Универзитет „Св. Климент Охридски" - Битола
ФАКУЛТЕТ ЗА ИНФОРМАТИЧКИ И КОМУНИКАЦИСКИ ТЕХНОЛОГИИ

Theme

„Protecting the environment and natural resources through the use of renewable energy (sun) to illuminate the shores of Lake Ohrid "

Written by:

Student: Tomislav Peshinovski

Faculty of Computer Science and Technology

Communication Technologies - Bilola

Mentor:

Andrijana Bocevska

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Content

Introduction

Solar energy is the sunlight and the heat from the sun that is collected through a number of constantly evolving technologies. Solar energy is a finite source of energy and a one-time investment cost for solar lamps that use solar energy to provide stable and safe lighting once and for all. Solar energy is widely distributed on Earth. As long as sunlight exists, the photovoltaic energy production system can be used without being limited by factors such as region and altitude. Solar energy itself does not use fuel, it does not emit any harmful gases, it does not pollute the environment, it does not create noise, in fact it is a green and renewable source of energy.

The idea of solar lighting in our country is to try and live in certain municipalities across the republic (no more than 100) with a minimum number of solar lamps such as Pilot projects that are installed, but for the southwestern RSM region and the Korca region in RAlbania, specifically the tourist towns of Ohrid and Podgrad is completely new.

The research, which is being carried out on solar lighting on the shores of Lake Ohrid, is aimed at obtaining relevant data on needs and benefits. It is also being carried out in the municipalities of Ohrid and Struga in the territory of the Republic of Northern Macedonia and the Podgradec area in the Korca region of the Republic of Albania, with which the population there will be reached.

The population's opinion on the application of solar lighting to Lake Ohrid has been researched by carrying out quasi-quantitative and qualitative research methods, as a survey questionnaire of a representative sample of more than 200 citizens from the Macedonian and 200 citizens from the Albanian border region on the need for solar lighting, SWOT analysis for the installation of solar lighting on the shores of Lake Ohrid, quantitative data on the consumption of electricity for lighting the shores of Ohrid Lake, A panel discussion with the relevant authorities on both sides of the border region on the proper implementation of the project, in order to preserve the legal provisions for the protection of cultural heritage.

The purpose of this research is to protect the environment and natural resources through the use of a renewable source of energy (sun) for lighting the shores of Lake Ohrid.

Analysis of the current situation through the implementation of quantitative and qualitative research methods

The Republic North Macedonia, as a developing country, is facing an economic and energy crisis that is not only in our country but throughout the world, they have tectonically shifted the way of using energy resources, which with their aggressive consumption, man has contributed to the destruction of nature, eco systems and led to climate changes that became life-threatening. We, as a generation, are witnessing the historical change in the production of electricity, from the use of fossil fuels (oil, coal, gas) to the use of renewable resources (sun, wind). Such transformation of energy capacities has particularly affected poor and developing countries.

Each of us can contribute to the development of our country, to the protection of nature and the resources we have, if we work on self-awareness and initiative. The use of solar lamps, not only in certain areas, is a huge contribution to energy efficiency, preservation of natural resources and economic viability.

Lake Ohrid as a unique natural relic, which has the status of a protected area by UNESCO, in recent decades due to negligence, economic and political interests is threatened and with the danger that that status can be taken away. The brutal usurpation and construction of the Ohrid coastline, pollution of the lake waters due to the negligence of the citizens and the drainage infrastructure, lack of awareness or hearing about the installation of purification stations, led to numerous criticisms of the preservation of the pearl of the Balkans.

Solar lighting is more than necessary when the access itself and the roads to the tourist center have not been lit for years. Safety is compromised and the risk of accidents is at an alarming level. The installation of solar lighting is also a benefit to the local governments, which will have a reduced cost for street lighting, as well as for its installation, cutting down on materials (digging, installation of wire installations), human capacities (no need for on-off control systems, frequent servicing, etc.) and infrastructural digging.

Solar lighting also contributes to the improvement of tourism. The ecological approach to the national natural treasures, and thus the preservation of the beauty that it has, is the reason for an increasing number of tourists and a recommendation for others to visit. Solar lighting in more advanced countries is an everyday thing that is constantly invested in because renewable resources are economically viable. , environmentally friendly and accessible to everyone.

