

# **C – INC**

## **ENERGETIC USE OF STRAW FOR THE PRODUCTION OF HEAT AND ELECTRIC ENERGY**



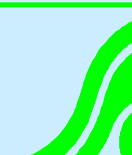
# INTRODUCTION

- The EU Renewable Energy Directive sets specific regulations as well as indicative targets for each member state.
- The Kyoto Protocol on the reduction of emissions (esp. CO<sub>2</sub>, CH<sub>4</sub>) requests signees to take qualified action (country specific targets of emission reduction).
- Worldwide efforts for the use of Renewable Energy Resources (being „CO<sub>2</sub> – neutral“)



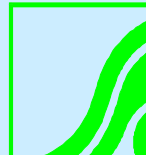
# RENEWABLE ENERGY RESOURCES

- A number of possible renewable energy (RE) resources are at hand but not all of them can or will be exploited depending on availability in the respective locations or in technologies suitable.
- RE from agricultural waste has been identified to offer a potential readily available in most European and Asian countries. So far only little use of straw has been made for a number of reasons.



# THE EU MARKET OF RENEWABLE ENERGY RE

- Most EU member states have already passed the national legal framework to set targets of RE percentages and their time schedules.
- Within the targets set most EU member states guarantee to the producers of RE the marketability of RE (in addition, some EU member states have set minimum prices per unit of RE).
- By law grid operators are obliged to transmit RE in a non-discriminating way at market prices and reinforce the grid – if necessary.
- Penalties are in force both for not meeting the country target and for power companies not purchasing RE (great variations among EU member states).



# THE RE POTENTIAL OF STRAW

- Straw as a waste product of crop production is theoretically available in huge quantities. At present it is reused only to a limited extent for various purposes.
- The Lower Calorific Value LCV of straws is close to low quality brown coal.
- The logistics of collection, baling, and storing of straw is already available and in operation.
- The price of pelletized straw delivered to the power plant is lower than the price of other biomass.
- The use of straw for RE production will be an important factor to stabilize the social structures of rural regions (additional revenues, saving or creation of jobs, transition from agriculture to energy production).



# REPORTED IMPEDIMENTS FOR STRAW AS RESOURCE

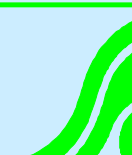
- Straws typically show a low ash melting point, which can lead to severe technical problems in the combustion chambers and boilers for steam production (clogging, corrosion).
- Emission limits could not be met.
- Other agricultural wastes showing higher energy content have been the preferred target of interest.
- Commercial aspects and viability of straw as RE resource have only been checked in selected few cases only.

... leading to the necessity of creating a comprehensive „Concept for the Utilization of Straw as Renewable Energy Sources“.



# KEY FEATURES OF THE CONCEPT

- Optimization of Straw Logistics
- Chemical Conditioning of Fuel
- Adapted Burner Technology



# OPTIMIZATION OF STRAW LOGISTICS

- The standard procedure of producing straw bales (squared blocks or rolled bales) shall be kept.
- Storage of bales will continue to be open air or under open shelters.
- The Special Project Company may invest for and operate mobile pelletizers which visit the storages over an annual cycle and produce high density pellets of straw (packed in big bags).
- Big bags of pellets will be transported to the central power plant of the Special Project Company for combustion and production of RE.
- (Alternative: straw pellets to be purchased from the market delivered to the power plant or straw bales delivered to the plant where direct grinding without pelletizing takes place)



