EIHP

Ministry of the sea, transport and infrastructure, *Republic of Croatia*

Activities to support sustainable transport in Croatia

WORKSHOP

SUSTAINABLE ENERGY USE IN TRANSPORT

AND PUBLIC SECTORS IN SOUTH-EAST EUROPE

Vienna, 14th November 2016

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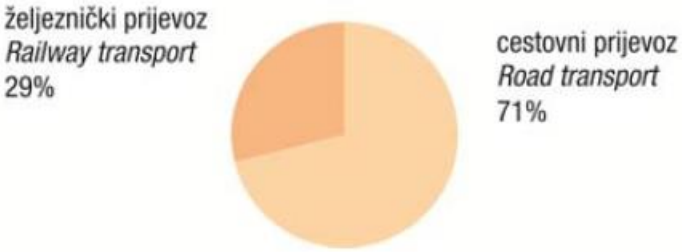
MODAL SPLIT

G-1.1. STRUKTURA KOPNENOGA PUTNIČKOG PRIJEVOZA PREMA VRSTAMA PRIJEVOZA U 2015.
STRUCTURE OF INLAND PASSENGER TRANSPORT, BY TYPE OF TRANSPORT, 2015

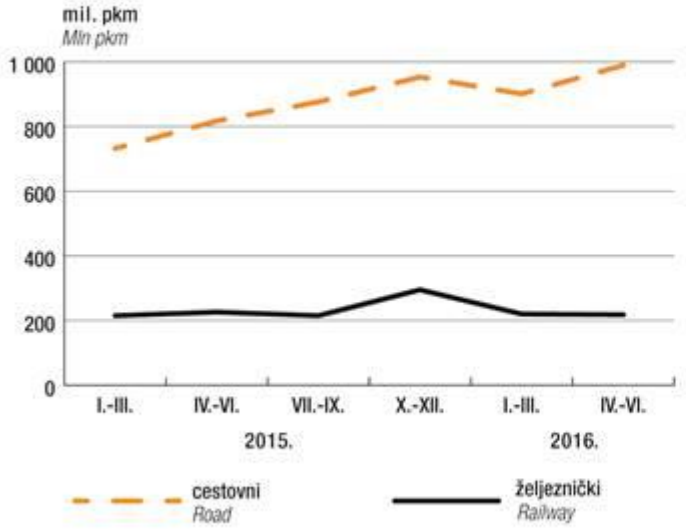


G-1.2. STRUKTURA KOPNENOG PRIJEVOZA ROBE PREMA VRSTAMA PRIJEVOZA U 2015.
STRUCTURE OF INLAND GOODS TRANSPORT, BY TYPE OF TRANSPORT, 2015

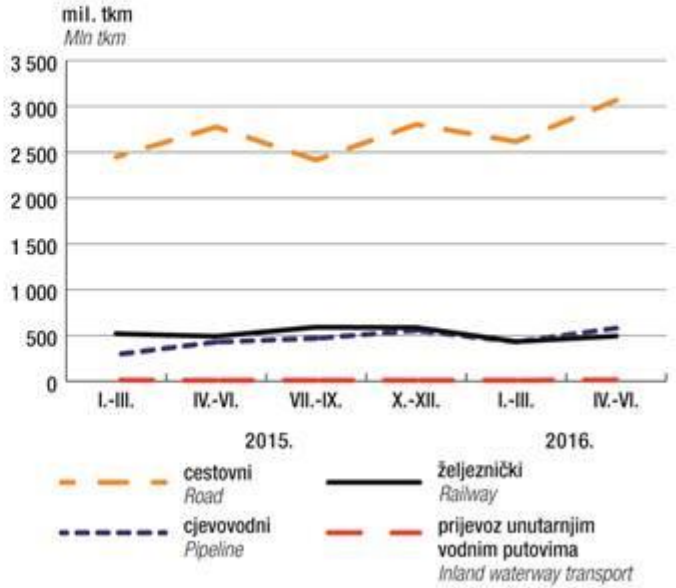
Source: http://www.dzs.hr/Hrv_Eng/publication/2016/SI-1566.pdf

TRENDS

G-1. OSTVARENI PUTNIČKI KILOMETRI U KOPNENOM PRIJEVOZU U 2015. I 2016.
PASSENGER-KILOMETRES PERFORMED IN INLAND TRANSPORT, 2015 AND 2016



G-2. OSTVARENI TONSKI KILOMETRI U KOPNENOM PRIJEVOZU U 2015. I 2016.
TONNE-KILOMETRES PERFORMED IN INLAND TRANSPORT, 2015 AND 2016



Source: http://www.dzs.hr/Hrv_Eng/publication/2016/05-01-01_02_2016.htm

REPUBLIC OF CROATIA'S TRANSPORT DEVELOPMENT STRATEGY targets to 2020

20% reduction in transport related GHG emissions in comparison to 1990 levels

20% improvement in energy efficiency in comparison to 1990 levels

20% share of renewable energy sources in transport

10% reduction of transport related noise levels

10% reduction of pollutants (PM, NOx, SOx)

support measures

State level: taxation

Special environmental charge for motor vehicles

- Fee paid by legal and natural persons owners or authorized holders of rights on motor vehicles paid at the time of the registration of the vehicle
- Formula for its calculation takes into consideration CO2 emissions (besides vehicle category, type of engine and motor fuel, piston displacement or power-rating of the engine and age of the vehicle)

support measures, cont.

