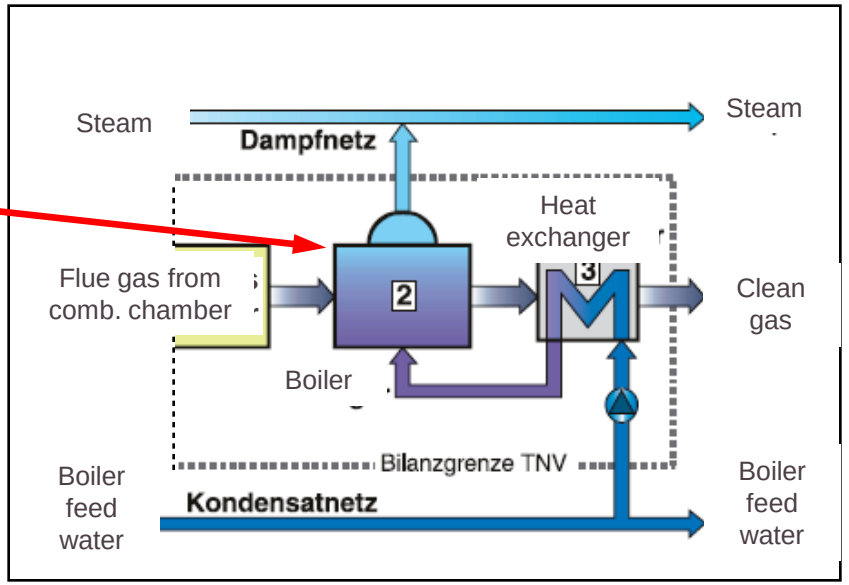
Optimization options: Steam production

Increase of steam production



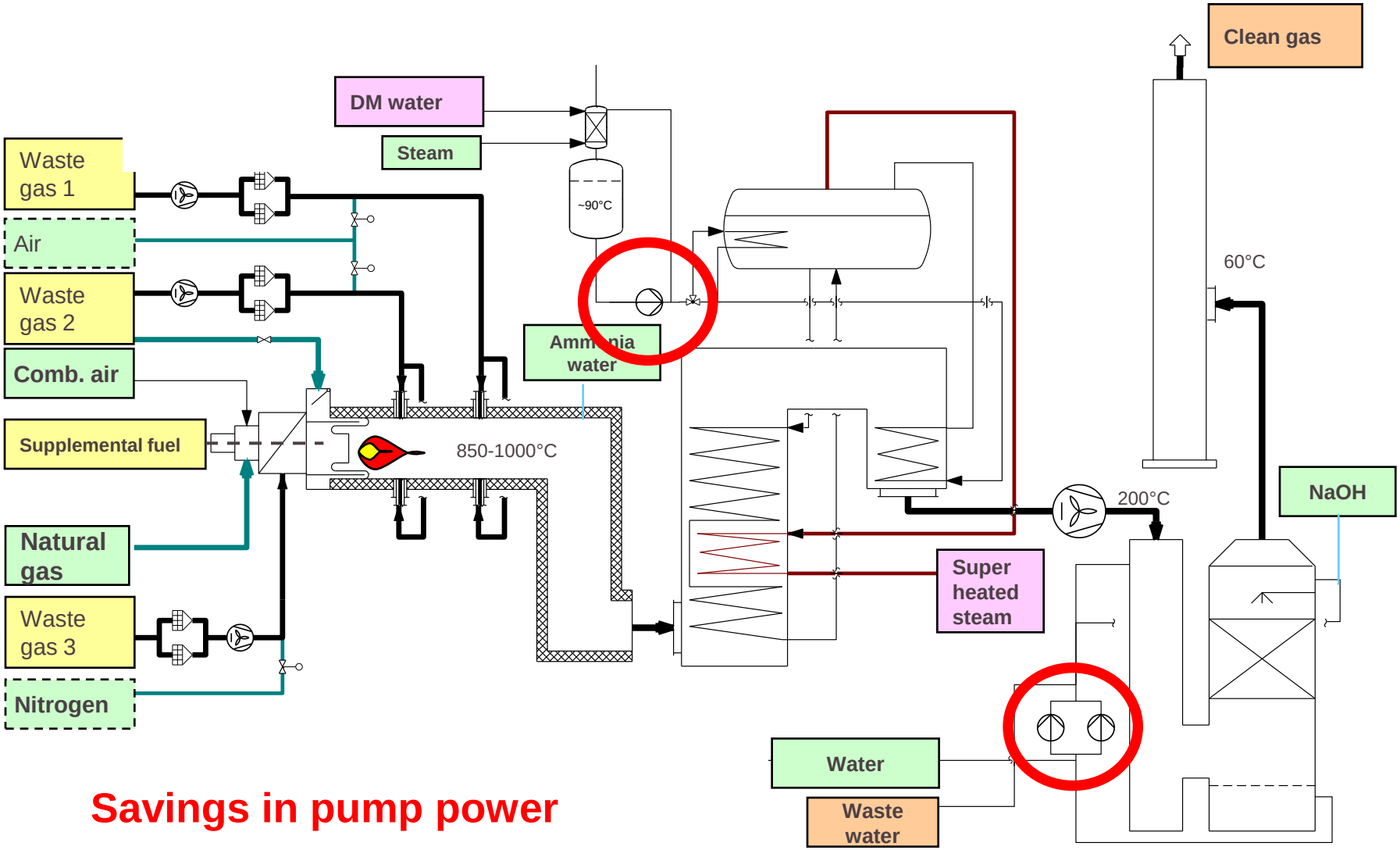
Optimization options: Steam production





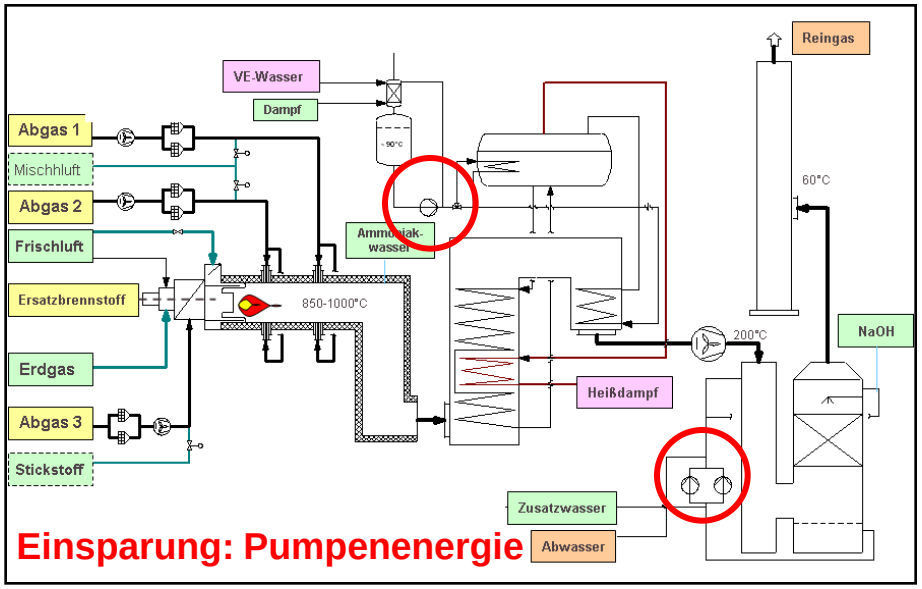
- **Preheating of boiler water (through economiser or use of external heat sources)**
- **Continuous cleaning and maintenace of heat exchange surface so that flue gas outlet temperature will decrease**
- **Optimization of deoxidisation system for boiler feed water conditioning (Reduce steam demand for deoxidisation)**

