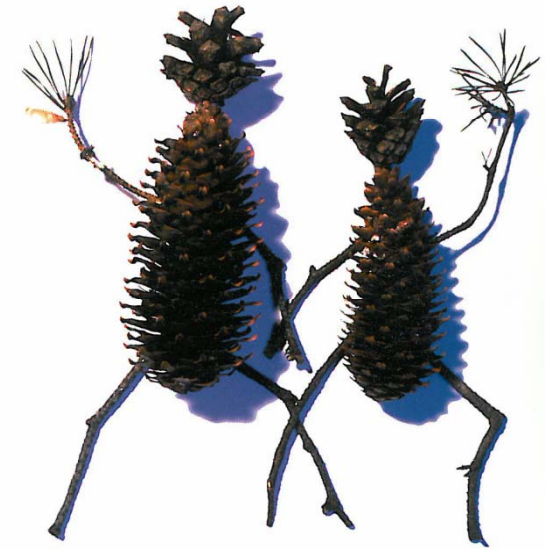


VÄRMEFORSK

This is Värmeforsk!

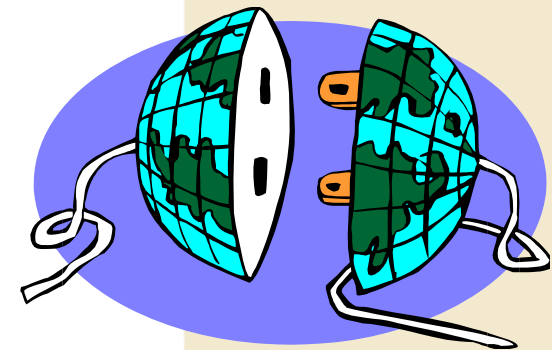


Thermal Engineering Research  
Association

## Goal

# Developing energy and process industries

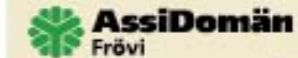
- Association for joint research
- Solving problems related to heat and power production
- Meets future challenges/demands
- Networking
- R&D to be applicable in industry within 5 years
- Turnover approx. 40 MSEK