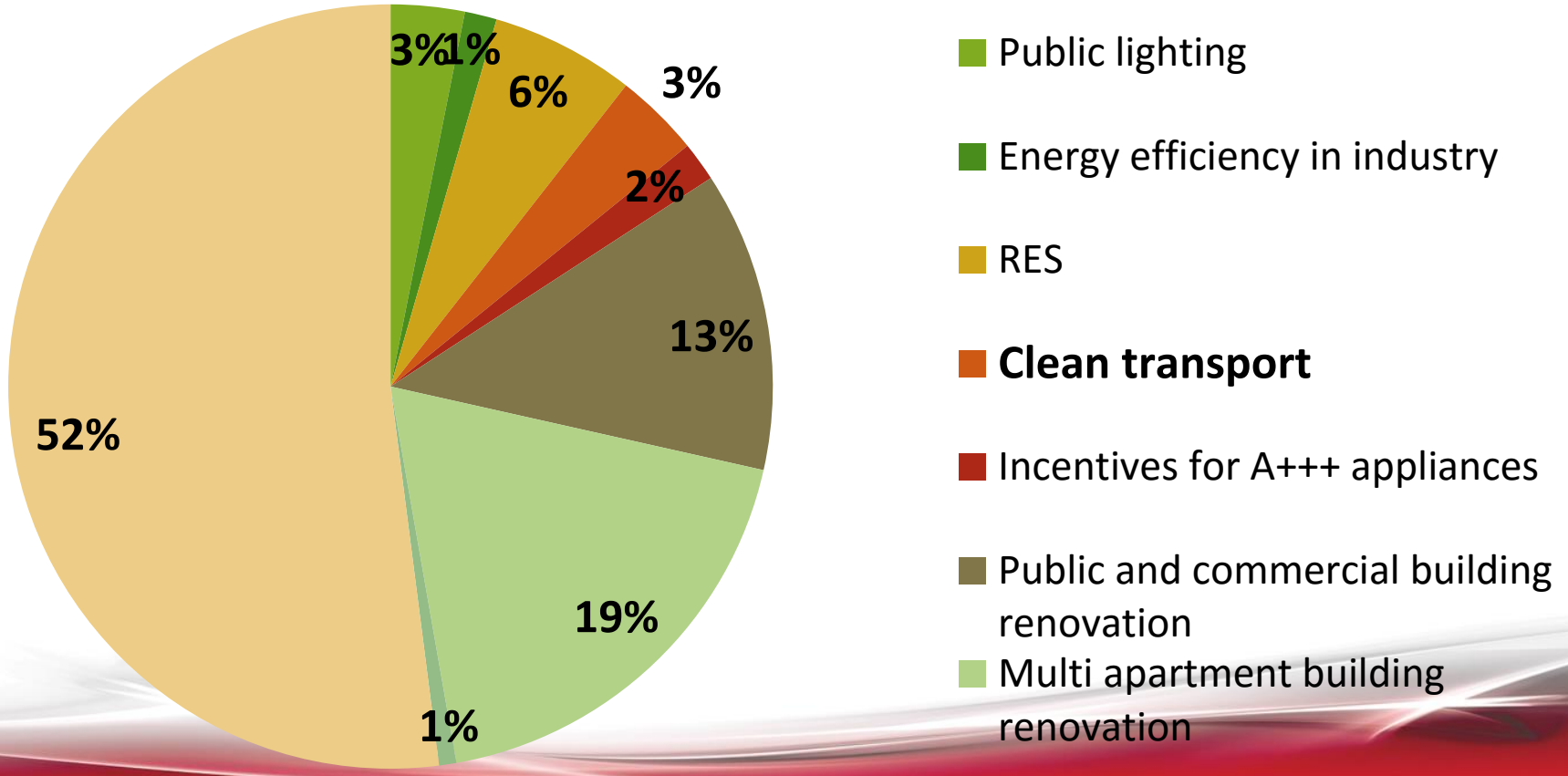
State level: incentives

Environmental Protection and Energy Efficiency Fund (Eco Fund)

- obliged to co-finance measures defined in the NEEAP (National Energy Efficiency Action Plan) under the Act on Energy Efficiency
- Incentives scheme for citizens and companies to purchase electric vehicles

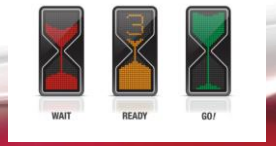
Investments in energy efficiency and reneweable energy sources in 2015

960 million HRK (127 M€) allocated for EE and RES projects

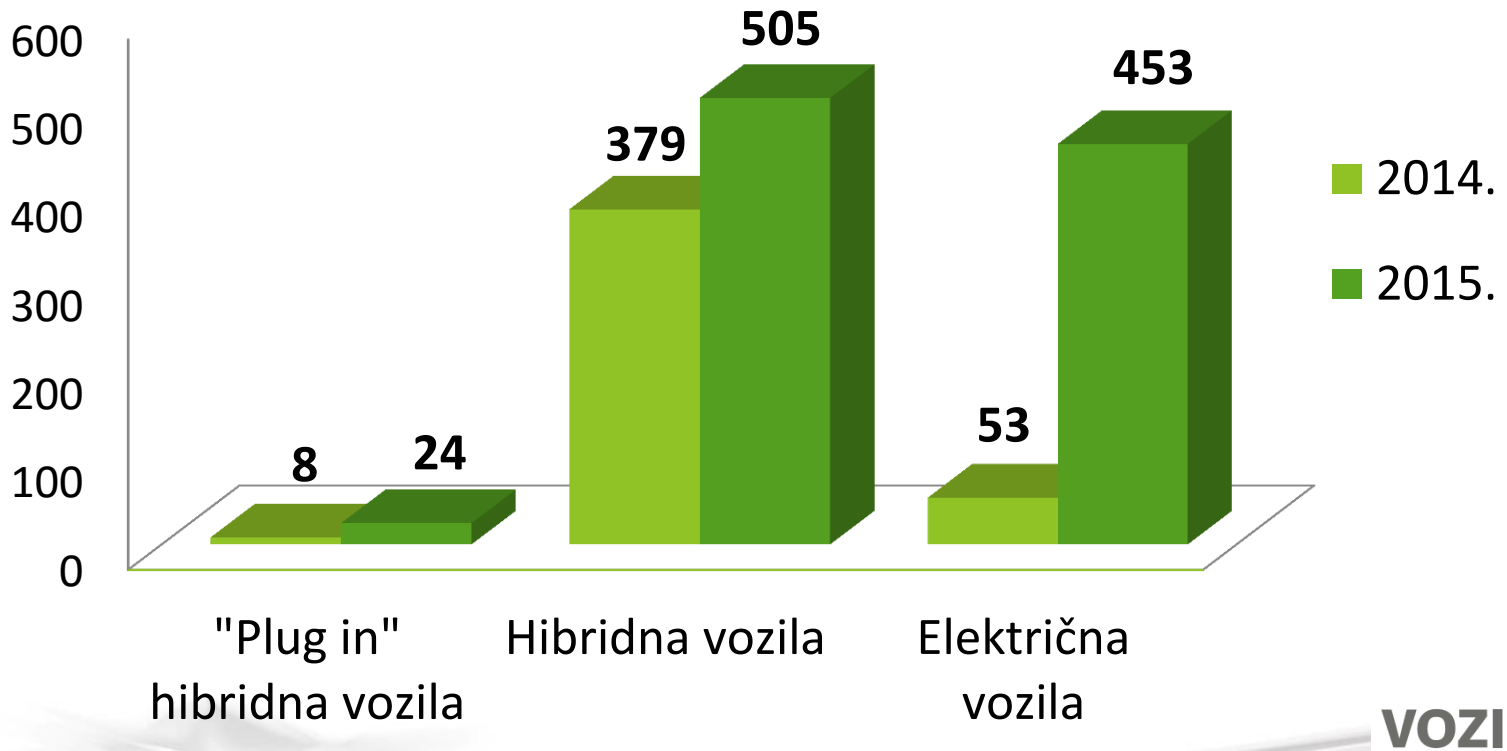


Programmes for cleaner transport

- Electric and hybrid vehicles
  - **41.5 Mkn** (5.5 M€) approved, **668 vehicles** already purchased:
    - 109 electric + 9 PHEV + 550 hybrid
- Sustainable urban mobility plans
- Eco-driving (pilot project: 8 to 18% savings)
- Other measures: conversion to CNG or electric, charging stations, public bicycle systems, electric bicycles, optimising distribution routes, intelligent traffic signalisation



Incentives for electric and hybrid vehicles



The procedure

APPLICATION

1. Application form,
2. A copy of the identity card,
3. Informative offer for the purchase of vehicles

Signing a contract within 30 days, 6 months deadline for the purchase.

PAYMENT

1. The bill,
2. A copy of the vehicle registration and the Certificate of Conformity

Green line

- Exclusive for the National and Nature parks of Croatia - 80% of financing:
  - Electric and hybrid vehicles
  - Electric and hybrid vessels,
  - Electric bicycles
  - Electric vehicles for the carriage of passengers and/or goods
  - EV charging stations

City of Zagreb: 5 EV charging stations in public garages

Power 44kW (2x22kW)

INVESTMENT:
HRK 203,158.00

THE FUND
HRK 65,010.56

City of Čakovec: public bicycles (electric)

INVESTMENT:
HRK 992,300.63

THE FUND
HRK 396,920.25

Croatian Post: 180 electric bicycles

INVESTMENT:
HRK 3,738,825.00

THE FUND
HRK 1,130,121.69

City of Koprivnica: Civitas Dynamo project

car sharing system + remodelling 2 buses for public transportation

INVESTMENT:
HRK 2,687,076.67

THE FUND
HRK 892,145.39

Vukovar waterbus „Bajadera”

