Climate Investment Funds

November 2, 2010

CLEAN TECHNOLOGY FUND
INVESTMENT PLAN FOR KAZAKHSTAN

The Republic of Kazakhstan

The Clean Technology Fund (CTF) Investment Plan

October 28, 2010

Revision Notes for October 20 Version

At its meeting in Manila on March 15, 2010, the Clean Technology Fund Trust Fund Committee adopted the following decision regarding the CTF Investment Plan for the Republic of Kazakhstan:

Decision on Kazakhstan Investment Plan

14. The Trust Fund Committee reviewed document CTF/TFC.5/7, CTF Investment Plan for Kazakhstan, and endorses an investment plan for Kazakhstan with an envelope of up to USD 200 million in CTF funding. The Government of Kazakhstan and the MDBs are requested to revise the proposed investment plan, taking into account the comments of the Trust Fund Committee, for endorsement by the Trust Fund Committee prior to the further development of any project.

The present document is the revision requested by the Trust Fund Committee. It has also taken into account the constraints on the Trust Fund Committee imposed by the decision of the United States Congress, under which no funding for fossil fuel power generation is available through the Clean Technology Fund. This has had a material impact on the selection of intervention areas. The Government of the Republic of Kazakhstan is very keen on preserving access to the full envelope of funding of USD 200 million which was endorsed by the Trust Fund Committee, and hopes that the Committee will now allow the MDBs to develop their investment projects and access CTF funding.

The main change has been to pursue the aim of de-carbonising energy supply through the intervention area of renewable energy development, which has been scaled up to absorb the funding which, without the constraints imposed by the conditions on funding fossil fuel energy, would have gone to the development of power generation based on associated gas. A small adjustment in the provision of CTF funding has also been made to the district heating intervention area, where the MDBs have indicated to the government that additional funds could be absorbed. A further considerable change in co-financing has had to be made in the district heating intervention area, where the IFC indicated that the original estimate of co-financing included a sponsor financing plan which reaches beyond the CTF investment period. In consequence, the Government has seen fit to correctly portray the co-financing as such which is restricted to the CTF investment period.

The investment plan has also been expanded to discuss energy prices, further outline the rationale for investment support in district heating, and to give a more detailed description of the legislative programme of the Government in the area of sustainable energy use.

The Government of the Republic of Kazakhstan sees the revisions of the investment plan to be fully in the spirit of the Clean Technology Fund, namely to achieve market transformation by creating a renewable energy industry in Kazakhstan which will be key to decarbonising energy supply, and by overcoming the barriers to investment which still persist in the district heating sector.

Section 1: Description of the country and sector context

Kazakhstan's economic development

The Republic of Kazakhstan is the largest economy in Central Asia. Kazakhstan's economic growth is based to a large degree on revenues from oil, the country's primary export commodity. After an economic contraction in the 1990s, the Kazakh economy started a period of rapid economic growth at the turn of the century. This growth continued until the recent global economic recession. With its real GDP growth averaging 9.6% in 2004 – 2007, Kazakhstan confidently entered the ranks of middle-income economies. Kazakhstan's Strategy of Transition to Sustainable Development by 2024 envisages:

- Doubling GDP by 2015, with the rate of economic growth of 10 % per year through 2012, followed by 12 % through 2018 and then 14 % through 2024.
- Tripling labor productivity;
- Reducing by half the energy intensity of GDP by 2015-2020.

Kazakhstan is the largest emitter of greenhouse gases (GHG) in Central Asia. The World Bank's Country Partnership Strategy for Kazakhstan (2004, updated in a 2008 progress report) includes as one of its key objectives ensuring that future economic growth in the country will not harm the environment. EBRD's strategy from 2008 in particular highlights investment in energy efficiency.

Kazakhstan is rich in fossil fuels, especially coal, and a major producer of oil and gas. It is also the world's largest exporter of uranium ore.

Box 1. MDBs' Support to Kazakhstan's Development Agenda. Kazakhstan is ODA-eligible and has active lending programs supported by the World Bank Group, Asian Development Bank, and EBRD, with active projects in the sustainable energy, industry, and infrastructure sectors among others. Kazakhstan's economy has been striving to reduce the energy intensity of its GDP and achieve a greater diversification by developing new, non-oil sources of income. Reducing the environmental stress has also become a pressing need, with air pollution in large cities (most notably Almaty) becoming a persistent problem. Kazakhstan's overall development agenda reflected in the World Bank Country Partnership Strategy includes objectives ("pillars") such as: (a) promoting competitiveness and reducing barriers to business development and investment; (b) investment in basic infrastructure - including the power transmission network and urban infrastructure/services; and (c) ensuring future growth will not harm the environment. Given the level of obsolescence and physical deterioration of Kazakhstan's basic infrastructure, replacement of outdated plant and equipment is an increasingly pressing need. District heating is a prime example of a vital yet technologically outdated sector in Kazakhstan. Shortages of electric power supply (particularly in the South) have also emerged, spurring the accelerated development of renewable hydro-electricity projects and their associated power transmission lines.

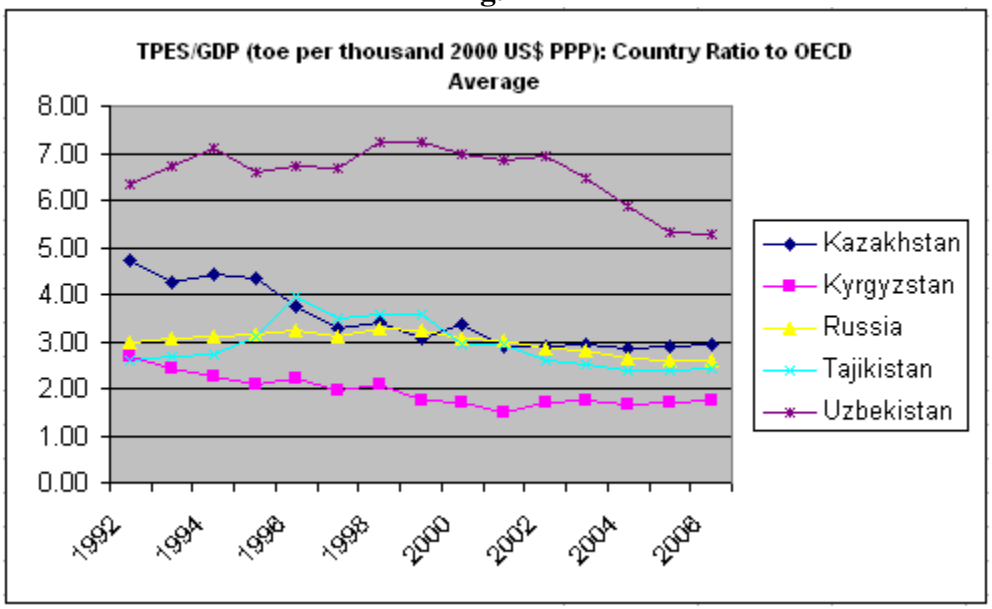
Kazakhstan is however also rich in renewable resources, especially wind and hydro for electricity production, and there is considerable potential in biomass use.

Energy is not being used efficiently in Kazakhstan, due to a legacy of a state-dominated economy, low prices reflecting the rich endowment of the country with fossil fuels, and low levels of affordability for investments in modern energy efficient technologies.

Kazakhstan's Greenhouse Gas (GHG) Emissions, International Context and Comparisons

High Energy Intensity and GHG Emissions. Like most countries of the former Soviet Union (FSU), Kazakhstan has an energy-intensive economy. While energy consumption per capita is almost the same as the OECD average, Kazakhstan's consumption of energy *per unit of GDP* is very high. In 2006, the energy intensity of Kazakhstan's GDP (based on purchasing power parity - PPP) was 0.524 toe per thousand US$, almost three times the OECD average. More importantly, since 2004 this ratio has been increasing, and it is likely to continue to do so, given the plans for increasing oil and gas production. (see **Fig. 1**).

Fig. 1[1]



Background to Kazakhstan's Emissions Profile

Kazakhstan is the largest emitter of GHG in Central Asia. This is a combined result of high energy intensity, relatively high economic output, and a coal-dominated energy sector (with more than 70% of Kazakhstan's electricity generated by coal, compared with the ECA[2] average of 30%). In 2007, Kazakhstan's GHG emissions (without accounting for carbon sinks[3]) were about **246 million tons of CO2 equivalent** (see **Annex 1** for

[1] TPES = Total Primary Energy Supply. The value on the vertical axis of this graph is a ratio of each country's energy intensity to the average energy intensity of the OECD countries. For example, Kazakhstan's energy intensity was almost 5 times the OECD average in the early 1990s and about 3 times the OECD average around 2006.

[2] Europe and Central Asia

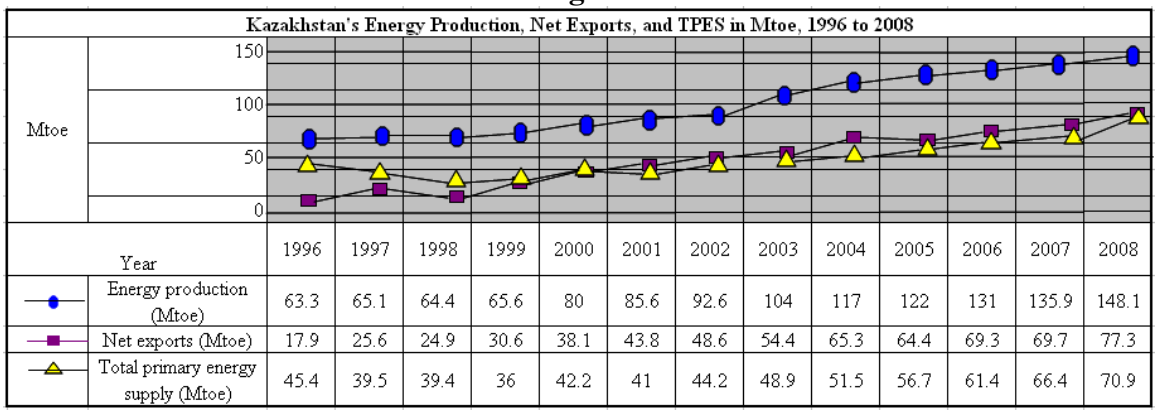
[3] A carbon sink is a source of negative emissions of GHG. Carbon sinks are found almost exclusively in the sector denoted by IPCC as LULUCF (Land Use, Land Use Change, and Forestry). In Kazakhstan, this sector accounted for an estimated net reduction (absorption) of 9.2 million tCO2 equivalent or 3.7% of all GHG emissions in 2007.

details).[4] Also contributing to high energy consumption and GHG emissions in Kazakhstan is the level of energy prices, which is low relative to other countries (see **Table 1**), although it has been increasing faster than inflation since 2007, and is expected to continue to rise at a fast rate.

Energy Production and Supply

Since 1999, Kazakhstan's energy production, supply (consumption), and exports (mostly oil) have been steadily growing (see **Fig. 2**). The primary energy exports are oil and gas from the Caspian Sea, the production of which has considerable impact on the CO_2 emissions of the country. Renewables accounted for only 1.1% of TPES in 2008, while coal and gas account for a rougly identical share. Oil is primarily used in transport, and its relatively low share reflects the early stage of Kazakhstan's economic development.

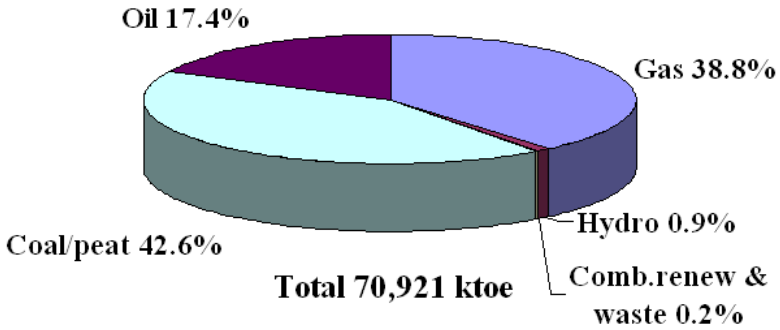
Fig. 2



Year	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Energy production (Mtoe)	63.3	65.1	64.4	65.6	80	85.6	92.6	104	117	122	131	135.9	148.1
Net exports (Mtoe)	17.9	25.6	24.9	30.6	38.1	43.8	48.6	54.4	65.3	64.4	69.3	69.7	77.3
Total primary energy supply (Mtoe)	45.4	39.5	39.4	36	42.2	41	44.2	48.9	51.5	56.7	61.4	66.4	70.9

Fig. 3

TPES Share by Fuel in Kazakhstan, 2008



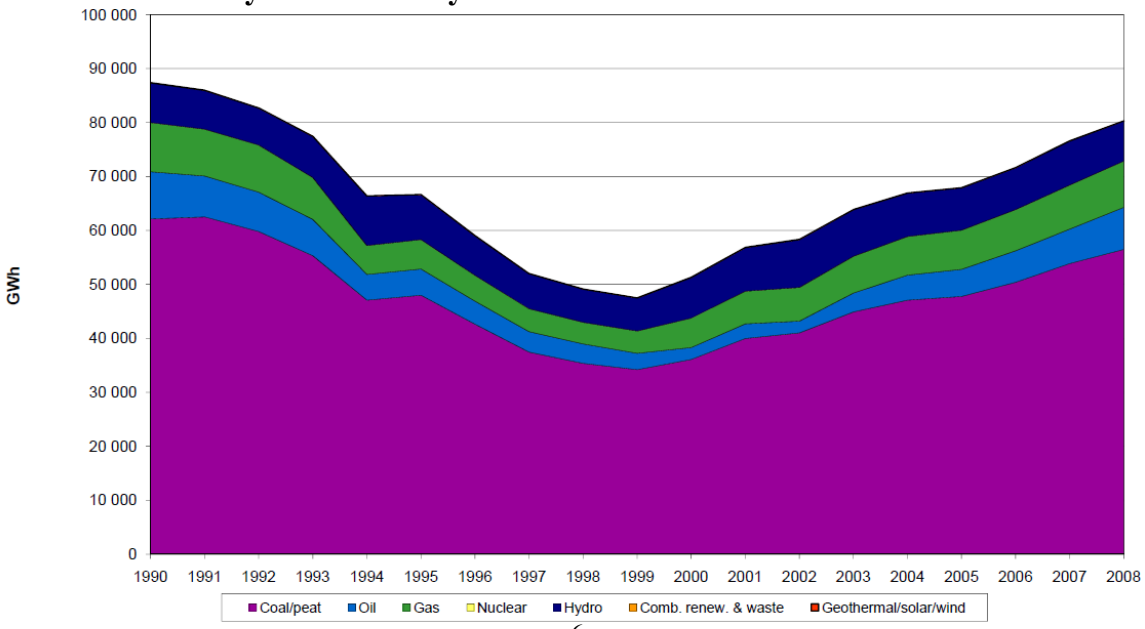
Source: International Energy Agency/OECD[5]

[4] For comparison, GHG emissions reported (for 2006) by some other countries were: UK 655.8, Poland 400.5, Turkey 331.7, Netherlands 207.5, and Romania 156.7 million tCO2 equivalent. In the FSU, only two much larger economies - Russia and Ukraine - emit more GHG. Uzbekistan emitted 199.8 million tons of CO2 equivalent in 2005.

