

Can we produce snow sustainble?

Outline for group discussion

April 30th, 2010

M. Breiling, TU Wien, TTL

Six identified fields of action for producing snow



1. Climate change adaptation and support for local residents
2. Intelligent energy use and renewable energy systems
3. Wise water and other resource use
4. Snow saving strategies
5. Higher quality snow production
6. New ways of snow production



Climate change adaptation and support for local residents



- Climate change is proceeding
 - A snow rich winter like 2009/10 is unlikely to return on a regular base
 - Warmest winter was in 2007/08 on Northern Hemisphere
 - Regardless the altitude range, all skiing areas were affected
- Climate Change Adaptation in Winter Tourism Countries
 - Practiced since 25 years
 - More efficient, new transportation system for winter sports
 - Infrastructure of artificial snow was established
 - Smaller skiing resorts in lower elevations were pushed out of business



Intelligent energy use and renewable energy systems (RES)



- Artificial/technical snow is common adaptation practice
 - has to be combined with renewable energy systems
 - 20% RES required in Europe in 2020
 - Should be much higher in mountains
 - In Austria this share should be 34%
 - There are many possibilities to gain renewable energy particularly in mountains
 - » Solar energy & photovoltaics
 - » Water
 - » Wind
 - » Biomass
 - » Geothermal



Wise water and other resource use



- Water resources are limited in many locations of artificial snow production
 - Conflicts skiing industry with environment and water protection
 - Large reservoirs needed as ponds for artificial snow making
 - Highest water demand in period of lowest water supply
 - Problems with sewage treating in cold period
 - EU WFD requires improvement of water systems until 2015



Snow saving strategies



- Principle of conserving snow that would otherwise melt
 - How to overcome the warm period
 - How to improve environment conditions to get better natural cooling
- In particular relevant for colder regions in Europe
 - High mountain regions
 - E.g. snow farming on glaciers
 - Northern latitudes of Europe
 - Provision of snow storage facilities





Higher quality snow production

- Artificial/Technical Snow in current form is rather production of „ice“
 - Implications for environment
 - Composition of plants
 - Reduction of vegetation period
 - Implications for exercising winter sports
 - Natural snow is favored by many skiers
 - UNESCO snow classification to „certify“ particular states of produced snow
 - Standardization of snow classification required



New ways of snow production



- Current technology is first generation snow production
 - Many improvements are possible and on the way
 - Cloud seeding methods
 - Major project in US (6 million US\$)
 - Freezing of soil top layer
 - To protect snow from the bottom, large project in Northern Scandinavia (4 million €)
 - There are also risks in relation with new methods
 - Use of methods with MOs



Sustainable snow production?



- Is an aim that does not yet exist:
 - To make current snow production
 - More environmentally friendly
 - Minimize conflicts of resource consumption
 - Minimize unwanted impacts
 - More economically viable
 - Come down with price of snow production
 - Increase the use of snow production to other fields
 - » Species protection
 - » Agricultural production
 - » Other uses
 - More accepted publically and
 - avoiding possible threats to human health
 - Sustain winter sports in warmer climates



Thank you for your attention!



Danke für Ihre Aufmerksamkeit!



Comments: meinhard.breiling@tuwien.ac.at