The flexibility in terms of setting up solar lighting in areas that are difficult or impossible in standard lighting is a plus reason for their use. Led solar lamps do not contain mercury and other toxic chemicals in their composition, and thus do not create harmful emissions.

In order to see the situation on the ground and the durability of the installation of solar lighting on the Ohrid lake, a SWOT analysis was made to see the strengths, weaknesses, as well as the opportunities and threats that we will face.

SWOT analysis

Strengths	Weaknesses
- Reduction of the bill for consumed electricity. - Less heat, LED lamps are extremely efficient in converting energy into light. - Long working life, depending on the quality. - They are practically physically indestructible during normal use. - They do not contain mercury or other harmful materials - They do not emit vibrations, noise, ultraviolet rays and other	- Insufficient awareness of the advantages of solar technology on the part of buyers - Insufficient involvement of local authorities in solar lighting investments - Local authorities do not have a strategy for replacing the existing infrastructure with infrastructure for the use of solar energy - Lack of investments in the field of solar lighting - Lack of financial means to invest in solar systems

dangerous and harmful effects for health and the environment, - Wide range of light, - Charging the battery at temperatures below zero, - Stand-alone devices that do not require a cable or network connection. - The device is turned on and off automatically by sensors that are built into the device. - Maintenance is simple, it is enough to periodically clean the cover of the lamp from dust, as well as wipe the photocells from dirt. - They have a long working life. - Ecological devices - do not harm nature, - They do not pose a threat to people due to the use of low voltage.	
Opportunities - EU's commitment to increasing renewable energy sources, - Lack of coverage of the Macedonian market, which results in a large circle of potential customers, - Rapid development of solar energy	Threats - Not quality solar products, (financial possibilities are a decisive factor) - Heat as a reason for causing defects - Lack of financial resources for the implementation of solar lighting

	projects

Research

All households, on both sides of the cross-border region, have access to the national electricity system. In terms of electricity, the cross-border area in R. Albania is in a more difficult situation, because the high consumption and the lack of alternative energy resources create problems in the winter period, which in turn results in frequent interruptions and low voltage, which also complicates economic activities. On the Macedonian side, the problem occurs in rural areas, especially in the winter period. Solar lighting for this region contributes to reducing the consumption of electricity from the national electricity system in a period of energy crisis. The realization of this project is an incentive for local authorities to invest in systems with renewable energy sources that would be applied in everyday life, as subsidies for solar systems for heating water in households, heating, lighting, electricity production for individual consumers. The significance of this type of project is of economic and environmental importance. Citizens get the opportunity to facilitate daily functioning, reduced electricity costs and greater security.

The aim of the research is to protect the environment and natural resources through the use of a renewable source of energy (sun) for lighting the shores of Lake Ohrid. In order to achieve the stated goal, several techniques were applied, including a survey questionnaire on a sample of 200 citizens from the Macedonian and 200 citizens from the Albanian region for the need of the research. A SWOT analysis was prepared for the installation of solar lighting on the shores of Lake Ohrid, and a panel discussion was held with the competent authorities from both sides.

In addition to the main goal, the research covered several specific goals, namely:

- The benefits of an energy efficient lighting system;
- The rate of spent means for lighting;
- The promotion of tourism;
- Increasing safety when moving along the Ohrid coast;

- Protection of natural resources and existing infrastructure;
- Encouraging partnership cooperation in the energy sector for the development of the border region;
- Promotion of the status of Lake Ohrid in UNESCO;
- Encouragement of local authorities to invest in energy-efficient systems from renewable sources in daily functioning (solar heating systems, etc.)
- Raising citizens' awareness of energy efficiency and use of renewable energy sources;

Activities that were undertaken during the research, in order to achieve the main, as well as the specific objectives, are the following:

- Survey questionnaire - researched the need for installing solar lighting along the Ohrid coastline, including the border region of Korča, i.e. the city of Podgradec,
- Panel discussion - conversation with representatives of local governments from the border region about the results of the research,
- SWOT analysis for setting up solar lighting,
- Research of the infrastructure needs for the installation of solar lamps,
- Conversation with local authorities.

Research results

✓ Survey questionnaire

As stated earlier, a survey questionnaire was conducted within the framework of the research, on a sample of 200 respondents from the Macedonian (Ohrid) and 200 respondents from the Albanian (Korcha) border region for the needs of solar lighting. The survey questionnaire, in addition to the basic questions about gender and age, consisted of 5 questions:

- Are you familiar with the use of renewable energy sources (solar)?