[5] *http://www.iea.org/stats/pdf_graphs/KZTPESPI.pdf*

The installed generating capacity of power plants in Kazakhstan is about 18 GW (of which thermal power plants are 87.5 % and hydro power stations are 12.4 %), and total production reached 80.3 TWh in 2008. More than 70% of all electricity in Kazakhstan is produced from coal (see Fig.4), and large coal-fired plants tend to be located near coal extraction sites. Coal production is primarily poor quality lignite which is produced in open-cast mines. There is a strong north-south divide, with the north (where the coal reserves are located) having a power surplus, while the south (where the main population centre is located) requiring imports. Exports of electricity are consequently directed to Russia, while Kazakhstan's imports of electricity mostly come from Kyrgyzstan. Imports and exports are roughly in balance. The MDBs are supporting increases in the overall system efficiency through active lending and technical assistance to the energy sector.

Fig. 4
Electricity Production by Fuel in Kazakhstan 1990 – 2008 in GWh



Source: International Energy Agency/OECD[6]

Heating is an essential service in Kazakhstan's climate, and most of Kazakhstan's cities have district heating systems, often receiving heat from large cogeneration power plants. Total *heat* production from centralized plant stood at 110 TWh in 2008. The installed power generating capacity of CHP[7] (cogeneration) power plants is more than 6.7 GW (38% of the capacity of all power plants in the country, and 42.5% of TPP capacity). They cover about 40 % of heat consumption and about 46 % of electricity consumption in Kazakhstan, with the remainder of the heat being produced by heat-only boilers utilizing fossil fuels, often with low efficiencies.

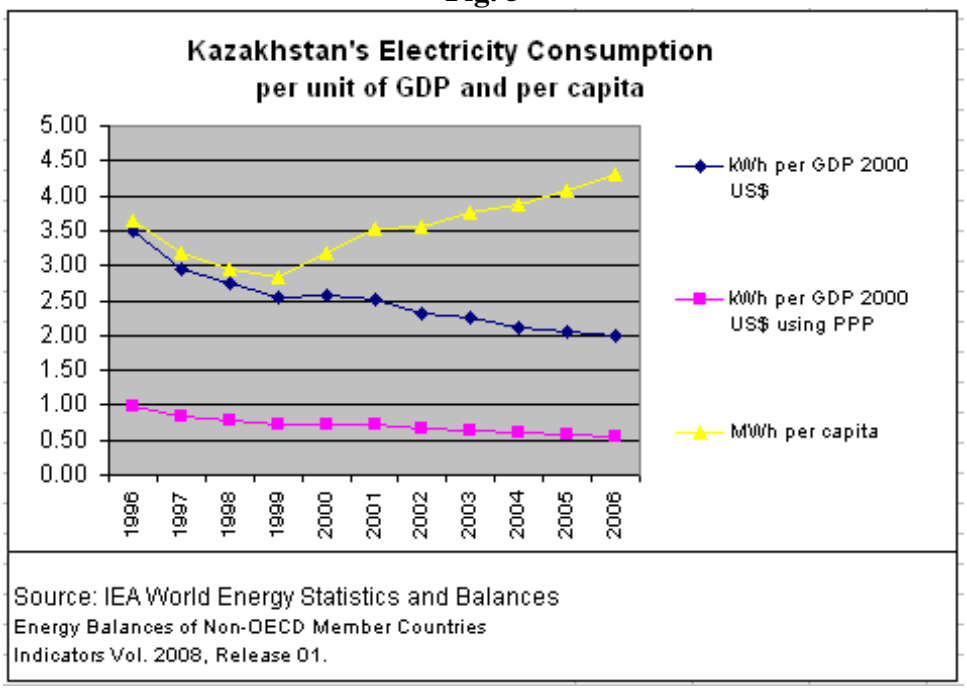
[6] http://www.iea.org/stats/pdf_graphs/KZELEC.pdf
[7] CHP = Combined Heat and Power. The Russian term for CHP is *Teploelectrocentral* (TEC).

Energy Demand

Energy consumption in Kazakhstan is dominated by electricity and heating requirements, due to the climatic conditions of the country. It peaks in January of each year. Industry accounts for about 37% of total final consumption, and almost all coal use outside the electricity/DH sector, while transport is only accounting for ca. 10% of final consumption.

Total *Electricity* consumption (including energy industry use, but excluding system losses) resumed growth in 2000, after declining in the 1990s. From 1999 to 2008, it increased from 42.4 TWh to 73.5 TWh, by 73%. The rapid economic growth starting from 1999 resulted in a slight reduction of electricity consumption per unit of GDP (see **Fig. 5**). By 2008, electricity consumption per capita had reached 4.7 MWh/a., still only 51% of the OECD average, but this is expected to grow in the future, with increasing wealth. Industry accounts for ca. 41% of total electricy consumption. Per unit of GDP (PPP basis) however, electricity use is about 1.78 that of the OECD average, further reinforcing the need to invest in overall system efficiency to cope with the inevitable growth in consumption that will follow further rises in living standards.

Fig. 5

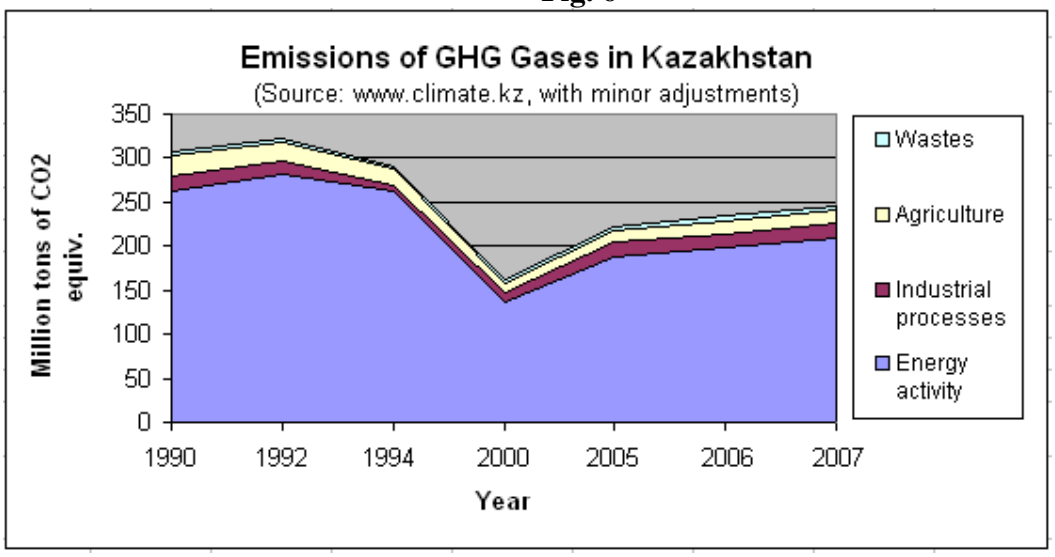


Total *heat* consumption from large plant before network losses reached 96 TWh in 2008. Of this, 49% was consumed by industry, and 24% by the residential sector.

Emissions

According to the annual emission inventories conducted in Kazakhstan for the UNFCCC Secretariat, energy activity is the dominant source of GHG emissions in Kazakhstan (see **Figure 6** below and **Tables 3 and 4** for details).

Fig. 6



Kazakhstan's GHG emissions peaked in 1992 and steadily declined due to the overall economic contraction brought about by the collapse of the USSR in the early 1990s and then the Russian financial crisis of 1998. Starting from 2000, the emissions started to grow as the Kazakh economy entered a period of rapid economic growth fueled by growing prices of oil, the country's primary export commodity. GHG emissions from energy activities come mostly in the form of CO_2 (90.9%), with CH_4 making up most of the rest (see **Table 1**). Emissions from other sources are neglible

Table 1
GHG Emissions from Energy Activities, million tCO2 equivalent

	1990	1992	1994	2000	2005	2006	2007
CO2	220.1	246.3	236.5	126.6	170.2	178.0	189.7
CH4	40.6	34.7	25.1	10.0	17.6	19.4	18.3
N2O	0.8	0.9	0.9	0.4	0.5	0.6	0.6
Energy activity total	**261.5**	**281.9**	**262.5**	**137.0**	**188.3**	**198.0**	**208.6**

As noted in **Box 2** below, energy activities as defined in Kazakhstan's GHG inventory contributed almost 85% of all GHG emissions in Kazakhstan in 2007. **Fig. 7** shows the overall size and composition of these emissions by sector over time. After the energy sector (53%), manufacturing and construction is the second largest (17%) source of GHG contributions from energy activity. The significant category of *other sectors* (9% of emissions from energy activity) includes commercial, institutional, and residential sectors. Note that GHG emissions from energy activity include not only emissions resulting from fuel combustion, but also *fugitive emissions* such as methane emissions from coal mines as well as venting and flaring emissions from the oil and gas sector.

Box 2. Energy-related sector definitions used in the Kazakh GHG inventories. It must be noted that the category of ***energy activity*** under the IPCC classification includes more than the usual definition of the *energy sector* (see **Fig. 7**). For example, fuel combustion in transport and in manufacturing also falls under energy activity. The share of emissions from the energy sector per se consists of fuel combustion in the production of electricity and heat, production of secondary fuels (as in oil refining), and production of solid fuels (coal mining). The share of the energy sector defined in this way in 2007 was 53% of overall energy activity from the graph above, which itself makes up about 85% of the overall GHG emissions (without accounting for the carbon sinks in land use and forestry).

Overall, the classification of GHG emissions used in Kazakhstan for emission inventories is broadly consistent with the methodological guidelines of IPCC[1], with the notable lack of reporting for fluorinated gases (PFCs, HFCs, and SF6) whose contribution to Kazakhstan's GHG emissions inventory is currently believed to be very minor.

Fig. 7

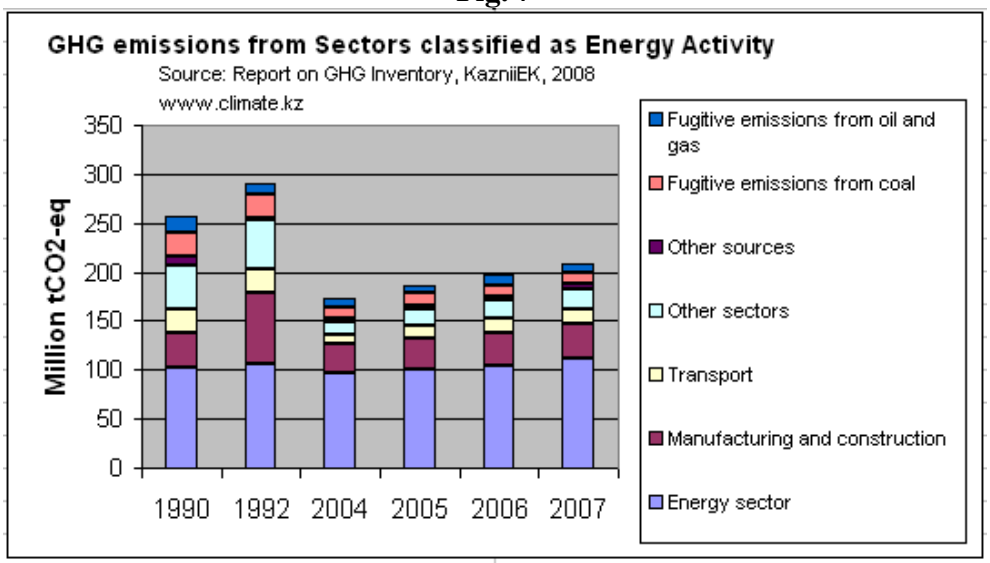
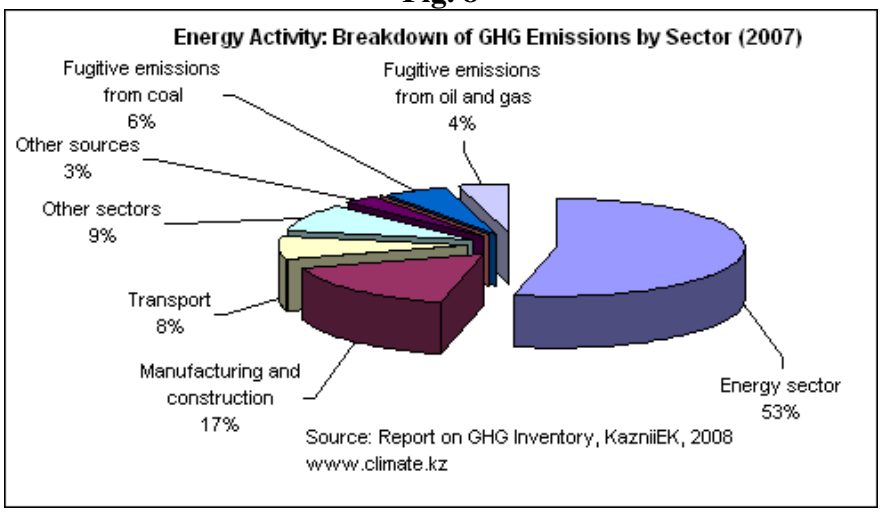


Fig. 8



Section 2: Identification of priority sectors for GHG abatement measures

GHG emission forecasts and mitigation measures

From the 2007 level of about 240 – 250 million tCO2 equivalent, the GHG emissions in Kazakhstan are likely to stay stable or possibly decrease in the short run, reflecting both the current economic contraction and some efficiency improvements later on. The contraction is largely due to the impact of the global economic crisis that started affecting the ECA countries in the fall of 2008. In the medium to long run (post 2012), the country's economic growth will undoubtedly rebound, making the projections below as relevant as they were before the crisis. The subsequent emission trajectory will depend on the composition of economic growth, the development of energy efficiency, and the technologies with which additional energy demand will be satisfied, and which will be used to replace current supply installations. Table 2 shows real GDP growth and inflation rates in Kazakhstan from 2007 to 2009.

Table 2
Real GDP Growth Rates and Inflation in Kazakhstan, 2007 – 2009

Year	GDP - real growth rate	Inflation
2007	8.9%	10.8%
2008	3.3%	17.2%
2009	1%	7.5%
Compound	**13.6%**	**39.6%**

Sourcce: CIA World Fact Book

Future emissions from energy activity

The CO_2 emission scenarios presented in Kazakhstan's 2nd National Communication to the UNFCCC incorporate a number of assumptions from the country's agreed programs of socio-economic development for 2010 - 2030. The scenarios for GHG emissions from energy-related activities were built using the MARKAL model[8].

The country's Strategy of Transition to Sustainable Development by 2024 envisages:

- Reducing by half the energy intensity of GDP by 2015-2020;
- Tripling labor productivity;
- Doubling GDP by 2015;

[8] This work was supported by the EU's TACIS programme. MARKAL (an acronym for MARKet ALlocation) is a mathematical model of the energy system that provides a technology-rich basis for estimating energy dynamics over a given time horizon. Reference case estimates of end-use energy demands are developed by the user on the basis of economic and demographic projections. In addition, the user provides estimates of the existing stock of energy related equipment, and the characteristics of available future technologies, as well as new sources of primary energy supply and their potentials.

- The rate of economic growth of at least 10 % per year through 2012, followed by 12 % through 2018 and then 14 % through 2024.

The MARKAL model simulation discussed here utilizes more conservative assumptions, including annual economic growth rates of 5-7% depending on the sector. In reality, the financial crisis has led to significant reductions in real growth rates, as shown in table 3 below. Nevertheless, the growth potential of the economy remains significant, and with economic growth resuming, GHG emissions are likely to resume growing as well. The mitigation scenarios reflected in the 2nd National Communication and in the underlying MARKAL analysis may be seen as proxy forecasts for GHG emissions under the mitigation program of the Government of Kazakhstan.

