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CONFERENCE OF EUROPEAN STATISTICIANS**

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SUSTAINABLE DEVELOPMENT IN THE CZECH REPUBLIC

- Three pillars approach
- Selection of indicators
- Long-term trends

Submitted by the Czech Statistical Office¹

SUSTAINABLE DEVELOPMENT IN THE CZECH REPUBLIC

1. In 2004, the Government of the CR approved a document concerning the strategy of sustainable development. Among its points of departure is a new extended concept of sustainable development. The need to ensure the balance in economic, social and environmental development becomes a starting point of strategy in the modified approach. An important task in this connection is to prepare a relevant set of indicators tracking the character of contexts and risks of sustainability of development among and inside in main pillars. Czech Statistical Office contributed to discussion concerning selection of indicators and assessment of long-term trends.

ECONOMIC PILLAR

2. The economic pillar has three sets of indicators based on criteria of performance, productivity and stability.

The first set presents aggregate output indicators, i.e. GDP and alternatively gross national income, used for assessment of performance of the economic pillar and its conformity to the development of other pillars.

The second set of indicators maps particularly sustainability, using indicators of economic growth resources. This set includes the following indicators: employment, fixed capital, labour and fixed capital productivity, innovation and education potential.

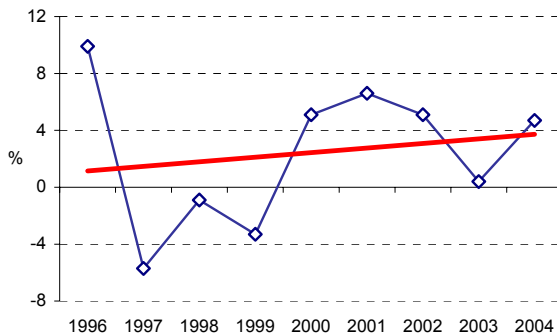
The third set of indicators serves for assessment of macroeconomic stability (im)balance, which conditions a smooth sustainable development. Selection of indicators for this set was based on key macroeconomic targets. Its mission is to monitor the nature of fluctuations and

¹ Prepared by Slavoj Czesany.

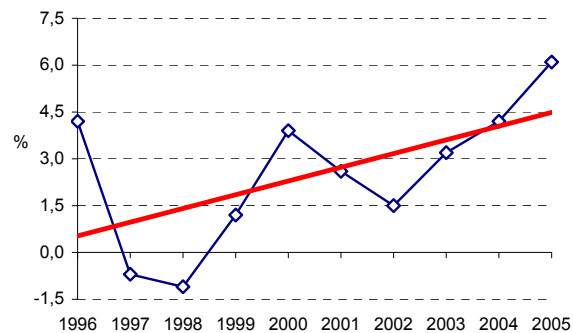
extent of stability in unemployment rate, inflation, production gap, current account balance and government budgets.

- Acceleration and deceleration of economic growth fluctuations** Developments of the economic performance were characterised by acceleration of average GDP growth from 2.5 % in 1996 - 2005 to 3.5 % in 2001 - 2005. Also the alternative aggregate coefficient of economic performance, real gross domestic income also accelerated from 3 % to 4.1 %. Differences against GDP consist in the fact that real gross domestic income was influenced by the exchange relations development.
- Increase in share of intensifying factors in economic growth** Labour productivity in 2001 - 2005 compared to the ten-years average accelerated and recorded dominant contributions to the economic growth. Employment in the analysed periods changed only negligibly, in the period 2001 - 2005 it almost stagnated, unlike the gross fixed capital formation, which accelerated in the last five years. Education and innovation growth potentials in the analysed periods changed only slightly. Decline of energy intensiveness has slowed down.
- Stability rate increased for GDP, investment and inflation** Macroeconomic imbalance (upon comparison of periods 1996 - 2005 and 2001 - 2005) for GDP was improved by reduction of fluctuations in the production gap between the trend value and real GDP growth in the individual years. While in 1996 - 2005 the average deviation amounted to 1.8 pp, in 2001 - 2005 the deviation was only 1.1 pp. Even bigger progress was achieved in the fluctuation rate of gross fixed capital formation, where average deviation of trend value and real value decreased from 4.7 pp to 2.5 pp. Inflation rate recorded low fluctuations.
- Imbalances continued in case of government budgets, current account and labour market** Except for 2005 external imbalance occurred in most years when the deficit of payment balance current account was close to the limit of 5 % of GDP. Stagnation of unemployment rate around 9 % indicates the continuing offer and demand imbalance on the labour market. Public finance deficit continued, in the last 2 years the Czech Republic met the Maastricht criteria (value under 3 %).

