

Information Technology for Sustainable Communities: Shrinking Your Environmental Footprint

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Most people in county government know about smart growth and green buildings. What fewer people have thought much about is the role that information technology (IT) systems play in efforts to preserve the health of our natural environment and build sustainable communities. IT is both a major environmental challenge and, potentially, a significant environmental solution.

IT is the central nervous system of our communities. It is the computers and telephone systems we use at work and home, the cell phones, PDAs, TVs, video screens, printers and electronic gadgets of every kind connected to the hidden infrastructure of wires and machines that are our global communications networks. IT systems are fundamental to the daily operation of our communities, a vital component of water and sewer systems, traffic control, health care and emergency services. They are increasingly what we depend on to do our jobs, entertain ourselves, manage our buildings and utilities and connect to our communities. They are also a major and rapidly growing environmental challenge.

People buying a new cell phone, computer or TV don't generally think about where it comes from, how much power it will use, or where it goes at the end of its useful life. They should. Many components of the IT systems we use every day may be small, but have a big environmental footprint.

For instance, manufacturing the silicon wafers and semiconductor "chips" that are the electronic brains of our "smart" devices requires a vast array of materials including precious metals mined from around the globe, chemicals, gases and large quantities of water and energy. The manufacturing processes produce toxic wastes and can be dangerous for the health of workers. The "smart" devices themselves are also material and energy intensive to make. A desktop computer and monitor include

more than 1,000 different materials and can have a materials-to-product ratio of 71:1. By comparison, a car or a refrigerator requires just one or two times its weight in natural resources. Furthermore, after manufacturing, IT products are packaged in large quantities of mostly non-reusable materials and shipped around the globe.

IT systems are also the fastest growing end use for electric power around the world, which makes them one of the fastest growing sources of greenhouse gas emissions from fossil-fueled power plants. The IT systems in a standard commercial office building consume 25% or more of the power used by the building, and that percentage is projected to increase due to changes in lighting and HVAC systems. Computer data centers are now estimated to represent 3% to 4% of total U.S. electricity consumption. One researcher has calculated that the annual lifecycle energy burden (the quantity of energy consumed by a product throughout its life—energy to acquire and manipulate materials, assemble the product, transport and use the product and then dispose of it at the end of life) of a personal computer is 1.3 times that of a refrigerator, which is itself a high energy use appliance.

One of the reasons IT equipment has high lifecycle energy use is because it typically has such a short useful life, which drives another rapidly growing problem: e-waste. Globally, about 130 million new PC's are produced each year. In 2006 cell phone production rates hit more than 1 billion per year. Statistics show that only about 12% of discarded computers and cell phones are recycled, compared to a 42% rate for overall solid waste and a 70% rate for major appliances like refrigerators, washing machines, and dryers. Much e-waste in the U.S. is exported to developing

regulations. The European Union has taken the lead with its RoHS and WEEE Directives that control the hazardous substances used in products and how electronic devices are disposed of. Four U.S. states also have their own e-waste regulations, (California, Maine, Maryland and Washington) and a score more are considering taking action. Updated Energy Star requirements for computers go into effect in June 2007 and new standards have been produced for 'wall warts,' the ubiquitous AC/DC power converters that consume up to 8% of U.S. electricity production. A Federal Executive Order mandates the



Telecommunications tools such as videoconferencing can improve business efficiency

purchase of EPEAT certified computers that are more environmentally friendly. In December 2006 the U.S. Congress directed the EPA to report on ways to reduce energy consumption by Data Centers.

Government policy makers have been slower to react to the potential for using modern IT systems as powerful tools to increase energy efficiency, reduce emissions, manage traffic and drive new urban development designs. But, as we begin to experience the profound changes brought about by universally available broadband com-

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munications networks, new concepts and policies are emerging.

The Potential of IT

One area that has seen fairly rapid adoption of new technology in the last decade has been e-government. Many services and materials are now available to citizens online. Much of the focus has been on providing automated self-service tools citizens can use conveniently on their own schedule. Every transaction handled on line or on the telephone can mean less paper used and fewer automobile

trips to county offices. Every potential juror who can call in to an automated system and be told they aren't needed today eliminates a car trip, which reduces traffic congestion and GHG emissions.

been promoted for a generation but has thus far only been commonly implemented in private hi-tech companies rather than local government. However, new features and management oversight capabilities offered by converged internet telephony and data systems should enable widespread adoption of innovative work practices that can significantly reduce employee commute travel. Some local governments and Federal agencies already have policies and systems that allow for flexible work locations and hours. Two recent reports for the City and County of San Francisco cited telework as both an essential tool for economic development and as one of the major ways to improve work-life balance for working women.

Video conferencing systems, with their potential to create the experience of "being there," have the potential to reduce demand for both ground and air travel. Such systems are beginning to be installed for corporate use and should rapidly become more widely available. Desktop video and videophones will also become more common and serve as substitutes for travel. Tele-medicine, the use of communications and information technologies for delivery of clinical care, is coming into more common use and has the potential to significantly effect how and where local governments provide health

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care services.

County governments are frequently one of the largest users of commercial real estate. A new generation of connected buildings with integrated IT systems built in as part of the basic infrastructure offer the promise of far more efficient use of materials and energy in commercial buildings. Currently buildings include multiple redundant and independent systems in which telephone, data, and video networks, HVAC and lighting controls, security monitoring and access controls are all separate systems. Combining those systems into an IT utility can significantly reduce requirements for equipment and energy use, as well as improve building operations efficiency and security.

Additionally, integrated IT systems can significantly reduce the amount of space needed to house government operations by increasing the number of employees that can comfortably work in a single building. In many buildings a substantial portion of offices and desks are empty on any given day due to employee travel, telecommuting, vacation time and staff turn over, yet governments pay for those spaces to be maintained and climate controlled. By wiring offices and desks so that multiple employees can use them, IT systems offers governments the ability to house more employees in a building while at the same time maintaining a high quality work environment. Both private sector companies and the Federal Public Buildings Service have created such new workspaces. Through these examples it has been proven that shared workspace buildings can allow for 40% to 300% more employees as well as increased energy efficiency and higher levels of worker satisfaction.

The next decade will see the continued rapid growth and evolution of the networked world. County governments must act, in policy and in operations, to address the negative environmental effects of IT and pursue new ideas for using information and communications technologies to build sustainable communities for the 21st century.

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