

UNITED NATIONS ECONOMIC COMMISSION FOR EUROPE

Promoting Green Innovation

Policy assessment and recommendations

Azerbaijan



UNITED NATIONS



UNECE

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November 2013

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Acknowledgements

This assessment is one of the outcomes of the UNECE technical cooperation project, "Building the capacity of SPECA countries to adopt and apply innovative green technologies for climate change adaptation".

The assessment was drafted by Rumen Dobrinsky, independent consultant. The general editor was Michiko Enomoto, who also provided substantive comments. Christina O'Shaughnessy copyedited the text. The cover page was designed by Mariana Darnet.

We gratefully acknowledge the financial support from the United Nations Development Account.

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1. Introduction: green economy, green growth, green innovation

Mitigation and adaptation are two types of policy responses to human-created climate change effects. “Mitigation” action addresses the alleged causes of climate change, firstly by reducing greenhouse gas emissions. “Adaptation” refers to action aimed at adjusting to climate change and lowering the presumed risks associated with it. Both types of policies are needed as part of the comprehensive policy response to global climate change. Success in mitigation reduces the impacts to which people have to adjust, while more preparatory adaptation would reduce future climate change impact.

Both types of policy action are associated with the notions of “green economy”, “green growth” and “green innovation”. The United Nations Environment Programme (UNEP) defines the green economy as follows:

“one that results in improved human well-being and social equity, while significantly reducing environmental risks and ecological scarcities. In its simplest expression, a green economy can be thought of as one which is low carbon, resource efficient and socially inclusive.”¹

The main prerequisites for greening the economy are the reduction of carbon emissions and pollution. This, in turn, implies boosting energy and resource efficiency and preserving biodiversity.

The patterns of economic growth that will lead to a green economy are referred to as “green growth”. They aim to harmonize economic growth with environmental sustainability, improve eco-efficiency of economic growth and enhance the synergies between the environment and the economy. In the context of the Millennium Development Goals, green growth is essential for achieving sustainable development.²

Green growth definitions stress the following characteristics:³

- Growth that maintains or restores environmental quality and ecological integrity, while meeting the needs of all people with the lowest possible environmental impacts
- Growth that emphasizes environmentally sustainable economic progress to foster low-carbon, socially inclusive development
- Growth ensuring that natural assets continue to provide the resources and environmental services on which our well-being relies
- Efficient in its use of natural resources, minimizing pollution and environmental impacts, resilient to natural hazards.

¹ Source: <http://www.unep.org/greeneconomy/>.

² Source: <http://sustainabledevelopment.un.org/>.

³ UNDESA, *A Guidebook to the Green Economy* Issue 1: Green Economy, Green Growth, and Low-Carbon Development, 2012.

In turn, as innovation is widely considered as the main source of economic growth and job creation in the modern economy, green economy and green growth are strongly associated with the notion of green innovation (sometimes also referred to as “eco-innovation”).

Eco-innovation is usually defined as having the following main characteristics:

- Innovation aiming at progress towards the goal of sustainable development, through reducing impacts on the environment or a more efficient/ responsible use of resources⁴
- New products and processes that provide customer and business value but significantly reduce environmental impacts⁵
- Novel goods, processes, systems, services, and procedures with a life-cycle minimal use of natural resources per unit output, and a minimal release of toxic substances⁶
- New products and processes that result, throughout their life cycle, in a reduction of environmental risk, pollution and other negative impacts of resources use.⁷

This paper draws on these notions to present an assessment of Azerbaijan’s institutional and absorptive capacity to adopt and adapt innovative green technologies and the prospects of its doing so through appropriate policy action.

2. The local context

Azerbaijan is a small country with 9.2 million inhabitants, occupying 86,600 km² on the shores of the Caspian Sea. It has rich oil and gas reserves. Back in the late 19th century, Azerbaijan was one of the world’s leading oil producers but the sector wasn’t greatly developed during Soviet times.

After the country’s independence, the hydrocarbon sector saw a new revival, thanks to new exploration leading to the discovery of significant new oil and gas reserves. The resulting upsurge in the sector produced an extraordinary economic boom during the past decade, which has been unmatched in recent history on the global scene (Table 1).

Between 2000 and 2010, Azerbaijan’s gross domestic product (GDP) at constant prices quadrupled, thanks to more than a 15% average annual rate of growth of real GDP, which is a unique achievement for any economy, making Azerbaijan the fastest-growing economy in the world during these years.

Over the same period, as measured by internationally comparable GDP per capita, Azerbaijan jumped three notches in the World Bank classification scale, from being classified as a “low-income country” in 2000 to being treated as an “upper middle-income country” (with a level of GDP per capita at more than 7,000 USD) by 2011.

⁴ Source: http://ec.europa.eu/environment/ecoinnovation2012/2nd_forum/inspiring_0.html

⁵ Peter James, “The Sustainability Circle: a new tool for product development and design”, *Journal of Sustainable Product Design*, 1997 (2), 52:57.

⁶ SYSTEMATIC *Eco-Innovation Report 2008*. Europe Innova Innovation Watch (www.technopolis-group.com).

⁷ EU MEI Project, Final Draft: “Measuring Eco-Innovation”, March 2008.

Table 1. Main macroeconomic performance indicators, 2000-2011

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
GDP at constant prices, annual % change	11.1	9.9	10.6	11.2	7.0	26.4	34.5	25.0	10.8	9.3	5.0	0.1
Of which: oil sector		7.9	3.9	0.6	2.5	66.3	63.1	36.8	7.0	14.8	5.0	-9.8
Non-oil sector		10.4	12.3	14.7	14.4	8.5	10.9	12.0	17.2	3.0	7.6	9.4
Share of oil sector in GDP, %	35.2	39.9	39.1	37.8	38.5	51.6	60.8	64.4	62.1	54.6	55.7	
GDP at current prices, million USD	5,273	5,708	6,236	7,276	8,680	13,239	20,983	33,050	48,853	44,297	52,909	64,781
Gross industrial production, real, annual % change	6.9	5.1	3.6	6.1	5.7	33.5	36.6	24.0	6.0	8.6	2.6	-5.0
Gross fixed investment, real, annual % change	2.6	20.6	60.0	61.5	16.9	16.6	15.2	23.8	31.8	18.4	18.5	21.2
Share of gross fixed investment in GDP, %	23.1	22.9	34.1	52.9	57.7	41.3	29.7	21.5	19.8	18.9	19.0	25.2
Share of exports in GDP, %	33.1	40.5	34.8	35.6	41.7	32.8	30.4	18.3	97.8	33.2	40.4	41.0
Share of imports in GDP, %	22.2	25.1	26.7	36.1	40.5	31.8	25.1	17.3	14.7	13.8	12.5	15.1
Total foreign investment (direct and portfolio), million US dollars	927.0	1,100.0	2,234.9	3,371.0	4,575.5	4,893.2	5,052.8	6,674.3	6,847.4	5,468.6	8,247.8	
Of which: oil sector	546.1	941.8	1,693.0	2,972.4	4,088.1	3,800.9	3,439.3	4,071.5	3,354.2	2,413.7	2,957.3	
Of which: financial credit						698.4	983.5	1,576.6	2,357.9	1,438.3	3,405.9	
Total foreign investment, % of GDP	17.6	19.3	35.8	46.3	52.7	37.0	24.1	20.2	14.0	12.3	15.6	
Consolidated government fiscal balance	-0.6	-0.4	-0.5	-0.8	1.0	2.6	-0.2	2.6	20.3	7.0	14.6	13.3
Oil fund assets, million USD								2,475	11,219	14,900	22,766	28,730
Current account balance (- deficit), % of GDP	-3.5	-0.9	-12.3	-27.8	-29.8	1.3	17.7	27.3	35.5	23.0	28.0	26.5

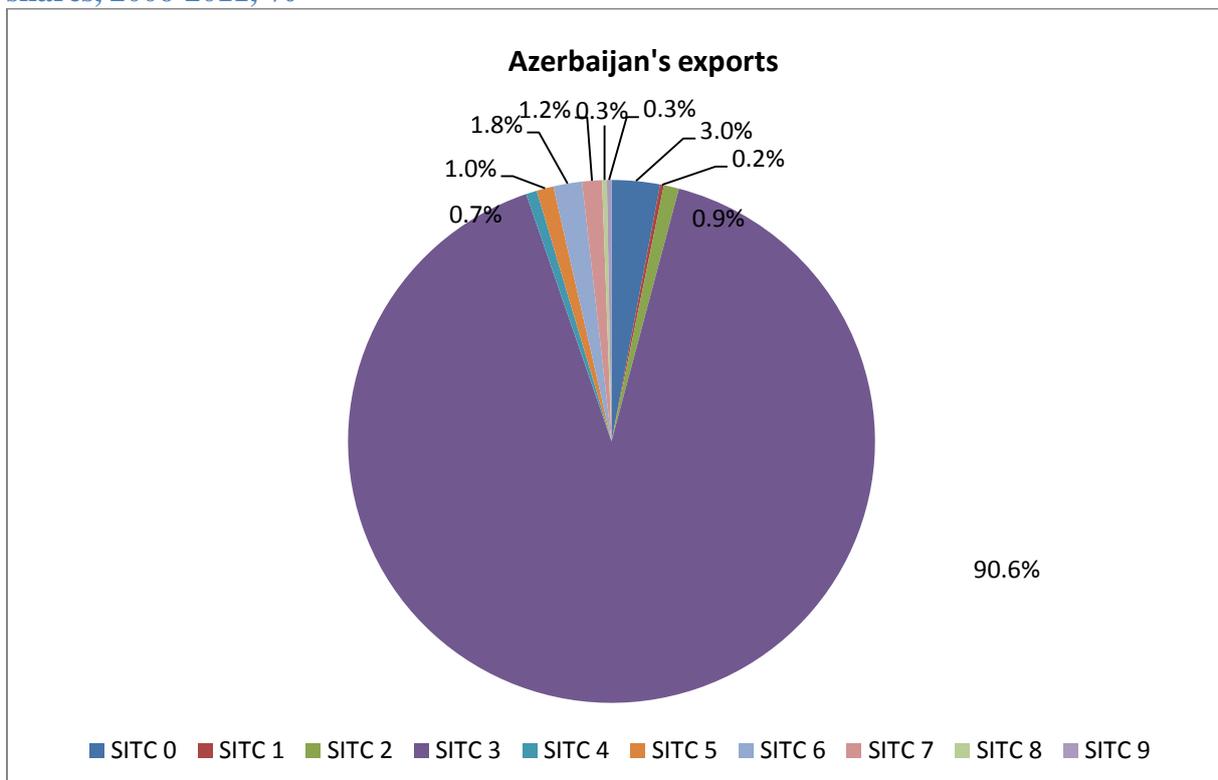
Source: State Statistical Committee of the Republic of Azerbaijan; IMF, World Bank.

