ENERGY SUBSIDIES AND CLIMATE CHANGE IN KAZAKHSTAN

Final Draft Report
ENERGY SUBSIDIES AND CLIMATE CHANGE IN KAZAKHSTAN:
Final draft report
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This report is also available in Russian under the title:

Энергетические субсидии и изменение климата в Казахстане

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EXECUTIVE SUMMARY

Kazakhstan’s economy is highly dependent on fossil fuels. In 2011, the oil and gas sector accounted for 24.6% of GDP and 65% of exports. The economy is also highly energy and carbon intensive: for example, in 2010, the carbon intensity of the energy sector was 1.30 kg of CO₂ per unit of GDP, the seventh highest in the world and considerably higher than other emerging economies such as the Russian Federation and China.

The Kazakh Government aims to reduce the energy and carbon intensity of the economy, and diversify its structure beyond the hydrocarbon and mining sectors. On 30 May 2013, it adopted a Green Economy Strategy. Among other things, the Strategy envisages that by 2050 renewable and alternative energy sources will provide 50% of all energy produced in Kazakhstan.

Achieving these policy objectives in a cost-effective manner will require implementation of a comprehensive and coherent set of policies. At present, Kazakhstan is far from having such a set of policies. In particular, significant subsidies are provided to the energy sector which impedes the transition towards a greener model of development. Such subsidies, as a rule, create market distortions and result in a range of negative environmental, economic and social impacts.

In order to support policy reform, this study identifies energy subsidies in Kazakhstan that may be environmentally harmful and economically wasteful, specifically, subsidy schemes for oil and petroleum products, gas, coal and electricity and heat generation. Based on modelling results, the study also examines the magnitude of subsidies provided through the heat tariff and their linkage to greenhouse gas emissions. This scheme was selected for in-depth analysis due to an important contribution to the generation of greenhouse gas emissions and its economic and social significance.

The study uses the World Trade Organisation definition of a subsidy, which, in addition to being internationally accepted, has been largely transposed into national legislation following the Customs Union established with the Russian Federation and Belarus. The study applies the methods developed by the OECD and IEA for identifying, estimating and assessing energy subsidies and other forms of support.

Subsidy identification and estimation

The study shows that most types of support schemes used in OECD countries are also present in Kazakhstan, and that consumer subsidies predominate in quantitative terms. Direct grants to producers are not significant, but because of missing data, it was not possible to estimate whether other forms of producer subsidies are provided. This is due to a lack of information, particularly on tax expenditures, and also to the low transparency about the support provided to energy producers by the national sovereign wealth fund.

The IEA has estimated that consumer subsidies for energy amounted to USD 5.85 billion in 2011, equivalent to 3.3% of GDP. Most of these subsidies were for consumption of oil and petroleum products (55%), electricity (30%), and coal (10%). The main consumer subsidy programme identified was the indirect subsidy for diesel fuel used by farmers. These estimates are made using the price-gap approach, which estimates the difference between domestic and international fuel prices.

In terms of fuel prices, the low domestic price of crude oil (less than twice the export price) and diesel has created incentives for oil producers to export oil and oil products. This has resulted in significant domestic shortages of these products, particularly at harvest times. To address this problem, the government has started importing petroleum products from the Russian Federation (which have turned out to be more expensive than domestic products), and imposed export bans on diesel and low-octane gasoline
during the harvest period. To help farmers, as the most affected group, the government has regulated the prices at which agricultural users can buy diesel. In 2010-12, these export bans resulted in discount of about 10% for agricultural producers compared with the average market price of diesel fuel, equivalent to about KZT 6 billion or USD 40 million per year. Such government controls depress investments in the oil-refining sector.

Direct budgetary support for electricity and heat consumers has largely been eliminated. However, support has been provided indirectly by regulating electricity and heat tariffs and keeping them below the full cost of provision of the service.

The review of budgetary spending at the national level indicates that the scale of direct producer subsidies is not significant. However, there are direct investment subsidies for the development and modernisation of energy infrastructure, and for the development of the oil and gas sector. In the period 2009-15, they are expected to total about USD 2.19 billion. Direct support to the operation and maintenance costs of energy (electricity and heat) producers in the period 2008-12 was not significant either - USD 0.1 billion.

These figures are probably a significant underestimate of the total volume of producer support for the energy sector as they do not take account of direct and indirect support provided through the Sovereign Wealth Fund, Samruk Kazyna, and some of its subsidiaries, such as the Kazakhstan Investment Fund JSC, the National Innovation Fund JSC and the Kazyna Capital Management JSC. These bodies provide support for investments in Kazakh companies involved in oil refining and the development of oil and gas infrastructure. Samruk Kazyna owns a number of major energy companies e.g. KazMunaiGaz (the state oil and gas company) and Samruk Energy (the major energy producer).

The adoption of the new Tax Code in 2009 largely eliminated tax expenditures (tax concessions and privileges) to producers. However, a number of Production Sharing Agreements (PSAs) that predated this law remain in effect, including for the three biggest oil developments. Under PSAs some regular taxes, royalty payments and other charges are waived or replaced by sharing the profit between private investors and the state. Such arrangements are viewed as conferring a subsidy by some governments, including in the Russian Federation. Taking account of these other forms of support would further increase the overall estimate of producer energy subsidies.

**Modelling the impact of consumer subsidies in the district heating sector**

The linkage between low consumer tariffs for domestic heating and greenhouse gas (GHG) emissions was examined to give some insights into possible reform options. The starting point for the analysis was the current level of tariffs and revenues for the country’s district heating systems. On this basis, two scenarios were examined: in the first (“the heating comfort scenario”), the heat tariff was set at a level which leads to a decrease in heat consumption and subsequently to a lower heat temperature in dwellings (but not lower than 18°C, which is generally accepted as the minimum level of heating comfort for households); and in the second (“the affordability scenario”), a higher heat tariff was set equal to the affordability level of heat consumption for residential consumers.

The amount of subsidy in these two scenarios was calculated as the difference between the revenue generated at the current tariff and that generated by the increased tariff in each scenario. This assumes that, under current conditions, the increased tariff is not cost-reflective and is covered in some way by the state. As such, it provides a basis for discussing how tariffs could be reformed and who would pay. This approach is analogous to the price gap method used e.g. by the International Energy Agency (IEA) to calculate consumer subsidies. Ideally, the subsidy level would be calculated by comparing actual costs and revenues. However, this was not possible due to lack of data. This limitation should be taken into account when assessing the findings.
Tariffs in Kazakhstan are based on square meter of living space and not on actual consumption. Thus, improving the tariff setting methodology and introducing heat-energy metering at least at a building level are major prerequisites to reforming subsidies in the sector. Experience from other countries shows that such reforms, coupled with the implementation of energy efficiency measures in the residential sector can result in significant economic (reduced heat bills) and environmental (reduced GHG emission levels) benefits for consumers and society.

Modelling the reform scenarios of the subsidy provided through regulated heat prices shows that in total, the removal of current energy subsidies, under the heating comfort scenario, could save up to 12.9 million MWh annually. This is equal to 5.6 million tonnes of CO2 emissions annually, or 12% of the annual CO2 emissions from the district heating sector. In the case of the affordability scenario, the total reduction in energy production following subsidy removal could save up to 41.8 million MWh annually. This is equal to 18.4 million tonnes of CO2 equivalent emissions annually, or 39% of annual CO2 equivalent emissions from the sector. These are significant amounts that may contribute positively to the government’s ambitious targets of reducing the levels of greenhouse (GHG) emissions in the country; the share of the district heating sector in GHG emissions is close to 20% of the national total. There would also be additional environmental gains due to reduced impacts from local air pollutants generated by the use of low quality coal in district heating. The analysis also indicates that the regulated prices of district heat services lead to underinvestment and a further deterioration of the power infrastructure. This in turn reinforces demands from the sector for additional subsidies.

The analysis also examined the social impacts of the support measures. It showed that, as a share of household disposable income, low heat tariffs benefit the consumers in the richer cities, such as Astana and Almaty, rather than people in the poorer regions of the country.

The overall conclusion is that these subsidies hold back the economic development of the sector, are an ineffective way of helping the poor, and stimulate wasteful energy consumption and higher GHG emission levels. Further analysis of the economic and environmental benefits that could be generated by reforming energy subsidies is warranted. This analysis should take account of possible adverse social impacts and how they should be addressed.

**Major recommendations**

The major recommendations for reforming energy subsidies that emerge from this study include:

1. Strengthen the transparency and rules for disclosing information for investment programmes financed through the state budget, including through support provided by Samruk Kazyna; clarify who benefits from public support; consider regularly preparing tax expenditure reports that estimate the revenue foregone by the state because of various tax concessions.

2. Accelerate tariff reform in the district heating sector; gradually introduce tariffs to cover first operation and maintenance, and eventually investment costs, while providing targeted support for adversely affected poorer households.

3. Prepare a clear and credible timetable for the implementation of reforms to enable energy producers, distributors and households to adjust, for example, by investing in energy-efficiency measures.
ABBREVIATIONS AND ACRONYMS

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
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<tbody>
<tr>
<td>APEC</td>
<td>Asia-Pacific Economic Cooperation</td>
</tr>
<tr>
<td>ARNM</td>
<td>Agency for the Regulation of Natural Monopolies of Kazakhstan</td>
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<td>ASCM</td>
<td>Agreement on Subsidies and Countervailing Measures (WTO)</td>
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<td>BLS</td>
<td>Building level substation</td>
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<td>CAPEX</td>
<td>Capital expenditure</td>
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<td>CES</td>
<td>Common Economic Space</td>
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<td>CHP</td>
<td>Combined heat and power (generation or plant)</td>
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<td>CSE</td>
<td>Consumer support estimate</td>
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<tr>
<td>CGE</td>
<td>Computable General Equilibrium (model)</td>
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<td>DH</td>
<td>District heating</td>
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<td>EAP Task Force</td>
<td>Task Force for the Implementation of the Environmental Action Programme</td>
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<tr>
<td>EBRD</td>
<td>European Bank for Reconstruction and Development</td>
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<td>EECCA</td>
<td>Eastern Europe, Caucasus and Central Asia</td>
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<td>EHS</td>
<td>Environmentally harmful subsidy</td>
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<td>EITI</td>
<td>Extractive Industry Transparency Initiative</td>
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<td>EPT</td>
<td>Excess profit tax</td>
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<td>EU</td>
<td>European Union</td>
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<td>FDI</td>
<td>Foreign direct investment</td>
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<tr>
<td>GDP</td>
<td>Gross domestic product</td>
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<td>GHG</td>
<td>Greenhouse gas</td>
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<td>GSI</td>
<td>Global Subsidy Initiative</td>
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<tr>
<td>HDD</td>
<td>Heating degree day</td>
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<td>HOB</td>
<td>Heat only boiler</td>
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<tr>
<td>IEA</td>
<td>International Energy Agency</td>
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<tr>
<td>IMF</td>
<td>International Monetary Fund</td>
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<tr>
<td>KEGOC</td>
<td>The National Energy Transmission Company of Kazakhstan</td>
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<tr>
<td>KMG NC</td>
<td>National Company KazMunaiGaz (oil and gas company)</td>
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<tr>
<td>KZT</td>
<td>Kazakh Tenge (Kazakh currency)</td>
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<tr>
<td>MEDR</td>
<td>Ministry of Economic Development and Trade of Kazakhstan</td>
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<td>MEMR</td>
<td>Ministry of Energy and Mineral Resources of Kazakhstan</td>
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<tr>
<td>OECD</td>
<td>Organisation for Economic Co-operation and Development</td>
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<tr>
<td>O&amp;M</td>
<td>Operation and maintenance (expenditure)</td>
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<tr>
<td>OPEC</td>
<td>Organization of the Petroleum Exporting Countries</td>
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<tr>
<td>OPEX</td>
<td>Operation expenditure</td>
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<tr>
<td>PPP</td>
<td>Purchasing power parity</td>
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<td>PSA</td>
<td>Production sharing agreement</td>
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<td>PSE</td>
<td>Producer support estimate</td>
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<td>SEZ</td>
<td>Special economic zone</td>
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<td>SWF</td>
<td>Sovereign Wealth Fund</td>
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<td>UNDP</td>
<td>United Nations Development Programme</td>
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<td>USD</td>
<td>US Dollar</td>
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<tr>
<td>VAT</td>
<td>Value added tax</td>
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<td>WTO</td>
<td>World Trade Organization</td>
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<td>Units</td>
<td>Carbon dioxide</td>
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<td>Gigacalories</td>
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<td>Giga Joule or Gigajoule</td>
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<td>Giga Watt</td>
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<td>Gigawatt hour</td>
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<td>Kilocalories</td>
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<td>Kilojoule</td>
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<td>Kilocalories</td>
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<td>Kilogram of oil equivalent</td>
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<td>Kilowatt</td>
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<td>Kilo watt per hour</td>
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<td>Square meter</td>
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<td>Cubic meter</td>
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<td>Megawatt</td>
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1. The economic cost of energy subsidies can represent a significant burden on a country’s finances, can weaken its growth potential and encourage wasteful energy consumption. Governments support the production or consumption of energy in many ways: by providing grants, low-interest loans or tax exemptions, or by establishing price controls that lower the price received by energy producers or lower the price paid by energy consumers.

2. Subsidies to energy, by encouraging the use of fossil fuels and discouraging the production of low-carbon fuels, can lead to increased carbon dioxide and other greenhouse gas (GHG) emissions. Empirical studies suggest that the potential emissions reductions from removing consumer subsidies for fossil energy could be substantial. Moreover, such a move could bring major economic benefits, too. In many cases, the social costs of eliminating those subsidies would be small.

1. Objectives of the report

3. The main objective of the project is to raise the awareness of the Kazakh authorities of the economic and environmental impacts of wasteful energy subsidies. This is done by reviewing and estimating the volume and coverage of such subsidies and identifying, first and foremost, their environmental impacts, particularly with regard to GHG emissions related to fossil fuel production and consumption. The analysis is supported by a model for quantifying the economic and social impacts of implicit subsidies provided through regulated consumer prices in the residential district heating sector.

4. The project is designed so as to have a significant multiplier effect; using the EAP Task Force framework, the experience gained in Kazakhstan will be synthesised and disseminated in other countries in Eastern Europe, Caucasus and Central Asia (EECCA). This will provide the basis for conducting similar work in these countries.

2. International developments with energy subsidy reform

5. Energy subsidy reform has received a lot of attention internationally over the past several years, particularly in the context of the recent global financial and economic crisis. Within this context, many governments see the phasing out of such subsidies as a major policy instrument that can contribute to overcoming some of the consequences of the crisis.

6. The debate on rationalising and phasing-out wasteful energy, and specifically fossil fuel, subsidy schemes has particularly intensified in the context of climate change negotiations and G20 discussions. The call to phase out fossil fuel consumer subsidies was directed at all nations that subsidise fossil fuels, not only at the G20 countries themselves, taking into account the specific circumstances of each economy.

1 The Group of Twenty is an informal group of finance ministers and central bank governors from 19 major economies: Argentina, Australia, Brazil, Canada, China, France, Germany, India, Indonesia, Italy, Japan, Korea, Mexico, the Russian Federation, Saudi Arabia, South Africa, Turkey, the United Kingdom, the United States and the European Union, with representatives of the International Monetary Fund and the World Bank.
The Russian Federation, which is holding the Presidency of G20 in 2013, has made the phase out of fossil fuel subsidies a major issue for the agenda of the next G20 Leaders' Summit which will be held in St. Petersburg in September 2013.

7. Through its Green Growth Strategy, the OECD has also made the reform of such subsidies a major policy objective for the developed countries. The OECD also contributes to this policy effort by maintaining an inventory of all measures supporting the production and consumption of fossil fuels in 34 member countries (OECD, 2013).

8. Similarly, the issue of wasteful energy subsidies has come up in discussions held at the Asia-Pacific Economic Cooperation (APEC) meetings. In the European Union context, the “Roadmap for a resource efficient Europe” calls on member states to phase out environmentally harmful subsidies by 2020, with due regard to the social impact of such reforms, in particular on the poor. As part of this process, the member states should identify the most significant environmentally harmful subsidies (EHS), prepare plans and timetables to phase out EHS, and report on progress by 2013. In addition, subsidies are an important issue in the framework of the trade negotiations of the World Trade Organization (WTO) and are a particular concern for those EECCA countries that have chosen to join the WTO. All these international processes are helping to raise the profile of environmentally harmful subsidies in general and energy subsidies in particular on the international agenda.

9. While there is an on-going debate in the OECD and some developing countries, there is, generally, little discussion of the need to reform specific energy subsidy schemes in the EECCA countries, including in Kazakhstan. Despite some assessment of the magnitude of energy consumer subsidies (done by the International Energy Agency (IEA), using the price gap approach) and except for the Russian Federation, where a first inventory of subsidies to upstream oil and gas activities has been prepared (Gerasimchuk, 2012), comprehensive studies on the identification, measurement and impact assessment of environmentally harmful subsidies in the EECCA countries are generally lacking. The World Bank has also recently published a couple of overview studies on different types of energy subsidies which include some of the EECCA countries as well (see Laderchi, C.R et al., 2013 and Kojima, 2013). Through the experience of Kazakhstan, this analytical study aims to contribute to the debate on energy subsidies in the EECCA region and the efforts towards their rationalisation.

3. Method

10. The overall method for conducting the analysis follows the procedure described in the OECD report “Analysing Energy Subsidies in the Countries of Eastern Europe, Caucasus and Central Asia”. Box 1 presents the main stages in organising the energy subsidy work at a country level in the EECCA region.

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2 APEC is a forum for 21 Pacific Rim countries that seeks to promote free trade and economic cooperation throughout the Asia-Pacific region. APEC was established in 1989 in response to the growing interdependence of Asia-Pacific economies and the advent of regional trade blocs in other parts of the world. Of all EECCA countries, only the Russian Federation is a member of APEC.
Box 1. Organising energy subsidy work in the EECCA countries

The proposed approach for working on environmentally harmful subsidies in the energy sector in the EECCA region consists of the following major steps:

- Launch a country stakeholder dialogue to agree on the scope and focus of the work, including agreeing on the subsidy definition used in the analysis and identifying information sources;
- Recognise the subsidy scale by reviewing price-gap studies for a given EECCA country;
- Develop and use a questionnaire to support data collection at a country level;
- Identify and perform initial screening of subsidy schemes supporting coal, oil, natural gas, electric energy and heat generation, using the OECD Matrix (see Annex 3) and the Global Subsidy Initiative (GSI) identification methodology (see Annex 4);
- Select and agree on the fuels/commodities/sectors and specific energy subsidy schemes (coal, oil, gas, electricity or heat), based on the assessment of their likely impact on GHG emissions, to undergo an in-depth analysis;
- Measure levels of subsidies allocated to the selected fuel/commodity/sector, applying existing tools as appropriate (e.g. the price-gap approach, the Producer Support Estimate-Consumer Support Estimate framework);
- Evaluate the effectiveness of the selected subsidy schemes;
- Develop/adapt an economic model to assess scenarios for CO₂ reductions resulting from support scheme reforms;
- Apply the model and evaluate the impacts of subsidy phase-out on GHG emissions, public budgets and the broader economy (e.g. demand reactions to changes in costs and prices of energy products as a result of subsidy removal, investment choices). To the extent possible and depending on availability of data and information, also consider the impact of subsidy removal on poor households and industries subject to international competition;
- Define barriers to subsidy reform, identifying drivers for reform in close cooperation with government officials, experts and stakeholder group representatives;
- Prepare an analytical report and policy recommendations on a possible reform path and launch discussions within the government and with key stakeholders.

Source: OECD (2013a).

11. The study was implemented in co-operation with the Ministry of Environmental Protection of Kazakhstan. A comprehensive set of background documents concerning, and relevant to, the energy sector and various support schemes were examined by the review team. These included, among others, the Budget and Tax Codes, the annual budget laws for the past several years, the Customs Regulations, a number of sectoral laws and regulations. Various public accounts and official documents related to budget planning and reporting, academic literature and media items were also reviewed. In addition, during the field missions, the project team met with stakeholders from various ministries involved in shaping the country’s energy policy. The study has also benefitted from interviews and discussions with representatives of international organisations and financing institutions active in Kazakhstan.
The focus of the analysis is on government support schemes to producers and consumers of fossil fuels. The study thus covers the extraction sector (coal, natural gas and crude oil), refined petroleum products and electricity and heat generation (both its production and its consumption). Following the initial screening of various information sources and discussions, one specific subsidy scheme was selected to undergo further analysis, namely support provided to consumers through the under-pricing of district heating services.

3.1. Subsidy definition

To conduct the analysis, the project team has used a number of analytical tools developed by the OECD and other international organisations working on subsidy issues.

Addressing the issue of energy subsidies involves resolving questions related to definitions, measurement and evaluation techniques. The logical approach to analysing subsidies includes three stages: identification of subsidy schemes, measurement of their size and evaluation of the subsidy impact (in economic, social and environmental terms). This approach has been broadly, and to the extent possible, applied in this study as well.

Although the term subsidy is widely used in economics and national and international law, it remains a very elusive concept. The concept of subsidy has evolved over the years. Box 2 below briefly discusses the modern interpretation of subsidy.

Box 2. What is a subsidy?

The simplest and narrowest definition describes subsidy as a direct budgetary payment by a government to a producer or consumer. However, subsidies exist in a variety of different and complex forms – from direct budgetary transfers, to various tax concessions (known as tax expenditure) and price control mechanisms (including also through border measures such as tariffs and quotas). The subsidy definition has sometimes been further expanded to include also non-internalised externalities, such as pollution or habitat damage, as well as government uncollected and under-collected revenue which can result, for example, from un-taxed resource rents or royalty relief associated with the exploitation of publicly-owned or managed resources. As such, subsidies are often used for controlling and sharing the risks and rewards of economic activities. An operational definition of subsidies needs to reflect this feature as well: subsidies are government-provided goods or services, including risk-bearing, that would otherwise have to be purchased in the market.

In the broad sense, the under-pricing of services is also considered a subsidy. This is the case when prices of goods or services do not reflect the full costs of their production usually through exclusion of certain financial or economic costs.

Several international organisations have contributed to defining the boundaries of the concept of “subsidy”, including, among others, the OECD, the WTO, the European Union, the IEA, the World Bank, the International Monetary Fund (IMF), and the Global Subsidies Initiative. Despite certain differences in the definitions developed by these organisations, they largely reflect the essential elements of a subsidy, as understood today by economists, and constitute a useful guidance for national governments. Of all the subsidy definitions that exist, the WTO definition is most often used as a starting point in subsidy analysis due to its legally binding character for the WTO member countries (more than 150).

Source: OECD (2013a).

The WTO definition is detailed in the WTO’s Agreement on Subsidies and Countervailing Measures (ASCM), which is part of the documents package that any country acceding to the WTO usually signs, as will be the case of Kazakhstan.
17. Under Article 1, the ASCM determines that for all types of economic activities (not only for the energy sector), four types of subsidies exist, where:

- Government provides direct transfer of funds or potential direct transfer of funds or liabilities;
- Government revenue is foregone or not collected;
- Government provides goods or services or purchases goods;
- Government provides income or price support, and
- A benefit is conferred.

18. The WTO definition excludes two types of subsidies: (i) subsidies for general infrastructure and (ii) subsidies provided through tariff and non-tariff barriers which are regulated elsewhere.

19. The Global Subsidies Initiative (GSI) definition is largely based on the WTO ASCM definition. According to the GSI definition, a subsidy covers any preferential treatment – financial and otherwise - provided by the state to consumers and producers. Annex 4 provides an illustrative list of the subsidy types developed by the GSI.

20. The IEA definition focuses specifically on energy subsidies which it describes as “any government action that concerns primarily the energy sector that lowers the cost of energy production, raises the price received by energy producers or lowers the price paid by energy consumers” (IEA, 2006). In addition, a useful way of considering energy subsidies is to recognise that “energy” actually involves several distinct goods and services: the actual extraction and production of fossil fuels and their further transformation, the actual use of energy, the connection to a source of energy, the productive capacity for supplying the energy, and the underlying knowledge affecting the performance of both energy supply and energy efficiency.

21. Once subsidy schemes are identified, their size needs to be measured. There are different types of measurement tools that analysts use in trying to assess the size of subsidy schemes. The most common one, used in this analysis as well, is the price-gap approach, designed by the International Energy Agency. Price-gap is a generic term referring to a family of indicators based on the calculation of the gap between the domestic energy/fuel price and world reference prices. In principle, price-gap is used in calculating both consumer and producer support which affect final prices. However, not all support schemes directly affect final prices. In such cases, the Producer Support Estimate (PSE) and the Consumer Support Estimate (CSE) (developed by the OECD) are applied. These two methods are particularly useful when actual budgetary transfers and revenue foregone by the government and other economic entities are estimated. Annex 3 provides an organising framework for examining different types of government support to fossil fuels, reflecting their formal incidence (subsidy recipient) and the transfer mechanisms used.

22. To evaluate the impact of subsidies and their potential reform on the GHG emission levels, public budgets and the poor, a small Excel-based model was designed. This is a simplified partial equilibrium model. The features of the model, its elements and data needed to run the model application are described in detail in Annex 1 to this report.

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3 For a more detailed discussion on specific methods and tools for identification, measurement and evaluation of subsidy schemes, see OECD (2013a).
3.2. Definition of subsidy in the national legislation of Kazakhstan

23. One particular issue that needs attention in the context of this study is the definition of subsidy in the national legislation. Until recently, Kazakhstan did not have a clear legal definition of subsidy. Instead, the Budget Code uses a number of terms to denote different government support interventions. These include, among others, subventions, support, targeted transfers, targeted current transfers, budget investments, budget credits. It has to be noted though that all these are simply different types of subsidies.

24. More recently, the Agreement on unified rules for the provision of subsidies to the industry, prepared as part of the Customs Union legislation, which entered into force on 1 January 2012, and was signed by Belarus, Kazakhstan and the Russian Federation, provides a clear definition of what constitutes subsidy and how it should be interpreted. This definition states that subsidy is a government transfer that confers benefits to a recipient. The subsidy can take the form of:

- A direct transfer of funds (non-repayable loans (that is grants), obtaining shares in the statutory capital of an enterprise (or equity injections), loan guarantees;
- Tax expenditure (or revenue from taxes forgone by the government fully or partially), such as tax advantages, debt write-off;
- Provision of goods and services, excluding the goods and services targeted at the support and development of general infrastructure;
- Purchase of goods procured by the state;
- Any other form of income or price support which directly or indirectly reduces the import of manufactured goods from other countries or increases the export of goods to the territory of other countries.

25. The spirit of this definition is very close to the WTO definition of subsidy. This is not so surprising given that the Russian Federation has already joined the WTO and that Kazakhstan is on its way to join as well. It follows that some of the Customs Union legislation needs to be aligned with that of the WTO.

26. It has to be noted that the identification and measurement of energy subsidies in Kazakhstan was significantly limited by the lack of relevant data and information. Most data are unavailable and ministries’ web-sites do not always provide access to such data. Even data and information, which are considered public domain, such as government budget programmes are not easily accessible. Improved data and information availability is one policy area that needs further government attention.

4. Structure of the report

27. The report consists of four major chapters. Part I provides the policy context for analysing energy subsidies in Kazakhstan, including a discussion of the macroeconomic situation in the country and an overview of the energy sector (excluding district heating which is discussed separately). Part I also briefly looks at the climate change policy of the government.

28. Part II provides an inventory of the major support schemes in the energy sector identified as part of the analysis in terms of government support to both production and consumption of fossil fuels, including in the electricity and heat generation sector. It also discusses some of the major mechanisms for channelling subsidies to the energy sector, such as the sovereign wealth funds of Kazakhstan and production sharing agreements.
29. **Part III** provides an overview of the district heating sector in Kazakhstan, the pricing of district heating services as well as the main subsidy schemes that go to the sector. This discussion lays the basis for further analysis of the implicit subsidy provided to consumers by keeping the heat prices low. Part III explains the choice of this subsidy scheme for subsequent in-depth assessment.

30. Estimating the magnitude of the subsidy provided to consumers in the heat generation sector is in the focus of the discussion presented in **Part IV** of the report. This part also discusses the environmental, economic and social impacts of subsidy removal. The model developed as part of this project and used to simulate these impacts is also discussed in Part IV.

31. The report finishes with a summary of the major findings that emerge from the analysis and suggests possible options for improving the management of government support to the energy sector in Kazakhstan.
PART I. THE POLICY CONTEXT FOR ANALYSING ENERGY SUBSIDIES

32. Following independence, Kazakhstan quickly carried out macroeconomic reforms and established the legal and regulatory structure of a market-based economy. Since then, the country has liberalised prices, privatised major assets of the economy, including in the energy sector, and deregulated wholesale prices.

