

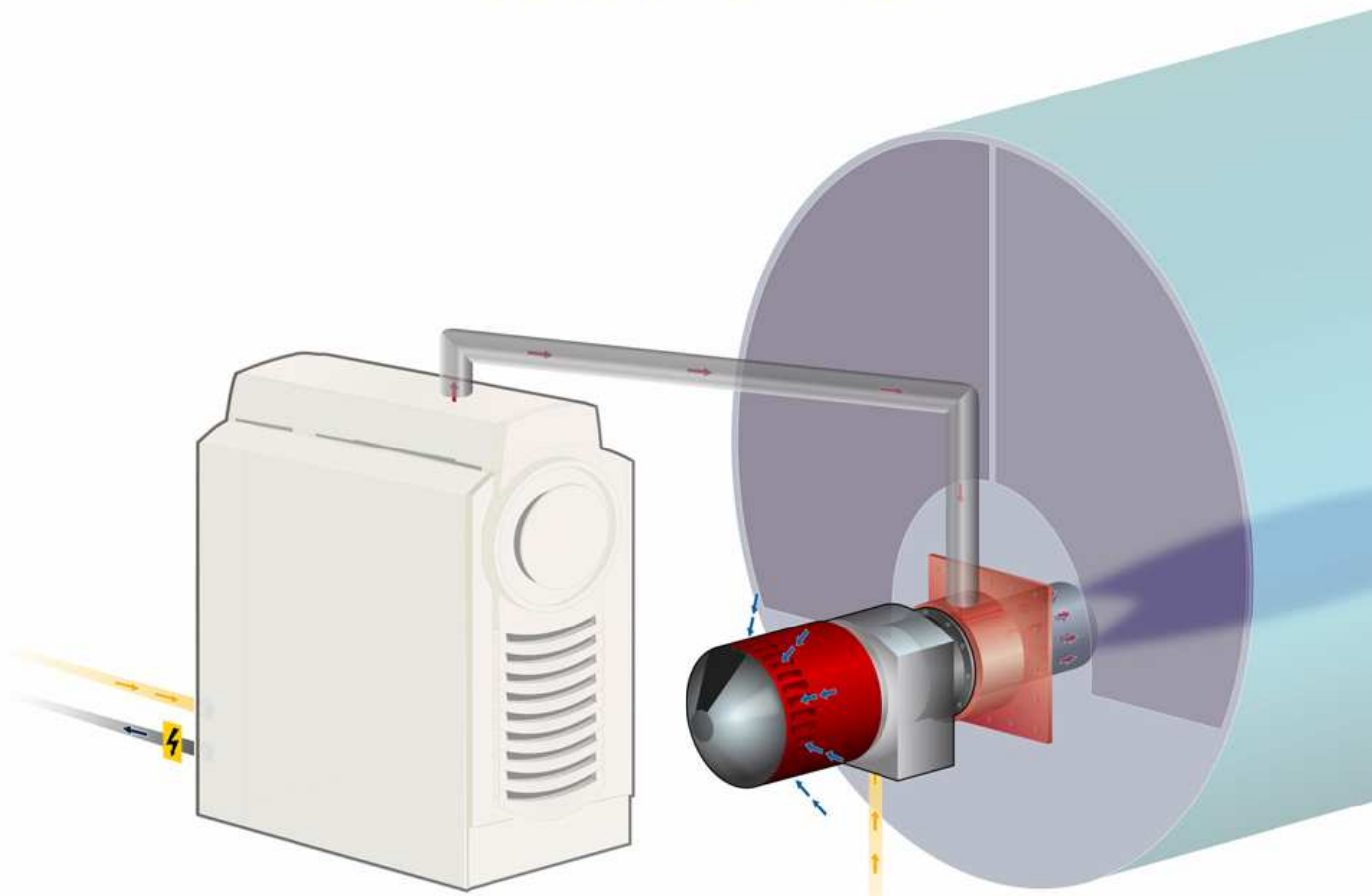
## Self Powered Boiler House

Novel method for incorporating a micro turbine into an existing domestic energy infrastructure for heat supply to households

By Floris de Groot  
Abstr.no: 5.3EF.08

# Introduction **BurnerGen Pack™** technology

## DUAL AIR BURNER



**BURNER** in combination with a **GENErator** with an adaptor in a **PACKage**: **BurnerGen Pack™**

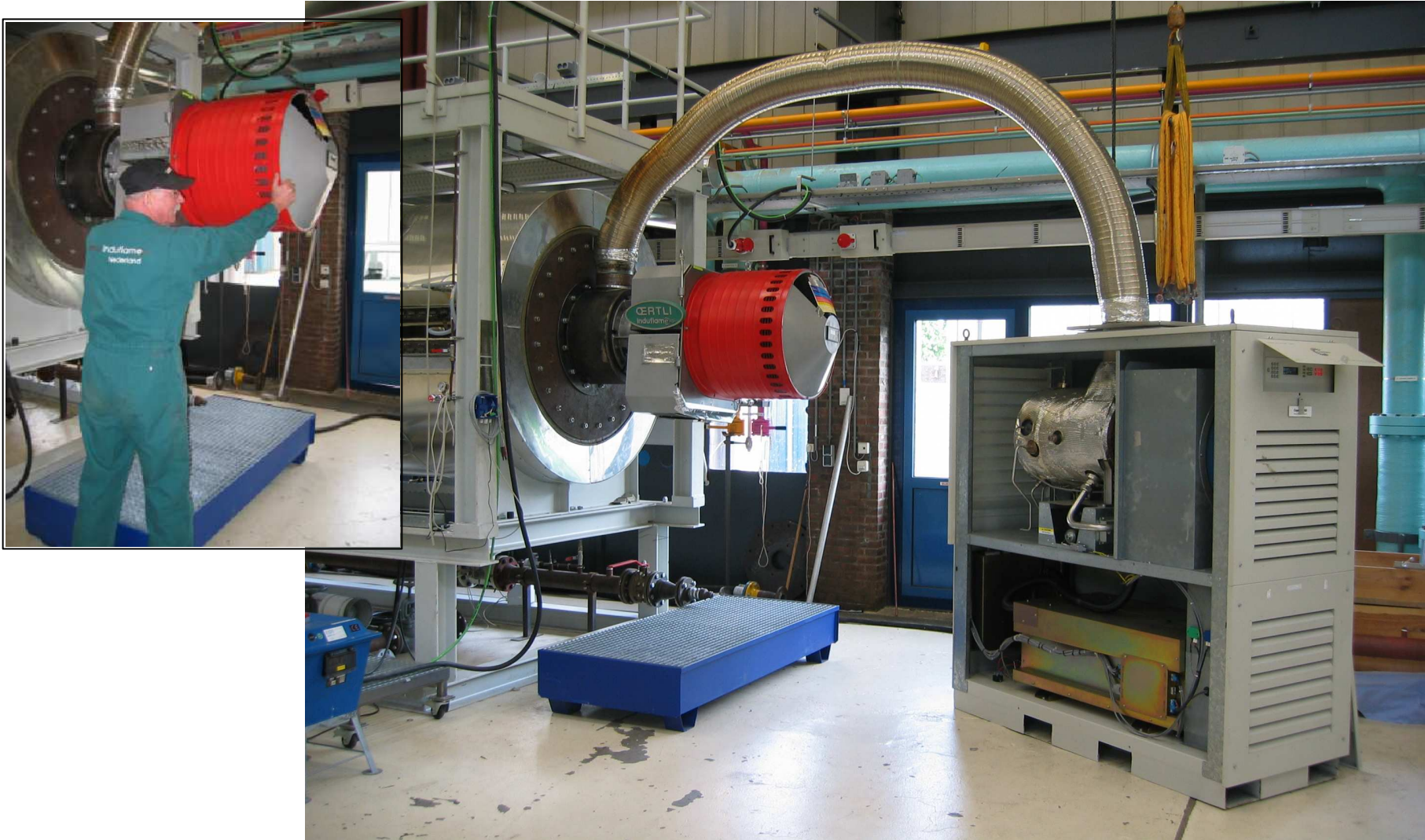
## Background **BurnerGen Pack™** technology

