



Clean Energy in Action Across the Globe

The Business Council for Sustainable Energy (BCSE) is a coalition of companies and trade associations from the energy efficiency, natural gas and renewable energy sectors. The following are case studies from a selection of eight BCSE members showcasing their clean energy projects both domestically and internationally.

1. Ingersoll Rand
2. Johnson Controls
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5. Polyisocyanurate Insulation Manufacturers Association
6. Qualcomm Incorporated
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Ingersoll Rand

ingersollrand.com

CryoTech

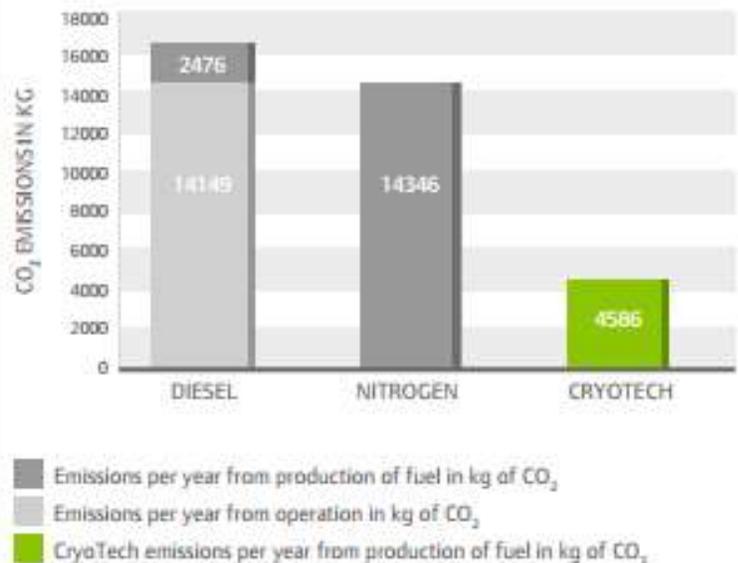
Project location: ASKO, Norway

CryoTech provides near-silent, zero-emissions refrigeration, ideal for distribution of perishables both day and night in busy urban locations.

CryoTech utilizes waste CO₂ (carbon dioxide) which reduces emissions. A major factor in shelf life of perishables is in maintaining their correct temperature. Fast recovery of the correct temperature after the doors have been opened multiple times is key to cargo quality. The Cryotech system outperforms traditional refrigeration systems because of fewer constraints on cooling capacity.

The new system is currently more expensive than the traditional diesel powered system, but running costs are lower resulting in an overall savings of about 7%.

AVERAGE ANNUAL CO₂ EMISSIONS FROM TRUCK UNIT OPERATION



Annual Average CO₂ Emissions from Truck Unit Operation

Johnson Controls

www.johnsoncontrols.com

SK Building – Beijing, China

The SK Building is a mixed-use development that is part of the Central World Trade Centre in the Chaoyang district of Beijing, China. With a total floor area of 106,000m², the building is home to many Fortune 500 companies, financial and professional service companies. The SK Building had poor fresh air circulation and system reliability. A building retrofit and integrated energy solutions strategy resulted in significant improvements in overall system reliability and guaranteed energy savings of 20 percent.

The project included the retrofit the building and replacement of the existing Building Management System and field devices. Energy-saving fresh air handling units and PM2.5 static discharge air purifier were installed as well as a comprehensive energy measurement system. The project includes 20% guaranteed savings (with potential savings exceeding 25%) or 5.5 million RMB (USD 895,000) per year.

This project which includes an innovative contracting model based on a short-term guaranteed energy savings model with rigorous measurement and verification that was recognized by US-China Energy Performance Contracting Working Group.

[Find out more about the project](#)



Hawaii Department of Transportation

Johnson Controls was awarded a 20-year contract by the Hawaii Department of Transportation to design, manage and install energy efficiency measures that will upgrade facilities, reduce energy usage by about 49 percent and with additional operational improvements save a total of \$518 million at 12 state-operated airports.

The program will deliver the results through new lighting systems, ventilating and air conditioning upgrades and renewable energy sources, while creating 300 skilled trade and nearly 90 professional, administrative and managerial jobs while adding more than \$670 million in economic development.

Johnson Controls will install 9,100 solar photovoltaic panels at the airports to generate 2.6 megawatts of renewable energy. Nearly 75,000 lighting fixtures will be replaced with high-efficiency LED and fluorescent equipment. In addition to the ventilating and air conditioning upgrades, the project will address many deferred maintenance items, including roof repairs and equipment replacement.

[Find out more about the project](#)



Jupiter Oxygen Corporation

www.jupiteroxygen.com

Industrial Energy Efficiency: Improving Economic Competitiveness while reducing Carbon Footprint of Industrial Processes

As countries look to grow their economies, the retrofitting of manufacturing facilities and power plants can offer significant energy and emissions savings. Jupiter Oxygen Corporation's (JOC)'s patented oxy-combustion process has significantly reduced fuel consumption and costs, as well as GHG emissions at an aluminum recycling and manufacturing plant in the United States. Building upon that success, JOC is now applying this technology to natural gas and coal-fired boilers for steam generation and power plants. The JOC high flame temperature oxy-combustion process maximizes heat transfer effectiveness, enables cost-effective carbon capture and key air pollutant control from these sources.

