Petroleum pricing in India

balancing efficiency and equity

Neha Misra
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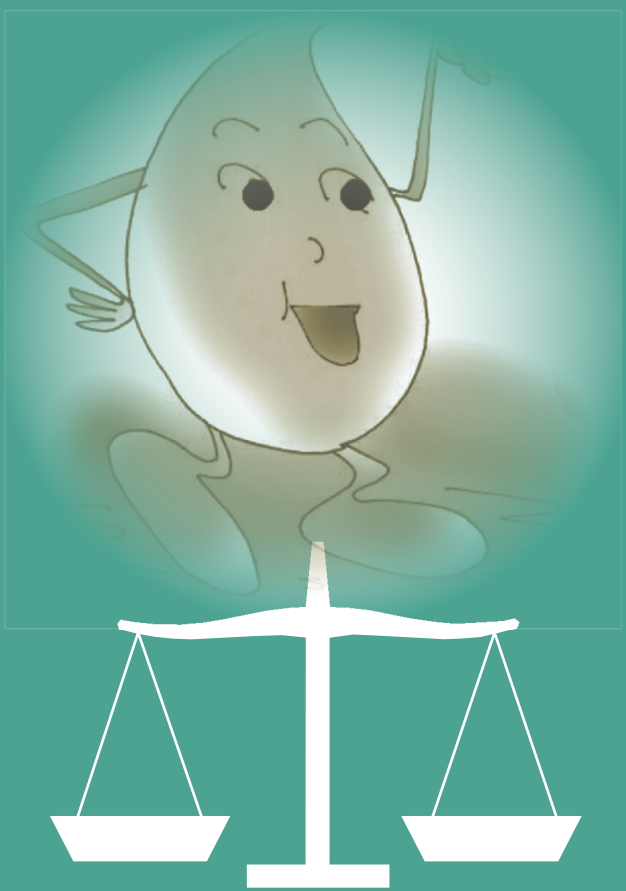
R K Pachauri



The Energy and Resources Institute

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Foreword

Petroleum product pricing in India has gone through various stages of evolution, particularly in relation to responsibilities exercised by different levels of government and the oil industry. When the first oil price shock took place in 1973/74 the Government of India passed on to consumers, almost fully, the sudden increase in global crude oil prices. The result was expectedly adverse, with inflation reaching record levels and creating considerable hardships for fixed income classes of the population. Over a period of time the APM (administered pricing mechanism) was established, which essentially allowed the oil companies a return on investment by adjusting product prices to reflect global market realities.

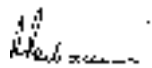
In the mid '90s the Government set up a high level group consisting of representatives from industry, both public and private sector; researchers and academics; as well as government officials to go into the restructuring of the oil industry. One of the major recommendations of this group was to do away with the APM, apart from several other changes that were recommended. To provide operational direction to the recommendation on APM, an expert committee then developed a plan, which required the APM to be dismantled in 2002 and to be replaced by a system that would allow oil market companies to set petroleum product prices in keeping with specific guidelines and principles.

While the Government accepted this recommendation they were not brought into force in 2002 as expected. Consequently, an anomalous process has been observed over the last three years wherein the APM is supposedly done away with but the proposed institutional arrangement that was to take its place has not been established. Consequently, several further distortions have crept into petroleum product pricing, which are leading to several negative externalities and unfavourable impacts on the economy, as well as on the welfare of society. The time for change is now, and the need for correcting existing distortions urgent.

This publication has gone into depth on the subject of petroleum product pricing and has come up with several recommendations, which it is hoped the authorities would reflect on and accept fully.

The analysis presented highlights past distortions and irrationalities, and then provides some refreshing innovations, which would ensure economic efficiency and also help to meet the needs of the poor.

It is believed that this publication and its recommendation can herald a process of rationalization of petroleum product pricing and correction of institutional weaknesses that the country can ill afford in the future.



R K Pachauri
Director–General

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* The research team has tried its best to create the price build-up of petroleum products sold in India. However, the calculations are subject to an error margin of ±5%.

TERI recommends that...

- The government must, as soon as possible, move to a system of market determined pricing of petroleum products as recommended by the Expert Technical Group.
- The Import Parity Pricing formula needs to be re-visited to ensure that the Indian refining industry enjoys a rational margin that is fair to producers as well as consumers.
- The government, as is demonstrated in the detailed paper, can define a sliding scale for excise duties that would ensure that its revenue expectations remain untouched with changes in international prices of crude and products. This would not only ensure that the consumer does not have to face the multiplying effect of an ad valorem duty but also make transparent and certain the response of the government to international price changes.
- The state governments can also devise a similar formula.
- The production of kerosene in the country could be phased out over a period of time. International prices of LPG (liqueified petroleum gas) are cheaper than that of kerosene. As such, the government needs to emphasize on the consumption of LPG rather than that of kerosene. Even if a subsidy is involved in the consumption of LPG by certain classes of consumers, it would be easier to monitor consumption and control adulteration apart from the positive health benefits.
- Since most of the kerosene in the country is used for providing low-quality lighting, the government can provide highly subsidized solar lanterns to all unelectrified households in the country at a fraction of the kerosene subsidy cost.

Continued...

- All subsidies on LPG should be provided to the consumer as a direct subsidy instead of a subsidy on the LPG cylinder. LPG debit cards floated jointly by financial institutions and oil companies can be issued to targeted consumers identified by the government. The government may define different debit limits to different categories of consumers if it so wishes. Administratively it would be easier to have just two classes of LPG consumers: subsidized and unsubsidized.
- A detailed study is required to understand the trucking industry and the impact of bringing taxation of diesel on par with other petroleum products.

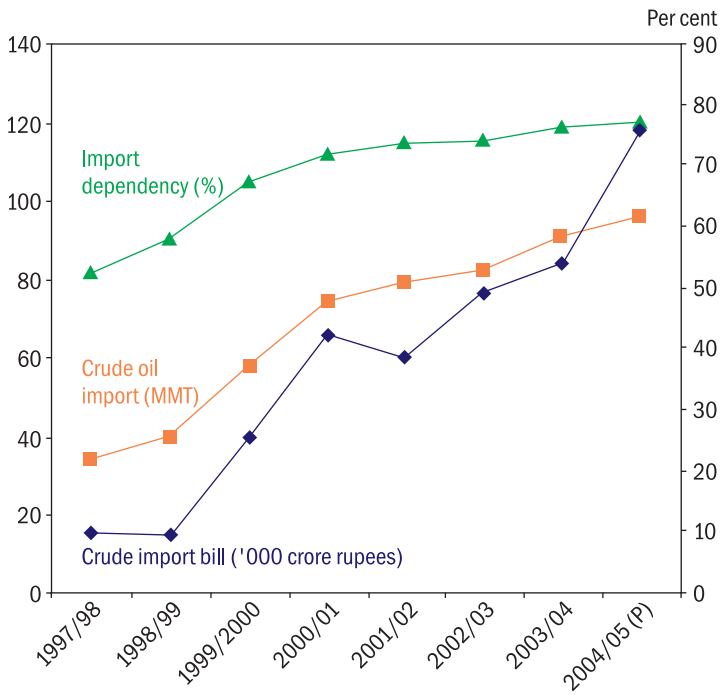
Background

India's oil import dependency

India's increasing vulnerability to price increases in the international oil markets is indisputable. In 2004-05, India's dependence on imported crude stood at 77% of its crude processing requirement.[1] While the total quantum of crude imports by the country grew at a CAGR (compounded annual growth rate) of 15.72% during the period 1997/98 to 2004/05, the total import bill shot up by more than double this rate (33.03%) during the same period (Figure 1).

The estimates for future import dependency, an assessment of the sensitive political situation in major oil producing countries, and trends in international crude oil prices do not offer any respite from

Figure 1 Trends in import dependency of India over the years



Source PPAC (Petroleum Planning and Analysis Cell)

[1] A decline has been registered in the net-import dependency of India. It has decreased from 86% in 1999/2000 to 70% in 2004/05. This is due to the increase in refining capacity resulting in a reduction in import of petroleum products and the export of some products.

this steep increase in the crude import bill. According to the *World Energy Outlook* India's crude import dependency is projected to rise to 94% in 2030, *ceteris paribus*.[2] TERI estimates using the MARKAL model also corroborate these estimates.

In the last several months there has been growing concern, leading to a sustained public debate, about how to tackle the implications of high crude prices for the economy. While, the question of whether oil prices will continue to rise, or indeed fall, over the next few years is debatable, what is clear is that India needs to explore opportunities for using oil as efficiently as possible and to put in place a pricing system that meets the multiple objectives of

- providing an adequate incentive to oil companies for further investments in the sector;
- providing resources for the government while minimizing the oil subsidy burden;
- minimizing the impact on consumers as oil prices remain high and continue to rise further; and
- promoting efficient consumption choices.

This paper makes an attempt to address these objectives by critically examining the pattern of petroleum consumption in the country, various facets of the current petroleum-pricing regime, and its implications for various stakeholders in the sector.

Growth of the sector

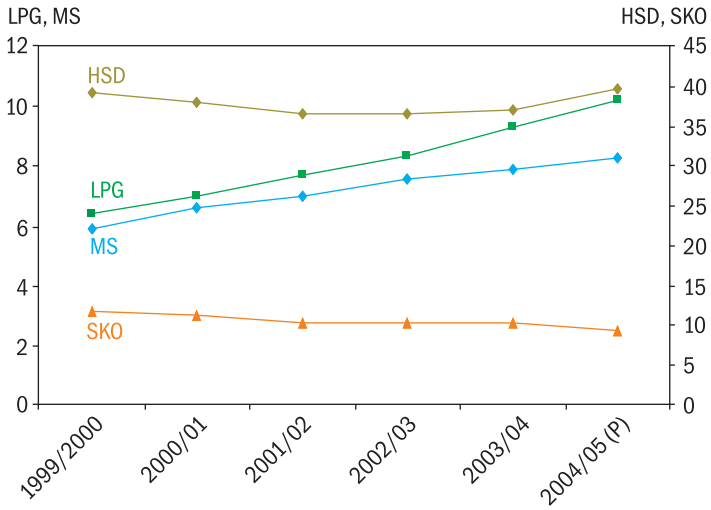
Trends in consumption and production: the big picture

Consumption of petroleum products in the country has increased from 97 MT (million tonnes) in 1999/2000 to 112 MT in 2003/04, growing at a CAGR of 2.64%. LPG, kerosene, HSD, and MS continue to form over 60% of the total sales generated in the sector (Figure 2).

