Environmental Energy and Economic Research (2017) 1(1):1-14
DOI 10.22097/eeer.2017.46453

Integration of Green Economy Concept into Fossil Fuels (Production and Consumption: Iran)

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Received: 7 October 2016 /Accepted: 28 December 2016

Abstract

Iran as a rapidly developing country, whose economy is enriched by oil and gas exports, has to integrate Green Economy concept into its energy sector. In order to integrate environmental concerns into energy sector, an Energy-Environment Review (EER) was considered as the mainstreaming tool capable of examining the interface between energy and the environment. The results of the EER should be interpreted, in the light of the objective of the Five-Year Development Plan in Iran, to achieve fast and sustainable green growth and accelerate the transition to a market economy. The proposed actions will promote economic efficiency, use of energy resources through a proper allocation of scarce resources, including environmental resources, so as to achieve economic efficiency and environmental and social protection. This article updates trends in Iran and provides: to be stated continuously (i) an analysis of the current situation with regards to energy production and consumption; (ii) an evaluation of the growth prospects; (iii) the identification of environmental issues induced by the generation and use of energy and estimation of the associated costs of damages; (iv) the evaluation of the extent of contribution to the climate change phenomenon through emission of greenhouse gases; (v) the evaluation of the proposed mitigation measures for the previously identified environmental problems; and (vi) conclusions and recommendations. It is assessed that the total health damage from air pollution in 2010 at about to be converted to dollars 160×10^{12}Rials (US$ fifteen billion); equivalent to 1.55% of nominal GDP. The damage cost to the global environment from the flaring of natural gas, assessed on the basis of a carbon price of US$ 17/ton CO_2, is found to be approximately US$1.02billion per year.

Keywords: Green economy, Energy, Environment, Iran

Present situation of the energy sector

Oil and Gas

The energy sector of Iran is dominated by oil and gas. Iran is OPEC's second largest oil producer and holds 8.6% (12.3 billion metric tons) of the world's oil reserves and 17% (26.6 trillion m^3) of its gas reserves. Oil production in 2010 amounted to ≈ 191 million metric tons or to 3.85 million barrels per day (mbd). Figure 1 illustrates the development of crude oil production, export and consumption over the last 31 years.

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The production of gas is now around 380 million cubic meters per day (mcmd). Of the total production 20 mcmd is flared and 90mcmd is re-injected into oil fields to boost oil production, leaving 270mcmd for marketing to consumers. About 300 towns have been covered by the gas grid and 20 more are being connected.

The crude oil meant for domestic use is refined in nine refineries, with combined nominal capacity of 1.65 mbd. There are plans to increase this capacity to 2 mbd. Environmental hazards, mainly in the form of water and soil contamination, are least for pipelines and maximum for road transport. Accordingly, it is desirable to move oil and oil products as much as possible through pipelines. In Iran, two-thirds of the total oil and oil products movements take place in this way. The export of approximately 2.7mbd of crude oil takes place, mostly from the offshore facility at Khark Island in the Persian Gulf, by means of tankers with capacities upward of 70,000 tons. The tankers have to deballast at the time of loading and consequently, nearly 2.7mbd of water mixed with oil is discharged into the sea. This has an implication for marine life and coral reefs.

Other types of primary energy (including renewable energy)

Compared to oil and gas, other forms of primary energy have limited importance and play only a minor role in the economy of the country. Coal has been produced since the early sixties. Coal reserves in Iran are estimated at 12.3% Giga metric tons. 90% of the reserves are in the Alborz Mountains and in North-East Khorasan. 45% of these reserves are of coking coal used in the steel industry.

