54th CONFERENCE OF DIRECTORS GENERAL OF CIVIL AVIATION ASIA AND PACIFIC REGIONS

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AGENDA ITEM 5: AVIATION AND ENVIRONMENT

ENERGY MANAGEMENT AT INDIAN AIRPORTS THROUGH USE OF SOLAR POWER

(Presented by India)

SUMMARY

Airports & its hangars are the best and the most convenient place for installing solar power due to availability of vast empty lands. Many airports in India and across the world have already begun to use solar energy to produce for their needs. They not only use vast areas of land but also roof top surfaces available.

Solar power for airports is an ideal solution as their power consumption is very high and this helps them not only to accomplish saving in power bills over a period of time but also reduce their carbon foot print and makes the airports self sustainable.

CIAL has become the world's first airport to fully operate on solar power. The innovations at Cochin & Kolkata airports have been helped by the growing economic viability of solar power in India. AAI has taken steps to build solar plants at their airports to meet own energy requirements and feed the surplus energy to the local grid.

Best practices for energy management through use of solar power contributes to sustainable developments and helps to design energy efficient & eco friendly Airports.

ENERGY MANAGEMENT AT INDIAN AIRPORTS THROUGH USE OF SOLAR POWER

1. INTRODUCTION

1.1. In a country like India where the Sun shines for around 300 days a year, there is enough solar energy to satisfy energy needs for the entire year. This hasn't gone unnoticed by the government of India and a lot of progress has happened in the country's solar energy production. It ranked fourth in the world in terms of solar power generation. Currently, Solar Power in India is a fast growing industry, with a solar capacity of 8062 MW as of 31st July 2016, which is a great improvement from 3743 MW last year.

1.2. Normally vast and open areas of land are acquired for the construction of airports. Airports are energy intensive as the buildings on these lands are large, tall and air conditioned. Usually the electrical energy requirement in any airport is met through conventional sources of energy, which are polluting.

1.3. Airports not only using surplus land available but also stressed on using the roof top surfaces of large areas available at airports to its full potential by installing solar grids. This initiative not only accomplishes savings in power bills over a period of time but also reduces their carbon footprint and makes the airport self-sustainable.

1.4. The Airport initiatives for sustainable development of solar energy for airport operations have the objectives to support the electricity need of airport in a sustainable manner. This can reduce energy consumption and dependence on electricity generated from fossil fuels and at the same time provides the benefit of reducing green house gas emissions.

2. INITIATIVES BY AAI

2.1. The Airport Authority of India (AAI) signed a Memorandum of Understanding with the Solar Energy Corporation of India (SECI) in 2014 to build solar plants at their airports in an effort towards propagating the use of alternate energy source. Their aim is to meet their own energy requirements and feed the surplus energy generated by these solar plants to the local grid.

2.2. AAI plans to install solar plants with a cumulative capacity of 50 MW in phase 1 which will be increased to 150 MW over a period of time. They operate a total of 125 airports in the country and they have identified 30 airports to build solar power stations so far.

2.3. Out of 449 airports and airstrips in India, around 70 are having regular commercial flights. Sixteen airports under Airports Authority of India (AAI) are already generating 5.4 MW of solar power. Government of India (GoI) wants to improve its underutilised airports through cheaper solar power in view of growing middle class travellers. These measures also help to achieve 100 GW solar power target under Jawaharlal Nehru National Solar Mission (JNNSM). The main achievement of JNNSM is that the electricity generated from solar PV has reached grid parity.

2.4. Kolkata's Netaji Subhas Chandra Bose Airport is also aspiring to be a green facility in the country. Currently, it has a 2MW solar power plant in its premises and has plans to increase its capacity to 15MW. This solar power plant helps the airport to save INR 2.15 crore per year and the 15MW plant is expected to cut down its power expenses by INR18 crore every year. The 2MW power plant itself has cost the airport INR12 crore.

2.5. Sri Guru Ram Das Jee International Airport at Amritsar has plans of generating its own power by tapping into solar energy. The AAI is in the process of installing a 400 kW solar power plant in the airport's premises, which will make it the first government run facility to have its own power generation facility. It is expected to produce 72,000 units of electricity per month. This will help the airport to save INR 54.5 lakh every year, which would mean that the INR 2.3 crore to be spent on installing the solar power plant would be realized within 5 years.

2.6**.** Kisangarh Airport is being constructed at Kisangarh, 27 km north east of Ajmer in Rajasthan. Being built by the Airports Authority of India (AAI), the airport is expected to have a 100MW solar power plant. This plant will make the Kisangarh airport the largest producer of solar energy in the country. A technical team of the AAI has earmarked an area to install the solar panels. The electricity produced is expected to be sufficient to run the airport initially.

2.7. Recently, Chennai has joined the league with a 1.5 MW solar plant installed at the rooftop of terminals. The plant generates 6,150 units a day which is 20 percent of the current power requirement of the airport. The power bills are brought down by half. They paid twenty crores to the state electricity board and now save 8 crores annually. The project costed Rs 8.5 crore but the carbon emissions is estimated to come down by 3,600 tons per annum. Airport has planned to expand it to a capacity of 7.5 MW.

2.8. In addition, airports in Ahmedabad, Jaipur, Tirchy, Bhubaneswar, Lucknow, Varanasi and Madurai have also set up solar plants. A recent report released by AAI said that so far 16 airports have been installed with solar plants with a capacity of 5.4 MW which produces a total of 51 lakh energy units. This saved 4,600 metric tons of carbon emission also. By December of this year, they are hoping to set up solar plants of 24.1 MW at 11 airports. In a long term, their target is to generate 116 MW of power by including 16 more airports. The AAI also won the National Excellence awards in 2016 for their green initiatives.

