© Institut für Interdisziplinäre Gebirgsforschung (Institute of Mountaun Research)

Renewable energy in winter sports destinations – desired, ignored or rejected?

Ulrike Pröbstl, Alexandra Jiricka & Florian Hindinger

Abstract

Energy supply and climate protection are two of the most discussed topics in our society. Conciliating the technical and environmental aspects of energy production is becoming increasingly important, especially in the winter tourism sector. Picking up on the current issue of ecological and sustainable tourism in the Alps, this study determines the extent to which the implementation of renewable energy solutions and the aim of energy autarky are relevant for the image and marketing possibilities of a winter sports tourism destination. It also ascertains the current level of environmental awareness towards green energy among alpine winter tourists.

Keywords: renewable energy, climate change, tourism, winter sports, sustainable, survey

1 Introduction

Winter tourism, especially revolving around downhill skiing and cross-country skiing, constitutes one of the most important economic sectors in the alpine area. Many studies have documented the negative impact climate change can have on these winter sports activities (e.g. Abegg et al. 2007; Alcamo et al. 2007; Elsasser & Bürki 2004; Jülg 2004; Loomis & Crespi 1999; Moen & Fredman 2007; Perry 2004; Scott et al. 2009; Unbehaun et al. 2008), and have emphasized the importance of adaptation and mitigation strategies (Scott et al. 2007; Sievänen et al. 2005; Pröbstl et al. 2008). Previous research on alpine skiing has discussed various mitigation and adaptation strategies available to ski area management for diminishing the negative impact of climate change (e.g. Bürki 2000; Elsasser & Bürki 2002, 2004; Scott et al. 2009; Scott et al. 2007). Unbehaun et al. (2008: 37) highlight three types of adaptation strategies that skiing destinations may consider:

- investing in technical adaptations, such as artificial snow-making;
- offering non-snow dependent additional services, such as new wellness and spa-facilities, indoor sports or other snow-independent attractions;
- developing year-round tourism, enhancing summer tourism and developing new alternatives for sport and recreation.

The application of these strategies requires new investment and in many cases also an increased cost for energy supply. This is explicitly relevant for technical adaptation in the form of artificial snow making. This adaptation strategy is actually already applied by most of the ski resorts in Austria. The percentage of ski slopes which can be covered with artificial snow has explicitly increased over the last five years in

© Institut für Interdisziplinäre Gebirgsforschung (Institute of Mountaun Research)

the alpine skiing areas (Zegg et al. 2010). Major skiing resorts in Austria and Switzerland are characterized by 80–100% artificial snow cover (Pröbstl 2006). Under the consideration of climate change and its effects increasing energy consumption provoked by artificial snowmaking is increasing the vicious circle. For this reason skiing areas increasingly apply renewable energies to ameliorate their environmental performance and perception by the skiers and media.

Another effect which can lead to prefer autonomous energy supply – provided by renewable sources – is the rise of energy costs which were transferred to ticket pricing over the last decade. Roth (2011) reported that the increasing price level of tickets is the main reason for tourists to decide not to go skiing in winter. Furthermore, the increasing costs are perceived as the major obstacle in attracting new target groups. Therefore, the Austrian skiing regions are discussing how to prevent their costs from increasing further, in order to remain attractive for their clients. A study by the Swiss ropeway association (Zegg et al. 2010) highlighted that many options are already in use and/or in discussion, such as photovoltaic panels on buildings, wind turbines, or hydro-electric power from natural or artificial lakes. The cost efficiency is always in line however with additional review on energy behaviour and consumption of the resort.

Beside possible reduction of costs, marketing aspects and the increasing relevance of the CO_2-footprint for new cable car developments (Pröbstl & Jiricka 2010) have boosted the interest in the use of renewable energy in winter sports destinations. Best practise examples have already been honoured by the Pro natura-pro ski foundation (Pröbstl & Jiricka 2011), such as the ski resort See in Tyrol for producing four times the amount of electricity throughout the year than will actually be needed during the winter season. The CO_2 – calculation methods need to be viewed critically however, in order allow comparing efforts through a holistic perspective.

Against this background we were interested in the tourists' reaction towards this development. In this paper we want to answer the following questions:

- Which of the possible methods of generating renewable energy is accepted or even preferred by tourists?
- Which of these opportunities could have an impact on further tourism development?
- How important is this issue for tourists' choice of destination?

