IVAGO

17th September 2010

KaHo Sint-Lieven

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general manager

WHAT IS IVAGO?

- **I**ntergemeentelijke
- **V**ereniging voor
- **A**fvalbeheer in
- **G**ent en
- **O**mstreken

= inter-communal co-operation for waste management in Ghent and Destelbergen

IVAGO: a mixed intercommunity organization for waste management

- Public partners: Ghent and Destelbergen: 49,9%
- Private partner ECOV: 49,9%
  - INDAVER
  - SITA
- Associated partners (incineration)
  - IVLA: 0,001%
  - IDM: 0,001%

Why IVAGO

Lack of Know-How

- Rapidly changing environmental legislation with many juridical consequences
- Inefficiency in logistic systems, old vehicles, no computerised systems
- Old fashioned incineration plant
- No management structure
- No experience in communication with residents
- Not enough technically skilled people

Why IVAGO

Lack of financial resources

- cost for city of Ghent for the year 1994 = 27 mio EUR
- Forcasted for year 2000 = 55 mio EUR
- (real budget for year 2008 = 28,5 mio EUR)

Key DATA

- foundation: 6th June 1994
- start operations: 1st January 1995
- number of employees: 400
- vehicles: 200
- budget: 51 million euro (2009)
- working location: 255.000 inhabitants
- ISO 14001 and 9001 certified

Activities IVAGO

- Collection of household waste residents:
  - kerbside: 72.000 ton
  - 7 amenity sites: 57.000 ton
- Collection of household alike waste small companies: 20.000 ton per year
- Cleansing services city of Ghent
- Marketing of collected waste fractions
- Waste communication & education programs
- Refuse waste incineration (non hazardous): 100.000 ton per year with energy recovery

Long term strategy of IVAGO

Control of costs of waste :

- waste prevention
- recycling and reuse
- information about waste streams
- change of behaviour towards waste
- feedback of results

Objectives IVAGO

Sustainable waste management

Waste hierarchy

- prevention
- reuse
- recycling
- incineration with energy recovery
- no landfill disposal of untreated waste

Differential tarification – “the polluter pays”

Practise: the polluter

- pays for the volume/weight presented
- Contributes in relation to the cost of final treatment
  - * refuse waste 100%
  - * organic solid waste 60-80%
  - * plastic bottles, metal and drink cans 5-10%
  - * paper, glass free