P = 2x30kW

C= 72x 165 Ah

INVESTMENT:
HRK 2,312,500.00

THE FUND
HRK 296,00.00

Implementation of Directive 2014/94 on alternative fuels infrastructure (AFI)

- Drafting of National Policy Framework (NPF) started immediately after the adoption of the AFI Directive
- Act on Alternative Fuels Infrastructure is being drafted, to be adopted by end of November 2016, NPF to be adopted eventualy (by Government, a week after the Act is in force)
- Targets: focus on minimal infrastructure coverage necessary to ensure the circulation of vehicles in urban nodes and vehicles/vessels on the core TEN-T network, binding targets only for electricity, LNG and CNG
- Revision of targets planned on a three year basis

Responsible bodies

- Ministry of Maritime Affairs, Transport and Infrastructure (coordinates the implementation of the AFI Directive and the drafting of the NPF)
- ~~Ministry of Economy (energy sector, energy efficiency policy)~~
- Ministry of Energy, Environmental and Nature Protection (energy sector, energy efficiency policy, decarbonisation policy)
- Ministry of Construction and Physical Planning (physical planning)
- Ministry of Finance (taxation)
- Ministry of Internal Affairs (information on registered vehicles)
- Energy Efficiency Authority (implementation of energy efficiency policy)
- Eco Fund (financing of measures)
- Regional and local authorities (measures at regional and local level)

Infrastructure targets: electricity

Road vehicles

By 2020 infrastructure must exist:

- in all cities and towns with more than 20 000 inhabitants
- On every 50 km on motorways
- In all seaports, inland ports and airports, as well as at all major railway stations

Ships

By 2025 infrastructure must exist:

- Seaports: Rijeka Port, inland ports: either Vukovar or Slavonski Brod

Airplanes

By 2025 infrastructure must exist:

- At all Croatian airports of international importance (9)

Infrastructure targets: CNG

By 2020 infrastructure must exist:

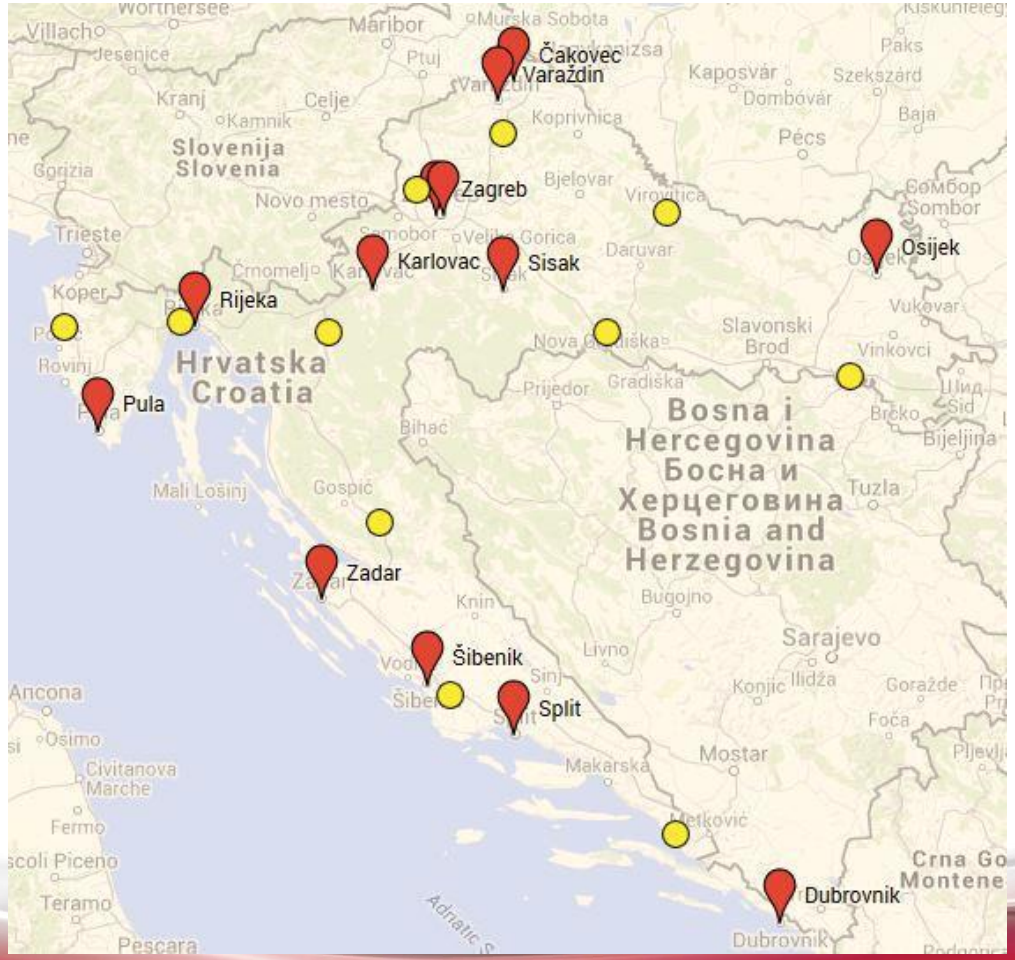
- In 12 cities and towns: Pula, Rijeka, Zadar, Šibenik, Split, Dubrovnik, Karlovac, Sisak, Osijek, Varaždin, Čakovec and Zagreb

By 2025 infrastructure must exist:

- On 11 locations (19 refuelling stations) on the motorway and main roads network (recommendation of average distance between refuelling points of 150 km respected)

CNG refuelling points

Projection for 2020 (red marks) and 2025 (yellow marks)



Infrastructure targets: LNG

Road heavy goods vehicles

By 2025 infrastructure must exist:

- In Zagreb and Rijeka

By 2030 infrastructure must exist:

- In Zadar, Split, Ploče, Slavonski Brod and Osijek

Ships and inland navigation vessels

By 2025 infrastructure must exist:

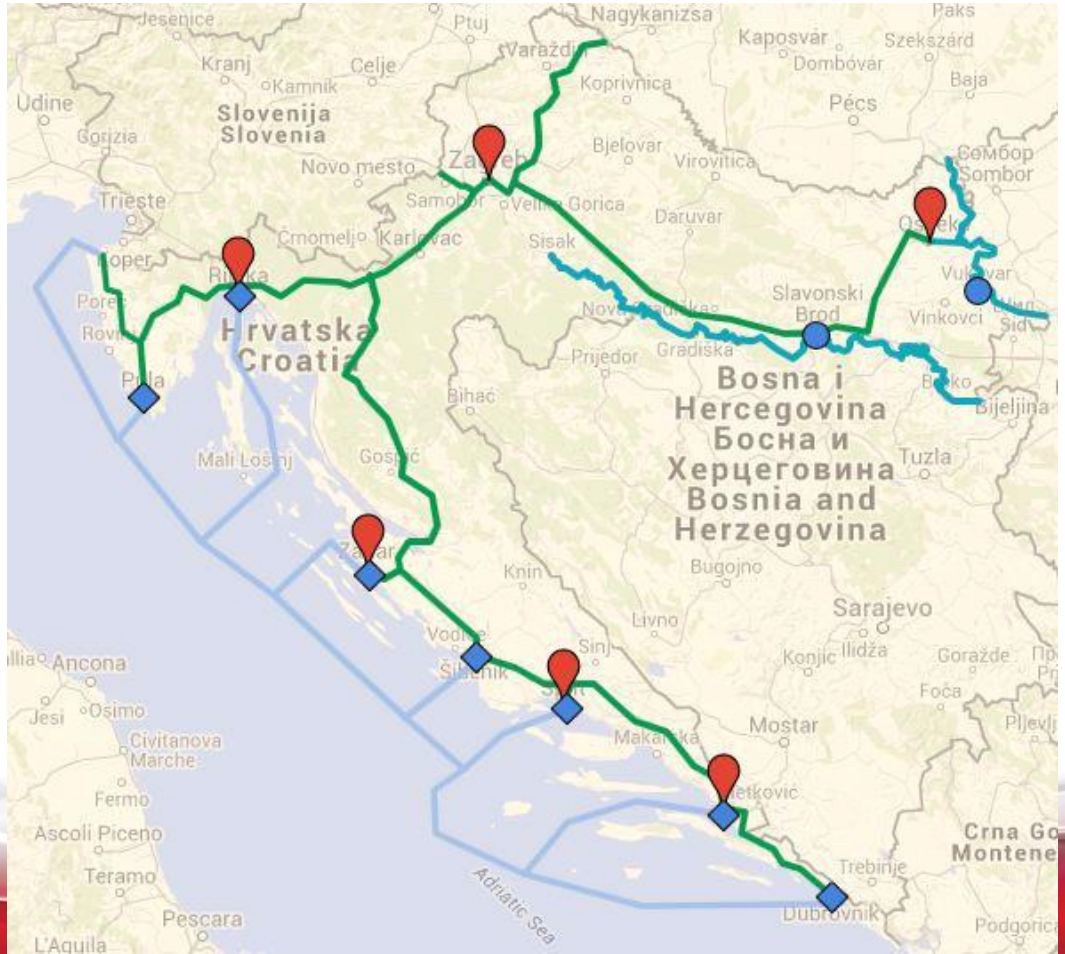
- Sea ports: Rijeka

By 2030 infrastructure must exist:

- Inland navigation ports: Vukovar and Slavonski Brod

LNG refuelling points targets

Refuelling points for ships (blue marks) and heavy goods vehicles (red marks)



Planned measures

- More systematic approach in measure planning
- Focus on achieving wider uptake without creating additional financial burden for public authorities
- creating job opportunities
- research and innovation
- use of alternative vehicles/vessels in tourism

Relation to other relevant strategic frameworks in transport/energy/environment

- 3-year Energy Efficiency Action Plans
- Regional and Local Energy Efficiency Plans
- Low Carbon Development Strategy (in preparation)
- Green Public Procurement Public Plan (2015-2017), adopted in August 2015

Cross-border issues

- NPF targets set basis for continuity of alternative fuels infrastructure coverage across national borders

- Cross-border links for circulation of H2 vehicles: NPF does not set binding targets, but recognises the possibility of a pilot project for the construction of refuelling points (in Zagreb and/or Rijeka), which could, taking into consideration the range of motor vehicles using hydrogen, enable circulation of H2 vehicles along the Croatian section of the TEN-T Mediterranean corridor

Cross-border cooperation

Interested in your experience concerning:

- method of AFI Directive legal transposition (new Act or amendment of the existing legislation)
- Measures for achieving investment security
- How is charging of e-mobility services regulated or planned to be regulated in your country?

Energy Institute Hrvoje Požar

From 1994 central scientific institution in planning and implementation of energy sector reform in Croatia

'Zagreb Energy School' heritage – more then 50 years of work and experience

- Non-profit scientific and research institution
- Project financed institution
- Organization covers different aspects of development of modern and sustainable energy systems

EIHP in SEE

Ministry of the sea, transport and infrastructure, *Republic of Croatia*

SOUTH EAST EUROPE

- *Projects of Energy Community Interest (Energy Community)*
- *Regional Gasification Study (World Bank)*
- *Western Balkans Sustainable Energy Direct Financing Facility (EBRD)*
- *Implementation of ACQUIS-a on renewable energy (Energy Community)*
- *Regional planning of transmission grid (USAID)*
- *Development of regional energy market (SEE REMS) (USAID)*

ME

- *Privatization of National Power Incumbent*
- *Energy Development Strategy until 2025 (Government)*

BiH

- *Energy Sector Development Study (WB)*
- *Energy Strategy of the Republic of Srpska*
- *Training on energy efficiency in households in Bosnia and Herzegovina (UNDP/GEF)*
- *Power Distribution System Development*
- *Gas Network Development Study*

KOSOVO

- *Energy Sector Technical Assistance Project (WB)*
- *Advisory on Privatization of the Electricity Distribution Company (USAID)*
- *Assistance to the Ministry of Energy and Mining in Kosovo*

AL

- *Analysis on Energy Supply until 2030 (IAEA)*
- *2nd and 3rd National Energy Efficiency Action Plan of Albania*

MK

- *Feasibility Study for a Gas Pipeline System*
- *Electricity Transmission System Development Plan*

SI

- *Environmental aspects of Nafta Geoterm takeover procedure*

EIHP around the region: INOGATE countries

Support to Statistical Cooperation

- enhance the use of energy statistics
- statistics harmonization with European standards
- develop a National Statistics System in Partner Countries and in particular National Statistical Institutes

EIHP – transport sector projects

- Expert groundwork for defining the draft of the national policy framework for implementation of the European Directive on the deployment of alternative fuels infrastructure
- Strategy of development of energy infrastructure for recharging electric vehicles in the City of Zagreb
- A study to support the development of the market of compressed natural gas (CNG) in transport
- MOBINCITY - SMART MOBILITY IN SMART CITY
- LNG Blue Corridors
- ODYSSEE – MURE Energy Efficiency Trends and Policies
- Technical assistance in development of business statistics and upgrading of data collection system
- Energy efficiency program in urban transport in the City of Zagreb
- National Action Plan for the development of infrastructure and the use of LNG in the Croatian maritime transport
- Feasibility Study on the use of liquefied natural gas from the LNG terminal Krk as fuel for maritime and road transport
- Urbanbiogas
- Feasibility study of the use of natural gas as fuel for motor vehicles of public transport of the city of Pula
- Consulting services and analysis of the results of Eco Driving
- Technical guidelines for the development and implementation of the legislative framework on the development of infrastructure for alternative fuels
- …

Energy consumption statistics in the transport sector in Croatia

Final energy consumption

Usual approach:

- top-down method
- data compilation at national level → conversion to the local area level
- unreliable statistics, comparison of energy balances over the years
- difficult determination of passenger and tonne kilometres (basis for the calculation of EE indicators)

New approach:

- bottom-up method
- comprehensive model of energy consumption
- detailed energy consumption by mode of transport
- accurate data on vehicle km, p.km, t-km, fuel consumption per person, relative efficiency, etc.

Additional pilot studies in road transport are necessary

- Pilot survey on the average occupancy of cars
- Pilot survey on energy consumption of tourist's and transit cars and buses
- Pilot survey of energy consumption and tonne kilometres for light duty vehicles (gross vehicle weight of less than 3.500 kg)
- Pilot survey on fuel consumption in marinas