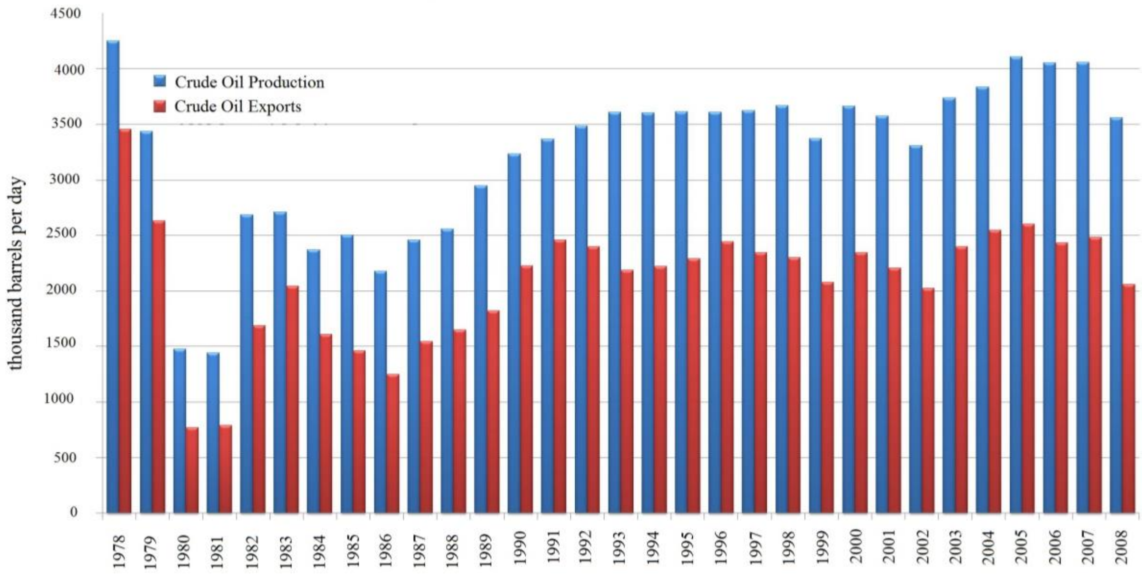

Figure 1. Development of crude oil production and exports

The theoretical potential for hydropower in Iran is estimated to be about 50,000 MW. About 13 hydropower schemes are now in operation in Iran with a total power generation capacity of 8,700 MW. These projects generated 6,908 GWh in 2000, accounting for 7.4% of total electricity; more than 60% of this power energy is obtained from the two dams Dez and Shahid Abbasspur (Karun 1), both in Khuzestan province. Nine large hydropower projects are now under construction. A 1,000 MW nuclear power plant is under commissioning in Busher. Tehran and Fars have photovoltaic generators of 32 MW capacities.

The wind energy potential in Iran is estimated to be around 6.5 GW. There is a wind farm in Manjeel with an installed capacity of 9.7 MW. The largest project, for development of wind energy, is the 90 MW plant under commissioning in Gilan.

There are a number of geothermal prospects in Iran. The most promising of these prospects is at Mount Sabalan in Ardebil province in NW Iran. The greater Sabalan area may have a geothermal power potential of up to 500 MW. As of January 2012 the sum of 2.5% of total electricity production in Iran (161.51 MW) is provided by renewable. This includes 56.25 MW small Hydro, 96.16 MW Wind, 6.60 MW Biomass and 2.5 MW photovoltaic powers.

Electricity

Iran has an installed electricity generation capacity of 54,870 MW of which 84.88% is thermal and the rest hydroelectric. Presently, production of electricity in Iran is achieved by 22 steam power plants (fueled with oil or natural gas), four combined cycle plants, 30 gas plants, 13 hydropower plants and one wind farm. The total annual production amounts to approximately 185,000GWh. This capacity is being expanded to meet the growing demand. Thermal plants are run on both natural gas (70.8%) and fuel oil.

Energy consumption

In the period 1980–2010, consumption of petroleum products rose from 172 to 470mboe and natural gas from 13 to 300mboe. The per capita consumption of oil and gas was 9.48 boe per year in 2010 (Fig. 2). In the last 15 years, gasoline consumption has increased faster than any other oil product, and in fact it has almost doubled.

