

## FINANCIAL ASSET MANAGEMENT for ROAD ADMINISTRATIONS

- a consulting service for infrastructure ministries

Dr. Gerhard P. Metschies

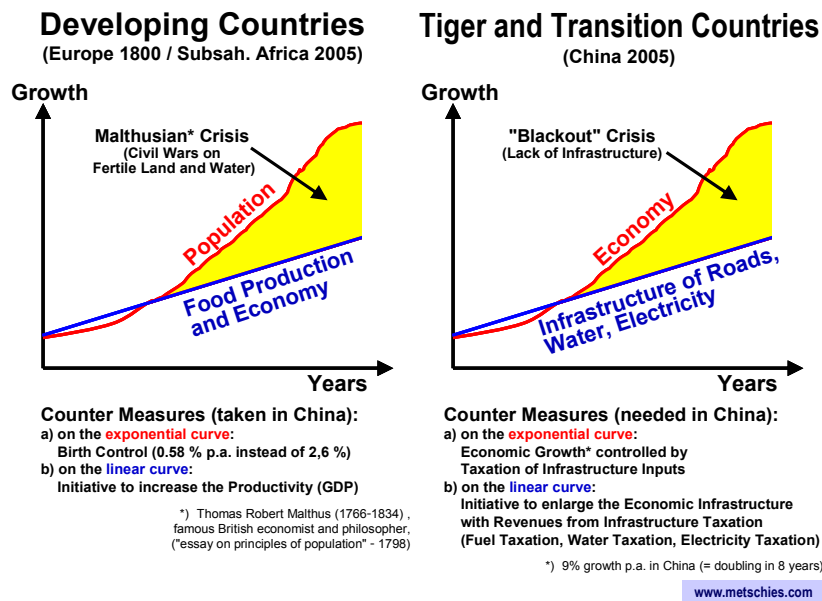
Senior Transport Advisor with the German Technical Cooperation GTZ

GTZ Division 44 Infrastructure, 65726 Eschborn GERMANY

[gerhard.metschies@gmx.de](mailto:gerhard.metschies@gmx.de) Tel. +49-6195-725354

### 1. Roads infrastructure as Asset of economic growth

Roads are the primary asset of nations and the world. Especially in growth economies a long-term strategy for future financing of roads is the key issue and has reached in some countries- mainly the Tiger and Transition Countries already crisis dimensions:



Therefore out of the graph three consequences are to be drawn:

- Transport infrastructure has to expand in line with economic growth
- The financing of the road infrastructure cannot be considered as a social service, as roads represent a capital of 20 to 25 % of GNP,
- Hence the roads sector in general basically is not a social, but an economic sector, which must be a profitable asset itself.

### 2. Consequential costs of roads

If roads are to be considered economic assets, its initial investment has yearly consequential costs.

#### Consequential Costs of Roads

in % of the actual new construction costs per year at an interest rate of 4 %

Road Type	Financial Costs	Technical Costs			Total Consequential Costs
		Current Maintenance Costs	Periodic Maintenance Costs	Total Technical Costs	
	per year in percent of the actual new constuction costs (replacement costs)				
(1)	(2)	(3)	(4)	(5) = (3) + (4)	(6) = (2)+(5)
Asphalt 400,000 US \$ / km for > 120 veh./day	6.5 % 30 years	0.5 %	(every10 years) 1.0 % p.a.	1.5 %**	8 % p.a.
Gravel 80,000 US \$ / km for > 60 veh/day	7.5 % 20 years	1.5 %	(every 7 years) 3.0 % p.a.	4.5 %	12 % p.a.
Earth 15,000 US \$ / km for > 15 veh/ day	9.0 % 15 years	4.5 %	(every 5 years) 6.5 % p.a.	(11.0 %)	20 % p.a.
NOTE	Interest 4 % + Repayment = Constant Annuity during total lifetime	Routine + Spot improvement	p.a. = yearly	to be earmarked in a 2 <sup>nd</sup> generation Road Fund	

Out of the graph two conclusion are to be drawn:

- Different road standards have different life time, depreciation periods and consequential costs. Hence maintenance costs mostly are calculated as approximately 1.5 % p.a. of the construction costs for asphalt roads, 4.5 % p. a. for gravel roads and nearly 11 % p. a. for earth roads.
- But more important – and often neglected, as they are borne by other ministries – are the financial costs of roads. They may be assumed as an annuity based on the long-term interest rates (which may be even higher than 4%). For asphalt roads the financial costs are more than 80 % of all costs, whereas for earth roads the maintenance costs of 55 % are dominating.

### 3. Benchmarking the organizational capacity of the State Road Sector

If roads have to be considered economic Assets, all road owner (the public one also) should display an appropriate ownership organization fulfilling the requirements of an ASSET MANAGEMENT. But the reality of the public sector is different, and all public road owner institutions may be classified (“benchmarked”) according to the %age out of the full competences required for managing the road owners balance sheet.

15<sup>th</sup> IRF World Meeting, Bangkok 2005

From A to B Organization Benchmarks: Six Steps from Road Administration to Road Business  
enlarging the traditional expenditure aspect to full economic accountability<sup>1</sup> - a balance sheet diagnosis for infrastructure and its bankability<sup>2</sup>

Step	Balance Sheet Components Colloquial Term	Revenues (1)	Expenditures (2)	Assets (3)	Liabilities (4)
Administration	0 Foreign Investment Gift	-	-	X	-
	Foreign Investment Loan	-	-	X	X
	1 Administration for the Emergency Case	-	- Staff Costs - Current Maintenance	-	-
	2 Good Governance ("NRW Force Account")	-	- Periodic Maintenance - Current Maintenance - New Investments	-	-
3	Road Tolls	- X	no return on equity	-	-
4	Concession (External Operation)	X	no return on equity	-	-
Business	5 Asset Management (50% Start-Up Finance)	X	partly return on equity	X	partly debt service
	Capital Management	X	including return on equity	X	X
	6 BUSINESS (Private Management for Stock and Exchange Quotation Rating)	X	including return on equity	X	X

<sup>1</sup> Explanation: ■ = considered, ■ = omitted. Aspect "Expenditures" with details of its contents.  
<sup>2</sup> A "political" balance sheet may comprise external costs and profits; the losses and gains for the infrastructure users as well as damage the environment.

