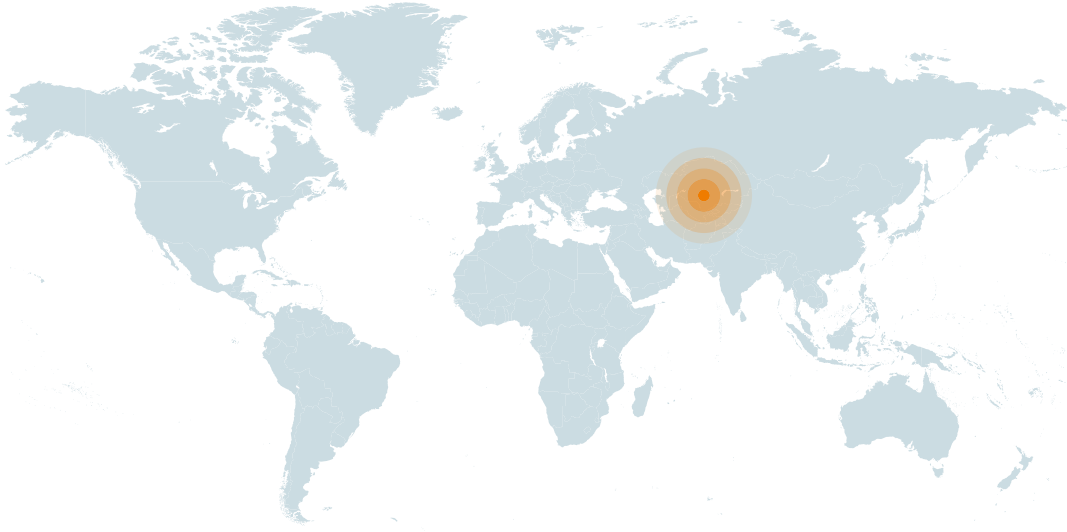
At the Crossroads

The Role of Renewable Energies in Kazakhstan's Macroeconomic Development

Thomas Helm / Nicolas Scholz



For many developing countries and states undergoing the transition to a market economy, the promise of vast natural resources has long since become a burden. Initially, the traditional economy was sacrificed to the "lure of the fast buck", but the wealth based on natural resources came to benefit only a select few. Ultimately, the country missed the right time to utilise its natural resource wealth to develop the economy in a way that would secure future prosperity. Is Kazakhstan going a different way?

Oil workers: The end of the oil boom will not only affect those working in the oil and gas industry, but the economy of the entire country. Source: © Shamil Zhumatov, Reuters.

After a period of frenetic economic growth, based mainly on gas and oil, the declining fossil fuel prices have led Kazakhstan to a crossroads. Will the Central Asian country succeed in changing course? What should and would need to happen? Can Kazakhstan become a good example or even provide a blueprint for many others?

The End to the Oil Boom

Kazakhstan's rise to become an economic "beacon" and anchor of stability in Central Asia over the last decade and a half was due mainly to the country's vast reserves of natural resources. Oil, gas, uranium and "rare earths" brought the former Soviet state not only a higher per capita income than that of "big brother" Russia but also remarkable social and political stability, based among other things on greater prosperity. For Germany and the European Union, Kazakhstan became the most important country in the region and a reliable partner, including for issues pertaining to the region as a whole. The so-called "multi-vector" foreign policy pursued by President Nursultan Nazarbayev has played a major part in this; at the heart of this policy is a strategy of seeking to mediate between the power centers in the immediate neighbourhood, particularly Russia and China, between the different interests in the region as well as between Asia and Europe. In the area of energy security, Kazakhstan has become one of the EU's most reliable partners worldwide.[1] 80 per cent of Kazakh oil exports go to the European Union, for instance.[2]

The surge in oil prices from the middle of the last decade onwards, access to new transport pipelines as well as its foreign policy strategy meant that Kazakhstan was able to increase its oil production to 1.7 million barrels a day, with an official production target of 3.5 million barrels a day. The government plans to export around 85 per cent of this volume in future.[3]

