Transport GHG reduction measures in Hungary

Workshop for effective policy implementation under the Effort Sharing Decision (ESD)

01 October 2014
Warsaw – Poland

László PÉNZES
NFM – Hungary

NEMZETI FEJLESZTÉSI MINISZTÉRIUM

Introduction

NFM – Nemzeti **F**ejlesztési **M**inisztérium
Ministry of National Development

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NEMZETI FEJLESZTÉSI MINISZTÉRIUM

Introduction

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KTI
Alapítva - Since 1938

Introduction

KTI – Institute for Transport Sciences:

- state-owned research base of Ministry of National Development (responsible for transport).
- more than 70 years practice
- significant role in Hungary and within Europe
- highly-qualified experts - national and international acclaim

membership:

- **E**uropean **C**onference of **T**ransport **R**esearch **I**nstitutes
- **F**orum of **E**uropean **R**oad **S**afety **R**esearch **I**nstitutes
- **F**orum of **E**uropean **N**ational **H**ighway **R**esearch **L**aboratories

KTI
Alapítva - Since 1938

Content

- Long-term targets (HU)
- Decreasing CO2 emission – infrastructure
- Decreasing CO2 emission – vehicle
- Carbon-free/low-carbon sources/fuels
- Electro-mobility
- Technical measures for efficiency
- P + P + P
- Conclusion

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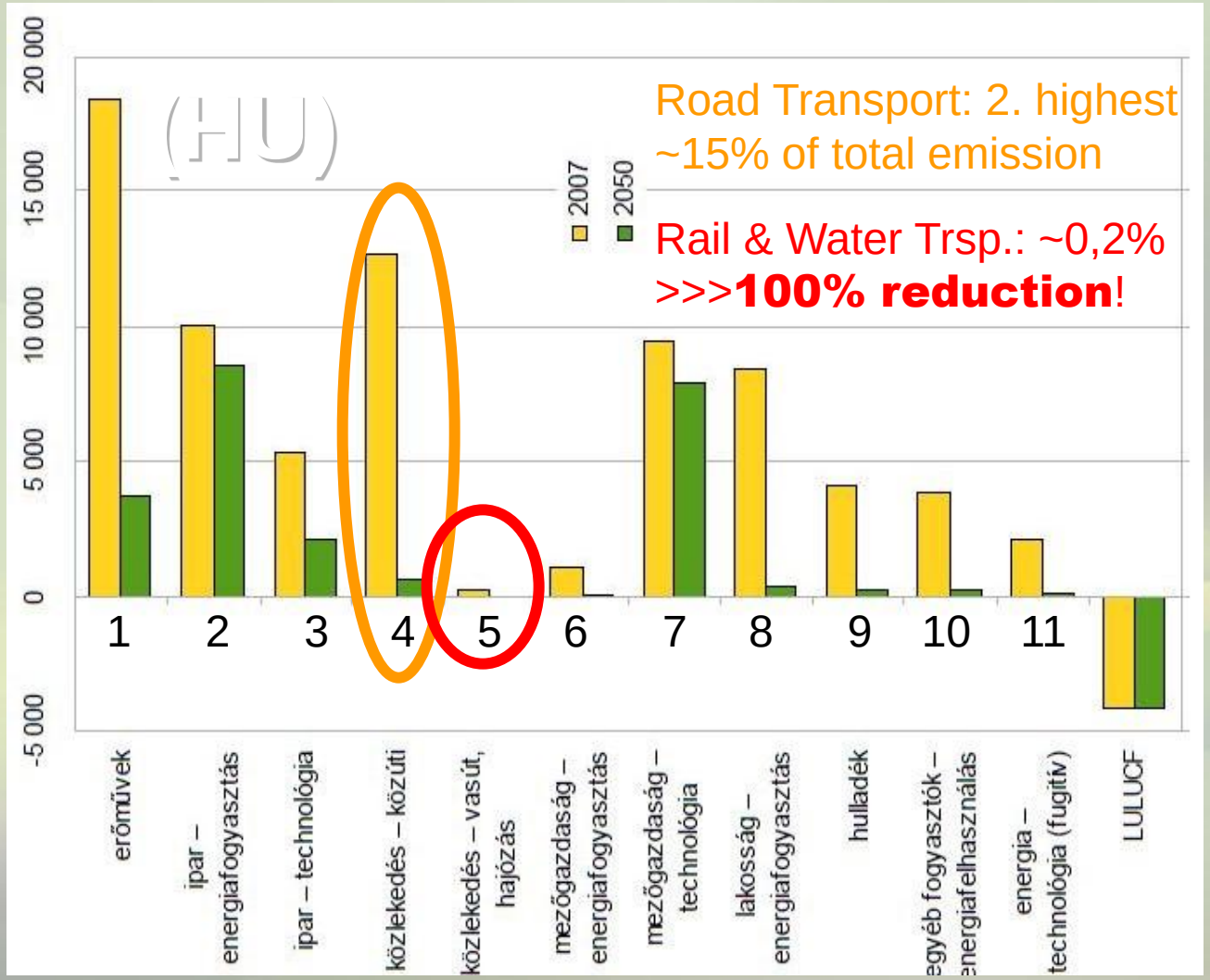
Long-term targets (2007 – 2050)



