



## Objective of Gasification Guide?

- To guide key target groups identifying potential hazards and make proper risk assessment
- Software Tool as an additional aid in risk assessment
  
- Key target groups:
  - Manufacturer
  - Technical adviser
  - Permitting authorities.



## Structure of Gasification Guide?

- Technology Description
- Legal Framework of BG Technology
- Theoretical Aspects of Risk Assessment
- Potential Hazards and Good design principles
- Annex A: Overview of possible Risk Assessment Procedures
- Annex B: Example for Hazard ID, Risk Assessment and Risk Reduction
- Annex C: Good Design Practice Table.



## Legal Framework: CE marking?

- Some parts need CE marking
- No requirement to deliver an all-inclusive declaration of conformity
- Manufacturer has to supply
  - operating instructions which cover
    - all hazards
    - all safeguards and precautions for safe operation.



# Legal Framework: Permit procedure for BGP?

IEA Bioenergy  
Gasification

- Very country specific
- ?????



# Legal Framework: Emission limits?

- Very country specific

What have we done? What can / should we do?

CO?

HC?

Emissions/kWhel - gasific = Emissions/kWhel - comb?



# Risk Assessment

- What must the manufacturer know?
- What RA is necessary for BGP?
- Does manufacturer need support?
- Who can give him support?
- What procedure do we recommend to manufacturer?
- Value of risk RA software tool?
- Your needs in RA and RA software tool?



# Potential hazards

- Potential hazards not mentioned in the presentations?
- Potential hazards that need special / more attention?



# Good design principles, reduction measures: controversial positions

- Blower?
  - ex-proof is necessary
  - not necessary
  - instead:
    - safe O<sub>2</sub> monitoring during normal operation
    - blower off during start-up (explosive mixture)
- Backfiring from the flare?
  - flare ignited only if O<sub>2</sub> below explosion limit
    - how to destroy the unhealthy gas if above explosion limit?
  - flame arrestor
  - water seal
  - other measures?



## Risk reduction measures: controversial positions

- Tertiary measures against explosion pressure **is necessary**
  - burst discs  
(Swiss expert: to avoid if ever possible → new problems)
  - explosion pressure = 1.5 x design pressure
    - safe O<sub>2</sub> monitoring during normal operation
    - blower off during start-up (explosive mixture)
  - spring loaded valves
- Tertiary measures against explosion pressure **is not necessary** sufficient to safely avoid
  - ignition source (blower off), or
  - explosive mixture (safe O<sub>2</sub> monitoring).



# Risk reduction measures: Ex-zoning

- What does ex-zoning mean?
- Ex-zoning is necessary
  - Where?
  - Owner must have explosion protection document?
- Ex-zoning not necessary.



## Risk reduction measures:

- Monitoring the temperature in the fuel storage pile?  
– where?
- Flame arrestor before the engine?
- Anti backfiring valve on the air inlet to the engine?
- Pipes above 500°C must be welded? No flanges or other detachable connectors?
- PLC must have uninterrupted supply unit (UPS).?
- Sensors must be doubled?



## Course of action?

- Emission limits?
- Agreement on controversial between safety experts / authority advisers?
  - Questionnaire?
- Application of the draft Guideline?
- ???