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A SURVEY OF TOURISM MANAGEMENT ATTITUDES TO RENEWABLE ENERGY SUPPLY IN PRIMORSKO-GORANSKA COUNTY (CROATIA)

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Abstract: The paper presents the methodology of a conducted questionnaire survey and the results regarding energy consumption in the tourism of Primorsko-Goranska County (Croatia). The attitudes about energy consumption management and practical aspects concerning consumption are highlighted.
The pool consists of three major groups of tourism objects: hotels and related facilities, camping parks and marinas. The plan was to analyze 91 tourism object, but only from 30 objects was achieved the response (33% rate). Largest share of the pool is located in the coastal area (73%), and much smaller shares are in the mountain region (13%) and the islands (13%).
The results of analysis show that the largest amount of energy is used for interior heating/cooling (26,0%) and food purposes (24,5%), then for the illumination (17,3%), hot water (17,0%), laundering and ironing (10,4%), cleaning and waste disposal (2,6%) and other (2,1%).
The attitudes about saving are emphasized and 96,7% of surveyed managers suppose that it is possible to manage the energy consumption and that energy increasingly influences their sustainable business activities. Information technology equipment for energy consumption control was installed in 16,7% of facilities and only 13,3% of businesses were exploiting renewable energy sources (RES) in 2007.

Key words: tourism, energy, renewable energy sources, questionnaire survey, management attitudes.

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INTRODUCTION

The technology used in producing energy and the way the tourism industry of the Primorsko-Goranska County uses this energy have changed radically a number of times.

At the onset of tourism (1844), lamps burning on olive oil were used to illuminate hotel interiors, later (1876) to be replaced by kerosene lamps equipped with wicks and glass chimneys. The greatest quantities of energy were used in heating rooms using wood-burning stoves.

Gas lighting, which had become a vital feature of European cities at the turn of the nineteenth century, was not used in the present territory of the County, due to the lack of a pipeline grid for gas. However, the use of carbide lighting in railway station restaurants has been recorded.

The use of electrical energy (1904) marks another turning point in hotel lighting. In the early phase, generators driven by steam engines were used to produce electricity, and the year 1922 saw the beginning of the development of hydropower usage.

The beginning of the use of electricity in hotels marks a crucial technological development because, before that, each lamp needed to be tended to individually and their luminous effect was low.

In the mid twentieth century, energy plants were built in the vicinity of hotels, further facilitating the use of modern energy-based conveniences. The energy crisis at the end of the last century was linked with difficulties in the supply and distribution of oil. This is when the air pollution in the vicinity of energy plants began to be measured, with results showing increased levels of gas emissions harmful to the environment.

In recent times, the shortage of fossil fuels, as well as the adverse environmental properties of these fuels, is compelling the tourist industry to practise rational energy management and to substitute non-renewable energy sources with renewable ones.

1. ANALYSIS OF CURRENT CONDITIONS AND THE RESULTS OF THE RESEARCH

The following section is analytical summary of responses to each of 22 questions. Some questions are merged to create indicators and weights for analysis, while others are left as they are. The maximum number of respondents is 30, but they did not always answer every question so the number varies.

Management of energy/water consumption in this analysis implies planning, simultaneous controlling and adjusting of amounts and proportions of the costs/consumption.

1.1. Operators' attitude about energy consumption management (Q6)

The question analyses operators' perception about the effectiveness of energy consumption management. The analysis reveals that 96,7% of respondents (29 out of 30) consider possible managing the consumption of energy in predictable weather conditions. The rest of 3,3% do not agree with the statement.

1.2. Operators' attitude about water consumption management (Q12)

In sequence to precedent explanation, current question analyses operators' perception about management of water consumption. Two thirds of respondents (20 out of 30) consider possible managing the consumption of water, while the others don't agree with them.

The difference between two questions (1/Q6 and 2/Q12) is rather obvious. The reason might be in higher frequency of mentioning energy efficiency and necessities of energy consumption management in media (related to global warming topics etc.).

1.3. Energy costs distribution and controlling (Q7)

Seventh question is directly related to the sixth one and aims to find out the proportion of respondents who actively manage energy costs by distributing them according the way of consumption criterion and then control them.