3. INITIATIVES BY OTHER AIRPORTS

3.1 COCHIN INTERNATIONAL AIRPORT LIMITED

3.1.1. Cochin International Airport Limited (CIAL) is the first airport in the world to become completely solar powered. With 52,000 units of power a day, the airport in Kochi is now stopped paying for its electricity altogether and are producing excess energy to be given back to the state electricity board as well. It began in March 2013, when CIAL airport authorities sought out to cut their expenditures on power and thus started investing in green energy. CIAL first installed a 100kW solar power plant on the rooftop of its arrival terminal block and then on and around aircraft hangar as pilot projects.

3.1.2. After the success of the first power plant, CIAL installed a much larger 1MW solar power plant. In August 2015, a 12MW solar PV plant was set over an area of about 45 acres. This enabled CIAL to produce 50,000-60,000 units of electricity per day to be consumed for all its operational functions, which technically make the airport ‘absolutely power neutral‘.

3.1.3. The whole project cost INR620 million (US$9.3million), offering a decent return of investment over the next 5 years. The project is completed in a record period of 6 months. This investment has also helped CIAL to cut down its carbon emissions by 300,000mt over the next 25 years thus contributing towards minimizing environmental degradation.

3.1.4. CIAL gives as much power it produces in day time to the grid of KSEB and buys back the same as when needed, especially in night.

3.2 DELHI INTERNATIONAL AIRPORT LIMITED

3.2.1. Delhi International Airport Limited (DIAL) is the second airport in the country to make use of solar energy. It has already become the second highest producer of solar energy in the country. In the first phase, the airport installed a 2.14MW plant in its premises that enabled it to produce about 3 million units of electricity. In the second phase, the airport almost tripled the amount of solar power produced to up to 7.84MW.

3.2.2. The solar photo voltaic panels installed on the airside of the Indira Gandhi International Terminal are non-reflective PV solar panels, which reduce the glare effect. Computer aided solar glare analysis for 365 days with complete sun movement from sunrise to sunset have been carried out to ensure that there is no impact on flight movement. This plant has helped DIAL save around INR12 crore annually. The project, which is spread over 18 acres, has seen an investment of INR47 crore. DIAL aims to increase the capacity of the solar power plant to up to 20MW by 2020.

3.3 HYDERABAD INTERNATIONAL AIRPORT

3.3.1. Following Cochin and Delhi, Hyderabad is the third airport in the country to make use of solar energy. GMR Hyderabad International Airport Ltd (GHIAL) has commissioned a 5MW solar power plant and plans to increase it to a 30MW plant by 2022. The 5MW plant is able to generate 25,000 units of electricity per day. The next phase of expansion will see the plant generate up to 12MW of solar power and eventually 30MW.

3.3.2. The 5MW plant, costing INR25 crore, will help reduce 30% of the airport's grid power requirement. The power plants have 16,000 modules of solar PV panels and are fitted at an angle to ensure maximum exposure to sunlight. This power plant will help avoid usage of 12 tons of coal and 76,800 litres of water every day, while cutting about 71,000mt of carbon emissions.

3.4 CHANDIGARH INTERNATIONAL AIRPORT LIMITED

3.4.1. Chandigarh Airport has the most eco-friendly facilities in the country. Apart from having a rainwater harvesting and sewage water treatment plant, the airport also boasts of a 200kW solar power plant on the rooftop. This solar power plant fulfils all the power needs of the building. The Chandigarh Airport has also been designed in such a way that it doesn't need any artificial lighting during the day and only relies on natural lighting. Further, around 40% LED lighting is used in the airport, thus, helping to reduce the power consumption.

4. PRECAUTIONS

4.1. Solar installation should be either on the roof top or away from the terminal/runway and should not be installed in the basic strip of Runway. Shadow / anti glare analysis should be undertaken during designing. The support structure should able to withstand wind speed upto 150kmph.

5. BENEFITS

5.1. The usage of solar power at Airports helps in achieving carbon-neutral growth as large amount of Co2 emission can be mitigated. Since output is more during summer, the increased load of air-conditioning at airports can be compensated. Though the efficiency of solar PV plant is low, the source of energy (sun) is freely available. Return of investment (RoI) is 4 to 5 years, thereafter, the power generated is at negligible cost, thereby, reduces the expenditure on electricity bill. Solar power plant has relatively short period of implementation time. The 12 MWp power plant in Cochin airport was completed within 8 months. It can make the Airport sustainable.

6. CONCLUSION

6.1. Airports Authority of India has taken several policy and implementation measures to actively participate in and contribute to the global initiatives of reduction in green house grass emission with its own activities. These measures are considered with reference to the ICAO global policy and guidelines. Now, the prices have dropped to a similar level to coal, which makes it a genuine alternative on small and large scales.

6.2. Indian government is keen to bring more solar power into the grid as it looks to provide stable, round-the-clock electricity.

6.3. The success of those initial efforts led to a much bigger endeavour. India's big move into solar is already paying off at a time when solar power has become much cheaper in India.

7. ACTION BY THE CONFERENCE

7.1. The Conference is invited to:

a) note India's experience in energy management through use of solar power; and

b) consider adoption of similar greener initiatives / measures at airports.

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