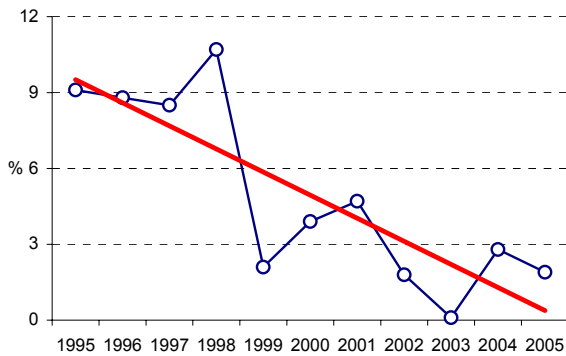
Graph 1 Expenditures on fixed capital formation; y-o-y changes in real terms and trend



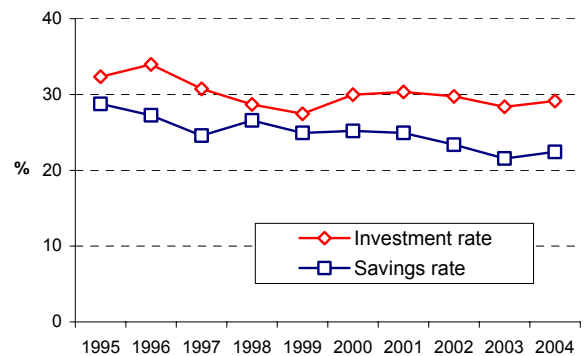
Graph 2 GDP – y-o-y changes in real terms and trend



Graph 3 Inflation – yearly values and trend



Graph 4 Savings rate and investment rate



SOCIAL PILLAR

3. The social pillar divides into three sets of indicators reasoned by their respective purpose.

The first set is targeted at key standard of living indications. These include: gross domestic product per capita, household consumption and savings, housing investment of population and real wages. These indicators were derived on the basis of the need to respond to the question about the balance of economic and social development, therefore they are measured against GDP development.

The second set of indicators maps the extent and structure of social cohesion by coefficients of social expenditures, wages differentiation, long-term unemployment rate, poverty rate. Determined trends may serve for assessment of development consistency of significant components of social cohesion.

The third set of indications tries to define selected aspect related to the population ageing. It contains coefficients indicating the extent of dependence of the non-active population on the active one, expenditures on health care, expenditures on pensions and average life expectancy. The aim is to express impacts of the population ageing on the relevant fiscal and real phenomena.

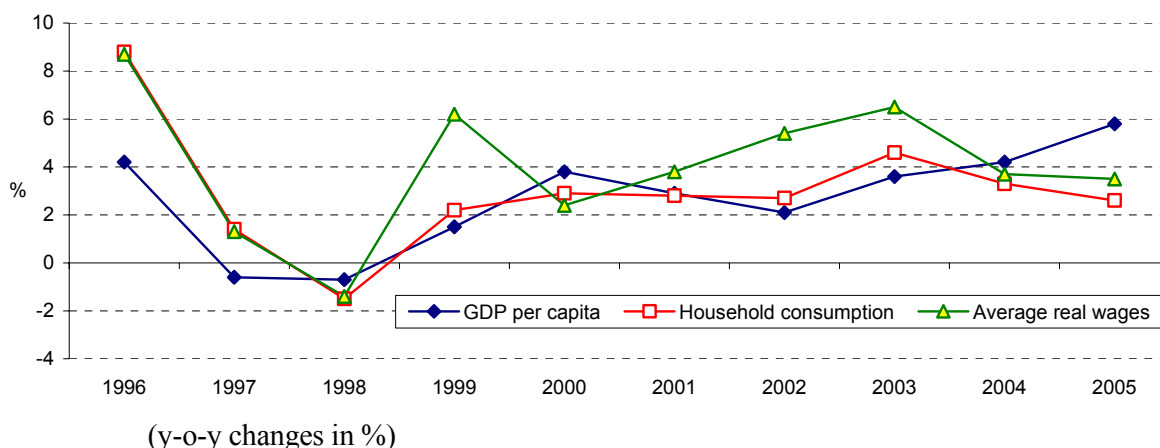
- Prevailing synchronous development of household consumption and GDP**

Household consumption is traditionally considered as the key indicator of the living standard development. Development trends in the last ten years were influenced by several specific circumstances, which resulted in development fluctuations of the household consumption and deviations from the gross domestic product development. Household consumption recorded its boom in 1995 and 1996, when households used the high wages increase to renew long-term consumption goods. This was followed by recession in 1997 - 1999, when also the household consumption slowed down considerably, in 1998 it even decreased. In the growth phase of the business cycle in 2000 - 2005 the growth of household consumption recovered and gained some dynamics. Growth rates of household consumption and gross domestic product were balanced and achieved similar dynamics (3.2 % and 3.5 %). In some years (2002 a 2003), when the household consumption growth rate overtook the economic growth, this development was enabled by concurrence of extremely favourable factors including low inflation, real wage amount and in recent years also low prices for lending capital.
- Dynamic development of housing investments**

The period 2000 - 2004 was characterised by a new feature, the increased interest of population in housing investments. This is confirmed by the records of increasing investment expenditures of households, which since 2000 have reached annual volumes exceeding CZK 100 billion, approximately double volumes compared to the 2nd half of the 90's. This interest was motivated by negative real interest rates for deposits and also by the willingness of people to solve their housing problem in the era of favourable interest rates on mortgage and consumer loans.
- Fluctuations in real wages growth**