Against this consumption, production of petroleum products has grown at a CAGR of 9.33% since 1999/2000, standing at 118 MT in 2003/04. The increased refining capacity in the country, contributed to significantly by private refining capacity, has almost completely eliminated the need to import petroleum products in the short

[2] *World Energy Outlook 2002* – International Energy Agency (IEA) p. 285

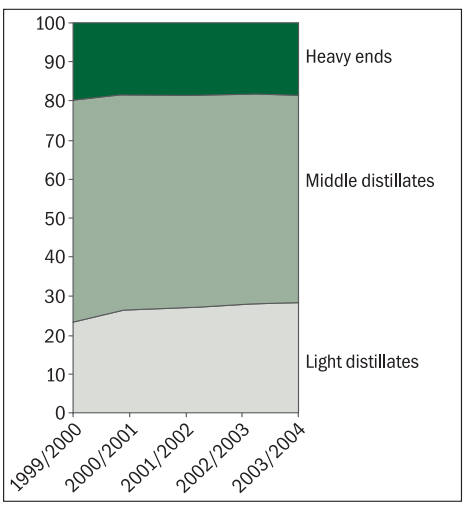
Figure 2 Consumption of four major petroleum products (million tonnes)



Source PPAC
Note LPG – liquefied petroleum gas; MS – motor spirit; HSD – high speed diesel; SKO – superior kerosene oil

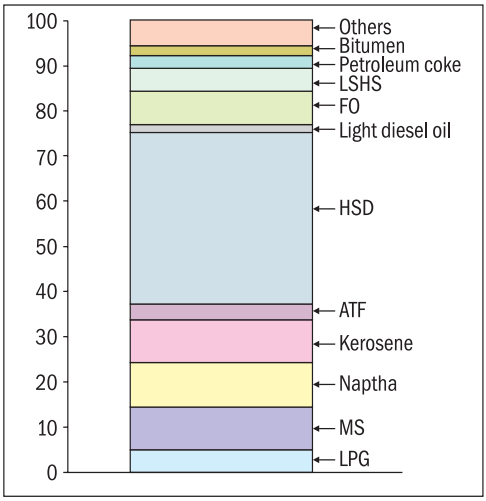
term. In 2004/05, petrol, diesel, LPG, and kerosene formed 61.56% of the total production of petroleum products in the country (diesel: 38.18%, petrol: 9.69%, kerosene: 8.69%, LPG 4.71 %)(Figures 3 and 4).

Figure 3 Trend in production of petroleum products (percentage)



Source PPAC

Figure 4 Production profile of petroleum products (2003/04) (percentage)

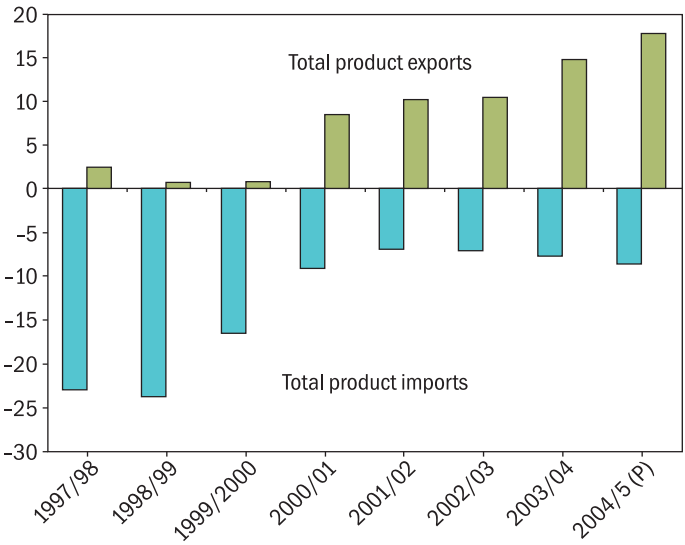


Source PPAC

Trade in Petroleum Products

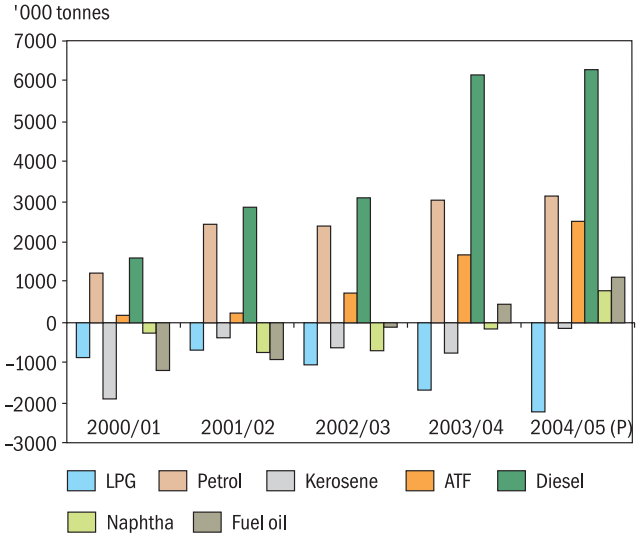
Supported by increasing refining capacity in the country, in 2001/02 India became a net exporter of petroleum products for the first time (Figure 5). In 2004/05, the country exported 17.53 MT of petroleum products against an import of 8.83 MT. There has been an upsurge in the export market of diesel, petrol, naphtha, ATF (avia-

Figure 5 Imports vs exports of petroleum products (million tonnes)



Source PPAC

Figure 6 Composition of exports and imports of petroleum products (thousand tonnes)



Source PPAC (2005)

tion turbine fuel), and fuel oil (Figure 6). In the last four years, the export market for diesel, petrol, and ATF has grown at a CAGR of 40.30%, 26.41%, and a whopping 97.37% respectively. On the import front, over the last four years, LPG imports have increased at a CAGR of 27.65%, standing at 2.33 MT in 2004/05 while kerosene imports have declined at a rate of 43.19%.

The present status of pricing

Starting from April 2002, the vestiges of the controlled era in the form of APM (administered pricing mechanism) were officially dismantled. However, substantial government control on the sector prevails till date. The following section discusses the key implications of dismantling of APM on the petroleum pricing in the country.

Pricing of domestic crude

With the dismantling of APM, the price of indigenous crude has been linked to international prices, which implies that the price received by domestic crude oil producers is linked to international prices (as against the pooled price in the APM regime which was the weighted average of international prices and the domestic cost of

production). In effect at the time of dismantling of the APM, domestic refineries were to pay international crude prices even for crude procured from domestic producers. Revenues of domestic crude producers, on the other hand, are over and above what would have been on the basis of their costs.

Pricing of petroleum products

Subsequent to dismantling of the APM, prices of petroleum products in the market were to be based on the principle of import parity, except for PDS (public distribution system) kerosene and domestic LPG, on which the subsidy element was to gradually reduce to 33% and 15% respectively. Linkage to IPPs essentially meant that the prices of petroleum products should represent the opportunity cost of importing these products from the international market as against producing them domestically. This, however, also translated into a higher exposure of product prices in the domestic market to the volatility in the international oil markets.

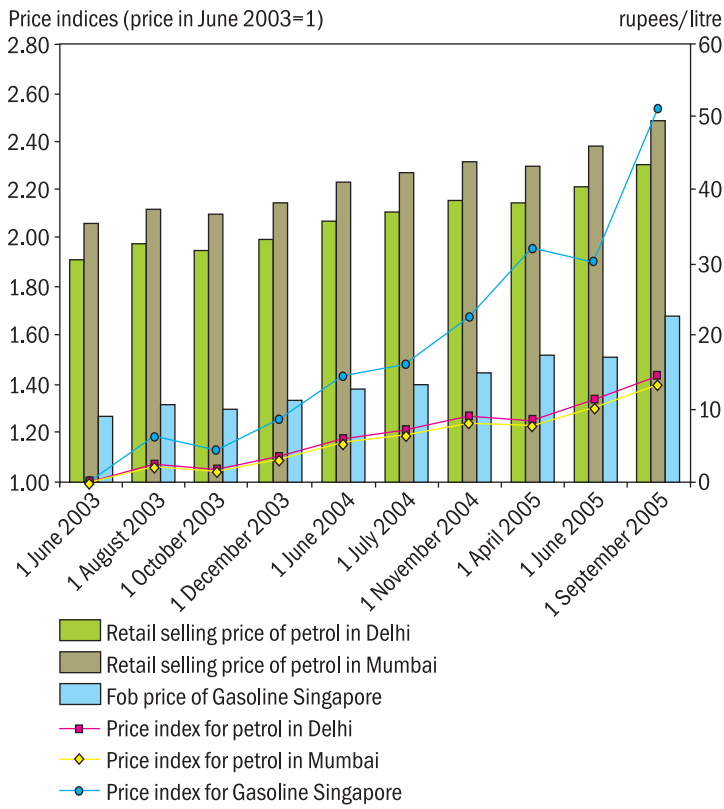
Petrol and diesel are the two major transportation fuels in the country. In 2003/04 these two fuels together formed 41.73% of total sales of petroleum products. With the dismantling of APM, the retail prices of these products were linked to the IPPs. However, in an effort to insulate consumers from the steep international price increases and volatility, the government was reluctant to allow OMCs (oil marketing companies) to increase retail prices of petrol and diesel in line with the corresponding increase in international crude oil prices.

The government did introduce a price band, from 1 August 2004, within which OMCs would be free to respond to international price changes. As per this mechanism, retail prices of petrol and diesel were to be based on the previous fortnight's average international price (in line with the import parity principle), subject to the condition that the exchange rate adjusted C&F (cost and freight) product price was within the band of plus or minus 10% around the mean of the previous three months rolling average price and previous one year's average price. In case of breach of this band, the OMCs were to approach the Ministry of Finance through the MoPNG (Ministry of Petroleum and Natural Gas) to modulate the excise duty rates to

ensure that the spiralling prices prevailing in the international markets do not cause undue hardships to the consumers. However, with increasing crude oil and product prices in the international market, the band was crossed within the first fortnight itself, and any further price increases were stalled due to reluctance on the part of the government to let the OMCs pass on the crude oil prices even partially to consumers. While the price of Dubai crude shot up by a staggering 47.32% between November 2004 and June 2005, the retail prices of both petrol and diesel remained static and were revised only on 20 June 2005 after a gap of almost seven months. Another price revision was announced by the government on 6 September 2005.