The recent brisk economic growth was associated with the widening and deepening of the exploitation of Azerbaijan's huge oil and gas reserves. After a decade of hefty investment in the oil and gas sector, mostly by multinationals (Table 1), major new production capacities and pipelines were put into operation, including the Baku-Tbilisi-Ceyhan (BTC) oil pipeline and the Baku-Tbilisi-Erzurum (BTE) gas pipeline.

This made possible an unprecedented expansion of the exports of hydrocarbons with a multitude of positive knock-on effects on the economy. According to World Bank estimates, thanks to the massive investment in the oil and gas sector, by 2005 Azerbaijan was the only CIS country to have increased its capital stock above its pre-transition level.⁸ At the same time, according to national statistics in 2010, fixed assets in the mining industry accounted for 42% of all fixed assets in the national economy.

The downside of these developments is the rather skewed structure of Azerbaijan's economy which is greatly dominated by the oil and gas sector; with gas accounting for more than half of the country's GDP and 90% of its exports (Table 1 and Chart 1). While the structure of imports is dominated by the imports of machinery and transport equipment (SITC7)⁹, the latter mostly reflects equipment for the oil and gas industry. Agriculture is the second most important sector in Azerbaijan's economy, especially in terms of employment. According to the national statistics in 2011, it accounted for 38% of all employed persons in the country.

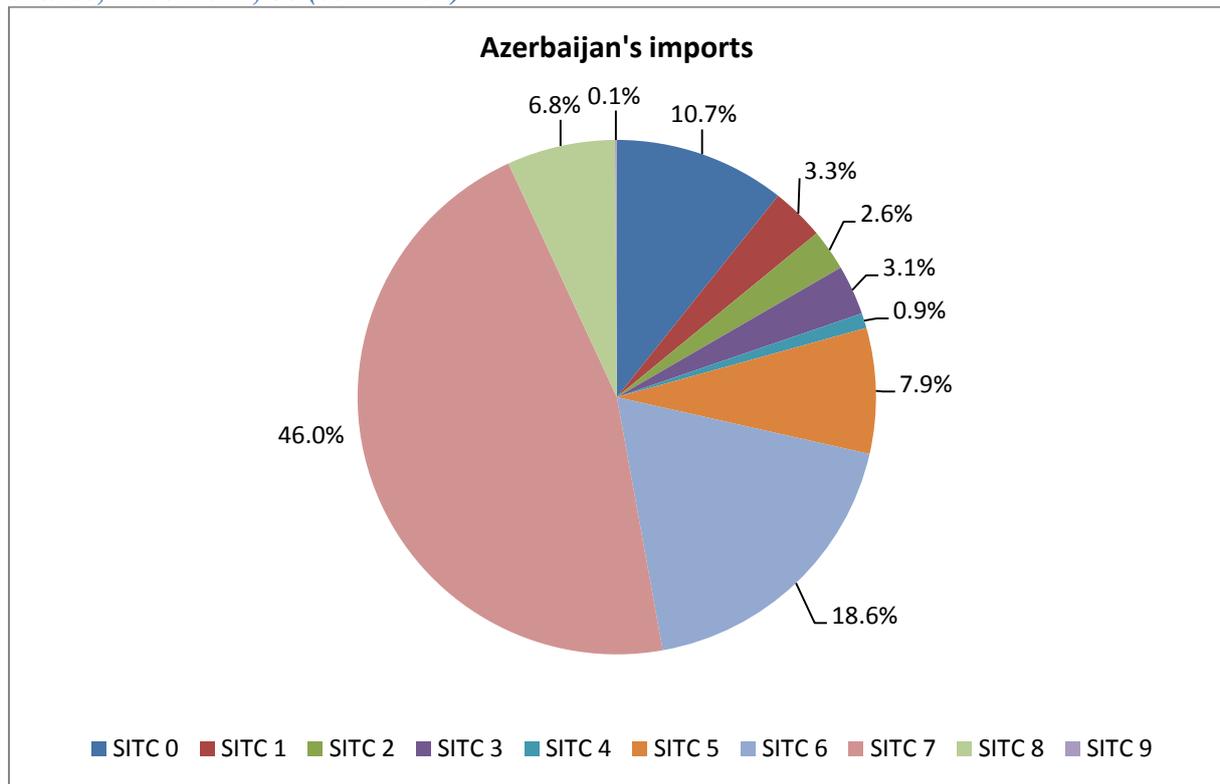
Chart 1. Structure of Azerbaijan's exports and imports by SITC categories*, average shares, 2006-2011, %



⁸ Harun Onder, *Azerbaijan: Inclusive Growth in a Resource-Rich Economy*. A World Bank Study, 2013.

⁹ See full set of SITC (Standard international trade classification) categories under Chart 1.

Chart 1. Structure of Azerbaijan's exports and imports by SITC categories*, average shares, 2006-2011, % (continued)



Source: State Statistical Committee of the Republic of Azerbaijan.

* Standard international trade classification categories:

- SITC 0: Food and live animals.
- SITC 1: Beverages and tobacco.
- SITC 2: Crude materials, inedible, except fuels.
- SITC 3: Mineral fuels, lubricants and related materials.
- SITC 4: Animal and vegetable oils, fats and waxes.
- SITC 5: Chemicals and related products, not elsewhere specified.
- SITC 6: Manufactured goods classified chiefly by material.
- SITC 7: Machinery and transport equipment.
- SITC 8: Miscellaneous manufactured articles.
- SITC 9: Commodities not classified elsewhere in SITC.

While the resource boom in Azerbaijan is still under way, it is expected to peak soon, as the current rate of extraction is high relative to the country's proven reserves of oil and gas. This reinforces the need for shifting away from the energy sector by developing the non-oil economy.

Despite the declared strategic policy goal of structural transformation towards diversification and balanced growth, there have been no visible signs of such changes at the macro-level, and the hydrocarbon sector's share in the economy has kept growing unabated. Thus the shift towards a more diversified structure of the economy remains a major challenge for policymakers, given the expectation that the oil boom will not last long.

The massive presence of FDI investors is an asset that has not been fully used so far. These investors are both potential sources of positive local spillovers and technology transfer into the domestic economy and also a prospective channel for further integration into the global economy.

The surge in the exports of hydrocarbons was accompanied by massive flows of windfall public revenue. Faced with the challenge of properly managing these funds, the Government established in 2000 the State Oil Fund of Azerbaijan (SOFAZ), with the mission to safeguard macroeconomic stability and promote investment in non-oil sectors of the economy.

To date, SOFAZ has accumulated oil-related revenue close to USD 30 billion. Some of the Fund's revenues are transferred to the budget on an annual basis (at present these transfers account for more than half of the Government's total annual revenue). Another portion of its revenues is invested in accordance with the Long-term Oil Revenue Management Strategy and the annually approved investment policy of the Fund.

The surge in oil-related public revenue enabled the Government to engage in large-scale public infrastructure projects and boost public-sector wages, as well as pensions. Fast economic growth and public policies contributed to a substantial improvement in living standards and a large reduction in poverty, with the aggregate poverty rate declining from 49.6 per cent of the population to about 15.8 per cent between 2001 and 2008.¹⁰

Azerbaijan's economy was not greatly affected by the immediate negative effects of the global economic and financial crisis and continued to grow steadily through 2010. The aftershocks of the crisis only reached Azerbaijan in 2011, putting brakes on the rapid economic expansion of previous years. It appears that the pace of GDP growth during the 2010s will be much more moderate than that recorded in the previous decade.

Business environment

Thanks to comprehensive and wide-ranging reforms during 20 years of independence, Azerbaijan boasts a relatively more favourable business environment than other CIS countries. The Government pursues an "open door" policy to foreign investors, which is seen as key for the diversification of the economy.

Foreign investment in Azerbaijan is regulated by several legal acts: the Law on the Protection of Foreign Investment (1992); the Law on Investment Activity (1995); the Privatization Law and the related Privatization Programme. The legal system provides foreign investors with the opportunity to repatriate profits, provided all applicable local taxes have been paid.¹¹

With some exceptions (such as the tax regime), the authorities do not offer special privileges to foreign investors but rather seek to establish a business climate that is generally conducive to investment.

The Azerbaijan Investment Promotion Agency (AzPromo) is tasked with promoting both foreign and domestic investment. One of its priorities is to facilitate business investment in areas that would contribute to economic diversification. It seeks to identify sectoral priorities corresponding to Azerbaijan's competitive advantages. Apart from targeting direct investment in non-oil sectors, it facilitates downstream business cooperation between oil and non-oil sectors.

¹⁰ Harun Onder, *op. cit.*

¹¹ *Commercial Laws of Azerbaijan. An Assessment by the EBRD, March 2011.*

One successful recent initiative in support of business was the establishment in 2008 of a “one-stop shop” for entrepreneurs who wish to register new businesses. Its implementation helped reduce registration time from weeks or even months to a few days. Another initiative that enjoys popular support is the online tax payments service.