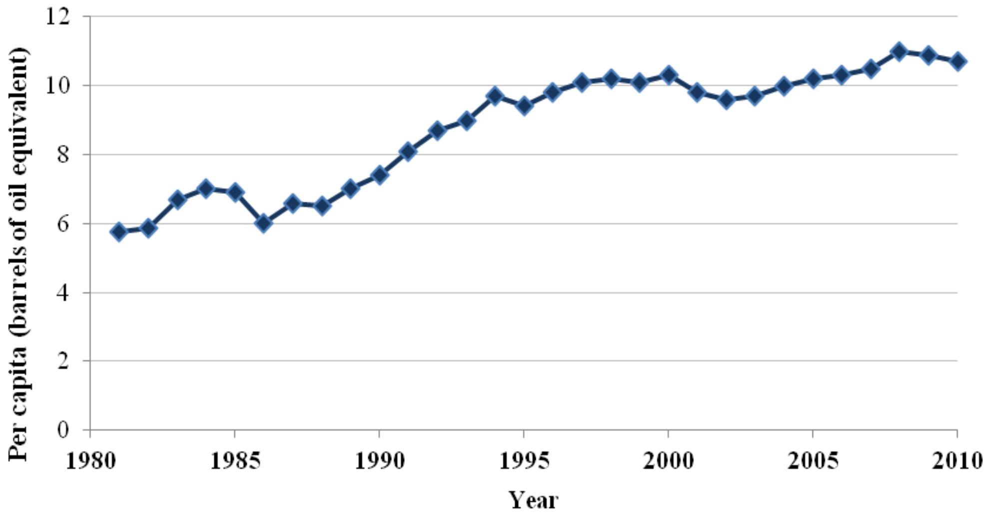

Figure 2. Per capita energy consumption

Increasing the consumption of natural gas is one of the objectives of the Iranian government. Gas is now used by 35 power plants, approximately 4,000 industrial units and over seven million domestic consumers. Of the urban population of 53.25 million, 50 million were covered by 2010. The long term plan aims to increase gas consumption to 260 bcm by 2020. Natural gas being a clean fuel, its increased use is desirable on environmental grounds. However, in Iran, it is purely desirable on economic grounds alone, as the cost of supply of natural gas is very low.

Electricity consumption has increased from 59,102 GWh/a in 1990 to nearly 273,000 GWh/a in 2010. This corresponds to an average annual growth rate of 7.7%. Per capita consumption grew at an average rate of about 5.8% per year.

Traffic (transportation) is one of the main consumers of energy and one of the main sources of urban air pollution. The Iranian vehicle fleet in 2010 comprised roughly 11.5 million vehicles (8.5 million excluding motorcycles), of which 7.5 million are passenger cars. A very substantial part of this fleet is concentrated in Tehran, the capital of Iran, where in 2010, without motorcycles, amounted to 3.9 million vehicles. The main fuels are still gasoline and gas oil. The fast rising vehicle populations, and the low fuel efficiency, have given rise to increasing fuel consumption by vehicles in Tehran. Fuel efficiency in cars is far below standards achieved in other developed countries. It is estimated that fuel efficiency could improve by 40% for gasoline vehicles at little additional cost ($500 per vehicle). A number of initiatives have been taken to reduce vehicular emission in Tehran. Compressed Natural Gas (CNG) has been largely introduced. The consumption of natural gas by taxis and passenger cars in Tehran reached 20,000 million m^3 in 2010. It is expected that further switch from gasoline or gas oil to CNG will help in reducing air contamination in this heavily polluted metropolitan area.

Energy subsidies

Energy in the domestic market used to be heavily subsidized. Heavy oil is currently subsidized at 65%, gas oil at 50% and gasoline at 40%. Electricity subsidies for domestic use vary from -10 to 50% (25% on average). The subsidies, not only put a heavy burden on Iran’s economy, they also lead to wasteful energy consumption, since the low energy prices do not present any incentive for efficient use of energy. Energy intensity has risen over the last 30 years, as is evidenced in Fig. 3, and it is very high in an international comparison. However, since the introduction of energy management scheme, (fuel pricing activity), there has been some 33% reduction in energy consumption and similarly positively affecting the energy intensity.

Development perspectives

The total population of Iran, one of the main parameters for the increase in energy consumption, has been growing from ten million in 1900 to 25.8 million in 1965 and to 74.1 million in 2011 (latest census). It was 64.9 million in 2000 and as expected reached 70.3 in 2007. The population would reach 86.3 million in 2021. Fertility has dropped considerably, actually to below replacement level in larger cities and the economically more developed provinces.

Development of energy consumption in the future will be influenced, among other factors, by the following parameters: Population Increase, Increasing Urbanization, Increasing per capita Consumption, Better Energy Efficiency, Lower Energy Subsidies, and Industrialization.

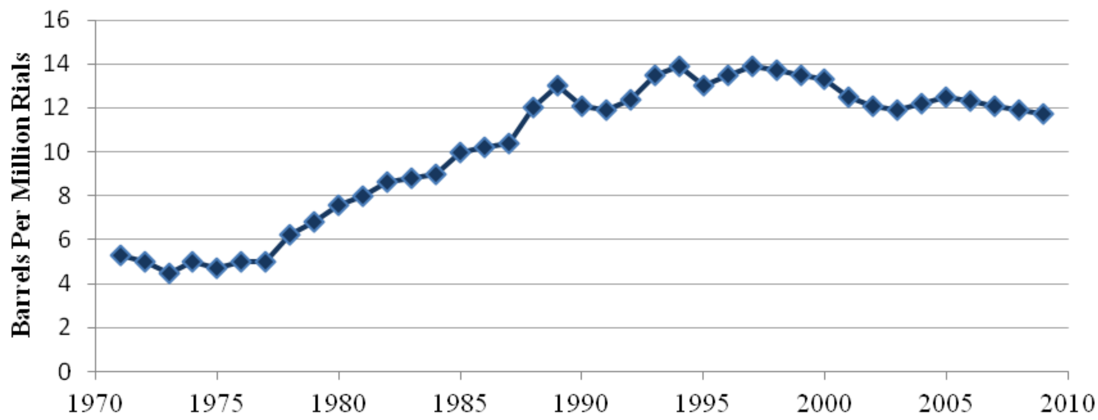

Figure 3. Energy intensity in Iran

Environmental issues

Environmental strategy of the country

Elements of an environmental policy are stated in a number of legal documents. The most important one is in Article 50 of the Iranian constitution. The development plans place priority on reducing pollution, and preserving the country's natural and cultural resources. There are also requirements in the Air Pollution Act (1995), and its executive by-law of 1997, for reducing pollution from motor vehicles, factories, power plants and residential sectors.

