The Jetwing Hotel Group

The Jetwing Hotel Group is a leading hotel chain in Sri Lanka, with properties spread around the country. In September, it won the Jetwing Sustainability Award for its efforts in sustainability and climate change.

Jetwing is taking a holistic approach to reducing its carbon footprint by using photovoltaic, solar thermal energy generation, biomass generation for cooling purposes, composting and many other measures. As a result, it has become a model for the Sri Lankan hotel industry.

As part of the Green Cooling Initiative (GCI), Jetwing was selected in an ideas competition to be a technology partner in one of three projects. The partnership will focus on the installation of an energy- and resource-efficient building. The Jetwing partnership will use the GCI’s technology and strategies for heating, ventilation and cooling (HVAC) systems.

In addition, by using absorption chillers at Yala and Lagoon, Jetwing can save about 1.5 million kWh per year and reduce its carbon footprint by about 1 million tCO2eq.

The green cooling initiative and GIZ Proklima

GIZ Proklima is a program of the German Ministry for Economic Cooperation and Development (GIZ), which provides technical support to developing countries to implement the provisions of the Framework Protocol and the京都議定書 on climate change. The program is designed to decrease the atmospheric concentration of greenhouse gases.

Three key objectives are to

1. Promote technologies and energy-efficient and sustainable technologies and solutions.
2. Stimulate public and private financing of projects.
3. Increase the awareness of climate change.

One way of mitigating the impact of the cooling industry on the environment is by helping it move to green cooling technologies by keeping refrigerants and natural refrigerants and renewables.

The overall objective of GCI is to introduce the environmental and climate impact of cooling systems used in the private and public sector.

Finding sustainable, cost-effective cooling solutions with a positive impact on the climate.

The Jetwing Hotel Group is a member of the Jetwing Sustainability Award. The company is a trendsetter in Sri Lanka for sustainable and climate-friendly refrigeration. It is a leader in Sri Lanka for sustainable and climate-friendly refrigeration. It is a trendsetter in Sri Lanka for sustainable and climate-friendly refrigeration. It is a leader in Sri Lanka for sustainable and climate-friendly refrigeration.

Almost all refrigeration and air conditioning systems in Sri Lanka are used for cooling, compared to the total energy consumption. In addition, by using absorption chillers in Jetwing’s hotels, the company can save about 1.5 million kWh per year and reduce its carbon footprint by about 1 million tCO2eq.

The Green Cooling Initiative

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Keeping Sri Lankan hotels cool

Climate change, doing prices for fossil fuels and more treaties with environmental ambitions are prompting hoteliers in tropical destinations such as Sri Lanka to find ways to maintain their businesses in a sustainable manner.

Refrigeration and air conditioning (RAC) in hotels often make up more than 50% of total energy consumption. In many cases, this corresponds to half of the hotel’s carbon footprint, and it is typically the single fastest growing cost point for hotels in warm climates.

Greenhouse gas (GHG) emissions in Sri Lanka have been increasing continually over the last decades (Figure 1) as the hotel economy has grown. Refrigeration and air conditioning (RAC) for roughly 12% of national GHG emissions, and hotels contribute a major share of that. By leaking emissions from refrigeration and air conditioning, Sri Lanka can move toward its climate targets.

GHG emissions resulting from refrigeration and air conditioning come from the electricity used to operate appliances, which is in turn generated with fossil fuels and results in massive amounts of indirect CO2 emissions. It also comes from the release of climate-damaging HFC and HCFC refrigerants during the operation and maintenance of refrigeration and cooling appliances. This adds to indirect CO2 emissions as well.

In Sri Lanka, around 70% of GHG emissions are estimated to be indirect, coming from electricity used to operate appliance, while 30% are direct from refrigerants released into the atmosphere, according to data from 2014 (Figure 2).

Almost all refrigeration and air conditioning equipment, such as chillers, air-conditioners, domestic refrigerators and commercial refrigeration equipment, can operate using natural refrigerants and with superior energy efficiency. When old equipment needs to be replaced, this technology is the best choice and could reduce GHG emissions in Sri Lanka by around 40% by 2030.

The Sri Lankan tourism industry has grown tremendously since 2010. In 2012, it achieved 1 million arrivals (Sri Lanka Tourism Development Authority, 2014). Travel is an area the country can contribute significantly to the overall Green Cooling Dominate Protocol (GDP) representing 10% in 2015.

