

A stylized world map composed of a grid of grey dots, with several dots highlighted in red to represent specific countries.

Resource Efficiency Gains and Green Growth Perspectives in Azerbaijan

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- Azerbaijan's economy relies heavily on the exploitation of its natural resources causing several environmental problems, most importantly a scarcity of water. By gaining energy mainly out of gas and oil and tolerating outdated vehicle standards, the country's CO₂ emissions rank above regional average.
- There exist several governmental programmes on energy efficiency, renewable energies and ecological sustainable development. However, most proposed activities were not carried out as authorities suffer from institutional and organisational weaknesses. Azerbaijan acknowledges several international agreements, but the implementation patterns of international standards are very low.
- The main potential for green growth in Azerbaijan lies in the generation of energy, transportation and housing. Green jobs will emerge mainly in the sectors of alternative energy generation, construction and eco-tourism. The main obstacles to green growth are corruption, low salaries in and lacking funds of research institutes, low awareness levels among the population, poor business climate, a brain drain due to emigration and a large informal sector.



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1. Introduction

The dynamic growth of the Azerbaijan economy resulted in GDP approximately 20 times higher in 2010 compared to 1995. Improvements in the living standards of the growing population and increased economic activity have put substantial pressure on the physical environment and natural resources, however.

2. Current Situation

2.1 Energy Efficiency

Energy in Azerbaijan is produced and distributed mainly by the two state-owned electric companies and one gas company. In 2010, 18710MWh energy was produced, of which 15003MWh was produced at gas power stations and 3446 MWh – 18.4 per cent of the total – was produced in hydropower stations.

Azerbaijan is one of the most energy-intensive economies among 35 countries in Europe and Central Asia, ranking in the top 10 in terms of energy intensity (IFC Report 2010). The same report indicates that among 100 companies surveyed in Azerbaijan, energy efficiency indicators are mostly low or medium.

Table 1. Production of electrical energy (MWh)

Year	Production of electricity	including:				
		Gas power stations	Hydro power stations	Non-energy plants	By generator	Wind energy
2000	18 699	17.69	1 534	83.1	13.0	–
2010	18710	15003	3446	259.7	–	0.5

Table 2. Energy consumption by source (%)

	2000	2010
Solid fuel	0.2	0.6
Oil	60.6	41.8
Gas	38.3	55.7
Renewable energy	0.9	1.9
Emissions of air pollutants from energy sector, thousand tonnes	–	140.5

Table 3. Key energy efficiency indicators of 30 selected companies, Azerbaijan, 2008

Prioritization of EE	Low
Awareness of EE potential and measures	Medium
Historical EE investment	Low
Planned Investment relative to historical investment	High
Average value of investment planned	Medium
Integration of EE into business planning	Low
Perceived effectiveness	Medium

In the past few years, however, major changes have been made to the energy infrastructure. Power stations have been updated and the grids have been changed. A few rehabilitation projects have been completed to raise the energy efficiency of power stations across the country. Due to the rehabilitation of the Azerbaijan Thermal Power Plant, the company will increase energy efficiency from 32 per cent up to 41 per cent and save 1,679,000 tonnes of CO₂ emissions a year. The European Investment Bank (EIB) agreed to establish a Multilateral Carbon Credit Fund (MCCF) in Azerbaijan. The project will use Clean Development Mechanism (CDM) methodology for power plant rehabilitation projects.

Metering is important for monitoring consumption and collecting payments. In order to ensure better collection of payments, energy companies introduced smart cards, with which consumers pay upfront for a certain amount of electricity and gas. A new plant started to produce smart cards and associated equipment. Metering will be installed for the remaining consumers as the smart cards become available. The new centralised monitoring system of the electricity grid prevents illegal use of electricity. This is a significant change in the direction of energy efficiency as in the past illegal tapping into the grid was common.

Azerbaijan has drafted a State Programme of Development, Technical Regulation and Standardisation of Energy Efficiency. The programme is designed to increase economic efficiency and accelerate the introduction of European experience in the energy system. The programme has been coordinated with the relevant government structures and submitted for consideration by the Azerbaijani Cabinet. The main purpose of the state programme is to solve problems concerning saving energy resources, raise energy efficiency, ensure effective



economic development, improve the environment, increase resource efficiency and the competitiveness of local products, and develop national standards on the basis of regional standards. Within the programme it is planned to develop 69 pertinent national standards.

According to an IFC survey in 2008 the rate of proposed investments in energy efficiency for 2009–2011 was 780 per cent higher than actual investment in 2006–2007. However, due to the abundance of energy sources and the low price of fuel and electricity in Azerbaijan, energy efficiency is not seen as an important issue among the general population. The use of economic instruments to influence public transport demand and fuel choice remains limited. Leaded petrol has not yet been fully phased out. European vehicle emission standards are being gradually introduced, but not much progress has been made in tightening fuel quality standards. Negative trends in public urban transport have not been reversed (OECD). The energy efficiency of buildings remains inadequate to reduce energy losses. Although on average energy consumption per company is USD139,000 (IFC) formal planning for energy efficiency – and its incorporation into the business strategy – is not common.

