



Wkk-inventaris Flanders state of the art 2005 (2)

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VITO - study carried out in task of VEA

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management summary

Since 1990 Vito have been established Wkk-vermogen in Flanders inventoried. In an earlier report Wkk-inventaris Flanders: State of the art 2005 this inventory in task of VEA was actualised for 2005. In 2006, important modifications was carried out concerning the quality definition and the Flemish and European reference output for calculating the energieperformantie of Wkk-installaties. In the preceding report Wkk-inventaris Flanders: State of the art 2005 (2) "becomes the figures from the report" Wkk-inventaris Flanders: State of the art 2005 reassessed taking into account the previous modifications. The numbers that prevents, can be therefore no longer compared with these from the previous inventories o.w.v. the adapted calculation manner.

Table mentioned below gives a summary Wkk-installaties established of the capacities and energy figures of in Flanders in 2005:

- beside the data for the totally established electric capacity and total electricity production, the corresponding figures were calculated according to annex II of the directive 2004/8/EG of the European Parliament and the Council [1] or according to appendix II of the decision of the Flemish government of 7 July 2006,2]. Because of this parts warmth or electricity of the same installation which does not come from WKK become, excluded. Moreover the figures are also reflected for certificate beneficiary Wkk-installaties. These are the installations as from 01/01/2002 those qualitative are according to appendix III of the decision of the Flemish government of 7 July 2006,2], where was taken into account the European reference output [3].
- for the classification in qualitative and not qualitative Wkk-installaties were taken into account point a and c annex III of the directive 2004/8/EG of the European Parliament and the Council [1] or with appendix III of the decision of the Flemish government of 7 July 2006,2]. Small-scale Wkk-installaties are considered as qualitative when the RPEB > 0 and large Wkk-installaties become as qualitative are considered when the RPEB > 10%. were taken into account moreover for the reference output the Ministrieeel decide of the Flemish government that in the Bulletin of Acts, Orders and Decrees has appeared on 1/12/2006, [3], and in what the European reference output was taken over. It was not taken into account appendix IV of this last decision (correction factors for netverliezen) because insufficient data were available this apply. For the installations larger than 25 MWe it was taken into account Art. 12 point 2 of the directive 2004/8/EG of the European Parliament and the Council [1] for stipulating presence or absence of qualitative is of an installation.
- the primary energy saving three times were calculated: 1 time on the basis of the European reference output (according to the Ministrieeel decides of the Flemish government that in the Bulletin of Acts, Orders and Decrees has appeared on 1/12/2006, [3]).2 on the basis of the Flemish reference output such as described time in Art.10 of the decision of the Flemish government of 7 July 2006,2] where 1 time was described, for the installations which work with recuperatiestoom, taken into account with the fictitious stoomopwekkingsrendement such as in the appendix to decision 2004-62 of the VREG [4].

	Engines	Gasturbines	STEG	steam turbines netgekoppeld	steam turbines direct traction	Total
Total established electric WKK capacity [MW]	161	326	731	126	113	1457
Total established thermal WKK capacity [MW]	200	422	436	742	962	2762
Established electric WKK capacity according to annex II [MW]	152	289	371	126	113	1051
Established electrically qualitative WKK capacity according to definition directive 2004/8/EG [MW]	143	203	282	90	53	771
Established electric certificate-authorized WKK capacity [MW]	40	0	395	5	0	440
Production of electricity and warmth of Wkk-installaties						
Total net electricity production [GWh/year]	418	2337	3644	612	907	7918
Total calorification [GWh/year]	558	3054	2812	3206	6631	16261
Net electricity production according to annex II	398	2102	2122	519	899	6040
Net electricity production qualitative WKK according to definition directive 2004/8/EG [GWh/year]	397	1445	2014	465	396	4717
Net certificate beneficiary electricity production [GWh/year]	102	0	1233	40	0	1375
Average vollastdraaitijd [h/year]	2602	7165	4986	4841	8026	5433
Primary energy saving of Wkk-installaties						
Primary energy saving on the basis of Flemish reference output [GWh/year]	288	1148	1587	274	229	3526
Primary energy saving on the basis of Flemish reference output with fictitious stoomopwekkingsrendement [GWh/year]	288	1148	1587	79	-960	2142
Primary energy saving of qualitative WKK on the basis of Flemish reference output	316	1118	1461	532	748	4175
Primary energy saving of qualitative WKK on the basis of Flemish reference output with fictitious stoomopwekkingsrendement [GWh/year]	316	1118	1461	337	335	3567
Primary energy saving on the basis of European reference output [GWh/year]	315	1413	1985	883	1818	6414
Primary energy saving of qualitative WKK on the basis of European reference output	342	1257	1701	1112	1448	5860
Relative primary energy saving of Wkk-installaties						
RPEB on the basis of Flemish reference output	19	15	16	5	2	10
RPEB on the basis of Flemish reference output with fictitious stoomopwekkingsrendement [%]	19	15	16	2	-10	6
RPEB of qualitative WKK on the basis of Flemish reference output [%]	22	23	21	13	13	18
RPEB of qualitative WKK on the basis of Flemish reference output with fictitious stoomopwekkingsrendement [%]	22	23	21	6	3	15
RPEB on the basis of European reference output	21	17	19	16	16	17
RPEB of qualitative WKK on the basis of European reference output [%]	24	25	24	23	23	24

The totally inventoried electric capacity to Wkk-installaties amount to MWe in 2005 in Flanders 1,457, what means that for 378 MWe to WKK's in 2005. these installations have a total net electricity production of 7,918 GWh/year Wkk-productie have recovered according to appendix II of the decision of the Flemish government of 7 July 2006,2] amount to of this 76%. 53% of the established capacity concern qualitative Wkk-installaties according to Art. 12 point 2 of the Europes directive 2004/8/EG [1]. 30% of the established capacity and 17% of electricity production are certificate-authorized.

The totally established thermal capacity amounts to 2,762 MW with a total calorification of 16,261 GWh per year.

The industry the most important sector with an electric capacity of 925 MWe or 63.5% of the totally established capacity has been totally established.

Concerning the fuels, aardgas appears has been totally installed by far the most important fuel with an electric capacity of 1,176 MWe or almost 81% of the totally installed capacity.

The total primary energy saving calculated with the Flemish reference output amounts to 3,526 GWh per year or 12.7 PJ. When the qualitative installations are only considered, PJ amount to these 4,175 GWh per year or 15. The total primary energy saving calculated with the European reference output amounts to 6,414 GWh per year or 23.1 PJ, what almost double this way much have been calculated as this with the Flemish reference output.

There is 1 Steg-installatie for which are, in spite of the RPEB of more than 10%, the WKK output nevertheless smaller than 70%, as a result of which these for Europe if qualitatively can be considered. However this installation is certificate-authorized, since the additional requirement from Art. 12 point 2 for installations with a capacity larger than 25 MWe was not incorporated in the Flemish quality definition.

1 PJ amounts to the total primary energy saving which qualifies for Wkk-certificaten in 2005, 281 GWh or.

1 Introduction

Since 1990 Vito have been established Wkk-vermogen in Flanders inventoried.

In an earlier report Wkk-inventaris Flanders: State of the art 2005 this inventory in task of VEA was actualised for 2005. the data collection for Wkk-inventarissen as from 2004 has differently gone than for that. With the ministerial decision of 23.02.2005 are Wkk-exploitanten oblige annually communicate capacities of their installations, established for to 1 May the energy figures and, to VEA. Mainly of data of Wkk-constructeurs determined the first inventories (established capacities and service taken capacities). In the inventories of for 2002 no production figures had been incorporated. For the inventories of 2002 and 2003 energy production - and use WKK's were assessed extrapolation of the energy figures of some installations. With the new fact search as from 2005 Wkk-inventarissen can be used as from 2004 energy figures of much more installations for. The exactitude of the figures in the inventories as from 2004 is thus larger than in the previous inventories. Moreover figures were also taken concerning Wkk-elektriciteitsproductie, the wkk-electric capacity and Wkk-percentage according to the calculations of annex II of European Wkk-richtlijn 2004/8/EG [1].

In 2006, some important modifications have been carried out concerning the quality definition and the Flemish and European reference output for calculating the energieperformantie of Wkk-installaties, viz.:

- the decision of the Flemish government of 7 July 2006,2] in which an adapted definition has been taken for presence or absence of qualitative is of Wkk-installatie and in which moreover reference output also modified was taken for biobrandstoffen for calculating the warmth strength saving;
- decide the approval of the European reference output in the Ministriëel of the Flemish government [3].

In the preceding report Wkk-inventaris Flanders: State of the art 2005 (2) "becomes the figures from the report" Wkk-inventaris Flanders: State of the art 2005 reassessed taking into account the previous modifications. The numbers that prevents, can be therefore no longer compared with these from the previous inventories o.w.v. the adapted calculation manner.

2 Inventory WKK with engines

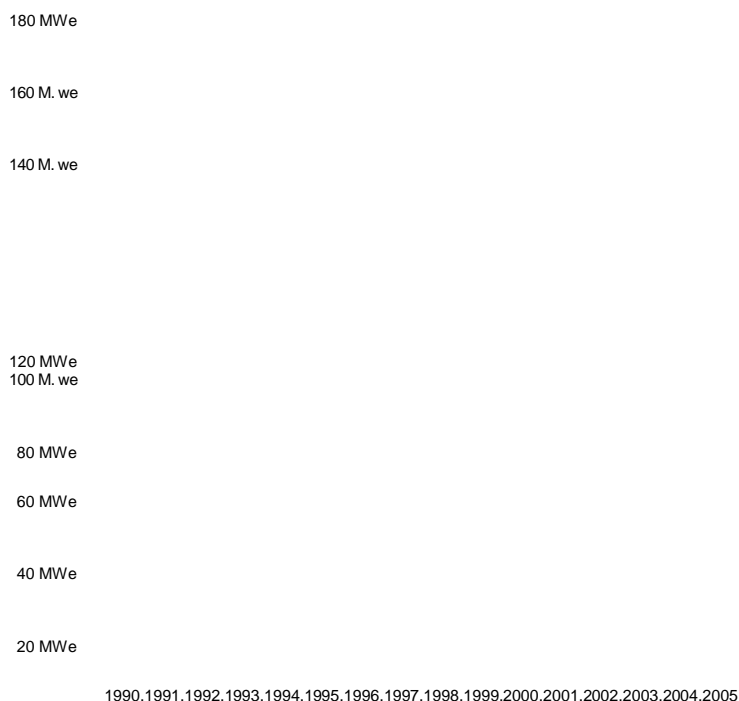
Since 1990 Vito an overview has been made of on that moment realised Wkk-installaties in Flanders. In 1990, the established electric capacity amounted to almost 8 MW. In 2004, this had run to a total capacity of 157.4 MW. In 2005, the total capacity to 160.6 MW has incurred.

2.1 The established capacity to Wkk-motoren

2.1.1 Evolution of the established capacity to Wkk-motoren

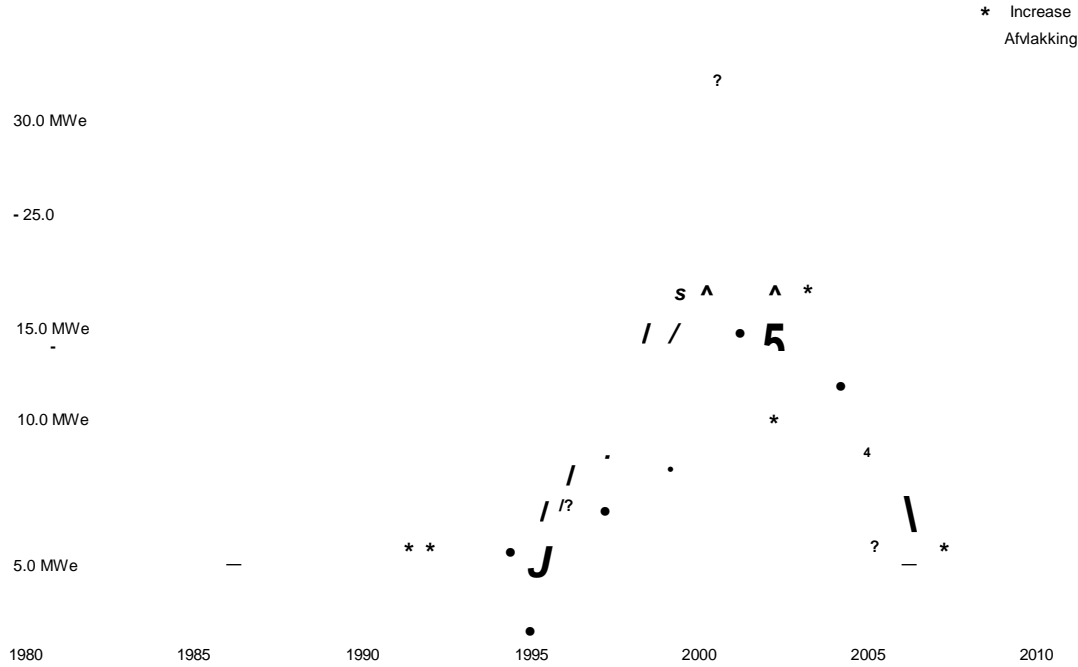
Character 1 shows the evolution of the established electric capacity to Wkk-motoren in Flanders between 1990 and 2005.

From the character appears that the established capacity has increased strongly in Flanders as from 1995. between 1995 and 1996 are the established capacity seeming doubled of 27 MWe to 52 MWe. From 1996 up to now the established electric capacity still more than to a totally established electric capacity has tripled in 2005 of 160.6 MWe.