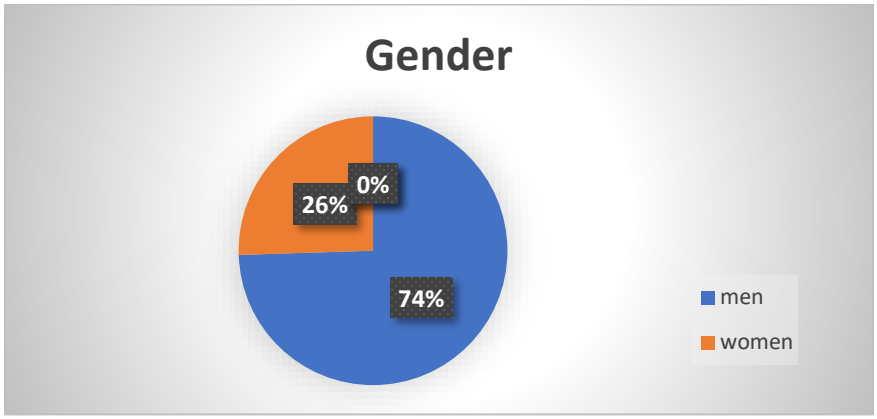
- In your opinion, how much does the state work to promote renewable energy sources, does it promote them enough?Колку локалната власт работи на промоција на обновливите извори на енергија?

- In your opinion, what are the benefits of applying solar energy (specify...)?

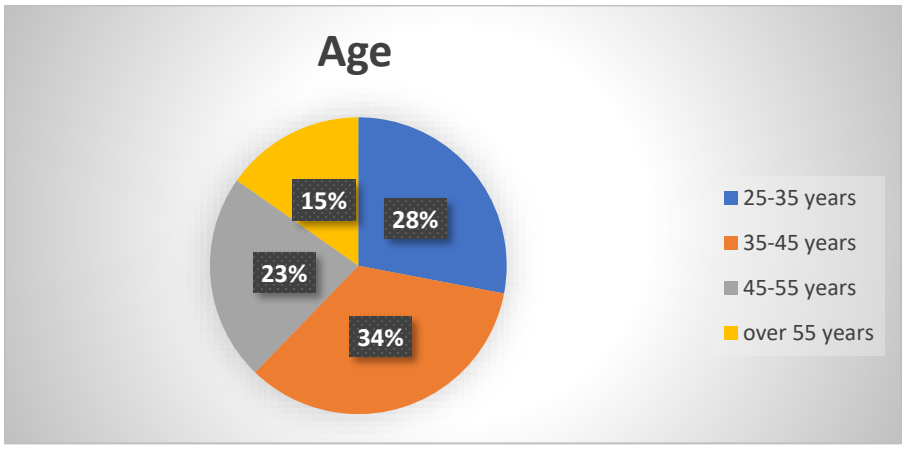
- Do you think that the application of solar lamps on the shores of Lake Ohrid (on both sides of the border) will protect the environment and preserve natural resources?

The following is an analysis of the responses from the questionnaire.

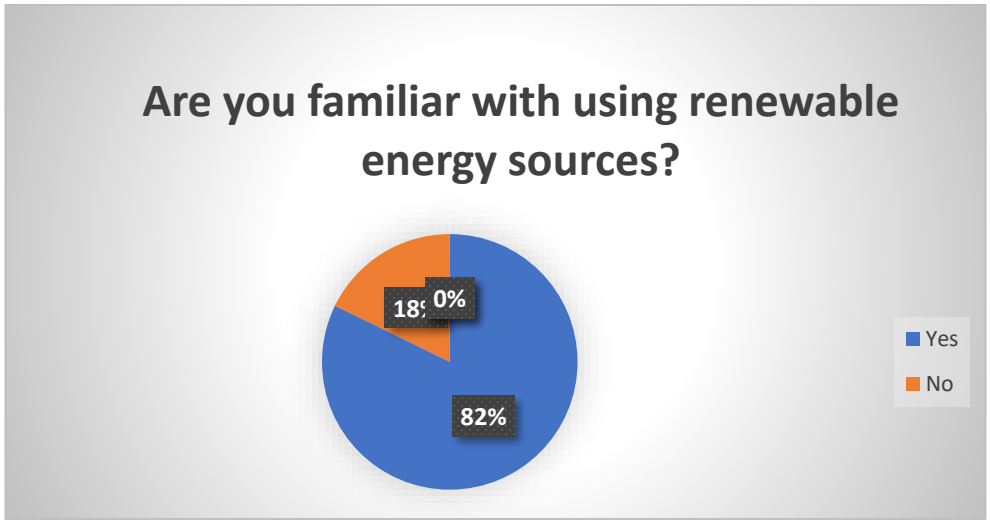
Out of a total of 400 respondents (200 from each side during the border period), 298 were men and 102 were women.



