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List of acronyms

BAU	Business-as-usual
CHP	Combined heat and power
CO_2	Carbon dioxide
ESCO	Energy services company
EU	European Union
EU IPA	European Union Instrument for Pre-Accession Assistance
FIT	Feed-in tariffs
GDP	Gross Domestic Product
GE	Green Economy
GHG	Greenhouse gas
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit
GWh	Gigawatt hour
HNVF	High Nature Value farming
IMF	International Monetary Fund
LPG	Liquid petroleum gas
MAFWM	Ministry of Agriculture, Forestry and Water Management
MTOE	Mega Tonnes of Oil Equivalent
NEEAP	Energy Efficiency Plan of the Republic of Serbia for the Period 2010 to 2012
NEAS	National Environment Strategy of the Republic of Serbia
NG	Natural gas
NPEP	National Programme for Environmental Protection
NSDS	National Sustainable Development Strategy
NSSUNR	National Strategy for Sustainable Use of Natural Resources
NSWM	National Strategy for Waste Management
PV	Photovoltaic
RPS	Renewable portfolio standards
SD	System Dynamics
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
VAT	Value added tax
WDI	World Development Indicators
WTO	World Trade Organization

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Acknowledgements

This report was developed on the basis of Chapter 7, "Analysis of Scenarios in Selected Sectors", a quantitative analysis undertaken as part of the "Study on Achievements and Perspectives towards a Green Economy and Sustainable Growth in Serbia"[1], which was prepared as the country's contribution to the Rio+20 process. UNDP and UNEP supported the Ministry of Energy, Development and Environmental Protection (formally Ministry of Environment, Mining and Spatial Planning) in the overall coordination, collection and documentation of case studies and drafting of the report. UNEP carried out a quantitative analysis of green economy options developed in Chapter 7 of the above-mentioned study, and produced the current Green Economy Scoping/ Modelling report.

The UNEP coordination team was led by Rie Tsutsumi and Moustapha Kamal Gueye, under the guidance of Jan Dusik and Steven Stone. Miroslav Tadic and Andelka Mihajlov coordinated the expert team from Serbia, which consisted of data collection and consultations.

The following ministries[2] and organizations contributed to the data collection and review of the scenario analysis: Ministry of Economy and Regional Development, Ministry of Finance, Ministry of Infrastructure and Energy, Ministry of Health, Ministry of Agriculture, Trade, Forestry and Water Management, Office for Sustainable Development of Underdeveloped Areas – Government of the Republic of Serbia, and Chamber of Commerce and Industry of Serbia, Belgrade Chamber of Commerce.

Andrea Bassi carried out the scenario analysis and drafted Sections 1, 3 and 5, including the Annex, as well as contributed to Section 4. Philip Gass developed Chapters 2 and 4, and carried out the overall review. Editing and layout by Diwata Hunziker. Original design by Thomas Gianinazzi.

Executive summary

Serbia faces a number of challenges, even as it continues to pursue economic reform and transition after years of conflict and political strife: soaring unemployment rate (over 20 per cent in 2012);[3] stagnant GDP growth after an economic collapse in the 1990s and current pressure from the global economic downturn; negative domestic budget and international trade balance; and significant decline in population due to emigration and low birth rates. Overall, these factors threaten to compound an already fragile national reform process and, at the same time, calls for the urgent implementation of economic transition in a manner that will ensure long-term sustainable development.

This scoping study provides an overview and starting point for Serbia's transition to a green economy. It presents a macro-economic profile of the country, a sector-specific review, economic modelling and potential policy-enabling conditions.

The following sectors were identified for their role and importance to the national economy and became the focus of the analysis:

- **Energy demand**, with emphasis on energy efficiency in buildings (including residential, commercial and services energy use), industry, and transport.
- **Energy supply**, with emphasis on power generation, including the use of renewable energy.
- **Agriculture**, with focus on the potential to transition to organic agriculture practices, increasing value added and employment.

The analysis involved the creation of customized sectoral simulation models, which are based on existing data and sectoral/national plans, to analyze the impact of green investments (e.g., energy and CO_2 savings, income and job creation). The results of a business-as-usual (BAU) scenario are compared with a green investment scenario. The analysis focused on the synergies created across policy options in order to eliminate weaknesses and make use of the collective strengths of the intervention strategy.

