REPUBLIC OF LEBANON
MINISTRY OF ENVIRONMENT

الصندوق اللبناني للنهوض
المنبثق عن مؤتمر ستوكهولم

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FOSSIL FUEL SUBSIDIES IN LEBANON

Fiscal, Equity, Economic and Environmental Impacts

2015 MINISTRY OF ENVIRONMENT

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May 2015

This document should be referenced as:

MoE/UNDP (2015). Fossil Fuel Subsidies in Lebanon: Fiscal, Equity, Economic and Environmental Impacts. Beirut, Lebanon.

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Fossil Fuel Subsidies in Lebanon: Fiscal, Equity, Economic and Environmental Impacts

Reference project

National Action Programme to Mainstream Climate Change into Lebanon's Development Agenda

Executed by

Ministry of Environment

Funded by

Financed by the Lebanon Recovery Fund, a Lebanese Government led programme established on the occasion of the Stockholm Conference

Implemented by

United Nations Development Programme, Lebanon

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Foreword

Ministry of Environment

Through the publications of Lebanon's Initial and Second National Communications to the United Nations Framework Convention on Climate Change, and the Technology Needs Assessment for Climate Change, the Ministry of Environment drew the large climate change picture in the country. The picture shed the light on a number of climate change matters: Lebanon's contribution to global greenhouse gas emissions, the sectoral share of national emissions, the socio-economic and environmental risks that the country faces as a result of climate change, and the potential actions that could and should be undertaken to fight climate change both in terms of mitigation and adaptation.

Through these series of focused studies on various sectors (energy, forestry, waste, agriculture, industry, finance and transport), the Ministry of Environment is digging deeper into the analysis to identify strengths, weaknesses, threats and opportunities to climate friendly socio-economic development within each sector.

The technical findings presented in this report (Fossil Fuel Subsidies in Lebanon: Fiscal, Equity, Economic and Environmental Impacts) will support policy makers in making informed decisions. The findings will also help academics in orienting their research towards bridging research gaps. Finally, they will increase public awareness on climate change and its relation to each sector. In addition, the present technical work complements the strategic work of the National Climate Change Coordination Unit. This unit has been bringing together representatives from public, private and non-governmental institutions to merge efforts and promote comprehensive planning approach to optimize climate action.

We are committed to be a part of the global fight against climate change. And one of the important tools to do so is improving our national knowledge on the matter and building our development and environmental policies on solid ground.

Mohammad Al Mashnouk

Minister of Environment

Foreword

United Nations Development Programme

Climate change is one of the greatest challenges of our time; it requires immediate attention as it is already having discernible and worsening effects on communities everywhere, including Lebanon. The poorest and most vulnerable populations of the world are most likely to face the harshest impact and suffer disproportionately from the negative effects of climate change.

The right mix of policies, skills, and incentives can influence behaviour and encourage investments in climate development-friendly activities. There are many things we can do now, with existing technologies and approaches, to address it.

To facilitate this, UNDP enhances the capacity of countries to formulate, finance and implement national and sub-national plans that align climate management efforts with development goals and that promote synergies between the two.

In Lebanon, projects on Climate Change were initiated in partnership with the Ministry of Environment from the early 2000s. UNDP has been a key partner in assisting Lebanon to assess its greenhouse gas emissions and duly reporting to the UN Framework Convention on Climate Change. With the generous support of numerous donors, projects have also analysed the impact of climate change on Lebanon's environment and economy in order to prioritise interventions and integrate climate action into the national agenda. UNDP has also implemented interventions on the ground not only to mitigate the effects of climate change but also to protect local communities from its impact.

This series of publications records the progress of several climate-related activities led by the Ministry of Environment which UNDP Lebanon has managed and supported during the past few years. These reports provide Lebanon with a technically sound solid basis for designing climate-related actions, and support the integration of climate change considerations into relevant social, economic and environmental policies.

Ross Mountain

UNDP Resident Representative

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Acronyms

BAU	Business as Usual
CAS	Central Administration of Statistics
CPI	Consumer Price Index
CSE	Consumer Subsidy Equivalent
EDL	Electricité Du Liban
GDP	Gross Domestic Product
GHG	Greenhouse Gas
GoL	Government of Lebanon
IT	Information Technology
MENA	Middle East and North Africa
MoEW	Ministry of Energy and Water
MoF	Ministry of Finance
OECD	Organization for Economic Cooperation and Development
PSE	Producer Subsidy Equivalent
PV	Photovoltaic
VAT	Value-Added Tax

Executive summary

Fossil fuel subsidies in Lebanon are either in the form of direct cash transfers such as those given to Electricité Du Liban (EDL), or in the form of forgone revenues such as those resulting from a reduction in the gasoline excise rate in 2011 and the Value-Added Tax (VAT) exemption on diesel oil in 2012.

Declining international oil prices in 2014 poses the question of whether the Lebanese government should continue to subsidize the fossil fuel consumed in the electricity and transport sectors in the short-run. Also, possible hikes in oil prices over the long-term would lead to strong and consistent increases in the fiscal cost of fuel subsidies. This study first measures the scale of fuel subsidies in Lebanon using different methods. It is found that these contain significant fiscal ramifications, with an estimated USD 3.1 billion in fuel subsidies for the year 2013, constituting 7.0% of Gross Domestic Product (GDP).

This study then proposes a subsidy phasing-out roadmap over a 10-year period for both the electricity and transport sectors. The plan contains sector reforms that need to be implemented prior to the phasing-out. The fiscal, equity, economic and climate change impacts of phasing-out are then calculated and analyzed.

Results convey that if the phasing-out had occurred in 2013, it would have reduced the fiscal deficit from 9.4% of GDP to 3.8% of GDP. Also, the primary deficit (at 0.5% of GDP) would have shifted to a surplus of 5.1% of GDP. This is assuming that 80% of the fuel subsidies are replenished back into the fiscal budget, while the rest is allocated to a special social fund that can ear-mark part of the savings from the phasing-out, to be invested, for example, in sustainable public transportation, healthcare and education, thus benefiting the lowest income categories.

On the equity side, it is roughly estimated that only 6% of total transport subsidies are received by the poorest quartile in the country, while the richest quartile receive 55% of the total. Also, the poorest quartile, receives only 16.5% of the total subsidy of the power sector, while the richest quartile receives 38% of the total.

Other economic impacts of phasing-out will generally be reflected on energy-intensive sectors and possible inflation hikes. The single-most highest impact in the productive sectors will be on the manufacture of petroleum, chemicals, rubber and plastics industry[1]. Also, a simple inflation assessment shows a potential 1% increase post phase-out when having static assumptions. If however, the dynamic behavior of phasing-out over a period of 10 years is considered, the inflation impact is expected to be less pronounced.

[1] This industry includes: the manufacture of coke oven products, the manufacture of refined petroleum products, the manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics and synthetic rubber in primary forms, the manufacture of other chemical products, the manufacture of man-made fibers, the manufacture of rubber products, and the manufacture of plastics products.

The climate change impact of fossil fuel subsidies is analyzed through projected changes in fuel consumption following the phase-out of subsidies as proposed in the roadmap, since low subsidized prices drive out excessive consumption. The removal of the subsidy is also expected to encourage investment in renewable energy sources due to forecasted global fuel price hikes, and reduction in renewable energy technology prices. Results show that removing that moral hazard-driven distortion will result in a potential GHG (Greenhouse Gas) emission reduction of 2.838 million tonnes of carbon dioxide equivalent (CO_2eq.) in 2020, constituting 10.45% of total emissions from the power sector in 2020. Also, the removal of the gasoline subsidy is expected to lead to a reduction of 1.411 million tonnes of CO_2eq. in 2020, constituting 11.3% of total emissions from the transport sector.

الملخص التنفيذي

دعم الوقود الاحفوري في لبنان يكون إما على هيئة تحويلات نقدية مباشرة، مثال تلك الممنوحة لشركة كهرباء لبنان، وإما على هيئة انخفاض في الإيرادات مثال تلك الناتجة عن انخفاض رسم الاستهلاك الداخلي عن مادة البنزين في العام ٢٠١١ وإعفاء ضريبة القيمة المضافة على الديزل أويل في العام ٢٠١٢.

