Possibilities of Developing Energy Tourism in the Island of Crete, Greece

John Vourdoubas

ABSTRACT

The aim of the current work is to investigate the possibility of developing energy tourism on the island of Crete, Greece. The concept of energy tourism is related to the interest of some visitors to explore various renewable energy installations during their vacations acquiring new knowledge, and experiences and probably having new perceptions about these benign energy technologies. The flourishing tourism industry and the existing renewable energy installations in Crete are mentioned. The preconditions of its development in Crete as well as the benefits of various stakeholders on the island are stated. Our results indicate that the required preconditions for the development of energy tourism in Crete are fulfilled offering new prospects for the promotion of thematic tourism on the island. Various daily guided tours to renewable energy installations could be organized and offered to visitors according to their interests and preferences. It can be said that Crete is a privileged island regarding the development of energy tourism having a flourishing tourism industry and abundant renewable energy resources currently used for heat and power generation. The findings of the current study are important for the future development of energy tourism in Crete which could create many benefits for all stakeholders on the island.

Keywords: Crete-Greece, energy route, energy tourism, knowledge, renewable energies, sustainability, thematic tourism, tourist experience.

I. INTRODUCTION

The concept of energy tourism is quite novel and is related with the interest of some travelers to get knowledge and experiences on sustainable energy technologies during their vacations. Travelers are incentivized by the global policies for climate change mitigation and the efforts to replace fossil fuels with carbon-free renewable energies in the coming decades. Only a small segment of tourists arriving at a destination is interested to visit sites with various renewable energy installations guided by experts who are able to present and explain the benign energy technologies and their operation. Island of Crete is a living laboratory for renewable energies hosting a large number of renewable energy installations utilizing different energy sources and technologies generating carbon-free heat and electricity. Various researchers have investigated the possibilities and the prerequisites of developing energy tourism is various destinations differentiating the tourist product offered and covering the interests of some visitors. Island of Crete is a famous and attractive tourism destination worldwide in the eastern Mediterranean region. Its permanent population is around 650,000 inhabitants while its tourism industry is well developed hosting more than 5 mil. visitors annually. It also has abundant renewable energy resources and hosts many renewable energy systems utilizing solar energy, wind energy, solid and gaseous biomass, hydroelectricity and the ambient heat. It also has various quite developed and well-known academic institutions with many researchers in the field of sustainable energies. Energy tourism has not been developed so far in Crete. The regional authorities in the island are willing to develop the thematic tourism and to extent the tourism period all over the year. Current work investigates various aspects related with the development of energy tourism in Crete as well as the resulted benefits to several stakeholders.

II. LITERATURE SURVEY

The literature survey is separated in four sections comprising a) Climate change and renewable energies, b) Renewable energy installations in Crete, c) The tourism industry in Crete, and d) Development of energy tourism in various countries.

A. Climate Change and Renewable Energies

In reference [1], it has been reported on renewable energies and climate change. The report mentioned that renewable energies need further technological development for decreasing their cost. It is also stated that the existing scientific knowledge is already significant facilitating the use of renewable energies in many sectors. Capros et al. [2] have analyzed the EU policies on climate change and renewable energies. The authors investigated the policy options that were debated globally on these two issues. In reference [3], the renewable energy opportunities for island tourism have

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been examined. The study has analyzed four renewable energy technologies including: a) solar water heating, b) Solar air-conditioning, c) Sea water air-conditioning, and d) Solar photovoltaic. Owusu Asantewaa and Asumadu-Sarkodie [4] has studied the contribution of renewable energies in sustainability and in climate change mitigation. The authors stated that renewable energies promote energy security and self-sufficiency, social and economic development as well as climate change mitigation. They also mentioned that various barriers hinder the promotion of renewable energies that should be removed. Sims [5] has studied the link between renewable energies and climate change. The author stated that society should choose what short of world wants to pass to future generations. He mentioned that the cost of renewable energies has decreased in recent years while he recommended that setting a price in carbon emissions will facilitate the market penetration of renewable energies.

