

SAVE 5E in Universities Pilot Action Report of Ghent University

This report describes the pilot action at Ghent University on procurement of personal computers and monitors and evaluates the realized energy saving

1. Procurement policy of Ghent University

Procurement of office equipment is done with a centrally managed contract. There is a centrally managed contract for computer equipment, including desktops, laptops, servers and monitors. The procedure consists of the following steps.

- A request for tender proposals is made by a university procurement officer to a set of potential suppliers of the equipment via the government e-tenders website or the official journal of the European Union.
- Interested suppliers send a tender to the university.
- The tenders are subjected to an evaluation process. One supplier is chosen. The supplier contracts with the university.
- The central administration of the university is bound by the contract to purchase only from the chosen supplier.
- Departments are allowed to buy outside the contract. For orders above 5500 €, departments have to prove why, for their purpose, a choice outside the contract is necessary. So, in practice, for computer equipment, an individual may buy a desktop or a laptop from a different supplier. For sets of PC's, it becomes extremely difficult not to follow the central contract.

2. Procurement procedure for computer equipment

A renewal of the central contract for computer equipment was due by July 2003. The preparation of the procedure for the call for tenders was started in March-April 2003. This happened at the beginning of the current project, at a time where the partners did not yet have a common policy on the pilot action. The officer responsible for the contract for computer equipment is one of the chief officers of the university's managing board for ICT. As a result of the contacts between the 5E team and this officer on energy efficiency criteria within the tender process, the officer determined his point of view as follows.

- He expressed his concern about energy efficiency of computer equipment, in line with the general commitment of the university on energy efficiency, adopted by the board of the university in 2000.
- He expressed his doubt about the feasibility of introducing energy efficiency criteria in the forthcoming call for tenders due to a multitude of reasons:
 - the lack of legally accepted harmonized standards and guidelines to make transparent to candidate suppliers how energy efficiency would be one of the criteria of evaluation;
 - the fear that energy efficiency requirements, when not properly formulated, might lead to a choice of a supplier with a higher price than suppliers with somewhat less energy efficient equipment;

- the insignificance of specifying general energy efficiency requirements such as the obligation to satisfy 'Energy star' criteria, since these criteria are so moderate that they only exclude the most inefficient products;
 - the very unlikely situation that a supplier for a central contract of the university would not be a supplier of energy efficient equipment. The expectation of the officer was that there might be a rather large number of candidate suppliers, but that the number of manufacturers involved could not be large and that only big manufacturers had a chance to be chosen on the basis of the criteria on price, performance, quality, durability, maintainability, service support and delivering times.
- He further suggested that it would be much more effective with respect to energy savings to undertake three actions:
 - to specify as a standard desktop system one equipped with an LCD monitor instead of a CRT monitor, although at that time the price of an LCD monitor was still much larger than the price of a CRT monitor;
 - to instruct system managers to use, as much as possible, low-power or sleep-mode features in the power management system of desktops and monitors;
 - to promote the use of laptops.

A call for tenders was sent out for desktops, laptops, servers and monitors. As result of the call, 7 candidate suppliers made offers. The tenders were evaluated on the basis of the criteria of price, quality, durability, maintainability, service support and delivering times for a number of performance classes. The result was that Dell was chosen for the desktops, laptops and servers. Two desktops, two laptops and two servers were chosen:

- desktops: OptiPlex GX270
OptiPlex SX270
- laptops: Latitude D600
Latitude D800
- servers: PowerEdge 1750
PowerEdge 2650.

The observation was that, although energy efficiency was not used as criterion, the chosen desktops are amongst the most energy efficient types. This corresponds with the expectation of the ICT-officer.

For monitors, 9 types were selected: three CRT-types (two 17" types of Philips and one 17" type of Dell) and 6 LCD-types of Dell ranging from 15" types to 20" types.

According to the suggested policy of the ICT-officer, the standard desktop systems were combined with the 15" TFT of Dell: 1504FP. This led to the following prices:

OptiPlex GX270: 480 €excl. VAT
 Monitor 1504FP: 250 €excl. VAT
 Windows XP: 25 €excl. VAT
 Sum: 755 €excl. VAT = 915 €incl. VAT

OptiPlex SX270: 550 €excl. VAT
Monitor 1504FP: 250 €excl. VAT
Windows XP: 25 €excl. VAT
Sum: 825 €excl. VAT = 1.000 €incl. VAT.