2.2 Greenhouse Gas Emissions

According to the IEA report in 2009 Azerbaijan emitted 25.2 million tonnes of greenhouse gases (by sector) which is a 60.7 per cent decrease since 1990. In accordance with the reference approach, GHG emissions were 27.7 million tonnes, which is a 59.3 per cent decrease since 1990. The main contributions to emissions were made by electricity and heat production, which totalled 10.4 tonnes in 2009, while transport amounted to 4.5 million tonnes of emissions while other sectors contributed 6.7 million tonnes of GHG emissions. Other sectors included 5.7 million tonnes of CO₂ emissions from residential sources, which is 23 per cent of total emissions.

Table 4. CO₂ emissions by sector in 2009 (million tonnes)

Total CO2 emissions from fuel combustion	Electricity and heat production	Other energy industry own use	Manufacturing industries and construction	Transport	Other sectors	of which: Residential
25.2	10.3	2.4	1.3	4.5 (4.0 road)	6.7	5.7

Note: »Other« includes commercial/public services, agriculture/forestry, fishing, energy industries other than electricity and heat generation, and other emissions not specified elsewhere.

Table 5. Energy supply

	1990	2009	Change
Total primary supply of energy Million tonnes of oil equivalent	26.2	12	-54.4%
GDP at 1 billion 2000 US dollars	9	20.2	125.8%

A 125.8 per cent rise in GDP between 1990 and 2009 was mainly due to oil and gas production.

2.3 Environmental Pollution

Azerbaijan faces a number of environmental challenges. Some were inherited from the Soviet Union, such as pollution in the Sumqayit industrial area and contamination in the old oil fields, while other pollution is the outcome of rapid and unsustainable development, such as the waste discharges of extractive industries, emissions from food and construction material production and emissions from the rapidly growing transport sector. Emissions from mobile sources almost doubled between 2000 and 2010 but total emissions of pollutants from stationary sources decreased by 2.4 times, mainly due to updates in the industrial sector.



Table 6. Selected indicators, Azerbaijan, 2008 (OECD)

Key Indicators		Compound Indicators	
Population (million)	8.68	TPES/Population (toe/capita)	1.54
GDP (billion 2000 USD)	18.5	TPES/GDP (toe/thousand 2000 USD)	0.72
GDP (PPP) (billion 2000 USD)	69.9	TPES/GDP (PPP) (toe/thousand 2000 USD)	0.19
Energy production (Mtoe)	58.59	Electricity consumption / population (kWh/capita)	2318
Net imports (Mtoe)	-44.5	CO2/TPES (t CO2/toe)	2.19
TPES (Mtoe)	13.37	CO2/population (t CO2/capita)	3.37
Electricity consumption* (TWh)	20.12	CO2/GDP (kg CO2/2000 USD)	1.58
CO2 emissions ** (Mt of CO2)	29.28	CO2/GDP (PPP) (kg CO2/2000 USD)	0.42

Notes: * Gross production + imports – exports – losses. ** CO₂ emissions from fuel combustion only. Emissions are calculated using IEA energy balances and the Revised 1996 IPCC Guidelines.

Table 7. Air pollutant emissions from mobile sources, by contents (thousand tonnes)

Emissions	2000	2010
Carbon Oxide (CO)	148.2	528.3
Nitrogen Oxide (NO ₂)	31.3	62.3
Hydrocarbons	56.4	101.7
Specific emissions	156.8	49.7
Total	392.7	742.0

Source: Azerbaijan State Statistical Committee.

Table 8. Air pollutants from stationary sources, by contents (thousand tonnes)

Emissions	2000	2010
Gaseous and liquid matters	496.2	195.5
Sulphuric anhydrite (SO ₂)	35.1	2.2
Carbon Oxide (CO)	26.3	27.2
Nitrogen Oxide (NO ₂)	24.2	19.8
Total	515.4	214.8

Source: Azerbaijan State Statistic Committee.

While some of environmental challenges are local, others involve neighbouring states, most notably, the safety of trans-boundary water resources for drinking and irrigation.

Per capita water consumption, the energy required to pump water, the volume of unaccounted-for water and

staffing levels in water utilities are high compared to OECD countries. Some evidence suggests that corruption plays a role in the operations of the water sector. According to OECD reports, between 2000 and 2008 the Azerbaijan economy enjoyed stable economic growth, growing by 16.4 per cent. However, WSS performance is not correlated with economic performance: 30 per cent of the extracted water is lost in delivery.

Table 9. (Million cubic meters)

	2000	2005	2007	2008	2009	2010
Water taken from natural sources	11,110	12,050	12,270	11,735	11,425	11,566
Water lost during transportation	3 053	3 462	3 899	3 849	3 786	3,852
Discharge of wastewater	4114	4885	5247	5334	4823	6,037
Discharge untreated water	171	161	177	181	171	164

Note: Information based on data provided by the Melioration and Water Industry Incorporations.

Nevertheless, WSS services have improved somewhat over the past decade. Several international donors – including the French government, the World Bank and UNOPS – have been assisting Azerbaijan in taking an integrated approach to water problems.

Due to the poor management of storm-water runoff and the increased proportion of impervious surfaces in cities the storm-water generated during rain and snow-melt events flows over the land or impervious surfaces



(paved streets, parking lots and building rooftops), accumulating debris, chemicals, sediment or other pollutants that can adversely affect water quality when the runoff is discharged untreated.