1 Power-plants
2 Industry – energy
3 Industry – tech.
4 Road-transport
5 Rail & waterways
6 Agriculture – energy
7 Agriculture – tech.
8 Domestic – energy
9 Waste
10 Other – energy
11 Other – technology
12 LULUCF

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Decreasing CO2 emission / 1

Infrastructure:

- Increasing efficiency (efficient fuel use):
  - minimising congestions
  - minimising route length
- Renewable fuels – fuelling infrastructure
- Electric fuelling infrastructure
- Developing non motorised „transport”

+

- Shaping attitudes (**eco-driving**)

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Decreasing CO2 emission / 1

- **Increasing efficiency:**
  minimising congestions
  minimising route length
- Renewable fuels – fuelling infrastructure
- Electric fuelling infrastructure
- Developing non motorised „transport”
  +
- Shaping attitudes (**eco-driving**)

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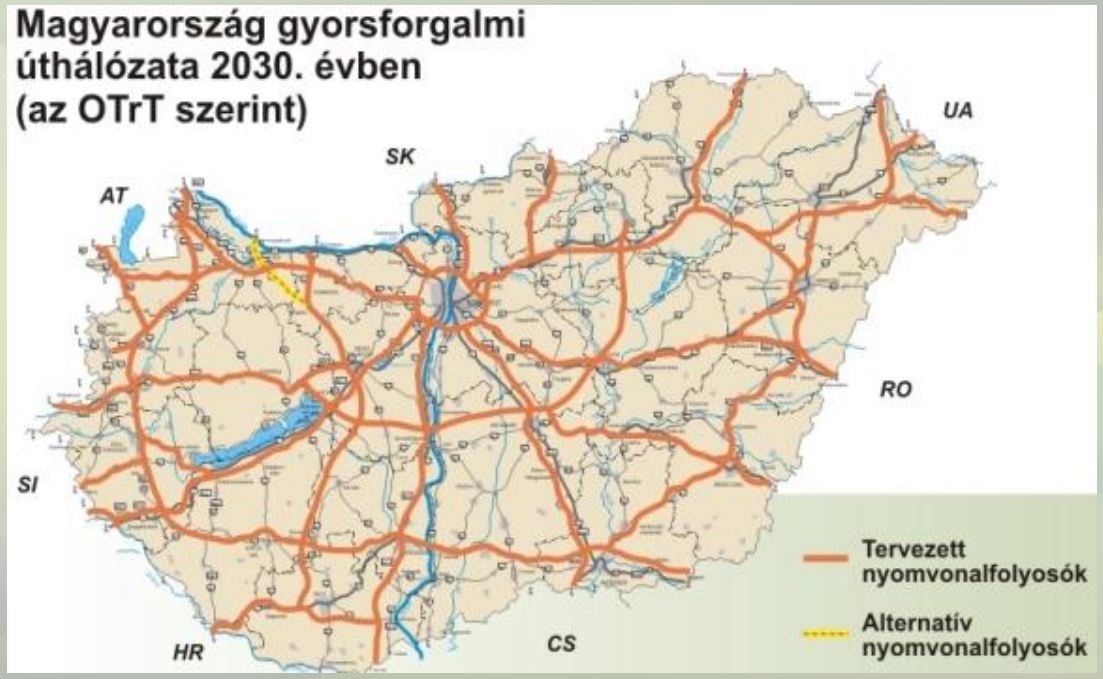
Decreasing CO2 emission / 1

- **Increasing efficiency:**
  minimising congestions > IT
  minimising route length > new roads



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Decreasing CO2 emission / 1

- Increasing efficiency:
  minimising congestions
  minimising route length
- **Renewable fuels – fuelling infrastructure**
- Electric fuelling infrastructure
- Developing non motorised „transport”
  +
- Shaping attitudes (**eco-driving**)

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Decreasing CO2 emission / 1

- **Renewable fuels – E85 fuelling infrastructure**

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Decreasing CO2 emission / 1

- Increasing efficiency:
  minimising congestions
  minimising route length
- Renewable fuels – fuelling infrastructure
- **Electric fuelling infrastructure**
- Developing non motorised „transport”
  +
- Shaping attitudes (**eco-driving**)

