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4-16-2011

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芽|Sprouts Working Papers on Information Systems ISSN 1535-6078

GREEN IT - WHERE TO FROM HERE?

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Abstract
This paper looks at the current state of research into green information technology and the acceptance of this as a means of sustainability, reduction in energy costs and the role that IT companies are playing in its deployment. Implementation of Green IT has been slow and patchy We propose a preliminary list of activities that academics and researchers can undertake to speed the greening of IT; contributions and additions to the list are welcome.

Keywords: Green IT, sustainability, environment

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Reference: Dick, G. N., Case, E. (2011). "GREEN IT - WHERE TO FROM HERE?," Proceedings > Proceedings of SIGGreen Workshop . *Sprouts: Working Papers on Information Systems*, 11(18). http://sprouts.aisnet.org/11-18

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This paper looks at the current state of research into green information technology and the acceptance of this as a means of sustainability, reduction in energy costs and the role that IT companies are playing in its deployment. Implementation of Green IT has been slow and patchy We propose a preliminary list of activities that academics and researchers can undertake to speed the greening of IT; contributions and additions to the list are welcome.

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The use of technology for "green" purposes has reached a point where many researchers and numerous others in the community at large can see a great deal of potential benefit. Governments around the world continually call for technological solutions to environmental problems. While there are environmental issues in the manufacture, use, and obsolescence of technological devices (who still has his first cell 'phone and where did they all go?) and with the high energy and chemical cost of their production, the benefits at least look promising.

Fast internet connections enable video-conferencing, meaning that widespread telecommuting programs are at least technically viable, with the inherent reduction in emissions leading to less dependence on (foreign) oil. GPS technology means that trucks can choose routes with less congestion, saving time and money. At a more pedestrian level, the use of screen savers on a PC means less consumption of energy and longer screen life, energy optimization software with energy saving options now comes standard on many new computers, fast central printers can cut the cost of printing and the use of toners, a multitude of green apps are available on smartphones to aid in environmentally conscious decision making, and energy monitoring software is available that allows users to visualize and remotely control energy use. Many plants and manufacturers use sophisticated energy management systems to maximize production, minimize costs and improve plant efficiencies in small and medium size businesses across the United States (Masanet, 2010). Other potential "green" solutions include the use of thin clients, virtualization, promising nanotechnology that shrinks both hardware and its energy requirement, (Laitner, 2010) the implementation of smart cooling systems to cut cooling costs for the perpetually toasty data centers, and the use of alternative energy to satisfy our centers' ever growing demand for power (Mutchek and Williams, 2010).

As more and more products are delivered digitally, (music, video, tickets, books) the energy used in the production and delivery of the product declines, sometimes substantially (Weber, Koomey, and Matthews, 2010). Using information and technology to further optimize irrigation controllers to deliver the right amount of water to the right place in the field at the right time reduces both cost and carbon (Mutchek and Williams, 2010). IS and IT companies stand to benefit from the green shift as developers of the

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cleaner software and technology. According to "Smart2020: Enabling the low carbon economy in the information age," a report put out by The Climate Group on behalf of the Global E-Sustainability Initiative, IS and IT companies could facilitate a global emissions reduction of 15% by 2020. As developments in climate science make it increasingly obvious that there is a future economic cost of emitting green house gases, it becomes increasingly likely that the cost of emissions will be incorporated into the cost of doing business through government policy. With a potential price for emitting on the horizon (and with definitive emissions prices in Europe and elsewhere), IS and IT's immense potential to reduce these emissions could translate into major future profits as these companies help others avoid the cost of pollution. IS and IT companies are therefore in a good position to push for green policies like reductions in CO2 emissions so that they can profit from the developments that lead to a cleaner economy. Perhaps this is one reason why we see big names in IT (Cisco, Dell, Erikson, Fujitsu and Google) topping Greenpeace's Cool IT leaderboard that rates the extent to which IT companies are involved in developing, implementing, and publicly advocating for solutions to climate change (Van Horne, 2010).

