

## PROGRAM OVERVIEW

K. Raheja Corp (KRC), a leading real estate corporation that owns many properties in India, is working with the Clinton Climate Initiative (CCI) Cities Program<sup>1</sup>, a close partner of the C40 Cities Climate Leadership Group (C40) to implement energy-saving measures at a number of KRC's commercial holdings. KRC is at the forefront of environmental responsibility in India, paving the way for others to follow. The company is committed to achieving LEED-certification for new building projects and to increasing energy savings and reducing operational expenses in existing buildings across its portfolio. Retrofitting base building systems provides KRC with the opportunity to lower operating costs for its national and international corporate tenants, whose demand for energy has increased with the growth of technology use in buildings.

In 2007, KRC began working with CCI's Energy Efficiency Building Retrofit Program on three retrofit projects in Mumbai: the Inorbit Mall Malad (one of the largest indoor shopping malls in India), The Resort Hotel, and Hotel Renaissance. In order to address KRC's concern for rising energy costs, CCI suggested using energy performance contracting (EPC), which guarantees savings are designed to pay back the initial cost of the project. CCI helped KRC design the initial projects and assisted with the vendor selection and project development process.

Buoyed by the success of these projects, KRC decided to establish a program to look for energy savings in all of its existing buildings over the next several years.

By choosing to address its entire portfolio rather than individual buildings, KRC created economies of scale

“Retrofitting is a new concept in this part of the world. CCI is playing an important role as a neutral facilitator between the ESCOs and KRC to help streamline the procurement processes and eliminate barriers to action. CCI has provided essential training to members of the KRC team, helping us to advance our ambitious program under a broad set of industry best business practices. Going forward, KRC continues to rely on CCI/C40 as an unbiased partner who can provide technical advice and support project coordination and planning.”

– Chairman, K.Raheja Corp Group

### PROJECT AT A GLANCE: INORBIT MALL

**ESCO/CONTRACTOR:** Johnson Controls Inc.

**PROJECT SIZE:** 1 building / 560,000 square feet

**PROJECT COST:** USD\$380,187

**ANNUAL SAVINGS**

Total energy savings: 10%

Cost savings: 37%

**ANNUAL EMISSION REDUCTIONS:** 445 metric tons CO<sub>2</sub>

**SIMPLE PAYBACK:** 2.8 years

## PROJECT TIMELINE: INORBIT MALL



<sup>1</sup> CCI Cities Program is now a fully integrated partner with the C40 Cities Climate Leadership Group (C40). In April 2011, the C40 and CCI Cities Program announced an expanded alliance which brings significant resources and infrastructure to the two organizations and their programs. For more information, please visit [www.c40cities.org](http://www.c40cities.org).

in its procurement processes; streamlined the project development process, and expedited cost savings and carbon emission reductions. Instead of focusing only on “energy hog” buildings or those with an attractive financial payback, KRC recognized that every building has the potential to be more energy efficient — and that, given India’s energy security issues and rising greenhouse gas emissions, every building counts.

CCI has been working closely with KRC to execute retrofit projects on a dozen properties, including hotels, malls and office buildings in Mumbai, Hyderabad, and Pune. KRC continues to rely on CCI/C40 as an unbiased partner who can provide technical advice and support project coordination and planning.

### INITIAL ENGAGEMENT

CCI approached KRC initially through its relationship with the city of Mumbai. KRC first identified a number of improvements that were desired for one major property in Mumbai: the InOrbit Mall Malad. CCI introduced the energy performance contracting (EPC) model and offered to support project development as well as to facilitate the procurement process.

### ESCO SELECTION

CCI introduced KRC to several international and Indian energy service companies (ESCOs) that could provide turnkey energy efficiency retrofitting services under a global best practices framework. After a competitive selection process that involved reviewing preliminary building audit reports and proposed project scopes, KRC decided to work with Johnson Controls Inc (JCI) and Honeywell. For each project, the two ESCOs were asked to conduct walkthrough audits and submit initial proposals. KRC selected the ESCO whose proposal demonstrated the highest energy and cost savings for the project.