The price of a 17" CRT monitor at that time was ranging from 109 €to 137 € So, the possible saving by replacing the 15" LCD monitor by a 17" CRT monitor was about 125 €on a system price of 755 €or 825 € excl. VAT, so, about 150 €incl. VAT. So, the price difference was not negligible at the beginning of the contract. .

The prices for the laptops were, at the beginning of the contract:

Latitude D600: 1.035 €excl. VAT = 1.250 €incl. VAT
Latitude D800: 1.150 €excl. VAT = 1.390 €incl. VAT.

The central contract is valid for 2 years, so for the period July 2003 – July 2005, with an evaluation time after one year, so in July 2004. The evaluation time gives the possibility to interrupt the standard contract if market circumstances change significantly. Further, the contract is regularly adjusted to the evolution of the technology and the evolution of the prices.

3. Evaluation of the procurement procedure

Energy efficiency criteria did not influence the selection of the computer equipment. However, as expected by the ICT-officer, the selection procedure did not result into a choice of energy inefficient equipment.

The discussion about energy efficiency during the preparation of the call for tenders for computer equipment led to an energy policy of the ICT-management of the university with the following features:

- promote flat screen monitors instead of CRT monitors;
- encourage system managers to use as much as possible the power management system entering the computer and the monitor into standby mode after a period of inactivity;
- encourage procurement of laptops instead of desktops for laboratory use.

4. Evaluation of the energy savings

At the end of 2002, the university had about 9000 computers: 6000 personal computers and 3000 servers. At the beginning of 2005, there are about 11000 computers: 6500 personal computers and 3500 servers. Personal computers have a typical lifetime of 3.5 years. This means that during 2003 about 1700 personal computers have been replaced and that about 250 new computers have been added. This means a total of about 1950 computers. For 2004, the figures may be estimated as replacement of 1750 personal computers and addition of 250 personal computers, so, a total of 2000 personal computers.

The new central contract for computers started in July 2003. So, at the beginning of 2005, it has been effective for one and a half year. This means that the new contract applies to about 3000 personal computers. A large amount of these computers has LCD monitors. The general

impression of the ICT services of the university is that still a large number of computers bought in the second half of 2003 were equipped with CRT monitors. This tendency changed during the first half of 2004. The reason was the lowering of the price of LCD monitors. Mid 2004 the contract with Dell was evaluated. The ICT-officer has decided to continue the contract with Dell. At that time, it was also decided to mask to possible buyers at the university that the current contract contains 9 monitors. From mid 2004 on, on the website of the university the desktop systems are described with standard monitor 1504FP (15") with possible upgrades to 1703FP (17") and 1901FP (19"). This decision was taken to promote LCD monitors and was justified by the relative low difference in price with CRT monitors. So, from mid 2004 on, one may assume that almost no CRT monitors have been bought and that the most frequent choice has been for the 17" flat screen. So, one may assume that about 75% of the purchased monitors in 2004 in departments was an LCD monitor. Further, it was decided to replace all monitors in the central administration of the university by flat screens. Further, as far as can be verified, for student class rooms only LCD monitors have been bought.

For 2004, one may estimate the purchase of personal computers and monitors as follows (estimating the life cycle of a personal computer to be 3.5 years).

Personal computers at the beginning of 2004:	6250
- in the central administration	500
- in PC rooms for students and class rooms	1500
- in departments	4250

Replacements of computers and monitors during 2004:	
- replacement of monitors in the central administration	500
- replacement of desktops in the central administration	150
- replacement of monitors (and computers) in PC rooms and class rooms for students	450
- replacement of monitors (and computers) in departments	1150
- newly bought personal computers (and monitors?) in departments	250
- replacement of desktops by laptops in departments (10 %)	115

4.1 Energy saving due to LCD monitors

We estimate the LCD monitors replacing CRT monitors at 500 (central administration) +450 (student PC rooms and class rooms) + 75% x 1150 (departments). This is about 1800 monitors. Further, we assume that for the equivalent of the number of the newly bought computers, old CRT monitors have been reused.

The energy consumption of a 17" LCD monitor Dell 1704FP in on/idle mode is 31 W. The energy consumption of a 17" CRT monitor Philips 107T60 in on/idle mode is 57.9W (these are both very energy efficient monitors). One may estimate that monitors are about 6 hours

active per day in administrative offices and in department offices. Monitors are about 10 hours active per day in student rooms.