B. Renewable Energy Installations in Crete

Gigantidou [6] has reported on the growth of renewable energies in Crete. The author stated that during the last fifteen years a significant number of wind parks and solar-PV systems have been installed in Crete. Vourdoubas [7] has examined the use of renewable energies for energy generation in rural areas in Crete. The author mentioned various renewable energy systems installed in rural areas in the island producing heat and electricity. They included solar thermal systems, solar-PV systems, wind farms, small hydroelectric systems and biomass burning systems. Vourdoubas [8] has analyzed the nexus between tourism and renewable energies in Crete. The author stated that tourist accommodation utilizes heat and electricity produced by renewable energies. He also mentioned that existing renewable energy systems in the island could be used for the development of energy tourism in Crete. Nikolau et al. [9] have investigated the maximum rejected wind electricity that can be saved in Crete in the pumped hydro system (PHS) in “Potamon” dam, Rethymno. The authors estimated that the contribution of the PHS system to the annual gross electricity consumption in the island is estimated at around 2%. Katsprakakis et al. [10] have investigated the impacts of electricity storage systems on the penetration of renewable energies in the energy system of Crete. The authors stated that higher penetration of renewable energies require the creation of electricity storage plants. They also mentioned the penetration of renewable energies in Crete could be easily reach at 90%. In reference [11], it has been reported on the electricity system of Crete in 2018. The report stated that the installed power of wind parks in Crete was at 200 MW, of solar-PV systems at 96 MW and of small hydro power plants at 0.6 MW. Kyriaki et al. [12] have studied the use of large-scale solar thermal systems for hot water production in Cretan hotels stating that they have used during the last thirty years successfully. Vourdoubas [13] has examined the use of biomass for energy generation in Crete. The author stated that solid biomass is used for heat production by burning in buildings, greenhouses and industries. He also mentioned that small quantities of biogas are produced and used for energy generation in Crete while biofuels are not produced so far in the island.

C. The Tourism Industry in Crete

Andriotis [14] has studied the impacts of tourism development in Crete on the modernization of the island. The author stated that the rapid tourism expansion in Crete had positive and negative economic, social, and environmental impacts. Mavridougou et al. [15] have analyzed the tourism infrastructure for the development of health and environmental tourism in Crete. The authors stated that the infrastructure in the island allows the development of medical and wellness tourism. Saatsakis et al. [16] have studied the possibilities of developing ecotourism in Crete. The authors mentioned that its development requires careful planning and continuous monitoring. Mantzarakis and Nastos [17] has analyzed the tourism potential of Crete. The authors stated that the natural potential for tourism in Crete is high while an extension of the tourism period is possible. They also mentioned that the mild climate in the island is suitable for wellness and cultural tourism of specific population groups. Lolos et al. [18] have examined the tourism-related growth in Greece. The authors stated that Greece is greatly relied on tourism while during the period 1960-2020 tourism growth had positive impacts on its GDP growth. Agha-Seyed-Hashem-Kadhkoda and Jelev [19] has examined the possibilities of expanding the tourism season in Heraklion area, Crete. The authors stated that under some circumstances the annual tourism period can be expanded in Heraklion, Crete.