At the same time, a recent European Bank for Reconstruction and Development (EBRD) assessment of Azerbaijan’s legal business environment revealed that in order to meet international standards it needs some further development. In particular, this assessment identified legal shortcomings due to the superimposition of new laws and decrees upon the old Soviet system, which created potential legal conflicts. In addition, some laws contain ambiguities or do not address pertinent details that may be of importance to foreign investors.¹²

Tax regimes

Azerbaijan applies three different tax regimes.¹³ The statutory tax regime applies to all legal entities (both local and foreign) with the exception of those that are governed by a Production Sharing Agreement (PSA) or a Host Government Agreement (HGA). PSA and HGA tax regimes establish specific rules that generally apply to oil-operating companies, foreign investors serving as contractor parties and foreign-service companies working with such parties. HGAs are exclusively applied to the BTC and BTE pipelines.

International cooperation and trade relations are governed by a range of agreements. Azerbaijan’s relations with the EU are governed by the EU-Azerbaijan Partnership and Cooperation Agreement (PCA), which entered into force in 1999. Azerbaijan is also party to the Economic Cooperation Organization Trade Agreement (2003, with neighbouring States). Accession negotiations between the World Trade Organization (WTO) and Azerbaijan have been under way since 1997 and are at an advanced stage.

Bilateral negotiations focus on market access based on revised offers in goods and services. Multilateral work is proceeding on the basis of a Factual Summary of Points Raised since December 2008. National legislation in Azerbaijan is being revised regularly to reflect the outcomes of WTO negotiations.

A number of legislative acts that focus specifically on facilitating entrepreneurial activity have been adopted, including the Law on Entrepreneurship (1992) and the Law on State Registration of Legal Entities (2003). The National Confederation of Entrepreneurs (Employers) Organizations (established in 1999) is a non-governmental organization coordinating and supporting entrepreneurial activity and providing various forms of support to entrepreneurs.¹⁴

Despite the declared public support, entrepreneurship is still underdeveloped. According to data from the State Statistical Committee, in 2011 the share of small entrepreneurship (individual entrepreneurs and SMEs) in the total gross value added was 2.6% and that of the non-oil sectors was 5.0%. The relatively low shares in output were partly due to lower labour productivity; thus the share of the small entrepreneurship sector in total employment in 2011 was significantly higher, amounting to 7.4%.

¹² *Commercial Laws of Azerbaijan. op. cit.*

¹³ *Doing Business and Investing in Azerbaijan* 2011 edition. PwC Azerbaijan (www.pwc.com/az).

¹⁴ *Small and Medium Entrepreneurship in Azerbaijan*, Country Assessment, Center for Economic and Social Development (CESD), 2012.

Among the reasons for the underdevelopment of entrepreneurship, one can point out:

- The skewed economic structure dominated by the oil and gas sectors (which do not open many direct opportunities for entrepreneurship).
- The 70-year break in entrepreneurial tradition during the Soviet times.
- The immature institutional and regulatory environment.
- The underdeveloped financial system and, in particular, the absence of specific financial instruments to support entrepreneurship and SMEs.

Environmental challenges

At present, Azerbaijan is facing several environmental challenges, both inherited from Soviet times and newly emerging ones—upshots of an unsustainable development pattern, especially during the years of rapid growth. Some of these challenges are domestic but others (such as the safety of transboundary water resources for drinking and irrigation) stretch across borders and involve neighbouring States.

The Asian Development Bank identified the following main environmental vulnerabilities and challenges that Azerbaijan was facing:¹⁵

- Past and current pollution from industrial sources,
- Solid waste management,
- Energy inefficiency and industrial air pollution,
- Power supply and deforestation,
- Mobile source pollution,
- Water and wastewater management,
- Land degradation,
- Vulnerability to natural risks and emergency preparedness,
- Threats to protected areas and ecosystems, and
- Regional environmental concerns, in particular, the Caspian Sea and transboundary rivers.

The specificity of Azerbaijan's economy, heavily relying on hydrocarbon extraction, has contributed to an ongoing increase in greenhouse gases emissions. According to some estimates, by 2025 these emissions are expected to double compared with the level of 1990.¹⁶

Intensive oil extraction and transportation have also caused serious environmental damage in some regions. It's estimated that some 30% of the coastal zone and 50% of the river basins are polluted.¹⁷ This is coupled with traditionally low energy efficiency in all sectors of the economy and the household sector, excessive waste discharges from the

¹⁵ Asian Development Bank, *Country Environmental Analysis - Azerbaijan*, November 2005.

¹⁶ *Legal Framework for a Green Economy within the BSEC Member States*. Regional Review and Dialogue on Systems and Perspectives. Joint BSEC-GIZ Project, 2012.

¹⁷ *Ibid.*

extractive industries and emissions from the transport sector, as well as from the food and other manufacturing industries.¹⁸

The body in charge of environmental protection and natural resource management in Azerbaijan is the Ministry of the Environment and Natural Resources (MENR). A number of other public bodies (in particular, the Ministry of Industry and Energy and the Ministry of Economic Development) also have responsibilities for certain aspects of environmental protection.

The current structure of the economy (overwhelmingly dominated by the oil and gas sector), the need for economic diversification, coupled with the existing environmental challenges, make a strong case for a major focus on developing the green economy and re-orientation towards green growth on the basis of promoting eco-innovation.

Conclusions

1. Azerbaijan is a small country richly endowed with oil and gas resources.
2. Thanks to the exploitation of new discoveries, during the past 10-15 years Azerbaijan was among the fastest growing economies in the world which also allowed it to move from the category “low-income country” to the category “upper middle-income country”.
3. On the other hand, this natural endowment has laid a strong footprint on the structure of the national economy, which is clearly skewed towards the extraction of hydrocarbons.
4. Azerbaijan is offering a relatively favourable business environment and is open to foreign investors. However, FDI has flown in almost exclusively into the extractive sectors.
5. Azerbaijan is facing a number of environmental challenges, which makes a strong case for developing the green economy and re-orientation towards green growth on the basis of promoting eco-innovation.
6. Among the key sectors where eco-innovation can contribute the most to addressing environmental challenges and supporting green growth—and where introducing innovative green technologies can be considered a high priority—are the following:
 - Hydrocarbon extraction
 - Energy
 - Transport
 - Water and sanitation
 - Waste management
 - Land management (in view of degradation).

¹⁸ Naila Aliyeva, *Resource Efficiency Gains and Green Growth Perspectives in Azerbaijan*, Friedrich Ebert Stiftung study, October 2012.

3. Azerbaijan's national innovation system: institutional and regulatory aspects

Innovation in the modern economy is a highly complex process, involving the interactions of a whole range of “innovation stakeholders”:

- Innovative entrepreneurs
- Academic and research and development (R&D) institutions
- The business sector as source and target of innovation
- Innovation intermediaries and support institutions
- Public bodies with responsibilities to support innovation
- Financial institutions, national policies in the area of innovation, the framework conditions for innovation
- The consumers (more generally, the market for innovation).

The concept “national innovation system” reflects the notion that the innovation process takes part in a system (the systemic view on innovation) and characterizes the systemic interdependencies that influence the processes of generation and diffusion of innovation in the economy.

One of the broad definitions of the national innovation system is: “the network of institutions in the public and private sectors whose activities and interactions initiate, import, modify and diffuse new technologies”.¹⁹ The systemic approach to innovation helps to identify specific aspects (strengths, weaknesses, driving forces, etc.) of the innovation process and to identify policy actions and measures that could help improve innovative performance.

For Azerbaijan, one needs to take into account several specific characteristics of the national economy environment:

- The legacies of the Soviet past. Before independence, science and R&D activities in Azerbaijan followed the traditional Soviet model of central planning and control and a linear type of linkages from research to product development.
- The disintegration of traditional economic, industrial and trade links (under which Azerbaijan and its R&D system were part of the Soviet market and R&D system) which rendered much of the local industry and the related R&D obsolete under market conditions.
- The unusually high dominance of the oil and gas sector in the national economy, coupled with an almost complete lack of local high-tech consumer goods industries, a sector that is usually a key driver of innovative activity in mature economies.

Azerbaijan's national innovation system is still immature and underdeveloped. And many of the building blocks that are typical of innovation systems in mature economies are non-existent in Azerbaijan. In particular, so far the authorities have not prepared a national

¹⁹ Chris Freeman (1987), *Technology Policy and Economic Performance - Lessons from Japan*, London: Pinter Publishers.

innovation strategy or plan; nor has any coherent national innovation policy framework been put in place.

The *level of innovation activity and performance* in Azerbaijan is low, even as compared to other CIS countries. National statistics of R&D and innovation in Azerbaijan are quite scarce, they don't follow internationally agreed standards of compilation and their quality is sometimes questionable. Therefore, the assessment presented below is also only partial and only covers some selected specific aspects of innovations activity.

The level of gross expenditures on research and development at present is just around 0.2% of GDP (Table 2). For comparison, the level in Belarus is 0.7% and in Ukraine is around 0.9%. At the same time, the level of gross expenditures on research and development in Kazakhstan as a percentage of GDP is comparable to that in Azerbaijan. Most of the funding of R&D in Azerbaijan (around 80% in recent years – Table 2) originates in the public sector, whereas the business sector (even in the presence of the strong FDI-dominated oil and gas sector) provides only about 20% of the funding.

Table 2. Main indicators on science and technology in Azerbaijan, 2000-2011

	2000	2005	2007	2008	2009	2010	2011
Gross expenditures on research and development, million manats	15.9	29.2		67.0	89.2	93.4	111.1
of which: financed by the public sector, %		80.2		77.1	78.0	80.6	82.2
financed by the business sector, %		19.8		22.9	22.0	19.4	17.8
Gross expenditures on research and development, % of GDP	0.36	0.25		0.18	0.25	0.22	0.22
Public expenditures on R&D, % of total public expenditure	1.2	1.3		0.6	0.8	0.8	0.7
Number of organizations undertaking R&D	137	146		146	148	145	143
Number of employed persons engaged in R&D	15,809	18,164		17,942	17,401	17,924	18,687
Innovative products as % of total industrial production			3.7	23.0	3.2	15.7	37.6

Source: State Statistical Committee of the Republic of Azerbaijan; author's calculations.