The removal of natural vegetation and topsoil during intense construction activities makes the exposed areas particularly susceptible to erosion. Erosion during and after construction of roads, highways and bridges contributes large amounts of sediment and silt to runoff waters, which can deteriorate water quality and lead to other ecological problems.

Illegal dumping and inadequate disposal sites are widespread. The absence of a proper waste management infrastructure and practices remains a serious concern (OECD 2011).

Within the framework of a joint five-year project costing USD 41.5 million, »Aphseron Restoration Programme«, supported by the World Bank and the government of Azerbaijan there are projects to assist reforms to facilitate the establishment of sustainable systems of municipal waste management. Project activities include five components, including institutional reforms, developing strategic plans, building capacity, closing some old landfills and waste collection points, updating other landfills to increase their efficiency, preparing to build a new landfill and establishing the Temiz Sheher waste management company.

Despite the environmental projects implemented by the government, international development organisations and industry, in general, the population does not seem to value natural ecosystem services, such as water supplies to the watershed, water quality and biodiversity as assets for sustainable growth.

What is the country's current economic strategy? (Rent-seeking, export-oriented, cheap labour/low standards-based integration in international/European division of labour? Exploitation of natural resources or manufacturing or service industries?)

The Azerbaijani economy relies heavily on exploitation of its natural resources, such as oil, gas and precious metals and some exports of agricultural products.

Table 10. Domestic and foreign investments in industry

Investments		Amount in AZN	Share in total investments %
Foreign	Industry	1,917,294.0	79.7
	Extractive industry	1,882,933.5	78.2
Domestic	Industry	2,358,938.2	31.5
	Extractive industry	1,068,960.2	14.3

In 2010, 14.3 per cent of total domestic investments and 78.2 per cent of total foreign investment went into extractive industry, mainly oil and gas production; 64 per cent of all investments in extractive industry were by foreign companies. Oil production in Azerbaijan recorded a significant increase over the past few years and surpassed the 1 million bbl/d mark in 2009. The State Oil Company of Azerbaijan Republic (SOCAR) is responsible for producing oil and natural gas in Azerbaijan. It operates the country's two refineries, runs the pipeline system and manages oil and natural gas imports and exports.

Due to exports of oil and gas the economy enjoyed spectacular growth from 2005 to 2007, with an average GDP

Table 11. Key macroeconomic data, Azerbaijan, 2009

Population in millions mid 2010	GDP billion	GDP per capita	GDP real growth % change	General tax revenue	General tax expend. % of GDP	General government balance, % of GDP	General government debt, % of GDP	FDI inflows, millions	Domestic credit provided by banking sector %	Inflation, consumer prices, annual average, % change
8.4	43	4899	9.3	16.7**	27.6	9.4	99	473	23.1	1.4

Note: ** 2007 data.



Table 12. Key water consumption data by activity, 2010 (million cubic metres)

	Water from natural sources	Water consumption	Recycled water	Water lost in delivery	Discharge of untreated water	Discharge of treated water
Total	11,566.3	7,714.6	1,786.5	3,851.8	6,037.1	164.1
including:						
Agriculture, hunting, forestry	10,103.3	5,460.6	–	3,703.6	4,597.4	0.57
Mining industry	233.0	236.8	126.5	0.2	184.9	4.97
Processing industry	24.5	71.0	215.6	0.3	34.4	8.63
Electricity, gas, water production and distribution	1,134.6	1,816.1	1,411.0	145.8	853.6	21.59
Other	25.2	59.8	0.3	0.3	321.7	126.2

Table 13. 2008 Energy balance, Azerbaijan (thousand tonnes of oil equivalent (ktoe) on a net calorific value basis)

Supply and consumption	Crude oil	Oil products	Gas	Hydro	Geo-thermal solar, etc.	Combustible renewables and waste	Electricity	Heat	Total*
Production	44727	0	13670	192	0	2	0	0	58590
Imports	0	73	0	0	0	3	19	0	94
Exports	–37042	–3116	–4401	0	0	0	–70	0	–44629
International aviation bunkers**	0	–441	0	0	0	0	0	0	–441
Stock changes	–16	–41	–190	0	0	0	0	0	–247
TPES	7669	–3525	9078	192	0	4	–51	0	13367
Electricity plants	0	0	–496	–192	0	0	384	0	–304
CHP plants	0	–441	–4273	0	0	0	1669	539	–2505
Heat plants	0	0	0	0	0	0	0	0	0
Gas works	0	0	0	0	0	0	0	0	0
Oil refineries	–8077	7822	0	0	0	0	0	0	–255
Energy industry own use	–15	–389	–419	0	0	0	–371	–98	–1292
Losses	–275	0	–610	0	0	0	–272	–14	–1172
TFC	0	2766	3281	0	0	4	1331	427	7809
Industry	0	168	581	0	0	0	256	363	1368
Transport	0	1746	1	0	0	0	33	0	1780
Other	0	344	2633	0	0	4	1042	63	4087
Residential	0	118	2581	0	0	0	640	33	3372
COMMERCIAL AND PUBLIC SERVICES	0	3	43	0	0	0	346	30	422
Agriculture & forestry			209				55		270
Non–energy use			209	67					362



increase of 28.6 per cent. Despite a relative slowdown during the economic crisis in 2008 and 2009, the data show that since 2010 the Azerbaijani economy has been returning to its strong growth trend.