ويطرح انخفاض أسعار النفط العالمية خلال العام ٢٠١٤ السؤال حول ما إذا كان على الحكومة اللبنانية المضيّ في دعم النفط الاحفوري المستخدم في قطاعي الكهرباء والنقل على المدى القصير. كما أنه بإمكان الزيادات المحتملة في أسعار النفط على المدى الطويل أن تؤدي إلى زيادات قوية وثابتة في التكلفة المالية لدعم الوقود. وتقيس هذه الدراسة، أولًا، حجم دعم الوقود في لبنان باستخدام أساليب مختلفة، وتبيّن أنها تحتوي تداعيات مالية مهمة وما يقدَّر بمبلغ ٣,١ مليار دولار أميركي للعام ٢٠١٣، مشكّلة ٧٪ من الناتج المحلي الإجمالي.

ومن ثم تقترح هذه الدراسة خارطة طريق للإنهاء التدريجي للدعم المالي على مدى فترة ١٠ سنوات لكل من قطاعي النقل والكهرباء. وتتضمن الخطة بعض الإصلاحات القطاعية التي يجب تنفيذها قبل الإنهاء التدريجي. بعد ذلك، يتم احتساب الآثار المالية والاقتصادية وآثار تغير المناخ لعملية الإنهاء التدريجي وتحليلها.

وتفيد النتائج بأن الإنهاء التدريجي سيؤدي إلى انخفاض في العجز المالي من ٩,٤٪ من الناتج المحلي الإجمالي إلى ٣,٨٪ منه، بناءً على أرقام العام ٢٠١٣؛ كما سيتحول العجز الأولي (٠,٥٪ من الناتج المحلي الإجمالي) إلى فائض يبلغ ٥,١٪ من الناتج المحلي الإجمالي.

وفي ما يتعلق بالتوزيع الاقتصادي العادل، تشير التقديرات إلى استلام حوالي ٦٪ فقط من إجمالي دعم النقل من قبل الربع الإحصائي الأكثر فقرًا في البلد، فيما يحصل الربع الإحصائي الأغنى على ٥٥٪ من هذا الإجمالي. إضافة إلى ذلك، فإن الربع الإحصائي الأكثر فقرًا لا يحصل إلا على ١٦,٥٪ من إجمالي إعانات قطاع الطاقة، فيما يحصل الربع الإحصائي الأغنى على ٣٨٪ من هذا الإجمالي.

وهناك انعكاسات اقتصادية أخرى للإنهاء التدريجي على القطاعات كثيفة الاستهلاك للطاقة وعلى التضخم المالي بشكل عام. فالتأثير الأعلى في القطاعات الإنتاجية سيكون على مجال صناعة البترول والكيماويات والمطاط والبلاستيك[١]. كما يُظهر تقييم بسيط على التضخّم المالي، احتمال زيادة بنسبة ١٪ بعد الإنهاء التدريجي وذلك عند وجود افتراضات ثابتة. أما إذا أخذنا السلوك الديناميكي للإنهاء التدريجي على فترة ١٠ سنوات، فمن المتوقع أن يكون أثر التضخم أقل أهمية.

يتم تحليل تأثير تغير المناخ لدعم الوقود الاحفوري من خلال تغيرات متوقعة في استهلاك الوقود بعد الإنهاء التدريجي للدعم كما هو مُقترَح في خارطة الطريق. ومن المتوقع أيضا أن إزالة الدعم يؤدي إلى تشجيع الاستثمار في مصادر الطاقة المتجددة بسبب توقعات في ارتفاع الأسعار العالمية للوقود الاحفوري و انخفاض في أسعار الطاقة المتجددة. وتشير النتائج إلى أن الإنهاء التدريجي للدعم سيؤدي إلى انخفاض محتمل في انبعاثات الغازات الدفيئة بحجم ٢,٨٣٨ مليون طن من مكافئ ثاني أكسيد الكربون في العام ٢٠٢٠، ما يشكّل ١٠,٤٥٪ من إجمالي الانبعاثات الناتجة عن قطاع الطاقة في العام ٢٠٢٠. إضافة إلى ذلك، من المتوقّع أن يؤدي إلغاء دعم البنزين إلى انخفاض بحجم ١,٤١١ مليون طن من مكافئ ثاني أكسيد الكربون في العام ٢٠٢٠، ما يشكّل ١١,٣٪ من إجمالي الانبعاثات الناتجة عن قطاع النقل.

[١] يشمل هذا المجال: صناعة منتجات فرن الكوك وصناعة منتجات البترول المكرر وصناعة المواد الكيميائية الأساسية والأسمدة والمركبات النيتروجينية والبلاستيك والمطاط الصناعي في أشكال أولية وصناعة المنتجات الكيماوية الأخرى وصناعة الألياف وصناعة منتجات المطاط وصناعة منتجات البلاستيك.

1. Introduction

Despite growing concerns over climate change and energy security, the scale of fossil fuel subsidies is increasing globally. Global fossil fuel subsidies amounted to USD 548 billion in 2013, compared to USD 121 billion in renewable energy subsidies, (IISD 2014). Some of these fossil fuel subsidies were implemented for social objectives such as regional development, while the majority exists primarily due to successful lobbying by the beneficiary industries (Koplow and Track, 2009).

Fossil-fuel subsidies have wide-ranging economic consequences (International Monetary Fund, 2013):

- While aimed at protecting consumers, subsidies aggravate fiscal imbalances, crowd-out priority public spending, and depress private investment, including in the energy sector.
- Subsidies also distort resource allocation by encouraging excessive energy consumption, artificially promoting capital-intensive industries, reducing incentives for investment in renewable energy, and accelerating the depletion of natural resources.
- Most subsidy benefits are captured by higher-income households, reinforcing inequality.
- Future generations are affected by the damaging effects of increased energy consumption on global warming.

Fossil fuel subsidies in Lebanon are either in the form of direct subsidies given to oil products for final consumption, or in the form of indirect subsidies, such as treasury transfers to Electricité du Liban (EDL) on behalf of consumers who in turn only pay one-third of the recovery rate. Fuel subsidy elimination could be a climate change mitigation policy that is possibly achieved with an overall economic profit rather than a cost, and is therefore particularly worthy of investigation (Holton, 2012). In recognition that inefficient fossil-fuel subsidies distort markets, impede investment in clean energy sources and undermine efforts to deal with climate change, this study evaluates the impact of fossil-fuel subsidies on the Lebanese economy, fiscal balances, and the environment, while accounting for equity and poverty alleviation concerns.

1.1. Oil consumption and prices in Lebanon

Lebanon is an oil importer, constituting a 22.7% share of total imports by value in 2013[1]. Consumption trends are displayed in Figure 1 showing that gas/diesel oil constitutes the highest consumption share in recent years among other categories of oil.