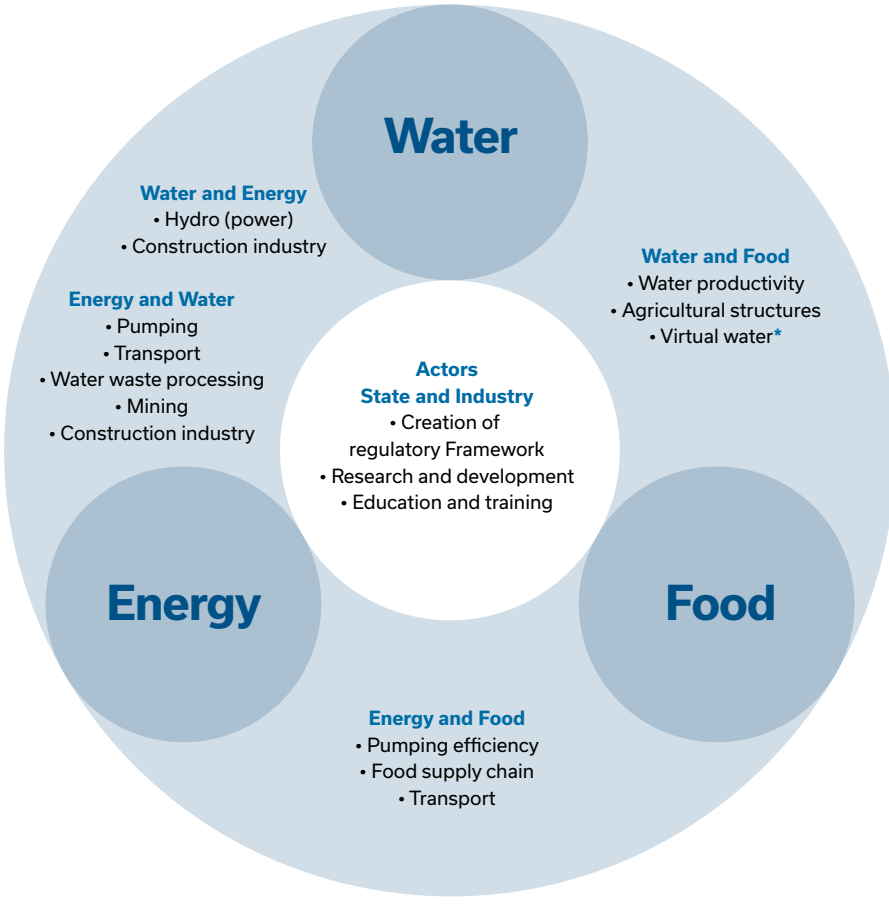
Besides bringing greater prosperity to swathes of the population, this also swelled the state coffers, gave a boost to the construction industry and provided for a healthy national fund of over 100 billion U.S. dollars.Those times are now a thing of the past.

Kazakhstan's Economy Facing New Challenges

The Kazakh economy has suffered a great deal from the price slump in the energy and natural resource markets over the last two years, resulting in a steady decline of economic growth. While the economy grew by six per cent in 2013 and by 4.3 per cent in 2014, growth was down to 1.3 per cent in 2015. The financial and debt crisis in the European Union, the economic depression in Russia and reduced demand from the People's Republic of China are having a direct impact on Kazakhstan's foreign trade. Kazakh goods exports, for instance, declined by 73 per cent during the first six months of 2015.[4]

The slump in prices on the international oil market in particular is having a significant detrimental effect on Kazakhstan. Oil exports expanded greatly as a proportion of total exports between 2000 and 2014, rising from approximately 55 per cent to over 80 per cent.[5] This development increased Kazakhstan's dependence on oil revenues for financing its budget. Furthermore, the price per barrel has dropped by 70 per cent since June 2014. The situation is exacerbated by the fact that Kazakhstan is currently not capable of increasing oil production and thereby at least securing international market shares for the future. It is likely that technical problems at the Kashagan oil field will delay the boost in oil production until 2017.[6]

Fig. 1: Correlations between Water, Energy and Food



* The term virtual water or embedded water is used to describe the volume of water that goes into the production of a product, directly and indirectly.
Source: Own illustration.