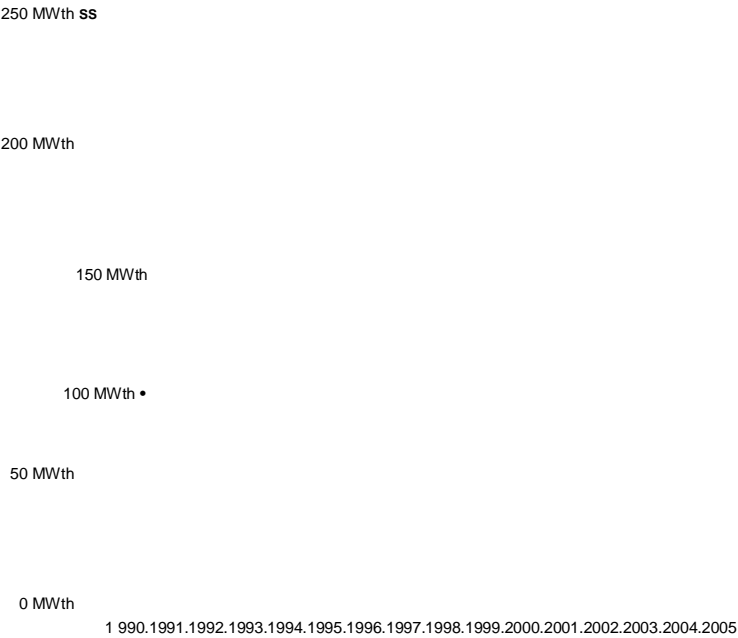
Character 1: Evolution established electric capacity Wkk-motoren in Flanders between 1990 and 2005.

Character 2 shows the annually additional established capacity to Wkk-motoren. Can be seen that the increase reaches maximum in second half of 1990s and that the additional capacity has decreased since 2000.



Character 2: Bijgebouwd electric capacity Wkk-motoren in Flanders between 1983 and 2005.

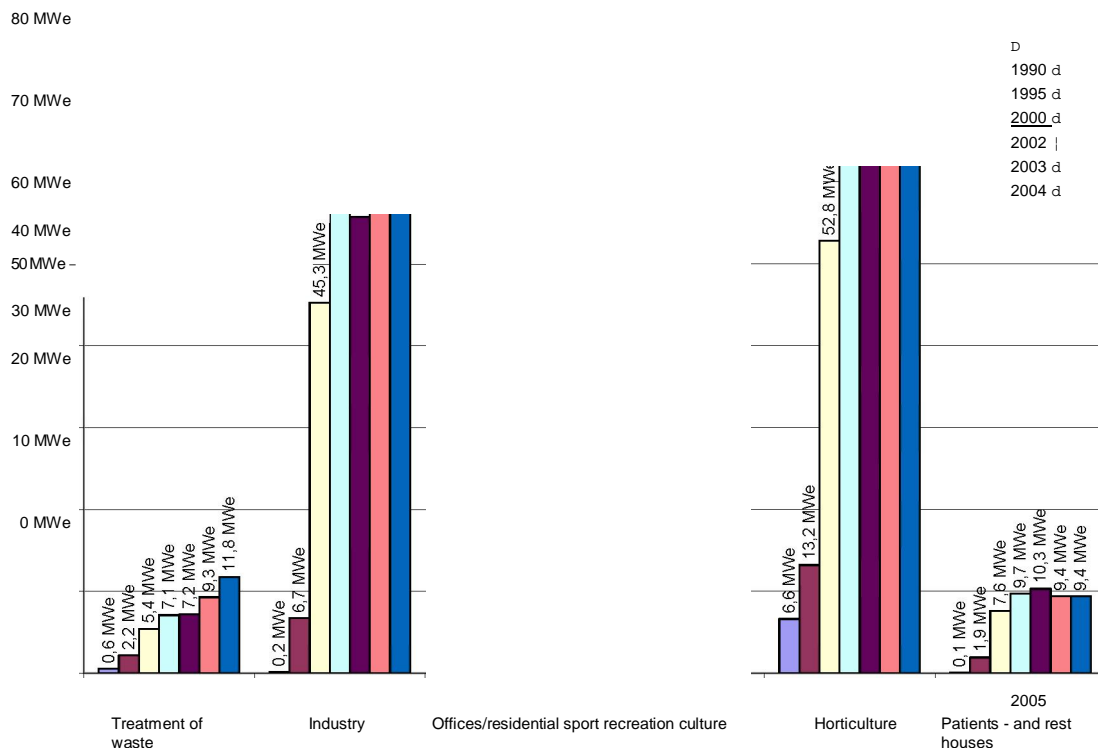
Character 3 shows the evolution of the established thermal capacity to Wkk-motoren. In 2005, a total thermal capacity of 199.9 MW had been established.



Character 3: Evolution established thermal capacity Wkk-motoren in Flanders between 1990 and 2005.

2.1.2 Partitioning of the established electric capacity of Wkk-motoren by sector

Character 4 reflects the established electric capacity for the years 1990.,1995.,2000.,2004 and 2005, subdivided to the 6 most important sectors in which Wkk-installaties occur on the basis of engines in Flanders. Horticulture remains the most important sector with a totally established capacity of 74.4 MW (46%), 60.9 MW (38%) amount to the established capacity in the industry. The share of treatment of waste, hospitals and rest houses, sport recreation culture and offices/residential amounts to respectively 7%, 6%, 2% and 1%. in comparison with the inventory of 2004 this partitioning the same has virtually remained.



Character 4: Partitioning electric capacity Wkk-motoren concerning the different sectors in 1990.,1995.,2004 and 2005.

2.1.3 Evolution of the entity size of Wkk-installaties with engines

Totally established Wkk-vermogen on the basis of engines have strongly increased between 1990 and 2005

but also the size of the different projects has a rising recent development. Table 1 gives overview.

The last years decrease the number of projects and the number of engines, but the entity size of installations increase.

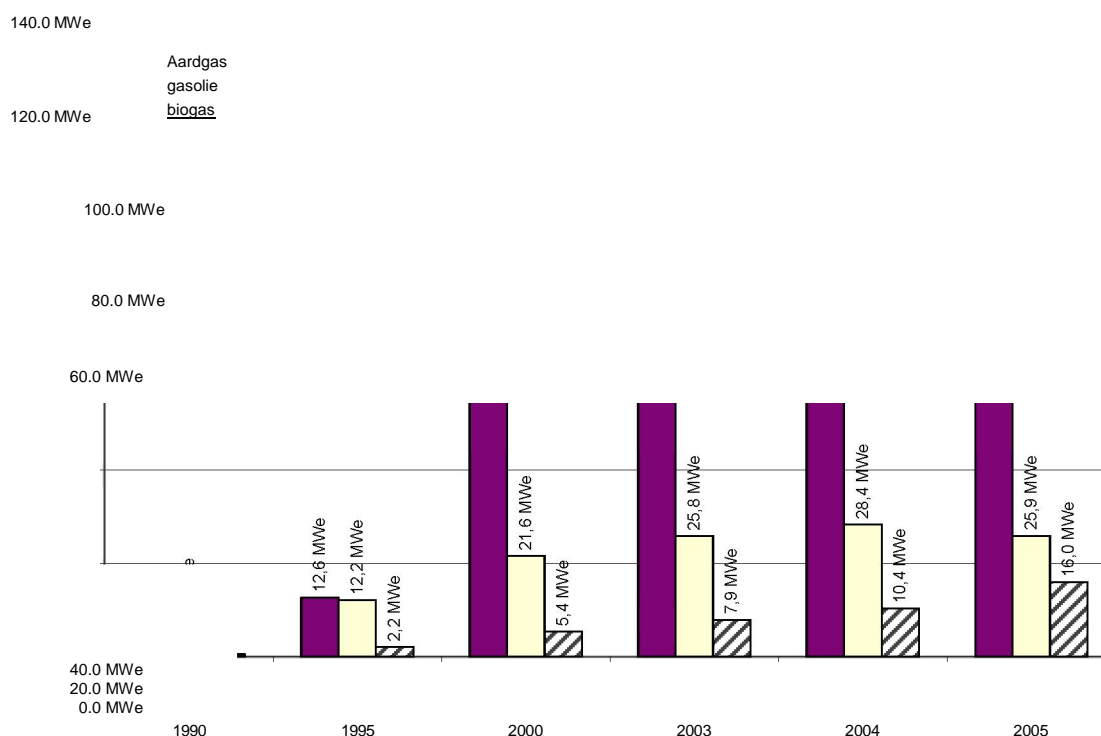
Table 1: entity size

Wkk-motoren in

	1990	1995	2000	2002	2003	2004	2005
<i>1990.,1995.,2000.,2003.,2004 and 2005</i>							
			2000				2005
Totally electric capacity	7.7 MWe	27.0 MWe	116.0 MWe	146.0 MWe	151.0 MWe	157.4 MWe	160.6 MWe
Totally thermal capacity	9.9 MWth	36.9 MWth	149.0 MWth	187.0 MWth	192.0 MWth	196.8 MWth	199.9 MWth
Number wkk-projecten	29	76	143	163	172	167	157
On average electric capacity by project	266 kWe	355 kWe	813 kWe	901 kWe	880 kWe	943 kWe	1023 kWe
On average thermal capacity by project	341 kWth	486 kWth	1043 kWth	1148 kWth	1120 kWth	1178 kWth	1273 kWth
Number of engines	45	103	206	231	241	251	246
On average electric capacity by engine	171 kWe	262 kWe	565 kWe	636 kWe	628 kWe	627 kWe	653 kWe
On average thermal capacity by engine	220 kWth	358 kWth	724 kWth	810 kWth	799 kWth	784 kWth	812 kWth

2.1.4 Partitioning of the established electric capacity of Wkk-motoren by fuel

Character 5 shows the totally established electric capacity of Wkk-motoren in 1990.,1995.,2000.,2003.,2004 and 2005. up to 1994 was gasolie still the most important fuel, as from 1995 this aardgas. t.e.m. 2004 is the established capacity is evenly increased for the different fuels. For biogas this tendency also continues himself in 2005. For aardgas and gasolie on the other hand one sees a purchase in 2005, for the first time.



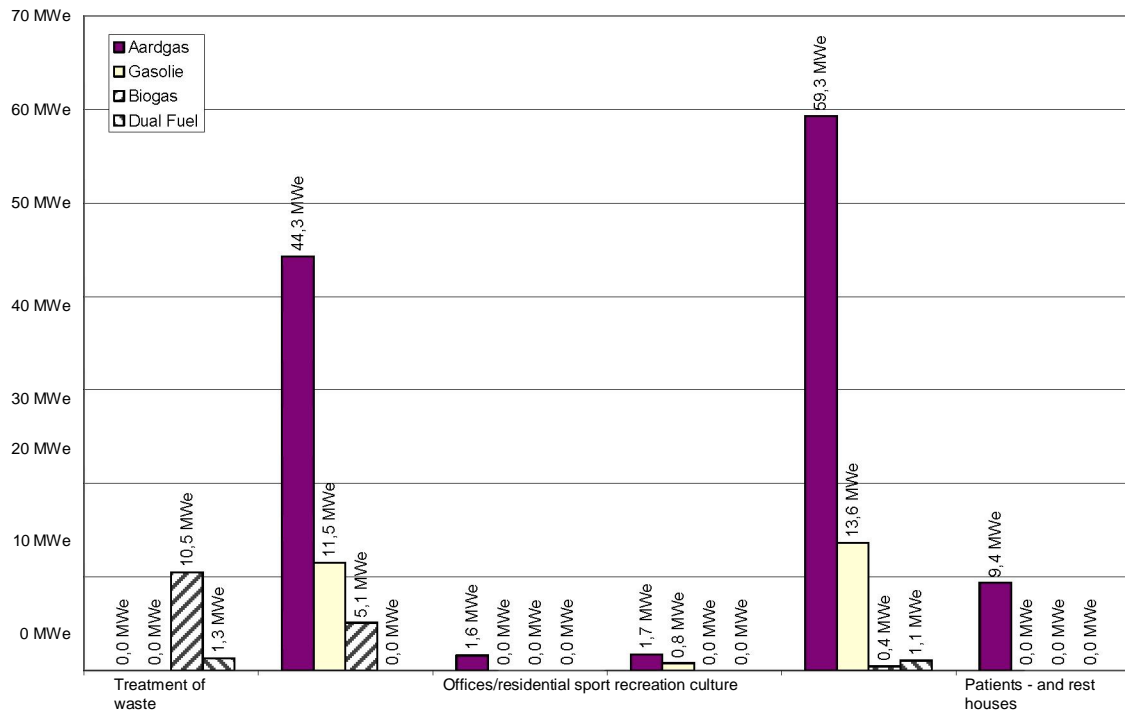
Character 5: Share several fuels in 1990.,1995.,2000.,2003.,2004 and 2005.

Moreover also 2.4 MWe to engines which work on several fuels, have been still installed. It concerns 1 installation of 1.1 MWe which either on gasolie either on biofuel works and 1 installation on aardgas and/or biogas of 1.3 MWe.

Character 6 gives an overview of the used fuels by sector. Only in horticulture, industry and sport recreation culture sector still a share has gasolie although here too aardgas is by far the most important fuel. In the sector treatment of waste biogas the most important fuel is. The dual fuel engines prevent

only in the sectors horticulture and treatment of waste.

