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SINTEF Energy Research



The evaluation of our proposal

1.Relevance (Threshold 3 /5 ; Weight 1)	Mark :
The proposal fully fits the objectives of the call, demonstrating innovative technologies for large scale electricity generation in several EU member states.	5
2.Potential impact (Threshold 3 /5 ; Weight 1)	Mark :
Successful results from the proposed work would have substantial impact in short and medium term in the European waste incineration industry. This is particularly true in view of the fact that the consortium includes major actors/investors in the sector. The results will help competitiveness of European industry.	5
3.S and T excellence (Threshold 4 /5 ; Weight 1)	Mark :
The proposal vision of rebalancing the sector's focus on waste reduction to viewing waste and biomass as fuels for power generation is welcomed. The STobjectives are clearly defined and justified. The proposal shows excellent understanding of demonstration needs in the sector. Individual components of the work are not all new but the integrated approach is highly innovative.	5
4.Quality of the consortium (Threshold 3 /5 ; Weight 1)	Mark :
The consortium is excellent quality with industry player and highly reputed research partners. The composition of the consortium guarantees that results will be optimally used and actually implemented.	5
5.Quality of the management (Threshold 3 /5 ; Weight 1)	Mark :
The size of the consortium and diversity of work to be undertaken will make project management challenging. An appropriate management plan is included and the breakdown into subprojects is considered well-suited for this proposal.	4
6.Mobilisation of the resources (Threshold 3 /5 ; Weight 1)	Mark :
Overall the resources allocation matches the work proposed, however, budget may be high for some activities. The proposal is missing some financial details such as plant equipment costs.	4

- Ranked as no.1
- 28 out of 30 points
- Got all the funding we asked for



EUs largest project within energy from waste and biomass
Homepage: www.nextgenbiowaste.com

- **Title: "Innovative demonstrations for the next generation of biomass and waste combustion plants for energy recovery and renewable electricity production"**
- Funded by the European Commission (6FP)
- Contract no.: 019809
- Project duration: 2006-2010 (48 months)
- Budget: 29 017 555 €
- Co-ordinator: SINTEF Energiforskning AS, Norway

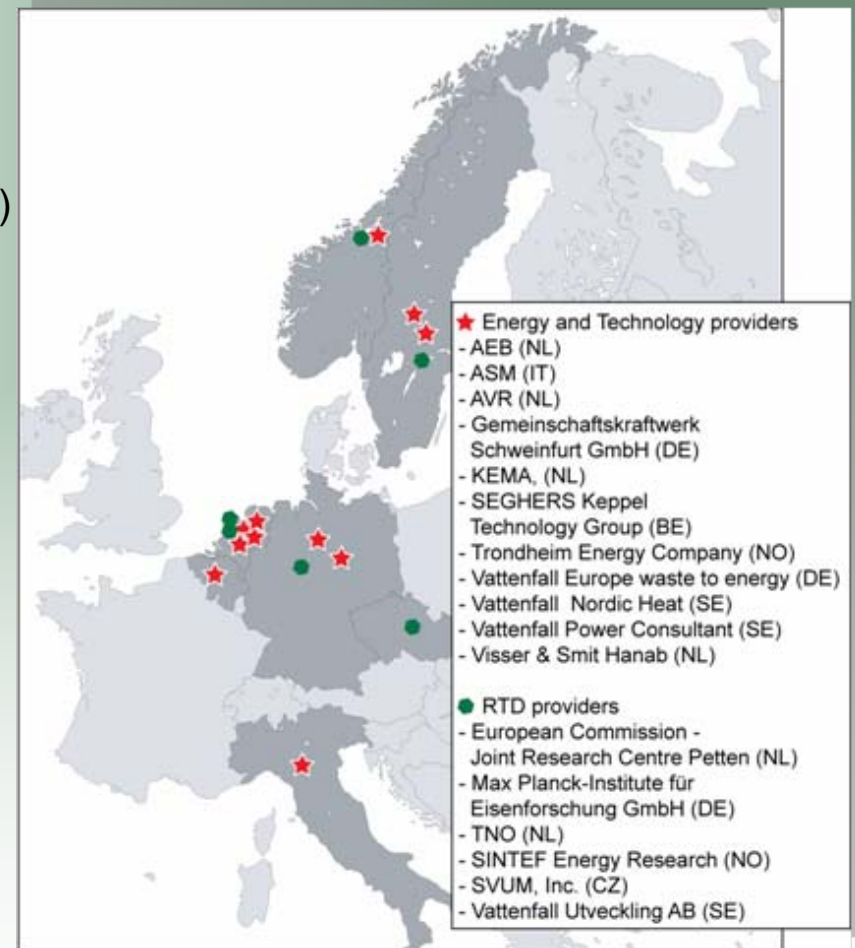
Consortium - 17 partners from 7 countries