Administration = Organization for the economical SURVIVAL of the road infrastructure (not bankable)  
 Business = Management for sustainable economical GROWTH of the road infrastructure (bankable)

Roads as profitable Real Estate [www.metschies.com](http://www.metschies.com)

The graph shows how the road's dead capital may be converted into growth capital step by step.

Hence six benchmarking steps on the way to commercializing road management may be distinguished:

- It starts with “**step 0**”, where a road as an asset is given as a gift free of charge (or – in another version - with some preferential loan conditions), but where no institution for maintenance and no responsible ownership of the newly built road is available (as may be in some LDCs)
- The following “**Step 1**” indicates, that a roads institution with qualified staff is in place, but funds are limited to the payment of salaries or for current road maintenance only. This “step 1” in the table may be called “administration for the emergency case”.
- The “**Step 2**” may be called “good governance” as the necessary amounts of current and periodic road maintenance are available and even few new investments (broadening and improving intersections etc.) are carried out. Separately some taxation of the roads sector may have started.
- With “**Step 3**” only the traditional form of public road administrations is left. By creating a “Road Fund” the “revenues” are directly linked with the “expenditures”. Road user charges (RUC) are levied and a roads authority outside the ministerial organisation is created and (in the second generation of road funds the “earmarking of funds” for priority maintenance has started.
- In “**Step 4**” the concession model is reached. Revenue collection and maintenance are outsourced out of the government and form a juridical (often private) entity of its own.. But competences are still limited to operating procedures within the framework determined by the public road owner, who often may recall the concession when he thinks it necessary.

- In the “**Step 5**” an approach to the decisive transition from Administration to Business is started. For the first time the majority of the costs, the 80% of the financial costs (as shown above) enter into the picture. An asset management of the road investments (comparable to the real estate management in the building sector) may become possible.
- “**Step 6**” is the final stage of user financed infrastructure, i.e. a complete commercialisation and full private ownership is reached. Even a business at the stock exchange as with the Italian AUTOSTRADE is possible. Naturally in this final commercial stage, the road sector is fully submitted to the VAT tax

**Summarizing** we may state, that in the **steps 5 and 6 only a management of full cost recovery** (including capital assets and liabilities) is possible (marked green in the table).

In all the other cases (step 1 to 4, marked red) a technical administration only and no financial asset management takes place.

#### 4. Priority policy decisions

Depending on the individual situation of the country

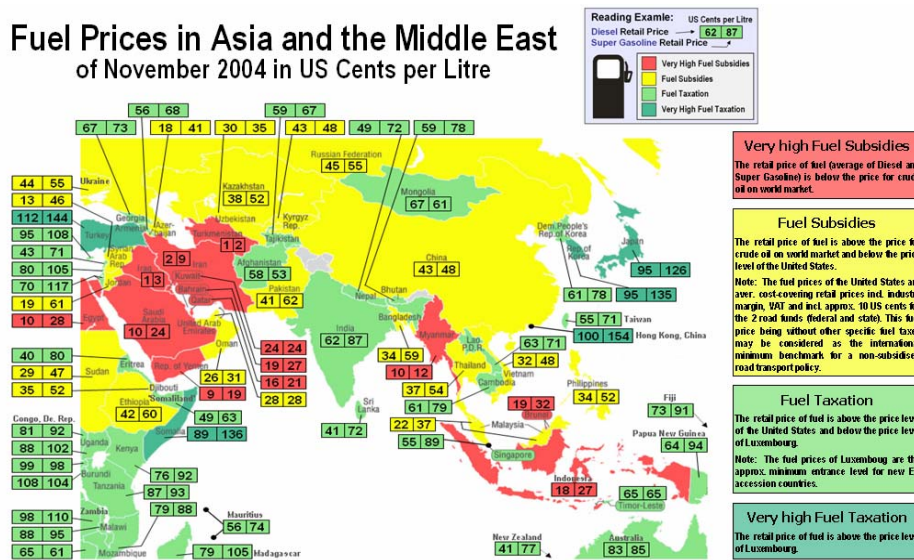
- (1) the securing of adequate **revenues** from the road sector (full fledged “step 2” of “good governance”),
- (2) introduction of a **Road Fund** (“step 3”) or
- (3) establishment of an autonomous **ROAD Agency** (“step 5”) may be the next steps.

The first most important and urgent step, especially in many Asian countries, is rising revenues by fuel taxation.

**Fuel taxation** generally is the predominant source (about. 75 %) of all revenues from the transport sector for those countries, where fuel is taxed (**marked green** on the map like India and Cambodia).

The GTZ price survey of 20 Nov. 2004 revealed that fuel retail prices vary considerably in different Asian countries. This holds true despite a uniform world market price for crude oil (\$ 42.4 per barrel BRENT at time of survey). A series of countries - mostly in the Near East and Indonesia - (**marked red**) are subsidizing the motor fuel from the general budget. Other countries like China and, Vietnam (**marked yellow**) do apply fuel prices which are cost-covering but not securing the road expenditures.