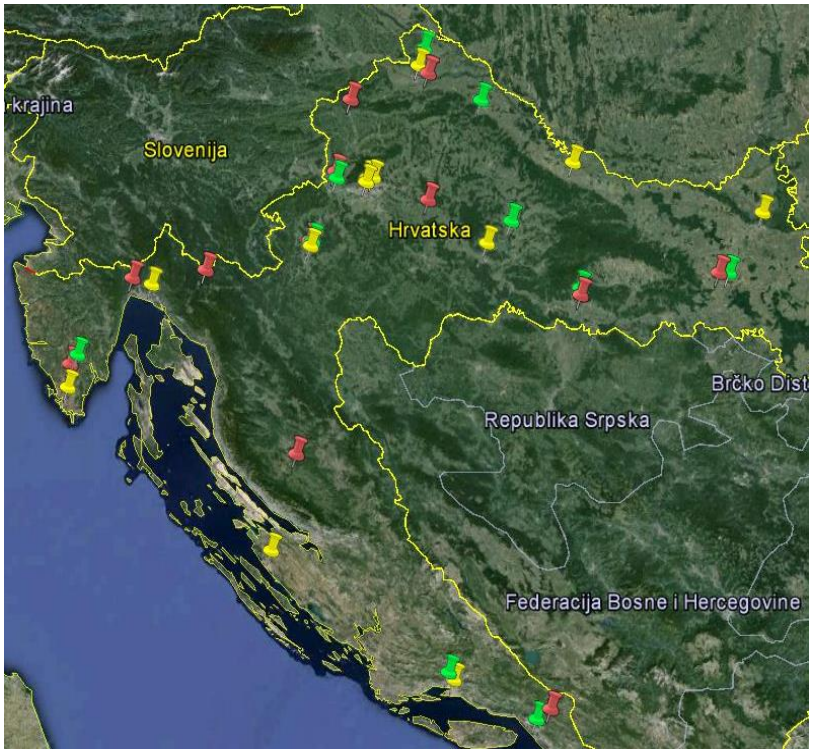
Data collection:

- Database of registered vehicles and km (Ministry of Internal Affairs, Croatian Centre for Vehicles)
- Consumption in rail transport (Croatian Berau od Statistics)
- Consumption in maritime and inland waterway transport (CBS, Jadrolinija, EIHP database)
- Air transport (CBS, EIHP database)

Pilot survey on the average occupancy of cars

Exploring the average occupancy of cars was conducted on 34 measurement points in the following manner:

- the research was carried out on 12 measuring points on highways in Croatia
- the research was carried out in 12 towns in Croatia
- the research was carried out on 10 inter-urban roads
- duration of each separate measurement was at least one hour
- 4 times a year (each three months) that made a total of 136 separate measurements

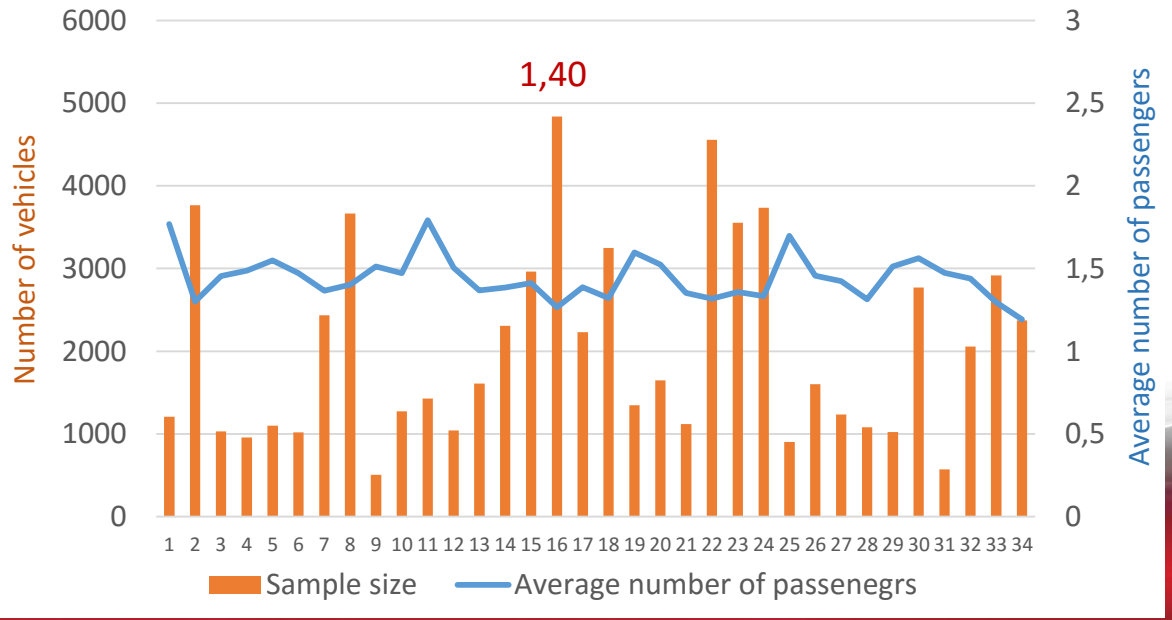


Pilot survey on the average occupancy of cars

	A	B	C	D
1	DATUM	VRSTA LOKACIJE 1 Autocesta 2 Grad 3 Međugradska cesta	LOKACIJA	BROJ LISTA
2	26.01.2015.	1	Dugopolje	1
3	22.01.2015.	2	Av. Većeslava Holjevca- kod MSU	2
4	27.01.2015.	3	Šenkovec	3
5	23.01.2015.	3	Dubrava kod Šibenika	4
6	24.01.2015.	2	Zrinski i Frankopana- Rotor	5
7	22.01.2015.	3	Omiš	6
8	17.01.2015.	2	Split, križanje Dubrovačke i Poljičke	7
9	22.01.2015.	2	Virovitica	8
10	26.01.2015.	1	AC Zagreb- Goričan, NP Varaždin	9
11	22.01.2015.	2	raskršće ulica Petra Krešimira IV i Kolodvorske, Kutina	10
12	27.01.2015.	2	Zadar	11
13	26.01.2015.	1	naplatne kućice Zadar 1	12
14	23.01.2015.	1	Delnice Zapad	13
15	24.01.2015.	1	Rijeka- Rujevica Zapad	14
16	21.01.2015.	2	Rijeka, križanje Zvonimirove i Liburnijske	15
17	23.01.2015.	3	Opatija- oznaka ceste 66	16

prva strana 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21

- Total of 69 116 cars recorded
- Average number of passengers per vehicle calculated



Pilot survey on energy consumption of tourist's and transit cars and buses

- 90 border crossings
- 42 160 responded questionnaires
- types of vehicle
- number of passengers in vehicle
- country of living
- transit vehicles number of nights
- money paid for the fuel
- type of fuel they use in a car/bus
- scaling up (benchmark number of entries total in Croatia)

Results:

- Average consumption
- Average mileage
- Fuel structure
- Average occupancy
- Total consumption
- Total passenger km

Pilot survey of energy consumption and tonne kilometres for light duty vehicles

Final energy consumption of N1 category of vehicles

1. REPORTING UNIT

a) Name of legal entity _____

b) Seat of the company _____

2. INFORMATION ABOUT THE PERSON WHO COMPLETED THE QUESTIONNAIRE

Name and Surname: _____

E-mail adress: _____

Phone number: _____

Date: _____

3. INFORMATION ON N1 CATEGORY OF VEHICLES (gross vehicle weight of less than 3.500 kg)

Fuel type	Engine power	Carrying capacity	Annual milleage of vehicle in 2013	Share of annual milleage of loaded vehicle	Average load of vehicle	Average consumption of vehicle
	kW	kg	km	%	kg	l/100 km
A	B		C	D	E	F

← questionnaires distributed to companies

Results:

N1	TOTAL DIESEL CONSUMPTION IN CROATIA (1000 l)	167.021
	TOTAL GASOLINE CONSUMPTION IN CROATIA (1000 l)	5.218
	TOTAL LPG CONSUMPTION IN CROATIA (1000 l)	1.429
	TOTAL CNG CONSUMPTION IN CROATIA (1000 kg)	46
	TOTAL TONNE-KILOMETRES IN CROATIA (1000000 tkm)	898