The impact of declining demand for natural resources and the oversupply of crude oil on the world market is not limited to Kazakhstan's energy sector. These developments are also affecting the Kazakh economy as a whole, which is in turn reflected in the country's buying power. While the Kazakh tenge was still traded at 230 per euro in August 2015, the current exchange rate makes one euro worth 377 tenge.[7] This is making imported goods more expensive, while making locally produced goods cheaper abroad. With a total population of just 17 million and consequently a relatively weak domestic market, this development also provides opportunities for the government to promote its export-focused economic model. In this context, the government would be well advised to encourage particularly those sectors that suffered from the high oil prices and the associated high currency value between 2001 and 2013. Particularly agriculture and the manufacturing industry offer substantial potential and can make great progress particularly in the country's southern and eastern areas because of the proximity to sales markets and high population figures.

Despite all its efforts, the government has so far failed to diversify the Kazakh economy with long-lasting effect. Technologically advanced industry products, for instance, make up some 25 per cent of all imports. While the proportion of industrial products in the country's total imports

has declined slightly from 2000 to 2013 (2000: 27 per cent; 2005: 28 per cent),[8] the import structure clearly demonstrates that the Kazakh economy depends on the extraction of natural resources[9] and that the size of its own industrial production is inadequate.

It is therefore essential that Kazakhstan gives the modernisation of its economy top priority. To establish Kazakhstan successfully in the circle of the most competitive countries of the world will require a transformation towards an economy characterised by sustainability and driven by innovation. With this goal in mind, President Nursultan Nazarbayev has called upon the Kazakh government to implement a number of programs, including the "100-Step Programme"[10] and the strategy paper "Kazakhstan 2050".[11] The latter describes the path Kazakhstan will need to take to raise it up into the circle of the 30 highest-developed countries. While the "100-Step Programme" can be interpreted not so much as providing long-term strategic orientation but as a tactical response to the country's economic depression, the two programs cover a great deal of common ground in the areas of innovation, education, energy, infrastructure and agriculture. In addition, the "Kazakhstan 2050" strategy paper lists five important challenges for the country's socioeconomic development:[12]

1. Food security,
2. Water shortage,
3. Energy security,
4. Exhaustion of natural resources,
5. Third industrial revolution.

These challenges are linked closely to the food-water-energy security nexus; the correct response for Kazakhstan will be to expand and promote renewable energies, modernise agriculture and promote high-quality industrialisation.

While these goals cannot be regarded in isolation from each other, the transformation of the energy sector will play a key role in overcoming the above-mentioned challenges. The energy sector produces 80 per cent of the country's greenhouse gas emissions. With annual CO_2 emissions of 200 million tons, Kazakhstan is the largest emitter in Central Asia, ranked 30th globally.[13]

Particularly in view of the country's topography, with large swathes of grassland as well as deserts and semi-arid regions, this has an impact on water resources and agriculture that must not be underestimated. According to experts, an estimated 70 per cent of potential negative climate change impacts would affect agriculture and particularly hit wheat production.[14]

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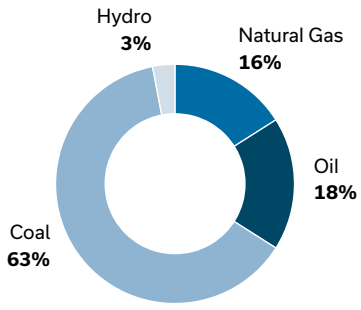
Increasing incidences of drought in northern Kazakhstan have caused significant fluctuations in annual grain yields. In 2013, for instance, only 12.5 million tonnes of grain were produced, while it was still 22.7 million tonnes the previous year.[15] For one of the world's largest grain producers, climate change therefore represents a great threat to the country's food security.

Renewable Energies in Kazakhstan's Development

Around the world, the expansion of renewable energies goes hand in hand with the hope of increasing energy security as well as reducing dependence on fossil fuels, energy intensity and greenhouse gas emissions. The "Kazakhstan 2050" strategy paper includes the goal of covering half of the country's entire energy demand from renewable energies by 2050.[16] The motivation comes partly from the impact of climate change on agriculture and from the country's potential in the area of renewable energies. Another component is the prospect of being able to reduce domestic consumption to release export potential of conventional energy sources.[17]

Fig. 2: Kazakhstan's Energy Consumption by Energy Source



Source: Own illustration.