33. This chapter provides information on the general macroeconomic situation in Kazakhstan and strategic plans for its development. The chapter also presents a brief overview of the energy sector (excluding district heating which is discussed separately) as well as discusses the current climate change policy in Kazakhstan. All these elements come together to set the framework in which government support to the energy sector can be provided. They also set the background against which support to the sector can be analysed.

1. Macroeconomic situation and strategic plans for development

34. Establishing Kazakhstan as one of the 30 most competitive economies in the world constitutes a top priority in the national development strategy. A key component of this process is achieving sustainable economic growth while reducing pollution levels and making rational use of the country’s rich natural resources, as indicated in the national strategy “Kazakhstan 2050”. With the aim of further strengthening and diversifying its economy, in May 2013, Kazakhstan adopted its Green Economy Strategy. Among other things, the Strategy envisages that by 2050 renewable and alternative energy sources will provide 50% of all energy produced in Kazakhstan.

1.1. Macroeconomic situation

35. The first decade of independence was challenging in Kazakhstan due to, among other factors, hyperinflation and the effects of the 1998 Russian crisis that hit Kazakhstan particularly badly. In contrast, the beginning of the century saw a dramatic improvement in the country's economy. By the early 2000s, oil began to flow in large quantities just as world oil prices rose and the oil exports contributed to the start of the significant economic growth that Kazakhstan enjoyed during this decade. Revenues from the energy boom translated into an increased state budget.

36. Kazakhstan’s strategy towards the development of its energy sector in this first decade of independence departed to a significant extent from that of other states similarly well-endowed with natural resources. While many states choose to guard these resources in state ownership and control, Kazakhstan rapidly privatised the bulk of its energy sector and invited direct international involvement in the development, production and exploration of its energy reserves. According to the World Bank, between 1993 and 2011, the country attracted over USD 250 billion in Foreign Direct Investment (FDI) into the mineral and energy sectors, of which about 30% were in the oil and gas sector.

4 Before the year 2000, Kazakhstan was not a significant producer of oil and gas, although in 1990 the Gorbachev government signed the largest foreign investment deal in Soviet history to develop the Tengiz oilfield in Kazakhstan's portion of the Caspian Sea.
Cumulative foreign investments, high oil and commodity prices, and conservative fiscal policies allowed Kazakhstan to achieve economic stability and spectacular growth in the first eight years of the new millennium. Boasting one of the highest growth rates in the world, Kazakhstan’s GDP grew by an average 9% or more per year between 2000 and 2007. As a result, Kazakhstan joined the group of the upper middle income countries.

After a period of very strong economic growth in the mid-2000, the recent global financial and economic crisis was particularly detrimental to Kazakhstan. In Kazakhstan, it started with the real estate bubble, which burst in 2007, leaving the country with a banking crisis. Kazakhstan was suffering from a high number of non-performing bank loans that had to be written off or restructured (non-performing bank loans accounted for 27% of total gross loans in 2010). Growth in 2009 dropped significantly, down to about 1%, but it quickly resumed the following year going back to about 8%.

The economy was saved due to the generous fiscal stimulus package that the government put in place and the subsequent bouncing of world energy prices back to higher levels. The government used the National Oil Fund to bail out the problematic banks but also to support industry and invest in infrastructure. The anti-crisis plan, launched in late 2008, pledged USD 10 billion, or 9.5% of GDP, largely funded from the National Oil Fund and channeled through the Sovereign Wealth Fund (SWF) Samruk-Kazyna. This was successful in limiting the decline in economic growth without stimulating inflation or accumulating public debt. This achievement was remarkable given that oil prices fell dramatically in 2008-2009 from a peak of USD 145 per barrel in July 2008 to USD 38 by December of that year, before recovering to USD 80 at the end of 2009 and USD 100 in January 2011 (OECD, 2013b). According to the International Monetary Fund (IMF), with an estimated growth rate of above 7% (7.3% in 2010 and 7.5% in 2011), Kazakhstan ranked among the top ten fastest-growing economies in that period.

Most recently, in 2011, the economy grew strongly by 7.5% but growth has started to slow down in 2012. According to preliminary EBRD estimates, overall growth slowed to 5.6% (year-on-year) in the first half of 2012 (the World Bank estimates it at an even lower rate of 5%). The banking sector remains weak and non-performing loans now exceed 30% of total loans. Currently, the failure to restore the health of the banking sector is one of the major challenges in Kazakhstan.

The oil and gas industry, as the main driver of Kazakhstan’s economic growth, has contributed largely to the macro-economic stability of the country. This industry will most likely continue to be the main driver in the medium- to long-term. In 2011, the hydrocarbons extraction accounted for more than 25% of GDP (an increase from 10.9% of GDP in 2001) and for 63% of national exports. However, with a high dependence on oil revenues, government revenue is vulnerable to oil price volatility. Despite the fact that it is the largest, the oil industry is not a considerable source of job opportunities as it is capital- rather than labour-intensive. Although the risk of a decrease in oil prices undoubtedly exists, with recent discoveries and development in the Kashagan oil field5, the key role of oil in the economy is likely to persist over the medium and long-term.

1.2. **Strategic plans for economic development**

While growth in Kazakhstan is fuelled by the extractive industries, the government is looking for ways, both domestically and internationally, to diversify the economy and to get better integrated into the world economy.

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5 Kashagan Field is an offshore oil field in the Kazakhstan's zone of the Caspian Sea. The field, discovered in 2000, is located in the northern part of the Caspian Sea and is considered the world's largest discovery in the last 30 years, combined with the Tengiz Field.
43. Kazakhstan has recently embarked upon a “clusters” strategy aimed at boosting “infant industries” to help the economy diversify. It is not yet clear how this policy will be implemented, or how far it relies on market forces and the provision of an adequate investment and competitive climate, as opposed to a pick-and-choose strategy of propping up selected industries. This policy is backed by institutions and government-sponsored funds. These funds include the Investment Fund of Kazakhstan, the Small and Medium Enterprises Development Fund, and the National Innovation Fund. The Development Bank of Kazakhstan is also involved in this policy. Priority sectors are: food, textiles, metallurgy, construction materials, tourism, transport and logistical services, but also downstream oil and gas activities.

44. At the same time, Kazakhstan has initiated a wide-scale privatisation programme (People’s Initial Public Offerings or IPO\(^6\), which will include IPOs of shares in the country’s most attractive national companies and monopolies in the infrastructure and energy sectors. The move is considered a major economic reform aimed at improving the country’s standing, liquidity and economic development over the coming decade, and provide a larger stake in the national wealth to Kazakhstan’s population.

45. The Customs Union and the Common Economic Space are expected to bring various economic benefits to the member states, including to Kazakhstan. The benefits comprise lower tariff and non-tariff trade barriers, an increased market size available to all members, and the liberalisation of services markets by lowering entry barriers for firms and investors from other countries. How to leverage the benefits of economic integration in a regional union dominated by commodity exporters is a particular concern in the Customs Union. However, partly due to the fact that both Kazakhstan and the Russian Federation predominantly export oil and other commodities, the Customs Union is less economically integrated than commonly perceived. However, it is too early to judge to what extent benefits of regional integration within the Eurasian Economic Community may materialise, and whether challenges can be overcome (EBRD 2013).

46. As part of its aspiration to get better integrated in the world economy, Kazakhstan applied to the World Trade Organisation (WTO) back in 1996. It is expected that the negotiation process will be finalised in 2013. At a minimum, WTO accession will require Kazakhstan to bring its practices and policies in line with the WTO rules. The rules and procedures that will be developed as part of the Common Economic Space will also need to take account of the WTO rules and procedures. Altogether, it is generally thought that WTO membership will embed Kazakhstan in an institutional and legal framework that fosters greater transparency and collaboration, including regular subsidy reporting and disclosure which are at the heart of the WTO policy.

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An IPO is a type of public offering where shares of stock in a company are sold to the general public for the first time. Through this process, a private company transforms into a public company. IPOs are used by companies to raise expansion capital and to become publicly traded enterprises.
At the Commonwealth of Independent States Summit in Yalta in 2003, Belarus, Kazakhstan, the Russian Federation and Ukraine agreed to create a Common Economic Space (CES), which would evolve in three stages: the coordination of customs duties and harmonisation of trade and custom regulations; the lifting of current trade barriers and creation of a Customs Union; and the liquidation of internal customs boundaries to be replaced by a common customs boundary and the creation of a supra-national regulating institution. Belarus and Russia even broadened the CES agenda by aiming at a monetary union based on the rouble.

The integration process gained political momentum in November 2009 when Belarus, Kazakhstan and the Russian Federation signed an agreement establishing a Customs Union and started applying a common import tariff from 1 January 2010. Internal border controls were removed, first between Belarus and the Russian Federation and then between Kazakhstan and the Russian Federation. Under the Customs Union framework, import tariff revenues accrue to national budgets in predetermined proportions (with the Russian Federation entitled to 88%, Kazakhstan to 7% and Belarus to 5%, but subject to regular review). The Union is open to other countries providing that they share a common border with the existing members. The Kyrgyz Republic is now considering membership and Ukraine has been invited to join.

The next stage was launched on 1 January 2012 with the creation by Belarus, Kazakhstan and the Russian Federation of the Common Economic Space of the Eurasian Economic Community. It involves developing supranational institutions, modelled explicitly or implicitly on the European Union, headed by the Eurasian Economic Commission, with 8 commissioners responsible for various areas of economic integration. The Commission is expected to gradually assume some of the competencies of the national authorities, including import tariff setting, technical regulations and competition policy.

Key decisions within this supranational framework will be taken by the Council of Country Representatives based on the one country-one vote principle. In some cases decisions require unanimous approval. The decisions of the supranational bodies become legally binding for member countries a certain period after their publication and will prevail over any inconsistent national norms. Any disputes can be taken to the Economic Court of the Eurasian Economic Community, the decisions of which are binding on member states.

The Eurasian Development Bank, based in Almaty in Kazakhstan, has a broader membership beyond the Customs Union countries and includes Armenia, the Kyrgyz Republic and Tajikistan. The Bank currently has an Anti-Crisis Fund programme to help Belarus (subject to policy conditions and regular reviews), under which two disbursements totalling USD 1.24 billion were made in 2011. Tajikistan is also a beneficiary of a USD 70 million programme.

The ultimate goal of the Eurasian Economic Community is free movement of goods, capital and people, as well as the harmonisation of macroeconomic and structural policies. As of 2012, the member countries agreed to codify various existing agreements and treaties by 2015 and then discuss steps towards further integration.

Source: Adapted from EBRD (2013).

2. **Overview of the energy sector**

47. This section focuses on oil, gas and coal extraction and electricity generation. Heat generation is dealt with separately in Part III. Renewables and nuclear energy are not discussed here. Renewables are negligible in Kazakhstan and nuclear energy is virtually non-existent. However, as announced by government officials, Kazakhstan is planning to build its first nuclear power plant, most likely in Aktau, Mangistau region.

2.1. **Oil and gas extraction**

48. With its modern oil sector, Kazakhstan has become one of the fastest-growing oil-producing nations outside the Organization of the Petroleum Exporting Countries (OPEC), along with the Russian Federation, Brazil and Azerbaijan. This substantial growth in Kazakhstan was driven primarily by its ability to bring into the sector international oil majors that provided necessary capital and applied the latest technologies to a resource base that had been explored partially during the Soviet era.
49. The oil and gas industry is responsible for the predominance of exports and fiscal revenue in the country. In a 2012 BP Statistical Review, Kazakhstan ranked 11th globally in the amount of proven oil reserves and 16th in production worldwide. Among the countries of Eastern Europe, Caucasus and Central Asia (EECCA), in terms of oil reserves and oil production, Kazakhstan comes second after the Russian Federation. Kazakhstan's current production is dominated by two giant fields: Tengiz and Karachaganak, which produce about half of Kazakhstan's total output.

50. In 2012, proven oil reserves totalled 30 billion barrels, whilst onshore and offshore possible hydrocarbon dwarf proven reserves are estimated to be 60 - 100 billion barrels coming mostly from the Kazakhstan’s part of the Caspian Sea. Some estimate that the offshore Kashagan field alone may contain up to 50 billion barrels of oil. The Kashagan energy project is the largest and most expensive of its kind in the world. Some sources state that the Kashagan project costs USD 136 billion to develop. Kazakhstan’s vast natural resources are projected to provide 2-3% of predicted global oil demand in the next decade7.

Table 1. Comparison of oil reserves, production and consumption in Kazakhstan, Azerbaijan and the Russian Federation, 2012

<table>
<thead>
<tr>
<th>Country</th>
<th>Reserves, thousand million barrels</th>
<th>Production, thousand barrels daily</th>
<th>Consumption, thousand barrels daily</th>
<th>Reserves-to-production ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kazakhstan</td>
<td>30</td>
<td>1,728</td>
<td>265</td>
<td>47.4</td>
</tr>
<tr>
<td>Azerbaijan</td>
<td>7</td>
<td>872</td>
<td>93</td>
<td>21.9</td>
</tr>
<tr>
<td>Russia</td>
<td>87.2</td>
<td>10,643</td>
<td>3,174</td>
<td>22.4</td>
</tr>
</tbody>
</table>


51. Oil production in Kazakhstan has been steadily increasing over the years and between the beginning of the new century and 2012 it almost doubled. At the end of 2012, total crude oil production stood at more than 1.7 million barrels daily.

Figure 1. Kazakhstan’s production of crude oil, 2002-2012


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7 Source: http://www.caspianmainport.com/public/Kaz.jsp
52. Kazakhstan also has sizeable reserves of gas with reserves estimated at 1.3 trillion cubic meters in 2012. The country is a net exporter and has relatively high reserves-to-production and reserves-to-consumption ratios - rough measures of how long the country can sustain current production and consumption with existing reserves. Most of Kazakhstan’s natural gas reserves comprise associated gas and are located in just four fields: Karachaganak, Tengiz, Imashevskoye, and Kashagan. It should also be noted however that most recently Kazakhstan has made a considerable achievement in reducing gas flaring (by nearly 70% since 2006) which has brought a positive GHG emissions impact.

Table 2. Comparison of gas reserves, production and consumption in Kazakhstan and selected EECCA countries, 2012

<table>
<thead>
<tr>
<th>Country</th>
<th>Reserves, trillion cubic meters</th>
<th>Production, billion cubic meters</th>
<th>Consumption, billion cubic meter</th>
<th>Reserves-to-production ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kazakhstan</td>
<td>1.3</td>
<td>19.7</td>
<td>9.5</td>
<td>65.6</td>
</tr>
<tr>
<td>Russia</td>
<td>32.9</td>
<td>592.3</td>
<td>416.2</td>
<td>55.6</td>
</tr>
<tr>
<td>Turkmenistan</td>
<td>17.5</td>
<td>64.4</td>
<td>23.3</td>
<td>*</td>
</tr>
<tr>
<td>Uzbekistan</td>
<td>1.1</td>
<td>56.9</td>
<td>47.9</td>
<td>19.7</td>
</tr>
<tr>
<td>Azerbaijan</td>
<td>0.9</td>
<td>15.6</td>
<td>8.5</td>
<td>57.1</td>
</tr>
</tbody>
</table>


53. The leading companies in the oil and gas extraction sector are KazMunaiGaz – a state-owned company with stakes in virtually all major oil and gas projects in the country (its structure can be compared to Gazprom and Rosneft in the Russian Federation), Karachaganak Petroleum Operating BV and Tengizchevroil. These companies produce roughly two thirds of total oil extraction. Other players are PetroKazakhstan Ink, the Kazgermunay joint venture and KazMunaiTeniz.

54. The national company KazMunaiGaz (KMG NC) represents the interests of the state in the oil and gas sector through which the government has sought to gain influence in energy resource development. KMG NC, fully-owned by government-held Samruk-Kazyna, consolidates exploration and production assets, owns oil and gas transportation companies, and has a controlling stake in Kazakh refineries. The state interests in the oil and gas sector are shown in Figure 2 below.

Figure 2. State interests in the oil and gas sector

Source: [http://www.eia.gov/countries/country-data.cfm?fips=kz](http://www.eia.gov/countries/country-data.cfm?fips=kz)
2.2. Coal extraction

55. Kazakhstan contains Central Asia’s largest recoverable coal reserves, with 33.6 billion tonnes of mostly anthracitic and bituminous coal. Most coal production is sourced from two main basins, the Karaganda Basin (which supplies coking coal from underground mines) and the Ekibastuz Basin (supplying coal to the power plants).

56. The coal industry enterprises have been privatised. Vertically integrated structures of “coal-electricity” and “coal-metal” have been created to ensure a stable market and a profitable production. More than 30% of the Kazakh coal production is exported mainly to Russian power stations. There are also some exports to other countries – Romania, Poland, the Czech Republic and Turkey.

57. With annual coal production of 58.8 million tons oil equivalent (2012), Kazakhstan ranks among the top ten coal producing countries. Kazakhstan’s largest coal producer is Bogatyr Komir (about 40% of the country’s coal output). After privatisation in 1996, the owners of the company have changed several times (from the US Access Industries Incorporated to the Russian United Company RUSAL). In 2007, the government owned Samruk-Energo acquired 50% of the shares in Bogatyr Komir.

2.3. Electricity generation

58. Most of Kazakhstan's energy generation comes from the Ekibastuz, Almaty, and Karaganda regions, and is based largely on coal. Due to the high concentration of Kazakhstan's heavy industry in these areas, it is also the largest user of electricity, approaching 70% of all electricity consumed.

59. The former vertically integrated power sector was unbundled into separate generation, transmission, and distribution (sale) sub-sectors. Most of the generation plants and regional distribution companies have been subsequently privatised.

60. There are 66 power stations in Kazakhstan (including five hydroelectric plants) with installed capacity of 15.8 GW. At the moment, 84.7% of Kazakhstan’s electricity comes from coal-fired plants and 9.1% from hydroelectric sources. The coal-fired plants are located in the north coal-producing regions. Hydroelectric facilities are located mostly along the Irtys River. There is a deficit of electric energy generation sources in the southern regions of Kazakhstan and electricity consumption is covered mostly by electricity transfers from the north (the Ekibastuz generation hub) through the North-South interconnectors and smaller imports from the Kyrgyz Republic (used mostly for frequency regulation).

61. According to the Kazakhstan Electricity Grid Operating Company (KEGOC), around 97% of the power plants in Kazakhstan are privately owned. It must be noted, however, that state ownership is exercised through equity involvement in energy companies through Samruk-Kazyna.

62. For instance, Samruk-Energo (in which Samruk-Kazyna holds 94.38% of the shares) operates:

- Hydropower plants: Shardara HPP, Bukhtarma HPP, Shulbinsk HPP, Ust-Kamenogorsk HPP;
- Combined heat and power plants: Ekibastuz GRES-2, Almaty power plants;
- The open-pit mine Bogatyr-Komir.

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9 Source: BP (2013).
10 Source: http://www.uskba.net/about_power.htm
63. Altogether power plants operated by Samruk-Energo represent 28% of the installed generation capacity in Kazakhstan.

64. The Sovereign Welfare Fund Samruk-Kazyna is also directly involved in the electricity generation sector as it holds 50% of the shares in the Ekibastuz GRES-1, the second largest power station in Kazakhstan (with installed capacity of 4 GW).

65. State ownership in the power sector is a common practice in other countries as well. For example, 85% of the shares of the Électricité de France S.A. (Electricity of France), the second largest electric utility company in the world, are held by the French state. In Poland, 35% of electricity generation comes from the state-owned company (Polska Grupa Energetyczna) in which the Polish state holds 60%. As can be seen from Table 3, in both Kazakhstan and Poland, the power sector heavily relies on coal.

### Table 3. Comparison of the power sector in Kazakhstan and Poland

<table>
<thead>
<tr>
<th></th>
<th>Kazakhstan</th>
<th>Poland</th>
</tr>
</thead>
<tbody>
<tr>
<td>Population</td>
<td>16.9 million</td>
<td>38.5 million</td>
</tr>
<tr>
<td>Installed capacity</td>
<td>15.8 GW</td>
<td>35.9 GW</td>
</tr>
<tr>
<td>Electricity production</td>
<td>83.6 TWh (2010)</td>
<td>163 TWh (2011)</td>
</tr>
<tr>
<td>Per capita electricity production</td>
<td>4.9 MWh</td>
<td>4.2 MWh</td>
</tr>
<tr>
<td>Share of electric energy produced with coal</td>
<td>85%</td>
<td>94%</td>
</tr>
</tbody>
</table>

66. Kazakhstan’s Electricity Grid Operating Company (KEGOC) is fully owned by the state (100% of its shares are held by Samruk Kazyna). KEGOC operates the high-voltage interregional transmission grids. In addition, there are 21 regional distribution companies. Most of these companies are privately owned. At the same time, it should be noted that the state has taken full responsibility for building-related infrastructure which is true not only for the electricity sector but also for heat and gas.

67. Electricity generators sell electricity under bilateral contracts to industrial firms and supply companies at unregulated but capped wholesale prices. Since 2009, the government has imposed “maximum” (predelniye) tariffs on the generation companies to incentivise them to make new investments in modernising and extending capacity. Under a complicated and not fully transparent scheme, generators, including those privately owned, were grouped into 13 “tariff groups” on the basis of plant type, fuel type and distance from the fuel source. Within each tariff group, an upper limit (cap) was set for up to a 7-year period to be adjusted annually. *De facto*, this is partial administrative regulation of the generation tariffs. Suppliers’ retail prices are also capped by the Agency for the Regulation of Natural Monopolies (ARNM), which has an unusual mandate of controlling inflation and very limited autonomy as a regulator. In principle generators can compete by lowering the prices below the cap. In reality, however, prices almost always reach the caps. After price caps were introduced for generators in 2009 the spot market dried out. Balancing market has never been implemented in Kazakhstan. Market power of Samruk-Energy also limits competition in the sector. However, going forward the proposed non-competitive and discriminatory capacity payment system may introduce producer subsidies into the electricity system.

3. **Climate change policy**

68. Kazakhstan’s economy is both highly energy and carbon intensive. The main source of CO₂ emissions is the burning of fossil fuels by power generators. Kazakhstan is among the five largest CO₂ emitters in Central Europe and Asia. The IEA estimates that the per capita CO₂ emissions from fossil fuel burning in 2009 for the region was 6.9 tonnes of CO₂, for Kazakhstan this level is particularly high: 12 tonnes per capita (Table 4).
### Table 4. Five largest CO2 emitters from fuel burning in Europe and Central Asia, 2009

<table>
<thead>
<tr>
<th>Country</th>
<th>Per capita emissions (tonnes of CO2)</th>
<th>Population (millions)</th>
<th>Total emissions (tonnes of CO2, million)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Russian Federation</td>
<td>10.8</td>
<td>141.9</td>
<td>1532.6</td>
</tr>
<tr>
<td>Poland</td>
<td>7.5</td>
<td>38.2</td>
<td>286.8</td>
</tr>
<tr>
<td>Ukraine</td>
<td>5.6</td>
<td>46.0</td>
<td>256.4</td>
</tr>
<tr>
<td>Turkey</td>
<td>3.6</td>
<td>71.9</td>
<td>256.3</td>
</tr>
<tr>
<td>Kazakhstan</td>
<td>12.0</td>
<td>15.9</td>
<td>190.0</td>
</tr>
</tbody>
</table>


69. In addition to burning fossil fuels, other, non-combustion, activities also release significant amounts of CO2, methane and other greenhouse gases (GHG). Venting and flaring is the major source of methane and non-combustion CO2 emissions in Kazakhstan. While Russia is the world’s leading gas-flaring country (responsible for 26% of global flaring in 2010), Kazakhstan is ranked 7th (responsible for 3%) (Deichmann, U. and F. Zhang, 2013).

70. With the growth of the economy, domestic demand for energy in Kazakhstan is rapidly rising. At the same time, the country’s aging energy infrastructure needs substantial modernisation. Almost 45% of its power generating plants are over 30 years old. The government is concerned that the country’s high energy intensity is a major impediment to improving the competitiveness of its economy, and wants to reduce this by 10% over the next 5 years. The low-voltage distribution system is also dilapidated and needs significant rehabilitation. On the other hand, the high-voltage national transmission network has been considerably upgraded in the past 15 years with IBRD/EBRD assistance and is considered one of the most advanced in the EECCA region.

71. To combat climate change and increase the competitiveness of its economy the government of Kazakhstan has taken a number of important political decisions. In its Strategic Plan, the Ministry of Environmental Protection has stated that in the post-Kyoto period after 2012, it intends to reduce GHG emissions by 15% by 2020 and by 25% by 2050 from a base of 1990. In the Strategic Plan of the Republic of Kazakhstan until 2020, Kazakhstan has also committed to work towards a low-carbon economy. Kazakhstan appears well-suited to achieve this objective, since it has abundant and untapped resources of hydro, wind, solar, geothermal, and biomass.

72. Recently, the government adopted a new Green Economy Strategy. This long-term 20-30 year strategy aims to support the country’s transition to a green path of economic development. Given that countries such as China and Korea spend about 1.5% and 2% of their GDP on green growth initiatives respectively, the Kazakh government hopes to be able to spend annually about 1% of GDP on green growth initiatives. Among other things, the Strategy envisages that by 2050 renewable and alternative energy sources will provide 50% of the energy mix in Kazakhstan.

73. Kazakhstan has adopted legislation on energy efficiency and renewable sources of energy as well as put in place some government programmes to support such initiatives. The Law on Energy Saving and National Energy Saving Programme came into force in 1997. However, this law is now superseded by a new Energy Efficiency Law which has been in effect since January 2012. For implementation support of the law, a “Comprehensive Programme for Energy Efficiency” was also adopted, which is a time-bound action plan consisting of specific measures focusing on the industry and the residential/municipal sector.
74. In June, 2009 Kazakhstan's parliament passed the final amendments to the Law on the Use of Renewable Energy Sources. The law obliges all electricity transmission companies to allow the renewables sector to connect to the grid. In addition, the legislation states that 5% of Kazakhstan's total energy balance must be based on renewable energy by 2024.

75. Kazakhstan is also the first EECCA and Asian country that has launched an Emission Trading Scheme (ETS)\textsuperscript{12}. The Kazakh ETS will operate similarly to the EU ETS. Kazakhstan initiated a one-year trial period, or Phase I, of its ETS at the beginning of 2013. The length of Phase II is yet to be determined; it may span 2014-2020. The main elements of Kazakhstan ETS Programme are provided in Table 5 below.

76. Kazakhstan is party to both the UN Framework Convention on Climate Change and the Kyoto Protocol. It signed the Kyoto Protocol in 1999 and ratified it in 2009. It is currently a non-Annex I (under the Convention) and a non-Annex B country (under the Kyoto Protocol).

<table>
<thead>
<tr>
<th>ETS design element</th>
<th>Kazakhstan</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sector coverage</td>
<td>Oil, coal, and gas production; the power sector; mining and metallurgy; chemical industry; agriculture (inclusion currently debated); and transport (inclusion currently debated)</td>
</tr>
<tr>
<td>Emitters/installations covered</td>
<td>178 companies, number of installations to be decided</td>
</tr>
<tr>
<td>Emission coverage</td>
<td>Phase I: About 55% of Kazakhstan's GHG emissions and 77% of CO\textsubscript{2} emissions</td>
</tr>
<tr>
<td>Gases covered</td>
<td>Carbon Dioxide (CO\textsubscript{2}) and perhaps other gases after Phase I. Methane is subject to monitoring and methane reductions are eligible under the domestic offsets regulations</td>
</tr>
<tr>
<td>Threshold for inclusion</td>
<td>20,000t/ CO\textsubscript{2}e/yr</td>
</tr>
<tr>
<td>Offsetting allowed</td>
<td>The following sectors are preferred for domestic offsets: mining and metallurgy; agriculture; housing and communal services; forestry; prevention of land degradation; renewables; processing of municipal and industrial waste; transport; and energy-efficient construction</td>
</tr>
<tr>
<td>Targets</td>
<td>Overall objective is a 7% reduction below 1990 levels by 2020 and a 15% reduction by 2025 compared with the 1992 emission level. The energy sector's target is a 3% reduction by 2015 compared with 2012 levels</td>
</tr>
</tbody>
</table>

Source: EDF and IETA (2013).

