



UNECE & EEL
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Athens

**Climate Change is here
and the Impact on Roadways
should not be ignored!**

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United Nations Strategy on Climate Change (Paris Agreement)

- Keep the increase in global average temperature to well below 2°C and strive to maintain it at 1.5°C.
- Emission levels of Greenhouse Gases (GHGs) should begin to decrease as soon as possible.
- Each country must determine, plan, and regularly report on its contribution to GHGs (Nationally Determined Contributions (NDCs) by 196 parties/countries including the EU).

Priority:

Increase awareness and understanding of the urgency to act



European Commission Target

- EU is responsible for 10% of the global GHGs.
- The Transport Sector is responsible for 25% of EU greenhouse emissions.

*EU-2050: Achieve a carbon neutral economy
with zero GHGs emissions*

Through carbon offsetting or eliminating carbon emissions









Risks due to Climate Change in the Mediterranean Area

- Significant rise of Maximum Temperatures
- Reduction of rainfalls and river flows
- Increased risk of drought
- Increased risk of loss of biodiversity
- Increased risk of wildfires
- Increased water demand for agriculture
- Crop reduction
- Reduction of energy production potential
- Increased energy demand for cooling



Climate Zones in Europe

	Mediterranean Region
	Mountain Regions
	Continental Region
	Atlantic Region
	Arctic Region
	Boreal Region

Source : COM(2018) 773, 28/11/2018



www.irfnet.ch

The International Road Federation

Global, Independent, Not-for-profit Organisation

Established in **1948**. Based in **Geneva**, Switzerland

UN Ecosoc status since 1951.

Assisting **Public** and **Private** stakeholders in Roads & Mobility

Sector for the past **70 years** with:

3 Strategic Pillars of Activities

1. Knowledge
2. Connections
3. Advocacy



Members & Partners
in more than
90 countries



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Thematic Streams

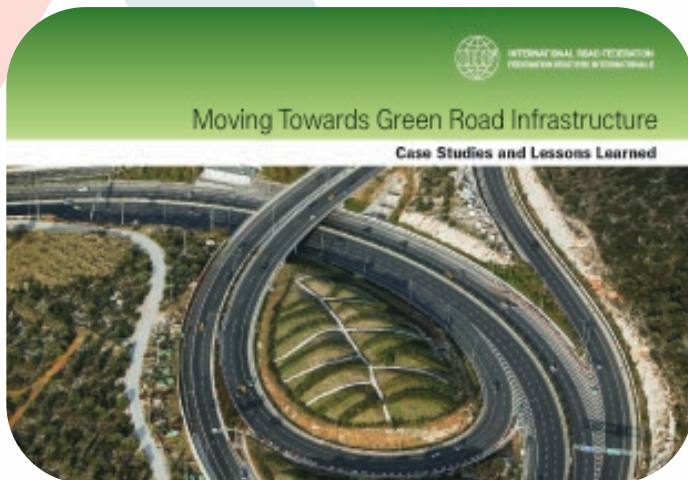


IRF Environment and Climate Change

IRF Manifesto on
Climate Change Adaptation



CHANGER
Greenhouse Gas Calculator



IRF Policy Statement
Environment



www.irfnet.ch

The Impact of Climate Change on Infrastructure

- Climate change will have a significant impact on planning, construction, maintenance and operation of road infrastructure.
- Planning of infrastructure is traditionally based on historical data, but now future climate estimations will also need to be considered.
- The target is **Resilient Infrastructure**, so as to reduce their exposure to climate change, while also aiming to reduce overall CO2 emissions.



Consequences of a Warmer World on Road Infrastructure

Extreme max. temperatures

- Asphalt melting, rutting
- Thermal expansion of bridge joints
- Structure materials

Reduction of annual rainfall

- Road foundations

Extreme Rainfall & Storms

- Landslides
- Bridge undermining, destruction or submergence
- Structural Damage
- Embankments

Floods

- Road scouring
- Road subgrade degradation
- Risk to embankments
- Expansion joint shrinkage due to scouring

Hot/Cold Variability

- Road pavement scouring
- Joint damage
- Extreme winter events



Flooding



Freeze-thaw damage



Rutting

Consequences of climate change on road infrastructure can be direct, as stated above, but also indirect, due to interdependencies with other sectors, such as energy and water.

