

Connecting Cities: Achieving Sustainability Through Innovation

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In the 21st century, sustainable development—defined by the United Nations as the “interdependent and mutually reinforcing pillars of economic development, social development, and environmental protection”¹—has emerged as a major strategy and policy priority among government and enterprise organizations globally. Preeminent challenges in securing sustainable development include energy use and climate change—and the associated risks of massive environmental degradation that would heavily impact people around the globe.

Sustainable Cities

Cities are the largest contributor to energy consumption and climate change. The world’s 20 megacities alone, each with a population exceeding 10 million, are responsible for 75 percent of the planet’s energy use. With their populations on the rise—according to the United Nations, 60 percent of the world will live in cities by 2030—cities are experiencing considerable increases in energy consumption. It is expected that by 2010, global electricity use will grow by more than 35 percent—and by more than 75 percent by 2020.²

Cities are also centers of innovation, economic growth, social transformation, healthcare, and education—and most are taking a proactive approach to address the urban sustainability challenge. The unprecedented development of new cities around the globe, however, and the need to renew outdated 20th century infrastructures in mature cities, require the creation of new urban design, metropolitan governance, and infrastructure investment models.

Most attention in sustainable urban development has been directed to three sectors: buildings, energy, and mobility. Today, however, it is becoming evident that a fourth, equally important element must be addressed: information and communications technology (ICT).

When it comes to urban sustainability, ICT is part of the problem (based on its contribution to overall energy consumption), but an even bigger element of the solution. A recent study,³ for example, found that ICT is a significant contributor to energy efficiency: for every extra kilowatt-hour of electricity demanded by ICT, the U.S. economy increases its overall energy savings by a factor of 10.

1. World Summit Outcome Document, United Nations, 2005

2. CNN, December 31, 2007

3. “Information and Communication Technologies: The Power of Productivity, How ICT Sectors Are Transforming the Economy While Driving Gains in Energy Productivity,” American Council for an Energy-Efficient Economy, February 2008

The Role of ICT in Sustainable Urban Development

Today's cities are linked by a global information and communications infrastructure that facilitates communications, human interaction, collaboration, and mobility. Cities are evolving into places where overlapping networks of companies, institutions, civil societies, and citizens are supported by ICT-enabled flows of people, materials, information, capital, services, and media. Worldwide digital communications and the Internet are becoming the fourth utility in cities (in addition to roads, water, and electricity).

Effects of ICT-enabled Sustainable Urban Development

To date, the proposed solutions to energy consumption and climate change simply acknowledge the role ICT plays as a key enabler of environmental effectiveness in large metropolitan areas. The Internet Business Solutions Group (IBSG), Cisco's global strategic consulting arm, has taken this a step further by addressing exactly *how* urban ICT and broadband connectivity can help, and what the carbon-reduction impact of innovative urban ICT policy for energy efficiency can be.

Any discussion of sustainable urban development must acknowledge that ICT is part of the problem facing cities today, based on its ever-increasing levels of energy consumption. This downside, however, is more than mitigated by ICT's valuable contributions to energy efficiency, its ability to reduce energy demand in other activities (e.g., using teleworking to reduce trips to the office), and the existence of ICT applications that increase the efficiency of energy used in these activities (e.g., car routing that cuts traffic congestion).

Urban ICT impacts sustainable development of cities in three ways: directly, indirectly, and systemically.

- *Direct effects* are caused by the physical existence of urban ICT infrastructures that are resource-intensive in manufacturing and distribution. Mature cities already estimate that the direct ICT contribution to their energy consumption ranges between 5 percent and 15 percent.⁴
- *Indirect effects* stem from the use of broadband and ICT applications—the essential drivers for productivity improvements and innovation, as well as for more efficient management, control, and visualization of urban networks. For example, one U.S. study⁵ projects that use of broadband could save 1 billion tons of greenhouse gases over 10 years—representing 11 percent of annual oil imports—through transportation substitution and “dematerialization.”

