

State-of-the-Art Adaptation in Finland

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Finnish Transport Agency contributes to the development of Finland's transport system

We are responsible for **the Finnish roads, railways and waterways** and the comprehensive development of the **transport system**.

We promote **traffic safety** and the balanced and sustainable development of the regions.

We enable smooth, efficient and safe **travel and transport**.

We are a multidisciplinary **expert organisation** specialising in transport, and operating under the jurisdiction of the Ministry of Transport and Communications



Infrastructure provides a platform for growth

€ Infrastructure assets

20 billion €

€ Current spending on ongoing projects

2.6 billion €

€ FTA's share of the total infrastructure market

1/5

€ Annual budget approximately

2.1 billion €

FTA personnel, permanent

620
experts

Number of people the FTA employs indirectly through projects

12,000



Railway statistics

2,463
level crossings and
44
tunnels on the
main lines

Annual rail freight
volume
33
million tonnes

Length of the
Finnish railway
network

5,900
kilometres,
of which
90 %
on single track

Number of
annual train
journeys
76
million



Road statistics

Motorways, approx.

880 km

Pedestrian and
bicycle lanes

5,320 km

Bridges

15,000

Finland has
approx.

78,000
km of highway

270

million tonnes of
goods carried by
lorries annually

Passenger transport
amounts to

95 %
and freight transport to

69 %
of all road transports



Maritime statistics

About

8,300

km of coastal
fairways and

8,000

km of inland
fairways

Finland has

26

ports kept open all
year. About

80 %

of the freight traffic
is handled by 10
ports.

25,600

aids to navigation
(lighthouses,
buoys and spar
buoys) in the
fairways

Total length of
merchant shipping
lanes in Finland

4,000
km



Impacts of Climate Change

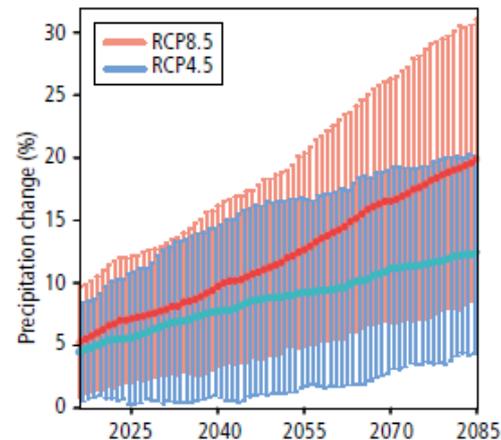
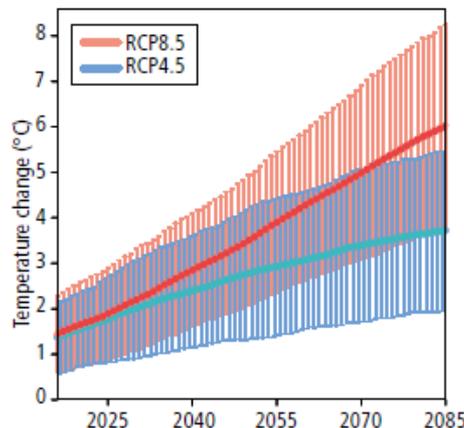


Climate projections for Finland

The temperature increase in Finland is expected to be more than 1.5 times as large as the global mean warming on average

- The temperature change in Finland is expected to be 2.4 C by 2040 and 3.6 C by 2080 in the RCP4.5 scenario representing fairly moderate emissions (2.9. and 5.8 C with high emissions).
- The projected increase in precipitation will be substantial.
- During the latter half of the 21st century, climatic changes will depend strongly on the emission path.

Projected temporal evolution of annual mean temperature (left) and precipitation (right) in Finland by 2085, relative to the means for the period 1971–2000. The thick solid lines represent the multimodel means, hatching the 90 per cent confidence interval of the projection. Both are given separately for the moderate-emission scenario, RCP4.5 (blue), and the high-emission scenario, RCP8.5 (red)





Railway infrastructure is affected by...