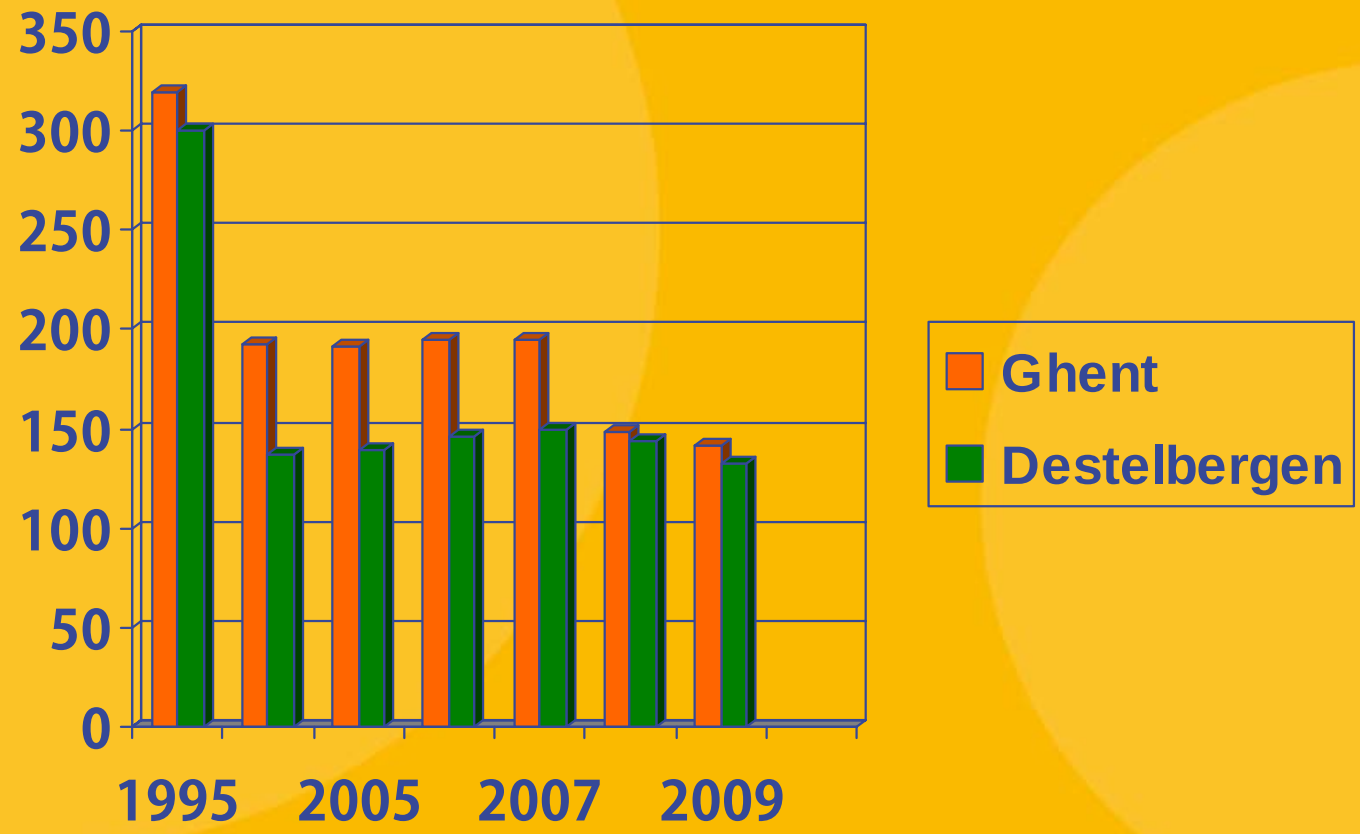
Reuse, Recycling

- Selective door-to-door collection
  - Glass
  - Paper
  - Kitchen and Garden Waste
  - Packaging Waste: bottles, cans,…
  - Bulky household
- Selective collection appartment blocs
- Application principle “the polluter pays”

Waste prevention

- Home Composting
- Educational programs
- Reusable shopping bags
- Guide for less waste
- Application of the principle ‘the polluter pays’

IVAGO – results – refuse waste



Civic Amenity Sites

Bring sites (7)

- demolition waste
- green waste
- metals
- white goods & brown goods
- wood
- tyres
- household hazardous waste (batteries, paint residues, oils)
- textile
- number of visitors: 480.000