Risks of Failed Road Infrastructure from Climate Change

Infrastructure Operators	Users	Investors	Insurers	Government
<ul style="list-style-type: none">• Loss of revenue• Damaged assets	<ul style="list-style-type: none">• Service failure• Dangers	<ul style="list-style-type: none">• Economic losses of infrastructure operators• Losses from investments reliant on infrastructure	<ul style="list-style-type: none">• Increased risks	<ul style="list-style-type: none">• Assistance with losses in extreme circumstances

An adaptable road infrastructure network is resilient to today's natural hazards and prepared for the future changing climate.



The Impact of Climate Change on Road Infrastructure



United Kingdom



Japan



South Africa



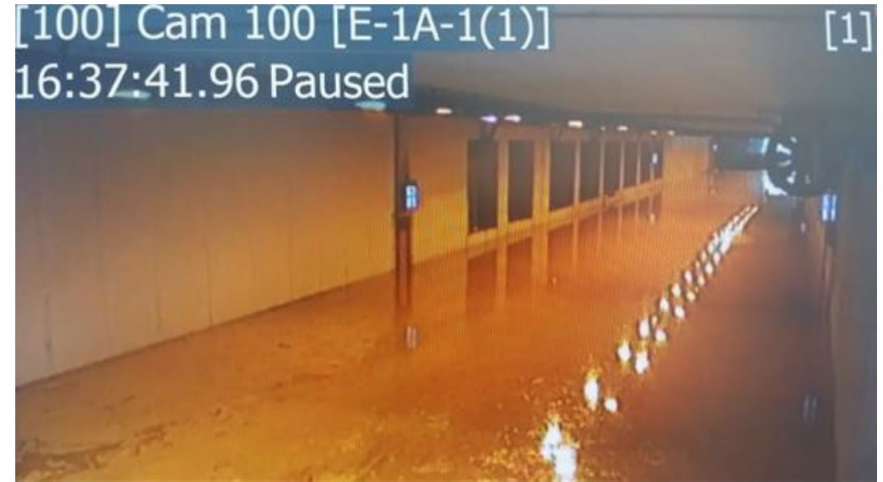
Thailand

Flood in Attica Tollway (Mandra Area, 15.11.2017)