In terms of age, 112 were aged 25-35, 137 aged 35-45, 90 aged 45-55 and the remaining 61 over 55 (the oldest respondent was 63).



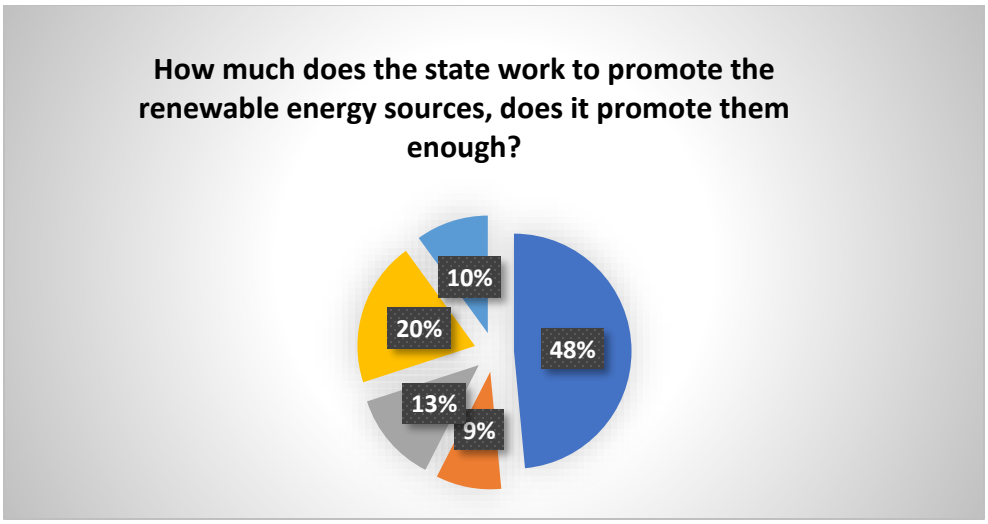
Are you familiar with the use of renewable energy sources (in this case solar energy)? Respondents answered this question with Yes and No. Out of a total of 400 respondents, 329 answered yes, while the remaining 71 answered no**.**



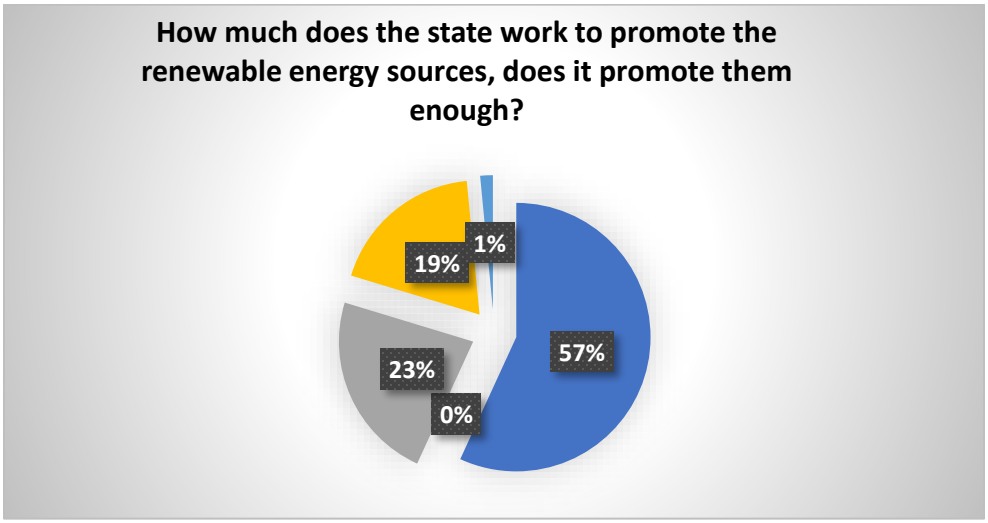
In your opinion, how much does the state work to promote renewable energy sources, does it promote them enough?

