Urban Transport

Environmental impacts, management, public transport, **sustainability**

Instruments of urban management and target areas

	Urban planning	Urban management	Economic instruments	Limit values	Public information
Air quality	• Land-use • Transport	• Integrated emission control	• Emission charges	• Air pollution • Drink water • Noise pollution • Indoor loads	• monitoring • reports
Urban space	• Land use • Urban reha-bilitation • Open spaces • Green areas • Housing conditions	• zone-systems • Formation of special zones	• Land use charges	• Requi-rements of green areas • Building codes	• Safe-guarding and main-tenance

	Urban planning	Urban management	Economic instruments	Limit values	Public information
Transport	• land use • urban freight • parking regulation	• urban traffic • public transport • traffic calming	• fuel charges and taxes • road charges and taxes	• emissions • transport performances • fuel structure and composition	• Support of public transport
Energy	• energy efficiency programs • energy savings	• energy-efficiency	• energy prices	• emissions • emission limit values	• energy savings
Waste	• reductions targets • integrated waste management	• Reuse and recycling systems • selective waste management systems	• taxation	• products • wrapping • disposal of waste	• product classification • re-use

Indicators of urban management

Urban population	Population	Inhabitants in city and conurbation
	Population density	Population per km^2 area per density classes
Urban land-cover	Total area	In km^2
	Built in areas	In km^2- by land use
	Open areas	In km^2 , green areas, water surfaces %
	Transport networks	Road network length, railway length, km, % of total urban area
Derelict areas		In km^2 , % of total urban area
Urban renewal areas		In km^2 % of total urban area
		% of total urban area
Urban mobility	Modal split	Number and average length of trips in km per inhabitant per mode of transport per day
	Commuting patterns	Number of commuters into and out of conurbation, % of urban population
	Traffic volumes	Total and inflow, outflow in vehicle km, number of vehicles on main routes,

Indicators of urban flows

Water	Water consumption	Consumption per inhabitant in litres per day % of groundwater resources in total water supply
	Waste water	%- of dwellings connected to a sewage system, number and capacity of plants by type of treatment
Energy	Energy consumption	Electricity use, Gwh/year, Energy use by fuel type and sector
	Energy production plants	Number and type of power and heating plants in the conurbation
Materials and products	Transport of goods	Quantity of goods moved into and out of the city in kg per capita per year
Waste	Waste production	Solid waste collected on tonnes/inhabitant per year Composition of waste
	Recycling	% of waste recycled per fraction
	Waste treatment and disposal	Number of incinerators and volume incinerated , Number of landfills, and volume by waste type

Indicators of urban environmental quality

Quality of water	Drink water	Number of days exceeded WHO drinking water standards,
	Surface waters	O_2 concentration of urban surface waters mg/l, pH>9 and >6, (days)
Air quality	Long term NO_x and PM	Annual mean concentration
	Short term concentration of O_3, NO_x and PM	exceedances
Acoustic quality	Exposure to noise	Exposure to noise above 65 and 75 dB
Traffic safety	Fatalities and casualties by traffic accidents	Number of people killed and injured in traffic accidents / 10.000 inh.
Housing quality	Average floor area / person	m^2/person
Access of green areas	Proximity to urban green areas	Percentage of people within 15 minutes walking distance of green areas
Quality of urban wildlife	Number of bird species	Number of bird species

Conditions of sustainable urban and regional mobility

Instruments, strategies, indicators

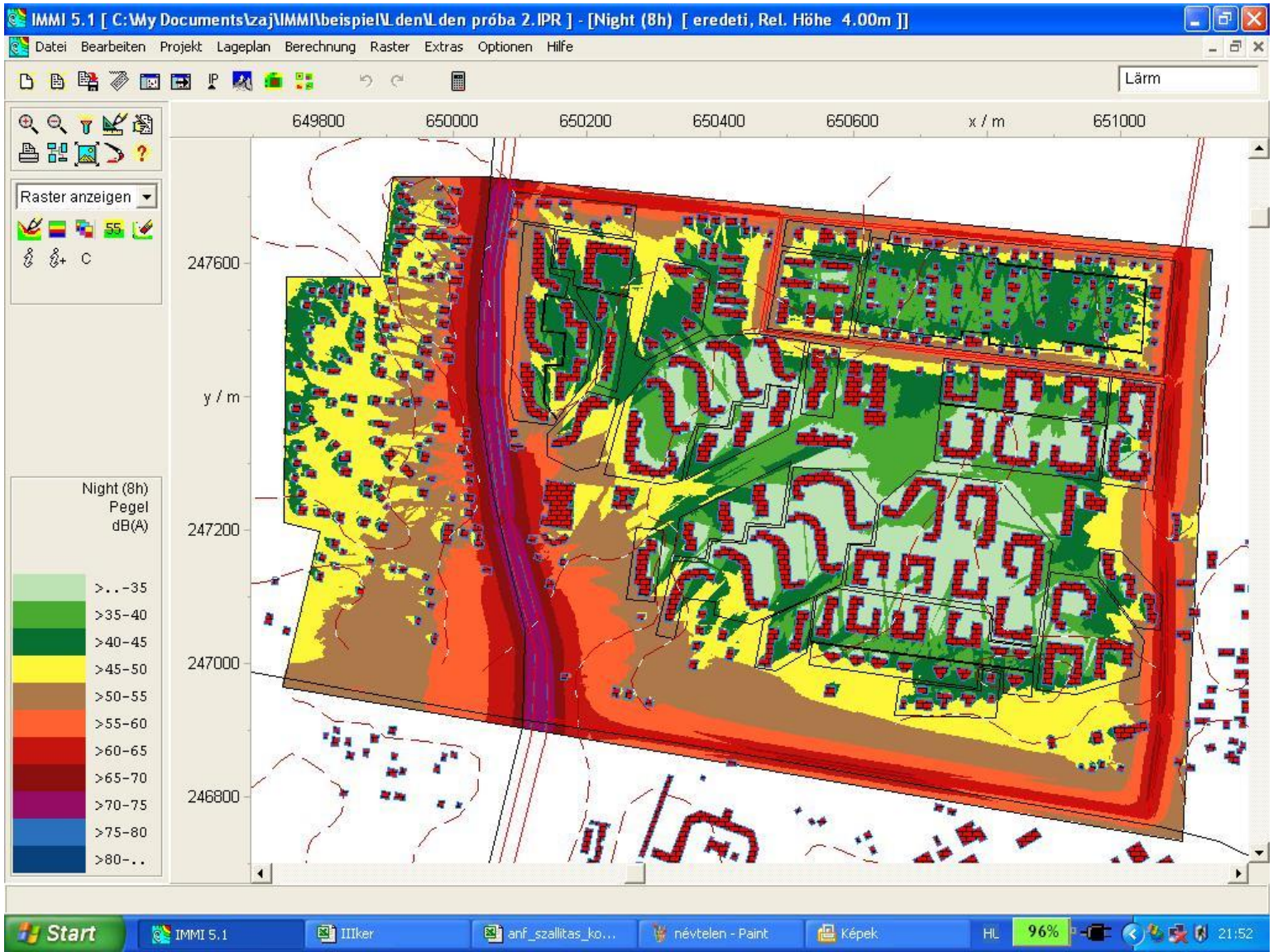
Basic conflict

- Urban development, urbanization, **quality of urban life – transport,**
- The road towards **sustainable city,** leads through transport,
- The most **serious challenge**, we are far away from sustainability, significant damages, losses, additional costs,
- Effects, factors, **cumulated impacts**.