An opinion survey was conducted in four large Austrian skiing destinations in the winter season of 2010/2011, in order to answer these questions.

2 Methodological approach

Within the research project ADAPT, which deals with renewable energy supply for winter sports destinations, we developed a questionnaire directed at tourists. This questionnaire was applied in four large Austrian ski destinations (Lech am Arlberg, Schladming, Zell am See, Silvretta Montafon) which are all covered by artificial snowing to a great extent. The characteristics are presented in Table 1.

© Institut für Interdisziplinäre Gebirgsforschung (Institute of Mountaun Research)

Table 1: Characteristics of selected skiing areas.

Characteristics	Lech a. Arlberg	Schladming	Zell am See	Silvretta Montafon
Federal State	Vorarlberg	Styria	Salzburg	Vorarlberg
Size	279 km (Lech/Zürs)	126 km (Planai-Hochwurzen)	77 km	158 km
Altitude	1,480 m	680–2,100 m	750–2,000 m	700–2,300 m
Major target groups	High performers sportive	Family oriented, World cup	International, fun oriented	Several target groups
Artificial snow coverage	100%	95%	100%	ca. 55%
Environmental Policy (online)	Environmental declaration (ISO 14001, former EMAS)	Short information included into the overall policy	Information to the press about environmental policy (EMAS in prep. & env. Steering group)	no information available
Price level (2010/2011)	Per day € 44.50	Per day € 42	Per day € 42	per day € 40.50

These resorts cover the existing range of Austrian skiing regions regarding geographical distribution in the main winter sport regions in Austria, and differ in target groups, altitude, access to the area and size. Larger resorts (which means medium to large size in comparison with the Austrian "average") are chosen because of their financial and management potential to introduce and integrate renewable energies into their overall energy concept.

Respondents were asked to fill in the questionnaire during the cable car rides, which gave us a response rate of around 70%. A total of 1,165 tourists were involved in the study. We selected mostly weekdays instead of weekends for conducting the questionnaire, in order to reach more tourists than local day visitors. 79% were visiting for one week, 13% were day visitors about 6% were ski instructors and local visitors and 2% were other guests. About 25% of the respondents were under the age of 29 years, 17% were between 30 and 39 years old, and 18% were over the age of 50 years. The majority (40%) was between 40 and 49 years old. Figure 1 provides an overview about the visitors interviewed

Figure 2 explains the distribution according to winter sport activities. Less than a quarter of the people interviewed takes out any winter sport activity other than skiing. Nevertheless, the distribution of the international guests does not reflect the overall presence of international guests. Tourists from eastern European countries, especially, are slightly underrepresented due to language problems (the questionnaire was only prepared in German and English).

In order to ask tourist about renewable energy supply we had to explain the possible options. To avoid a potential bias we decided not to use pictures, photographs or drawings. The selection of renewable energy supply facilities is based on the existing offers and application in the Alpine ski resorts and cable car enterprises (Zegg 2010; Österreichischer Seilbahnverband 2011).

© Institut für Interdisziplinäre Gebirgsforschung (Institute of Mountaun Research)

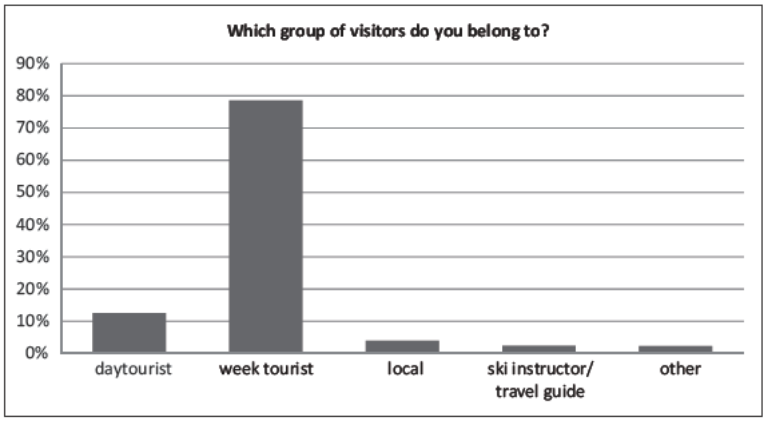

Figure 1: Visitor segments (n = 1,165).