IVAGO

Technology

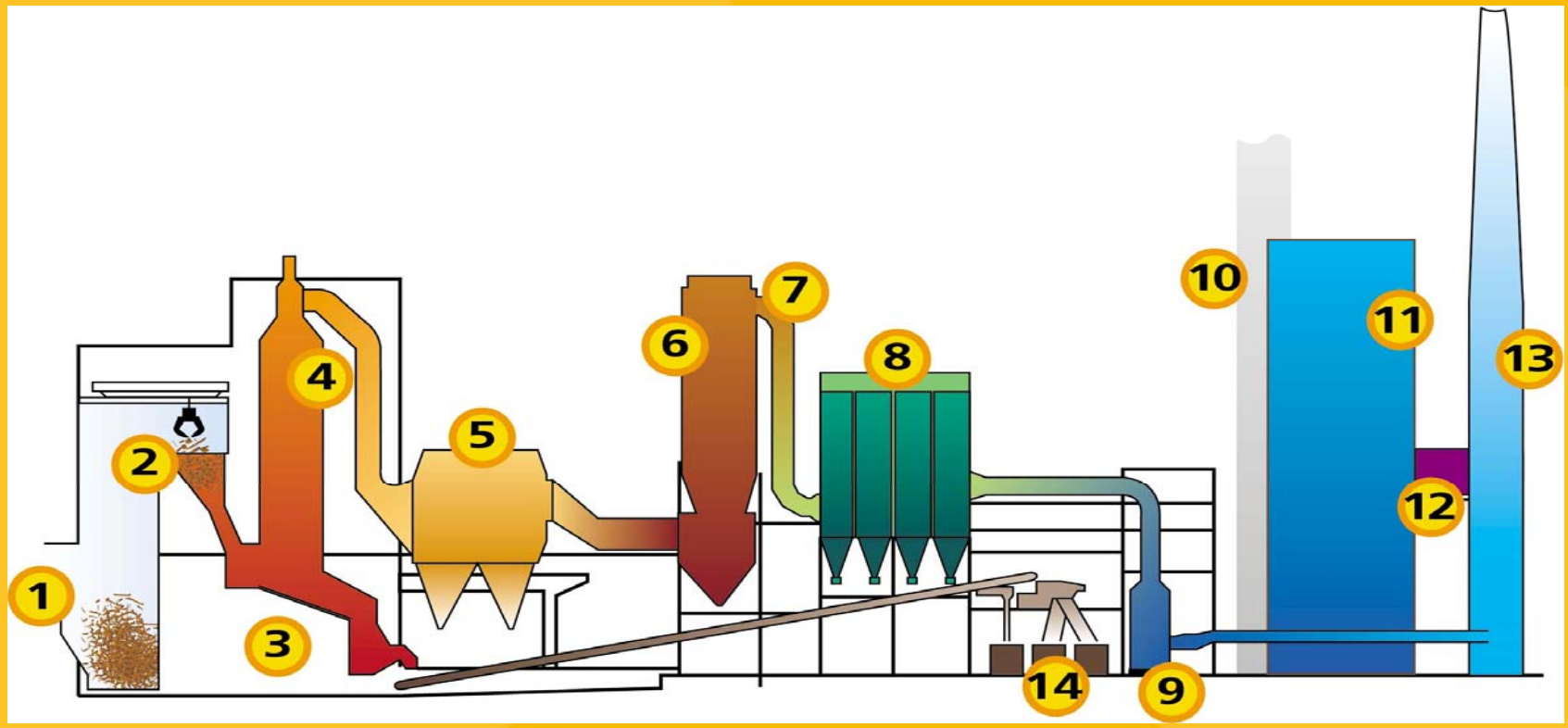
Energy recuperation

Incineration of waste

Built in 1979

- refurbished in 1996
- new installation
  + river water intake
  + flue gas cleaning
  + deNOx (Nox) – 2000
  + recovery of energy

The installation



EMISSION RESULTS

Table: Emission results based upon the on-line measurement equipment			
	Mass flow rate	**Emission concentration**	**Norm**
			(Vlarem II en milieuvergunning dd 08/01/2004)
	(ton/year)	expressed in mg/Nm³ at 11% O_2	
N0x	44,6	81,75	200
SO_2	3,6	5,71	50
CO	2,1	3,75	50
Total dust	0,77	1,28	10
HF	-	< 0,1	1
HCl	0,15	0,24	10
CO_2	84500	-	-

Table: Emission results heavy metals in the flue gasses				
		Mass flow rate	**Emission concentration**	**Norm**
				(Vlarem II en milieuvergunning dd 08/01/2004)
			Expressed in mg/Nm³ at 11% O_2	
Cd		< 0,003	< 0,0055	
Tl		< 0,0055	< 0,01	
	Som	< 0,011	< 0,02	0,05
Sb		< 0,0055	< 0,01	
As		< 0,004	< 0,007	
Pb		0,0032	0,006	
Cr		< 0,0055	< 0,01	
Co		< 0,0055	< 0,01	
Cu		0,0032	0,006	
Mn		0,0032	0,006	
Ni		0,004	0,007	
V		< 0,0055	< 0,01	
Sn		< 0,0055	< 0,01	
	Som	< 0,0065	0,012	0,5
Hg		0,008	0,014	0,05