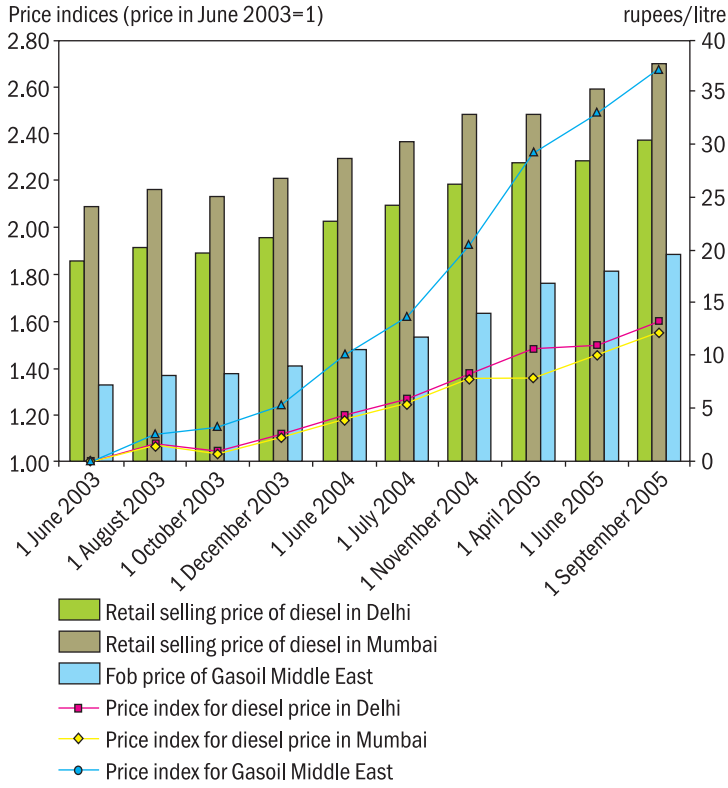
Figures 7 and 8 bring out the significantly higher price that

Figure 7 Comparison of movements in retail price of petrol vs fob (free on board) Gasoline Singapore and their respective price indices (prices in Rs/litre)



Source TERI analysis based on data from IOC (Indian Oil Corporation) and Platts

Figure 8 Comparison of movements in retail selling price of diesel vs fob price Gasoil Middle East and their respective price indices (prices in Rs/litre)



Source TERI analysis based on data from IOC and Platts

consumers pay for petrol and diesel as compared to their international trade price, highlighting the huge duties/taxes levied on these products. The line graphs indicating price indices, however, reveal that domestic prices have not increased at the same pace as international prices.

The MoPNG has proposed what they call 'an equitable burden sharing' between the government, companies, and consumers to ride the price roller coaster. Under the arrangement, consumers were asked to pay higher prices for the transportation fuels, with 3 rupees/litre and 2 rupees/litre increase in the prices of petrol and diesel respectively. The central government would be issuing oil bonds to the OMCs worth 12 000 rupees crore. Upstream companies ONGC and OIL have also been asked to share the burden by

providing crude oil to these companies at discounted prices. Standalone refineries like MRPL, KRL, and private refinery Reliance have been asked to supply LPG and kerosene to these OMCs at discounted rates. The discount is expected to be around 5000 rupees crore. This discount offered by the refiners to the OMCs is over and above the discounts given by them in supply of petrol and diesel. The upstream companies such as ONGC, GAIL, and OIL are expected to contribute towards meeting about one-third of the losses, which is equal to 13 000 rupees crore to 14 000 rupees crore. (The likely profit to the upstream oil companies on a 32 MT production per annum due to IPP is atleast about 34 000 rupees crore at an international price of 45 dollars/bbl.)

The frequent policy changes by the government, and often ad-hoc reactions to international developments, have rendered the pricing process opaque: at least to the common citizen. So, who will be able to absorb how much of the price increases? Who are the beneficiaries of the current pricing regime? What are the implications for increasing efficiencies? T E R I has attempted to reconstruct the price build up for the petroleum sector, and through an analysis based on the model so developed, proposes a way forward.

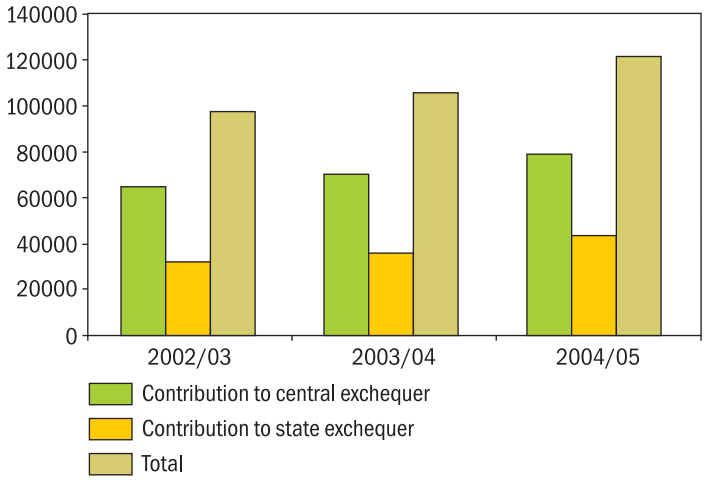
Oil prices: burden-sharing potential

Revenue earnings by the government

As indicated earlier, crude oil and petroleum products are major sources of revenue for the government: both central and state. In the present structure, a mix of specific and ad-valorem duties are imposed on petroleum products. This essentially means that, with an increase in prices of petroleum products, government realization also goes up. Figure 9 shows the increase in contribution of petroleum products to the government exchequer over the last three years.

With our crude oil import dependency increasing from 56% in 1997/98 to 77% in 2004/05, expenditure on crude oil import increased seven fold to 1 31 891 rupees crore in 2004/05. While the government has attempted to reduce customs duties, it has in-

Figure 9 Government revenue earnings from crude oil plus petroleum products (crore rupees)



Source Sixth Report of Committee on Petroleum and Natural Gas: placed during the 14th Lok Sabha

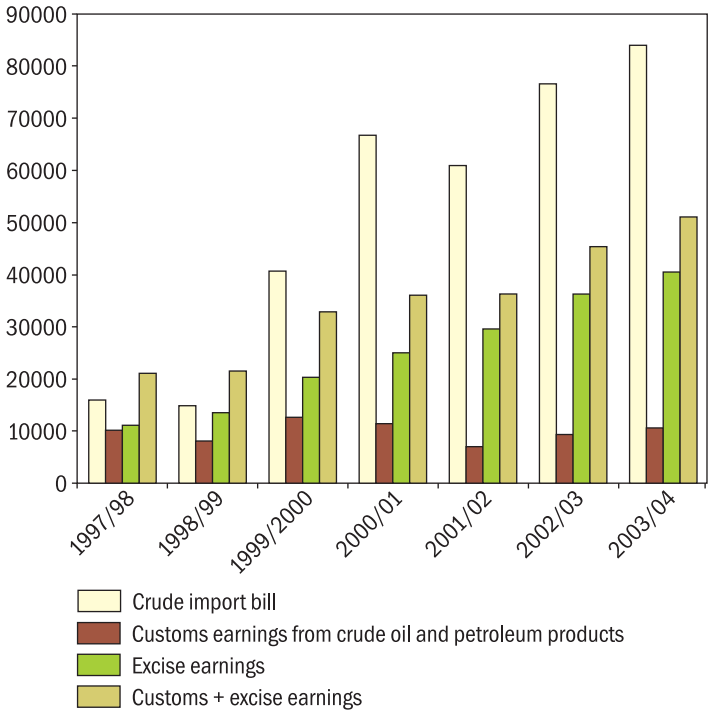
creased excise duties disproportionately to more than offset the loss in revenue due to customs duty reductions. As a result, during this period, total earnings of the central government from excise and customs duty on crude oil and petroleum products have more than doubled (Figure 10).

The share of petrol and diesel in total excise duty realization from petroleum products by the central government has increased from 35.23% in 1990/91 to 67.4% in 2003/04 (Figure 11).

The sixth report of the Standing Committee of Petroleum and Natural Gas presented to the 14th Lok Sabha on 4 August 2005, states that we have a build up of prices in which more than 50% of the price is taxes. The percentage tax on petrol in Mumbai, Chennai, Kolkata, and Delhi is 146%, 138%, 132%, and 112% respectively of the basic price. Budget 2005/06 slashed customs duty on petrol and diesel from 15% to 10%.[3] This would have at least brought some relief in the retail prices of petrol and diesel, if not for an effective increase in the excise duty on these products. The excise duty on petrol and diesel pre- and post-budget 2005/06 was as follows (Table 1).

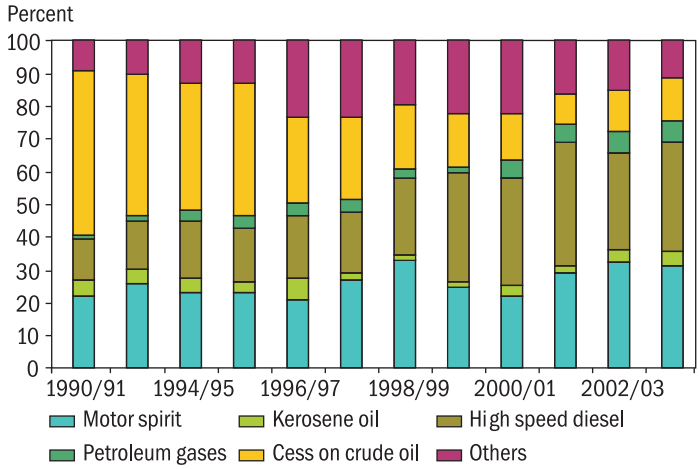
[3] Both excise and customs duty on LPG and Kerosene were reduced to nil.

Figure 10 Crude oil import bill vs central government earnings from crude oil and petroleum products (crore rupees)



Source PPAC 2005

Figure 11 Composition of excise duty from crude oil and petroleum products (percentage)



Source PPAC 2005; *TEDDY 2003/04*, *MoPNG Annual Report 2004/05*

Table 1 Excise duty structure for petrol and diesel: pre-2005 budget and post-2005 budget

	Petrol		*Diesel*	
Excise duty	*Pre-budget 2005/06*	*Post-budget 2005/06*	*Pre-budget 2005/06*	*Post-budget 2005/06*
	23%+ Rs 7.50/litre	8% + Rs 13/litre	8%+ Rs 1.5/litre	8%+ Rs 3.25/litre

Source PPAC

The additional excise imposed on both petrol and diesel has in effect increased the burden of excise duty on these products (Table 2).