D. Development of Energy Tourism in Various Countries

Michalena [20] has studied the use of renewable energies for achieving sustainability in Mediterranean islands. The author stated that the direct and indirect use of renewable energies can transform Mediterranean islands into sustainable tourism areas. Lun et al. [21] have investigated the linkages between tourism and green economy. The authors mentioned that renewable energy installations could become attraction sites and education centers for tourists. They stated that two categories of visitors can be attracted in these installations including: a) Experts including engineers, architects, post-graduate students and designers of energy systems who are willing to acquire specific knowledge in these technologies, b) No-experts who are willing to acquire new experiences and excitement following a guided energy tour. Topler Potonik [22] has examined the presentation and preservation of heritage in Slovenia through sustainable energy tourism. The author mentioned that energy tourism is new in Slovenia while there is a local tradition that tourists visit local power plants for educational purposes. She proposed the creation of new energy tourism projects integrating storytelling, new media and new technologies. Beer et al. [23] have investigated the renewable energies as an attractive element of industrial tourism. The authors stated that renewable energy infrastructure can attract tourists in an area increasing the number of visitors. They proposed visits to geothermal power plants, wind parks and hydroelectric plants that could be exciting for tourists. Frantal and Urbankova [24] has examined energy tourism as an emerging field of study. The authors proposed guided study visits in energy infrastructure in Czech Republic that could be attractive to tourists including: a) Coal safaris in surface coal mines and operating mining machinery, b) In an info center of a nuclear power
plant, and c) in Wind turbines. Li et al. [25] have studied the transitioning to community-owned renewable energy in Germany. The authors described a rural community in Freiham, Germany achieving 100% power generation from renewable energies. They mentioned that the creation of the energy community resulted in economic benefits, in the improvement of the surrounding and in climate change mitigation. In reference [26], it has been reported on the strategic options for developing wind farms in Australia. The report stated that many complaints from local residents arise during the development of wind parks. The complaints are focused on potential landscape changes, the impacts on visual amenity and in the fact that the economic benefits are not shared with the local society. Warren and Warren [27] has investigated whether community ownership of wind parks in Scotland affect the public attitude. The authors stated that community owned wind farms could have a positive effect on public attitudes regarding the development of wind parks in Scotland. Silva and Delicato [28] have studied the residents’ and visitors’ perceptions concerning the wind farms in Portugal. The authors stated that installations of wind turbines did not affect the preference of tourists regarding the selection of their destination. Denes David et al. [29] have studied the eco-energy tourism stating that investments in renewable energies can promote energy tourism. The authors mentioned that eco-energy tourism is a branch of tourism using renewable energy installations as tourist attractions. Tourists visiting them can increase their knowledge having also new experiences. Alekseeva and Hercegova [30] have examined energy tourism assessing its potential with reference the Russian and Czech Republic. Energy tourism links tourism to benign energies while it will gain importance due to the necessity to mitigate climate change. Pavlikovic et al. [31] have studied the role of tourism in the promotion of geothermal energy in Slovenia. The authors mentioned that the motivation factors for geothermal tourism include gain of new knowledge, self-excitement and fun. They proposed a geothermal tourism route including visits in a geothermal well in a spa, a geothermal greenhouse and a geothermal power plant. Chodkowska-Miszczyk and Ryszewska [32] have examined an educational tourist route using renewable energies in Poland. The proposed educational tour included visits in a hydro dam, in solar-PVs, in wind farms and in an ecological landfill. Hartholt [33] has investigated the impacts of wind energy on tourism in a Dutch territory. The author mentioned that most tourists are disturbed when wind turbines are operating at their destination area. Jiricka et al. [34] have studied the concept of energy tourism as a niche tourist product. The authors stated that energy tourism is appropriate for rural areas while the pre-conditions of energy tourism are: an existing infrastructure with renewable energy technologies, commitment from the community and the region and the establishment of networks with stakeholders. Safian [35] has studied the synergies of community ownership and renewable energy production. With reference Gussing in Austria and Samso in Denmark the author stated that energy tourism can be created in their territories. Dowling [36] has studied geo-tourism as an emerging form of sustainable tourism. The author stated that geo-tourism is a new form of tourism based on the geological environment while it focuses on geo-heritage, geo-diversity, geo-conservation and geo-tours. He mentioned that it promotes the understanding of the abiotic environment to build greater awareness of the biotic environment of plants, animals and human societies. The proposals and developments of energy tourism in various countries are presented in Table I.

### Table I: Proposals and Developments of Energy Tourism in Various Countries

<table>
<thead>
<tr>
<th>Reference</th>
<th>Country</th>
<th>Proposal</th>
</tr>
</thead>
<tbody>
<tr>
<td>[21]</td>
<td>Slovenia</td>
<td>Renewable energy installations could become attraction sites and education centers for tourists</td>
</tr>
<tr>
<td>[22]</td>
<td>Czech Republic</td>
<td>Visits in power plants and in sustainable energy installations</td>
</tr>
<tr>
<td>[23]</td>
<td>Slovakia</td>
<td>Visits to geothermal power plants, wind parks and hydroelectric plants</td>
</tr>
<tr>
<td>[24]</td>
<td>Germany</td>
<td>Visits in coal mines and in nuclear power plant’s info centers</td>
</tr>
<tr>
<td>[29]</td>
<td>Austria</td>
<td>Visits in renewable energy installations</td>
</tr>
<tr>
<td>[30]</td>
<td>France</td>
<td>Visits in power stations and renewable energy sites</td>
</tr>
<tr>
<td>[31]</td>
<td>Slovenia</td>
<td>Visits in a geothermal well in a spa, a geothermal greenhouse and a geothermal power plant</td>
</tr>
<tr>
<td>[32]</td>
<td>Poland</td>
<td>Visits in a hydro dam, in solar-PVs, in wind farms and in an ecological landfill</td>
</tr>
<tr>
<td>[35]</td>
<td>Denmark</td>
<td>Good practices for learning from Gussing-Austria and Samso-Denmark</td>
</tr>
<tr>
<td>[36]</td>
<td>Australia</td>
<td>Development of geo-tourism worldwide</td>
</tr>
</tbody>
</table>

Aims of the current study are:

a) To present the current status of tourism industry and the existing renewable energy installations in Crete,

b) To present the concept of energy tourism,

c) To investigate the possibilities of developing energy tourism in the island of Crete, Greece.