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Decreasing CO2 emission / 1

- **Electric fuelling infrastructure**

Működő publikus töltőoszl

⓪ ELMŰ székház

Új publikus töltőoszlopok

① Clark Ádám tér

② Bajcsy-Zsilinszky út

③ Oktogon

④ Margit sziget

⑤ Fő utca (NFM)

⑥ Istenhegyi út

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Decreasing CO2 emission / 1

- Increasing efficiency:
  minimising congestions
  minimising route length
- Renewable fuels – fuelling infrastructure
- Electric fuelling infrastructure
- **Developing non motorised „transport”**
  +
- Shaping attitudes (**eco-driving**)

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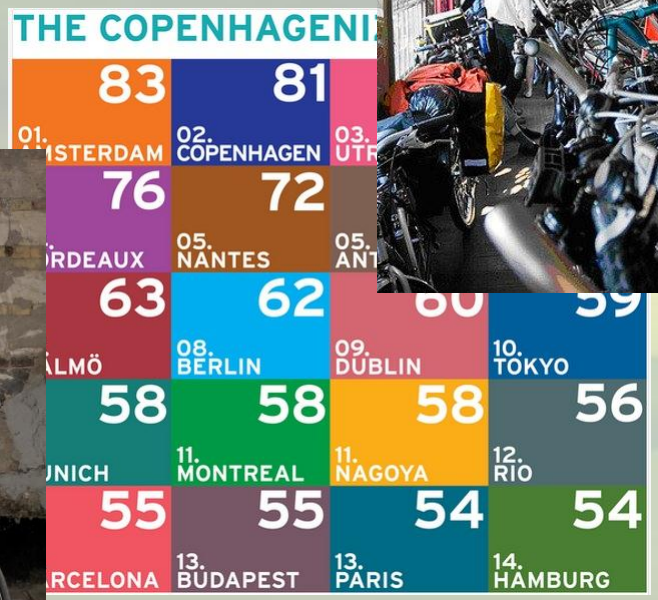
Decreasing CO2 emission / 1

- Developing non-motorised „transport”



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MINISZTÉRIUM

Decreasing CO2 emission / 1

- Increasing efficiency:
  minimising congestions
  minimising route length
- Renewable fuels – fuelling infrastructure
- Electric fuelling infrastructure
- Developing non motorised „transport”
  +
- **Shaping attitudes (eco-driving)**

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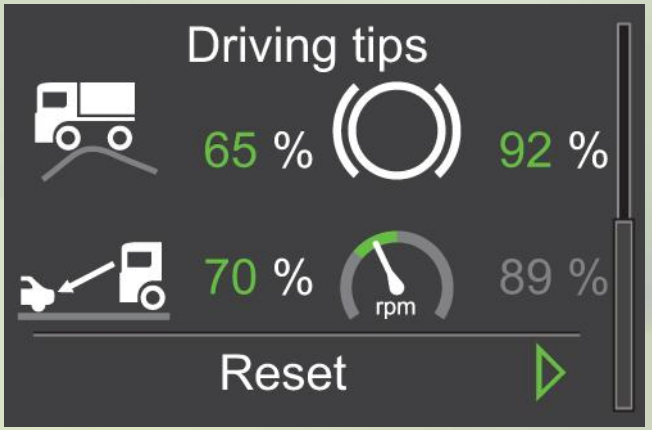
Decreasing CO2 emission / 1

- **Shaping attitudes (eco-driving)**



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Decreasing CO2 emission / 2

The vehicle...

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Decreasing CO2 emission / 2

Vehicle:

- Low/lower energy consumption
- Energy saving solutions (hybrid)
- Using (nearly)-zero carbon (renewable) sources
- Using zero carbon (nuclear) sources
- Zero/nearly-zero carbon „transport” (non-motorised)

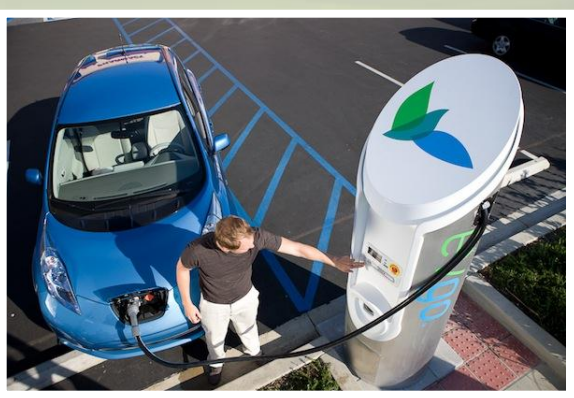
Decreasing CO2 emission / 2

Vehicle:

- **Lower energy – lower CO2**
- Energy saving solutions (hybrid)
- Using (nearly)-zero carbon (renewable) sources
- Using zero carbon (nuclear) sources
- Zero/nearly-zero carbon „transport” (non-motorised)

Decreasing CO2 emissions / 2

- **Lower energy – lower CO2 - modes**



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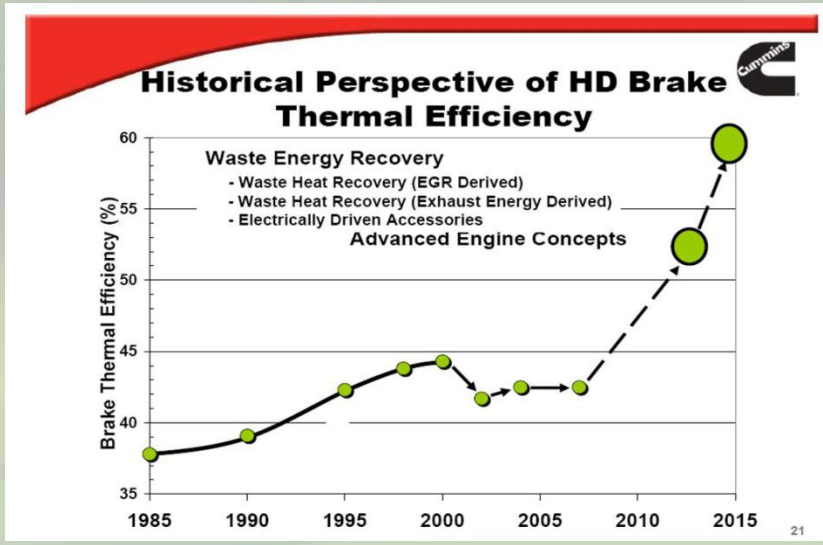
Decreasing CO2 emission / 2

Lower energy – lower CO2 emission - vehicles

Tool box for a lower CO2 emission of LDVs & HDVs

- Improved engine technologies
- Reduced need for power
- Hybridization
- Electrification
- Fuel cell technology
- Alternative fuels (> AMF, etc.)



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Decreasing CO2 emission / 2

Advanced motor fuels (AMF)**:**

- **Reduces GHG emissions**
- High energy efficiency
- Low toxic emissions
- Contributes to security of supply

Possibilities:

- reformulated fuels (gasoline and diesel)
- bio-fuels (ethanol, biodiesel etc.)
- synthetic fuels (methanol, Fischer-Tropsch, DME...)
- gaseous fuels (CNG, biogas, LPG, hydrogen etc.)

Decreasing CO2 emission / 2

Alternative fuels (Clean Power for Transport Package)

- **Biofuels:** nearly 5% of the market - blended fuels
  - sustainability (!)
- **Electricity:**
  - **pure electric/plug-in-hybrid:** experimental stage.
  - **hybrid:** only marginal (fleet under 5000 cars (2013))
- **Hydrogen:** NO Hydrogen network/fuelling possibilities.
- **Natural Gas (Liquefied (LNG) and Compressed (CNG):**
  - **LNG:** NO LNG network/fuelling possibilities.
- **CNG:** only ~15 public fuelling possibilities.
  - GHG reduction only from renewable sources

Decreasing CO2 emission / 2

Vehicle:

- Lower energy – lower CO2
- **Energy saving solutions (hybrid)**
- Using (nearly)-zero carbon (renewable) sources
- Using zero carbon (nuclear) sources
- Zero/nearly-zero carbon „transport” (non-motorised)

Decreasing CO2 emission / 2

- **Energy saving solutions (hybrid)**

Kecskemét, Budapest…

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Decreasing CO2 emission / 2

Vehicle:

- Lower energy – lower CO2
- Energy saving solutions (hybrid)
- **Using (nearly)-zero carbon (renewable) sources**
- Using zero carbon (nuclear) sources
- Zero/nearly-zero carbon „transport” (non-motorised)

Decreasing CO2 emission / 2

- **Using (nearly)-zero carbon (renewable) sources**

Zalaegerszeg

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Decreasing CO2 emission / 2

Vehicle:

- Lower energy – lower CO2
- Using low-carbon energy sources
- Energy saving solutions (hybrid)
- Using (nearly)-zero carbon (renewable) sources
- **Using zero carbon (nuclear) sources**
- Zero/nearly-zero carbon „transport”

Decreasing CO2 emission / 2

- Using zero carbon (nuclear) sources

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Decreasing CO2 emission / 2

Vehicle:

- Lower energy – lower CO2
- Using low-carbon energy sources
- Energy saving solutions (hybrid)
- Using (nearly)-zero carbon (renewable) sources
- Using zero carbon (nuclear) sources
- **Zero/nearly-zero carbon „transport”**

Decreasing CO2 emission / 2

Zero/nearly-zero carbon „transport”

- B + R systems (Esztergom, Budapest, Szeged)
- „VELOTAXI” type tourist transport
- Cargo bikes - mostly in the capital
- Bike transporting rail carriages
- Sightseeing with *SEGWAY*

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„Alternative fuels”

Is it a possibility of GHG reduction?