The present tax structure for the sector not only has basic excise and customs duty that are levied on various petroleum products but also additional duties to fund road construction, the national highway project, and an education cess that are all loaded on to the final retail prices of these products.

Revenue earnings by the refiners

The present pricing of petroleum products in the country is based on the import parity principle, that is, retail prices are to be comparable with the price of the product if it were to be imported. In principle, IPP is economically efficient and would reflect the scarcity

Table 2 Share of taxes and duties in retail selling price based on IPP formula

	Petrol		*Diesel*	
Duty/tax element	*Pre-budget 2005/06* (%)	*Post-budget 2005/06* (%)	*Pre-budget 2005/06* (%)	*Post-budget 2005/06* (%)
Customs	6	4	7	5
Excise	26	30	9	14
Sales tax	24	24	27	27
Total % of duties and taxes in RSP as per IPP formula	46	58	43	46

Source TERI estimates

value of a product. However, the parity provided to domestic refiners equals the fully loaded cost of the imported product (Table 3). Bearing in mind the fact that in reality India is importing only LPG and a very small quantity of kerosene while exporting most other products, refiners are not actually paying out the various charges identified in table 3. As such, Indian refineries are obviously making significantly higher margins than are apparent. These charges can be termed as a notional margin. Since most of these charges are ad valorem in nature, the increase in international prices would translate to a much higher notional margin. At an international crude oil price of 45 dollars, these notional margins could contribute to as much as three rupees in the price build-up of diesel and petrol. This could translate into a policy driven earnings of nearly 40 000 rupees crore for the refinery sector in India!!!

Table 3 Fully loaded import parity pricing: notional earnings

FOB (free on board) price
Load port charges
Freight
Cost and freight
Insurance
Ocean loss
CIF (cost, insurance, and freight) price
LC charges
Landing charges
CIF + landing charges+ LC charges
Customs duty
Cost + basic customs
Navigation charges
Port dues
Pilotage and towage
Mooring charges
Berthing charges
Wharfage
Terminating charges
Landed price at import parity

Source TERI (2005)

Obviously, if integrated refining and marketing companies were to deal with subsidy levels that are higher than the notional margins, their incentive to export the product would increase substantially—given the uncertainties associated with domestic retail pricing and recovering subsidies from the government. This could explain the increasing level of exports, particularly from private refineries.

Impact of international price changes

Impact on retail prices

This section presents the results of sensitivity analysis of retail prices of diesel and petrol in the country resulting from an increase in price of crude oil in the international market as per current import parity formula. Seven scenarios have been built corresponding to crude oil prices of (a) $25/bbl, (b) $45/bbl, (c) $55/bbl, (d) $65/bbl, (e) $75/bbl, (f) $85/bbl, and, (g) $105/bbl. We have also analysed change in the shares of notional price element, excise duty, and sales tax in the final retail prices based on IPP in each of these scenarios. The prevailing rate of excise and customs duty, and the weighted average sales tax rates in the country have been taken in the analysis.

Table 4 shows that with an increase in international crude price from 45 dollars/bbl to 65 dollars/bbl, there would be an increase in retail price of diesel from 31.78 rupees/litre to 42.85 rupees/litre: a jump by 35%. It is interesting to note that inbuilt in this price increase is a 33% increase in notional price, a 15% increase in excise duty and a 30% increase in sales tax earnings! In case of petrol similar results are seen in table 5. For increase in international crude oil price from 45 dollars/bbl to 65 dollars/bbl, there would be a 24% increase in the retail price level of petrol. There is also a corresponding jump in earnings from notional prices, excise duty, and sales tax by 31%, 4%, and 22% respectively!

Impact on government revenues

To get an insight into the sensitivity of government revenues to different combinations of excise and customs duty, five scenarios were built.

Table 4 Sensitivity analysis for retail price of diesel based on IPP (Rs/litre)

Scenario	*Crude oil price* ($/bbl)	*FOB price*	*Retail price based on IPP*	*Notional price in IPP build-up*	*Excise duty*	*Sales tax*	*Total taxes and duties*
A	25	7.95	20.77	2.03	4.18	4.20	8.38
B	45	15.33	31.78	3.00	4.8	6.03	10.87
C	55	19.01	37.29	3.49	5.18	6.94	12.12
D	65	22.70	42.85	3.98	5.51	7.85	13.36
E	75	26.38	48.37	4.46	5.85	8.76	14.61
F	85	30.07	53.88	4.95	6.18	9.68	15.86
G	105	37.44	64.91	5.92	6.85	11.50	18.35

Source: TERI estimates

Table 5 Sensitivity analysis for retail price of petrol l based on IPP (Rs/litre)

Scenario	*Crude oil price* ($/bbl)	*FOB price*	*Retail price based on IPP*	*Notional price in IPP build-up*	*Excise duty*	*Sales tax*	*Total taxes and duties*
A	25	9.06	36.39	2.19	14.04	8.08	22.12
B	45	16.36	47.83	3.16	14.70	10.41	25.11
C	55	20.01	53.55	3.64	15.03	11.58	26.61
D	65	23.66	59.43	4.13	15.36	12.75	28.11
E	75	27.31	65.17	4.60	15.69	13.92	29.61
F	85	30.97	70.91	5.09	16.02	15.08	31.10
G	105	38.27	82.38	6.05	16.68	17.42	34.10

Source TERI estimates

- Scenario 1: Present duty structure, that is, post budget 2004/05
- Scenario 2: Present structure without any specific excise component
- Scenario 3: Pre-budget duty structure
- Scenario 4: Reduction in customs duty and in specific component of excise duty
- Scenario 5: Reduction in customs duty and nil specific duty

Table 6 shows the assumptions for each of these scenarios.

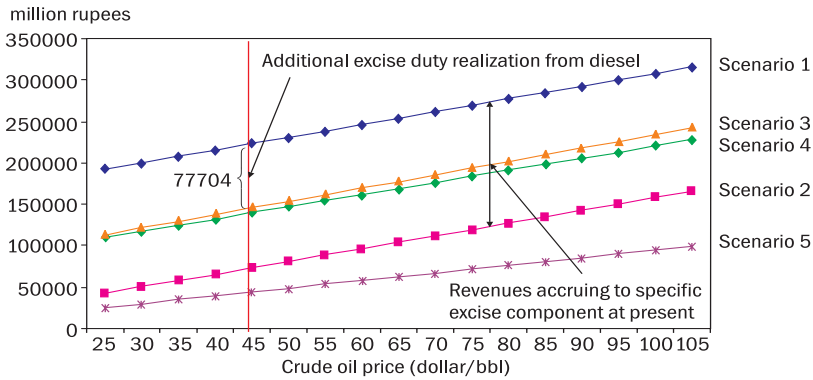
Table 6 Various scenarios considered for sensitivity analysis

Assumption	*Scenario 1 Present duty structure*	*Scenario 2 Present structure minus specific excise component*	*Scenario 3 Pre-budget duty structure*	*Scenario 4 Reduction in customs and excise duty*	*Scenario 5 Reduction in customs and excise, nil specific excise duty*
Diesel	Customs duty: 10%; excise duty: 8% + Rs 3.25/litre	Customs duty: 10%; excise duty: 8%	Customs duty: 15%; excise duty: 8% + Rs 1.5/litre	Customs duty: 5%, excise 8% + Rs 1.5/ litre	Customs duty: 5%; excise duty:5%
Petrol	Customs duty: 10%, excise duty: 8% + Rs 13/litre	Customs duty: 10%, excise duty: 8%	Customs duty: 15%, excise duty: 23%+ Rs 7.50/litre	Customs duty: petrol 5%, excise duty: 8% + Rs 7.5/ litre	Customs duty: petrol 5% duty : 5%

Source TERI (2005)

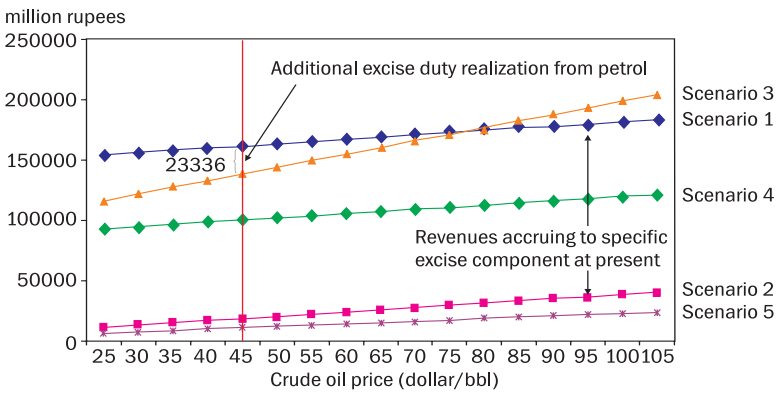
Taking the typical barrel of consumption in India, figures 12 and 13 depict the sensitivity of total excise revenue accruing to the central government from sale of diesel and petrol under each of these scenarios. The exercise illustrates that despite the government's claims that it has taken steps for rationalizing the duty structure of petroleum, significant distortions remain, and have in fact, increased over the last year. Budget 2004/05, for example, brought an increase in the specific excise duty component on diesel from Rs 1.5/litre to Rs 3.25/litre, ad valorem component remaining the same, that is, eight per cent. Assuming last year's price levels, this alone translates into additional revenue of 7770 rupees crore to the central government! Add to this, additional sales tax earnings to the tune of 826 crores that would accrue to the state governments. In case of petrol, the ad-valorem excise duty was decreased significantly from previous level of 23% to 8%. However, this reduction did not bring much relief for the retail prices of petrol as the specific component was increased from 7.5 rupees/litre to 13 rupees/litre. This duty structure translates into additional revenue of 2333 rupees crore to the central government at last year's price level. Besides, the state government would gain from additional sales tax earnings of 364

Figure 12 Sensitivity of central government revenues from excise duty on diesel (million rupees)



Source TERI's analysis

Figure 13 Sensitivity of central government revenues from excise duty on petrol (million rupees)



Source TERI's analysis

rupees crore. If one takes into account the significant increase in crude oil prices over the last year these figures would increase further.

