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**Waste-to-Energy**

▶ **Energy & Resource Efficiency**

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## Improving the Energy Efficiency of the WtE plant Attero Wijster (NL)

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# Subjects



- R1 performance of Dutch WtE plants
- Introduction to Attero's WtE plants
- Attero Wijster WtE plant in more detail
- Improvement potential to raise the energy performance
  - - projects in execution
  - - projects in development



## Summary

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- 2008 performance based on NL approach (= net eff.), for some plants errors included and others based on design figures
- 2010 performance based on EU Guidance (strict interpretation), most plants calculated from real operational figures. Independent verification on thermal input by Dutch Emission Authority, energy output on agreed invoices payed by customers



2011 performance based on EU Guidance, figures comparable to 2010 performance. All plants operational



WtE plant	2008	2010	2011
AEB/Amsterdam	0.69	0.76	0.79
ARN/Nijmegen	0.67	0.86	0.82
<b>Attero/Moerdijk</b>	<b>0.97</b>	<b>1.01</b>	<b>1.05</b>
<b>Attero/Wijster</b>	<b>0.49</b>	<b>0.62</b>	<b>0.66</b>
AVR/Duiven	0.39	0.61	0.62
AVR/Rozenburg	0.59	0.62	0.61
E.on/Delfzijl	0.96	0.75	0.83
HVC/Alkmaar	0.55	0.69	0.70
HVC/Dordrecht	0.61	0.71	0.65
Omrin/Harlingen	0.95	1.00	0.76
Sita/Roosendaal	0.63	0.75	0.70
Twence/Hengelo	0.52	0.83	0.76



# Attero WtE plant Moerdijk

1



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# Attero Wte plant Wijster

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# Anaerobic Digestion Wijster (May 2012)

cap 55 kton/a of organic wet fraction from MSW  
producing 4,5 million m<sup>3</sup> SNG/a



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# Steam export to Noblesse Proteïns Wijster (processing animal by-products)







- **Capacity of waste treatment plant: 1.040.000 t/a**
- **Capacity of incineration plant: 400 -625 kt/a, depending on NCV (determined by input and operational setpoint of the waste treatment plant)**
- **Steam production: 3\* 75 t/hr at 41 bar/405°C**  
» (3\* 70 t/hr design figure)