\textsuperscript{12} An ETS places a price on CO\textsubscript{2} emissions and other greenhouse gases, as well as negative global climate externalities, and, as a result, increases the cost of generating power. In the case of climate-related impacts, estimates range from USD 1 and USD 100 per tonne of carbon, depending on the models. In 2011, the market price for carbon in the EU ETS was between Euro 6 and 14.5.
PART II. INVENTORY OF SUPPORT SCHEMES AND CHANNELS FOR TRANSFERRING GOVERNMENT SUPPORT TO FOSSIL FUEL PRODUCTION AND CONSUMPTION

77. Governments provide support to producers and consumers of fossil fuels and fossil fuel-based generated energy in many and diverse ways. These can range from direct budgetary support to support provided through different tax concessions and tax privileges to using price control mechanisms which keep prices for end-users below market prices or lower the costs of producers in the extractive and energy generating sectors. Although, strictly speaking, tariffs and non-tariff barriers are not subsidies, due to the fact that they have effects on prices similar to those of subsidies, they are also considered a form of government support. Many of these are indirect, often “hidden”, as they do not show in the national budget and for this reason their identification and estimation may be very difficult.

78. This chapter discusses the major fossil fuel subsidy schemes identified as part of this study as well as the main channels for providing government support to the energy sector. The chapter discusses both consumer and producer subsidies provided both directly from the state budget or as part of the taxation regime in the country.

1. Consumer subsidies to oil, natural gas, coal and electricity

Existing analysis shows that OECD countries tend to subsidise mainly energy production, while in non-OECD countries, most energy subsidies go to consumers - usually through price controls that hold end-user prices below the full cost of supply. Kazakhstan has cut direct consumer subsidies but other forms of indirect and implicit consumer support continues to exist.

79. To estimate consumer energy subsidies, the International Energy Agency (IEA) has developed a method known as the price-gap approach. This approach is described in more detail in Box 4 below.

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Box 4. Price-gap approach

The price gap-approach is designed to capture the net effect of all subsidies that reduce final prices below those that would prevail in a competitive market. For countries that import a given product, subsidy estimates, derived through the price gap approach, are explicit. That is, they represent net expenditures resulting from the domestic sale of imported energy (purchased at world prices in hard currency), at lower, regulated prices. In contrast, for countries that export a given product – and therefore do not pay the world prices – subsidy estimates are implicit and usually have no direct budgetary impact. Rather, they represent the opportunity cost of pricing domestic energy below market levels, i.e. the rent that would be recovered if consumers paid world prices. For countries that produce a portion of their consumptions themselves and import the remainder (such as Iran, for example), the estimates represent a combination of opportunity costs and direct government expenditures.\(^\text{13}\)

The basic concept of the price gap approach is straightforward:

\[
\text{Price-gap} = \text{Reference Price} - \text{End-User Internal Price}
\]

This approach thus centres on the difference existing between the price of a good in a given country (end-user price) and a reference price. Whilst spotting end-user price is relatively easy, controversies exist around defining an adequate reference price. In many cases such a reference price does not exist, even where a good is internationally traded, as is the case with coal. Coal prices vary significantly across countries and regions. However, the lower observed prices for the same quality of coal in one country may result not from direct subsidies but from lower production costs resulting from different mining methods applied or from significantly lower labour costs.

\(^\text{13}\) IEA, OECD and World Bank (2010).
In the absence of sufficient information on energy subsidies to consumers in Kazakhstan, this study relies on IEA estimates. These show that in 2011, the average fossil fuel consumption subsidised rate, expressed as a proportion of the full cost of supply, for Kazakhstan was about 33%, an increase from a 30% rate in 2010, caused by higher world prices. The estimated total fossil fuel subsidies in 2011 were USD 5.85 billion (an increase from USD 4 billion in 2010), which represented about 3.3% of the country’s GDP in that year. In terms of per capita subsidies, this amounted to 359.3 USD per person in 2011. Most of the subsidies went to oil and petroleum products (about 55%), followed by electricity (about 30%) and coal (about 10%).

Table 6. Fossil fuel consumption subsidies in Kazakhstan (billion USD)

<table>
<thead>
<tr>
<th></th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oil</td>
<td>0.41</td>
<td>2.03</td>
<td>3.19</td>
</tr>
<tr>
<td>Natural gas</td>
<td>0.21</td>
<td>0.22</td>
<td>0.33</td>
</tr>
<tr>
<td>Coal</td>
<td>0.47</td>
<td>0.38</td>
<td>0.58</td>
</tr>
<tr>
<td>Electricity</td>
<td>0.73</td>
<td>1.69</td>
<td>1.75</td>
</tr>
</tbody>
</table>


For comparison, a study by the IEA (World Energy Outlook, 2011) shows that in 2011 fossil fuel consumer subsidies in non-OECD countries amounted to USD 523 billion (outweighing subsidies for renewables by a factor of almost six), with subsidies to oil products representing almost half of the total. For 2011, IEA information on some EECCA countries shows that fossil fuel subsidies for consumers (oil, coal, gas, electricity) may have totalled about USD 2 billion in Azerbaijan (equivalent to about 3% of GDP), USD 40 billion (about 2% of GDP) in the Russian Federation and USD 9.3 billion in Ukraine (about 6% of GDP) (see Table 7 below).

Table 7. Fossil fuel consumer subsidies in selected EECCA countries, 2011

<table>
<thead>
<tr>
<th>Country</th>
<th>Average subsidisation rate (%)</th>
<th>Subsidy (USD per person)</th>
<th>Total subsidy (% of GDP)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Azerbaijan</td>
<td>35.8</td>
<td>215.9</td>
<td>3.1</td>
</tr>
<tr>
<td>Kazakhstan</td>
<td>32.6</td>
<td>359.3</td>
<td>3.3</td>
</tr>
<tr>
<td>Russian Federation</td>
<td>18.4</td>
<td>283.4</td>
<td>2.2</td>
</tr>
<tr>
<td>Turkmenistan</td>
<td>61</td>
<td>1115.4</td>
<td>22.7</td>
</tr>
<tr>
<td>Ukraine</td>
<td>25.5</td>
<td>205.4</td>
<td>5.7</td>
</tr>
<tr>
<td>Uzbekistan</td>
<td>60</td>
<td>448.5</td>
<td>28.1</td>
</tr>
</tbody>
</table>

81. Figure 4 presents the calculation of coal consumer subsidies for China, Thailand and Kazakhstan in 2010, using the price-gap approach. The rate of subsidisation is the subsidy expressed as a percentage of the full economic price. As can be seen in Figure 4, in monetary terms, China has the biggest coal consumer subsidies (measured as the differences between actual prices and the full economic cost of supply), amounting to around USD 2 billion, though the rate of subsidisation (measured as a percentage of the full economic price) is less than 5%. In Kazakhstan, the coal subsidy was about USD 400 million, which translates into a much higher subsidisation rate, a little bit above 60%. Hence, what really matters is the rate of subsidisation.

**Figure 4. Coal consumption subsidies for selected countries, 2010, billion USD**

![Rate of subsidisation (top axis) Monetary value](image)


82. Domestic prices for crude oil in Kazakhstan are at least twice below the export prices, and oil producers have more incentives to send crude oil to the export market than sell it locally. In addition, oil producers have no incentive to sell oil to refineries as the government regulates prices for oil products and attempts to keep them low on the domestic market.

83. Retail prices of gasoline and diesel fuel are subject to state regulation (but not wholesale prices). The prices are set by the Agency for the Regulation of Natural Monopolies (ARNM). Table 8 shows the price ceilings established by the Agency in 2012 and 2013.

**Table 8. Retail diesel and gasoline prices in Kazakhstan, 2012-2013**

<table>
<thead>
<tr>
<th>Type of fuel</th>
<th>Price, KZT per litre 2012</th>
<th>Price, KZT per litre 2013</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diesel fuel</td>
<td>90</td>
<td>102</td>
</tr>
<tr>
<td>A - 80 (RON gasoline)</td>
<td>86</td>
<td>89</td>
</tr>
<tr>
<td>A - 92 (RON gasoline)</td>
<td>106</td>
<td>110</td>
</tr>
</tbody>
</table>

Source: ARNM.

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14 RON is an abbreviation for research octane number. Octane rating or octane number is a standard measure of the performance of a motor or aviation fuel. In broad terms, fuels with a higher octane rating are used in high-compression engines that generally have higher performance. In contrast, fuels with lower octane numbers are ideal for diesel engines.
84. Compared with other countries at a similar level of economic development, the retail gasoline and diesel prices in Kazakhstan are much lower (Figure 5). Oil-exporting countries, such as Kazakhstan, are far less likely to pass on price increases to consumers (see Table 9 further below).

![Figure 5. Retail gasoline and diesel price in selected countries, in July 2012, USD per litre](source: Kojima (2013)).

85. Due to low petroleum products prices, the refineries cannot expect to recoup the costs of capital, and respond by decreasing production. The government responds to these shortages by importing petroleum products from Russia. However, this option is now becoming more expensive due to a rising demand for both crude oil but also due to the rising price of Russian petroleum products and the increased export duties on such products. Additionally, as the global petroleum product prices have increased, the refineries have begun to export oil products overseas.

86. To stop petroleum product export, for years now, every harvest season the government has been imposing export bans on diesel and low octane gasoline with the particular aim to improve the availability of gasoline to farmers. However, this has been done at the expense of oil producers and refineries.

87. In 2010-2012, these export bans resulted in approximately a 10% discount for agricultural producers on the average market price of diesel fuel (this discount was between 24% and 50% in 2003-2005). The amount of the subsidy arising from reduced diesel prices is estimated at KZT 6 billion (USD 40 million per year in 2010-2011) (OECD, 2013b).

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15 Kazakhstan has three refineries, Atyrau, Shymkent and Pavlodar, processing a total of 13.7 million tonnes of oil, which supply the western, southern and northern regions of the country. Apart from these three, there are 32 mini-refineries, processing 10 to 600 thousand tonnes of oil per year. The output of these mini-refineries does not comply with the standards and requires further deeper processing. Thus, all processed products are exported.
88. Since 2009, the government has capped prices on a number of oil products, most importantly on diesel fuel to keep it affordable to farmers. Temporary export bans have supported price regulation. Currently, the price caps on oil products are linked to Brent price and the prices in the Russian Federation. The Ministry of Oil and Gas applies for the price revision, while the Agency for the Regulation of Natural Monopolies approves the final prices.

89. Export restrictions reduce domestic prices, with negative consequences for the oil companies and for neighbouring countries to which the petroleum products are exported. In recent years, Kazakhstan has banned exports of light petroleum products annually for about six months at a time to deal with fuel shortages during the agricultural season. A temporary ban that began in May 2010, however, has been repeatedly extended to the end of June 2013 (Kojima, 2013).

90. Fuel shortages are far more common when fuel suppliers cannot fully recover costs with reasonable returns and cut back on fuel acquisition and sales, or when they decide to pursue higher-return opportunities elsewhere, such as exports and out-smuggling.

91. In addition, Kazakhstan has imposed an export duty on light oil products. Export tariffs are rather common at times of inflation or when shortages of a certain good occur. However, they can hurt the economy significantly. In 2012, the export duty was set at USD 168.88 per tonne of light oil products and at USD 112.59 per tonne on heavy oil products. Since its introduction in August 2010, the export duty on oil products (at USD 98.13 per tonne of light products and USD 65.42 per tonne of heavy products) was raised four times – by 68% in aggregate. By hiking up the duty, the government was trying to address fuel shortages and to curtail the rapid growth of gasoline prices, but this policy has not been particularly successful.

92. Many governments control retail prices, but some control prices at the wholesale or ex-refinery level. In the extreme, where retail prices are controlled, wholesale prices may be higher than retail prices, undermining the financial viability of the retail business. An example is Kazakhstan where wholesale prices, which are not controlled and determined primarily by import prices, have matched or exceeded retail price ceilings set by the government in recent years. In response, the Kazakh Oil Ministry signed a memorandum with oil companies to limit wholesale prices to a maximum of 87% of the maximum retail price in August 2011 (Kojima, 2013). This distorts the wholesale market and indirectly regulates its prices.
Government authorities are now facing serious challenges in the domestic refining industry. The refining sector is capital intensive and the methods the government uses seem to further discourage investment in the sector given its low profitability. The main reason behind the unprofitable refining industry is low gasoline and diesel prices on the domestic market. Refiners thus lack sufficient incentives to invest in the modernisation of existing facilities or the construction of new ones. Until recently, the government lacked a comprehensive strategy for the domestic downstream (processing) sector. Theoretically, the existing infrastructure should be able to meet the country’s refined oil product needs (at least in terms of capacity). However, Kazakhstan’s technologically outdated refineries are unable to produce quality products in sufficient quantity.

Avoiding the recurrence of fuel consumer subsidies requires that domestic prices be adjusted automatically at regular (e.g., monthly, on a 3-month basis) intervals in line with changes in international prices. There is no such regular adjustment mechanism in Kazakhstan. In addition, the pass-through coefficient for Kazakhstan, between January 2009 and July 2012, when oil prices in nominal U.S. dollars more than doubled, compared with other similar countries, is among the lowest (see Table 9).

<table>
<thead>
<tr>
<th>Country</th>
<th>Gasoline</th>
<th>Diesel</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brazil</td>
<td>57</td>
<td>30</td>
</tr>
<tr>
<td>Chile</td>
<td>188</td>
<td>127</td>
</tr>
<tr>
<td>China</td>
<td>100</td>
<td>127</td>
</tr>
<tr>
<td>Colombia</td>
<td>91</td>
<td>126</td>
</tr>
<tr>
<td>India</td>
<td>76</td>
<td>24</td>
</tr>
<tr>
<td>Indonesia</td>
<td>19</td>
<td>23</td>
</tr>
<tr>
<td><strong>Kazakhstan</strong></td>
<td><strong>32</strong></td>
<td><strong>7</strong></td>
</tr>
<tr>
<td>Mexico</td>
<td>53</td>
<td>80</td>
</tr>
<tr>
<td>Russia</td>
<td>49</td>
<td>74</td>
</tr>
<tr>
<td>South Africa</td>
<td>168</td>
<td>177</td>
</tr>
<tr>
<td>Tajikistan</td>
<td>143</td>
<td>202</td>
</tr>
</tbody>
</table>

Source: Kojima (2013).

2. Direct transfer of funds to producers

Direct, budgetary transfers are the most straightforward and visible types of subsidies as they appear in a country’s annual budget and normally undergo parliamentary scrutiny. They include, among others, grants to cover losses by state-owned enterprises, capital grants, interest rate subsidies, wage subsidies.

Our analysis of the annual budget laws for the period 2009-2012 has shown that there are a number of budget programmes that can potentially provide government support to producers. However, it is difficult to estimate the exact size of the subsidies provided by these various programmes. Often it is not clear if support is provided through a grant, or as a (concessional) loan from the budget, who exactly receives the support and under what conditions. This type of information is crucial for any further analysis of support.

There are two main mechanisms for transferring support to producers in Kazakhstan, namely direct support from the republican or local budgets and support provided through the Sovereign Wealth Fund (SWF) Samruk-Kazyna.
98. Direct budgetary support in the form of investments to producers can be provided in several forms. The main ones include: budgetary transfers for the implementation of investment projects, budgetary transfers for equity investments, concessional projects where the state participates as a co-financier. Apart from the Budget Code, the implementation of equity investments is regulated also by the Law on Joint Stock Companies and in the case of co-financing – by the Law on Concessions. It is rather difficult to understand the difference between these three types of investment support as all three are financed either by the republican or local budgets and all three are aimed at increasing the value of state assets.

99. The state budget investment expenditure for some selected sectors, including for the fuel and energy complex and sub-soil use, are presented in Table 10 and Figure 7 below. This information comes from sources of the Ministry of Economic Development and Trade (MEDT).

### Table 10. State budget investment support by sector, 2009-2011, mln KZT

<table>
<thead>
<tr>
<th>State budget expenditure by sector</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
</tr>
</thead>
<tbody>
<tr>
<td>Education</td>
<td>660 917</td>
<td>755 295</td>
<td>986 773.4</td>
</tr>
<tr>
<td>Health</td>
<td>450 893</td>
<td>551 326</td>
<td>626 309.9</td>
</tr>
<tr>
<td>Social security</td>
<td>758 308</td>
<td>905 273</td>
<td>1 133 573.0</td>
</tr>
<tr>
<td>Housing and communal economy</td>
<td>304 049</td>
<td>334 155</td>
<td>389 238.2</td>
</tr>
<tr>
<td>Fuel and energy complex and sub-soil use</td>
<td>58 577</td>
<td>79 720</td>
<td>112 490.7</td>
</tr>
</tbody>
</table>

Source: MEDT (2012).

100. As can be seen from the data, the direct state support for investments in the energy and sub-soil sector increased almost twice in the period 2009-2011, despite the crisis years, from KZT 58 577 mln in 2009 to KZT 112 490,7 mln in 2011. And yet, compared with other social sectors (education, health, social security), it was practically insignificant. Of total state expenditure in 2009 – the energy and sub-soil sector received 2.6%, and in 2011 – this amount went up to 3.5%. The simple explanation for this seemingly odd situation, as discussed further in the report, is that most expenditure to this sector are actually channelled not directly from the state budget but rather through Samruk-Kazyna. It is also worth noting that it is not clear what exactly the sub-soil sector covers, actually apart from support to fossil fuels it most likely covers support to the extraction of other minerals that Kazakhstan is rich of.
101. More detailed information about the type of investments that were supported through the budget was not available for analysis. It is also not clear what share of this support is provided as grants and what the share of budget credits is and under what conditions the support is provided. The analysis in the report prepared for the Center of public-private partnership of Kazakhstan, under the Ministry of Economic Development and Trade (MEDT, 2012), points out to certain challenges with preparing investment projects submitted for financing from the budget. For example, the report states that 217 investment projects were planned to be financed by the budget in 2011. Of these, detailed Terms of Reference (project proposals) were required only for 73 of them. Of these 73 projects, 44 were not submitted for economic appraisal which would normally be carried out by the Center of public-private partnerships. In addition, the analysts have found out that one and the same project has requested financing several times, each time submitted under a different category. Alternatively, several different projects all designed to solve the same problem would request financing.

102. All these deficiencies in the process of appraisal and selection of investment projects consume a lot of government resources both in terms of time and money. Apart from the direct amounts allocated from the budget for poorly designed projects, there is an additional cost for the state of financing the same project several times until a problem is solved. This additional cost of wasting state resources by supporting inefficient projects represents yet another, hidden, subsidy. The government needs to improve its capacity to identify and select cost-effective projects that can receive state support. There is also a need to design and ensure application of robust rules, procedures and criteria for the appraisal and selection of investment projects that have to be valid for everybody. In addition, there is a need to further clarify the different types of investments in order to avoid duplication in financing similar projects more than once. Such practice creates an unhealthy investment environment and gives the impression that the state finances are easily available to support investment projects. Such a situation also does not allow the development of good projects and prevents the building of project preparation capacity in the country. This poor level of investment project preparation and the poor level of scrutiny on the side of the government should require special attention.


103. Direct transfers for investment programmes are made from the central budget and Samruk Kazyna Fund (see the next section which presents the operations of Samruk Kazyna in the energy sector).

104. The following investment programmes supporting the energy sector directly from the budget have been identified under 2013 – 2015 budget plan\(^{16}\):

- **Sub-programme on industrial development** amounting to KZT 1,157 billion (USD 7.9 billion) comprising, among others:
  - Programme for nuclear energy sector development (0.02%, or USD 1.58 mln);
  - Power sector development (1%, or USD 79 mln);
  - Special economic zones (1%, or USD 79 mln);
  - Development of the oil and gas sector (5%, or USD 395 mln);

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– The largest share of the budget of the industrial development programme will go to transport infrastructure (58%).

- **Sub-programme on regional development** in the amount of KZT 501 billion (USD 3.5 billion). The financial resources under this programme will be allocated, among others: to water and wastewater infrastructure, natural gas infrastructure and the development of district heating and transport infrastructure. The largest proportion will be spent in Astana and Almaty (72%).

105. Again, detailed information on these programmes is not available. A complex public finance architecture, a large number of public finance sources and lack of transparency on public funding do not allow proper analysis. Despite requests by the project team to obtain more detailed information, no official information was provided.

106. In addition to direct budgetary support, government support to the sector is also provided through Samruk Kazyna and some of its subsidiaries, such as Kazakhstan Development Fund JSC, the Damu Entrepreneurship Development Fund, Kazakh Industry Development Institute, Kazakhstan Investment Fund JSC, National Innovation Fund JSC and Kazyna Capital Management JSC. These entities provide mostly support for (equity) investments to Kazakh companies, including in oil refining and the development of oil and gas infrastructure.

2.2. **Selected subsidy schemes in the electricity sector**

107. Some examples of different government support forms to the electricity sector are given below. These include direct state investment, direct transfers for operation and maintenance (O&M) costs to energy producers, equity injections.

2.3.1. **Direct state investment in the electricity sector**

108. An example of direct state investment is the support to Samruk Energy JSC and specifically to its subsidiary KEGOC. KEGOC operates the national power grid, owns and operates all main and interregional transmission lines and masters sub-stations across the country. Also, KEGOC provides transmission tariff discounts (i.e. tariff charged below the regulated one) to selected customers, which may well qualify as implicit subsidies. In the past, in some years, the aggregate value of these discounts amounted up to 20% of KEGOC’s revenue but it is markedly less now.

109. Samruk Energy expects the nation’s power industry to attract USD 63 billion of investment by 2030. The investment plan by 2020 is expected to be covered by:

- Borrowings – 53.9% of the total capital investment;
- Equity funds – 35.0% of the total capital investment;
- Funding from the state budget – 11.1% of the total capital investment\(^\text{17}\).

110. However, the total amount expected to be invested by 2020 is not clear.

2.3.2. Direct transfers for O&M costs to electricity producers

111. Direct transfers for O&M costs have also been identified in electricity generation, for example, budgetary transfers for ensuring stable electricity supply in the southern regions of Kazakhstan (amounting to USD 37.5 million in 2008). This support was provided for the stable operation of the Zhambyl Power Plant to cover the electric energy shortage in the southern regions during the autumn-winter period. The scheme was aimed at preserving stable electricity prices for consumers in South Kazakhstan by offsetting the cost of the supply of fuel (MEMR, 2007).

2.3.3. Other forms of state support

112. Other support measures to Samruk-Energy comprise state guarantees (through Samruk-Kazyna), assets contribution and equity injections (of KZT 89 billion between 2009 – 2011). The government usually makes equity injections into Samruk Energy, which redistributes the funds among its operating companies.\(^{18}\)

2.2. Sovereign wealth funds\(^ {19}\)

113. Although the National Oil Fund of Kazakhstan is the fund most comparable to other SWFs around the world, the legal entity Samruk Kazyna is also labelled a SWF. Its founder is the Ministry of Finance and its single shareholder is the government of Kazakhstan. Samruk Kazyna is much larger and much more important in terms of its effect on the economy than the National Oil Fund. However, the assets of Samruk Kazyna are difficult to value since many of the companies are not publicly traded. Estimates range from 50 to 80% of GDP. The sales or revenues of the companies owned by Samruk Kazyna are in the range of 20-30% of total GDP, perhaps higher. The Law on Sovereign Wealth Funds, signed by President Nazarbayev on 13 February 2009, governs Samruk Kazyna. Samruk was a holding company of the five large state monopolies, KazTelecom, KazRail, KazMunaiGaz, KazPost and KEGOK (electricity distribution). On the other hand, Kazyna JSC consisted mainly of regional Social-Entrepreneurship Companies focused on economic development issues. Now there are well over one hundred entities held by Samruk Kazyna, ranging from Air Astana to real estate ventures and newly acquired commercial banks. The total number of companies held is difficult to estimate because many of these companies have multiple subsidiaries.

114. A number of important energy companies are in the portfolio of Samruk Kazyna. These include, for example:

- KazMunaiGaz (the state oil and gas company);
- Samruk Energy (the energy producer);
- KEGOC (the national power grid company);
- Tauken Samruk (mining industry).

115. Samruk Kazyna was established with three major objectives:

- First, Samruk Kazyna must play a leading role in the diversification of the economy, lessening its dependence on natural resources;

\(^{18}\) [http://www.reuters.com/article/2012/11/30/idUSWLB153320121130](http://www.reuters.com/article/2012/11/30/idUSWLB153320121130)

\(^{19}\) Adopted from Kemme (2011).
Second, it must help increase the efficiency and performance of the companies held by Samruk Kazyna, both in the real economy sector (such as KazMunaiGaz) and in the monetary sector (the banks and funds for entrepreneurship); and,

Third, it must support anti-crisis activities like those of 2008-2009, but this objective is expected to decrease over the next few years.

116. The Kazakhstan Development Bank, a Samruk-Kazyna subsidiary, is a state financial development institution that provides medium and long-term financing for investment projects and leasing operations and trade financing for export operations in priority sectors of the economy. Among others, it offers: loans for investment projects - from 5 to 20 years, of a minimum value of USD 1 million; financial leasing – from 3 to 20 years, of a minimum value of USD 1 million; project financing; mezzanine financing.

117. The Kazakhstan Innovation Fund backs up the country’s policy on industrial innovation and provides state assistance to private sector initiatives aiming at creating competitive manufacturing industries. It operates by taking equity stakes in the companies it invests.

118. Despite the stated goal of using the resources of the SWFs to help diversify the economy, this does not always seem to be the case. As reported by Financial Times20, in March 2012, President Nazarbayev announced that up to USD 4 billion from Kazakhstan’s National Oil Fund should be transferred to the state oil company KazMunaiGaz. The credit – equivalent to about 9% of the entire assets of the National Oil Fund – will be disbursed in two chunks in 2013 and 2015. KazMunaiGaz is expected to use the money to pay its way at the giant Kashagan oil development and invest in Rompetrol, the loss-making Romanian oil refining group it controls. Experts in Kazakhstan believe these funds may be spent better on projects to diversify the economy.

119. One of the major concerns with regard to Samruk Kazyna is the lack of transparency of its transactions which makes it difficult to evaluate the overall performance of the resources spent by Samruk Kazyna itself. This is improving, however, as the ten to fifteen largest companies have annual reports available for several years and Samruk Kazyna for the last 3-4 years.

120. Given the objectives of Samruk Kazyna and the priorities of such energy companies as Samruk Energy, for example, it is clear that the government support, provided through Samruk Kazyna, for investments (grants and loans), equity injections and guarantees to the Samruk Kazyna companies and its subsidiaries can be significant. Due to the lack of data and information, however, it is practically impossible to estimate the size of these support schemes.

3. Tax expenditures

121. Tax expenditures (also known as tax concessions and privileges) are estimates of what revenue would have been collected if the tax regime had been different. The challenge is to identify the standard or benchmark tax regime to be used to establish the nature and extent of any tax concession. Many countries base their tax expenditure estimates on a conceptual view about what constitutes “normal” taxation of income and consumption, although they may often modify this for practical reasons. Even in a relatively straightforward case, like Value Added Tax (VAT), the different approaches could lead to different results. Thus, on one basis any tax rate less than the standard rate of VAT would give rise to tax “expenditures”,

while others might regard lower rates of VAT as an inherent part of the regime and not giving rise to tax expenditures (OECD, 2013a).

122. Tax concessions and privileges are usually established in the Tax Code of a country. The Tax Code of Kazakhstan has been significantly simplified over the past several years. For example, the Kazakhstan Tax Code does not provide for tax holidays or accelerated depreciation allowances. However, for many years, such tax privileges have been provided through Production Sharing Agreements (PSA). Contractors of such agreements usually enjoy special tax regimes. More recently, the special economic zones also provide opportunities for special tax treatment for the companies registered on the territories of such zones. So, while tax concessions through the Tax Code have been largely eliminated, there are still other mechanisms that allow for their existence.

123. Kazakhstan’s Tax Code has undergone a number of amendments over the years. The most comprehensive changes were made in 2009, when the Code was completely overhauled, particularly in its part on subsoil users (extracting companies). Under the new Tax Code, the tax burden on small and medium enterprises was eased, while taxes on mineral users were increased, the only exception being, those working under grandfathered Production Sharing Agreements.

124. According to the Tax Code, the subsoil users operating in Kazakhstan pay several types of taxes – including corporate income tax, mineral extraction tax (which replaced a royalty system), bonuses (signature bonus and commercial discovery bonus, the commercial discovery bonus is a fixed payment that is due from subsoil users when a commercial discovery of useful minerals is made on the contractual territory), PSA interest, export custom duty, excess profit tax, a rent tax for export of oil. The subsoil users do not have a tax stabilisation clause 21 except those PSAs signed before 2009. Under the new Tax Code of 2009, the PSA contracts have been abolished and since then any new contract is supposed to operate within the framework of the regular tax regime. However, this implies that the two tax regimes for sub-soil users will continue to co-exist for a while.