**Fuel Prices in Asia and the Middle East**  
of November 2004 in US Cents per Litre



4 [www.international-fuel-prices.com](http://www.international-fuel-prices.com)

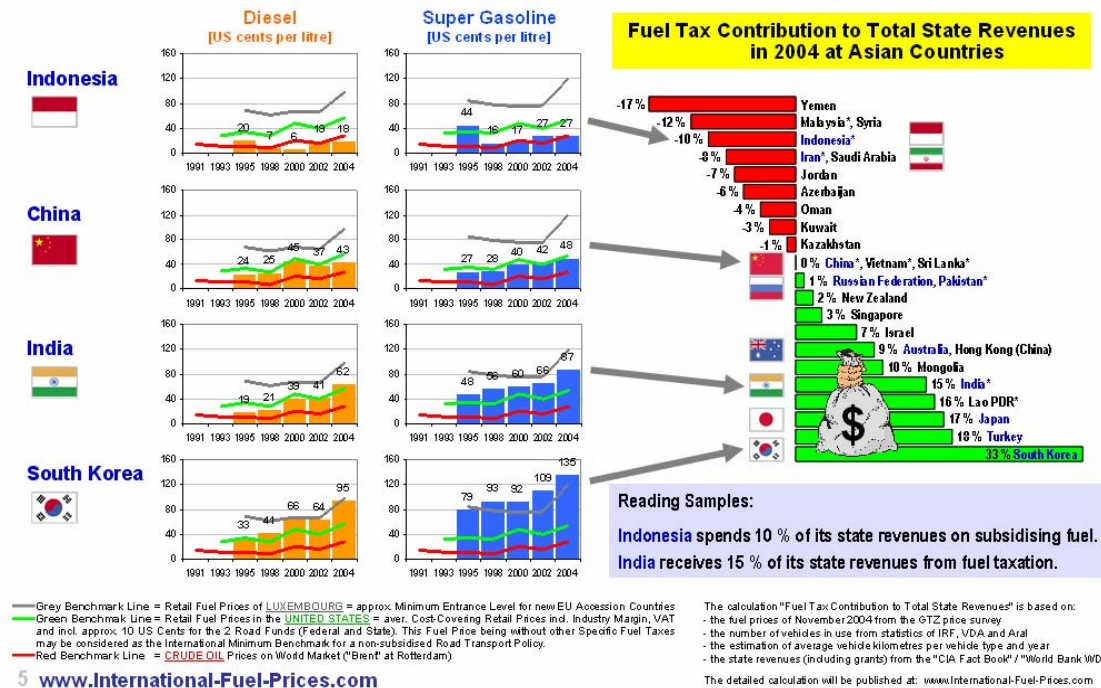
[www.metschies.com](http://www.metschies.com)

Generally a rate of **10 US cents per litre**, for both gasoline and diesel is an accepted average for financing a country-wide **road network** linking all rural and urban markets in a country. This holds true for the least developed countries of Africa as well as advanced market economies such as the United States, where sales prices (including the levy for the Road funds) were 57 cents per litre Diesel and 54 cents per l Super. **For public transport** additional transfers from fuel tax revenues are often necessary: In Germany **3 cents/litre** is collected for mass rapid transit systems. In Colombia the additional fuel tax to finance Bogota’s bus rapid transit (BRT) system was **5 to 8 cents per litre**.

## 5.FUEL TAXES AND STATE FINANCING

The same lack of sufficient road financing may be seen from the chart of fuel tax contribution to the State budget.

### Fuel Taxation Policy and its Influence on the State Budget



The Graph reveals, that the situation is worst in Yemen, where 17% of all State Revenues are spend (!) on fuel subsidies, but best in SOUTH KOREA, where 33% of Revenues are received (!) from the motor fuel tax. Most important is, that CHINA and VIETNAM don't tax the motor fuel and therefore don't dispose of sufficient funds for the national, provincial and local road network, whereas INDIA receives 15% of total state revenues from fuel taxation. How this present situation has been developed over time may be seen from the time series of fuel prices shown also on the graph.

### Conclusion:

The German Technical Cooperation GTZ during the last 14 years covered the revenue aspect of the Road sector in developing, transition and tiger countries, also vehicle and road taxation worldwide. By this way a data basis has been created for a National ASSET MANAGEMENT of roads. This data base still may be improved locally, including specifically the **social aspects of rural roads**.

But the main message remains:

Based on its consultancy services to transport ministries and finance ministries worldwide the German Technical Cooperation and its consultants are ready to be engaged in cooperation countries, in order to introduce

- **full cost coverage** of the road sector based on the user pays principle,
- **new price and tax policies** and also
- road funds and road agencies – in case, if it is necessary for the implementation of a full-fledged and nation-wide ASSET MANAGEMENT of ROADS.

Thank you. GTZ 2004

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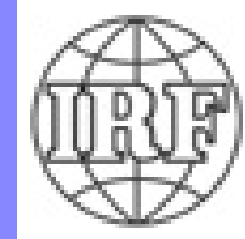
Download this document and its graphs in colour at: [www.metschies.com](http://www.metschies.com)





# 15<sup>th</sup> IRF World Meeting

14 - 18 June 2005, Bangkok / Thailand



## Financial Asset Management for Road Administrations

- Consulting Services of the German Technical Cooperation GTZ -



Foto G. Metschies

Dhaka City / Bangla Desh

  
German Technical Cooperation  
Deutsche Gesellschaft für  
Technische Zusammenarbeit GmbH

**Gerhard P. Metschies**  
[gerhard.metschies@gmx.de](mailto:gerhard.metschies@gmx.de)  
[www.metschies.com](http://www.metschies.com)



German Federal Ministry for  
Economic Cooperation and  
Development (BMZ)