The study finds that synergies could be developed to create the necessary enabling conditions for a transition to a green economy, by using the following policy options:

- **Mandates**, which include the enactment of the Law on Rational Use of Energy that requires the entrance of renewable energy in power supply to reach a specific target in a given year. It will enable energy savings for large and public consumers, introduce requirements for energy producers, distributors and transmitters to fulfill minimal energy efficiency requirements, and introduce consumption-based billing.

- **Incentives and capital investments** that will reduce upfront costs (shared between government and other actors, such as households and the private sector), with incentives being especially effective if the upfront cost is contained and capital investments are high. These include incentive packages such as feed-in tariffs, contributions to adopt organic agriculture practices, establishment of an Energy Efficiency Fund, etc.

The modelling results indicate that there are significant long-term benefits from a transition to a green economy in each of the following sector:

- **Energy demand.** Avoided costs will be higher than investments by 2030, reaching a cumulative net benefit of €1 to 2 billion, or approximately €50 to 100 million per year. Simulation reveals that the overall payback time is seven to 10 years, with the breakeven point (from an economy-wide perspective) being reached in 2019-2022. The investments simulated are projected to have the potential to create 5,000 to 8,000 jobs by 2030, depending on the specific policies implemented.

- **Energy supply.** The avoided power generation from coal reaches 5,000 to 10,000 GWh in 2030, generating capital savings of up to €1.3 billion. Based on rough assumptions (at €20 per ton) on the current and future cost of coal for power generation, the net investment for energy supply reaches a

total of €10 to 40 million in 2030, or reaching up to 50 per cent of the annual investment. The total additional employment generated ranges between 1,500 and 2,600 jobs (with temporary peaks at 5,000 jobs), assuming the policy adopted and the potential for domestic manufacturing of power generation capacity from renewables.

- **Agriculture.** Shifting to organic agriculture will contribute to boost revenue through the increase in market price, yield and other additional economic benefits, i.e. revenue from carbon sequestration. The extra value added from even a low-end 20 per cent premium price margin scenario would largely allow for full repayment of costs (depending on the assumptions used for investment and yield). Projections on the organic land area indicate that production could increase when the land is managed with more ecological practices, especially for certain types of production. Moreover, organic agriculture practices would reduce soil erosion and allow higher carbon sequestration in the soil relative to conventional practices. Considering an average market value of carbon, the value of carbon sequestered in the year 2030 alone could reach between €0.6 to 1.7 million in the ambitious expansion scenario (150,000 ha by 2030).

The elements of a sectoral green economy roadmap to Serbia's transition to a green economy, as well as the means to achieve these results, include:

- **Improved data collection.** More data is needed to better evaluate the potential impact of green economy interventions in Serbia. Information regarding job creation and potential salary levels, as well as productivity of green practices, would allow for considerable improvement in the analysis and better inform decision-making.

- **Removal of policies that stimulate inefficiencies** (such as fossil fuel energy subsidies) in order to level prices and returns in the energy sectors and stimulate efficiency improvements and low carbon development. Although easily implemented, due to the domestic production of coal, the gradual removal of electricity subsidies should be considered in the context of a green economy strategy and in light of Serbia's future integration in the European Union (EU). Furthermore, subsidies could be reallocated (as avoided expenditure) to support energy efficiency. Bearing all these in mind and in order to stimulate rational use of energy and increase energy efficiency, it is crucial to establish the Energy Efficiency Fund as soon as possible and introduce other incentive mechanisms such as value added tax (VAT) and tax reduction.

- In view of the potential energy and/or agriculture production cost increases, **design interventions which provide incentives** that reduce inputs and mitigate potential cost increase. Initial efforts to comply with the EU's Directive on energy efficiency should therefore be continued.

- **Low carbon transport options**, especially public transport, require considerable upfront investments but lead to considerable medium and longer term savings. Should energy prices increase in the future, a more efficient public transport sector (both passenger and freight) would increase profitability (leading to higher avoided costs).

- **Introduction of renewable energy for selected utilities** (e.g., solar-heated water) in the short-term, such as the expanded use of biomass for energy production which could support the creation of a local supply chain and reduce waste.