In 2008, mineral fuels, mining and quarrying comprised 52.5 per cent of GDP in Azerbaijan, with oil and gas making up almost all of it. In 2010, extractive activities counted for 46 per cent of GDP in 2010. Gold and copper are also exported.

In Azerbaijan, the Ministry of the Environment and Natural Resources (MENR) is responsible for environmental protection and natural resource management. Priority is usually given to the exploitation of natural resources that brings in capital. Some aspects of the environment in Azerbaijan are managed by different ministries and organisations, such as the Ministry of Industry and Energy and the Ministry of Economic Development. The highly complex nature of the environmental sector complicates communications between related organisations and delays the implementation of national environmental programmes.

Overall, the share of sectors with low value-added production remains significant and the tertiary sector is underdeveloped, particularly in comparison with OECD countries. Knowledge and technology-intensive branches have a very modest share (OECD).

2.4 Resource-intensiveness by sector

The combination of inefficient production and rising unsustainable consumption is dangerous to economic development, even in resource-abundant Azerbaijan. The environmental impacts of energy production, transport and use of natural resources are many and significant. They range from land and water contamination from fossil fuel extraction and transport to emissions of air pollutants and greenhouse gases (GHG) from fuel combustion.

The OECD's Towards Green Growth 2011 report indicated the seven most polluting industrial sectors including land transport, electricity, gas and water supply, coke and petroleum refining. All these sectors contribute to air pollution and increase CO₂ emissions in Azerbaijan.

Table 14. Tariffs per 1000 m³ (including tax) (AZN)

Wholesale prices of natural gas	
Population	100.0
Others (including greenhouses owned by legal and physical persons independent of ownership and location)	100.0
Retail tariffs of retail sales, treatment and transportation	
Wholesale of natural gas to retail sellers	42.0
Treatment of natural gas (Azerbaijan Qas Treatment company)	5.5
Transportation of natural gas (per 100 km distance)	2.0
Chemical, aluminium energy and steel (based on ore) companies that are connected directly to main gas pipelines and consume natural gas for production (monthly consumption no less than 15 million m ³ of gas)	42.0

The main consumers of energy are the residential and transport sectors, followed by industry. It appears that current energy tariffs, especially for gas and water, do not favour efficiency in using these resources. Electricity is at least 30 per cent cheaper for major industrial consumers and they pay 2.4 times less for gas.

2.5 Potential for short- and medium-term energy savings and reduction of CO₂ emissions

A review of research documents and interviews demonstrated that the greatest potential for short- and medium-term energy savings and reduction of CO₂ emissions is in energy, transportation and housing, especially public and commercial buildings.

Table 15. Tariffs for electricity (including tax) (Qepik, 100 qepik= 1 AZN)

Name of the service	Tariffs KWh/ hour
Wholesale tariffs	
Produced by Azerenerji	4.1
Produced by private small hydropower stations	2.5
Produced at wind power stations	4.5
Retail tariffs	
For all consumers	6.0
Chemical industry, mining (includes oil and gas), aluminium and steel production companies working with ores with stable average monthly consumption no less than 5000 MWT	
Daytime 08.00–22.00	4.2
Nighttime 22.00–08.00	2



Most electricity in Azerbaijan is generated at gas power stations. The power stations work on a steam cycle with an efficiency of 30–41 per cent. Adding a gas cycle to the process would increase energy efficiency to 50–56 per cent. A combination of gas and steam cycles can save approximately 1.5 million MWh of energy a year at the current energy production rate. One of the 13 gas power stations in Azerbaijan, the 400 MWT Shimal station, works with a combined steam-gas cycle at an efficiency of 56 per cent.

According to data provided by the Road Police Department the number of vehicles on the roads of Azerbaijan has increased by about three times, from 358,000 automobiles in 1993 to 1,040,000 in November 2011. From 1995 to 2010 the number of passenger cars per 1,000 people increased by 2.6 times, from 35 to 91. This increase has not only added to air pollution in the country but has also stimulated the construction of new highways and bridges, increasing the impervious surface for water runoff. The vehicles are imported into the country.

In 2010, Azerbaijan issued a decree «Adjusting the requirements for air emissions from the transport on the territory of Azerbaijan (imported or produced in Azerbaijan) to European standards». According to the decree vehicles imported or produced in Azerbaijan have to meet Euro-2 (1996) European emissions standard. It is planned to adopt Euro-3 fuel standards by late 2012. Changes in price for this kind of fuel are not expected, regardless of whether fuel conforms to Euro-2 or Euro-3. Action is needed to speed up the transition from Euro-2 standards to more stringent emissions standards to reduce air pollution from mobile sources. Considering the rapidly growing number of vehicles, especially private vehicles, their growing share in creating air pollution and the availability of reasonable public transportation options, increasing fuel prices for vehicles can be a viable short-term energy saving option.