[Video about the project](#)



JOC's Vision of Sustainable Development and Promotion of Clean Energy Technologies



November 18, 2015: Agreement signed for commercial scale CCUS – ECBM project in western China

A Portfolio Approach Includes Carbon Capture and Utilization (CCUS)

Carbon capture and storage (CCS), including carbon dioxide (CO₂) utilization, is part of the low-carbon energy portfolio solution. Applying Jupiter Oxygen's cost effective carbon capture and air pollutant control technologies, which were developed jointly with the U.S. Department of Energy's National Energy Technology Laboratory, to existing and new coal power plants, will be key for sustainable development and growth. Essential to this business model is a market that will utilize the captured CO₂, such as enhanced oil recovery (EOR), and enhanced coal bed methane (ECBM) recovery. JOC's integrated approach offers a cleaner fossil energy pathway, as countries prepare to improve their competitiveness and transition to a low-carbon economy.

Kingspan Insulated Panels

www.kingspanpanels.us

The Path to Net-Zero Energy

Kingspan has completed an extensive refurbishment of its 32,000m² manufacturing facility in Selby as part of its journey to becoming a Net-Zero Energy business by 2020. Through the installation of a new, high-performance insulated roof incorporating rooflights, rooftop solar PV panels and intelligent LED lighting, Kingspan has transformed the 1980's warehouse into an ultra-efficient building suitable for the company's operations today.

The building now achieves an 'A' EPC rating (up from F), BREEAM 'Very Good', and will save 34,895 tonnes in carbon emissions and £5.2m in energy costs over the next 25 years as a result of the refurbishment. Not only does this help Kingspan to be a more sustainable business, it also provides a practical example to customers of the economic and environmental benefits of Net-Zero Energy buildings.



[Find out more about the project](#)

Castle Square Multifamily Deep Energy Retrofit

A Scalable, Repeatable Model for Deep Energy Retrofit for Low Income Multifamily Housing to reduce demand side energy and related GHGs

Located in the South End of Boston, Castle Square Apartments, built in the 1960s was constructed with brick with concrete infill, no insulation in the walls and minimal insulation on the roof. Kingspan's Envelope First Energy Efficiency is the first step to a high performance building. Deep Energy Retrofits produce 50% or more energy savings and reduced Demand Side Energy and GHGs.

6 key areas of improvement were identified:

1. **Super Insulate**
2. **Air Seal**
3. **Scale Down Heating & Cooling Equipment**
4. **Improve Indoor Air Quality**
5. **Harness the Sun**
6. **Reduce Plug Load**
7. **Results.**

The Castle Square Deep Energy Retrofit reduced total building energy consumption and Demand Side Energy BY 52%. The super Insulated Shell of Exterior applied Insulated Metal Panel assemblies allowed occupants to remain in their units during the retrofit.





Polyisocyanurate Insulation Manufacturers Association

www.polyiso.org

Passive House Design Expands to Multifamily Dwelling

Passive house design is a growing trend in the building design world. It seeks to achieve high levels of energy efficiency through design choices such as super insulation, solar exposure planning and natural ventilation. There are estimated to be 40,000–50,000 passive homes around the world, with the first one built in the United States in 2003.

Although the return on investment for a passive home has been well documented, the increased costs associated with their design and construction has raised the barriers to entry. This means that most passive house buildings have mainly been single-family homes built in affluent areas.

The tide is changing, however, as several multifamily passive house buildings have been built or are in the planning stages around the U.S. One example of this is the soon-to-be-completed Harry and Jeanette Weinberg Commons project in Washington, D.C. This multi-unit, passive house design building will soon provide homes for 36 low- and moderate-income families. The project is the first of its kind in D.C. and was recently awarded the First Annual Maryland Innovation & Entrepreneurship in Real Estate Awards by the University of Maryland's Colvin Real Estate Institute.

A similar project recently completed in Philadelphia, the Belfield Avenue Townhomes, is another example. According to an article published by *Dwell*, "like most Passive Houses, Belfield Avenue incorporates supercharged wall insulation (in this case, nearly eight inches of densely packed cellulose and Polyiso, a type of rigid foam board), triple-pane windows, and an energy-recovery ventilator, which draws fresh air into the house while expelling kitchen and bathroom exhaust." According to the U.S.-based Passive House Institute, of the 121 passive homes in the United States that they have certified, 100 are private, single-family residences.

[Find out more about the project](#)





Qualcomm Incorporated

www.qualcomm.com

Wireless Reach Environmental Sustainability

A Mobile Application to Monitor Use and Incentivize the Adoption of Clean Cooking Technologies

The SootSwap project demonstrates how mobile phones can aid in advancing the economic, health and environmental objectives of individuals and communities. SootSwap provides an affordable, reliable, mobile phone-based, monitoring device to enable widespread participation in a voluntary carbon market when individuals use clean cookstoves versus traditional biomass burning cookstoves. The Qualcomm® Wireless Reach™ program was initiated to support Project Surya, a global multi-organization initiative focused on helping to mitigate climate change by replacing traditional cookstoves with cleaner technologies using an innovative sensing application.