Maintaining neutrality in central and state government revenues

Given the present duty structure of the petroleum sector, an increase in crude oil prices leads to an increase in revenues accruing to central and state governments as also to the refineries. If the

government did not control retail prices, disproportionately affecting some companies, retail price increases would need to reflect international price increases, and consumers would end up bearing more than the burden of increase in the crude prices. Hence, this creates a need for adjusting the duty structure such that revenue accruing to central and state governments remains constant and the entire burden of the high prices does not fall on consumers.

Stabilizing revenues of the central government is one side of the story. For equitable burden sharing among all stakeholders it is important to stabilize revenues accruing to the state government. Hence when determining an equitable burden-sharing revenue/expenditure, implications to the following stakeholders are taken into account: refiners, central government, state government, and consumers. For determining the possible burden-sharing arrangements between the different stakeholders, revenues earned by central and state government under the prevailing duty structure at crude oil price of 45 dollars/bbl have been assumed to be the benchmark revenue. Sensitivity analysis was done for a range of crude oil prices keeping the revenue stream to the central and state revenue constant. The customs duty (which is notional in reality) has also been decreased to five per cent for ensuring refiners contribution in burden sharing. Consequently, adjustments in customs duty, excise duty, and sales tax have led to decrease in the retail prices payable by consumers. The impact of burden sharing can be appreciated from the fact that at 65 dollars/bbl, if there is no adjustment in the prevailing structure, the price to be paid by the consumer is 59.43 rupees/litre for petrol and 42.85 rupees/litre for diesel. However, if there is an equitable burden sharing between all stakeholders the price comes down to 55.11 rupees/litre (a decrease of 4.32 rupees/litre) and 39.06 rupees/litre (a decrease of 3.79 rupees/litre) for petrol and diesel respectively.

Tables 7 and 8 summarize the impact on retail prices if this burden sharing is done by all concerned stakeholders for petrol and diesel respectively. The government may also decide to publish a table preparing consumers what price impact to expect, corresponding to international price changes and the consequent modifications in excise duties and sales taxes.

Table 7 Revised excise duty and sales tax structure for maintaining excise revenue to central government and sales tax revenue to state government at $45/bbl level (Petrol)

	Base case	*Revised excise duty and sales tax structure for maintaining excise revenue to central government and sales tax revenue to state government at $45/bbl level (Petrol)*											
Crude oil price	$/bbl	45	55	60	65	70	75	80	85	90	95	100	105
Notional customs duty	%	10	5	5	5	5	5	5	5	5	5	5	5
IPP to refiner	Rs/litre	19.86	22.94	24.90	26.87	28.83	30.85	32.76	34.72	36.77	38.65	40.61	42.57
Excise Duty													
Ad-valorem	%	8	6.99	6.47	6.02	5.63	5.28	5	5	4.47	4.25	4.05	3.87
Specific	Rs/litre	13.00	13.00	13.00	13.00	13.00	13.00	13.00	13.00	13.00	13.00	13.00	13.00
Total Excise Duty	Rs/litre Rs/MT	14.70 19844	14.70 19844	14.70 19844	14.70 19844	14.70 19844	14.70 19844	14.70 19844	14.70 19844	14.70 19844	14.70 19844	14.70 19844	14.70 19844
Sales Tax	%	26	23.95	22.80	21.76	20.81	19.94	19	18.40	17.72	17.08	16.49	15.94
	Rs/litre	9.45	9.54	9.54	9.54	9.54	9.54	9.54	9.54	9.54	9.54	9.45	9.54
	Rs/MT	12883	12883	12883	12883	12883	12883	12883	12883	12833	12883	12833	12883
Earnings to central govt	Rs Million	161927	161927	161927	161927	161927	161927	161927	161927	161927	161927	161927	161927
Earnings to state govt	Rs Million	105125	105125	105125	105125	105125	105125	105125	105125	105125	105125	105125	105125
Retail price (without any adjustment)	Rs/litre	47.83	53.69	56.56	59.43	62.3	65.17	68.04	70.91	73.77	76.64	79.51	82.38
Retail price (after burden sharing)	Rs/litre	47.83	51.10	53.10	55.11	57.11	59.18	61.11	63.12	65.12	67.12	69.12	71.13
Potential increase in the retail price avoided*	%		44.20	39.59	37.27	35.87	34.54	34.29	33.75	33.35	33.04	32.08	32.56

Source TERI's analysis

If notional part of the price build up is done away with, the retail price will come down by the Rs 4.84/litre to Rs 13.64/litre

* This calculates an increase in retail price due to international crude oil prices using original IPP formula (A) and revised IPP formula (B) over the base case. Increase in retail price avoided represents the ratio (A–B)/A.

Table 8 Revised excise duty and sales tax structure for maintaining excise revenue to central government and sales tax revenue to state government at $45/bbl level (Diesel)

	Base case	*Revised excise duty and sales tax structure for maintaining excise revenue to central government and sales tax revenue to state government at $45/bbl level (Diesel)*											
Crude oil	$/bbl	45	55	60	65	70	75	80	85	90	95	100	105
Notional customs duty	%	10	5	5	5	5	5	5	5	5	5	5	5
IPP to refiner	Rs/litre	18.71	21.88	23.86	25.84	27.82	29.81	31.79	33.77	35.75	37.73	39.72	41.70
Excise Duty													
Ad-valorem	%	8	6.90	6.36	5.89	5.49	5.14	4.83	4.56	4.32	4.10	3.90	3.72
Specific	Rs/litre	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25
Total Excise Duty	Rs/litre	4.84	4.84	4.84	4.84	4.84	4.84	4.84	4.84	4.84	4.84	4.84	4.84
	Rs/MT	5862	5862	5862	5862	5862	5862	5862	5862	5862	5862	5862	5862
Sales Tax	%	20	18	16	15.42	14.52	13.72	13.00	12.35	11.77	11.24	10.75	10.31
	Rs/litre	5.03	5.03	5.03	5.03	5.03	5.03	5.03	5.03	5.03	5.03	5.03	5.03
	Rs/MT	6081	6081	6081	6081	6081	6081	6081	6081	6081	6081	6081	6081
Earnings to central govt	Rs Million	223297	223297	223297	223297	223297	223297	223297	223297	223297	223297	223297	223297
Earnings to state govt	Rs Million	231649	231649	231649	231649	231649	231649	231649	231649	231649	231649	231649	231649
Retail price (without any adjustment)	Rs/litre	31.78	37.29	40.09	42.85	45.61	48.37	51.13	53.88	56.64	59.40	62.16	64.91
Retail price (after burden sharing)	Rs/litre	31.78	35.02	37.04	39.06	41.08	43.10	45.12	47.15	49.17	51.19	53.21	55.23
Potential increase in the retail price avoided*	%		41.31	36.76	34.25	32.74	31.74	31.02	30.48	30.06	29.73	29.45	29.23

Source TERI's analysis

If notional part of the price build up is done away with, the retail price will come down by the Rs 5/litre to Rs 15/litre

* This calculates an increase in retail price due to international crude oil prices using original IPP formula (A) and revised IPP formula (B) over the base case. Increase in retail price avoided represents the ratio (A–B)/A.

If notional part of the price build up is done away with, the decrease in retail price will vary from 4.84 rupees/litre to 13.64 rupees/litre at different crude oil prices.

Impact on consumers: households

Despite any burden-sharing efforts by the government and the industry, consumers would have to feel the impact of price increases. In the case of kerosene and LPG, the household sector is one of the major consumers. It consumes these fuels primarily for lighting and cooking, or both. In fact, 78.8% of LPG is consumed by the domestic sector.

In 2003/04, central subsidy on petroleum products was 6507 rupees crore. This was a 26% increase from the previous year.[4] In the same time period revenue accruing to the government increased only by 7.88%. Subsidies on both kerosene and LPG are universal in nature and do not target a specific segment of the population. Who enjoys these subsidies the most? According to Census 2001, biomass accounts for about 90% of the total primary fuel consumption for cooking in rural areas (Figure 14). This dependence on firewood for cooking has affected the health of the people in these areas. Approximately half a million premature deaths and nearly 500 million cases of illness are estimated to occur annually as a result of exposure to smoke emissions from biomass use by households in India, making indoor air pollution the third leading health risk factor. Young children (under five years of age) and women are affected disproportionately.[5]

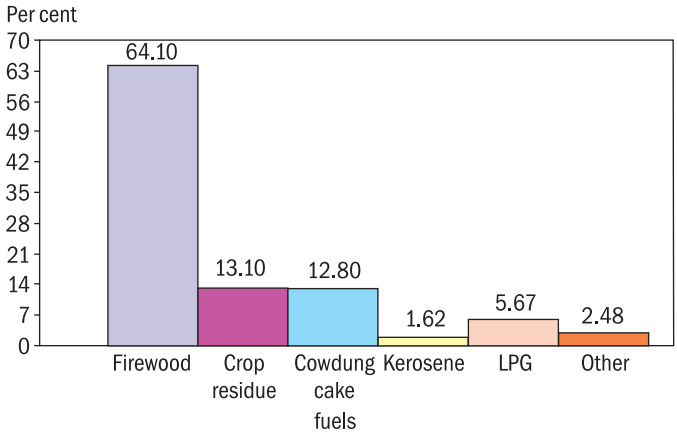
LPG is the primary fuel consumed by the urban households. While traditional fuels are also consumed in these areas, their usage is restricted to the lowest expenditure classes (Figure 15).