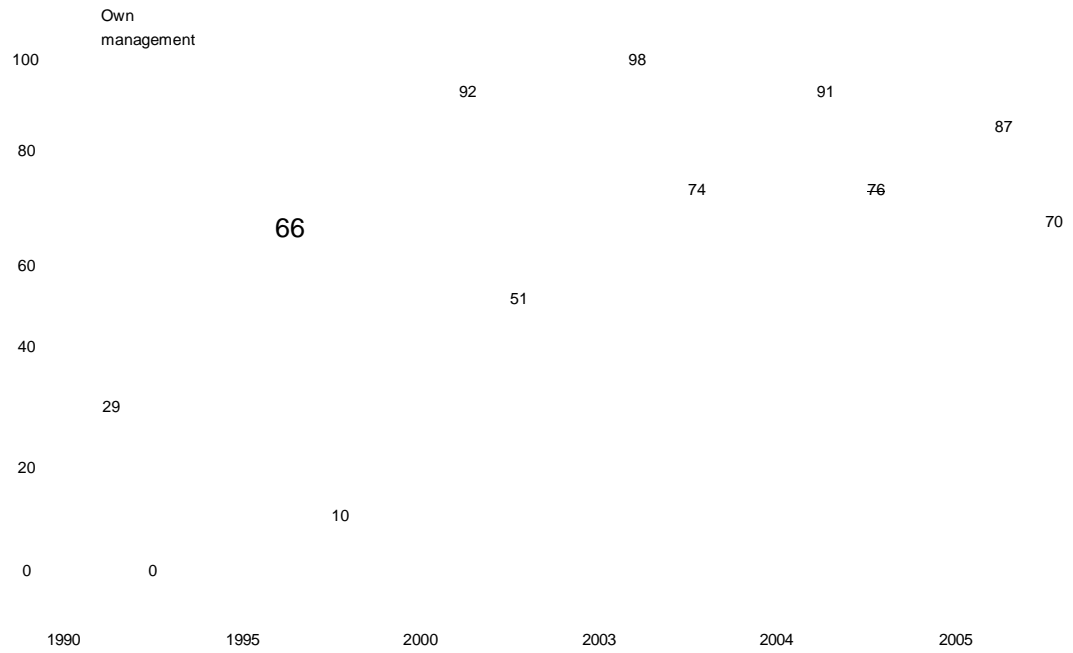
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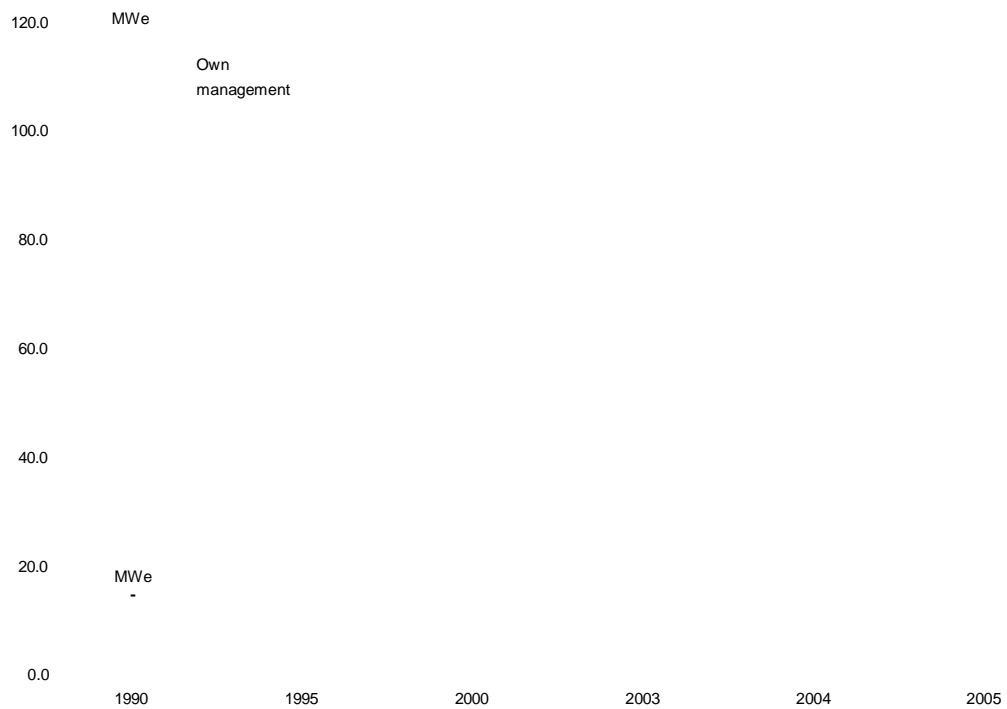
Character 6: Established capacity Wkk-motoren by fuel and by sector in 2005,

2.1.5 Partitioning of the established electric capacity of Wkk-motoren by beheersvorm

Character 7 and character 8 give an overview of the handled beheersvorm: own management or cooperation with the electricity society. To number of projects own management is still the most frequent beheersvorm, to established capacity cooperation with the electricity society is however the most frequent beheersvorm what indicates on a larger installed capacity by project.



Character 7: Number Wkk-projecten in own management – cooperation



Character 8: Total established capacity in own management – cooperation

2.2 energy production of the WKK's on the basis of engines in 2005,

In the inventories of for 2002 no production figures had been incorporated. For the inventories of 2002 and 2003 energy production and –use WKK's were assessed extrapolation of the energy figures of some installations. The ministerial decision of 23.02.2005 has contributed that the current inventory can have energy figures of much more installations. The exactitude of the figures in the inventories as from 2004 is thus larger than in the previous inventories. Consider, however, that not nearly all data follow from measurings. In those cases the operator of the WKK or VITO has made an estimation on the basis of among other things turn times.

The result has been reflected in table 2: energy figures for the established WKK's on the basis of engines in Flanders in 2005.

Beside the data for the totally established electric capacity and total electricity production, the corresponding figures were calculated according to annex II of the directive 2004/8/EG of the European Parliament and the Council [1] or according to appendix II of the decision of the Flemish government of 7 July 2006,2]. One retrieves these figures in table 2 at "Wkk-gedeelte". Because of this parts warmth or electricity of the same installation which does not come from WKK become, excluded. These figures must reported to Europe and must also be taken at the recording of Wkk-certificaten by the VREG.

For the classification in qualitative and not qualitative Wkk-motoren were taken into account point a and c annex III of the directive 2004/8/EG of the European Parliament and the Council [1] or with appendix III of the decision of the Flemish government of 7 July 2006,2]. Small-scale Wkk-installaties are considered as qualitative when the RPEB > 0 and large Wkk-installaties become as qualitative are considered when the RPEB > 10%. were taken into account moreover for the reference output the Ministrieeel decide of the Flemish government that in the Bulletin of Acts, Orders and Decrees has appeared on 1/12/2006, [3], and in what the European reference output was taken over. It was not taken into account appendix IV of this last decision (correction factors for netverliezen) because insufficient data were available this apply.

The primary energy saving was twice calculated: 1 time on the basis of the European reference output (according to the Ministrieeel decides of the Flemish government that in the Bulletin of Acts, Orders and Decrees has appeared on 1/12/2006, [3]) and 1 time on the basis of the Flemish reference output such as described in Art.10 of the decision of the Flemish government of 7 July 2006,2].

As a last in table the 2 also figures are reflected for certificate beneficiary installations. These are the installations as from 01/01/2002 those qualitative are according to appendix III of the decision of the Flemish government of 7 July 2006,2], where was taken into account the European reference output [3].

Table 2: energy figures for the established WKK's on the basis of engines in Flanders in 2005.

	Total	Wkk-gedeelte
Established electric capacity	160.6 MWe	151.6 MWe
Established thermal capacity	199.9 MWth	199.9 MWth
Annual turn time	<u>260</u> 2 h/j	
electricity production	417.9 GWh/j	397.9 GWh/j
Calorification	557.5 GWh/j	557.5 GWh/j
Overall Wkk-percentage	95.2%	
Relative primary energy saving *	20.9%	

Qualitative wkk-motoren *

Established electric capacity	143 MWe	
Established thermal capacity	<u>183</u> MWth	
electricity production	396.6 GWh/j	383.7 GWh/j
Primary energy saving *	342.5 GWh/j	
Primary energy saving **	315.7 GWh/j	
Relative primary energy saving *	23.8%	
Wkk-percentage	96.7%	

certificate beneficiary Wkk-motoren *

Established electric capacity	40 MWe	
Established thermal capacity	51 MWth	
electricity production	101.9 GWh/j	100.7 GWh/j
Primary energy saving *	113.3 GWh/j	
Primary energy saving **	108.7 GWh/j	
Relative primary energy saving *	30.2%	
Wkk-percentage	<u>98</u> . 8%	

* On the basis of European reference output ** on the basis of Flemish reference output

Above table indicates that there are engines established for approx. 40 MWe those in principle qualify for Wkk-certificaten in 2005.

2.3 Partitioning of the energy production of Wkk-motoren by fuel and by sector in 2005

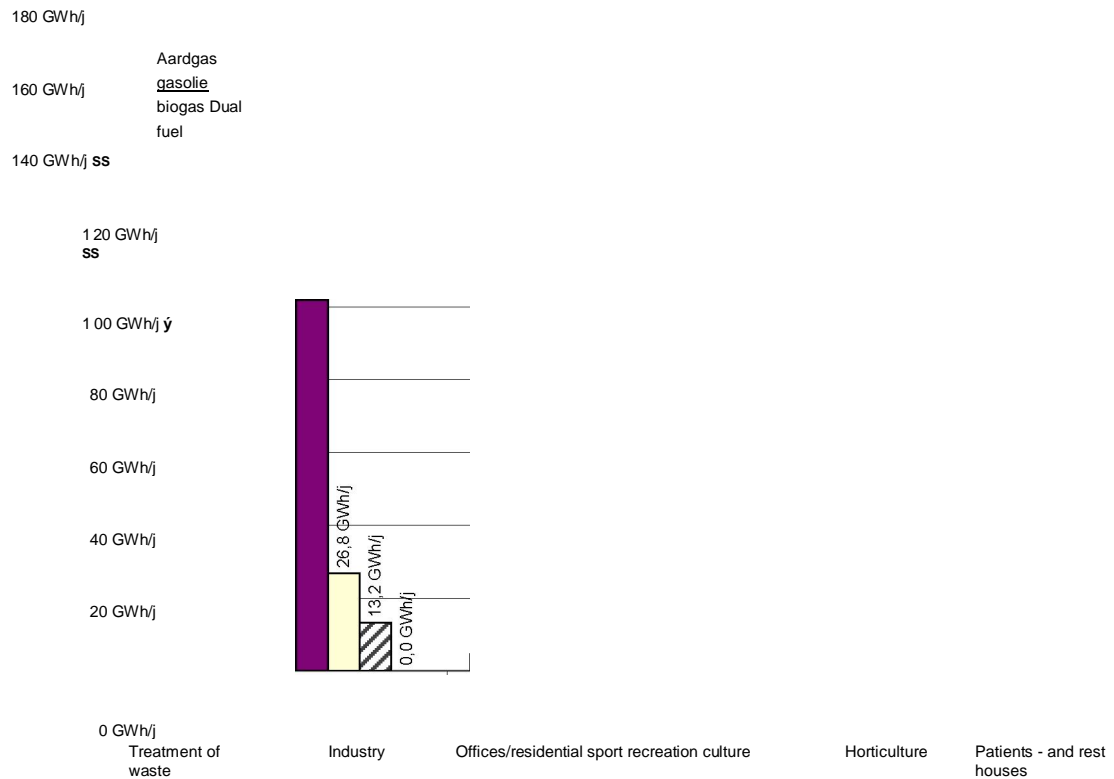
The following characters give a partitioning for Wkk-motoren in 2005 by fuel and by sector of:

Net electricity production (character 9);

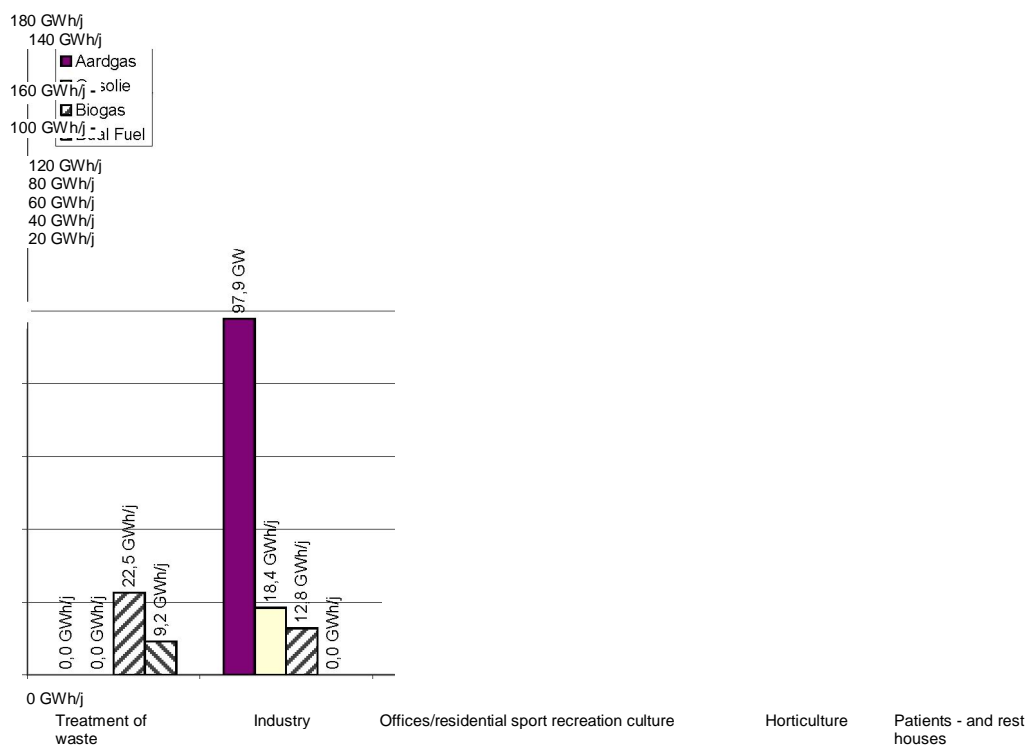
The electricity production calculated according to appendix II of the decision of Flemish Government of 7 July 2006,2] (character 10);

Qualitative electricity production (character 11);

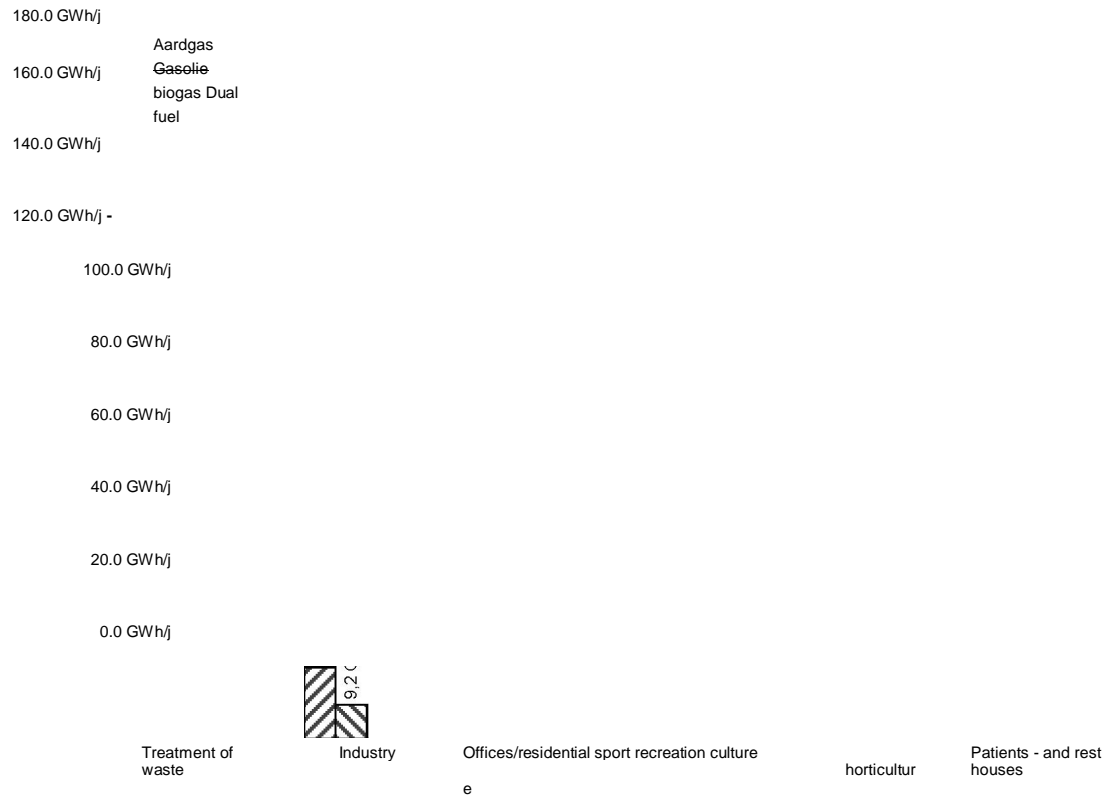
The electricity production of certificate beneficiary installations (character 12).