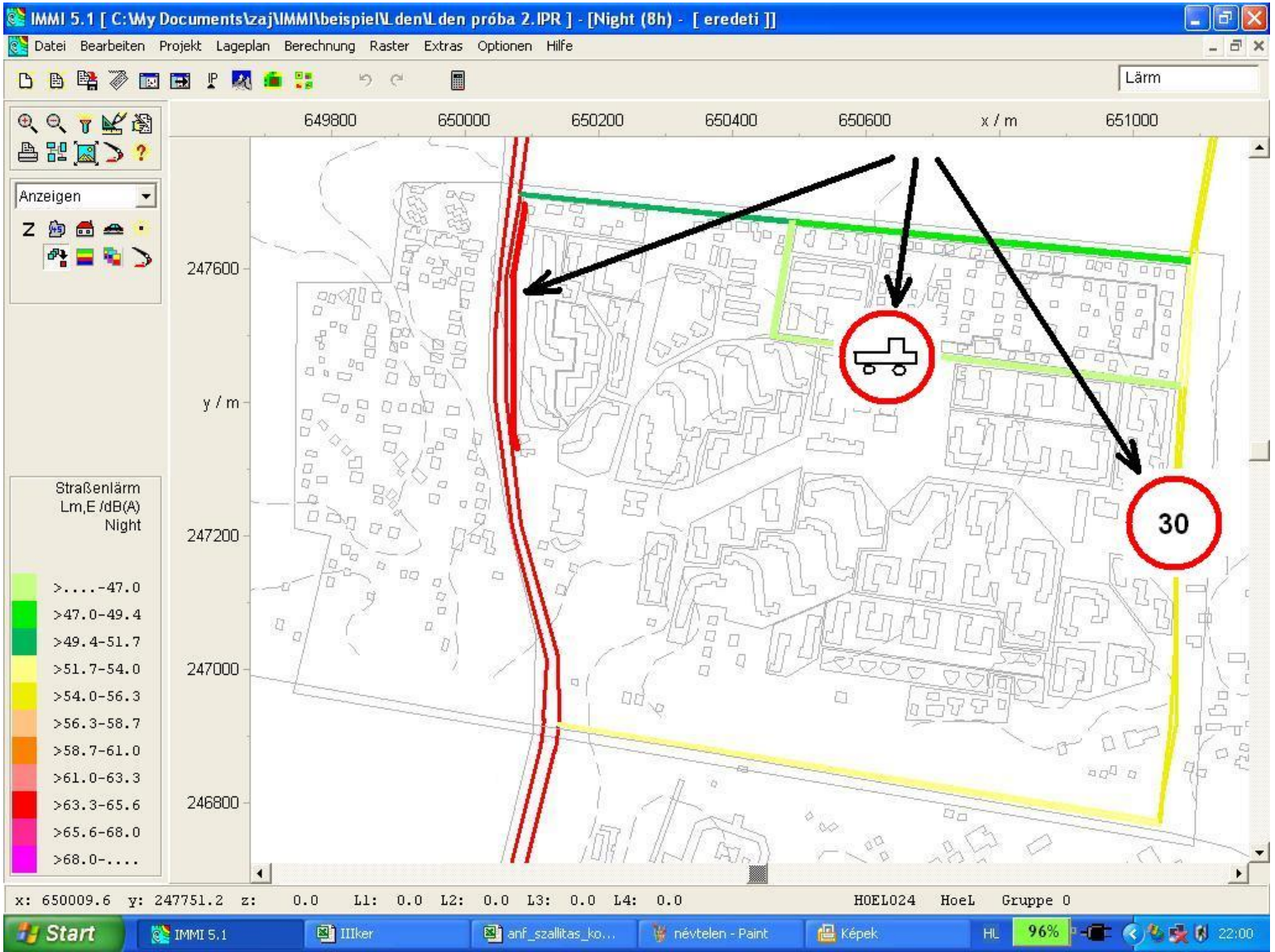
Noise load

- **Population**: over 40% is loaded by or over 55 dB equivalent, 20% over 65 dB,
- 10 dB reduction = **one order of magnitude** reduction of traffic flows 1/10 !,
- Community recommendation - 2002/49/EC – preparation of **noise maps** and **action plans**, for reducing of noise load,
- **Transport planning**, regional and land use planning, technical measures to reduce noise sources, reduction of noise spreading.