Not all „alternative” is **renewable.**

Not all „renewable” is **sustainable.**

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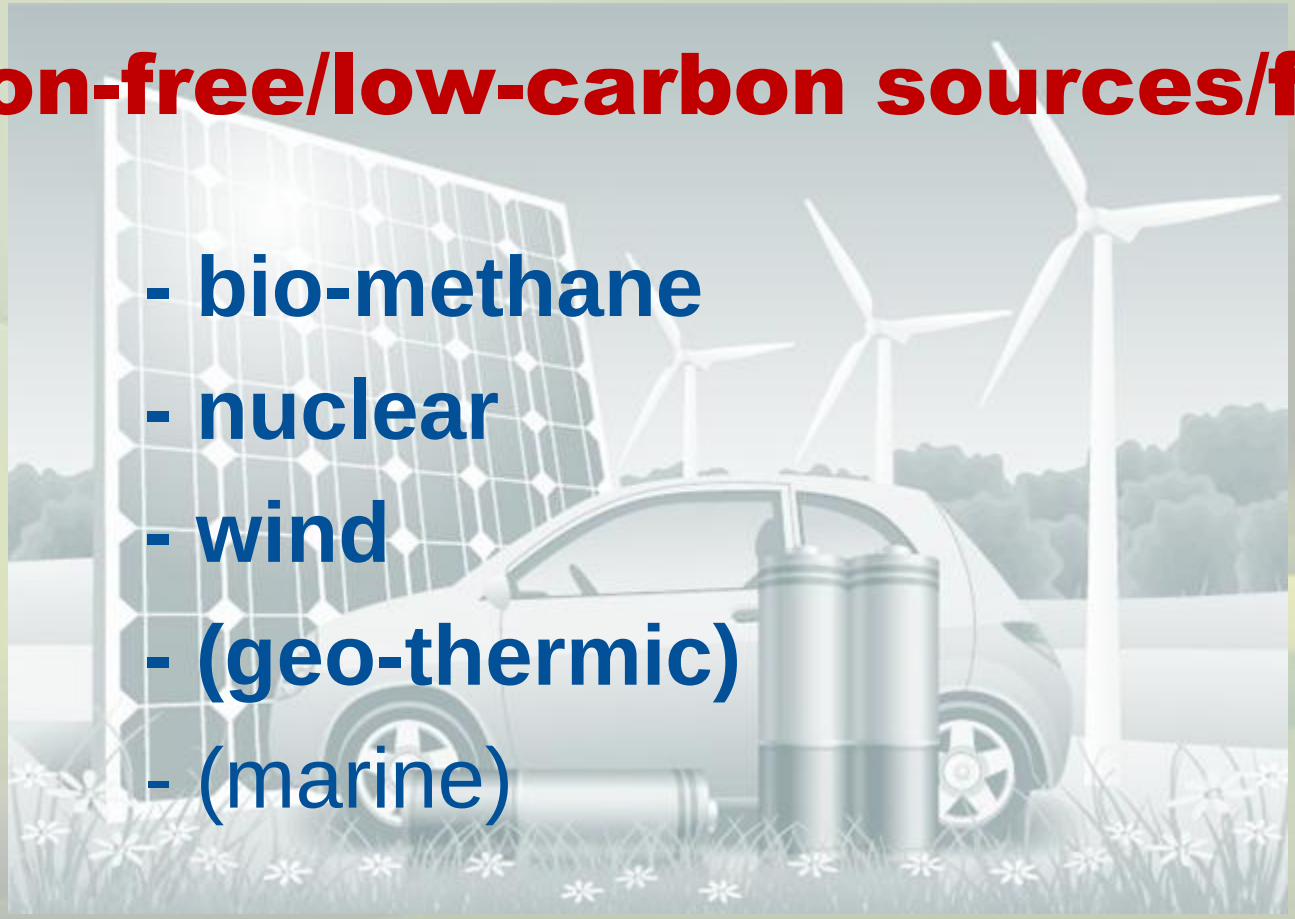
Carbon-free/low-carbon sources/fuels