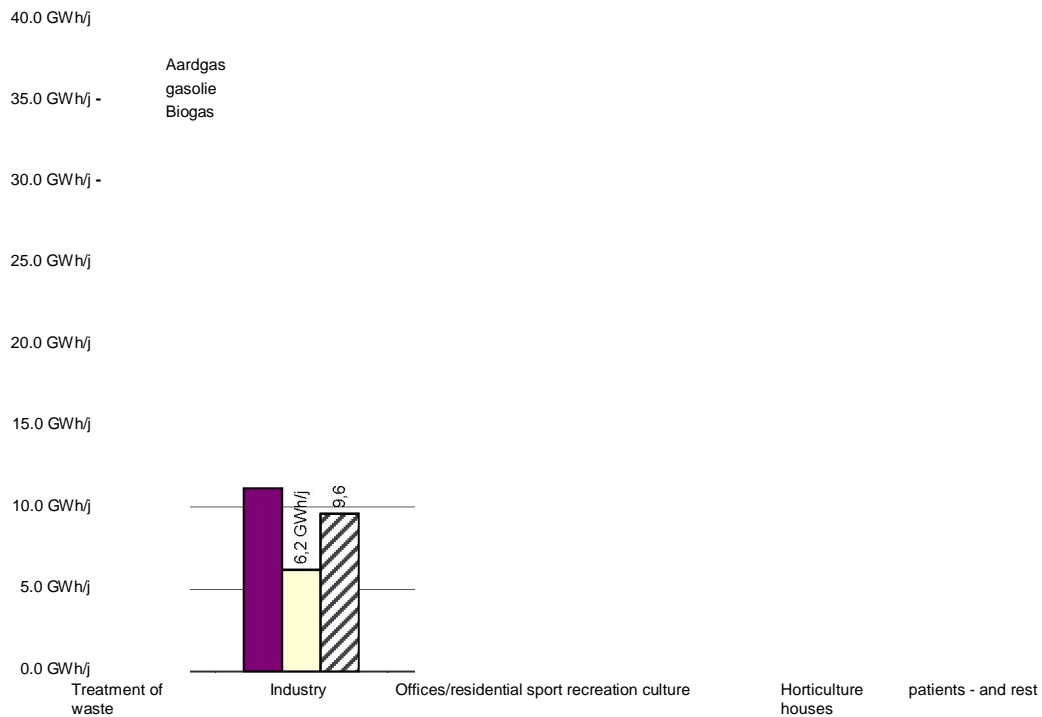
Character 9: Net electricity production of Wkk-motoren by fuel and by sector in 2005



Character 10: electricity production of Wkk-motoren by fuel and by sector in 2005 calculating according to appendix II of the decision of the Flemish government of 7 July 2006,2]



Character 11: Qualitative electricity production of Wkk-motoren by fuel and by sector in 2005



Character 12: Net electricity production of certificate beneficiary Wkk-motoren by fuel and by sector 2005

On character 12 after one in all these graphs see returning the same proportions as in the graph with the established electric capacity by fuel and by sector (character 6): aardgas appears by far the most important fuel, whereas gasolie is only still used in the sectors industry, horticulture and sport recreation culture for certificate beneficiary installations takes both biogas and gasolie a larger relative share. Moreover the dual fuel engines, which are not qualitative according to the definition in appendix III of the decision of the Flemish government of 7 July 2006,2], are certificate-authorized because this concerns installations of for 2002.

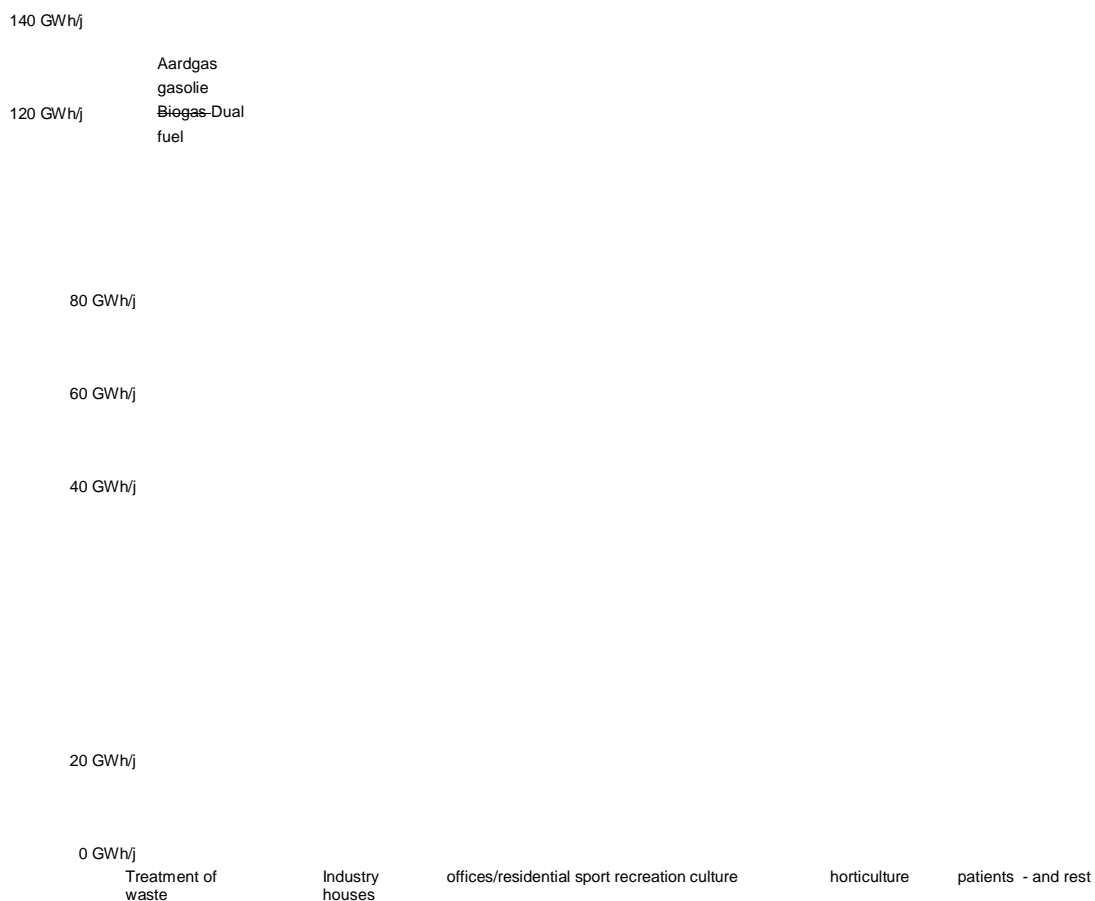
2.4 Partitioning of the primary energy saving of Wkk-motoren by fuel and by sector in 2005

The following characters give a partitioning for Wkk-motoren in 2005 by fuel and by sector of:

- the primary energy saving calculated on the basis of the European reference output [3] (character 13);
- the primary energy saving calculated on the basis of the European reference output [3] for the installations which qualitative are according to the definition of appendix III of the decision of the Flemish government of 7 July 2006,2] (character 14);
- the primary energy saving calculated on the basis of the Flemish reference output such as described in Art. 10 of the decision of the Flemish government of 7 July 2006,2] for the installations as from 01/01/2002 those qualitative is according to the definition of appendix III of the decision of the Flemish government of 7 July 2006,2]. This is certificate beneficiary Wkk-motoren (character 15).



Character 13: Primary energy saving of Wkk-motoren by fuel and by sector in 2005



Character 14: Qualitative primary energy saving of Wkk-motoren by fuel and by sector in 2005



Character 15: Primary energy saving of certificate beneficiary Wkk-motoren by fuel and by sector 2005

To the primary energy saving the same observations apply as these which were made for electricity production.

2.5 Decisions WKK's on the basis of engines in 2005,

The last 15 years has been installed Wkk-vermogen increased by engines of 7.7 to 160.6 MWe and of 9.9 to 199.9 MWth.

The most important tendencies herewith are:

- the totally established electric capacity amounts to 161 MWe, with a total net electricity production of 418 GWh/year Wkk-productie calculated according to appendix II of the decision of the Flemish government of 7 July 2006,2] amount to of this still 95%. 89% of established capacity concern qualitative Wkk-motoren according to appendix III of the same decision. Only 25% of the established capacity qualify for Wkk-certificaten. This corresponds to 14% of electricity production.
- the additional installed capacity has decreased in 2005, with respect to 2004 and is even smaller than these in 2003. the overall recent development remains decreasing.
- most the installations prevent in horticulture and the industry where in 2005, 135.4 MWe to Wkk-vermogen are established.
- the most important fuel remains aardgas, although the established electric capacity of Wkk-motoren aardgas have on decreased in 2005 with regard to 2004th this last also apply to the engines on gasolie. The established electric capacity of Wkk-motoren on biogas on the other hand amount to 154% of this in 2005 in 2004.
- in the sectors treatment of waste and horticulture also Wkk-motoren which works on more than 1 fuel, have been established. It concerns a totally established electric capacity of 2.4 MWe.
- the majority of the projects is run still in own management; on capacity basis the energy sector is however the most important owner of Wkk-installaties, what indicates on a larger installed capacity by project.

3 Inventory WKK with gasturbines and STEG's

3.1 the established capacity to gasturbines and STEG's

3.1.1 Evolution of the established capacity to gasturbines and STEG's

In 2005, 1 additional STEG installation in company was taken in Flanders, viz. Zandvliet power in Antwerp. Furthermore an important shift has happened for the installation of Petrofina with regard to the inventory of 2004. in 2002, after the afgassenketel of the gasturbine a backpressure steam turbine was placed. These both installations work according to the owner as Steg-combinatie and here also as are so inventoried. In the inventory of 2004 the installations still appart were incorporated (1 at the gasturbines and 1 at the netgekoppelde steam turbine). Moreover the established capacity still deviates from the values in the inventory from 2004. this is for some installations explain because the data deviate from the operators in 2005, sometimes from these of 2004. in 2005, the total electric capacity established to gasturbines amount to 326 MWe and this of STEG's amounts to 731 MWe. Of the 15 installations is there 6 with nageschakelde steam turbine (Steg-WKK's). The established thermal capacity amounts to 422 MW to gasturbines and 437 MW to STEG's.

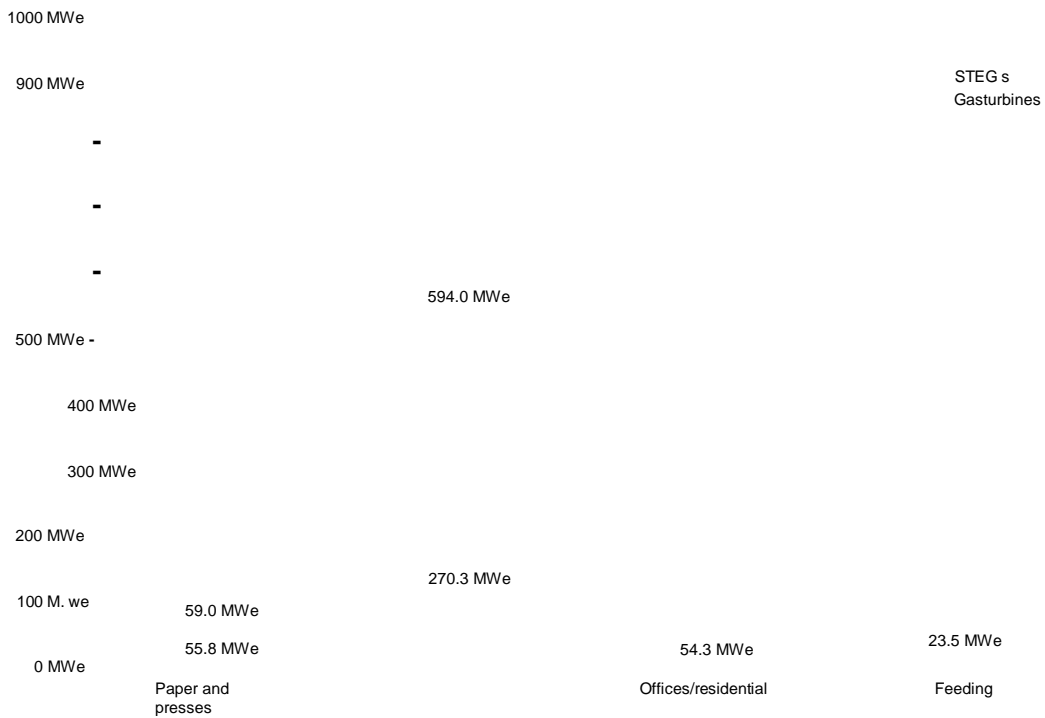
Table 3 gives an overview of the established gasturbine and STEG Wkk-installaties.