Figure 8 and **Table 3** show the emissions and reduction potential of the GHG emissions from the main economic sectors considering the sector development plans and mitigation measures based on low-carbon technology choices and policies. All the emissions shown in the table are MARKAL-simulated and thus energy related.

Table 3
GHG emissions from the main sectors of the economy of RK (million tons of CO_2 equivalent) included in the MARKAL simulation, 2000 to 2024

	2000	2004	2008	2012	2016	2020	2024
Energy Sector (excluding oil and gas production)							
Base Case	77.85	96.09	122.83	139.02	153.05	162.5	183.11
Efficiency improvements for existing capacity and construction of new capacity based on efficient technologies and renewable energy	77.85	96.09	119.04	126.52	132.81	131.05	138.26
Transport							
Base Case	8.76	13.32	17.09	22.29	29.21	36.46	44.91
Introduction of the "Euro 2 - 4" emission standards, 7 year maximum age for imported vehicles	8.76	13.32	17.09	20.73	24.52	27.35	30.14
Oil and Gas Production							
Base Case	8.03	17.15	23.09	25.62	29.35	30.99	40.77
Application of efficient and environmentally clean technologies	8.03	17.16	22.37	24.39	26.7	28.94	36.03
Steel Production							
Base Case	6.59	7.83	8.63	9.31	10.16	10.98	11.72
Application of more efficient technologies	6.59	7.83	8.19	8.66	9.15	9.55	9.87
Cement Production							
Base Case	0.72	1.74	1.96	2.23	2.5	2.81	3.14
Production efficiency improvement, use of natural gas	0.72	1.74	1.86	2.07	2.25	2.44	2.64

	2000	2004	2008	2012	2016	2020	2024
Ferroalloy Production							
Base Case	3.38	3.33	3.71	3.96	4.26	4.61	4.89
Use of new capacity with higher production efficiency	3.38	3.33	3.53	3.68	3.84	4.01	4.11
Commercial and Municipal Sector							
Base Case	1.91	2.67	3.2	3.73	4.09	4.41	4.91
Application of energy saving technologies	1.91	2.67	2.89	3.14	3.2	3.26	3.32
Residential Sector							
Base Case	4.61	4.89	5.58	6	6.49	6.44	7.03
Application of energy saving technologies	4.61	4.89	5.32	5.54	5.75	5.46	5.37
Agriculture							
Base Case	2.18	2.15	2.71	3.01	3.83	4.79	5.55
Effective technologies of waste processing and energy use	2.18	2.15	2.68	2.89	3.15	4.00	4.31
Total GHG Emissions Under Base Case	114.03	149.17	188.80	215.17	242.94	263.99	306.03
Total GHG Emissions Under the Mitigation Scenario	114.03	149.18	182.97	197.62	211.37	216.06	234.05
Total GHG Emission Reduction Under the Mitigation Scenario	0.00	-0.01	5.83	17.55	31.57	47.93	71.98
Percent Reduction Relative to the Base Case	**0%**	**0%**	**-3%**	**-8%**	**-13%**	**-18%**	**-24%**

Source: The table is a close replica of Table 4.11 in the 2nd NC, Astana 2009

Fig. 9

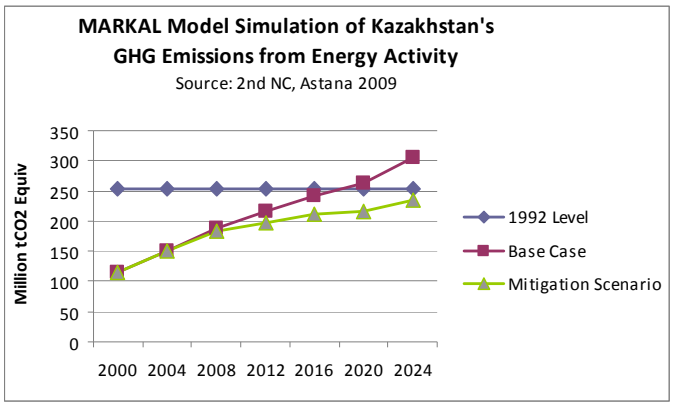
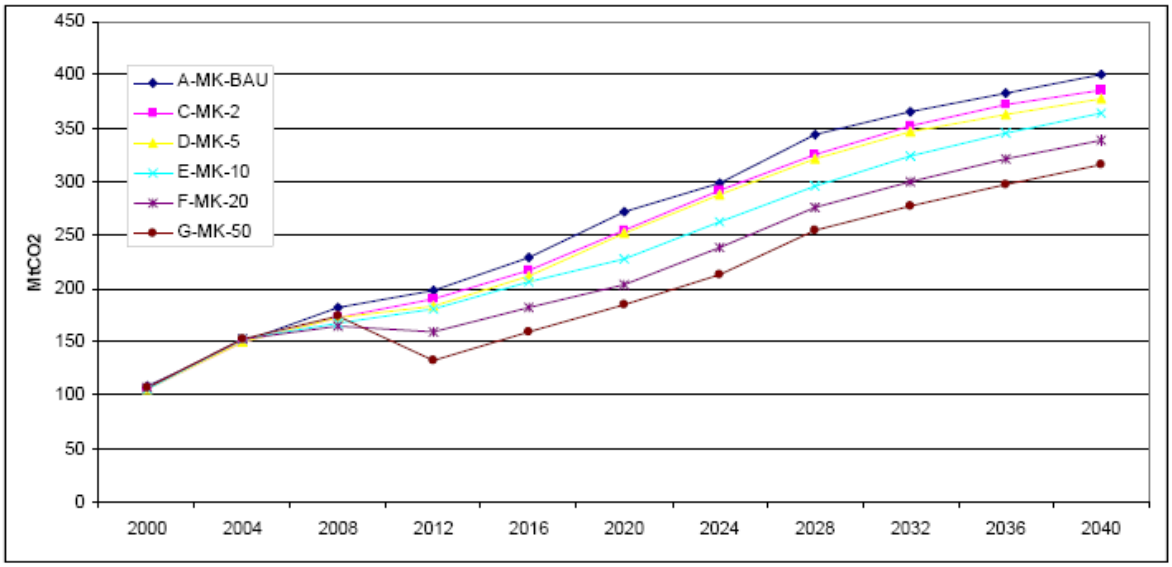


Figure 9 shows that GHG emissions will reach the 1992 level by about 2016 in the base case but only after 2024 in the mitigation scenario. The improvement of energy production efficiency from the replacement of existing power by new more efficient technologies (especially cogeneration/CHP technologies, including those for coal-fired plants), along with an increased share of renewable energy, shift to environmentally friendly transport, utilization of bioethanol, and the accelerated introduction of low-

carbon and energy saving technologies in all sectors will result in a substantial reduction in both fuel usage and GHG emissions. Thus, the total annual GHG emission reductions achievable in Kazakhstan through the assumed mitigation policies and processes could amount to 47.93 million tCO2-eq/a by 2020, and 71.98 million tCO2-eq/a by 2024, compared to the business-as-usual case.

The scenarios depicted in **Figure 10** (marked MK-2, MK-5, etc.) correspond to mitigation cost assumptions of US$2, 5, 10, 20 and 50 per tCO2, respectively (constant dollars of year 2000 are assumed). The Base Case scenario is denoted as A-MK-BAU.

Fig. 10
MARKAL Simulation Mitigation Scenarios for Kazakhstan 2008 to 2040



Source: TACIS (by Tosato et al) 2006, Figure 50

As is shown in **Tables 3** and **4**, the bulk of the GHG emissions and most of the mitigation potential can be attributed to the energy sector. According to the 2006 TACIS project report on the results of the MARKAL model simulations for Kazakhstan[9], the main contribution to these reductions is made through a change in the energy mix and improved efficiency of power generation.

Table 4 furthermore shows that most of the GHG reduction potential is concentrated in the energy sector, where emissions are mostly due to fuel combustion for electricity and heat generation. The amount of GHG emission reduction as well as the choice of technologies for mitigation depends on the costs involved for the introduction of higher-efficiency technologies.

[9] TACIS project: "Technical assistance to Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan with respect to their global climate change commitments". Final report of Task 6: "Enhance Economic Modeling Capacity in Kazakhstan: Energy System and CO2 Emission Scenarios for Kazakhstan, Prepared with the Technical Economic MARKAL-MACRO Modeling Tool". September 2006

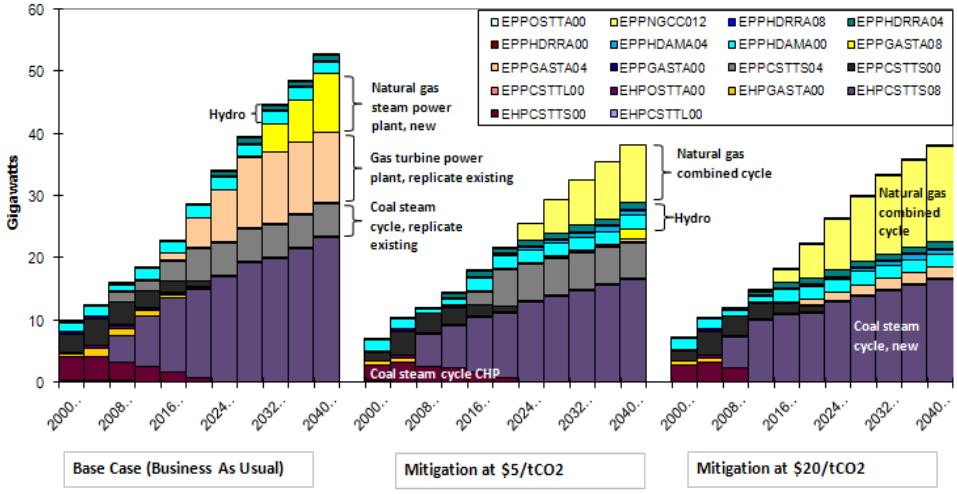
Table 4
Potential GHG Savings by Sector (Relative to the Base Case)

	2012		2016		2020		2024	
	Million tCO2-eq	Percent	Million tCO2-eq	Percent	Million tCO2-eq	Percent	Million tCO2-eq	Percent
Energy Sector	12.50	71.2%	20.24	64.1%	31.45	65.6%	44.85	62.3%
Transport	1.56	8.9%	4.69	14.9%	9.11	19.0%	14.77	20.5%
Oil and Gas Production	1.23	7.0%	2.65	8.4%	2.05	4.3%	4.74	6.6%
Steel Production	0.65	3.7%	1.01	3.2%	1.43	3.0%	1.85	2.6%
Cement Production	0.16	0.9%	0.25	0.8%	0.37	0.8%	0.50	0.7%
Ferroalloy Production	0.28	1.6%	0.42	1.3%	0.60	1.3%	0.78	1.1%
Commercial & Municipal Sector	0.59	3.4%	0.89	2.8%	1.15	2.4%	1.59	2.2%
Residential Sector	0.46	2.6%	0.74	2.3%	0.98	2.0%	1.66	2.3%
Agriculture	0.12	0.7%	0.68	2.2%	0.79	1.6%	1.24	1.7%
TOTAL	**17.55**	**100.0%**	**31.57**	**100.0%**	**47.93**	**100.0%**	**71.98**	**100.0%**

Source: The table is derived from the data of Table 4.11 in the 2nd NC, Astana 2009

Fig. 11 shows that, even by implementing a mitigation policy costing US$5/tCO2, well within the range of prices achieved per emission reduction unit (ERU) under Joint Implementation projects, coal generating capacity becomes less dominant in the energy system and installations with lower GHG emissions (such as natural gas fired combined cycle power plants) begin to make increasing headway into the energy system. The shift from coal to natural gas is even more pronounced at US$20/tCO2. Due to the higher power plant efficiency, the required installed capacity is about 25 – 30% lower than in the base case. In both cases however the shift in the energy balance towards cleaner fuels and technologies takes a substantial amount of time.

Fig. 11
MARKAL Simulation Mitigation Scenarios for Kazakhstan's Electricity Sector 2008 to 2040



Section 3: Rationale for selected sector or sub-sector for CTF co-financing

General Approach

For the purposes of the CTF Investment Plan, it is appropriate to assume a more radical mitigation trajectory than that set out in Section 2. In addition to the emission reductions planned under the 2nd National Communication, the CTF mitigation scenario would need to aim for a larger share of renewable energy in the energy supply system – first of all hydro, but also wind and solar power. The existing scenarios reflected in **Fig. 10** seem to give these sources of energy an insufficient role. The CTF mitigation scenarios will emphasize the areas of intervention discussed in **Annex 3** with the aim of establishing functioning markets for these technologies in Kazakhstan.

Potential Sectors/Programs for CTF

The selection of programs/projects to be supported by CTF is, in line with the CTF guidelines, based on the assessment of a combination of factors, including: (a) the potential for large-scale GHG emission reductions, (b) the cost-effectiveness of GHG emission reductions, (c) the presence of additional costs or risks associated with the GHG emission reduction investment that affect its financial viability; (d) demonstration potential, including scope for replication of results on a wider scale; (e) institutional and market transformation potential[10], (f) development impact (e.g., poverty reduction or increased access to electricity), and (g) implementation potential/capacity in the country. The following sectors/programs can satisfy the above set of criteria in Kazakhstan, and these are outlined in more detail in Section 4 below:

1. **Renewable energy development** – especially small hydroelectric and wind power generation, as well as solar energy; this can be combined with upgrading the transmission capacity to enable the integration of renewable energy sources into the energy system; financing of small, distributed renewable energy projects can be leveraged by using commercial financial institutions (banks and leasing companies);
2. **District heating system modernization** including both supply and demand side interventions – such as large-scale introduction of building-level heat exchanger substations to reduce heat demand and network losses;
3. **Demand side management and end-user efficiency** in small and medium enterprises (SME), commercial, municipal and residential sectors by stimulating financial infrastructure and enhancing capabilities of private financial institutions to provide such financing. An example of a facility in this area is given in Box 3 below.

[10] Transformation potential refers to the expected impact of the project/program resulting in lasting changes in the structure or functioning of a sub-sector, sector, or market. Such transformation should speed up or deepen market penetration of a low-carbon technology. Strong market transformation will typically result in economies of scale, enhanced competition and private sector participation, and eventually in lower costs of GHG emission reduction. Market transformation can be achieved by instituting new policies, or by creating new institutions and market players: e.g., a financial intermediary facility to provide funding for energy service companies operating in the municipal sector, where sustainable energy lending has struggled before.

Box 3: EBRD's KAZSEFF Intermediated Finance Facility

The Facility consists of two components (a) USD 75 million financing facility for on-lending to industrial enterprises through local Partner Banks JSC "ATF Bank" and JSC "Bank CenterCredit"; and (b) A technical assistance package to support the Partner Banks in marketing the Facility and to assist enterprises in the preparation of bankable EE/RE projects.

Although KAZSEFF's current pipeline consists largely of energy efficiency projects, the facility can also support small-scale renewable energy projects[11]. KAZSEFF's existing operating structure is given in **Fig. 11**. For projects requiring loans more than USD 7 million, EBRD may on-lend CTF funds directly to the private renewable energy developers. Several such companies have already approached EBRD, including SPK "Jetysoo"[12] and TOO "EnergoAlem"[13] among others.