The share of innovative products in industrial production as reported by the State Statistical Committee features unusual variations from year to year (Table 2), which is why the reliability of these figures is somewhat questionable. Thus, according to some expert estimates, only some 3% of the output of the Azerbaijani industry can be considered as high-tech. The latter primarily consists of the production of communication equipment and, to a smaller degree, the production of computers and scientific equipment.²⁰

The framework conditions for R&D and innovation in Azerbaijan haven't been particularly supportive. With very few recent exceptions, mostly related to ICT (see below, the text on the State programme on development of ICT and the ICT Development Fund), the framework conditions offer no particular incentive for engaging in this type of activity or, for that matter, in entrepreneurship in general.

In terms of public bodies tasked to promote innovation, the responsibilities regarding the support of innovation and R&D activities are dispersed among different bodies but in a

²⁰ "Country Report Azerbaijan". In Sonnenburg, J., Bonas, G. and Schuch, K. (eds.) (2012): *White Paper on opportunities and challenges in view of enhancing the EU cooperation with Eastern Europe, Central Asia and South Caucasus in Science, Research and Innovation*. Prepared under the FP7 INCO-NET EECA Project, International Centre for Black Sea Studies, (ICBSS), Athens. Annex I – Country Reports.

limited context as compared to mature economies. The main scientific organization and supreme public body implementing science and technology (S&T) policy in the country (there is no other public body with functional responsibilities on science and technology) is the Azerbaijan National Academy of Sciences.

In accordance with the current regulations (Presidential decree of 2003), Academy was assigned the functions of organizing and managing national scientific activity and identifying the directions of the S&T policy.²¹ Accordingly, it is expected to be the main source of public initiatives in the area of innovation, to be further discussed and approved by the Government. It is also assigned the responsibility of organizing and carrying out basic and applied research and coordinating basic research conducted in other R&D organizations and universities. In recognition of this, the financing of the Academy and its core activities is included as a separate item in the State budget.

The Ministry of Economic Development of Azerbaijan should take also part in the formation of national innovation and S&T policy. However, there's no rule concerning the coordination of the formation of the national S&T policy and its priorities between the Ministry and the Academy. As an example, a draft law on R&D policy in Azerbaijan was prepared already back in 1998; since that time it has been given three readings in Parliament, but the law has not yet been adopted.²²

The State Committee for Standardization, Metrology and Patents is the body that implements public policy and regulation in standardization, metrology and quality control, as well as in the protection of industrial property rights. Many of its functions have a direct effect on the country's environment for innovation activity.

The Ministry of Communications and Information Technologies is another public body with a relatively important role in promoting innovation. Its main functional responsibilities are to formulate and apply public policy in information and communication technologies (ICT) and the related regulations.

The importance of this Ministry has grown in recent years due to the high priority that ICT has been assigned in the Government's policy portfolio, which has specified the development of the ICT sector as a long-term strategic goal for Azerbaijan. An ICT Development Fund has recently been established under the auspices of the Ministry.

In mature economies, public support for innovation is usually embedded in the framework of well-defined national priorities and strategic goals. Azerbaijan is only now embarking on this type of policy approach. While innovation and innovation policy have often been on the Government's agenda, so far the authorities have not developed either a formal national innovation strategy or a coherent innovation policy framework.

“Innovation policy” as such has not been formally debated by the Government. The policy initiatives have been sporadic and haven't followed a systemic approach. Innovation has been addressed in a number of State programmes adopted in the past decade; however, the related priorities can only be regarded as implicit, given that in most cases the programmes do not set specific objectives and quantifiable targets.

²¹ *Structure of EECA Research Inventories. Country: Azerbaijan*
(<http://www.st-gaterus.eu/media/Azerbaijan.pdf>).

²² Source: <http://www.increast.eu/en/148.php>.

The following are among the recent State programmes that address innovation issue:²³

- National information and communication technologies strategy (2003-2012)
- State programme on developing ICT (2005-2008) (Electronic Azerbaijan)
- Establishment of a regional innovation zone
- State programme on developing the fuel and energy complex (2005-2015)
- State programme on using alternative and renewable energy sources
- Scholarship programme for youth to study abroad.

In these circumstances, innovation policy and innovation governance in Azerbaijan is also partial, uneven and piecemeal. In accordance with internationally accepted practice,²⁴ innovation policymaking should conform to the following objectives and rules: coherence of innovation policies; maintaining a regulatory framework conducive to innovation and stimulating the establishment and growth of innovative enterprises; and well-functioning interfaces in the innovation system. Most of these conditions are still in an embryonic form in Azerbaijan.

Furthermore, internationally practised approaches to formulating long-term strategic goals such as foresight in science and technology have not been implemented systematically. One of the reasons is the low awareness both of policymakers and of the public of the importance of such approaches. More generally, the formulation of strategic policy goals does not engage the stakeholder community but usually follows a top-down approach. Most of the existing programmes and policy documents lack evaluation procedures and mechanisms.

Governance—in the sense of aligning policy objectives with decision-making and implementation, as well as with the allocation of the necessary resources—is an important component of policymaking, especially regarding “horizontal” type of policies such as innovation policy. Such policies, which cut across many different sectors of the economy and are covered by line ministries, require close coordination among the public bodies overseeing these sectors.

As a first attempt to move in this direction, a National Coordination Council on the Organisation and Coordination of Scientific Research was set up on the initiative of the Academy. It includes some 30 members (including leading scientists, policymakers, high-level government officials and representatives of the business community) and is chaired by the President of the Academy. It has a two-tier structure, overseeing the work of 28 second-tier councils in different fields of science.

According to its statute, the Council should discuss and endorse future directions of research in the country and coordinate the activities of all research institutions and universities. However, it has largely remained a low-key initiative of the Academy and this entity was not mandated with proper coordinating functions by the Government. Consequently, its ambitions in this area have so far not materialized.

The funding of R&D and innovation follows a similar non-systemic pattern, with the bulk of the funding originating in the public sector. Most of the funding is allocated in the

²³ *Country Report Azerbaijan, op. cit.*

²⁴ Communication on “Innovation in a knowledge-driven economy” COM (2000) 567 of the European Commission.

form of institutional support to R&D organizations. The funding of the branch R&D institutes, which are within the structure of different ministries, is part of the budgets of the respective ministries.

Project funding of R&D is only in its initial phase. In 2009, the Government established the Science Development Foundation²⁵ to stimulate national scientific activity, to contribute to improving the efficiency of research and encourage international cooperation in this area.

While the Foundation supports research projects in all fields of science, it sets its priorities in a dynamic manner. Funding applies to both fundamental and applied projects and allows also for the purchase of necessary equipment. It offers grants to scientists to travel abroad and for organizing conferences. As of the end of 2012, six calls for project proposals had been completed or continued and one call was still under evaluation. Within these calls, funding amounting to some €25 million was allocated to 155 projects.

The newly established ICT Development Fund started operations in early 2013. Some € 15 million was expected to be allocated from the budget of the State Oil Fund of Azerbaijan for 2013 to back its activities. The ICT Fund is expected to provide project support through concessional funding (loans and grants) to companies, including small innovative companies and promising start-ups in science and technology. It will also be offering special incentives in taxation and customs to firms in the ICT sector, in particular, stimulating the importation of high-tech products.

Early financing of entrepreneurial and innovative activity (a key ingredient of a business environment conducive to innovation and entrepreneurship) is practically missing. This early financing is a very specific area involving high risks and banks usually are hesitant to engage in it. The financial institutions that typically undertake such risky activity (such as business angels and venture capital institutions) need time to develop; targeted public support – both in the form of sharing some of the financial risks by the Government and in establishing enabling regulatory framework – can contribute to speeding up this process.

Turning to *knowledge generation*, at present there are more than 140 organizations performing R&D activity in Azerbaijan. By far the most important among them is the Azerbaijan National Academy of Sciences, which covers some 45 research organizations which are divided into six divisions. The Academy also coordinates about 90 R&D institutes and 8 ministries:

- Ministry of Economic Development
- Ministry of Health
- Ministry of Agriculture
- Ministry of the Environment and Natural Resources
- Ministry of Communications and Information Technology
- Ministry of Transport
- Ministry of Labour and Social Protection
- Ministry of National Defence.²⁶

²⁵ Source: www.sdf.gov.az.

²⁶ *Country Report Azerbaijan, op. cit.*

Whereas the Academy focuses on basic and fundamental research, most other institutes are of an applied, sectoral nature. The total number of employed persons engaged in R&D in recent years has been around 18,000 persons (Table 2), of which about 10,000 are employed by the Academy.

Most of the non-Academy institutes are part of the R&D system inherited from the Soviet era and were previously established to foster the development of different sectors through introducing new technologies. However, during the transition, the State R&D institutes stagnated due to the lack of demand for their output, to brain drain/brain waste, to obsolete equipment and skills, and to poor linkages with national industry and international markets.

While the R&D activity in Azerbaijan's traditional industries inherited from Soviet times is relatively weak, recently there have been some positive shifts with a number of new private companies, primarily small innovative firms, engaging in R&D and innovation activities. This is the sector with the biggest growth potential. However, at present the new innovative private sector faces significant hurdles such as:²⁷ the shortage of staff with adequate skills in technology transfer, marketing and management; generally poor awareness of the role of intellectual property for innovation; and financing difficulties.

Universities are, in principle, also part of the knowledge-generating component of the national innovation system. Azerbaijan has 47 higher education institutions, including 30 public universities and 17 accredited private universities. Among the most important are Baku State University, the State Oil Academy, Azerbaijan Technical University, the State Management Academy, the University of Architecture and Construction, and the State University of Economy. Universities in Azerbaijan focus on teaching, and their research activities are relatively weak.

While the number of knowledge-generating organizations in Azerbaijan is considerable, their output hasn't been impressive. The number of scientific articles by Azeri authors in international publications is low, as is the level of patent applications and the citations of the scientific results published by Azeri authors. Thus in 2011, just 418 patent applications were filed in Azerbaijan, compared with 2,368 in Belarus, 1,821 in Kazakhstan and 3,312 in Ukraine.²⁸ In per capita terms, patent activity in Azerbaijan was one quarter of the level in Belarus and half that of Kazakhstan. Overall, the level of understanding of intellectual property issues appears to be inadequate both among researchers and among technology entrepreneurs.