Construction in Azerbaijan has been experiencing a boom for more than a decade. The total living area of buildings increased by 27 per cent between 1995 and 2010, adding 16.4 million m². There are no energy efficiency standards for buildings in Azerbaijan. Most apartments and houses have independent heating systems that mainly use gas because of its cheap price. Heating with electricity is also common. The efficiency rate of heating equipment has not been studied. Using insulation materials and energy-

efficient windows in the construction of buildings is rare. Most insulation materials are imported.

Adjustments made to existing regulations on buildings and the production of construction materials, including energy and resource efficiency requirements, will, on one hand, necessitate a reduction in energy losses in buildings and, on the other hand, raise resource efficiency in the production of construction materials, such as cement and steel, which are among the most resource intensive industries in the country. Energy savings could be realised by reducing heat-distribution losses, insulating buildings and installing metering and thermostats in buildings to prevent waste.

Both households and business in principle will follow price and other monetary signals to adjust their behaviour. The main strengths of price-based signals is that they can set the right incentives for broadly based actions that reduce environmental damage with the least resource cost, and also promote and guide green innovation. Considering the low price of energy in Azerbaijan and increasing GDP per capita, a gradual increase in the price of energy will be the quickest way to achieve CO₂ reductions. The tariffs for electricity in Table 12 show the significant differences in the price of electricity for industries and other customers. Adjustments to electricity charges may stimulate industry to be more energy efficient.

2.6 National initiatives to mitigate climate change

Information on initiatives to develop strategies for low-carbon economies is scarce. Climate change initiatives have not been explicitly formulated in any national programmes, but economic development programmes include actions with potential to increase energy efficiency and reduce CO₂ emissions. Ongoing and upcoming reforms in infrastructure offer a major opportunity to put the economy of Azerbaijan onto a sustainable path. They include state programmes on forestation and forest rehabilitation, the use of alternative and renewable sources of energy, development of the fuel and energy complex and others.

Forestation projects get a significant attention in Azerbaijan. National budgets for the management of pro-



tected areas have increased seven times. Three million trees have been planted which will serve as carbon sinks in the near future.

3. Perspectives for Green Growth/Resource Efficiency

3.1 Potential for Green Growth/Green Jobs?

Alternative energy has great potential in Azerbaijan and some potential exists for eco-tourism and agricultural tourism, as well as sustainable forestry (EC, 2011). The construction sector will need serious improvements in the next few years. Similarly, Azerbaijan needs to green its transport sector.

Intensive research into developing AES/RES potential has been carried out in Azerbaijan, revealing high potential in wind, solar and hydropower energy. The country's biogas and thermal power resources are quite substantial as well. Azerbaijan's climatic conditions provide for solar energy heat and electric power generation. Annual solar hours are 2,000-2,800. Due to Azerbaijan's geographic position, natural resources and economic infrastructure, annual potential of wind energy is estimated to be 800 MW, which amounts to some 2.4 million MWh of electric power a year.

The construction of dozens of small HPPs on rivers and water reservoirs would annually secure some 3.2 million MWh of power. With the construction of new small HPPs, CO₂ emissions are expected to fall by 6,393,000 tonnes.

In the past decade Azerbaijan has established eight National Parks. The parks were established in territories that were strictly protected in the past. The government of Azerbaijan has included 52 Important Bird Areas across the country in its official national tourism action plan, ensuring the protection of the areas and even the provision of infrastructure for bird watching tours. This marks that Important Bird Areas (IBAs), as developed by BirdLife International, have been officially recognised in a national tourism plan.

Azerbaijan is also well known for its hospitality. It has rich biodiversity as well as large areas of farmland. It is these areas of farmland and, more broadly, the rural areas of Azerbaijan, which could best offer and support unique tourism products. Coupled with the National

Parks these areas could attract international and local tourists who are looking for more remote getaways that will allow them to enjoy nature, view traditional cultures and sample local cuisine. Agro-tourism offering tours and bed and breakfasts have potential to create green jobs in rural areas.

The country receives a large influx of tourists, particularly in the northern region. Major tourist companies have been involved in the preparation of a management plan and strategy for regional tourism development in Azerbaijan. The number of hotels and recreation areas in the regions has been increasing rapidly. The creation and operation of sustainable tourism infrastructure using local resources and products is the key to supporting sustainable livelihoods among local communities.

More stringent requirements on erosion control and storm-water runoff can generate jobs for people who will produce materials such as filter fabrics, design and build silt fences, stabilise soils to reduce the amount of sediment carried off construction sites, seed grass and fertilise vegetation cover to provide long-term stabilisation of exposed surfaces.

With the support of international development agencies two organic agriculture projects have been implemented successfully. The success of these enterprises demonstrates that there is potential for this sector considering the fact that the demand for organic food is growing abroad and Azerbaijan itself.

3.2 Current developments in Green Growth

MENR is active in supporting afforestation projects, the development of forest management policies and legislation and the development of fish farming. Particular attention is given to the protection of forests. Over 3 million trees were planted to improve land in Baku and Apsheron. Eight National Parks have been established over the past decade.

The reconstruction of the Samur-Apsheron irrigation system and the construction of the 262 km long Oguz-Gabala-Baku water pipeline with a capacity of 900,000 m³ is under way to improve the water supply. ADB is financing the rehabilitation of the water supply and sanitation network in the capital Nakchivan. Funding consists of a series of loans aimed at improving the quality



and coverage of water and sanitation services for about 70,000 people in the city. Renovations of the Hovsan Aeration Station have made a significant contribution to solving sewage problems in the capital, Baku.

