



# **The sustainability of snowmaking**

## **A conceptual analysis**

Robert Steiger  
Institute of Geography  
University of Innsbruck



## Outline

- Sustainable snow production – A relevant topic ?
- Snowmaking – is it necessary ?
- Different modes of snow production and its reasons
- Sustainability of snowmaking
- Potential impacts of climate change
- Concluding remarks



# Sustainable snow production – A relevant topic ?



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## Background – Energy consumption

- Energy index of Austrian cableways in the last 10 years increased by 43,8 % (Manova 2009)
- 5,3 % of annual turnover is spent for energy (2008/09)
- Snowmaking accounts for 1/3 to 2/3 of total energy consumption of ski lift companies depending on the type of snowmaking and intensity



## **Background – Costs of snowmaking**

- Costs of snowmaking between 10-20% of turnover
- A further increase is to be expected in the next years



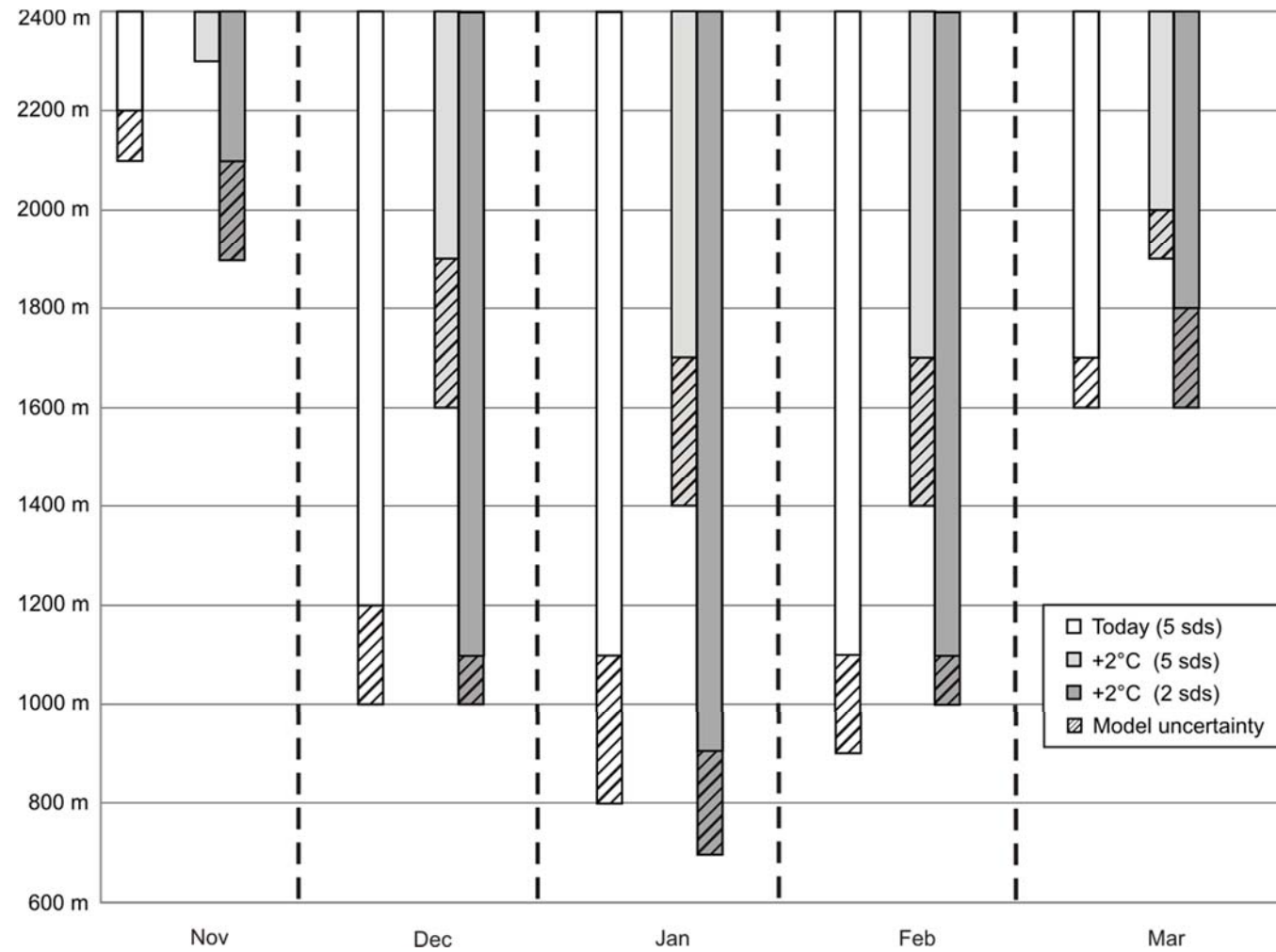
# Snowmaking – is it necessary ?