Industry and science linkages are also poor, and often non-existent. A major factor impeding industry-science cooperation is the skewed structure of the economy, dominated by the oil and gas sector and the almost complete lack of modern high-tech consumer industries. Apart from that, the potential of the main prospective generator of such linkages, the FDI-dominated oil and gas sector is underutilized in this sense. Recently, the Government has been placing great emphasis on developing the ICT sector, including on providing specific incentives. However, the outcomes of these policies are yet to be seen.

²⁷ *Ibid.*

²⁸ WIPO, *Patent applications by patent office and origin*, 2011 (http://www.wipo.int/ipstats/en/wipi/figures.html#section_a).

After a prolonged break following the disintegration of the Soviet Union, international cooperation in R&D and innovation has been reviving in Azerbaijan, albeit slowly. After joining the EU's Neighbourhood Policy, Azerbaijan benefits from access to new possibilities for technological cooperation and some components of EU's framework programmes. Azerbaijan has also signed bilateral cooperation agreements on cooperation in science and technology with several CIS countries, as well as with other countries. The State Committee for Standardization, Metrology and Patents of Azerbaijan has joined a number of international agreements under the framework of the World Intellectual Property Organization (WIPO).

Conclusions

1. The national innovation system is still in its early stages of development and bears the visible footprints of the Soviet legacy. The level of innovation activity in the country is relatively low even if compared to that in countries with similar legacies.

2. Many important institutions (both public and private) that typically are part of the national innovation system in mature economies (such as agencies/bodies entrusted with the formulation and implementation of innovation policy, policy coordination mechanisms, innovation intermediaries and other support institutions, early stage financing institutions, etc.) are still missing in Azerbaijan. Connectivity among the existing parts of the national innovation system is also inadequate.

3. No coherent national innovation policy framework has been put in place yet. There's no formal national innovation strategy, the policy initiatives in this area have been sporadic and the responsibilities for their implementation are dispersed among different public bodies.

4. The framework conditions for R&D and innovation aren't particularly supportive and no incentive mechanisms are in place that target stimulating innovation and innovative entrepreneurship.

5. The national statistics on R&D and innovation are inadequate and lag behind internationally agreed standards and methodologies of compilation.

6. The knowledge base for innovation in Azerbaijan is generally weak. Research activities are mostly concentrated in the Azerbaijan National Academy of Sciences, as well as the branch R&D institutes, but since independence, these have been on a downward path. Little R&D is being carried out in the universities and the business sector.

7. There's still a great gap between research and market. Owing to the weak support from the eco-system, the poor industry-science linkages and the still prevailing linear innovation model, even fewer research outputs are commercialized into marketable products.

8. One of the factors inhibiting stronger industry-science linkages is the skewed structure of the economy, which is dominated by the oil and gas sector while the share of high-tech industries sectors (which drive innovation) is very low. Consequently, the demand for R&D results by the local industry is also very low, which does not encourage applied research and the development of this segment of the knowledge base.

9. The few new private companies that engage in innovation activities encounter considerable problems due to the unsupportive framework conditions and the underdeveloped infrastructure of the NIS. Much still remains to be done to support the emergence and growth of new technology firms.

10. One of the main impediments to the development of innovative entrepreneurship is the difficult access to capital for start-up companies. Early stage financing in the country is practically not available in the forms in which it exists in mature economies.

11. The existing potential of the large FDI sector (mostly concentrated in the oil and gas sector) to contribute to R&D and innovation activity in Azerbaijan, including through forward and backward linkages, is still greatly underutilized.

12. International cooperation in R&D and innovation activities is only starting to develop. It is not backed by adequate support mechanisms.

4. The environment for the adoption and adaptation of innovative green technologies

The capacity of Azerbaijan's economy to absorb innovation is low. This is even more pronounced concerning the demand for, and capacity to absorb, green innovation. Owing to its complex nature, eco-innovation only materialized through the concerted efforts of a range of innovation stakeholders, including the active participation of the State.

Given the numerous systemic and market failures associated with green innovation, we see inherent difficulties in internalizing the eco-related costs and benefits along the process. Without targeted government intervention, the perceived risk of investing in such projects is generally high whereas the demand for green products is low. Therefore, policy intervention in different forms has in general a central role to play in promoting eco-innovation and, in particular, in boosting the demand for green products.²⁹

According to various estimates, demand for green products in Azerbaijan is weak.³⁰ This is due to the absence of targeted regulatory measures to support such demand. In the absence of such measures, green products on the local market lose the price competition with traditional similar products. Public awareness about the rationale for switching towards the consumption of green products is also insufficient for stimulating or generating new consumer demand.

Also affecting the absorption capacity has been the low level of R&D human capital development and the general level of technology adoption. While Azerbaijan traditionally maintains high levels of school and university enrolment, relatively few university graduates pursue careers in R&D and innovative activity (Table 2). The level of modern technology adoption in Azerbaijan (as reflected in the United Nations Development Programme *Human*

²⁹ OECD, *Opportunities for Fostering Eco-Innovation in Eastern Europe, Caucasus and Central Asia: Major Lessons from International Practice*. Background paper (ENV/EPOC/EAP(2012)).

³⁰ Naila Aliyeva, *Resource Efficiency Gains ...*, *op. cit.*

*Development Report*³¹) is also relatively low compared with developed industrialized countries (Table 3).

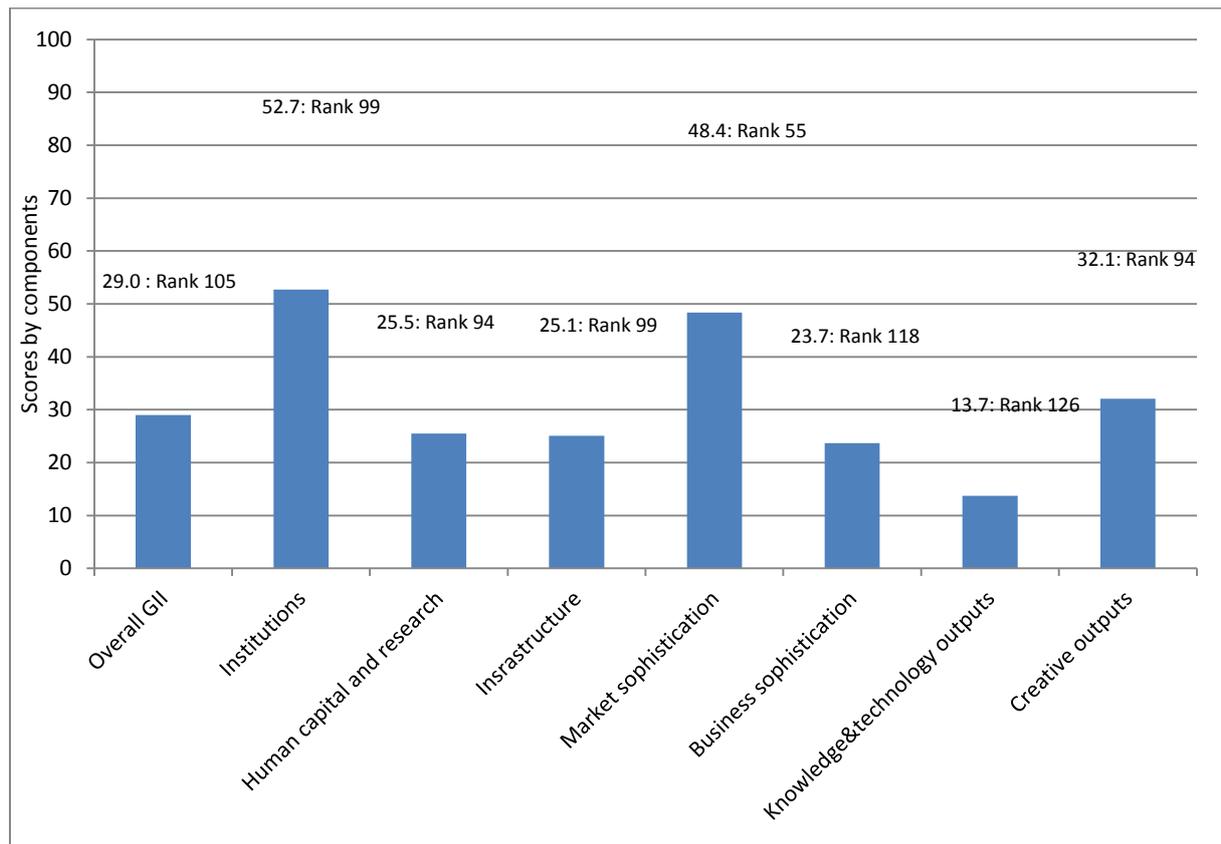
Table 3. Technology adoption in Azerbaijan compared with developed industrialized countries (per 100 persons)

Technology	Azerbaijan	Developed industrialized countries (typical)
Personal computers	8.0	40-80
Internet users	46.7	70-90
Fixed broadband Internet subscriptions	5.0	20-35
Fixed and mobile telephone subscribers	117.1	140-160

Source: UNDP, *Human Development Report 2013*.

As a result, Azerbaijan generally reports underperforming scores in the Global Innovation Index³², which compares the innovative performance of 142 countries (Chart 2).

Chart 2. Azerbaijan in the Global Innovation Index, 2013
(Scores scaled from 0 to 100; Ranking from within 142 countries)



Source: *The Global Innovation Index 2013. The Local Dynamics of Innovation*. Cornell University, INSEAD; WIPO, 2013.

³¹ UNDP, *Human Development Report 2013*.

³² *The Global Innovation Index 2013. The Local Dynamics of Innovation*. Cornell University, INSEAD; WIPO, 2013.

According to these scores, Azerbaijan is lagging behind in a range of aspects related to absorption capacity, such as human capital and research, infrastructure, business sophistication, knowledge and technology outputs.