Rising temperatures
Increasing precipitation



Changes in freeze-thaw cycles and snowfall
Increasing frequency or intensity of strong winds or lightning





Sectoral estimates of the economic impacts of climate change in Finland

Sectoral estimates of the economic impacts of climate change in Finland, and a summary of current research from the Finnish perspective (positive economic impact figures denote a net benefit)

Sector	Economic impacts	State of research
Tourism	By 2020, EUR 107 million; by 2050, EUR 107 million; by 2080, EUR 107 million (changes in net value added).	International research, with Finland involved from 2006. Research conducted within Finland in 2005.
Insurance	Weather and climate risks increasing, no overall estimates on economic impacts.	No Finnish research.
Agriculture	<ul style="list-style-type: none"> By 2020, EUR 60 million; by 2050, EUR 100 million; by 2080, EUR 120 million (changes in net value added). About 0.1 per cent of GDP. 	Latest study conducted within Finland in 2005. European PESETA project in 2009.
Forestry	By 2020, EUR 75 million; by 2050, EUR 150 million; by 2080, EUR 250 million (changes in net value added).	Latest figures from 2005, estimates also from the recent VACCIA project.
Biodiversity	No economic estimates. An estimate of EUR 10,000 million regarding negative impacts within Europe.	
Health and welfare	No economic estimates.	No overall estimates, research also scarce on a global level.
Built environment	Costs due to rivers flooding: <ul style="list-style-type: none"> in Pori, EUR 40–50, or up to EUR 100 million (for flooding events occurring once every 50 years) 0.2–0.4 per cent of GDP. 	TOLERATE, PESETA, and ClimateCost estimated the impacts of river floods; no overall estimates for the built environment.
Transport and communications	Overall estimates based only on current costs. For example, weather-induced traffic accidents: about EUR 230 million; pedestrian slipping injuries: about EUR 2.4 billion.	The EWENT project and the VTT Technical Research Centre of Finland estimated current costs; there are no Finnish estimates on the overall costs induced by climate change.
Energy sector	By 2020, EUR –37 million; by 2050, EUR –73 million; by 2080 EUR –141 million (changes in net value added).	Latest estimates from 2005.



Economic, health and other societal impacts

Preliminary estimates

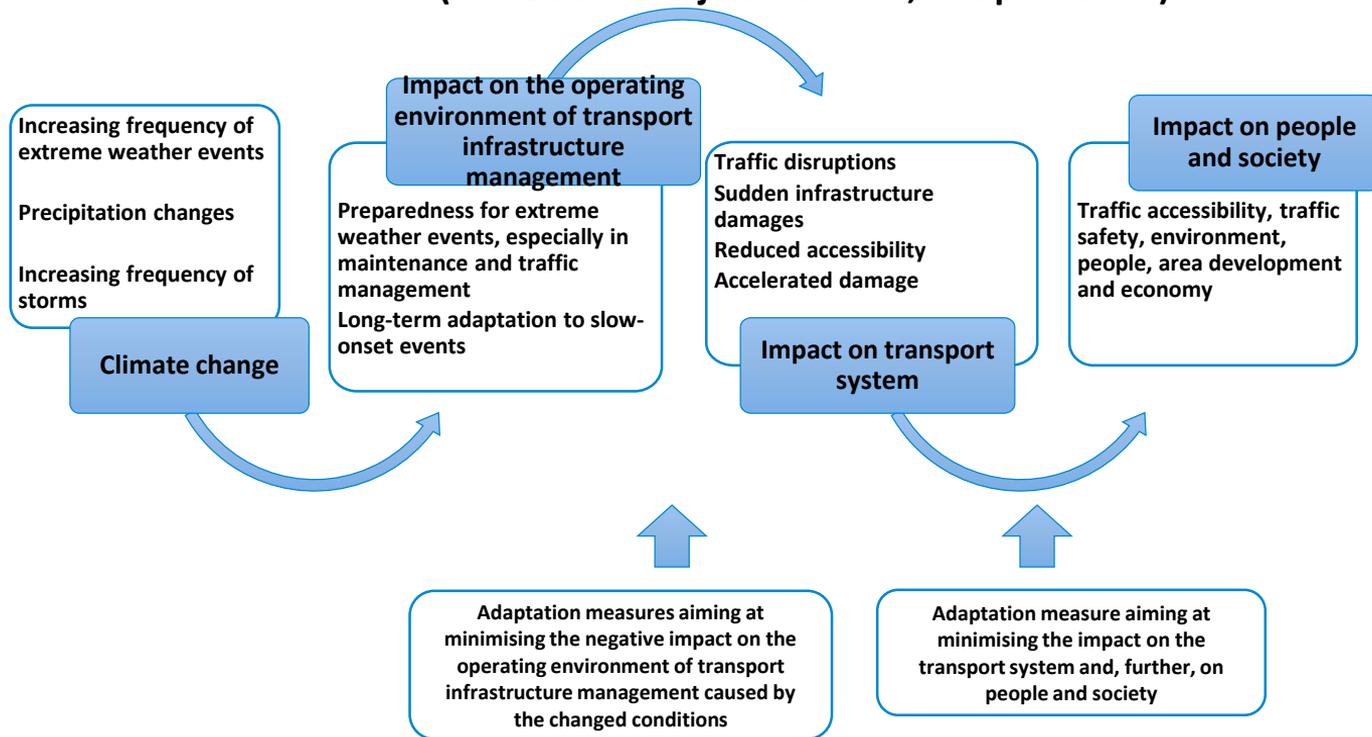
- In Finland only preliminary estimates have been made on the economic impacts of climate change
- Extreme weather events may cause **significant costs locally**
 - Additional costs due to the exceptionally large amounts of snow in Helsinki in winter 2010-2011 were estimated at 14 million euros
 - The flooding caused by heavy rains in Pori in 2007 caused economic damage estimated about 20 million euros
- So far little research has been done in Finland on the health impacts of climate change
- **Transboundary effects**
 - The repercussions of the global impacts of climate change in Finland and adaptation to these are not yet understood well enough
- **Adaptive capacity of society**
 - Some of the actions call for significant investments
- **How to reinforce the capacity of the existing built environment to the changes?**