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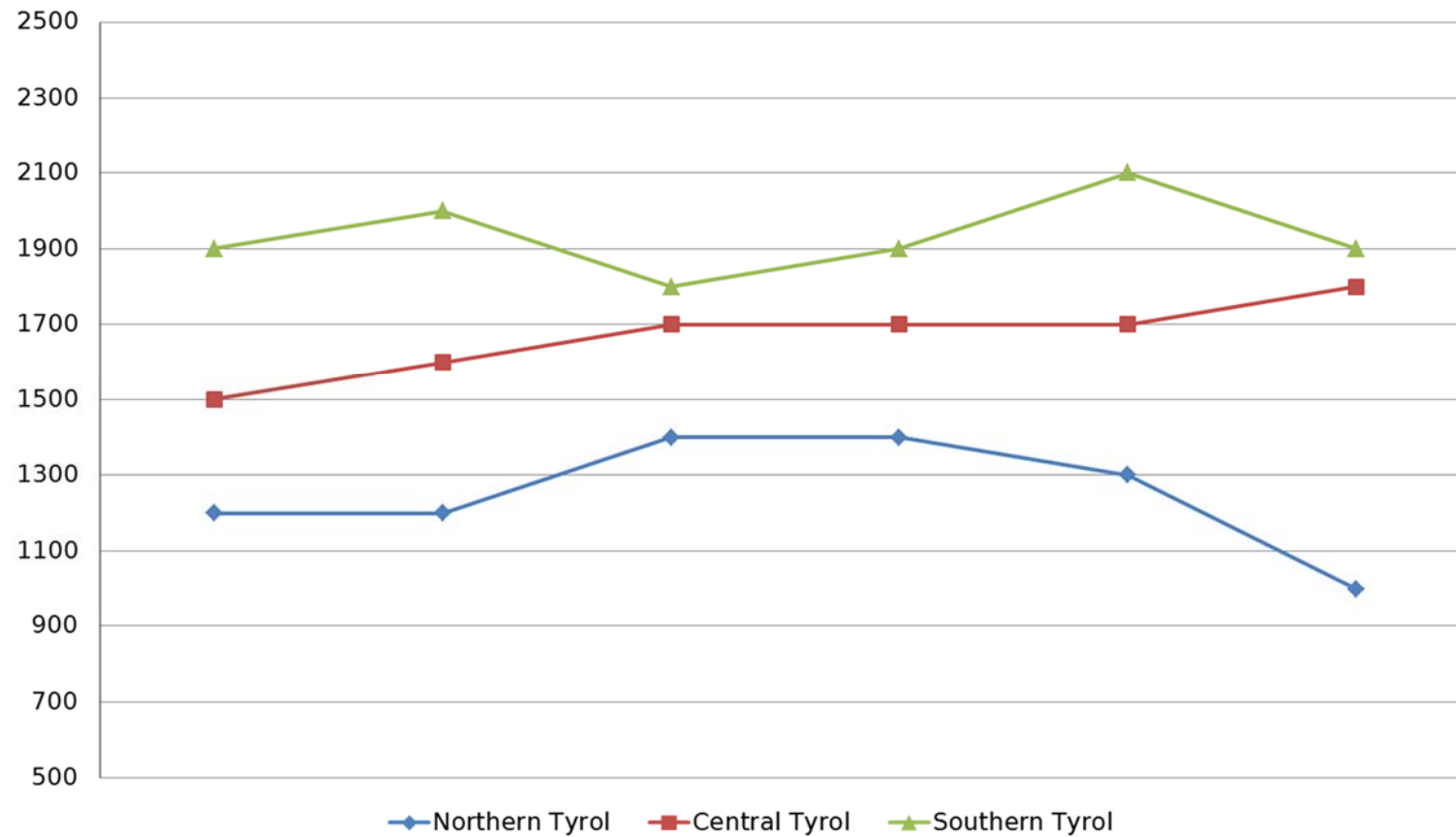
# Snowmaking - is it necessary ?