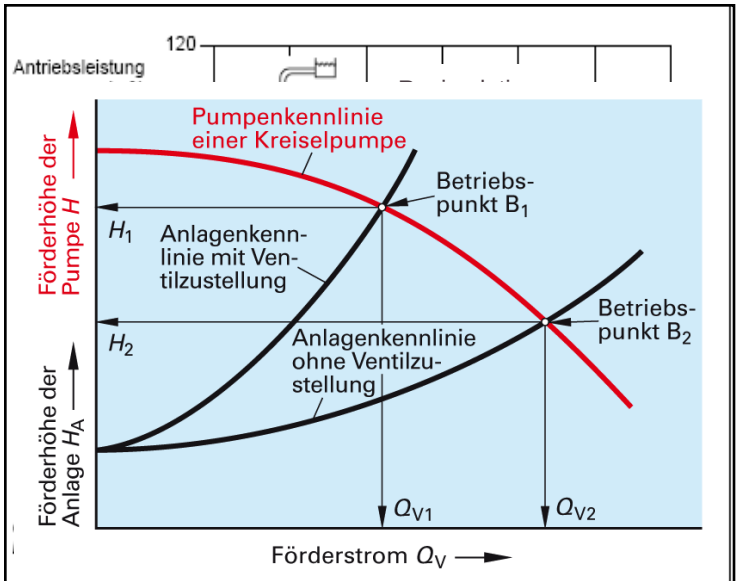
Optimization options: Pumps



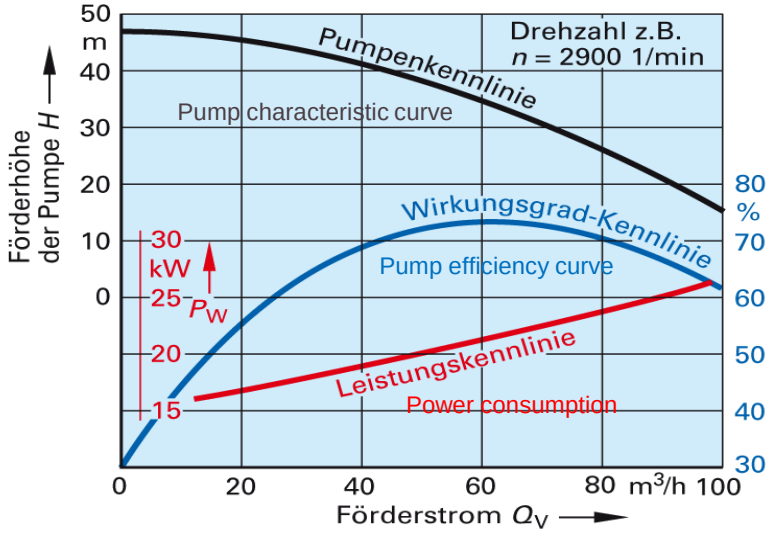
Savings in pump power

Optimization options: Pumps

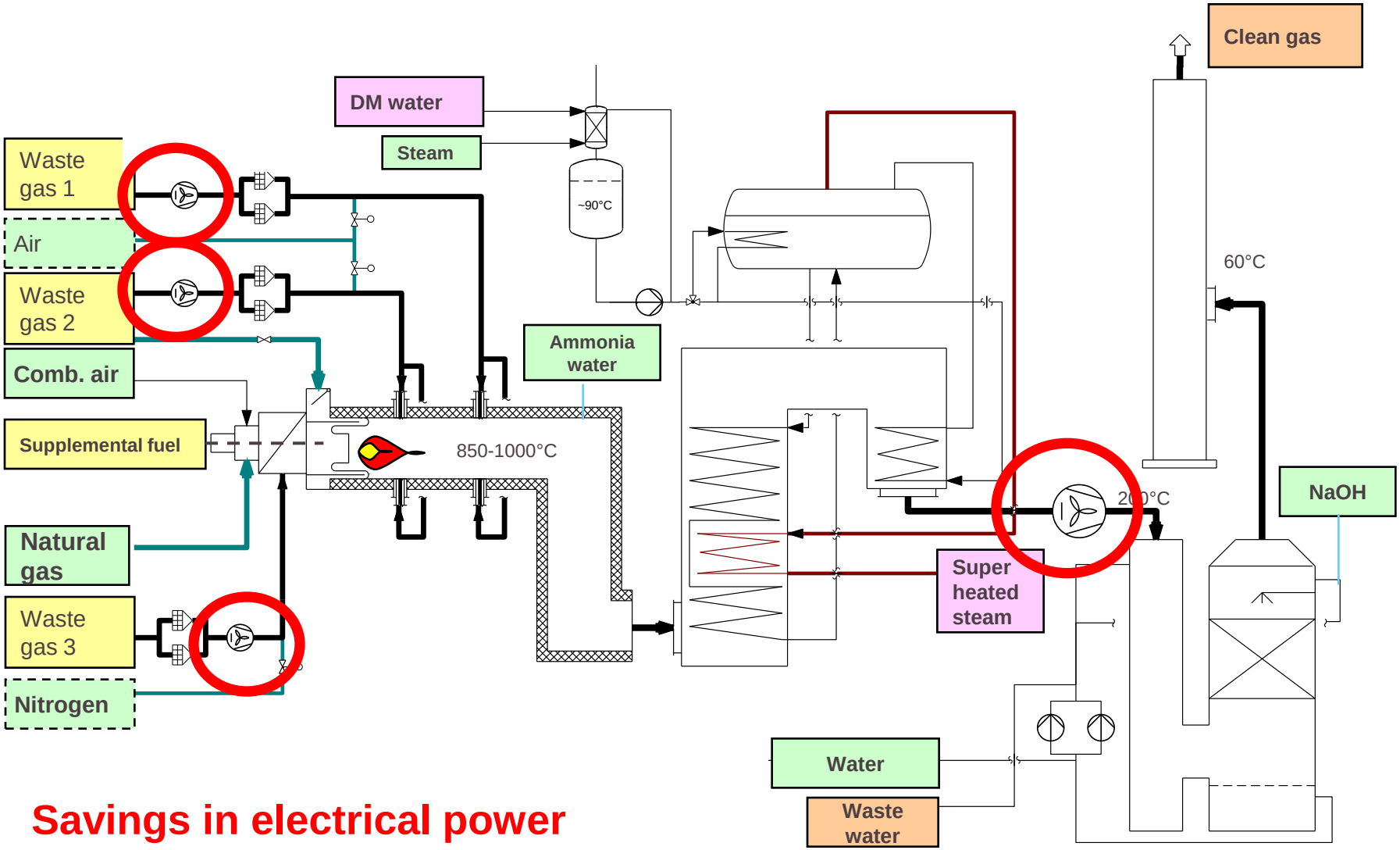




- **Operation of pumps at maximum efficiency**
- **Type of controlling:**
  Use of frequency converter on pumps which operating with various flow rates and pump pressures
- **Purchase new equipment and/or motors with higher efficient factors**