- bio-methane
- nuclear
- wind
- (geo-thermic)
- (marine)

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Carbon-free/low-carbon: Bio-CNG

Bio-methane production: Wastewater Treatment Plants

Zalaegerszeg – Pilot Project

- service-vans
- trucks
- buses

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Carbon-free energy: Nuclear

„ *Safe nuclear energy, which serves as the basis for the electrification of road and rail transport…*”

(Hungarian Energy Strategy - 2030)

Nuclear share ~40% in producing electricity

Store possibilities (H2 - FC or battery):

Rail transport:

- Intercity use
- Regional use
- Local use

Road transport:

- Local use

Ships:

- Local use

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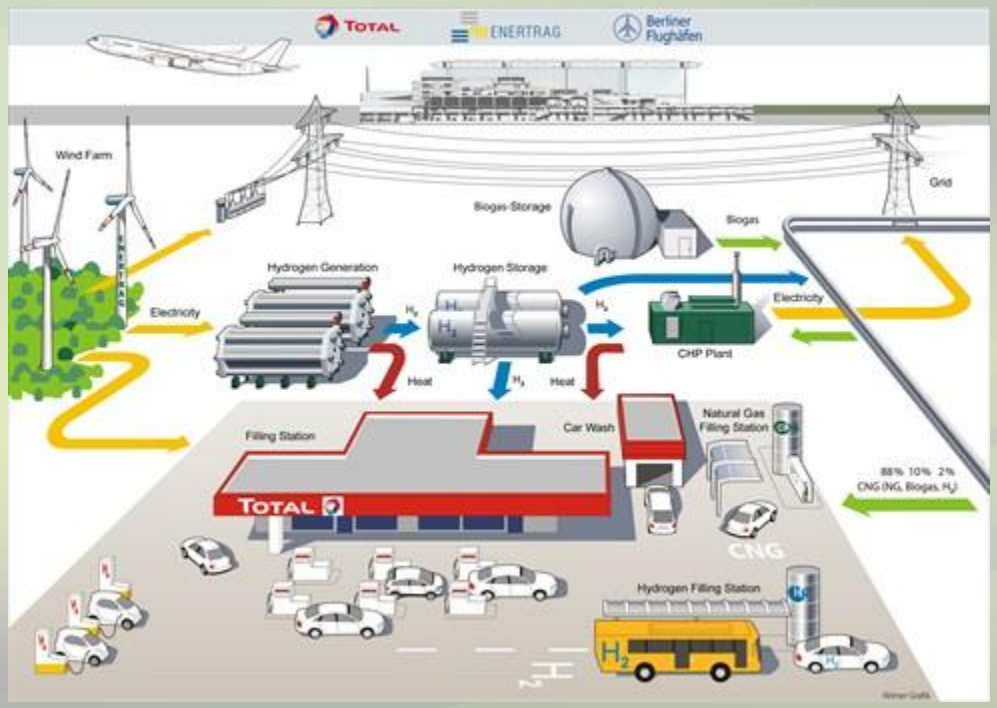
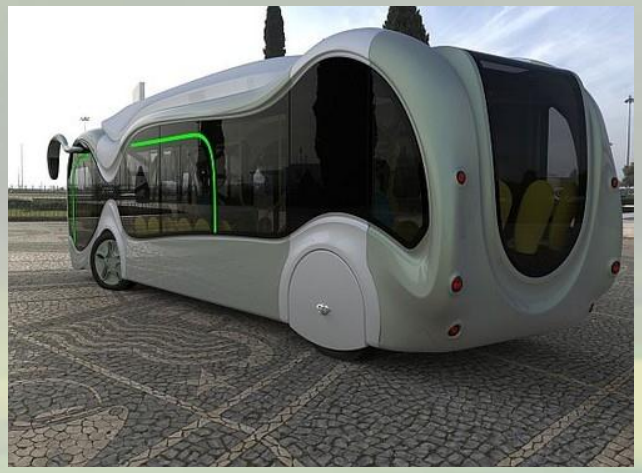
Carbon-free energy: Wind-H2

Mainly local usage of wind-energy > advantages

Store > Accumulator charging > H2 „accumulator”