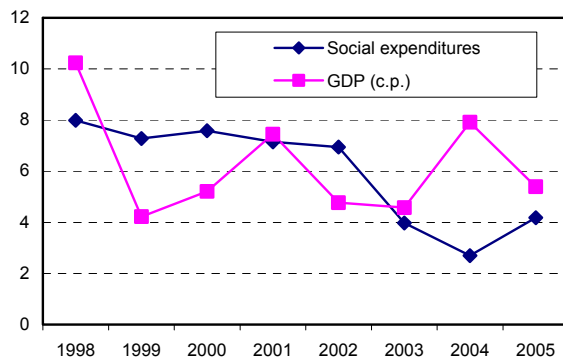
Another key indicator defining the living standard development is the growth rate of real wage, which specified the purchasing power of the population. In the period 2000 - 2005 these rates in average amounted to 4.6 % p.a. and exceeded by 0.6 % the development rates in 1996 - 2005. However, since 2003 the real wage growth rate has slowed down. This development was partly influenced by inexact estimates of anticipated inflation. International comparison of labour productivity and wages in the Czech Republic to the EU countries average level shows that the wage level in the Czech Republic reaches approximately 1/3 of the EU average level and therefore it lags behind the labour productivity level estimated as 2/3 of the EU average level.

Graph 5 Key welfare indicators

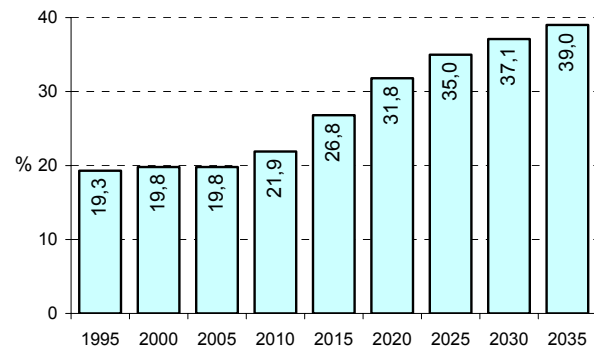


- Low wages differentiation among sectors and branches** Data on structure of the wage development in the CR in 2004 show various differentiation levels. Almost identical age levels were achieved in the business sphere and non-business sector. Individual industries show a relatively low differentiation of wages except for the sector of finance, which records approximately double wage compared to the average. The highest wage differentiation appears within individual companies, where owners and management workers get multiples of average wage. The review of the wages structure shows that the medium income group defined by the wage range of CZK 15 - 25 thousand per month includes almost 50 % of employees. Almost 20 % of employees receive more than CZK 26 thousand per month and approximately 30 % of employees get less than 14 thousand per month.
- Differences in development of social cohesion components** Differences appeared in the development of main social cohesion components. Almost stagnating tendency is shown by the rate of regional unemployment rate dispersion ranging from 5.6 to 5.8. However, adverse development of the unemployment rate dispersion is recorded on lower levels as regions, districts and micro regions. Low poverty rate indication is on the top level in international comparison. Also relations of the economic performance and social expenditures have improved. This trend is indicated by the decrease of the average growth rate of social expenditures from 6 % in 1996-2005 to 5 % in 2001-2005. Upon comparison of five-years averages the two development trends tend to converge. Tendencies indicating adverse development include growth of the long-term unemployment rate from the average of 3.2 % in 1996-2005 to 4 % in 2001-2005.

Graph 6 Social expenditures and GDP (c.p., y-o-y changes)



Graph 7 Index of persons' dependence in postproductive age



Source: CZSO, Eurostat

- **Stagnation of share of older people** The development of indications related to the ageing of population is dominated by tendencies to stagnation. This applies particularly to the development of the number of non-active persons, where in relation to active population a stabilized proportion of approximately 20 % has been maintained. This proportion is supposed to increase in 2010, sharp increase should appear in 2015.
- **Moderate increase of share of health and pensions expenditures** Only moderate movements were recorded in increase of pensions from the average 8.2 % of GDP in 1996 - 2005 to 8.4 % in 2001 - 2005. In the same period average government expenditures on health care increased from 5.5 % of GDP to 5.6% of GDP. This evidences the balanced growth of the economic performance and expenditure components related to health and pensions. A certain roles was played also by the fact that the rate of the average life expectancy increase has slowed down to one half.