4.1. Production sharing agreements

125. Production Sharing Agreements (PSA) are a taxing instrument under which some regular taxes, royalty payments and other charges are waived or replaced by production sharing between private investors and the state. Such provisions are viewed as subsidy by some governments (including in Russia). The Production Sharing Agreement is also a model for sharing the profit between the host state and the oil company.

126. Applying a production sharing model to subsoil use contracts has been the common international practice in countries with developing or transitional economies, lacking financial resources and technical means for independent field development. The specifics of subsoil use in Kazakhstan (high production cost, long transportation network limited internal processing facilities) make the production sharing concept less effective, and difficult to manage and apply. The practice of existing production sharing agreements in the Kazakhstan shows that the country does not receive adequate returns from these projects, even with the prices for raw material being high 22.

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21 A clause in an agreement according to which the government can grant tax relief incentives to encourage investors to execute projects within their country territories.

22 IIED (2012), this statement comes from the presentation of the new law on Subsoil Use to Kazakhstan’s Parliament, Majilis Administration (2009).
127. PSA have been criticised in recent years by the Kazakh government. These PSAs were done in a rush, in the early years of independence, when the market economy in Kazakhstan was not yet well established. According to the PSAs, the international oil companies were, for the most part, allowed to develop and export hydrocarbons under exemptions from normal tax and customs procedures. For this reason, the government decided to abolish this tax instrument in the revised 2009 Tax Code. Currently concluded and future contracts are expected to be excess profit tax (EPT) contracts23.

128. As such, it can be assumed that through these PSAs the government has failed to collect or has under-collected significant amounts of revenue generated from state-owned resources. Thus, this form of support, known as revenue foregone, was and, to a certain extent, will still be present for a while in Kazakhstan, particularly given the fact that the three largest oil fields are regulated through PSAs which remain in force after the modifications of the Tax Code in 2009.

129. Indeed, since the country's three largest hydrocarbon projects – Tengiz, Kashagan and Karachaganak – are all being developed under fixed-tax regimes (either via long-term concessions or production-sharing agreements), analysts point out that the changes in the Tax Code have had no real impact on the foreign consortia that hold the rights to those fields. This means that, overall, the government's accumulation of tax revenue from the hydrocarbon sector has not materially improved.

130. A summary of the differences in the two taxation models is highlighted in Table 11 below. As can be seen from the table there are a number of taxes which are treated differently under the two regimes. These differences give rise to tax expenditure of the country. However, Kazakhstan does not prepare and maintain tax expenditure reports which can help understand better the magnitude of the revenue not collected by the state as a result of the PSA taxation model.

### Table 11. Differences between the EPT and PSA taxation models

<table>
<thead>
<tr>
<th>Taxes</th>
<th>EPC model</th>
<th>PSA model</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Special taxes and payments on hydrocarbon agreements:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>a) Bonuses</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>b) Royalties (mineral extraction tax from 2009)</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>c) Excess profit tax</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>d) Share of production</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>e) Additional payments under PSAs</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>2. Other taxes and compulsory payments to the state:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>a) Rent tax on oil and gas condensate exports</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>b) Excise tax on oil and gas condensate</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>c) Land tax</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>d) Property tax</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>e) Environmental fees</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>f) Other fees (e.g., waterway navigation fees)</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>g) Other taxes and payments</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Source: IIED (2012).

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23 EPT is calculated annually. The tax is paid at progressive rates applicable to the portion of net income that exceeds 25% of deductions. The taxable tranches are derived by applying ratios to the deductible expenses (Ernst & Young, 2012).
131. PSAs are confidential in Kazakhstan, hence disclosure of information concerning PSAs is very difficult. Even though contracts are commercial transactions, they have a public element that creates a strong argument for transparency and public scrutiny. For this reason, both the World Bank and the International Finance Corporation (IFC) as well as other international organisations have called for disclosure of such agreements. While certain contract provisions must be held confidential, general terms of the contracts can still be made available, with commercially sensitive clauses excluded. Kazakhstan needs look no further than Azerbaijan or Russia for an example of how to disclose PSA terms and conditions. In Azerbaijan and Russia, for example, all PSAs have the force of law, and are thus publically accessible.

132. Given the natural resource base of the economy and in an attempt to increase transparency of the management of its oil revenues, in 2005, Kazakhstan joined the Extractive Industries Transparency Initiative (EITI) and set up a multi-stakeholder group to implement it. The EITI aims to establish revenue transparency through the publication of reports outlining the payments made by companies to governments and the payments received by governments. A Memorandum of Understanding signed by the Government of Kazakhstan, extractive companies, members of Parliament and civil society organisations manifests the commitment of parties with EITI implementation.

133. The last report for 2011 provided by Kazakhstan to the EITI Secretariat mentions over 800 companies working in the subsoil sector (oil, gas, mining), of which 170 companies participate in the EITI. The number of companies joining the Initiative increases every year. Companies are required to disclose all payments (tax and non-tax) contributed to both the national and local budgets of the country. On 17 October 2013, the international EITI Board designated Kazakhstan as an EITI compliant country.

4.2. Special economic zones

134. Similarly, special economic zones (SEZs) which were created in a number of regions in Kazakhstan (10 such zones exist so far) several years ago, give rise to tax expenditure.

135. These economic zones are established by the Law on Special Economic Zones initially for a period of 25 years and with the main purpose of attracting investors in priority sectors of the country. Companies, registered on the territory of such zones and investing in the priority sectors, identified by the government, are entitled to a number of tax and customs privileges. These include, among others: exemptions from corporate income tax, property tax and land tax; VAT exemption on goods and services produced on the zone territory, VAT exemption on buildings and civil works for administrative and industrial facilities, customs free policy. According to the Law on Investments, companies operating in such zones can also receive in-kind government support (e.g. land, buildings, machinery, transport vehicles, industrial and household equipment). Kazinvest, a joint stock company owned 100% by the state, is the entity charged with promoting investments and overseeing the SEZ development.

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24 The EITI was announced by UK Prime Minister Tony Blair at the World Summit on Sustainable Development in Johannesburg, September 2002. As part of the UK Government, the Department for International Development (DFID) aims to increase transparency of revenue paid by extracting industries to governments and government-linked entities, as well as transparency over revenue management by those host country governments. The EITI, whose Secretariat is in Oslo, Norway, is a coalition of governments, companies, civil society groups, investors and international organisations. The EITI assists natural resource-rich countries in strengthening accountability and good governance, as well as promoting greater economic and political stability. This, in turn, aims to contribute to the prevention of conflict based around the oil, mining and gas sectors. http://eiti.org/node/71/implementation


26 http://invest.gov.kz/?option=content&section=3&itemid=105
136. Given that oil refining and development of oil and gas infrastructure is one of the key government priorities in these zones, it can be expected that the energy sector has benefited and will benefit significantly from this policy instrument. For example, the National Industrial Petrochemical Technopark SEZ in the Atyrau Region (oil and gas engineering, petrochemicals) aims to support the development of the petrochemical production and hydrocarbon processing. The Pavlodar SEZ was created to help the chemical and petrochemical industry produce export-oriented products with high additional value and integrate local products into the global production and distribution system.

137. These zones are industrial clusters where external economies of scale and other advantages help the operating firms in reducing costs, developing competitive production systems and attracting investment, in particular, Foreign Direct Investment (FDI). As a result of these benefits, many developing countries have been promoting zones with the expectation that they will provide the engine of growth to propel industrialisation. There is, however, no conclusive evidence regarding the role of the zones in the development process of a country. The literature review indicates that while some countries have been able to capture the dynamic and static gains, for many more this has been largely a costly exercise. For example, after less than 10 years of experience, Ukraine closed down its special economic zones (in March 2005), as they were disturbing the fiscal stability of the country and impacting negatively on competition.

138. Also, by granting privileges, government has to accept a reduction in its tax revenue and share its power with the local authorities or the industry managers. This may have the unintended effect of reduction in government’s ability to control and implement central Government’s decisions at the local level. In addition, the abuse of environmental regulations and labour laws is rather frequent on the territories of such zones.

139. Therefore, Kazakhstan needs to regularly monitor the costs and benefits of building the SEZs and conduct a regular assessment. This is particularly important given the long-term arrangements for participants in the zones. Developing and launching the preparation of tax expenditure statistics will help the government to better understand the gains and losses for the state from this policy tool.

4.3. Other

140. Much of the legislation in Kazakhstan appears to be aimed at expanding the employment of Kazakhstan nationals, particularly, in the oil and gas sector. In the light of this objective, Kazakhstan taxation policy has a particular feature. As reported by Jensen and Tarr, foreign companies in the oil and gas sector are exempt from VAT on their sales (which, of course, are for the most part exports and would be exempt from VAT under most other systems) but also on their purchases of imported inputs. Thus, domestic inputs, whose sales the government seeks to expand, are taxed, but imported inputs are not. This taxation policy therefore encourages the use of imported inputs and discourages the use of domestic inputs. Generally, this practice seems in conflict of creating value-added and employment in Kazakhstan.

141. Jensen and Tarr note “... that a policy option being considered in Kazakhstan [is] the waiver of VAT on domestic inputs into oil and gas; the intent of which is to place domestic inputs on an equal VAT footing with imported inputs in the crude oil and gas sector, as multinationals in the sector are reported to have negotiated a waiver of VAT on imported inputs.” Clearly, such a decision would redress the balance. Equally clearly, the government would lose revenue. Whether the increase in employment justifies the loss of revenue is therefore uncertain. This dilemma still awaits its resolution.
PART III. SCOPING OF THE IN-DEPTH ANALYSIS OF THE DISTRICT HEATING SECTOR IN KAZAKHSTAN

142. District heating is very common in Kazakhstan. Over 50% of the urban heating demand in the country is covered by district heating. Most of power generation is coal-fuelled. As a result, the district heating sector is a significant contributor to greenhouse gas (GHG) emissions in Kazakhstan. The associated emissions are close to 20% of the national total, at 47 MtCO$_2$. At the same time, this sector is economically and socially important for the country. Direct consumer subsidies were eliminated a long time ago but consumers are subsidised indirectly, by keeping end-user prices low and by providing support to producers. These are some of the main reasons for which the district heating sector was selected for further in-depth analysis.

143. This chapter provides an overview of the district heating sector in Kazakhstan, the pricing of district heating services and the main subsidy schemes that benefit the sector. This discussion provides the basis for further in-depth analysis and modelling of the proposed subsidy reform scenarios.

1. District heating sector in Kazakhstan

144. There are 42 large district heating (DH) systems in the country connected to 38 large co-generation plants (CHPs) and 30 big central heat only boilers (HOBs). The efficiency of the DH systems is generally low with heat losses reaching up to 50% of the primary energy used. The high level of heat losses is primarily due to old, obsolete equipment (typically between 25 and 40 years old) and inadequate maintenance. By improving the energy efficiency of the existing DH systems and by further promoting co-generation, the total conservative GHG emission reduction potential has been estimated at about 4.6 million tonnes of CO$_2$ equivalent per year.

145. The installed electrical capacity of the power plants in Kazakhstan is about 18 gigawatts (of which coal-fired power plants account for 87.5 % and hydroelectric stations 12.4 %). Most of the power generation is coal-fuelled. Kazakhstan has a developed infrastructure of heat supply. The installed capacity of heat power plants is more than 6 700 MWs (38 % of the capacity of all power plants of the country). They cover about 40% of the heat consumption and about 46% of the electricity consumption in Kazakhstan.

146. In Kazakhstan, generally, there is no natural gas supply infrastructure in urban centres (except in several urban centres in Southern Kazakhstan, including Almaty, where residential gas use is significant); as a result, district heating companies often face no competitive pressure from natural gas suppliers. The lack of alternatives is an important factor in the low disconnection rate.

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27 Adapted from OECD (2013c).
28 Combined Heat and Power plants (CHP) refers to plants which are designed to produce both heat and electricity (sometimes referred to as co-generation power stations).
29 The carbon dioxide equivalent (CO$_2$e) allows the different greenhouse gases to be compared on a like-for-like basis relative to one unit of CO$_2$. CO$_2$e is calculated by multiplying the emissions of each of the six greenhouse gases by its 100 year global warming potential.
30 UNDP website.
147. The district heating sector accounts for a significant share of Kazakhstan’s greenhouse gas (GHG) emissions. According to national statistics, some 110 TWh of heat (served through large district heating networks or through smaller local ones) is consumed each year, with additional heat generated in individually heated buildings. Of this, around 75 TWh is consumed by residential, public and commercial buildings; the remainder accounted for by industrial heat consumption. The associated emissions are close to 20% of the national total, at 47 MtCO₂ (NERA Economic Consulting and BNEF, 2011).

148. Furthermore, a significant share of air pollution is attributable to electricity and heat production in thermal power plants, especially with respect to emissions of sulphur oxides (SOx), nitrogen oxides (NOx), carbon monoxide (CO) and ash. According to UNECE (2008), much of this pollution is caused by the use of very low quality coal as well as the inefficient gas purification systems in thermal power plants, notably the lack of denitrification and de-sulphurization units. Mean estimates of mortality risk attributable to air pollution are about 16 000 cases per year (Kenessariyev U., Golub A., Brody M. et al., 2013), which constitutes a significant contribution to the environmental burden of diseases. In relative terms, the impact of air pollution on premature mortality in Kazakhstan is notably higher than in Russia and the Ukraine.

149. Kazakhstan has over 5 000 heating and cooling-degree days during the year, of which about 4500 are heating-degree days, the fourth highest among EBRD countries and behind only Mongolia, the Russian Federation and Finland. Therefore, the extent of the need and impact of the residential sector on total consumption of heating energy are significant.

150. NERA Economic Consulting and BNEF (2011) estimate that as much as 60% of primary energy use in the district heating and buildings energy supply chain could be cut even as service is improved.

2. Prices of district heating services in Kazakhstan

151. The Law on natural monopolies of 1998 and the Concept on tariff policy development in the area of natural monopolies of 2005 govern the tariff rates and pricing for the energy sector in Kazakhstan. The energy sector is subject to regulation by the central government and the economic regulation of tariffs is undertaken by the Agency for the Regulation of Natural Monopolies (ARNM) and its regional branches. The ARNM oversees and approves tariffs proposed by natural monopolies and dominant market participants in the utilities sector (supply of water, heating, electricity and gas) and in licensed services (e.g. oil and gas pipelines, rail transportation, telecommunication services, and all types of education).

152. The tariff system for heating and domestic hot water is a cost-plus system and legally can be set at cost recovery levels. However, tariffs are charged per square metre of living space and not on actual consumption of heat energy. Thus, district heating companies are typically loss-making.

153. Tariff regulation and low end-user charges are a major obstacle to investment by network companies. Although tariffs nominally are set through a cost-based approach, historically they have lacked specific elements required to promote investment (an insufficient rate of return on investment and inadequate allowance for the depreciation of assets), as well as suffering from a more general tendency not to cover key costs. In part, the tendency to keep tariffs low reflects the vital role of heating for social welfare in Kazakhstan’s harsh climate.

31 Heating degree day (HDD) is a measurement designed to reflect the demand for energy needed to heat a home or business. It is derived from measurements of outside air temperature. The heating requirements for a given structure at a specific location are considered to be directly proportional to the number of HDD at that location. A similar measurement, cooling degree day, reflects the amount of energy used to cool a home or business.
Compared with most Central and Eastern European countries, heat tariffs for district heating in Kazakhstan are rather low (Table 12 and Figure 8). These low tariffs are mostly the result of low-cost fuel used in heat generation and the exclusion of capital expenditure (CAPEX) from user tariffs. The insufficient expenditure for the maintenance of the obsolete district heating infrastructure is another reason for the under-pricing of district heating services. It should be noted, however, that the ability of users to pay increased tariffs is a significant barrier to introducing full-cost recovery rates in Kazakhstan.

Table 12. Comparison of heat prices for residential users in selected cities in Poland, Bulgaria, the Russian Federation and Kazakhstan

<table>
<thead>
<tr>
<th></th>
<th>Poland (Kraków)</th>
<th>Bulgaria (Sofia)</th>
<th>Russia (Novosybirsk)</th>
<th>Kazakhstan (Almaty)*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Price in local currency (per GJ)</td>
<td>48.51 PLN/GJ</td>
<td>24.00 BGN/GJ</td>
<td>212 RUB/GJ</td>
<td>1267.00 KZT/GJ</td>
</tr>
<tr>
<td>EU exchange rate applied</td>
<td>4.10</td>
<td>1.96</td>
<td>39.7</td>
<td>195.00</td>
</tr>
<tr>
<td>Price in EURO/GJ</td>
<td>11.83</td>
<td>12.27</td>
<td>6.5</td>
<td>6.50</td>
</tr>
</tbody>
</table>

Note: Since the most common way of charging residential users in Kazakhstan is based on the apartment service area (measured in KZT/m²), in order to calculate the unit rate per volume of energy in Almaty, it was assumed that the average heat consumption in a standard apartment amounts to 266 kWh/m² which ensures heat comfort of 20°C (for more explanations see Part IV).

In the case of Kraków, Poland (750 000 inhabitants) heat is mostly supplied by two CHP plants using bituminous coal. These plants are privately owned and the district heating networks are organised in a limited liability company owned by the Kraków municipality. There are no subsidies for operational expenditure either to producers or to the distribution utility. In recent years, however, the distribution utility has benefited from investment subsidies from the European Union funds for the modernisation of the district heating network.

In Sofia, Bulgaria (1.2 million inhabitants), the heat-generation sources consist mostly of gas-fired CHPs. Both CHPs and the distribution network are operated by JSC Toplifikatsja Sofia, which is owned by Sofia municipality.

Figure 8. Comparison of heat prices for residential users in selected cities in Europe and Kazakhstan

Note: For the cities in Kazakhstan, the prices were calculated using the average heat consumption in the residential sector in a given region multiplied by unit tariffs set per the surface area of apartments.
As can be seen and as will be discussed further on, the prices in most Kazakhstan cities (Figure 8) are several times lower than in cities in other countries (Figure 8). One of the main reasons for the low heat tariffs is the low cost of fuel. Since the cost of fuel is a major component (usually more than 50%) of the operating and maintenance costs, the fuel cost has a significant impact on the unit cost of heat production. For example, the average thermal coal \(^{32}\) price for producers in Poland during the first half of 2013 was USD 98 per tonne; in Kazakhstan, it was estimated to be USD 18-25 USD per tonne. Information on the coal price in Kazakhstan is available for coal purchased for the Sogrinskaya CHP plant from Karazhira (KZT 3 286 per tonne); Maikuben Vest (KZT 3 787 per tonne). The CHP plant in Ust-Kamenogorsk paid KZT 2 932 per tonne for its coal. Therefore, assuming an average calorific value of thermal coal of 22 GJ/t, the average fuel price in Kazakhstan was one quarter that in Poland. Given the number of different types of coal and the fact that coal price can differ by country and by region, however, it is difficult to take one single price as a benchmark to compare the Kazakhstan coal price against it. Starting in 2013, all Kazakhstan utilities buy coal exclusively on the Eurasian Trading System Commodity Exchange. Moreover, the average thermal coal price in international markets can range from USD 60 to USD 200 per tonne. Even though one may assume that labour and the technology and production methods used in Kazakhstan in extracting coal are very cheap, they cannot fully account for these very low fuel prices in the country.

### Table 13. Approved tariff of heat producers in Almaty, 2012

<table>
<thead>
<tr>
<th>Item</th>
<th>Expenses</th>
<th>Unit</th>
<th>Approved amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Expenditure incurred on production</td>
<td>000 KZT</td>
<td>6 377 311</td>
</tr>
<tr>
<td></td>
<td>Including</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>All expenses on fuels and materials</td>
<td>-/-</td>
<td>5 037 937</td>
</tr>
<tr>
<td></td>
<td>Including</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.1</td>
<td>Materials and supplies</td>
<td>-/-</td>
<td>41 590</td>
</tr>
<tr>
<td>1.2</td>
<td>Fuel</td>
<td>-/-</td>
<td>4 289 150</td>
</tr>
<tr>
<td>1.3</td>
<td>Combustive and lubricating materials (ГСМ )</td>
<td>-/-</td>
<td>8 203</td>
</tr>
<tr>
<td>1.4</td>
<td>Electric energy</td>
<td>-/-</td>
<td>698 994</td>
</tr>
<tr>
<td>2</td>
<td>Labour</td>
<td>-/-</td>
<td>1 003 572</td>
</tr>
<tr>
<td></td>
<td>Including</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.1</td>
<td>Salaries</td>
<td>-/-</td>
<td>913 168</td>
</tr>
<tr>
<td>2.2</td>
<td>Social security</td>
<td>-/-</td>
<td>90 404</td>
</tr>
<tr>
<td>3</td>
<td>Depreciation</td>
<td>-/-</td>
<td>200 081</td>
</tr>
<tr>
<td>4</td>
<td>Repairs</td>
<td>-/-</td>
<td>69 871</td>
</tr>
<tr>
<td>5</td>
<td>Outsourced services</td>
<td>-/-</td>
<td>28 361</td>
</tr>
<tr>
<td>6</td>
<td>Taxes (environmental taxes)</td>
<td>-/-</td>
<td>4 686</td>
</tr>
<tr>
<td>7</td>
<td>Other expenses</td>
<td>-/-</td>
<td>32 803</td>
</tr>
<tr>
<td>8</td>
<td>General administrative expenses</td>
<td>-/-</td>
<td>156 815</td>
</tr>
<tr>
<td>III</td>
<td>All expenses</td>
<td>000 KZT</td>
<td>6 534 126</td>
</tr>
<tr>
<td>IV</td>
<td>Profit</td>
<td>000 KZT</td>
<td>161 493</td>
</tr>
<tr>
<td>V</td>
<td>All necessary income</td>
<td>000 KZT</td>
<td>6 695 619</td>
</tr>
<tr>
<td>VI</td>
<td>Volume of energy sold</td>
<td>000 Gcal</td>
<td>1 754,73</td>
</tr>
<tr>
<td>VII</td>
<td>Tariff (without VAT)</td>
<td>KZT/Gcal</td>
<td>3 815,75</td>
</tr>
</tbody>
</table>

Source: Annex to ARNM (2012).

\(^{32}\) A generic term used to describe cheap coal which is used primarily to generate heat at thermal power stations as opposed to metallurgical coal which is converted to coke for use in steel production. Sometimes, it is referred to as steam coal.
158. The example of Almaty heat producers (Table 13) shows how all these factors (a low depreciation rate and a low rate of return, combined with low labour and fuel costs) translate into a low heat tariff. Nonetheless, fuel still represents about 66% of the overall cost structure of the producer. Access to low-cost fuel constitutes the main reason for low heat prices in Kazakhstan. Increasing input prices to the levels of the countries of Central and Eastern Europe would result in a two to three-fold increase in heat prices.

159. Another factor that allows heat prices to be kept low is the fact that tariffs are not based on full-cost recovery. As shown in Table 13, depreciation accounts for 3% of total operating expenses (OPEX) while the profit margin is set at 2.4% of OPEX. The expenses on repairs correspond only to 1% of OPEX. The exclusion of capital expenditure (CAPEX) from tariffs is one of the main barriers halting the modernisation of the district heating sector in Kazakhstan.

160. Figure 9 presents the degree of cost-recovery through user fees. A full cost recovering tariff is the one that covers both OPEX and CAPEX (level IV). Currently, in most district heating utilities in Kazakhstan, the tariffs allow the (partial) coverage of OPEX but not CAPEX (level II or I). In many cases maintenance expenditure by the utilities is also very low, which results in further degradation of the existing infrastructure. In order to keep the utilities running, the state needs to provide additional support in one form or another.

Figure 9. Degree of cost recovery through user fees

3. Subsidies to the district heating sector

161. Kazakhstan does not provide direct budgetary support to heat consumers. Such direct consumer subsidies were eliminated long time ago but consumers are subsidised indirectly, by keeping end-user prices low and by providing support to producers. Keeping heat tariffs low is often justified on social grounds but also as a way to reduce inflationary processes in the economy.
Direct subsidies to O&M costs in the district heating sector

162. According to information from the energy regulatory office, direct subsidies to operation and maintenance (O&M) in the district heating sector are limited only to several underdeveloped regions (Table 14). Between 2008 and 2012, transfers for fuel purchases amounted to about KZT 8 billion (EUR 50 million). These subsidies are allocated from the respective local budget.

Table 14. Subsidies to operation and maintenance in the district heating sector, 2008-2012

<table>
<thead>
<tr>
<th>in KZT thousand</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eastern Region:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>for building the</td>
<td>Subsidies for building the fuel stock</td>
<td>365 655</td>
<td>219 900</td>
<td>480 648</td>
<td>477 486</td>
</tr>
<tr>
<td>fuel stock</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>to natural gas</td>
<td>Subsidies to natural gas purchases (Costanaskaya Oblast)</td>
<td>659 970</td>
<td>922 883</td>
<td>966 418</td>
<td>839 328</td>
</tr>
<tr>
<td>purchases</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(the town of</td>
<td>Fuel oil purchases (the town of Arkalyk)</td>
<td>958 443</td>
<td>521 233</td>
<td>600 525</td>
<td>705 825</td>
</tr>
<tr>
<td>Arkalyk)</td>
<td>Fuel purchases (Jambylska Oblast)</td>
<td></td>
<td>39 163</td>
<td>224 786</td>
<td></td>
</tr>
<tr>
<td>for fuel</td>
<td>Subsidies for fuel purchases (total): KZT 7 982 263 thousand</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>purchases</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Investment grants

163. The central budget subsidises investments in the development and the extension of district heating networks as well as the construction and modernisation of CHPs. There are a number of investment programmes that can potentially be a source of such subsidies. The investment grants assigned from the central budget for regional development between 2013 and 2015 amount to KZT 501 billion (EUR 2.6 billion). These resources will be spent, among others, on modernisation of district heating networks, CHPs, gas distribution networks and water/wastewater infrastructure.

Guaranteed tariffs

164. In 2009, the government set the scheme of guaranteed tariffs for heat distribution companies in order to encourage investments in the modernisation of district heating networks. This scheme allows utilities to recover necessary investment expenditures. No details on the results ensuing from the introduction of guaranteed tariffs in the distribution systems are available but, generally, the system seems to not have worked well.

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33 Central budget investment grants 2013 – 2015: Regional development, the formation of the points of growth (Региональное развитие, формирование точек роста).
PART IV. ASSESSMENT OF POTENTIAL EFFECTS AND MAIN SCENARIOS OF SUBSIDY REFORM IN THE RESIDENTIAL DISTRICT HEATING SECTOR

165. This chapter presents major results of modelling the impact of subsidy removal from the residential district heating sector. The main subsidy scheme considered in this analysis is implicit support to consumers provided through regulating heat prices which keeps tariffs below the full cost of supply of the service. The model designed to support this analysis estimates the magnitude of the subsidy provided through regulated heat prices. The impact of subsidy removal (at the current heat tariff level) is simulated in terms of: average prices of heat energy for households, energy consumption by households, average bills for heat services paid by households and the relation of average bills to disposable households income (affordability). The chapter finishes with a discussion of the impact of subsidy removal on greenhouse gas (GHG) emissions from the residential district heating sector, the public budget and the poor and proposes several policy scenarios for possible subsidy reform.

1. Introduction

166. The main objective of the model is to estimate the magnitude of subsidy provided through regulated heat prices and simulate the impact of subsidy removal from the residential district heating sector, at current heat prices. Estimating the subsidy magnitude is a challenge, as we do not know the exact amount of support provided to consumers by under-pricing heating services. To make this estimation, we calculate the subsidy magnitude indirectly. In simple terms, we do this by calculating the revenue generated by the whole sector at the current tariff and comparing this revenue level with a new level of revenue generated when heat tariffs are increased. We propose two scenarios for tariff increase which we explain further in the analysis. The difference in the revenue collected at the current tariff level and at new increased tariffs is the estimated subsidy magnitude.

167. It has to be noted that, ideally, the level of subsidy should be derived from comparing current levels of tariffs with tariffs set at a cost-recovery level (that is, based on the long-run marginal cost of supply). Calculating cost-recovery levels of tariffs is a daunting exercise as it requires a huge amount of data and detailed knowledge of the cost structure (including fixed and variable costs) of each and every installation generating heat in the country. This is a valuable exercise but it will require time and money and even more importantly the willingness of competent authorities and operators to provide relevant and detailed data.