This is perfectly understandable from a Kazakh perspective as energy from fossil fuels in Kazakhstan is very cheap by international comparison, which poses a challenge for renewable energies in terms of competitiveness. As the income and wealth disparities are very large in this country in transformation, the burden of subsidising renewable energies until they become competitive cannot be placed mainly on the shoulders of end consumers such as private households as this would lead to undesirable social tensions.

It would also further throttle the country's efforts to transform into a modern industrialised society. With the international competitiveness of the manufacturing sectors having suffered for years from the strong tenge and high pay rates, which were based on high resource prices, a strong increase in energy prices would impact on competitiveness yet again. A "Kazakh energy transition" will therefore need to be funded in part by revenues from the sale of conventional resources if it is to succeed. In addition, there are some forces working behind the scenes that are hostile to a stronger drive towards renewable energies. Powerful actors from the oil, gas and coal sectors, some parts of which are state-owned, are exerting influence to secure extremely lucrative deals from the resource sales for year to come.

That said, the Kazakh government is pursuing plans to gradually increase the proportion of renewable energies according to its "Kazakhstan 2050" strategy, namely to three per cent by 2020, to 30 per cent by 2030 and to 50 per cent by 2050. However, one needs to bear in mind in this context that nuclear energy is considered one of the "green" types of energy in Kazakhstan because of the low emissions it entails. As one of the world's largest uranium producers, Kazakhstan is interested in boosting the use of nuclear power and intends to increase its share in energy production from zero today to 4.5 per cent by 2030.[18] By then, wind, solar and hydropower are to account for ten per cent of total energy production.

The required restructuring of the energy sector over this period will require enormous efforts and cost 64 billion U.S. dollars by 2030 alone.[19] After all, over 60 per cent of energy consumption is currently still covered by coal.

The Potential of Renewable Energies in Kazakhstan

Kazakhstan offers excellent conditions for the expansion of renewable energies. Particularly in rural areas that are not connected to the national grid, the proliferation of small-scale solar, wind and hydropower plants can help to ease the local energy deficit. The long transport distances and the burning of fossil fuels not only place a disproportionately large burden on the environment, they also have a detrimental effect on productivity in agricultural businesses and the manufacturing industry, thereby hindering prospects for economic growth. Renewable energies can make an important contribution to resolving these problems.

Kazakhstan has tremendous potential where renewable energies are concerned. Considering the climatic and geographic conditions, the estimated potential of wind energy, for instance, which can be economically developed, is about 760 gigawatts.[20] But these potentials are still for the most part unexploited. Currently, hydropower dominates in the area of renewable energies, accounting for 98 per cent of total capacity.

Exhaust emissions: The Temirtau steel plant is Central Asia's biggest steel producer and one of its biggest polluters. Source: © Shamil Zhumatov, Reuters.

← Lights off: The Baiterek monument moments prior to Earth Hour in Kazakhstan's capital Astana. The event is held annually, encouraging people worldwide to turn off their lights for one hour, in an attempt to raise environmental awareness. Source: © A J Sisco, Reuters.

Hydropower

At a total annual output of 7.78 gigawatts, the use of hydropower is most advanced. It contributes some 13 per cent to total electricity generation, accounting for approximately three per cent of Kazakhstan's total energy generation.[21] The 15 large hydropower plants currently in operation have a total energy generation capacity of 2.248 gigawatts.