Azersu is the main provider of water in the country, and tariffs are set nationally for different types of consumers. The tariffs were last increased by approximately 50 per cent in February 2011 (from USD 0.23 to USD 0.36 per cubic meter for domestic users and USD 0.8 to 1.2 for other users), demonstrating a willingness to increase revenues. Metering rates also increased during the period, with 8.3 per cent of connections to water supply networks metered by 2005, going up to 12.5 per cent by 2009.

Three hydroelectric power stations are to be built in Azerbaijan this year, in Goychay, Gusar and Ismayilli regions. A total of 200 mini-hydroelectric power stations are planned across the country. Besides resolving the energy problems related to power supply in distant rural areas, building of the plants would contribute to solving certain social problems.

Most of the jobs related to the energy sector and almost all jobs related to the preservation or restoration of the environment are in the government sector. With a minimum wage of 85 AZN, the average salary in Azerbaijan ranges from 160.3 AZN for employees in forestry and fishing to 592.2 AZN for employees in the energy sector. In comparison, employees of extractive industries in both the private and the government sector earn on average 1004.7 AZN per month.

Low salaries, severe restraints on funding at publicly owned research institutes and rote learning practices at universities are major challenges to innovation. The private sector does not show sufficient interest in or support of research or in-house technological advancement as most of the technology is imported.

3.3 Green products and technologies

There is little demand for green products in Azerbaijan. The relatively high price of green products is a major barrier. There is also low environmental awareness among the population about the footprint of the products they use and a lack of government support for green products.

There is sporadic and limited use of green technology in the country and most technology, such as wind turbines, solar panels and heat pumps, are imported. One of several infrastructural projects implemented in Azerbaijan is Sumgait Technologies Park (STP), a large-scale construction that is bringing cutting-edge European technologies to construct new plants. The operating enterprises employ 3,000 workers but their number is planned to increase to 5,500 employees.

Using modern technologies the plants will produce equipment for energy and machine-building industries for domestic needs and export. This Industrial Park will consist of 17 factories and produce high quality products, including various types of cables, transformers, high voltage equipment, hydro-turbines, water pumps, electrical engines, pipes and gases (argon, oxygen, nitrogen). Based on German technology, Sumgait Technologies Park Solar plans to produce collectors to harness solar energy for heating. The products produced there will meet high quality standards. Sale of these products is planned not only in Azerbaijan but also on European markets. The intention is to produce photovoltaic panels in the future. Currently, eight plants are operating in the SIP area and 12 plants are under construction.

According to the Ministry of Economic Development several more industrial parks and centres will be created in different regions of the country. It is also planned to develop a network of innovation and training centres for business. Up to 30 contemporary production units will be placed in the Park.

A few small and medium-sized private companies have recently got involved in projects utilising alternative energy sources, such as biogas, wind, solar and heat pumps.

What is the quantity and quality of green jobs (ILO green jobs definition)?

There are no data on the quantity and – especially – the quality of green jobs. The quality and wages of jobs that can be attributed to green jobs vary significantly depending on sector and qualifications. Since most green jobs are created by state entities the wages are not high.



Table 16. Net average wage by economic sector (AZN)

Activity types	2010
Average	331.5
Agriculture, forestry and fishing	160.3
Mining includes oil & gas industry	1004.7
Treatment industry	320.5
Electricity, gas and steam production, distribution and supply	349.4
Water supply, waste management	197.7
Construction	505.8
Trade, repair of vehicles	282.8
Transportation and warehouses	395.1
Lodging and food industry	333.7
Professionals, science and technical activity	592.2
Public service employees	425.7

3.4 Knowledge and innovation: what is the current level of technological development?

Framework conditions are still unsupportive of investment and innovation in general and of green investment and innovation in particular. Publicly-owned research institutes and design bureaus are still the central players in the current innovation system. The transition period has seen the diversification of the original institutional landscape, which now includes a few independent research organisations in addition to traditional state-run research institutes and universities. Unfortunately, those supporting research often lack a critical mass of resources. In 2010, investment in science amounted to 0.8 per cent of the public budget.

What are the main economic obstacles to the creation of a low-carbon economy and the creation of green jobs?

Azerbaijan lacks the strong drivers for environmental improvement that exist in Western countries (public demand, price signals). Going green is not part of the economic restructuring and diversification that is necessary to overcome the current rentier model of economic growth in Azerbaijan. The basic legal and policy frameworks are often in place and keep improving, but further important cross-cutting reforms are still needed. Implementation and maintenance of existing programmes, laws and regulations is a real problem. Progress is taking

place at the policy development level, but is not always accompanied by action plans and effective legislation.

Although the low level of available financial resources is a common constraint in the implementation of many environmental policies this is not always the most important barrier blocking the way to progress. Such barriers include, among others, poor business climate, brain drain due to emigration, a large informal sector and relatively low labour productivity.

Private sector investors are not yet active in the area of energy efficiency. Among reasons for this is a lack of experience concerning how to select and formulate energy efficiency investment projects. Due to the current risks related to long-term investments, commercial banks are reluctant to give long-term loans. The situation with environment-related infrastructure – such as waste, energy and urban transport – is often characterised by unsustainable financial models that result in problems with maintenance, poor service and negative environmental impacts (OECD).