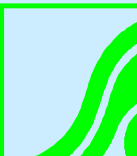
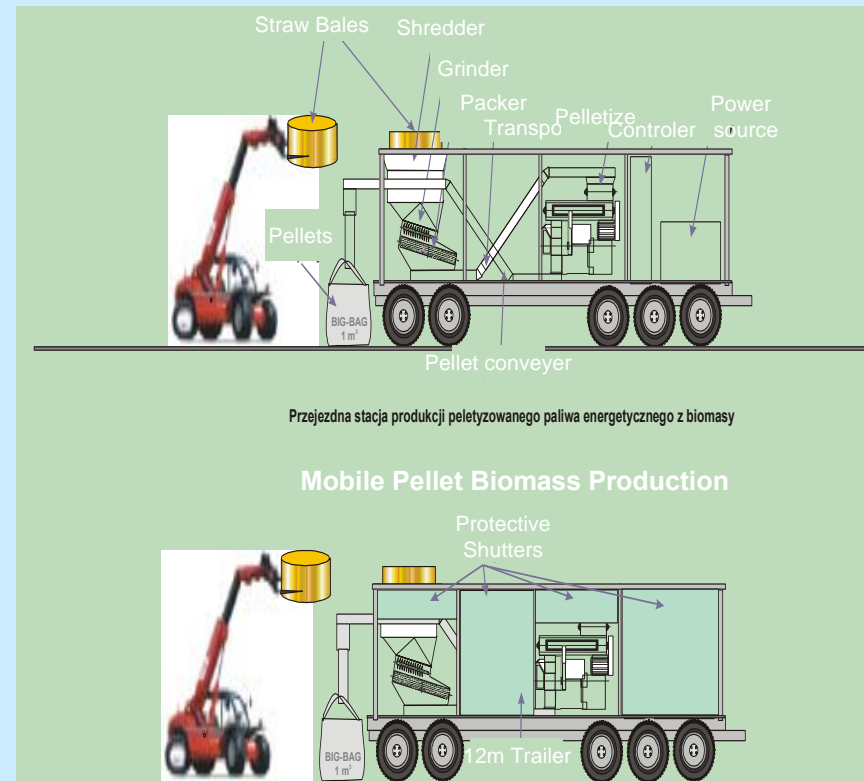
# MOBILE PELLETIZER STATION

## Each station comprises:

- shredder-grinder
- packer
- straw transporter
- pelletizer
- controller
- power source
- dosing of additives (if ever necessary)

## Mounted on shuttered trailer

Capacity 3.5 t/hr running 16 hours/day: 56 t/day max.



# CHEMICAL CONDITIONING OF WASTE STRAW

- Prevention of ash melting in the incineration chamber
  - additives adapt the ash properties of straw  
(increase of initial deformation / hemisphere / fluid temperature)
- Coating of heat transfer surfaces on boiler pipes and blocking of flue gas passes will be prevented
  - less corrosion and better efficiency
- Lower emission levels
  - immobilization of corrosive elements