Thus, it is obvious that subsidies have not been able to change the

[4] Central Government Subsidies in India. A report prepared with the assistance of the National Institute of Public Finance & Policy by Department of Economic Affairs Ministry of Finance Government of India (December, 2004)

[5] Access of the Poor to Clean Household Fuels in India United Nations Development Programme (UNDP) and World Bank Energy Sector Management Assistance Programme (ESMAP) publication (2003) Source: Census 2001

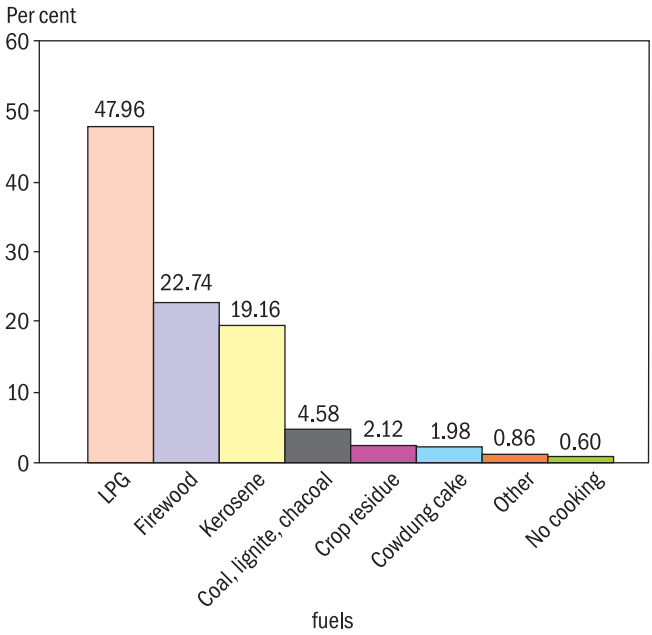
Figure 14 Share of primary fuels used for cooking(rural)



Source Census 2001

pattern of consumption in rural areas, and the dominance of traditional fuels still continues. Subsidized kerosene, on the other hand, is used by rural households to meet their lighting needs, with 56%

Figure 15 Share of primary fuels used for cooking (urban)

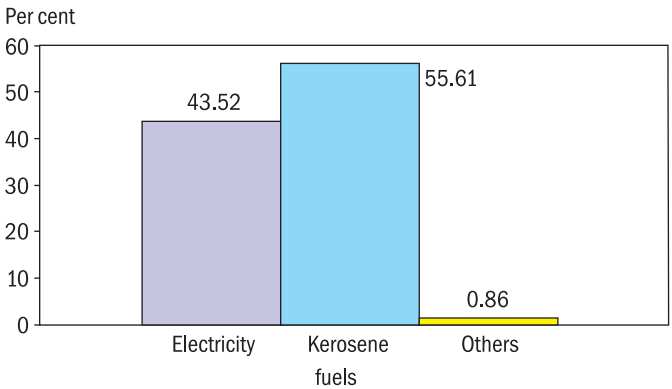


Source Census 2001

depending on kerosene as a primary fuel for meeting lighting requirements[6] (Figure 16).

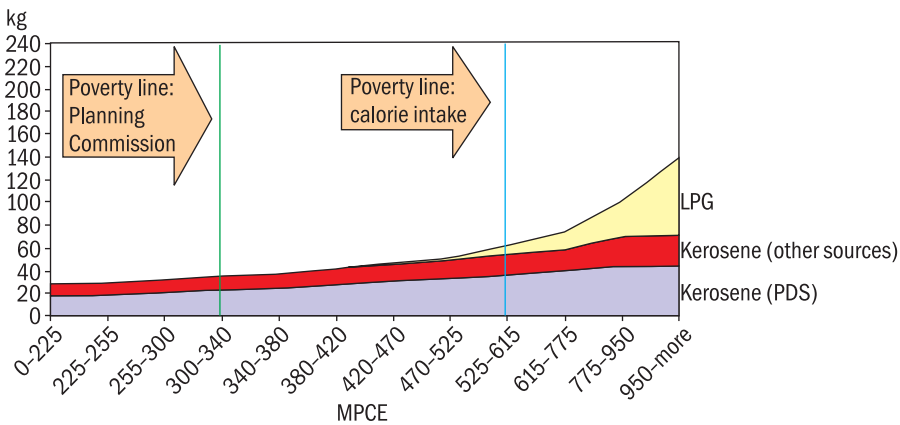
Figure 17 depicts the pattern of consumption of kerosene and LPG across various expenditure classes and the source of supply in the rural areas. It is clearly visible that kerosene is the dominant fuel over all expenditure classes. Whereas kerosene distributed through the PDS is subsidized, kerosene distributed through the parallel marketing system is not. Thus it is apparent that PDS kerosene is

Figure 16 Share of primary fuels used for lighting (rural)



Source Census 2001

Figure 17 Consumption of fuels per household- Rural



Source NSSO 55th Round (Report 461 and 471) and Planning Commission

[6] Census 2001

unable to meet the needs of the lowest-income classes while it is available to the higher-income classes. However, the important point is that this kerosene is being used to meet lighting requirements in a very inefficient manner. If the kerosene were to be used for cooking, it has been estimated that around 26 kgs of kerosene per household per month would suffice (Advisory Board on Energy 1985).

The consumption pattern of LPG is highly skewed towards the higher expenditure classes in the rural areas. In fact, expenditure classes below 420 MPCE[7] do not consume LPG at all. This would correspond to a monthly household income of around 2100 rupees, assuming there are no savings. The rural poverty line in India is set at 1637.80[8] rupees per household. An alternative method for estimating the poverty line in India is based on the minimum calorific intake.[9] In rural areas this is equivalent to 2400 kcal and 2100 kcal in urban areas. These correspond to higher MPCE class 525–615, where again consumption of LPG is marginal. LPG consumption increases rapidly at household income levels of greater than Rs 3000 per month.

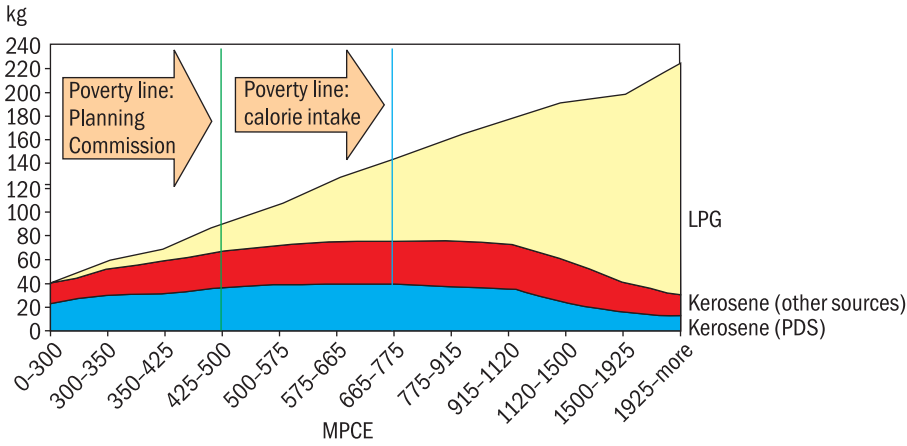
Even in the urban areas (Figure 18), LPG consumption increases significantly above the same MPCE class as in rural areas, but the quantities consumed are much larger, and therefore, the subsidy benefits in urban areas are much larger. Using the underlying data, it can be deduced that 76% of the LPG subsidy goes to urban areas with 25% of total population, and that 52% of this urban subsidy is

[7] The household consumption analysis is based on the data provided under the National Sample Survey (NSS) 55th Round (July 1999–June 2000) conducted by National Sample Survey Organisation (NSSO). The analysis of household consumption is based on Monthly per capita consumer expenditure (MPCE). The survey takes consumption expenditure as a proxy to the income levels MPCE for a household is equivalent to its consumer expenditure over a period of 30 days divided by its size. A person's MPCE is understood as that of the household to which he/she belongs.

[8] According to Planning Commission estimates poverty line is around Rs 327.56 per person. (Dhongde S. ***Decomposing Spatial Differences in Poverty in India***) Research Paper No. 2004/53 WIDER (World Institute for Development Economic Research). We have assumed an average household size of 5. http://www.wider.unu.edu/publications/rps/rps2004/rp2004–053.pdf.

[9] Calorific intakes are mentioned in the NSS 55th round Report 471. (http://gamma.nic.fi/~otammile/povindia.htm)

Figure 18 Consumption of fuels per household (urban)



Source NSSO 55th Round (Reports 461 and 471) and Planning Commission

enjoyed by top 27% of households. In other words, nearly 40% of the LPG subsidy is enjoyed by top 6.75 % of the population! It also needs to be noted that, for this segment of the population, the LPG subsidy constitutes less than two per cent of their monthly household expenditure at a crude price of 45 dollars and less than four per cent at a crude price of 65 dollars!!

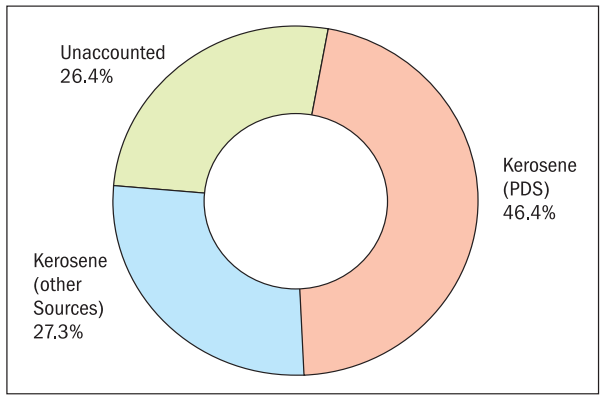
In the urban areas, per household monthly consumption of kerosene is nearly double that required for cooking. While it is stated that kerosene in the urban areas is also primarily used for lighting purposes, it is apparent that a significant percentage of this is finding its way into the black market for adulteration purposes.

The cost of adulteration

Based on the NSSO data, TERI estimates that around 26% of the total kerosene consumed in the country cannot be accounted for (Figure 19). (In a recent study NCAER [National Council of Applied Economic Research] has put this figure at 40%.)

It is believed that the kerosene that is siphoned off is used for adulterating diesel, used as a transportation fuel, and in pumpsets/gensets in rural areas. A key reason for adulteration is the price difference between diesel and kerosene. At present diesel is priced at

Figure 19 Source-wise break up of total kerosene consumption



Source TERI estimates

30.45 rupees/litre[10] and PDS kerosene is priced at just 9.05 rupees/litre. This differential is a big incentive for retail sellers to adulterate.

