

UrbanEnergy Management

An Innovative *Connected and Sustainable Cities* Pilot by the Cisco Internet Business Solutions Group (IBSG) and the City of Madrid

Background

In recognition of the profound trends of urbanization, climate change, and innovation at the beginning of the 21st century, Connected Urban Development (CUD) was born from Cisco's commitment to the Clinton Global Initiative to participate in helping reduce carbon emissions in cities. Launched at the end of 2006, CUD consists of building partnerships with cities worldwide to focus on applying information and communications technology (ICT) to promote innovative practices for reducing carbon emissions, while fostering economic growth and improving the quality of life. Innovation is transforming urban life, and is making it possible to design and manage cities in radically different ways. With the advance of broadband, wireless, and increasingly smart city infrastructures, collaboration and connectivity are becoming essential to urban sustainability.

CUD envisions that the same principles of openness that have made the Internet a thriving ecosystem over the past 20 years can be applied to make cities a smarter platform for people, products, and services. This global, open-standards approach will support all urban and natural environment-related applications, tools, and technologies. It will provide real-time, tangible information to enable citizens, communities, cities, countries, and business organizations to make smarter decisions and to develop policies that improve the sustainability of cities. Following are the program's urban technology principles:

- Wired communications provide infrastructure
- Wireless communications provide mobility
- Miniaturized, inexpensive electronic devices provide access points everywhere
- Digital memory and processing power provide intelligence everywhere
- Software and online content provide new functionality and services

Through its partnership with the City of Madrid, CUD has created a new concept—UrbanEnergy Management—that will provide new benefits to cities, citizens, and businesses. It will be replicated across other CUD cities and scaled around the globe.

Overview

UrbanEnergy Management is a landmark innovation and a key element of CUD's Connected and Sustainable Cities framework. The pilot project is a collaborative effort involving Cisco IBSG—the global strategic consulting arm of Cisco—and the CUD partner city of Madrid through the Office of Madrid-Centro, Department of Urbanism and Housing.¹ The organizations are jointly applying an urban services platform approach toward which

¹ www.munimadrid.es

visionary cities and the ICT industry are moving. Madrid is the first city worldwide to launch an UrbanEnergy Management pilot service.

The "[*Strategic Plan for the Central Area*](#)"² is one of the main projects of Madrid's Local Council, whose objective is to transform the center of Madrid into a better-connected and more accessible, attractive, and competitive area. Within this program, city leaders have realized the importance of focusing carefully on how energy is generated, managed, and consumed (homes, buildings, open areas, and businesses)—and on the need to transform Madrid from a resource-consuming, contaminant-gas-producing city into one that smartly produces and uses energy while minimizing its greenhouse gas footprint. Broadband, connectivity, and smart infrastructures are essential in the model definition and project implementation.

The UrbanEnergy Management pilot is being implemented in a 33-apartment building with common areas and parking that belongs to the Local Council. The building is an innovative test bed that will serve as a "role model" for subsequent projects incorporating bioclimatic design and heating/cooling using geothermal and solar panel technologies among other design innovations. These innovations, together with the UrbanEnergy Management solution and the installation of an Urban Energy Controller, can deliver estimated energy savings of between 75 and 85 percent.³

The main goals of the *UrbanEnergy Management* platform are:

- Reduce consumption of energy and resources through a smart and connected energy management strategy
- Promote active involvement of the city's inhabitants—both individually and as members of the larger community
- Build awareness about the impact of citizens' actions on energy consumption and climate change, providing real-time information for making personal decisions as well as recommendations on how to maintain a more sustainable home
- Create a sense of community among citizens, fostering collaboration for achieving objectives
- Provide real data to city leaders and support decision-making around energy management as well as urban design and city operations
- Establish a scalable, economically viable, intuitive, and nonintrusive UrbanEnergy Management model for residential buildings and homes
- Design a platform for supporting a global, smart and connected UrbanEnergy Grid concept for the near future:
 - All constituents of the energy value chain (utility companies, citizens, business, government) are part of the community sharing energy resources
 - Real-time information will guide the entire energy grid as an integrated system, actively sensing and responding to changes in power demand, supply, costs, and emissions from anywhere in the network

² Please see the following website for more information: <http://tinyurl.com/Madrid-Strategic-Plan>

³ Estimated on an ex-ante basis by the City of Madrid, Department for Urbanism and Housing.

Urban Services Platform Approach

CUD ultimately envisions UrbanEnergy Management as part of a global urban services platform approach for—and among—cities. Services will include, but are not limited to, citizen engagement, collaboration, community-building, professional geo-referential data, real-time environmental and energy metering and monitoring, simulations for real estate development, transportation planning, location marketing, and city scenario planning. Incorporating UrbanEnergy Management into this platform will enable cities to optimize citizen services over time and encourage adoption of more efficient energy-usage alternatives.