In hotels, the large amount of energy the electrical energy used for cooling by hotels is the best. The decrease in energy used for cooling, compared to the total energy, can be linked to the use of absorption chillers.

In addition, by using absorption chillers at Yala and Lagoon, the hotels can save money, since the fuel used, is relatively cheap.

The two vapor absorption chillers at Yala and Lagoon use distilled water as a coolant, which has a high warming potential of water.

How Jetwing Hotels are staying cool

The refrigeration and air-conditioning systems in Jetwing Hotels consume up to 64% of the total electricity used. Of that 64% or air-conditioning chillers across the group consume around 40%.

Unitary air-conditioners are the second highest energy-consuming equipment, other than the chillers, which consume around 50% of the total electricity. Refrigeration, condensing units and others consume a smaller amount of electricity among the different installed RAC appliances.

At amongst 10 hotels, most emissions are indirect (40%) and produced from burning fossil fuels to operate cooling appliances. While the rest (60%) are direct emissions from leaking refrigerants (Figure 3).

At Yala and JW Lagoon, which rely on absorption chillers, the best energy consumption patterns (Figure 4). About 95% of the energy used in both Yala and Lagoon is produced by energy efficient vapor absorption chillers using biomass as fuel. Only the remaining 5% comes from electric driven two-stage vapor compression chillers that are used as back-up (Figure 4). The different uses of the individual teams and the total number of rooms in each team may explain the varying energy consumption patterns.

Figure 4 shows that JW Beach has the highest consumption of electricity for cooling (44%), while JW Yala consumes only 27%. The total electricity consumption patterns and the cooling energy analysis show that although JW Yala consumes the largest amount of energy, the electrical energy used for cooling by Yala Yala is the least. The decrease in energy used for cooling, compared to the total energy, can be linked to the use of absorption chillers.

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The two vapor absorption chillers at Yala and JW Lagoon use distilled water, a coolant, which has a high warming potential of water.

Jetwing is taking a holistic approach regarding reducing the cooling load in the group on how to continuously transition to natural refrigerants and maximized potential of zero.

As part of the Green Cooling Initiative (GCI), Jetwing was selected in an ideas competition spread around the country from 10 companies in the Jetwing Hotel Group. The GCI and Jetwing have analyzed the potential of zero.

Jetwing’s transition to natural refrigerants and maximized potential of zero.

Jetwing’s Hotel Group is a leading hotel group in Sri Lanka, and it includes all-sectors (last access 12 May 2017) as the study here:

The Sri Lankan tourism industry has grown tremendously since 2010. In 2012, it achieved 1 million arrivals (Sri Lanka Tourism Development Authority, 2014). Travel is an area the country can contribute significantly to the overall Green Cooling Dominate Protocol (GDP) representing 10% in 2015.

Comparison of energy-efficient alternatives with current system

The Jetwing Hotel Group

JW Lagoon

JW Yala

Table 1: Equipment electricity consumption pattern (in KWh) in Jetwing Hotels

<table>
<thead>
<tr>
<th>Equipment type</th>
<th>Electricity consumed (kWh/a)</th>
<th>COP</th>
<th>Running hours (hours/a)</th>
<th>Biomass consumed (kg/year)</th>
<th>Biomass cost (US$)</th>
<th>GHG Emissions (tCO2/year)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Refrigerators</td>
<td>20.000</td>
<td>60%</td>
<td>7,229.108</td>
<td>8,646</td>
<td>155,234</td>
<td>2.000</td>
</tr>
<tr>
<td>Condensing units</td>
<td>69.000</td>
<td>50%</td>
<td>2,162.05</td>
<td>18,000</td>
<td>200,000</td>
<td>65,487</td>
</tr>
<tr>
<td>others</td>
<td>13,781</td>
<td>20%</td>
<td>3,742.24</td>
<td>33,000</td>
<td>1,000,000</td>
<td>1,378</td>
</tr>
<tr>
<td>Total</td>
<td>82.861</td>
<td></td>
<td>14,133.41</td>
<td>59,646</td>
<td>1,150,234</td>
<td>85,731</td>
</tr>
</tbody>
</table>

Jetwing Group

Comparing energy use across the two different sites of the Jetwing Group show a significant decrease in energy consumption in the RAC sector in Sri Lanka. The Sri Lankan tourism industry has grown tremendously since 2010. In 2012, it achieved 1 million arrivals (Sri Lanka Tourism Development Authority, 2014). Travel is an area the country can contribute significantly to the overall Green Cooling Dominate Protocol (GDP) representing 10% in 2015.