After the literature survey the tourism industry in the island is analyzed followed by the description of the existing renewable energy installations in Crete. After that the concept of energy tourism is discussed followed by an investigation of the possibilities of its development in Crete combined with the presentation of the resulted benefits. In the last sections of the current work the discussion of the findings and the conclusions drawn are presented while in the end of the text the references used are presented.

### III. The Tourism Industry in Crete

Tourism industry in Crete has become a primary source of income and employment improving the quality of life of the local residents. Evolution of tourism has changed the local societies modernizing them and transforming the old agrarian economy to a modern tourism-oriented one. However, it has resulted in environmental degradation, cultural pollution and commercialization of human relations. The island has 630,000 permanent inhabitants, 270,000 beds and hosts more than 5 mil. tourists per year. Crete is dependent on mass tourism that results in extensive degradation of the natural and cultural environment characterized by high seasonality of the tourism demand as well as with spatial overconcentration in certain areas. The north side of Crete is overdeveloped while the south part is completely underdeveloped. The luck of governmental strategy regarding tourism development is a main obstacle hindering the development of ecotourism in...
Crete. Analysis of the climatological parameters of the island shows that the natural tourism potential is high and, thus, an extension of the tourism period is possible. The mild periods of the year are suitable for thematic tourism including wellness and cultural tourism targeting at specific population groups and, therefore, contribute to the extension of the tourism period in Crete. Studies regarding the tourism industry in Greece during the period 1960-2020 indicate that tourism growth is strongly related with the national GDP growth. The share of local tourism industry to Cretan domestic product is currently estimated at around 47%.

IV. USE OF RENEWABLE ENERGIES FOR ENERGY GENERATION IN CRETE

Island of Crete is rich in various renewable energy resources including solar energy, wind energy, hydro energy and solid biomass. Particularly, the energy potential of solar and wind energy is very high. Until now the electric grid of Crete was autonomous while currently its interconnection with the electric system of continental Greece is under implementation. Many renewable energy technologies are mature, reliable, well-proven and cost-efficient while their applications in many sectors are growing rapidly. During the last fifteen years the use of renewable energies for heat and power generation in Crete has been increased while the finalization of the electric grid’s interconnection is going to multiply the existing installations. Electricity generated mainly by solar-PV systems and wind parks has a share slightly higher than 20% in the overall electricity generation in the island. Large scale solar thermal systems are used in Cretan hotels for hot water production. Solid biomass, based mainly in residues, wastes and by-products of olive trees, is used for heat production in residential buildings, hotels and industries. Small quantities of biogas are produced and used for co-generation of heat and power. The existing installations of renewable energy technologies in Crete are presented in Table II. New systems of renewable energy technologies that could be installed in the future in the island are presented in Table III.

<table>
<thead>
<tr>
<th>Energy source</th>
<th>Technology</th>
<th>Generated energy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solar energy</td>
<td>Photovoltaic panels</td>
<td>Electricity</td>
</tr>
<tr>
<td>Solar energy</td>
<td>Solar thermosiphonic systems</td>
<td>Heat, hot water</td>
</tr>
<tr>
<td>Wind energy</td>
<td>On-shore wind turbines</td>
<td>Electricity</td>
</tr>
<tr>
<td>Hydro energy</td>
<td>Hydro power generators</td>
<td>Electricity</td>
</tr>
<tr>
<td>Solid biomass</td>
<td>Burning</td>
<td>Heat</td>
</tr>
<tr>
<td>Biogas</td>
<td>Burning</td>
<td>Heat and electricity</td>
</tr>
<tr>
<td>Ambient heat</td>
<td>Heat pumps</td>
<td>Heat and cooling</td>
</tr>
</tbody>
</table>