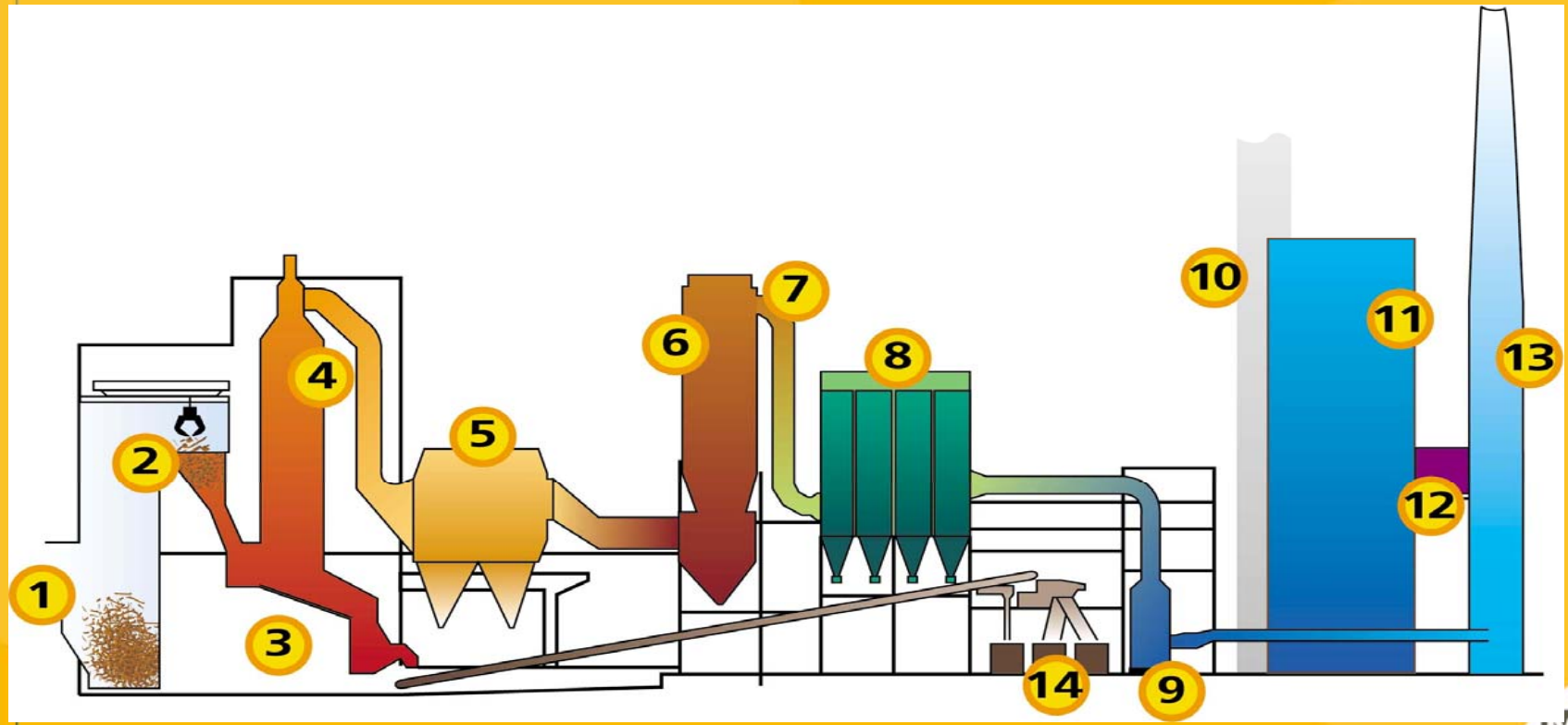
EMISSIONS

Periode	Lijn 1
26/12/2007 - 07/01/2008	0.0013
10/12/2007 - 26/12/2007	0.0014
14/11/2007 - 10/12/2007	0.0015
29/10/2007 - 12/11/2007	0.0015
15/10/2007 - 29/10/2007	< 0.001
01/10/2007 - 15/10/2007	0.0013
17/09/2007 - 01/10/2007	0.001
03/09/2007 - 17/09/2007	0.0012
20/08/2007 - 03/09/2007	0.001
06/08/2007 - 20/08/2007	0.0012
23/07/2007 - 06/08/2007	0.0013
09/07/2007 - 23/07/2007	0.0014
25/06/2007 - 09/07/2007	0.0015
11/06/2007 - 25/06/2007	0.002
29/05/2007 - 11/06/2007	0.0028
02/05/2007 - 29/05/2007	0.0031
16/04/2007 - 02/05/2007	0.0022
02/04/2007 - 16/04/2007	0.0074
19/03/2007 - 02/04/2007	0.0121
05/03/2007 - 19/03/2007	0.0063

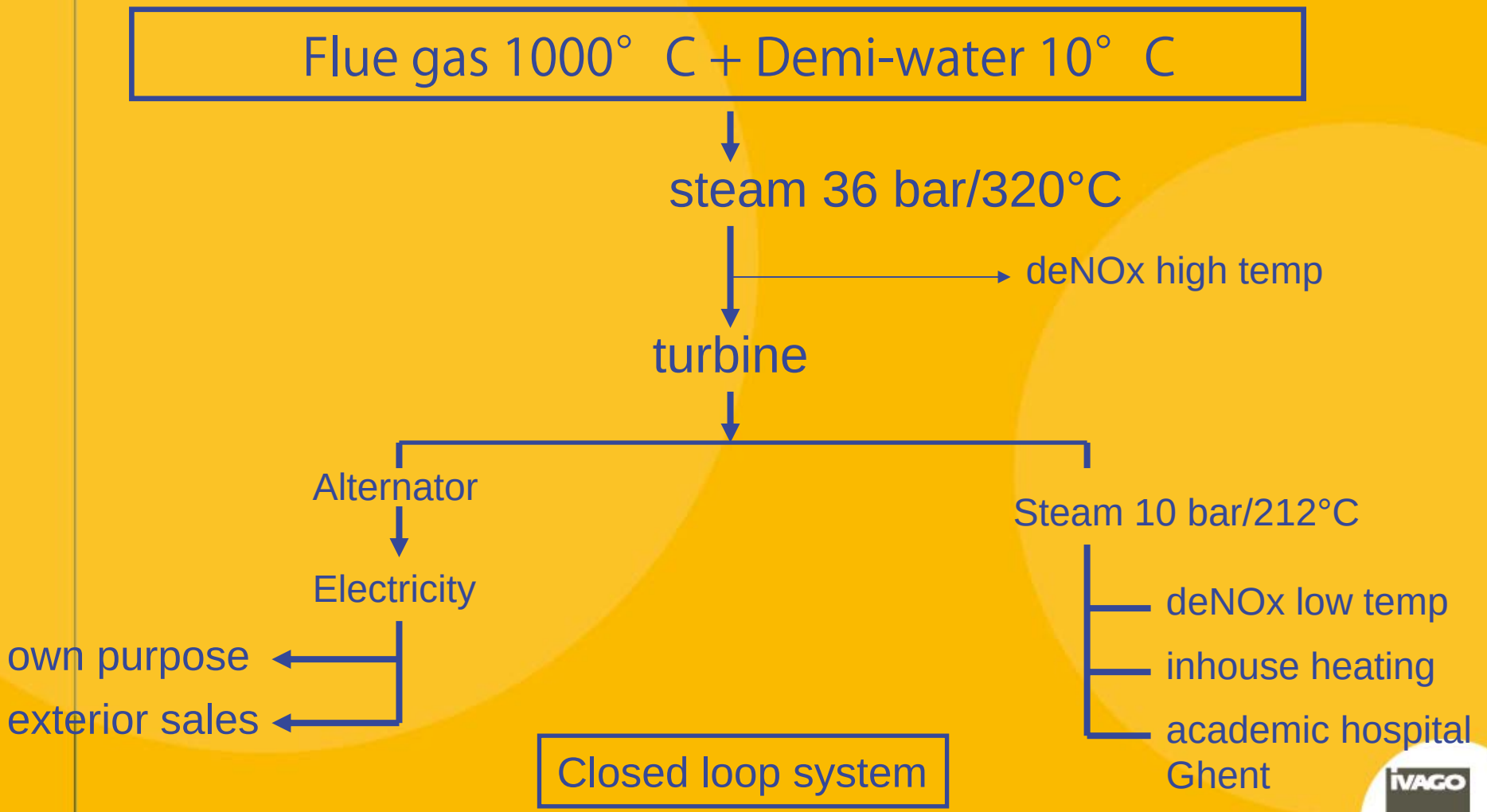
- IVAGO installed modern equipment for the continuous sampling of the emission for dioxines and furanes
- Each 300 à 500 hours the sample is investigated at a certified laboratory
- The emission to achieve is 0.1 ng TEQ/Nm^3
  ng = nanogram = one billion of a gram