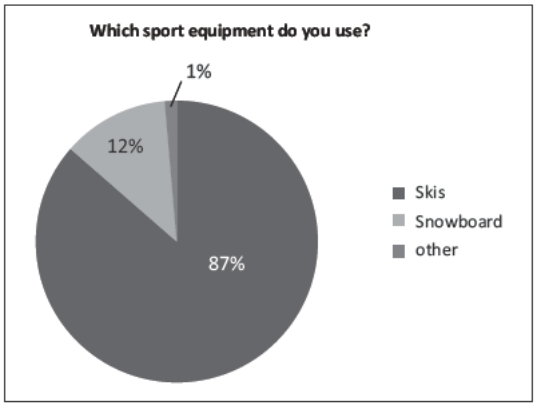

Figure 2: Distribution of winter sport activities (n = 1,165).

We tried to describe the size and location as clear as possible and presented the following options:

- Photovoltaic on buildings
- Photovoltaic on meadows
- Geothermic for buildings
- Waterpower in combination with artificial lakes for technical snow
- Waterpower using natural rivers
- Small compact wind turbines
- Wind turbines close to buildings
- Large and exposed wind turbines
- Small locally adapted bio gas plant
- Large, efficient bio gas plant

These ten different options were to evaluate by the tourist concerning its possible impacts first on the environment and second on landscape aesthetics.

© Institut für Interdisziplinäre Gebirgsforschung (Institute of Mountaun Research)

3 Results

3.1 Preferred form of renewable energy supply

The survey showed that overall photovoltaic on buildings are the most preferred option (see Figure 3). Also highly accepted are the use of waterpower in combination with artificial lakes for technical snow and geothermic. The least preferred infrastructure is large exposed wind turbines and the use of natural rivers for water power.

The tourist obviously differentiated well between the different options and distinguished between the options to use water, sun or wind.

The study (explicitly Figure 4) illustrates that tourists distinguish between environmental effects and possible impacts on the landscape. This is visible in the different evaluation of photovoltaic panels on meadows, small compact wind turbines and small biogas plants. Large exposed wind turbines are least preferred in both cases and small compact wind turbines are also expected to impact the landscape in a negative way.

By most tourists photovoltaic panels on existing buildings are, again, well accepted. Also the use of geothermic and hydro-electric power in combination with artificial lakes is perceived to have a low impact on the landscape.

Against these findings we conclude that any winter sports destination must be cautious in deciding to use any type of wind turbines, large photovoltaic plants or large biogas plants. These methods of producing renewable energy have – in the eye of the tourist – a strong impact on the environment and on landscape beauty. Further analysis will show whether there occur differences in the tourists' perception in case they have been already exposed to renewable energies in skiing areas or

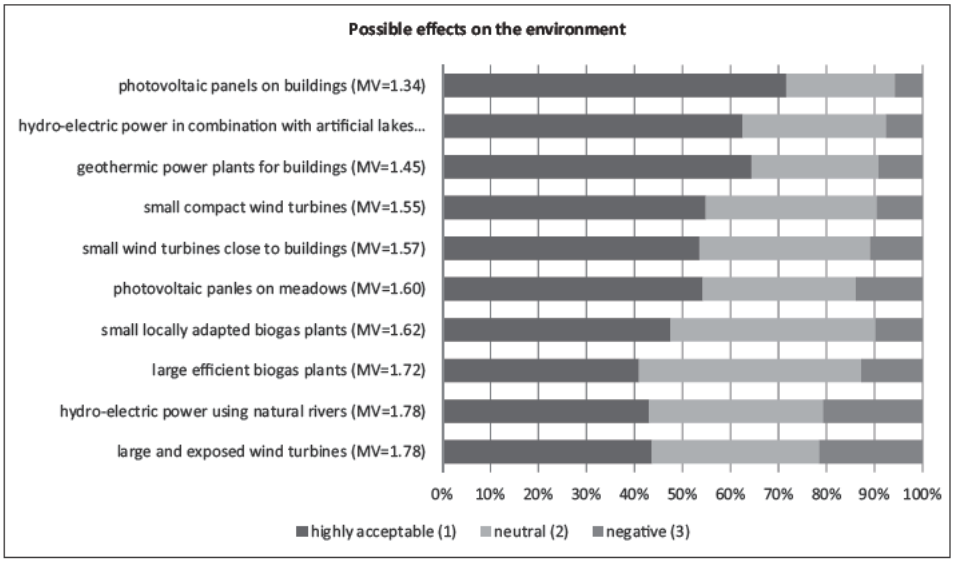

Figure 3: Possible effects on the environment (mean value (MV): 1 = highly acceptable, 2 = neutral, 3 = negative) n = 879.

