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

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Managing Director & CEO, Attikes Diadromes SA
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

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

www.irfnet.ch
Thematic Streams
IRF Environment and Climate Change

IRF Manifesto on Climate Change Adaptation

CHANGER
Greenhouse Gas Calculator

Moving Towards Green Road Infrastructure
Case Studies and Lessons Learned

IRF Policy Statement Environment

Sustainable Asset Valuation Tool
ROADS
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

<table>
<thead>
<tr>
<th>Extreme max. temperatures</th>
<th>Reduction of annual rainfall</th>
<th>Extreme Rainfall &amp; Storms</th>
<th>Floods</th>
<th>Hot/Cold Variability</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Asphalt melting, rutting</td>
<td>• Road foundations</td>
<td>• Landslides</td>
<td>• Road scouring</td>
<td>• Road pavement scouring</td>
</tr>
<tr>
<td>• Thermal expansion of bridge joints</td>
<td></td>
<td>• Bridge undermining, destruction or submergence</td>
<td>• Road subgrade degradation</td>
<td>• Joint damage</td>
</tr>
<tr>
<td>• Structure materials</td>
<td>• Structural Damage</td>
<td>• Structural Damage</td>
<td>• Risk to embankments</td>
<td>• Extreme winter events</td>
</tr>
<tr>
<td></td>
<td>• Embankments</td>
<td></td>
<td>• Expansion joint shrinkage due to scouring</td>
<td></td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Infrastructure Operators</th>
<th>Users</th>
<th>Investors</th>
<th>Insurers</th>
<th>Government</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Loss of revenue</td>
<td>• Service failure</td>
<td>• Economic losses of infrastructure operators</td>
<td>• Increased risks</td>
<td>• Assistance with losses in extreme circumstances</td>
</tr>
<tr>
<td>• Damaged assets</td>
<td>• Dangers</td>
<td>• Losses from investments reliant on infrastructure</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

www.irfnet.ch
The Impact of Climate Change on Road Infrastructure

United Kingdom

Japan

South Africa

Thailand
Flood in Attica Tollway (Mandra Area, 15.11.2017)
Flood in Attica Tollway (Mandra Area, 15.6.2018)
Resilient Infrastructure

The Resilient Road: Fully adaptable to extreme weather conditions
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

https://www.scientificamerican.com
Thank you!!!

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