Economic impacts of storms on electrified lines up to hundreds of thousands of euros per event





IMPACT CHART: Climate change phenomena – both the increasing occurrence of extreme weather events and the slow-onset changes due to weather factors have multiple impacts on people, the environment and society (Valkeisenmäki ja Sikiö 2015, not published).





Policy and legal framework



Key programmes and strategies in the implementation of the National Strategy for Adaptation to Climate Change (2005)

2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
									Finland's National Climate Change Adaptation Plan 2022				
							Evaluation of the strategy (2013)						
						Action Plan for the Adaptation to Climate Change of the Ministry of Agriculture and Forestry (2011-15)							
						Climateguide.fi portal							
			Climate Policy Programme for the administrative branch of the Ministry of Transport and Communications (2009, 2013)										
		Action Plan on Adaptation of the environmental administration (2008, 2011)											
		Mid-term evaluation of the strategy (2009)											
	Management group of the adaptation research programme			The co-ordination group of adaptation 2008-2013									
	Climate Change Adaptation Research Programme ISTO (2006-2011)												
National Strategy for Adaptation to Climate Change (2005)													
Regional and local climate and adaptation programmes and plans													



Policy and legal framework

- **Finland's National Strategy for Adaptation to Climate Change 2005** http://mmm.fi/documents/1410837/1721050/MMMjulkaisu2005_1a.pdf/63f5d78d-8492-4621-b019-fe38d7aeb709
 - The first policy document guiding climate change adaptation
 - Revised ->
- **Climate Policy Programme for the Ministry of Transport and Communications' administrative sector for 2009-2020** (2009)
Agencies and state majority-owned companies
 - Finnish Meteorological Institute
 - Finnish Transport Agency
 - Finnish Transport Safety Agency
 - Finnish Communications Regulatory Authority
 - Finrail Oy
 - Air Navigation Services Finland Oy
 - Yleisradio Oy
- **The Government Resolution (20.11.2014) of the National Climate Change Adaptation Plan 2022**
(Publication: Finland's National Climate Change Adaptation Plan 2022, Publications of Ministry of Agriculture and Forestry 5b/2014, in English)
 - The new national adaptation framework
- **The Climate Change Act (609/2015)**, which entered into force in June 2015, is the first national statute defining general long-term guidelines for Finland's climate change policy and laying down provisions on a planning system for climate change policy.
- **National Strategy for Energy and Climate 2030** (2016)
- On 8 February 2017 The Finnish Ministry of Transport and Communications appointed a **parliamentary working group** to define the means necessary for maintaining and developing the Finnish transport network. The working group will also consider how to meet the emission reduction targets defined in the Nation Climate Policy for the transport sector and create conditions for transport automatisisation and a digital growth environment for transport.