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Keeping Sri Lankan hotels cool

Climate change, doing prices for fossil fuels and more travelers with environmental consciousness are prompting hoteliers in tropical destinations such as Sri Lanka to find ways to maintain their businesses in a sustainable manner.

Refrigeration and air conditioning (RAC) in hotels often make up more than 50% of total energy consumption. In many cases, this corresponds to half of the hotel’s carbon footprint, and it is typically the single biggest growing cost point for hotels in warm climates.

Greenhouse gases (GHG) emissions in Sri Lanka have been increasing continuously over the last decades (Figure 2) due to the economic boom. Refrigeration and air conditioning are responsible for roughly 10% of national GHG emissions, and hotels contribute a major share of that. By limiting emissions from refrigeration and air conditioning, Sri Lanka can move toward its climate targets.

GHG emissions resulting from refrigeration and air conditioning come from the electricity used to operate appliances, which is typically generated with fossil fuels and results in massive amounts of indirect CO₂ emissions. It also comes from the release of climate-damaging HCFC or HFC-based refrigerants during the operation and maintenance of refrigeration and cooling appliances. This adds to indirect CO₂ emissions as well.

In Sri Lanka, around 70% of GHG emissions are estimated to be indirect, coming from electricity use, while roughly 30% are direct from refrigerants released into the atmosphere, according to data from 2014 (Figure 2).

Almost all refrigeration and air conditioning equipment, such as chillers, unitary air conditioners, domestic refrigerators and commercial standalone equipment, can operate using natural refrigerants and with superior energy efficiency. When old equipment needs to be replaced, this technology is the best choice and could reduce GHG emissions in Sri Lanka by approximately 45% by 2030.

The Sri-Lankan tourism industry has grown tremendously since 2010. In 2018, it achieved 13 million arrivals (Sri Lanka Tourism Development Authority, 2018). Travel architecture in the country has changed significantly in the last years, turning to superior technology and greener methods.

How Jetwing Hotels are staying cool

The refrigeration and air-conditioning systems in Jetwing Hotels consume up to 64% of the total electricity used. Of these, 44% of cooling chiller systems across the group consume around 43%.

Unitary air conditioners are the second highest energy-consuming equipment other than the chillers, which consume around 38% of the total electricity. Refrigeration, condensing units and other chillers consume a smaller amount of electricity among the different installed RAC appliances.

At around 10 hotels, most emissions are direct (45%) and produced from burning fossil fuels to operate cooling appliances, while the rest (55%) are indirect emissions from leasing refrigerants (Figure 4).

Jetwing hotels in Sri Lanka have successfully introduced absorption chillers at three hotels, which have become a model for the Sri Lankan hotel chain in Sri Lanka, with properties in the professional world.

Jetwing is taking a holistic approach to reducing its carbon footprint by improving energy efficiency and using renewable energy. They are also making their facilities more sustainable by choosing green materials and using renewable energy.

As part of the Green Cooling Initiative (GCI), Jetwing was selected in an ideas partnership to focus on the installation of absorption chillers at Jetwing hotels. The idea is to replace old equipment needs to be replaced, this technology is the best choice and could reduce GHG emissions in Sri Lanka by approximately 45% by 2030.
Absorption chillers

Vapor absorption chillers (VAC) have numerous advantages compared to electric cooling systems. They operate by making use of waste heat, which greatly increases cost effectiveness. Absorption chillers also reduce operating costs by helping avoid peak electricity charges and by minimizing the high incremental costs of electric cooling with their greater absorption efficiency.

The major benefits of VACs are:
- Quiet and vibration-free operation
- Low pressure systems with no large rotating components
- Low maintenance and high reliability
- Environmentally-friendly water and salt water solutions as a refrigerant
- Ability to operate with residual wood, i.e. from cinnamon production

However, an absorption system usually cannot meet the whole cooling load requirements of a large building. This means a conventional system needs to run in parallel or as a substitute, which increases system complexity.

All in all, absorption chillers are an important alternative technology because they reduce overall energy consumption, can cut out on low-cost fuels and reduce GHG emissions.