The Facility consists of two components:

- A **USD 75 million** financing facility for on-lending to industrial enterprises through local Partner Banks: (JSC "ATF Bank" and JSC "Bank CenterCredit");
- A technical assistance fund to support the Partner Banks in marketing the Facility and to assist enterprises in the identification of energy loss areas, technical solutions for lowering energy consumption and in the preparation of bankable projects.
- KAZSEFF is designed for privately owned private companies, both medium sized and larger scale enterprises in Kazakhstan. Under this facility typical energy efficiency investments range from USD 250,000; the maximum loan amount for any company (for one or several energy projects) should not exceed USD 7 million.

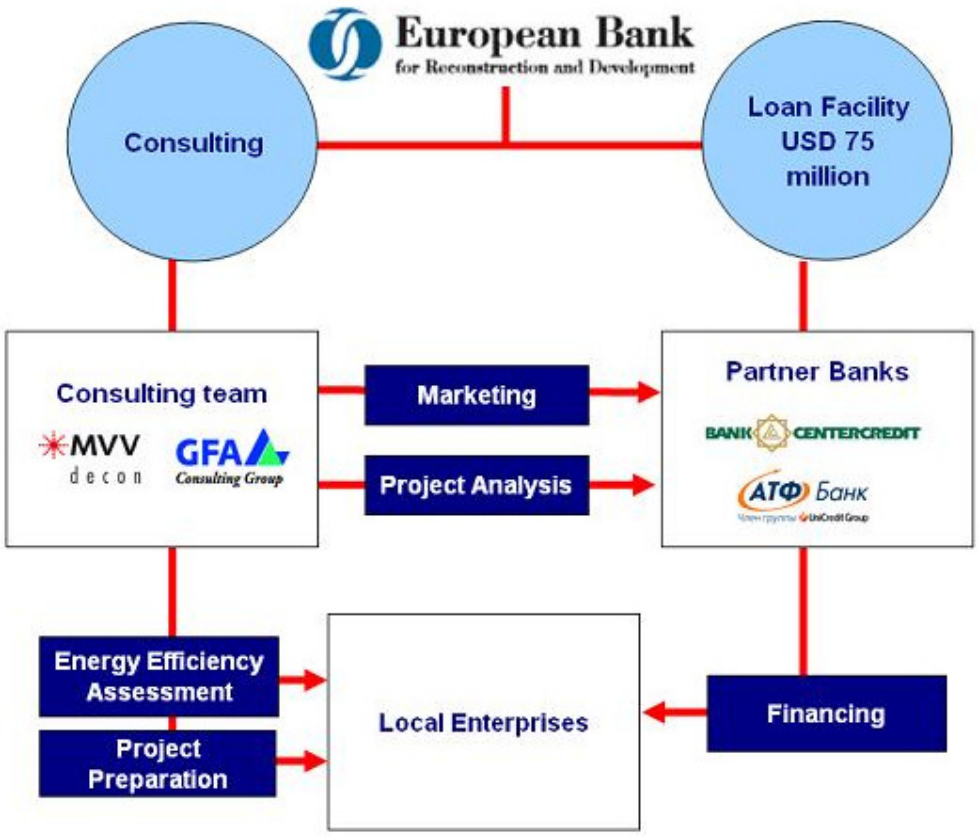
KAZSEFF is being implemented by a consortium of international and local companies comprising: MVV-Decon (Germany) and GFA Consulting Group (Germany). The implementation partner is the Novosibirsk Energy Center (Russia). The consultants provide free-of-charge support in the technical and financial evaluation and preparation of EE/RE projects.

[11] The maximum loan amount for any company (for one or several energy projects) should not exceed USD 7 million.

[12] SPK "Jetysoo" is a government-sponsored enterprise created in 2007. It operates in the Almaty region and specializes in socially oriented projects, including small hydro and wind power. One of its projects is the construction of a cascade of 10 small hydro power plants with a total capacity of 67 MW. (Source: http://panorama.kz/index.php?option=com_content&task=view&id=7558&Itemid=1).

[13] TOO "EnergoAlem" has successfully implemented a small hydro pilot project of about 5MW on Issyk river in Alamty region (Source: http://pda.zakon.kz/125403-v-kazakhstane-realizovan-novyjj.html). The company plans to implement about 90 MW of similar projects, according to the list available from the Ministry of Environment.

Fig. 12
The Operating Structure of the EBRD-financed
Kazakhstan Sustainable Energy Financing Facility (KAZSEFF)
Source: http://www.kazseff.kz/En/about.php



Section 4: Intervention Areas of the Clean Technology Fund Investment Plan for Kazakhstan (see Annex 4 for details)

The chosen intervention areas have the following attributes:

- Based on tested MDB approaches in the sector (although not in the country);
- Significant direct emissions savings are possible;
- Potential for sectoral transformation through replication exists; and
- Concessional finance is required to overcome barriers currently preventing the investment.

In total, the MDBs estimate that the direct investment effect could be to reduce Kazakhstan's CO2 emissions by about 1%, compared to their current level. This is before the transformation impacts of the investments are taken into account.

1. Renewable Energy Development

The proposed CTF-supported investments would include: (i) constructing and restoring small hydropower installations of up to 25 MW per installation, in line with local legislation[14]; (ii) constructing wind, solar power, and other renewable installations with a unit abatement cost below $50/tCO2eq or feed-in tariff required for acceptable rate of return not higher than 15 KZT/kWh for hydro, and 24 KZT/kWh for wind and biomass projects; (iii) constructing and strengthening electric power lines from renewable energy installations to the power grid.

Such projects are beyond the normal course of action of the energy sector companies in Kazakhstan, and the incidence of such projects in the past has been very low, and in some key sectors, such as energy from wind, entirely absent. However, now the Government of Kazakhstan aims to significantly increase the share of electricity generated from renewable energies. The Concept of Transition of Kazakhstan to Sustainable Development in 2007 – 2034 identifies renewable energy development as an important objective, and a new renewable energy law came into force in July 2009[15]. The resulting enabling environment is hoped to allow Kazakhstan to bring the total share of RE in the energy balance to 5% by 2024, and as a first step lead to the production of an additional 1 TWh of renewable electricity by 2014, followed by a potential doubling of this by 2020, to reach the target of 2.5 TWh of new renewable energy production (10 TWh total renewable production) by 2020.

According to pre-feasibility studies available to Kazakhstan's Ministry of Environmental Protection, 21 proposed small hydropower plants with a total installed capacity of 90.7 MW and annual output of 540.6 GWh could produce total annual GHG emission savings of about 517,000 tCO2. At a minimum, the CTF-supported financing would enable the construction of this initial pipeline of small hydro plants, but it seems possible to at least double this target based on available estimates, once the economics have been proven and some scale is achieved. Ultimately (beyond the scope of the current Investment Plan),

[14] Kazakhstan's law on renewable energy defines small hydro to be 25 MW or less.
[15] 4 July 2009. Law of the Republic of Kazakhstan "On Promotion of Renewable Energy Sources Utilization".

scaling this up to the total economic potential of small hydro available in Kazakhstan could produce emission reductions of about 7.2 – 10.5 million tCO2. This is between 2.9 and 4.3 % of Kazakhstan's current total emissions of 246 million tCO2.

Wind power will be the other major target for CTF support, with an estimated 50-100 MW to be installed in total, replacing 140,000 to 280,000 tCO2/a. The UNDP's GEF-financed project "Wind Power in Kazakhstan" outlines the great technical potential for wind power in Kazakhstan, which is currently held back by the very low cost of existing and replacement coal-fired power generation. The role of the CTF would be to supplement the government's financial support to a degree that makes wind projects viable, thereby enabling the creation of a support infrastructure for wind power in Kazakhstan.

Waste to energy plants will also be targeted under the investment plan, in line with the developing government agenda in this field, which aims to introduce best-practice approaches to waste disposal, including energy recovery. Further opportunities exist in biogas production and electricity generation from sewage sludge, and the use of dried sludge as a solid biofuel in e.g. cement or power/heat production. The overall potential of this will be further analysed over the next 12 months.

The scope of investment in solar energy and solid or liquid biomass use will need to be further analysed, including an analysis of market potential of various technologies.

Funding the investments in renewable energy will be supplemented by donor-financed technical assistance (sourced both from the CTF and augmented by e.g. Special Shareholder Fund resources available through the EBRD) to help the Ministry of Industry and New Technologies (MINT) develop the by-laws and standard procedures for feed-in tariffs and power purchase agreements. As a result, a favorable environment will be created for further renewable energy projects in Kazakhstan. EBRD is already engaged in legal and regulatory dialogue with MINT in the area of renewable and energy efficiency, and has recently concluded an assignment to support MINT in introducing a methodology and standard procedures in line with best international practice for the development of a market for renewable electricity in Kazakhstan. MINT is now considering the results of this assignment, while a new assignment to support further revisions to the 2009 Renewables Law is under preparation by EBRD.

The economic development benefits of the proposed investments will be significant: (i) improved availability of electric power in the areas of renewable energy development; (ii) improved security of power supply in areas otherwise dependent on imported energy (southeast of Kazakhstan); (iii) increased employment – especially, in remote/ rural areas; (iv) reduced local pollution due to displacement of coal or other polluting fuels for local energy needs.

The performance indicators for the proposed investments would include: Direct annual GHG emissions reduction from the planned investments: at least 0.5 million tCO2eq immediately following the planned investments, ramping up to at least 0.75 million

tCO2eq per year over next 5-10 years; Abatement cost not higher than $20/tCO2eq based on best estimate of lifetime (20-year) GHG emission reductions; share of renewable energy in the energy balance of Kazakhstan increased by >10%.

2. Municipal Energy Efficiency and District Heating System Modernization

The proposed CTF-supported investments would cover municipal energy efficiency investments in transport, water, but put the overall focus on district heating modernization, where they would be restricted to the demand and transport side of systems, and include: (i) modernization of central heat exchanger substations (CHS) and/or installation of automated building-level substations (BLS) and liquidation of CHS; (ii) installation of heat and hot water meters at the building level; (iii) installation of modern variable flow pumps at boiler plants.

District Heating Modernisation

Supply of heat to multi-apartment buildings (district heating) during the cold season of the year is a vital yet technologically obsolete sector in Kazakhstan. Both the district heat suppliers and the municipal housing owners usually stick to the traditional technical solutions dating back to the Soviet times, and are furthermore dilapidated, with losses averaging 26%. Comprehensive investment programs to modernize district heating systems are rare. At the same time, the international community has well established good practice and commercially proven technology for the sector, capable of reducing the final heat demand typically by 25 – 40%, with proportional energy savings and GHG emission reductions. The best practice in achieving such energy savings in Eastern Europe has involved the broad introduction of building-level substations (BLS), alongside other measures increasing energy efficiency. Such technology introduced in Eastern Europe and some Russian cities has demonstrated excellent technical performance.

Box 4: Building Level Sub-Stations (BLS)

BLS are not unfamiliar to district heating specialists in the former Soviet Union. They are known in Russian as the "ITP" (*individualnyi teplovoi punkt*). However, due to an insufficiently developed market for equipment required for modernization of DH systems, the high unit price of equipment such as BLS has been a serious barrier to broader introduction of this technology. While the average capital cost of such equipment in Eastern Europe has come down to about US$10-15 thousand per installation (per average multi-apartment building), it is not unusual for the same equipment in Russia to cost 2-3 times as much, due to a lower level of demand in the market, leading to lack of market entry by providers and supplier-driven pricing.

Besides the high investment cost barriers for modern equipment, other barriers are present as well. The local monopoly status of most municipal heating utilities and resulting lack of client focus has also stalled such investments in the past. The successful removal of the latter barrier in Eastern Europe has usually required active collaboration between the energy utility (district heating company) and the municipality/housing authority. The role of the regulator in allowing the tariffs to reach cost recovery levels is also important.

The proposed CTF-supported investments in district heating would be combined with EBRD and IFC loans amounting to up to USD 150 million for various cities in Kazakhstan. Soft lending terms from the CTF will help scale up the procurement of equipment such as BLS, advanced metering, and other related equipment to a level sufficient to reduce the price to a competitive level. The core operation is a private sector operation (supported by EBRD and IFC as appropriate) which will proceed with investments in cities including Pavlodar, Ekibastuz and Petropavlovsk in Northern Kazakhstan.

In Kazakhstan, the GHG emissions from the heating sector (including those from the CHP and heat-only boiler plants) are estimated at 42 – 46 million tCO2 per year, or almost 20% of total emissions. Energy efficiency gains can lead to fuel savings and GHG reductions of as much as 30%. Thus, the GHG emission reduction potential in Kazakhstan's district heating sector over the next few years can be at least 12.6 – 13.8 million tCO2eq per year or 5.1 – 5.6 % of Kazakhstan's current total emissions of 246 million tCO2.

The development benefits of the proposed operation are quite significant. District heating remains the most cost-effective way of supplying heat to the majority of population in the average post-Soviet city. The low/middle income urban residents will be the main beneficiaries of the modernization program. The stable and comfortable temperature in their homes is the first thing noticed by residents. Additional (economic) benefits would come with the introduction of consumption-based billing, which only becomes possible once the BLS is installed in the building. Environmental benefits also include reduced emissions from the stacks of the boiler plant supplying the heat.

The program results indicators for the investments in district heating could be: Annual GHG emissions reduction from the planned investments: at least 0.5 million tCO2eq immediately following the planned investments, ramping up to at least 1.5 million tCO2eq per year over next 5-10 years; Abatement cost not higher than $20/tCO2eq based on best estimate of lifetime (20-year) GHG emission reductions; at least 20% of buildings (and apartments) with heat energy supplied from modernized district heating systems (with BLS installed and building level metering) by 2020.

3. Sustainable Energy Finance through Financial Institutions

The proposed CTF-supported investments would include addressing barriers preventing local financial institutions to provide finance for small scale EE/RE projects in SME, commercial, municipal and residential sectors by providing (i) funding where liquidity is an issue (ii) risk sharing to support on lending activities by reducing risk perceptions of lenders; and (iii) capacity building to help FIs develop financial products for EE/RE financing and to help them understand the risks associated with such projects.

One of the key limitations for wider EE/RE project implementation is the lack of financial resources and proper lending facilities, particularly for small-scale projects. Financial institutions view the EE/RE sectors as high-risk, due to lack of technical

capacity on the part of lenders to evaluate such projects and potential borrowers being unable to establish bankability of their projects.

CTF can be instrumental in attracting the attention of the financial institutions to this new field and developing a competitive market for these products.

The developmental benefits of the proposed investments will be significant, including: (i) saving of energy resources for the country; (ii) improved competitiveness of the Kazakh economy by increasing its industrial energy efficiency; and (iii) improved local environment through reduced emissions of conventional pollutants.

The financial sector initiative is addressing the support needed by SMEs and the commercial and municipal sectors in scaling up EE projects in Kazakhstan. The proposed interventions will catalyze local FIs to develop lending programs for small sized carbon mitigating investments and to reach market segments and market niches, which are currently not covered.

The following program results indicators can be established for monitoring: Reduced Energy Consumption – subsequent GHG emissions avoided (tCO2/year); Growth of energy efficiency loan/lease portfolio in volume (outstanding and disbursed amount, (US$) and number of leases; Number of FIs providing finance to EE/RE.