© Institut für Interdisziplinäre Gebirgsforschung (Institute of Mountaun Research)

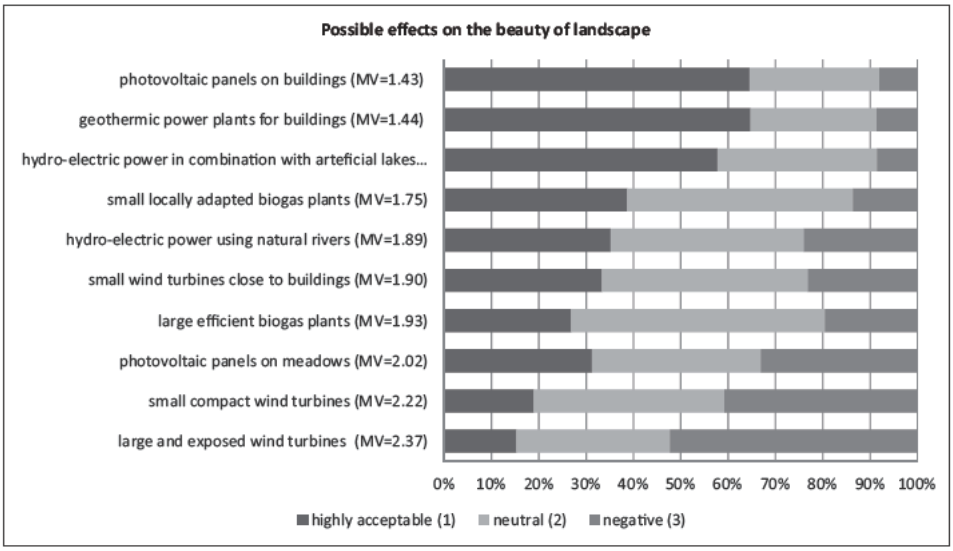

Figure 4: Possible effects on the landscape beauty (mean value (MV): 1 = highly acceptable, 2 = neutral, 3 = negative), n = 912.

have never experienced them during their skiing holiday. Therefore future analysis will distinguish between the four areas which have different forms of renewable energies in use each.

3.2 Importance of renewable energy supply for destination choice

There are two questions which are relevant in the context of destination choice. First we asked tourists about their most important criteria when selecting a skiing destination. Secondly we asked whether they would show preference for ski resorts that are energy neutral and supply all the required energy with their own infrastructure.

The first question confirmed what is already known from several other studies in the alpine area (Unbehaun et al. 2008). The most important set of criteria is always the quality of the slopes, the snow security, the price level, the accessibility and the size of the ski area. The second important group is – also according to other studies – related to landscape, the natural environment, landscape aesthetics and the atmosphere (see Figure 5). Less important are social aspects such as family friendly offers, the number of huts or opportunities for après-ski and parties. Figure 5 illustrates that 'green criteria' – such as an ecologically friendly management, use of renewable energy or environmentally friendly accessibility with public transport – are also of low importance.

In a separate question we asked the respondents about their preferences for ski destinations in another context: 'Would you prefer a ski resort that is able to cover its energy demand by itself?' As shown in Figure 6, 44% of the respondents agree, 46% are unsure and 10% would not take this aspect into consideration.

© Institut für Interdisziplinäre Gebirgsforschung (Institute of Mountaun Research)

