

SKIING WITH A
CLEAR CONSCIENCE?
OF COURSE!

SKI



TECHNOALPIN®

WHY
SNOWMAKING IS
BETTER THAN
ITS REPUTATION...



**SETTING
THE STANDARDS**



In recent years, winter sports, particularly snowmaking, have often been portrayed negatively – in our view, unjustly. It is true – both we at TechnoAlpin and the skiing industry as a whole still have room for improvement, and our task is to **operate ski resorts in a carbon-neutral manner.** A responsible use of resources and the use of renewable energy are in the inherent interest of all those who live and work in the mountains. Innovative solutions have already led to significant savings. **The ecological footprint of winter sports is no larger than that of comparable activities.** On the contrary - the mountain location favors the use of renewable energy. Studies also show that ski operations **do not negatively impact biodiversity.** The initial fears often expressed about snowmaking should have been dispelled long ago.

Climate change will undoubtedly influence winter sports, but it will not make them impossible. Technological innovations make it possible to **expand snowmaking systems in a sustainable way.**

Snow and winter sports hold a fascination for millions, which they can follow without a guilty conscience. This brochure summarizes facts and scientific information to give winter sports the positive image they deserve.

THE HARD FACTS
ABOUT
SNOWMAKING AND
WINTER SPORTS:



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- › Technical snow is made exclusively from **water and air**.
- › Water used during snow production stays in the natural cycle. The **water isn't used up**, it's temporarily stored as snow instead. When the snow melts, the cycle continues.
- › Snowmaking and lift equipment are powered exclusively by electricity, and this is predominantly **generated from renewable sources** in the Alpine regions.
- › Around 80% of CO₂ emissions generated by a winter vacation are caused by travel and accommodation. According to the Austrian Federal Environmental Agency, a summer vacation in Austria causes roughly the same amount of CO₂ emissions as a winter vacation.
- › Winter sports are an **important economic factor** in the Alpine regions, with a **multiplication factor** of between 6 and 8. Every 1€ in revenue generated by the lift companies translates to between 6€ and 8€ for the region.

INNOVATION MAKES THE DIFFERENCE

Technology leader TechnoAlpin's product range is shaped by the constant search for innovation solutions. Our approach is characterized by the careful use of resources.



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- › Modern fan guns from the current generation create around **15% more snow** using the same amount of energy (comparison of T60 from 2007 to TR10 from 2019).
- › Noise emissions are also reduced by approx. 10% (comparison of T60 from 2007 to TR10 from 2019).
- › Up to **70% of energy can be saved** by replacing the lance head.
- › 115 international patents have been registered, of which 52% are directly linked to increased sustainability.
- › €8 million is invested in research and development annually.
- › 90% of identical parts in current fan guns simplify procurement and optimize storage.
- › One motor drives the compressor and turbine, which means one electric motor less is required.
- › Standard variants equipped with the essentials also help to ensure an additional reduction in materials.
- › TechnoAlpin snow guns are predominantly made from easily recyclable materials.
- › **Oil-free compressors** in the snow guns ensure that not a single drop of oil is released into the environment.
- › **New valve technology makes optimum use of each of these drops of water** because the residual water in the nozzles is fed into the snow jet during step switching, converting it to snow. In conventional systems, this residual water is discharged when changing stages.
- › **Small power stations** can use the infrastructure of these snowmaking systems to generate energy.
- › Various snow management tools allow for forward planning and ensure that not one snowflake too many is produced.



STATEMENTS TO CLARIFY ANY AMBIGUITIES

Increasingly strong criticism is being leveled at winter sports in general and snowmaking in particular. The aim of this document is to remove any ambiguities and set the record straight about resource requirements. Below you will find questions that we are regularly confronted with, as well as scientific knowledge and our arguments.



**SETTING
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01

How much energy
is required
for snowmaking?