Given the general consensus that it would be beneficial to apply more technological solutions to environmental problems, it is frustrating to many of us that we do not see wider and faster adoption. Thomas Friedman, a long time advocate of re-engineering and greening the current energy infrastructure, appeared on *Meet the Press* on May 23, 2010 and fantasized about being China for a day so that programs could be implemented quickly. While he was strongly criticized in the blogosphere for his "authoritarian envy," this reaction smacked of shooting the messenger. Yet at least a few Chinese intellectuals share Friedman's opinion that the U.S. must do more to green its energy infrastructure. During international climate change talks held in Tianjin, China last October, several Chinese academics delivered a similar message in the form of an open letter to the U.S. expressing that "the U.S. must at least match China's effort to address climate change" and that "what the climate crisis needs is far higher ambition from all developed countries."

Leading IS researchers have called for the use of green IT to develop sustainable business practices and proposed a number of frameworks through which such adoption might be considered (Watson, Boudreau, and Chen, 2010). However recent exploratory research has indicated that while business does see the potential benefits it will not move to implement green IT unless there is a positive effect on the bottom line (Kuo and Dick, 2010; Sayeed and Gill, 2008). Recently, the first of the leading journals in the Information Systems discipline devoted a special issue to "The Greening of IT" (the Journal of Strategic Information Systems, March 2011). From the editorial article in that issue:

> *".... now is a time to decide on how we should employ the very technologies that have enabled and amplified not only the positive, strategic gains, but also, humankind's negative impact on the planet: the unintended .....in terms of IT's organizational impacts"* (Berthon, and Donnellan, 2011)

The editors are to be commended; the production of the special issue by itself has raised the profile of research and awareness of the issues in the academic community.

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Government organizations have cost pressures too, especially in recessions, and while the cost of the new technology remains higher than the alternative and long term investment capital is limited, the adoption is likely to be slow and patchy.

What can be done to speed the Greening of IT? Governments can offer a carrot and stick approach in the form of subsidies and taxation but in the current political and economic climate, along with entrenched interests around the existing practices, such government action would be courageous at best, probably foolhardy, and almost certainly doomed to failure. The answer has to come from somewhere else. It seems likely from an exploratory review of small business and green IT (Dick and Burns, 2011) that one size will not fit all. Some owners and managers of small business are implementing "green technology" because it can be shown to be cost effective, others because their competitors are doing so and they do not wish to be left behind and still others because "it is the right thing to do". Listed below are some options that might lend themselves to further consideration (there will no doubt be many more – this is not meant to be an exclusive list).

1. A determined effort by academics and research groups to promote discussion and consideration of the benefits that may ensue and the obstacles that need to be overcome. Ideally this would extend beyond academic papers and conferences into MBA texts and the more popular business press.
2. The recruitment of early adopter entrepreneurs and business practitioners to talk about and publicize the successes (and failures) they have encountered
3. A focus on the medium to long term benefits – while it may be difficult to think and plan long term while struggling to survive the current quarter, there seems little doubt that in the end the future lies here. Early adopters will produce benefits for their industry and for their nation.
4. A community-driven approach to keep the pressure on governments to continue the carrot and stick approach mentioned above.
5. In all of the above, a focus on the business perspective:
    a. Long term value for money (and indeed survival, as others adopt and practices change)
    b. Upfront, informed estimates on the initial capital investment for energy saving technologies and an emphasis on payback periods
    c. Being a good "corporate citizen" (and taking advantage of the predicted rise in demand for environmentally sensitive products and services and the corresponding rise in the value of eco-focused market differentiation)
    d. Encouraging innovation (perhaps by means of the government carrots, perhaps by a competitive edge)
    e. Being seen as a good place to work that is oriented towards and making calculated investments based upon future trends
    f. Being seen as a green savvy industry leader that aids in shaping new, emerging norms

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g. Instilling within the culture of work and norms of the workplace the environmental values reflected by a large portion of society

6. Communicating to students that as future IS and IT specialists, they are uniquely positioned to contribute to and profit from the shift to greener technologies

As we write this we are reading a Business section front page story in the New York Times (Woody 2010) about how American solar innovators are having to catch up to China.. and finding if difficult. Is this a success story or a failure emanating from past practice? If we do not move in the direction of the steps outlined above, we could be reading a lot more stories like this – only this time the headline may well be "Left Behind".

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