Analysis shows that only 26,9% of respondents (7 out of 26) divides energy costs to control them. All the others (73,1%) do not do that. The difference between those who consider possible managing the consumption of energy (1/Q6) and those who actually apply that (3/Q7) equals high 69,8%. So, in spite of high awareness of energy consumption management possibilities, there is a discrepancy when it comes to implementation

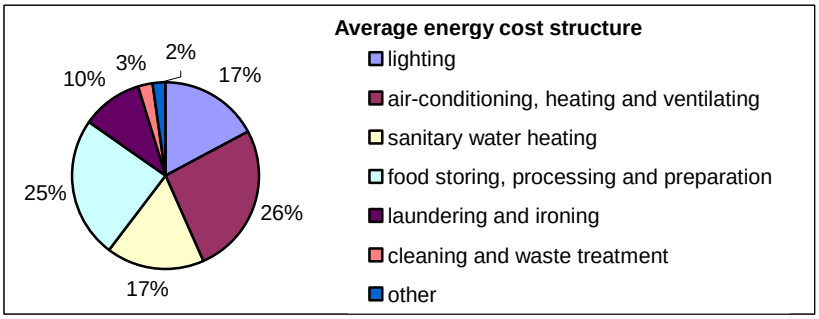
1.4. Energy costs structure (Q8)

Following question continues elaboration of distribution of energy costs. The final results are weighted according the market shares of analyzed accommodation types and according the geographical position in the County.

The results reveal that in average operation the highest share in energy cost in 2006 was spent on air-conditioning, heating and ventilating (26,0%). Given amount was immediately followed by food storing, processing and preparation (24,5%). Lighting (17,3%) and sanitary water heating (17,0%) represent the medium level of consumption, while laundering and ironing (10,4%), cleaning and waste treatment (2,6%) and other (2,1%) have the lowest share in costs. Presented data are shown in the Figure 1.

Energy costs structure enables the calculation of energy footprint for average tourist, the amounts of total energy costs in Primorsko-Goranska County, but primarily it can serve as benchmark.

Figure 1: Weighted average energy costs structure in Primorsko-Goranska County



1.5. Specific amounts and energy cost structures (Q5)

The calculation of weighted specific amounts of distributed energy costs is based on total energy costs per each accommodation type, energy cost structures, specific working days, and calculated weights. The results are presented in four ways: per occupied room per year, per occupied room per day, per occupied bed per year and per occupied bed per day. Throughout calculation the term *per year* refers to any active period of time in operation (also calculated). Same principle applies to *per day* term; day in active period of operation.

Comparison of energy cost structures (4/Q8 and 5/Q5) reveals small gaps between percentages. That is because different methodology is applied (different weighting and incomplete answers). Since differences are minor, both structures can be accepted as correct. However, proportions in Tab. 1 are to be used only together with given amounts, while proportions expressed in Figure 1. should be used in any other occasion.

Total energy cost is relevant value; total (sum) is just sum of given amounts. The difference between two numbers exists because some operators didn't answer both questions in questionnaire (4/Q8 and 5/Q5).

Table 1: Weighted average distributed energy costs and related costs structure in Primorsko-Goranska County fixed roof accommodation (2006)

Prim.-Gor. County	energy costs per occupied room /year		energy costs per occupied room /day		energy costs per occupied bed /year		energy costs per occupied bed /day	
all amounts in HRK	amount	proport.	amount	proport.	amount	proport.	amount	proport.
total energy cost	7.829,00		29,01		5.057,88		18,11	
lighting	1.130,89	17,1%	3,54	17,1%	613,25	17,2%	1,92	17,2%
air-conditioning	1.913,87	29,0%	6,00	29,0%	1.029,63	28,9%	3,23	28,9%
sanitary water	1.092,71	16,6%	3,42	16,6%	589,95	16,6%	1,85	16,6%
food handling	1.467,48	22,2%	4,60	22,2%	793,17	22,3%	2,49	22,3%
laundering/ironing	704,36	10,7%	2,21	10,7%	381,34	10,7%	1,19	10,7%
cleaning	168,10	2,5%	0,53	2,5%	88,35	2,5%	0,28	2,5%
other	119,45	1,8%	0,37	1,8%	64,56	1,8%	0,20	1,8%
total (sum)	6.596,84	100%	20,67	100%	3.560,25	100%	11,16	100%

1.6. Consumption and costs of water (Q13)

Water consumption, same as energy consumption, indicates the management's demeanour towards resources. Analyzing them together gives a more complete picture of resource usages in 2006 in tourism of Primorsko-Goranska County. The results are presented in same categories as in 5/Q5, but for a difference, here are expressed in physical (m^3) and financial units (Croatian currency).