*Table 3: Established capacity to WKK gasturbines and STEG's
2005*

NAME	PLACE	SECTOR	IN COMPANY	electrically	thermally	TURBINE	MARK
Esso	Antwerp	chemistry	1993	42 MW	56 MW	Gasturbine	General Electric frame 6 SI
Stora	Langerbrugge	paper	1993	37 MW + 22 MWstoom	66 MW	STEG	General Electric frame 6 DLE
Phenolchemie	Beveren	chemistry	1994	23 MW	35 MW	Gasturbine	ABB GT 10 b
Ghent ham	Ghent	bldg.	1995	42 MW + 13 MWstoom	27 MW	STEG	General Electric LM-6000 OJEC
Cargill	Izegem	feeding	1996	16 MW + 7 MWstoom	28 MW	STEG	General Electric LM-2500
Distrigas	Zeebrugge	chemistry	1996	40 MW	72 MW	Gasturbine	General Electric LM-6000 OJEC
SAPPI	Lanaken	paper	1997	41 MW	36 MW	Gasturbine	General Electric LM-6000 PD
Amoco	Yellow	chemistry	1997	37 MW	45 MW	Gasturbine	General Electric LM-6000 PD
VPK	Oudegem	paper	1997	15 MW	24 MW	Gasturbine	2x Alstom-Ruston Tempest DLE
Amylum	Aalst	chemistry	1998	41 MW + 10 MWstoom	79 MW	STEG	General Electric LM-6000 PD
Petrofina	Antwerp	chemistry	2002	149 MW	170 MW	STEG	3x General Electric LM-6000 PD
Lanxess	Lillo	chemistry	1999	43 MW	43 MW	Gasturbine	General Electric LM-6000 PD
Degussa	Antwerp	chemistry	1999	42 MW	50 MW	Gasturbine	General Electric LM-6000 PD
Monsanto	Antwerp	chemistry	2000	43 MW	61 MW	Gasturbine	General Electric LM-6000 PD
Basf	Antwerp	chemistry	2005	395 MW	67 MW	STEG	Siemens V94.Á2

3.1.2 Partitioning of the established electric capacity of gasturbines and STEG's by sector

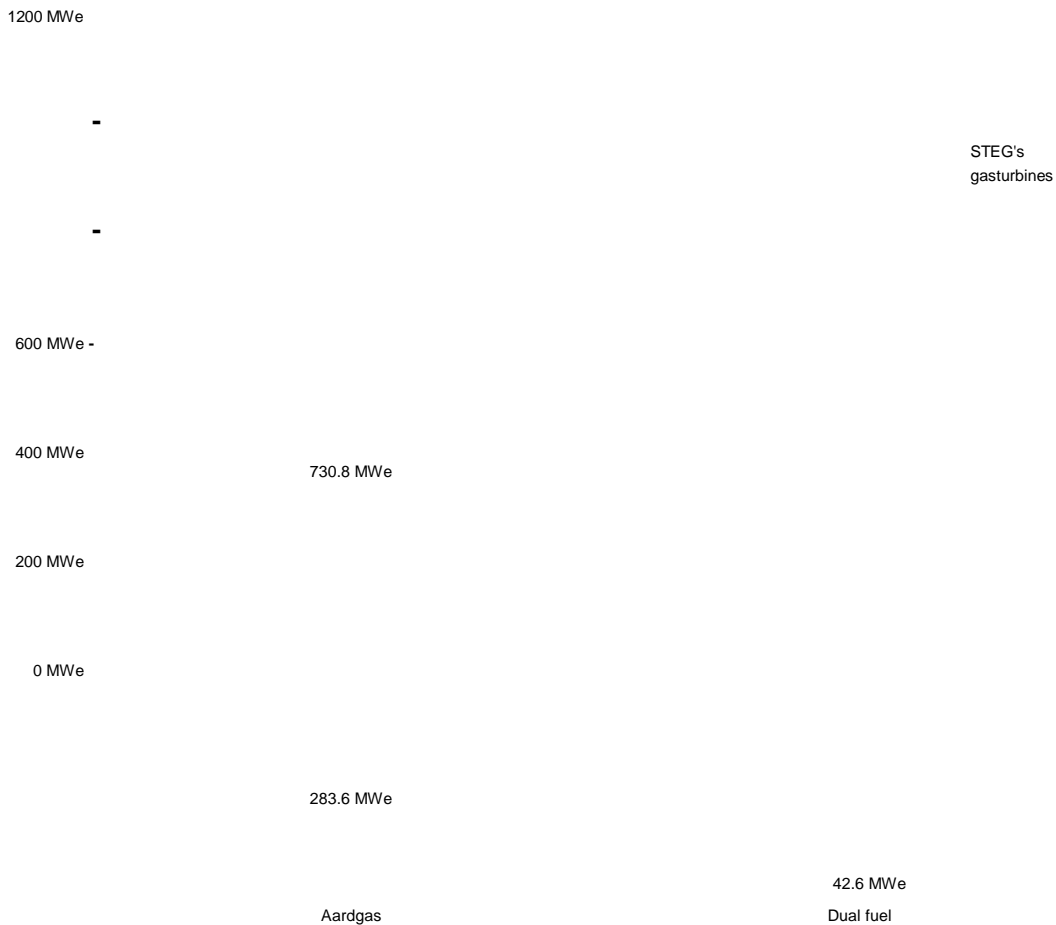
Character 16 gives the established electric capacity for gasturbines and STEG's in 2005, subdivided to the 4 sectors in which these Wkk-installaties occur in Flanders. The industry the most important sector with an electric capacity of 864 MWe has been totally established, what determines almost 82% of the totally installed capacity to gasturbines and STEG's. In the sectors only Steg-installaties prevent offices/residentiël and feeding. The STEG's to take the electric capacity totally in total 69% of established.



Character 16: Partitioning electric capacity of gasturbines and STEG's concerning the different sectors in 2005,

3.1.3 Partitioning of the established electric capacity of gasturbines and STEG's by fuel

Character 17 shows the partitioning of the established electric capacity to STEG's and gasturbines for the different fuels. Aardgas takes clearly the largest share: 96% of the installed capacity have aardgas as fuel. In the industry 1 installation which exists from, has been established a gasturbine which can work on more than 1 fuel: these work either on aardgas, either on raffinaderijgas.



Character 17: Partitioning electric capacity of gasturbines and STEG's for the different fuels 2005

3.2 energy production of the WKK's on the basis of gasturbines and STEG's in 2005,

In the inventories of for 2002 no production figures had been incorporated. For the inventories of 2002 and 2003 energy production and –use WKK's were assessed extrapolation of the energy figures of some installations. The ministerial decision of 23.02.2005 has contributed that the current inventory can have energy figures of much more installations. The exactitude of the figures in the inventories as from 2004 is thus larger than in the previous inventories. Consider, however, that not nearly all data follow from measurings. In those cases the operator of the WKK or VITO has made an estimation on the basis of among other things turn times.

The result has been reflected in table 4: Summary energy production data and performantie of WKK's on the basis of gasturbines and STEG's in Flanders in 2005.

Beside the data for the totally established electric capacity and total electricity production, the corresponding figures were calculated according to annex II of the directive 2004/8/EG of the European Parliament and the Council [1] or according to appendix II of the decision of the Flemish government of 7 July 2006,2]. One retrieves these figures in table 2 at "Wkk-gedeelte". Because of this parts warmth or electricity of the same installation which does not come from WKK become, excluded. These figures must reported to Europe and must also be taken at the recording of Wkk-certificaten by the VREG.

For the classification in qualitative and not qualitative WKK gasturbines and STEG's it was taken into account point a and c annex III of the directive 2004/8/EG of the European Parliament and the Council [1] or with appendix III of the decision of the Flemish government of 7 July 2006,2]. Small-scale Wkk-installaties are considered as qualitative when the RPEB > 0 and large Wkk-installaties become as qualitative are considered when the RPEB > 10%. were taken into account moreover for the reference output the Ministriële beslissing of the Flemish government that in the Bulletin of Acts, Orders and Decrees has appeared on 1/12/2006, [3], and in what the European reference output was taken over. It was not taken into account appendix IV of this last decision (correction factors for netverliezen) because insufficient data were available this apply. For the installations larger than 25 MWe it was taken into account Art. 12 point 2 of the directive 2004/8/EG of the European Parliament and the Council [1] for stipulating presence or absence of qualitative is of an installation. This had only impact on 1 installation, viz. these of basf: in spite of the RPEB of more than 10% the WKK output of this installation are smaller than 70% as a result of which these for Europe if qualitatively can be considered. However this installation is certificate-authorized, since the additional requirement from Art. 12 point 2 for installations with a capacity larger than 25 MWe was not incorporated in the Flemish quality definition.

The primary energy saving was twice calculated: 1 time on the basis of the European reference output (according to the Ministriële beslissing of the Flemish government that in the Bulletin of Acts, Orders and Decrees has appeared on 1/12/2006, [3]) and 1 time on the basis of the Flemish reference output such as described in Art.10 of the decision of the Flemish government of 7 July 2006,2].

As a last in table the 4 also figures are reflected for certificate beneficiary installations. These are the installations as from 01/01/2002 those qualitative are according to appendix III of the decision of the Flemish government of 7 July 2006,2], where was taken into account the European reference output [3].

At the interpretation of the table it is important the fact take into account that none of the qualitative installations certificate-authorized is. There is only 1 certificate beneficiary installation which cannot be considered for Europe as qualitatively.

Table 4: Summary energy production data and performantie of WKK's on the basis of gasturbines and STEG's in Flanders in 2005,

	Total	Wkk-gedeelte
Established electric capacity	1056.9 MWe	659.8 MWe
Established thermal capacity	858.2 MWth	858.2 MWth
Annual turn time	5658 h/j	
electricity production	5980.4 GWh/j	4224.0 GWh/j
Calorification	5865.8 GWh/j	5865.8 GWh/j
Overall Wkk-percentage	70.6%	
Relative primary energy saving *	18.3%	

Qualitative Wkk-gasturbines and STEG's *

Established electric capacity	484 MWe
Established thermal capacity	607 MWth
electricity production	3458.9 GWh/j 3458.9 GWh/j
Primary energy saving *	2957.5 GWh/j
Primary energy saving **	2579.1 GWh/j
Relative primary energy saving *	24.4%
Wkk-percentage	100.0%

certificate beneficiary Wkk-gasturbines and STEG's *

Established electric capacity	395 MWe
Established thermal capacity	67 MWth
electricity production	1233.0 GWh/j 34.6 GWh/j
Primary energy saving *	242.7 GWh/j
Primary energy saving **	149.3 GWh/j
Relative primary energy saving *	10.2%
Wkk-percentage	<u>2.8%</u>

* On the basis of European reference output **
on the basis of Flemish reference output

3.3 Partitioning of the energy production of gasturbines and STEG's by fuel and by sector in 2005,

The following characters give to a partitioning for WKK gasturbines and STEG's in 2005, by fuel and by sector of:

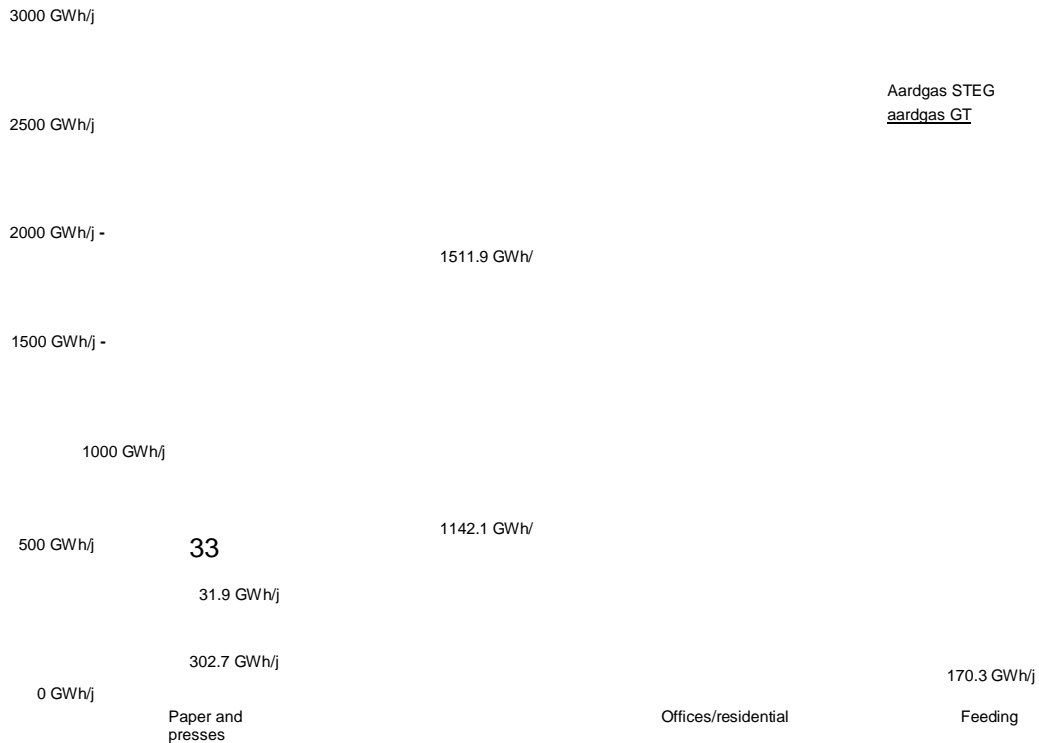
- net electricity production (character 18);
- the electricity production calculated according to appendix II of the decision of the Flemish government of 7 July 2006,2] (character 19);
- qualitative electricity production (character 20);



Character 18: Net electricity production of gasturbines and STEG's by fuel and by sector in 2005,



Character 19: electricity production of gasturbines and STEG's by fuel and by sector in 2005, calculating according to appendix II of the decision of the Flemish government of 7 July 2006,2]



Character 20: Qualitative electricity production of gasturbines and STEG's by fuel and by sector in 2005,

Appears clear that the industry is the most important sector. Moreover is there of the STEG's which are established in the sector offices/residential absolutely no installation qualitatively and its all STEG's in the sectors feeding and paper and press, however, qualitative.