Table 1 Indicators of population ageing

	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	Average 96-05	Average 01-05
Expenditures on pensions (% of GDP)	7.5	8.0	8.1	8.3	8.3	8.3	8.5	8.5	8.2	8.4	8.2	8.4
Government expenditures on health (% of GDP)	5.3	5.4	5.3	5.4	5.3	5.5	5.8	5.9	5.8	.	5.5	5.6
											Difference 00-96	Difference 05-01
Average life expectancy – men, years	70.4	70.5	71.1	71.4	71.7	72.1	72.1	72.0	72.6	72.9	1.3	0.8
Average life expectancy – women, years	77.3	77.5	78.1	78.1	78.4	78.4	78.5	78.5	79.4	79.1	1.1	0.7

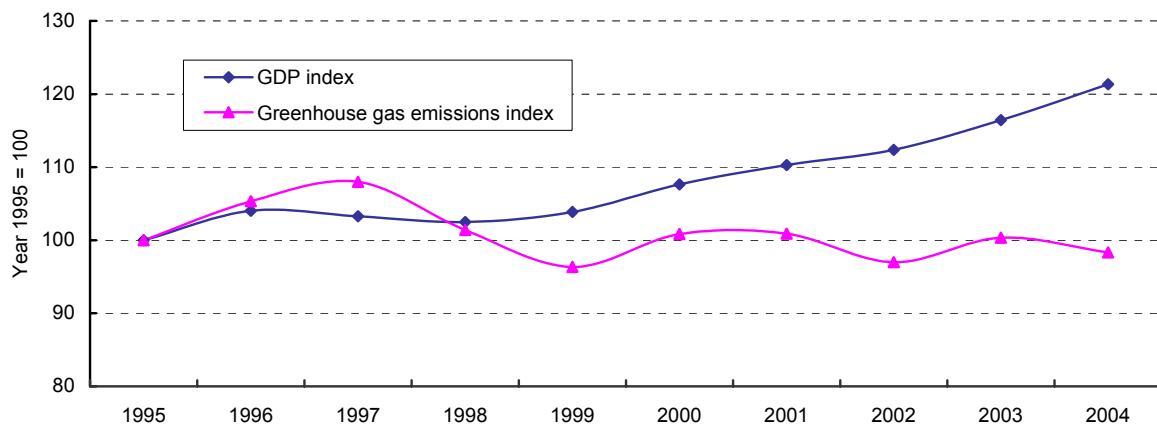
ENVIRONMENTAL PILLAR

4. This chapter covers typical spheres of the environmental pillar of sustainable development and their relation to economic performance. This year's analysis was enlarged by material flows series. The chapter emphasizes improvements or deterioration of development in the last five years (2000-2004) compared to the development in the entire decade (1995-2004) expressed as yearly averages for the period, summarized in the closing table.

• **Emissions of main pollutants** In the sphere of main pollutants emissions of solids in the last five years dropped by distinctive 34 % (compared to the decade) and among acidifying substances sulphur dioxide (SO₂) dropped by 48 %, nitrogen oxides (NO_x) by 2.3 % and ammonia emissions (NH₃) by 1.9 %. Curves of GDP and solids emissions continue their separation, i.e. the trend of mitigation the environmental pressures from economic growth. There are no signs regarding separation of the curves of acidifying substances emissions and GDP².

Positive development of greenhouse gases emissions Greenhouse gases emissions after a sharp decline in early 90's stagnated in the last decade. They are relatively well below the Kyoto Protocol Commitment (174.7 million tonnes CO₂ eq.³). In 2004 their level decreased in comparison to the preceding year, which supported further separation of their development from GDP⁴. However, according to international comparison further reduction of emissions is desirable.

Graph 8 Greenhouse gases emissions and GDP



Source: CZSO, ME

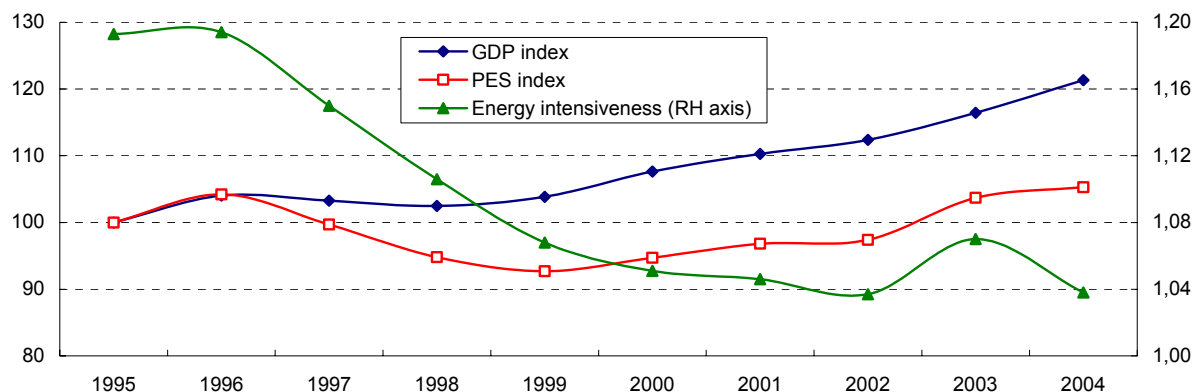
• **Energy intensiveness decreases particularly due to GDP growth** Also the year 2004 recorded continuing increase of primary energy sources (PES), resumed in 2000 after prior sharp decline in the 90's. Average PES consumption in the last five years almost has not changed compared to the last decade. Energy intensiveness shows almost steadily declining trend. The only exception was the year 2003 when the increase was caused by the volume of heat energy produced in the Temelín nuclear power station. In 2004 curves of GDP and PES started to separate particularly due to the strong growth of economic performance.