QUESTION

¹ <https://www.wko.at/oe/transport-verkehr/seilbahnen/oekologie-und-umwelt>

² <https://www.wko.at/oe/transport-verkehr/seilbahnen/seilbahnen-und-energie-factsheet.pdf> >

One of the unique features of snowmaking is the huge amount of intermittent power it requires over a very short period of time.

Modern snowmaking systems run for up to 200 hours per season. This very short amount of time ultimately sets the snow base for the entire winter season. Beyond these 200 or so hours of operation, the systems require very little power. Alpine regions are particularly well suited for generating and using renewable energies. **Around 90% of energy used for snowmaking in Austria comes from renewable energy.**

At Snow Space Salzburg, for example, using green energy for snowmaking can save 9,800 tons of CO₂.

In recent years, ski area operators as well as manufacturers of ski lifts, snow groomers and snowmaking systems have made great efforts to reduce their energy consumption and use electricity from predominantly renewable energy sources. Sustainable developments in the field of winter sports are in the best interests of everyone involved.

The energy required by ski areas should also be considered in relation to overall demand and alternative leisure activities.

In Austria, Germany and Switzerland, ski areas need between 0.01% and 1.2% of the annual overall energy requirements. In comparison, significantly more energy is lost to devices in standby mode.

	National energy requirements overall	Ski area energy requirements, incl. for snowmaking	% of national energy requirements	Energy used by devices in standby mode
AUT	72,300 GWh	750 GWh	1.2%	800 GWh
GER	483,900 GWh	42,5 GWh	0.01%	10,500 GWh
SUI	57,000 GWh	210 GWh	0.34%	2,000 GWh

If ski areas were to adjust their operations or only offer them on a very limited basis without snowmaking, it can be assumed that a portion of winter sports tourists would opt for alternative activities that require a significantly higher energy supply. The overall energy used per skier per day in Austria (for lifts, snowmaking, slope preparation, gastronomy, heating and infrastructure) is around 18.0 kWh.¹

In comparison, for the same amount of energy you could:

- › Drive a modern mid-class car (7 l per 100 km) for 26 km trip and a duration of around 23 minutes.

Alternative activities in comparison to skiing:

- › ½ hour jet skiing at sea = 7 days of skiing.
- › If someone from Vienna flies to Palma de Mallorca, they could spend 30 days skiing in Austria and use the same amount of energy.
- › If someone from Vienna flies 8,906 km to the Caribbean, this person could use the same amount of energy to spend 105 days skiing in Austria AND use the cable daily from July through to September to go hiking.
- › If a person travels 7,780 km from Hamburg to New York on a mid-size modern cruise ship, this person could spend 351 days skiing in Austria and would consume the same amount of energy.²

02

Is climate change a decisive factor for the expansion of snowmaking?

QUESTION

Climate change has a big effect on ski area operations. But it is not the main reason for increasing investments in snowmaking systems. **This is much more related to being able to be better prepared for the season and deal with increased guest requirements.** Besides the size of the ski area, snow guarantee and slope quality are some of the most important factors when selecting a ski area. High investments in infrastructure require certainty and predictability when it comes to a ski area's most important resource: snow.

03

Will climate change make it impossible to make snow, or massively increase CO₂ output?
Do current investments still make any sense?

QUESTION

The FuSEAT (Future of Snow Cover Evolution Austria) projects investigated the effects of climate change on guaranteed snow in the mountains, taking snowmaking into consideration. **If the Paris Agreement (2-degree warming) is adhered to, almost all ski areas with snowmaking will continue to have guaranteed snow.** Weather conditions for snowmaking decrease by about 10% at altitudes between 1,500 and 2,000 meters. Climate protection therefore has an enormous influence on the snow situation, and so it is clearly in the interests of the winter sports industry to be keenly aware of this.

