

### BACKGROUND

The Continental Automated Buildings Association (CABA) is an industry association dedicated to the advancement of intelligent homes and intelligent buildings technologies. CABA is an international association, with over 300 major private and public technology companies committed to research and development within the intelligent buildings and connected home sector. Association members are involved in the design, manufacture, installation and retailing of products for home and building automation. CABA is a leader in initiating and developing cross-industry collaborative research, under the CABA Research Program.

CABA's Intelligent & Integrated Buildings Council (IIBC) is focused on areas of research that address the needs and priorities of high performance and intelligent buildings. A recent CABA membership survey identified two key areas that the IIBC should explore in its 2011 Landmark Research study. Most importantly, the impact of smart grid development on intelligent buildings, and secondly, the progression of intelligent buildings towards net zero energy. There is a growing marketplace outlook that achieving energy sustainability and the growth of building intelligence are interdependent and exert a collective influence in the progression of high performance intelligent buildings. Consequently, CABA's IIBC members desire to focus the 2011 Landmark Research study on an investigation and assessment of the impact of the smart grid on the commercial buildings sector. Though still early in development and deployment, the research will also examine the relationship of smart grids and the progression towards net zero energy output in intelligent buildings.

The smart grid is an advanced power grid for the 21st century, in that it adds and integrates many varieties of digital computing and communication technologies and services with the power-delivery infrastructure. Bi-directional flows of energy and two-way communication and control capabilities will enable an array of new functionalities and applications for intelligent building infrastructure. In 2009, the US smart grid industry was valued at approximately \$21.4 billion. It will exceed an estimated \$42.8 billion by 2014, according to the "Zpryme Research: Smart Grid Market Report".

The NIST Framework and Roadmap of 2009 determined that smart grid interoperability must have six main characteristics. A smart grid must enable informed participation by all parties; it must accommodate all generation and storage options; it must enable new products, services, and markets; it must provide the power quality for the range of needs; it must optimize asset utilization and operating efficiently; and it must operate resiliently to disturbance, attacks, and natural disasters. In order to integrate the sophistication of smart grid capabilities into commercial buildings, it is reasonable to conclude that building management systems require a certain degree of integration and intelligence, beyond independent systems. A US Department of Energy (USDOE) study calculated that internal modernization of existing US grids with smart grid capabilities would save between \$46 and \$117 billion USD over 20 years. The USDOE believes that smart grid development needs to be furthered in the immediate-term, as outages and power quality issues cost US businesses more than \$100 billion on average each year.

## **PURPOSE OF THE RESEARCH**

Against this background, the broad purpose of this study is to identify, define and size the principle business opportunities presented by the growth of smart grids, in relation to “intelligent buildings”. An examination of smart grid should yield immediate value to all stakeholders in the intelligent building industry, as smart grid and auto demand response holds more relevance in the industry today - with opportunities in existing buildings and new construction. Energy capacity/supply problems need to be addressed in the short-term, and made available in emerging technology. This will serve to add to market education and understanding, and address market knowledge gaps. As well, open and interoperable communication between energy suppliers and commercial energy users is an eventuality - which should be further explored in relation to smart grid development and intelligent buildings. The purpose of these initiatives is two fold – an educational and validation exercise for industry participants and a means to drive public opinion and facilitate policy decisions at industry stakeholder, public authority and government organization levels.

Overall, the research will provide a market size forecast and roadmap for smart grid and intelligent buildings, contributing to business process transformation deemed necessary to capitalize on investments in smart technology. This study is particularly timely, in light of the recent US Recovery Act Smart Grid stimulus programs that funneled \$3.4 billion in investment and demonstration grants, in addition to loan guarantees, to develop and implement an intelligent, energy efficient and secure electric grid.

## **RESEARCH VENDOR**

The research study will be conducted by BSRIA, a consultancy well established for over 50 years as a global source for knowledge in the intelligent buildings industry. BSRIA has served the complete building environment chain with expertise across all industry sectors, with a unique blend of technical and marketing capability and understanding. They are an industry leader in helping the commercial buildings sector understand and forecast market sizes, market opportunities and aid strategic decision-making. BSRIA conducted the CABA Market Sizing North America 2009 research study that was sponsored by 26 leading intelligent buildings organizations. The study encompassed an in-depth analysis of environmental controls, lighting controls, security systems, fire detection systems, and IT convergence in the North American commercial buildings sector.