² Gross domestic product is always stated at constant prices of 2000.

³ Greenhouse gases are F-gases, nitrogen oxides, methane and CO₂, as well as water vapour. CO₂ makes up approximately 70 % but other greenhouse gases (except for water vapour) are more harmful. Emissions are converted to CO₂ equivalent.

⁴ The advantage of the so-called “decoupling” indicators“ derives from their simplicity. They determine any deviation of economic growth from environmental burden. A weakness is seen in the fact that most environmental pressures come from multiple sources. These external impacts on the environment may not be linear and a continuous pressure on a resource or species may remain hidden until it reaches a certain limit and negative effects grow strongly.

Graph 9 Energy intensiveness of GDP and development of consumption of PES and GDP

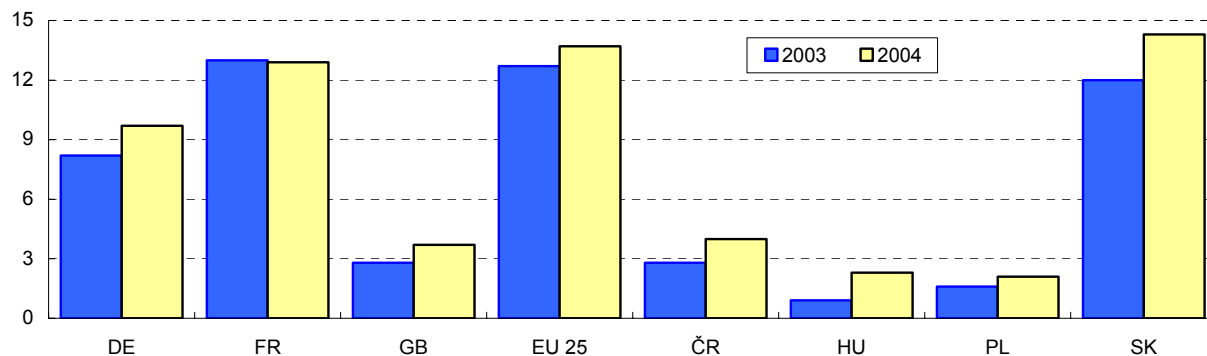


• **Renewable energy sources**

Data on the share of renewable energy sources (RES) in the gross electricity consumption and in the PES consumption in the Czech Republic have been available since 2003.

Graph 4.3.3. presents an international comparison of the share of electric energy from renewable sources in the gross electricity consumption. Electricity produced from RES includes hydro energy, wind, solar, geothermic energy and energy from biomass. The commitment until 2010 for the Czech Republic states 8 % and for the EU-25 average 21 %. Use of RES constitutes a great potential for the future; for interest's sake – the current global energy consumption equals to mere 0.01 per mill of annual energy from solar radiance reaching the Earth surface.

Graph 10 Share of electricity from RES in gross electricity consumption – international comparison



Source: Eurostat

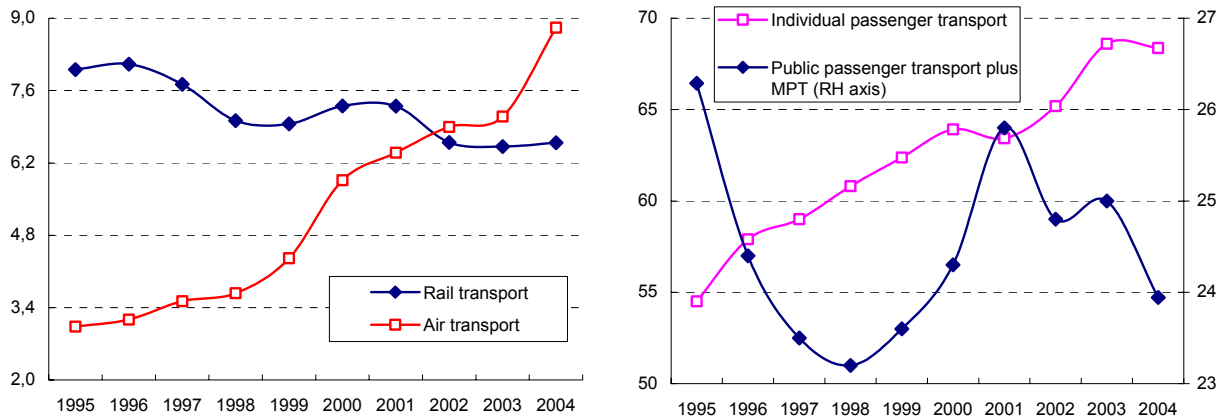
• **Growing passenger transport outputs**

Transport constitutes one of the highest environmental burdens in the Czech Republic. Passenger railway transport outputs are more or less stagnating after cyclic falls in the last three years. Passenger air transport unambiguously confirms its continuing boom. Transport outputs of individual car transport in 2004 were slightly below the preceding year's level. Outputs of passenger bus transport together with municipal public transport (MPT) have been declining since 2001, when they almost recovered the level achieved in 1995. In comparison of averages of the last five years and the decade the railway passenger transport recorded a decrease, while the air passenger transport grew rapidly. Transport outputs of goods transport by road increased slightly and

public bus transport with MPT remained in average almost unchanged, in spite of their rather volatile development.