A current Canadian study predicts an increased need for snowmaking in the coming years, and higher energy requirements as a result. It also considered technical developments and efforts to promote the use of renewable energy sources. The authors concluded that Canada's decarbonization policy would mean that **future emissions would continue to be under the current base value, even with a significant increase in snowmaking.**³

04

Do winter sports
cause more
CO₂ emissions than
alternative activities?

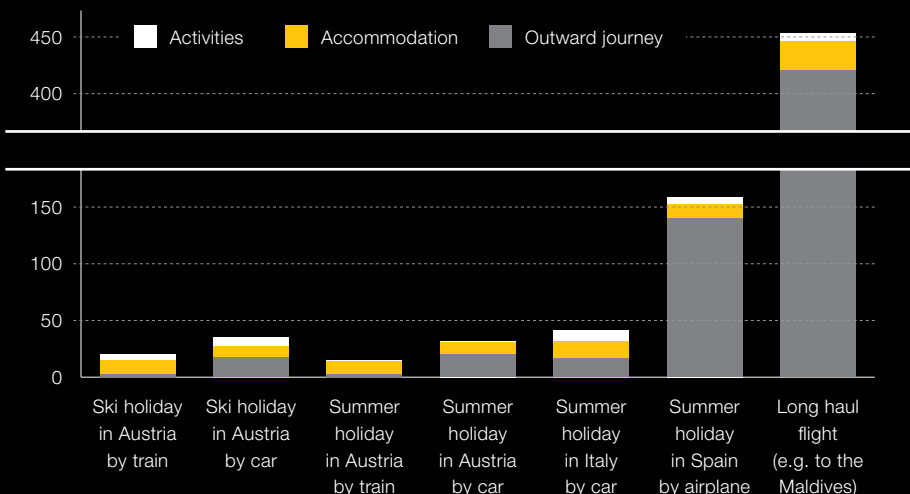
QUESTION

⁴ https://www.umweltbundesamt.at/fileadmin/site/aktuelles/2018/treibhausgasbilanz_urlaubsreisevergleich_factsheet2018.pdf >

The Austrian Federal Environmental Agency published the greenhouse gas balance of various types of vacation in 2018. It showed that mode of transport and distance have the greatest effect on vacation-related CO₂ emissions by far. Choice of accommodation is the second biggest factor. On-site activities play a lesser role in the greenhouse gas balance.

Summer and winter vacations in Austria create roughly the same carbon footprint⁴. This doesn't mean that winter sports destinations and the industry as a whole can reduce their efforts, however. But the balance does show that switching to an alternative activity in a destination further away can have an overall negative effect on the CO₂ balance created by tourism.

kg CO₂ emissions per person per day



05

Does snowmaking have a negative effect on the water supply and can this lead to a water shortage?

QUESTION

⁵ https://info.bml.gv.at/dam/jcr:c6bb05d2-418e-4905-a66c-325a7d39756c/Bericht_Wasserschutz_Zusammenfassung_gsb.pdf

⁶ Ulrike Pröbstl-Haider von der Universität für Bodenkultur in Wien
<https://www.wko.at/oe/transport-verkehr/seilbahnen/mgv-ulrike-proebstl-haider.pdf> >

Water used for snowmaking isn't used up, instead it melts and evaporates, then returns to the natural cycle unpolluted. Technical snow is made exclusively from water and air. Snow production doesn't create usage conflicts with the population's drinking water supply, as **no drinking water reservoirs are tapped.**

In South Tyrol, only about 0.2% of the annual precipitation is used for snowmaking. 86 billion cubic meters of usable water is available in Austria. This is the total of precipitation and flowing water minus evaporation.⁵ The total amount of water needed for technical snowmaking in Austria per year is around 48 million cubic meters. **Snowmaking therefore uses approximately 0.06% of all usable water in Austria.**

Ulrike Pröbstl-Haider from the University of Natural Resources and Life Sciences in Vienna published the following statement on this topic: "A large-scale water shortage is not possible in the Northern or Western Alps due to high precipitation in the mountains. There is no water shortage here. Water shortages in the Southern Alps may be possible, but even here the proportion of snow-covered ski slopes is between 0.6 and 1.5% of the Alpine area, depending on the region. **Which means that the remaining 98.5% could not dry out completely.**"⁶

06

Do winter sports
have a negative effect
on the Alps?