Climate Policy Programme for the Ministry of Transport and Communications' administrative sector for 2009-2020

Measures to take

- “Measures will be taken to achieve the climate policy aims of the administrative sector”:
 1. The vehicle fleet will be renewed.
 2. Energy efficiency in transport will be improved.
 3. The growth of passenger traffic volumes in urban areas will be directed to more environmentally friendly transport modes.
 4. The attainments of Finland's climate policy objectives will be supported by the information society and communications policy.
 5. A decision will be made in 2012 on the financial steering methods used in the transport sector.
 6. **Measures will be taken to adapt to climate change.**
 - The taken measures are reported annually. Examples of measures taken in railway 2016:
 - Protection and rescue planning was developed in collaboration with the rescue authorities:
 - >The Finnish Transport Agency contributed to the development and execution of railway preparedness training;
 - >collaboration on the transport of dangerous goods by rail – in terms of safety equipment on marshalling yards
 - Storm damages were prevented: -> continued intensified removal of trees posing risks

Preventing storm damages by removal of trees





Key measures

- Key measures in transport infrastructure management in Finland
 - **Integrating adaptation work into all activities**
 - Examining weather factors and the impact of variable weather
 - Collecting data for **risk assessment**, adaptation planning and cost estimation
 - Aiming to solve the problems of low traffic volume roads
 - **Utilising the positive effects of climate change**
- Adaptation in railway management
 - Developing warning systems jointly with weather information providers and other transport operators
 - Improving rescue services and safety information
 - Strengthening the rail structures
 - Improving protection against weather
 - Updating monitoring guidance and maintaining the infrastructure
- **It is vital to develop risk analysis methods**
- The greatest risks of damage in railway transport are posed by:
 - Traffic control and safety devices
 - Passenger information systems
 - Outdated constructions and neglected maintenance in terms of **preparedness**
- **We have to know what we are preparing for, before we can make a decision on what adaptation and preparedness measures to take**



Adaptation reports of transport infrastructure management

- Preliminary reports (per transport mode: railways, roads and waterways) on the adaptation to climate change have been drawn up for the years 2007-2009
 - Saarelainen & Makkonen 2008. Adaptation of railway management to climate change, preliminary study. Finnish Rail Administration A 16/2008. (In Finnish, summary in English) http://www2.liikennevirasto.fi/julkaisut/pdf4/rhk_2008-a16_ilmastonmuutokseen_sopeutuminen_web.pdf
 - Gaia Consulting 2009. Final report (in Finnish). Impact of climate change on the Finnish Maritime Administration's activities and the necessary measures to adapt to climate change)
 - Finnish Road Administration 2009. The effect of climate change on the routine and periodic maintenance of roads. Finnish Road Administration, Central Administration 8/2009. (In Finnish, summary in English) http://alk.tiehallinto.fi/julkaisut/pdf2/3201122-v-ilmastonmuutoksen_vaikutus_kunnossapitoon.pdf
- Other reports:
 - Prevention of storm damages: collaboration between electricity network companies, rescue authorities, emergency response centres and the Finnish Transport Agency 2013 (In Finnish)
 - Survey of public roads prone to flooding (2014) (http://www2.liikennevirasto.fi/julkaisut/pdf8/lr_2014_maanteiden_tulvakohteiden_web.pdf) (In Finnish, abstract in English)
 - Development needs regarding data management of draining systems and drainage of public roads in a changing climate 2015 http://www2.liikennevirasto.fi/julkaisut/pdf8/lts_2015-53_maanteiden_kuivatusjarjestelmien_web.pdf (In Finnish, abstract in English)



Discussion

- More integration with other transport modes?
- More cross-sectoral cooperation?





Thank you!

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