V. THE CONCEPT OF ENERGY TOURISM

Energy tourism belongs to the not-so-well-researched fields of tourism. Being a part of industrial tourism or tourism of special interest, this type of tourism includes visits to energy facilities and locations such as energy factories, mines, power stations and renewable energy sites. It combines environmental education and novel “tourism products” with energy installations while it leads to positive perception of climate change mitigation strategies. “Energy tourism” is based in two pillars.

a) The first pillar is targeting at professional visitors who want to gain new knowledge and in-depth understanding of renewable energy technologies. This type of energy tourism is called “expert-oriented energy tourism” while the visitors are interesting to use the new knowledge gained in their communities or in their enterprises. The main motivation of this type of energy tourism is to get familiar with innovative energy installations in order to be able to transfer the novel technologies in their communities. Expert-oriented energy tourism requires a guided day-trip to the benign energy installations.

b) The second pillar is related with “experience-oriented energy tourism”. In this type of “energy tourism” the target groups are families or groups of children and pupils who are environmental conscious and well educated. It is oriented to leisure, recreation and fun. Renewable energy plants combined with interactive communication tools can attract a segment of tourists in a destination. Experience-oriented energy tourism should have an orientation of leisure and fun for tourists in order to attract them. It requires a guided half-day or full-day trip to the benign energy installations.

The pre-conditions for the development of energy tourism in a region are:

a) The existence of infrastructure and facilities with operating renewable energy systems,
b) Commitment of the community and the region to support renewable energies, and
c) A network among public and municipal authorities, tourism officials and agents, enterprises located in rural areas, energy experts and owners of the renewable energy installations.

VI. POSSIBILITIES OF DEVELOPING ENERGY TOURISM IN CRETE

The regional authorities in Crete promote the development of thematic tourism in the island attracting more visitors particularly in the less developed rural areas. Many renewable energy installations generating heat and electricity operate currently in Crete using solar energy, wind energy and biomass. Taking into account that more than 5 mil. tourists visit annually the island some of them could be interested in energy tourism either as expert-oriented or as experience-oriented visitors. Energy tourism is targeting at a niche tourism market segment which might be valuable for many reasons. Renewable energy systems are mainly installed in rural areas away from the large touristic centers where regular visits of tourists are highly desirable. The local communities hosting renewable energy installations are willing to welcome tourists hoping that they will get familiar with the local
products and their natural and cultural attractions. Universities and research centers are highly developed in Crete organizing every year many conferences and seminars in different topics including in sustainable energy technologies particularly in the current era of climate change mitigation. Some tourists could be interested in expert-oriented energy tourism during their staying in the island. Scientists from local universities could guide the expert-oriented visitors as well as the experience-oriented visitors in different benign energy sites. Various energy routes could be created by the local tour operators supported with energy experts while tourists can be guided for half-day or one-day tours in various benign energy installations in Crete. Energy tours in Crete could indicatively include:

a) Visits in large solar thermal systems producing hot water, visits in solar-PV systems and wind farms,
b) Visits in small hydroelectricity plants and energy systems using solid biomass or biogas for heat and power generation.

Different energy tours combining different sustainable energy technologies could be created in Crete based upon the specific interests and preferences of the participants and the suggestions of the local experts. Public authorities, tourism enterprises, scientists, and experts as well as owners of renewable energy installations in Crete are eager to promote energy tourism in the island expecting that all of them will benefit from its development. The prerequisites and their fulfillment for the development of energy tourism in Crete are presented in Table IV. Renewable energy sites that can be visited by tourists in Crete are presented in Table V.

TABLE IV: PRE-CONDITIONS AND THEIR FULFILLMENT FOR DEVELOPING ENERGY TOURISM IN CRETE

<table>
<thead>
<tr>
<th>Pre-conditions</th>
<th>Stakeholders</th>
<th>Stakeholders’ interest</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating installations of various renewable energy systems using different energy sources and technologies</td>
<td>Various private and public enterprises</td>
<td>They want visits of tourists in their installations for better public perception and acceptance</td>
</tr>
<tr>
<td>Positive acceptance from local communities (mainly rural with low tourist development)</td>
<td>Local communities</td>
<td>They want more visits of travelers in their communities promoting the local products to tourists and assisting the local enterprises</td>
</tr>
<tr>
<td>Positive acceptance from public authorities in Crete</td>
<td>Public authorities</td>
<td>They want to promote thematic tourism and to differentiate the tourist product of the island</td>
</tr>
<tr>
<td>Positive acceptance of the academic institutions in Crete</td>
<td>Regional universities and research centers</td>
<td>They want to organize conferences and seminars in sustainable energy technologies providing also experts in different guided tours</td>
</tr>
<tr>
<td>Positive acceptance of the local tour operators</td>
<td>Cretan tour operators</td>
<td>They want to increase the tourist services offered organizing various guided tours for visitors</td>
</tr>
<tr>
<td>Positive acceptance of the hotel’s associations</td>
<td>Cretan hotel associations</td>
<td>They want to offer more experiences to tourists during their staying in Crete and to differentiate the tourist product offered</td>
</tr>
</tbody>
</table>