- The **potential of organic agriculture should be explored**, especially the market value of organic products and the opportunities for employment creation. Relevant opportunities may be available for the sector and Serbia could profit from early positioning in the European market. The capacity of organic agriculture to increase carbon sequestration is also potentially interesting, which could provide additional revenues should a global (regional or national) carbon price mechanism be enacted in the future.

The financing needs of a green economy transition will be significant, which the government of Serbia has recognized and is currently addressing. National development plans such as the National Strategy for Waste Management, National Programme for Environmental Protection, National Strategy for Sustainable Use of Natural Resources, National Sustainable Development Strategy, National Environmental Approximation Strategy and others have set out clear implementation frameworks to support sustainable development, address environmental needs, and identify potential financial resources from government (budgetary) allocations, "polluter-pays" tariffs, and international financing opportunities.

As Serbia shifts to a green economy, it is important to ascertain that economic interventions are measured, transparent and consistent to build market confidence and ensure continued public and private sector support for a transition to a green economy. Although there will be temporary economic pressures, as traditional sectors are required to transition to a green economy, stakeholder engagement, education and training, complemented by the monitoring of economic instruments, could ensure that the intended affects are achieved and to prevent adverse side effects.

The Serbian government has expressed its motivation to undertake green economic reform, and has confirmed this by setting up national policy frameworks in key sectors and identifying potential financial resources. The pieces are in place to begin this transition and as the economic modelling of this report shows, the potential long-term benefits of a shift to a green economy can be substantial for its economic, social and environmental well-being.

1 Introduction

This study is an analysis of key opportunities in support of Serbia's transition to a green economy. It was undertaken with the aim of informing Serbia's decision-makers with an innovative, flexible and transparent assessment of the impacts of green investments in selected sectors. In particular, the study intends to provide Serbia with a scenario analysis that evaluates the sectoral and cross-sectoral impacts of green economy interventions in three targeted sectors: energy demand (efficiency), energy supply (including renewables) and agriculture. It also examines policy options that could enable these sectors' transition to a green economy.

The definition of a green economy varies on a country-to-country basis, according to the local context and national priorities. As a consequence, the strategies could also be very different, for which further national studies are needed.

UNEP's Green Economy Report (2011)[4] defines a green economy as "an economy that results in improved human well-being and social equity, while significantly reducing environmental risks and ecological scarcities." It is "…a system of economic activities related to the production, distribution and consumption of goods and services that result in improved human well-being over the long term, while not exposing future generations to significant environmental risks or ecological scarcities."

At the operational level, a green economy is seen as one where income and employment growth is driven by investments that:

- reduce carbon emissions and pollution;
- enhance energy and resource efficiency; and
- prevent the loss of biodiversity and ecosystem services.

These include investments in human and social capital, as well as the recognition of the central position of human well-being and ultimate goal of social equity. The approach is based on sound economic analysis of current trends, risks and opportunities, as well as national experiences in the application of integrated policy tools effectively. In fact, there could be several different operational definitions of the green economy at the national level, where the national context shapes priorities and goals for greening the existing (often unique) economic structure of the country.

A green economy implies the decoupling of resource use and environmental impacts from economic growth. It is characterized by substantially increased investment in green sectors, supported by enabling policy reforms. These investments, both public and private, provide the mechanism for the reconfiguration of businesses, infrastructure and institutions, and the adoption of sustainable consumption and production processes. Such reconfiguration would lead to a higher share of green sectors in the economy, more green and decent jobs, reduced energy and material intensities in production processes, less waste and pollution, and significantly reduced greenhouse gas emissions.[5]

In this respect, the study introduces (but does not fully test) a range of policies that could be employed to create investment, or leverage public expenditure, focusing on three main intervention areas: capital investment, regulations (e.g., mandates) and incentives (e.g., subsidies). The process involved the creation of customized sectoral simulation models, based on existing data and sectoral/national plans, to analyze the impact of green investments (e.g., energy and CO_2 savings, income and job creation). The results of a BAU case are compared with a green investment (GE) scenario – with an emphasis on the synergies created across policy options – to eliminate weaknesses and make use of the collective strengths of the intervention strategy.