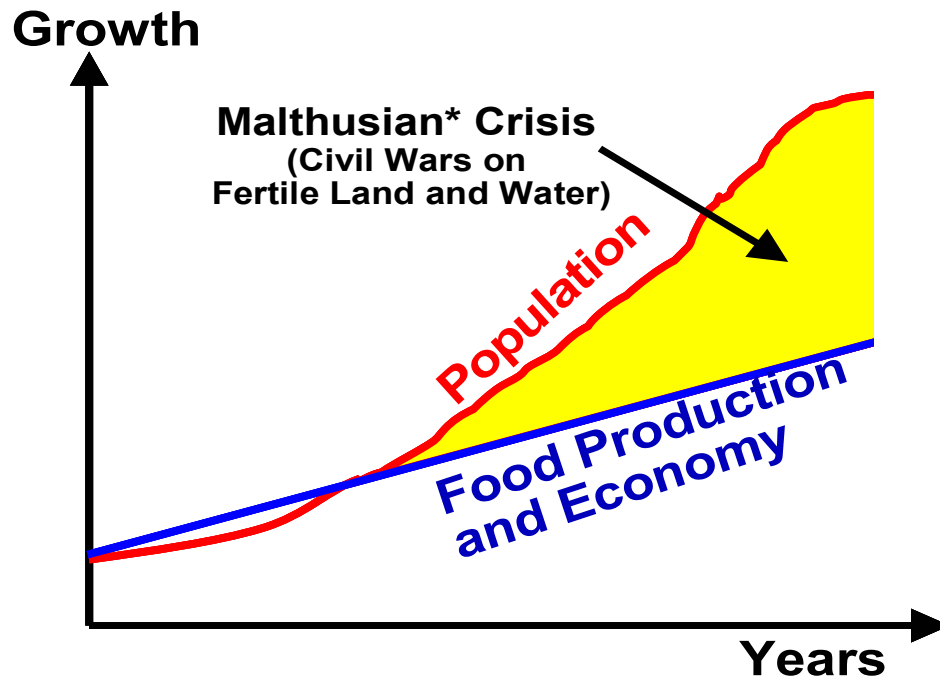
Bundesministerium für  
wirtschaftliche Zusammenarbeit  
und Entwicklung (BMZ)



German Technical Cooperation GTZ (Deutsche Gesellschaft für Technische Zusammenarbeit GmbH),  
Department 44 – Energy and Transport, P. O. Box 5180, 65726 Eschborn, Germany

## A) Developing Countries

(Europe 1800 / Subsah. Africa 2005)



### Counter Measures (taken in China):

a) on the **exponential curve**:

Birth Control (0.58 % p.a. instead of 2,6 %)

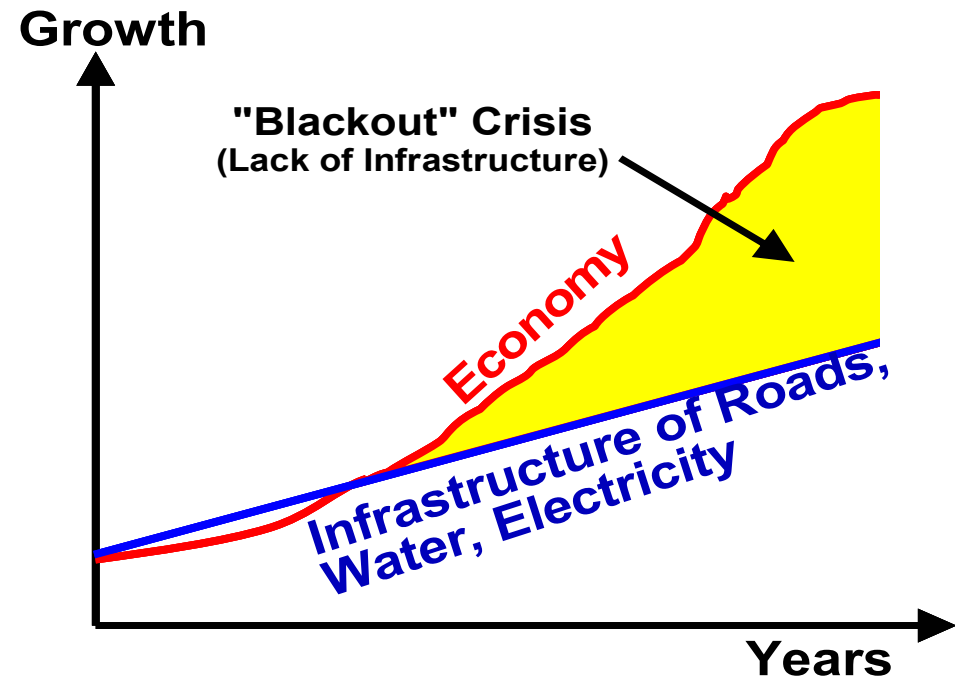
b) on the **linear curve**:

Initiative to increase the Productivity (GDP)

\*) Note: Thomas Robert Malthus (1766-1834) was a famous British economist and philosopher ("Essay on principles of population" - 1778)

## B) Tiger and Transition Countries

(China 2005)



### Counter Measures (needed in China):

a) on the **exponential curve**:

Economic Growth\* controlled by Taxation

b) on the **linear curve**:

Initiative to enlarge the Economic Infrastructure with Revenues from Infrastructure Taxation (Fuel Taxation, Water Taxation, Electricity Taxation)

\*) 9% growth p.a. in China (= doubling in 8 years)

## Consequential Costs of Roads

in % of the actual new constuction costs per year at an interest rate of 4 %

Road Typ	Financial Costs	Technical Costs			Total Consequential Costs
		Current Maintenance Costs	Periodic Maintenance Costs	Total Technical Costs	
	per year in percent of the actual new constuction costs (replacement costs)				
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NOTE	Interest 4 % + Repayment = Constant Annuity during total lifetime	Routine + Spot improvement	p.a. = yearly	to be earmarked in a 2 <sup>nd</sup> generation Road Fund	