# Snowmaking – is it necessary ?

The altitude of natural snow reliability from West to East (Tyrol)

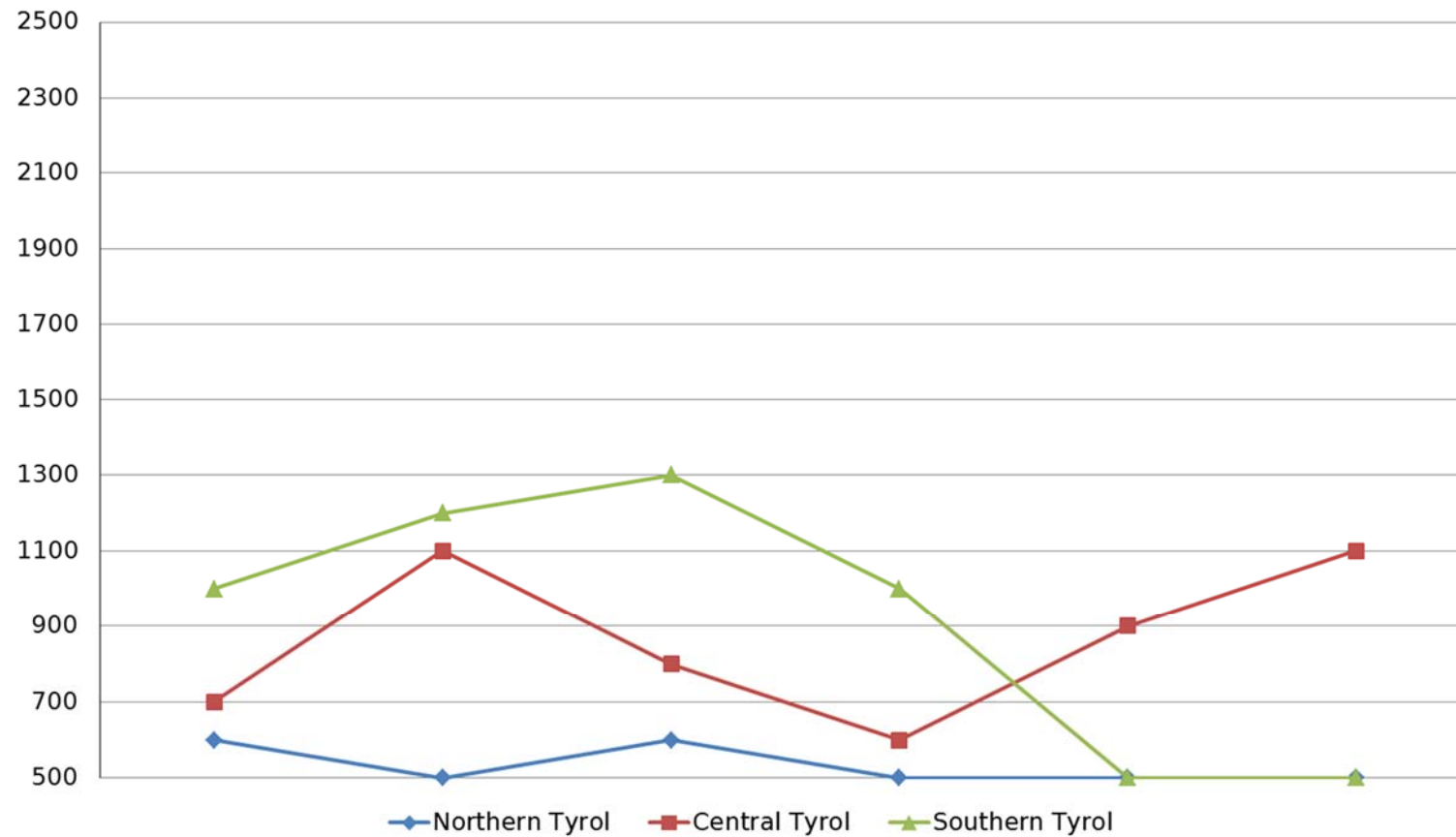






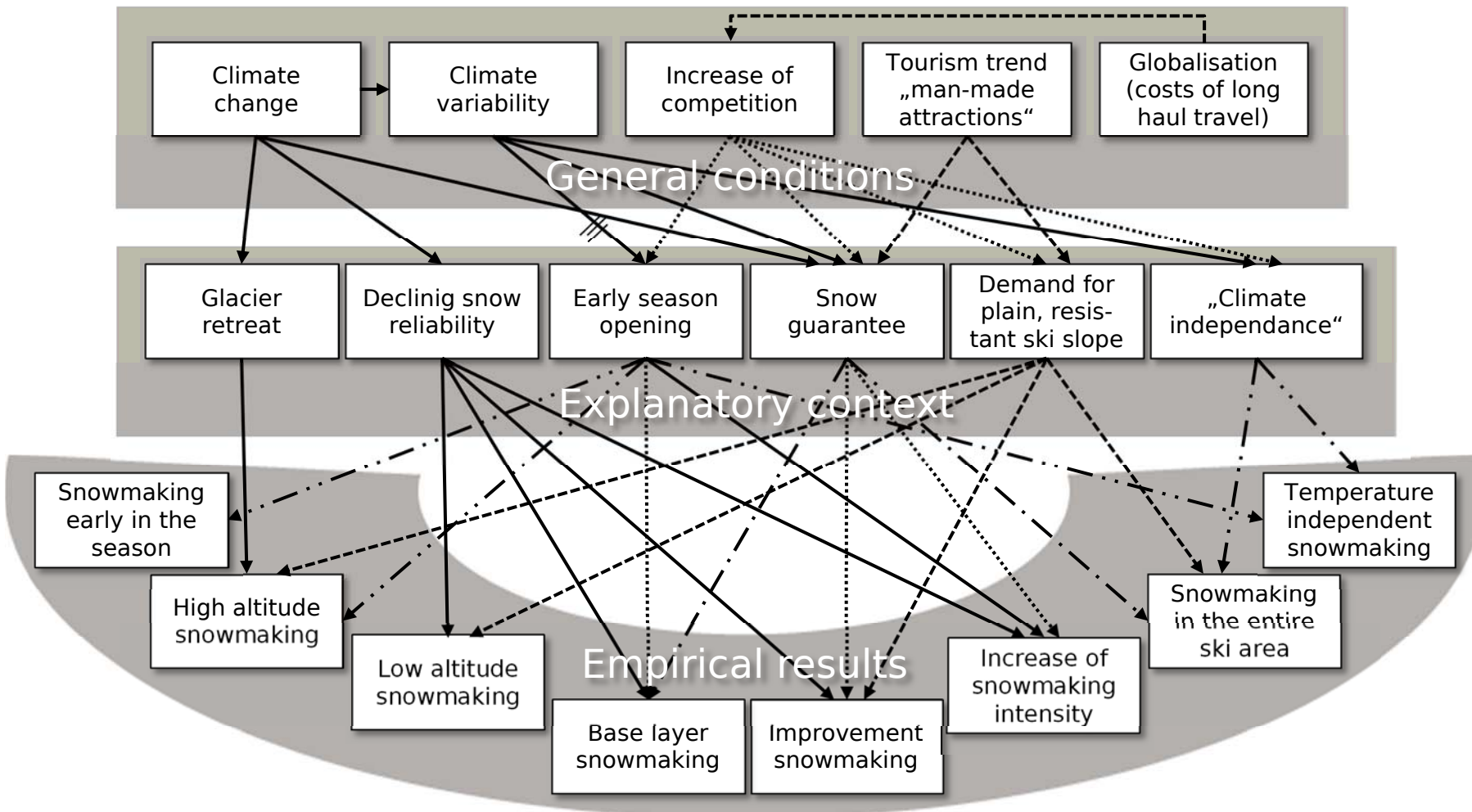
# Snowmaking – is it necessary ?