Table 2: Weighted average water costs and consumption in Primorsko-Goranska County fixed roof accommodation (2006)

Prim.-gor. County	average water consumption, m^3	average water cost, HRK
per occupied room per year	202,37	4.076,66
per occupied room per day	0,69	13,97
per occupied bed per year	107,48	2.170,01
per occupied bed per day	0,37	7,44

1.7. Proportions of electric energy costs (Q9)

The advantages of cheaper night-tariff are obvious (reduced costs of electricity). In spite all, many processes can't be executed but during the day. The weighted average proportion representative for entire County amounts 78,6% : 21,4% in favor of the higher (daily) tariff.

1.8. Operations' air-condition equipment rate (Q11)

The question analyzes average equipment rate of fixed-roof accommodation facilities, with air-conditioners. This issue is emphasized because tourists ask for more comfort and cumulative amount of energy consumed by air-conditioners is already huge[2] and still growing. One fifth (21,1%) of all accommodation units are equipped with AC equipment. So, it can be expected further growth of investments in this area, and related growth of energy costs.

1.9. Energy efficiency awareness (Q10)

The question deals with operators' energy efficiency awareness and effective application in everyday operations. As an indicator of energy efficiency is taken the usage of fluorescent light bulbs. The proportion of light bulbs in facility was not asked.

The overall result shows that 83,3% of respondents (25 of 30) use fluorescent light bulbs, while all the others (16,7%) don't. Given result can be compared to the research[3] comprising Croatian households, where 64% of respondents use or intend to

[2] Total installed air-condition power in Croatia is higher than ½ of the output power of NPP Krsko (Slovenia). Mandic and Hrabak-Tumpa (2007)
[3] *Mijenjaju li se nase navike vezano uz stednju energije?*, GfK-Croatia, Zagreb

use fluorescent light bulbs. In only 21% of Croatian households are used such energy efficient light bulbs.

The advantages of fluorescent light bulbs are not just in increased energy efficiency, but also in much longer duration. In large facilities with high ceilings and many light bulbs the effects of long duration are very desirable.

1.10. Computer controlled energy efficiency (Q14)

Another question elaborating energy efficiency analyses more sophisticated awareness level. The usage of information technology for controlling processes in tourism is not *black box* anymore. Only 16,7% of respondents (5 out of 25) confirms to have installed software controlled equipment to monitor energy and water consumption. Majority of operators (83,3%) still work without mentioned equipment.

1.11. Perceived usefulness of RES for tourist operations (Q19)

Usefulness of RES to the largest extent refers to energy and money savings and to marketing potential. Various researches confirmed that some types of RES possess strong attraction potential.[4] In total, 89,3% of respondents (25 out of 28) consider (potential)[5] exploiting of renewable energy as advantage, 7,1% (2 operators) think it would have negligible impact, while 3,6% (1 respondent) sees it as a drawback.

1.12. Proportion of respondents with a RES installation (Q15)

In sequence to precedent analysis, the question aims to state whether there is any discrepancy between known operators' awareness and effective application.

Only 13,3% operations (4 out of 30) in County's tourism exploits some kind of green energy. The result can be compared to similar researches conducted in Queensland (Australia) – 9,2% of operators uses RES (Dalton et al., 2007), and in Greece – 25% of RES exploiting rate (Karagiorgas et al., 2006). So, regional tourism has better result than Queensland, but worse than Greece.

1.13. Attitude about installation of RES (Q16)

Analysis reveals that less than half of respondents (44,8%; 16 out of 29) expressed positive interest in considering RES installations. The result is comparable to the one from Queensland where 71% of respondents showed positive attitude towards investing in exploiting renewable energy.

[4] Cf. *Wind farms Research For Scottish Renewables Forum & the British Wind Energy Association. Tourist Attitudes towards Wind Farms*, Summary Report, MORI Scotland, 2002.; *Employment in the Environment: Methods, Measurements and Messages*; *Marketing Renewable energy*, Chapter 6, Australian Government, s. a., p. 121

[5] „Potential" is put in the brackets because some of the respondents already exploit renewable energy.