In the energy sector, market conditions are fairly rudimentary. Energy prices are administratively fixed by the State in accordance with a medium-term programme of tariff change which envisages a transition to full-cost recovery. The energy market (to the extent it can be defined as such) is fragmented by a supplementary price differentiation by classes of producers and consumers (wholesale and retail, businesses and households, etc.) and regions.³³ Although energy efficiency in Azerbaijan is low, there has been little public support for business initiatives in this area. Under these circumstances, introducing price-based policy measures targeting the demand for green products and green innovation can be even more problematic.

There's considerable untapped potential to boost the demand for—and capacity to absorb—green innovation, both by resorting to more traditional measures and by applying more sophisticated mechanisms. As an example, given that the public sector still accounts for some 30 per cent of the economy, “green public procurement”, granting specific privileges to the procurement of environmentally friendly products can be a key instrument for a switch towards this direction.

As already noted, public policy has not been particularly active in stimulating the demand for green products and, in particular, the absorption green of technologies by firms.

The authorities have repeatedly asserted their support for a sustainable, environmentally friendly national development pattern. This declared policy priority is manifested in a range of national strategic policy documents that affect green growth and green innovation (Table 4).

Table 4. Main national strategic policy documents that affect green growth and green innovation, 2000-2011

Year	Document	Horizon
1998	National Environmental Action Plan	2003
2003	State Programme on Environmentally Sustainable Social and Economic Development State Programme on Poverty Reduction and Sustainable Development	2010 2005
2004	State Programme on the Use of Alternative and Renewable Energy Sources in the Republic of Azerbaijan State Programme for the Socioeconomic Development of the Regions	2013 2008
2006	Comprehensive Action Plan on Improvement of the Environmental Situation in the Republic of Azerbaijan National Strategy and Action Plan on Biodiversity Conservation and Sustainable Use	2010 2009
2008	State Programme on Poverty Reduction and Sustainable Development State Programme on Renewable and Alternative Sources of Energy National Programme on the Rehabilitation and Expansion of Forests	2015 2015 2015
2009	State Programme for the Socioeconomic Development of the Regions	2013
2010	Programme on Technical Regulation and Standardization System Development in Energy Saving	...
2012	National Strategy on the Use of Alternative and Renewable Energy Sources	2020

Sources: UNECE, *Environmental Performance Reviews Azerbaijan*, Second Review, United Nations, New York and Geneva, 2011; *Increasing Energy Efficiency to Secure Energy Supplies in the CIS region*, Moscow, April 2011; State Committee for Standardization, Metrology and Patents.

³³ *Legal Framework for a Green Economy within the BSEC Member States*, op. cit.

Climate change mitigation and/or adaptation have not been directly addressed in any of the many long-term programmes and similar policy documents. Thus, as party to the Vienna Convention for the Protection of the Ozone Layer, Azerbaijan has committed itself to putting in place a national plan of action for reducing the expected impacts of climate change. This, however, has not yet materialized. On the other hand, initiatives targeting climate change mitigation and/or adaptation effects (such as those increasing energy efficiency, reducing CO² emissions and promoting the use of alternative and renewable sources of energy) have been integrated into broader national programmes.³⁴

A range of public bodies are assigned with functional responsibilities in the area of green-growth development. Apart from the Ministry of the Environment and Natural Resources (MENR) which is in charge of environmental protection and natural resource management, related responsibilities are assigned to the Ministry of Industry and Energy, the Ministry of Economic Development, the Ministry of Agriculture, the Ministry of Education, the Ministry of Health, the Ministry of the Interior, the Ministry of Justice, and the Ministry of Transport. A number of ministries also have a department on environment which coordinates activities with the Ministry of the Environment and Natural Resources.³⁵

Below the ministerial level one finds several agencies or committees that are assigned with complementary or implementation functions in certain related areas. Thus the State Agency for Alternative and Renewable Energy Sources under the Ministry of Industry and Power Energy (in June 2012, this agency was transformed into the State Company on Alternative and Renewable Energy Sources) is mandated to prepare draft regulations and conduct supervision in the area of alternative and renewable energy. The Tariff Committee is mandated with the powers to set the prices of energy resources for different types of consumers and users.

The downside of the spreading of responsibilities across so many government bodies is the problem of coordination in developing and implementing policies. In principle, policy coordination takes place in the Council of Ministers. For expediting operational coordination and communications, the Council sometimes sets up interagency commissions. However, coordination in policy development and implementation in environment-related issues needs further improvement.³⁶

Other institutional and organizational weaknesses include the skill capacity of the administration mandated with responsibilities in the area of green growth and eco-innovation and the generally low environmental awareness (and in particular, awareness of climate change mitigation and adaptation issues) of both the public and governmental officials.³⁷

While these facts provide some evidence of the recognition of green growth and eco-innovation as long-term policy priorities, to translate these objectives into operational policy a broad range of instruments and mechanisms need to be put in place. Moreover, eco-innovation requires the mobilization of a range of stakeholders. Hence, the policy instruments

³⁴ Naila Aliyeva, *Resource Efficiency Gains ...*, *op. cit.*

³⁵ *ENPI Shared Environmental Information System, Azerbaijan Country Report, 2011.*

³⁶ *Ibid.*

³⁷ Naila Aliyeva, *op. cit.*

and instruments that can stimulate eco-innovation need to address not only the technical dimension but also a broad array of social, political and institutional aspects of the process.³⁸

This level of governance and policymaking, however, is still underdeveloped or even non-existent. In Azerbaijan, one still cannot find coherent operational policy documents in any of the key components of the policy mix that in mature economies usually targets climate change mitigation or green growth/eco-innovation.

For example, there's still no documented agreed policy even in energy efficiency. And the existing regulatory framework on alternative and renewable energy is regarded as inefficient as it does not provide sufficient incentives for investing in and using such sources. The local funding sources supporting investment in these areas are limited or non-existent.

The inter-agency and interregional coordination mechanisms needed for the implementation of such cross-sectoral and multi-stakeholder projects are missing or inefficient.³⁹ One such example of policy-induced hurdles related to interagency coordination is the current low level of administratively set tariffs for renewable and alternative energy sources. This is considered to be one of the key barriers to investment in the sector.⁴⁰

As an example of the effect of the acting policy and regulations on green growth and eco-innovation, the prevailing framework conditions for renewable energy are generally assessed as unfavourable for producers and consumers of alternative energy. These technologies are more expensive to install and operate on the local market than conventional ones.

Some limited public funding supporting the development of renewable and alternative energy sources is available but has not been sufficient to encourage abundant investment.⁴¹ Financing such projects from private sources is problematic, especially for smaller-scale projects. The current tariffs for renewable and alternative energy do not offer incentives to investors.⁴²

This is not to say that nothing has been undertaken in Azerbaijan at the operational level. One of the leading efforts in this area based on targeted public investment is the establishment of the Sumgait Technology Park, which develops and employs high technologies, including those in green energy. It is envisaged that the park would host some 15 plants oriented towards alternative energy and energy saving; and will produce among other things, collectors to harness solar energy for heating.

The Ministry of Economic Development plans to support the establishment of several similar industrial parks in different regions of the country. Starting in 2010, the State Oil Fund of Azerbaijan (SOFAZ) financially supports investment projects in alternative and green energy sources. Azerbaijan also hosts a number of international events promoting green growth and eco-innovation such as the international exhibition "The Caspian: Technologies

³⁸ UNECE, "Policy options to foster the financing and development of clean technologies", ECE/CECI/2011/3, Geneva, 2011.

³⁹ *Legal Framework for a Green Economy within the BSEC Member States. op. cit.*

⁴⁰ *In-Depth Review of the Energy Efficiency Policy of Azerbaijan.* Energy Charter Secretariat, 2013.

⁴¹ The Law on Utilization of Energy Resources (1996) prescribed the establishment of a fund supporting efficient utilization energy. In accordance with this law, part of this fund is aimed to support the development of renewable energy sources. Also the fund may grant subsidies to firms for similar purposes.

⁴² *In-Depth Review... op.cit.*

for the Environment” held in November 2011 and organized by the Ministry of Environment and Natural Resources. However, these first steps are rather modest and not sufficient to provide a strong push towards green growth and eco-innovation.

It appears, therefore, that what needs further development in the local regulatory framework is the translation of the proclaimed policy goals and objectives into operational policies and mechanisms. These should support an environment conducive to business and investment decisions.

International cooperation, trade and foreign direct investment play an important role in promoting green growth and eco-innovation in developing and transition economies. Azerbaijan is party to a range of multilateral international conventions and agreements that have implications for green growth and eco-innovation (Table 5).

Table 5: Azerbaijan's participation in the multilateral environmental protection agreements and programmes

United Nations Framework Convention on Climate Change (New-York, 1992)
Kyoto Protocol (Kyoto, 1997)
Convention for the Protection of the Ozone Layer (Vienna, 1985)
Montreal Protocol on Ozone Depleting Substances (Montreal, 1987)
United Nations Convention to Combat Desertification in Countries Experiencing Serious Drought and/or Desertification, Particularly in Africa (Paris, 1994)
Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal (Basel, 1989)
Convention on POPs (Stockholm Convention)
Convention on Wetlands of International Importance (Ramsar Convention)
Convention Concerning the Protection of the World Cultural and Natural Heritage
International Convention for the Prevention of Pollution from Ships
Convention on Long-Range Transboundary Air Pollution (Geneva, 1979)
Convention on the Transboundary Effects of Industrial Accidents
Convention on the Protection and Use of Trans-boundary Waters and International Lakes Convention on Access to Information, Public Participation in Decision-Making and Access to Justice in Environmental Matters (Aarhus, 1998)

Source: UNECE, *Environmental Performance Reviews Azerbaijan*, Second Review, United Nations, New York and Geneva, 2011; *ENPI Shared Environmental Information System*, Azerbaijan Country Report, 2011.

Some of the above conventions have direct implications for the promotion of green growth and eco-innovation. Thus the Ministry of Environment and Natural Resources is the Designated National Authority for the Clean Development Mechanism (CDM) and its Climate Change and Ozone Centre acts as the secretariat.⁴³

The CDM, as defined in the Kyoto Protocol, allows developed countries with emission-reduction commitments under the Protocol to carry out emission-reduction projects in developing countries, which can count towards meeting the Kyoto targets. Such eco-investment projects (in the area of renewable energy) have already been implemented in Azerbaijan (see annex).