HU - only planned, tests in 2008





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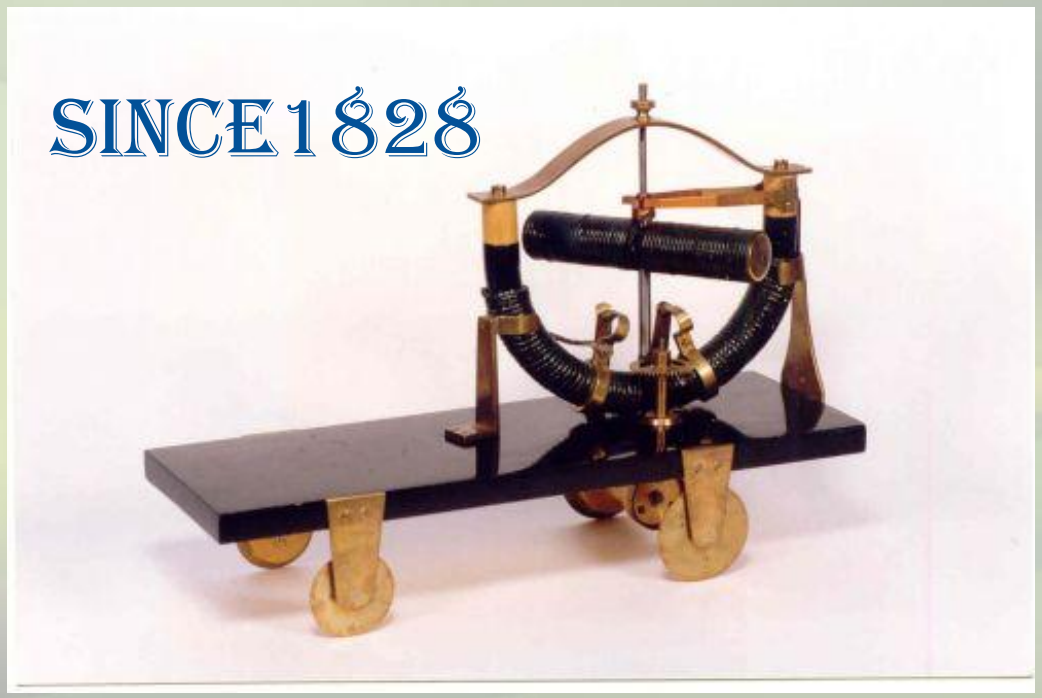
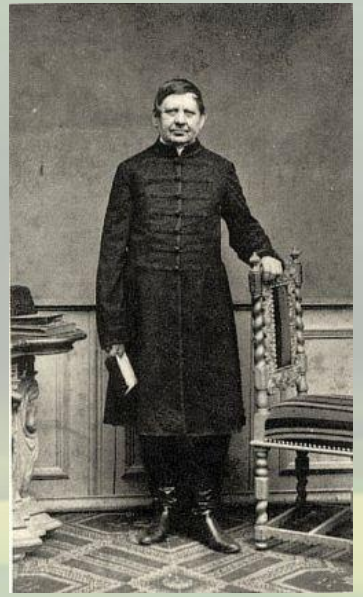
Electro-mobility

The key technology: E-drive

ÁNYOS JEDLIK





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Electro-mobility

Ányos Jedlik Plan / 1

A blueprint for the regulatory and support framework required for the popularization of E-mobility in Hungary

•The Plan promotes electric cars, the establishment of a **country-wide network of charging** stations and the streamlining of taxation and legal requirements

•The Government is also weighting the option of ‚labelling' E-vehicles, permitting the utilization of bus lanes, free parking at charging stations and the expansion of tax incentives.

•The E-mobility **in public transport** has importance in Plan

•Planned increasing number of electric taxis and the introduction of an electric vehicle rent-system.

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Electro-mobility

Ányos Jedlik Plan / 2

- The charging poles of ELMŰ-ÉMÁSZ Group – the energy service company - now free of charge until and would be able to do so by the end of this year. Currently has 20 public charging stations in Budapest and another 14 operating at shopping centers and public garages.
- EU directive entered into force on January 2013 > HU has until 2020 to install 68 000 E-charging stations > 7000 public.
- HU: 2014 - near 200 pure-electric vehicles. For Ministry KTI developed an energy & climate model. According this model for 2050 > 3 500 000 e-traction vehicle (hybrid, plug-in-hybrid, pure electric) – mainly cars & vans.