- **Gazetta.ru, 1 Jan 2003: “Emergence situation declared in north Russia due to heating failures”**
- **Moscow Times, 15 jan 2003: “27.000 People remain without heat:**
- **Gazetta.ru, 18 March, 2002: “Cold War Breaks Out In Lenin’s Hometown”**
- **RFE/RL Newslines, 12 augustus 2002: APARTMENT DWELLERS BLOCK MOTORWAY TO DEMAND HEAT**

# BurnerGen Pack™ technology laboratory setup



# BurnerGen Pack™ technology laboratory setup



# Examples micro turbine CHP projects (1)

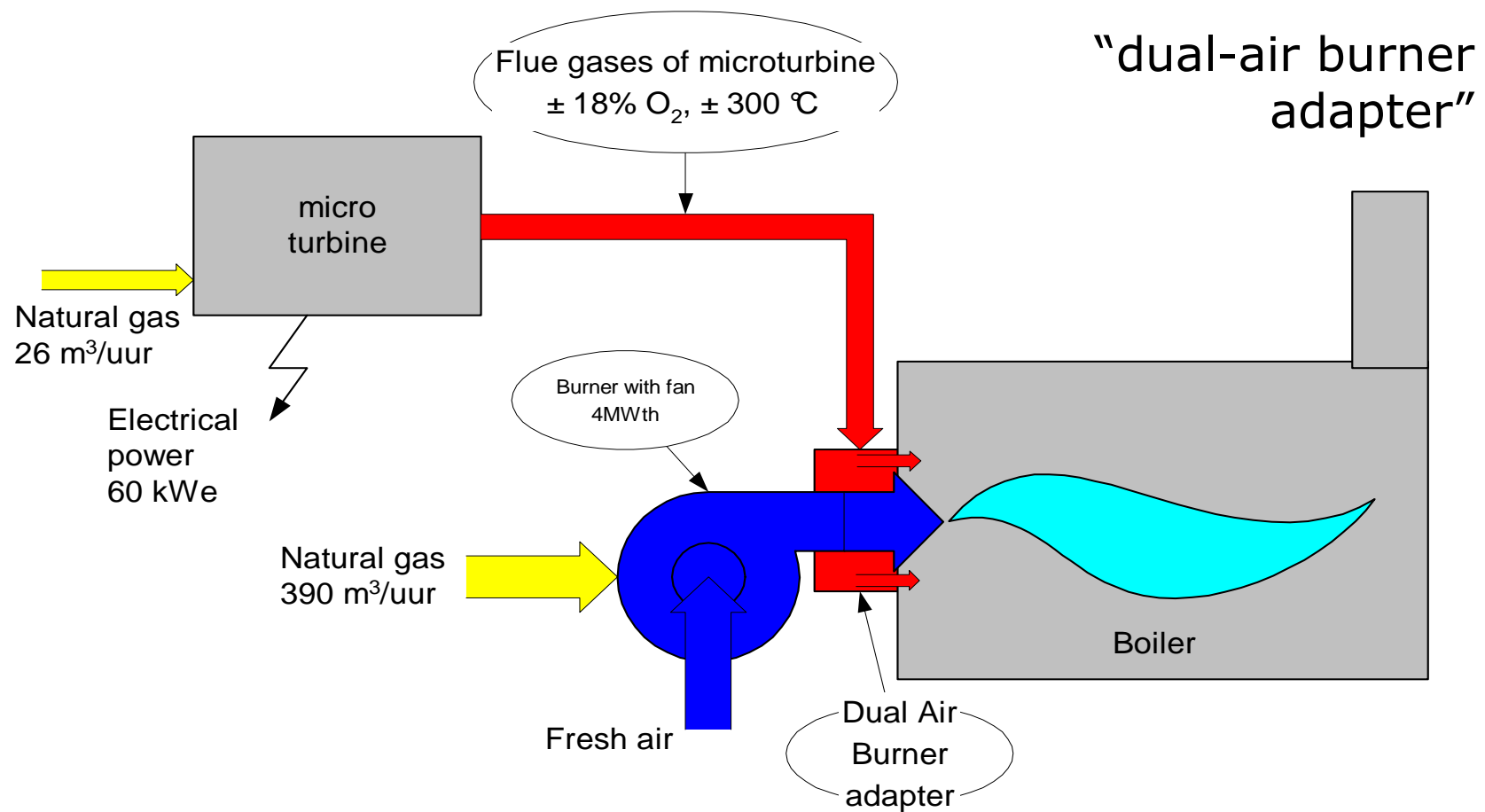