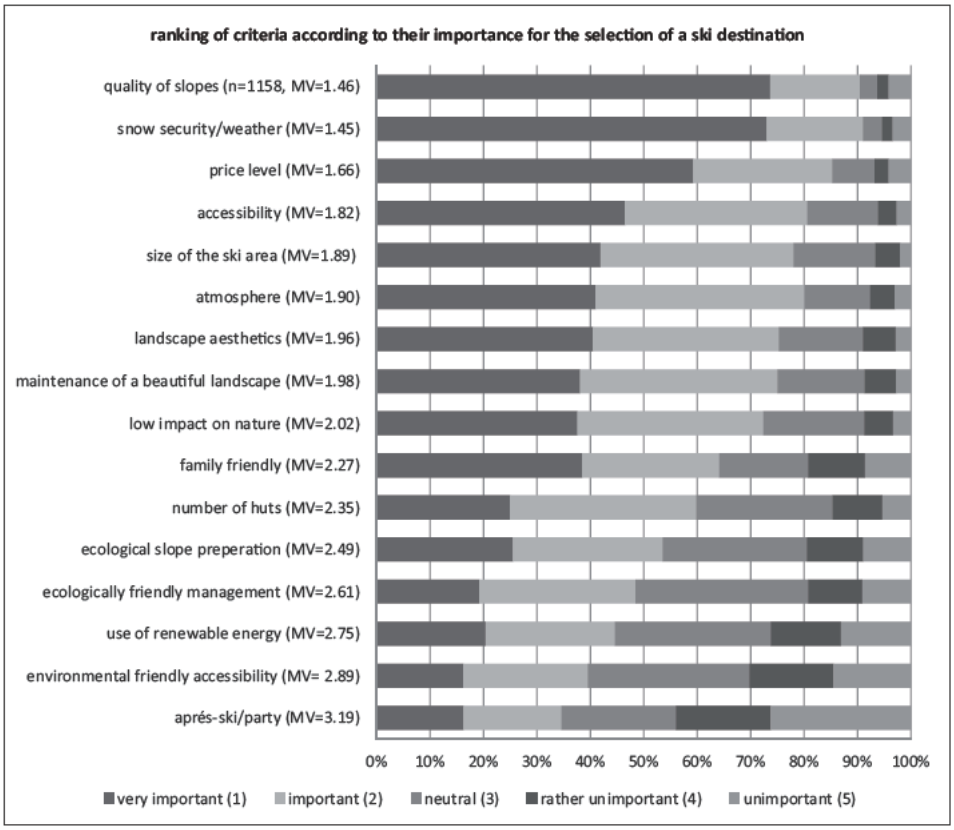

Figure 5: Ranking of criteria according to their importance for the selection of a ski destination (mean value (MV): 1 = very important, 2 = important, 3 = neutral, 4 = rather unimportant, 5 = unimportant), n = 1,152.

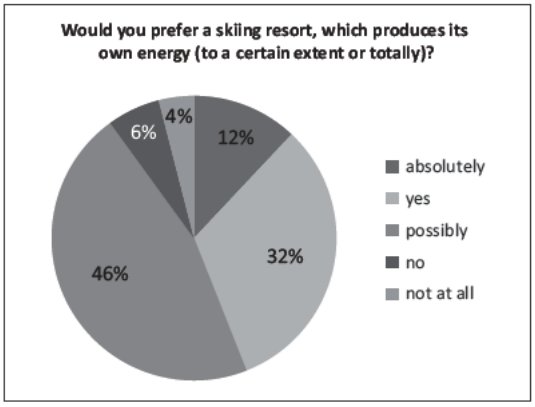

Figure 6: Preference for a ski resort that covers its energy demand by itself (n = 1,133).

© Institut für Interdisziplinäre Gebirgsforschung (Institute of Mountaun Research)

At first, these two findings seem to be totally contradicting and misleading. Are 'green' criteria relevant for destination choice or not? We believe that these findings are not as contradicting as they may at first seem. The process of destination choice must be perceived as a process of several steps of decision making. The main motive is the outdoor activity and this activity must be assured before any other criteria (even including the hotel) will be taken into consideration. If several destinations offer a similar quality of slopes, a high level of snow security and a large area to ski in, then 'green criteria might be relevant for the further selection process. These findings are in line with the results of Schmid (2003). In her survey skiing tourists in the ski resort Schladming were asked about the relevance of an environmental auditing for destination choice. The study also showed that a large majority was more or less undecided. Schmid showed that this group can only be attracted if green arguments are promoted in a very prominent and obvious way and very obvious during the booking and decision making process.

Against this background, we asked the respondents to evaluate the opportunities for a ski resort to inform about their green offers and environmental strategies. The respondents were chosen to select between the internet, information boards at the entrance, information on cable car tickets, promotion by posters, books about ski resorts or using special brochures and leaflets. The evaluation of these different options is presented in Figure 7.