From **A** to **B**

## Organization Benchmarks: Six Steps from Road **Administration** to Road **Business**

enlarging the traditional expenditure aspect to full economic accountability<sup>1</sup> - a balance sheet diagnosis for infrastructure and its bankability<sup>2</sup>

Step		Balance Sheet Components		Revenues		Expenditures		Assets		Liabilities	
		Colloquial Term									
Administration	0	Foreign Investment Gift		-		-		X		-	
		Foreign Investment Loan		-		-		X		X	
	1	Administration for the Emergency Case		-		-		Staff Costs		-	
						-		Current Maintenance			
	2	Good Governace ("NRW Force Account")		-		Periodic Maintenance		Staff Costs		-	
						New Investments		Current Maintenance			
	3	Road Tolls		-	X	no return on equity		-		-	
4	Concession (External Operation)		X		no return on equity		-		-		
Business	5	Asset Management (50% Start-up Finance)		X		partly return on equity		X	-	partly dept service	-
		Capital Management		X		including return on equity		X		X	
	6	BUSINESS (Private Management for Stock and Exchange Quotation Rating)		X		including return on equity		X		X	

**Administration** = Organization for the economical **SURVIVAL** of the road infrastructure (*not bankable*)

**Business** = Management for sustainable economical **GROWTH** of the road infrastructure (*bankable*).

<sup>1</sup> Explanation: **X** / **X** = considered, **-** = omitted. Aspect "Expenditures" with details of its contents.

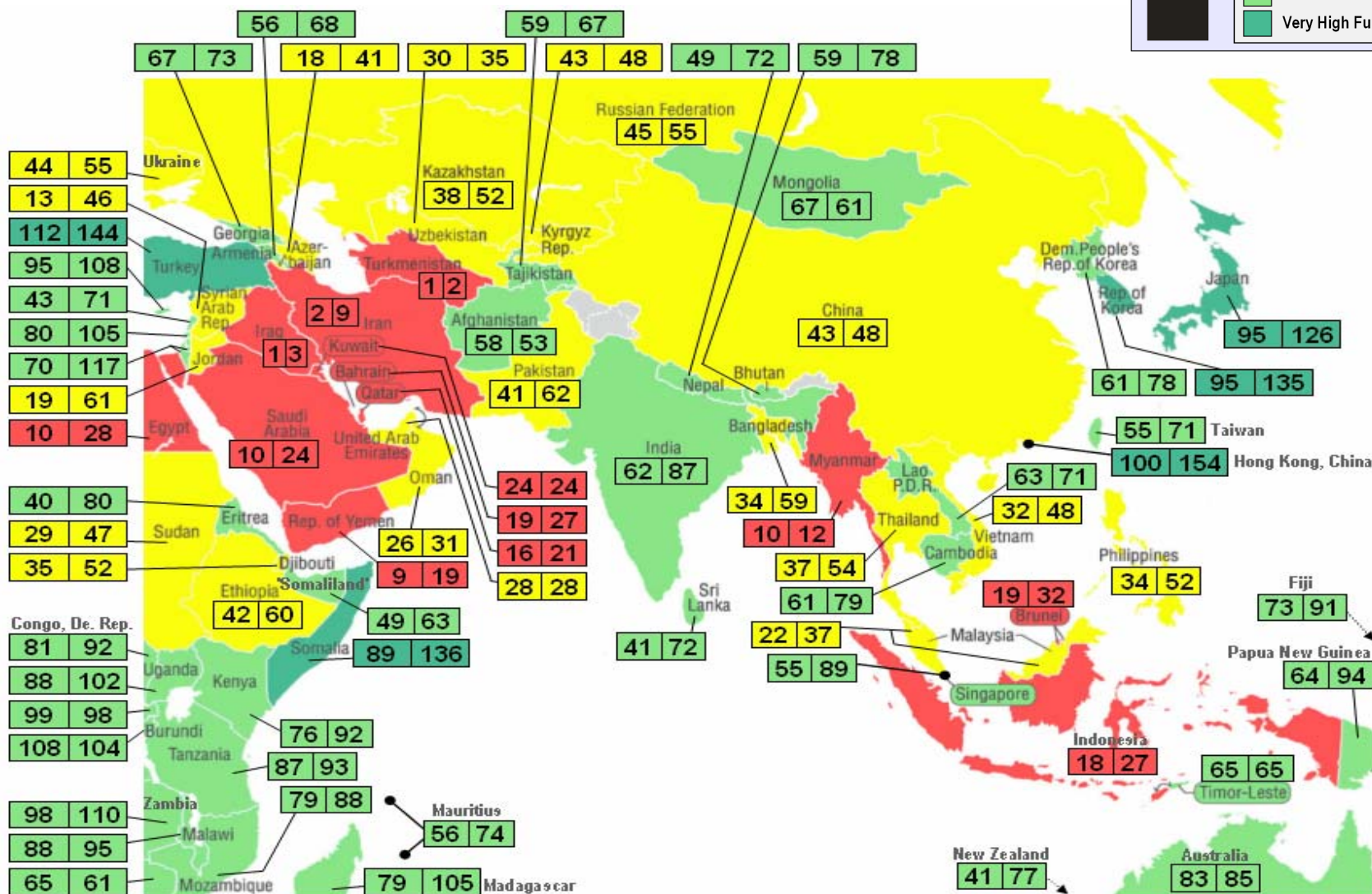
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**Roads as profitable Real Estate**

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## Fuel Prices in Asia and the Middle East of November 2004 in US Cents per Litre



### Very high Fuel Subsidies

The retail price of fuel (average of Diesel and Super Gasoline) is below the price for crude oil on world market.