The Jetwing Hotel Group is a model in Sri Lanka with its VACs and will install a third one in cooperation with the Green Cooling Initiative.

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The Jetwing Hotel Group is a model in Sri Lanka with its VACs and will install a third one in cooperation with the Green Cooling Initiative.

Solar panels
The hotel also generates electricity from solar panels, thereby using a holistic, sustainable approach.

Vapor absorption chillers
Vapor energy is converted into cold, which cools the hotel in a sustainable way, with water as a natural refrigerant.

Cinnamon wood combustion for power generation
The wood is burned at a high temperature so that as little GHG as possible is produced. In this way, users generate climate-friendly electricity.

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The upfront cost of a VAC is considerably more than a similarly sized vapour compression chiller, but it takes less time to earn back the investment via reduced operating costs. For an absorption chiller, the investment can be recovered in roughly 5.5 years, compared to 4.4 years for a vapour compression chiller, assuming price and supply stability of the biomass.

The Jetwing Hotel Group is a model in Sri Lanka with its VACs and will install a third one in cooperation with the Green Cooling Initiative.

Sustainable cooling in hot Sri Lanka
For those vacationing in hotels in tropical Sri Lanka, cooling is indispensable. The vapor absorption chiller is a sustainable technology that helps reduce harmful emissions.
The Jetwing Hotel Group

The Jetwing Hotel Group is a leading hotel chain in Sri Lanka, with properties spread around the country from Negombo to Galle. Jetwing is taking a holistic approach to reducing its carbon footprint by using photovoltaic, solar thermal energy generation, biomass generation for heating purposes, composting and many other measures. As a result, it has become a model for the Sri Lankan hotel industry and beyond.

As part of the Green Cooling Initiative (GCI), Jetwing was selected as one of three hotels to be a technology partner in one of these projects. The partnership will focus on the installation of hotel-based absorption chillers which uses steam generated in a power plant. Jetwing will also continue developing its roadmap for the group on how to continuously release its carbon footprint and become a carbon-free Sri Lanka for sustainable and climate-friendly refrigeration and air conditioning solutions.

The GCI and lending boost-integrated refrigeration and air-conditioning (RAC) equipment and processes at GCI-compatible Jetwing Hotel Group, and GCI has recommended strategies for hotels to mitigate their greenhouse gases.

These include:
- Reducing the cooling load from existing and new buildings,
- Transitioning to natural refrigerants when renewing or new HVAC appliances,
- Introducing energy-efficient appliances and using renewable energy sources.

Find the whole study here:
http://www.green-cooling-initiative.org/

The Green Cooling Initiative and GIZ Proklima

GIZ Proklima is a program of the German Federal Ministry for Economic Cooperation and Development (GIZ). It provides technical support to developing countries to implement the provisions of the Montreal Protocol and the Kigali amendment on substance phase-down that will bring down the ozone layer and affect the global climate.

Three key objectives include:
- Promoting non-CFC refrigerants and energy-efficiency
- Establishing advanced training institutions and eventual certification
- Developing public and private financing of projects

One way of minimizing the impact of the cooling industry on the environment is by helping it move to green cooling technologies by keeping refrigerants from ozone-depleting refrigerants to natural refrigerants and maximizing energy efficiency.

Keeping Sri Lankan hotels cool

In Sri Lanka, around 70% of GHG emissions are estimated to be indirect, coming from electricity use, for example, for refrigeration and air conditioning. Air conditioning is responsible for roughly 15% of national GHG emissions, and hotels contribute a major share of that. By limiting emissions from refrigeration and cooling appliances, Sri Lanka can make a significant contribution to meeting the climate targets of the Paris Agreement.

The Sri Lankan tourism industry has been increasing continuously since the 1980s, with a positive impact on the climate. Climate change, rising prices for fossil fuels and more tourists with destinations such as Sri Lanka to stay in hotels often makes up more than 50% of total energy consumption. In many cases, this corresponds to half of the hotel’s carbon footprint, and it is very important to reduce it.

At Jetwing’s 10 hotels, most emissions are due to burning fossil fuels to operate cooling appliances, while the rest (6%) are direct emissions of chlorofluorocarbons (CFCs) and hydrochlorofluorocarbons (HCFCs) from refrigerators, condensing units and other equipment.