## *Swimming pool*



## Examples micro turbine CHP projects (2)

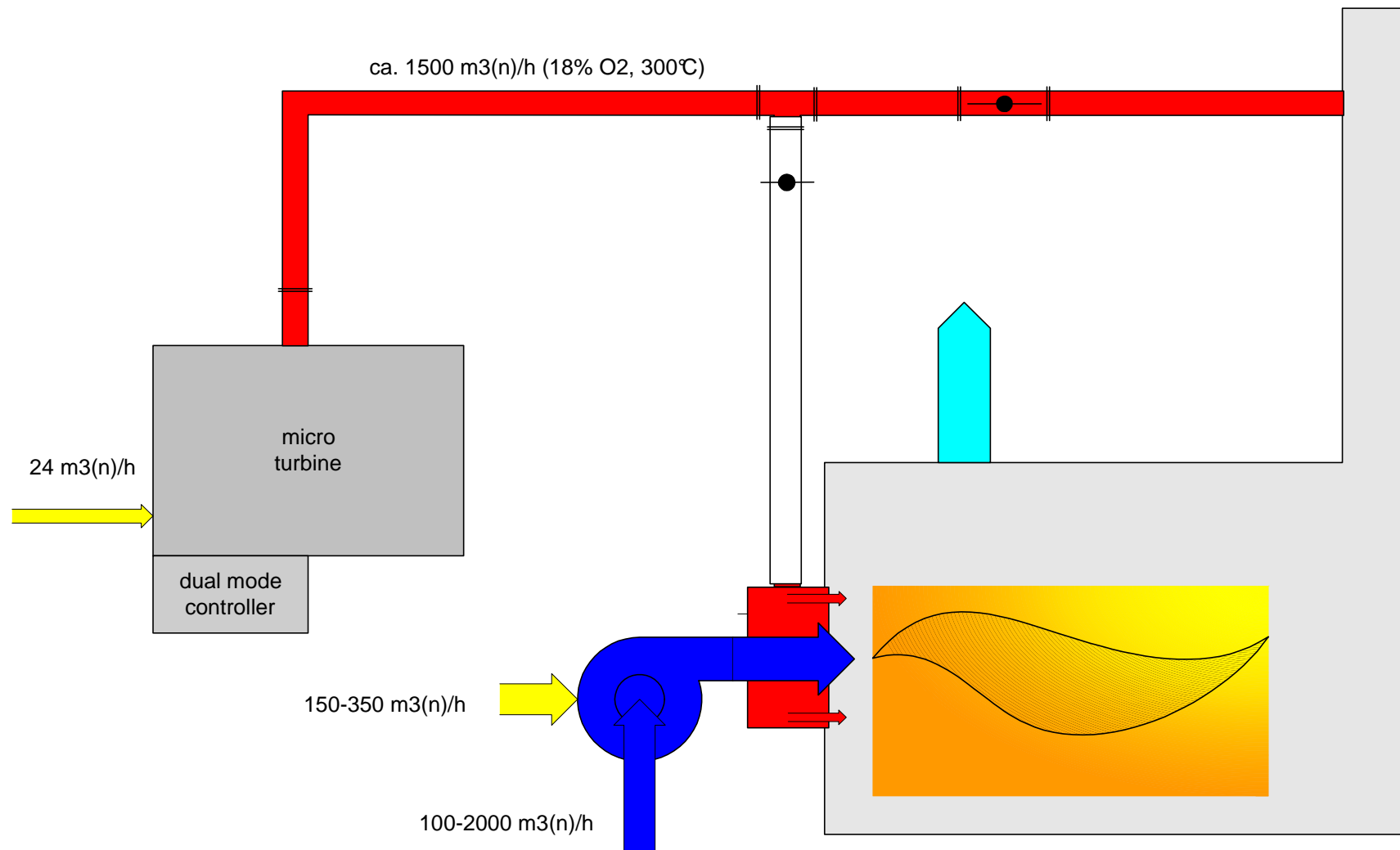


# System description: principles of operation

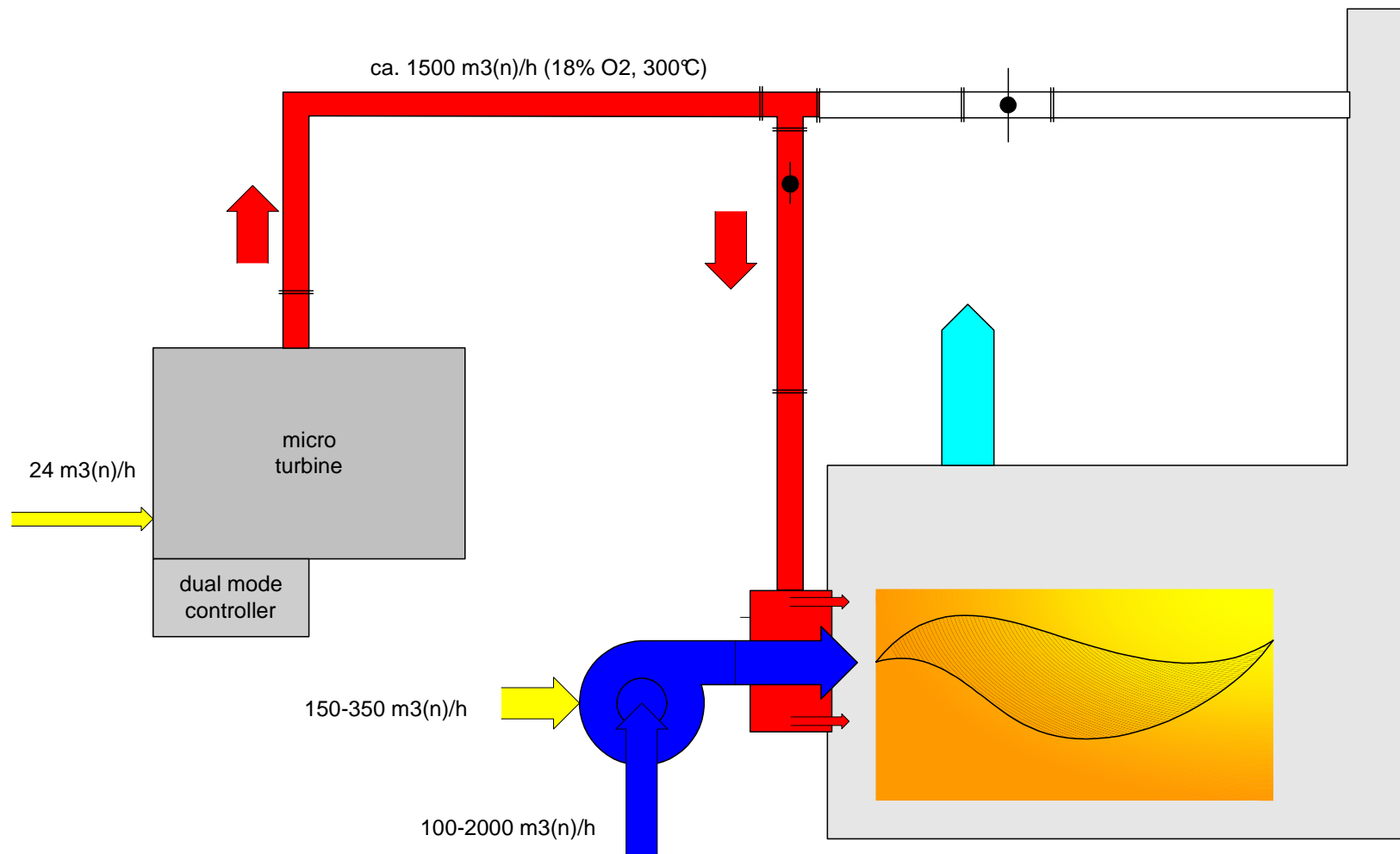




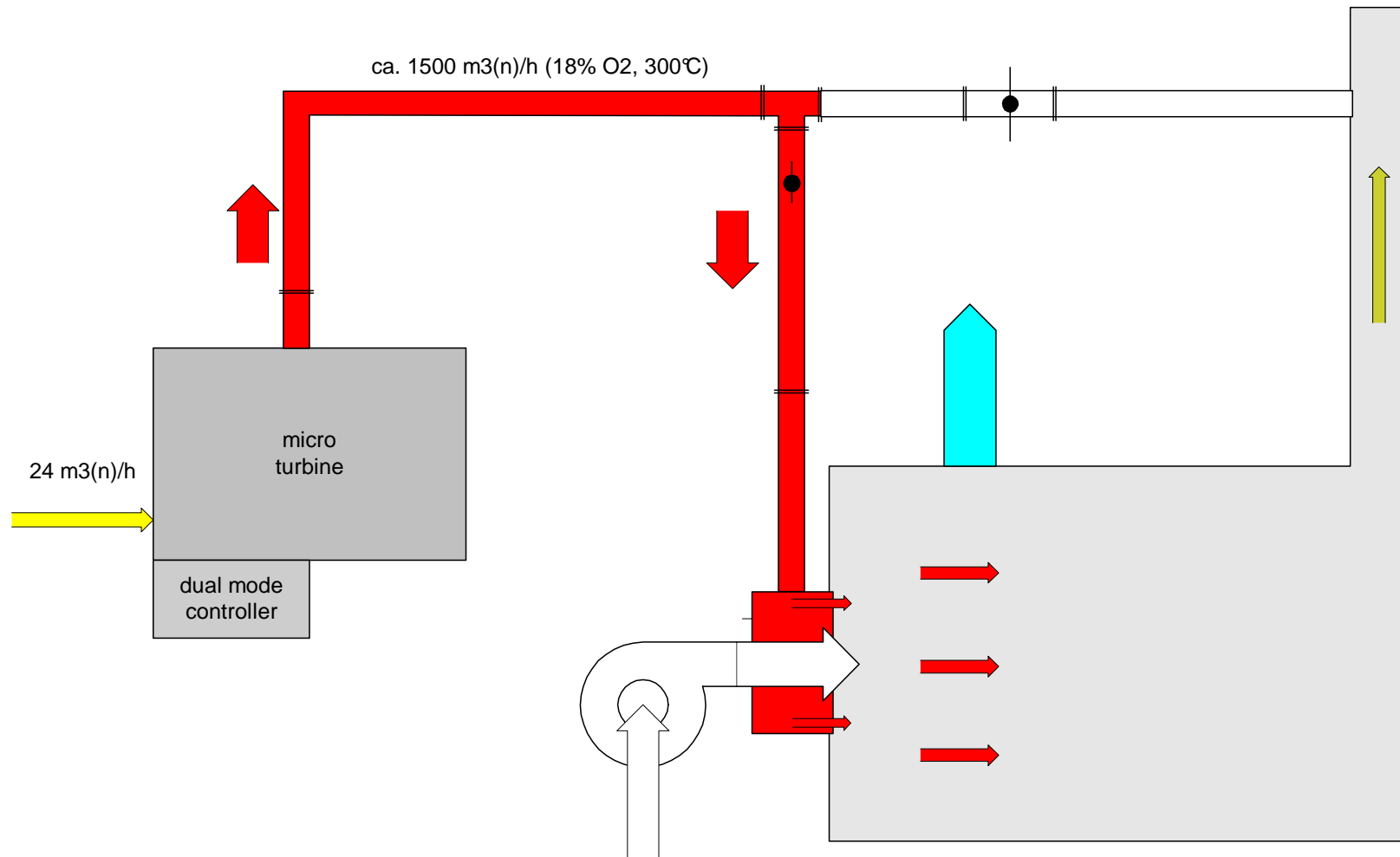
# Operation mode: Fresh or Cold air mode