The results of this study are to be used as options to be considered for possible interventions and for informing the creation of a more detailed (vertically and horizontally) follow-up of national green economy feasibility studies.

Review and modelling methodology

The macro-economic profile of Serbia is based on a desk review of publicly available documents, as well as inputs and statistics from international bodies such as the World Bank's World Development Indicators (WDI). The government's submissions to the United Nations Framework Convention on Climate Change (UNFCCC) and Rio+20 processes also served as key inputs. The analysis of policy options and enabling conditions is largely based on UNEP's Green Economy Report and additional studies related to a transition to a green economy.

The data collection was carried out by a team formed by the government of Serbia with support from UNDP. Two main scenarios were simulated and analyzed in the investment modelling associated with this study, as presented below:

- A **business-as-usual case** (BAU) that assumes the continuation of historical and present trends. This includes all policies and interventions currently active and enforced, but excludes policies planned not yet implemented (e.g., all targets that are not mandated by law or policies that are being evaluated for future implementation). In the case of energy, this means a continuation of demand trends for energy consumption and no marked expansion of renewable energy for power generation, as highlighted by the scenarios included in the Energy Sector Development Strategy[6]. Concerning agriculture, the BAU scenario does not assume an expansion of organic agriculture, with the area cultivated with ecological practices remaining constant in the future.

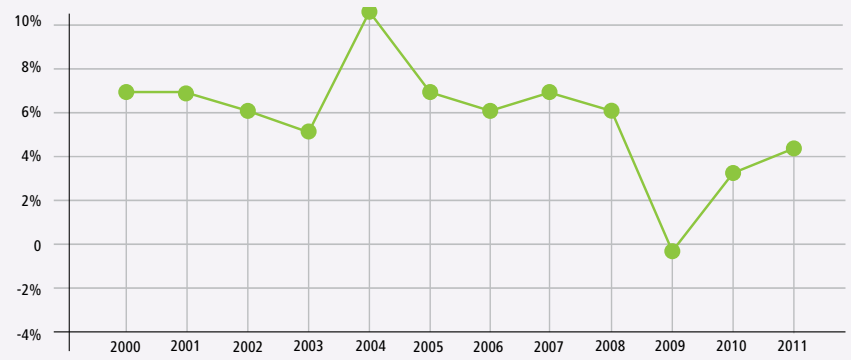
- A set of **green economy** (GE) scenarios that simulate additional interventions that reduce energy intensity, increase the use of renewable energy and support the adoption of sustainable agriculture practices. The specific interventions and assumptions simulated in the GE scenario are listed in Section 3.

For all sectors and scenarios, impacts were estimated on avoided energy consumption and costs, avoided CO_2 emissions (energy demand and supply interventions), economic performance and production (agriculture sector) and employment.

2 Macro-economic profile and overarching challenges to the economy

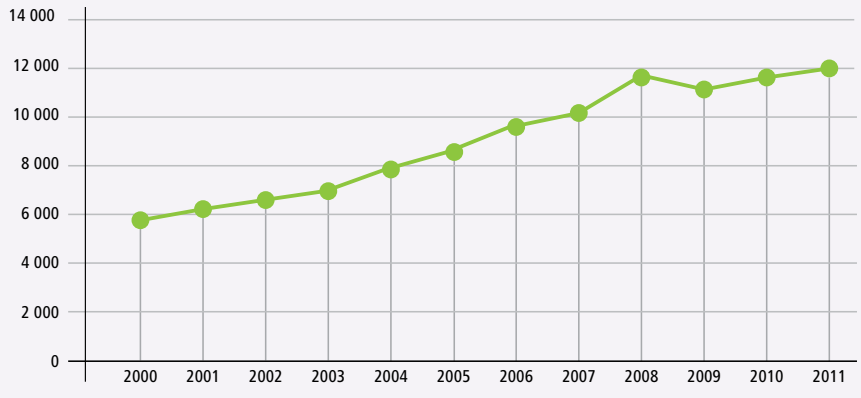
In recent years, Serbia's economy has gone through a series of growth and recessionary periods. Its average annual GDP growth was 16.75 per cent over the 1990-1993 period,[7] when the breakup of Yugoslavia resulted in economic collapse and resulted in international sanctions and hyperinflation. Positive GDP growth trends did not stabilize until 2000, but by then the country's GDP was already in a significantly depressed state.[8] Between 2000 and 2008, annual GDP growth averaged 4.9 per cent (see Figure 1). Since this period, the Serbian economy has been affected by the global economic downturn, and faced pressure due to unemployment and instability. It is worth noting that since 2000, the GDP per capita (PPP adjusted) indicates a steady and significant improvement trend (see Figure 2).