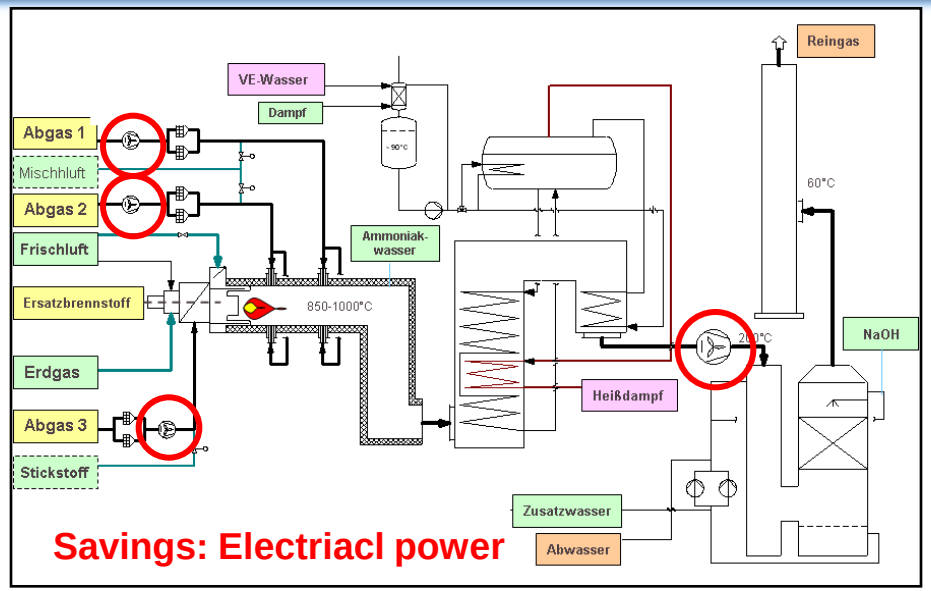


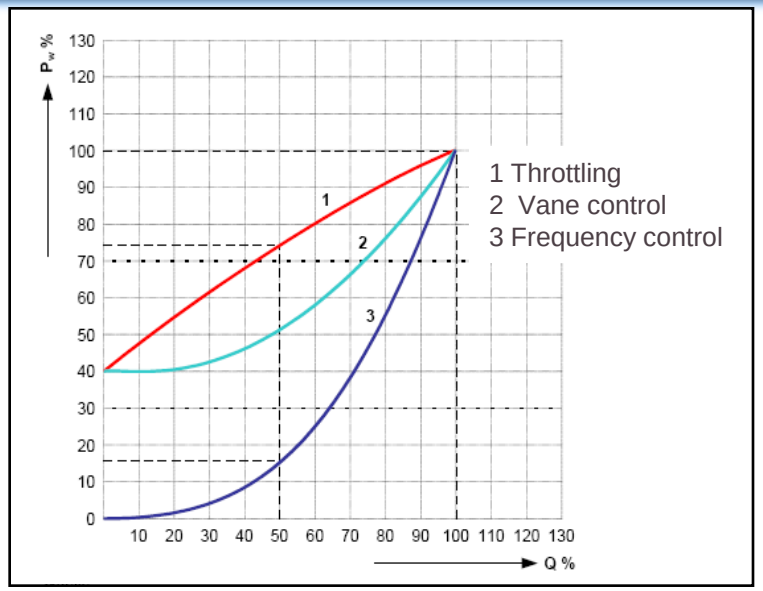
Optimization options: Fans



Savings in electrical power

Optimization options: Fans





- **Powertransmission: fixed or flexible 1:1 coupling**
- **Controlling: Use of frequent converter or vane controllers if gas flow varies**
- **Modification of ventilator placement in process**
- **Continuous maintanece and cleaning of the impeller**
- **Purchase new equipment and/or motors with higher efficient factors**

Energy efficient Check: Conclusion

Saving potential at waste gas connection/combustion chamber

⇒Adjust injectors nozzles to requirements

⇒Use of supplemental fuel (liquid residues)

Saving potential in steam production

⇒Heat utilization as much as possible

⇒Focus behind the boundaries (Use of steam, required steam pressure, etc.)

Cross media effects

⇒Possibility of certification for DIN ISO 16001 (EnMS)

⇒Reduction of CO_2 emissions

⇒Possibility to register under Kyoto protocol as CDM project

Thank you!