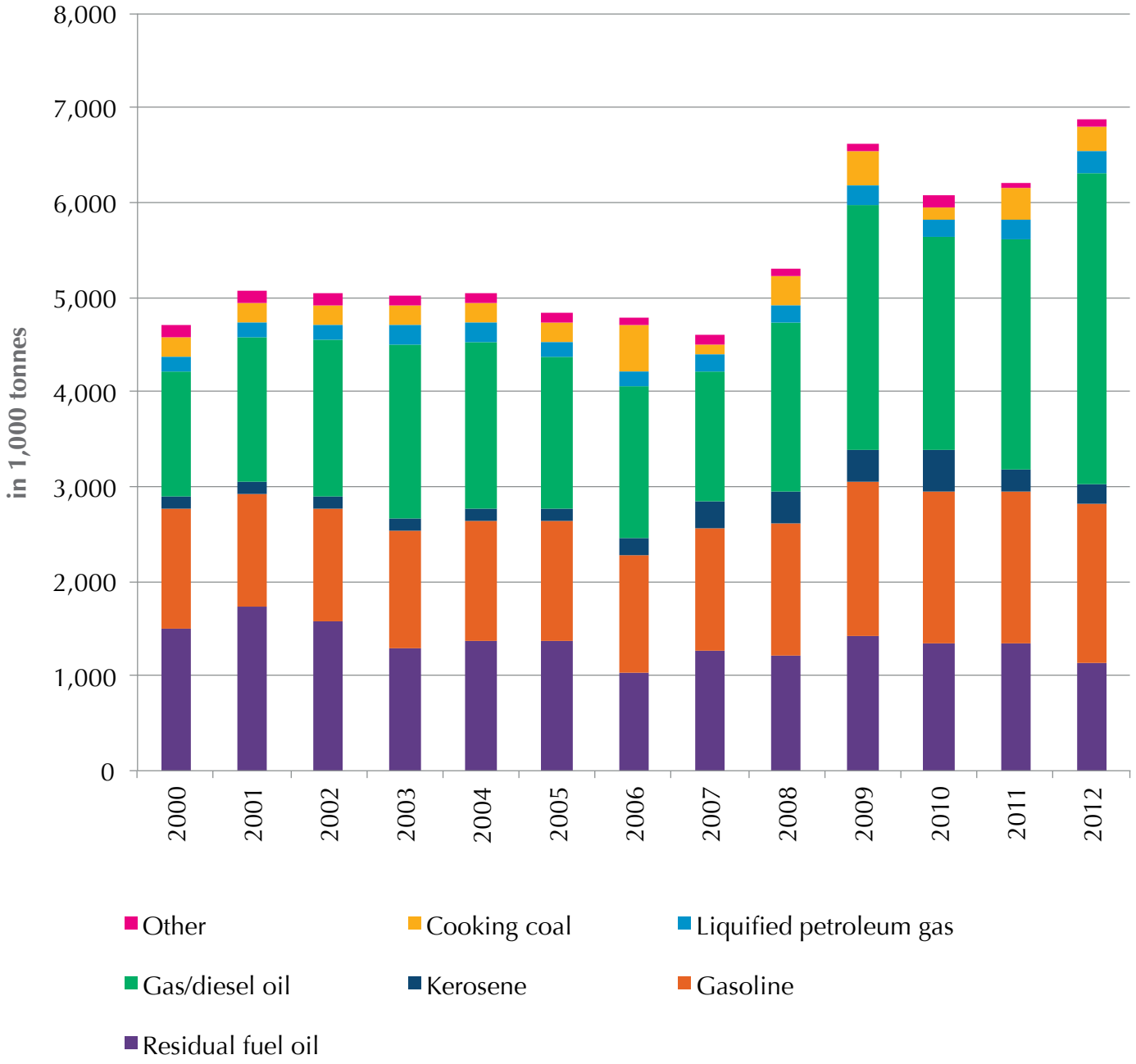

Figure 1: Oil consumption in Lebanon by category type

Source | MoEW, 2013

[1] According to figures by the Lebanese Customs Higher Council.

Figure 2 below shows the volatility of prices of a number of fuel types in Lebanon. These prices are set every week; Octane 98 and Octane 95 refer to gasoline used for automobiles, diesel oil (red) generally fuels electricity generators and is used for heating, while diesel oil (green) is mainly used for automobiles, and fuel oil is used for electricity production by EDL.

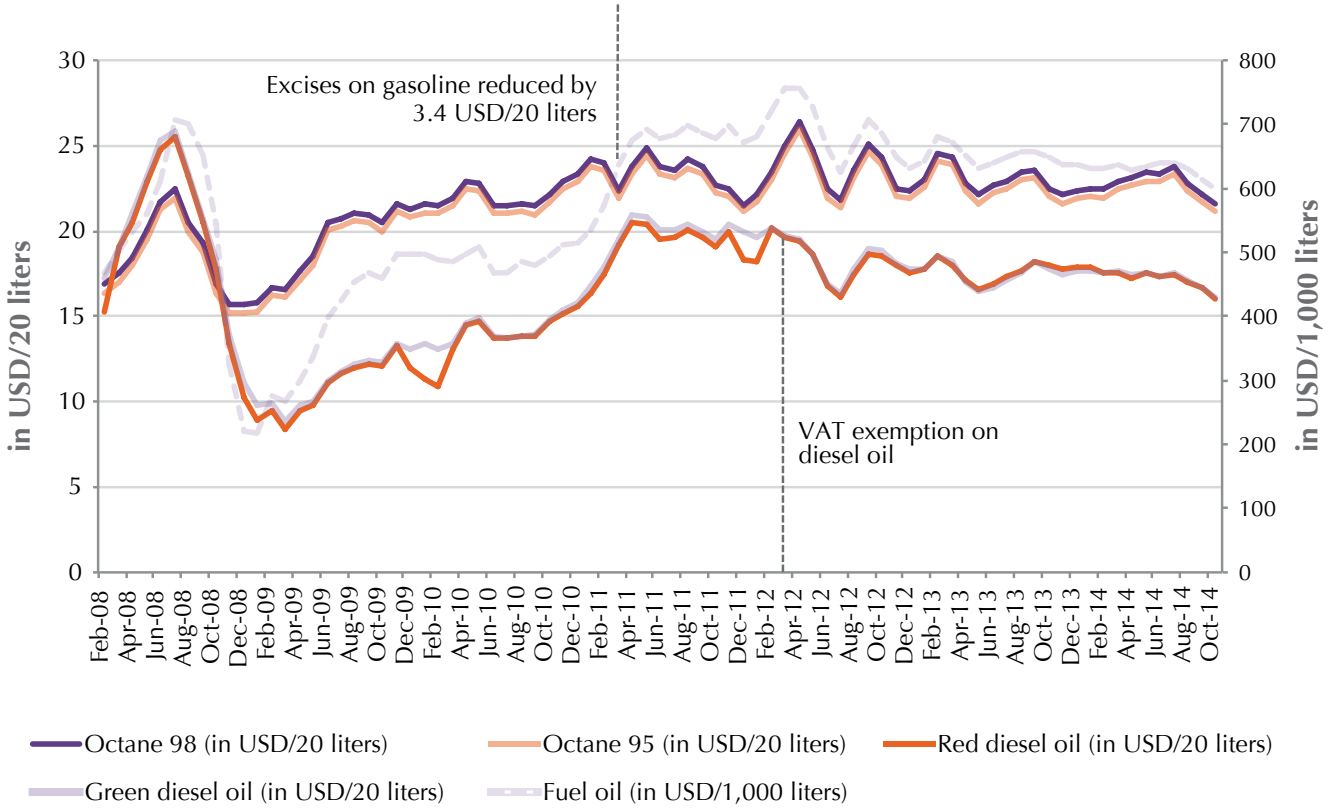

Figure 2: Gasoline, diesel oil and fuel oil prices trends

Source | MoEW, 2014

1.2. Motivation for introducing fossil fuel subsidies

Most fossil fuel subsidies in Lebanon, whether direct cash transfers or foregone revenues to the treasury, have been introduced to protect consumers from increases in oil prices and preserve their purchasing power. These subsidies, which are targeted to benefit the low income groups, instead benefit higher income groups who are generally the larger energy consumers (see section 4.3). The various subsidies are explained below:

- Transfers to EDL amounted to USD 2.3 billion in 2012, equivalent to around 5.3% of Gross Domestic Product (GDP), compared to USD 1.7 billion in 2011. The subsidy represents an important burden on the government, and stems mainly from high international fuel prices. In detail, these cash transfers cover the cost of diesel and fuel oil imports, and include a small allocation for the settlement of various concessional loans as well. It is worth mentioning that EDL's inability to meet market demand for electricity has prompted the private sector to establish an illegitimate network of generators.