On this question, respondents were offered ratings from 1 to 5 (with 1 being low promotion and 5 being high promotion).

The first graph shows the responses of the residents of the Macedonian side. Out of a total of 200, 97 answered with 1 (weak promotion), 18 answered with 2, 25 rated with 3, 40 rated with 4 and the remaining 20 rated with 5 (existence of high promotion).

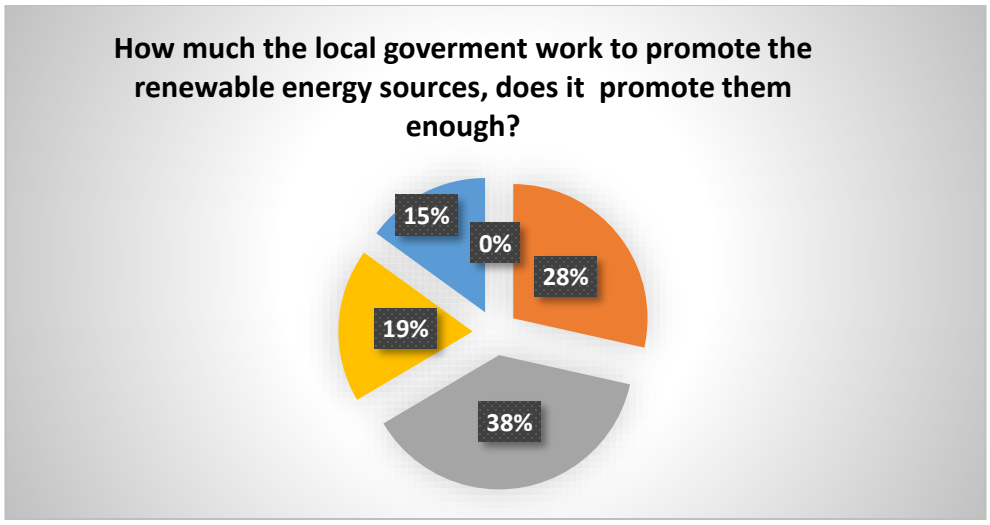


The situation is similar among respondents from the Albanian side. Out of a total of 200 respondents, 112 rated the situation as 1 (weak promotion), 45 gave a rating of 3, 37 gave a rating of 4, and only 3 rated it as a 5 (solid promotion).

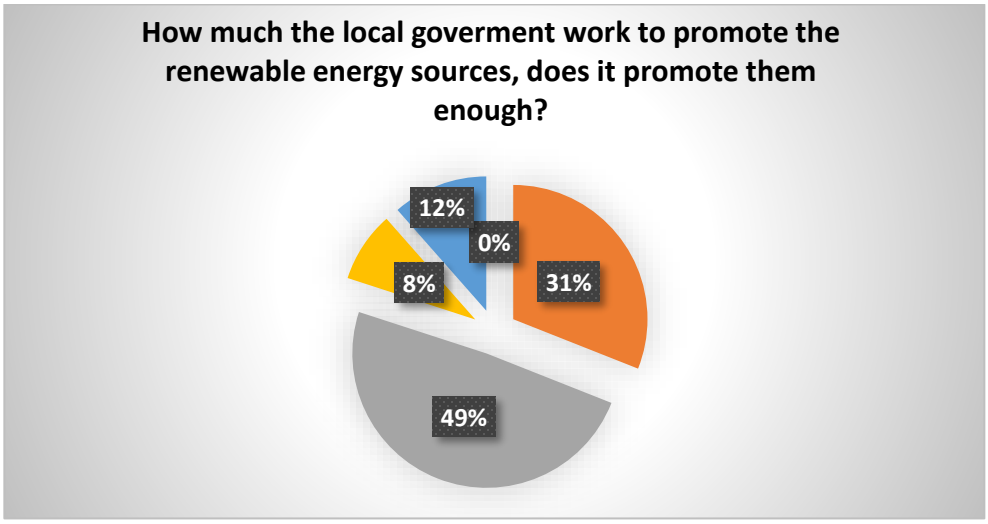


To what extent does the local government work on the promotion of renewable energy sources? On this question, respondents gave marks from 1 (for the weakest) to 5 (for solid promotion).