E.g.: Noise load – map of a residential area



„Action plan”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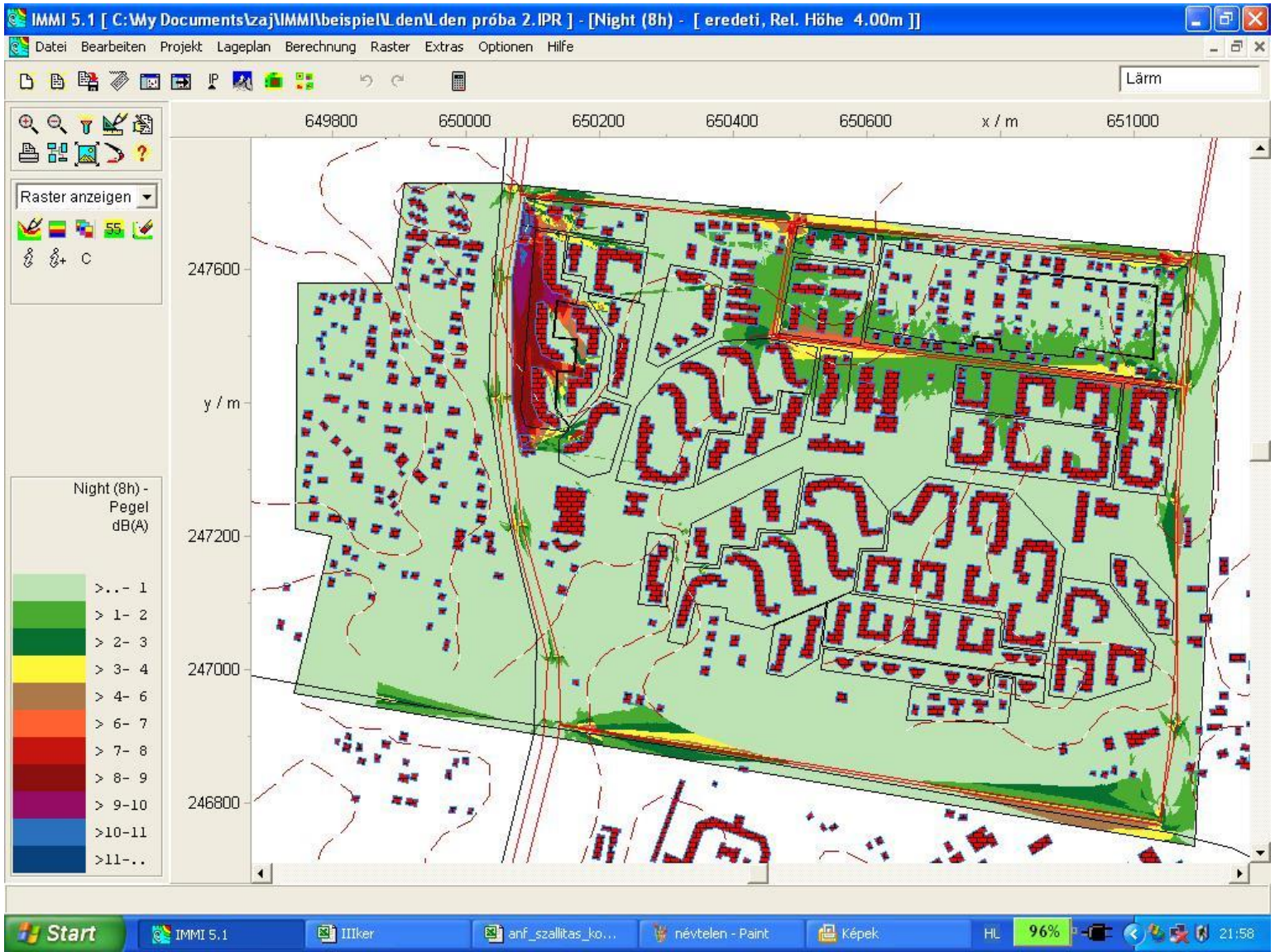
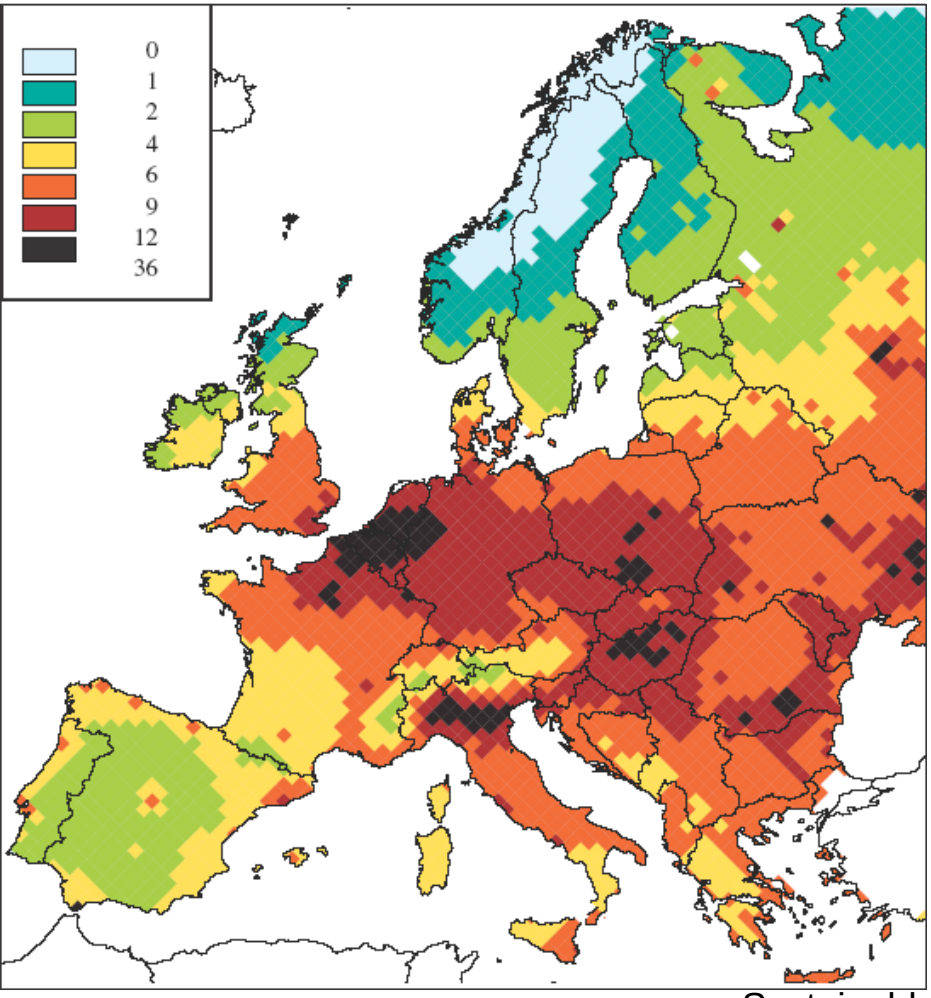