In Azerbaijan, MENR combine responsibilities for managing both the use of natural resources and environmental protection. Under this institutional arrangement, particularly when economic and regulatory functions are combined, the extraction of short-term dividends from the country's natural capital often overshadows goals related to its long-term sustainable use (OECD).

4. The Role of Politics and Society

Public policy is needed to create the requisite conditions to develop markets to channel private investment into the greening of the economy. These conditions would include sound regulatory frameworks, including a government commitment to green procurement to promote development of green economic sectors and limits on spending that deplete natural capital (A. Chalebi).

4.1 Public debates on environmental questions

Popular support for cross-cutting environmental policy reforms is very weak. Environmental NGOs or civil society groups are not actively involved in climate change policies. Environmental awareness among the population, especially in the rural areas, is low. The few envi-



ronmental awareness programmes focus on the cities, especially Baku, but have had limited scope and audience. The environmental awareness of a few people is unlikely to create much demand for green products or technologies.

Public hearings on major industrial projects are few and formal. Azerbaijan continues to struggle with every step of the environmental information chain (OECD). Although some environmental indicators exist, they are hardly used anywhere for policy analysis or linked to policy targets.

4.2 Role of the state

The Government of the Azerbaijan Republic has adopted a number of important programmes, including:

- government programme on using alternative and renewable sources of energy;
- national programme on regeneration and forestry development;
- sustainable development programme from an ecological point of view.

In Azerbaijan there are also a number of laws that have the potential to reduce energy waste and resource inefficiency and to promote green growth.

Following the adoption of the State Programme for the Development of Alternative Energy a number of laws have been enacted, and in 2009 a presidential decree created the State Agency for Alternative and Renewable Energy Sources (ABEMDA). The Agency began operations in 2010. Currently, the Agency is working on a number of wind and solar energy projects.

In 2011 the first large-scale alternative energy project was launched in Gobustan. The capacity of this hybrid station is 5.5 megawatts. The facility is planned to produce wind, solar, biogas and geothermal energy and was built using funds appropriated from the national budget. The station, in addition to ensuring the availability of stable and environmentally friendly electric power for a single town with a population of some 20,000 persons, will also serve as a test site for studying new renewable energy technologies and as a training centre for students

of technical universities and researchers.

The government of Azerbaijan has already provided 14.6 million AZN to the ABEMDA. There are plans to launch a minor dam producing 1 MW by May 2013. Over USD 700,000 was provided for construction, which is 30–50 per cent of construction costs. Azerbaijan intends to build another 200 minor dams.

In November 2011 the Ministry of Ecology and Natural Resources organised an international exhibition entitled »The Caspian: Technologies for the Environment (CTE)«. The event presented new technologies in the fields of environmental protection and natural resource management and attracted 76 companies from 13 countries. Along with the exhibition there was a conference »The Caspian: Environmental Technologies and Opportunities for a Green Economy«.

Nevertheless, the environmental authorities suffer from institutional and organisational weaknesses. Additional weaknesses include a shortage of skills related to the functioning of market economies; a poor understanding of the role of information management in policy development and implementation; strong command-control management; weak horizontal and vertical inter-institutional coordination; as well as low environmental awareness on the part of major economic agents.

4.3 Urgently needed political regulations

Government can play an important role by clarifying the future direction of energy production and infrastructure development, and making key policy decisions to give business the confidence it needs to undertake low carbon investments. Policies to adjust prices for natural resources such as natural gas, water and fuel, in principle, can be the best cure for unsustainable production and consumption while stimulating technological change.

Consulting and partnering with the private sector can help increase the feasibility and market-friendliness of proposed policies. This can facilitate greater private sector engagement in achieving low carbon growth and improve the sustainability and scale-up of green investments.

Improving the investment climate and stimulating competitive markets may help to maximise financial inflows



of private finance to the green economy. Government support in terms of tax incentives has major potential to stimulate energy and resource efficiency projects and promote green growth.

The green growth agenda can be closely aligned with some of the most central development goals of Azerbaijan, such as economic diversification, increasing the efficiency of production and thus competitiveness in global markets, fully harnessing the export potential, avoiding job losses and contributing to fiscal stability. The government can promote green growth by including it as a criterion for finance allocation to projects or programmes. The most promising sectors for the rapid reduction of energy and natural resource inefficiencies are energy, buildings and construction, procurement and transport.

4.4 Nationally Appropriate Mitigation Plan (NAMP)

A NAMP, including measures to promote energy efficiency as well as indicators to assess the energy savings achieved by these measures, will be a powerful driver for change. The plan should set concrete medium-term and long-term energy efficiency targets to reduce greenhouse gas emissions and include operating and maintenance costs. The financial risks of non-compliance with regulatory requirements need to be increased through the reform of liability regimes and fines. Limited government subsidies should be included in the NAMP to stimulate energy efficiency projects.