- After several diesel oil subsidies since 2004[2], the parliament voted on 5 March 2012 on law 207, which exempts VAT on both red and green diesel oil. It is worth mentioning that diesel oil is mainly used for electricity generation by both EDL and private generators, and also for heating and public transportation.
- In light of an increase in international oil prices during the first half of 2011[3] , the government decided to reduce the gasoline excise rate from LBP 10,000 (USD 6.67) per 20 liters to LBP 5,000 (USD 3.34) per 20 liters[4] .
- The Government of Lebanon (GoL) exceptionally allowed the Ministry of Finance (MoF) to subsidize gasoline for taxi and bus drivers for a period of three months, after the parliament approved the policy by adopting law 182 dated 5 October 2011. The subsidy per official number plate was set equal to the value of LBP 1,248,000 (USD 832) for a three months period starting 13 October 2011. Payments were made through the MoF cashiers in November 2011 and December 2011 for a total of 32,957 plates or a total of LBP 41 billion (USD 27.4 million).

Table 1: Overview of fossil fuel subsidies in Lebanon

Subsidy	Description	Year
Electricity subsidy	In the form of treasury transfers to EDL.	Yearly
Diesel oil subsidy	Winter subsidy aimed at protecting lowest income households, who use diesel oil for heating purposes.	2004 - 2012
VAT exemption on red and green diesel oil	This policy replaced the previous subsidy offered every winter.	March 2012 - present
Reduction of gasoline excise tax	Decrease in the gasoline excise rate by LBP 5,000 per 20 liters.	February 2011 - present
Gasoline subsidy to taxi drivers	Introduced for a very short period of time as a result of continuing rising gasoline prices.	2011 - 2012

2. Scope of subsidies in Lebanon

Subsidies can be generally distinguished by the channels through which they are administered; these include budgetary payments, regulations, taxes and trade instruments (IEA-OECD-WB, 2010). They can be grouped as either direct transfers, such as grants to expedite the deployment of fledging energy technologies, or indirect transfers, such as the regulation of end-use prices (IEA-OECD-WB, 2010).

[2] The diesel oil subsidy was first introduced during the winter of 2004-2005 and implemented on a yearly basis until 2012, with the exception of the 2010-2011 winter.

[3] Oil prices averaged USD 111 per barrel in the first half of 2011, compared to USD 77 per barrel for the same period of 2010.

[4] As per the Higher Council of Customs' decision number 21/2011, dated February 26th, 2011.

2.1. Measuring the subsidy scale

Fuel subsidies are also frequently differentiated according to whether they confer a benefit to producers or consumers, or whether they support traditional fossil fuels or cleaner forms of energy (IEA-OECD-WB, 2010). Fossil fuel consumption subsidies lower prices to end-users, while production subsidies involve measures that seek to maintain or to expand domestic supply (IEA-OECD-WB, 2010).

Efforts to assess the subsidy magnitude either have generally focused on measuring the value transferred to market participants from particular programs (program-specific approach) or on measuring the variance between the observed and the "free-market" price for an energy commodity (price gap approach) (Koplow and Track, 2009). One set of methods that captures both pricing distortions (net market transfers) and transfers that do not affect end-market prices (net budgetary transfers) is the Producer Subsidy Equivalent (PSE) and Consumer Subsidy Equivalent (CSE) metrics commonly employed in the agricultural sector (Koplow and Track, 2009). Table 2 below explains the various approaches used in measuring subsidies.

Table 2: Oil imports to Lebanon by category type

Approach/description	Strengths	Limitations
Program-specific Quantifies value of specific government programs to particular industries and aggregates programs into overall level of support.	• Captures transfers whether or not they affect end-market prices. • Can capture intermediation value (which is higher than the direct cost) of government lending and insurance.	• Does not address questions of ultimate incidence or pricing distortions. • Is sensitive to decisions on what programs to include and requires program-level data.
Price-gap Evaluates positive or negative "gaps" between the domestic price of energy and the delivered price of comparable products from abroad.	• Can be estimated with relatively little data; very useful for multi-country studies. • Is a good indicator of pricing and trade distortions.	• Is sensitive to assumptions regarding "free market" and transport prices. • Understates full value of supports by ignoring transfers that do not affect end-market prices.
PSE/CSE Provides a systematic method to aggregate transfers plus market support to particular industries.	• Integrates transfers with market supports into holistic measurement of support. Separates effects on producer and consumer markets.	• Is data intensive. • Provides little empirical PSE/CSE data for fossil fuel markets.

Source | Koplow and Track, 2009

2.2. How much do we expend?

This section explains the methods used to quantify the different categories of fuel subsidies in Lebanon. Globally, energy products are taxed to factor in the negative externalities from energy consumption. For transport fuels, excise taxes[5] are the most common form of taxation. Based on a compilation of energy prices and taxes from a number of Organization for Economic Cooperation and Development (OECD) countries (IMF, 2014), it is found that the average excise rate among 22 OECD countries is 60.2 US¢/liter, and the average excise rate on diesel oil among 15 OECD countries is 42.44 US¢/liter. Excise rates in Lebanon stand well below these averages: at 16.7 US¢/liter (LBP 5,000 per 20 liters) for gasoline and no excise taxes on diesel oil, which is also exempted from the VAT. Table 3 below displays the externality costs of each of gasoline and diesel oil.

Despite the fact that externality costs of gasoline are higher than the current excise tax level, a conservative assumption in this study to calculate the optimal excise rate is taken. Excise rates in Lebanon were reduced from 33.4 US¢/liter (LBP 10,000/20 liters) to 16.7 US¢/liter (LBP 5,000/20 liters) in March 2011. Therefore, it is assumed that the optimal excise rate is set back at 33.4 US¢/liter and the gasoline subsidy (i.e. forgone revenues) is calculated accordingly.

The diesel subsidy is calculated as per the forgone revenues from a 33.4 US¢/liter excise tax, as well as from the 10% VAT.

Table 3: Transportation-related externality costs for gasoline and diesel oil in Lebanon

US¢/liter	Gasoline	Diesel
Pollution cost	11.43	1.14
Carbon cost	0.03	0.01
Congestion cost	47.07	33.34
Accidents cost	51.03	3.61
Total	**109.6**	**38.10**

Source | MoE/UNDP, 2015

As for the electricity subsidy, it simply amounts to treasury transfers given to EDL each year. Data show that fuel subsidies almost doubled in 2013 when compared to 2010, mainly explained by a continuous rise in international oil prices as well as changes in fiscal policies.

[5] An excise tax is an indirect tax charged on the sale of a particular good.

During 2013, total fuel subsidies amounted to USD 3.1 billion (7.0% of GDP), and represented around 94% of total subsidies offered by the government. It is worth mentioning that Lebanon's non-fuel subsidies are the "wheat and bread" and "interest subsidy"[6].