The results presented in Figure 7 underline the important role of the internet which should be used to promote energy autarky of ski resorts. Furthermore this form of promotion is the only one that is also relevant and useful for destination choice. Against this background more information is recommended in comparison to the content available online up to day presented in chapter 2 (Table 1).

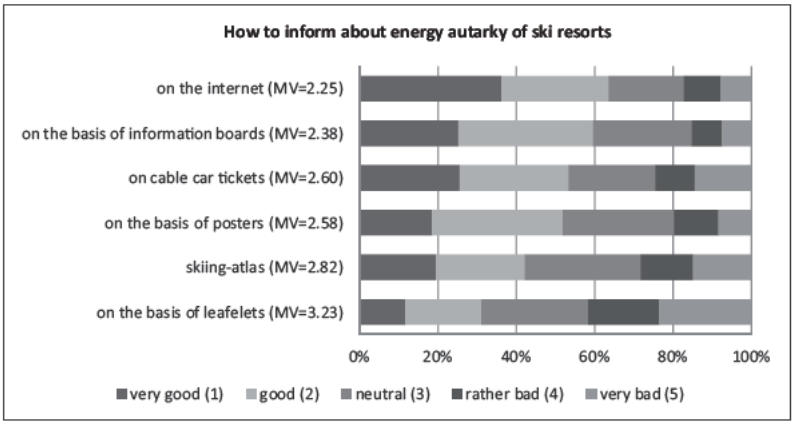

Figure 7: How to inform about energy autarky by ski resorts (n = 1,114).

© Institut für Interdisziplinäre Gebirgsforschung (Institute of Mountaun Research)

4 Recommendations and conclusions

Ski destinations have various options for improving their CO_2-balance. The survey shows that tourists are sensitive towards wind turbines of any size, as well as towards larger biogas plants and large photovoltaic fields. Further analysis will study the effect of exposure to this facilities and a correlated acceptance (evaluation per resort and comparison of resorts in correlation to their energy supply facilities and strategy).

The positive effect of some of these infrastructures on the CO_2-balance could harm the perceived integrity of the region's nature and landscape beauty. We therefore recommend considering other possibilities, before the infrastructure for an environmentally friendly energy supply could harm the goose that laid the golden egg. The trade of between environmental performance and effects on landscape is to be made carefully. Solutions are multiple and need to be discussed per skiing area.

Overall tourists prefer the use of existing technical infrastructure such as the system for artificial snowmaking or photovoltaic detached to existing buildings. This emphasises the increased acceptance of well-known infrastructure and could support the hypothesis of increased acceptance of renewable energy facilities after time (e. g. solar shields).

In general, however, the reaction of skiers towards renewable energies is positive, though the study confirms the minor influence of environmental efforts – and explicitly the application of renewable energies – during the destination choice. One reason could be missing information on the application of RE and their impact on the resort's CO_2-balance. A review of the websites of the presented ski resorts shows a lack of information on these issues. The survey underlines the role of the internet in promoting environmental improvements. An attractive presentation in the internet is also a precondition for these aspects to be considered in destination choice. It is to be expected that, due the ongoing societal discussion, environmental issues and the question of energy supply will play an increasing role for the overall image of destinations and for their marketing. This development is likely to influence destination choice. Leading destinations such as Lech am Arlberg already use this aspect to promote their innovative and green image. Further research will have to focus on the differences between tourists from different countries and their respective expectations.

References

Abegg, B., S. Agrawala, F. Crick & A. de Montfalcon 2007: Climate change impacts and adaptation in winter tourism. In: Agrawala, S. (ed.): *Climate Change in the European Alps. Adapting Winter Tourism and Natural Hazards Management*, OECD. Paris.

Alcamo J.J.M., B. Moreno, M. Nováky, M. Bindi, R. Corobov, R.J.N. Devoy, C. Giannakopoulos, E. Martin, J.E. Olesen & A. Shvidenko 2007: Europe. Climate Change. Impacts, Adaptation and Vulnerability. In: Parry, M.L., O.F. Canzziani, J.P. Palutikof, P.J. van der Linden & C.E. Hanson (eds.):

© Institut für Interdisziplinäre Gebirgsforschung (Institute of Mountaun Research)

Contribution of Working Group 11 to the Fourth Assessment Report of the Intergovernmental Panel of Climate Change (IPCC). Cambridge U.K.: 541–580.