⁴³ UNECE, *Environmental Performance Reviews Azerbaijan*, Second Review, United Nations, New York and Geneva, 2011.

The role of the European Union as a cooperation partner in environment-related areas has been growing in recent years. The Partnership and Cooperation Agreement, which entered into force in 1999, provides the legal framework for EU-Azerbaijan relations. In 2009, the EU launched within its European Neighbourhood Policy (ENP) a new initiative, the Eastern Partnership, which offers opportunities to deepen and broaden this cooperation for several countries in the region, including Azerbaijan. Cooperation in the area of energy is among the priority areas in the Indicative Programme for Azerbaijan under the ENP for the period 2011-2013.

In 2006, Azerbaijan concluded a Memorandum of Understanding (MoU) with the EU, establishing a strategic partnership in energy. The MoU identified four priority areas of cooperation, including the development of renewable energy sources and increased energy efficiency. Implementation was supported by targeted funding amounting to €14 million.⁴⁴

In addition to that, starting in 2010, the EU provided financial and technical support to Azerbaijan under the Energy Reform Support Programme (ERSP). Some €13 million had been allocated under this programme by the end of 2012.⁴⁵ EU funding under the MoU was also matched by national sources through the State Agency for Alternative and Renewable Sources of Energy, which is the main focal point for cooperation with the EU in alternative energy sources and energy efficiency.

Apart from access to additional funding, international cooperation has been providing a push for the introduction of legislation and regulations in “green growth”. Thus the regulations on air emissions by vehicles have gradually been adjusted to European standards. The decree adopted in 2010 mandates that vehicles imported into or produced in Azerbaijan are obliged to meet the Euro-2 European emission standard. In 2012, the country switched to the Euro-3 fuel standard and there are plans to adopt later standards soon.

Over the years, the United Nations Economic Commission for Europe (UNECE) has been providing technical assistance to Azerbaijan relating to green growth and green innovation. Azerbaijan is party to the Convention on Long Range Transboundary Air Pollution since 1979, as well as to its accompanying Protocols, which identify technology transfer, a particular objective in this area.

UNECE has also undertaken two Environmental Performance Reviews in Azerbaijan. These focus on the management of the environment and address issues related to environmental policy, including the implementation and financing of environmental projects as well as the integration of environmental and economic concerns.⁴⁶

Public procurement, regulations and standards also can play a pivotal role for the adoption of green innovation.

Governments have all the prerogatives to include environmental requirements, along with other criteria, in the rules and regulations that govern the purchasing decisions the agencies and bodies entrusted with public procurement. In developed countries, green public procurement is considered as an important mechanism for green growth. This is implemented by including environmental specifications among other technical characteristics that are part

⁴⁴ President Barroso and the President of Azerbaijan sign a Memorandum of Understanding on energy partnership. Press Release (http://europa.eu/rapid/press-release_IP-06-1516_en.htm).

⁴⁵ Source: <https://sites.google.com/site/eeinazerbaijan/legislation>

⁴⁶ UNECE, *Environmental Performance Reviews Azerbaijan, ...*, *op.cit.*

of the procurement procedure. In addition, public procurement has important demonstration effects whereby the Government “leads by example”.

Azerbaijan has some experience in environmentally friendly public procurement, which dates back to Soviet times such as the deposit-refund systems (in beverage and chemical containers).⁴⁷ At present green public procurement has been recommended in all sectors but progress so far is slow. The country’s public procurement law is based on the Model Law on Procurement of Goods, Construction and Services of 1994 recommended by the United Nations Commission on International Trade Law (UNCITRAL). It would need to be updated in line with current international best practice.

Mandatory technical standards are a powerful regulatory instrument for fostering technological adaptation in the direction desired by policymakers. In the area of green growth, standardization is also an instrument that can facilitate eco-innovation both by mandating the required technical norms in this area and by promoting collaboration between the different stakeholders in the innovation process.⁴⁸ International good practice suggests that standards are efficient instruments in this area only if they are part of a coherent policy mix and are continuously revised and adjusted to the changing environment.⁴⁹

Standards exert their regulatory effect through the demand side of innovation. The introduction of a new mandatory technical norm requires technological change by businesses that are affected by the regulation. This is equivalent to the generation of new demand for new technological solutions. This has been recognized in Azerbaijan where the Law on the Utilization of Energy Resources of 1996 say that “...State power standards shall determine the [...] demands for the energy resources and the renewable power sources”.

One of the positive recent initiatives in applying a demand-oriented policy approach to support green growth and eco-innovation is the Technical Regulation and Standardization System Development in Energy Saving drafted in 2010. The main objective is to develop and introduce national standards (based on international best practice) that would promote energy saving and boost energy efficiency. This will, however, require considerable effort and time. The programme envisages putting in place some 70 national standards affecting energy efficiency.⁵⁰

International cooperation and donor programmes have been a channel for promoting the development of standards consistent with climate change adaptation and other environmentally friendly policies. Technical assistance projects in this area have been supported by the European Commission, EBRD, UNDP, UNECE and various other organizations. The process of adjusting regulations on air emissions by vehicles to European standards is one of the examples.

⁴⁷ *Legal Framework for a Green Economy within the BSEC Member States, op. cit.*

⁴⁸ UNECE, “*Policy options ...*”, *op.cit.*

⁴⁹ OECD, *Opportunities ...*, *op.cit.*

⁵⁰ Naila Aliyeva, *op. cit.*

Conclusions

1. The public's environmental awareness (in particular, awareness of climate change mitigation and adaptation issues) appears to be low. The administration mandated with responsibilities in the area of green growth needs to further develop its capacity to deal with these issues.

2. Climate change mitigation and adaptation have not been addressed directly and specifically in long-term policy programmes and documents; nor is a coherent policy framework in place. Rather, some policy objectives related to climate change mitigation and/or adaptation effects have been integrated into broader national programmes.

3. An area that needs further development is the translation of proclaimed strategic policy goals and objectives into operational policies and working instruments and mechanisms related to climate change mitigation and/or adaptation.

4. The spreading of functional responsibilities related to green growth and eco-innovation across numerous government bodies leads to coordination problems in developing and applying policies targeting growth and eco-innovation. The coordination mechanisms essential for carrying out cross-sectoral and multi-stakeholder projects are missing or inefficient.

5. Demand for green products in Azerbaijan is still weak. One important reason for this is the absence of targeted regulatory measures to support such demand.

6. Even though energy efficiency in Azerbaijan is low, there has been relatively little public support for business initiatives and investment in this area.

7. International cooperation has played an important role in promoting green growth and eco-innovation in Azerbaijan. Apart from access to additional funding, international cooperation has been providing impetus for the introduction of legislation and regulations relating to green growth.

8. Green public procurement has been recommended in all sectors but progress so far is modest. The country's public procurement law has not been adjusted to present-day international best practice in the area of green growth.

9. Azerbaijan has some positive experience in applying demand-oriented policy approach to support green growth and eco-innovation. Some of these initiatives have been made possible thanks to international technical cooperation and donor programmes.

10. Overall, there seems to be considerable untapped potential to boost the demand for—and capacity to absorb—green innovation in Azerbaijan, both by resorting to more traditional measures and by applying more sophisticated mechanisms.

5. Policy implications and recommendations for accelerating the adoption and adaptation of innovative green technologies

Recommendations related to the framework conditions and institutional environment

1. There is an obvious need to complete the process of establishing a modern national innovation system in Azerbaijan. This calls for targeted policy efforts in the following directions:

- Undertake a critical assessment of the national innovation system to identify the missing components and linkages.
- Undertake a public awareness campaign among key innovation stakeholders regarding the necessary changes.
- Develop a strategic programme of institutional building in consultation with key stakeholders.
- Enhance the cooperation among the stakeholders within the national innovation system.
- In building a programme for a national innovation system, mandate a public body (agency or committee) with strategic functional responsibilities for developing and applying innovation policy, including the related inter-agency coordination.
- Ensure the establishment of/reinforcement of the innovation intermediaries or innovation-support institutions with specific focus on targeted policies.
- The national statistics of R&D and innovation should be improved and aligned with internationally agreed standards and methodologies of compilation.

2. Place policies targeting green growth and eco-innovation within the general context of a national innovation strategy. The development and adoption of a workable and practical national innovation strategy also requires a range of supplementary actions by the authorities:

- Develop the national innovation and eco-innovation strategy as part of the ongoing policy efforts towards economic diversification and modernization. A more diversified economy is a prerequisite for intensifying innovative activity.
- Raising awareness among the public, including the business and academic communities and civil society, about innovation issues and the country's innovation strategy (of which eco-innovation is part) is another prerequisite for boosting green technologies.
- Undertaking targeted exercises to identify key directions in eco-innovation and also the scoping, organization, management and coordination in the long-term application of related policies.

- Promoting a broad policy dialogue engaging the “innovation constituency” (the key stakeholders in the national innovation system and also civil society) on innovation strategy, including green growth and eco-innovation issues to build a strong ownership base.
- Undertaking focused efforts to improve coordination in policy design and implementation, including in day-to-day management.

3. While the national innovation strategy would set the main long-term objectives and indicate the path to achieving them, supportive framework conditions (that is, the requisite institutions that support innovation) both concerning innovation activity in general and the areas related to green growth and eco-innovation need to be in place to ensure that the economy is continuously guided towards these objectives. While these are broader conditions that have wider positive effect on business and investment activity, for green growth and eco-innovation, the following aspects could be pointed out:

- There’s scope for further improvement in the local business and investment climate and its key ingredients—such as protection of property rights (including intellectual property), a stable institutional environment, a predictable regulatory framework, competitive market environment.
- Equally, there is considerable scope for advancing fiscal incentives such as tax incentives or targeted eco subsidies to support green growth and eco-innovation (as well as innovation in general and start-up firms) as these instruments so far have only been attempted sporadically.
- The authorities should build on their positive past experience in promoting the development of physical infrastructure and the support of entrepreneurship and business development. Such measures would improve the general conditions for innovation.
- The positive experience of the Sumgait Technology Park could be replicated in the development of other similar parks whereas the incentives offered to park-nurtured businesses could be extended to other sectors of the eco-economy.
- The authorities could also consider expanding the positive experience of the “one-stop shop” for entrepreneurs to the support of innovation and eco-innovation.