Environmental impacts due to the energy sector

Air pollution, especially in mega cities, figures prominently among the main environmental causes which affect human health. A study on air quality in Tehran revealed the morality risk, associated with particulates (PM_{10}), as being at approximately 4,000 deaths per year due to this pollutant. To this, an about equal number of cancer cases caused annually by exposure to NO_x, has to be added.

The marine environment is affected by oil pollution. About 1.2 million barrels (roughly 160,000 metric tons) of oil are spilt into the Persian Gulf Area annually. The bulk of this oil stems from tanker transport accidents (49.5%), from offshore production facilities (19.4%) and from urban runoff (14.8%), while almost 10% stem from natural sources (oil seeping out from natural deposits).

Greenhouse gas emissions

The Islamic Republic of Iran signed the United Nations Framework Convention on Climate Change (UNFCCC) at the Rio de Janeiro Earth Summit in 1992 and ratified the Convention in 2005 as a Non-Annex I-Party. It has submitted its First and Second National Communications to the COP of UNFCCC and has commenced the Third Communication in January 2012recently.

The National Greenhouse Gases Inventory for 2000 can be characterized as follows:

- 77% of total CO_2 emissions are resulting from the energy sector (fuel combustion and 'hot flaring'). Energy Transformation (refineries and Power Plants), Industry, Transport, and Building each have a share of 6–19% of the CO_2 emissions from fuel combustion.
- 47.8% of total CH_4 (methane) emissions are resulting from the energy sector (fugitive emissions from natural gas production and 'cold flaring'). Agriculture with 25% (livestock

and rice production) and waste with 24% are the other two important contributors. Fuel combustion is of minor importance for the CH_4 emissions.

- Only 6.5% of total N_2O emissions are attributed to the energy sector. Agriculture with a share of about 59.6% is responsible for the bulk of the N_2O emissions.

All Iranian GHG emissions together sum up to a CO_2 (equiv.) of 491,053Gg (= 6.7 metric tons per capita) in 2000. The contribution of Iran to the global CO_2 emissions is under 1.5%.

Proposed measures in line with Green Economy for environmental protection

Different sources, have proposed a high number of measures of a very diverse nature, (from national policy to very specific technical interventions), to be adopted for reducing impacts in the energy environment interface. Many of these have not gone beyond the stage of idea or concept, others have been elaborated to some detail, and some are being implemented.

The single most important measure for a reduction of energy consumption, and in this way for a reduction of emissions, is the reduction and finally elimination of energy subsidies. Subsidizing fuel for cars and other forms of energy puts a very heavy burden on the economy of the country. Furthermore, cheap energy (as low as 30% of world market prices for some energy carriers) leads to a wasteful use of energy and very effectively prevents taking measures for increasing energy efficiency. The total costs for energy subsidies correspond to 25% (1999) and 27% (2010) of GDP. The effects of phasing out subsidies have been calculated for a number of scenarios (see below).

In addition to the subsidy issue, a list of sectorial measures or policies has been compiled, based on the multitude of already proposed measures and on the insight gained from the work carried out. These have then carefully been analyzed in order to verify which ones should be recommended for implementation, and under what conditions. The criteria for the selection of such measures and their recommendation for implementation were the following:

- Measures in the interface of energy, economy and environment, i.e., suitable for reducing pressure on the environment stemming from the energy sector.
- Applicability and relevance in the context of the conditions prevailing in Iran.
- Substantial beneficial effects for the environment.
- Favorable cost-benefit ratio (least cost alternatives, win-win types of projects, considerable reduction of external costs).

The measures established for detailed analysis are listed in Table 6.

The proposed integration strategy

a. Damage costs

The proposed integration strategy of “Green Economy” in energy sector in Iran, seeks to explore the possibilities of reducing the damage through price reform, sectorial measures aimed directly at polluting activities or a mixture of the two.

The damage done by air pollution from the energy sector in Iran in 2010 was about 160×10^{12}Rials ($15 billion); this is equivalent to 1.55% of GDP. Formerly, subsidies paid to the consumers of energy in 2001 were 118×10^{12}Rials ($14.7 billion) or about 18% of GDP in Iran. The most damaging forms of energy are among those with the highest subsidies.