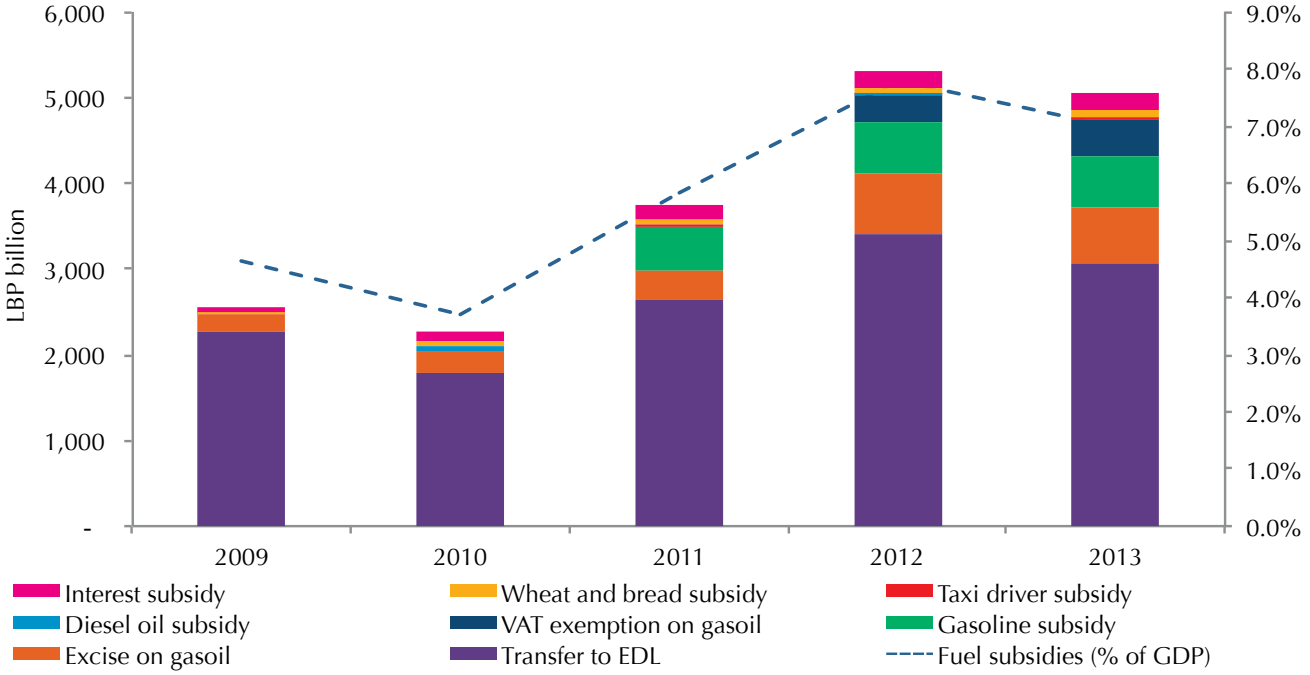

Figure 3: Fuel and non-fuel subsidies (2009-2013)

Source | UNDP Calculations, MoF, Central Administration of Statistics (CAS)

3. Fossil fuel subsidy reforms: lessons learned

Fossil fuel subsidies are in the process of being reformed and reduced at a promising pace in a number of countries around the world (IISD, 2014). Countries in the Middle East and North Africa (MENA) region that had energy subsidy reforms in the past two years are Morocco, Tunisia, Egypt, Sudan, Yemen, Oman, Bahrain, Kuwait, and Iran (IISD, 2014)[7]. This section highlights subsidy reform experiences by two Arab North African countries: Morocco and Egypt, while Table 4 depicts several other countries with similar initiatives.

In Morocco, the subsidy bill has been a drain on the budget, reaching 6% of GDP in 2011 and 6.5% in 2012, with fuel subsidies representing the bulk of the subsidy expenditure (IMF, 2014). A part of a subsidy reform plan in June 2012, the prices of diesel, gasoline, and fuel oil were increased by 14% to 8.15 Dirham/liter, 19.6% to 12.18 Dirham/liter, and 27% to 4,666 Dirham/tonne, respectively (IMF, 2014). Additionally, in January 2014, subsidies on gasoline and industrial fuel were eliminated; their prices are reviewed twice a month (IMF, 2014). As part of mitigating efforts to control any substantial negative social and economic impact, the Moroccan government is gradually strengthening the existing social safety nets and targeting vulnerable groups. They are also using the monetary returns of subsidy reduction to invest in public transport (IMF, 2014).

[6] The MoF finances an interest subsidy program targeting the following sectors: industry (including agro-industry), agriculture, Information Technology (IT), software and knowledge-based enterprises and related service providers as well as tourism development. An interest subsidy is the value of a firm's deduction of the interest payments on its debt from its earnings before calculation of its tax bill.

[7] Other countries include Mexico, Ecuador, Argentina, Ghana, Nigeria, Angola, Ukraine, Uzbekistan, Turkmenistan, Russia, China, Nepal, Bangladesh, India, Myanmar, Thailand, Malaysia and Indonesia.

In July 2014, Egypt undertook sweeping energy subsidy reforms, significantly increasing the price of transport fuels, electricity and natural gas. These subsidy reforms form part of a broader attempt to reduce Egypt's budget deficit to 10% of GDP in the 2014 financial year (through revenue enhancements as well as cost cutting), from an expected deficit of around 14% in the 2013 financial year, with slow year-on-year reduction in the size of the budget deficit thereafter (IISD-GSI, 2014). Although transport operators undertook strikes and protests in Cairo, Sinai and Alexandria as a reaction to the subsidy reform, large-scale demonstration of the kind experienced during and since the revolution of January 2011 has been absent (IISD-GSI, 2014). The government made significant efforts to communicate the rationale for reforms immediately before and after the event, beginning with a media offensive on the energy subsidy problem during the budget negotiations in late June 2014 (IISD-GSI, 2014).

Table 4: Energy subsidy reforms of selected countries

Country	Energy product	Reform episode	Reform impact
Brazil	Fuel	Early 1990s - 2001	From 0.8% of GDP in subsidies in mid-1990s to revenue generating since 2002
Brazil	Electricity	1993 - 2003	0.7% of GDP
Egypt	Fuel	2014	Fiscal expenditures are expected to decline by around 10% in the 2014 financial year as compared to the 2013 financial year.
Indonesia	Fuel	2008	Subsidies declined from 2.8% of GDP in 2008 to 0.8% in 2009.
Iran	Fuel	2010	Growth in the consumption of petroleum products initially stabilized
Mauritania	Fuel	2011	Subsidies declined from 2% of GDP in 2011 to close to zero in 2012.
Morocco	Fuel	2012	Total budgeted subsidies declined by 40% in 2014, as compared to 2013 levels.
Nigeria	Fuel	2011 - 2012	Subsidies declined from 4.7% of GDP in 2011 to 3.6% in 2012.
Philippines	Electricity	2001	Subsidies declined from 1.5% of GDP in 2004 to zero in 2006.
Yemen	Fuel	2010	Subsidies declined from 8.2% of GDP in 2010 to 7.4% in 2011.

Source | IMF, 2013, Reuters, 2014 and IISD-GSI, 2014

4. Phasing-out

International oil prices have dropped by 42.7% by the end of December 2014 as compared to end December 2013[8]. This raises the question of whether the government should continue subsidizing oil in the short-run. This chapter explains the proposed roadmap to phasing-out fuel subsidies in Lebanon, with expected fiscal, equity, economic and climate change impacts.

4.1. Roadmap

Fuel subsidy reform plans employ gradual phasing-out in price increases along certain mitigation measures to control any social or economic adverse impacts of the reform. The appropriate phasing-out and sequencing of price increases will depend on a range of factors, including the magnitude of the price increases required to eliminate subsidies, the fiscal position, the political and social context in which reforms are being undertaken, and the time needed to develop an effective communication strategy and social safety nets (IMF, 2013). In a number of reform case studies, successful and partially successful subsidy reforms required on average about five years (IMF, 2013). A subsidy decision tree (Annex I) shows how an overall subsidy assessment can be done via a number of phases.

In the case of Lebanon, a timeline of 10 years is suggested instead, since reforms to power and transport sectors are needed before eliminating the subsidies. The recommended phasing-out plan is displayed in Figure 4 below and constitutes the following assumptions:

For the power sector:

- Energy supply will meet demand by 2020 and therefore the tariff will gradually increase from 9.3 US¢/kWh in 2015 to 14 US¢/kWh in 2020.
- The tariff is raised to 20 US¢/kWh by 2025 where the electricity utility will be able to start generating profit.
- 12% of the energy supply in 2020 (3,574 GWh) and 2025 (4,896 GWh) are from renewable energy sources[9]. The 12% target in 2020 and 2025 is therefore divided as follows: 5.8% from hydropower, 3.6% from solar Photovoltaic (PV) and 2.6% from wind power. The profit/cost to the government is therefore reflected from the estimated cost of production and the relative share of production from each technology.

[8] Based on the IMF Crude Oil Price Index, which is a simple average of three spot prices: Dated Brent, West Texas Intermediate, and the Dubai Fateh.

[9] Available at: http://climatechange.moe.gov.lb/Library/Files/Uploaded%20Files/Renewable%20Energy%20-%20Investment%20Cost%20-%20Final%20Version.pdf

For the transport sector:

- The gasoline and diesel subsidy phasing-out is assumed to be accompanied by the deployment of an efficient "mass transit system"[10].
- By 2020, the 10% VAT on diesel oil is expected to be resumed.