By working with two ESCOs, KRC was able to compare the specializations and skills of each firm and make the best fit between the ESCO and the building type and project requirements. In addition, by developing a long-term partnership with these two firms, KRC streamlined project development by reducing the time for initial assessments and contract negotiations, allowing projects to be designed and implemented more quickly.

### PROJECTS

This case study presents three of KRC’s first retrofit undertakings: InOrbit Mall Malad, the Resort Hotel, and the Renaissance Mumbai Convention Center Hotel.

KRC has completed the first phase of the InOrbit retrofit project, which focused on common area systems within the mall, and is currently in its second phase, which will focus on energy balancing. The first phase has already reduced CO<sub>2</sub> emissions by 445 metric tons per year. The next phase will identify the heating and cooling loads for the HVAC system, allowing it to operate at

#### PROJECT AT A GLANCE: THE RESORT HOTEL MUMBAI

**ESCO/CONTRACTOR**  
Honeywell

**PROJECT SIZE**  
1 building / 75,229 square feet

**PROJECT COST**  
USD\$362,471

**ANNUAL SAVINGS**  
Total energy savings: 15%  
Electric savings: 14.3% (415,578 kWh)  
High Speed Diesel savings: 41.0% (45,340 kWh)  
Cost savings: USD\$119,688

**ANNUAL EMISSION REDUCTIONS**  
389 metric tons CO<sub>2</sub>

**SIMPLE PAYBACK**  
2.5 years

### PROJECT TIMELINE: RESORT HOTEL MUMBAI



maximum efficiency. In all of its projects to date, KRC has born the cost of the retrofits and passed the energy cost savings on to the tenants.

In the hotel properties, KRC recognized the escalating energy costs associated with maintaining service levels. The Resort Hotel, an older property, needed to be refit with a building management system for better facilities management. The Hotel Renaissance also optimized its energy management in addition to improving its core building systems. With both projects now complete, the Resort is reducing energy costs by 15 percent and CO<sub>2</sub> emissions by 389 metric tons, and the Renaissance is reducing energy costs by 7 percent and CO<sub>2</sub> emissions by 971 metric tons per year.

All three projects have focused on improvements in building systems and upgrading equipment.

- **HVAC upgrades** included installing energy-efficient chilled water pumps, condenser pumps, air handling units (AHUs), and variable frequency drives (VFDs) to reduce consumption during non-peak hours; modifying piping system for built-in flexibility and hydraulic balance, and upgrading fill of cooling towers for improved heat transfer; correcting discharge pressure in cooling tower basins to equalize the flow and avoid water splashing; installing controls on the entire air-conditioning system comprising of chillers, pumps, cooling towers, AHUs, fan control units and ventilation fans; and setting up commission automation and control systems to optimize operation of equipment systems and monitor information including temperatures, flows, pressures, and actuator positions.
- **Chiller plant improvements** included replacing old monoblock pumps with individual, chiller-wise, inline cooling water pumps, which were selected and designed for optimal flow and operation in their best-efficiency zone; and optimizing pump operation time by linking pump operation to chiller operation.

- **Hot water upgrades** included installing heat pumps for simultaneous heating and partial cooling with built-in flexibility and range for meeting operational hot water requirements at different times of day.
- **Lighting improvements** included replacing existing lamp ballasts with right-sized, finely-tuned ballasts and less efficient lamps with LEDs for greater lamp efficiency and longer operational life; optimizing lighting system to improve lumen levels throughout the work place; and installing motion sensors in indoor parking lot and InOrbit mall food court.
- **Sewage treatment plant improvements** included implementing duty-cycling for the air blowers through programmable VFDs and using sensors to communicate the dissolved oxygen level and temperature to the controller that then determines the speed of blower to maintain the optimum dissolved oxygen level.