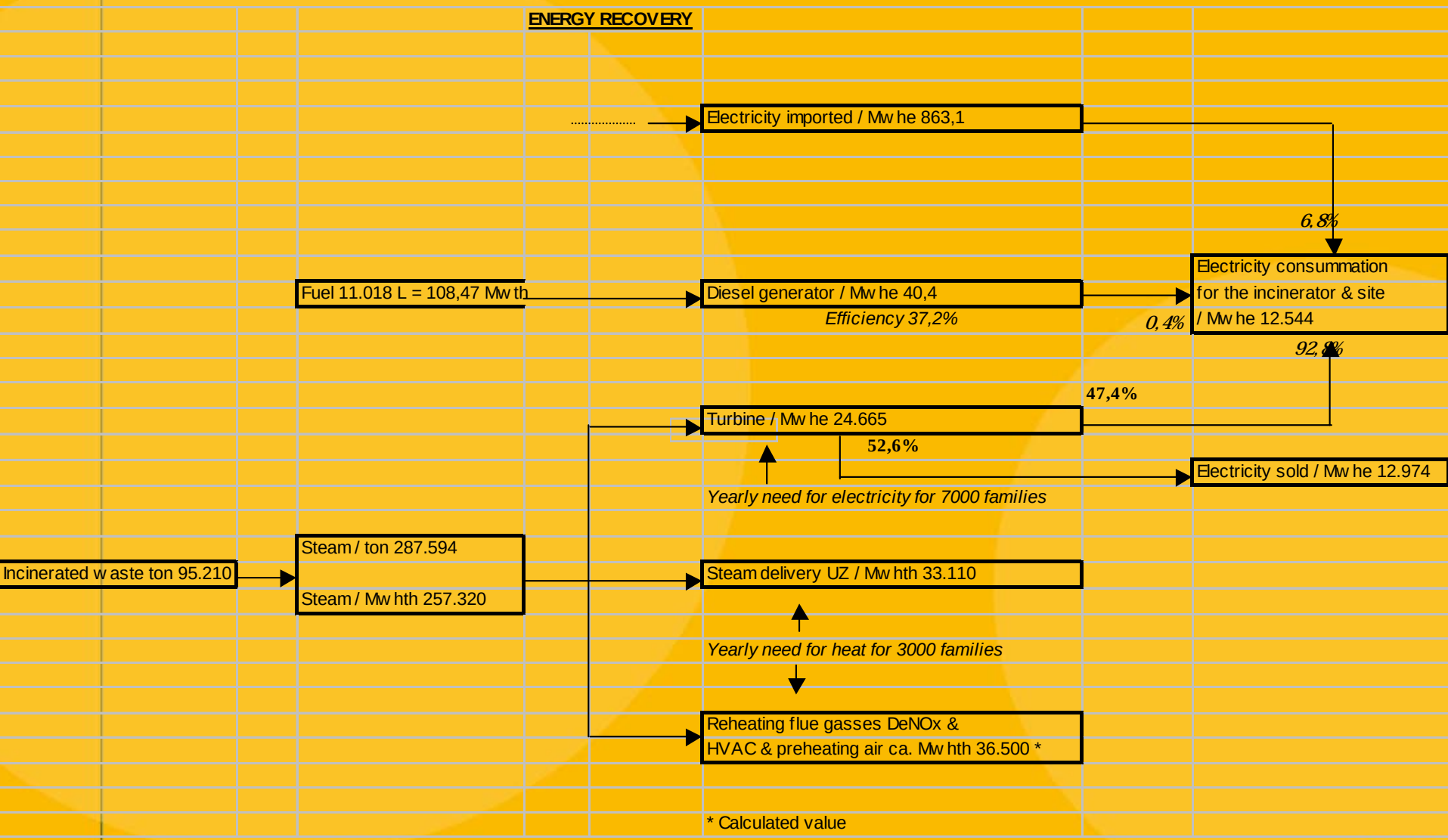
Why energy recuperation ?