# Trustees

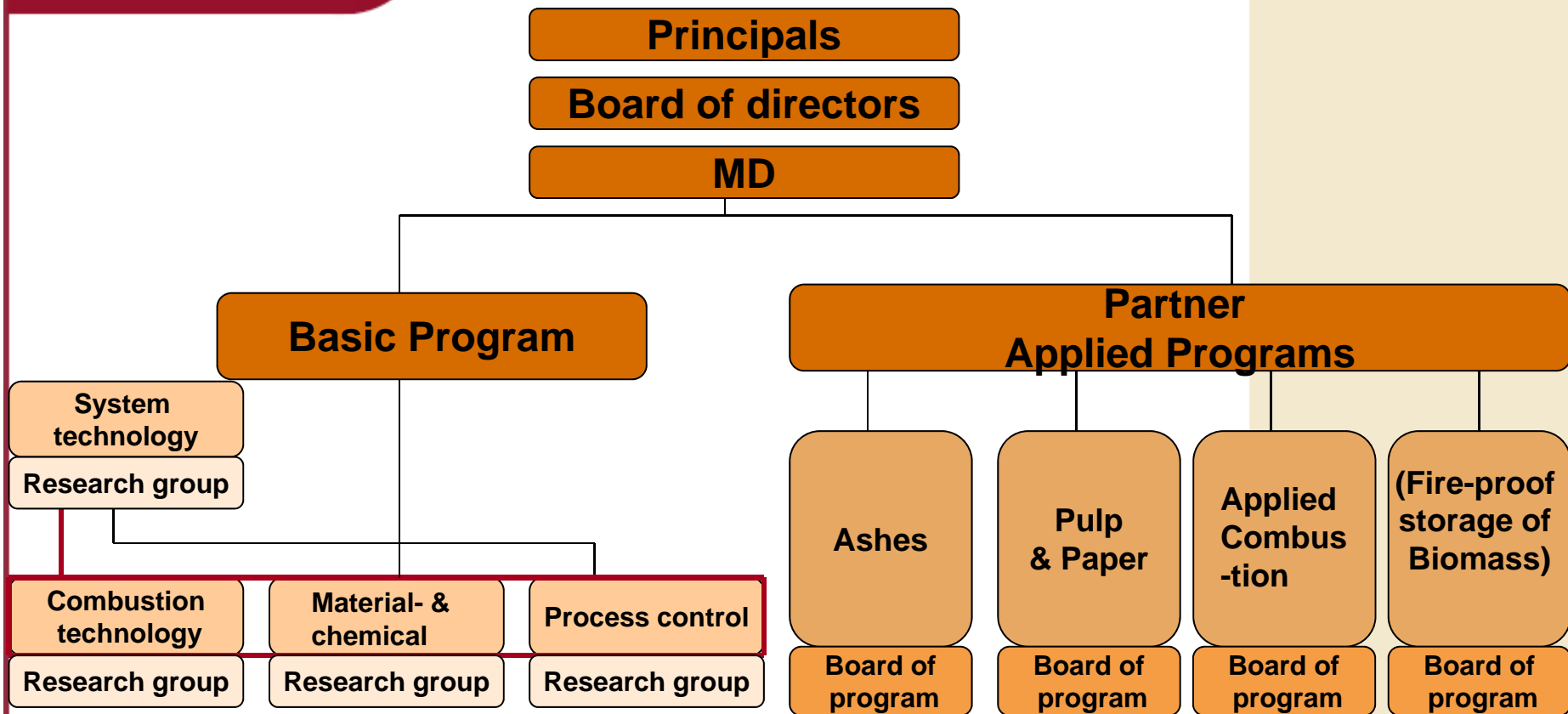
## Many participants

- Swedish Energy Agency
- Heat and Power producers
- Manufacturing industry
- Pulp and Paper industry
- Swedish District Heating Association
- Swedish Waste Management



# ORGANISATION

# Organisation and programs



## Main objectives

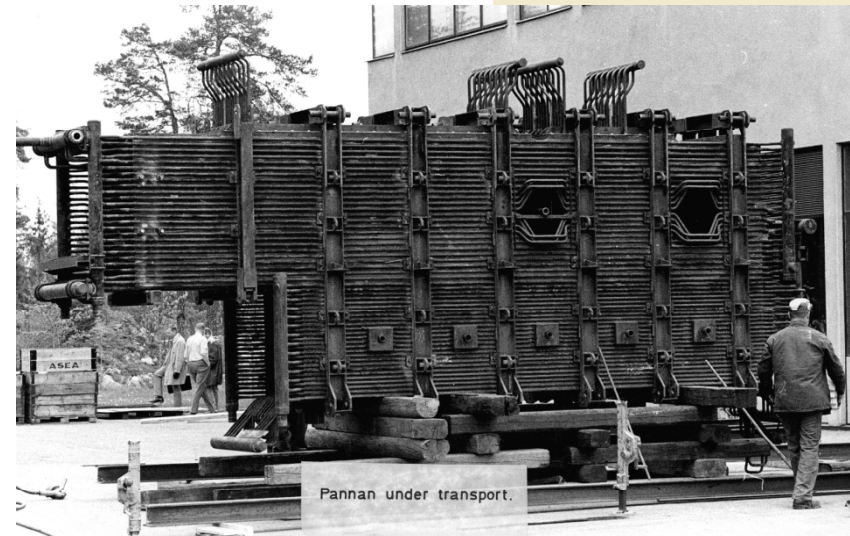
The programme aims to research and technical development:

- for using different fuels. The priority area during the program period is:
  - Forestry biomass
  - Classified waste fuels like paper, plastic or wood (SRF)
  - Crops and agrowaste
- for efficient operation of heat and power plants
- for increasing the accessibility and lifetime of the plants
- for solving technical environmental problems
- combined production, e.g. polygeneration of heat, power and biofuels



