



The NComputing Green Advantage

Introduction

We all know that modern PCs are more powerful than the earliest room-filling computers. They also use less electricity. Arguably the first general-purpose computer, ENIAC drew roughly 150,000 watts of electricity. By comparison, today's PCs consume less than 150 watts. That seems small. But there was only one ENIAC—and there are close to a *billion* PCs in use today.

- One billion PCs consume an immense amount of electricity. Most of it is provided by burning fossil fuels. This process also emits pollutants, sulfur, and carbon dioxide into the air. These emissions can cause respiratory disease, smog, acid rain, and global climate change.

When CIOs are surveyed on where they are spending their money, they speak of hardware (such as PCs, servers, storage, and networking equipment), and software projects (security, CRM, business intelligence, etc.). They rarely if ever mention how much it costs to keep all those systems running. But as a matter of fact, in 2006 businesses spent about \$55 billion on new servers, according to market-research firm IDC, and they spent \$29 billion (almost half the cost of the equipment itself) to power and cool those machines. The cost of powering desktop computers is tracked even less due to their distributed nature.

- The so-called holy grail of educational computing is a one-to-one student-to-computer ratio. But a classroom full of 30 PCs has to supply sufficient power to each machine. On top of this, the heat generated by the PCs requires the room to be air conditioned. This all results in considerable increases in capital costs.
- In developing countries around the globe, electricity is often scarce, expensive, and unreliable. Crossing the digital divide isn't as easy as donating old PCs. Power must be considered as part of the overall equation.
- In addition to the problem of PC energy consumption, the high rate of technology refresh in PCs burdens our environment even further when PCs are retired and become e-waste.

From the largest to the smallest scales, the environmental impact of today's PC architecture is a big and growing problem.

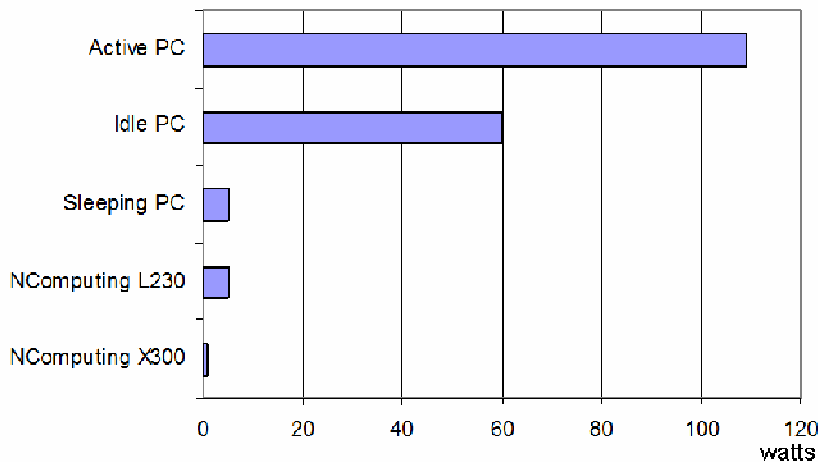
The NComputing Architecture

The NComputing solution is based on a simple fact: today’s PCs are so powerful that the vast majority of applications only use a small fraction of their computing capacity. NComputing’s virtualization software taps this unused capacity so that it can be simultaneously shared by multiple users. Each user’s monitor, keyboard, and mouse are connected to a very small and highly reliable access device, which is then connected to the shared PC. The access device has no CPU, memory, or moving parts, and the solution is easy to deploy and maintain. As a major leap forward in green computing, NComputing solutions draw less than five watts of power for each added user versus 110 watts for a typical PC. The 90% reduction in energy consumption is especially critical in developing countries where electricity is expensive and limited. NComputing systems are compatible with Windows, Linux, and standard PC applications, and cost as little as \$70 per seat. In fact, the energy savings alone can pay for the cost of NComputing products in as little as one year.

A Radical Difference

Although PC power supplies are generally rated at over 200 watts, most of the time they consume far less—about half. According to most studies and tests, an “active” PC, meaning one in use, consumes about 110 watts. An idle PC drops to about 60 watts.