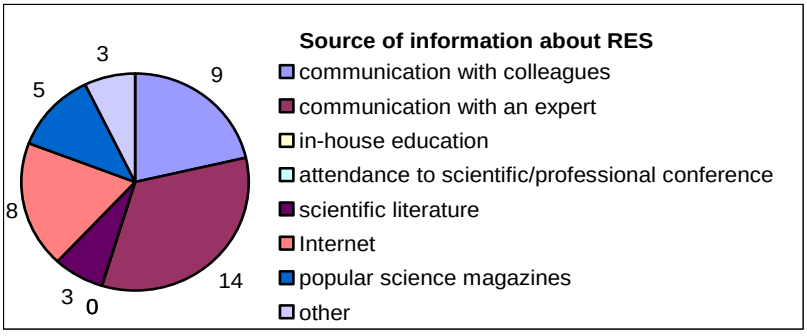
1.14. Adeptness to RES equipment (Q17, Q18)

Adeptness in renewable energy technologies for own operation, could present further step in the process of activities directed to exploiting such form of energy. But data can also simply show the operators' level of proactivity. The results show that 77,8% of operators (21 out of 27) have taken the opportunity to inform themselves, in some way, about the RES.

Second part of this analytical entirety researches the channels of information about RES. The aim is to find out the most efficient communication channel. Eight alternatives are offered. It was possible to fill up a gap in answer "Other", and it was possible to choose more than one answer. The results are shown in Figure 2.

Communication with an expert presents the most efficient medium of getting information (33,3% of respondents). Communication with colleagues (21,4%) is the next source, and Internet comes third with 19%. From popular science magazines 11,9% managers retrieves information, and 7,1% of them analyzes scientific literature. The same amount (7,1%; 3 answers) refers to category "Other", where two sources are added: municipality initiative and own experience. No respondents chose in-house education, or attendance to professional and scientific conferences.

Figure 2: Operators' sources of information about RES



1.15. RES ability to supply enough power (Q20)

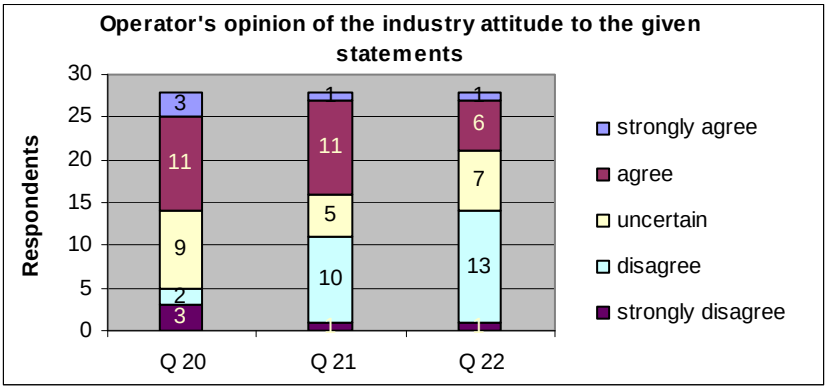
Questions 15/Q20, 16/Q21 and 17/Q22 asked for operators' perception of the tourism industry attitude to the given statements. The results are shown in Figure 3. One of the main challenges of RES is to supply enough power to cover seasonal demand variations, power surges and peaks throughout a normal day (Dalton, Lockington and Baldock, 2007, 579). Many researches have been done to find out whether energy self-supply is possible.[6]

[6] E.g. Majdandzic and Sauer (2002), Glasnovic et al. (2002), Miscevic (2002), Glasnovic and N. Peric (2002)

It was proven that RES can supply all the tourism operations.[7] Current question analyses the perception that RES can't supply the full power requirements of a resort of over 10 rooms.

The analysis shows that 17,9% of respondents (5 out of 28) don't agree with the given statement and consider that tourism sector thinks RES can supply enough power. The result is almost twice as high as in Australian research (9,4%) (Dalton et al., 2007). Other 50% of Croatian respondents agrees with the statement and the rest are uncertain (32,1%).