4. University of California, February 2001; Fraunhofer Institute for Systems and Innovation Research ISI, January 2003; Global Action Plan, December 2007; McKinsey & Company, October 24, 2007

5. American Consumer Institute, October 31, 2007

6. Harvard Business School, March 12, 2007

- *Systemic effects* reflect the socioeconomic impact of ICT on influencing behavioral changes, leading to the development of more distributed, compact, and mixed-use urban forms. Green real estate development in densely populated locations could have the most significant impact on sustainable urban development, reducing energy consumption from the average suburban U.S. household by 75 percent, according to a paper published by Harvard Business School.⁶

The Connected Urban Development Program

Connected Urban Development (CUD) was born from Cisco's participation in the Clinton Global Initiative—launched by the William J. Clinton Foundation in 2005 to solve global problems that affect the quality of human life—to help reduce carbon emissions and improve energy efficiency.

CUD draws on expertise from Cisco IBSG and researchers from the Massachusetts Institute of Technology (MIT). Cisco IBSG is managing the CUD project and supporting each city's strategic planning process through research and analysis, and by piloting innovative, new technology solutions. Through the CUD initiative, Cisco IBSG offers a unique approach to tackling sustainable development. The combination of Cisco IBSG's distinctive thought leadership, developed from replicable pilots; the ability to bring together a coalition of influential communities to exchange ideas and best practices; a financial commitment to the cities and to the Clinton Global Initiative; and Cisco's ICT expertise have established CUD as the most comprehensive program to address this global issue.

The CUD program demonstrates how to reduce carbon emissions by introducing fundamental improvements in the efficiency of urban infrastructure through ICT. The CUD approach is different because it goes beyond assessing the challenges and opportunities presented by sustainable development, offering scalable, tangible solutions for cities to increase operational efficiencies and optimize resource utilization in a manner that helps reduce carbon emissions and improve energy efficiency.

The three CUD founding cities—San Francisco, California; Amsterdam, the Netherlands; and Seoul, South Korea—were selected because each had implemented or planned to execute a next-generation broadband infrastructure; each suffers from significant traffic congestion issues; and each is led by a visionary mayor already involved in green initiatives. Phase 1 of CUD will result in a blueprint of best practices and methodologies that other cities can reference in the second phase of the program, which will focus on scaling CUD's benefits to other cities around the globe. Areas addressed are Green ICT, Connected and Sustainable Built Environment, Connected and Sustainable Mobility, Connected and Sustainable Work, and Connected and Sustainable Energy.

The CUD program will transcend the environmental dimension, delivering innovative, sustainable models for urban planning and economic development. Cisco's Corporate Development organization will invest US\$15 million in the program over the next five years, including people, research, and equipment. Relying on its networking expertise

to provide a viable and sustainable solution for helping cities reduce carbon emissions, Cisco will determine how to use technology innovations to manage cities and create an urban communications infrastructure that improves the sustainability of cities.

The 4 Principles of CUD

CUD is based on four basic principles:

1. **ICT directly contributes both to energy usage and CO2 reduction.** Industry efforts aimed at developing energy-efficient technology solutions can contribute to a sensible reduction of the environmental footprint in cities.
2. **Deploying broadband-based applications and services improves energy efficiencies.** These can be clustered in four major areas: Connected and Sustainable Built Environment, Connected and Sustainable Mobility, Connected and Sustainable Work, and Connected and Sustainable Energy.
3. **Urban pervasive broadband infrastructure and continuous development of application and services clusters can enable radically innovative practices** in the areas of urban form and planning, energy policy, new working practices, and new lifestyles.
4. **ICT and broadband connectivity have become enablers of combined, citywide urban policy, and of previously disconnected operational programs.** Mobility, Built Environment, and Energy-related efficiency initiatives can now be successfully combined into integrated urban development programs.

Connecting Within and Among Cities

CUD's vision is to create a global community of cities committed to sustainability. This focus is reflected in CUD's theme, "Connecting Cities: Achieving Sustainability Through Innovation," which refers both to the need to connect *within* cities (which, by inference, includes technology) and to the importance of connecting *among* cities. It is the start of a dialogue about how cities can develop coherent, long-term policies and plans to manage the environmental impacts of ICT, and to utilize ICT strategically to create sustainable 21st century cities.

About Cisco and the Clinton Global Initiative

The William J. Clinton Foundation launched the Clinton Global Initiative in 2005 to solve global problems that affect the quality of human life. The initiative brings a community of global leaders together to devise and implement innovative solutions that address some of the world's most pressing challenges. It aligns with Cisco's strategy to reduce dependency on physical travel by investing in collaboration technologies that help reduce carbon emissions.