Co-ordinator:

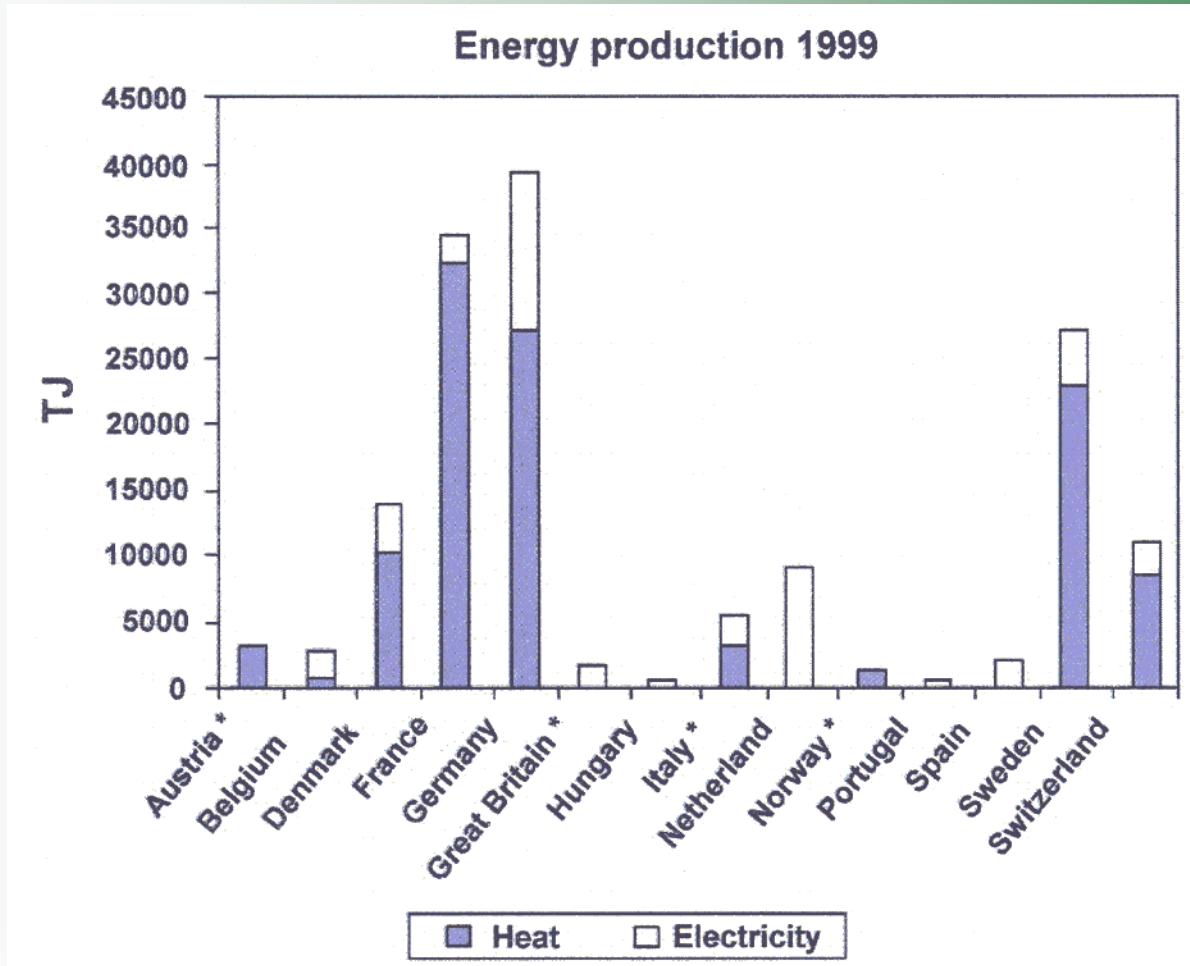
 SINTEF Energiforskning AS (NO)

