



MEMORANDUM

To: Mayor and Members of City Council
From: David Driskell, Executive Director of Community Planning and Sustainability
Date: July 18, 2011
RE: IBM's Smarter Cities Challenge: Boulder Report

INTRODUCTION

The City of Boulder was selected to participate in the Smarter Cities Challenge, a grant awarded by IBM to only 24 cities worldwide “to address the wide range of financial and infrastructure challenges facing cities today.” In May 2011, a team of six experts representing diverse IBM program areas interviewed over sixty members of the community and reviewed countless documents to provide the City of Boulder with a perspective on how the current technological capabilities of Xcel Energy’s SmartGridCity™ project could help advance Boulder’s clean energy goals. The IBM team presented their findings on May 27. The subsequent report, entitled “IBM’s Smarter Cities Challenge Boulder Report” (IBM Report) is provided as Attachment A. Additionally, to supplement the IBM Report, the staff research memo prepared in anticipation of the IBM team’s visit is provided as Attachment B.

The following summarizes how the team’s findings relate to ongoing and upcoming City projects and potential next steps.

IBM FINDINGS

The IBM Report concluded that SmartGridCity has the potential to offer Boulder customers significant future value because it is capable of transmitting large amount of data and integrating back office operations: SmartGridCity is compared to the Internet before it was a venue for consumer content.

After analyzing SmartGridCity’s infrastructure, the IBM team identified “key gaps” in functionality that, if addressed, could help Boulder meet its clean energy goals.¹ These gaps include:

- Access to real-time data,
- Commercial and industrial customer engagement
- Renewable energy integration and storage
- Dynamic pricing
- Electric vehicle integration
- Smart home devices and appliances

- Demand aggregation
- Predictive grid operation.

The IBM Report suggests that Boulder would receive the greatest benefit in the shortest amount of time, and with the least cost, by focusing on three gaps:

1. Renewable energy integration;
2. Plug-in hybrid electric vehicle (PHEV) integration; and
3. Engaging the small and medium business (SMB) sector.

The IBM Report suggests addressing these gaps with a series of pilots and partnerships that Boulder could engage in with Xcel Energy, the University of Colorado, and Colorado-based national laboratories like NIST, NCAR, and NREL.

SUGGESTED PILOTS AND PROGRAMS

The IBM Report suggests a series of pilot projects and programs to address the three priority gaps that both track ongoing City efforts and offer potential areas for further investigation. They are described as follows:

1. **SMB Energy Efficiency Pilots with the City as a Model User.** The IBM Report suggests engaging SMB consumers, who make up the majority of Boulder’s energy demand, in energy efficiency and demand response pilots. SMB and residential customers alike have limited access to demand response programs, which are frequently within the utility’s purview in the absence of a competitive wholesale market.

The City is already making significant progress in this area, offering innovative energy efficiency programs that are supplemented by Xcel Energy’s efficiency rebates, as well as grants and rebates to facilitate solar photovoltaic installations. The City’s successful Small Building Tune-Up Pilot is being incorporated into the EnergySmart program and staff is learning from large property owners about how to achieve greater energy efficiency in Boulder’s existing building stock.² Furthermore, the Facilities & Assets Management (FAM) division is currently in the process of implementing an energy performance contract to upgrade 66 city facilities.³ Staff will continue to explore new and better opportunities to advance efficiency pilots in this area, as it does indeed represent a key area for cost-efficient energy investment. Opportunities to leverage SmartGridCity in this area rely in part on cooperation from the utility and on access to customer energy use data--a topic currently before the PUC.

2. **Solar and PHEV Self-Sustainability.** The IBM Report suggests linking solar rooftop arrays or solar gardens to electric vehicle charging stations, an aspect of “smart” charging. Staff is investigating this opportunity for solar arrays on City facilities as well as assisting with the development of multiple local solar gardens which may allow pilots of this kind. Implementing the electronic billing systems necessary to create public charging stations will require engagement by Xcel Energy.

3. **Renewable Energy Distributed Generation and Storage.** The IBM Report suggests that the City collaborate with Xcel Energy and NREL to determine the feasibility of assessing and increasing distributed solar capacity. This is an area that has been the focus of previous discussions, but needs additional work in order to position Boulder as a national hub for smart grid innovation.
4. **Program Management Office (PMO).** The IBM Report suggests that Boulder implement a PMO to manage metrics and project interdependencies related to its energy goals. The Energy Future project is currently coordinated by the Department of Community Planning & Sustainability, which already tracks metrics related to energy and carbon reductions in its LEAD office and is in the process of developing new tools, consistent with the report's recommendations. This includes participating as a beta-test site for ICLEI's new Community Star Index program, and working with an interdisciplinary team at CU on sustainability indicators.

The IBM Report offers a series of other case studies, programmatic changes, and pilots—including investments in renewable energy storage, implementing online sustainable facilities tools, and coordinating community contests. Some of these dovetail with efforts already underway, while others represent areas for potential new efforts. Staff will continue to review the recommendations and consider how they could be incorporated in existing and upcoming initiatives. Staff also anticipates that further analysis of the smart grid system will need to be completed as the city moves forward in pursuing Boulder's energy goals.

We appreciate the IBM team's willingness to investigate this challenging issue and look forward to developing the partnerships that will be necessary to create customer-side benefits within SmartGridCity.

¹ *Boulder's Energy Future – Goals and Objectives*, http://www.bouldercolorado.gov/index.php?option=com_content&view=article&id=14220&Itemid=4927.

² The Brendle Group, Nexant, & Control Service Center, *City of Boulder Small Building Tune-Up Pilot Program Final Report* (Dec. 2010), http://www.bouldercolorado.gov/files/LEAD/EnergySmart/FINAL_REPORT-City_of_Boulder_Small_Building_Tune-Up_Pilot_Program.pdf.

³ *Energy Efficiency Upgrades in City Facilities - Energy Performance Contract (EPC)*, http://www.bouldercolorado.gov/index.php?option=com_content&view=article&id=13734&Itemid=2092.

ATTACHMENTS

Attachment A: IBM's Smarter Cities Challenge Boulder Report (IBM Report)

Attachment B: Inventory of Smart Grid City Infrastructure