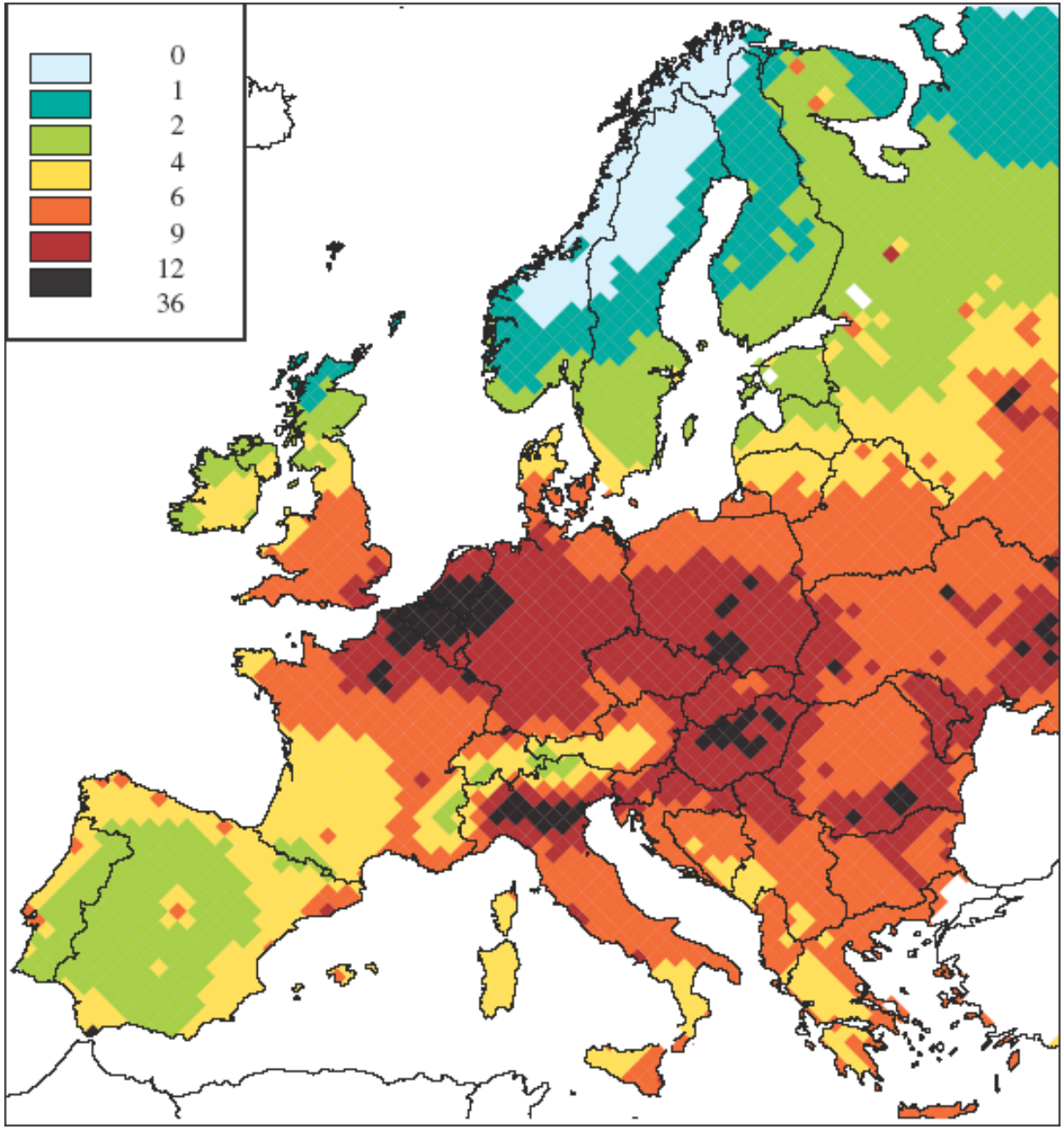
E.g.: Air pollution, the role of transport in Budapest air pollution (t)

	NO_x	CO	pm	SO_2
Industry	3 344	2 620	320	1 647
Road transport	**14 448**	**98 227**	**1 854**	**275**
Heating systems	1 418	2 608	379	625
Services	249	263	5	21
Air transport	883	1 266	0	39
total	20 342	104 984	2 558	2 607

E.g.: PM2.5 Expected life time reduction in months, in connection of anthropogenic PM2.5 emissions



- 300.000 deaths in EU, in connection of PM2.5 immissions,
- Hungary: one year loss, due to PM2.5 load,


0
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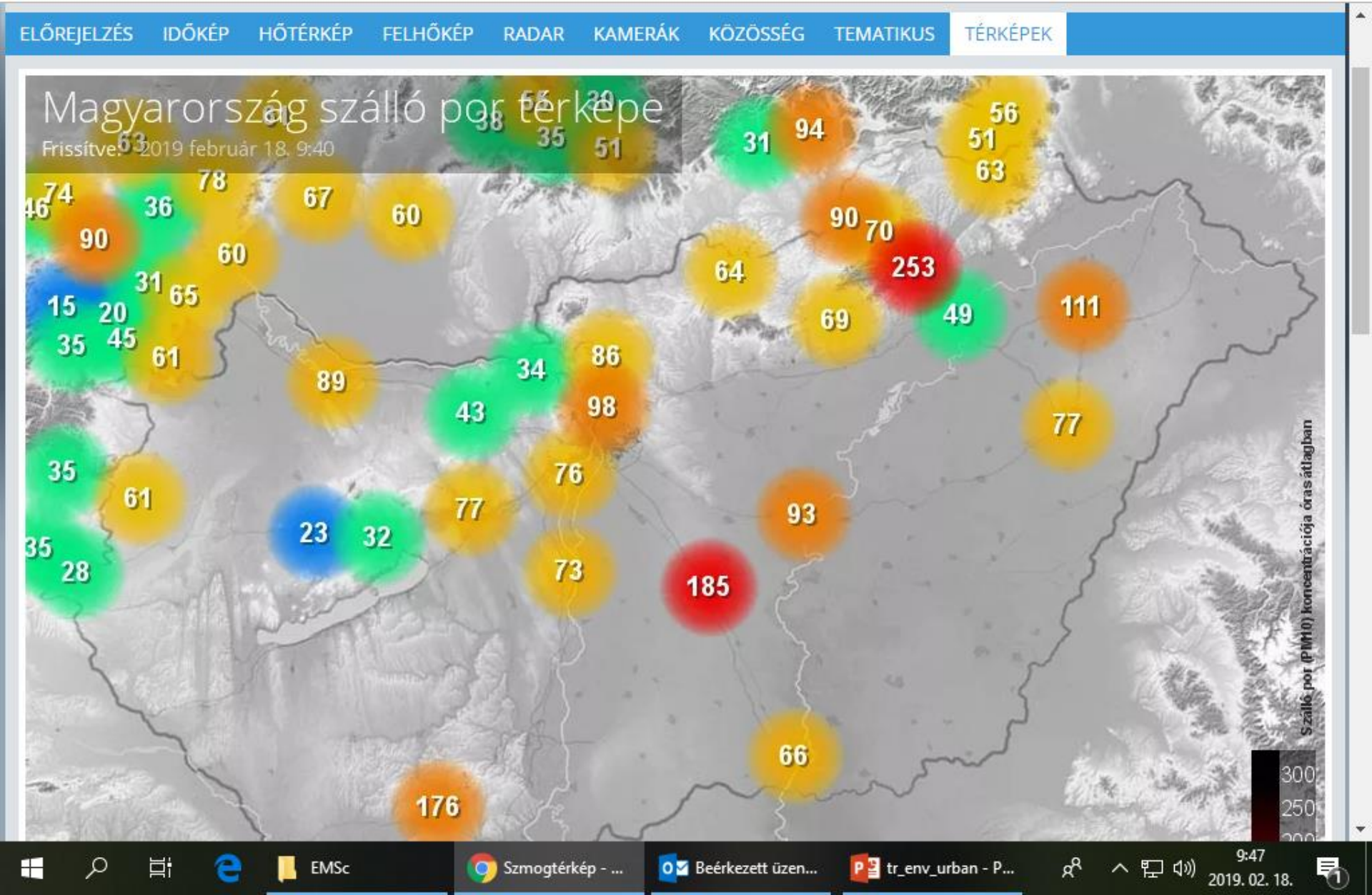
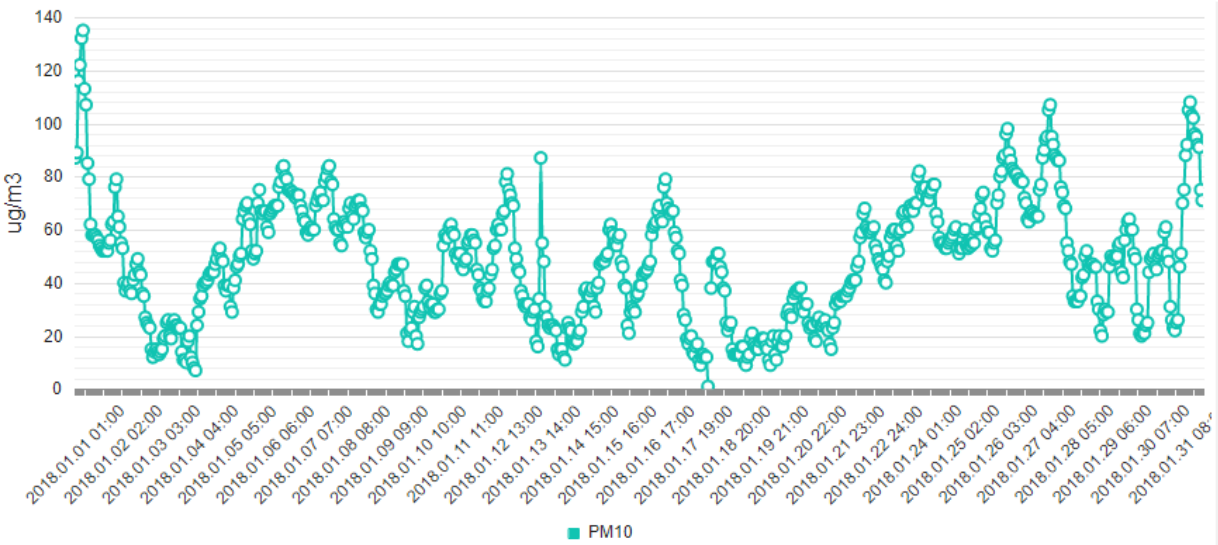
36