## The Origin

1968



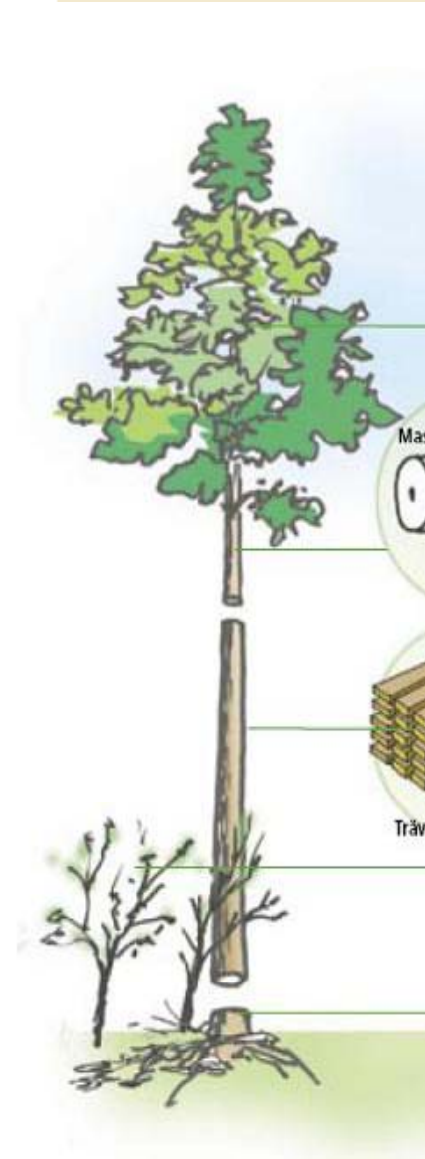
- Advanced steam parameters

# Turning-point of Swedish Heat-& Power Production

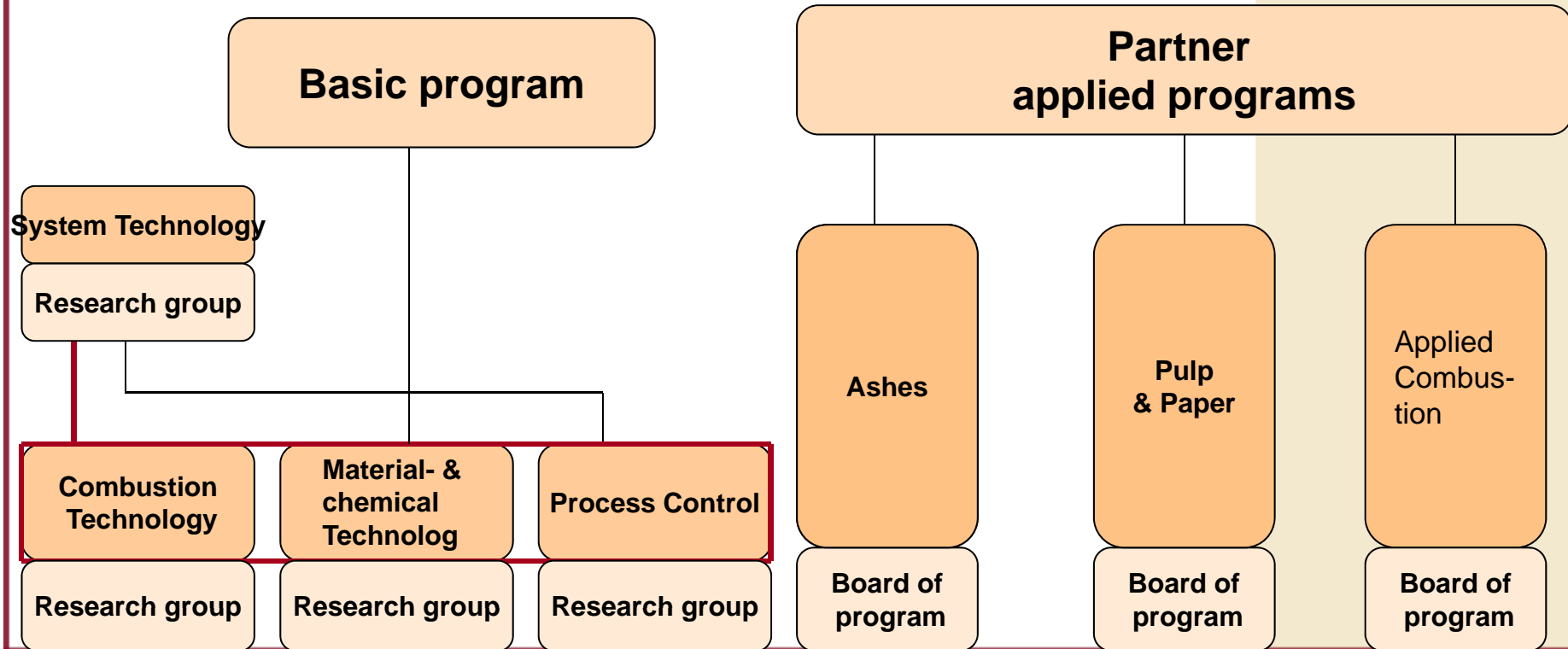
## Biomass!