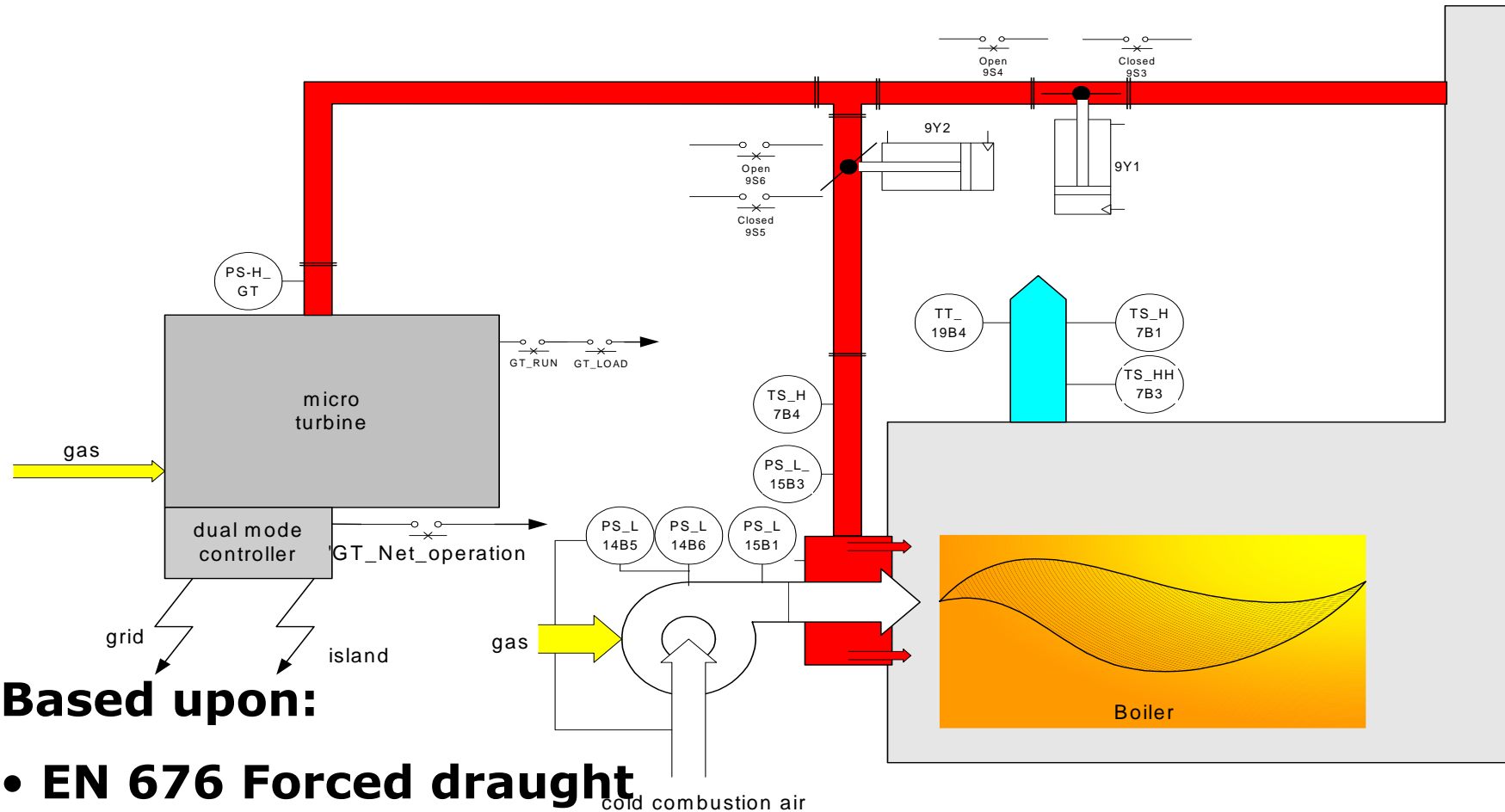
# Operation modes: Mixed air



# Operation modes: Hot Air



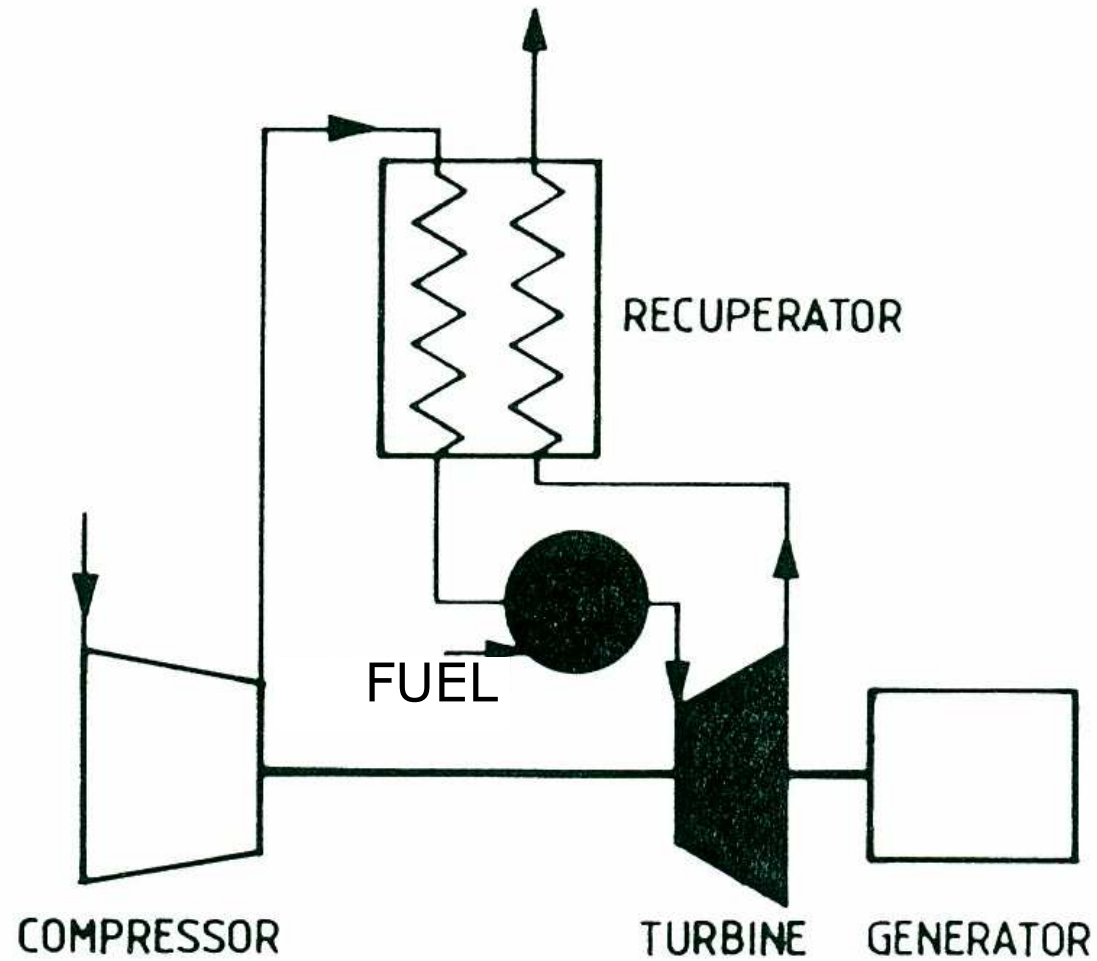
# Safety philosophy



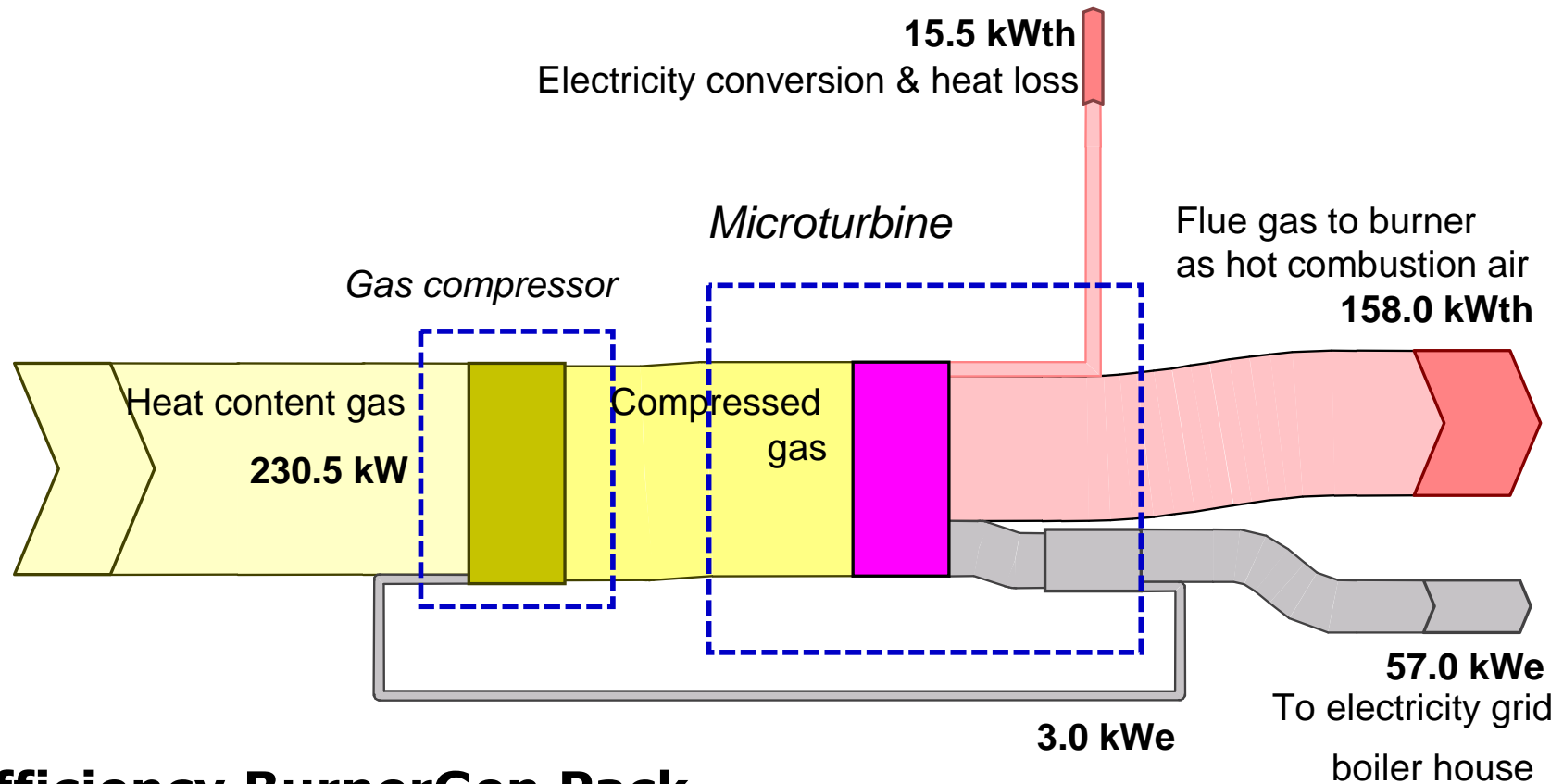