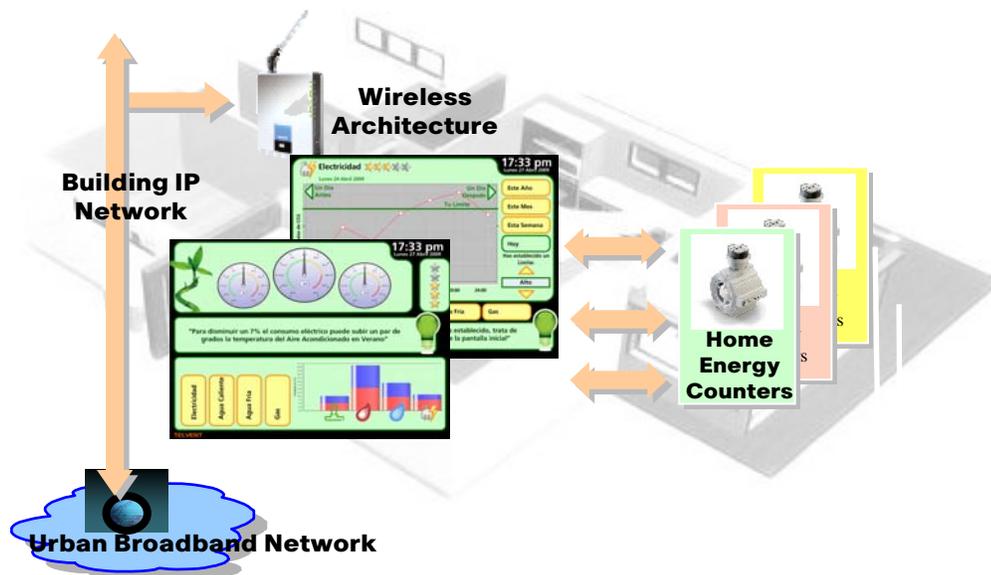
Furthermore, to tackle global climate change, we need a global view, which requires a global, open-standards approach. The urban services platform approach is based on an ecosystem that encompasses an eco-centric set of technologies and standards that allows for interoperability of applications and devices. Much like the Internet, the platform comprises a multi-layer stack of standards that defines how applications and devices consume and share information. Applications publish (contribute) data to the ecosystem, and other applications can then discover and consume it. This will allow for a single, global system and, more important, a global “pulse” of the eco-health of our planet.

Key Features

The UrbanEnergy Management platform is based on a broadband infrastructure that shares information about energy generation, consumption, and usage patterns in homes, apartment buildings, and open spaces (such as parking areas, gardens, and streets). The platform has the following components, all connected through a seamless broadband platform:

- **Home Energy Controller:** In each apartment, a Home Energy Controller (HEC)—utilizing monitoring devices and the building’s broadband infrastructure—is being implemented to enable each resident to manage energy consumption, establish limits, and receive energy-related alerts. The HEC is an intelligent device with a high-definition touch-screen that enables users to read and store information regarding energy consumption, analyze real-time information and statistics, and link this information to a website and other devices.
 - HEC provides easy access to the following information regarding electricity, gas, and hot/cold water:
 - Graphical, real-time energy-consumption curves translated to CO2 emissions
 - Curves comparing consumption with previous days, months, and years
 - Alarms regarding consumption limits established by citizens themselves, and by the Urban Energy Controller (described below)
 - Messages advising on how to consume less and encouraging sustainable energy management

Figure 1. Home Energy Controller Helps Individuals Manage Energy Consumption More Effectively



Source: Telvent, 2009; Cisco IBSG, 2009

- **Urban Energy Controller:** The UEC is used by building managers, city authorities, and those who will be managing energy consumption at broader levels—whether in an apartment building or in a wider urban area. The information is organized by different apartments as well as by public and common areas (garages, gardens, solar panel energy generation, and others). The objective is to create a community of consumers able to control and manage urban energy consumption by establishing limits, responding to alerts, and even participating in competitions based on energy savings—all of which will foster emissions reductions. UEC provides information that enables a wider community view, including easy access to the following information regarding electricity, gas, and hot/cold water:
 - Graphical, real-time curves showing energy consumption (total per apartment, for common areas/public areas, buildings, and more)
 - Data pertaining to maximum-minimum energy consumption, and curves comparing current energy consumption to historical levels
 - Energy consumption alarms based on defined limits for shared buildings
 - Messages that can be sent to communities regarding news, specifics about regulations/offers/prices, government info, or consumption alerts

Partners

- City of Madrid
- Cisco
- Telvent
- Telefonica
- Fernandez Molina, Obras y Servicios