Total transport outputs of the mentioned types of passenger transport in the last five years increased by 11% compared to the decade.

Graph 11 Passenger transport outputs (passenger-km, bn.)

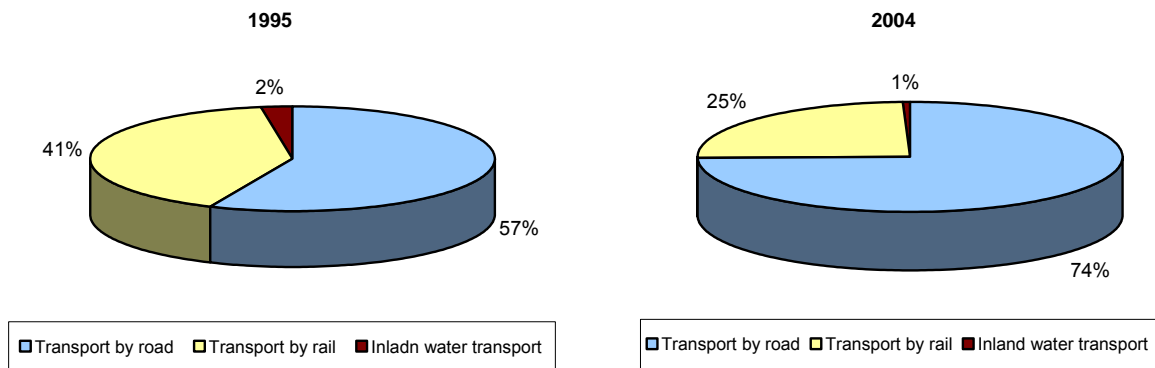


Source: MT

• **Increasing environmental burden caused by road transport**

If we compare the five years average of transport outputs in goods transport to the ten years average, the goods transport by road recorded an increase by 12.3 % contrary to the decrease of the goods transport by rail by 10 % and inland water freight transport by 21.2 %. Air freight transport increased by 4.1 %. The change of structure of transport outputs in goods transport, harmful for the environment, is clearly seen in Graph 4.3.5.

Graph 12 Share of goods transport outputs by type of transport⁵



Source: MT

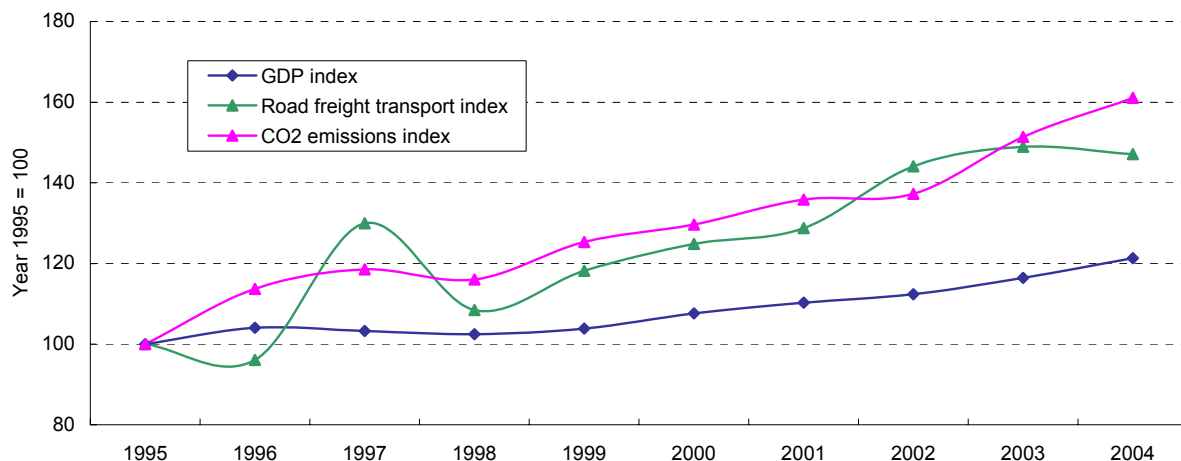
• **GDP transport**

and Transport outputs of the goods transport by road, as well as carbon dioxide emissions (CO₂) from transport still grow faster than GDP. In other words, the economic growth in this case contributes to higher environmental burdens. But we have to mention that the data on road freight transport (elaborated in accordance with European legislation) do not record foreign trucks, only vehicles registered in the Czech Republic. The indicator therefore illustrates the transport outputs of Czech carriers, also outside the territory of the Czech Republic. Since 2004 we have data on transport outputs of goods transport by road converted only for the territory of the Czech Republic, again only for the

⁵ This does not include air freight transport, which represents only a very low percentage.

vehicles registered in the Czech Republic. Therefore we may presume the environmental burden resulting from these data to be rather underestimated.