On the Macedonian side, out of a total of 200 respondents, 57 gave a grade of 2, 76 gave a grade of 3, 37 gave a grade of 4, and the remaining 30 gave a solid grade for the promotion.



Again a similar situation on the Albanian side. Out of a total of 200 respondents, 62 gave a grade of 2, 98 gave a grade of 3, 17 gave a grade of 4, and the remaining 23 gave a grade of 5.



In your opinion, what are the benefits of applying solar energy (specify...)?.

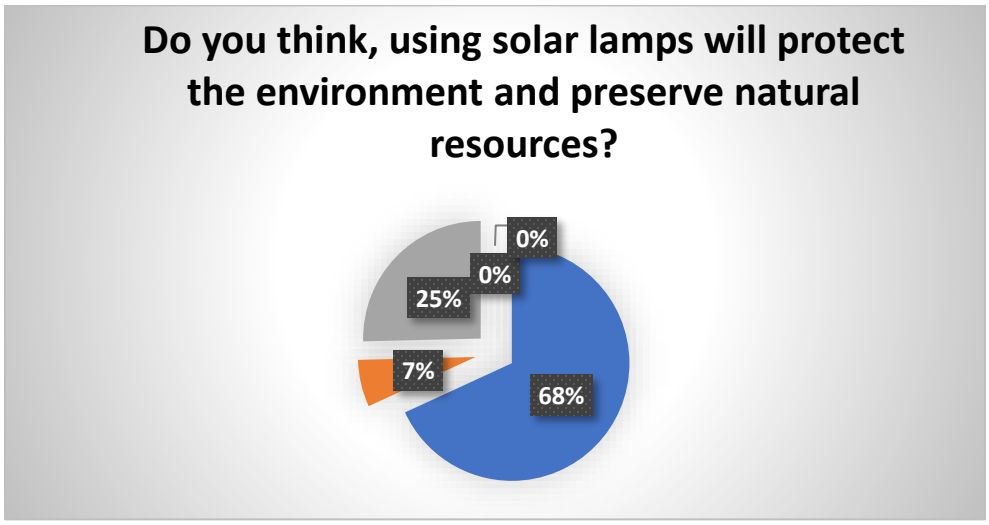
On this question, the respondents were free to write anything they thought was a benefit of using solar energy. The most common answers from all 400 respondents were the following:

- Benefit for the environment;
- Reduction of costs for electricity bills;

- Reduction of energy production costs;

And the last question from the survey questionnaire was: **Do you think that with the application of solar lamps on the shores of Lake Ohrid (on both sides of the border) the environment will be protected and natural resources will be preserved?** Respondents have offered three answers, Yes, No and Maybe.

Out of a total of 400 respondents, 25 answered with No, 112 with maybe, and the remaining 263 answered with Yes.



✓ Panel discussion

In addition to the conducted survey, a panel discussion was held in Podgradec, on the topic "Application of renewable energy sources, application of solar energy as a source for solar lighting", which was attended by 10 participants, i.e. 2 representatives from the local governments of Ohrid and Podgradec. 4 representatives from the NGO sector for environmental protection (2 each from RSM and RA) and 4 representatives from the tourism sector (2 each from RSM and RA). At this discussion, they talked about the needs of both sides, the opportunities offered by the project through the installation of solar lights on the Ohrid coast. They talked about all the rules and procedures that follow during the implementation of the activities, following the legal provisions for the protection of cultural heritage. , in order to avoid possible violations of the law and

violation of the status of a protected city by UNESCO. Proposal for applying solar energy projects for state and EU funds. From the panel discussion, it can be concluded that the benefit of installing solar lamps has significance from several aspects, including economic, environmental, safety. With their wider application, it is possible to contribute to the reduction of dependence on electricity, which automatically means a reduction in costs, not only in the border period, but also in general at the level of the entire country.

Analysis of a similar event

An example from which one could see the benefits of solar lighting is that of Calcutta, India where solar LED lights are used for the first time to illuminate Deshapriya Park.

KOLKATA: The City of Joy is poised to become the first city in the country to have its public parks illuminated by an automated carbon-neutral solar lighting system, reducing the carbon footprint and electricity bills.