168. Given these constraints and in order to find a practical solution to this challenge, instead of using the cost-recovery tariff as a benchmark against which to compare the current tariff and estimate the subsidy magnitude, we have proposed two other benchmarks. These two benchmarks (or scenarios) are: first, a higher heat tariff which leads to a decrease in heat consumption and subsequently to a lower heating temperature in dwellings (but not lower than 18°C which is generally accepted as the minimum level of heating comfort for households) (we call this the heating comfort scenario). The second scenario (the affordability scenario) assumes a yet higher level of heat tariff set at the affordability level for residential consumers.

169. In the model, in order to calculate the revenue generated by the sector from heat supplied, we need to know the level of residential tariffs and the level of heat consumption by region in the country (tariff multiplied by volume of consumption gives the revenue in each scenario). Once we estimate the level of subsidy under each scenario, we check how consumers react to these price changes and what the impact of this behavioural change is on consumption and subsequently on the level of CO₂ emissions in the country.
170. In order to arrive at the subsidy magnitude, we need to start with calculating the revenue generated by tariffs. In the current (or reference) scenario, the revenue equals current tariffs multiplied by the volume of current heat energy consumption. Then, we modify the initial assumptions, first, by increasing the heat tariff up to an affordability level and then, we reduce the level of consumption down to a new level which, however, ensures the minimum level of heating comfort.

2. Description of the model scenarios

171. Detailed description of the model designed to support this analysis is presented in Annex 1 to this report. As described in Annex 1, a simplified partial equilibrium model was used in order to determine the magnitude of the subsidy and its influence on GHG emissions and the social situation of society (in terms of price affordability).

172. As mentioned earlier, the main objective of the model is to simulate the impact of subsidy removal from the residential district heating sector, under current circumstances (that is, current price and heat consumption), on:

- Average prices of heat energy for households;
- Energy consumption by households;
- Greenhouse gas emissions from the residential district heating sector;
- Average bills for heating services paid by households and the relation of average bills to disposable household income (affordability);
- Magnitude of the subsidy calculated as the difference in revenues under current prices and prices after a subsidy removal.

173. As discussed above, in order to estimate the magnitude of the subsidy, we need to calculate the revenue generated at the current level of tariff, hence we need to know heat prices and consumption volumes. The model then calculates energy consumption for the two price increase scenarios. To sum up, the three scenarios discussed are:

- Reference scenario – which represents the current situation – current prices and consumption;
- Affordability scenario – where the monthly bill for heat energy cannot exceed the affordability constraint of 8% of disposable household income;
- Heating comfort scenario – the energy consumed cannot be lower than the level needed to ensure an indoor temperature of 18°C in the worst buildings (a Khrushchevka-type building). Actually, the model simulates two scenarios of minimum indoor temperature, at 18°C and 20°C.

34 The only prerequisite for a subsidy removal is that households are enabled to regulate the heat energy they consume and to pay for the energy consumed.

35 The Khrushchevka type of building is a cement-panel or brick apartment building and very energy inefficient that was very popular in the Soviet Union in 1958-1985. The building usually has 5 storeys and took its name from Nikita Khrushchev.
174. The model results are not predictions, the model simply demonstrates what would happen if subsidies are removed at the current (2012) conditions of heat prices and consumption. The model does not predict future trends, it analyses the current situation only. Thus, no changes in GDP and real household income are modelled. Also, this is the reason why income elasticity is not used in the model, we use price elasticity only.

175. The model consists of five elements (spreadsheets):

i. **Assumptions.** Most input data are entered in the assumption spreadsheet. The main assumptions are discussed below;

ii. **Elasticity.** The elasticity spreadsheet determines the parameters of the elasticity curve and presents the main results of the modelling, such as price and consumption after subsidy removal. Elasticity\(^{36}\) is one of the key elements of the model. Elasticity helps determine the maximum affordable price for the population. For the sake of modelling, we use a non-linear price elasticity of demand for heat where elasticity starts from -0.15 at current heat prices and reaches -0.50 at the level of affordability/below basic needs comfort, after which it quickly reaches 0\(^{37}\);

iii. **Consumption.** In the consumption spreadsheet, the consumption of heat energy for different prices is simulated. The model calculates consumption separately for each region of Kazakhstan;

iv. **GHG emissions.** In the GHG emissions spreadsheet, the results from the modelling are converted into CO\(_2\) emissions;

v. **Affordability and subsidy magnitude.** In the affordability and subsidy magnitude spreadsheet, the energy bills of households for each of the subsidy removal scenarios are presented. Also, the total revenues from heat energy consumption are calculated in order to determine the magnitude of the subsidy, defined as the difference between the revenues generated at the current prices and the revenue generated at increased prices.

176. The Assumptions spreadsheet of the model requires the following data for each region of Kazakhstan separately:

- Living area [m\(^2\)];
- Average energy consumption by a typical building [kWh/year];
  - at 20°C
  - at 18°C
- Average energy which is needed to heat a typical building [kWh/(m\(^2\)·year)];
  - at 20°C
  - at 18°C

\(^{36}\) Price elasticity of demand is a measure used to show the responsiveness, or elasticity, of the quantity demanded of a good or service to a change in its price.

\(^{37}\) The issue of elasticity is discussed at length in Annex 1.
• Average size of an apartment [m²];
• Average size of household [#];
• Average household income [KZT annually];
• Average current price for energy in the respective region [KZT/m²];
• International Energy Agency (IEA) data on average emission (g CO₂) for one kWh of heat energy produced;
• Price elasticity for heat energy at the current price and income situation and when the heat tariff reaches the affordability constraint.

177. Most entries of the model are calculated by the model using data from different sources, such as IEA or national statistics. Detailed calculations of the assumptions are presented in Annex 1. It should be mentioned, however, that most of the data need to be entered for each region of Kazakhstan separately because climate conditions and disposable household income vary across Kazakhstan. For example, the data in Table 30 in Annex 1 (Heat tariffs in the regional centres of Kazakhstan, 2011-2012) indicate that household disposable income in Taraz (Zhambyl) is almost three times lower than that in the city of Astana. These differences will have a significant influence on the level of affordability, should heat prices be increased.

178. Similarly, climate conditions across the regions in Kazakhstan differ significantly. Table 34 in Annex 1 shows average temperatures by region. From Table 35, it is evident that heating comfort in South Kazakhstan, where the average temperature in January is -2°C, is much easier to achieve than in the city of Astana, where the average temperature in January is -16.8°C and the heating season is almost 2 months longer. Thus, the model makes separate calculations for each of the 16 regions (14 regions and the cities of Astana and Almaty).

179. As a result of model simulations, several data sets are obtained for each region and for each simulated price. These sets include:

• Average unit energy consumption, in kWh/(m²·year);
• Average monthly bill for heat services;
• Bill as % of disposable household income;
• Total energy consumption by all heated dwellings (kWh/year);
• Total energy production needed to supply required consumption (the consumption increases when losses in the distribution system are included);
• GHG emissions associated with energy production;
• Total revenues associated with heat energy consumption; the difference in the level of revenue generated when tariff is increased in each of the scenarios and the revenue generated at the current level of tariff gives the information on the magnitude of the implicit subsidy.
The GHG emissions are calculated using a simplified method, that is by multiplying the energy produced by an indicator for CO₂ emissions per kWh from electricity and heat (Figure 10). The pre-set value comes from IEA data, which provides information for different countries. For Kazakhstan, the value is 438.879 CO₂ g/kWh.

The step-by-step approach to applying the model and doing the calculations is presented in Figure 10 below.

---

2.1. Magnitude of the subsidy

Estimating subsidy magnitude is one of the major outputs of the model. Usually, the magnitude of the subsidy is calculated using the price gap approach. A benchmark price is determined based on the production costs using technologies applied in the country (this is done by using the Levelized Energy Cost calculation) increased by the costs of distribution and value added tax (VAT). The price gap approach applied in the situation of Kazakhstan will imply that part of the subsidy that is not economically wasteful will be included in the calculation.

---

38 Levelized Energy Cost is the price at which energy (electricity/heating) must be generated from a specific source to break even over the lifetime of the project. It is an economic assessment of the cost of the energy-generating system including all the costs over its lifetime: initial investment, operations and maintenance, cost of fuel, cost of capital. It is a kind of a long-term marginal cost based price.
183. The magnitude of the subsidy is determined by the price of the minimum consumption that ensures heating comfort or a price at which the affordability constraint is reached, depending on which is reached first. In the case of Kazakhstan, the affordability constraint is much harsher than the price at the heating comfort level. Thus, the price of the minimum consumption that ensures heating comfort is more realistic to be used to determine the magnitude of the subsidy.

184. The magnitude of the subsidy is then calculated as the difference in revenue at the calculated new price and the current price, multiplied by the annual consumption of heat energy for each price.

3. Results of the model simulations

185. Three scenarios were simulated using the model:

   i. **Reference scenario** – tariff is not changed – this scenario reflects the current situation.

   ii. **Heating comfort scenario** – the tariff is raised up to the level where the basic heating comfort is ensured.

   iii. **Affordability scenario** – the tariff is raised up to the affordability level without checking if basic heating comfort is ensured. It is assumed that basic heating comfort is ensured through different actions, mainly through energy efficiency measures.

186. The major assumptions used in the model are summarised in Table 15 below. The assumptions are calculated for each region separately. It is interesting to note that while in absolute terms, the city of Almaty and the Kostanay region pay the highest heat tariffs, in terms of affordability (that is the share of household income spent on heating), it is Shymkent (South Kazakhstan), followed by Taraz and Kazylorda, that pay most (see Table 30 on Heat tariffs in the regional centres of Kazakhstan, 2011-2012, in Annex 1). Thus, Astana and Almaty, the two richest cities in the country, seem to benefit more from the current situation of low heat tariffs.

<table>
<thead>
<tr>
<th>Region</th>
<th>Living area [m²]</th>
<th>Energy consumption kWh/year at 20°C</th>
<th>Energy produced kWh/(m²·year) at 20°C</th>
<th>Average apartment area [m²]</th>
<th>Household income KZT</th>
<th>Price for energy KZT/m²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Akmola</td>
<td>6 154</td>
<td>426.4</td>
<td>1 077.1</td>
<td>52.1</td>
<td>34 035</td>
<td>77.81</td>
</tr>
<tr>
<td>Astana</td>
<td>10 696</td>
<td>426.4</td>
<td>1 077.1</td>
<td>65.4</td>
<td>56 847</td>
<td>69.74</td>
</tr>
<tr>
<td>Aktoke</td>
<td>7 797</td>
<td>379.6</td>
<td>599.1</td>
<td>55.8</td>
<td>37 231</td>
<td>62.34</td>
</tr>
<tr>
<td>Almaty Region</td>
<td>6 146</td>
<td>286.2</td>
<td>672.5</td>
<td>55.5</td>
<td>35 111</td>
<td>34.98</td>
</tr>
<tr>
<td>Almaty</td>
<td>20 907</td>
<td>266.2</td>
<td>672.5</td>
<td>54.5</td>
<td>44 101</td>
<td>101.16</td>
</tr>
<tr>
<td>Atyrau</td>
<td>4 061</td>
<td>295.2</td>
<td>745.8</td>
<td>60.2</td>
<td>37 436</td>
<td>95.79</td>
</tr>
<tr>
<td>East Kazakhstan</td>
<td>15 589</td>
<td>404.8</td>
<td>1 022.7</td>
<td>51.3</td>
<td>29 131</td>
<td>48.38</td>
</tr>
<tr>
<td>Zhambyl</td>
<td>7 360</td>
<td>248.5</td>
<td>627.8</td>
<td>57.0</td>
<td>18 180</td>
<td>69.63</td>
</tr>
<tr>
<td>West Kazakhstan</td>
<td>5 182</td>
<td>364.4</td>
<td>920.7</td>
<td>51.0</td>
<td>26 644</td>
<td>85.49</td>
</tr>
<tr>
<td>Karagandy</td>
<td>21 311</td>
<td>399.7</td>
<td>1 009.6</td>
<td>53.6</td>
<td>34 025</td>
<td>67.04</td>
</tr>
<tr>
<td>Kyzylorda</td>
<td>4 069</td>
<td>280.4</td>
<td>708.4</td>
<td>71.7</td>
<td>27 396</td>
<td>66.95</td>
</tr>
<tr>
<td>Kostanay</td>
<td>8 983</td>
<td>420.7</td>
<td>1 062.8</td>
<td>48.7</td>
<td>28 711</td>
<td>105.69</td>
</tr>
<tr>
<td>Mangystau</td>
<td>4 204</td>
<td>220.6</td>
<td>557.3</td>
<td>56.4</td>
<td>26 472</td>
<td>47.08</td>
</tr>
<tr>
<td>Pavlodar</td>
<td>9 954</td>
<td>422.2</td>
<td>1 068.5</td>
<td>51.3</td>
<td>32 271</td>
<td>48.94</td>
</tr>
<tr>
<td>North Kazakhstan</td>
<td>4 913</td>
<td>441.6</td>
<td>1 115.5</td>
<td>49.7</td>
<td>34 926</td>
<td>81.27</td>
</tr>
<tr>
<td>South Kazakhstan</td>
<td>18 470</td>
<td>201.9</td>
<td>510.0</td>
<td>72.9</td>
<td>20 696</td>
<td>86.63</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>155 796</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
After determining the elasticity function, the price and consumption that ensure heating comfort are calculated. The results are presented in Table 16 below. At the heating comfort price, in absolute terms, Almaty and Atyrau will have the highest heat price but as a share of total disposable income, the energy bills are the highest in South Kazakhstan and Zhambyl and the lowest in Almaty Region and Astana.

Table 16. Calculation of the minimum heat consumption that ensures heating comfort

<table>
<thead>
<tr>
<th>Region</th>
<th>Current price KZT/m²</th>
<th>Current price KZT/month</th>
<th>Heating comfort price KZT/m²</th>
<th>Heating comfort price KZT/month</th>
<th>Energy bill at heating comfort price as % of disposable income</th>
</tr>
</thead>
<tbody>
<tr>
<td>Akmola</td>
<td>77.81</td>
<td>3 968.31</td>
<td>3.1%</td>
<td>135.81</td>
<td>6 430.90</td>
</tr>
<tr>
<td>Astana</td>
<td>69.74</td>
<td>4 533.10</td>
<td>2.1%</td>
<td>131.74</td>
<td>7 842.12</td>
</tr>
<tr>
<td>Aktobe</td>
<td>62.34</td>
<td>3 179.34</td>
<td>2.4%</td>
<td>119.34</td>
<td>6 001.43</td>
</tr>
<tr>
<td>Almaty Region</td>
<td>34.98</td>
<td>1 783.98</td>
<td>1.4%</td>
<td>89.98</td>
<td>4 335.57</td>
</tr>
<tr>
<td>Almaty</td>
<td>101.16</td>
<td>6 069.60</td>
<td>3.2%</td>
<td>205.16</td>
<td>9 706.62</td>
</tr>
<tr>
<td>Atyrau</td>
<td>95.79</td>
<td>4 885.29</td>
<td>4.0%</td>
<td>170.79</td>
<td>9 085.38</td>
</tr>
<tr>
<td>East Kazakhstan</td>
<td>48.38</td>
<td>2 467.38</td>
<td>2.2%</td>
<td>92.38</td>
<td>4 292.04</td>
</tr>
<tr>
<td>Zhambyl</td>
<td>69.63</td>
<td>3 551.13</td>
<td>5.7%</td>
<td>113.33</td>
<td>5 563.20</td>
</tr>
<tr>
<td>West Kazakhstan</td>
<td>85.49</td>
<td>4 359.99</td>
<td>4.2%</td>
<td>142.49</td>
<td>6 520.02</td>
</tr>
<tr>
<td>Karagandy</td>
<td>67.04</td>
<td>3 419.04</td>
<td>2.7%</td>
<td>123.04</td>
<td>5 962.85</td>
</tr>
<tr>
<td>Kyzylorda</td>
<td>66.95</td>
<td>3 414.45</td>
<td>4.6%</td>
<td>117.95</td>
<td>7 369.26</td>
</tr>
<tr>
<td>Kostanay</td>
<td>105.69</td>
<td>5 390.19</td>
<td>4.7%</td>
<td>164.69</td>
<td>7 284.38</td>
</tr>
<tr>
<td>Mangystau</td>
<td>47.08</td>
<td>2 401.08</td>
<td>2.6%</td>
<td>115.08</td>
<td>5 447.44</td>
</tr>
<tr>
<td>Pavlodar</td>
<td>48.94</td>
<td>2 495.94</td>
<td>2.0%</td>
<td>93.94</td>
<td>4 376.69</td>
</tr>
<tr>
<td>North Kazakhstan</td>
<td>81.27</td>
<td>4 144.77</td>
<td>3.0%</td>
<td>140.27</td>
<td>6 364.14</td>
</tr>
<tr>
<td>South Kazakhstan</td>
<td>86.63</td>
<td>4 418.13</td>
<td>7.9%</td>
<td>86.63</td>
<td>4 418.13</td>
</tr>
</tbody>
</table>

A similar calculation is carried out for the affordability level which is presented in Table 17 below. The calculations show that there is sufficient room for heat price increase (up to affordability level of 8%) in all regions but South Kazakhstan. This is so because the current price in this region is already high compared to disposable household income. Therefore, an increase of prices in South Kazakhstan is limited. In other regions, the price of heating comfort is quite low compared to the affordability level.
Table 17. Calculation of the minimum consumption that ensures affordability level

<table>
<thead>
<tr>
<th>Region</th>
<th>Current price</th>
<th>Energy bill at current price</th>
<th>Energy bill as % of income</th>
<th>Affordability price</th>
<th>Energy at affordability price</th>
<th>Energy bill at affordability price as % of income</th>
<th>Unit energy consumption kWh/(m² year)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>KZT/ m²</td>
<td>KZT/month</td>
<td></td>
<td>KZT/ m²</td>
<td>KZT/month</td>
<td>%</td>
<td></td>
</tr>
<tr>
<td>Akmola</td>
<td>77.81</td>
<td>3 968.31</td>
<td>3.1%</td>
<td>296.91</td>
<td>10 486.46</td>
<td>8.0%</td>
<td>426.37</td>
</tr>
<tr>
<td>Astana</td>
<td>69.74</td>
<td>4 533.10</td>
<td>2.1%</td>
<td>448.54</td>
<td>17 513.08</td>
<td>8.0%</td>
<td>426.37</td>
</tr>
<tr>
<td>Aktobe</td>
<td>62.34</td>
<td>3 179.34</td>
<td>2.4%</td>
<td>328.74</td>
<td>11 470.17</td>
<td>8.0%</td>
<td>379.64</td>
</tr>
<tr>
<td>Almaty Region</td>
<td>34.98</td>
<td>1 783.98</td>
<td>1.4%</td>
<td>363.68</td>
<td>10 817.81</td>
<td>8.0%</td>
<td>266.22</td>
</tr>
<tr>
<td>Almaty</td>
<td>101.16</td>
<td>6 069.60</td>
<td>3.2%</td>
<td>361.26</td>
<td>13 586.35</td>
<td>8.0%</td>
<td>266.22</td>
</tr>
<tr>
<td>Atyrau</td>
<td>95.79</td>
<td>4 885.29</td>
<td>4.0%</td>
<td>257.49</td>
<td>11 534.49</td>
<td>8.0%</td>
<td>295.24</td>
</tr>
<tr>
<td>East Kazakhstan</td>
<td>48.38</td>
<td>2 467.38</td>
<td>2.2%</td>
<td>288.28</td>
<td>8 974.71</td>
<td>8.0%</td>
<td>404.84</td>
</tr>
<tr>
<td>Zhambyl</td>
<td>69.63</td>
<td>3 551.13</td>
<td>5.7%</td>
<td>114.93</td>
<td>5 602.58</td>
<td>8.0%</td>
<td>248.50</td>
</tr>
<tr>
<td>West Kazakhstan</td>
<td>85.49</td>
<td>4 359.99</td>
<td>4.2%</td>
<td>211.49</td>
<td>8 208.94</td>
<td>8.0%</td>
<td>364.45</td>
</tr>
<tr>
<td>Karagandy</td>
<td>67.04</td>
<td>3 419.04</td>
<td>2.7%</td>
<td>300.54</td>
<td>10 482.58</td>
<td>8.0%</td>
<td>399.66</td>
</tr>
<tr>
<td>Kyzylorda</td>
<td>66.95</td>
<td>3 414.45</td>
<td>4.6%</td>
<td>150.75</td>
<td>8 442.37</td>
<td>8.0%</td>
<td>280.43</td>
</tr>
<tr>
<td>Kostanay</td>
<td>105.69</td>
<td>5 390.19</td>
<td>4.7%</td>
<td>230.19</td>
<td>8 854.54</td>
<td>8.0%</td>
<td>420.71</td>
</tr>
<tr>
<td>Mangystau</td>
<td>47.08</td>
<td>2 401.08</td>
<td>2.6%</td>
<td>226.38</td>
<td>8 155.43</td>
<td>8.0%</td>
<td>220.59</td>
</tr>
<tr>
<td>Pavlodar</td>
<td>48.94</td>
<td>2 495.94</td>
<td>2.0%</td>
<td>328.14</td>
<td>9 492.00</td>
<td>8.0%</td>
<td>422.16</td>
</tr>
<tr>
<td>North Kazakhstan</td>
<td>81.27</td>
<td>4 144.77</td>
<td>3.0%</td>
<td>322.57</td>
<td>10 760.32</td>
<td>8.0%</td>
<td>441.58</td>
</tr>
<tr>
<td>South Kazakhstan</td>
<td>86.63</td>
<td>4 418.13</td>
<td>7.9%</td>
<td>86.63</td>
<td>6 315.33</td>
<td>7.9%</td>
<td>201.90</td>
</tr>
</tbody>
</table>

189. The calculation of the subsidy based on comparing the revenue of the sector at current prices and the revenue generated at the new price set at the comfort heating level shows that the subsidy amounts to KZT 78 302 million (see Table 18).

Table 18. Calculation of the subsidy, heating comfort constraint only

<table>
<thead>
<tr>
<th>Region</th>
<th>At current price</th>
<th>At heating comfort price</th>
<th>Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Energy bill</td>
<td>Total revenues</td>
<td>Energy bill</td>
</tr>
<tr>
<td></td>
<td>KZT/month</td>
<td>as % of income</td>
<td>KZT/month</td>
</tr>
<tr>
<td>Akmola</td>
<td>4 053.90</td>
<td>3.1%</td>
<td>5 746</td>
</tr>
<tr>
<td>Astana</td>
<td>4 561.00</td>
<td>2.1%</td>
<td>8 952</td>
</tr>
<tr>
<td>Aktobe</td>
<td>3 478.57</td>
<td>2.4%</td>
<td>5 833</td>
</tr>
<tr>
<td>Almaty Region</td>
<td>1 941.39</td>
<td>1.4%</td>
<td>2 580</td>
</tr>
<tr>
<td>Almaty</td>
<td>5 513.22</td>
<td>3.2%</td>
<td>25 380</td>
</tr>
<tr>
<td>Atyrau</td>
<td>5 766.56</td>
<td>4.0%</td>
<td>4 668</td>
</tr>
<tr>
<td>East Kazakhstan</td>
<td>2 481.89</td>
<td>2.2%</td>
<td>9 050</td>
</tr>
<tr>
<td>Zhambyl</td>
<td>3 968.91</td>
<td>5.7%</td>
<td>6 150</td>
</tr>
<tr>
<td>West Kazakhstan</td>
<td>4 359.99</td>
<td>4.2%</td>
<td>5 316</td>
</tr>
<tr>
<td>Karagandy</td>
<td>3 593.34</td>
<td>2.7%</td>
<td>17 145</td>
</tr>
<tr>
<td>Kyzylorda</td>
<td>4 800.32</td>
<td>4.6%</td>
<td>3 269</td>
</tr>
<tr>
<td>Kostanay</td>
<td>5 147.10</td>
<td>4.7%</td>
<td>11 393</td>
</tr>
<tr>
<td>Mangystau</td>
<td>2 655.31</td>
<td>2.6%</td>
<td>2 375</td>
</tr>
<tr>
<td>Pavlodar</td>
<td>2 510.62</td>
<td>2.0%</td>
<td>5 846</td>
</tr>
<tr>
<td>North Kazakhstan</td>
<td>4 039.12</td>
<td>3.0%</td>
<td>4 791</td>
</tr>
<tr>
<td>South Kazakhstan</td>
<td>6 315.33</td>
<td>7.9%</td>
<td>19 201</td>
</tr>
<tr>
<td>Total</td>
<td>137 693</td>
<td></td>
<td>215 995</td>
</tr>
</tbody>
</table>

55
190. The second calculation takes into account the affordability constraint only, assuming that heating comfort is provided by different means, for example, by applying energy efficiency measures. In this calculation, the subsidy is estimated to be KZT 206,199 million. The results are presented in Table 19. In addition, Figure 11 below summarises the simulations of calculating the magnitude of the subsidy. The light blue part of the bars indicates the magnitude of the hidden subsidy in each of the two scenarios.

Table 19. Calculation of the subsidy, affordability constraints only

<table>
<thead>
<tr>
<th>Region</th>
<th>Energy bill KZT/month</th>
<th>as % of income</th>
<th>Total revenues KZT million /a</th>
<th>Energy bill KZT/month</th>
<th>as % of income</th>
<th>Total revenues KZT million /a</th>
<th>Energy bill KZT/month</th>
<th>as % of income</th>
<th>Total revenues KZT million /a</th>
</tr>
</thead>
<tbody>
<tr>
<td>Akmola</td>
<td>4,053.90</td>
<td>3.1%</td>
<td>5,746</td>
<td>10,486.46</td>
<td>8.0%</td>
<td>14,865</td>
<td>6,432.56</td>
<td>4.9%</td>
<td>9,118</td>
</tr>
<tr>
<td>Astana</td>
<td>4,561.00</td>
<td>2.1%</td>
<td>8,952</td>
<td>17,513.08</td>
<td>8.0%</td>
<td>34,372</td>
<td>12,952.08</td>
<td>5.9%</td>
<td>25,420</td>
</tr>
<tr>
<td>Aktobe</td>
<td>3,478.57</td>
<td>2.4%</td>
<td>5,833</td>
<td>11,470.17</td>
<td>8.0%</td>
<td>23,433</td>
<td>7,991.60</td>
<td>5.6%</td>
<td>13,900</td>
</tr>
<tr>
<td>Almaty Province</td>
<td>1,941.39</td>
<td>1.4%</td>
<td>2,580</td>
<td>10,817.61</td>
<td>8.0%</td>
<td>44,375</td>
<td>8,876.42</td>
<td>6.6%</td>
<td>11,795</td>
</tr>
<tr>
<td>Almaty</td>
<td>5,513.22</td>
<td>3.2%</td>
<td>25,380</td>
<td>13,586.35</td>
<td>8.0%</td>
<td>62,544</td>
<td>8,073.13</td>
<td>4.8%</td>
<td>37,164</td>
</tr>
<tr>
<td>Atyrau</td>
<td>5,766.56</td>
<td>4.0%</td>
<td>4,668</td>
<td>11,534.49</td>
<td>8.0%</td>
<td>34,372</td>
<td>5,767.93</td>
<td>4.0%</td>
<td>25,420</td>
</tr>
<tr>
<td>East Kazakhstan</td>
<td>2,481.89</td>
<td>2.2%</td>
<td>9,050</td>
<td>8,974.71</td>
<td>8.0%</td>
<td>32,726</td>
<td>6,492.81</td>
<td>5.8%</td>
<td>23,676</td>
</tr>
<tr>
<td>Zhambyl</td>
<td>3,968.91</td>
<td>5.7%</td>
<td>6,150</td>
<td>5,602.58</td>
<td>8.0%</td>
<td>16,681</td>
<td>1,633.67</td>
<td>2.3%</td>
<td>2,531</td>
</tr>
<tr>
<td>West Kazakhstan</td>
<td>4,359.99</td>
<td>4.2%</td>
<td>5,316</td>
<td>8,208.94</td>
<td>8.0%</td>
<td>19,009</td>
<td>3,848.95</td>
<td>3.8%</td>
<td>4,693</td>
</tr>
<tr>
<td>Karagandy</td>
<td>3,593.34</td>
<td>2.7%</td>
<td>17,145</td>
<td>10,482.58</td>
<td>8.0%</td>
<td>50,015</td>
<td>6,889.24</td>
<td>5.3%</td>
<td>32,870</td>
</tr>
<tr>
<td>Kyzylorda</td>
<td>4,800.32</td>
<td>4.6%</td>
<td>3,269</td>
<td>8,442.37</td>
<td>8.0%</td>
<td>9,749</td>
<td>3,642.05</td>
<td>3.5%</td>
<td>2,480</td>
</tr>
<tr>
<td>Kostanay</td>
<td>5,147.10</td>
<td>4.7%</td>
<td>11,393</td>
<td>8,845.54</td>
<td>8.0%</td>
<td>19,580</td>
<td>3,698.44</td>
<td>3.3%</td>
<td>8,187</td>
</tr>
<tr>
<td>Mangystau</td>
<td>2,665.31</td>
<td>2.6%</td>
<td>2,375</td>
<td>8,155.43</td>
<td>8.0%</td>
<td>7,295</td>
<td>5,500.11</td>
<td>5.4%</td>
<td>4,920</td>
</tr>
<tr>
<td>Pavlodar</td>
<td>2,510.62</td>
<td>2.0%</td>
<td>5,846</td>
<td>9,942.00</td>
<td>8.0%</td>
<td>23,148</td>
<td>7,431.38</td>
<td>6.0%</td>
<td>17,303</td>
</tr>
<tr>
<td>North Kazakhstan</td>
<td>4,039.12</td>
<td>3.0%</td>
<td>4,791</td>
<td>10,760.32</td>
<td>8.0%</td>
<td>19,201</td>
<td>6,721.20</td>
<td>5.0%</td>
<td>7,972</td>
</tr>
<tr>
<td>South Kazakhstan</td>
<td>6,315.33</td>
<td>7.9%</td>
<td>19,201</td>
<td>6,315.33</td>
<td>7.9%</td>
<td>19,201</td>
<td>0.00</td>
<td>0.0%</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td>137,693</td>
<td></td>
<td></td>
<td>343,892</td>
<td></td>
<td></td>
<td>206,199</td>
</tr>
</tbody>
</table>

Figure 11. Total revenue and subsidy level for different price scenarios for heating

191. Figure 12 shows the new calculated prices as part of the affordability and heating comfort scenarios. From the simulation, it is evident that heating comfort, and not affordability, is rather the main system constraint, as indoor temperature cannot be decreased endlessly (although raising tariffs to affordability levels may not be socially and politically feasible, either). This means that in estimating the indirect subsidy support provided through lower heat prices, it is the price at the heating comfort level that needs to be seen as the more realistic benchmark against which the subsidy can be calculated.
The results are presented in Table 20 and Table 21 below.