By contrast, NComputing access devices consume next to nothing. NComputing has two product lines—the L-series and the X-series. L-series products typically consume 5 watts per added user. X-series consume about 1 watt per added user.



These are radically important savings in energy consumption. *The NComputing X300 uses up to 100 times less power than a PC that complies with US Energy Star requirements.*

- An X300 saves 99% of the energy of a PC.
- An L230 saves 95%.

Air Conditioning

A classroom full of 30 full-blown PCs (the equivalent of thirty 110 watt light bulbs) warms up very quickly. In fact, PC-filled classrooms and computer labs almost always have to be air conditioned. That adds additional electricity costs (to power the air conditioner), and it also creates a large capital cost to buy and install the AC. On the contrary, a classroom powered by a handful of PCs and a full complement of NComputing access devices generates far less heat and does not require additional air conditioning.

Reliability

The least reliable components in most electronic devices are the parts that move. In personal computers, this includes hard disk drives and fans. NComputing access devices have no moving parts; they are very small and very reliable solid-state devices. They fail far less often than the PCs that they share, so maintenance is much easier and much less expensive. If you repair PCs yourself, you'll make fewer service trips and tie up less money in spare parts inventory. If you pay a third-party to maintain your PCs, your contract is probably based on how many PCs you have—so the NComputing solution can save you money on maintenance contracts that can be better spent on other priorities.

Noise

Compared to jet engines and jack hammers, personal computers are relatively quiet. The problem with PCs and noise pollution comes from two factors. First, a room full of them is much noisier than just one. And second, the environment where they are often installed (classrooms, libraries, internet cafes, offices) are places where silence is highly valued.

Source of sound	dB
immediate soft tissue damage	185
rocket launch	165
threshold of pain	134
damage from short-term exposure	120
jet engine	110
jack hammer	100
damage from long-term exposure	85
traffic noise	80
moving car	70
television	60
private office	50
normal talking	40
personal computer	35
library	30
very calm room	20
calm human breathing	10

E-Waste

Electronic waste is a growing problem in the US and throughout the world. People rarely think of their PCs in the same way they think of other toxic waste, but whereas electronic waste represents only 2% of America's trash in landfills, it represents 80% of the toxic waste. NComputing greatly reduces the magnitude of this problem.

- Access devices have a longer life than PCs. When a shared PC is upgraded, all NComputing users enjoy the boost in performance. So whereas PCs might be upgraded every three years or so, access devices could easily last five years or more. With less turnover, less equipment ends up in a landfill.
- In sheer mass, PCs generate much more waste. A typical PC weighs about 20 pounds; an access device weighs about one-third of a pound. That means that there is 98% less waste to deal with.
- Because they weigh about one-sixtieth of a PC, access devices cost less to ship and burn less fuel doing so.
- NComputing access devices are compliant with RoHS regulations, which restrict harmful substances such as lead, mercury, and cadmium.

Calculating the Energy Savings

At 1 to 5 watts per added user, you can save a lot of electricity with NComputing access devices. But how much? You can find out by using our simplified web-based calculator at www.ncomputing.com/green or downloading the more detailed calculator from the same location.

Conclusion

In these times of high energy costs and climate change, we all need to think strategically about how to minimize costs and conserve energy wherever possible. A major cost of running an organization comes from supporting the information technology infrastructure. Probably the most well-known and expensive part of this infrastructure is the PC. Over the past twenty years, PCs have become an essential part of every type of organization. People need computers to communicate, learn, interact and do their jobs, however, computing has evolved since the creation of the PC, and we now can choose alternate approaches to deliver PC access at a fraction of the cost—and energy.

This paper quantified the cost of energy consumption of desktop devices, and discussed the related topics of e-waste and noise pollution. NComputing access devices save money up front, and over time. They consume less power, generate less heat, last longer, and produce less e-waste, all while delivering a rich PC experience. Ultimately, the NComputing green advantage helps reduce our impact on our shared global environment.