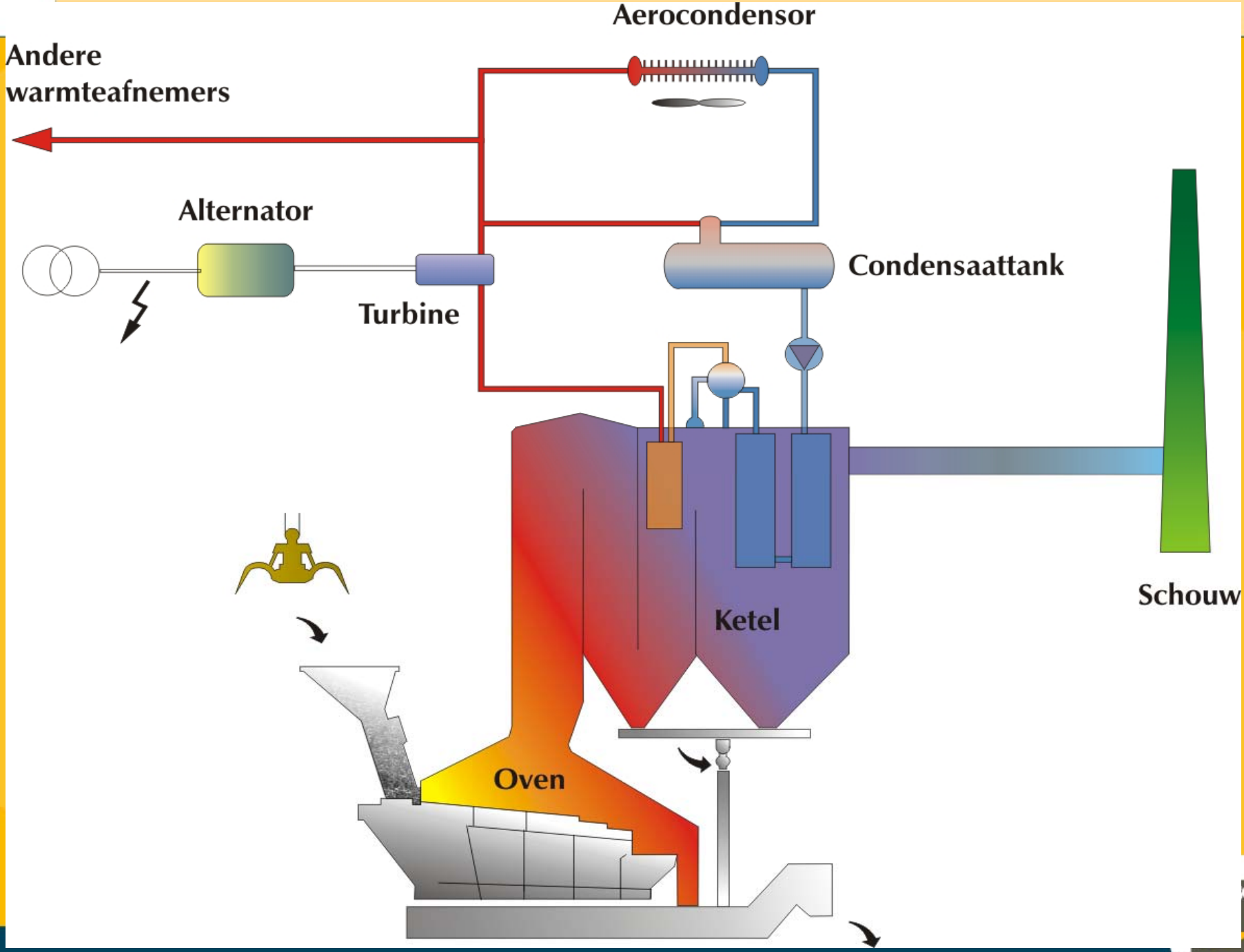
- legislation: 2008!
- environmental taxes: 7 euro/ 14 euro
- loss of energy