However, the Kazakh government is also intent on supporting smaller projects in rural areas. 112 of 257 projects are being implemented in Southern Kazakhstan and 77 in Zhambyl. This means that over 70 per cent of the hydropower projects with a total production capacity of 2.5 gigawatts are located in the south of the country.[22]

Wind Power

While wind power is much less developed than hydropower, it offers significant potential. The German company Fuhrländer, for instance, has built 22 wind farms in a joint venture with a Chinese company in the Akmola Region (at a distance of some 150 kilometres from Astana). The areas with the greatest potential for the expansion of wind power are Western Kazakhstan (close to 30 per cent of the countrywide potential), Central Kazakhstan (19 per cent), some eastern areas (four per cent) and Southern Kazakhstan (approximately 50 per cent).[23] While air speeds are highest in Central Kazakhstan and on the Caspian Sea at an average eight to ten meters per second, 30 per cent of the entire annual production capacity could be generated in the south alone. In the south, wind power plays the second largest role in the area of renewables after hydropower, although this type of energy generation is hardly affordable for private households and small agricultural businesses. The cost for a turbine with an output of ten kW (conventional size to produce enough energy for one household) is between 22,000 and 29,000 U.S. dollars.[24]

Solar Power

The proportion of solar power in the energy mix is currently less than one per cent. But particularly in Southern Kazakhstan, the use of solar power is a cost-efficient option for optimising energy availability and decentralising supply. There are between 2,200 and 3,000 hours of insolation a year in this region, yielding 1,300 to 1,800 kilowatts per square metre of solar panel area.[25] In Germany, by comparison, solar panels only produce some 1,000 kilowatts per square metre a year. There are currently three large solar power plants located near Astana and Almaty City. Six further large-scale solar plants are under construction in Zhambyl.

Barriers to the Expansion of Renewable Energies

In the past, the use of renewable energies was frequently not cost-effective. This was mainly due to the high requirements with respect to battery storage and low feed-in tariffs. But the recent devaluation of the national currency has also had a major impact on the profitability of investments in renewable energies as the equipment generally needs to be imported. The situation is not helped by the fact that hard data on the benefits of different energy sources is scarce, which hampers well-founded investment decisions.

To obviate these problems in the future, the Kazakh government drafted a renewable energies bill in early 2016, which envisaged the following reforms and which was adopted by the newly elected parliament in May 2016:

- Creation of a national development model for the regional expansion of renewable energies,
- Feed-in tariffs pegged to the dollar,
- Scrapping of the regulations on battery storage,

- Ministry of Energy to be established as key institution,
- Reimbursement of 50 to 80 per cent of capital cost when purchasing locally produced energy generation equipment.[26]

In addition, the Kazakh government will be able to use EXPO 2017 in Astana as a platform to showcase best practices in the area of renewable energies to promote research and technological development relating to "green" energy, to sensitise the public for the opportunities offered by renewable energies and to speed up the know-how transfer between all relevant stakeholders.[27]

Conclusions and Outlook

The decline in prices on the international natural resource markets, particularly for crude oil and gas, has caused the Kazakh economy to slide into crisis. There is now a growing realisation in the country that it has relied on the sale of fossil fuels and other mineral resources for too long. The government has wasted valuable time.

The political will to restructure the country's economy is now being voiced more clearly in Kazakhstan. Such a transformation can succeed as long as the right course is set right now. After all, the country does have great potential.

The energy sector will play a key role in Kazakhstan's economic transformation; particularly renewable energies. Their expansion can solve several problems simultaneously, mostly linked to the food-water-energy security nexus. The expansion of renewable energies can, for instance, increase energy security while allowing the environmentally damaging use of coal to be phased out.

Nevertheless, Kazakhstan will not be able to do without the extraction of fossil fuels until such time that renewable energies for domestic use have reached a point where they can compete on the energy market and the transformation of the economy has succeeded in producing a modern industrial society. It will require the revenues from oil and gas exports and the local manufacture of important oil products for the construction, automotive and food sectors to enable the government to succeed in its transformation efforts. Otherwise, it will be virtually impossible to avoid social unrest and overcome the existing barriers. Seen from this perspective, the crisis in the international natural resource markets and its impact on the Kazakh economy offer a good opportunity to look to the future and take proactive steps to overcome the crisis sustainably and secure a prosperous future.

Thomas Helm is Head of the Konrad-Adenauer-Stiftung's office in Astana, Kazakhstan.

Nicolas Scholz is an intern at the Konrad-Adenauer-Stiftung's office in Astana, Kazakhstan.

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