### Fuel Subsidies

The retail price of fuel is above the price for crude oil on world market and below the price level of the United States.

Note: The fuel prices of the United States are aver. cost-covering retail prices incl. industry margin, VAT and incl. approx. 10 US cents for the 2 road funds (federal and state). This fuel price being without other specific fuel taxes may be considered as the international minimum benchmark for a non-subsidised road transport policy.

### Fuel Taxation

The retail price of fuel is above the price level of the United States and below the price level of Luxembourg.

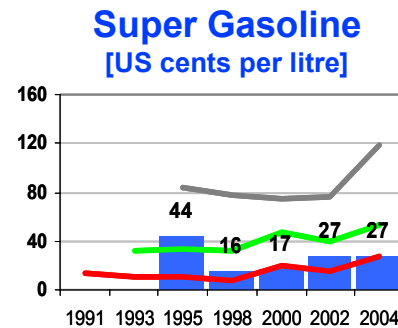
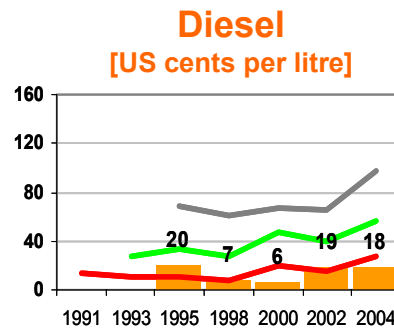
Note: The fuel prices of Luxembourg are the approx. minimum entrance level for new EU accession countries.

### Very high Fuel Taxation

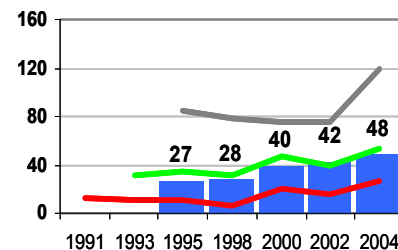
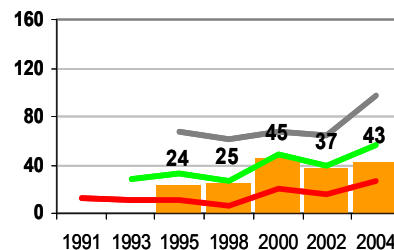
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## Fuel Taxation Policy and its Influence on the State Budget

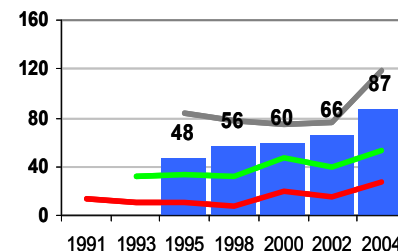
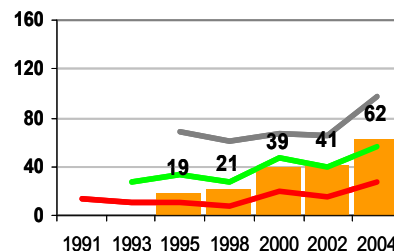
### Indonesia



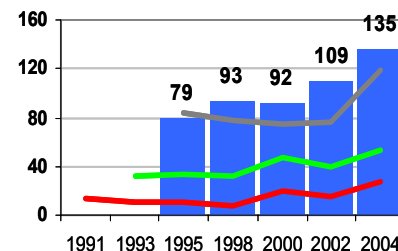
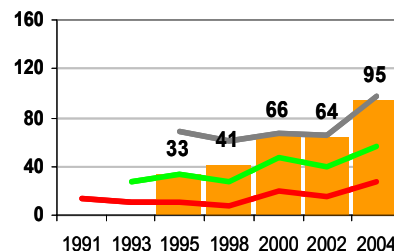
### China



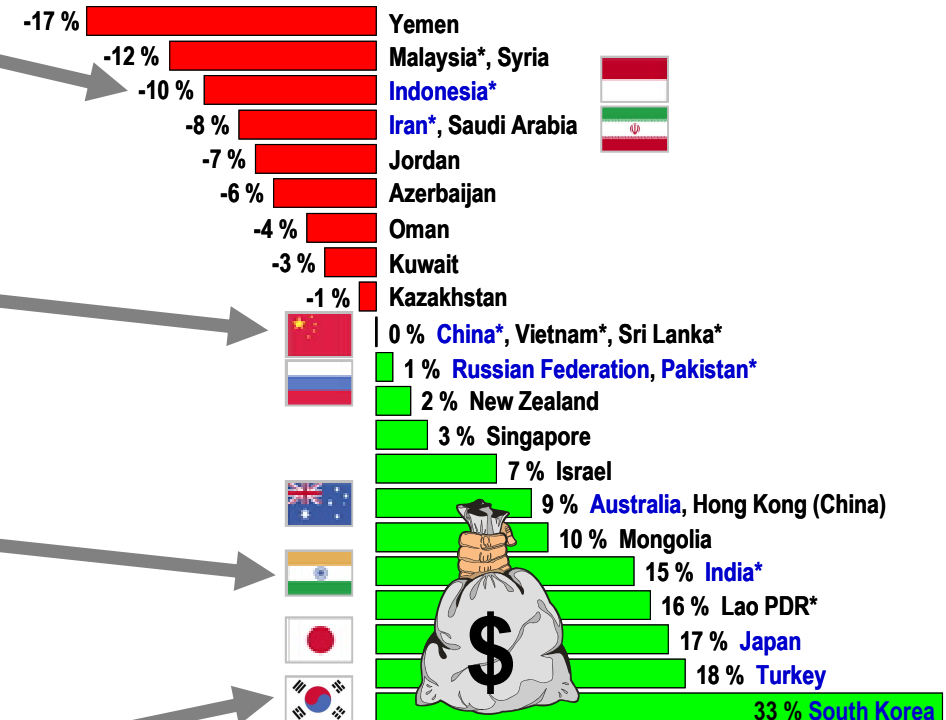
### India



### South Korea



### Fuel Tax Contribution to Total State Revenues in 2004 at Asian Countries



### Reading Samples:

Indonesia spends 10 % of its state revenues on subsidising fuel.  
India receives 15 % of its state revenues from fuel taxation.

