FUJITSU

White Paper
Environmental Benefits of Desktop Virtual Computing

Energy efficiency benefits and Environmental Considerations when Deploying a Virtual Desktop Solution

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Introduction

The rise and uptake of the virtual desktop has enabled organisations to realise a number of benefits including improved user experience, better customer service and up to a 40% reduction in desktop support costs. Not to mention the ability for organisations to move from a CAPEX operating model to a more OPEX utility based platform.

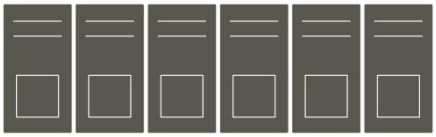
With most of the focus being on tangible business benefits, little has been said about the environmental benefits of virtual desktops. With rising energy costs and environmental compliance the total environmental benefits of a virtual desktop solution have been to date undervalued.

This white paper focuses on the closely linked subjects of energy use and carbon emissions around the desktop environment. It looks at the potential decreased energy costs in the context of Fujitsu's Virtual Client Services (VCS) virtual desktop solution and also delves deeper into other tangible and intangible benefits. These benefits include more efficient maintenance, longer refresh cycles of desktop hardware, decreased heat load in buildings, ability to sweat assets longer and the potential reduced embodied carbon and emissions throughout the lifecycle of a VCS solution.

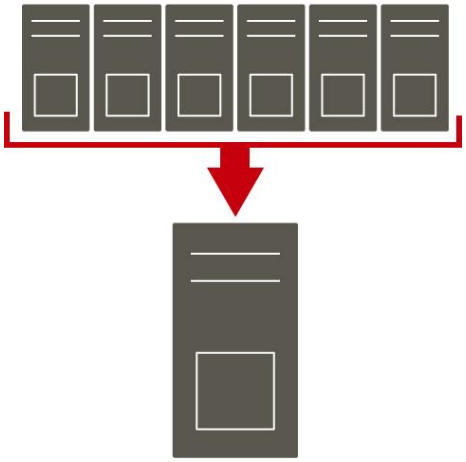
In our recent global ICT Sustainability Survey* which included interviews with 1,200 CIO's and IT Leaders across 8 countries showed that 51% are either in the planning or pilot phase of desktop virtualisation and just 12% considering themselves at best practice. The remaining 27% currently do not have plans for virtual desktops.

By factoring in the reduced energy costs and also other tangible environmental benefits this paper aims to provide you with practical advice on how to further support the business case for virtual desktop solutions.

Physical



Virtual



Virtual Computing Services Defined

Virtualisation lets one computer do the job of multiple computers by sharing the resources of a single computer across multiple environments.

The virtual desktop allows organisations to host and centrally manage desktop virtual machines in the data center while giving end users a full PC desktop experience.

Virtual desktop solutions typically involve a thin client based connection to a desktop environment which can include office productivity suite alongside other desktop applications. The desktop is hosted, run, delivered and supported from a central location with high-quality and resilient connections to the Internet/cloud.

Connecting clients run pre-installed or downloaded viewer applications via one of many remote desktop protocols. Clients can include thin clients, PCs, workstations, mobile and handheld devices running a variety of operating systems such as Windows, Mac OS X, Linux and others.

Current State of Desktop Energy Use

Currently the traditional desktop is connected to a corporate network and all the processing is done via that desktop which is known as decentralised computing. An average desktop computer has a power usage of between 80 and 250 watts, depending on the graphics cards, processors etc.

To calculate desktop energy usage we used the following method:

$$\sum_{\substack{Asset\\Types}} (Number\ of\ asset \times Power\ consumed\ by\ asset\ per\ hr \times Hrs\ asset\ is\ used\ per\ day \times Days\ assets\ are\ used\ per\ year)$$

The desktop calculations are based on the following assumptions:

- Is on for 3,000 hours per year out of a possible 8760 hours
- Average power draw of 120 watts at a 65% utilisation
- Paying 0.25c per kWh
- Emission factor of 0.88 kg of CO2e per kWh (Based on NSW)

Annual running costs: $58.50**
Annual Co2e: 210 kg
Annual Energy: 230 kWh

A thin client on the other hand can have a power draw of just 8 to 25 watts and based on the above assumptions and assuming a power draw of 15 watts the annual usage is as follows:

Annual running costs: $7.31**
Annual Co2e: 30 kg
Annual Energy: 29 kWh

Per unit a thin client could potentially save up to $51.19* per year in energy costs while also reducing emissions by 140kg. Across a fleet of say 5,000 users the savings could be quite significant, resulting in energy costs savings of $255,950 and a reduction of 900 tonnes of CO2e per annum.

It's not all clearly black and white....

While centralising computer power to a data center is needed for virtual desktops, energy consumption required for computing power is shifted from each individual machine to a central data center. This means an increase in requirement at the server end but that is offset by a much improved utilisation of available hardware at the central location.