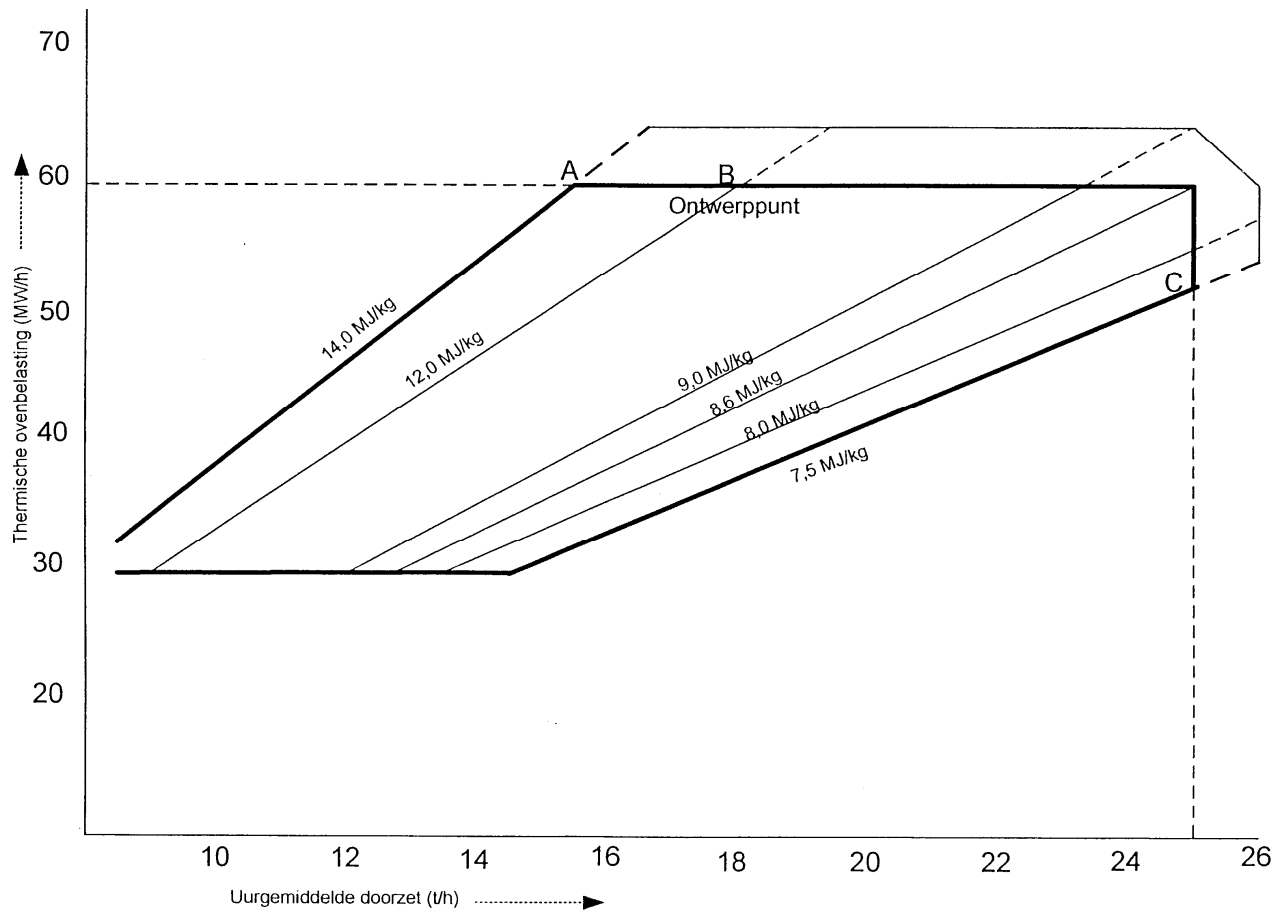


- **Turbine generator: 54 MWe gross (installed capacity)**  
» (48 MWe at design load)

# Attero Wijster WtE plant in more detail

## Incineration diagram GAVI Wijster

2



# Attero Wijster WtE plant in more detail

Waste pretreatment (Aug '09/May '12)