Energy recuperation

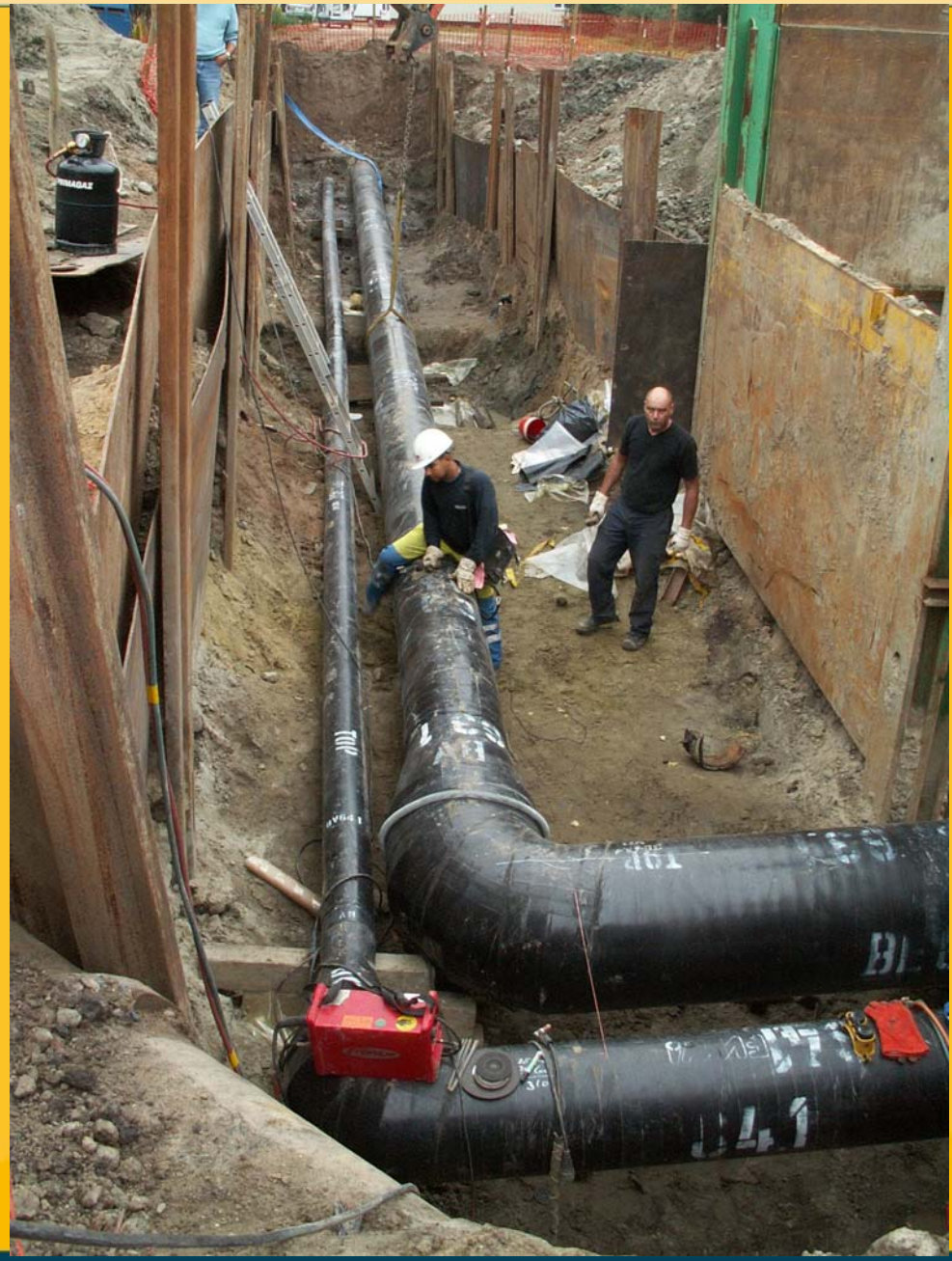


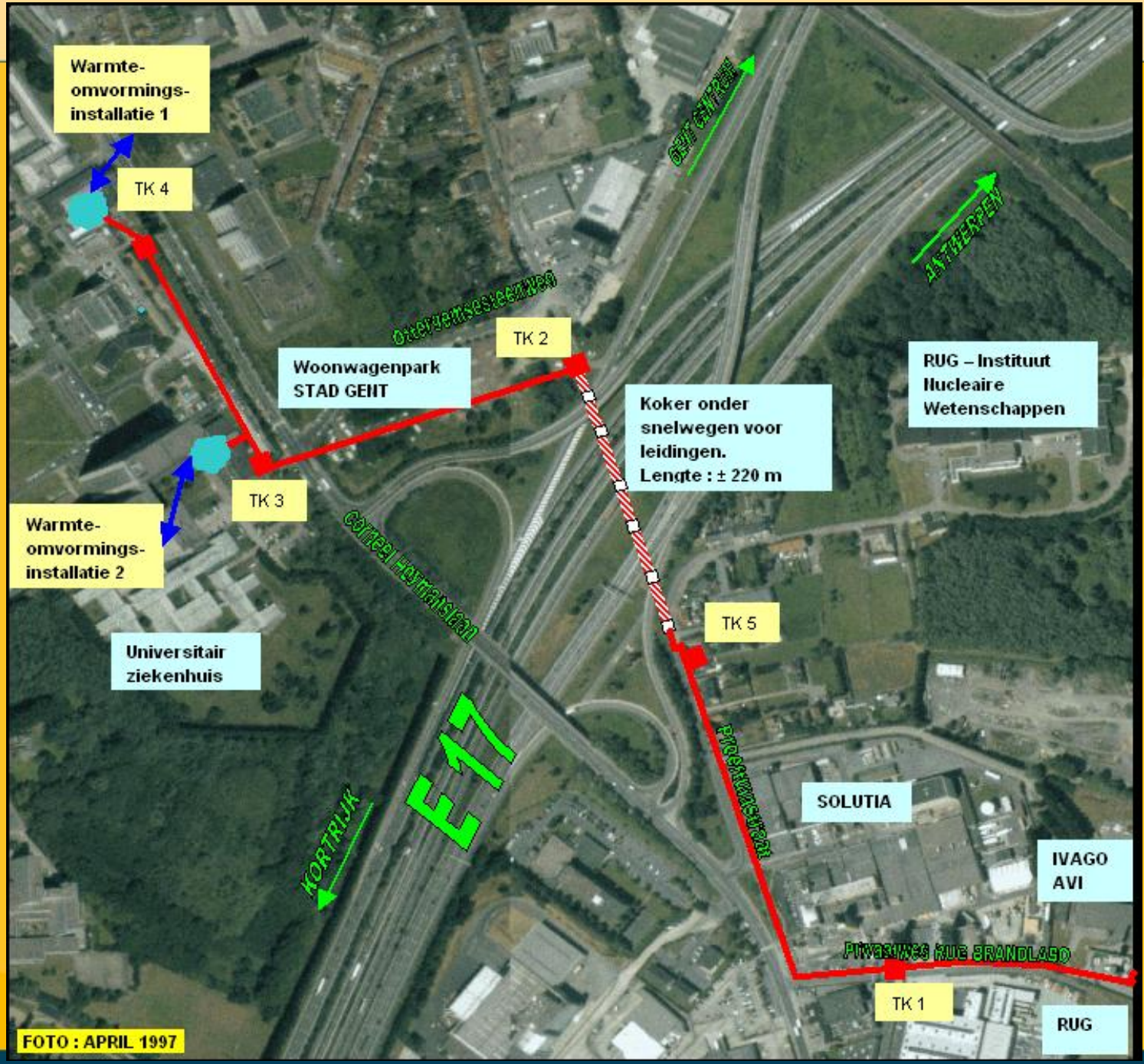

ENERGY RECOVERY
Electricity imported / Mw he 863,1
6,8%
Electricity consummation for the incinerator & site / Mw he 12.544
Fuel 11.018 L = 108,47 Mw th
Diesel generator / Mw he 40,4
Efficiency 37,2%
0,4%
92,8%
47,4%
Turbine / Mw he 24.665
52,6%
Electricity sold / Mw he 12.974
Yearly need for electricity for 7000 families
Incinerated w aste ton 95.210
Steam / ton 287.594
Steam / Mw hth 257.320
Steam delivery UZ / Mw hth 33.110
Yearly need for heat for 3000 families
Reheating flue gasses DeNOx & HVAC & preheating air ca. Mw hth 36.500 *
* Calculated value


Aerocondensor
Andere warmteafnemers
Alternator
Turbine
Condensaattank
Ketel
Schouw
Oven

Energy recuperation

- 2 lines: 5,8 tons/hour, availability 91 %
- 2 steam boilers: 320° C, 19,4 tons/hour/line, availability 98 %
- 1 two stage turbine: 1,8 – 4,8 MWe/h, availability: 99 %
- production of electricity: 23.500 ~= MWe/year consumption of 10.000 families
- production of steam: 90.000 MWe/year ~= energy consumption of 15.000 families




Warmte-
omvormings-
installatie 1
TK 4
Woonwagenpark
STAD GENT
TK 2
TK 3
Warmte-
omvormings-
installatie 2
Universitair
ziekenhuis
Koker onder
snelwegen voor
leidingen.
Lengte : ± 220 m
RUG – Instituut
Nucleaire
Wetenschappen
TK 5
SOLUTIA
IVAGO
AVI
TK 1
RUG
E17
KORTRIJK
GENT CENTRUM
ANTWERPEN
FOTO : APRIL 1997

Financial aspects

- Investment of 34 mio euro
- Depreciation over 19 years
- Less environmental taxes
  Almost no costs for electricity
  Almost no costs for heating (gasoil)
- Total cost per ton : 120 euro

Yearly environmental savings

- Since 2000 (deNOx installation)
  * dioxines/furanes: average 0,002 ng TEQ/Nm^3
  * NOx: reduction with 80% (- 250 ton)
- Since 2005 (energy recuperation)
  * CO_2 reduction with 30.000 ton
  * CO reduction with 80% (-25 ton)
  * Nox reduction with 30% (-32 ton)
  * SO_2 reduction with 60% (-20 ton)

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