The altitude of technical snow reliability from West to East (Tyrol)



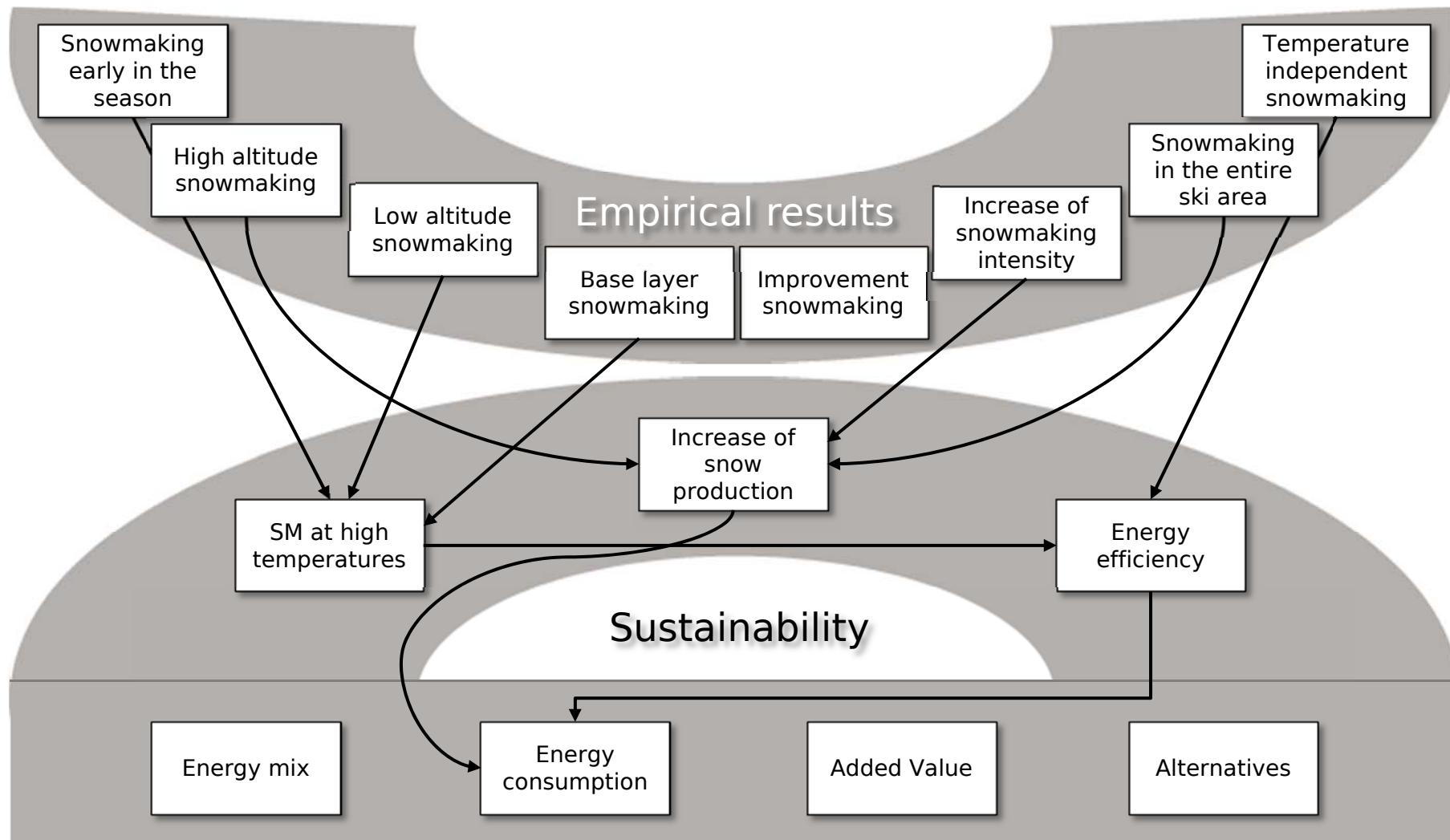


# Different modes of snow production





# Sustainability ?





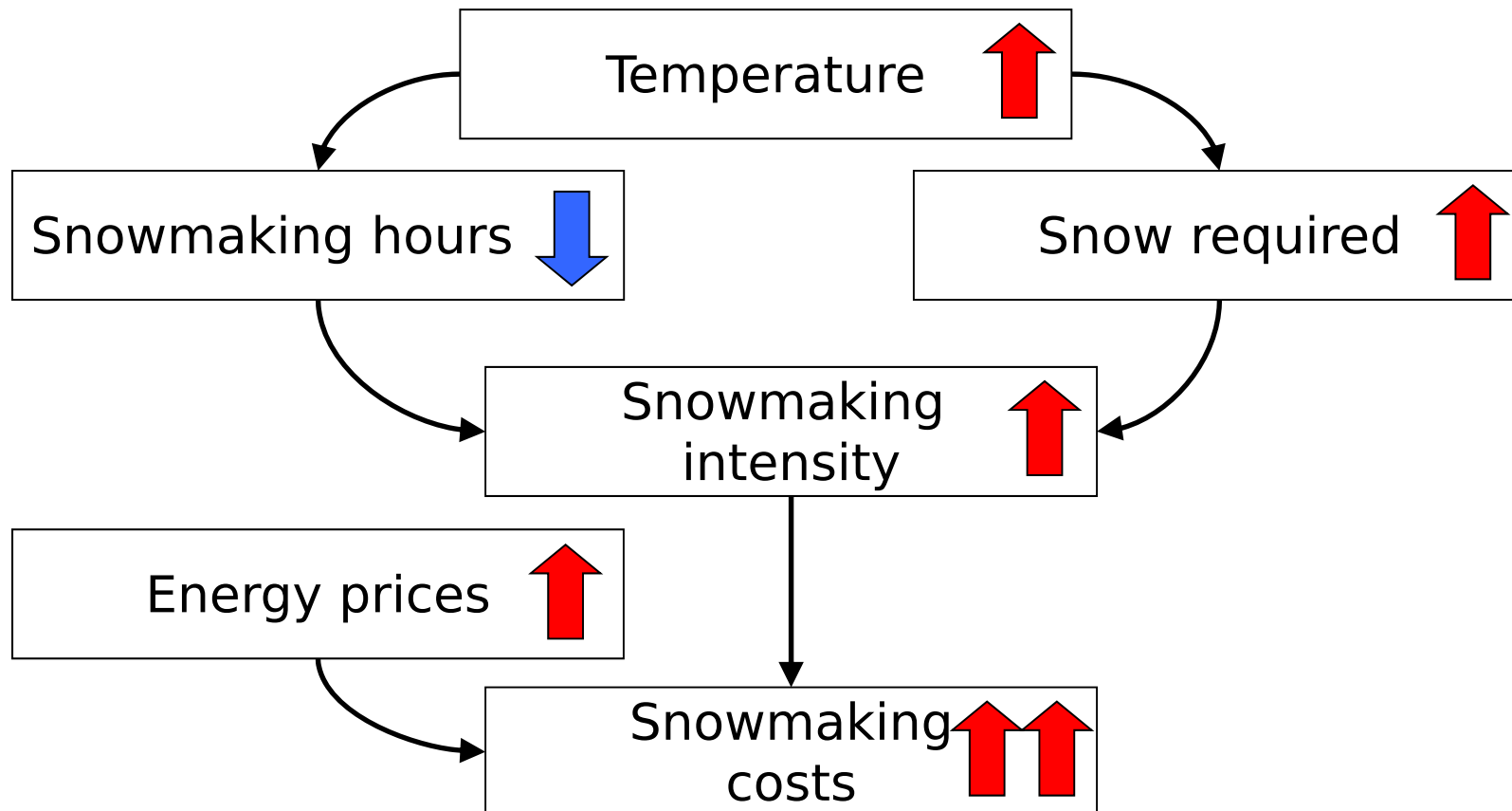
# Potential impacts of climate change