3

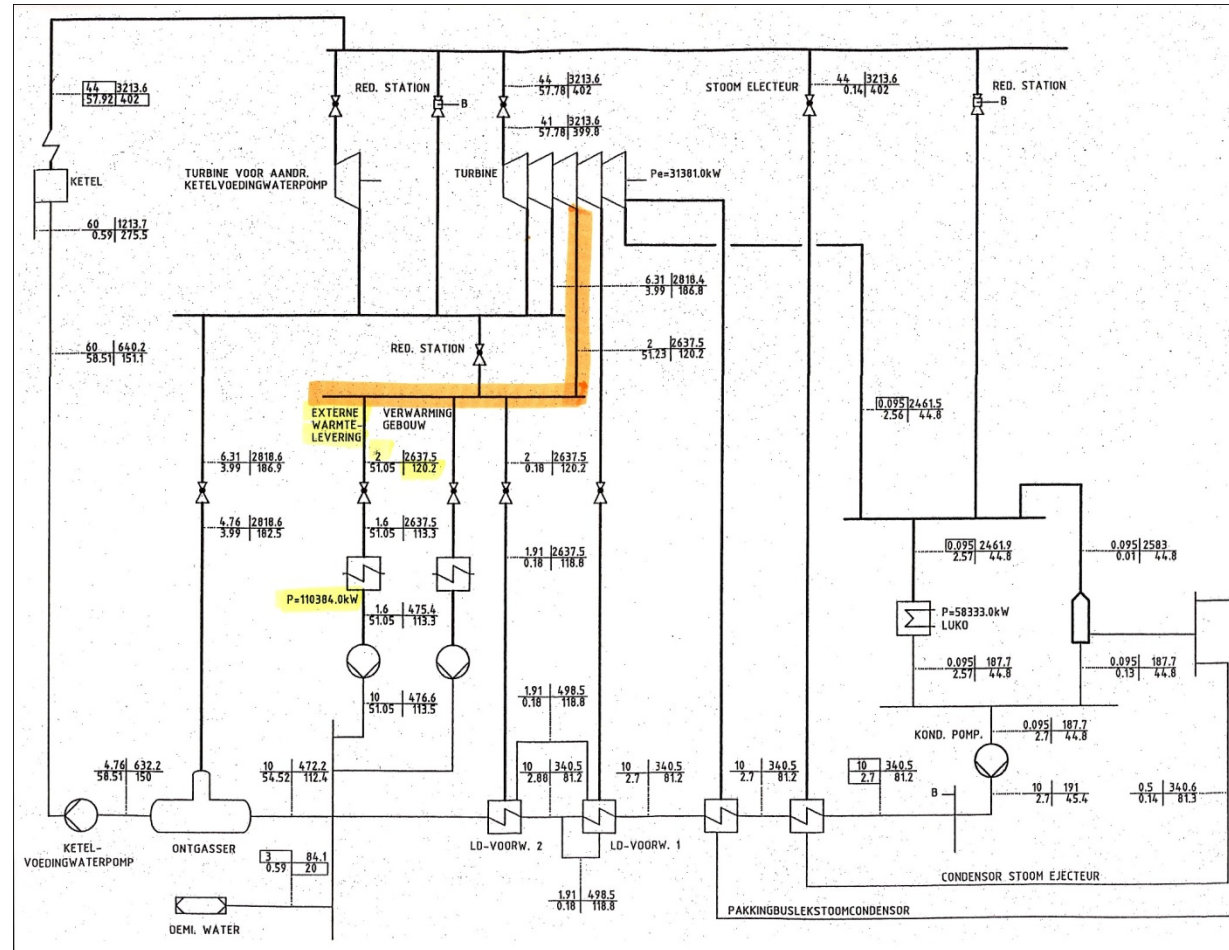


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# Attero Wijster WtE plant in more detail