Adulteration of low-sulphur diesel with higher-level sulphur kerosene can cause the fuel to exceed the sulphur maximum. This impacts unfavourably on the quality of ambient air as it affects the engine efficiency of vehicles and increases tailpipe emissions of HC (hydrocarbons), CO (carbon monoxide), NOx (oxides of nitrogen) and PM (particulate matter).[11] The adulteration of diesel by kerosene also negates the huge investments done by the refiners for improving fuel quality in India.[12]

Though a number of studies suggest that fuel adulteration will increase the tail pipe emissions, the exact quantification of emissions due to adulteration is limited. There is also a paucity of scientific studies on the impact of air pollution on health in developing countries, particularly in India. With this limitation, a modest attempt has

[10] Delhi prices (as on 20 September 2005) Source: www.iocl.com accessed on 20 September 2005

[11] Urban Air Pollution (South Asia Urban Air Quality Management Briefing Note No. 7); World Bank (2002)

[12] In 2003, refiners invested more than 100 billion rupees in bringing down the sulphur content in petrol and diesel to 0.05% (TEDDY 2004)

been made to get preliminary estimates of increase in emissions of pollutants due to adulteration in the transport sector and the health risks associated with it, particularly the effect of PM on premature mortality. Here we adopted exposure effectiveness approach and dose response function reported in the literature (Kandlikar and Ramachandran 2000, Ostro 1994)[13] and applied it to the city of Mumbai.

Major steps involved in the estimation of overall impact are summarized below.

Fuel consumption × Emission factor = emissions/year ..... (1)
Emissions/year × Exposure effectiveness = exposure impact (exposure/year) ..... (2)
Excess mortality = dose response function × change in exposure unit × crude mortality rate × exposed population ..... (3)

Available information suggests that adulteration generally occurs in three-wheelers and trucks, and often as much as 20%–30% (ESMAP 2002*). Lower and upper bound of damage due to adulteration have been made conservatively. In the lower bound case it has been assumed that the relative change in the emission factor due to adulteration is about 20%, and in the upper bound the relative change in emission factor is considered to be 50%.

With the above conservative assumptions, the estimates of the resulting change in particulate emissions vary from three per cent to six per cent. Translated into concentration and exposure terms, the health damage due to adulteration could result in an additional 200 cases of mortality with the lower-bound estimate, and as high as an additional 600 cases of mortality in case of upper bound for the city of Mumbai alone!

[13] Kandilkar M, Ramachandran G. 2000. **The Causes and Consequences of Particulate Air Pollution in Urban India: A Synthesis of the Science.**

* ESMAP, 2002. **Catching gasoline and diesel adulteration** South Asia Urban Air Quality Management Briefing Note No. 7. World Bank.

Substituting LPG for all traditional fuels used for cooking

Apart from the issue of adulteration, as stated earlier, kerosene is used primarily for lighting and not for its intended use as a cooking fuel. As such, traditional biomass fuels continue to be used as cooking fuels. The rural populace does not assign any cost to the time and drudgery associated with biomass collection, nor does the government value its impact on ecosystems or the health of women and children.

Given the above backdrop, it would be useful to explore the feasibility and economics of substituting LPG for kerosene use. A World Bank Study (*The Health Benefits of Clean Fuels in India: a case study of Andhra Pradesh, 2002*) of 59 000 children (0–4 years) reported a substantial reduction in child morality rates because of use of LPG in comparison to traditional fuels.[14]

The Advisory Board on Energy formed in 1985, estimated a normative level of useful energy required by a household for cooking on a daily basis as 620 kcal/person,[15] which is equivalent to approximately 12 LPG cylinders per year for an average household size of five members. Figure 20 summarizes TERI's estimates of the additional number of LPG cylinders that would be required if the entire useful energy required by different MPCEs is met through LPG.

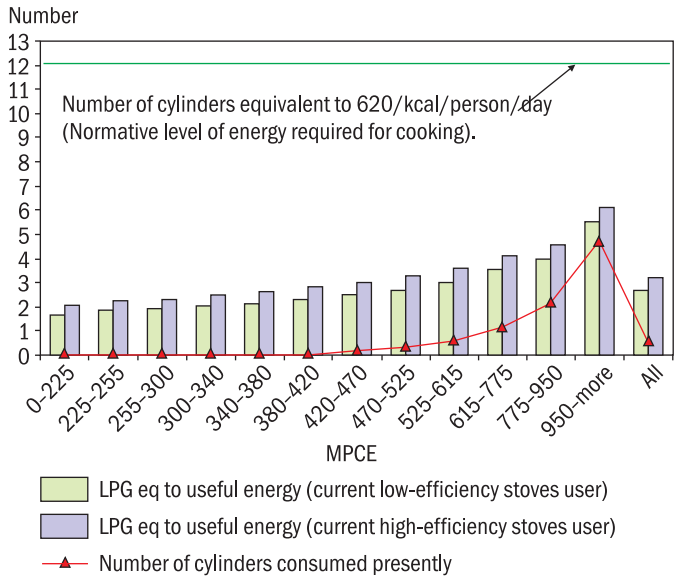
For understanding the possible subsidy implications of moving to LPG it would be interesting to examine the current expenditure by various expenditure classes of population on meeting their cooking energy needs. Additionally, since a lot of the biomass is collected and not traded, it would be useful to arrive at the implicit value of this energy using time spent and wage costs as proxy measures.

From figure 21, it is obvious that rural consumers today are paying a much higher price for meeting their cooking energy needs

[14] Antonette D'Sa and. Narasimha Murthy K.V LPG as a cooking fuel option for India, Energy for Sustainable Development (Volume VIII No. 3)September 2004

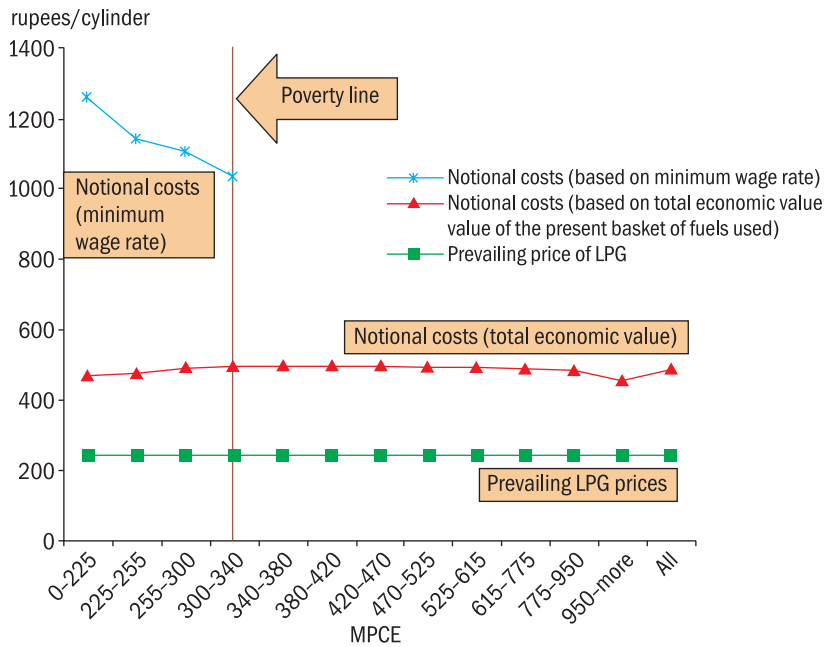
[15] Gundimeda H and Köhlin G *What do we know about the Fuel Wood Scenario in India*? pp. 60

Figure 20 Substitution of traditional fuels



Source TERI's analysis (all are annual estimates)

Figure 21 Social costs of rural consumers for energy



Source TERI's analysis

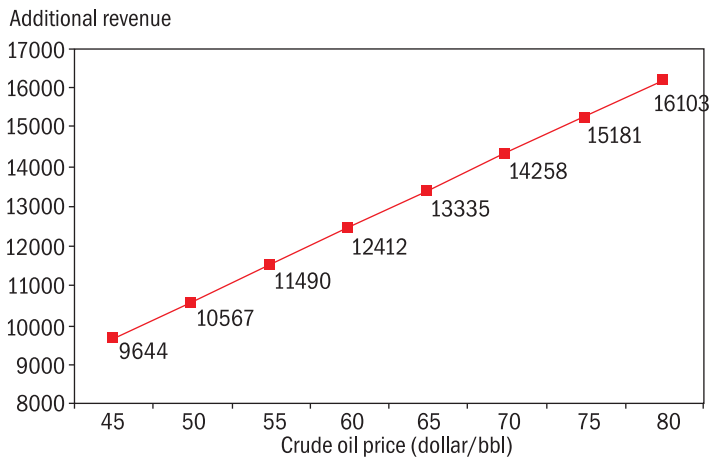
than if they were to use LPG for the purpose. Unfortunately, the people of India have been conditioned to expect subsidies on LPG prices.

Implications of phasing out kerosene production

In 2004/05, total subsidy on PDS kerosene, including actual payments released from the union budget and the under recoveries sustained by OMCs on supply of PDS kerosene, was over 10 000 rupees crore. Phasing out production of kerosene would have two benefits: one, it will lead to huge savings arising from avoided cost of subsidy; two, it would translate into additional revenue accruing from excise duty and sales tax on the incremental production of diesel and ATF. Even at crude oil price of 45 dollars/bbl, this amounts to 9644 rupees crore! Assuming 2004/05 sales levels, figure 22 shows sensitivity of this additional revenue to crude oil price level.

The total amount, both from avoided cost of kerosene subsidy and from the additional revenues, is considerable and can instead be channelled into provision of more efficient sources of energy such as LPG.

Figure 22 Additional revenue accruing from diesel and aviation turbine fuel by stopping current kerosene production (crore rupees)



Source TERI estimates

Smart cards for delivery of energy subsidies

Smart cards are emerging as an effective tool for efficient delivery mechanism in a range of applications (Box 1). Use of smart cards can also be used to effectively target energy subsidies. The subsidies on both LPG (for cooking needs) and electricity (for light and other needs) can be provided through smart cards. They can be designed to maintain personal identity and benefit eligibility details for targeted beneficiaries of energy subsidies. The cards would also hold information on beneficiary's transaction histories, which would make it much easier to track the pattern and extent of subsidy utilization. This would also help in tracking any fraud in use of allocated energy subsidies. The card could be renewed on an annual or monthly basis.

Box 1 Smart cards for smart subsidies

Internationally, there are several successful examples of use of smart cards for efficient delivery of a range of services. In 2002, the Moscow Social Card was officially launched as the world's first integrated benefits and payment card of its scope. Moscow distributes the card to those who receive state aid, including students, pensioners, public employees, members of the armed forces, and those who traditionally benefit from reduced or free prices for goods and services, including Moscow's underground system. Beneficiaries use the card for public transit, health and medical insurance, access to government subsidies, and discounts from participating retail stores. In India itself several applications of smart cards are underway. These include provision of microfinance by SKS (Swayam Krishi Sangam) in the Medak district of Andhra Pradesh and Smart Prepaid Cards for electricity in Sundarbans. Tenth Five-year Plan also talks about the need for restructuring PDS by exploring innovative approaches such as smart cards to eliminate hunger and make food available to the poor in a cost-effective manner.