15/11/2017 8:00:01 πμ
GTB Standard Time

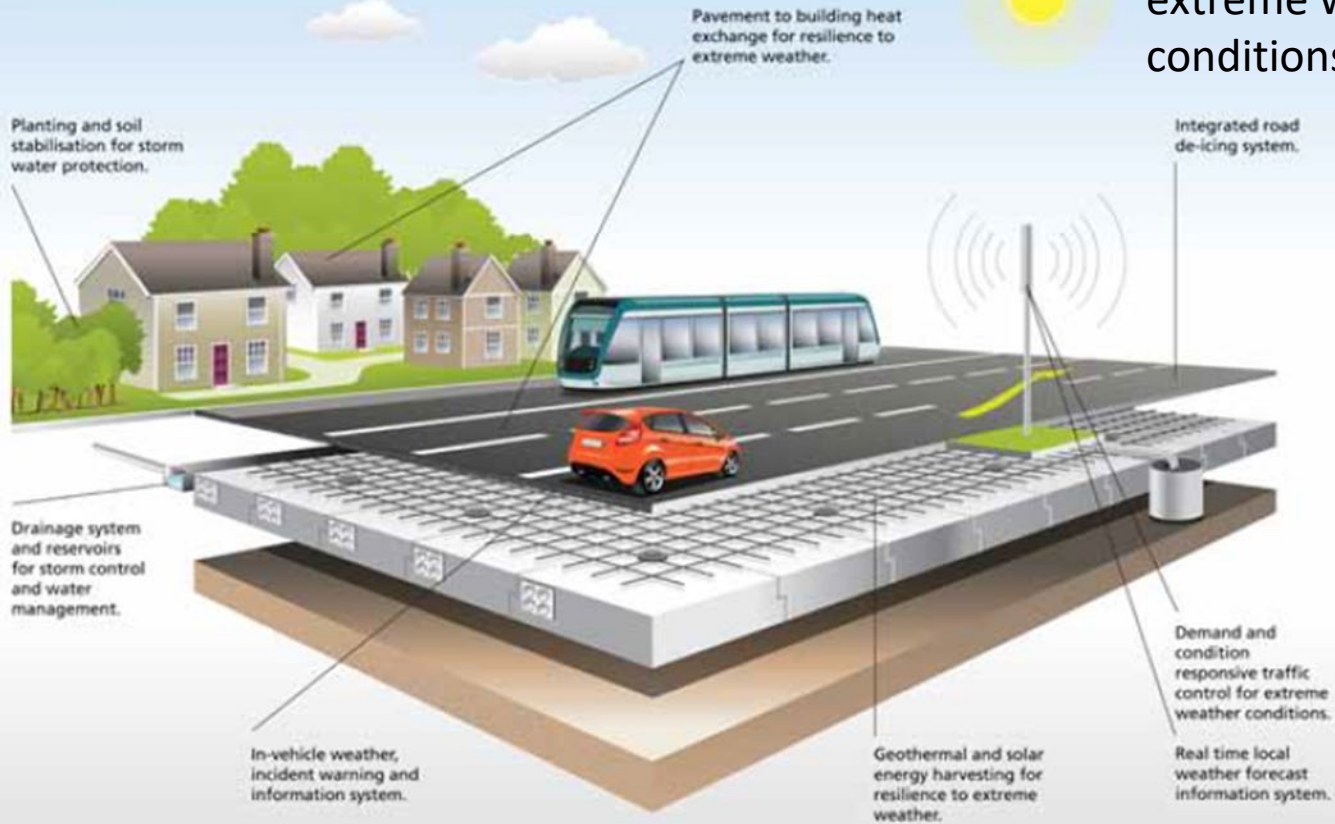
Flood in Attica Tollway (Mandra Area, 15.6.2018)



Resilient Infrastructure



The Resilient Road



The Resilient Road:
Fully adaptable to extreme weather conditions

FOREVER OPEN ROAD
Redefining Road Transport for the 21st Century



FEHRL's Flagship Programme

How will Road Infrastructure Become more Resilient?

- 1) Recording infrastructure vulnerability
- 2) Risk and consequences assessment
- 3) Identification of ways to reduce impacts
- 4) Strategic Planning
- 5) Use of new technologies



Clean, Safe and Connected Mobility to Battle Climate Change

- Zero and low-emission vehicles such as electric cars (given that electricity is produced from renewable sources).
- Promotion of smart mobility (MaaS - Mobility as a service).
- Vehicle to Infrastructure (V2I) & to other vehicles (V2V) Connectivity for the information of drivers.
- Connected and Autonomous Vehicles (CAV) for the reduction of traffic jams and crashes.



Conclusions

- Obtain consistent climate projection data sets.
- Need for strategic planning with all stakeholders.
- Need for vulnerability assessment of existing infrastructure.
- Crisis Management with alternative routes, evacuation, maintenance etc.
- Adaptation of operation and maintenance procedures.
- Adaptation of design and construction specifications to climate change data.
- Investment in innovation and multimodal and smart mobility.
- Share experiences, lessons learned and good practices.



Q: Is it possible for a person or a company to change the progression of climate change?

A: YES



Credit: Mark Garlick Getty Images

<https://www.scientificamerican.com>



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Thank you!!!



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