Partners:

-  Afval Energie Bedrijf, Amsterdam (NL)
-  ASM BRESCIA SPA (IT)
-  Gemeinschaftskraftwerk Schweinfurt GmbH (DE)
-  Joint Research Centre of the EC (BE)
-  KEMA (NL)
-  Max-Planck-Institute (DE)
-  N.V. Afvalverwerking Rijnmond (NL)
-  SEGHERS Keppel Technology Group (BE)
-  SINTEF Energiforskning AS (NO)
-  SVUM, a.s., Prague (CZ)
-  TNO (NL)
-  Trondheim Energiverk Fjernvarme AS (NO)
-  Vattenfall AB Business unit Nordic Heat (SE)
-  Vattenfall Europe Waste to Energy GmbH (DE)
-  Vattenfall Power Consultant AB (SE)
-  Vattenfall Utveckling AB (SE)
-  Visser & Smit Hanab (NL)



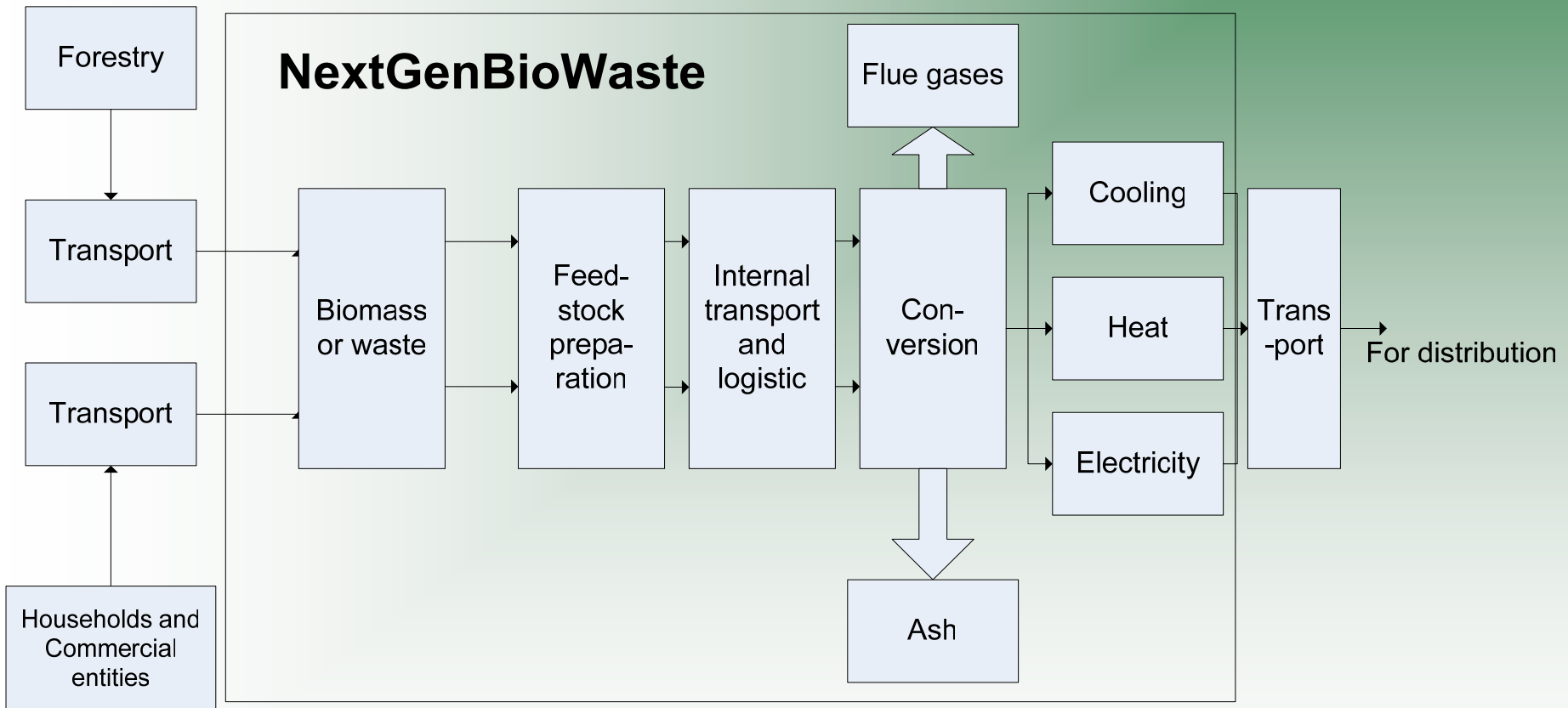
Energy from MSW combustion in Europe



Estimated Investment Costs/Benefits by Sector

TYPE OF ENERGY	ADDITIONAL CAPACITY 1997-2010	UNIT COST 1997 ECU	UNIT COST 2010 ECU	AVERAGE UNIT COST ECU	TOTAL INVESTMENT 1997-2010 billion ECU	ADDITIONAL ANNUAL BUSINESS 2010 billion ECU	BENEFIT OF ANNUAL AVOIDED FUEL COSTS 2010 billion ECU	TOTAL BENEFIT OF AVOIDED FUEL COSTS 1997-2010 billion ECU	CO ₂ REDUCTION million tn/year IN 2010
1. Wind	36 GW	1,000/KW	700/KW	800/KW	28.8	4	1.43	10	72
2. Hydro	13 GW	1,200/KW	1,000/KW	1,100/KW	14.3	2	0.91	6.4	48
3. Photovoltaics	3 GWp	5,000/KWp	2,500/KWp	3,000/KWp	9	1.5	0.06	0.4	3
4. Biomass	90Mtoe				84	24.1	-	-	255
5. Geothermal (+ heat pumps)	2.5 GW	2,500/KW	1,500/KW	2,000/KW	5	0.5	-	-	5
6. Solar Collectors	94 Mio m ²	400/m ²	200/m ²	250/m ²	24	4.5	0.6	4.2	19
Total for EU market					165.1	36.6	3	21	402

Scope of NextGenBioWaste



The objective

The objective of NextGenBioWaste is to demonstrate innovative ways of improving the energy conversion and renewable electricity production using municipal solid waste materials and biomass for large-scale supply of renewable electricity and heating/cooling to end-users - at a more competitive cost and improved environmental parameters.