Some certificate beneficiary installation is himself in the industry.

3.4 Partitioning of the primary energy saving of gasturbines and STEG's by fuel and by sector in 2005,

Character 21 shows the primary energy saving of the WKK's on the basis of gasturbines and STEG's for 2005 divided concerning the different fuels and sectors.



Character 21: Primary energy saving of gasturbines and STEG's by fuel and by sector in 2005,

The largest primary energy saving is realised in the chemistry since in this sector most of the WKK's are established on the basis of gasturbines and STEG's. Character 22 is analogous to character 21 but only considers the qualitative WKK's. comparison of character 21 and character 22 shows that only in the sectors feeding and paper and purely qualitative WKK's press on the basis of STEG's have been established and find be that in the offices/residential sector only niet-kwalitatieve WKK's.



*Character 22: Qualitative primary energy saving of gasturbines and STEG's by fuel and by sector
2005*

Some certificate beneficiary installation is himself in the industry.

3.5 Decisions WKK's on the basis of gasturbines and STEG's in 2005,

- what concerns the gasturbines and STEG's 1 Steg-installatie have recovered in 2005. for some installations several capacities have been nevertheless inventoried with respect to the previous inventory what to blame is to the fact that the operator has passed on data slightly for 2005 modified. Moreover is there a shift happens of an installation as a gasturbine to the STEGs (with a backpressure steam turbine which had been incorporated in the previous inventory at the netgekoppelde steam turbines).
- the totally established electric capacity to Wkk-installaties with gasturbines and STEG's amount to MWe in 2005 in Flanders 1057, with a total net electricity production of 5,980 GWh/year Wkk-productie according to appendix II of the decision of the Flemish government of 7 July 2006,2] amount to of this 70.6%, 46% of the established capacity concern qualitative WKK gasturbines and STEG's according to Art. 12 point 2 of the Europe's directive 2004/8/EG [1]. None of the installations qualitative according to Europe is certificate-authorized. Only 1 of the established installations Wkk-certificaten qualify for. This makes that 37% of the established capacity and 20.6% of electricity production certificate-authorized is.
- the established thermal capacity amounts to 858 MW.
- most of the installations prevent in the industry, where in 2005, a total electric capacity had been established of 864 MWe (82%).
- the most important fuel aardgas has been established, with a share of 96% of the electric capacity. In the industry still an electric capacity has been established of 42.6 MWe that exists from dual fuel installation in which either aardgas, either raffinaderijgas are used as fuel.
- the WKK's on the basis of gasturbines and STEG's succeed beautiful primary realise energy savings. On an annual basis they save almost 3400 GWh to primary energy. If the qualitative WKK's are only examined, is 2,958 the reached primary energy saving GWh/year.

4 Inventory WKK with steam turbines

Preceding Wkk-inventarissen for steam turbines had been based on data of the Belgian federation for electricity producers BFE and an inquiry which was set up with Fedichem. As from 2005 were the operators of stoomturbine wKK's within the framework of the ministerial decision of 23.02.2005 obliged to communicate the energy figures of their installations, as a result of which the inventories are based as from 2004 on more and more precise figures than for that.

Between netgekoppelde and niet-netgekoppelde steam turbines is distinguished. Most of the steam turbines are netgekoppeld. Some installations, especially at large chemical companies, are niet-netgekoppeld: the steam turbines drive in which cases direct 1 or several large machines (compressor, pump...).

4.1 The established capacity to steam turbines

4.1.1 Evolution of the established capacity to steam turbines

Concerning the netgekoppelde steam turbines no additional installations were reported for 2005. with respect to the inventory of 2004 are nevertheless some modifications for several reasons:

- capacity now twist 1 installation on reduced with respect to the previous inventory;
- for another installation were reported a smaller thermal capacity;
- 1 installation of the netgekoppelde to niet-netgekoppelde have gone the steam turbines;
- 1 installation have moved of the netgekoppelde steam turbines to the STEG's.

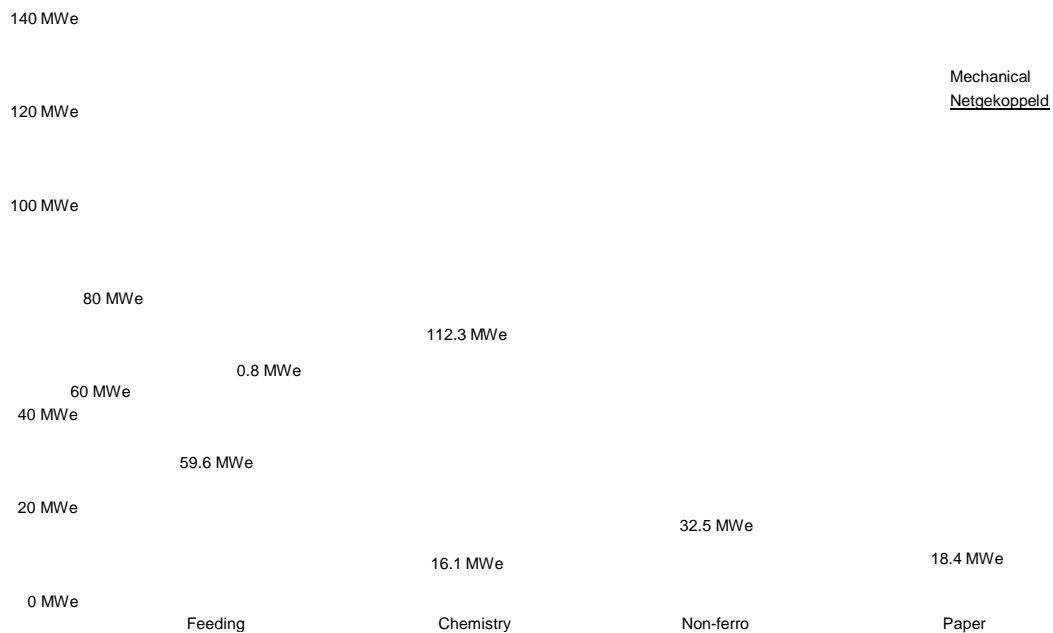
Prevent niet-netgekoppelde the steam turbines especially in the large process industry. The steam turbines which cases are mainly operated with detritus warmth or with high busy rest gases from the process with regard to Wkk-inventaris 2004, 2 installations were extra reported. Moreover there are modifications still other with regard to the previous inventory:

- for 1 installation were reported a smaller thermal capacity;
- 1 installation has recovered at niet-netgekoppelde the installations which stood previous year still at the netgekoppelde installations;
- some companies which previous reported, however, their steam turbines to years, have had this since 2005 no longer done. For these companies it was supposed that the steam turbines turns still the same as in 2003.

The totally established electric capacity in 2005, amounts to 239.5 MWe, viz. 126 MWe to netgekoppelde and 113 MWe to niet-netgekoppelde steam turbines. The corresponding thermal capacities are respective 742 MW and 962 MW. It concerns in the total 23 netgekoppelde and 55 niet-netgekoppelde steam turbines.

4.1.2 Partitioning of the established electric capacity of steam turbines by sector

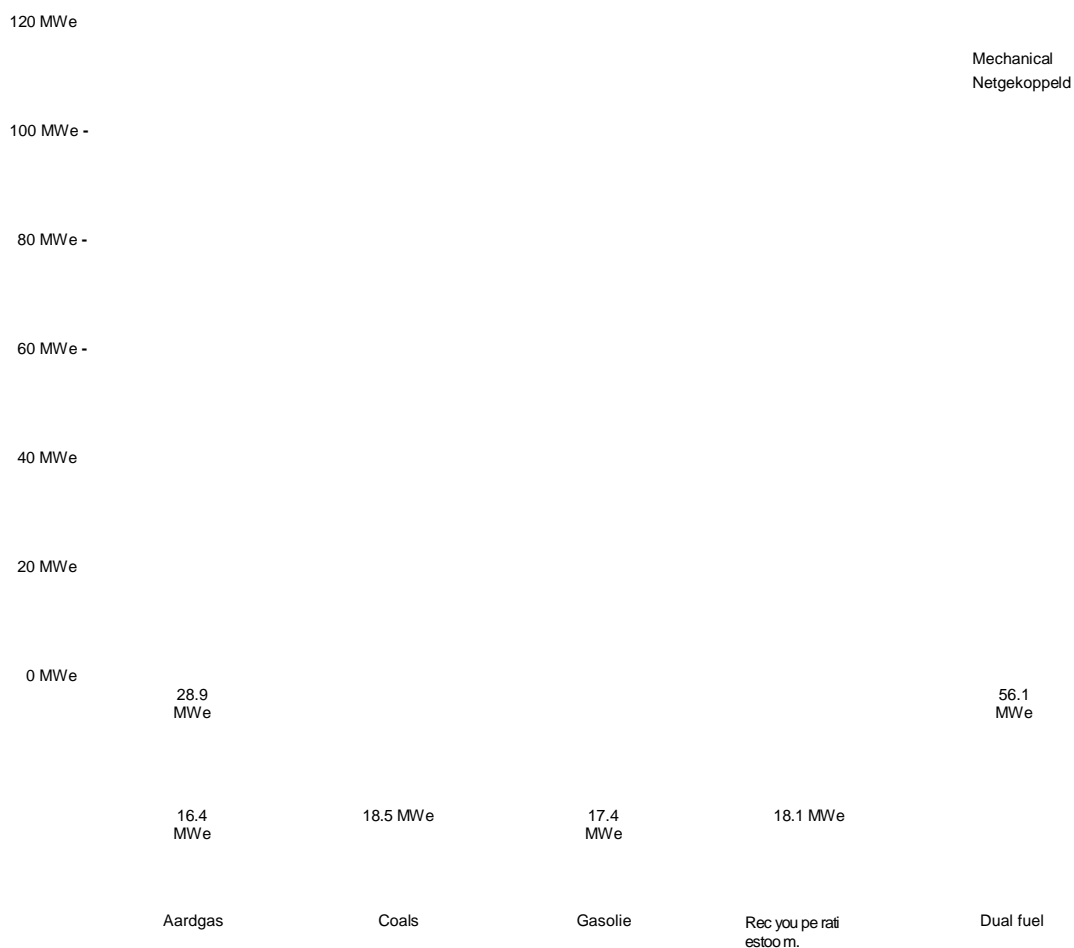
Character 23 shows the established electric capacity for steam turbines subdivided to the 4 sectors in which prevent these installations in Flanders in 2005. the chemistry clearly the most important sector with have been totally established a capacity of 128 MWe, what corresponds to almost 54% of the totally established electric capacity to steam turbines. More than 99% of the established capacity to niet-netgekoppelde steam turbines have been installed in the chemistry sector. For the netgekoppelde steam turbines the largest part has been established in the voedingsector, viz. 59.6 MWe or 47%. in the sectors non-ferro and paper prevent only netgekoppelde installations.



Character 23: Partitioning electrically/mechanical capacity to steam turbines concerning the different sectors in 2005,

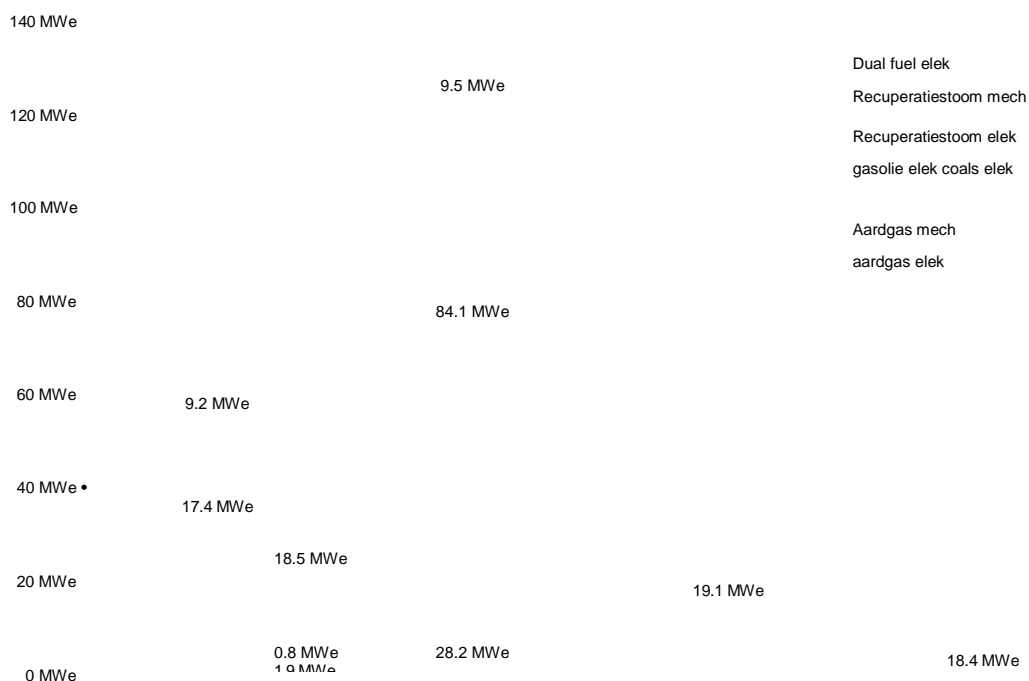
4.1.3 Partitioning of the established electric capacity to steam turbines by fuel

Character 24 gives an overview of the established electric capacity to steam turbines by fuel in 2005. almost 43% of the established capacity or in the total 102 MWe exists from steam turbines which work on recuperatiestoom. It concerns here mainly (82%) niet-netgekoppelde tractions. Also the number of installations which on more than 1 fuel works, takes a large share of the totally installed capacity, viz. 23.4%, these all netgekoppelde steam turbines are. Also what concerns coals and gasolie, there are only netgekoppelde installations.