TABLE V: RENEWABLE ENERGY SITES THAT CAN BE VISITED BY TOURISTS IN CRETE

<table>
<thead>
<tr>
<th>Energy technology</th>
<th>Generated energy</th>
<th>Installations in Crete</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solar thermal systems for hot water production</td>
<td>Heat</td>
<td>Large installations in hotels</td>
<td>Many sites in Crete</td>
</tr>
<tr>
<td>Solar photovoltaic systems</td>
<td>Electricity</td>
<td>Many installations in buildings and in fields</td>
<td>Many sites in Crete</td>
</tr>
<tr>
<td>Hydroelectricity generation</td>
<td>Electricity</td>
<td>Hydroelectricity museum</td>
<td>Agia community, Prefecture of Chania</td>
</tr>
<tr>
<td>Wind farms</td>
<td>Electricity</td>
<td>Various installations of wind parks</td>
<td>Many sites in Crete</td>
</tr>
<tr>
<td>Solid biomass burning systems</td>
<td>Heat</td>
<td>Various burning systems in buildings, greenhouses and in industry</td>
<td>Many sites in Crete</td>
</tr>
<tr>
<td>Biogas production and burning</td>
<td>Heat and electricity</td>
<td>Three systems in Crete</td>
<td>Two sites in Heraklion prefecture and one in Chania prefecture</td>
</tr>
<tr>
<td>High efficiency heat pumps</td>
<td>Heat and cooling</td>
<td>Many installations in buildings</td>
<td>Many sites in Crete</td>
</tr>
</tbody>
</table>

VII. BENEFITS FOR THE DEVELOPMENT OF ENERGY TOURISM IN CRETE

The development of energy tourism in Crete will result in many benefits to tourism-related stakeholders including:

a) Development of a new niche tourism market in the island,
b) Differentiation of the tourism product in Crete offering new experiences and knowledge to tourists promoting the thematic tourism,
c) Support to rural communities hosting various renewable energy installations lacking advanced tourism infrastructure. Tourists will become familiar with the unspoiled rural environment and probably will buy the local products,
d) Increase of the income of tour operators who will offer guided tours to tourists to sustainable energy installations,
e) Tourists as well as local inhabitants will become familiar with various renewable energy technologies acquiring a better perception of them. The public acceptance to various renewable energy installations will be increased that is important in the current era of climate change mitigation,
f) Promotion of tourism all over the year in Crete. Tourists who are interesting in energy tourism can visit the island in off-peak periods avoiding the overcrowded summer months,
g) Opportunities to Cretan academic institutions to organize conferences and seminars in sustainable energy technologies while their well-educated experts will participate in guided energy tours having an additional income,
h) Strengthening the links among various stakeholders in the island who are interesting to promote energy tourism.
VIII. DISCUSSION

Energy tourism is a modern branch of industrial tourism and is related with visits of tourists in various renewable energy sites in a destination either for getting experience and excitement or for getting deeper knowledge on specific sustainable energy technologies. Our results indicate that the island of Crete, Greece has all the required preconditions for the development of energy tourism. The well-developed tourism industry, the high number of different renewable energy installations and the eagerness of the regional authorities and the local communities to promote the thematic tourism in Crete favor the development of energy tourism. The results mention the necessary preconditions which should be fulfilled for its development in Crete. They also state several operating renewable energy installations, encompassing different technologies and energy sources, in the island that could be visited by tourists in guided tours. Finally, they indicate the benefits of all stakeholders due to development of this type of tourism in Crete. Our results do not describe the various guided energy routes that should be designed and offered to tourists during their staying in the island. It is obvious that development of energy tourism in Crete requires the cooperation of all stakeholders involved according to the quadruple helix model, including the public authorities, the private enterprises, the academic institutions and the civic society. It also requires the creation, by the local tour agents, of various guided energy routes that could be interesting and attractive to visitors.