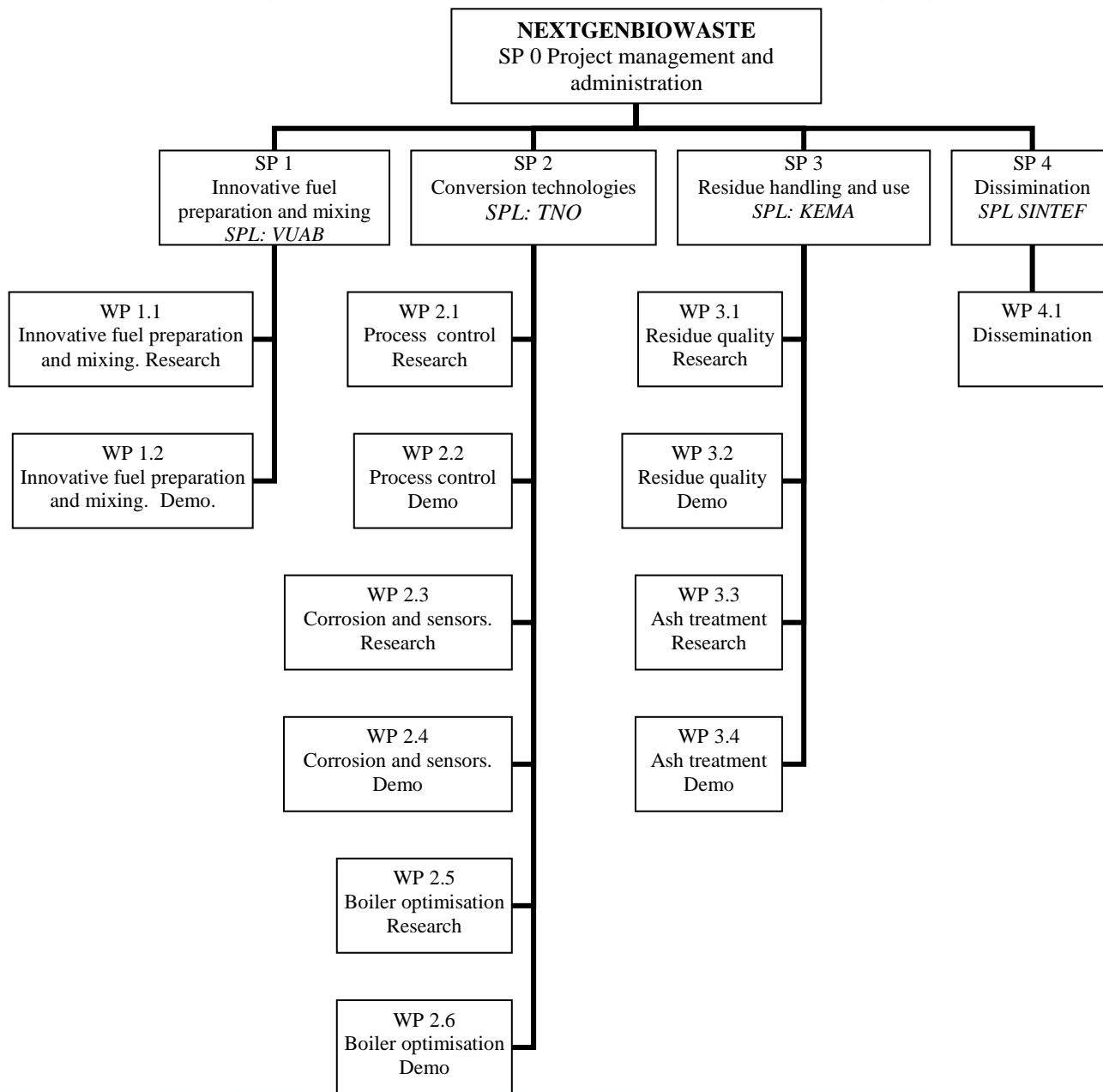


NextGenBioWaste's Targets

1. Increase the electric efficiency for waste to energy plants from 22% to 30% (gross generated).
2. Double the lifetime of heat exchange components at existing steam temperatures
3. Increase the electric efficiency for biomass combustion plants from 33% to 35%, while making the systems more cost-effective by the use of more low-grade fuels
4. Lower the fuel cost at least 1 mill.€/year for a 100 MW_{th} biomass combustion plant while maintain the two former sub targets (2 and 3).
5. Enable technologies for upgrading of bottom ash, thus, enabling the utility companies to valorise from 70% of their bottom ashes for civil engineering purposes