PM10 map of Hungary µg/m³



Széna square, PM10 in January

Grafikon Táblázat



Budapest Széna tér

Dátum	PM_{10}
Határértékek	
2018.01.01 01:00	87 ug/m3
2018.01.01 02:00	89 ug/m3
2018.01.01 03:00	116 ug/m3
2018.01.01 04:00	122 ug/m3

Bezár

Accidents

- **Values,** tolerance – among impact factors
- **Three times road risk,** by pass.km weighting, with large regional differences,
- **Number of travels**, locomotion has no change, speed and distance are growing,
- Specifically improving, but by **quantitatively growing** accident consequences.

Land use

- **Direct** transport use – E.g. (urban, suburban) motorway 2,5 ha/km
- **Indirect** – additional side effects, background facilities, - 8 ha/km,
- **Cumulated**, noise and air polluted area: 20 ha/km, + island formation effect, degradation,

Sustainable mobility
conditions, requirements, approaches

- **Survey of criteria and factors, research works** – European Union, and OECD thematic projects.
- **Basic-mobility**, without endangering, damaging the nature and environment.
- Today's **basic mobility needs**, expected environment and natural resources in the **future**, clarification of public health threats, and threshold limits of emission factors, polluters.

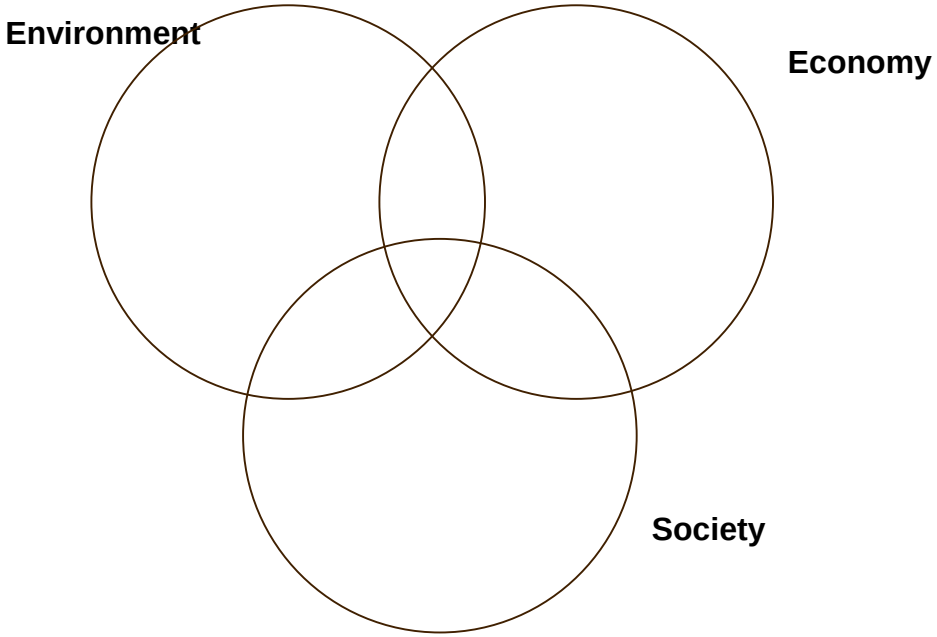
Sustainable mobility

- Offering a **basic-mobility** to all citizens, **without endangering**, damaging the nature and environment.
- Formulation of today's basic mobility needs, **expected quality of future environment** and resources**,** clarification of threats of public health.
- **Limiting values**, timetable, action plans with intermediate and „final" targets.

Sustainability models

So called **light** sustainability:

Joint environmental, social, and economic property, the mission is it's safeguarding and growth:

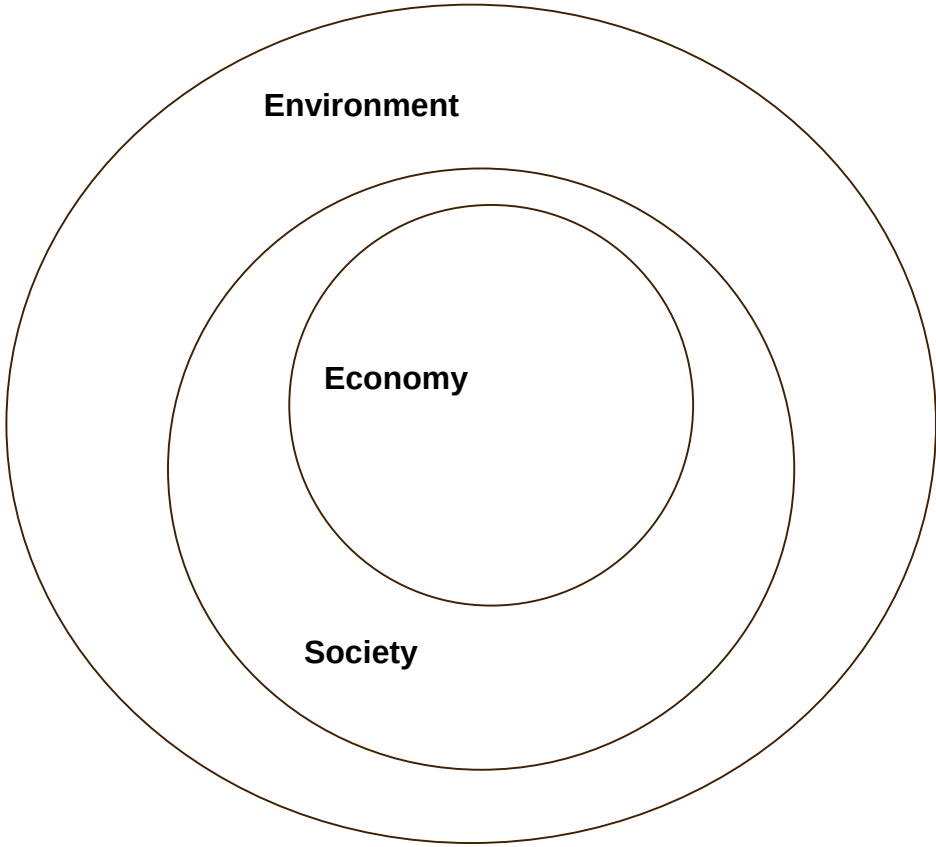


Sustainability models

So called **strong** sustainability :

Self evident fulfilment of environmental requirements, as basic condition

(Based on models of David Pearce, Fleischer Tamás, and Herman Daly)



Sustainable mobility

- **Social and economic** considerations of sustainability – equity, fairness, practical implementation – **feasibility**,
- **Qualitative** definitions and **quantitative** criteria for fulfilment - formulation of mobility objectives, demands, and those relation with **environmental criteria** and objectives.

Environmental Objectives:

- Reduction of **harmful emissions** and noise load.
- Reduction of **GHG emissions**.
- Reduction of consumption of **fossil fuels**.
- Reduction of use of other **non-renewable** natural resources.
- Improvement of use of **renewable** resources.
- Minimization of load effects of **transport infrastructure.**

Social objectives:

- Improvement of **human health** and safety.
- Improvement of aesthetic quality of **built** and **natural environment**.
- Improvement of **access**, availability.
- Reductions of **inequality**.
- Reduction of loads for the **future generations**.

Economic objectives

- Improvement of **efficiency** of transport systems.
- Improvement of **transport efficiency** of economic activities.
- Improvement of efficiency of **resource use**.
- Support of **sustainable** economic activities.

Sustainability factors
- levels, objectives, impact elements -

	Objective		
Levels	**Public health**	**Condition of eco-system**	**Safeguarding of natural resources**
Global	Upper atmosphere ozone layer depletion, organic compounds	GHGs, ozone depletion gases, biodiversity	Energy use, use of materials, recyclability
Regional	Lower atmosphere ozone, organic compounds	Lower atmosphere ozone, acidification gases (NO_x, SO_x), organic compounds, nitrification	Land use, energy use, production of waste
Local	O_3, VOC, PM, CO, $NO_{x,}$ Carcinogenic materials, Noise, safety	Impacts on urban environment, landscape, green areas, function dispersion, effects of transport infrastructure	Built environment, environmental impacts, energy use, land use, production of waste

Sustainable mobility - criteria

Environmental and Public Health Objectives		
Noise – WHO guidelines -	⇒	Noise sources - 50% - 70%
Air quality – WHO guidelines, NO_2 PM – reduction Ozone level reduction	⇒	Emissions - 50% NOx , 90% PM - 80% NOx , és VOC
Acidification, eutrofisation Reduction of critical level	⇒	SOx , NOx , emissions - 75% - 80% (- 50% NH3)
Climate protection CO_2 emission stabilization	⇒	Greenhouse gas, CO_2 emissions OECD 80%, globally 50%

Sustainable mobility
criteria and objectives for 2030

CO_2 Reduction of transport related emissions by 50 % of the 1995 basis level.	**NOx** Reduction of transport related emissions by 80% until 2030, on the 1995 basis, 30 μg/m3 annual load level in urban and suburban areas
VOC. Reduction of carcinogenic hydrocarbon chemicals emission under the 10% of 1995 level.	**Particulate Matter – PM10** Reduction of the 1995 level by 90%, based on local, and regional conditions, load level below 20 $\mu g/m^3$ annual value
Noise 55 dB daily and 45 dB night noise level	**Land use** Land use of transport in urban and suburban areas under 10%, along further qualitative and structural objectives, targets

Elements of Strategy, directions

- **Management** of transport needs, moderation,
- Intentions to reach more **favourable structure** of use of transport modes,
- Improvement of environmental **indicators**, of vehicle fleet,
- Improvement of efficiency and environmental indicators, of **existing transport systems.**

Elements of toolkit for sustainability

- **Integration** and those levels,
- Local and regional, programs, **strategies**,
- **Financial**, fiscal tools,
- **Regulation and** legislation tools,
- Related tools, E.g. public **awareness** campaigns, actions, voluntary agreements.

Indicators, monitoring

Direct environmental result, or effect indicators, E.g.:

- Number and rate of population concerned by **noise pollution**.
- Existing **noise protection facilities.**
- **Air pollution index,** number of cases of overrun of limiting values.
- **Quantity** of polluters, emitted by vehicles in a given period, those **tendencies**.

Transport – environmental indicators

- **Use of transport modes**, development of modal split in given periods.
- Number of **traffic disruptions**, congestions, delays, first of all on behalf of buses, applicable as indicator.
- Quantity and tendency of **traffic calming** facilities, **zones**, residential, and rest zones, pedestrian zones, P+R parking places, availability, quantity, activating in a given period.

Sustainable mobility - priorities

- Improvement of market access and operation conditions, emphasizing the **rail sector** and **ports**.
- **Development of integrated transport systems** with the TEN networks and support of intelligent transport systems, by GNSS - global navigation satellite systems -.
- **Fair and efficient pricing of transport** by elimination of competition inconveniences between transport modes.
- More attention to the **social conditions** of transport.

