CLIMATE CHANGE IMPACT AND ADAPTATION IN CROATIAN TRANSPORT SECTOR

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COMPETENT AUTHORITIES

TRANSPORT:

◦ Ministry of the Sea, Transport and Infrastructure

ENVIRONMENT (Clima):

◦ Ministry of Environment protection and Energy - responsible for the overall national protection policy of the environment, including climate change, and reporting on policy and measures implementation and projections emission

◦ The Croatian Environment and Nature Agency - responsible for organizing the Inventory of greenhouse gas emissions, data collection, quality assurance planning and quality control
LEGAL FRAMEWORK

- **Air Protection Act** (Official Gazette, No.130/2011, 47/2014, 61/2017)


- Guidelines for low-carbon development by 2020
- Strategic Framework for Development 2006 - 2013
- Strategy Compliance Framework 2007-2013
- National Strategic Reference Framework
CLIMATE MODELING - CROATIA

- reference climate period (1971-2009)
- RegCM regional climate model for the European area at a resolution of 50 km.
- 4 climatic scenarios RCP4.5 and RCP8.5, the four global climate models from IPCC AR5
- Calculations were made on supercomputers VELEBIT
BASIC FACTS – CLIMA in Croatia

- Temperature in Croatia is increasing, bigger changes are expected in the continental part of the country than on the coast.
- The amount of rainfall decreases in winter season.
- More extreme weather events are expected - especially drought and heat strikes especially during the summer.
- In the future, it is expected that the climate in Croatia will become warmer and drought - especially during the summer.
- Climate models predict that, if greenhouse gas emissions increase, the period from 2040 to 2070 could be warmer for 3 to 3.5 °C throughout Croatia, during the summer. By the end of the century, increasing temperature and reducing rainfall will be even more pronounced.
- Projections of changing the Adriatic Sea level by the end of the 21st century provide a steady increase in the range between 32 and 65 cm.
- Change in spatial distribution of forest vegetation; higher risk of waterborne fires (on the coast, but also parts of Slavonia).
Expected changes in the total amount of summer precipitation in the period 2011-2040 and in the period 2041-2070, relative to the reference climate 1971-2000 according to the RPC 4.5 scenario generally shows a decrease in precipitation.
In 2017, in Croatia, the number of precipitation was higher than the average (1961. - 1990.) in most analyzed stations in Croatia.

The comparison with multi-annual average shows that precipitation levels for 2017 range from 66% to 130% (Mali Lošinj) of the average. The wider area of Split is in the category of extremely dry, while a part of the southern Adriatic is in the category very dry. The wider area of Bjelovar and Knin is in the category of dry. Part of the northern Adriatic is in the category of very rainy while the wider area of Zadar, Zavižana, part of Istria and Kvarner and the wider area of Slavonski Brod are classified as rainy. The rest of Croatia is in the category of normal.
Expected average minimum air temperature rise in the period 2011-2040 and 2041-2070 relative to the reference climate 1971-2000 according to RPC 4.5 scenario
Expected average minimum air temperature rise in the period 2011-2040 and 2041-2070 relative to the reference climate 1971-2000 according to RPC 8.5 scenario
Air temperature anomalies in year 2017

The average annual air temperature for the year 2017 in Croatia was above the perennial average (1961-1990). Anomalies of the mean annual air temperature are in the range of 0.6 °C to 2.1 °C.

The heat conditions in Croatia for 2017 are described in the dominant category „extremely warm” while the wider Daruvar area and part of the Central and South Adriatic are classified as very warm.
TEMPERATURE

Nineteen hottest years since the beginning of meteorological observations (1862 - 2017), Zagreb-Grič.
TRANSPORT NETWORK

ROADS: 26,958.5 kilometers of total length
  • motorways and semi-motorways 1,416.5 km

RAILWAY: 2,722 km of total length of track

SEA PORTS; of state interest:
  • 3 mostly freight - Rijeka, Ploče and Šibenik; 3 mostly for passengers: Zadar, Split and Dubrovnik

INLAND WATERWAYS: total length of 804.1 km
INLAND PORTS: 4 Vukovar, Osijek, Sisak, Slavonski Brod

AIRPORTS: 7: Zagreb, Dubrovnik, Split, Zadar, Pula, Rijeka and Osijek
  • 2 Airfields: Mali Losinj and Brač
TRANSPORT

Basis of sustainable and regional balanced development of Croatia

Road infrastructure prevail over the other types of transport infrastructure – increases per year.

Stagnation of non-road (more environmentally acceptable forms) transport infrastructure (rail and river) - since 2006 there has not been move in the construction of new railway lines.