Next, the model simulates the unit heat consumption for the new prices (Tables 20 and 21). There are 4 types of price areas that emerge from the price simulations. These include:

- **I.** The price is below the current price, no simulation is needed for such prices (highlighted in green);
- **II.** The price is below the affordability level but consumption ensures heating comfort (highlighted in white);
- **III.** The highest price ensuring minimum heating comfort is below the affordability level (highlighted in red);
- **IV.** The price is above affordability or minimum heating comfort is not ensured; thus, consumption does not decrease (elasticity is zero) (highlighted in light brown).

Therefore, the tariff policy where the best results can be achieved (in terms of heating comfort and heat price) and where the government needs to focus its tariff policy is the second price area where the price is below the affordability level but consumption ensures heating comfort. The white areas show the optimum heat prices per region.
Table 20. Simulation of unit heat consumption \([\text{kWh/(m}^2\cdot\text{year})]\) depending on price. Heating comfort ensured

| Region          | 45  | 50  | 55  | 60  | 65  | 70  | 75  | 80  | 85  | 90  | 95  | 100 | 105 | 110 | 115 | 120 | 125 | 130 | 135 | 140 | 145 | 150 | 155 | 160 | 165 | 170 | 175 | 180 |
|-----------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Akmola          |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|                 | 425 | 422 | 418 | 415 | 412 | 408 | 405 | 401 | 398 | 395 | 392 | 389 | 386 | 383 | 380 | 377 | 374 | 371 | 368 | 365 | 362 | 360 | 357 | 355 | 352 | 349 | 346 | 343 |
| Astana          |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|                 | 426 | 423 | 420 | 417 | 414 | 411 | 408 | 405 | 402 | 399 | 396 | 393 | 390 | 388 | 385 | 382 | 380 | 377 | 374 | 371 | 368 | 365 | 362 | 359 | 356 | 353 | 350 | 347 | 344 |
| Aktobe          | 378 | 375 | 371 | 368 | 365 | 361 | 358 | 355 | 352 | 349 | 346 | 343 | 340 | 337 | 334 | 331 | 328 | 325 | 322 | 319 | 316 | 313 | 310 | 307 | 304 | 301 | 298 | 295 | 292 |
| Almaty Province | 260 | 257 | 253 | 250 | 247 | 244 | 241 | 237 | 234 | 231 | 228 | 225 | 222 | 219 | 216 | 213 | 210 | 207 | 204 | 201 | 198 | 195 | 192 | 189 | 186 | 183 | 180 |
| Almaty          |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| Alytau          |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| East Kazakhstan | 403 | 399 | 395 | 390 | 386 | 382 | 377 | 373 | 369 | 365 | 361 | 357 | 353 | 349 | 345 | 341 | 337 | 333 | 329 | 325 | 321 | 317 | 313 | 309 | 305 | 301 | 297 |
| Zhambyl         | 248 | 244 | 240 | 236 | 232 | 228 | 225 | 221 | 217 | 214 | 210 | 207 | 203 | 199 | 196 | 192 | 189 | 186 | 183 | 180 | 177 | 174 | 171 | 168 | 165 | 162 | 159 |
| West Kazakhstan | 361 | 358 | 355 | 352 | 348 | 345 | 342 | 338 | 335 | 332 | 329 | 326 | 323 | 320 | 317 | 314 | 311 | 308 | 305 | 302 | 299 | 296 | 293 | 290 | 287 | 284 | 281 |
| Kyzylorda       | 278 | 275 | 271 | 268 | 264 | 261 | 257 | 254 | 250 | 246 | 243 | 240 | 237 | 234 | 231 | 228 | 225 | 222 | 219 | 216 | 213 | 210 | 207 | 204 | 201 | 198 | 195 |
| Kostanay        |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| Mangystau       | 219 | 216 | 214 | 211 | 209 | 206 | 203 | 201 | 198 | 196 | 193 | 190 | 188 | 185 | 183 | 180 | 178 | 176 | 173 | 171 | 169 | 167 | 165 | 163 | 161 | 159 | 157 | 155 |
| Pavlodar        | 421 | 417 | 413 | 408 | 404 | 400 | 396 | 392 | 388 | 384 | 380 | 376 | 372 | 369 | 365 | 362 | 359 | 356 | 353 | 350 | 347 | 344 | 341 | 338 | 335 | 332 | 329 | 326 |
| North Kazakhstan|     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| South Kazakhstan|     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |

| Price is below current price, no simulation is needed for such prices |
| Price is below affordability and consumption ensures heating comfort |
| The highest price ensuring minimum heating comfort and below affordability |
| Price is above affordability or minimum heating comfort is not ensured; thus, consumption does not decrease (elasticity is zero) |
### Table 21. Simulation of unit heat consumption [kWh/(m²·year)] depending on price. Affordability ensured

<table>
<thead>
<tr>
<th>Region</th>
<th>Price [KZT/m²]</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>45  50  55  60</td>
</tr>
<tr>
<td>Akмола</td>
<td>425 424 419 416</td>
</tr>
<tr>
<td>Astana</td>
<td>426 424 422 384</td>
</tr>
<tr>
<td>Aktobe</td>
<td>378 376 373 370</td>
</tr>
<tr>
<td>Almaty Province</td>
<td>262 261 259 257</td>
</tr>
<tr>
<td>Almaty</td>
<td>265 263 262 260</td>
</tr>
<tr>
<td>Atyrau</td>
<td>293 291 289 286</td>
</tr>
<tr>
<td>East Kazakhstan</td>
<td>404 400 397 394</td>
</tr>
<tr>
<td>Zhambyl</td>
<td>248 244 240 236</td>
</tr>
<tr>
<td>West Kazakhstan</td>
<td>361 358 354 351</td>
</tr>
<tr>
<td>Kyzylorda</td>
<td>278 275 271 267</td>
</tr>
<tr>
<td>Kostanay</td>
<td></td>
</tr>
<tr>
<td>Mangystau</td>
<td>219 217 215 213</td>
</tr>
<tr>
<td>Pavlodar</td>
<td>422 418 415 412</td>
</tr>
<tr>
<td>North Kazakhstan</td>
<td>439 436 433 430</td>
</tr>
</tbody>
</table>

- Price is below current price, no simulation is needed for such prices
- Price is below affordability and consumption ensures heating comfort
- The highest price below affordability
- Price is above affordability thus, consumption does not decrease (elasticity is zero)
4. Modelling the subsidy impact analysis

195. Once optimal heat prices are established and the magnitude of the subsidy calculated, we model the impact of the subsidy on GHG emission levels (and specifically CO₂ emissions), the public budget and on the poor.

4.1. Modelling the impact of energy subsidies on GHG emission levels

196. Most heat energy in Kazakhstan is produced from coal and little from other fossil fuels. Thus, a reduction in energy consumption in the long term will result in a reduction in GHG emissions. In this context, policy makers need to discuss and understand to what extent heat producers are prepared for a drop in consumption and whether such a reduction may actually lead to an increase in losses on the production side, which may result in no reduction in GHG emissions. In addition, part of the heat energy in Kazakhstan is produced by combined heat and power plants, thus reduction in the heat demand will lead to a different allocation of costs between the generation of electricity and heating. In this case, if electrical power still needs to be produced, a reduction in the demand for heat may not always lead to a reduction in GHG emissions.

197. The above arguments are true but rather in the short term. In the long term, a reduction in the demand for heat will make the industry adapt to the new situation (for example, no new power capacity in heat production will be installed or released power (due to lower consumption) will be used to secure new connections to the district heating system). When producers adapt to the situation, the subsidy removal will affect GHG emissions.

198. The calculation of the GHG emissions levels is done by comparing the current emissions from the sector with emissions at the reduced consumption due to the higher prices resulting from the removal of the implicit subsidy. Similarly to simulating unit heat consumption, the unit heat production and total heat production were also calculated.

199. As explained earlier, the model calculates GHG emissions by multiplying the energy produced by an indicator for CO₂ emissions per kWh from electricity and heat production. The pre-set value comes from IEA data which for Kazakhstan is 438.879 CO₂ g/kWh.

200. Table 22 below summarises the calculation of the difference between heat energy currently produced and heat energy produced when the subsidy is removed.

<table>
<thead>
<tr>
<th>Region</th>
<th>Energy production (million MWh/year)</th>
<th>Difference million MWh/year</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Current Without subsidies</td>
<td></td>
</tr>
<tr>
<td>Akmola</td>
<td>6.63 6.02</td>
<td>0.61</td>
</tr>
<tr>
<td>Astana</td>
<td>11.52 10.49</td>
<td>1.03</td>
</tr>
<tr>
<td>Aktobe</td>
<td>7.48 6.74</td>
<td>0.74</td>
</tr>
<tr>
<td>Almaty Region</td>
<td>4.13 3.59</td>
<td>0.54</td>
</tr>
<tr>
<td>Almaty</td>
<td>14.06 12.21</td>
<td>1.85</td>
</tr>
<tr>
<td>Atyrau</td>
<td>3.03 2.68</td>
<td>0.35</td>
</tr>
<tr>
<td>East Kazakhstan</td>
<td>15.94 14.44</td>
<td>1.5</td>
</tr>
<tr>
<td>Zhambyl</td>
<td>4.62 3.98</td>
<td>0.64</td>
</tr>
<tr>
<td>West Kazakhstan</td>
<td>4.77 4.28</td>
<td>0.49</td>
</tr>
<tr>
<td>Karagandy</td>
<td>21.52 19.45</td>
<td>2.07</td>
</tr>
<tr>
<td>Kyzylorda</td>
<td>2.88 2.51</td>
<td>0.37</td>
</tr>
<tr>
<td>Kostanay</td>
<td>9.55 8.67</td>
<td>0.88</td>
</tr>
<tr>
<td>Mangystau</td>
<td>2.34 1.97</td>
<td>0.37</td>
</tr>
<tr>
<td>Pavlodar</td>
<td>10.62 9.64</td>
<td>0.98</td>
</tr>
<tr>
<td>North Kazakhstan</td>
<td>5.48 5.00</td>
<td>0.48</td>
</tr>
<tr>
<td>South Kazakhstan</td>
<td>9.42 9.42</td>
<td>0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>133.99 121.09</td>
<td>12.9</td>
</tr>
</tbody>
</table>
201. In total, the reduction in energy production could save 12.9 million MWh annually, which is equal to 5.7 million tonnes of CO₂ emissions annually, or 12% of the annual CO₂ emissions from the residential heating sector.

202. For the option when the affordability level is ensured, the results of the simulation are presented in Table 23.

**Table 23. Calculation of the reduction in energy produced for the “affordability” scenario**

<table>
<thead>
<tr>
<th>Region</th>
<th>Energy production (million MWh/year)</th>
<th>Difference million MWh/year</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Current</td>
<td>Without subsidies</td>
</tr>
<tr>
<td>Akmola</td>
<td>6.63</td>
<td>4.49</td>
</tr>
<tr>
<td>Astana</td>
<td>11.52</td>
<td>6.88</td>
</tr>
<tr>
<td>Aktobe</td>
<td>7.48</td>
<td>4.68</td>
</tr>
<tr>
<td>Almaty Region</td>
<td>4.13</td>
<td>2.22</td>
</tr>
<tr>
<td>Almaty</td>
<td>14.06</td>
<td>9.70</td>
</tr>
<tr>
<td>Atyrau</td>
<td>3.03</td>
<td>2.25</td>
</tr>
<tr>
<td>East Kazakhstan</td>
<td>15.94</td>
<td>9.67</td>
</tr>
<tr>
<td>Zhambyl</td>
<td>4.62</td>
<td>3.95</td>
</tr>
<tr>
<td>West Kazakhstan</td>
<td>4.77</td>
<td>3.63</td>
</tr>
<tr>
<td>Karagandy</td>
<td>21.52</td>
<td>14.00</td>
</tr>
<tr>
<td>Kyzylorda</td>
<td>2.88</td>
<td>2.25</td>
</tr>
<tr>
<td>Kostanay</td>
<td>9.55</td>
<td>7.53</td>
</tr>
<tr>
<td>Mangystau</td>
<td>2.34</td>
<td>1.50</td>
</tr>
<tr>
<td>Pavlodar</td>
<td>10.62</td>
<td>6.27</td>
</tr>
<tr>
<td>North Kazakhstan</td>
<td>5.48</td>
<td>3.68</td>
</tr>
<tr>
<td>South Kazakhstan</td>
<td>9.42</td>
<td>9.42</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>133.99</strong></td>
<td><strong>92.12</strong></td>
</tr>
</tbody>
</table>

203. In total, the reduction in energy production could save 41.9 million MWh annually, which is equal to 18.4 million tonnes of CO₂ emissions annually, or 39% of annual CO₂ emissions from the residential heating sector.

**4.2. Modelling the impact of energy subsidies on the public budget**

204. Subsidies in the residential district heating sector are mostly induced transfers to consumption due to regulated prices. Removing subsidies will increase revenues to the district heating companies and energy producers as well as generate higher revenues from VAT and other taxes. As the energy sector requires government support (in the form of equity or capital transfers), it can be assumed that the total magnitude of the subsidy would be accumulated by the public budget, at least in the first years (until the sector becomes competitive and fully self-financing).

205. Part of the increase in the revenues to the public budget (or reduced expenditures to support the energy sector) could be used to protect poor households. In addition, some public funds could be allocated to support energy efficiency measures, which is a major prerequisite for reforming implicit subsidies to consumers in the residential district heating sector.
4.3. Modelling the impact of energy subsidies on the poor

206. The model is designed so that heat prices do not exceed the affordability level, meaning that expenditures on heating will not exceed 8%\(^{39}\) of disposable household income and heating comfort is ensured. While subsidies like those discussed here lead to wasteful consumption and higher emissions, the consumption used to satisfy human basic needs (such as basic heating in cold seasons) cannot be treated as wasteful\(^{40}\); thus, in this model the heat price set at the heat comfort level was not treated as a wasteful subsidy.

207. Due to the nature of the model, which needs to generalise, it is average disposable household income that was used in the calculations. Clearly, the average does not reflect the situation of the poorest households. Thus, part of the savings that can accrue to the budget as a result of the positive influence of the subsidy removal should be used to support the poorest groups of the population.

5. Policy application of the modelling results: Three main scenarios for reforming subsidies

208. The policy adaptation of the modelling results requires comprehensive actions. The first issue that needs to be addressed before any further policy is implemented is the limited possibilities of end-users to regulate their consumption and react to price signals. Thus, the following policies (prerequisites) need to be put in place in the district heating sector before removing subsidies:

- **Improved tariff structure**: the practice of charging heat tariffs based on a square meter of living space renders even a full cost recovery tariff ineffective since end-users pay the same amount regardless of their consumption. Policy analysts identify tariffs as one of the main barriers to district heating development. Lump sum heat tariffs motivate neither the heating company nor customers to undertake energy efficiency measures. Therefore, tariff structure needs to be revisited and established on the basis of actual consumption.

- **Ensuring heat regulation by thermostatic valves**: once end-users can be billed for actual consumption, they will need to have thermostatic valves installed on the radiators in their flats. Otherwise, individual end-users in large apartment blocks would still lose out because while they would be paying for actual usage, they would have little control over this usage apart from opening windows to reduce indoor temperatures.

- **Increased metering**: in order for a tariff structure based on actual consumption to be effective, households need to be metered so that they can be billed for actual consumption. The level of meters installed in buildings in Kazakhstan is still very low (different sources show between 30% and 40% of the housing stock is equipped with meters). Meters could be installed at level of the building or at the level of individual apartments.

209. Providing the above prerequisites are in place, the following policy reforms are proposed:

1. **Subsidy removal** by enabling the regulator to increase heat tariffs. After the calculation of the tariff which ensures a basic heating comfort, the regulator should still observe the reaction of consumers to price increases and eventually stop the price increase when basic heating comfort fails to be ensured.

\(^{39}\) World Bank benchmark for middle-income countries.

\(^{40}\) As noted in the 2010 IEA, OECD and World Bank report (2010).
2. **Decreasing consumption by end-users**: Modelling results show that setting heat prices at affordability level is less of a challenge (providing it is socially and politically feasible) than ensuring basic heating standard and it is this factor that limits (determines) the magnitude of the wasteful subsidy and, consequently, the proposed reform policies. Even if end-users receive the right price signals and the tariff structure is reformed, consumers will have limited possibilities to decrease consumption. This is so because: first, individual end-users still have no influence on the overall energy use of the building in which they live. And second, energy efficiency measures are rarely adopted by individual households. Any subsidy removal policy needs to be accompanied by minimum energy efficiency measures, such as the insulation of buildings.

3. **Promoting investments in more significant energy efficiency measures**, such as those aimed at reducing heat losses through walls and roofs. This can involve the establishment of capital investment funds by housing associations – assisted by the government – as well as incentives for the establishment of energy service companies conducting energy audits and installing thermal insulation. Thus, this policy option will enable a price increase up to the affordability level. In such an option, individual households will need to contribute financially as well. However, government support will also be required.

4. **Conducting concurrent reforms related to the domestic consumption of electricity**. Consumption of electrical energy is lower than consumption of heating by the domestic sector; thus, the expected results will be respectively lower. On the other hand, there is a clear correlation between heating and electricity. When heating prices rise and electricity prices do not, electricity could be the easiest substitution for the heat energy. In such a case, the results of the reform in the district heating sector will only diminish accordingly. Thus, a concurrent reform of both sectors will lead to much better results.

210. Table 24 below summarises the benefits from the three policy options of reforming subsidies to heat consumers in the district heating sector. The three main policy options include:

- Removal of the subsidy for heating without additional energy efficiency measures;
- Removal of the subsidy for heating with additional energy efficiency measures;
- Removal of the subsidy for heating with additional energy efficiency measures accompanied by the removal of subsidy to electricity.

**Table 24. Description of three policy options for subsidy reform**

<table>
<thead>
<tr>
<th>Policy option</th>
<th>Option 1</th>
<th>Option 2</th>
<th>Option 3</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Description of the policy option</strong></td>
<td>Removal of the subsidy for heating without additional energy efficiency measures</td>
<td>Removal of the subsidy for heating with additional energy efficiency measures</td>
<td>Removal of the subsidy for heating with additional energy efficiency measures accompanied by the removal of subsidy to electricity</td>
</tr>
<tr>
<td><strong>Price increase</strong></td>
<td>Low</td>
<td>Moderate</td>
<td>Moderate</td>
</tr>
<tr>
<td><strong>Investment needs required by domestic users</strong></td>
<td>Minimal</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td><strong>Investment needs required by district heating companies</strong></td>
<td>Heating meters</td>
<td>Heating meters, Building level substations</td>
<td>Heating meters, Building level substations</td>
</tr>
<tr>
<td><strong>Need for additional support from the government</strong></td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>Effect of substitution of heat energy by electricity</strong></td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td><strong>Scale of the GHG emissions reduction</strong></td>
<td>Moderate</td>
<td>Higher</td>
<td>Highest</td>
</tr>
</tbody>
</table>
OVERALL CONCLUSIONS AND RECOMMENDATIONS

211. Since independence, Kazakhstan has carried out significant macroeconomic reforms, such as price liberalisation and privatisation, including in the energy sector. The country has set a very ambitious goal for itself: to become one of the 30 most competitive economies in the world by 2050. Despite a significant economic growth over the past decade, Kazakhstan’s economy remains very energy and carbon intensive which hinders its economic development.

212. As part of the reform process, Kazakhstan has largely eliminated direct consumer subsidies in the energy sector. And yet, energy subsidies, which are often environmentally harmful and economically wasteful, have not completely disappeared. They have just changed their focus.

213. Fossil fuel subsidies, in general, come in many different forms – from direct budgetary transfers, to all kinds of tax concessions and privileges to keeping end-user prices low, below their full cost of supply. Most OECD countries support energy production, while in non-OECD countries, most fossil fuel subsidies go to consumers – usually through price controls which reduce prices to consumers.

214. After the removal of direct consumer support programmes early in the transition process, Kazakhstan has continued to provide subsidies to the energy sector to both producers and consumers. Although data and information are not sufficient to quantify fossil fuel subsidies precisely, the analysis has shown the presence of all types of subsidy schemes listed in the OECD matrix, as summarised in Table 25 below.

215. The consumer subsidies identified are all induced transfers since they result from government interventions that keep end-user prices low compared with the full cost of providing the service.

216. Electricity and heat prices in Kazakhstan are low as compared with prices in other countries. The main factors leading to low prices are: (i) tariffs that are not cost-reflective, in particular with respect to capital expenditures; and (ii) power generation costs that are low due to low input (fuel) prices. Low tariffs constitute a major barrier to modernising the power sector but also to energy efficiency improvements in Kazakhstan.

217. The main producer subsidies come from the state budget. There are direct investments subsidies to development and the modernisation of energy infrastructure. The review of the plans for budgetary spending indicates, however, that the scale of such subsidies is not significant. Direct support to O&M input costs of producers are not significant, either.

218. However, given that information on direct budgetary support from Samruk Kazyna to its companies and their subsidiaries and on the revenue foregone because of the existing production sharing agreements is missing, subsidies to producers may be equally significant. If investments (grants and loans), equity injections and state guarantees provided through Samruk Kazyna financing entities are also added as well as the revenue foregone by the state from activities in the special economic zones, subsidies to producers may actually be much bigger. Due to the lack of data, it is practically impossible to estimate the size of these support schemes.

64
Table 25. Main energy subsidy schemes identified in the analysis

<table>
<thead>
<tr>
<th>Subsidy category</th>
<th>Total amount, USD billion</th>
<th>Period</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>I. Consumer subsidies to fuels</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Induced transfers</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oil, including:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Price caps on diesel fuel to keep prices affordable for farmers (in combination with temporary export bans and export duty on light oil products)</td>
<td>0.08</td>
<td>2010-2011</td>
<td>Ministry of Agriculture</td>
</tr>
<tr>
<td>Natural gas</td>
<td>0.76</td>
<td>2009-2011</td>
<td>IEA</td>
</tr>
<tr>
<td>Coal</td>
<td>1.43</td>
<td>2009-2011</td>
<td>IEA</td>
</tr>
<tr>
<td>Electricity</td>
<td>4.17</td>
<td>2009-2011</td>
<td>IEA</td>
</tr>
<tr>
<td>District heating</td>
<td></td>
<td>2012</td>
<td>Model calculations</td>
</tr>
<tr>
<td>at comfort heating prices</td>
<td>0.53</td>
<td></td>
<td></td>
</tr>
<tr>
<td>at affordability prices</td>
<td>1.41</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>II. Producer subsidies</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Direct budgetary support</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.1. From the Republican Budget</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Investment support to the fuel and energy complex and sub-soil use (most likely covers also support to the extraction of minerals other than oil and gas)</td>
<td>1.72</td>
<td>2009-2011</td>
<td>Budget law 2009-2011</td>
</tr>
<tr>
<td>Investment support to power sector development</td>
<td>0.08</td>
<td>2013-2015</td>
<td>Sub-programme on industrial development</td>
</tr>
<tr>
<td>Investment support to the development of the oil and gas sector</td>
<td>0.39</td>
<td>2013-2015</td>
<td>Sub-programme on industrial development</td>
</tr>
<tr>
<td>Direct transfers to electricity producers to support O&amp;M costs (Zhambyl Power Plant)</td>
<td>0.04</td>
<td>2008</td>
<td>Ministry of Energy and Mineral Resources</td>
</tr>
<tr>
<td>Direct transfers to producers in the district heating sector to support O&amp;M costs (for fuel purchases)</td>
<td>0.07</td>
<td>2008-2012</td>
<td>Ministry of Energy and Mineral Resources</td>
</tr>
<tr>
<td>1.2. From Samruk Kazyna</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Equity injections to Samruk Energy</td>
<td>0.61</td>
<td>2009 – 2011</td>
<td>Reuters</td>
</tr>
<tr>
<td>Direct transfer of funds to KazMunaiGaz</td>
<td>4.00</td>
<td>2013-2015</td>
<td>Financial Times</td>
</tr>
<tr>
<td><strong>2. Tax revenue foregone</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tax concessions to producers as fixed in PSAs and as part of the special economic zones policy</td>
<td>Non available but most likely significant</td>
<td></td>
<td>On-going</td>
</tr>
</tbody>
</table>

219. Modelling the reform of the subsidy provided through heat prices below the full cost of provision of the service shows that in total, the reduction in energy production, under the heating comfort scenario, could save up to 12.9 million MWh annually, which is equal to 5.7 million tonnes of CO2 emissions annually, or 12% of the annual CO2 emissions from the district heating sector. In the case of the affordability scenario, the total reduction in energy production could save up to 41.7 million MWh annually, which is equal to 18.4 million tonnes of CO2 emissions annually, or 39% of annual CO2 emissions from the sector. These are not insignificant amounts and may contribute positively to the government’s ambitious targets of reducing the levels of greenhouse emission (GHG) emissions in the country.
220. The analysis has shown that regulated fuel prices depress investments in the oil-refining sector but also result in low prices of electricity and particularly district heat services, which leads to under-investment and the progressive depreciation and obsolescence of the power infrastructure. This situation creates a vicious circle that leads to an increase of the role of the state in financing the sector. In addition, the analysis shows that, as a share of household disposable income, low heat tariffs actually benefit the consumers in the richer cities, such as Astana and Almaty, rather than people in the poorer regions of the country. Altogether, not only do these indirect subsidies hold back the economic development of the sector but they also prove to be an ineffective way to help the poor. Coupled with the fact that such subsidies stimulate wasteful energy consumption and subsequent higher GHG emission levels, the overall effectiveness of heat price subsidies as a policy instrument may be questioned. At a minimum, this issue requires the attention of the government and further policy debate.

221. The recommendations for reforming energy subsidies that emerge from this study include:

1. Liberalise petroleum products prices.

2. Increase the transparency and rules for disclosing information for investment programmes financed through the state budget, including through support provided by Samruk Kazyna. This will make it clearer who are the beneficiaries of public support.

3. Consider launching the preparation of tax expenditure reports (reports which estimate the revenue foregone by the state because of various tax concessions). Such reports will provide the government with more solid basis for analysing the costs and benefits of different measures that generate tax expenditures.

4. Gradually decrease subsidies to the energy production and distribution sector. Use some of the savings to increase social transfers targeted at low-income households that may be affected by increased heat prices.