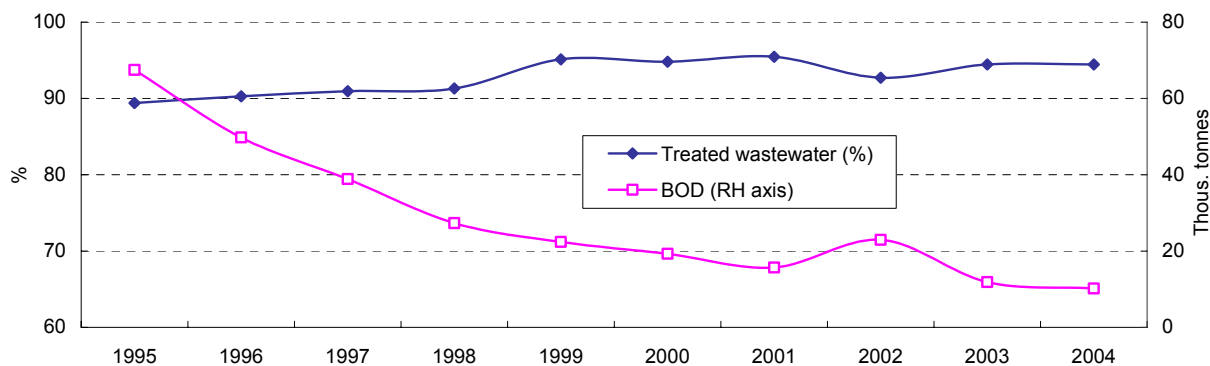
Graph 13 Goods transport, CO₂ emissions from transport and GDP



Source: MT

• **Further decrease of water pollutants** The trend of pollutants discharge from point sources stated as BOD⁶ remained positive in 2004 and this indicator dropped further below 13.9 %. The percentage of wastewater treated in public sewerage systems remained on the last year's level.

Graph 14 Wastewater treatment in public sewerage systems and discharge of pollutants from point sources, in terms of biochemical oxygen demand



Source: CZSO, ME

N.B.: The trend change results from floods.

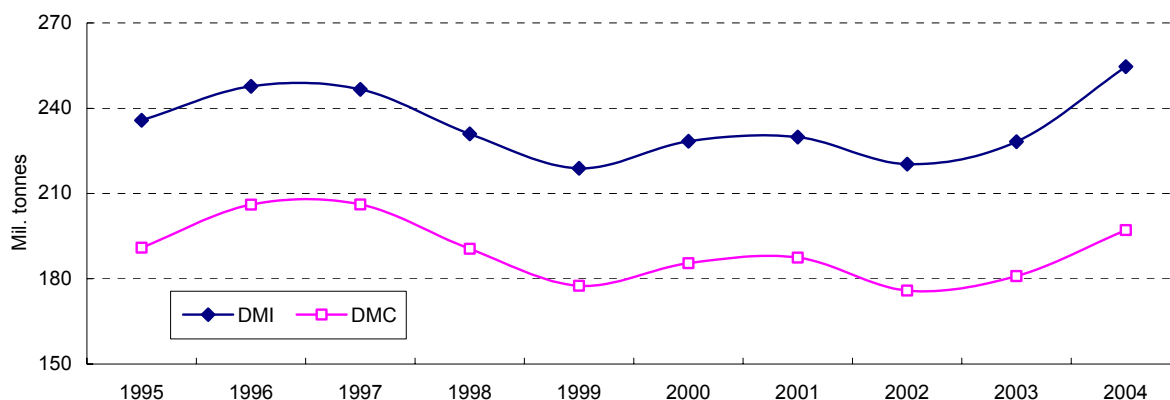
• **Background of material flows analysis** Macroeconomic analysis of material flows and its indicators were developed in the 90's. In 2001 the analysis was standardized by Eurostat and since that time these indicators are regularly monitored and analysed. The officially defined system of material flow accounts exists only in the EU Member States and Japan. It is regularly used by several EU Member States. Methodological guidelines to these accounts and indicators are summarized in an official publication by Eurostat [1], according to which also the macroeconomic material flow accounts

⁶ The indicator of biochemical oxygen demand (BOD) measures discharged organic pollution and hence the pollution of surface waters. High levels indicate water pollution and danger to the aquatic ecosystem as well as more demanding drinking water treatment. Chemical oxygen demand (COD) is another indicator of organic pollution. Water is also polluted by undissolved substances (US) and dissolved inorganic salts (DOS).

for the Czech Republic were elaborated. The accounts were compiled under a research project upon cooperation of numerous institutions [2].