Character 24: Opgesteld electrically/mechanical capacity to steam turbines by fuel in 2005,

Character 25 shows the partitioning of the different fuels by sector. The use of recuperatiestoom prevents only in the sectors chemistry and non-ferro. Aardgas is only used in the sectors feeding and chemistry. Coals and gasolie are only still used in the voedingsector. In the paper sector oil is only used as fuel.



Character 25: Established electrically/mechanical capacity to steam turbines by fuel and by sector in 2005,

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On 2 netgekoppelde steam turbines after its all Wkk-installaties with steam turbines in own management.

4.2 energy production of the WKK's on the basis of steam turbines in 2005,

In the inventories of for 2002 no production figures had been incorporated. For the inventories of 2002 and 2003 energy production and –use WKK's were assessed extrapolation of the energy figures of some installations. The ministerial decision of 23.02.2005 has contributed that the current inventory can have energy figures of much more installations. The exactitude of the figures in the inventories as from 2004 is thus larger than in the previous inventories. Consider, however, that not nearly all data follow from measurings. In those cases the operator of the WKK or VITO has made an estimation on the basis of among other things turn times.

The result has been reflected in table 5: energy figures for the established WKK's on the basis of steam turbines in Flanders in 2005.

Beside the data for the totally established electric capacity and total electricity production, the corresponding figures were calculated according to annex II of the directive 2004/8/EG of the European Parliament and the Council [1] or according to appendix II of the decision of the Flemish government of 7 July 2006,2]. One retrieves these figures in table 2 at "Wkk-gedeelte". Because of this parts warmth or electricity of the same installation which does not come from WKK become, excluded. These figures must reported to Europe and must also be taken at the recording of Wkk-certificaten by the VREG.

For the classification in qualitative and not qualitative Wkk-stoomturbines were taken into account point a and c annex III of the directive 2004/8/EG of the European Parliament and the Council [1] or with appendix III of the decision of the Flemish government of 7 July 2006,2]. Small-scale Wkk-installaties are considered as qualitative when the $RPEB > 0$ and large Wkk-installaties become as qualitative are considered when the $RPEB > 10\%$. were taken into account moreover for the reference output the Ministrieeel decide of the Flemish government that in the Bulletin of Acts, Orders and Decrees has appeared on 1/12/2006, [3], and in what the European reference output was taken over. It was not taken into account appendix IV of this last decision (correction factors for netverliezen) because insufficient data were available this apply. For the installations larger than 25 MWe it was taken into account Art. 12 point 2 of the directive 2004/8/EG of the European Parliament and the Council [1] for stipulating presence or absence of qualitative is of an installation. This had an impact on absolutely no installation. For the steam turbines which work with recuperatiestoom became as fuel "recuperatiewarmte" at the gaseous fuels in the Ministrieeel decides of the Flemish government that in the Bulletin of Acts, Orders and Decrees has appeared on 1/12/2006, [3] chosen.

The primary energy saving three times were calculated: 1 time on the basis of the European reference output (according to the Ministrieeel decides of the Flemish government that in the Bulletin of Acts, Orders and Decrees has appeared on 1/12/2006, [3]), 2 time on the basis of the Flemish reference output such as

described in Art.10 of the decision of the Flemish government of 7 July 2006,2] where 1 time was described, for the installations which work with recuperatiestoom, taken into account with the fictitious stoomopwekkingsrendement such as in the appendix to decision 2004-62 of the VREG [4].

As a last in table the 5 also figures are reflected for certificate beneficiary installations. These are the installations as from 01/01/2002 those qualitative are according to appendix III of the decision of the Flemish government of 7 July 2006,2], where was taken into account the European reference output [3].

Table 5: energy figures for the established WKK's on the basis of steam turbines in Flanders in 2005,

	Total	Wkk-gedeelte
Established electrically/mechanical capacity	239.5 MWe	239.5 MWe
Established thermal capacity	1704.4 MWth	1704.4 MWth
Annual turn time	6344 h/j	
Production of electricity or strength	1519.5 GWh/j	1417.3 GWh/j
Calorification	9837.4 GWh/j	9837.4 GWh/j
Overall Wkk-percentage	93.3%	
Relative primary energy saving *	16.1%	

Qualitative Wkk-stoomturbines *

Established electrically/mechanical capacity	143 MWe
Established thermal capacity	<u>1197</u> MWth
Production of electricity or strength	861.1 GWh/j 780.9 GWh/j
Primary energy saving *	2559.6 GWh/j
Primary energy saving **	1280.1 GWh/j
Primary energy saving ** with VREG reduction	672.1 GWh/j
Relative primary energy saving *	22.9%
Wkk-percentage	90.7%

certificate beneficiary Wkk-stoomturbines *

Established electrically/mechanical capacity	5 MWe
Established thermal capacity	87 MWth
Production of electricity or strength	39.9 GWh/j 39.9 GWh/j
Primary energy saving *	362.8 GWh/j
Primary energy saving **	76.3 GWh/j

Primary energy saving ** with VREG reduction	-64,3 GWh/j
Relative primary energy saving *	31.3%
Wkk-percentage	<u>100,0%</u>

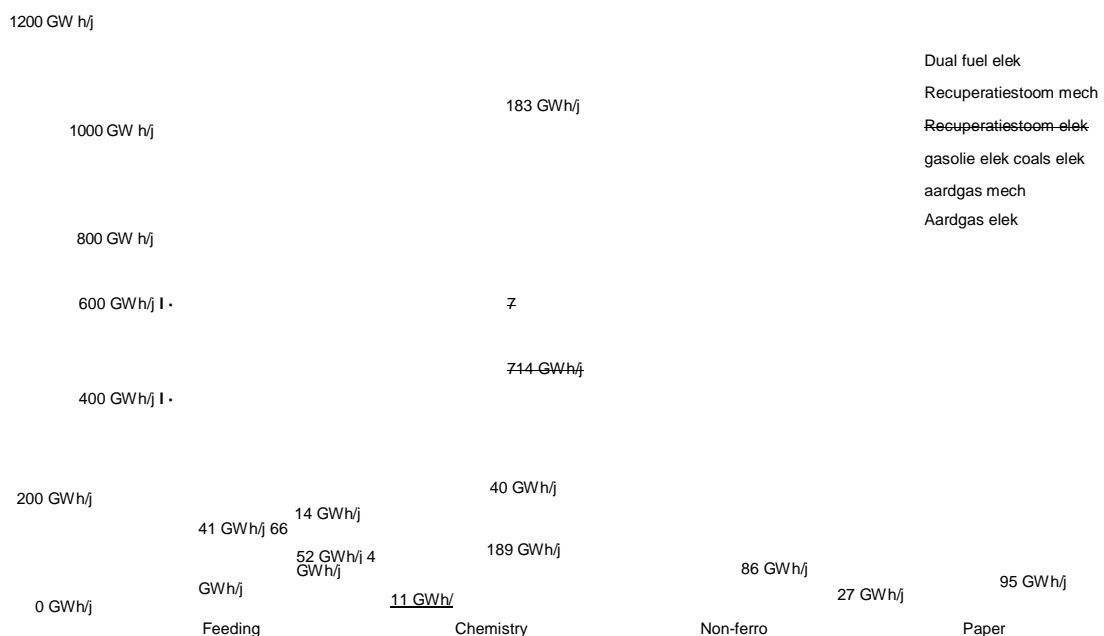
* On the basis of European reference output **
on the basis of Flemish reference output

Above table indicates that there steam turbines are those in principle qualify for Wkk-certificaten in 2005., established for approx. 5 MWe, it concern here all netgekoppelde installations. 1 moreover installation of this, however, certificate-authorized, but nevertheless qualifies for WKK certificates o.w.v. negative PEB has not been calculated with the Flemish reference output and taking into account the fictitious stoomopwekkingsrendement according to [4].

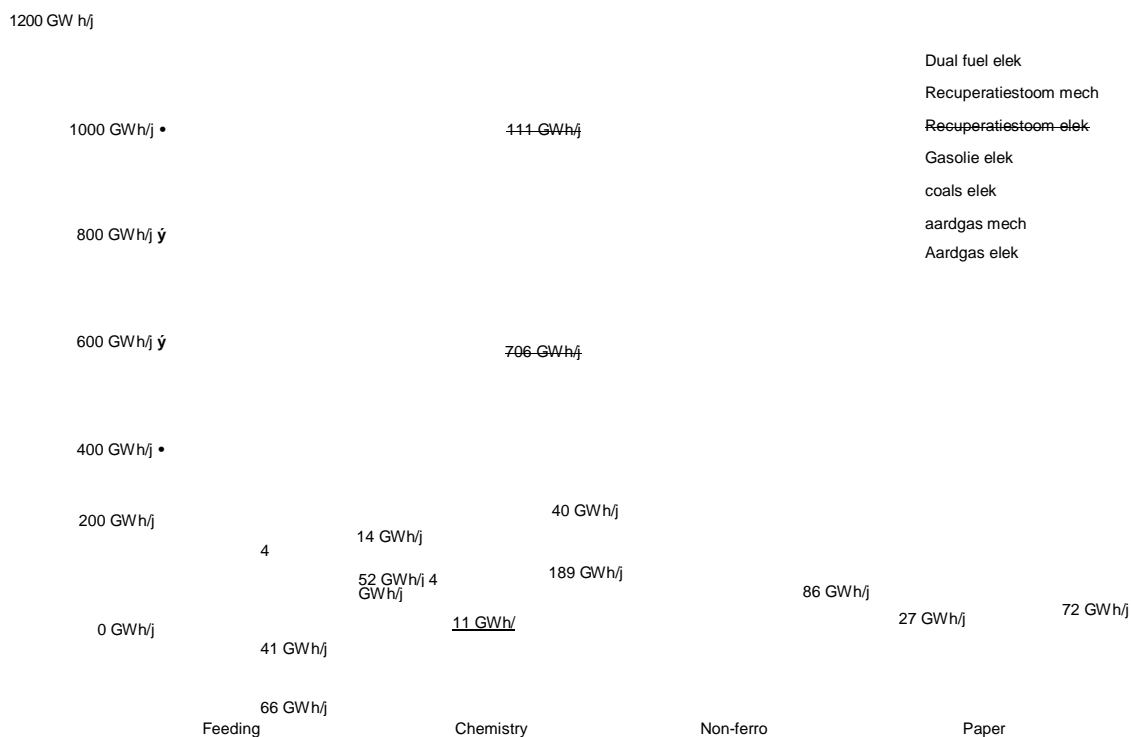
4.3 Partitioning of the electric and mechanical production of WKK steam turbines by fuel and by sector in 2005,

The following characters give a partitioning for steam turbines in 2005, by fuel and by sector of:

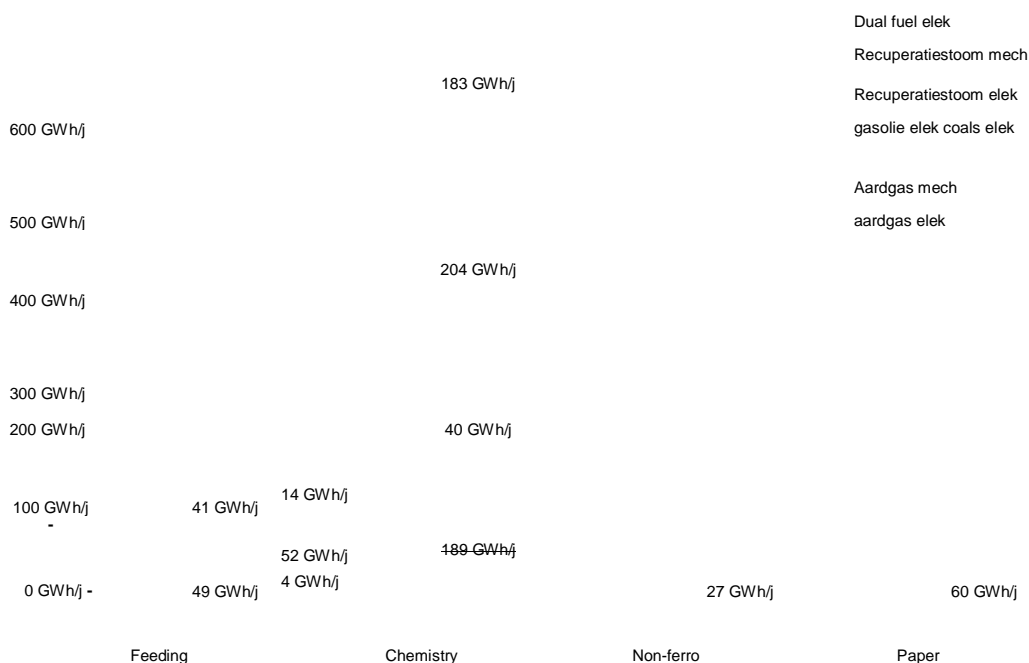
- net electricity/strength production (character 26);
- electricity/strength production calculated according to appendix II of the decision of the Flemish government of 7 July 2006,2] (character 27);
- qualitative electricity/strength production (character 28);



Character 26: Net electric and mechanical production of steam turbines in 2005, by fuel and by sector



Character 27: Electric and mechanical production of steam turbines calculated in 2005, by fuel and by sector according to appendix II of the decision of the Flemish government of 7 July 2006,2]



Character 28: Qualitative electric and mechanical production of steam turbines in 2005, by fuel and by sector

In these graphs one sees the same proportions returning as in the graph with the established capacity by fuel and by sector (character 25). the use of recuperatiestoom prevents only in the sectors chemistry and non-ferro. Aardgas is only used in the sectors feeding and chemistry.

Coals and gasolie are only still used in the voedingsector. In the paper sector oil is only used as fuel. In the voedingsector and non-ferro the sector can be considered all energy production as Wkk-energieproductie according to appendix II of the decision of the Flemish government of 7 July 2006,2]. Of the netgekoppelde steam turbines on aardgas there absolutely no installation is qualitative in the chemistry sector. Moreover netgekoppelde also absolutely no "dual fuel " steam turbine in non-ferro the sector are qualitative.

The energy production of certificate beneficiary steam turbines amounts to 40 GWh per year and is aroused entirely in the chemistry sector by 2 netgekoppelde steam turbines which work on recuperatiestoom.