Skills Development

Training in skills related to green technologies and industries can help position the country to take advantage of any new low carbon growth opportunities and markets. Policies can make the transition to green growth quicker and more beneficial by minimising skill bottlenecks, by helping workers to move from contracting to expanding sectors. Broad awareness-raising programmes are needed to increase public understanding of climate change and the implications of resource depletion and their possible impacts on people's livelihoods and welfare. This can be implemented formally, for example through schools, or informally, through public awareness campaigns.

Transport

Transport is best approached holistically and should include public transport, clean, sustainable fuels and efficient vehicles. Further work is required to develop regulations to combat air pollution by mobile sources (fuel standards, exhaust gas emission standards) and enforcement measures (vehicle inspection programmes). Reforming taxes on imported vehicles and fines for polluters is also important. A requirement to put a more »consumer-friendly«, colour-coded label displaying CO₂ emissions on all new cars could give consumers clear information about the environmental performance of different vehicles. Higher taxes or charges on fuels can support further development and maintenance of public transportation.

Carbon Market

Carbon finance, for both mitigation and adaptation, is a potentially important source of finance for environmental expenditure that Azerbaijan needs to exploit extensively. Policies directed to helping enterprises in Azerbaijan to engage in the global carbon market can produce efficient and cost-effective solutions and create incentives to ensure that proper emissions are reduced first where it is cheapest to do so. The policies need to consider public funds to catalyse private investment. This can be achieved through a range of mitigation policies, such as taxes on the production or consumption of carbon intensive goods, subsidy of new infrastructure, regulatory interventions and performance standards.

The development of a Climate Change Fund and an appropriate policy framework, such as a NAMP and/or a low carbon growth strategy, can help to convince donors that climate change is taken seriously in Azerbaijan, and that any funding will be spent transparently and effectively. The policies should include the pursuit of a low carbon growth path as a prerequisite for receiving finance either for mitigation or adaptation.

This is already some activity in this direction. A wind farm in Yeni Yashma has already received CDM credits for CO₂ reductions. Five more projects are in the process of applying for credits. Implementing carbon offset projects can spur a whole industry around them, which involves project developers, validators, verifiers, standard setting entities, consultants and many more, which have



a strong vested interest in the continuous development of emissions trading.

Green Procurement

In Azerbaijan, where the public sector accounts for more than 30 per cent of the economy, public purchasing can have a major impact by creating demand for green products.

By promoting green procurement, the government can require that when making purchasing decisions the relevant agencies consider the environmental impacts of products and services, along with price, performance and other traditional factors, to prevent waste and pollution. The assessment can consider raw materials acquisition, production, manufacturing, packaging, distribution, reuse, operation, maintenance or disposal of the product or service. Environmentally preferable products may include less or non-toxic products, products manufactured with recycled content, bio-based products, products and services that reduce waste, energy efficient products and products that reduce water consumption.

Housing-building codes for energy-saving purposes and relevant programmes to educate the promoters of residential housing projects, companies and home builders (master builders, architects) can play a key role in achieving energy reductions in this sector. Deposit-refund systems – beverage and chemical containers – were very successful during Soviet times.

4.5 Role of international/European standards

Climate change and other international environmental policies have given a powerful incentive to the environmental administration to improve its management practices in order to be able to compete successfully for donor funding. Internationally recognised issues, such as climate change, biodiversity conservation and direct involvement of other ministries – such as the Ministry of Industry and Energy and the Ministry of Economic Development – in these processes has raised the profile of the environmental authorities.

International projects and initiatives play a major role in building capacity, which is the key to supporting progressive environmental policies. Advisory work provided

with the intention of facilitating the adoption of international standards in Azerbaijan enables the development of supportive policy measures. Projects conducted by the European Bank for Reconstruction and Development, UNDP, UNECE and other organisations have had positive outcomes due to their capacity-building and funding elements.

4.6 Main social, cultural and political obstacles

The social and cultural challenges include decentralising responsibilities in a fiscally-responsible manner; concerns about the competitiveness of the economy and social impacts of environmental policies; and a common perception among some policymakers that environmental protection, especially climate change, is a hindrance to economic growth, rather than a necessary element for socio-economic development over the long term.

There is a lack of advocacy groups that can actively challenge on environmental issues, such as high resource consumption, pollution, recycling and use of sustainable transport. The watchdog role of NGOs and the scientific community is essential to pursue a long-term sustainable green growth agenda. Trade unions are formal with little power to advocate green economy strategies that generate employment opportunities to ensure social sustainability. There are very limited opportunities for NGOs to receive sufficient and independent funding to perform environmental research or lobby to promote environmental issues in parliament.

There is growing concern over transparency and measurement of performance. Civil society is concerned that oversight of financial intermediary compliance with environmental and social safeguards may be weak. Ensuring that financial intermediaries and funds meet acceptable environmental and social standards is important. Independent evaluation will be critical to ensure that the policies serve the public good and sufficient incentives are in place to meet the needs of pro-poor investments. A rigorous, comprehensive, transparent and inclusive process around green economy policies can create fertile ground for green growth in Azerbaijan.



About the author

Naila Aliyeva holds a Master of Science in Environmental Science and a Diploma with Distinction in Biology and Chemistry. She is a passionate environmental professional with more than 9 years of experience in projects and complex operations with the ability to effectively network and build strategic relationships with internal and external partners and stakeholders. The author won the BP President's Award for Best Practice Guidance in Waste Management.

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