Developed model

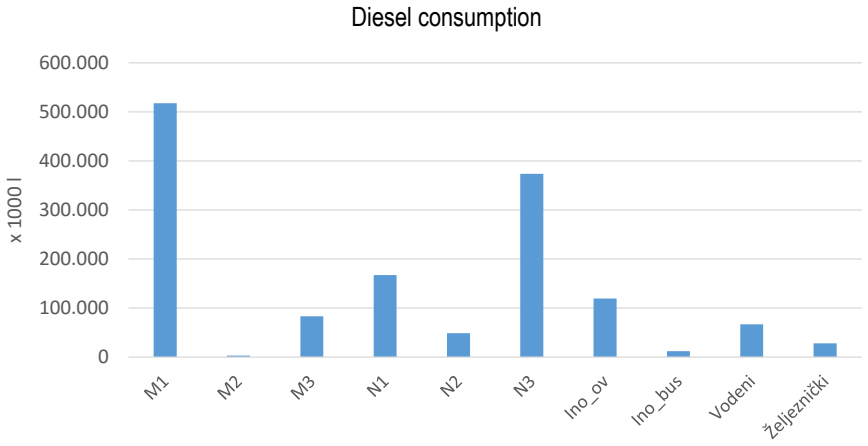
Systematization:

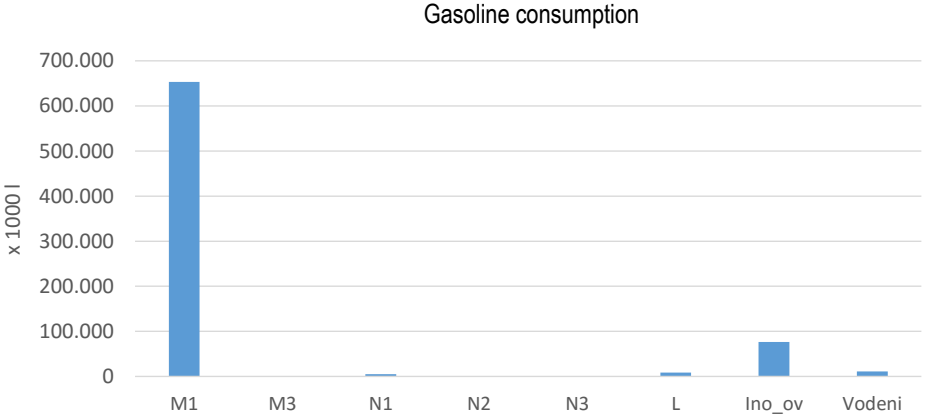
Category of vehicle	Fuel type	Year of production	Average fuel consumption - base fuel (l/100km)	Average fuel consumption - alternative	Base fuel factor	Total annual consumption - base fuel (l)	Total annual consumption - alternative fuel (l(kg))	Correction factor for kilometres passed in Croatia
			11,7	12,9	0,1	13.627	134.908	1
M1	Gasoline + LPG	1996.-2000.	7,5	8,3	0,1	187.623	1.857.470	1
			7,6	8,4	0,1	372.410	3.686.856	1
			8,2	9,0	0,1	269.509	2.668.139	1
			8,5	9,4	0,1	376.355	3.725.914	1
			9,1	10,0	0,1	482.080	4.772.590	1
			9,4	10,3	0,1	280.909	2.780.997	1
			10,3	11,3	0,1	111.599	1.104.831	1
			11,5	12,7	0,1	49.082	485.914	1
M1	Gasoline + LPG	2001.-2005.	7,4	8,1	0,1	169.864	1.681.652	1
			7,5	8,3	0,1	273.545	2.708.098	1
			8	8,8	0,1	193.207	1.912.753	1
			8,3	9,1	0,1	304.287	3.012.439	1
			8,8	9,7	0,1	227.984	2.257.039	1
			9,2	10,1	0,1	206.788	2.047.200	1
			10	11,0	0,1	80.899	800.897	1
			11,2	12,3	0,1	101.219	1.002.065	1
			7	7,7	0,1	66.128	654.664	1

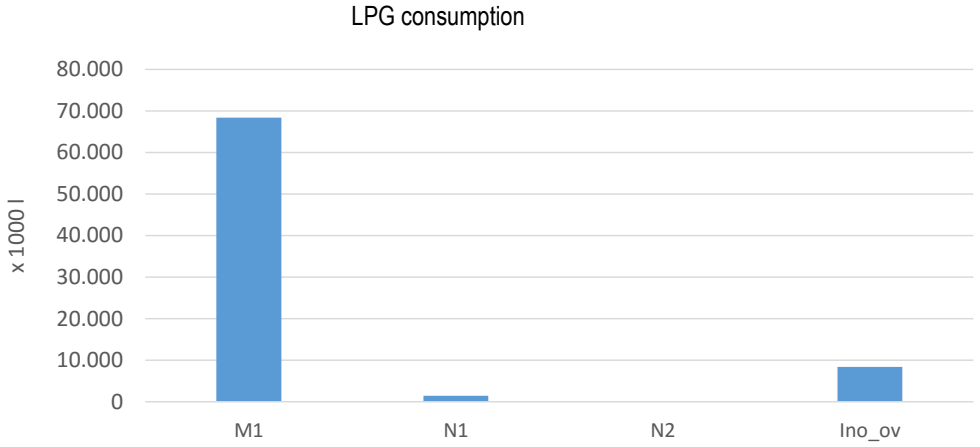
Category of vehicle	Fuel type	Year of production	Engine power (kW)	Number of vehicles at the end of 2012.;2013.*	Total annual mileage (reg.2013 - reg.2012)	Average annual mileage (km/vehicle)	Total annual mileage (base fuel)
M1	Diesel	do 1990.	<50	28.768	280.707.539	9.758	280.707.539
			51-60	10.585	103.389.838	9.768	103.389.838
			61-70	2.293	22.905.271	9.989	22.905.271
			71-80	373	3.840.202	10.295	3.840.202
			81-100	463	5.254.937	11.350	5.254.937
			101-130	36	539.363	14.982	539.363
			131-160	2	3.365	1.683	3.365
			>160	1		0	0
M1	Diesel	1991.-1995.	<50	23.884	289.912.444	12.138	289.912.444
			51-60	20.865	260.109.842	12.466	260.109.842
			61-70	14.058	194.624.514	13.844	194.624.514
			71-80	718	7.748.149	10.791	7.748.149
			81-100	2.520	33.424.521	13.264	33.424.521
			101-130	562	8.561.148	15.233	8.561.148
			131-160			0	0
			>160	1	18.165	18.165	18.165
			<50	26.326	336.747.310	12.791	336.747.310

- M1 category - 208 sub-categories defined (breakdown by type of fuel, production period and range of engine output)
- M2 category - 184 sub-categories defined
- M3 category - 160 sub-categories defined
- N1 category - 52 sub-categories defined
- N2 category - 70 sub-categories defined
- N3 category - 44 sub-categories defined
- L1 – L7 category
- Air, rail and maritime and inland waterway model defined