**Based upon:**

- **EN 676 Forced draught burners**
- **Harmonized standard of GAD**

# Energy balance of the Micro Turbine (1)



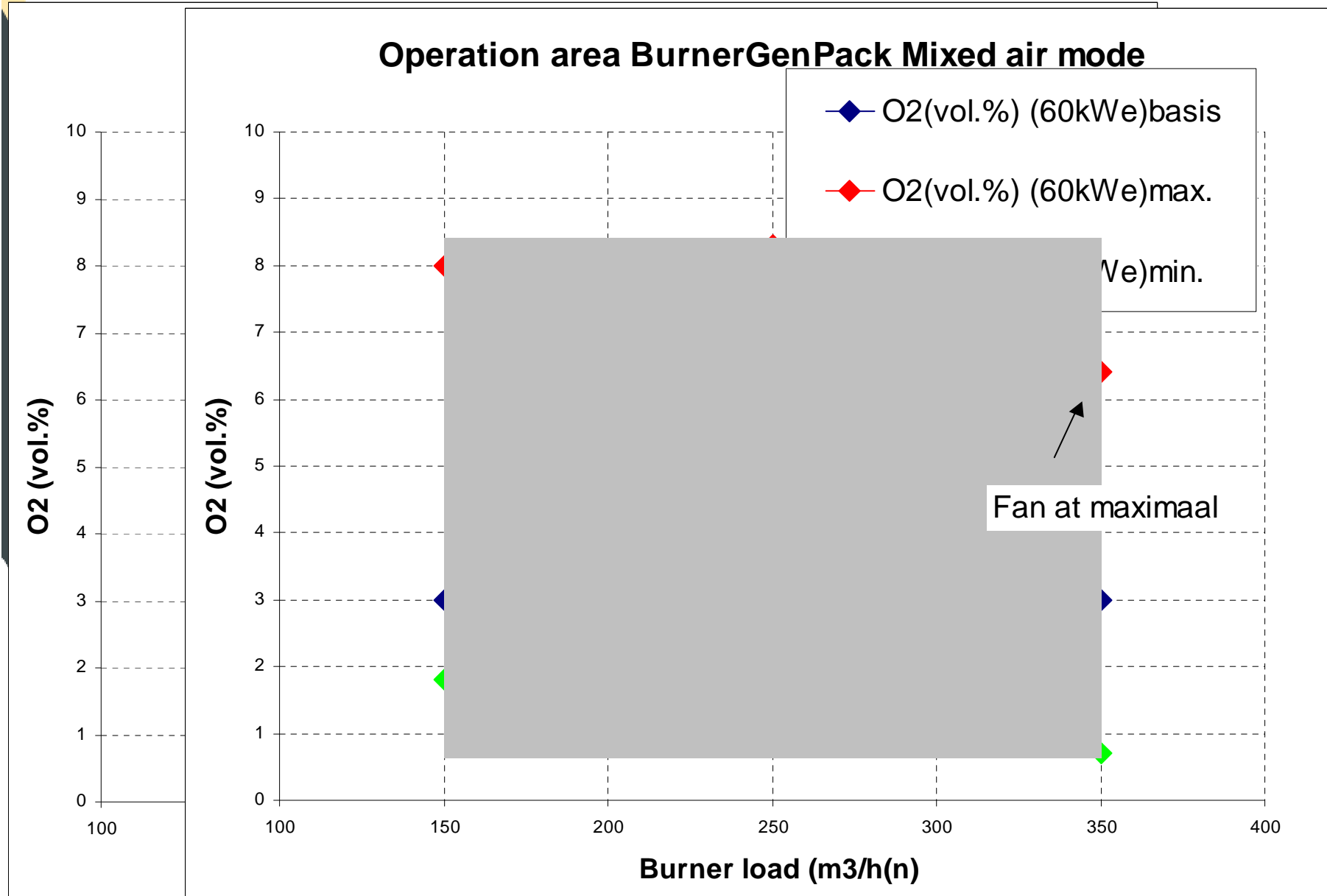
## Energy balance of the Micro Turbine (2)