- Indicators of material flows** Material flow indicators include domestic material consumption (DMC⁷) and direct material input (DMI⁸). The first indicator comprises physical volume of extracted materials (e.g. fossil fuels, minerals and ores) and biomass (timber, agricultural harvest etc.), plus imports and minus exports. The direct material input indicator is calculated by adding exports to the domestic material consumption. Material intensiveness of an economy is the resulting ratio of the individual material flows and GDP.
- Material consumption on the increase** Domestic material consumption in the CR at first decreased from its peak value of 299.6 million tonnes in 1990 mainly due to the shift from consumption of black and brown coal to gas, reduction of energy-intensive industry, application of more advanced technologies and increase of recycling rate. In 1994 the decline slowed down and in 2002, when the consumption reached its lowest value, the material consumption started to grow again.

Graph 15 Direct material inputs and domestic material consumption



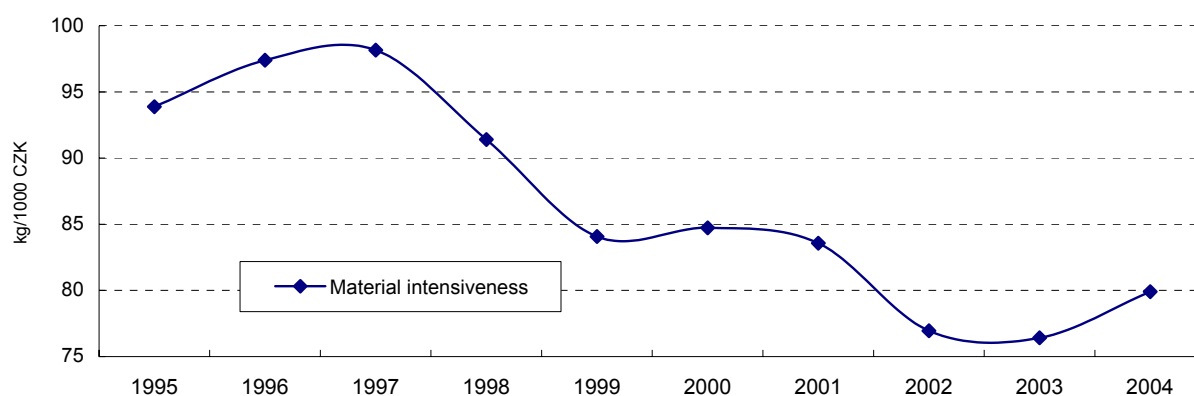
Source: UK COŽP, CZSO

- Material intensiveness of the Czech economy** Material intensiveness of the Czech economy had followed a downward trend since 1997, efficiency of transformation of material inputs to outputs per GDP unit increased and mitigated pressure on the environment. Average material intensiveness in the last five years compared to the decade dropped by 7.3 %.

⁷ Domestic material consumption.

⁸ Direct material input.

Graph 16 Material intensiveness



Source: CZSO calculation

Table 2 Closing summary table

Indicator	Average – 10 years 1995 – 2004	Average – 5 years 2000 – 2004	State
GDP - % change, c.p. 95*	0.97	3.2	improvement
AIR EMISSIONS			
Solids – thous. tonnes	98.3	64.5	improvement
Acidifying: sulphur dioxide SO ₂ – thous. tonnes	465	241	improvement
Nitrogen oxides – thous. tonnes	335	328	improvement
Ammonia NH ₃ – thous. tonnes	79.1	77.6	improvement
Greenhouse gases – mil. tonnes of CO ₂ eq.	144	142.1	stagnation
ENERGY			
Primary energy sources – PJ	1728.1	1736.8	stagnation
Energy intensiveness of GDP – GJ/thous. CZK	1.142	1.048	improvement
TRANSPORT			
Passenger – t. outputs in billions of persons/km	99.4	104.5	deterioration
Freight – t. outputs in billions of tkm	59.98	61.94	deterioration
CO ₂ emissions from transport – th. tonnes	13739	15250	deterioration
MATERIAL FLOWS			
Domestic material consumption – mil. tonnes	190	185	improvement
Material intensiveness – kg/1000 CZK	86.65	80.31	improvement
WATER			
Pollutants discharge – BOD thous. tonnes/year	28.58	15.99	improvement
Wastewater treatment - %	92.88	94.7	improvement

Due to data revision the time series begins in 1996.

REFERENCES

- [1] Czech Statistical Office
- [2] Eurostat 2001, Economy-Wide Material Flow Accounts and Derived Indicators: A Methodological Guide. Luxembourg: Office for Official Publications of the European Communities, 92 pp.
- [3] Markošová Katarína, Environmentální účetnictví – Současný stav na Českém statistickém úřadě, Sborník mezinárodní konference Environmentální účetnictví Ukazatele udržitelného rozvoje, Praha 2005 ((Environmental Accounting – current situation at Czech Statistical Office, Collection of International Conference, Environmental Accounting and Indicators of Sustainable Development, Prague 2005)

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