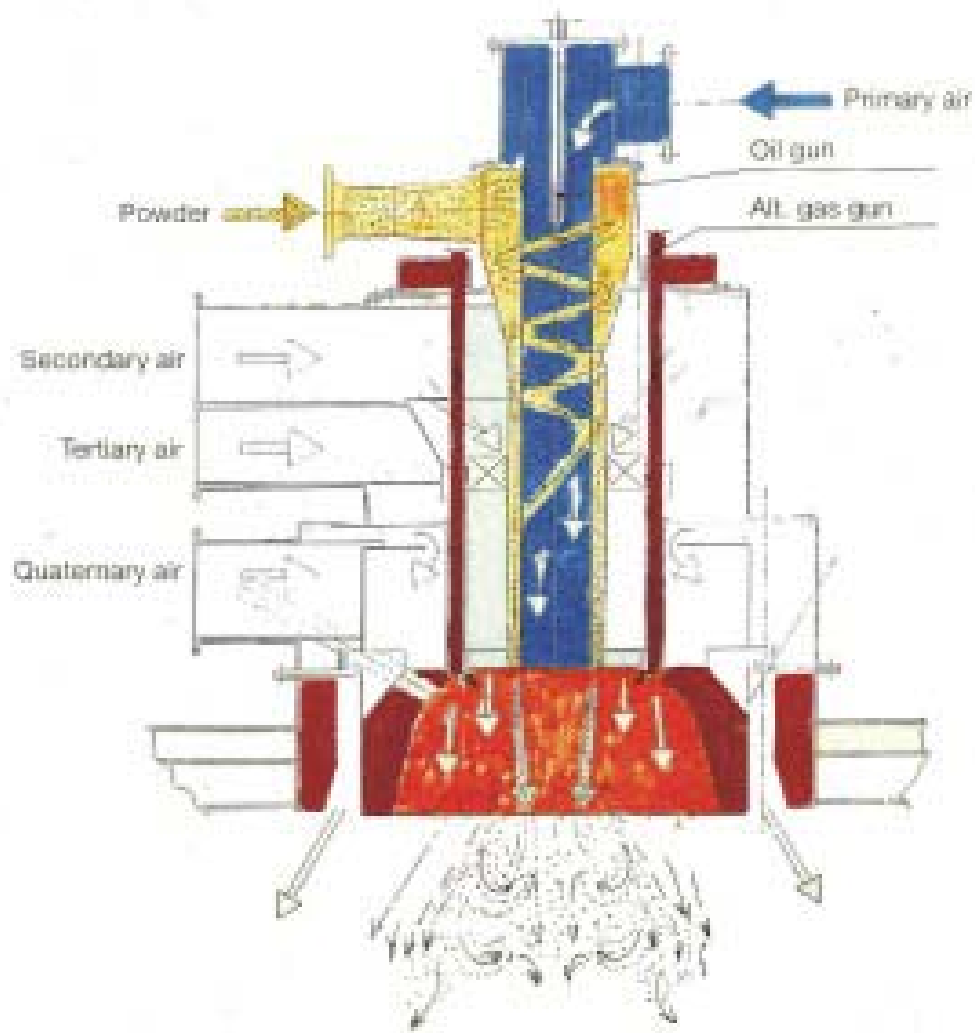


# POWDER INCINERATION

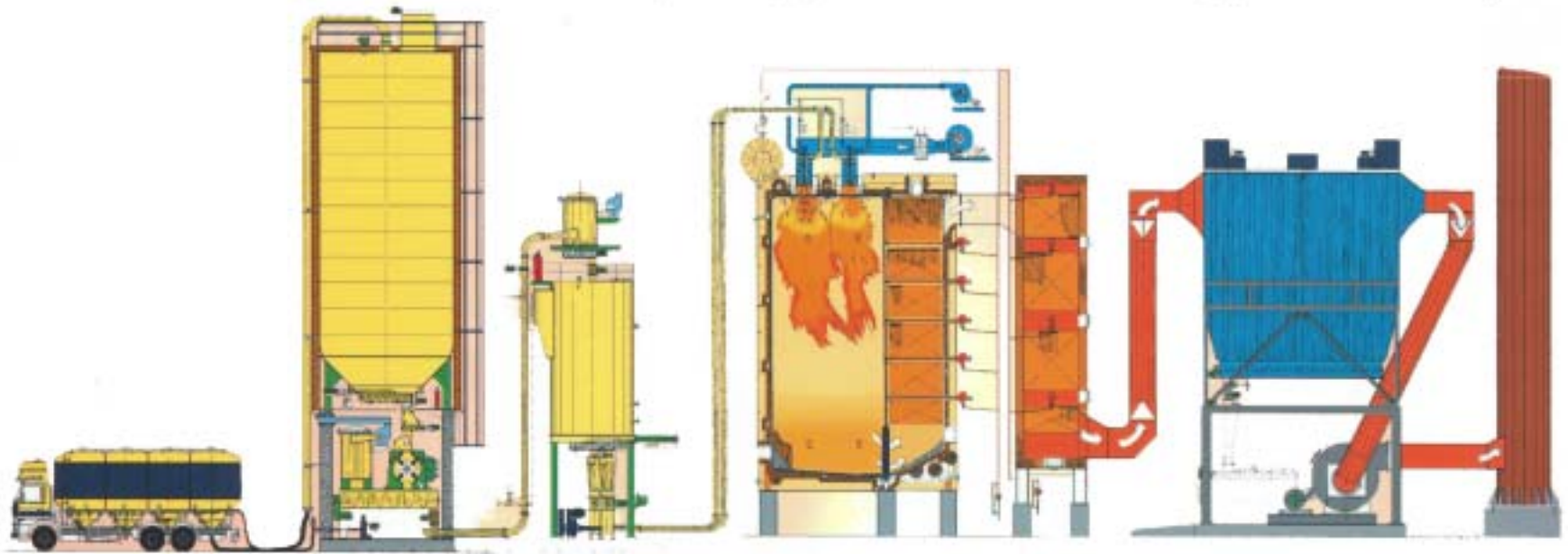
- **Improved control of incineration process**
- **Fewer movable components in the incineration chamber**
- **Improved control of corrosion and emission**



# POWDER BURNER



# POWER PLANT SCHEMATICS



**FUEL SUPPLY**

**FUEL STORAGE**

**FUEL GRINDING**

**INCINERATION  
CHAMBER**

**BOILER**

**FLUE GAS CLEANING**



# NAMYSLOW POWER PLANT (PL)



Version 09



# STATE OF THE ART

- Pelletizing of straw developed and tested
- Fuel additive developed and tested
- Fuel incineration developed and tested  
(incineration of 40 tons of straw in full technical scale)



# THE CONCEPT – ITS DEVELOPERS AND CONTRIBUTORS

- **ENOD d.o.o. of Katowice (PL)**  
(a group company of SFC Umwelttechnik GmbH of Austria)
- **an EU based manufacturer of power plants**  
(a company being a world leading specialist for powder incineration)
- **SFC Umwelttechnik GmbH of Salzburg (A)**  
(an international technology contractor)