Environmental damage costs will increase even faster than energy use because as incomes rise, the willingness of the population to pay for a better environment will also increase. In the absence of price reform and policy intervention, the damage will grow to$20 billion by 2019, in the money of 2001. This is equivalent to 2.2% of GDP, i.e., a larger percentage of a much larger GDP. Of this total$8.4 billion arises from the transport sector.

b. Damage from the energy sector in 2001

Using these damage costs, one can estimate the total local damage from the energy sector in 2001. The results are shown in Table 2.

Damage costs from the air pollution caused by the energy sector can be estimated as before by multiplying emissions by a unit damage cost. It must be remembered that the transfer of the damage costs from the EU basis was calculated in proportion to the GDP per capita of Iran. As GDP in Iran will increase in the period, we must allow for the increased willingness to pay for environmental values and the consequent higher damage costs.

According to demographic assessment, the rate of increase of population from 2005 to 2010 is 1.46% per annum and from 2010 to 2021 will be 1.21% per annum. Coupled with the GDP growth estimates noted earlier, this indicates a per capita GDP growth rate of 4.5% under the 3rd socio economic development Plan of Iran, 2.5% under the 4th Plan and 2.8% under the 5th and 6th Plans. The local damage costs have been adjusted accordingly.

The future benefit values for avoided emissions are shown in Table 1, while Tables 2 and 3 shows the estimate of total damage cost obtained from these benefit values.

The total of $20 billion of damage is equivalent to 2.2% of GDP in 2019, compared to 8.4% in 2001. Damage will not, as a result of the proposed strategy being implemented, grow in absolute terms, also as a percentage of GDP.

Table 1. Benefit values proposed for Iran

Pollutant	Value (k Rial/ton)	Value ($/ton)
PM_{10}	34,400	4,300
SO_2	14,600	1,825
CO	1,500	188
NO_x	4,800	600
CO_2 Low	24	3
CO_2 Medium	80	10
CO_2 High	640	80

Table 2. Damage caused by the sector in 2001 (and 2019) bn Rials

	Natural Gas	Crude Oil	Gasoline	Kero	Gasoil	Fuel Oil	LPG	Total
Oil refining		2,963 (8,508)						2,963 (8,508)
Power generation	694 (3,440)					6,703		7,397 (3,440)
Agriculture				10 (42)	1,657 (5,178)	61 (140)		1,728 (5,359)
Res. Comm.	265 (1,075)			348 (1,515)	670 (2,094)	774 (1,771)	37 (163)	2,095 (6,618)
Industry	143 (580)			2 (9)	723 (2,260)	6,509 (14,894)	5 (21)	7,382 (17,763)
Transport	0 (0)		9,039 (30,728)		5,954 (18,604)	370 (847)	41 (181)	15,404 (50,360)
Others	42 (168)		2 (8)	10 (43)	540 (1,686)	108 (247)	3 (22)	704 (2,173)

Table 3. Future damage costs (k Rial/ton)

Pollutant	2001	2004	2009	2014	2019
PM_{10}	34,400	39,256	44,415	50,991	58,541
SO_2	14,600	16,661	18,850	21,641	24,846
CO	1,500	1,712	1,937	2,223	2,553
NO_x	4,800	5,478	6,197	7,115	8,168

Energy Price Reforms and Reduction of Subsidies

The impact on environmental damage and the national economy of policies to make energy prices cost-reflective was examined. The only clear target for price reform is the opportunity cost. Opportunity costs are an attempt to take out all the distorting and superfluous components of market prices, and to estimate the true value to the country of inputs and outputs into the measures induced by policy.

Table 4 provides a comparison of market prices with opportunity costs. A big effort is needed to bring prices in line with costs.

About three scenarios for price reform have been analyzed, namely, elimination of subsidies by:

• 2009 (end of 4th Development Plan of Iran; fast price reform);
• 2014 (end of 5th Development Plan of Iran); and
• 2019 (end of 6th Development Plan of Iran; slow price reform).