## Rankine cycle with max delivery of heat

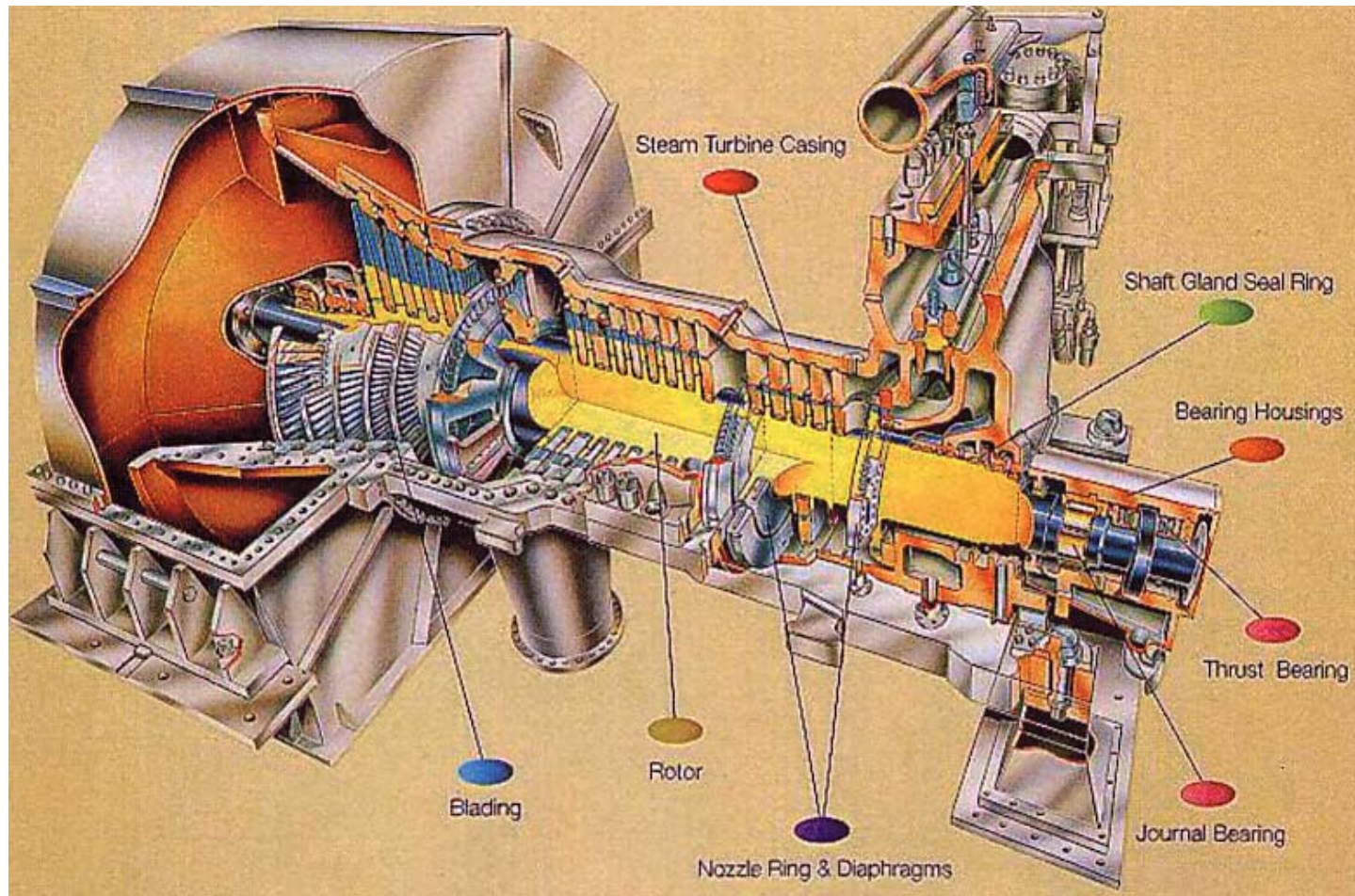
4



# Attero Wijster WtE plant in more detail

## Steam turbine (exploded view)

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## Improvement potential to raise the energy performance: existing projects



- Comparing 2010 to 2011 shows an increase of 0.04 (0.62 to 0.66), due to a large maintenance project in 2010 (0.03 setback) and continuous operational excellence (contribution in 2011: +0.01).
- The cycle of large maintenance projects was every 4 years since start of operation in 1996; from 2015 this cycle will be extended to 6 years. Lifting of the turbine rotor (like in 2010) will be done every 12 years (= ca 100.000 oper. hours). Av. effect on R1 ca 0.01 +
- Steam export to Noblesse Proteïns has started end of 2011. At full load the effect on R1 will be ca 0.04 + (expected from 2013 on)
- Switch from SCR to SNCR: first of 3 FGT blocks realized, last one to be modified at start of 2013. Total effect on R1 ca 0.04 +
- LP steam to AD plant (0.01+) and LT heat to leachate water treatment plant (0.03+) will raise R1 ca 0.04 + together



## Improvement potential to raise the energy performance: projects in development



- A number of projects are in negotiation (different potential customers). Heat export by water of 90°C (ideal temp. level for 2 bar steam extraction from the steam turbine). Total amount of heat ca 35 MWth with 8.000 hrs/a operation. If all will be realized, a further increase of R1 at  $> 0.14$  is possible (decrease of electricity with 0.07 but increase by heat export of 0.21 makes a net effect of 0.14)
- Existing customer Noblesse Proteïns considers an extension of their activities with increase of their heat demand as well. Details are not available up to now.



## Summary for Attero Wijster



- Current (2011) status is R1 at 0.66
- Projects in execution will increase 0.12, resulting in R1 at 0.78
- Opportunities with new projects promise ca 0.14, raising R1 further to ca 0.92
- Conclusion: an existing WtE plant over 15 years of age with modest energy performance can be upgraded to high R1 values if the operator is willing to focus on heat export (Attero Wijster is just an example, it is not the only WtE plant in NL doing so).