## **RESEARCH OBJECTIVES**

The overall objective of this collaborative research opportunity will be to assess and size the business opportunities around the integration of smart grids into intelligent controls and building automation systems within the commercial buildings market. This research will address:

## Smart Grid Impact on Intelligent Buildings 2011

- Demand Side: To identify and quantify the benefits and implications for the principle stakeholder groups (i.e. building developers, owners, users, managers)
- Supply Side: Identify the implications and quantify business opportunities for all those who are (or are potentially) trying to expand their footprint in the building technical facility markets and supply chain (e.g. Utilities; Automatic Metering Infrastructure (AMI) providers; Utility Systems Developers and Integrators; providers of Demand Response and Energy Management System/Software as a Service (EMS); Communications infrastructure; Meters; Building Automation Systems (BAS); and Grid Optimization)
- The research will include, but not necessarily be limited to, the opportunities for smart metering, building energy management, integration and convergence, as well as services
- To support and validate research findings in real-world case study demonstrations of participant projects encompassing intelligent buildings and smart grids

The research study will also include an assessment within the commercial building space of net zero energy buildings (NZEB) and their relationship to smart grids. NZEB are generally characterized as buildings which produce as much energy as they consume over a given time period – but definitions vary. NZEB are, by design, very energy efficient and their remaining low energy needs are typically met with on/off-site renewable energy. The scope of the study will include drivers towards NZEB, definitions, the interrelationship between the roll out of smart grids and roll out of NZEB. Specific objectives will address the following:

- Assessment of stages of NZEB implementation (i.e. low energy or near-net zero buildings and % of net zero energy achieved), and how quickly is it going to happen
- Identification of the building energy codes and incentives driving NZEB
- Definition of net zero energy in terms of types of building that are more suitable (i.e. factors of design, scale, infrastructure, location, etc.)
- Identification of the new technologies and applications needed, and identification of the optimal business opportunities for the industry
- Identification of communications protocols that will be the enablers for smart grids and NZEB
- Identification and showcase of best practice within the current handful of NZEB pilot projects in North America

## **PROPOSED STUDY SCOPE**

The focus of the study will encompass smart grids, NZEB and intelligent buildings business opportunities within the following system components:

- The Distributed Generation Sources (On Site)
- Through Network Operations Centers
- To Industrial and Commercial End-Users
- Including NZEB

## **STUDY APPROACH & RESEARCH METHODOLOGY**

The study will be implemented in stages, beginning with the presentation of the research concepts and framework via webinar, to prospective study participants. The project scope, research objectives and project deliverables will then be refined with the eventual collaborative sponsors, represented on the Project Steering Committee.

The target framework of the research parameters will be established with the project sponsor Steering Committee in terms of:

- Markets
- Technologies
- Industry players
- Regulatory and legislative issues
- Other relevant identified issues impacting the above

## **Qualitative & Quantitative Assessments**

All information detailed in the research objectives will be constructed through relevant and applicable industry sources, publications and statistics using primary and secondary methods, and shall be documented and noted to the root source in analysis and reporting.

## **Questionnaire Development and Interview Targets**

Study questionnaires and sample design for primary research pertaining to smart grids and NZEB will be developed by BSRIA in conjunction with, and with the final approval of, the project Steering Committee.

It is proposed that 40-50 executive interviews with key stakeholders, decision-makers and industry experts involved with smart grids and/or NZEB development and deployment be undertaken for this study. An oversample specific to the NZEB section of the study may be provided. It is estimated that 50%-60% of the interviews will be conducted in-person, with the remainder conducted by telephone, via scheduled appointment. The content, nature, structure and interview length will be developed by BSRIA in conjunction with the project Steering Committee.

There may be options for some interviews involving an **additional structured questionnaire**, with the understanding that this would significantly impact the interviewing program.

A prospective target list of respondents of commercial building industry participants and providers is as follows:

- Building developers, owners, users, managers, utilities, automatic metering infrastructure providers, utility systems developers and integrators, demand response providers, energy management system/software as a service (EMS) providers, communications infrastructure providers, metering manufacturers, building automation systems (BAS) providers, grid optimization specialists

\*Additional interviews with consultants, contractors, FM companies and other relevant players should be considered.

