



# On the natural advantages of a ropeway project

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# Sustainability of ropeways

## Hangursbanen, Voss - Norway





# Some historical facts

- MA Millennium Ecosystem Assessment (2005)
- TEEB The Economics of Ecosystems and Biodiversity (2010)
  
- UK NEA UK National Ecosystem Assessment (2011)
- NOU The benefits of Nature – on the value of Ecosystem Services (NOU 2013-10)



# Ecosystem Services



- ▶ **Supporting services**  
Services necessary for production of other ecosystem services
- ▶ **Provisioning services**  
Products obtained from ecosystems
- ▶ **Regulating services**  
Benefits obtained from the regulation of ecosystem processes
- ▶ **Cultural Services**  
Non-material benefits people obtain from ecosystems and landscape



# Ecosystem Services







## Supporting Services

-  Nutrient cycles
-  Soil formation



## Provisioning services

-  Food
-  Water
-  Minerals
-  Pharmaceuticals





# Ecosystem Services



## ➤ Regulating Services

- Carbon sequestration
- Waste decomposition and detoxification
- Crop pollination
- Pest and disease control

## ➤ Cultural services

- Recreational experiences
- Scientific discovery
- Spiritual enrichment



Voss Resort – downhill slopes, skilifts, chairlifts and aerial ropeways

Courtesy: Voss Resort AS





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Lower station located in close connection to the railway station.



# Ropeway data and characteristics:

Concept: Tricable gondola lift

Lower station at 58 meters above sea level

Top station at 815 meters above sea level

Profile length: 1,800 meters

Number of gondolas: 13, each gondola capacity 34 people

Distance between gondolas: 420 meters

Travelling speed: 7 m/s

Capacity: 1,500 passengers/hour each direction

Number of towers: 3

# Magnitude of reduced CO<sub>2</sub>-emissions.

## Preconditions:

- each day in the weekend 1000 passengers travel by train rather than by car
- this makes 500 cars less on the road each day
- a similar number of people utilize these facilities the rest of the week
- i.e: 1,500 cars less on the road for the whole week
- these conditions are valid for 17 weeks – skiing season
- the CO<sub>2</sub> –emission of each car is on average 150 g/km.
- the distance not travelled is 250 km (Bergen-Voss/return)

# The social cost of CO<sub>2</sub>-emission

The value of damage avoided due to a small emission reduction is estimated to be EUR 207 per ton (Nature Climate change)

Reduced CO<sub>2</sub>-emission calculated: 960 tons per year

Economic value: EUR 200,000 per year



# Present value. Shadow cost of capital

Preconditions:


- ropeway lifetime is estimated to be 50 years
- economic discount rate the first 40 years is 4%
- the next 10 years 3%

Present value of economic benefit: EUR 4.5 millions

which represent in the order of 20% of the ropeway construction cost.

# Summary

50 000 passengers travelling by rail rather than by car,  
causes a CO<sub>2</sub>-reduction priced at:



EUR 200,000 each year

or EUR 4.5 mill. in 50 years

or 20% of the ropeway construction cost



Thank you for your attention !

Courtesy: Voss Resort AS