According to data from 2016, direct emissions of CFCs and HCFCs are 1,000 tons per year. If this were to continue, the carbon footprint would increase by 64% of the total electricity used. Refrigerators, condensing units and other equipment consume 15% of the total electricity used, with the highest consumption of electricity for hotels.

Figure 2: The share of cooling on total electricity consumption (%)

Figure 3: Total energy from vapour absorption chillers at two different sites of the Jetwing Group

Figure 4: Total energy per room (kWh/a)

Figure 5: Share of cooling on total electricity consumption (%)

Figure 6: Vapour compression

High efficiency vapour absorption chillers using biomass as an auxiliary are a refrigerant, which has a global warming potential of zero.

Figure 7: Vapour absorption per room

JW Lagoon JW Yala

0 10.000 20.000 30.000 40.000 50.000 60.000 70.000 80.000 90.000 100.000

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Figure 9: Share of cooling on total electricity consumption (%)

Figure 10: Vapour absorption per room

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Climate-friendly cooling for the hotel industry in Sri Lanka

Finding sustainable, cost-effective solutions with a positive impact on the climate.

About Jetwing

Jetwing is a multi-award winning Sri Lankan hotel chain. The company was founded in 1974 and now operates 10 hotels in the Jetwing Hotel Group, which has become a model for the Sri Lankan hotel industry.

The company has been a pioneer in energy efficiency and has taken a holistic approach to reducing its carbon footprint by using photovoltaic, solar thermal energy generation, biomass generation for heating purposes, composting and many other measures. As a result, it has become a role model for the Sri Lankan hotel industry and beyond.

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Jetwing is transitioning to natural refrigerants when investing in new RAC equipment and processes at two different sites of the Jetwing Group (RAC) equipment and processes at Yala and Lagoon, the hotels can save 10% of their energy consumption by installing biomass-fired absorption chillers.

Three key objectives include: Promoting natural refrigerants and energy-efficiency, Encouraging public and private financing of projects, Developing public and private sector strategies for Jetwing to mitigate its impacts on greenhouse gasses.

## The Green Cooling Initiative and GIZ Proklima

GIZ Proklima is a program of the German Government (Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH, which promotes environmental and climate-friendly technologies, policies, and energy-efficiency by encouraging public and private sector strategies for Jetwing to mitigate its impacts on greenhouse gasses.

Jetwing’s 10 companies in the Jetwing Hotel Group (GCI) are working on behalf of the German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU) and the International Climate Initiative (IKI) to promote ozone- and climate-friendly refrigerants when investing in new RAC appliances.

One way of minimizing the impact of the hotel cooling industry on the environment is to help move it to green cooling technologies by keeping refrigerants to natural refrigerants and minimized energy with any other technology.

## How Jetwing Hotels are Staying Cool

The refrigeration and air conditioning come from the electricity use, for example, according to data from 2016, the economy has grown. Refrigeration and air conditioning solutions in one of the Jetwing’s in Sri Lanka have become a template for the Sri Lankan hotel industry and beyond.

## Jetwing Hotel Group

The Jetwing Hotel Group is a leading hotel chain in Sri Lanka, with properties spread around the country from Negombo to Colombo to Hikkaduwa. Jetwing is taking a holistic approach to reducing its carbon footprint by using photovoltaic, solar thermal energy generation, biomass generation for cooling purposes, composting, and many other measures. As a result, it has become a model for the Sri Lankan hotel industry and beyond.

As part of the Green Cooling Initiative (GCI), Jetwing was selected as an ideas competition to be a technology partner in one of its projects. The technology partnership will focus on the installation of a biomass-fired absorption chiller which uses steam generated in a biomass-fired boiler. Jetwing will also continue developing its roadmap for the group on how to continuously reduce its carbon footprint and become a template to Sri Lanka for sustainable and climate-friendly refrigeration and air conditioning solutions.

The GCI and Jetwing have studied in-depth refrigeration and air-conditioning (GCI) in the equipment and processes on Jetwing’s Hotel Group and GCI has recommended strategies for Jetwing to mitigate its impacts on greenhouse gasses.

These include: Reducing the cooling load is both existing and new buildings, transitioning to natural refrigerants when investing in new RAC appliances, continuously upgrading highly-energy-efficient appliances and using renewable energy sources.

Find the whole study here: www.green-cooling-initiative.org