— **Grey Benchmark Line** = Retail Fuel Prices of LUXEMBOURG = approx. Minimum Entrance Level for new EU Accession Countries  
— **Green Benchmark Line** = Retail Fuel Prices in the UNITED STATES = aver. Cost-Covering Retail Prices incl. Industry Margin, VAT and incl. approx. 10 US Cents for the 2 Road Funds (Federal and State). This Fuel Price being without other Specific Fuel Taxes may be considered as the International Minimum Benchmark for a non-subsidised Road Transport Policy.  
— **Red Benchmark Line** = CRUDE OIL Prices on World Market ("Brent" at Rotterdam)

The calculation "Fuel Tax Contribution to Total State Revenues" is based on:  
- the fuel prices of November 2004 from the GTZ price survey  
- the number of vehicles in use from statistics of IRF, VDA and Aral  
- the estimation of average vehicle kilometres per vehicle type and year  
- the state revenues (including grants) from the "CIA Fact Book" / "World Bank WDI".

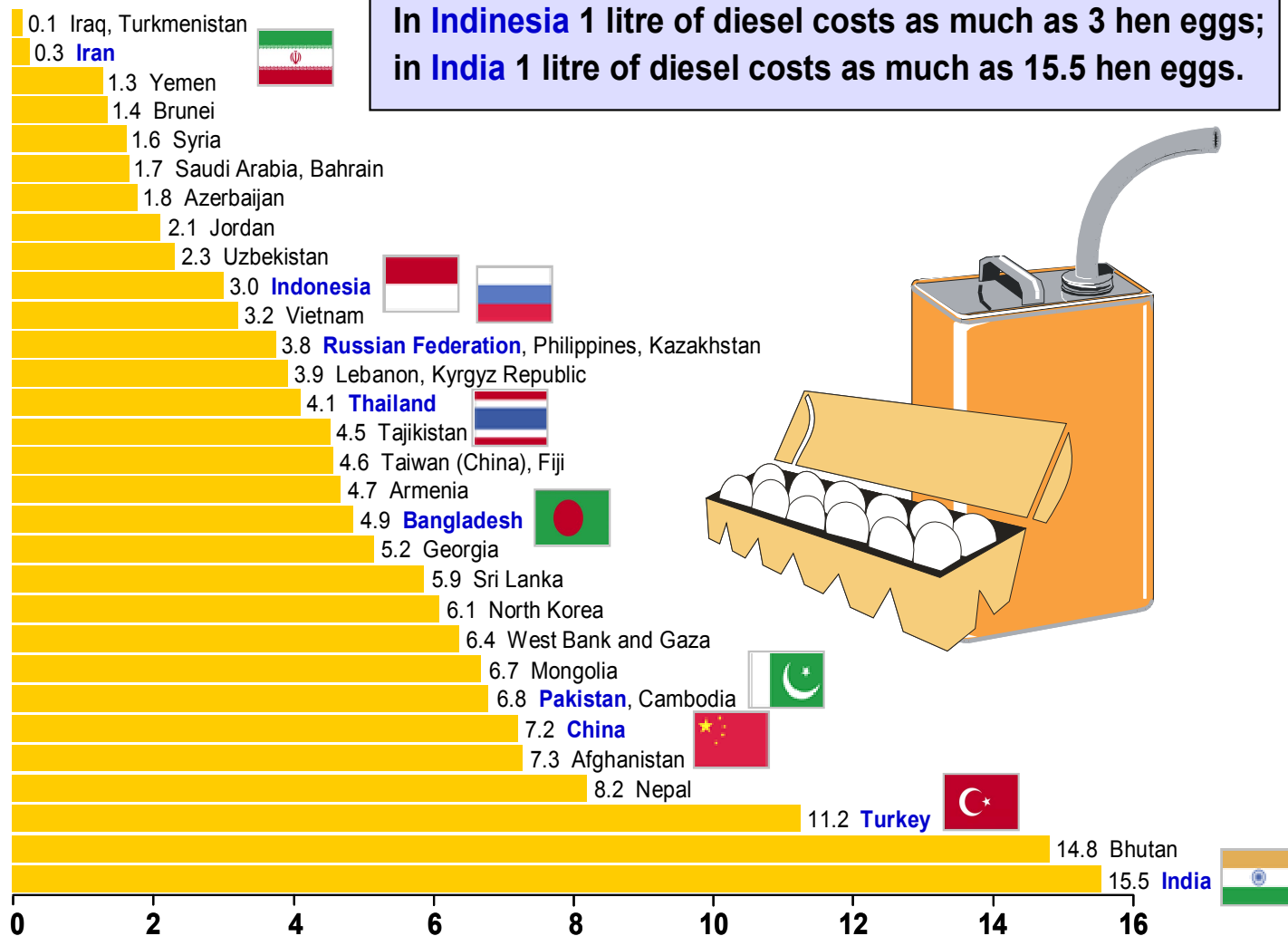
The detailed calculation will be published at: [www.International-Fuel-Prices.com](http://www.International-Fuel-Prices.com)

## ANNEX 1: Discussion Paper "Considering the local purchasing power..."

### Diesel Prices in Egg Equivalents in Asian Countries and the Middle East from Nov. 2004

#### Reading Sample:

In **Indonesia** 1 litre of diesel costs as much as 3 hen eggs;  
in **India** 1 litre of diesel costs as much as 15.5 hen eggs.