- Targeting of interview respondents will also be segmented to include major organizations/key players/companies involved in primary sectors such as: Utilities, AMI Providers, BAS Companies/Grid Optimizers, Utility Systems Developers and Integrators, Demand Response/EMS Software as a Service Providers, and Communications Infrastructure/Metering Companies

### PROPOSED ANALYSIS & REPORTING

The final content of the study analysis and reporting will be developed by BSRIA in conjunction with, and with the approval of, the project Steering Committee. Though not exhaustive, it has been proposed that the research project report on market areas such as:

- Detailed availability of smart grids in North America
- Smart Meter and AMI Deployment in Commercial Buildings
- Architecture of the market landscape
- Definition and quantification of market potential for service providers in smart grid, by various relevant segments (i.e. definition of services, size of current and future markets, supplier shares and strengths, and potential future market migration)
- Identification and accounting of key suppliers targeting the smart grid market, by various relevant segments and activity
- Identification and mapping of strength and relative position of key suppliers in key markets, by relevant market attributes
- Identification of product types, solutions and services
- Pilot project examples and current best practices
- Accounting of trends, developments and potential future directions (multiple scenario)
- Identification and analysis of market barrier and market enabler factors
- Identification and analysis of potential roll-out and implementation of real-time communication components (multiple scenario)

## Smart Grid Impact on Intelligent Buildings 2011

- Potential roll-out design of uptake, penetration and roll-out degree forecasting (in-depth focus)
- Accounting and analysis of current and future stakeholders, evolving relationships and potential business models
- Market size and forecast by types of products, solutions, and services
- Vertical market overview (in-depth focus)
- Determination and mapping of energy services buying process/supplier selection (in-depth focus)
- Based on the research findings, a summary of key conclusions, potential market scenarios and recommendations (in-depth focus)
- **As per the stated research objectives, a study section of analysis and reporting on developments and potential within NZEB**

### PROJECT DELIVERABLES

The deliverables for this project will consist of the following:

- Presentation of complete project findings by webinar/teleconference at project conclusion, Steering Committee feedback for report
- “Print Ready” electronic color full report in Microsoft Word including executive summary, detailed findings, conclusions, recommendations and Level 1 case studies.
- Provision of hardcopy color reports to participant organizations, after the conclusion of the project (Level 1 = 3 copies, Level 2 = 2 copies, Level 3 = 1 copy)

### Level 1 Participant Case Study

Level 1-study participants will have featured case studies of leading examples of smart grid or NZEB projects included for analysis. The case studies will reflect “real-world” goals, application and benefits, as spearheaded by technology providers and integrators that have advanced the intelligent buildings market and will demonstrate the value derived from incorporating/deploying these technologies. Level 1 case studies will be similarly structured in reporting and will be included in the final study report. For samples of similar case studies from previous CABA Intelligent Buildings research, please go to: “Convergence of Green and Intelligent Buildings” at: [www.CABA.org/brightgreen](http://www.CABA.org/brightgreen).

### PROPOSED TIMELINE

Timeline details will be finalized during the initial planning session by BSRIA and the project Steering Committee. This timeline is based on the scope of the project as defined in this document. Depending on breadth of agreed specification, estimated project duration is 5-6 months. BSRIA will prepare detailed timelines, project milestones, responsibilities, action/delivery dates, as agreed to by the project Steering Committee.

Project Activity	Estimated Time
<ul style="list-style-type: none"> <li>Project Steering Committee kickoff meeting</li> <li>Identify target companies and contacts</li> <li>Questionnaire development and approvals</li> </ul>	Weeks 1 - 3
<ul style="list-style-type: none"> <li>Face-to-face interviews</li> <li>Telephone interviews</li> </ul>	Weeks 4 - 12
<ul style="list-style-type: none"> <li>Data analysis and report preparation</li> <li>Report delivery, presentation of findings, Steering Committee feedback</li> <li>Delivery of final report</li> </ul>	Weeks 13 – 20
<p>Note: Research during vacation periods may extend the timescale by 2 –3 weeks</p>	

## PROJECT PARTICIPATION OPPORTUNITIES

### Level 1: \$15,000 per participant

Benefits: Featured case study, Study Steering Committee participation, study scope definition, survey design, study presentation, final color reports (“print ready” electronic and 3 color hardcopies)

### Level 2: \$10,000 per participant

Benefits: Study Steering Committee participation, study scope definition, survey design, study presentation, final color reports (“print ready” electronic and 2 color hardcopies)

### Level 3: Contributor: \$5,000 per participant

Benefits: Study input, final color reports (“print ready” electronic and 1 color hardcopy)

## CONTACT INFORMATION

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