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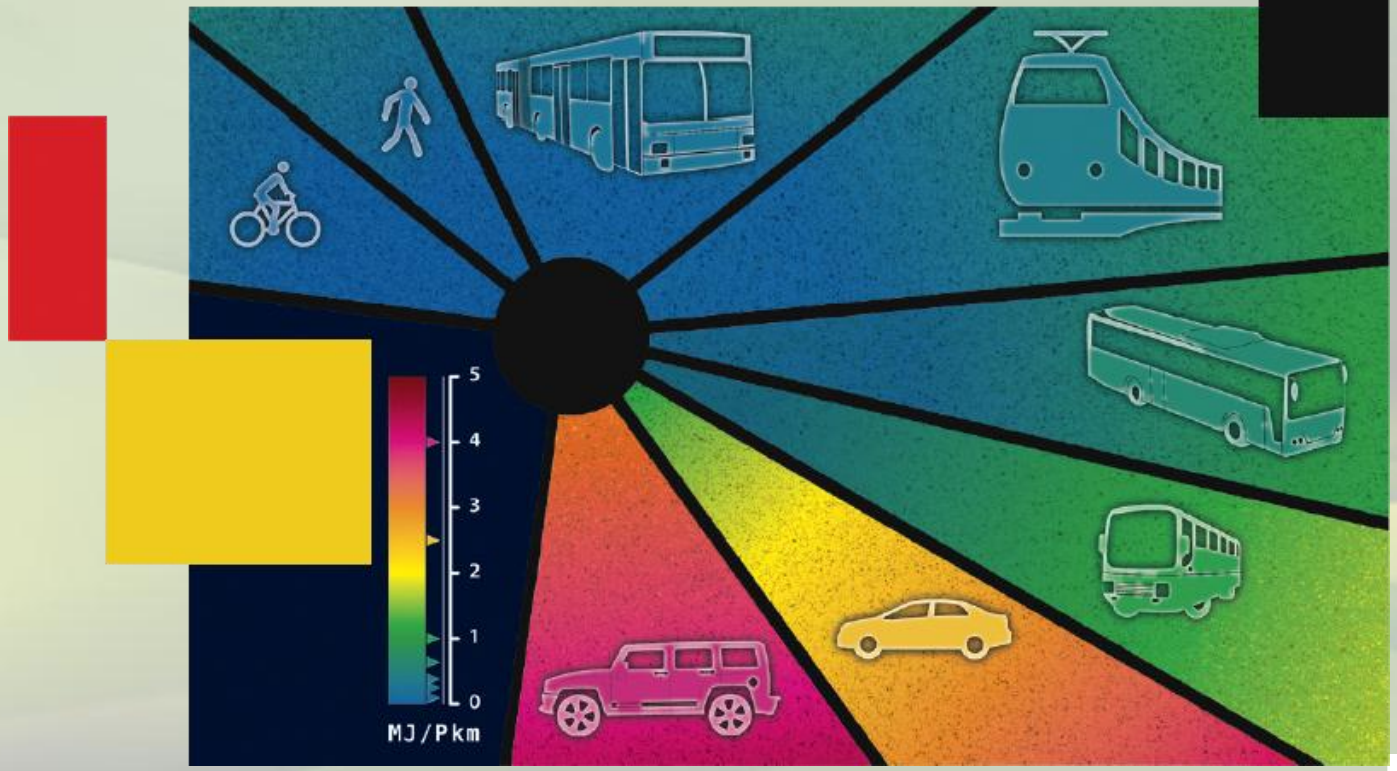
Technical measures for efficiency

Average efficiency of transport modes:



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Technical measures for efficiency

Passenger cars:

- smaller and lighter vehicles
- reduced performance
- hybridization, electrification

City buses & trucks:

- reduced weight
- hybridization, electrification

HD trucks (for highway use)

- improved aerodynamics
- optimized highest speed

Technical measures for efficiency

Legal aspects:

In 2011 Government accepted an Action-plan for decrease of PM10 Emission.

This Plan contains a lot of measurements however means energy/fuel savings > that means a possibility for decreasing of GHG emission.

In 2013 Government accepted the National Transport Strategy and the Action-plan of Transport Energy-efficiency. Both of them: the most important goal is to fulfill the EU (and global) CO2 requirements.

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P + P + P

Plans

Pilot Projects

Practice

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Bio-methane trucks, buses - planned

Budapest, etc.

P + P + P

New metro line in Budapest

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NEW tram/trolley lines

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P + P + P

New light-weight EMU instead of conventional train

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Rent – a – Bike

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P + P + P

Electric buses

Budapest. etc.

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Hybridization on rail

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Conclusion

Infrastructure:

- **build** the connections, **optimal use** of road-capacity (IT)
- for all sustainable energy source, **sufficient fuelling network** needed
- **focus of measures varies –** depends on the area (urban – suburban – rural – interurban – international transport)
- inter-modality must have has **greater potential** then in the past
- **building activity** of infrastructure must be sustainable too…

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Conclusion

Vehicles:

- Independent of the energy source, **energy efficiency** must have priority
- There are **available technical measures** for reducing energy consumption
- The **focus of measures varies** from one vehicle category to another
- HDV's has **greater potential** for reduction of energy consumption than LDV's
- **Driving behavior** has a major impact on energy consumption and emissions

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