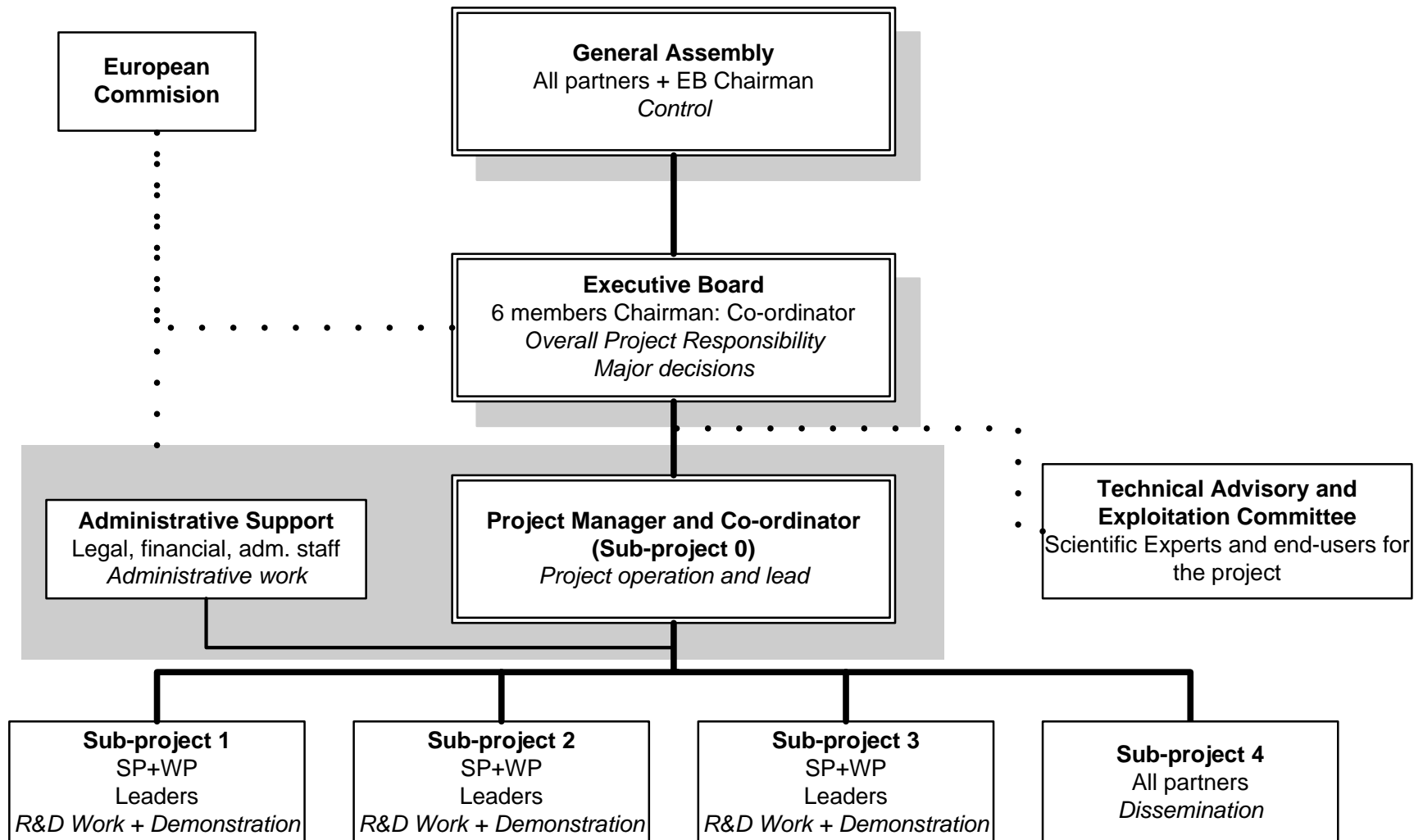
Demonstrations on 8 plants in Europe

1. A full-scale demonstration of a retrofit fluidised bed bottom design for combustion of 100% of waste wood fuel in a 100 MWth biomass boiler
2. Large-scale demonstration of advanced control systems enabling plant operators to obtain more stable conditions and improved electrical efficiency
3. Large-scale tests of advanced boiler materials and cladding of superheater surfaces to reduce maintenance costs
4. Large-scale demonstration of advanced combustion techniques using low excess air enabling more compact and cost-effective systems with higher electrical efficiency
5. Full-scale demonstration of high-dust selective catalytic reduction (SCR) of NO_x for improved electrical efficiency and environmental performance
6. Full-scale demonstrations on the use of additives in order to reduce operation costs because of decreased fouling and to reduce maintenance costs via an increased lifetime
7. Demonstration of novel design and retrofitting of boilers for improved efficiency
8. Full-scale demonstration of artificial aging of bottom ashes for improved leaching properties giving added value products





Project management



Examples of large-scale demonstrations

■ Vattenfall Europe Waste to Energy, Hamburg Germany