The level of transport activities that are a source of pollution of the environment and nature (space occupation, emission of various pollutants, extraordinary events, impact on biodiversity and landscape, the use of significant energy) is increased.
Figure 2: CO2 emissions from transport sector for the period from 2009 to 2014 (Adjusted according to: Energy in Croatia in 2014)

Figure 3: The share of emissions from transport in the Energetics sector (Prepared by: IRES EKOLOGIJA d.o.o.)
Measures to reduce negative impacts from transport sector, for the sustainable use of all resources, are in process of developing and implementing

Based on an analysis of the current state of the country, identifying medium and long term development in the Republic of Croatia

As a result of the policies and strategies of the European Union and the Republic of Croatia, a list of general objectives was established:

- specific objectives derive from the analysis of the Croatian transport system, and are further elaborated by the sectors to which they relate.
TRANSPORT SECTOR:
TRANSPORT DEVELOPMENT STRATEGY 2017-2030

C01
- Promote the distribution of passenger traffic in support of public transport (PT) and forms of transport with zero emission of harmful gases.

C02
- Change the distribution of freight traffic in favor of rail and maritime traffic and inland waterway transport.

C03
- Develop a traffic system (management, organization and development of infrastructure and maintenance) according to the principle of economic viability.

C04
- Reduce the impact of the traffic system on climate change.

C05
- Reduce the impact of the transport system on the environment (environmental sustainability).

C06
- Increase the security of the transport system.

C07
- Increase the interoperability of the transport system (public transport, rail, road, maritime and air traffic and inland waterway transport).

C08
- Improve the integration of transport modes in Croatia (management, intelligent transport systems (hereinafter: ITS, VTMIS), park and ride parking lots (hereinafter: P & R) etc.).

C09
- Further develop the Croatian part of the Trans-European Road Network (hereinafter: TEN-T) (basic and comprehensive).
Bicycle transport

Incentives to move to low consumption vehicles

More efficient public transport

Better planning and organization of traffic in cities

Moving from road traffic to rail transport

Increasing Energy Efficiency in Traffic (Aggregated Measure)
THE IMPACTS OF CLIMATE CHANGE IDENTIFIED DURING THE IMPLEMENTATION OF SEA FOR TDS

<table>
<thead>
<tr>
<th>DROUGHTS</th>
<th>FLOOD AND EXTREME PRECIPITATION RATES</th>
<th>STORMS AND STRONG WINDS</th>
<th>LANDSLIDES</th>
<th>SEA LEVEL RISE, STORM STRIKES, COASTAL EROSION, HYDROLOGICAL REGIMEN AND SALT WATER PENETRATION</th>
<th>EXTREMELY LOW TEMPERATURES</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Increasing temperatures can lead to a decrease in rainfall and the occurrence of long-term droughts. Reducing precipitation and increasing drought periods does not anticipate a negative impact on the measures envisaged by the Strategy.</strong></td>
<td><strong>Events caused by climate change, which potentially negatively affect the activities envisaged by the Strategy, are extreme precipitation and flooding. They can influence the implementation of such as the development of road and rail infrastructure.</strong></td>
<td><strong>The strategy envisages the development of road infrastructure containing structures that cross the valleys, rivers, streams ... Storms and strong winds can affect the implementation of measures such as the development of road and rail infrastructure.</strong></td>
<td><strong>Landfills may adversely affect the development of road and rail infrastructure if this is developed in areas at risk of landslide without adequate protection.</strong></td>
<td><strong>The development of Sea ports affects the rise of the sea level in a way that prevents the normal flow of passenger and freight transport, thus preventing the planned development.</strong></td>
<td><strong>Low temperatures, snow and freezing and thawing caused by climate change can adversely affect the development of road and rail</strong></td>
</tr>
</tbody>
</table>

**GROUP OF EXPERTS ON CLIMATE CHANGE IMPACT AND ADAPTATION FOR TRANSPORT NETWORKS AND NODE**
INSTITUTION IN RELATION TO ADAPTATION TO CLIMATE CHANGE-MSTI

CURRENT STATUS

MODERATELY IMPORTANT

Preparation, development and supervision of the implementation of all strategic documents from the Transport sector

FUTURE STATUS

VERY IMPORTANT

- Development of Climate change adjustment measures in the Transport sector.
- proposing and evaluating Climate adjustment measures in cooperation with stakeholders
- Renewal and rehabilitation of Transport infrastructure according to priorities
- Cooperation with scientific institutions in design and analysis for the needs of climate modeling in the transport sector
CLIMATE CHANGE REQUIREMENTS

The process of transition to a low carbon economy is a continuous and long-lasting, affecting the entire society and economy, should be reasoned and adapted to the possibilities and available resources.