Recommendations related to the absorptive capacity of the national economy and the demand for eco-innovation

4. The capacity of the economy to successfully absorb and adopt new technologies depends on the level of human capital, in particular the skills and educational levels of employees. More efforts are needed (as also seen by the low level of R&D spending in the country) to invest in the country’s science base and skills development, as green growth and eco-innovation are especially demanding in this sense:

- The authorities could consider setting specific target levels of increasing public spending on R&D, with a particular focus on green growth and eco-innovation.

- As a concrete example, the Government could consider establishing a special fund to support R&D and innovation activities targeting future green growth.
- Specific measures (such as tax relief, public-private cooperation and others) are needed to encourage R&D and innovative activities of the business sector, which at present contributes little to the generation of knowledge.
- As green growth is not well represented in university and school programmes, there is also a need to expand its coverage in university and school curricula.
- Vocational training programmes could be envisaged for re-training workers in new targeted technology areas.
- More focused government programmes targeting support to R&D human capital development would boost the absorptive capacity of the economy, thus contributing to higher innovation demand.

5. The authorities can build on successful experiences and practices to stimulate the demand for innovation, in particular, eco-innovation in Azerbaijan:

- Public procurement mechanisms need to be applied more widely to spur and expedite new demand for green products and eco-innovation.
- Eco-innovation can also be promoted indirectly by stimulating the demand for goods and services that are the product of eco-innovation.
- The preparatory work for introducing eco-standards and other similar regulations needs to be expedited to accelerate the transition to green growth and environmentally sustainable development.
- There is considerable room for expanding the scope and range of targeted regulatory measures to support the demand for eco-innovation; energy efficiency is one area where there is ample room for improvement.

Recommendations related to the policy mix

6. There is a critical need to enrich the innovation policy mix. Given the multifaceted nature of eco-innovation, which brings together multiple stakeholders, the Government also has a role in facilitating partnerships and cooperation as a way of promoting risk-sharing among them.

- The coverage of the policy mix has to catch up with good practices in mature economies where it also encompasses broader areas such as the absorptive capacity of the economy; the generation of knowledge, the diffusion of innovation and the demand for innovation.⁵¹

⁵¹ For further details, see UNECE, *Creating a Conducive Environment for Higher Competitiveness and Effective National Innovation Systems. Lessons Learned from the Experiences of UNECE Countries*. United Nations, New York and Geneva, 2007.

- In view of the complexity of eco-innovation, policies to support it will only be successful if the policy mix is coherent and consistent. This raises the need for better and more efficient policy coordination both in design and implementation in this area of policymaking.
- As instruments facilitating partnerships and cooperation among eco-innovation stakeholders are still practically non-existent in Azerbaijan, the authorities would need to plan focused investment to develop specific capacity in these areas of public policy;
- The policy mix should also include targets, instruments and mechanisms related to the further development of the financial system in Azerbaijan, which is still in a rather rudimentary state as regards the critical early stage financing.

7. As Azerbaijan is an economy that is generally below the leading frontiers of technological development, the diffusion of innovation will play an important role as a technological catch-up mechanism. The innovation policy mix should therefore assign high priority to policies that support and facilitate the diffusion of innovation. Moreover, given the systemic nature of eco-innovation, linkages within the national innovation system play a key role in the process of diffusion:

- As connectivity between key innovation actors and stakeholders within the Azeri national innovation system is poor, the authorities should consider introducing specific mechanisms and instruments that encourage and facilitate linkages among stakeholders.
- A particularly promising avenue in pursuing linkages (both horizontal and vertical; forward and backward) is that along the FDI firms in the extracting industries and the possible development of their linkages with local firms.
- Another promising avenue is promoting the internationalization of newly emerging private businesses (including SMEs) with a self-declared mission in eco-innovation. Measures could include the support of forward and backward linkages of FDI firms operating in Azerbaijan, as well as the support of local SMEs, for joining international value chains.
- In promoting connectivity and linkages, the authorities need to apply mechanisms that generate incentives for market participants to engage in cooperation leading to the adoption of innovative green technologies.

Recommendations related to specific policy instruments

8. A range of policy instruments that are applied to support green technological development and eco-innovation in mature economies are still missing in Azerbaijan. One important group among them falls into the category of financial instruments supporting eco-innovation:

- Given that the Government is privileged with sizeable and stable inflows of public revenue (which are expected to continue at least for some time to come), it has some scope to consider expanding the level of public funding allocated to the financing of innovation in general and, in particular, of eco-innovation.

- As one possible practical approach to implementing the above, the State Oil Fund of Azerbaijan (SOFAZ) could develop a specific funding programme to this effect.
- As an alternative approach, the authorities could consider establishing or setting aside a special fund (which could in principle be part of the Science Development Foundation) providing project funding, on a competitive principle, to projects targeting eco-innovation or the development of green products for the local market. The authorities could draw on the positive experience of the ICT Development Fund.
- There is also significant and still untapped policy space to enrich the range of policy instruments applied to support R&D and innovation, especially regarding the use of various grant schemes of support.
- Furthermore, the authorities could consider establishing project-based eco-innovation financing instruments whereby the establishment of new linkages among the participants in the project (such as industry-science cooperation or inter-firm linkages) are part of the funding conditionality.
- Appropriate and focused support mechanisms and instruments such as programmes supporting joint innovation projects with the participation of local and international partners could also target widening and broadening international cooperation in eco-related R&D and innovation activities.

9. One of the key institutional gaps in Azerbaijan's financial system, namely, the absence of institutions of early stage financing (such as business angels and venture capital firms), needs to be addressed by targeted policy measures:

- There is a need to expand considerably public support to the pre-commercialisation stages of eco-innovation projects where the funding problems are particularly acute;
- Similarly, there is a need of targeted public support to the development of financial institutions that specialize in early stage financing including the financing of start-up firms and SMEs, which are the most dynamic agents of innovation but face systemic hurdles in the access to finance;
- Public support in this area concerns both the establishing of new (or strengthening of existing) public bodies mandated with such functions and public support to the establishment of appropriate private financing institutions, in particular those performing business angel and venture capital financing.

Annex

Cases of successful eco-innovation projects in Azerbaijan

1. AzDRES Energy Efficiency Improvement project, undertaken under the Kyoto Protocol Clean Development Mechanism

The Clean Development Mechanism (CDM), as defined in the Kyoto Protocol, allows a country with an emission-reduction or emission-limitation commitment under the Protocol to carry out an emission-reduction project in developing countries. Such projects can earn saleable certified emission reduction, which can be counted towards meeting Kyoto targets. The mechanism stimulates sustainable development and emission reductions, while giving industrialized countries some flexibility in how they meet their emission reduction or limitation targets.⁵²

AzDRES is the largest thermal power plant in Azerbaijan, generating half of the country's electricity. It became the first in the world to sell carbon credits earned thanks to an energy efficiency modernization project.⁵³ This project was financed by the European Bank for Reconstruction and Development through a US\$ 207 million loan which was made under the Bank's Sustainable Energy Initiative. The loan was used to rehabilitate and modernize the plant's technology, significantly increasing the plant's efficiency and capacity.

The project was registered under CDM by the CDM Executive Board and is estimated to generate over 10 million carbon credits over the 10-year crediting period. These credits can now be sold on global carbon markets, including the EU's Emissions Trading Scheme.

2. Sumgait Technologies Park

The Sumgait Technologies Park is an important infrastructural project focusing on the development of renewable and alternative energy sources. The Park⁵⁴ is based on German technology and is designed to produce collectors to harness solar energy for heating. The final products should meet international quality standards with a view to marketing them not only on the local market but also on European markets. Future production plans include photovoltaic panels.

3. Demonstration effects of a new hydro-electric power plant

In January 2011, the State Agency for Alternative and Renewable Energy Sources initiated a demonstration project of international cooperation to promote renewable energy

⁵² http://unfccc.int/kyoto_protocol/mechanisms/clean_development_mechanism/items/2718.php.

⁵³ European Bank for Reconstruction and Development.

⁵⁴ Naila Aliyeva, *op. cit.*

and sustainable development.⁵⁵ The project will be undertaken in cooperation with the United Nations Development Programme, with financial support from the EU (€500,000) and the Norwegian Government (€790,000). It envisages the construction by 2013 of a new hydro-electric power plant.

The specific demonstration objectives of the project include:

- Demonstrating the feasibility of this renewable energy source in Azerbaijan
- Assessing the hydro-electric power potential in remote and rural areas
- Identifying the optimal types of renewable power for the different regions
- Identifying geographic areas with potential for sustainable power generation
- Training and educating target groups and beneficiaries on sustainable energy.

4. Joint loan facility of the Nordic Investment Bank and the Black Sea Trade and Development Bank

In 2011, the Nordic Investment Bank (NIB) and the Black Sea Trade and Development Bank (BSTDB) concluded a new agreement opening a loan facility aimed at reducing greenhouse gas emissions in BSTDB's member countries.⁵⁶ The new loan programme has a 10-year maturity and totals €30 million. Some 70% of the loan programme is to be allocated towards reducing the emissions in countries around the Black Sea. Projects may be implemented in the sectors of renewable energy, energy efficiency and energy saving as well as public transportation.

From the point of view of the funding agencies, the main objective of the programme is to contribute to mitigating climate change and the effective use of energy in the countries of the region. The funds will also be used for projects involving advanced technology from and cooperation with enterprises from NIB member countries.

⁵⁵ *In-Depth Review... op.cit.*

⁵⁶ Source: www.reuters.com/article/2011/06/09/idUS139562+09-Jun-2011+HUG20110609.