Table 4. Comparison of market prices and opportunity costs

Energy Form	Opportunity Cost (kRls/bbloe)	Market Price (kRls/bbloe)	Subsidy (% of OC)	Annual increase to 2009 (%)	Annual increase to 2014 (%)	Annual increase to 2019 (%)
Gasoline	260	84	68	25	12	8
Kerosene	217	19	91	63	28	18
Gasoil	217	22	90	58	26	16
Furnace Oil	108	17	85	45	20	13
NatGas (Industry)	68	23	67	25	12	8
Gasoil (Industry)	206	44	79	36	17	11
NatGas (ResComm)	78	19	75	32	15	10
CNG (Trans)	123	17	86	48	22	14
Elec (Agric)	975	18	98	122	49	31
Elec (ResComm)	975	118	88	52	23	15
Elec (Industry)	244	217	11	2	1	1
Elec (Others)	731	162	78	35	16	10

The effect of price reform on the energy sector would be dramatic. If prices are brought to the level of opportunity costs by the end of the 5th Plan in 2014, then the Total PrimaryEnergy Requirement in 2019 will be 1,030 mnbbloe, compared to 878 mnbbloe in 2001 and to 1,947 mnbbloe in 2019 if there is no price reform. The emissions of CO_2 in 2019 in this scenario will be 358 million metric tons compared to 708 without price reform and to the 325 million metric tons emitted in 2001. The increase in GDP over the period will be 124%. So with price reform, the economy can meet growth targets with little increase in energy requirement or emissions of CO_2.

The costs of the energy sector by 2019 are halved by price reform. The total opportunitycost of the sector in 2019 under a 2014 price reform scenario, is about 174 × 10^{12}Rialscompared to an estimated 356 × 10^{12}Rials in the absence of price reform.

There are equally dramatic impacts on environmental damage. With price reform thetotal damage cost in 2019 is 81 × 10^{12}Rials compared to 155 × 10^{12}Rials under thereference scenario. This is still higher than in 2001.

Price reform in the energy sector will increase the level of prices to consumers, directly through the energy bill and indirectly through the impact on other goods and services. The likely upper level of impacts is shown in Table 5.

This analysis shows that there are some advantages in a slower introduction of reform. Price reform will boost economic growth. The value of the extra income from the sale of the energy products, released for export by the reform program, is equivalent to an extra 12.8% of GDP by 2019. In the slowest price reform scenario (by 2019), the extra growth is added over the whole period.

If comprehensive price reform is not politically feasible, then price increases should betargeted to transport fuels because these give the largest environmental benefit per unit of subsidy avoided. A 5% annual rise in the real prices of gasoline and diesel would produce by 2019 annual subsidy savings of $3.8 and $2.3 billion respectivelyand damage cost savings of $1.7 and $2.1 billion.

Table 5. Effect on Consumer Price Index (CPI) of price reform

Price reform by	Increase in CPI (% per year)
2009	12.6
2014	6.1
2019	4.0

Sectorial measures

Where feasible, a cost-benefit analysis (CBA) for each of the selected sectorial measures was conducted. Table 6 contains summary results for the measures. The classification A, B, C, D and X represents the following cases:

Note that the classifications do not indicate the cost-effectiveness of the activity, but of the promotion of the activity by the government.

Note that the promotion of the switch to gas in residential and commercial sectors is not cost-effective only because the conversion is attractive and needs no further measures by government.

The sectorial measures have been modeled to determine their impacts under current pricing, and when implemented concurrently with price reform. Figure 4 shows the cumulative benefits of the measures to the national economy in the case when price reform is fully achieved by 2014. The cumulative benefits to the economy are measured by the value in export of released energy products, reduced by the investments required to implement the measures. The cumulative benefit including the damage cost is also shown. The damage is a real cost to the economy and reduction in damage is a real economic benefit. It can be seen that the policy package pays back in economic terms in 6 years, if damage costs are not included, but in 3 years if damage costs are included. The cumulative net value of the policy package by 2019 is around 50×1012 Rials (about US$ 6.25billion).

Figure 5 shows the net financial flow to the state budget. This is important information because it reveals the ability of the state to finance the measures.

Table 6. Summary of Cost Benefit Analysis (CBA) Results

Measure	Class
Mainstreaming the environment	X
Public awareness raising	X
Reduction of flaring	C
Renewable energy	C
Fuel gas desulfurization at power plant	B
Reducing fugitive emissions at refineries	C
Reduction of T&D losses in electricity	A
Reduction in losses from oil and gas network	X
Price reform for energy products	A
Reduction in the S content of middle distillates	B
Inspection and maintenance of vehicles	A
Exhaust emissions standards for new vehicles	B
Enhancing public transport	C
Increased use of CNG in vehicles	A
Demand side management program	C
Standard and labeling for appliances	B & C
Promotion of the switch from oil to natural gas in industry	A
Promotion of the switch to gas in residential and commercial sectors	D
Fuel switching from diesel to electricity (ground water pumping)	A

A: Measure is win-win: it has both net economic benefits and reduces local damage,
B: Measure is cost-effective only when local damage savings are included,
C: Measure is cost-effective only when global damage savings are incorporated; suitable for CDM activities,
D: Measure is not cost-effective,
X: Indicates either that insufficient data was available to conduct a CBA or the topic did not lend itself to the methodology.