The program results indicators for the investments in energy efficiency lending through local banks could be: Annual GHG emissions reduction from the planned investments: at least 0.3 million tCO2eq immediately following the planned investments, ramping up to at least 1.0 million tCO2eq per year over next 5-10 years; Abatement cost not higher than $20/tCO2eq based on best estimate of lifetime (10-year) GHG emission reductions; at least two new banks to enter the sector and at least one new sector covered by the facility.

Section 5: Enabling policy and regulatory environment

The Presidential Decree No. 216 on the endorsement of the Concept of Sustainable Development (November 2006) has provided the political framework for the recent government initiatives relevant to clean energy development. One notable strategic initiative is the State Program for Accelerated Innovative Development championed by the Ministry of Industry and Trade. The other important legislative initiatives are the Renewable Energy Law[16] (passed in July 2009), which is now being revised and the draft law on Energy Efficiency[17], which is currently under consideration, as well as the introduction of modern waste legislation. [18] With specific reference to climate policy, the major milestones are described below.

Existing Policies and Measures for GHG Emission Reduction

Kazakhstan's official strategy on climate change is yet to be developed. Nevertheless, the 2nd National Communication to the UNFCCC discussed in Section 2 contains sections that present elements of a potential climate change strategy, including mitigation and adaptation measures.

Sectoral Mitigation Programs

Kazakhstan's climate change mitigation priorities in the energy sector include:

- Reconstruction and modernization of power stations using modern technologies, with an emphasis on cogeneration of heat and electricity;
- Increasing share of natural gas in the energy balance;
- Increasing introduction of renewable energy sources.

It is emphasized that the main objective for the energy sector will be to replace the obsolete equipment of existing thermal power plants with modern equipment. This will be done with the introduction of the latest technologies and equipment with significant economic and environmental benefits.

In keeping with the energy self-sufficiency objectives under **Strategy 2030** (see **Annex 2** for details), one of the principles of energy sector development by 2015 will be maximum use of existing energy sources, their reconstruction and modernization. New capacity will be added only if it replaces imported energy.

[16] 4 July 2009. Law of the Republic of Kazakhstan "On Promotion of Renewable Energy Sources Utilization".
[17] http://www.eep.kz/?m=html&cid=24
[18] All these laws are supported in their development through technical assistance from the EBRD.

Box 5. Kazakhstan's commitments on climate change mitigation. Kazakhstan ratified the UN Framework Convention on Climate Change (UNFCCC) in May 1995. In March 1999, it signed the Kyoto Protocol (KP) without joining Annex 1 to the Convention or Annex B to the Protocol. Subsequently, Kazakhstan declared its intention to join Annex 1 of the Convention but achieved this goal only partially in Marrakech in 2001. In accordance with the Marrakech Decision of 2001, Kazakhstan will be able to use the flexible mechanisms of the KP as an Annex 1 Party to UNFCCC only if it is included in Annex B of the KP. This means that Kazakhstan must commit to a specific emission reduction target for the period 2008 – 2012 relative to its base year. Kazakhstan considers its base year to be 1992 when GHG emissions peaked at 323.6 million tCO2 equivalent.

In February 2009, Kazakhstan's Parliament ratified the Kyoto Protocol without committing to any particular emission reduction target that would allow qualifying it as an Annex B country. Kazakhstan's ambition has been to negotiate a zero reduction from base-year level (100% target) similar to that of Russia and Ukraine.

However, the Kyoto target needs to be negotiated with the other parties to the Protocol. In the current conditions when Kazakhstan's emissions are not likely to exceed 240 – 250 million tCO2 equivalent during the next couple of years, it is conceivable that a zero reduction target based on the 1992 emission levels will not be easily accepted.

The other precarious aspect of Kazakhstan's focus on becoming an Annex 1 party to UNFCCC is that Kazakhstan, unlike most other countries without emission reduction targets, will probably not be considered eligible for projects under the Clean Development Mechanism (CDM). So far, CDM has been the largest source of carbon credits outside the EU emission trading scheme. Instead, Kazakhstan must rely upon the possibility of utilizing Joint Implementation (JI) and International Emissions Trading (IET) mechanisms designed for more developed economies, or unilateral linking of its proposed domestic emissions trading scheme.

Nevertheless, Kazakhstan's ratification of the Kyoto Protocol is a welcome step forward. In this way, Kazakhstan returns into the orbit of climate change negotiations with a view to active participation in any post-Kyoto treaty.

Copenhagen Accord. At the 15th Conference of the Parties to UNFCCC in Copenhagen (December 2009), Kazakhstan declared its commitment to a level of GHG emissions 15% below the 1992 level by 2020. EBRD is now in the process of setting up a technical assistance assignment to identify carbon abatement cost curves for Kazakhstan. (Source: http://graphics8.nytimes.com/packages/pdf/science/earth/20091218_CLIMATE_TEXT.pdf)

Laws and Regulations

Ecological Code provisions for GHG Emissions

Historically, FSU countries have not considered CO_2 (or any other GHG) to be a pollutant that needs to be regulated. However, Kazakhstan's recently adopted Ecological Code (in force since February 2007) sets the basic legal framework for climate protection and requires setting emission limits to GHGs along with other air pollutants.

Presidential Decree № 216 from 14 November 2006
Sets a target of 10 TWh of renewable electricity supplied per year, from an installed capacity of 3,000 MW of renewable energy sources ("RES"), to be supplied to the grid in

Kazakhstan by 2024. The 2008 volume was 7.5 TWh from hydro power, and none from new renewable sources.

2009 Renewables Law

In 2009 the government passed a renewable energy law. This law establishes project-based support mechanisms and priority dispatch. A number of issues remain unresolved, and the government is currently in the process of reviewing the law with MDB support, with a view to implementing revisions in 2011. The law is the main vehicle to achieve the short- and medium-term targets of 1 TWh of renewable energy production by 2014, and 2.5 TWh by 2020.

Energy Efficiency Law

An energy efficiency law is currently being drafted, and is expected to be passed early 2011. GEF support could become available for implementing industrial energy efficiency standards, through an EBRD-managed GEF project, should this be accepted by the GEF council in November 2010. EBRD has given considerable support in developing the law.

Proposed law on Waste Management Standards

The government is planning to introduce a law establishing modern best-practice standards on waste management in Kazakhstan, with a strong focus on energy recovery from waste. EBRD is supporting this law project through a technical assistance assignment.

Proposed law on Emissions Trading

The government is planning the introduction of a domestic emissions trading scheme in 2011, based on the EU-ETS. The MDBs are contributing to the development of this law.

Proposed revision of the municipal budget law

A revision is currently under discussion in the government which would enable municipalities to enter into long-term energy performance contracts. This revision has been supported by technical assistance from the EBRD.

Section 6: Implementation potential and risks to CTF program objectives

General

Implementation Potential: With its real GDP growth averaging 9.6% in 2004 – 2007, Kazakhstan has confidently entered the ranks of middle-income economies. It has also emerged as a potential leader in Central Asia in terms of levels of investment and participation in regional initiatives. While expressing concerns about transparency and complicated environment for business, all three major world rating agencies have kept investment grade ratings for Kazakhstan's debt. The environment for climate-friendly investments has been improved by GoK's recent legislative initiatives such as: (a) a Grid Code adopted under the World Bank financed transmission rehabilitation project establishing a set of transparent rules for non-discriminatory third-party access to the transmission network; (b) an amendment to the Law on Oil to oblige extractive companies to reduce gas flaring through associated gas utilization; (c) the law on Natural Monopolies ensuring full recovery of justifiable costs, including the cost of new investments, for the regulated monopolies which allows both the national grid company and local electric utilities to operate profitably; (d) the 2009 Renewables Law.

The GoK informed the MDBs that the Ministry of Environment will be the main counterpart for MDBs on Climate Investment Funds in Kazakhstan. Additional implementing agencies for specific CTF-supported programs/projects/sectors will also need to be engaged, including Government agencies and companies, state-owned or private – possessing the necessary knowledge of the sector at hand and able to successfully implement large-scale investment projects. A recent change in ministerial responsibilities, which removed the control of energy efficiency and renewables legislation from the Ministry of Energy and allocated it to the Ministry of Industry and New Technologies, has been beneficial for MDB engagement and implementation potential, due to the higher level of interest in the subjects in the new ministry.

Fit with MDB strategies: all the proposed interventions are fully in line with the MDB strategies in Kazakhstan. In particular in the area of policy dialogue, the EBRD is engaged in close policy-dialogue with the Government of Kazakhstan on a number of issues relating to e.g. renewables and energy efficiency legislation, the Kyoto Protocol, energy budgeting for municipal authorities, and the power sector. This dialogue is based on a Sustainable Energy Action Plan between the Bank and the Government, signed in 2008, and it will be a fundamental element in assuring the implementation of the Clean Technology Fund investment plan in Kazakhstan.

Risks: while the economic crisis has had a strong effect on Kazakhstan, it is expected that during the course of the next 2-3 years, this impact will diminish, and investment will commence again to set Kazakhstan on a course for continued economic growth.

Financial sector readiness: EBRD has an existing non-concessional US$75 million facility (Kazakhstan Sustainable Energy Finance Facility – KAZSEFF) which is

pioneering sustainable energy lending to the corporate sector in Kazakhstan. This facility is already engaged in transforming parts of the local finance sector. CTF support would be targeted to sectors in which non-concessional lending for sustainable energy investments is not feasible at present.

Energy Prices and Subsidies

General: Energy subsidies are a substantive issue for energy tariffs in Kazakhstan and the removal of subsidies is proceeding, albeit slowly. The government of Kazakhstan is engaged in a process to increase energy tariffs to cost-recovery levels, and the implicit subsidies in the form of tariffs not covering cost which prevailed in the past are progressively falling away, in the process increasing the incentive for investment in energy efficient power and heat production and use. MDBs are supporting this process by engaging in policy dialogue and technical assistance with the GoK, with a view to move energy tariffs towards market-based tariff structures which will allow all operators in the systems to recover their cost. Table 5 puts Kazakhstan's energy prices into comparison with those of major developed and middle-income countries.

Table 5

Energy Prices in Kazakhstan in International Comparison (Q1 2010) [19]

	US	UK	France	Turkey	Poland	Kazakhstan[1]		KZ Change from 2007 in Market FX
						Market FX	PPP FX	
Electricity for Industry, US cent/kWh	6.6	13.0	10.3	15.8	12.8	4.5	8.0	+65%
Electricity for Households, US cent/kWh	10.8	20.2	16.3	19.3	15.1	5.6	10.0	+54%
Heavy Fuel Oil (for Industry), US$/ton	484	539	506	977	481	245	435	+72%
Coal (for Industry), US$/ton	50	103	n/a	88	110	15[2]	27	+57%
Natural Gas (for Industry) US$/1000m3	245	301	466	427	457	74	131	+33%[3]

Source: International Energy Agency

[1] Prices are converted based on real exchange rates for all countries except for Kazakhstan. The PPP exchange rate was 83.04 KZT/USD in 2008, compared to a market exchange rate of 147.6 KZT/USD in October 2010. This difference increases Kazakh tariffs by ca. 78% http://data.un.org/Data.aspx?d=MDG&f=seriesRowID:699

[2] This at market FX is comparable to the open market sales prices for US coal in 2009 in Montana, North Dakota, and Wyoming, and the available captive prices in Texas and Wyoming according to the EIA. http://www.eia.doe.gov/cneaf/coal/page/acr/table33.html

[3] Increase for households: +24%

When making such comparisons, it is important to keep in mind that low energy prices in Kazakhstan are partially caused by the facts that (i) Kazakh coal is very cheap to mine, and (ii) due to distance and quality, it is not exposed to world market prices[20].

[19] It should be noted that Table 5 contains average prices. There is considerable regional variation within Kazakhstan, with highest prices reaching US$ 0.0838/0.1489 (market FX/PPP FX) in the Almaty region, and prices as low as US$ 0.0265/0.0471 (market FX/PPP FX) in the Mangistau region. At the high end, electricity prices in PPP are comparable with prices in the US states of Maryland, and Rhode Island and higher than in 40 US states; even at market exchange rates they are comparable to prices in Idaho and Arkansas, and higher than those in Washington State (see: EIA *Electric Power Monthly* data for July 2010 http://www.eia.doe.gov/electricity/epm/table5_6_a.html)

As Table 5 shows, prices in Kazakhstan have increased faster than compound inflation of 40% over the last three years (with the exception of natural gas) (see Table 3), and are expected to continue to do so, bringing Kazakhstan closer to world market prices. For example, district heating operators expect electricity and fuel input prices to increase by 60% between 2010 and 2014, and by 9% per annum thereafter. The power generation tariff has also increased under the higher "ceiling tariff" new regime implemented by the Kazakh Government since 2009, to support much needed investment in new capacity and to stimulate energy savings. This tariff reform process has been slowed by the financial crisis and the impact this had on affordability, but it has not been abandoned.

Policy dialogue by MDBs plays a major role in addressing the need for improvements in the sustainable energy investment environment in Kazkhstan. In 2008 EBRD signed a Sustainable Energy Action Plan (SEAP) with the Government of Kazakhstan (GoK), in which it outlined a range of actions to improve the investment framework for clean energy in Kazakhstan, and specific projects the EBRD would undertake. Many of these actions have already been carried out, and the SEAP is now providing a basis for sustained and close policy dialogue between the EBRD and the GoK. In 2009/2010, EBRD is supporting the Government in developing energy efficiency and renewable energy legislation, including tariff-setting, and from 2011 it will support a major overhaul of the renewables law of 2009, and the introduction of best practice waste legislation.

CTF funding is very timely to support Kazakh government decision to move towards utility tariffs which better reflects overall system costs incl. investment costs. While in a static analysis, the current low prices are a disincentive to investment, it is the experience of the MDBs, e.g. in Ukraine[21], that investors take a dynamic view, and base their decision on expectations of future price developments. Since the GoK is committed to a reform process which will lead to increasing prices for energy, it is likely that rational investors will factor this into their decision-making process and will analyse their options accordingly. This effect would therefore support the transformational impact of the investments.

Furthermore, efforts to improve the enabling environment by continuing to reduce and eventually eliminating the remaining subsidies need to be introduced gradually to address the social and financial implications this will have for end-users. As described below, many of these changes are already progressing. The expectation is that these ongoing changes can be accelerated, if they are coupled with the introduction of new and more efficient technologies supported by the CTF, because of the increased efficiency of power and heat supply.

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[20] This is comparable to the situation of coal mines in Montana and Wyoming, where prices are considerably lower (and in some instances comparable to Kazakhstan), than e.g. on the Eastern Seaboard of the USA.

[21] The prime example here is the EBRD Ukraine Energy Efficiency Programme (http://www.ukeep.org/) which has seen considerable investment and rapid take-up in a similar environment (low current prices but expectations of rapidly rising future prices).

CTF investment will increase system efficiencies and reduce GHG emissions, while reducing overall cost of energy supply to final users, allowing tariffs to be raised. This is expected to lead to a positively reinforcing cycle which will support the transformation of the Kazakh energy supply system to a lower-carbon state.

Power Generation: As a consequence of the continued and intensive dialogue, there is increasing understanding by the GoK that in order to build new capacity, investors need more assurance on the price/tariff environment. Therefore there are very positive steps with:

(i) the introduction of a price cap mechanism administered by MEMR (not the regulator AREM), which saw higher price caps approved under a simplified and more effective approval procedure at the levels proposed by the generators, which led to firm commitments by these generators to invest. While this is not a fully free market, it does ensure sufficient levels of prices to allow cost-recovery and profit, and provides a certain level of certainty to investors. At present, the price caps for generators cover only the existent power plants and newly built plants are not subject to caps;
(ii) the GoK is considering the establishment of an efficient power capacity market and consultants retained by EBRD for this purpose are working on this as part of the Bank's TC Roadmap for the Kazakh Power Generation Market (see below).