THE GOAL:
- limitation of the global temperature increase well below 2°C - changes in lifestyle, behavior and cultural patterns, consumer choices, change in energy structure - the whole economy

capacity building, intersectoral cooperation
LOW-CARBON VISION BY 2050 - TRANSPORT SECTOR - MEASURES

- Low carbon and non-urban transport:
  - (hybrid vehicles, developed vehicle refueling infrastructure, environmentally friendly fuels, narrower urban centers, electricity for renewable energy vehicles, new technology, cycling, higher public transport);
- High levels of public awareness of Public transport (cleaner forms of transport)
- Developed railway, river and air traffic (transition from road to rail and river traffic, developed infrastructure);
- Taxes on fossil fuel vehicles (collection of fuel consumption, ecological vignette);
- Public transport is completely low-spirited;
- Increasing Energy Efficiency in Traffic (Aggregated Measure)
- Croatia branded as a country of ecological and sustainable development
POLICY AND MEASURES

- Low-carbon Development Strategy up to 2030 with a view to 2050, with Action Plan for Implementation of the Low-Carbon Development Strategy for a period of 5 years;


- Energy efficiency program in public lighting by 2025;

- Integrated Energy-Climate Plan for the period 2021-2030;

- The plan for the use of financial resources from the sale of emission allowances by auction based on the EU ETS for the period 2017 to 2020;

- Climate change adaptation strategy in Croatia for the period up to 2040 with a view to 2070 (currently in process of adoption by Croatian Government).
MEASURES - PROJECTS

- Environmental protection and conservation measures carried out during the planning and construction of the transport infrastructure, in accordance with regulations in the field of environmental protection, spatial planning and construction.

- SEA and EIA procedures are implemented when applying for calls of proposal, investors must demonstrate that the projects are planned in accordance with the EIA Directive and that, when designing the project,
  - they take into account the relevant indicators of possible impacts of climate change on the operation;
  - that the risks are assessed
  - and that the materials and processes of construction are adapted to withstand the identified climatic changes.
<table>
<thead>
<tr>
<th>Measure</th>
<th>Goal</th>
<th>Type of instrument</th>
<th>Status of Implementation</th>
</tr>
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<tbody>
<tr>
<td>Informing consumers about the fuel economy and CO2 emissions of new personal cars</td>
<td>informing consumers of fuel consumption and CO2 emissions of new cars</td>
<td>Information</td>
<td>Adopted</td>
</tr>
<tr>
<td>Training of road vehicles for eco-driving</td>
<td>reduction of CO2 emissions from road vehicles</td>
<td>Education</td>
<td>Adopted</td>
</tr>
<tr>
<td>Obligation to use biofuels in transport</td>
<td>increasing the share of biofuels in transport</td>
<td>Regulatory, economic, tax</td>
<td>adopted, partly applied</td>
</tr>
<tr>
<td>Special Environmental Fee for Motor Vehicles</td>
<td>reduction of CO2 emissions from road vehicles</td>
<td>tax, economic</td>
<td>Adopted</td>
</tr>
<tr>
<td>Special Tax on Motor Vehicle</td>
<td>reduction of CO2 emissions from road vehicles</td>
<td>tax, economic</td>
<td>Adopted</td>
</tr>
<tr>
<td>Development of Alternative Fuels Infrastructure</td>
<td>legislative framework and reduction of CO2 emissions from road vehicles</td>
<td>Regulatory, economic</td>
<td>Adopted</td>
</tr>
<tr>
<td>Promoting Integrated and Intelligent Transport Systems and Alternative Fuels in urban areas</td>
<td>reduction of CO2 emissions from road vehicles</td>
<td>Planning</td>
<td>partially adopted, partially applied</td>
</tr>
<tr>
<td>Monitoring, reporting and verification of greenhouse gas emissions in the life cycle of liquid fuels</td>
<td>Monitoring greenhouse gas emissions from liquefied petroleum fuels</td>
<td>Regulatory</td>
<td>Adopted</td>
</tr>
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# ALLOCATION ESIF

## OPERATIONAL PROGRAM COMPETITIVENESS AND COHESION

<table>
<thead>
<tr>
<th>Priority Axis</th>
<th>Allocation ESIF (EUR)</th>
</tr>
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<tbody>
<tr>
<td>Promoting Energy Efficiency and Renewable Energy</td>
<td>531,810,805</td>
</tr>
<tr>
<td>Climate Change and Risk Management</td>
<td>245,396,147</td>
</tr>
<tr>
<td>Relationship and Mobility</td>
<td>1,260,415,428,00</td>
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</table>
Extreme weather condition in Croatia on Jun 7, 2018.

THANK YOU FOR YOUR ATTENTION!

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