SUMP – the Sustainable Urban Mobility Plans

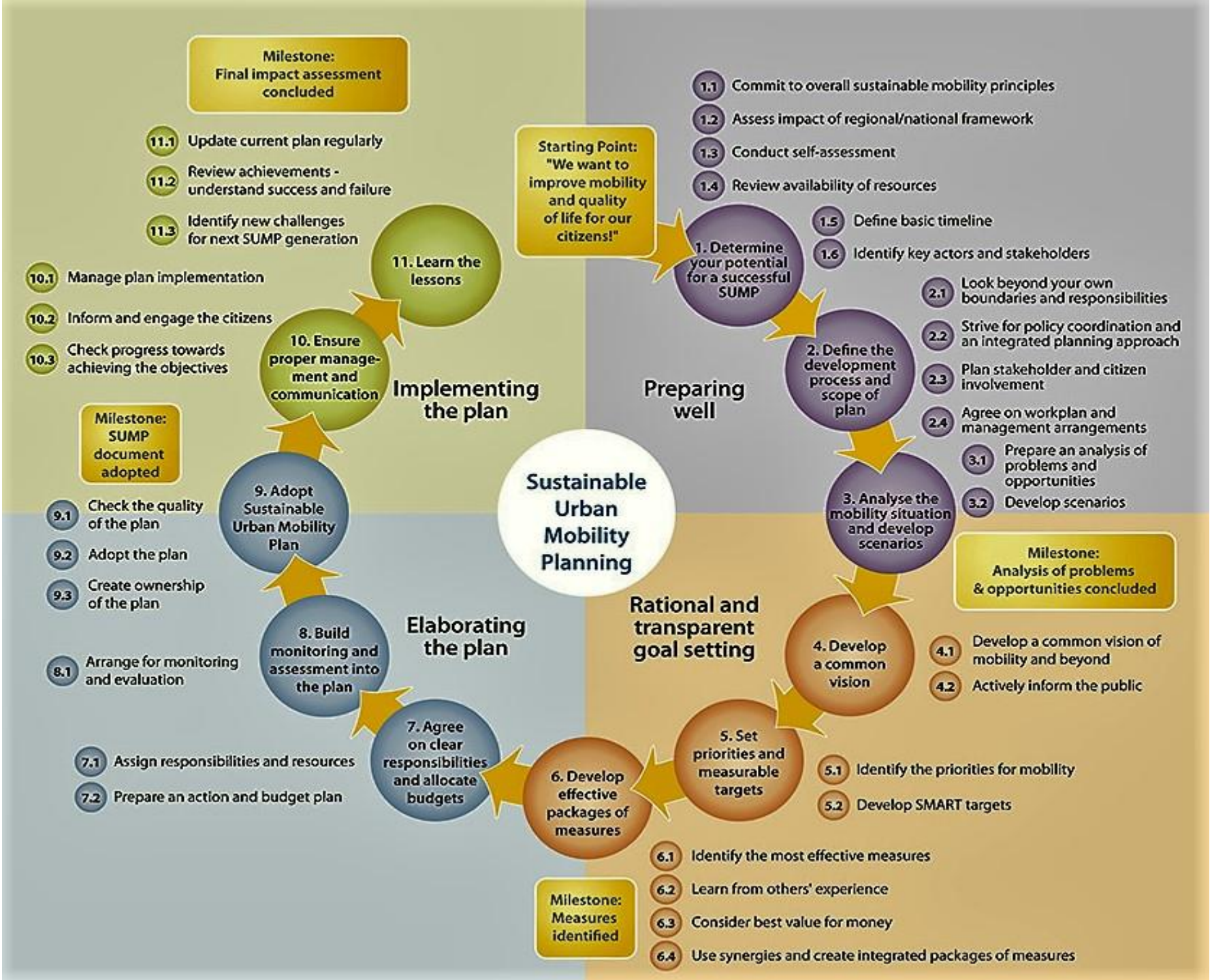
- The need for more sustainable and **integrative planning processes** as a way of dealing with the complexity of urban mobility has been widely recognised.
- New approaches to urban mobility planning for **local authorities** seek to break out of past silo approaches and develop strategies that can stimulate a shift towards cleaner and more **sustainable transport modes.**

SUMP concept elements

Public transport
Walking and cycling
Intermodality
Urban road safety
Road transport (flowing and stationary)
Urban logistics
Mobility management
Intelligent Transport Systems

SUMP concept elements

- Horizontal and vertical **integration**
- **Participatory** approach
- **Monitoring**, review, reporting
- **Quality** assurance.


Sustainable Urban Mobility Planning
Starting Point: "We want to improve mobility and quality of life for our citizens!"
Preparing well
1. Determine your potential for a successful SUMP
1.1 Commit to overall sustainable mobility principles
1.2 Assess impact of regional/national framework
1.3 Conduct self-assessment
1.4 Review availability of resources
1.5 Define basic timeline
1.6 Identify key actors and stakeholders
2. Define the development process and scope of plan
2.1 Look beyond your own boundaries and responsibilities
2.2 Strive for policy coordination and an integrated planning approach
2.3 Plan stakeholder and citizen involvement
2.4 Agree on workplan and management arrangements
3. Analyse the mobility situation and develop scenarios
3.1 Prepare an analysis of problems and opportunities
3.2 Develop scenarios
Milestone: Analysis of problems & opportunities concluded
Rational and transparent goal setting
4. Develop a common vision
4.1 Develop a common vision of mobility and beyond
4.2 Actively inform the public
5. Set priorities and measurable targets
5.1 Identify the priorities for mobility
5.2 Develop SMART targets
6. Develop effective packages of measures
6.1 Identify the most effective measures
6.2 Learn from others' experience
6.3 Consider best value for money
6.4 Use synergies and create integrated packages of measures
Milestone: Measures identified
Elaborating the plan
7. Agree on clear responsibilities and allocate budgets
7.1 Assign responsibilities and resources
7.2 Prepare an action and budget plan
8. Build monitoring and assessment into the plan
8.1 Arrange for monitoring and evaluation
9. Adopt Sustainable Urban Mobility Plan
9.1 Check the quality of the plan
9.2 Adopt the plan
9.3 Create ownership of the plan
Milestone: SUMP document adopted
Implementing the plan
10. Ensure proper management and communication
10.1 Manage plan implementation
10.2 Inform and engage the citizens
10.3 Check progress towards achieving the objectives
11. Learn the lessons
11.1 Update current plan regularly
11.2 Review achievements - understand success and failure
11.3 Identify new challenges for next SUMP generation
Milestone: Final impact assessment concluded

Sustainable Urban Mobility Plans

- Data bases, investigations, case studies, manuals and networks,
- **Mobility-management measures**,
- Coordination of land use and transport planning,
  - **Public transport-oriented development,**
  - Pedestrian and cycling **routes and networks**, development,
  - **Car-free oriented development.**