EBRD is now implementing a roadmap for Kazakh power generation, to design the most suitable generation market model in Kazakhstan, including the introduction of market mechanisms to incentivise investment in new capacity. Overall there is a positive reception of the roadmap project by the GoK, and the Ministry for Energy and Mineral Resources (MEMR) is open to the idea of facilitating reforms to the power generation market in Kazakhstan.

The roadmap consists of three technical assistance components:

(i) A least cost investment plan to address power needs on the country (this includes construction of new capacity, transmission line expansion, etc.)
(ii) Options for market reform aiming to stimulate investments in new capacity (incl. capacity market model)
(iii) A framework for implementation of reforms through setting new rules and regulation (at discretion of MEMR)

In conclusion, in power we only see subsidies at the level of supply companies (end-user and regulated supply margins) that are still being regulated by the Agency for the Regulation of Natural Monopolies (AREM) and the competition protection agency in case of monopoly suppliers. But even these tariffs have been steadily rising. To support the regulator in setting adequate prices, EBRD finalised a first stage of the technical assistance support assignment to AREM at the end of 2009 to establish a benchmarking methodology for the operating costs of the electricity distribution networks, and the work was well received by AREM. At present the full implementation of this methodology, which would include the introduction of capital expenses is pending and we expect it

might come later. Once these methodologies are implemented, we expect that network tariffs will also move towards cost-recovery levels.

District Heating: The district heating sector has been unbundled and limited privatisation has taken place. Heat distribution, however mainly remains state-owned with a few private operators. The district heating business is viewed as less attractive to private investors compared to the electricity business which has a competitive segment. The main drawback of the district heating business is that in Kazakhstan the main end-users of heat, residential customers, do not pay against actually consumed volumes but by the norms set out during Soviet times. These norms vary from region to region depending on technical and technological parameters of heat systems and are 10-30 per cent below the actually consumed volumes. Moving to a realistic system of cost allocation through metering and/or revision of the norms will be a key aspect of the proposed CTF intervention.

District heating is a regulated industry where tariffs are set by the Agency for Regulation of Natural Monopolies (AREM), an independent state body. Tariffs are set by the local branches of AREM through an annual revision of tariffs based on cost-plus methodology. Tariffs are calculated based on costs and a so-called "affordable profit", which is a return on the Client's net asset base (RAB). Technically, the methodology allows full cost recovery through the tariff, including capital investments. Table 6 below shows prices for heat and warm water in major cities in Kazakhstan.

Table 6
District Heating Tariffs in Major Kazakhstan Cities as of 01.01.2010[22]

	Heat (per m2) per month			Hot water (per m3) per month		
		USD			USD	
City	KZT	Market FX	PPP FX	KZT	Market FX	PPP FX
Pavlodar	43.89	0.3	0.53	92.9	0.63	1.12
Petropavlovsk	72.56	0.49	0.87	120.94	0.82	1.46
Ekibastuz	48.78	0.33	0.59	86.09	0.58	1.03
Taldykorgan	26.27	0.18	0.32	116.49	0.79	1.40
Aktau	44.5	0.3	0.53	130.18	0.88	1.56
Almaty	101.16/50.58	0.68/0.34	1.21/0.6	237.08	1.6	2.84
Astana	66.56	0.45	0.80	114.86/91.85	0.78/0.62	1.39/1.1
Atyrau	74.4	0.5	0.89	138.12	0.93	1.65
Shymkent	86.63	0.58	1.03	225.43	1.52	2.70
Kokshetau	91	0.61	1.08	160.72	1.08	1.92
Kostanai	103.52	0.7	1.24	195.21	1.32	2.35

Source: EBRD

The proposed projects will aim to support the investment with an increase of tariffs to cost recovery levels and thus lead to the progressive phasing out of subsidies. The

[22] This compares to a mixed heat and hot water tariff of e.g. USD 1.26/m^2 in Berlin as of 1 January 2010, based on the average usage of 144 kWh/m^2 per year..

increases in energy efficiency are expected to allow unit prices to increase to sustainable levels, and this is expected to have a strong demonstration effect to other DH operators in Kazakhstan, and lead to further increase in energy efficiency investment. The key in this sector is to enter a virtous circle in which investment is bringing down production cost without affecting affordability, and to then follow this up with tariff reform and metering. MDB economists are routinely evaluating affordability constraints in concessional finance projects in the region.

Renewables: The proposed projects will be implemented after the Renewables Law of 2009 has become fully effective, and a feed-in tariff has been established. EBRD has developed a tariff calculation methodology for MEMR which is expected to bring forward projects. CTF funding in this area is required not primarily to buy down cost (since this will already be achieved by the Feed-In Tariff), but rather to address issues associated with market opening, raising finance, and encouraging entry of e.g. technology suppliers. Once CTF funding has established a market for renewable energy technologies in Kazakhstan, it is expected that funding based on the revised Renewable Energy Law of 2009 should be sufficient to sustain this market with no further intervention.

Section 7: Indicative financing plan

See Annex 4 for a detailed financing plan. The financing plan makes assumptions about the contribution from the CTF and the MDBs which are subject to internal approval processes. Contributions from other sources such as project sponsors, development partners, and commercial financial institutions are estimated based on experience. There is no direct contribution from the government of Kazakhstan foreseen in this financing plan.

Table 7
Clean Technology Fund Financing Plan for Kazakhstan

Financing, Million USD							
	CTF Finance	***CTF TA***	**CTF Total**	**MDB loans**	**Others**	**Total**	**CTF Share incl. TA**
Renewable Energy	110	6	116	280	200	596	19%
District Heating	60	3	63	140	110	313	20%
Energy Efficiency	20	2	22	50	30	102	22%
TOTAL	**190**	**11**	**201**	**470**	**340**	**1,011**	**20%**

Note: TA = Technical Assistance (EBRD uses the term 'Technical Co-operation'); 'others' are project sponsors, development partners, and local or international commercial banks.

Section 8: Results from the Public Consultation on the Investment Plan

Organized by the EBRD, and with co-operation from the IFC, a public consultation was held on the investment plan, consisting of an invitation to provide feedback through a web-based element, and a workshop held in Almaty on 12 February 2010, chaired by the Ministry of Environment of the Republic of Kazakhstan. The consultation was held in line with EBRD rules governing disclosure and ran from 4 February to 19 February 2010. Participation at the workshop was strong, with 20 organizations participating. Furthermore, seven written comments were received.

Comments:

1. Request for the inclusion of a bioethanol project into the IP as it has the potential of saving 3.5-3.9 million ton of CO_2 in less than 10 month period if 15 % of it is mixed in fuel for transport.
2. Use of deeper expertise in order to assess the environmental impact of hydro projects and to consult with local scientists on this issue.
3. Request to add use of biogas as subprogram under RE topic. Suggestion was to utilize biogas from waste land fields. Also it was pointed out that there is no waste category on CO_2 emissions chart.
4. Request to include coal bed methane use.
5. Request to remove financial intermediaries in extending CTF loans as interest rates get higher. Also suggested to use interest rate not more than LIBOR + 1 for all RE projects.
6. All NGOs suggested using wide PR and making this IP and CTF widely recognizable. They suggested publishing this IP and info on CTF in government sites and some other sites such as CARNET.
7. Most other comments were related to NGO requests to government regarding particular government resolutions and improvements in laws that are seen as necessary in order to increase investments into RE projects.

Responses:

1. This project is currently being assessed regarding its viability, and could theoretically be included in the EBRD Renewables Programme should it require concessional co-finance, subject to Clean Technology Fund Trust Fund Committee and the usual EBRD internal approvals.
2. Environmental assessments of hydro projects will be undertaken following the strict and robust rules and procedures of the MDBs.
3. Such projects could be included in the EBRD Renewables Programme should they require concessional co-finance, subject to Clean Technology Fund Trust Fund Committee and the usual EBRD internal approvals.
4. There is insufficient clarity on the needs for concessional finance for this technology in Kazakhstan.
5. MDBs pointed out that this was not a practical approach and that it would contradict the desire for sustainable transformation of the finance sector.
6. This is the intention.
7. Other comments were not directly related to the Investment Plan.

Annexes

Annex 1
Table A-1
GHG Emissions Inventory Results 1990 to 2007

Total emissions of gases with direct greenhouse effect in Kazakhstan, mln. t CO_2-eq							
IPCC sources categories	**1990**	**1992**	**1994**	**2000**	**2005**	**2006**	**2007**
CO_2	**238.40**	**261.20**	**243.70**	**137.30**	**186.30**	**193.30**	**208.23**
Energy activity	220.10	246.30	236.50	126.6	170.2	178	189.71
Fuel combustion	216.80	243.00	233.9	120.3	163.7	171.3	184.51
Fugitive emissions	*3.3*	3.3	*2.6*	*6.3*	*6.5*	6.7	5.2
Industrial processes	*18.3*	14.9	*7.2*	*10.7*	*16.1*	15.3	18.52
Land use change and forestry (LUCF)	-8.1	-7.1	-4.8	-7.1	-5.9	-7.5	-9.2
CH4	**65.15**	**58.34**	**44.82**	**23.13**	**33.63**	**38.41**	**35.41**
Energy activity	40.6	34.7	25.1	10	17.6	19.4	18.3
Fuel combustion	*39*	*32.8*	*23.9*	*9.6*	*17*	18.6	17.5
Fugitive emissions	*1.6*	*1.9*	*1.2*	*0.4*	*0.6*	0.8	0.8
Industrial processes	0.05	0.04	0.02	0.03	0.03	0.01	0.01
Agriculture	20.9	20.2	16.7	9.1	11.7	14.5	12.9
Wastes	3.6	3.4	3	4	4.3	4.5	4.2
N2O	**3.4**	**3.2**	**2.5**	**1.4**	**1.8**	**2.3**	**2.5**
Energy activity	0.8	0.9	0.9	0.4	0.5	0.6	0.6
Fuel combustion	0.8	0.9	0.9	0.4	0.5	0.6	0.6
Agriculture	2.2	1.9	1.1	0.7	0.9	1.3	1.5
Wastes	0.4	0.4	0.5	0.3	0.4	0.4	0.4
Total emission	**306.95**	**322.74**	**291.02**	**161.83**	**221.73**	**234.01**	**246.14**
Net emissions (sources and sinks)	**298.85**	**315.64**	**286.22**	**154.73**	**215.83**	**226.51**	**236.94**

Summary

	1990	**1992**	**1994**	**2000**	**2005**	**2006**	**2007**
Energy activity	261.5	281.9	262.5	137	188.3	198	208.61
Industrial processes	18.35	14.94	7.22	10.73	16.13	15.31	18.53
Agriculture	23.1	22.1	17.8	9.8	12.6	15.8	14.4
Wastes	4	3.8	3.5	4.3	4.7	4.9	4.6
Total:	**306.95**	**322.74**	**291.02**	**161.83**	**221.73**	**234.01**	**246.14**
Total net of LUCF	**298.85**	**315.64**	**286.22**	**154.73**	**215.83**	**226.51**	**236.94**

Source: Climate Change Coordination Center: www.climate.kz

Table A-2 Economic Sectors by type of GHG – 1990 to 2007							
Energy activity	Year						
	1990	**1992**	**1994**	**2000**	**2005**	**2006**	**2007**
CO_2	220.1	246.3	236.5	126.6	170.2	178.0	189.7
CH4	40.6	34.7	25.1	10.0	17.6	19.4	18.3
N2O	0.8	0.9	0.9	0.4	0.5	0.6	0.6
Energy activity total	261.5	281.9	262.5	137.0	188.3	198.0	208.6
Industrial processes							
	1990	**1992**	**1994**	**2000**	**2005**	**2006**	**2007**
CO_2	18.3	14.9	7.2	10.7	16.1	15.3	18.52
CH4	0.05	0.04	0.02	0.03	0.03	0.01	0.01
N2O	0	0	0	0	0	0	0
Industrial processes total	18.4	14.9	7.2	10.7	16.1	15.3	18.5
Agriculture							
	1990	**1992**	**1994**	**2000**	**2005**	**2006**	**2007**
CO_2	0	0	0	0	0	0	0
CH4	20.9	20.2	16.7	9.1	11.7	14.5	12.9
N2O	2.2	1.9	1.1	0.7	0.9	1.3	1.5
Agriculture total	23.1	22.1	17.8	9.8	12.6	15.8	14.4
Wastes							
	1990	**1992**	**1994**	**2000**	**2005**	**2006**	**2007**
CO_2	0	0	0	0	0	0	0
CH4	3.6	3.4	3	4	4.3	4.5	4.2
N2O	0.4	0.4	0.5	0.3	0.4	0.4	0.4
Wastes total	4.0	3.8	3.5	4.3	4.7	4.9	4.6
Total w/o LUCF	**306.95**	**322.74**	**291.02**	**161.83**	**221.73**	**234.01**	**246.14**
Land use change and forestry							
	1990	**1992**	**1994**	**2000**	**2005**	**2006**	**2007**
CO_2	-8.1	-7.1	-4.8	-7.1	-5.9	-7.5	-9.2
CH4	0	0	0	0	0	0	0
N2O	0	0	0	0	0	0	0
L&F total	-8.10	-7.10	-4.80	-7.10	-5.90	-7.50	-9.20
TOTAL net emissions	**298.85**	**315.64**	**286.22**	**154.73**	**215.83**	**226.51**	**236.94**

Annex 2

Key objectives of Kazakhstan's *Program of Energy Development till 2030*

The objectives of this program include the following:

- Achieve self-sufficiency of the economy and population with respect to electric energy and thus obtain energy independence as part of the national security strategy;
- Create export-competitive resources of electricity for possible sale of electricity to neighboring and other third countries;
- Develop a competitive market for electricity based on the electric transmission and distribution network and dispatch system open to all generators.

The main elements in the implementation of this strategy are:

- Creation of a unified power system of Kazakhstan;
- Reactivation of integration with the unified power system of Russia as well as the Central Asian systems;
- Further development of open competitive market for electricity;
- Maximum use of existing energy sources, with their reconstruction and modernization;
- Introduction of new electric capacity only if it replaces imports;
- Improvement of the energy balance through introduction of renewable energy sources;
- Reconstruction and modernization of the existing heat-supply systems using cogeneration as an effective energy-saving technology, helping to reduce consumption of organic fuel and reduce emissions of greenhouse gases;
- Introduction of modern autonomous high-quality heating sources wherever it is economically and ecologically more beneficial than cogeneration and district heating.

Annex 3
CTF Intervention Areas

CTF Intervention Area No 1: Renewable Energy Development

(a) Problem Statement

Kazakhstan is well endowed with renewable energy resources, but only a small fraction of this potential is utilized. According to the Ministry of Energy and Mineral Resources, renewable energy (excluding large hydro) represents only 0.37% of Kazakhstan's energy balance[23], while the IEA puts it at 1.15%.