5. Accelerate tariff reform in the district heating sector. Improved tariff methodology and regulations are crucial for attracting new investment in energy, infrastructure and utilities. Gradually introduce tariffs to cover first operation and maintenance, and eventually investment. Promoting the efficient use of energy will also be easier when tariffs are cost-reflective.

6. Introduce heat energy metering at least at a building level and charge consumers based on actual consumption.

7. Prepare a clear and credible timetable for reform implementation to enable energy producers, distributors and households to adjust, for example, by investing in energy efficiency measures.
REFERENCES


Earnst & Young (2012), *Kazakhstan Oil and Gas Tax Guide 2011*, Earnst & Young, Astana.


ANNEX 1. MAIN FEATURES OF THE MODEL AND DATA NEEDS

222. Annex 1 presents the main features of the model that was designed, as part of this project, to support the analysis of subsidy reform. The focus is on the main input data that need to be collected and fed into the model in order to conduct the analysis.

1. Introduction

223. Environmentally harmful subsidies have an economic impact by distorting prices and therefore affecting production and consumption decisions. To quantify the effects of subsidy reform on the economy and the environment, analysts have designed different economic and/or econometric models. The most commonly used ones are Computable general-equilibrium (CGE) models and Partial-equilibrium models. The Partial-equilibrium models consider only the market in which the subsidy reform occurs (in this case, the district heating market) and estimate price, demand and production changes in energy (which are linked to fossil fuel consumption) as a result of subsidy removal based on simple supply-and-demand curves and economic assumptions.

224. Due to limited access to data, a simplified partial-equilibrium model is proposed for this study and is used to observe the effects of subsidy reform in the district heating sector. The model is simplified because it uses only one elasticity indicator – price elasticity of demand. The supply side is not modelled; it is assumed that supply (production) follows changes in demand without significant influence on prices. The justification for such a simplification is that most of the district heat in Kazakhstan is supplied by combined heat and power (CHP) plants and in the long term CHPs will adapt to the situation. Another reason is that the increased unit costs of producing heat energy will be covered by increased prices. All this justifies not modelling the supply side. In addition, access to the data on supply was limited.

225. The main purpose of the model is to estimate the magnitude of the “hidden” subsidy provided to consumers through the heat tariff and the level of CO₂ emissions that result from this subsidy. We start from the assumption that current heat tariffs are below the full cost of provision of the service, that is tariffs are subsidised indirectly because of tariff setting regulations that do not ensure full cost recovery and because current tariffs are far from affordability levels, as will be demonstrated later on. We then analyse the factors that would affect subsidy reform, that is possible tariff increase. In the first place, we aim to understand what the effect of tariff increase would be on heat consumption (demand) by consumers, depending on their level of income, and how this change in consumption will impact the level of CO₂ emissions. To measure consumers’ response in terms of demand (consumption) to tariff increase, economists use elasticities.

226. Elasticities are critical to determining demand responses to price changes. Elasticities are a key component in any model but their values are highly uncertain as they require a lot of precise data. An extensive discussion on elasticities is provided further down along with a proposal on how to handle uncertainties. A non-linear elasticity is used in the model which is dynamically linked to the affordability and heating comfort benchmarks. More detailed information on non-linear elasticity computation is presented in Annex 2 to this report.
2. **Major components of the model**

The model consists of several major components (spreadsheets). Each spreadsheet is organised around the following data groups:

- **Assumptions** - where all data needed for the necessary calculations are entered (this type of data are provided further below);

- **Greenhouse gas (GHG) emissions** - where the results from the modelling work are converted into CO₂ emissions. The data required are taken mostly from the International Energy Agency (IEA) data on average emissions (g CO₂) for one kWh of energy produced;

- **Elasticity** - where the elements of the elasticity curve are determined (for this we need only a price elasticity for current prices and for the price at the affordability level);

- **Consumption** - where the consumption of heat energy is simulated for different prices, with calculations for each country region. Data for the consumption component are made available through other spreadsheets in the model (the assumptions part);

- **Affordability and subsidy magnitude** - where the average bill/household income is calculated and then the total difference in bills is summarised. The necessary data are taken from other spreadsheets.

All these elements are described in more detail further below. The only exception is the discussion on the subsidy magnitude and affordability which is provided separately in Part IV of the report, as these are major outputs of the model. The reason is that the first four elements contain (mostly) input data, while the last one constitutes the major output of the model calculated on the basis of the input data. Given the policy relevance of the subsidy magnitude and affordability, the discussion of these issues is provided as part of the main report.

### 2.1. Assumption spreadsheet and data needs

Apart from the data on elasticity, all other data are entered through the assumptions spreadsheet. The data contained in the assumptions spreadsheet cover:

- **Living area [m²]**;

- **Energy consumption [kWh/year]** – considered at two levels (and explained further down);
  - at 20°C
  - at 18°C

- **Energy production kWh/(m²·year)** - considered at two levels;
  - at 20°C
  - at 18°C

- **Average apartment size [m³]**;
230. The necessary data for this spreadsheet will come mostly from the analysis conducted as part of the discussion on the housing stock in the country (see section 2.4 below).

### 2.2. Emissions of carbon dioxide from the district heating sector

231. According to the inventory from Kazakhstan’s Initial National Communication (1998) – after corrections – the GHG net emissions in Kazakhstan in 1990 amounted to about 350 million tonnes of CO₂ equivalent, while in 1994 this figure had dropped to about 230 million tonnes due to economic difficulties. In this way, total GHG emissions in Kazakhstan decreased by more than 34%. The largest GHG emitter in Kazakhstan is the energy sector; in 1990, they accounted for 291 million tonnes of CO₂ equivalent, while in 1994 they dropped to 195 million tonnes, or from 81.4% to 81.1% of total emissions, respectively. In the energy sector, about 90% of the emissions refer to those from fuel combustion and about 10% to fugitive emissions related to extraction, transportation and processing of fuel.

232. According to 2011 data, the total GHG emissions in Kazakhstan were estimated at 274.5 million tonnes CO₂, equivalents. The energy sector was responsible for some 84.5% of the total emissions, of which the share of energy production (electricity and heat) was about 41%. Due to its cold climate, Kazakhstan uses significant quantities of energy for space heating. More than 60% of heat energy is consumed in the cities, and approximately 80% of that within the residential sector.

233. Table 26 details key aspects of the CO₂ emissions of Kazakhstan (i.e., not carbon dioxide equivalents). While Kazakhstan still emits less than in 1990, emissions are generally on the rise, regardless of the approach used. A positive trend is the substitution of natural gas for oil and coal.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Kazakhstan, reference approach</td>
<td>240.9</td>
<td>171.2</td>
<td>116.3</td>
<td>166.0</td>
<td>223.4</td>
<td>202.0</td>
<td>237.0</td>
<td>-1.6%</td>
</tr>
<tr>
<td>Kazakhstan, sectoral approach</td>
<td>236.4</td>
<td>167.5</td>
<td>113.0</td>
<td>157.1</td>
<td>227.9</td>
<td>197.8</td>
<td>232.1</td>
<td>-1.8%</td>
</tr>
<tr>
<td>Coal/peat</td>
<td>153.3</td>
<td>111.6</td>
<td>75.6</td>
<td>102.8</td>
<td>142.0</td>
<td>123.3</td>
<td>131.8</td>
<td>-14.0%</td>
</tr>
<tr>
<td>Oil</td>
<td>58.3</td>
<td>32.5</td>
<td>22.1</td>
<td>25.8</td>
<td>38.2</td>
<td>28.3</td>
<td>46.7</td>
<td>-19.9%</td>
</tr>
<tr>
<td>Gas</td>
<td>24.8</td>
<td>23.5</td>
<td>15.2</td>
<td>28.5</td>
<td>47.7</td>
<td>46.2</td>
<td>53.5</td>
<td>115.8%</td>
</tr>
</tbody>
</table>

Source: IEA (2012).

---

41 Adapted from OECD (2013c).

42 The term fugitive emissions means uncontrolled GHG releases to the atmosphere from the processing, transmission, and/or transportation of fossil fuels or other materials, such as chlorofluorocarbon leaks from refrigeration or methane from solid waste landfills, among others, that are not emitted via an exhaust pipe(s) or stack(s).

43 http://www.climate.kz/eng/?m=html&cid=19

44 There are two methods for calculating carbon dioxide emissions, the Reference and Sectoral Approaches. They can often give different results. See IEA (2012) for more explanations.
234. Since 2005, however, emissions of CO2 have continued to increase and in 2010 they were already similar to the 1990 level. Clearly, Kazakhstan is beginning to realise its energy production potential and is fashioning a role for itself on the world stage.

235. Kazakhstan has a very energy intensive economy and is a large emitter of CO2, both in overall, as well as in per capita, terms.

<table>
<thead>
<tr>
<th>Table 27. Carbon intensity of the economy of Kazakhstan</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CO2/GDP (Exchange rate basis)</strong></td>
</tr>
<tr>
<td>4.71</td>
</tr>
<tr>
<td><strong>CO2/GDP (PPP basis)</strong></td>
</tr>
<tr>
<td>2.04</td>
</tr>
<tr>
<td><strong>CO2 emissions / population (tonnes CO2 per capita)</strong></td>
</tr>
<tr>
<td>14.46</td>
</tr>
</tbody>
</table>

Source: IEA (2012).

236. The carbon intensity of Kazakhstan, measured in kilograms of CO2 from energy use per USD of GDP in 2000 prices, in 2010, stood at 1.30, the second highest, after Turkmenistan (1.41) among transition countries\(^{45}\) and the seventh highest in the world. In its 2011 report “The Low Carbon Transition”, the European Bank for Reconstruction and Development (EBRD) stated 2 tonnes of CO2 per capita per year as a sustainable emissions target, while in Kazakhstan these levels are much higher.

237. While exact figures differ from source to source, it is well-established that the energy sector in Kazakhstan generates far and away most of the country’s greenhouse gas emissions. For example, one source states that the energy sector generates about 80% of the total GHG emissions of the country, 90% of which come from power and heat generation. Further, the residential sector is the third largest energy consumer after energy and manufacturing and therefore is also a large contributor to GHG emissions. Nationally, buildings, and in particular residential buildings, account for 13.5% of national power and 24% of national heat demand\(^{46}\).

238. In 2010, according to official statistics, 63% of the energy generated for heat came from the combustion of coal, 17% from natural gas, 10% from fuel oil and gas distillates, 5% from electricity, and 5% from all other sources.

2.3. Elasticity

239. The discussion in this section focuses on price elasticity of demand for heat, that is how consumers react to changes in tariff. Then, we discuss constraints that households face in adjusting their heat demand (consumption) when tariffs are raised. The two main constraints are the level of heating comfort (for obvious reasons, one can reduce the heat consumption in apartments up to a certain level only) and affordability constraint (or the ability of households to pay their heat bills).

\(^{45}\) IEA (2012). For comparison, at the same time, the Russian Federation had a carbon intensity of 0.79, China 0.79, the United States 0.41, India 0.43, and the EU-27 0.26.

\(^{46}\) UNDP Kazakhstan, [http://www.eep.kz/eng/?m=news&id=26&act=show_big](http://www.eep.kz/eng/?m=news&id=26&act=show_big)
4.3.1. Price elasticity of demand

240. Raising energy tariffs will have an immediate impact on all households. Higher tariffs translate into higher energy bills and households typically only have a few choices to react to the price increase. These include:

- maintaining their current energy consumption, resulting in significantly higher energy expenditure;
- reducing energy consumption to an extent where energy expenditures remain unchanged;
- switching to other energy sources.

241. A switch to other energy sources is limited in multi-storey buildings, as it is already observed in Kazakhstan. However, when district heating does not provide heating comfort, electricity is used for additional heating.

242. The extent to which households reduce or substitute heat energy consumption depends on the price elasticity, the level of consumption prior to the tariff increase, the extent of the price increase and the relative price of substitutes. The impact of a price increase is measured by comparing consumption before and after the reform.

243. For heating, the consumption after reform is calculated taking into account a price elastic demand:

\[ C_{\text{new}} = C_{\text{old}} + E \times \frac{p_{\text{new}} - p_{\text{old}}}{p_{\text{old}}} \times C_{\text{old}} = C_{\text{old}} \times (1 + E \times \frac{p_{\text{new}} - p_{\text{old}}}{p_{\text{old}}}) \]

Where

- \( C_{\text{new}} \) is consumption of heat energy after changing the price for households
- \( C_{\text{old}} \) is current consumption of energy for households
- \( p_{\text{new}} \) is the price of heat energy after changing the price
- \( p_{\text{old}} \) is the current price of heat energy
- \( E \) is the price elasticity of heat energy.

244. Ideally, price elasticity is derived from country data and estimated for different population groups. As mentioned before, price elasticity also depends on current price levels, in particular how far current bills are from the affordability limit.

245. Due to the lack of relevant empirical data for Kazakhstan, the price elasticity proposed to be used in the model is based on international evidence and earlier studies, taken from different countries, assuming that the current population would behave similarly. Table 28 summarises different information sources that have calculated price elasticity for heating and electricity.
Table 28. Price elasticities for heating and electricity

<table>
<thead>
<tr>
<th>Price elasticity</th>
<th>Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>-0.13 to -0.26</td>
<td>OECD (2008), The political economy of environmentally related taxes, OECD, Paris.</td>
</tr>
<tr>
<td>-0.37 to -0.46 (in the long run)</td>
<td></td>
</tr>
<tr>
<td>-0.2 (USA)</td>
<td>OECD (2000), Behavioural responses to environmentally-related taxes, OECD, Paris.</td>
</tr>
<tr>
<td>-0.2 to -0.6</td>
<td>Grohnheit, Poul E. and Klavs, G. (2000), Elastic electricity and heat demand in the Balmorel Model, Roskilde, Denmark and Riga, Latvia.</td>
</tr>
<tr>
<td>-0.15</td>
<td>Gassmann, F. (2012), Switching the lights off: The impact of energy tariff increases on households in the Kyrgyz Republic, Maastricht, The Netherlands.</td>
</tr>
<tr>
<td>-0.15 to -0.25</td>
<td>USAID (2008), Kyrgyzstan household energy analysis and proposed social protection measures, USAID, Washington DC.</td>
</tr>
<tr>
<td>-0.15</td>
<td>USAID (2007), Regional synthesis paper addressing affordability of utility services in urban housing: Energy efficiency solutions, USAID, Washington DC.</td>
</tr>
</tbody>
</table>

246. It is obvious from Table 28 that different studies provide significantly different results for price elasticity for energy. The reason is that price elasticity for heat energy depends on the specific situation of the country and varies over time. The most important factor is how close the current price and consumption are to the affordability constraint and whether the reduced consumption is still sufficient to provide basic heating comfort. Studies in Armenia, Georgia and Latvia, prepared in the 1990s, resulted in higher elasticities than the elasticities calculated for Denmark or the United States for the same period.

4.3.2. Income elasticity of demand

247. Another factor that will affect subsidy reform is income elasticity. Income elasticity indicates by how much consumption will change when household income increases or decreases. In Kazakhstan, household income is rising every year, which will soften the problem with the negative price elasticity of demand. On the other hand, the current study focuses on modelling the current subsidy level, not on a forecast of the future national economic development.

4.3.3. Constraints in elasticity - heat consumption and comfort and affordability

248. Households are constrained in adjusting their heat power consumption. It is common for countries in the region of Eastern Europe, Caucasus and Central Asia (EECCA), including Kazakhstan, to have central heating and hot water provided by district providers, which leaves connected households with few alternative choices. Furthermore, households rarely have control over their consumption as they do not have individual thermostatic valves and thermal power meters. Thus, one of the prerequisites for subsidy reform in the district heating sector is for consumers to have, at a minimum, thermostatic valves and, if possible, also building level substations (BLS) installed in residential buildings; the installation of both would allow consumers to self-regulate their heat energy consumption.

4.3.3.1. Heat consumption and heating comfort

249. Consumption does not always decrease when prices increase, even if households have the possibility to regulate their consumption. It is generally recognised (e.g. IEA, OECD and World Bank, 2010) that consumers of heat cannot reduce their consumption below a level that satisfies their human basic needs (such as basic heating in cold seasons). However, if subsidised tariffs lead to an increase in consumption that is not related to such basic needs, which is often the case in Kazakhstan, such subsidies become economically wasteful. The key issue then is to identify the basic needs level.
250. Most of the calculations concerning the heat comfort scenario are done for temperature of 20°C in an apartment; temperature of 18°C, however, is still acceptable. This means that households have some room to save energy during the coldest winter periods.

251. Another saving measure could be applied during the transitional (autumn and spring) period, when outside temperature at night is low, but during the day temperature rises and heating leads to an increase in the indoor temperature in apartments to more than 20°C. With no pricing signals, nor a possibility to regulate consumption, households do not save energy. Instead, they open windows in order to cool the apartment.

252. This is one of the reasons why the installation of an automatic building level substation (BLS) leads to energy savings of up to 30%. Automatic BLSs are equipped with an automatic control that measures the outside temperature and automatically decreases the heating temperature when it detects and predicts a higher outside temperature.

253. Price elasticity will decrease to zero after the point at which the basic needs is no longer provided. In the model, this situation is equivalent to energy use in a building that does not provide the possibility to keep the temperature above 18°C during the entire heating season, which for the city of Astana, for example, is 388.18 kWh/m² per heating season. Table 29 provides an estimate of energy needs for a Khrushcheyovka-type building for the oblasts of Kazakhstan in order to keep indoor temperature at 18°C and 20°C. Below the consumption of indoor temperature of 18°C, the elasticity used in the model reaches zero (perfectly inelastic demand).

Table 29. Energy consumption calculated for a typical Khrushcheyovka building at different levels of temperature [kWh/year]

<table>
<thead>
<tr>
<th>Region</th>
<th>Energy consumption kWh/year</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>at 20°C</td>
</tr>
<tr>
<td>Akmola</td>
<td>426.37</td>
</tr>
<tr>
<td>Astana</td>
<td>426.37</td>
</tr>
<tr>
<td>Aktobe</td>
<td>379.64</td>
</tr>
<tr>
<td>Aimały Province</td>
<td>266.22</td>
</tr>
<tr>
<td>Aimały</td>
<td>266.22</td>
</tr>
<tr>
<td>Atyrau</td>
<td>295.23</td>
</tr>
<tr>
<td>East Kazakhstan</td>
<td>404.83</td>
</tr>
<tr>
<td>Zhambyl</td>
<td>248.50</td>
</tr>
<tr>
<td>West Kazakhstan</td>
<td>364.44</td>
</tr>
<tr>
<td>Karagandy</td>
<td>399.66</td>
</tr>
<tr>
<td>Kyzylorda</td>
<td>280.42</td>
</tr>
<tr>
<td>Kostanay</td>
<td>420.70</td>
</tr>
<tr>
<td>Mangystau</td>
<td>220.59</td>
</tr>
<tr>
<td>Pavlodar</td>
<td>422.16</td>
</tr>
<tr>
<td>North Kazakhstan</td>
<td>441.58</td>
</tr>
<tr>
<td>South Kazakhstan</td>
<td>201.89</td>
</tr>
</tbody>
</table>

Source: OECD (2013c).

4.3.3.2. Affordability

254. Affordability imposes yet another constraint to elasticity. When the price increase reaches the affordability level, consumption becomes inelastic: households maintain consumption, but tend not to pay. The affordability level depends on disposable household income. The household disposable income is derived from the information and surveys collected by the Agency on Statistics of the Republic of Kazakhstan. Table 30 presents the calculation of disposable household income.

http://www.eng.stat.kz/
Table 30. Heat tariffs in the regional centres of Kazakhstan, 2011-2012

<table>
<thead>
<tr>
<th>City</th>
<th>Heat price 2011 KZT / m²</th>
<th>Heat price 2012 KZT / m²</th>
<th>Household disposable income (KZT per capita) 2010</th>
<th>Household disposable income (KZT per capita) 2012</th>
<th>Estimated monthly expenditures on heating KZT/person/month</th>
<th>Estimated affordability (% income spent on heating)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Astana</td>
<td>69.74</td>
<td>69.74</td>
<td>46,663</td>
<td>56,847</td>
<td>4,561</td>
<td>2.2%</td>
</tr>
<tr>
<td>Almaty</td>
<td>111.15</td>
<td>101.16</td>
<td>41,103</td>
<td>44,101</td>
<td>6,058</td>
<td>3.3%</td>
</tr>
<tr>
<td>Aktau (Mangystau)</td>
<td>47.08</td>
<td>47.08</td>
<td>24,032</td>
<td>26,472</td>
<td>2,655</td>
<td>1.8%</td>
</tr>
<tr>
<td>Atyrau</td>
<td>74.4</td>
<td>95.79</td>
<td>28,387</td>
<td>37,436</td>
<td>4,479</td>
<td>2.6%</td>
</tr>
<tr>
<td>Aktope</td>
<td>62.34</td>
<td>62.34</td>
<td>28,777</td>
<td>37,231</td>
<td>2,627</td>
<td>1.5%</td>
</tr>
<tr>
<td>Karagandy</td>
<td>67.04</td>
<td>67.04</td>
<td>31,848</td>
<td>34,025</td>
<td>3,593</td>
<td>1.9%</td>
</tr>
<tr>
<td>Kostanay</td>
<td>106.39</td>
<td>105.69</td>
<td>23,540</td>
<td>28,711</td>
<td>5,181</td>
<td>3.7%</td>
</tr>
<tr>
<td>Kyzylorda</td>
<td>66.95</td>
<td>66.95</td>
<td>21,177</td>
<td>27,396</td>
<td>4,800</td>
<td>3.8%</td>
</tr>
<tr>
<td>Kokshetau (Akmola)</td>
<td>77.81</td>
<td>77.81</td>
<td>28,942</td>
<td>34,035</td>
<td>4,046</td>
<td>2.3%</td>
</tr>
<tr>
<td>Oral (West Kazakhstan)</td>
<td>85.49</td>
<td>85.49</td>
<td>22,790</td>
<td>26,644</td>
<td>4,360</td>
<td>3.2%</td>
</tr>
<tr>
<td>Uskaman (East Kazakhstan)</td>
<td>42.8</td>
<td>48.38</td>
<td>24,428</td>
<td>29,131</td>
<td>2,196</td>
<td>1.5%</td>
</tr>
<tr>
<td>Pavlodar</td>
<td>48.94</td>
<td>48.94</td>
<td>27,979</td>
<td>32,271</td>
<td>2,514</td>
<td>1.5%</td>
</tr>
<tr>
<td>Petropavlovsk (North Kazakhstan)</td>
<td>81.23</td>
<td>81.27</td>
<td>27,310</td>
<td>34,926</td>
<td>4,037</td>
<td>2.5%</td>
</tr>
<tr>
<td>Taraz (Zhambyl)</td>
<td>69.63</td>
<td>69.63</td>
<td>17,360</td>
<td>18,180</td>
<td>3,969</td>
<td>3.8%</td>
</tr>
<tr>
<td>Taldykorgan (Almaty)</td>
<td>31.25</td>
<td>34.98</td>
<td>28,096</td>
<td>35,111</td>
<td>6,169</td>
<td>3.7%</td>
</tr>
<tr>
<td>Shymkent (South Kazakhstan)</td>
<td>86.63</td>
<td>86.63</td>
<td>28,096</td>
<td>35,111</td>
<td>6,307</td>
<td>6.3%</td>
</tr>
</tbody>
</table>


Note: Household disposable income from 2010 was adjusted to November 2012 using the real households’ income growth indicators provided by the Agency on Statistics of the Republic of Kazakhstan.

255. As can be seen from Table 30, in terms of affordability (that is the share of households’ income spent on heating), it is Shymkent (South Kazakhstan), followed by Taraz and Kazyldorda, that pay most for heating. Astana and Almaty, the two richest regions in the country, seem to benefit more from the current situation.

256. According to international benchmarks (e.g. the World Bank) the maximum affordable expenditures for heating should not exceed 8-10% of disposable household income. This means that on average, the price per m² in Kazakhstan may reach KZT/m² 75 to 332.48 (8% of average household disposable income).

257. Table 31 below presents the maximum price increase (in % of current tariff) which allows to achieve the maximum affordable tariff.
### Table 31. Maximum possible increase (in % of current tariff) allowing to achieve maximum affordable tariff at current consumption level

<table>
<thead>
<tr>
<th>Region (Oblast)</th>
<th>Current tariff KZT/ m²</th>
<th>Maximum tariff KZT/ m²</th>
<th>Possible increase %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Astana</td>
<td>69.74</td>
<td>253.60</td>
<td>364%</td>
</tr>
<tr>
<td>Almaty</td>
<td>101.16</td>
<td>245.24</td>
<td>242%</td>
</tr>
<tr>
<td>Aktau (Mangystau)</td>
<td>47.08</td>
<td>209.24</td>
<td>444%</td>
</tr>
<tr>
<td>Atyrau</td>
<td>95.79</td>
<td>294.74</td>
<td>308%</td>
</tr>
<tr>
<td>Aktope</td>
<td>62.34</td>
<td>332.48</td>
<td>533%</td>
</tr>
<tr>
<td>Karagandy</td>
<td>67.04</td>
<td>282.27</td>
<td>421%</td>
</tr>
<tr>
<td>Kostanay</td>
<td>105.69</td>
<td>228.52</td>
<td>216%</td>
</tr>
<tr>
<td>Kyzylorda</td>
<td>66.95</td>
<td>140.95</td>
<td>211%</td>
</tr>
<tr>
<td>Kokshetau (Akmola)</td>
<td>77.81</td>
<td>270.64</td>
<td>348%</td>
</tr>
<tr>
<td>Oral (West Kazakhstan)</td>
<td>85.49</td>
<td>213.73</td>
<td>250%</td>
</tr>
<tr>
<td>Uskaman (East Kazakhstan)</td>
<td>48.38</td>
<td>258.03</td>
<td>533%</td>
</tr>
<tr>
<td>Pavlodar</td>
<td>48.94</td>
<td>261.01</td>
<td>533%</td>
</tr>
<tr>
<td>Petropavlovsk (North Kazakhstan)</td>
<td>81.27</td>
<td>260.06</td>
<td>320%</td>
</tr>
<tr>
<td>Taraz (Zhambyl)</td>
<td>69.63</td>
<td>146.59</td>
<td>211%</td>
</tr>
<tr>
<td>Taldykorgan (Almaty)</td>
<td>34.98</td>
<td>75.63</td>
<td>216%</td>
</tr>
<tr>
<td>Shymkent (South Kazakhstan)</td>
<td>86.63</td>
<td>110.01</td>
<td>127%</td>
</tr>
</tbody>
</table>

Source: Model calculations.

### 4.3.4. Non-linear elasticity

258. As mentioned earlier, different studies provide different values of price elasticity for heating and electricity. The major problem is that research is conducted in the specific context of a given country. In particular, the difference between current prices and/or affordability limits and achieving service levels below basic needs are different. In countries where the difference is larger and elasticity is lower, the most frequently observed elasticity value is -0.15. In countries where prices are already higher or the level of poverty is high, elasticity is more significant, at -0.68. Thus, in this study, a non-linear elasticity model is proposed. The elasticity starts from -0.15 at the current prices and reaches -0.50 at the level of affordability/below basic needs, after which it quickly reaches 0.

259. The question is which factor will constrain consumer behaviour first: affordability, basic needs, or benchmarking level (magnitude of the subsidy). The description of the proposed non-linear elasticity is provided in Annex 2.

### 2.4. Heat consumption and housing stock in Kazakhstan

260. Information on the housing stock in Kazakhstan is needed as a basis of the calculation of the heat consumption in the residential sector. In terms of total living space (in square meters), the greatest share, or 13.7% of the total area in flats in urban settlements, is found in the Karaganda Oblast while the lowest is found in the Kyzylorda and Atyrau Oblasts, at 2.6% of the total surface area of flats in urban settlements.
consumption in the residential sector, we also need a clear description of the number and type of residential
heat tariffs in Kazakhstan are calculated as per square meter of living space. To obtain the total heat
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It is also important to point out that climate varies significantly across the different regions in Kazakhstan. Temperature is an important variable that affects consumption, hence differences in average temperature levels need to be taken into account in the model. The average temperature by region is presented in Table 34 below.

