



Smarter Sustainable Dubuque Marks Four Years of Learning

The Sustainable Dubuque initiative began in 2006 when Dubuque Mayor Roy D. Buol and the City Council made sustainability a top priority for the City of Dubuque. In September of 2009, the City of Dubuque and IBM Research announced a partnership to make Dubuque a living laboratory and one of the first “smarter” sustainable cities in North America. This initiative was named Smarter Sustainable Dubuque (SSD) and, since its inception, the City of Dubuque, IBM Research, and a diverse group of public and private partners have embarked on a series of pilot projects made possible through the participation of Dubuque volunteers.

Over the past four years, four SSD pilots have been successfully completed: Smarter Water (2010), Smarter Electricity (2011), Smarter Travel (2012), and Smarter Health and Wellness (2013). A fifth pilot project, Smarter Discards, is currently under way. What makes the SSD pilots unique is that more than 2,000 Dubuque households have participated in one or more of these pilots over the past four years, validating innovative sustainability concepts and yielding invaluable insights into the utility and adoption of these innovations and their eventual adoption beyond Dubuque.

The goals of Smarter Sustainable Dubuque are to provide Dubuque residents and businesses what they need (information and tools specific to their circumstances) to do what they want (save money, conserve resources, and improve the local economy and environment). Additionally, the development of new “smarter instrumented” technologies, coupled with community outreach and implementation strategies, is creating a replicable, international model of sustainability for communities of 200,000 and under, where over 40% of the U.S. population resides.

Lessons Learned and Key Findings Thus Far

Through the participation of volunteers, collaborations with partner agencies, and a variety of vendors, the four completed SSD pilot studies yielded a wealth of information.

- A variety of advanced technologies (cloud, mobile, social) was utilized to experiment and engage citizens. In four years, the number of households in Dubuque eligible to benefit from the Smarter Sustainable Dubuque technology increased 13 fold.
- The technology and protocols utilized a secure hosted environment, successfully protecting the volunteer’s data collected.
- Valuable insights were gained on effective ways to engage volunteers and increase their participation rate including direct calling, incentives, email, e-newsletters, education sessions, “community cafes,” and social media.

- Over 2,069 Dubuque residents were engaged to help advance SSD initiatives in various areas. Of this total, 300 participated in the Smarter Water Portal Pilot, 700+ in the Smarter Electricity Portal Pilot, 1000+ in Smarter Travel, and 69 in the Smarter Health and Wellness pilot. Almost 20% of the Smarter Water Pilot users also participated in the Smarter Electricity Pilot; approximately 15-20% prior SSD project users participated in Smarter Discards.

Some key statistics of each pilot are as follows:

- For the Smarter Water Portal Pilot, 151 portal users were able to conserve an average of 6.7% in water consumption, reported 8% leaks as compared to 0.98% of city-wide, and conserved an estimated total of 89,090 gallons of water over a nine-week period. There was an active participation rate of 44% or 134 out of 303 users, including 35% (106) portal users. The behavior study of the 56 (58%) survey respondents who used the portal multiple times showed that 77% reported that the Smarter Water Portal increased their understanding of their water use; 70% felt it helped them assess the impacts of the changes they had made; 48% felt that it helped them conserve water; 61% reported making a change to a water appliance or in the ways they used water (or both) during the study period; 48% reported that they planned to make changes to their water equipment or ways of using water in the future.
- For the Smarter Electricity Portal Pilot, most actively engaged citizens (97 or 36%) were able to conserve an average 7% in electricity consumption. Total of 266 portal users conserved about 31817 kWh (or \$3818¹) over a 21-week period. Active users of the portal saved 3x the rate of energy savings for compared to non-active users. The behavior study of the 78 (53%) survey respondents who used the portal more than once showed that 69% said that the electricity portal increased their understanding of their electricity use; 72% said the portal helped reinforce what they were already doing to save electricity; 46% felt that the portal helped them conserve electricity; 79% reported taking some action to conserve electricity during the pilot.
- During the Smarter Travel Study, the ridership of Dubuque's public transit increased 11.8%. The City is working with state and federal partners to analyze the data collected to improve its transit system. If new routes are implemented, operating costs are expected to decrease while the City's ability to meet public transit demand is expected to increase.
- For the Smarter Health and Wellness pilot, 47% of 69 users walked more than 45 minutes daily, 30% ran a mobile sensing app during the peak of the pilot, and 23% set goals, which resulted in a total of 11,225 minutes of walking activity sensed (87 hrs. or 9.8 hrs./participant).

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Assuming the base price of \$0.12/kWh as per Alliant Energy.