Also, Fig. 5 shows the net financial flow to the state budget, i.e., the avoided subsidies to the energy sector net of the costs of financing part of the investments in renewable energy, energy efficiency and fuel conversion required by the package. The cumulative financial flows become positive after 2010 and reach a maximum in 2012, after that year prices are so close to opportunity costs that there is no longer any significant flow of avoided subsidies to set against the costs of the measures. If the measures are to be continued after this date, then they need to be financed from other sources.

The support measures for renewable energies are expensive to the state, because they are justified in terms of climate change benefits that do not appear in the state budget.

Figure 6 shows the cumulative net cash flow to the state in the absence of the class C measures.

In this case it can be seen that the measures induce a positive cash flow from the outset. After the year 2012, when there are few benefits to the state from avoided subsidies, the revenues fall away. The policy package should be reconsidered at this point.

Table 7below summarizes the benefits in 2019, for a combination of price reform by2014 and sectorial measures of class A and B Table 8.

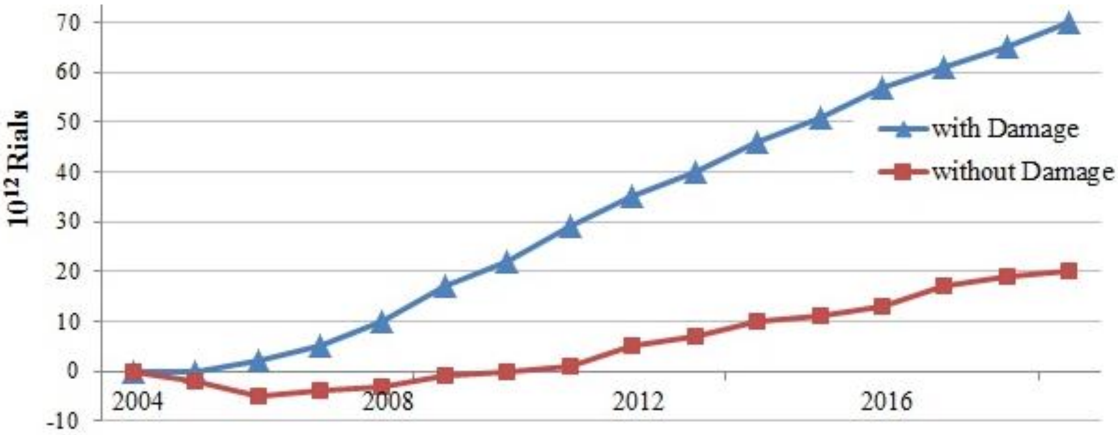

Figure 4. Cumulative net benefits to the country (10^{12}Rials)