With about 210 office days per year in administration and departments and about 125 class days in a year, the yearly energy saving due to replacement of monitors is about

$$\begin{array}{r} 27 \text{ W} \times 1350 \times 6\text{h} \times 210 \quad 45925 \text{ kWh} \\ + 27 \text{ W} \times 450 \times 10\text{h} \times 125 = \quad \underline{15185 \text{ kWh}} \\ \quad \quad \quad \quad \quad \quad 61100 \text{ kWh} \end{array}$$

The yearly electricity saving due to replacement of monitors will, of course, be somewhat less in the coming years due to the special action in the administration of the university during 2004. Further, it is difficult to say how much of this saving is due to the active energy policy of the ICT management office of the university. Undoubtedly, even without any policy, also a lot of CRT monitors would have been replaced by LCD monitors.

4.2 Energy saving due to power management

Power management possibilities are generally enabled for newly bought desktops in the central administration and in departments. The current desktop type is OptiPlex GX280. This system is delivered with "Energy Star Enabled". The general impression is that system managers have not done an effort to activate energy saving management in older computer systems. So, one may assume that in the administration and the departments, during 2004, 1550 (desktop or laptop) computers have been installed with an energy saving management system. This system is of largest value for putting computers and monitors in sleep mode during nights and weekends. At the beginning of the project, an inquiry learned that about 50% of the people do not switch off their personal computer during nights and weekends. They generally switch off the monitor. We assume that this percentage has not changed during 2004. Further, we count 210 office days, 120 weekend days (including extended weekends) and 35 holiday period days. We assume that people switch off systems during longer holiday periods. The on/idle power for the OptiPlex GX280 is about 72 W. The sleep mode power is about 2.5 W. The energy saving due to power management may estimated at:

$$70 \text{ W} \times 50\% \times 1550 \times 15\text{h} \times (210+120) = 268500 \text{ kWh}$$

This figure certainly overestimates the saving. In departments, Ph.D. students often work late at night. Further, it is likely that many people who do not switch off their computer for a night during the week, do it for a weekend, certainly for an extended weekend. So, a realistic figure is more likely in the order 200000 kWh. The figure nevertheless shows the extreme importance of a power saving management system.

For computers in student PC rooms and class rooms, the power management system is not enabled. Teaching during class hours would be much disturbed by computers going into sleep mode after some time of inactivity. An inquiry learns that a large fraction of students leaves the computer and the monitor on, when leaving the computer room at closing hour (generally around 10:00 p.m). At this time of the day there is no operator to shut down the computers. The room is closed by the night guard, but this person does not interfere with the computers. Monitors go into blanking state, but this is not a deep sleep state. The ICT-management of the university studies now the possibility to switch off automatically computers and monitors in

student PC rooms and class rooms at the closing hour of the rooms. This system is however, not active yet. It is just a matter of time, because it is obvious that an important energy saving is possible with this action. Further, it is not clear yet if the older computer systems allow such an action. One may estimate the possible saving to be:

$$50\% \times 100\text{W} \times 1500 \times 10 \text{ h} \times 125 \text{ day/year} = 100000 \text{ kWh}$$

4.3 Energy saving due to laptops

In the departments, a number of desktop computers have been replaced by laptop computers. It is difficult to say if this tendency will continue. Generally, a laptop is given to permanent staff, but much less to Ph.D. students.

The saving by installing laptops is not very big. Generally these systems are equipped with a docking station and a supplementary monitor. So, the saving is that the computer power goes down from the order of 70 W to the order of 35 W. The saving may be estimated to be:

$$35 \text{ W} \times 115 \times 6\text{h} \times 210 \text{ days/year} = 5000 \text{ kWh/year}$$

4.4 Global energy saving of the pilot action

The global energy saving is in the order of 265000 kWh/year. This is an impressive figure. It constitutes about 0.6 % of the global electricity consumption of the university.

5. Conclusion

The pilot action of the “Save 5E in Universities” project has led at Ghent University to the following results.

The procurement procedure for computer equipment does not contain energy efficiency criteria in an explicit way. However, the procurement officer takes care to avoid energy inefficient equipment.

The ICT management department of the university follows a policy of energy saving based on two main actions:

- encourage system managers to use as much as possible the power management system entering the computer and the monitor into standby mode after a period of inactivity;
- promote LCD monitors instead of CRT monitors.

This policy, once it will fully active, will result in a saving of electricity consumption of the order of 1 % of the global electricity consumption of the university. The saving realized at this stage is of the order of 0.6 % of global electricity consumption of the university.

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