Elsasser, H. & F. Bürki 2004: Auswirkungen von Umweltänderungen auf den Tourismus – dargestellt am Beispiel der Klimaänderung im Alpenraum. In: Becker, C., H. Hopfinger & A. Steinecke (eds.): *Geographie der Freizeit und des Tourismus*. München: 249–258.

Jülg, F. 2004: Wintersporttourismus. In: Becker, C., H. Hopfinger & A. Steinecke (eds.): *Geographie der Freizeit und des Tourismus*. München: 249–258.

Loomis, J. & J. Crespi 1999: Estimated effects of climate change on selected outdoor recreation activities in the United States. In: Mendelsohn, R. & J. Neumann (eds.): *The impact of climate change on the United States Economy*. Cambridge: 289–314.

Moen, J. & P. Fredman 2007: Effects of Climate Change on Alpine Skiing in Sweden. *Journal of Sustainable Tourism* 15, 4: 418–437.

Österreichischer Seilbahnverband 2011: Unpublished survey on environmental performance and projects in Austrian skiing areas.

Perry A. 2004: Sports tourism and climate variability. In: Matzarakis A., C.R. De Freitas & D. Scott (eds.): *Advances in tourism climatology* 12: 174–179.

Pröbstl U. 2006: *Kunstschnee und Umwelt – Entwicklung und Auswirkungen der technischen Beschneiung*. Bern Stuttgart, Wien.

Pröbstl, U., A. Prutsch, H. Formayer, M. Landauer, K. Grabler, A. Kulnig, M. Jesch, E. Dalhammer & C. Krajasits 2008: Climate change in winter sport destinations – transdisciplinary research for implementing sustainable tourism. In: Pineda, F.D. & C.A. Brebbia (eds.): *Sustainable Tourism* 3. Boston: DOI: 10.2495/ST080171.

Pröbstl, U. & A. Jiricka 2010: CO_2-neutral Skifahren? *Internationale Seilbahn-Rundschau 6*. Available at: http://www.isr.at/CO2-neutral-Skifahren.306.0.html.

Pröbstl, U. & A. Jiricka 2011: Pro natura – pro ski Award 2011. Verleihung im Rahmen der slowenischen Präsidentschaft der XI. Alpenkonferenz durch die Stiftung pro natura – pro ski in Liechtenstein. *Internationale Seilbahnrundschau* 2: 90.

Schmid, B. 2003: *Umweltzertifizierung von Skigebieten Chancen und Hemmnisse auf kommunalpolitischer Ebene – Eine empirische Untersuchung am Beispiel der Planai-Hochwurzen-Bahnen in Schladming, Österreich*. Diplomarbeit. Universität Lüneburg.

Scott, D., G. McBoyle & A. Minogue 2007: Climate change and Quebec's ski industry. *Global Environmental Change 17*: 181–190.

Scott, D, C.R.. de Freitas & A. Matzarakis 2009: Chapter 8. Adaptation in the Tourism and Recreation Sector. In: Ebi K.L., I. Burton & G. McGregor (eds.): *Biometeorology for Adaptation to Climate Variability and Change*. Springer: 171–194.

Sievänen, T., K. Tervo, M. Neuvonen, E. Pouta, J. Saarinen & A. Peltonen 2005: *Nature-based tourism, outdoor recreation and adaptation to climate change*. FINADAPT Working paper 11. Finnish Environment Institute Mimeographs 341. Helsinki Finland.

Unbehaun, W., W. Haider & U. Pröbstl 2008: Trends in winter sport tourism: challenges for the future. *Tourism Review* 63, 1: 36–47.

Zegg, R., T. Küng & R. Grossrieder 2010: *Energiemanagement Bergbahnen*. Studie im Auftrag von Seilbahnen Schweiz SBS.

ZOBODAT - www.zobodat.at

Zoologisch-Botanische Datenbank/Zoological-Botanical Database

Digitale Literatur/Digital Literature

Zeitschrift/Journal: IGF-Forschungsberichte (Instituts für Interdisziplinäre Gebirgsforschung [IGF]) (Institute of Mountain Research)

Jahr/Year: 2011

Band/Volume: 4

Autor(en)/Author(s): Pröbstl Ulrike, Jiricka Alexandra, Hindinger Florian

Artikel/Article: Renewable energy in winter sports destinations - desired, ignored or rejected? 309-318