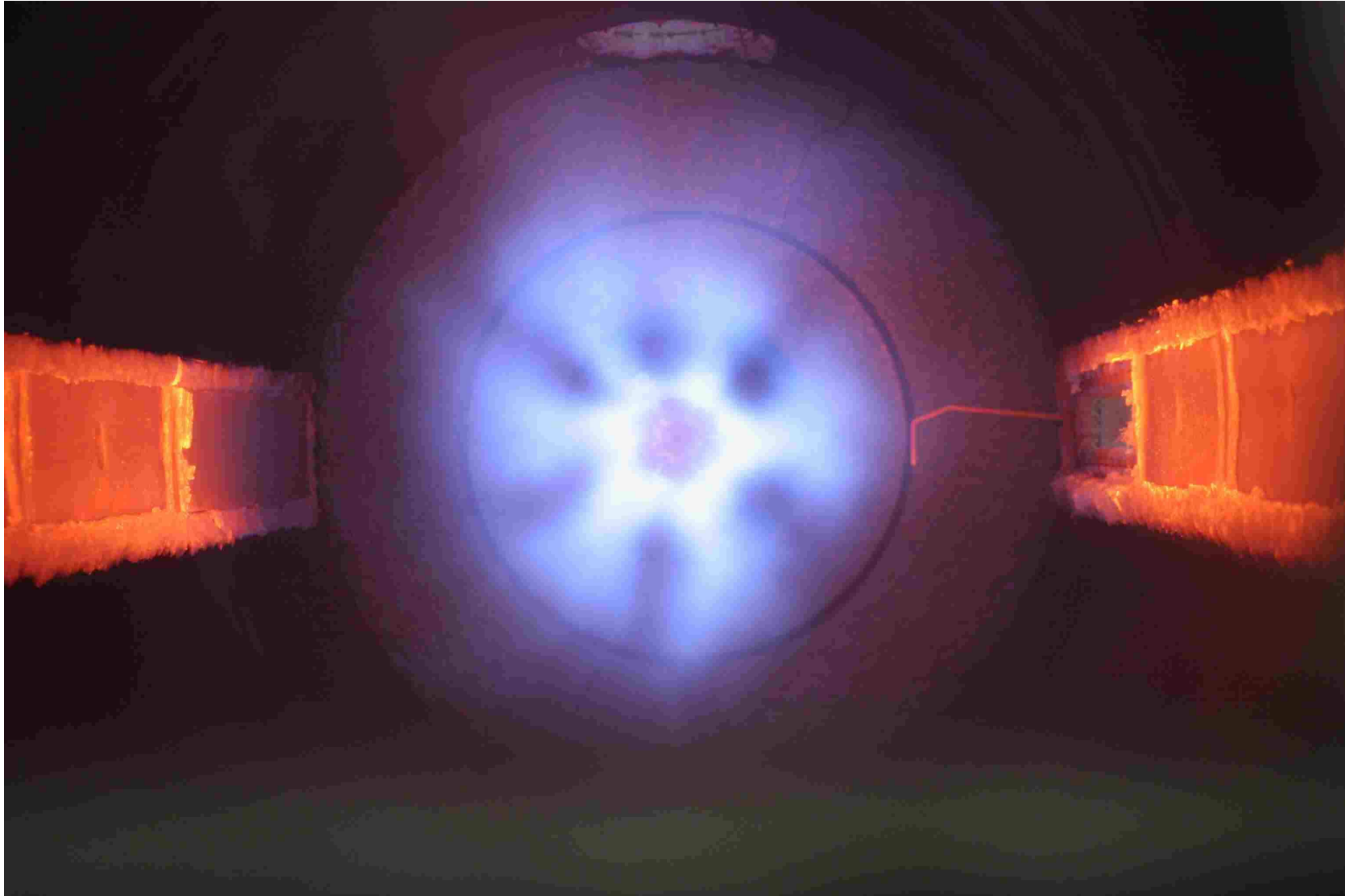
### Efficiency BurnerGen Pack

- **With gas compression: 93%**
- **Without gas compression: 95%**

# Operation area Burner

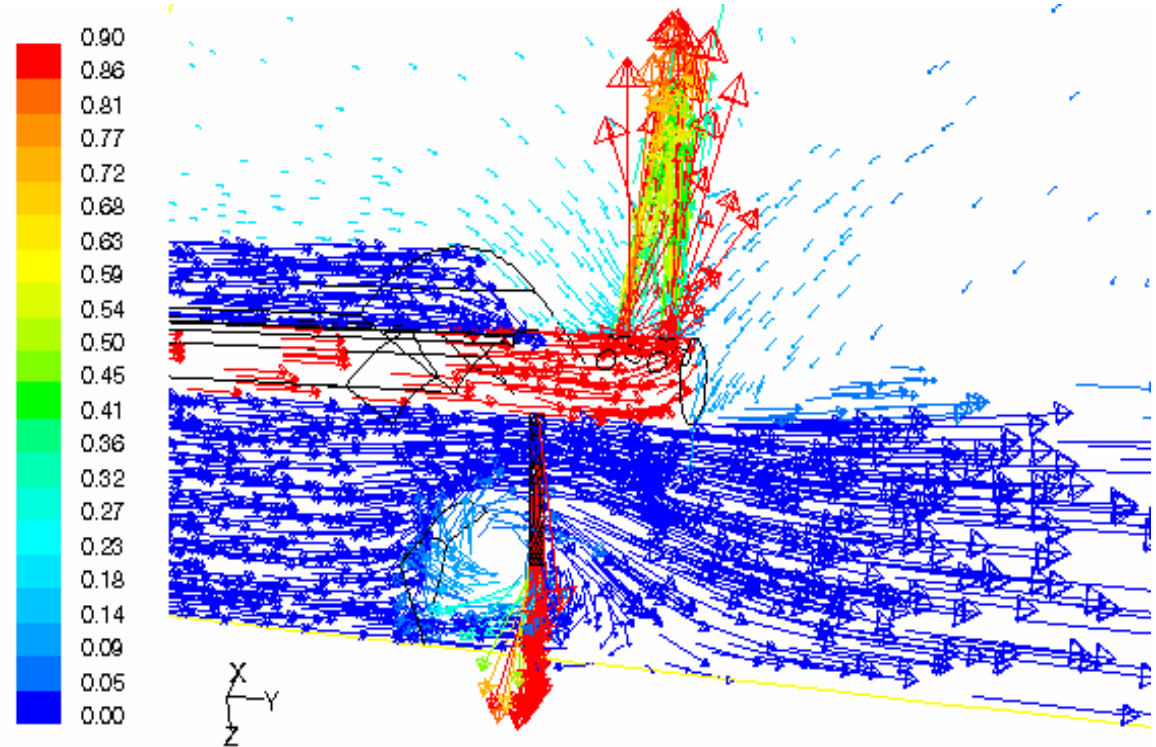


# Development Burner (1)





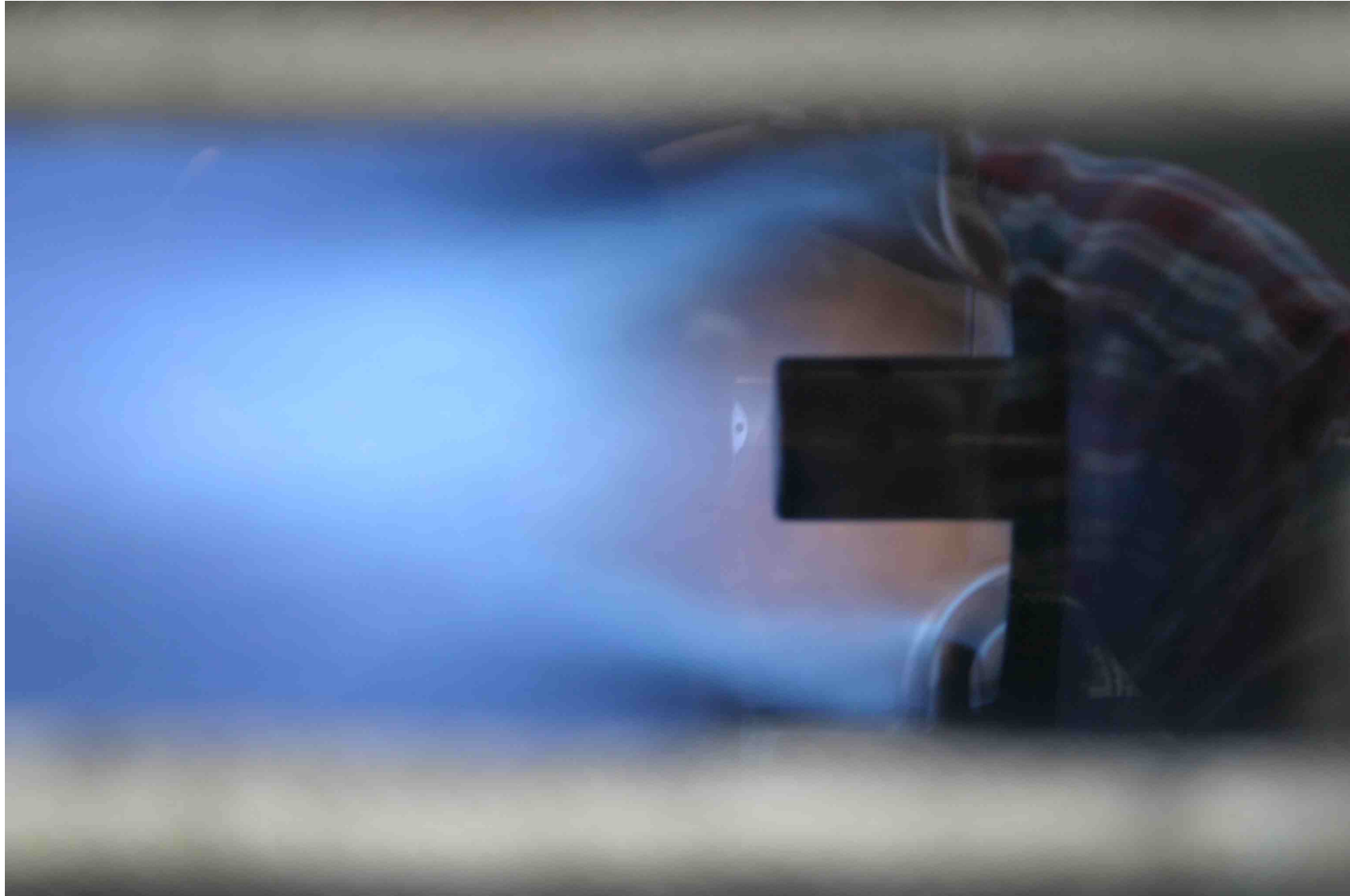
## Development Burner (2)



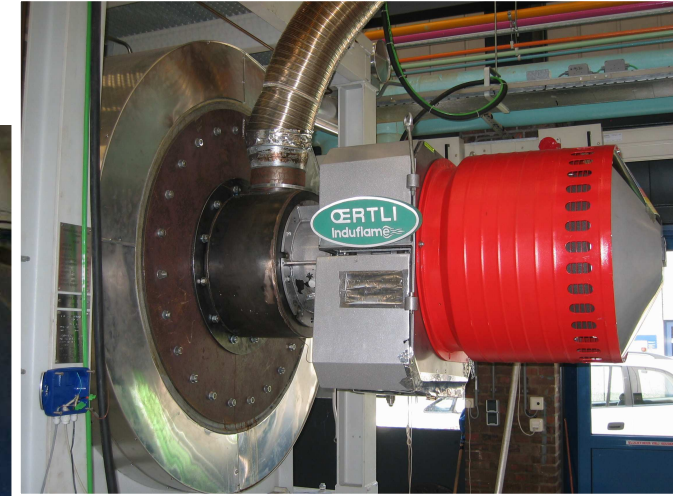
Velocity Vectors Colored By Mass fraction of ch4

Jul 13, 2004  
FLUENT 6.1 (3d, segregated, sp63, sk6)

## Development Burner (3)



# Boiler house selection



## Economics

- Investment:
  - Capstone C60 mini gasturbine
  - Gascompressor
  - Burner adaptor
  - **90 kEURO or 1500 EUR/kWe**
- Savings:
  - Strongly depends on ratio gas/electricity prices
- **Simple payback time (on energy only):**
  - **Typical 5 -10 years**

## Net Results BurnerGen™ Pack

- High efficiency:
  - 93% with gas compression
  - 95% without gas compression
  - Reduction of CO<sub>2</sub>
- NO<sub>x</sub> reduction of 10-15% when the flue gases of the micro turbine are added to combustion air
- Independent operation Burner and Gasturbine possible
  - High availability
- Suitable for retrofitting in existing boiler installations
- Safety requirements are fulfilled
- Field test foreseen mid 2006

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Thank you for your attention

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