The new automated solar lighting system, first installed at Deshapriya Park on a trial basis, would now be extended to 28 other parks by the Kolkata Municipal Corporation, the custodian of the parks.

"The unique part in this solar lighting system is that it is battery-less and connected with the power grid. An automatic control system has been put in place and the lights will be switched on automatically after evening and switched off in the morning," renewable energy expert S P Gon Chowdhury, who has devised the technology, told PTI. The lights will also dim automatically after midnight when requirement is low.

KMC's Member Mayor-in-Council (Parks and Squares) Debasish Kumar said the project, funded by the West Bengal government, should be ready in less than a year's time.

Explaining the concept of carbon-neutrality manager, thus named by Chowdhury, the expert said that the system would push solar energy generated during daytime back into the main electricity grid with the aid of a micro-converter.

"No battery is therefore needed. The amount of solar electricity produced through the solar panels is recorded on an electric metre. It is carbon-neutral because it produces as much electricity as it consumes," the solar expert said, claiming that the carbon neutrality manager, developed by him, is a first in the world.

The pilot project began earlier this year with Deshapriya Park where they have installed 50 solar electric posts having 180 Watt solar panels with LED lights. "We have been very successful in that project. Earlier the electricity bill used to be Rs 17,000, but now it has come down drastically to less than Rs 2,000. That is 90 per cent savings," Chowdhury said adding that with this technology parks can be made 95 per cent carbon-neutral.

Parks under consideration for the project include prominent ones like Md Ali Park, College Square, Maddox square and Subhas Sarobar Park.

When implemented, the project would result in monthly savings of lakhs of rupees in electricity bills, KMC's Kumar said.

It is also in line with the Jawaharlal Nehru National Solar Mission (JNNSM), the target for which has been recently revised five times. By 2022, the country aims to generate 1,00,000 MW of solar power while current capacity is estimated to be around 4000 MW. The existing model of using battery-powered solar lighting system has its drawbacks.

"The capacity of battery is itself a big issue. The ones in use can store 75W but that is not enough. With our battery-less system we can produce 300W. Another issue with batteries is its maintenance cost," Chowdhury, who runs Arka Ignou Community College of Renewable Energy, said. The system would also be useful for deployment in street lighting system as well as those on highways.

"I am in talks with a private power utility company to convert around 3000 streetlights into solar," he said adding that the Delhi Municipal Corporation had shown interest in the technology.[1]

Conclusion

In recent years, renewable energy sources are gaining more and more importance, that is, they represent an opportunity for the community to reduce environmental pollution in the long term. In this paper, research was conducted on the installation of solar lamps on the Ohrid coast from both sides, Macedonian and Albanian. In both regions, the application of solar lighting will contribute to the reduction of electricity consumption, which is of great importance in times of energy crisis. Residents are facilitated in their daily functioning, their electricity costs are reduced, and they have greater security.

[1] https://economictimes.indiatimes.com/industry/energy/power/kolkata-parks-to-have-indias-first-carbon-neutral-lighting/articleshow/48753748.cms

If we want in the future, the production of electricity from renewable sources to reach or even exceed the production from conventional sources, the Governments of the countries must create and implement strategies that will aim to fully apply the energy efficient systems that will replace up to now used fuels and methods for providing electricity in daily functioning. Technology must become more accessible to everyone, and efficiency must improve significantly. One of the most important segments in which a solution can be sought is finding ways to store electricity, as this would lead to a significant reduction in capital costs.

The purpose of the survey, which was conducted in the two border regions, was to determine how much the citizens are informed about renewable energy sources and how much the state advocates and whether it makes efforts to provide solar systems. The conclusion is that there is interest among the citizens, but the non-transparency of the system and the model leads to a general ignorance of the details, which results in minimal involvement. The state must pay more attention to educating the citizens, and the citizens must change their habits and sometimes initiate action on their own initiative.

From the panel discussion, I can conclude that there is an interest in joint cooperation of all stakeholders from the border region, ie. Ohrid and Podgradec, but they need to be further educated, directed and strengthened in order to provide funds for the implementation of the planned activities.

The overall communication, coordination and cooperation moves in the direction of development of the border region, from which the citizens of this region and in general the two countries, the Republic of North Macedonia and the Republic of Albania, benefit.

Used literature

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