It is difficult to determine the exact need for back end servers as you need to factor in the type of processing power needed, applications and user profiles. Based on an average typical office environment for 5,000 virtual desktop users you would need around 15 servers. Which using the same formula and assuming a power draw of 500watts on 24/7 would cost $10,676 in power with an additional $7,500 in cooling costs. (assuming it is hosted in an Data Centre with a Power Use Effectiveness of 1.7) The environmental impact including cooling would be around 73 tonnes of Co2e.

So in order to get a more complete picture on the environmental and costs benefits you will need factor in the server impact which in this example would be $18,176 and 73 tonnes of Co2e per annum.

Other Benefits of Virtual Desktops

While the main benefits lie directly in the reduced energy costs and associated emissions there are a number of other environmental benefits that could be factored into your decision making process on whether to adopt a virtual desktop solution.

Decreased Heat Load in Buildings

Typically in commercial buildings in Australia and New Zealand up to 70% of the energy use of the building can be attributed to running the heating, ventilation and air conditioning (HVAC). Three of the main factors that increase heat load in buildings are people, lighting and ICT. With ICT equipment the heat dissipation averages to be an additional 25% of the total kWh usage. So with a desktop that uses 230 kWh per year the HVAC system in the building will on average need to output an additional 57.5kWh of energy while a thin client which uses just 29 kWh per year would require an additional 7.25kWh.

Across a fleet of 5,000 users this could be an additional 251,250kWh for desktops resulting in $62,812 in energy costs. In comparison a virtual desktop environment will have an additional HVAC load of 36,250kWh resulting in $9,062 in power costs with a net benefit of $53,750.

Equipment Lifecycle and Disposal

One Main point of advantage that virtual desktop environments have is in life cycle and disposal. Thin client life spans are much longer as they do not have hard drive fan or other moving parts which means that there are no physical stress points. In theory you could run the asset for 5 to 10 years instead of the typical lifecycle of three years. This alone has significant sustainability benefits in the reduction in manufacturing and transport emissions and overall embodied carbon of your end user computing solution.

Aging thick clients can be readily converted to thin clients of a virtualised environment. Another aspect is the simplified decommissioning procedure. At the end of the operation phase, the device at end user's workplace is collected and decommissioned. This may include restoration of factory settings and deletion of data which may be a requirement for compliance with Information Security policies. In case of thin client, no elaborate decommissioning procedures are required and the unit can be redeployed or recycled much easier than a normal desktop.

Enablement of Activity Based Working (ABW) Environments

The concept of activity based work is becoming increasingly popular as organisations are adopting flexible workplaces and practices. This includes creating virtual offices through implementing the latest technology such as laptops, instant messaging and wireless connectivity enabling their staff to work almost anywhere. One of the main advantages of ABW is the reduced power, paper usage and real estate costs. Underpinning the move to an ABW environment if the technology and the ability for staff to be connected from any located and not tied to one desk. VCS can play a major role in unlocking the real benefits of ABW environments.

Telecommuting

Having Virtual Desktop gives organisation the ability to support infrastructure for remote work, telecommute or on-call. This results in increased employee productivity and saving on fuel costs. One major challenge with physical machines is that a fixed workstation restricts the organisation from supporting this flexibility while challenge with mobile workstations (laptops or tablets) is that there is little control over data security on the device. Virtualised desktop environment removes both constraints and provides both security and mobility.

Conclusion

The environmental benefits of a virtual desktop solution can be significant and the technology provides the CIO an opportunity to assist in making a significant contribution to the organization's sustainability and energy efficiency goals. Careful consideration must be made in the back end infrastructure and the hosting environment of the servers otherwise you risk merely pushing the issue from the desktop to the data centre. Also a key recommendation is to carry out energy testing of any new virtual desktop equipment to ensure you are getting the right product and can factor in the correct energy savings into your business case.

**Fujitsu Global ICT Sustainability Benchmark. Global index of the ICT Sustainability maturity of our IT leaders covering all aspects of ICT including Lifecycle, End User, Enterprise, Metrics and Enablement. (See appendix for link to latest survey results)*

***Figures quoted are for example purposes only. Actual situation may vary depending on the specs, age and use of old equipment, the specs and how the new virtual desktop system is used, what you pay for energy and the local emission factor applicable to your location. The Sustainability Consulting team is able to supply Fujitsu clients and prospects a detailed and tailored analysis specific to your situation upon request.*

Appendix

ICT Sustainability – The Global Benchmark
https://www-s.fujitsu.com/global/solutions/sustainability/Fujitsu-Sustainability.html

Fujitsu Sustainability Solutions – Virtual Desktop
http://www.fujitsu.com/au/sustainability/sustainability-solutions/desktop-virtualisation/index.html

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