Project results

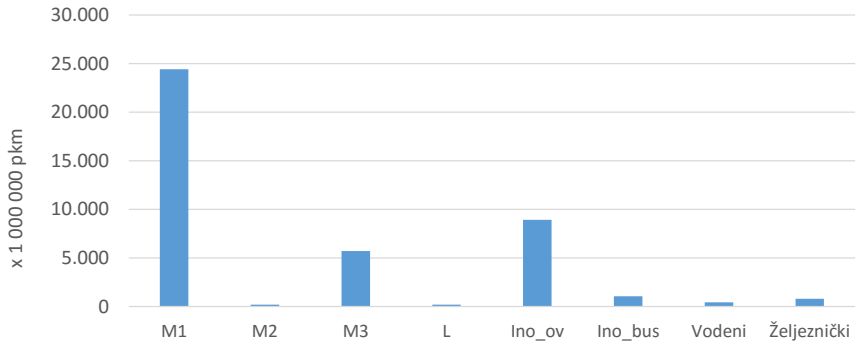


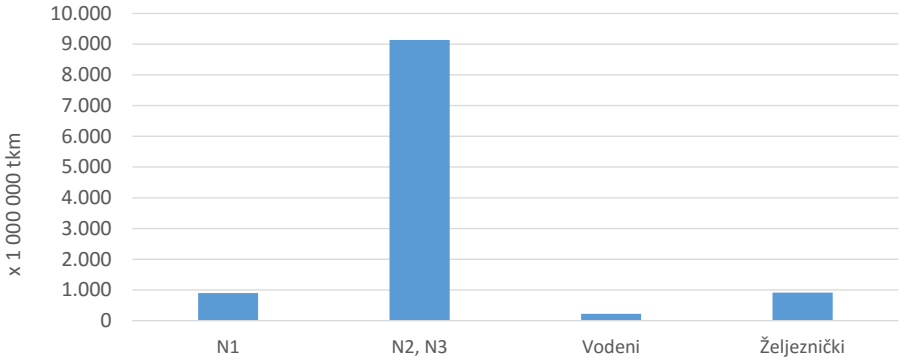


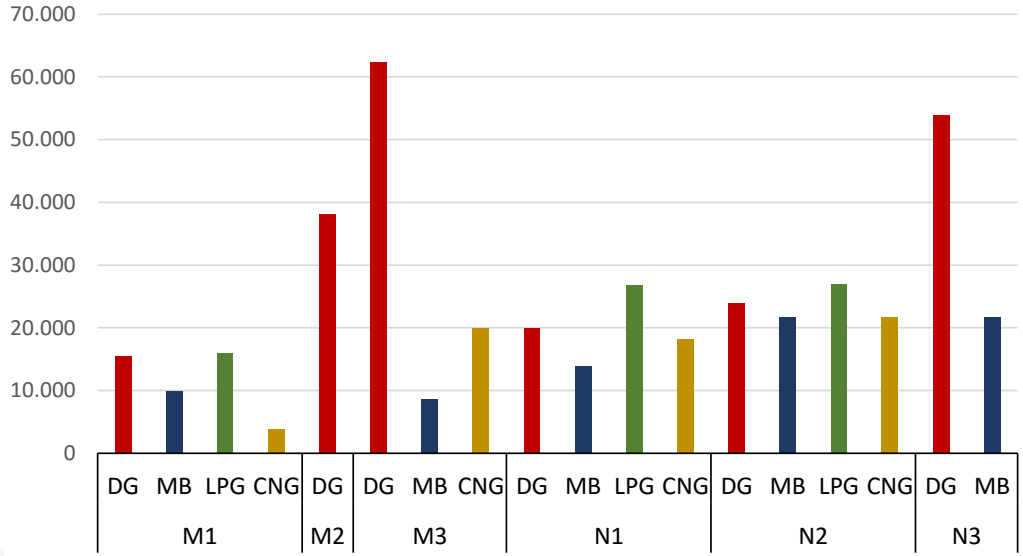


- detailed information on energy consumption in transport

Project results







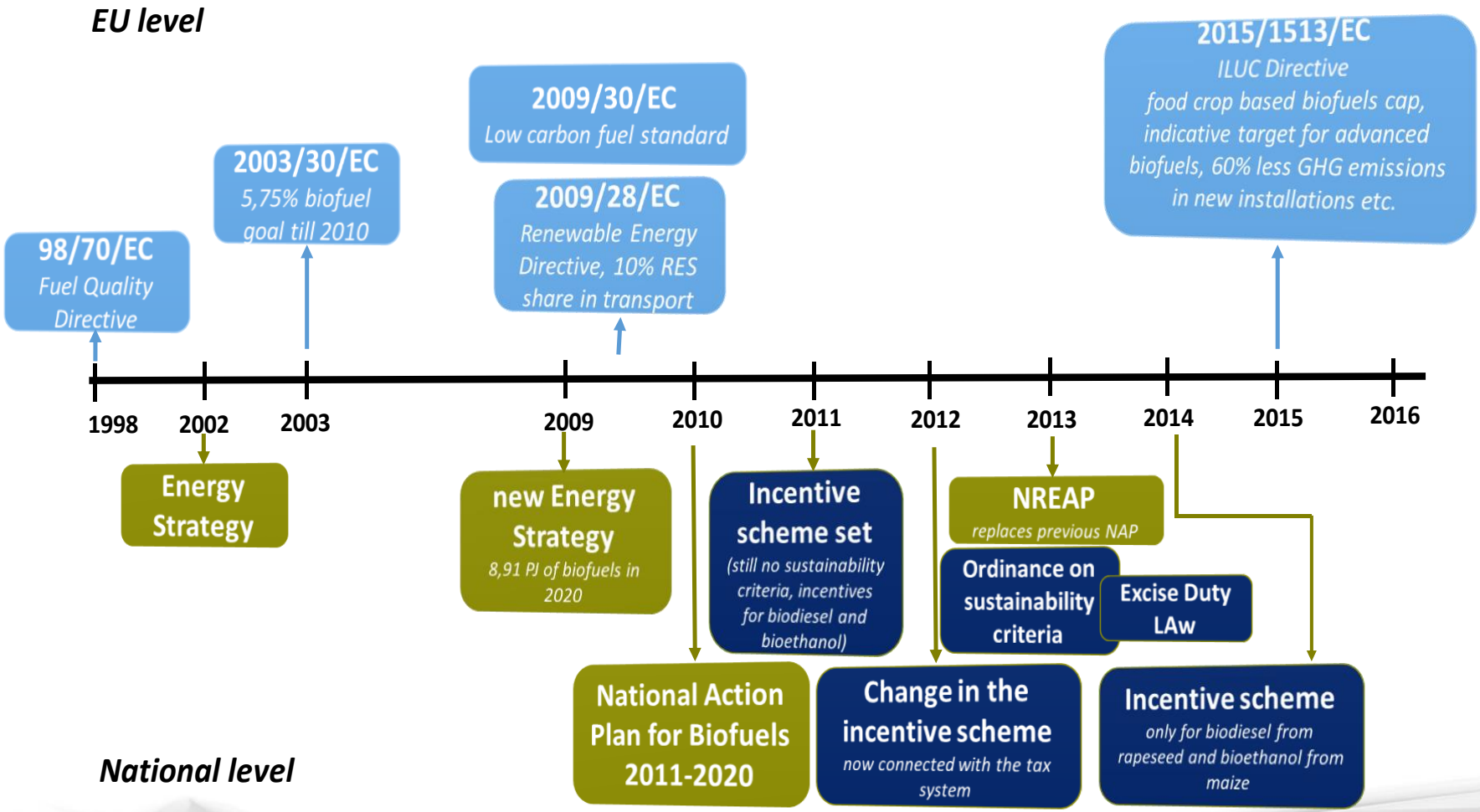
- detailed information on passenger and tonne kilometers