Table 34. Average temperatures in different regions of Kazakhstan

<table>
<thead>
<tr>
<th>Region/month</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
<th>12</th>
</tr>
</thead>
<tbody>
<tr>
<td>Akmola+Astana</td>
<td>-16.8</td>
<td>-16.5</td>
<td>-10.1</td>
<td>3.0</td>
<td>12.7</td>
<td>18.2</td>
<td>20.4</td>
<td>17.8</td>
<td>11.5</td>
<td>2.6</td>
<td>-7.0</td>
<td>-14.0</td>
</tr>
<tr>
<td>Aktobe</td>
<td>-14.9</td>
<td>-14.4</td>
<td>-7.3</td>
<td>5.9</td>
<td>15.0</td>
<td>20.2</td>
<td>22.5</td>
<td>20.4</td>
<td>13.7</td>
<td>4.6</td>
<td>-3.9</td>
<td>-11.3</td>
</tr>
<tr>
<td>Almaty Province+Almaty</td>
<td>-6.5</td>
<td>-5.1</td>
<td>2.0</td>
<td>10.8</td>
<td>16.2</td>
<td>20.7</td>
<td>23.5</td>
<td>22.3</td>
<td>17.0</td>
<td>9.5</td>
<td>0.9</td>
<td>-4.5</td>
</tr>
<tr>
<td>Atyrau</td>
<td>-9.6</td>
<td>-8.7</td>
<td>-1.5</td>
<td>9.6</td>
<td>18.2</td>
<td>23.4</td>
<td>25.7</td>
<td>23.7</td>
<td>16.8</td>
<td>8.2</td>
<td>0.4</td>
<td>-5.6</td>
</tr>
<tr>
<td>East Kazakhstan</td>
<td>-16.5</td>
<td>-16.0</td>
<td>-7.8</td>
<td>4.8</td>
<td>13.4</td>
<td>18.7</td>
<td>20.7</td>
<td>18.3</td>
<td>12.4</td>
<td>5.0</td>
<td>-6.1</td>
<td>-13.8</td>
</tr>
<tr>
<td>Zhambyl</td>
<td>-5.0</td>
<td>-3.3</td>
<td>3.3</td>
<td>11.3</td>
<td>16.8</td>
<td>22.1</td>
<td>24.9</td>
<td>22.8</td>
<td>17.1</td>
<td>9.9</td>
<td>2.0</td>
<td>-3.4</td>
</tr>
<tr>
<td>West Kazakhstan</td>
<td>-13.5</td>
<td>-13.2</td>
<td>-6.7</td>
<td>6.2</td>
<td>15.4</td>
<td>20.3</td>
<td>22.6</td>
<td>20.6</td>
<td>13.8</td>
<td>5.1</td>
<td>-2.9</td>
<td>-9.8</td>
</tr>
<tr>
<td>Karagandy</td>
<td>-14.5</td>
<td>-14.2</td>
<td>-7.7</td>
<td>4.6</td>
<td>12.8</td>
<td>18.4</td>
<td>20.4</td>
<td>17.8</td>
<td>12.0</td>
<td>3.2</td>
<td>-6.3</td>
<td>-12.3</td>
</tr>
<tr>
<td>Kyzylorda</td>
<td>-9.1</td>
<td>-7.3</td>
<td>0.9</td>
<td>12.0</td>
<td>19.5</td>
<td>24.5</td>
<td>26.4</td>
<td>23.9</td>
<td>17.2</td>
<td>8.6</td>
<td>0.3</td>
<td>-6.2</td>
</tr>
<tr>
<td>Kostanay</td>
<td>-17.0</td>
<td>-16.6</td>
<td>-9.8</td>
<td>3.8</td>
<td>13.0</td>
<td>18.6</td>
<td>20.4</td>
<td>17.9</td>
<td>12.0</td>
<td>3.0</td>
<td>-6.2</td>
<td>-14.1</td>
</tr>
<tr>
<td>Mangystau</td>
<td>-2.9</td>
<td>-2.3</td>
<td>2.5</td>
<td>10.4</td>
<td>17.7</td>
<td>22.8</td>
<td>25.6</td>
<td>24.6</td>
<td>19.5</td>
<td>12.3</td>
<td>5.5</td>
<td>0.2</td>
</tr>
<tr>
<td>Pavlodar</td>
<td>-17.6</td>
<td>-17.3</td>
<td>-9.4</td>
<td>4.2</td>
<td>13.2</td>
<td>19.5</td>
<td>21.4</td>
<td>18.5</td>
<td>12.3</td>
<td>3.5</td>
<td>-7.0</td>
<td>-14.4</td>
</tr>
<tr>
<td>North Kazakhstan</td>
<td>-18.1</td>
<td>-16.9</td>
<td>-10.3</td>
<td>2.4</td>
<td>11.6</td>
<td>17.0</td>
<td>18.9</td>
<td>16.2</td>
<td>10.7</td>
<td>1.9</td>
<td>-7.8</td>
<td>-15.2</td>
</tr>
<tr>
<td>South Kazakhstan</td>
<td>-2.0</td>
<td>0.0</td>
<td>5.6</td>
<td>13.1</td>
<td>18.4</td>
<td>23.5</td>
<td>26.3</td>
<td>24.8</td>
<td>19.3</td>
<td>12.3</td>
<td>5.2</td>
<td>0.2</td>
</tr>
</tbody>
</table>

ANNEX 2. NON–LINEAR ELASTICITY AND MATHEMATICAL FORMULATION OF THE MODEL

1. Non-linear elasticity

263. As mentioned earlier, different studies provide different values of price elasticity for heating and electricity. The major problem is that research is conducted in the specific context of a given country. In particular, the difference between current prices and/or affordability limits and achieving service levels below basic needs are different. In countries where the difference is larger and the elasticity is lower, the most frequently observed figure is -0.15. In countries where prices are already higher or the level of poverty is high, the elasticity is more significant at -0.68. Thus, in this study, a non-linear elasticity model is proposed. The elasticity starts from -0.15 at the current prices and reaches -0.50 at the level of affordability/below basic needs, after which it quickly reaches 0.

264. The question is which factor will constrain consumer behaviour first: affordability, basic needs, or benchmarking level (magnitude of the subsidy). The description of the proposed non-linear elasticity is provided in Figure 13 below. Figure 13 illustrates the relationship between consumption (measured as indoor temperature in the apartment and total expenditures for heating as a percentage of disposable household income) and elasticity. At the current price, which is very low compared to other countries, the assumed price elasticity is -0.15. When the price rises and the overall costs of heating get closer to the affordability constraint, the elasticity reaches its minimum of -0.68. Then, elasticity suddenly reaches 0, implying that consumption is perfectly inelastic. The higher price makes households continue to consume regardless of the price, basically by avoiding paying for services.

265. Reduced indoor temperature in the apartment (due to a decrease in consumption) has a minor effect on elasticity. However, it may be the reason why elasticity suddenly drops to zero earlier than reaching the maximum implied by the affordability constraint. Another constraint is the magnitude of the subsidy. If the price reaches international levels, the reform of subsidies is out of this discussion.

![Figure 13. Proposed elasticity curve depending on price](image-url)
2. Mathematical formulation of the model

266. In the section we present the mathematical formulation of the problem. The symbols used in the mathematical description are as follows:

- \( E(p) \) elasticity function depending on price, minimum at the affordability constraint
- \( E_h(p) \) elasticity function depending on price, minimum at the heating comfort constraint
- \( x \) additional variable
- \( p \) price of energy (variable)
- \( p_a \) price of energy at affordability constraint
- \( p_h \) price of energy at heating comfort constraint
- \( p_c \) current price of energy
- \( E_a \) elasticity at affordability constraint
- \( E_h \) elasticity at heating comfort constraint
- \( E_c \) elasticity at current price
- \( C_c \) energy consumption at current price
- \( C_a \) energy consumption at affordability price
- \( a, b \) parameters for the elasticity function, minimum at the affordability constraint
- \( a_h, b_h \) parameters for the elasticity function, minimum at the heating comfort constraint

267. The approximation of the elasticity function is given by the following function:

\[
E(p) = \begin{cases} 
(p + a) + b \times e^{(p+a)} & \text{if } p > 0 \\
E(p) < 0 & 
\end{cases}
\]

268. Figure 14 presents a graph of the function \( E(p) \).

Figure 14. Graph of function \( E(p) \)

269. In order to determine the parameters \( a, b \) we need to find a minimum of the function \( E(p) \). This could be done by calculating the derivative of \( E(p) \) and finding the zero of the derivative function.
As parameter \( a \) is a constant we can calculate a zero of another function, where \( x=p+a \), thus our elasticity function will be:

\[
E(x) = (x + b) \times e^x
\]

The derivative of \( E(x) \) is following:

\[
E'(x) = ((x + b) \times e^x)'
\]

then,

\[
E'(x) = (x + b)' \times e^{cx} + (x + b) \times (e^x)'
\]

but we know that

\[
(e^x)' = e^x
\]

thus,

\[
E'(x) = (x + b)' \times e^x + (x + b) \times (e^x)
\]

\[
E'(x) = 1 \times e^x + (x + b) \times (e^x)
\]

\[
E'(x) = e^x + (x + b) \times e^x
\]

In order to find the zero of the function \( E'(x) \) we need to solve the equation:

\[
E'(x) = 0
\]

\[
e^x + (x + b) \times e^x = 0
\]

\[
e^x \times (1 + x + b) = 0
\]

but \( e^x \) is always higher than 0, thus

\[
1 + x + b = 0
\]

and we substitute \( x \) by \( p+a \), thus

\[
1 + p + a + b = 0
\]
and

\[ p = -1 - a - b \]

273. The last equation gives the relations between price at minimum and two parameters of the function. We also know the two points where the function crosses the demand curve, thus we can formulate a set of equations:

\[
\begin{align*}
E(p) &= ((p + a) + b) \times e^{(p+a)} \\
E(p_a) &= E_a \\
E(p_c) &= E_c
\end{align*}
\]

and in addition we know that:

\[ p_a = -1 - a - b \]

and we know that \( p_a \) (price at affordability) will lead to a decrease in consumption at the affordability level. This can be described by a set of equations:

\[
\begin{align*}
p_a \times c_a &= 8\% \times Income \\
p_a - p_c \times E_a \times c_c &= c_a
\end{align*}
\]

274. Thus:

\[
\frac{p_a - p_c}{p_c} \times E_a \times c_c = \frac{8\% \times Income}{p_a}
\]

\[
\frac{p_a - p_c}{p_c} \times E_a \times c_c \times p_a = 8\% \times Income
\]

\[
\frac{E_a \times c_c}{p_c} \times p_a^2 + \frac{-p_c}{p_c} \times E_a \times c_c \times p_a - 8\% \times Income = 0
\]

\[
\frac{E_a \times c_c}{p_c} \times p_a^2 - E_a \times c_c \times p_a - 8\% \times Income = 0
\]

275. To find \( p_a \) we need to solve a quadratic equation.

276. The discriminant is calculated in the following way:

\[
\Delta = \sqrt{(E_a \times c_c)^2 - 4 \left( \frac{E_a \times c_c}{p_c} \right)(-8\% \times Income)}
\]
As the solution should be higher than zero, thus

\[ p_a = \frac{E_a \times c_c \pm \Delta}{2 \times E_a \times c_c / p_c} \]

Also we know that

\[ E_a = ((p_a + a) + b) \times e^{(p+a)} \]

and

\[ E_a = ((-1 - a - b + a) + b) \times e^{(-1-a-b+a)} \]

\[ E_a = (-1) \times e^{(-1-b)} \]

\[ -E_a = e^{(-1-b)} \]

\[ \ln(-E_a) = -1 - b \]

\[ b = \frac{-1}{\ln(-E_a)} \]

Thus, we can calculate parameter \( b \). For given values of \( E_a=-0.5, b=1.442695041 \)

The parameter \( a \) will depend on \( p_a \), which depends on \( p_c \), which is different for the different regions of Kazakhstan, thus we will use the above equations in the Excel model and will solve the problem in Excel.

### 2.1. Modification of the function due to the heating comfort constraint

When the heating comfort is satisfied, the function \( E_h(p) \) will be exactly the same as described for \( E(p) \) above. When the heating comfort is not satisfied, the function \( E_h(p) \) will achieve its minimum and will behave like \( E(p) \) after the affordability constraint is applied. Thus, instead of price affordability we will need another equation to find a minimum:

\[
\begin{cases}
E_h = ((p_h + a) + b) \times e^{(p_h+a)} \\
p_h - p_c \times E_h \times c_c = c_h
\end{cases}
\]

Where \( a, b \) are the same parameters as found for the function \( E(p) \), then the equation for the new function will be as follows:

\[
\begin{cases}
E_h(p) = ((p + a_h) + b_h) \times e^{(p+a_h)} \\
p > 0 \\
E_h(p) < 0
\end{cases}
\]

The solution for \( E_h(p) \) is similar as for \( E(p) \), the only difference is that now parameters are calculated for minimum at \( p_h \), instead of \( p_c \). The solution can be found using the Excel spreadsheet.
## ANNEX 3. OECD MATRIX FOR MAPPING SUBSIDY SCHEMES

<table>
<thead>
<tr>
<th>TRANSFER MECHANISM (how a transfer is created)</th>
<th>STATUTORY OR FORMAL INCIDENCE (to whom and for what a transfer is given)</th>
<th>Direct consumption</th>
</tr>
</thead>
<tbody>
<tr>
<td>Output return</td>
<td>Enterprise income</td>
<td>Unit cost of consumption</td>
</tr>
<tr>
<td>Direct transfer of funds</td>
<td>Output bounty or deficiency payment</td>
<td></td>
</tr>
<tr>
<td>Production</td>
<td>Operating grant</td>
<td>Wage subsidy</td>
</tr>
<tr>
<td>Cost of intermediate inputs</td>
<td>Input-price subsidy</td>
<td>Capital grant linked to acquisition of land</td>
</tr>
<tr>
<td>Cost of production factors</td>
<td>Wage subsidy</td>
<td>Capital grant linked to capital</td>
</tr>
<tr>
<td>Labour</td>
<td>Land and natural resources</td>
<td></td>
</tr>
<tr>
<td>Land and natural resources</td>
<td>Capital</td>
<td></td>
</tr>
<tr>
<td>Capital</td>
<td>Knowledge</td>
<td></td>
</tr>
<tr>
<td>Direct consumption</td>
<td>Unit cost of consumption</td>
<td></td>
</tr>
<tr>
<td>Tax revenue foregone</td>
<td>Production tax credit</td>
<td></td>
</tr>
<tr>
<td>Reduced rate of income tax</td>
<td>Reduced in excise tax on output</td>
<td></td>
</tr>
<tr>
<td>Tax revenue foregone</td>
<td>Property tax reduction or exemption</td>
<td></td>
</tr>
<tr>
<td>Other government revenue foregone</td>
<td>Investment tax credit</td>
<td></td>
</tr>
<tr>
<td>Transfer of risk to government</td>
<td>Government transfer of intellectual property right (IPR)</td>
<td></td>
</tr>
<tr>
<td>Transfer of risk to government</td>
<td>Underpricing of a government good or service</td>
<td></td>
</tr>
<tr>
<td>Induced transfers</td>
<td>Underpricing of access to government land or natural resources; Reduction of resource royalty or extraction tax</td>
<td></td>
</tr>
<tr>
<td>Import tariff or export subsidy</td>
<td>Government transfer of intellectual property right (IPR)</td>
<td></td>
</tr>
<tr>
<td>Monopoly concession; export restriction</td>
<td>Means-tested cold-weather grant</td>
<td></td>
</tr>
</tbody>
</table>
### ANNEX 4. GSI ILLUSTRATIVE LIST OF SUBSIDY TYPES

<table>
<thead>
<tr>
<th>Direct transfer or potential direct transfer of funds</th>
<th>Government revenue foregone</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Direct payments linked to production volumes or sales</td>
<td>• Tax expenditure: reduced tax rates, tax credits, exemptions or deferrals (e.g. on income tax, VAT, excise tax, property tax)</td>
</tr>
<tr>
<td>• Deficiency payments (the difference between target price and actual price)</td>
<td>• Accelerated depreciation allowances</td>
</tr>
<tr>
<td>• Grants for acquisition of capital or land</td>
<td>• Reduced royalty payments</td>
</tr>
<tr>
<td>• Subsidies to intermediate inputs</td>
<td>• Reduced resource rents</td>
</tr>
<tr>
<td>• Wage subsidies to assist individuals in preparing for and maintaining employment (e.g. training)</td>
<td></td>
</tr>
<tr>
<td>• Government loans: provided at below-market rates, low collateral requirements, lengthy repayment periods or deferred repayments*</td>
<td></td>
</tr>
<tr>
<td>• Government spending on research and development</td>
<td></td>
</tr>
<tr>
<td>• Guarantees for loans, security or credit*</td>
<td></td>
</tr>
<tr>
<td>• Government-provided insurance or indemnification*</td>
<td></td>
</tr>
<tr>
<td>• Assumption of occupational health and accident liabilities</td>
<td></td>
</tr>
<tr>
<td>• Assumption of liabilities for closure and post-closure risks (e.g. site cleanup)</td>
<td></td>
</tr>
<tr>
<td>• Caps on commercial liability</td>
<td></td>
</tr>
<tr>
<td>• Government use of tax-free bonds to fund private investments</td>
<td></td>
</tr>
<tr>
<td>• Government expenditure on creating and maintaining stockpiles</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Government-provided or government-purchased goods or services</th>
<th>Income or price support, or relief from normal costs or procedures</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Underpricing of government-provided goods or services</td>
<td>• Prices set at below-market rates for consumers (including where there is no financial contribution by government)</td>
</tr>
<tr>
<td>• Government procurement at above-market rates</td>
<td>• Above-market rate prices for producers via government regulations or import barriers (e.g. tariffs)</td>
</tr>
<tr>
<td>• Government-provided infrastructure specific to the sector (e.g. private roads, storage facilities)</td>
<td>• Mandated feed-in tariffs</td>
</tr>
<tr>
<td>• Access to government-owned natural resources or land</td>
<td>• Consumption mandates</td>
</tr>
<tr>
<td>• Government transfer of intellectual property rights</td>
<td>• Export taxes or restrictions</td>
</tr>
<tr>
<td></td>
<td>• Relief from costs enterprises normally bear in the normal course of business (e.g. labour, environmental, health and safety)</td>
</tr>
<tr>
<td></td>
<td>• Exemption from government procedures normally followed by enterprises</td>
</tr>
</tbody>
</table>

*Government-provided loans, loan guarantees and investment insurance are referred to as “export credits” when granted for exports or foreign investment.

Source: IISD-GSI (2010).
ANNEX 5. MAJOR MACROECONOMIC INDICATORS FOR KAZAKHSTAN

<table>
<thead>
<tr>
<th>Selected Indicators</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Income and Economic Growth</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GDP growth (annual %)</td>
<td>9.7</td>
<td>10.7</td>
<td>8.9</td>
<td>3.3</td>
<td>1.2</td>
<td>7.3</td>
<td>7.5</td>
<td>5</td>
</tr>
<tr>
<td>GDP per capita growth (annual %)</td>
<td>8.7</td>
<td>9.5</td>
<td>7.7</td>
<td>2</td>
<td>-1.4</td>
<td>5.8</td>
<td>6.6</td>
<td>3.5</td>
</tr>
<tr>
<td>GDP per capita (USD)</td>
<td>3771</td>
<td>5292</td>
<td>6771</td>
<td>8514</td>
<td>7165</td>
<td>9070</td>
<td>11357</td>
<td>12009</td>
</tr>
<tr>
<td>Private Consumption growth (annual %)</td>
<td>9.7</td>
<td>11.9</td>
<td>10.5</td>
<td>4.4</td>
<td>1.6</td>
<td>10.7</td>
<td>9.7</td>
<td>9.3</td>
</tr>
<tr>
<td>Gross Fixed Investment (% of GDP)</td>
<td>31</td>
<td>33.9</td>
<td>35.5</td>
<td>27.5</td>
<td>29.4</td>
<td>25.4</td>
<td>22.2</td>
<td>21.6</td>
</tr>
<tr>
<td>Gross Fixed Investment - Public (% of GDP)</td>
<td>4.6</td>
<td>4.5</td>
<td>5.6</td>
<td>5.8</td>
<td>5.5</td>
<td>5.1</td>
<td>4.6</td>
<td>4.6</td>
</tr>
<tr>
<td>Gross Fixed Investment - Private (% of GDP)</td>
<td>26.4</td>
<td>29.4</td>
<td>29.9</td>
<td>21.7</td>
<td>23.9</td>
<td>20.3</td>
<td>17.6</td>
<td>17</td>
</tr>
<tr>
<td>Savings (% of GDP)</td>
<td>29.7</td>
<td>31.4</td>
<td>27.6</td>
<td>32.4</td>
<td>25.9</td>
<td>26.7</td>
<td>29.1</td>
<td>2.9</td>
</tr>
<tr>
<td>Savings – Public (% of GDP)</td>
<td>9.7</td>
<td>11.8</td>
<td>12.4</td>
<td>10.3</td>
<td>7.6</td>
<td>10.4</td>
<td>12.9</td>
<td>12</td>
</tr>
<tr>
<td>Savings – Private (% of GDP)</td>
<td>19.9</td>
<td>19.6</td>
<td>15.4</td>
<td>22.1</td>
<td>15.2</td>
<td>16.4</td>
<td>16.2</td>
<td>13.9</td>
</tr>
<tr>
<td><strong>Money and Prices</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inflation, consumer prices (annual %, end of year)</td>
<td>7.4</td>
<td>8.4</td>
<td>18.8</td>
<td>9.5</td>
<td>6.2</td>
<td>7.8</td>
<td>7.4</td>
<td>6</td>
</tr>
<tr>
<td>Inflation, consumer prices (annual %, period average)</td>
<td>7.6</td>
<td>8.6</td>
<td>10.8</td>
<td>17.2</td>
<td>7.3</td>
<td>7.1</td>
<td>8.3</td>
<td>5.1</td>
</tr>
<tr>
<td>Nominal Exchange Rate (end of period)</td>
<td>1.34</td>
<td>1.27</td>
<td>1.21</td>
<td>1.21</td>
<td>1.48</td>
<td>1.47</td>
<td>1.48</td>
<td>1.5</td>
</tr>
<tr>
<td>Real Exchange Rate index (1998=100)</td>
<td>1.00</td>
<td>0.90</td>
<td>0.81</td>
<td>0.71</td>
<td>0.81</td>
<td>0.76</td>
<td>0.72</td>
<td>0.71</td>
</tr>
<tr>
<td><strong>Fiscal Accounts and External Debt/Assets</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Revenues (% of GDP)</td>
<td>28</td>
<td>28.3</td>
<td>29.2</td>
<td>29.7</td>
<td>22.7</td>
<td>25.4</td>
<td>27.7</td>
<td>26.8</td>
</tr>
<tr>
<td>Oil revenues (% of GDP)</td>
<td>9.4</td>
<td>10.1</td>
<td>8.1</td>
<td>12.3</td>
<td>8.1</td>
<td>10.4</td>
<td>14.3</td>
<td>13.4</td>
</tr>
<tr>
<td>Non-oil revenues (% of GDP)</td>
<td>18.6</td>
<td>18.3</td>
<td>21.1</td>
<td>17.4</td>
<td>14.7</td>
<td>14.6</td>
<td>13.8</td>
<td>13.4</td>
</tr>
<tr>
<td>Expenditures (% of GDP)</td>
<td>22.3</td>
<td>20.3</td>
<td>24.2</td>
<td>27.2</td>
<td>23.5</td>
<td>22.1</td>
<td>21.5</td>
<td>22.3</td>
</tr>
<tr>
<td>Capital and net lending (% of GDP)</td>
<td>15.8</td>
<td>14.2</td>
<td>14.8</td>
<td>14.2</td>
<td>16.1</td>
<td>15.1</td>
<td>14.9</td>
<td>16.2</td>
</tr>
<tr>
<td>Overall fiscal balance (% of GDP)</td>
<td>6.5</td>
<td>6.1</td>
<td>9.4</td>
<td>13.1</td>
<td>7.4</td>
<td>7.1</td>
<td>6.7</td>
<td>6.1</td>
</tr>
<tr>
<td>Non-oil fiscal balance (% of GDP)</td>
<td>-3.7</td>
<td>-2.1</td>
<td>-3</td>
<td>-9.8</td>
<td>-8.8</td>
<td>-7.6</td>
<td>-7.8</td>
<td>-8.9</td>
</tr>
<tr>
<td>Non-oil primary fiscal balance (% of GDP)</td>
<td>-3.3</td>
<td>-1.8</td>
<td>-2.8</td>
<td>-9.4</td>
<td>-8.4</td>
<td>-7.1</td>
<td>-7.3</td>
<td>-8.5</td>
</tr>
<tr>
<td>External debt, total (current USD billion)</td>
<td>43.4</td>
<td>74</td>
<td>96.9</td>
<td>107.9</td>
<td>112.9</td>
<td>118.2</td>
<td>125.2</td>
<td>137.1</td>
</tr>
<tr>
<td>External public debt (% of GDP)</td>
<td>3.8</td>
<td>3.9</td>
<td>2.1</td>
<td>1.6</td>
<td>3.2</td>
<td>3.5</td>
<td>2.9</td>
<td>2.9</td>
</tr>
<tr>
<td>Total public debt (% of GDP)</td>
<td>9.8</td>
<td>12.8</td>
<td>7.8</td>
<td>8.7</td>
<td>13.9</td>
<td>15.5</td>
<td>12.5</td>
<td>13.4</td>
</tr>
<tr>
<td><strong>External Accounts</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Export real growth (% yoy)</td>
<td>1.1</td>
<td>6.5</td>
<td>9</td>
<td>0.9</td>
<td>-11.6</td>
<td>1.9</td>
<td>3.5</td>
<td>-0.4</td>
</tr>
<tr>
<td>Import real growth (% yoy)</td>
<td>12.5</td>
<td>12.2</td>
<td>25.8</td>
<td>-11.3</td>
<td>16</td>
<td>0.9</td>
<td>6.9</td>
<td>19.5</td>
</tr>
<tr>
<td>Workers’ remittances, net (BoP, current USD billions)</td>
<td>-1.1</td>
<td>-1.9</td>
<td>-2.9</td>
<td>-1.9</td>
<td>-1.4</td>
<td>-1.4</td>
<td>-1.5</td>
<td>-1.7</td>
</tr>
<tr>
<td>Current account balance (current USD billions)</td>
<td>-1.1</td>
<td>-2</td>
<td>-8.3</td>
<td>6.3</td>
<td>-4.1</td>
<td>1.4</td>
<td>12.3</td>
<td>7.7</td>
</tr>
<tr>
<td>as percent of GDP</td>
<td>-1.8</td>
<td>-2.5</td>
<td>-7.9</td>
<td>4.7</td>
<td>-3.6</td>
<td>0.9</td>
<td>6.5</td>
<td>3.8</td>
</tr>
<tr>
<td>Foreign Direct Investment (current USD billions)</td>
<td>2.1</td>
<td>6.7</td>
<td>8</td>
<td>13.1</td>
<td>10.1</td>
<td>3.7</td>
<td>9.3</td>
<td>12.4</td>
</tr>
<tr>
<td><strong>Population, Employment and Poverty</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Population, total (millions)</td>
<td>15.1</td>
<td>15.3</td>
<td>15.5</td>
<td>15.7</td>
<td>16.1</td>
<td>16.3</td>
<td>16.6</td>
<td>16.8</td>
</tr>
<tr>
<td>Unemployment rate (% of labor force)</td>
<td>8.1</td>
<td>7.8</td>
<td>7.3</td>
<td>6.6</td>
<td>6.6</td>
<td>5.8</td>
<td>5.4</td>
<td>5.3</td>
</tr>
<tr>
<td>Poverty headcount ratio at national poverty line (% of population)</td>
<td>31.6</td>
<td>18.2</td>
<td>12.7</td>
<td>12.1</td>
<td>8.2</td>
<td>6.5</td>
<td>5.3</td>
<td>4</td>
</tr>
<tr>
<td>at USD 1 a day (PPP)</td>
<td>-</td>
<td>-0.4</td>
<td>0.2</td>
<td>0.1</td>
<td>-0.1</td>
<td>-0.1</td>
<td>-0.1</td>
<td>-0.1</td>
</tr>
<tr>
<td>Life expectancy (years)</td>
<td>66</td>
<td>66</td>
<td>67</td>
<td>67</td>
<td>68</td>
<td>68</td>
<td>69</td>
<td>50</td>
</tr>
<tr>
<td><strong>Other</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GDP (current tenge billions)</td>
<td>7591</td>
<td>10214</td>
<td>12850</td>
<td>16053</td>
<td>17008</td>
<td>21816</td>
<td>27572</td>
<td>30073</td>
</tr>
<tr>
<td>GDP (current USD billions)</td>
<td>57.1</td>
<td>81</td>
<td>104.8</td>
<td>133.4</td>
<td>115.3</td>
<td>148.1</td>
<td>188</td>
<td>201.7</td>
</tr>
</tbody>
</table>