The installed hydroelectric power capacity is currently about 2 GW generating about 7.5 TWh per year, or about 9% of all electric power production in the country. This is less than 30% of the economically viable potential for hydro power which is estimated to be 27 - 30 TWh/year[24]. The greater part of this potential is found in the east and south-east of the country, where its exploitation could also contribute to the alleviation of regional imbalances in power generation, and thereby the reduction of power system losses. Small rivers of the Almaty Region alone can potentially produce 2 TWh/year. Within the total hydroelectric potential, small hydro (*malyie GES*) is estimated to have an economic potential of 7.5 – 11 TWh/year[25], of which only 360 GWh/year or less than 5% is currently utilized. It is estimated that 21 small hydro plants with a total installed capacity of 78 MW are currently in operation[26]. The share of wind and solar power in the energy balance of Kazakhstan is currently close to zero.

The recent adoption of the law on renewable energy (July 2009) will facilitate greater utilization of Kazakhstan's renewable energy potential. However, renewable energy projects will continue to face many challenges. The most daunting one may be having to compete with the abundance of easily available cheap but carbon-intensive fuels such as coal. The country's wealth in oil is another factor that historically has reduced the political will for embracing renewable energy.

(b) Proposed Transformation

The proposed CTF-supported investments would include: (i) constructing and restoring small hydropower installations of about 250 MW in total and up to 25 MW per installation; (ii) constructing wind power installations of about 150 MW in total; and 50 MW of waste power plants, with a unit abatement cost below \$50/tCO_2eq or feed-in tariff required for acceptable rate of return not higher than 25 KZT/kWh; (iii) constructing and

[23] Presentation by Vice-Minister D. Turganov: http://www.unece.org/energy/se/pp/ee21_sc/20scJune09/4_june_morn/6_turganov_r.pdf
[24] MEMR estimate quoted in the 2008 annual report of "KazKuat" JSC, p. 18.
[25] The estimate of 11 TWh/year is based on the report from *The Study of the Alternative Energy Sector of the Republic of Kazakhstan*. Commissioned by the National Innovation Fund. IGM Consulting Company, Release v.1, November 2008.
[26] The 2nd National Communication to UNFCCC reports that a total of 90 small hydro plants have previously existed in Kazakhstan, but most of them are now destroyed.

strengthening electric power lines connecting renewable energy installations to the power grid.

The impact of these investments will be transformative for the energy sector in Kazakhstan as it will scale up renewable energy production to a dramatically higher level relative to the status quo. The penetration of renewable energy technology such as small hydro will also be substantially higher than envisaged under the national strategy documents as reflected in the 2nd National Communication to the UNFCCC.

(c) Implementation Readiness

The implementation of the renewable energy component of the Investment Plan will be expedited by the experience of the local finance sector with the EBRD-supported Kazakhstan Sustainable Energy Financing Facility (KAZSEFF).

(d) Rationale for CTF Financing

- potential for large-scale GHG emission reductions:

According to pre-feasibility studies available to the Kazakhstan's Ministry of Environmental Protection, 21 proposed small hydropower plants with a total installed capacity of 90.7 MW and annual output of 540.6 GWh could produce total annual GHG emission savings of about 517,000 tCO_2[27]. If the load and emission factors for the displaced fossil fuel implied in this calculation are maintained for the total economic potential of small hydro in Kazakhstan, annual emission reductions of about 7.2 – 10.5 million tCO_2 are possible. This is between 2.9 and 4.3 % of Kazakhstan's current total emissions of 246 million tCO_2.

Wind energy will also be growing rapidly according to MEMR. Priority projects include phased construction of wind power installations near Astana and in the Shelek corridor of the Almaty Region. These projects, as well as others identified, would amount to 150 MW of wind power.[28]

Waste-to-energy has a great potential in Kazakhstan, once modern waste legislation has been enacted. The government has indicated strong interest in energy recovery from waste for both electricity generation and heat production at the municipal level. The MDBs are supporting this through technical assistance work to ensure implementation readiness.

Other technologies include the production of biogas for heating and electricity generation, and solar.

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[27] Energoalem company for the Ministry of Environment of Kazakhstan.
[28] Source: http://www.memr.gov.kz/?mod=news&lng=rus&cat_id=71&id=2373

- cost-effectiveness of GHG emission reductions:

With an estimated average investment cost below $10 per tCO2 saved over the first 20 years of the plant's life, small hydro is a cost-effective way to reduce GHG emissions. The complete calculation of the unit abatement cost will include the operating cost savings such as the cost of displaced fuel, further reducing the cost of GHG emission reduction. Based on the available data, small hydro projects will typically be the ones with the lowest unit abatement costs, while wind and solar power will tend to be more expensive.

Box A-1. **UNECE estimation of GHG abatement costs of RE in Kazakhstan.** The estimates of abatement costs tend to be greatly reduced if the avoided costs such as those of fuel savings and investment costs of avoided new capacity are included. One study by the Economic Commission for Europe[1] attributes a negative cost per tCO2 (a "win-win" investment) to Kazakhstan's small hydro projects, while attributing relatively high unit abatement costs (from $25 to $50 per ton) to the solar and wind projects.
Promoting Energy Efficiency. Country Report: Kazakhstan. The ECE Energy Series. No. 24. Geneva, 2005.

The CTF criterion of cost-effectiveness of GHG emission reductions requires that CTF contribution to the investment cost should not exceed $200/tCO2. Projects with a negative unit abatement cost, on the other hand, should be subject to careful consideration of reasons why CTF support is needed at all.

EBRD is currently carrying out a more detailed study into abatement costs in Kazakhstan, which will report in early 2011, and this is expected to further inform project development in the country in the context of the CTF funding.

- the presence of additional costs or risks associated with the GHG emission reduction investment that affect its financial viability:

Even the most economically attractive renewable energy projects usually face a number of additional costs and/or risks that may block their implementation: (i) the cost recovery profile of such projects is often front-loaded, adding to the initial capital requirement and calling for financial resources with a longer tenure; such resources are scarce in Kazakhstan; (ii) the front-loaded cost profile also puts such projects into a relatively riskier position as the up-front costs need to be recovered in an often unstable regulatory environment; (iii) complications may arise due to the lack of established connections to the power grid; the split of the cost of connection (or reinforcement of the existing grid) between the project developer and the grid company may be a complicated issue; (iv) the intermittent (variable) nature of renewable energy sources such as solar, wind, and run-of-river hydro poses additional challenges for the distribution/transmission company and the system operator; and (v) the high perceived risks due to a lack of experience, and higher real risk due to a lack of supporting infrastructure in countries where the renewable sector remains immature.

The concessional financing from CTF will help provide finance adapted to renewable energy projects, and thereby allow the investors to put together sound financial structures for their projects.

- demonstration potential, including scope for replication of results on a wider scale:

The initial project for which CTF support is sought will include the construction of about 300 MW of small hydro, up to 200 MW of wind power projects, and up to 50 MW of waste-to-energy projects. The potential demonstration effect from the proposed investments is high, and scope for replication on a wider scale is substantial. To scale up the initial project to achieve the annual emission reductions of 7.2 million tCO2, the total installed capacity of small hydro power plant would have to be increased to 1,260 MW, which would require an investment of about US$1.4 billion. This scale of investment for renewable energy can be only achieved by pooling together the resources of the state, the private sector, and multilateral and bilateral donors. The initial CTF-supported phase of the program will provide the models for replication and ensure that the renewable industry has a sound base to grow from, with the lessons learned widely disseminated in Kazakhstan and beyond. It will also support the establishment and initial growth of a renewables industry in Kazakhstan.

- institutional and market transformation potential:

The institutional and market transformation effect will be achieved through: (i) the experience gained by the local institutions and market players from involvement in the implementation of the CTF-supported investments; (ii) the learning curve effect and resulting cost reductions due to the scaled-up renewable energy investments in Kazakhstan; the unit cost reductions will be most pronounced in Kazakhstan's own local market for the equipment and skilled labor involved; (iii) the impact on the market and institutions from the involvement of MDBs such as the World Bank Group and EBRD supporting the renewable energy agenda; and (iv) the transfer of knowledge from the MDBs to the local constituencies on the best international practice for state support to renewable energy.

- development impact (e.g., poverty reduction or increased access to electricity):

The developmental benefits of the proposed investments will be significant: (i) improved availability of electric power in the areas of renewable energy development – particularly where emerging power shortages due to growing demand have already led to load shedding (e.g., Almaty Region); (ii) improved security of power supply in areas otherwise dependent on imported energy (southeast of Kazakhstan); (iii) increased employment – especially, in the rural areas; the latter benefit will be especially pronounced if investments eligible for CTF support are found among the proposals to generate renewable energy off-grid or in self-standing mini-grids; (iv) reduced local pollution in those areas where the coal or other polluting fuel would otherwise be used to meet the local energy needs.

- Proposed instruments

The instruments proposed are (i) the establishment of a direct lending facility to support medium-size renewable energy projects; (ii) the establishment of a renewable energy equity fund to support project developers by providing an equity stake; (iii) direct lending to municipal or private operators developing waste-to-energy projects; and (iv) direct lending to large projects. Co-financing from other development partners and commercial banks would be actively sought in each of these instruments.

- implementation potential/capacity in the country:

The Government of Kazakhstan aims to significantly increase the share of electricity generated from renewable energies. The Concept of Transition of the Kazakhstan to Sustainable Development in 2007 – 2034 approved by Decree No. 216 by the President of Kazakhstan in November 2006 identifies renewable energy development as an important objective. In an effort to meet this goal and to start creating the necessary legal framework, the Kazakh Ministry of Energy and Mineral Resources (MEMR) developed a new renewable energy law which was approved by the senate in July 2009[29].

The Kazakh government is currently working towards a target of 1 TWh of renewable energy production by 2014. There are discussions to double this by 2020. Key constraints are the cost of renewable in the first period, compared to fossil fuel power generation. In the second period, it is likely that renewable power production can be competitive with fossil fuel power production, given the predicted tariff increases, and the learning curve of the renewable energy industry in Kazakhstan, which would be stimulated by the initial CTF support.

Following the adoption of the 2009 Renewables Law, MEMR started to develop the secondary legislation to define the implementation rules for the Law. At the request of the Kazakhstan government, EBRD contracted international consultants to ensure that the secondary legislation conforms to international good practice – including the provisions for off-take obligation by the grid operator and feed-in tariffs differentiated by type of technology. A second assignment was put in place to provide the government with a methodology on how to set feed-in tariffs, given the specific circumstances of Kazakhstan, and on the type of tariff (universal or project-based). The government received the report in October 2010 and is now considering its conclusions and recommendations. The government has also requested assistance from the EBRD to support the following relevant government projects:

i) a full-scale revision of the 2009 renewables law;
ii) the introduction of best-practice waste legislation with a strong focus on energy recovery from waste; and
iii) a review of the proposed emissions trading law for Kazakhstan.

[29] 4 July 2009. Law of the Republic of Kazakhstan "On Promotion of Renewable Energy Sources Utilization".

The implementation capacity in the country has also benefitted from the ongoing technical assistance under the UNDP/GEF project supporting wind energy development. The Ministry of Environment estimates that the measures undertaken now in support of RE will enable the construction of 2 GW of wind power and 1 GW of small hydro installations by 2024, with the total share of RE in the energy balance reaching about 5% by 2024.[30]

(e) Financing Plan[31]

Table A-3
Summary Financing Plan, Renewable Energy

Project Details and Sponsors			Sources and Amounts of Financing, Million USD		
Project Type	Investment Cost Million USD	Associated TC Million USD	CTF (EBRD)[32]	EBRD Loan/Equity	Other
Hydro	315	2	60	155	100
Wind	180	2	30	80	70
Energy from Waste	95	2	20	45	30
Total	590	6	110	280	200

(f) Project Preparation Timetable

2010 Preparation
2011 January CTF/EBRD Board Approval
2011-2012 Implementation

[30] 2nd National Communication to UNFCCC.
[31] Technology breakdown is indicative only
[32] It is likely that this contribution will be called on in two or three separate projects.

CTF Intervention Area No 2: District Heating System Modernization

(a) Problem Statement

Supply of heat to multi-apartment buildings (district heating) during the cold season of the year is a vital yet technologically obsolete sector in Kazakhstan. At the same time, the international community has an established body of knowledge and good practice for commercially proven technology for the sector, such as building-level heat exchanger substations with consumer controlled or automatic regulation. Both the final heat demand and distribution losses are reduced as a result (typically, by 25 – 40%), producing substantial energy savings and GHG emission reductions. This technology is widespread in Europe and gradually gaining acceptance in the former Soviet Union.

The district heating sector has been unbundled and limited privatisation has taken place. Heat distribution, however mainly remains state-owned with a few private operators. The district heating business is viewed as less attractive to private investors compared to the electricity business which has a competitive segment. The main drawback of the district heating business is that in Kazakhstan the main end-users of heat, residential customers, do not pay against actually consumed volumes but by the norms set out during Soviet times. These norms vary from region to region depending on technical and technological parameters of heat systems and are 10-30 per cent below the actually consumed volumes.

District heating is a regulated industry where tariffs are set by the Agency for Regulation of Natural Monopolies (AREM), an independent state body. Tariffs are set by the local branches of AREM through an annual revision of tariffs based on cost-plus methodology. Tariffs are calculated based on economically justified costs based on normative cosnumption of raw materials, fuel and energy and a so-called “affordable profit”, which is a return on the Client’s net asset base (RAB). Financial costs, including profit tax are pass-through. Technically, the methodology allows full cost recovery through the tariff, including capital investments.

Due to an insufficiently developed market for equipment required for modernization of DH systems in the former Soviet Union, the high unit price of equipment such as building-level substations (BLS, known in Russian as “ITP” for *individualnyi teplovoi punkt*), as well as the absence of e.g. advanced metering technology, has been a serious barrier for broader introduction of this technology. The other challenges include the need to convince the heat supplier that it can benefit from allowing the customers to save energy, and the need for active collaboration between the energy utility (district heating company) and the municipality/housing authority, and tariff reforms.

(b) Proposed Transformation

The proposed CTF-supported investments would include: (i) modernization of central heat exchanger substations (CHS) and/or installation of automated building-level substations (BLS) and liquidation of CHS; (ii) installation of heat and hot water metering equipment at the building level; (iii) installation of modern variable flow pumps at boiler plants.

The impact of these investments will be transformative for the district heating sector in Kazakhstan as it will transform the heating systems from being supply-driven and wasteful to demand-driven and consumer friendly, while creating the incentives for the consumers to conserve energy. The latter objective will be reinforced by introducing consumption-based billing for heat wherever feasible.

(c) Implementation Readiness

In the district heating sector, EBRD is ready to extend its loans to finance projects for a total amount of USD 100 million covering several cities. There are concrete private sector and municipal sector clients for these two projects and they are currently at the concept review stage within the Bank. The projects are ready to start in early 2011.

In addition, IFC is considering an equity investment of USD 40-50 million in Central Asian Electric Power Company (CAEPCO), an emerging leading heat and power private sector investor in Kazakhstan in which EBRD already holds an ownership stake. IFC's participation would co-finance CAEPCO's investment plan to achieve significant efficiency improvements, network loss reduction and environmental improvements. IFC is providing advisory services funded by the Government of Finland to assist on technical due diligence.