QUESTION

⁷ <https://www.sueddeutsche.de/reise/>

[skifahren-wintersport-umwelt-klimawandel-1.5509694?reduced=true](https://www.sueddeutsche.de/reise/skifahren-wintersport-umwelt-klimawandel-1.5509694?reduced=true)

⁸ Autonome Provinz Bozen-Südtirol (2014). Fachplan Aufstiegsanlagen und Skipisten: Band 1 Duchführungsbestimmungen, Berich. https://assets-eu-01.kc-usercontent.com/e90ea1ed-9101-0155-579f-5243d49e1f43/fa21e831-b75f-432a-b43a-92688326c4f5/BAND1_DE_BLR2_1545.pdf

⁹ Verband Deutscher Seilbahnen. Standpunkte 2022 https://www.seilbahnen.de/wp-content/uploads/VDS_standpunkte_SBEnergie-Nov2022-1.pdf >

Ski resorts are an important economic development factor in many valleys in the Alps and contribute to the prosperity of areas that don't have many alternative economic sectors. Because of this, ski areas are considered as economic sites with a high value-added factor. 1€ revenue in a ski area can create up to 8€ revenue for the region. **Concentrating high numbers of people on prepared slopes also has ecological advantages**, as it takes the pressure off the rest of the landscape and, for example, means that wild animals are less disturbed and young trees are not damaged, as is the case with individual activities that take place away from official slopes. **From an ecological standpoint, individual ski tour routes disturb 60 times more surface area.**⁷

Ski areas only use a very small part of the Alpine regions' territories. In South Tyrol, only 2% of the area is covered by so-called ski zones, or areas in which the development of skiing is even possible⁸, while 0.8% of the Bavarian Alps are used for ski slopes. That amounts to around 37 km².⁹ Tourist development in the form of ski slopes takes up around 0.28% of Austria's total area.

07

Do ski slopes,
and snowmaking
in particular,
have a negative effect
on biodiversity?

QUESTION

A study conducted by Schmittenhöhenbahn AG¹⁰, operator of Schmitten ski resort (AT), on biodiversity on ski slopes examined botany and the dissemination of various types of insects on slopes that have been covered with snow and groomed for several years. It determined that agricultural practices (mowing and fertilization) exceeded all other influential factors to a high degree. Management during the summer had a significant effect on how biodiverse the slopes were. **Some ski slopes are not subject to the high yield expectations imposed on agricultural areas, which allows for more resource-saving cultivation.** If no yield needs to be generated, then it's in the operator's interest to mow as little as possible. Fertilization is adjusted in these areas and mowing is done as late as possible. Both of these things are good for plant and species-rich meadows.

More than 20 different plant communities were found during snow mapping at Snow Space. In comparison, an average front garden lawn is only home to 6-7 types of flora. It can therefore be concluded that **snowmaking does not have a negative effect on biodiversity, and instead actually has a positive influence** since the ground cannot be damaged by skiers as it is completely covered in compact snow.

08

Are fewer people
going skiing?

QUESTION

Laurent Vanat, expert in tourism, publishes an annual report on winter tourism. Since the start of the 2000s, **the annual number of visitors to ski areas globally has remained at a stable level of between 350 and 380 million people.** The only ski market seeing a significant drop is Japan. Established markets continue to show stable levels with a small amount of growth. The 2006/2007 season saw a slight drop in the number of skiers due to poor weather conditions. Likewise, the 2019/2020 and 2020/2021 seasons were severely affected by Covid-19 restrictions.¹¹ During the 2021/2022 winter season, more than 370 million people across the globe visited ski areas for the first time, even though restrictions were still present in core markets.



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