4.4 Partitioning of the primary energy saving of Wkk-stoomturbines by fuel and by sector in 2005

The following characters give a partitioning for Wkk-stoomturbines in 2005 by fuel and by sector of:

- the primary energy saving calculated on the basis of the European reference output [3] (character 29);
- the primary energy saving calculated on the basis of the European reference output [3] for the installations which qualitative are according to the definition of appendix III of the decision of the Flemish government of 7 July 2006,2] (character 30);

3000 GWh/j
2500 GWh/j i

2000

GWh/j 1500

GWh/j 1000

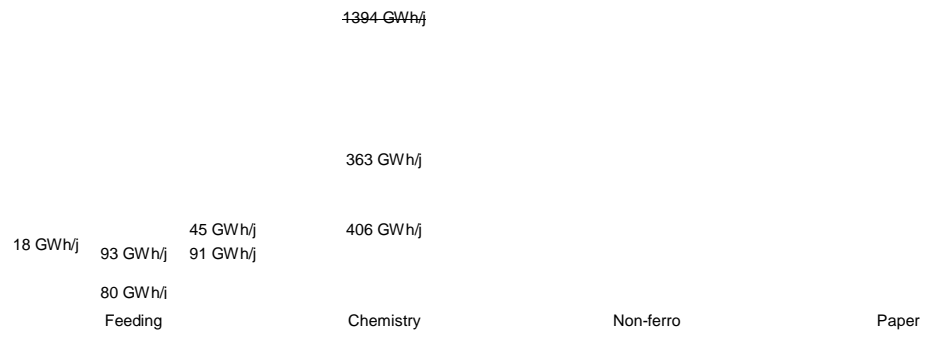
GWh/j

500 GWh/j
0 GWh/j
-500 GWh/j

233 GWh/j

Dual fuel elek
Recuperatiestoom mech
Recuperatiestoom elek
gasolie elek coals elek

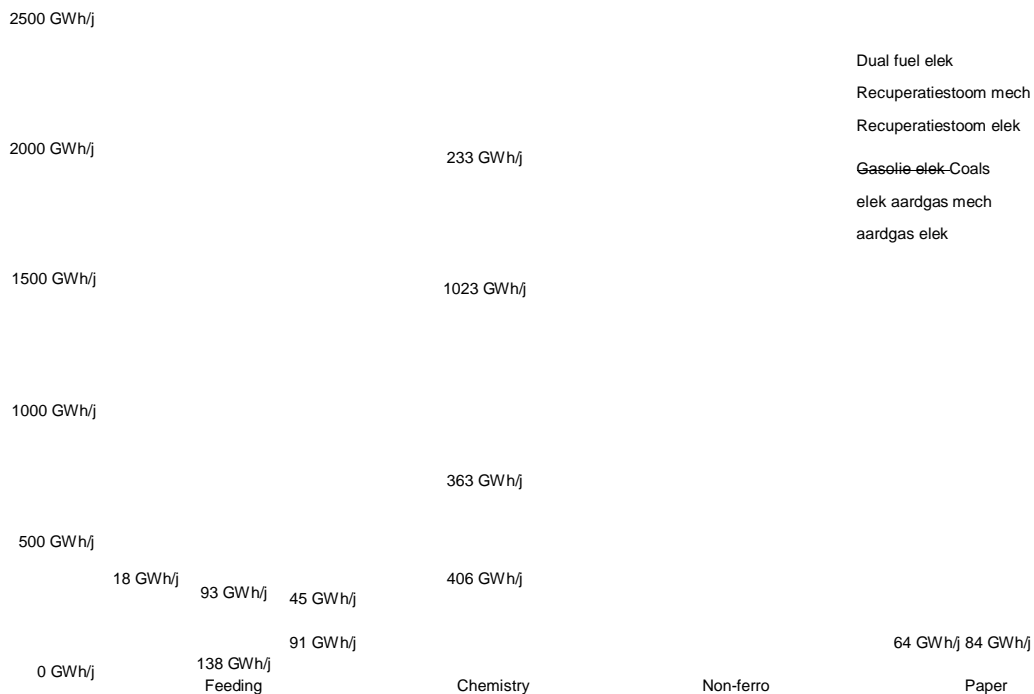
Aardgas mech
aardgas elek



Character 29: Primary energy saving of WKK steam turbines by fuel and by sector in 2005,

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From character 29 appears that the netgekoppelde steam turbines in the chemistry sector have together a negative primary energy saving. This also applies to the netgekoppelde steam turbines in the sectors non-ferro and paper.



Character 30: Qualitative primary energy saving of WKK steam turbines by fuel and by sector in 2005,

To the primary energy saving further the same observations apply as these which were made for energy production.

The primary energy saving calculated on the basis of the Flemish reference output such as described in Art. 10 of the decision of the Flemish government of 7 July 2006,²] for certificate beneficiary installations amount to 76 GWh per year and are aroused entirely in the chemistry sector by 2 netgekoppelde steam turbines which work on recuperatiestoom. When is taken into account the fictitious stoomopwekkingsrendement amounts to the primary energy saving for 1 of both installations 23.4 GWh/year the other installation has then a negative primary energy saving of -87,7 GWh/year, as a result of which these for the VREG not in aanmerkingkomt for Wkk-certificaten.

4.5 Decisions WKK's on the basis of steam turbines in 2005,

- In 2005, there is no steam turbine WKK's bijgeplaatst. Nevertheless there are modifications what concerns the results in comparison with these in the inventory of 2004. this is to the fact blame that for 2005 on the one hand other numbers were reported and on the other hand more installations were reported. Moreover there a shift took place of the netgekoppelde steam turbines to the STEG's and of the netgekoppelde to niet-netgekoppelde the steam turbines.

- the totally established electric capacity to Wkk-installaties with steam turbines amount to MWe in 2005 in Flanders 239, with a total net electricity production of 1,519 GWh/year Wkk-productie according to appendix II of the decision of the Flemish government of 7 July 2006,2] amount to of this 93.4%, 59.8% of the established capacity concern qualitative WKK steam turbines according to Art. 12 point 2 of the European directive 2004/8/EG [1]. Only 2% of the established capacity are certificate-authorized. This corresponds to 2.6% of electricity production.
- the established thermal capacity amounts to 1,704 MW.
- most of the installations prevent in the chemistry, where in 2005, a totally established electrically/mechanical capacity had been established of 128 MW (53.6%).
- the most important fuel is recuperatiestoom with a share of 42.7% of the established capacity.
- the energy production of certificate beneficiary steam turbines amounts to 40 GWh per year and is aroused entirely in the chemistry sector with netgekoppelde steam turbines which work on recuperatiestoom. Herewith 1 installation however is which does not qualify for WKK certificates o.w.v. negative PEB calculated with the Flemish reference output and taking into account the fictitious stoomopwekkingsrendement according to [4].

5 General decision

Table 6 gives a summary Wkk-installaties established of the capacities and energy figures of in Flanders in 2005.

Beside the data for the totally established electric capacity and total electricity production, the corresponding figures were calculated according to annex II of the directive 2004/8/EG of the European Parliament and the Council [1] or according to appendix II of the decision of the Flemish government of 7 July 2006,2]. Because of this parts warmth or electricity of the same installation which does not come from WKK become, excluded. Moreover the figures are also reflected for certificate beneficiary Wkk-installaties. These are the installations as from 01/01/2002 those qualitative are according to appendix III of the decision of the Flemish government of 7 July 2006,2], where was taken into account the European reference output [3].

For the classification in qualitative and not qualitative Wkk-installaties were taken into account point a and c annex III of the directive 2004/8/EG of the European Parliament and the Council [1] or with appendix III of the decision of the Flemish government of 7 July 2006,2]. Small-scale Wkk-installaties are considered as qualitative when the $RPEB > 0$ and large Wkk-installaties become as qualitative are considered when the $RPEB > 10\%$. were taken into account moreover for the reference output the Ministrieeel decide of the Flemish government that in the Bulletin of Acts, Orders and Decrees has appeared on 1/12/2006, [3], and in what the European reference output was taken over. It was not taken into account appendix IV of this last decision (correction factors for netverliezen) because insufficient data were available this apply. For the installations larger than 25 MWe it was taken into account Art. 12 point 2 of the directive 2004/8/EG of the European Parliament and the Council [1] for stipulating presence or absence of qualitative is of an installation.

The primary energy saving three times were calculated: 1 time on the basis of the European reference output (according to the Ministrieeel decides of the Flemish government that in the Bulletin of Acts, Orders and Decrees has appeared on 1/12/2006, [3]).2 on the basis of the Flemish reference output such as described time in Art.10 of the decision of the Flemish government of 7 July 2006,2] where 1 time was described, for the installations which work with recuperatiestoom, taken into account with the fictitious stoomopwekkingsrendement such as in the appendix to decision 2004-62 of the VREG [4].

Table 6: Summary established capacities and energieperformantie of Wkk-installaties in Flanders 2005.

	Engines	Gasturbines	STEG	steam turbines netgekoppeld	steam turbines direct traction	Total
Total established electric WKK capacity [MW]	161	326	731	126	113	1457
Total established thermal WKK capacity [MW]	200	422	436	742	962	2762
Established electric WKK capacity according to annex II [MW]	152	289	371	126	113	1051
Established electrically qualitative WKK capacity according to definition directive 2004/8/EG [MW]	143	203	282	90	53	771
Established electric certificate-authorized WKK capacity [MW]	40	0	395	5	0	440
Production of electricity and warmth of Wkk-installaties						
Total net electricity production [GWh/year]	418	2337	3644	612	907	7918
Total calorification [GWh/year]	558	3054	2812	3206	6631	16261
Net electricity production according to annex II	398	2102	2122	519	899	6040
Net electricity production qualitative WKK according to definition directive 2004/8/EG [GWh/year]	397	1445	2014	465	396	4717
Net certificate beneficiary electricity production [GWh/year]	102	0	1233	40	0	1375
Average vollastdraaitijd [h/year]	2602	7165	4986	4841	8026	5433
Primary energy saving of Wkk-installaties						
Primary energy saving on the basis of Flemish reference output [GWh/year]	288	1148	1587	274	229	3526
Primary energy saving on the basis of Flemish reference output with fictitious stoomopwekkingsrendement [GWh/year]	288	1148	1587	79	-960	2142
Primary energy saving of qualitative WKK on the basis of Flemish reference output	316	1118	1461	532	748	4175
Primary energy saving of qualitative WKK on the basis of Flemish reference output with fictitious stoomopwekkingsrendement [GWh/year]	316	1118	1461	337	335	3567
Primary energy saving on the basis of European reference output [GWh/year]	315	1413	1985	883	1818	6414
Primary energy saving of qualitative WKK on the basis of European reference output	342	1257	1701	1112	1448	5860
Relative primary energy saving of Wkk-installaties						
RPEB on the basis of Flemish reference output	19	15	16	5	2	10
RPEB on the basis of Flemish reference output with fictitious stoomopwekkingsrendement [%]	19	15	16	2	-10	6
RPEB of qualitative WKK on the basis of Flemish reference output [%]	22	23	21	13	13	18
RPEB of qualitative WKK on the basis of Flemish reference output with fictitious stoomopwekkingsrendement [%]	22	23	21	6	3	15
RPEB on the basis of European reference output	21	17	19	16	16	17
RPEB of qualitative WKK on the basis of European reference output [%]	24	25	24	23	23	24

The totally inventoried electric capacity to Wkk-installaties amount to MWe in 2005 in Flanders 1,457, what means that for 378 MWe to WKK's in 2005. these installations have a total net electricity production of 7,918 GWh/year Wkk-productie have recovered according to appendix II of the decision of the Flemish government of 7 July 2006,2] amount to of this 76%. 53% of the established capacity concern qualitative Wkk-installaties according to Art. 12 point 2 of the Europes directive 2004/8/EG [1]. 30% of the established capacity and 17% of electricity production are certificate-authorized.

The totally established thermal capacity amounts to 2,762 MW with a total calorification of 16,261 GWh per year.

Character 31 shows the totally inventoried electrically and mechanical capacity to Wkk-installaties by type and by sector. Appears clear that the industry the most important sector has been totally established with an electric capacity of 925 MWe or 63.5% of the totally established capacity.



Character 31: Established electrically and mechanical capacity to Wkk-installaties by type and by sector

In character 32 a partitioning is given of the inventoried electrically/mechanical capacity to Wkk-installaties by type and by fuel. Aardgas the most important fuel appears has by far been installed with totally an electric capacity of 1,176 MWe or almost 81% of the totally installed capacity.



Character 32: Established electrically/mechanical capacity to Wkk-installaties by type and by fuel

The total primary energy saving calculated with the Flemish reference output amounts to 3,526 GWh per year or 12.7 PJ. When the qualitative installations are only considered, PJ amount to these 4,175 GWh per year or 15. The total primary energy saving calculated with the European reference output amounts to 6,414 GWh per year or 23.1 PJ, what almost double this way much have been calculated as this with the Flemish reference output.

There is 1 Steg-installatie for which are, in spite of the RPEB of more than 10%, the WKK output nevertheless smaller than 70%, as a result of which these for Europe if qualitatively can be considered. However this installation is certificate-authorized, since the additional requirement from Art. 12 point 2 for installations with a capacity larger than 25 MWe was not incorporated in the Flemish quality definition.

1 PJ amounts to the total primary energy saving which qualifies for Wkk-certificaten in 2005, 281 GWh or.

References

[1] directive 2004/8/EG of the European Parliament and the Council of 11 February 2004 in the matter of

promotion of warmth strength link on the basis of the question to useful warmth within internal energy market and amending directive 92/42/EEG. [2] decides of the Flemish government of 7 July 2006 for the promotion of the elektriciteitsopwekking

in qualitative warmth strength installations. [3] Ministrieel decide in the matter of the engagements of reference output for application of

conditions for qualitative warmth strength installations. [4] appendix at BESL-2004-62 of the VREG: Closer rules concerning the procedure to

appraisal of the quality recognition of Wkk-installaties: how Wkk-installatie consider at the calculation of the warmth strength saving and relative primary energy saving.

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