- 1991 CO<sub>2</sub> tax was introduced in Sweden  
This creates incentives – fuels switch from coal to biomass

During 1990 and 2006 Sweden decreased emissions of CO<sub>2</sub> with 9%. At the same time the economic development was 44%

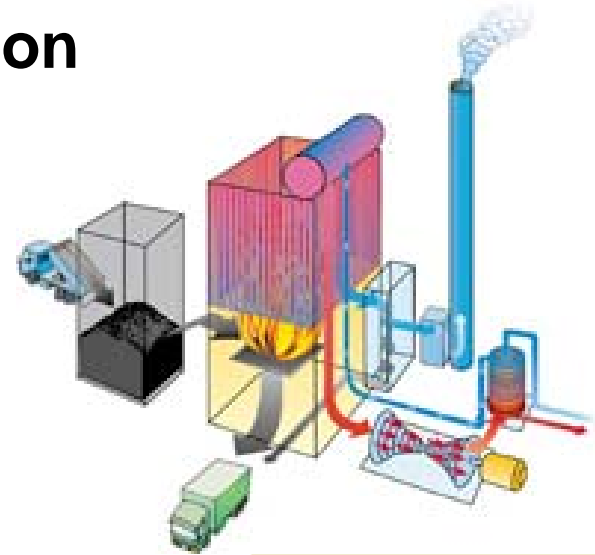


# Organisation



# Plant and Combustion Technology

## Base Program



- **Fuel management and fuel preparation**  
Developing methods and outlines for management and preparation of solid fuel – *Fuel Handbook*
- **Gas cleaning (Dioxin, CO, NO<sub>x</sub> and particles)**  
Adapt to new EU-directive and national environmental standards
- **Additives – sulfur, china clay, *municipal sewage sludge***

# Material- & Chemical Technology

- Materials for higher steam temperatures (up to 600°C) in biomass and waste fired plant
- Preventive maintenance and life time assessment with respect to cyclic operation
- Process chemistry  
Water cleaning Technologies



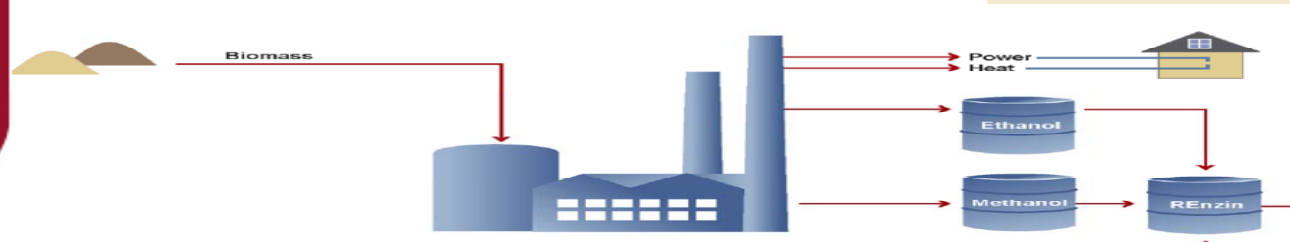
# Process Control

- **Control systems and optimisation**  
Model-based control strategies and production planning methods
- **Interaction between user and process**  
MMI (Man-Machine-Interface) methods that provide operating and maintenance personnel with reliable and clearly presented information to support their decisions in operating situations



# System Technology

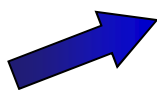
## Base Program



- **Polygeneration Plants**  
Optimizing energy systems through polygeneration plants which, as a base, produce heat and electricity
- **Sustainable fuel supply**  
Investigate possible fuel raw materials with respect to logistics, system design, environment, economy, steering instruments and risks

# Energy production in Pulp- and Paper industry

Applied Programs



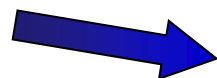
Pulp



District Heating



Electricity



Biomass  
• Bark  
• Peat  
• Lignin  
Bio- diesel



# Applied Combustion Technology

## Applied programs

- Exchange operational experiences
- Networking
- Solving today's problems



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THANK  
YOU!