Power sector	2015	2016	2020	2025
Production (GWh)	10,869	16,826	29,784	40,802
Demand (GWh)	21,741	24,658	29,784	40,802
Consumer tariff (US¢/kWh)	9.3	9.3	14	20
Profit/cost to government (million USD)	-471	-873	-736	+284
Forecast crude oil prices (USD/barrel)	388	415	541	755

Power sector	2015	2020	2025
	Deployment of an efficient "mass transit system"		
Gasoline subsidy	3.34 USD/20 liters	3.34 USD/20 liters	No subsidy
Diesel subsidy	6.67 USD/20 liters + 10% VAT	6.67 USD/20 liters	No subsidy

Figure 4: Subsidy reform roadmap for power and transport sectors

4.2. Saving the fiscal balance

As mentioned in section 2.2, fuel subsidies amounted to USD 3.1 billion in 2013. This amounts to a share of 29.5% of total budget expenditures, and 47.2% of general expenditures excluding interest payments and foreign debt principal repayment. The fiscal ramifications of fuel subsidy impacts in Lebanon will be even greater if international prices rise in the long-term.

The below figure shows the effect of removing the subsidy on four fiscal indicators: (1) total fiscal deficit-to-GDP, (2) primary deficit/surplus-to-GDP, (3) total fiscal expenditures-to-GDP, and (4) budget expenditures/revenues. Pre-reform figures are taken for the year 2013, and post-reform figures are an adjustment to these, assuming that 80% of the fuel subsidies are replenished back into the fiscal budget[11].

[10] As per the recommended Mitigation Actions for the Transport Sector in Lebanon (MoE/UNDP/GEF, 2015).
[11] The remaining 20% will be used as a compensation to the poorest population (see section 4.3).

A significant shift is in the primary budget, shifting from a deficit equal to 0.5% of GDP to a surplus of 5.1% of GDP.

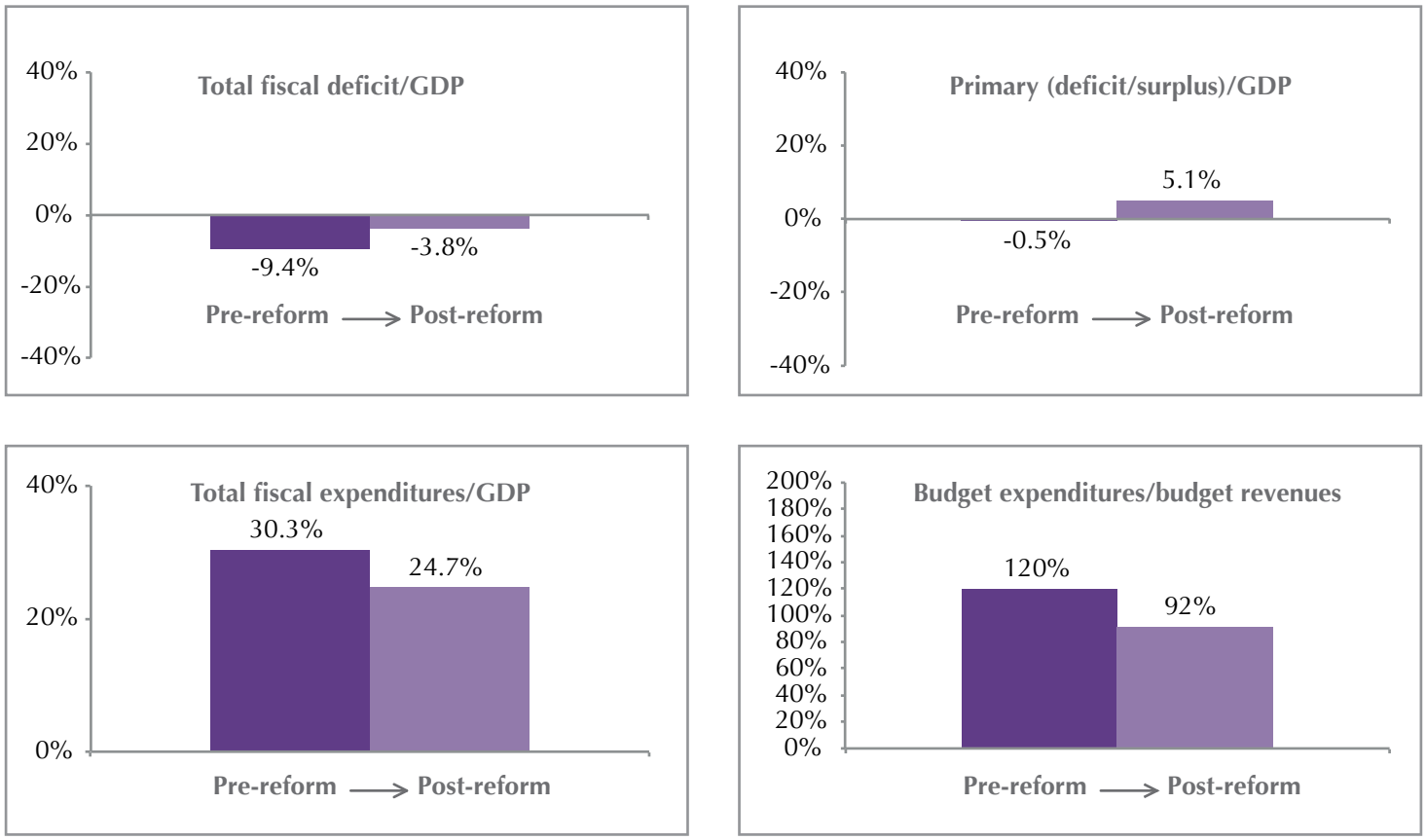

Figure 5: Shift in fiscal indicators, pre- and post-fuel subsidy reform

4.3. Who is benefiting from these subsidies?

This section highlights equity implications of electricity and transport fuel subsidies (diesel and gasoline) in Lebanon. It is well acknowledged that non-targeted subsidies largely benefit the richest populations of nations as they have the highest consumption trends.

The Central Administration of Statistics (CAS) household budget survey for 2012[12] provides indicators on household expenditures segregated by expenditure category and by their income level[13]. Based on this, and with certain assumptions on expenditure categories, it can be reflected that the poorest quartile received only 6% of total transport subsidies, while the richest quartile received subsidies of 55% of the total (see Figure 6).

[12] Available at: http://www.cas.gov.lb/index.php/all-publications-en#households-budget-survey-2012

[13] Households are segregated into four quartiles based on their income level: the bottom quartile (with income level lower than USD 5,200 per year), the second quartile (with income level between USD 5,200 and USD 9,600 per year), the third quartile (with income level between USD 9,600 and USD 19,200 per year) and the top quartile (with income level higher than USD 19,200 per year).

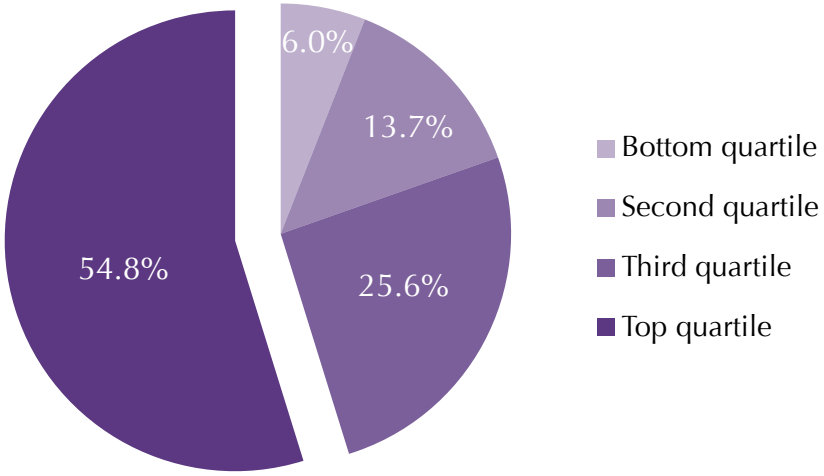

Figure 6: Share of benefits from the fuel transport subsidy in Lebanon

Based on the electricity expenditure component of the household survey, the poorest quartile receives only 16.5% of the total subsidy, while the richest quartile received subsidies of 38% of the total.