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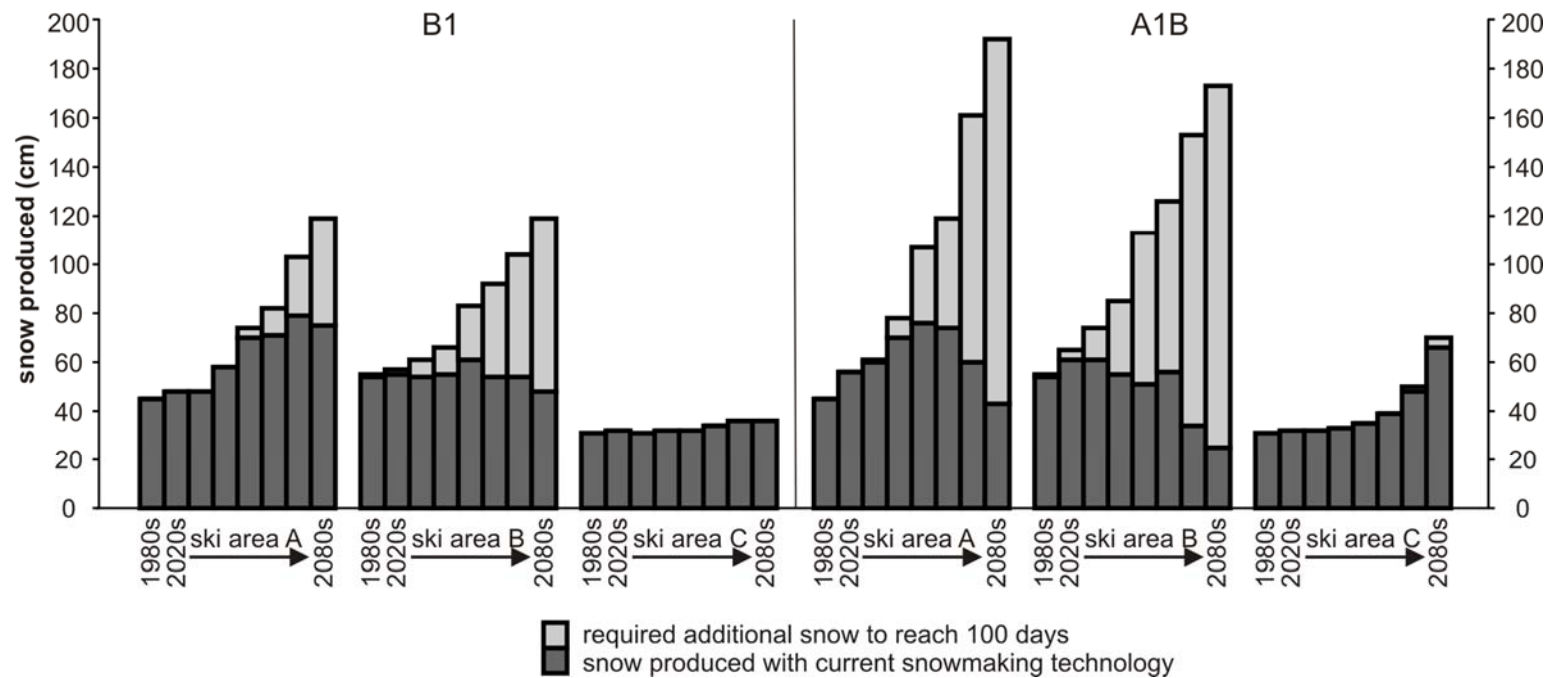


# Potential impacts of climate change





# Potential impacts of climate change





## **Actions required for sustainable snow production**

- Change in the (temporal & spatial) use of snowmaking
- Increase snowmaking efficiency
- Monitor specific snowmaking costs & gains from it
- Further technological development to increase energy efficiency
- Own energy production from renewable sources



**Thank you!**



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