- SSD pilots have provided insight into engagement of citizens. When comparing all of the SSD projects to date, participants generally fell into three broad groups across a normalized distribution. Twenty percent were in a group with high engagement activity. This group wanted more data and less direction, and was willing to do more independent research and investigation. The theme of this group was “Enlighten Me.” A second group, encompassing roughly 60% of the participants, exhibited a medium level of engagement. Their interest was in more direction and interpretation of what their data was showing and less interest in more data and advanced analytics. The theme of this group was “Inform Me.” The third group, totaling approximately 20% of the participants, was those that were least engaged. This group responded best when their data was compared to their own trends and averages, creating a set of defaults. This group wanted notifications based on deviations from their trends or exceptions and anomalies in their data. The theme of this group was “Warn Me.” Going forward, these approaches to how citizens use and respond to their data will be useful for planning and evaluation.

Influence on Other Initiatives

Success of the SSD projects has inspired, supported, and catalyzed a variety of other City initiatives, including:

- Smarter Water Expansion project (up to 4,000 users)
- DOT grant (Insights in Motion)
- Redesign of The Jule’s public transit routes
- EPA Climate Showcase Communities Grant
- EECBG Comprehensive Strategy
- Green Iowa Americorps community weatherizations
- Incorporation of Smarter Water into K-12 curriculum

As a result of the collaborations with IBM for these SSD projects, the City has advanced its SSD initiatives and garnered national and international attention, including:

- In 2013, Smarter Sustainable Dubuque was named one of the “Top 25 Innovations in Government” by The Ash Center for Democratic Governance and Innovation at the John F. Kennedy School of Government, Harvard University.
- In 2012, ECIA won the NADO award for innovation in transit for Insights in Motion (aka City in Motion), a first-of-its-kind project that promises to change the way in which transit and transportation organizations can use technology for better design and operational decision making.
- In 2011, Smarter Sustainable Dubuque Project was featured in *Fast Company’s* “United States of Innovation.”
- In 2010, Dubuque was selected by *Fast Company* as the *only* U.S city in a list of the 10 smartest cities on the planet.

- In 2010, Dubuque was first selected as a Natural Resource Defense Council Smarter City, one of 22 cities in the U.S., and one of the four small cities that were chosen.

SSD projects have also captured the attention of the media as follows:

- In 2011, for the Smarter Electricity Pilot, *Computer World*, *Government Computing News*, and *Dubuque Telegraph Herald* had all reported how the collaboration between Dubuque and IBM helped Dubuque residents to get smart in conserving electricity consumption and reducing electricity bills.
- In 2011, the Smarter Sustainable Dubuque Water Pilot was featured in *Public Works*, a magazine widely distributed to 65,000 state and local government officials.

Replication of the SSD Pilots Worldwide

All these SSD pilots, e.g., the Smarter Water Portal Pilot, the Smarter Electricity Portal Pilot, City in Motion, and the Smarter Health and Wellness Pilot are innovations that can be easily adopted. Since they are cloud-based, they can be replicated to other cities that have smart electric metering infrastructure and to citizens with smart phones. A very important aspect of these innovative pilots is that they laid the groundwork for the design of future systems. The work products produced by these pilots can serve as templates for other sustainable communities that desire to engage their constituents in resource conservation whether it is water, electricity or other natural resources, transit/transportation, and health/wellness, etc. These pilots have helped Dubuque reinforce its role as a sustainability leader, and the various awards and honors it has received is an apt recognition of its efforts and the proof points that Dubuque has become a model community for sustainability.

A barometer of SSD's success is the impact it has on technology being exported to the rest of the world. To this end, there have been a number of cities that have benefited from the work that originated in Dubuque.

1. Miami Dade County Parks worked with IBM to apply the consumer water conservation portal to manage water efficiently in the parks in the county.
2. The water conservation portal has now become a part of the IBM Intelligent Operations for Water product.
3. The energy conservation portal has led to a similar effort by a utility in the Netherlands.
4. Officials from the city of Townsville, Australia who visited Dubuque and were inspired by its sustainability agenda adopted the water conservation portal in 2013 and won the prestigious National Infrastructure Award for Innovation.
5. The Insights in Motion project was also implemented in Istanbul, Turkey (as diverse as it gets) and led to a successful model of Istanbul in Motion. This won the organization working with IBM on this project the prestigious UITP

(International Association of Transit Planners) innovation award.

6. The work in Dubuque has been the source of multiple publicly available videos from IBM available on YouTube and continues to inspire many other cities that benefit from this pioneering work that was made possible by Dubuque's leadership.