(d) Rationale for CTF Financing

- potential for large-scale GHG emission reductions:

District heating is a major component in Kazakhstan's energy balance. The official statistics reported the total production of commercial heat in 2007 (before losses in transmission and distribution) at 108.6 TWh.[33] This is more than the amount of electric energy produced in Kazakhstan in the same year, which stood at 76.4 TWh. The GHG emissions from the heating sector (including those from the CHP and heat-only boiler plant of various sizes) can be estimated at 42 – 46 million tCO2 per year. Energy efficiency gains of as much as 25% - 40% have been achieved in similar district heating systems during the recent years in the Baltic states and in some Russian cities, and average losses in Kazakhstan are 26% in the heating networks. Assuming that overall 30% fuel savings are possible in Kazakhstan through loss reduction and increasing end-use efficiency through control technologies, the GHG emission reductions potential in Kazakhstan's district heating sector can be estimated to be 12.6 – 13.8 million tCO2eq or 5.1 – 5.6% of Kazakhstan's current total emissions of 246 million tCO2.

The use of concessional funds will help to optimize the pace of investments in network modernization vs. affordability of end-user tariffs. Currently residential customers are mostly billed on the basis of estimated (based on norms) rather than actual consumption. Existing norms are well below actual consumption and limit incentives for customers to

[33] The Fuel and Energy Balance of the Republic of Kazakhstan in 2003 – 2007. Astana, 2008. Ed.: J.I. Omarov. The Statistics Agency of the Republic of Kazakhstan.

reduce energy use and for providers to invest in network improvements to reduce heat losses. Concessional funds will be instrumental in triggering such investments by increasing the project scope within the existing affordability constraints. Once the beneficial effects of the programme have been demonstrated in the market and investment costs are brought down by supplier entry, other utilities will be able to invest in similar programmes with greater confidence, while at the same time, the cost for individual technology elements have been brought down.

- cost-effectiveness of GHG emission reductions:

Modernization of district heating systems by installing advanced technologies for demand management is a cost-effective way to reduce GHG emissions. The investment costs for similar projects have been about $20 per tCO2 saved over the 20-year life of the investment. The complete calculation of the unit abatement cost should include the operating cost savings such as the cost of saved fuel, further reducing the cost of GHG emission reduction.

- the presence of additional costs or risks associated with the GHG emission reduction investment that affect its financial viability:

The cities where district heating systems have been modernized have found the investment economically attractive on the basis of fuel energy saved. However, the heat supplier (district heating company) may not have the incentives to help the consumer control the heating bill. In addition, the ultimate entity responsible for delivering heat to the residential customers is often the municipal housing management company rather than the district heating company. These factors can seriously impede the implementation of such projects. The best results have been achieved when the municipality has entered into a well-designed lease or concession agreement with a commercially oriented district heating company. The contract should include a well specified investment/modernization program and a clear set of provisions for full recovery of the investment costs.

Low prices of heat for the end user have also blocked such energy efficiency projects in the past. Phasing out the production subsidy for district heat (provided from the city budget to the heating company) has been the cornerstone of district heating sector reform in neighboring states, including Russia. The recently announced increase of the heating tariff in Almaty by 21% - to 3,542 KZT/Gcal (5.64 US$/GJ) - indicates that the regulatory agency in Kazakhstan is increasingly willing to allow the heat supplier to cover the production costs through the tariffs. The tariff at this level is thought to be sufficient to cover the justifiable operating expenses of the energy utility and the housing management company. Similar tariff increases are likely in other cities. Nevertheless, a potential increase to cover the costs of capital modernization will be viable only if the scope of the modernization program allows the customers to save energy, since otherwise it would risk being unaffordable to a large number of customers.

- demonstration potential, including scope for replication of results on a wider scale:

International experience has shown that energy efficiency benefits of modernizing the district heating systems go hand in hand with the improvement of the service quality. Therefore, the efforts to promote the results of the program/project should take advantage of the customer surveys from the cities where the program/project has been successfully implemented.

The proposed CTF-supported investments in district heating would be combined with a EBRD/IFC loans amounting to USD 150 million. Soft lending terms from the CTF will help scale up the procurement of equipment such as BLS, advanced metering, and other related equipment to a level sufficient to reduce the price to a competitive level. The core operation is a private sector operation by CAEPCO (assisted by EBRD and IFC as appropriate), which will proceed with investments in other cities including Pavlodar, Ekibastuz and Petropavlovsk in Northern Kazakhstan.

- institutional and market transformation potential:

Soft lending terms from the CTF will help scale up the procurement of modern equipment to a level sufficient to reduce the price to the level found in competitive markets, and allow them to break out of the circle of underinvestment.

As part of the programme, the Borrowers will be working closely with the regulatory authorities to secure tariff increases required for the implementaiton of the investment programme while maintaining the level of tariffs within affordability constraints. Distribution tariffs have been historically low in Kazakhstan as liberalisation of district heating business has lagged the pace of reform in the generation business. In some cases tariffs have not been raised for four years and increases in other cases in 2010 have at best kept up with inflation. Concessionary lending terms from the CTF will help to scale up the investment programme and to mitigate adverse impact on low-income households, and the IFIs will seek to covenant in the Loan Agreement appropriate increases in tariff levels of starting from the as early as 2012. The Borrowers will also seek to introduce two-part tariffs by the end of the Priority Investment Programme whereby the fixed charge will cover fixed costs and the variable charge will cover variable costs of heat distribution. This will reduce seasonal volatility of earnings and enhance the financial viability of service provision. The overall effect will be to demonstrate to the borrower, the regulator, and to other heat suppliers the benefit of improving tariffs, and the ability to do so in an affordability-constrained environment following the investments.

- development impact (e.g., poverty reduction or increased access to electricity):

District heating remains the most cost-effective way of supplying heat to the majority of people in the average post-Soviet city. The lower-middle income urban residents will be the main beneficiaries of the modernization program. The stable and comfortable temperature in their homes is the first thing noticed by the residents. Additional (economic) benefits may come with the introduction of consumption-based billing, which only becomes possible once the required technology (such as BLS) is installed in the

building. Environmental benefits may include reduced emissions from the stacks of the boiler plant supplying the heat.

- implementation potential/capacity in the country:

EBRD part-ownership of CAEPCO, IFC's proposed investment, as well as considerable efforts by EBRD in creating relationships with the Akimats (municipalities), together with high-level policy dialogue and technical assistance to the regulator and government ministries, will support the implementation of the programme.

(e) Financing Plan

Table A-4
Summary Financing Plan: District Heating

Project Type			Sources and Amounts of Financing, million USD					
Project Type	Investment Cost Million USD	Associated TC Million USD	CTF (EBRD)	EBRD Loan	Other	CTF (IFC)	IFC Loan/ Equity	Other
District Heating	310	3	40	100	60	20	50	40

(f) Project Preparation Timetable

2010 Preparation
2010 3rd Quarter: CTF Submission and Board Signing
2011 Implementation

CTF Intervention Area No 3: Sustainable Energy Finance through Financial Institutions (FIs)

(a) Problem Statement

End-user Energy Efficiency/Renewable Energy investments are market driven activities, usually depending on many drivers like price of energy, awareness, general investment climate and many others. One of the key prerequisites to invest in EE/RE measures in sectors like SME, commercial and residential is also access to finance. Financial institutions in developing markets are generally hesitant to provide energy efficiency financing as a specific product line since they associate such funding with higher transactional costs as a result of their lack of experience with EE/RE technologies and market opportunities, and the need for a more specialized approach.

In Kazakhstan, these challenges are highly pronounced – there is currently very limited activity on financial market side regarding sustainable energy financing. Kazakhstan's banking sector has felt the impact of the recent financial crisis with two large banks in default and most banks struggling to lend in the wake of the currency devaluation in February 2009 and the build-up of non-performing loans. Access to external financing is likely to be constrained during 2010 and into 2011, as the negative implications of the debt restructuring heighten investor risk aversion towards Kazakhstan. This will also have a negative impact on EE/RE projects. Therefore support of CTF at this stage would foster recovery and give a chance to the EE/RE sector to benefit from improved market conditions.

(b) Proposed Transformation

The objective of the intervention on EE/RE financing through FIs is to scale up and mainstream funding of EE products through financial intermediaries to deliver measurable economic, environmental and social benefits. The component is expected to generate a range of environmental and economic benefits related to the development of the energy efficiency industry and a stream of energy efficiency project investments. Specifically, the program would: (i) build capacity in the local banking and leasing sectors to finance energy efficiency projects; (ii) develop energy efficiency investment projects across all sectors; and (iii) reduce the energy- and carbon intensity of the Kazakh industry.

Also now that Kazakhstan's economy is starting to come out of recession, the country's major banks are preparing for a resumption of growth in sector operations - but a period of more cautious and conservative growth. For the Kazakh banks, EE/RE lending may be a perfect fit with such strategy.

(c) Implementation Readiness

The use of financial intermediaries is a successful business model applied by IFC in various regions, including former Soviet Union countries. Since 2003, IFC supported more than 25 clients in developing countries to catalyze the development of EE

financing market by supporting the creation of a new EE business lines in a leading financial institutions with extensive reach into the SME segment and the institutional capacity to successfully establish a business line in EE financing.

In Kazakhstan, the banking sector has been supported in providing specialized financial products for EE/RE projects in the corporate sector by EBRD through KAZSEFF. Initial market scoping confirmed that this may become interesting business opportunities especially given the current market conditions. The proposed facility would be developed in close co-operation with the EBRD to ensure full complementarity. The proposed facility would further support the extension of energy efficiency lending through local banks, in particular to sectors not currently addressed.

The new energy efficiency law, as well as the revision of the municipal budget law to allow energy performance contracting, are going to support the implementation of this project.

(d) Rationale for CTF Financing

- potential for large-scale GHG emission reductions:

The Kazakh economy had long been characterized as having one of the highest energy intensities in the world. Its GDP energy intensity was among the highest even within the former USSR. Although Kazakhstan has achieved very good results in reducing energy intensity over the past two decades, energy intensity in Kazakhstan is still almost three times the OECD average. Based on experience in other countries, a CTF investment of US$20m is likely to lead to GHG emissions reductions on the order of 300kt CO_2/yr.

- cost-effectiveness of GHG emission reductions:

Energy Efficiency in corporate, SME, commercial and residential sector is a cost-effective way to reduce GHG emissions, with the added benefit of improving the whole economy by making the Kazakh industry more competitive. The investment costs for EE projects have been in the range of $5 to $20 per tCO2 saved over the 20-year life of the investment.

- the presence of additional costs or risks associated with the GHG emission reduction investment that affect its financial viability:

The main risks associated with EE investments are lack of awareness among end users, relatively low energy prices and low capacity on the market to support EE investments (energy consultants, energy auditors). The mitigation proposed here would be the IFC-financed advisory component of the program designed to minimize those risks by providing capacity building and raising awareness of various stakeholders.

- demonstration potential, including scope for replication of results on a wider scale:

Currently, the technology used by the industrial sectors, SMEs and commercial sector in Kazakhstan is outdated and the production processes are highly inefficient. To a large extent, this is also due to limited access to finance in the past. Financial institutions have significant potential to reach a wide range of industries, SMEs and commercial entities which are already considered "bankable". Financial institutions can access and catalyze energy efficiency projects among their large client base as well as they can extend their reach to new market niches. The component is expected to have a large spillover effect to the companies through the on-lending of financial institutions.

- institutional and market transformation potential:

Important impediments to the development of the Kazakh SME sector include lack of access to equity capital, limited availability of long-term lending, and business managers' insufficient business expertise and technical training. The EE component aims to alleviate these constraints by providing financing supplemented by appropriate advisory services. Also Kazakh government would considerably benefit from targeted advisory on EE law, secondary legislation and strategic action plan for energy efficiency, as it was provided by IFC in Russia recently, for example.

- development impact (e.g., poverty reduction or increased access to electricity):

The component is expected to generate a range of environmental and economic benefits related to the development of the energy efficiency industry and stream of energy efficiency project investments. First of all, it will lead to saving of energy resources. Additionally, the Program would: (i) improve the competitiveness of the Kazakh economy by increasing its industrial energy efficiency; (ii) improve the local environment through reduced emissions of conventional pollutants; and (iii) increase the long-term sustainability of business operations, improve competitiveness, and bring financial benefits through lower costs and improved process efficiencies.

(e) Financing Plan

Table A-5
Summary Financing Plan: Energy Efficiency

Project Details			Sources and Amounts of Financing, million USD		
Project Type	Investment Cost Million USD	Associated TC Million USD	CTF (IFC)	IFC Loan	Other
Energy Efficiency	100	2	22	50	30

(f) Project Preparation Timetable

2010	Preparation
2011	CTF Submission and Board Signing
2011 – 2012	Implementation

Annex 4
Detailed Financing Plan

Table A-6 DETAILED FINANCING PLAN										
Financing, Million USD							Shares			
	CTF Loan	TA from CTF	CTF Total	MDB loans	Others	Total	CTF loan share (net of TC/TA)	CTF Technical Assistance	MDB Co-Financing	Private Sector Co-Financing
Renewable Energy	110	6	116	280	200	596	19%	1%	47%	33%
District Heating	60	3	63	150	100	313	19%	1%	48%	32%
Energy Efficiency	20	2	22	50	30	101	20%	2%	49%	29%
TOTAL	**190**	**11**	**201**	**480**	**330**	**1,011**	**19%**	**1%**	**48%**	**33%**

EBRD FINANCING TABLE										
Financing, Million USD							Shares			
EBRD Summary	CTF Loan (via EBRD)	TA from CTF	CTF Total	EBRD loan	Others	Total	CTF loan share (net of TC/TA)	CTF Technical Assistance	MDB Co-Financing	Private Sector Co-Financing
Renewable Energy	110	6	116	280	200	596	19%	1%	47%	33%
District Heating	40	2	42	100	60	202	20%	1%	50%	30%
Energy Efficiency	-	-	-	-	-	-	-	-	-	-
Total	**150**	**8**	**158**	**380**	**260**	**798**	**20%**	**1%**	**48%**	**32%**

IFC FINANCING TABLE										
Financing, Million USD							Shares			
IFC Summary	**CTF Loan (via IFC)**	**TA from CTF**	**CTF Total**	**IFC loan/equity**	**Others**	**Total**	**CTF loan share (net of TC/TA)**	**CTF Technical Assistance**	**MDB Co-Financing**	**Private Sector Co-Financing**
Renewable Energy	-	-	-	-	-	-	-	-	-	-
District Heating	20	1	21	50	40	111	19%	1%	45%	37%
Energy Efficiency	20	2	22	50	30	102	20%	2%	49%	29%
Total	**40**	**3**	**43**	**100**	**70**	**213**	**20%**	**1%**	**47%**	**33%**

Annex 5

List of Acronyms

AG	Associated Gas	IPCC	Intergovernmental Panel on Climate Change
APG	Associated Petroleum Gas (=AG)	MDB	Multilateral Development Bank
CO2	Carbon Dioxide	MW	Megawatt
CTF	Clean Technology Fund	MWh	Megawatt-hour
EBRD	European Bank for Reconstruction and Development	Mtoe	Million tons of oil equivalent
ECA	Europe and Central Asia	OECD	Organization for Economic Cooperation and Development
EE	Energy Efficiency	PPP	Purchasing Power Parity
GFR	Gas Flaring Reduction	RE	Renewable Energy
GHG	Greenhouse Gas(es)	SME	Small and Medium Enterprises
GoK	Government of Kazakhstan	tCO2	Ton of CO2
GW	Gigawatt	tCO2-eq	Ton of CO2 equivalent
GWh	Gigawatt-hour	TWh	Terawatt-hour
HFO	Heavy Fuel Oil	UNFCCC	United Nations Framework Convention on Climate Change
IFC	International Finance Corporation	USD	US Dollars (=US$)