IX. CONCLUSIONS

The possibilities of developing energy tourism in the island of Crete, Greece have been investigated. Energy tourism consists of a niche tourism product based on two pillars. The first is related with the “expert-oriented energy tourism” while the second with the “experience-oriented energy tourism”. Crete is a popular tourist destination worldwide while there are many renewable energy installations in the island using the abundant benign energy resources generating heat and electricity. The regional authorities are willing to promote the thematic tourism in Crete differentiating the tourist product currently offered and increasing the tourism period. Part of the tourists visiting annually the island are willing to have new experiences and fun as well as to acquire new knowledge regarding the sustainable energy sources and technologies that are increasingly used worldwide, replacing fossil fuels, contributing to climate change mitigation. The local tour agents could create various guided energy tours in existing renewable energy installations according to the interests and the preferences of tourists. The academic institutions in Crete can provide the energy experts that could guide the tourists and explain to them the operation and the advantages of low-carbon benign energy technologies. The local rural communities with poor tourism infrastructure hosting various renewable energy installations are also willing to accept tourists in their areas. Therefore, it is concluded that all the required preconditions for the development of energy tourism in Crete are fulfilled while all tourism stakeholders in the island are going to benefit from its future development. Further research should be focused on the design of different guided energy tours in every prefecture in Crete according to the local availability of renewable energy installations satisfying the preferences and the interests of the visitors in the island.

REFERENCES

[1] The IPCC Special report on renewable energy sources and climate change mitigation. IPCC Intergovernmental Panel on Climate Change. [Internet]. 2021. Available from: file:///C:/Users/%CE%B3%CE%B9%CE%B1%CE%BD%CE% B%CE%B7%CF%82%CE%B2%CE%BF%CF%85%CF%81%CE% B%CE%BF%CF%85%CE%BC%CF%80%CE%B1%CF%82Desk to%29-5%20-%20%20ENERGY%20TOURISM%5/11-2011.pdf
[3] Renewable energy opportunities for island tourism. IRENA. [Internet]. 2014 Available from: file:///C:/Users/%CE%B3%CE%B9%CE%B1%CE%BD%CE% B%CE%B7%CF%82%CE%B2%CE%BF%CF%85%CF%81%CE% B%CE%BF%CF%85%CE%BC%CF%80%CE%B1%CF%82Desk to%29-5%20-%20%20ENERGY%20TOURISM%5/23-2014.pdf
[19] Agha-Seyed-Hashemi-Kadkhoda A, Jelev AI. Expanding the tourist season in the Heraklion region of Crete, M.Sc. Thesis, Aalborg University, Copenhagen, Denmark. [Internet]. 2017 Available from: file:///C:/Users/%CE%B3%CE%B9%CE%B1%CE%BD%CE% B%CE%B7%CF%82%CE%B2%CE%BF%CF%85%CE%81%CE% B%CE%BF%CF%85%CE%BC%CF%80%CE%B1%CF%82Desk to%29-5%20-%20%20ENERGY%20TOURISM%5/30,2017.pdf

DOI: http://dx.doi.org/10.24018/ej.energy.2022.2.4.79


[26] Strategic options for delivering ownership and benefit sharing models for wind farms in NSW, 2014, Ernst & Young, Australia. [Internet]. Available from: file:///C:/Users/%CE%B3%CE%B9%CE%B1%CE%BD%CE%B7%CF%82%20%CE%BF%CF%85%CF%81%CE%B4%CE%BF%CF%85%CE%BC%CF%89%CE%B1%CF%82/Deskt op/[29-5]%20%20ENERGY%20TOURISM/61-2014.pdf.


[33] Hartholt T.J. Wind energy and tourism. Is coastal tourism ready for the next generation, University of Groningen, M.Sc. Thesis. [Internet]. Available from: file:///C:/Users/%CE%B3%CE%B9%CE%B1%CE%BD%CE%B7%CF%82%20%CE%BF%CF%85%CF%81%CE%B4%CE%BF%CF%85%CE%BC%CF%80%CE%B1%CF%82/Deskt op/[29-5]%20%20ENERGY%20TOURISM/2-2013.pdf.