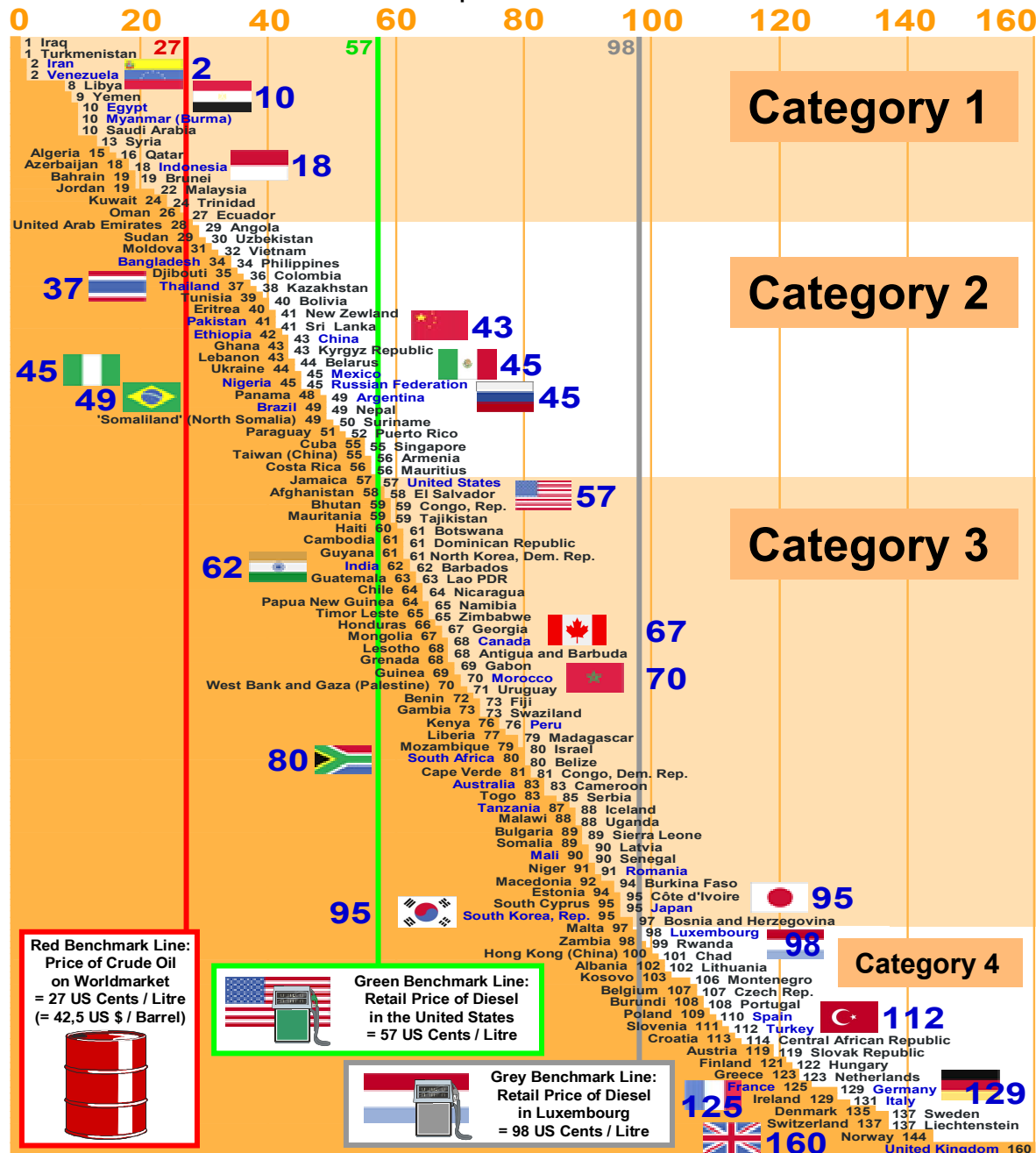
#### Calculation details of the graph:

Country	Egg Price	Diesel Price	Egg Index
	US Cent per Egg (Nov. 2004)	US Cent per Litre Diesel (Nov. 2004)	Eggs per Litre Diesel (Nov. 2004)
Bhutan	4	59	14,8
India	4	62	15,5
Saudi Arabia	6	10	1,7
Indonesia	6	18	3,0
Pakistan	6	41	6,8
China	6	43	7,2
Nepal	6	49	8,2
Iraq	7	1	0,1
Turkmenistan	7	1	0,1
Yemen	7	9	1,3
Bangladesh	7	34	4,9
Sri Lanka	7	41	5,9
Iran, Islamic Rep.	8	2	0,3
Syrian Arab Republic	8	13	1,6
Afghanistan	8	58	7,3
Jordan	9	19	2,1
Philippines	9	34	3,8
Thailand	9	37	4,1
Cambodia	9	61	6,8
Azerbaijan	10	18	1,8
Vietnam	10	32	3,2
Kazakhstan	10	38	3,8
North Korea	10	61	6,1
Mongolia	10	67	6,7
Turkey	10	112	11,2
Bahrain	11	19	1,7
Kyrgyz Republic	11	43	3,9
Lebanon	11	43	3,9
West Bank and Gaza	11	70	6,4
Russian Federation	12	45	3,8
Taiwan (China)	12	55	4,6
Armenia	12	56	4,7
Uzbekistan	13	30	2,3
Tajikistan	13	59	4,5
Georgia	13	67	5,2
Brunei	14	19	1,4
Fiji	16	73	4,6



## Diesel Prices of 172 Countries

in US Cents per Litre from Nov. 2004



## ANNEX 2: The 4 Categories of Fuel Taxation

### Very high Fuel Subsidies

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