Project results

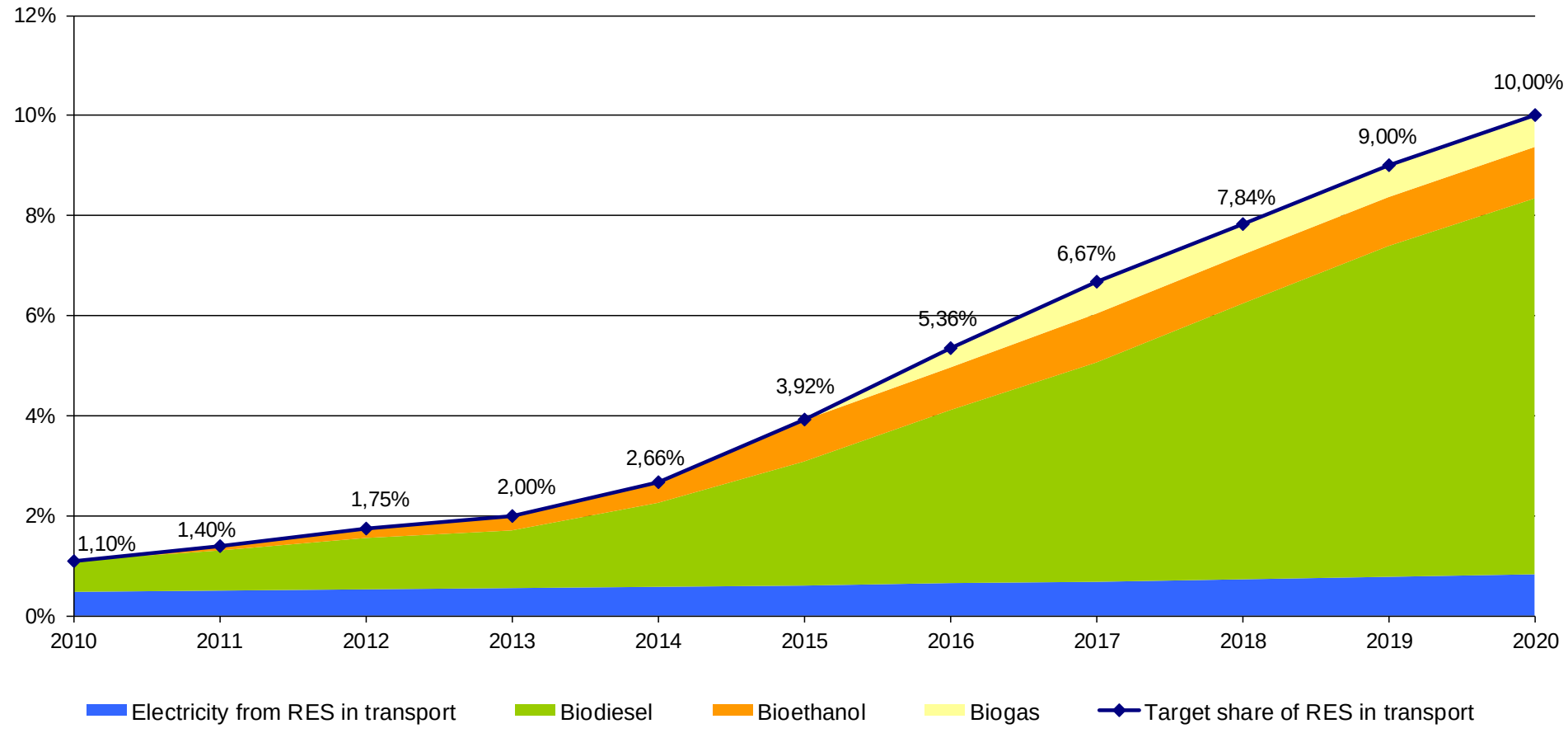
- detailed monitoring of energy efficiency in transport enabled
- continuous (every three years) conduction of the research is recommended

„Reliable, timely, accurate, accessible and comparable energy statistics are the precondition for the development of coherent national energy policies, strategies and plans”

Biofuel policy development in Croatia



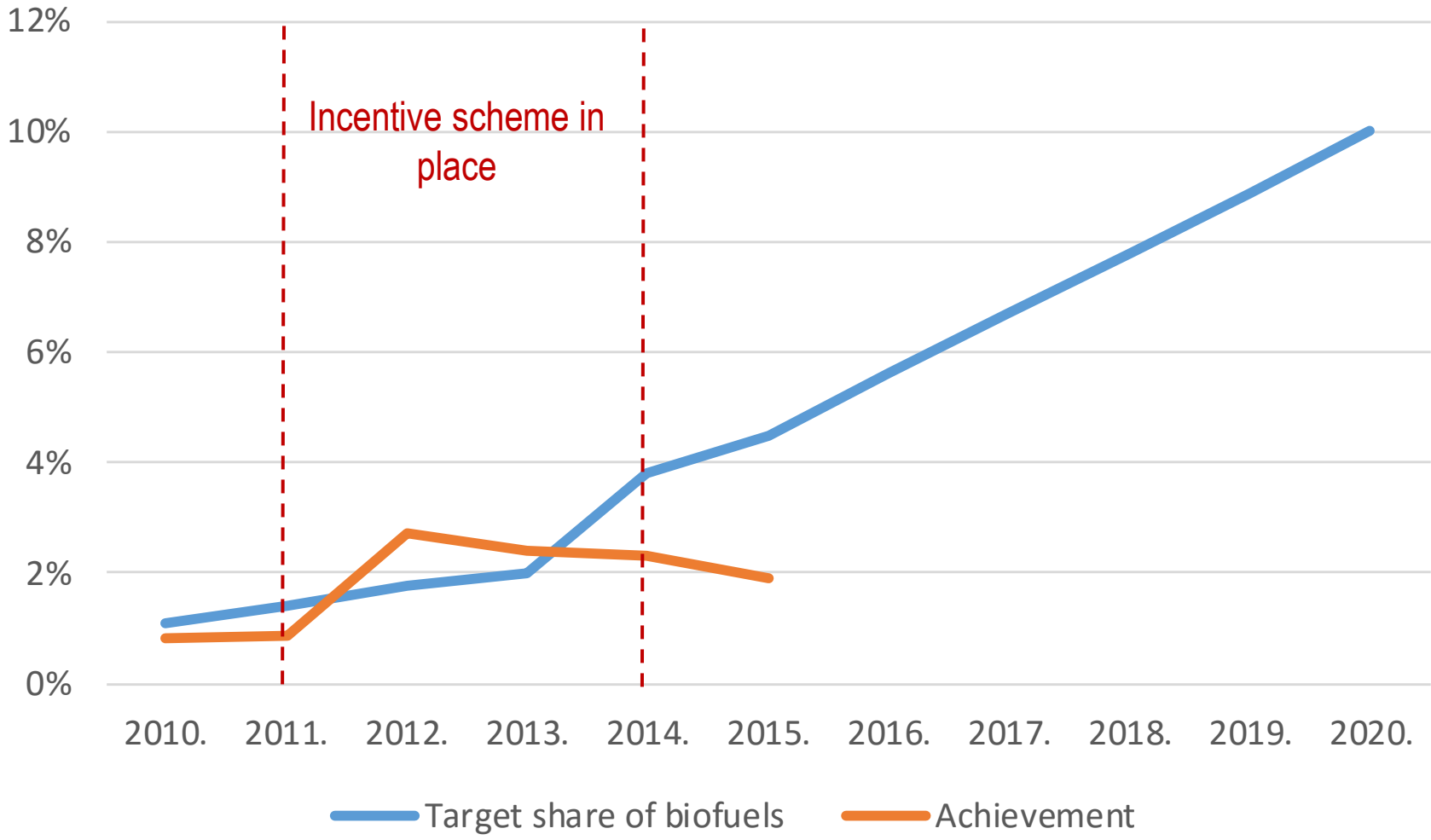
Planned shares of biofuels in transport



The main characteristics of the system

- Producers and importers of petroleum products are obliged to put biofuel on the Croatian market
- Environmental fee for unfulfill prescribed obligation
- Incentives for biofuel production (per liter of biofuel sold on Croatian market) (until the end of 2014)
- Fee for the promotion of biofuel production included in retail price of petroleum products (until the end of 2012)

Achievement of biofuel target share



Thank you for your attention!

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