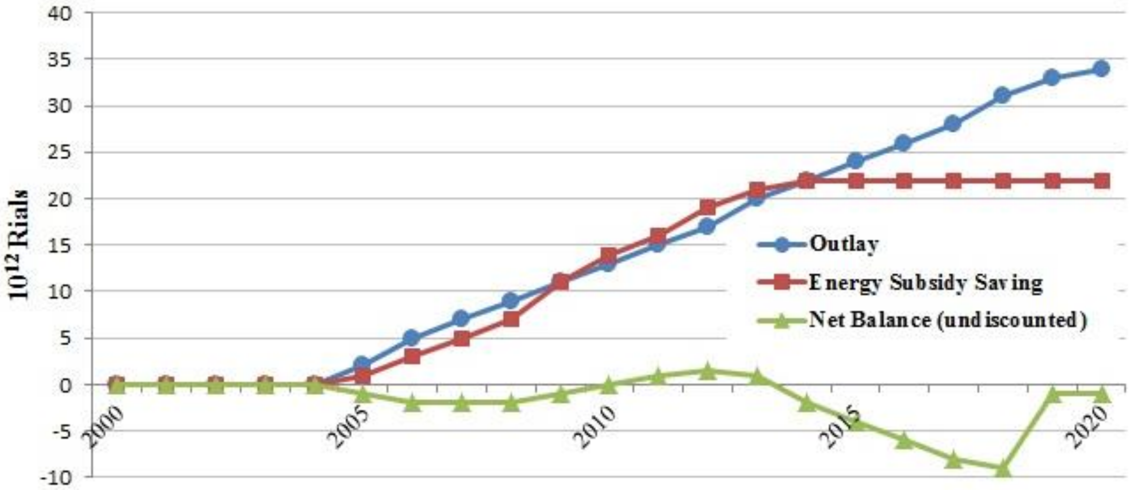

Figure 5. Net financial flows to the state

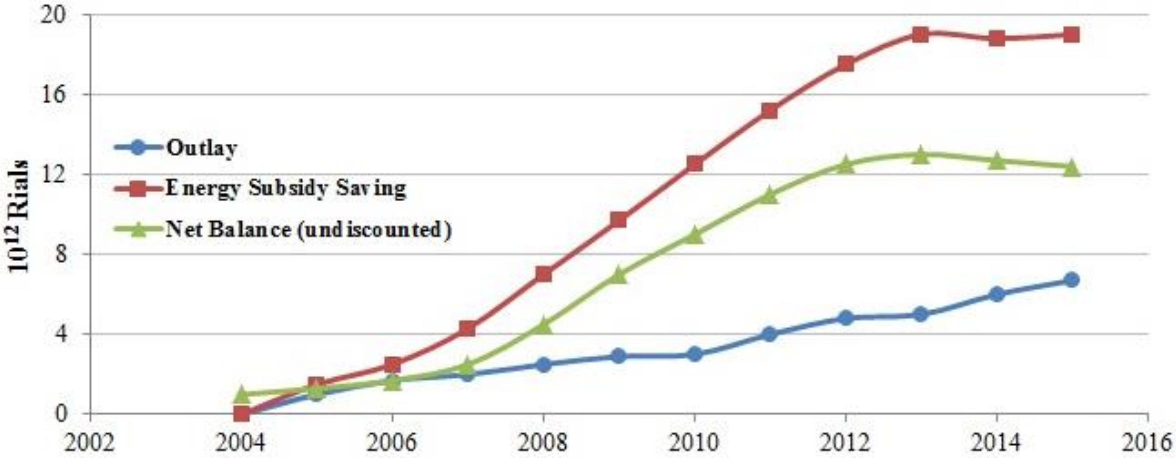

Figure 6. Net financial flows to the state without class C measure

Table 7. Indicators for combined price reform and sectorial measures in 2019

Scenario	Total primary energy in 2019 (bnbbloe)	Emissions of CO_2 in 2019 (mt)	Opportunity costs in 2019 (10^{12}Rials)	Subsidies in 2019 (10^{12}Rials)	Damage in 2019 (10^{12}Rials)
Reference (BAU)	1,947	708	327	265	94
Reform by 2014 + measures	962	332	157	0	31

Table 8. Main effects of price reform and sectorial measures

Year	2001			2019	
Scenario		1	2	7	9
Primary energy requ. (m bbloe)	878	1,947	1,835	1,030	962
Domestic energy cons. (m bbloe)	720	1,556	1,460	789	737
Out of which					
Nat. gas	242	575	588	300	310
Gasoline	99	198	160	117	94
Gasoil	160	294	294	92	92
Fuel Oil	73	98	41	66	31
Electricity	60	197	183	120	114
Emissions (kt)					
CO_2	352,000	708,000	649,000	358,000	332,000
SO_2	1,349	1,436	812	753	530
NO_x	1,106	2,161	1,578	1,076	747
CO	5,435	10,790	7,678	5,967	4,135
PM_{10}	131	228	214	80	72
Subsidies 10^{12}Rials	118	288	267	0	0
Bn US$	15	36	33	0	0
Subsidies in % of GDP	17.8	20.3	18.8	0	0
Damage costs 10^{12}Rials	37.7	94.3	65.2	47.5	31.0
Bn US$	4.7	11.8	8.2	5.9	3.9
DC in % of GDP	5.7	6.6	4.6	3.3	2.2

Scenarios.
1: Business as usual (no price reform, no sectorial measures)
2: No price reform, all sectorial measures (including class C)
7: Price reform by 2014, no sectorial measures
9: Price reform by 2014, sectorial measures (without class C; preferred scenario for the action plan)

Conclusions

The Government of Iran should consider a policy to bring energy prices to the level of opportunity costs by 2014 or 2019. If comprehensive price reform is not politically feasible then price increases should be targeted to transport fuels. In association with this price reform policy there should be a set of sectorial polices known as the Energy-Environment Action Plan. In addition, a mechanism should be developed to return a portion of avoided subsidies to an Energy Action Plan Fund to finance activities under the Action Plan. The initial resources of this fund should be of the order of $100 million. The focus of activities within the Action Plan should be on energy efficiency, substitution of natural gas and cleaner technology for transport. Besides, renewable energy projects should be conducted only in the context of international schemes that make payments available for avoided emissions of greenhouse gases. Detailed examination should be made of the volumes, composition and location of vented and flared gas and the options for cost-effective reduction of flaring should be determined and implemented.

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