Figure 1. GDP growth of Serbia (annual, %)



(Source: World Bank, World Development Indicators)

Figure 2. Serbian GDP per capita, PPP (current international US$)

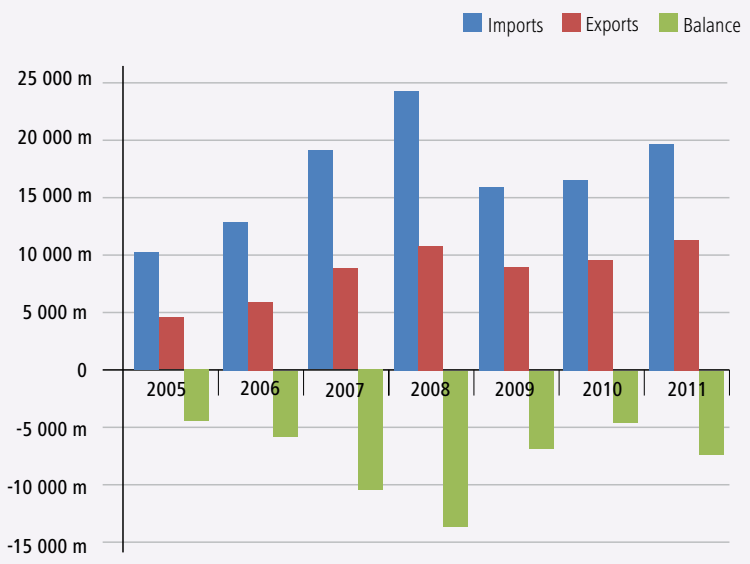


(Source: World Bank, World Development Indicators)

The country's exports originate from various of sources, including energy, metal products, pharmaceuticals, agricultural goods, clothing, manufactured automobile parts and chemicals.[9] As Serbia seeks to build its international profile and become increasingly integrated with the European Union, its exports have improved significantly, more than doubling in the 2005-2011 period. Despite this progress, a growing fiscal deficit, rising public debt, high unemployment (23.7 per cent)[10] and rising inflation have created adverse impacts. In 2013 the International Monetary Fund (IMF) expects the Serbian GDP to contract by -0.93 per cent.[11] Although the Serbian economy has undergone significant transition in the past 20 years and is increasingly influenced by market forces, there remain significant and relatively diversified state-owned enterprises, particularly those related to energy utilities and energy development (fossil fuels).

Table 1 provides a sectoral breakdown of Serbia's economy,[12] which indicates that services represent the vast majority of value added at 62.2 per cent. Agriculture and industry represent the other two major sectors at 10.7 per cent and 27.1 per cent, respectively.

Figure 3. Trade balance of the Republic of Serbia (in US$ millions)[13]



One of the challenges facing Serbia today is the growth of its negative trade balance. While exports have grown, so have imports (see Figure 3) leading to an annual trade imbalance of more than US$5 billion. Meeting its energy demand through oil and natural gas imports, which influence fuel price inflation, is another challenge facing Serbia. The government has sought to address high energy imports through improved domestic production.[14] Nonetheless, further reforms will be needed to improve the current trade imbalance, which has led to fluctuations in inflation estimates at 10.3 per cent in September 2012.[15]

The current fiscal priorities of Serbia focus on improving the precarious economic situation in the country and beyond that, tapping into the potential for GDP growth once this stabilization is achieved. In its recent mission in the country, the IMF identified "fiscal consolidation"[17] as the most urgent of all the challenges, while acknowledging that the government's effort to address them. In the short-term, ensuring that inflation is brought under control will be a significant task, one that would check spending and focus on rationalization of expenses. With the achievement of these goals, the medium-term focus is to "unlock Serbia's growth potential"[18] and create lasting economic stability, employment growth and poverty alleviation.