### PROJECT AT A GLANCE: HOTEL RENAISSANCE MUMBAI

**ESCO/CONTRACTOR**  
Honeywell

**PROJECT SIZE**  
1 building / 301,390 square feet

**PROJECT COST**  
USD\$695,325

**ANNUAL SAVINGS**  
Total energy savings: 7%  
Electric savings: 4.6% (756,027 kWh)  
Natural gas savings: 21.3% (7180 MBTU)  
Cost savings: USD\$245,833

**ANNUAL EMISSION REDUCTIONS**  
971 metric tons CO<sub>2</sub>

**SIMPLE PAYBACK**  
2.4 years

## PROJECT TIMELINE: HOTEL RENAISSANCE MUMBAI



- **Solar powered LCD “dashboards”** will function as communication tools that demonstrate the environmental and financial impacts of the projects on a real-time basis to educate community and manage stakeholder expectations.

## FINANCING SOLUTION

KRC was able to fund the three first projects through its own capital resources but may be looking to finance future projects. Each project is designed to meet KRC investment criteria to deliver a financial as well as environmental return on investment.

## PROJECT CHALLENGES

At the start of the retrofit projects, KRC faced the challenges of obtaining both management approval and shareholders' consent. Since KRC would not receive any extra premium from tenants and building occupants for implementing energy-saving measures, initial approval for the work as a capital investment needed to come from these decision-makers.

For both hotel projects, there was a mandate from top management for a maximum 2.5-year simple payback; under this condition, the proposed improvements had to be technically robust and efficient. Additionally, the lack of financial incentives from the government for the retrofits presented a financial constraint, and each project had to be assessed from KRC's investment perspective.

The development timeframe of the projects also proved challenging to the executing team. Because energy efficiency retrofitting was a fairly new concept in India, the development timeframe had to include training for architects, engineers, and building managers — adding extra time and expense to the projects. Additionally, contract negotiations between KRC and the ESCOs lasted approximately six months and were prolonged as a result of a financial liquidity crunch in 2008. These barriers, while significant for the first projects, are not expected to be repeated as additional projects leverage the lessons learned.

The Resort Hotel, an older building that was constructed over 30 years ago, presented a few additional challenges during project development. Its location near the coast, the corrosive ambient conditions, and its spatial constraints were among the issues that needed to be addressed. The facility lacked central monitoring and controls systems, so the implementation of a building management system was an essential step towards greater energy savings. At the Hotel Renaissance, the design of retrofit solutions and the calculations of reductions and baselines also had to account for plans for future changes and expansions in its facilities. Retrofitting under these existing conditions in fact required greater attention and planning than constructing an entirely new building.

## CCI ROLE

Through its partnership with KRC, CCI has served as a catalyst for the energy efficiency retrofit program, which is expected to involve many individual building projects over time. During the development process of each project, CCI supports KRC by:

- Attending initial negotiation agreements among key KRC stakeholders to launch the retrofit program and energy projects
- Educating staff on energy efficiency building retrofitting and lifecycle cost analysis to assess project success
- Introducing energy performance contracting concepts, identifying ESCOs that support EPC best practices, and playing the role of a neutral facilitator between ESCOs and KRC
- Supporting KRC to develop project requirements and a streamlined tender process
- Providing a review of ESCO responses and assisting in incorporating best practice terms and conditions into project contracts

## KEY CONTACTS

### **C40 CITIES CLIMATE LEADERSHIP GROUP/ CLINTON CLIMATE INITIATIVE**

Pradeep Nair  
[pnair@clintonfoundation.org](mailto:pnair@clintonfoundation.org)

### **K. RAHEJA CORPORATION**

Shabbir Kanchwala  
Vice President  
[skanchwala@kraheja.com](mailto:skanchwala@kraheja.com)  
<http://www.krahejacorp.com/>

### **HONEYWELL AUTOMATION INDIA, LTD**

Tarun Ramrakhiani  
Sales Manager  
[Tarun.Ramrakhiani@honeywell.com](mailto:Tarun.Ramrakhiani@honeywell.com)  
<http://www.honeywell.com/sites/acs/hail/>

### **JOHNSON CONTROLS INC**

Himanshu Wani  
Sales Manager  
[himanshu.wani@jci.com](mailto:himanshu.wani@jci.com)  
<http://www.johnsoncontrols.com/>