[Find out more about the project](#)
[Video about the project](#)



Smart Cities Smart Campus Pilot

With over 45 buildings and 14,000 employees spread across San Diego, Qualcomm Technologies, Inc. is constantly looking for ways to achieve greater operational efficiencies. One such opportunity lies within the building infrastructure itself – optimizing the legacy building management systems, or BMS, which are not attuned to environmental factors or the real-time demands of employees. By deploying open protocol standards, and leveraging the Qualcomm® Smart Campus OS, we have been working to make our vision of intelligent buildings a reality.

[Find out more about the project](#)
[Video about the project](#)



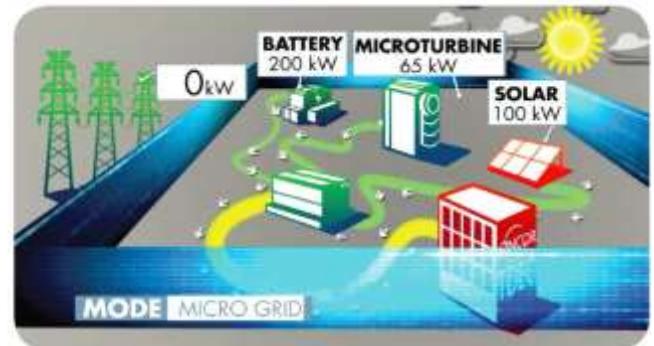
Schneider Electric

www.schneider-electric.com

Innovative Microgrid Improves Utility's Reliability & Optimizes Distributed Energy Resources

Oncor operates the largest regulated distribution and transmission system in Texas and the 6th largest in the US. Determined to ensure uninterrupted delivery of power for its millions of customers, Oncor sought a new microgrid solution to diversify its energy generation assets engaging Schneider Electric and S&C Electric to develop the project. Both companies agreed to collaborate to create a new system that would interconnect four microgrids relying on a variety of distributed generation sources. Schneider Electric's design and engineering experts developed a solution to manage loads, distributed generation, and battery energy storage systems. Load management involved HVAC equipment and an electric charging station. Distributed generation would address diesel and electric generators, a microturbine, solar panels and an energy storage system with lithium ion battery technology. Oncor's innovative system comprises four interconnected microgrids and uses nine different distributed generation sources, including inverter- and non-inverter-based energy resources that can disconnect from – and reconnect to – the main utility grid. The new microgrid improves energy efficiency and power reliability for Oncor customers while maximizing the company's newly installed generation and energy storage units.

[Find out more about the project](#)



Awarded Climate "A" List by CDP

Schneider Electric has been recognized as a global leader for its actions and strategies in response to climate change and for the 5th year in a row has been awarded a position on The Climate "A" List by CDP, the international nonprofit that drives sustainable economies. For the 5th year in a row, Schneider Electric is among the 5% of companies that have been awarded an A grade for their performance. The Group is also one of the only 5 French companies to appear on the Climate "A" List this year. The Group is also awarded a position on the Climate Disclosure Leadership Index (CDLI) for its high quality data on carbon emissions and energy.

[Find out more about the project](#)



US Green Building Council

www.usgbc.org

Retrofit of Empire State Building in New York City

The Empire State Building in New York City was awarded LEED Gold as further recognition from the \$550 million Empire State ReBuilding program in 2011. The improvements are expected to reduce carbon emissions by an estimated 105,000 metric tons over 15 years and included upgrades like efficiency, ultra-low flow fixtures in the building's restrooms and the instillation of recycled content carpets, low off-gassing wall coverings, paints, and adhesives. In addition, a tenant engagement and recycling program was implemented and mandatory green requirements are now included on all lease agreements.

[Find out more about the project](#)

Korea's Songdo International Business District

The Songdo International Business District, a new 1,500-acre city being built on reclaimed land on the coast of Incheon, South Korea, currently totals 19.5 million square feet of LEED-certified space and is one of the world's most ambitious LEED developments. The 19.5 million square foot figure represents 12 projects comprising an impressive 106 buildings (71 residential, 27 retail and eight commercial), and the project is only 65 percent complete. When finished in 2020, it will include one hundred million square feet of office, residential, retail, hotel and public space, and be home to 65,000 residents with 300,000 people will commute in daily.

[Find out more about the project](#)

New Construction at Dunbar High School, Washington, D.C.

Dunbar High School in Washington, D.C. recently achieved LEED Platinum certification and currently is the highest-scoring school in the world certified under the LEED for Schools-New Construction rating system. Scoring 91 out of 110 possible points, the school has a photovoltaic array that generates enough energy on a sunny summer day to power classroom lights for eight hours and below the surface of the school's athletic fields is D.C.'s largest ground-source heat pump, with wells reaching down 460 feet. In addition, two 20,000 gallon cisterns and low-flow systems help to conserve more than 1.4 million gallons of potable water annually.

[Find out more about the project](#)