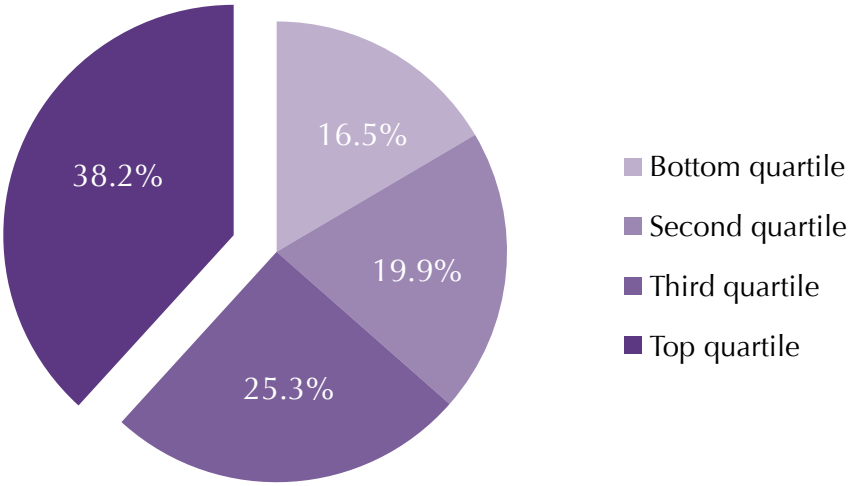

Figure 7: Share of benefits from the electricity subsidy in Lebanon

Therefore, it is clear that fuel subsidies in Lebanon are not well-targeted and benefit mainly higher income groups. Additionally, as evident in the previous section, even under conservative assumptions, phasing-out fuel subsidies would create large savings that could be used to compensate the population. If only 20% from the saving of the subsidy reform are used to compensate the population, then the average Lebanese household would receive USD 600 annually. This is not trivial considering the median annual household income in Lebanon is USD 13,000[14].

[14] According to Gallup, Byblos Bank Research: http://www.byblosbank.com/Library/Files/Lebanon/Publications/Economic%20Research/Lebanon%20This%20Week/Lebanon%20This%20Week_339.pdf

An optimal mitigating measure to avoid adverse impacts on the poorest households in the country would be to allocate a special social fund that can ear-mark part of the savings from the phasing-out, to be invested for example in sustainable public transportation, healthcare and education, benefiting the lowest income categories.

4.4. Economic impact

It is imperative to estimate the effects of subsidy reform on macroeconomic variables such as inflation and Gross Domestic Product (GDP), based on which mitigating measures could be proposed to contain any expected adverse effects on the economy. Partial-equilibrium as well as general-equilibrium models have been used to study the impacts of fossil-fuel subsidy reform. These models compare factors such as projected emissions and economic activity if subsidies were removed to "Business as Usual (BAU)" emissions and economic activity (Koplow and Dernbach, 2011). In this study, a simple input-output table of GDP reading is available to study the effect on the productive sector, and the Consumer Price Index (CPI) is used to analyze the impact on inflation.

Impact on the productive sector

At the incidence where electricity tariffs will increase to 14 US¢/kWh by 2020 and 20 US¢/kWh by 2025, and the EDL subsidy is removed, the impact on the productive sector in Lebanon will be stronger for energy-intensive sectors. According to the input-output table for intermediate consumption (Annex II), the single most highest impact will be on the manufacture of petroleum, chemicals, rubber and plastics industries. For this product category, electricity has a share of 40% of the total intermediate consumption level[15]. It should be noted that the use of this product category is divided as follows: 54.3% go to intermediate consumption, 36.3% to household consumption and 9.4% to exports. However, when demand is met and therefore the electricity tariff is raised, the dependency on expensive private generators will be reduced since it will be possible to rely on the national electricity network.

[15] Intermediate consumption is the total monetary value of goods and services consumed or used up as inputs in production by enterprises.

Inflation hike

A basic approach to analyze the impact of rising fossil fuel prices is adopted (following the suggested subsidy reforms) on inflation levels utilizing the CAS Consumer Price Index (CPI)[16]. It is assumed that a percentage rise in fuel or electricity end-consumer prices will have a direct impact on the price component of that category in the CPI. The results are displayed in Figure 8 below, showing an upward potential shift in inflation levels due to fuel subsidy phasing-out.

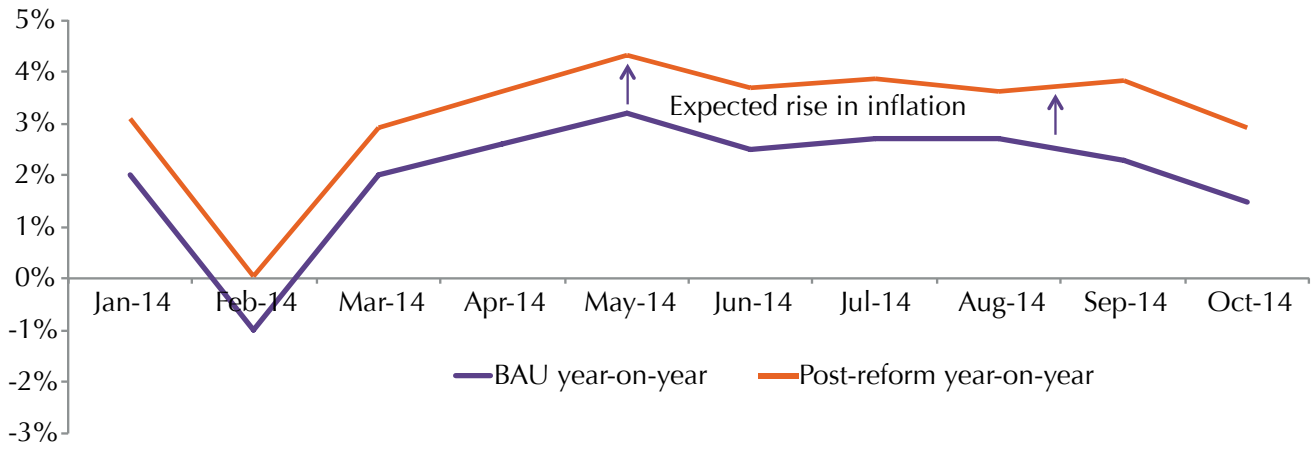

Figure 8: Impact of subsidy reform for gasoline and diesel oil (transport) on inflation levels

Note that the above calculations have static assumptions with regard to phasing-out, and that if subsidies are phased out over a period of 5 to 10 years, the inflation impact is expected to be less pronounced.

4.5. Climate change impact

The climate change impact of fossil fuel subsidies is analyzed through projected changes in fuel consumption following phasing-out of subsidies as proposed in the roadmap (Figure 4). Consumption changes are then utilized to calculate potential reductions in Greenhouse Gas (GHG) emissions. It is important to note that post phasing-out scenarios are compared to future scenarios with certain sector reforms and not to the BAU scenario.

In the power sector, it is assumed that energy supply will meet demand by 2020 with an end-consumer tariff of 14 US¢/kWh[17]. Incentives to fossil fuels create a disincentive for the development and rapid deployment of renewable energy, and therefore stunt the pursuit of countries for low-carbon growth (Asian Development Bank, 2011). Therefore, in this study, the environmental impact of subsidies compares a case of having no additional renewable energy investments by 2020 to a case with 12% renewable energy. Results show a potential GHG emission reduction by 2.838 million tonnes of CO_2eq. in 2020, constituting 10.45% of total projected emissions from the power sector in 2020.

[16] CAS publishes a quarterly CPI since 1999 with the technical assistance of the International Monetary Fund. These can be found at: http://www.cas.gov.lb/index.php/economic-statistics-en/cpi-en

[17] The current tariff is at 9.3 US¢/kWh.