Figure 3: Operators' opinion of the County tourism industry attitude to the given statements



1.16. Confidence in RES reliability (Q21)

It is proven that RES are less reliable in power supply,[8] when compared to conventional sources. Knowing that, tourism operators scruple to rely on renewable sources, since every power shortage might negatively influence tourists' experience of received quality (Dalton et al., 2007, 581). Partial solution might be in direct connection of smaller systems on electrical grid,[9] installing reserve battery[10] or alternative source of energy, e.g. diesel engine[11].

Relatively high proportion, 42,9% of respondents (12 out of 28), agrees with the statement that their colleagues are cautious with investing in RES because the lack of confidence in reliability. Other 39,3% don't agree and 17,6% are uncertain. In comparable Queensland research only 19% of managers agree to the above statement.

[7] Bakos and Soursos (2002) and Bakos and Soursos (2003), both papers cited in: Dalton et al. (2007, 579)
[8] *Bioenergy Project Development & Biomass Supply*, International Energy Agency, Paris, 2007., p. 53
[9] S. Teske, A. Zervos and O. Schäfer (2007) *Energy [r]evolution, A sustainable world energy outlook*, EREC – European Renewable Energy Council and Greenpeace International, p. 72
[10] J. Knight, N. Roolker et al. (2007) *Grid Connected Domestic and Small Scale Renewables in New Zealand*, Hydro Tasmania Consulting and Hydro-Electric Corporation, Hobart, p. 29
[11] Dalton et al., Op. cit. 2007, p. 580

1.17. Economic viability of RES (Q22)

Economic viability is probably one of the most important criteria when considering investment in RES. The payback period for some European countries has been analyzed in HOTRES study (2006). The results vary considerably. There are no data for Croatia. The results reveal that 50% of all respondents (14 out of 28) don't agree with the assumption that RES are not economically viable in small to medium sized businesses, while 25% agree. Among Australians, only 15% of them disagree.[12]

CONCLUSION

Questionnaire survey was conducted among tourism managers in Primorsko-Goranska County (Croatia) to determine management attitudes, adeptness and effective conditions regarding energy management. The survey was conducted during October and November of 2007 and respondent rate of 33% was achieved (30 out of 91 respondents). The pool consisted mostly of hotel managers located in maritime area, but other types of accommodation were represented including camping parks and marinas. The results – where necessary – were weighted according to geographical position and market share.

The results of analysis reveal that wide majority of respondents consider energy cost management to be possible. Similar result was achieved for consideration about the reality of water consumption management. Around 1/3 of surveyed operators divides energy costs for the purposes of controlling. In operations' energy cost structure air-conditioning (26%) and food processing (25%) have largest shares, and are followed by lighting and water heating (both 17%). Laundering, ironing, cleaning and other have the lowest shares.

Total energy cost per occupied room a year equals 7, 829 Kn, and for same period and occupied room water costs total 4,077 Kn or 202,4 m^3. Data show that 79% of electricity is spent during the day, and that only 1/5 of all accommodation units are equipped with AC equipment. Total of 83% of respondents use fluorescent light bulbs in their facilities, what represents energy efficiency awareness. Only 17% of respondents have installed computer controlled equipment to monitor energy efficiency.

The pool of 89% of respondents consider exploiting of renewable energy as advantage and only in 13% of operations in County's tourism exploits some kind of RES. Less than half of respondents (45%) expressed positive interest in considering RES installations.

Majority of 79% of operators have informed themselves about the renewable energy. Communication with an expert happens to be the most efficient medium of getting information (33% of respondents) and is followed by communication with colleagues (21%), Internet (19%), popular science magazines (12%), and scientific literature (7%). The same amount (7%) refers to other possible sources.

[12] Dalton et al., Op. cit. 2007, p. 582

The analysis shows that 17,9% of respondents don't agree with the given statement and consider that tourism industry thinks RES can supply enough power. Quite high proportion, (43%) of respondents agrees with the statement that their colleagues are cautious with investing in RES because the lack of confidence in reliability. Half of all respondents do not agree with the assumption that RES are not economically viable in small to medium sized businesses.

To conclude, energy management in Primorsko-Goranska County is not at the adequate level. Therefore should be considered institutional plans to support and promote RES and energy efficiency in the County tourism industry. From the operators' point of view more attention should be paid on positive world trends since that is usually the way to cut costs or create own long term advantages. Responses from County tourism operators indicate a positive interest in exploitation of renewable energy sources but additional researches should be made to reveal all the possible issues that prevent wide investments in renewable energy technology.

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