■ A few details:

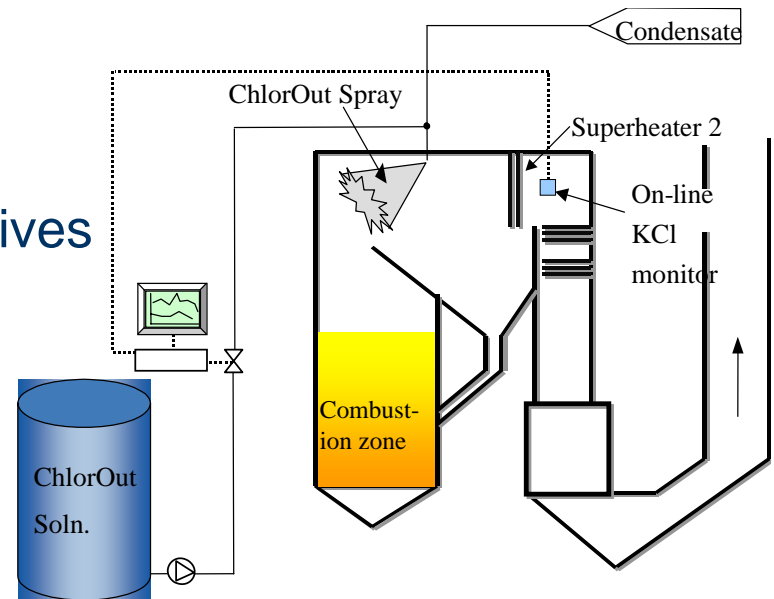
- WtE plant, MSW 320 000tons waste/year
- Grate fired. 2 lines. 380C steam
- 100 MW. A present heat.
- Possible to convert to heat and power

■ Corrosion reduction by use of additives

■ First time trial in a WtE plant

■ Both short-term and long term tests to be performed

■ The level of KCl will be monitored on-line



Examples of large-scale demonstrations

■ ASM SPA, Brescia Italy



■ A few details:

- Fuel: MSW / biomass
- 3 lines; 552 000 t/a (137.000 t biomass)
- 361GWh electric and 292 GWh thermal
- Reducing NOx emissions while improving the electrical efficiency
- Presently SNCR system is installed
- Installation of high-dust SCR system in existing boiler
- Risks: material performance and energy recovery potential

Examples of large-scale demonstrations

- Vattenfall Nordic Heat, Nyköping, Sweden 
 - A few details:
 - BFB plant, 100MWth
 - 1 line, CHP, 540°C steam
 - Fires about 50/50 forest wood residue/waste wood
 - Reconstruction of the bed bottom design, enabling the plant to burn 100% waste wood
 - Assess the impact of corrosion and fouling due to increased use of low-grade fuels
 - Demonstrate the use of additives to reduce corrosion and fouling
 - Potential to reduce fuel costs with 1 mill. €/year



Thank You For Your Attention!