In the transport sector, demand price elasticities for gasoline and diesel oil are used to project short-term consumption changes in the case where subsidies were removed, and therefore prices rose. Based on a review of 124 developed and developing countries, Dahl (2012) estimates a range of values for the demand price elasticity between -0.11 and -0.33 for gasoline, and between -0.13 and -0.38 for diesel. The conservative estimate of -0.11 elasticity for gasoline and -0.13 elasticity for diesel is selected. Results show that the removal of the gasoline subsidy is expected to lead to 1.411 million tonnes of CO_2eq. in 2020, constituting 11.3% of total emissions from the transport sector.

Table 5: Potential emission reductions from phasing-out of electricity and transport subsidies

Emission reduction potential	Carbon dioxide CO_2 emissions (million tonnes of CO_2)	Methane CH_4 emissions (million tonnes of CO_2eq.)	Nitrous oxide N_2O emissions (million tonnes of CO_2eq.)	Total (million tonnes of CO_2 eq.)
Phasing-out of electricity subsidy (12% target)	2.838	$1.6x10^{-3}$	$7.2\ x10^{-3}$	2.847
Phasing-out of transport fuel subsidies	1.400	$7.3\ x10^{-3}$	$3.7\ x10^{-3}$	1.411

5. Conclusions and recommendations

Fossil fuel subsidies in Lebanon contribute to a significant share of the fiscal deficit. Also, these subsidies are not well-targeted and mainly benefit higher income groups, and even under conservative assumptions, phasing-out would create large savings that could be used to compensate the poorest factions of the population.

Estimated externalities from consuming transport fuels (gasoline and diesel) show that the level of taxes is very low in Lebanon. The economic impact of removing subsidies needs to be further analyzed through a general equilibrium model. A preliminary assessment in this study finds that the impact of a subsidy phase-out on inflation is minimal, and energy-intensive sectors that will be mostly impacted from the price rise will be indirectly compensated by the avoided cost of not using private electricity generation.

Furthermore, the removal of subsidies can add impetus to the renewable energy market in the electricity sector and facilitate reaching the government's 12% renewable energy target by 2020. Also, the removal of subsidies on transport fuel products will aid in shifting the transport sector into sustainability provided that a public transit system exists and is efficient. This will evidently lead to potential reduction in GHGs from the electricity and transport sectors.

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Annex I

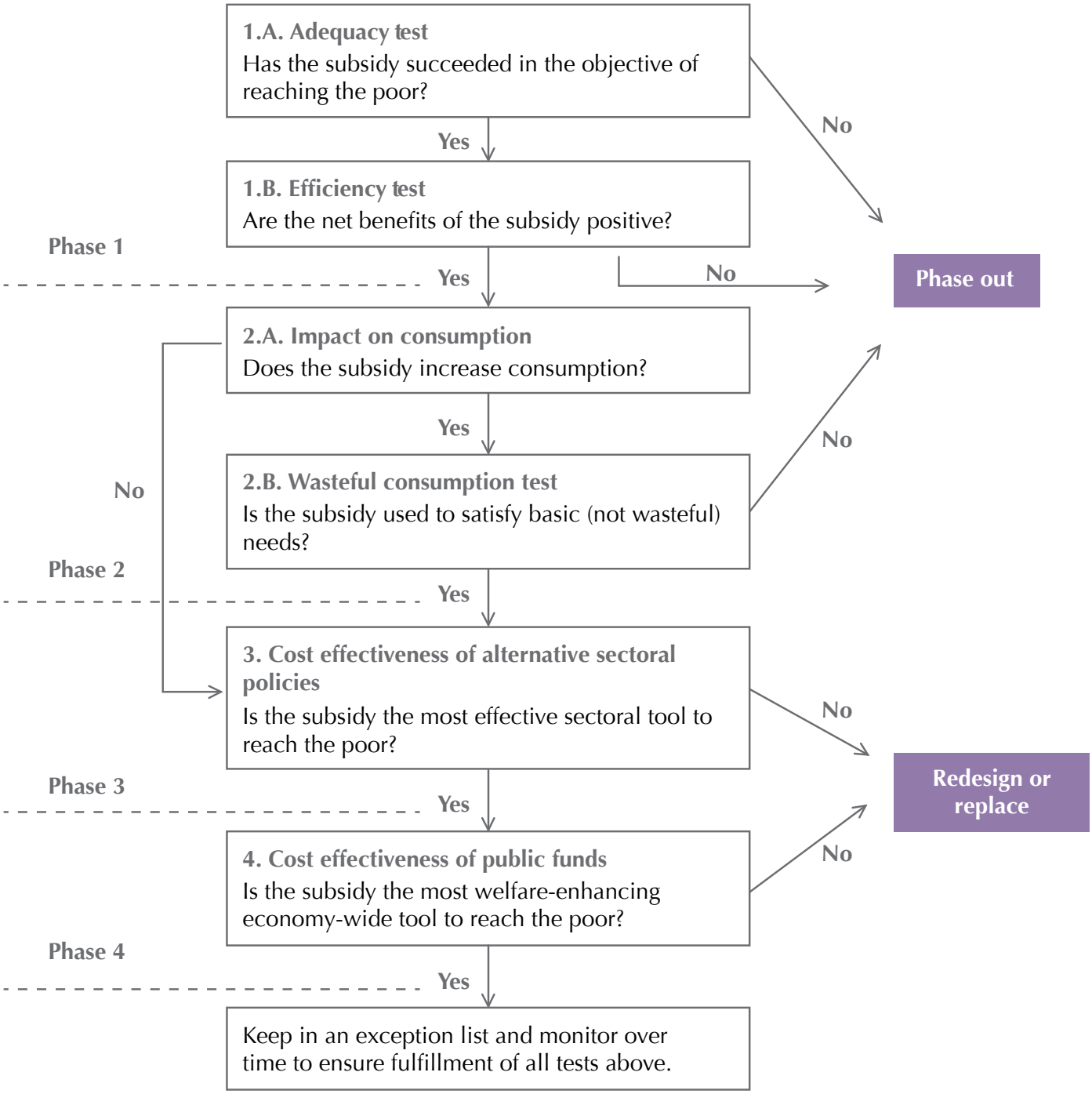

Figure 9: Subsidy decision tree

Source | IMF-OECD-WB, 2010

Annex II

Table 6: Production and electricity input (2011)

	Total (LBP billion)	Electricity (LBP billion)	Percentage
Total output	105,621	5,037	
Gross added value	55,514	789	
Input/output ratio	47%	84%	
Total intermediate consumption	50,107	4,248	
Agriculture and forestry	1,494	0	0%
Livestock and livestock products; fishing	1,095	0	0%
Mining and quarrying	764	0	0%
Manufacture of food products	1,226	0	0%
Manufacture of beverages and tobacco	256	0	0%
Manufacture of textiles, clothing and leather	545	2	0%
Manufacture of wood and paper products; printing	2,534	30	1%
Manufacture of petroleum, chemicals, rubber and plastics	9,022	3,631	40%
Manufacture of other non-metallic mineral products	2,928	0	0%
Manufacture of metal products, machinery and equipment	6,373	117	2%
Furniture and other manufacturing	592	13	2%
Electricity	1,051	290	28%
Water supply; sewerage, waste management etc.	161	17	11%
Construction	1,725	20	1%
Commercial trade and motor vehicle repairs	660	8	1%
Transport	2,134	18	1%
Accommodation and food service activities	404	6	1%
Information and communication	3,853	22	1%
Financial and insurance activities	3,516	23	1%
Real estate activities	2,432	0	0%
Professional, scientific and technical activities	3,381	23	1%
Administrative and support service activities	2,620	26	1%
Public administration and international	200	0	0%
Education	108	0	0%
Human health and social work activities	261	0	0%
Personal service activities n.e.c.	327	1	0%
Travel credits and debits	445	0	0%

Source | CAS, 2013