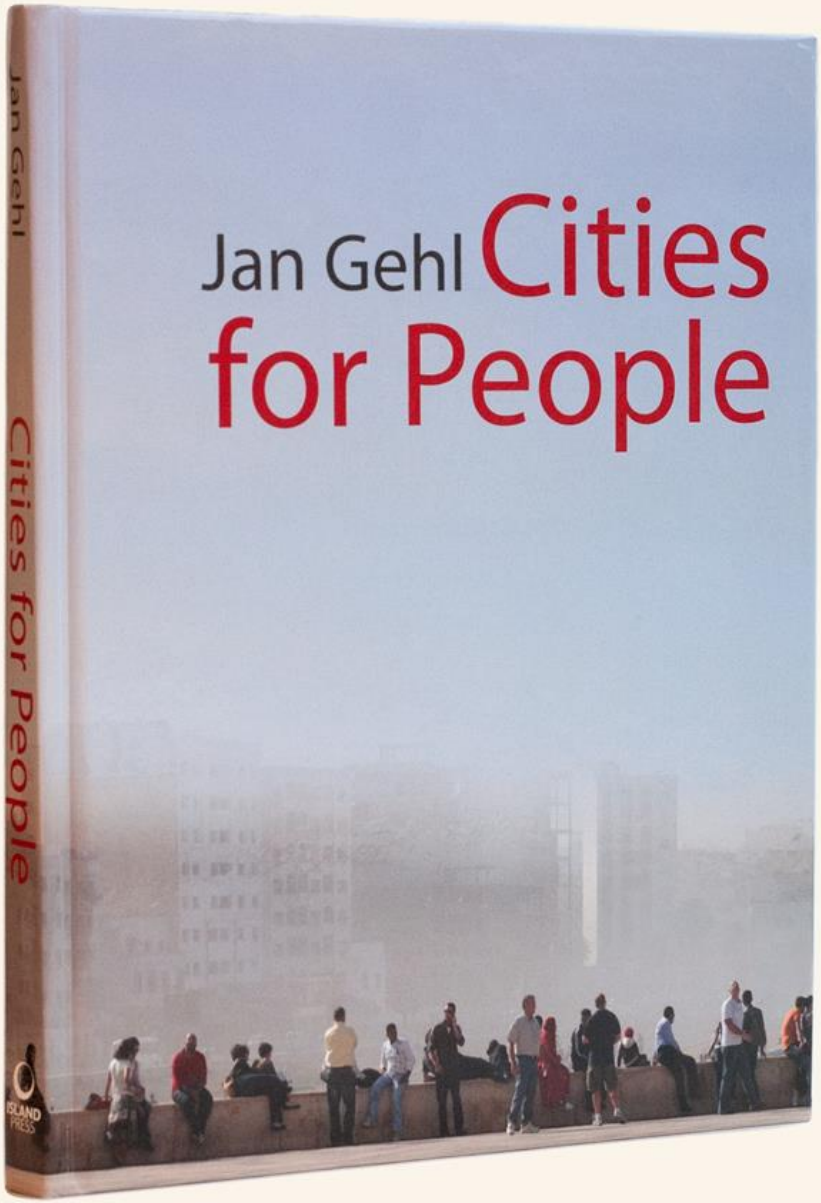
SUMP

- **Traffic calming**,
- Support of **cycling and walking**,
- Improvement of conditions of **public transport**,
- Urban **road charges**,
- Restriction of **polluting** vehicles,
- **Parking place** management,
- Support of **low emission** and quiet vehicles,
- Management of **urban freight** logistics,
- Methods of „soft persuasion” - **communication** (better information, improvement of awareness, mobility centers, NGOs, etc.)

Budapest Transport Development Strategy 2014-2030

Completion towards SUMP

http://www.sump-challenges.eu/sites/www.sump-challenges.eu/files/bmt2016_eng_v3.pdf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Cities for People

- “Jan Gehl is our greatest observer of urban quality and an indispensable philosopher of cities as solutions to the environmental and health crises that we face. With over half the world’s population now in urban areas, the entire planet needs to learn the lessons he offers in Cities for People.”
- — Janette Sadik Khan,
  Commissioner of the New York City
  Department of Transportation

Outlook: ELTIS

- European Local Transport Information Service, www.eltis.org,
- Case studies, projects, events, documents, actualities,
- Thematic search for European case studies, in 13 topics:
  - E.g.: Parma's SUMP: the first in Italy combined with a Strategic Environmental Assessment. Short description, link to more detailed materials, websites,

Outlook: CIVITAS

- CIVITAS - http://civitas.eu/mobility-solutions – offers implementation of sustainable, clean, and energy efficient urban transport systems, integration of related technologies, policies and regulations, as a network.
- Project consortiums, information networks, events, targeting the sustainability of urban transport, including walking campaignes, mobility management, and new opportunities of eco-driving.

Outlook: Low emission zones

- Portal, dealing with urban and suburban regions' low emissions or green zones, network change of information www.lowemissionzones.eu –
- Efficient measures targeting air quality improvement, on local, or regional level, by bypass of polluting vehicles with given technical and emission parameters. Local authorities, regions, efficient air quality control measures.

Outlook: Intelligent Energy Europe

- http://ec.europa.eu/energy/intelligent/index_en.htm
- Energy efficiency and renewable energy programs, for the 2020 EU target – 20% GHG reduction, 20% energy efficiency improvement, 20% renewable in the balance (not only transport)
- Project supports, consortiums.

The Smart City Vision of Budapest

MOBILITY

Mobility plays a key role in creating a liveable city since by choosing environmentally friendly modes of transport we can do a lot to improve our environment not only globally but locally, also. Such culture of mobility shall be developed in which the different modes of transport complement and enhance each other since in the chain of transport anyone might become a pedestrian, car, bicycle or public transport user depending on which the most efficient alternative is. By improving the transport system it shall be ensured that the most suitable mode of transport is available for everyone and that the transport of Budapest is overally as environmentally friendly as possible.

SUSTAINABLE MOBILITY

From the aspect of motorization walking and cycling are environmentally friendly forms of mobility and can become particularly healthy practices by providing the proper infrastructure and environment. By public transport the effective use of resources are ensured, reducing environmental impacts. By the spread of alternative vehicles and car sharing systems for public use the sustainability of car usage is increasing.

PEDESTRIAN-FRIENDLY BUDAPEST

In accordance with Balázs Mór plan the aim is to raise the current rate of pedestrians from 18% to 20% by 2030 by establishing a safe, accessible and non-hazardous environment.

In the course of continuing commenced complex public space renovation projects it is important to implement pedestrian and bicycle-friendly aspects. By redistributing public spaces wide and safe pedestrian surfaces can be designated, also, by establishing accessible crossings the conditions of barrier-free transport can be improved. By establishing a unified, multilingual information system throughout the whole city, both locals and visitors of Budapest can easily get informed.

INTERCONNECTED CITY FOR CYCLISTS

In the course of continuing recent impressive developments the aim is to raise the proportion of cycling from the current 2% to 10% by 2030 in accordance with Balázs Mór plan.

The development of a coherent bike network and interconnected road network shall be continued. Following the success of early years it is necessary to expand and improve MOL Bubi public bicycle system. The issue of applying such transport vehicles and travel rules that allow the transportation of bicycles shall be addressed. In addition, education and awareness raising programmes for participants of public transport – especially kids' education – is particularly important.

TRAM NETWORK OF BUDAPEST

In a global context the tram network of Budapest is extraordinary: regarding network length it is ranked 6th, daily passenger numbers it is ranked 2nd and relative passenger numbers/network length Budapest is the world leader. In recent years beside the renewal of the vehicle fleet new sections (considered as key sections in the network) were constructed and these improvements will be continued: the tram network of Budapest is about to undergo significant improvement and development.

Further details for the subject:

http://www.poly-sump.eu/the-methodology/?no_cache=1

http://www.eltis.org/guidelines/sump-guidelines

http://www.ifhp.org/sites/default/files/field/files_news/Jan%20Gehl_1.pdf