Source TERI compilation

At this stage, a pilot project for introduction of smart cards for delivery of energy subsidies should be undertaken on a priority basis. This would call for a proactive approach to bring together suitable government agencies, a card manufacturer, a bank with strong rural network since, and NGO partners. In later stages, the scope of merging the scheme with other social delivery programmes for the poor can also be explored.

Summary and conclusions

1 India is today largely self-sufficient in its petroleum product production. Major imports are of LPG while exporting diesel, petrol, and ATF.
2 Current import parity linked pricing formula gives an advantage to domestic refineries. Internationally competitive benchmarking would require output price of products at refinery gate to be less than or equal to the FOB price. On an avoided cost basis, the refinery gate price can at best be linked to c.i.f. price of products. Today, on account of the notional cost elements inbuilt in the IPP build up, domestic refineries get a price that would be ~ 4.36 rupees/litre higher in case of diesel and ~ 4.46 rupees/litre higher in case of petrol (at a crude price of 65 dollars/bbl), as compared to the respective FOB prices. Even in the case of LPG and SKO they would get a price that is ~ 57.40 rupees/14.2 kg cylinder and 2.09 rupees/litre higher than the respective FOB prices.
3 Domestic petrol and diesel price increases have been extremely sluggish as compared to international prices (Figures 7 and 8), indicating that the move to distance pricing decisions from political influence has failed under the current pricing formula. (1 June 2003 to 1 September 2005).
4 Contributions from POL (petroleum oil, and lubricants) to central government revenues have gone up from 33 806 rupees crore in 2002/03 to 41 386 rupees crore in 2004/05, registering a 22% increase! In 2004/05, 68% of this came from two products: petrol and diesel!
5 Assuming 2004/05 petroleum consumption basket, the tax structure implemented in 2005/06 Finance Bill would add additional revenues, to the tune of 11 000 rupees crore, to the central government exchequer.
6 It is possible to devise a formula by which central and state governments could absorb part of the impact of price increases while remaining revenue neutral. Table 9 indicates how the ad valorem component of excise duties and sales tax could be reduced to maintain revenues at levels that would accrue at a crude price of 45 dollars.

Table 9 Revision in ad-valorem excise duty and sales tax for maintaining revenues at 45 dollars/bbl level

Crude oil ($/bbl)		45	55	60	65	70	75
		Petrol					
Notional customs duty	%	10	5	5	5	5	5
Ad-valorem	%	8	6.99	6.47	6.02	5.63	5.28
Sales tax	%	26	23.95	22.80	21.76	20.81	19.94
Increase in the retail price avoided*	%		44.20	39.59	37.27	35.87	34.54
		Diesel					
Notional customs duty	%	10	5	5	5	5	5
Ad-valorem	%	8	6.90	6.36	5.89	5.49	5.14
Sales tax	%	20	18	16	15.42	14.52	13.72
Increase in the retail price avoided*	%		41.31	36.76	34.25	32.74	31.74

Source TERI's analysis

* This calculates an increase in retail price due to international crude oil prices using original IPP formula (A) and revised IPP formula (B) over the base case. Increase in retail price avoided represents the ratio (A–B)/A.

7 The government has for long been subsidizing kerosene and LPG in the country on the assumption that kerosene is the poor man's fuel. The results of the census survey 2001 clearly reveal that only 1.62% of the households in rural areas use kerosene as the primary fuel for cooking. LPG penetration is higher at 5.6%. Most of the kerosene consumed is for lighting purposes where the quality of light generated is extremely poor.

8 If one assumes an average crude price of 55 dollars instead of the expected price of 39 dollars at the beginning of the financial year, then the net revenue implications for various stakeholders versus their share in the burden-sharing formula would be as follows (Table 10).

9 Given that kerosene is not reaching either its targeted end-use or its targeted population, and, indeed, because of the fact that even the NSSO survey results indicate about 26% kerosene as being unaccounted for (NCAER places this statistic at 40%), the government needs to look at other solutions. Once such option is to promote the use of LPG as a cooking fuel instead of kerosene.

Table 10 Burden-sharing

	Incremental revenue due to international price increase during the year (Rs crore)	*Contribution to burden-sharing* (Rs crore)
Upstream companies	17 000	13 000–14 000
Refinery sector–Total	6 500	1200–1500 (stand alone and private refiners)
Government (Central + State)	19 000	12 000 (oil bonds)

Source TERI's analysis

10 The end-use of lighting can be met through the implementation of the government's target of a 100% household electrification by 2010. Even if this target is underachieved in terms of actual supply, it may be worthwhile to consider marketing solar lanterns for meeting this demand— not only would the quality of light be better but the pollution and fire risks would be lower too. The lowest expenditure class households in rural areas spend 200 rupees per annum per household (net of subsidies of close to 450 rupess provided by government) to meet their current lighting needs. A 5Wp solar lantern, that would give the light quality of a 40 watt bulb, would have an annualized cost of approx 500 rupees. If the government was to subsidize solar lanterns instead of providing kerosene, they could have a net saving of 150 rupees per household per annum while providing better quality service. As we move up the expenditure scale, the net savings to the government could increase substantially. If the government were, instead, to provide a free solar lantern to each of the households comprising the 57% population with no access to electricity the annualized subsidy burden would amount to only 3796 rupees crore (point 3 in Table 11).

11 As far as cooking needs are concerned, the government needs to target provision of LPG for atleast all non-slum urban households (currently 48% of urban households use LPG as primary cooking fuel), and for that section of rural households that seem

Table 11 Utilization of funds earned through kerosene subsidy avoided and additional tax revenues earned from other petroleum products (diesel, ATF)

		$45/bbl (Rs crore)	*$65/bbl* (Rs crore)
1	Kerosene subsidy avoided	10 000 *	15 000
2	Tax revenues from other products	9 644	13 335
3	Cost of solar lanterns subsidy	3 796	3 796
4	Cost of LPG subsidy – Fixed subsidy based on current price levels	11 185	21 901
5	Cost of LPG Subsidy- supply to presently un-served population	13 675	20 050

Source TERI's analysis

* Total subsidy on kerosene for 2004/05 (includes government subsidy and under recoveries)

to be inclined to use LPG. LPG penetration in rural areas starts at the expenditure level of above 470 rupees per capita per month. The households above this expenditure level constitute 45% of rural households. At a crude price of 45 dollars/bbl, the subsidy cost of catering LPG to this target of households would amount to 11 185 rupees crore (point 4 in Table 11). On the other hand, if we were to stop production (and hence also subsidization) of kerosene and produce higher amounts of diesel or ATF, the net incremental revenue generation of the government would be 19 644 rupees crore (sum of points 1 and 2 in Table 11).

12 If, one was to recognize that the LPG subsidy benefits are today primarily going to the richer segments of society (40% subsidy goes to top 6.75% of households!) for whom the subsidy amount constitutes less than 2% of their expenditure, then the rationale for an LPG subsidy – both for rural and urban consumers – becomes suspect. As such, if the households identified in paragraph 10 were to pay the full cost of LPG, then the savings identified could be used to extend LPG support to the uncovered segments. Ensuring that these households do not expend more than 10% of their total monthly expenditure on energy, assuming that the cooking energy needs of these households could be met with half the energy needed by higher income households, at a crude price of 45 dollars, the required subsidy would be 13 675

rupees crore (point 5 in Table 11). Thus after providing for the solar lanterns (para 9) and LPG to the targeted populations, the government would still be revenue positive!

13 The key to all the above, of course, is an effective delivery mechanism. Technological advancements today would make possible a more effective delivery of required subsidy. The government could devise a system of energy debit cards (the equivalent of a prepaid telephone card) which could be issued to the targeted households with a monthly expense limit. This debit card could be used to procure solar lanterns or LPG cylinders without engaging in a cash transaction. Companies or financial institutions could recover these amounts from the government also enabling much better account keeping. This would also eliminate the need to have a dual pricing system as in effect there is a direct subsidy that would be provided to the poor.

About TERI

A dynamic and flexible organization with a global vision and a local focus, TERI was established in 1974.

While in the initial period the focus was mainly on documentation and information dissemination, research activities in the fields of energy, environment, and sustainable development were initiated towards the end of 1982. The genesis of these activities lay in TERI's firm belief that efficient utilization of energy, sustainable use of natural resources, large-scale adoption of renewable energy technologies, and reduction of all forms of waste would move the process of development towards the goal of sustainability.

A unique developing-country institution, TERI is deeply committed to every aspect of sustainable development. From providing environment-friendly solutions to rural energy problems to helping shape the development of the Indian oil and gas sector; from tackling global climate change issues across many continents to enhancing forest conservation efforts among local communities; from advancing solutions to growing urban transport and air pollution problems to promoting energy efficiency in the Indian industry, the emphasis has always been on finding innovative solutions to make the world a better place to live in. However, while TERI's vision is global, its roots are firmly entrenched in Indian soil. All activities in TERI move from formulating local- and national-level strategies to suggesting global solutions to critical energy and environment-related issues. It is with this purpose that TERI has established regional centres in Bangalore, Goa, and Guwahati, and a presence in Japan, Malaysia, and the UAE. It has set up affiliate institutesTERI-North America in Washington, DC, USA, and TERI-Europe in London, UK.

TERI hosts the annual Delhi Sustainable Development Summit, which is swiftly gathering momentum as a major forum for the convergence of globally renowned leaders and thinkers dealing with the issue of sustainability.

With a staff strength of over 650, drawn from multidisciplinary and highly specialized fields, offices and regional centres equipped with state-of-the-art facilities, and a diverse range of activities, TERI is the largest developing-country institution working to move human society towards a sustainable future. TERI makes effective use of the latest developments in modern information technology in both its in-house and outreach activities.

TERI lays great emphasis on training, capacity building, and education. In 1999, it set up the TERI School of Advanced Studies, recognized as a deemed university by the University Grants Commission, India. The TERI School is evolving as a research university, offering doctoral and master's programmes in bioresources, biotechnology, energy, environment, and regulatory and policy studies.

Having celebrated its silver jubilee in February 2000, TERI is now poised for future growth, driven by a global vision and outreach, with a philosophy that assigns primacy to enterprise in government, industry, and individual actions.