Table 1. Structure of industry gross value added in 2011

Sector	%
Industry	27.1
Agriculture	10.7
Services	62.2

(Source: Chamber of Commerce and Industry of Serbia (CCIC))

The shift to a green economy therefore calls for economic performance without sacrificing environmental and social development goals. The current situation calls for a shift to a green economy that is focused on addressing the trade imbalance, which is significantly influenced by imports of fossil fuels to meet domestic energy demand. This transition could produce positive economic spinoffs, as well as improve environmental performance and generate jobs.

2.1 Environmental footprint

Serbia's environmental footprint is uniquely shaped by its high degree of biodiversity and its efforts to preserve protected areas. In recent years, however, there have been adverse impacts of development expansion and utilization of natural resources in the form of increased GHG emissions and a decline in water quality and natural resource sustainability.

2.1.1 GHG emissions

Serbia's resource endowment include 48.14 billion m^3 of natural gas and 77.5 million bbl of oil reserves. In both cases, however, it imports more than it exports, leading to high energy costs and resulting in adverse impacts on the economy. Its electrical needs are

Table 2. GHG emissions by sector

Sector	Emissions (million metric tons CO_2e)
Electricity and Heat Production	30.93
Gaseous fuel consumption	0.32*
Liquid fuel consumption	1.03*
Solid fuel consumption	3.13*
Manufacturing and construction	5.53
Residential buildings and commercial and public services	2.04
Transport	6.47
Other sectors	1.07
Agriculture (methane and nitrous oxide)	0.89
Total (est.)	~50

* (2009 est.) (Source: World Bank Data Sets[21])

served primarily through a combination of two-thirds fossil fuels (mainly lignite-fired thermal plants) and one-third hydroelectric generating stations. In response to growing energy demand, the state-owned energy provider Elektroprivreda Srbije[19] has announced plans to greatly increase hydroelectric capacity. The company also plans to increase the capacity of renewable energy sources. With 34,130 employees, Elektroprivreda Srbije is the largest enterprise in the country.[20] It is also the largest producer of lignite with an annual production of 38 million tons, resulting in substantial thermal generation and making it a significant GHG emitter.

In 2010, GHG emissions from electricity and heat production totalled nearly 31 million metric tons, representing 67 per cent of total fuel combustion emissions in Serbia. Emissions from transport fuel combustion accounted for an additional 6.5 million metric tons. The share of the other sectors in the country's emissions (2010) are presented in Table 2.

2.1.2 Water

In addition to high emissions from energy production, other environmental challenges have been identified by the **National Environment Approximation Strategy** of the Republic of Serbia (NEAS).[22] Depletion of groundwater resources, as well as untreated industrial and municipal wastewater, leading to generally low and deteriorating water quality are described as serious challenges that need to be addressed. NEAS describes drinking water quality across the country as "generally unsatisfactory",[23] an assessment that is shared by NPEP who further declares that examples of clean water are "very rare".[24]

According to NPEP, the total capacity of existing sites of groundwater is 21,000 liters/per capita with a potential of 60,000 liters/per capita (see Table 3) and that approximately 92 per cent its total water resources originate from outside Serbia, with the remaining 8 per cent from its own resources.[25] At the same time, recent European Commission data finds that Serbia holds significant freshwater resources per inhabitant, totalling over 23,000 m^3. As such, NPEP considers that Serbia has sufficient water resources to meet its needs, but only if they are used in a rational manner, protected from degradation and pollution, and the impacts of climate change are taken into account.[26]

With regards to the country's protected wetlands, nine areas have gained Ramsar Protected Area status: Special Nature Reserves Obedska bara, Carska bara, Ludasko jezero, Slano kopovo, Labudovo okno (part of the Deliblato Sands Special Nature Reserve), Gornje Podunavlje and Zasavica, Landscape of Exceptional Characteristics Vlasinsko jezero and Karajukica bunari in Pester field, covering an area of 55,627 ha.[27]

2.1.3 Biodiversity

Serbia is characterized by high genetic, species and ecosystem diversity[28] (see Table 3). In addition to 464 protected nature areas of various types, the county is also host to 215 protected plant species and 429 animal species which are endemic and rare.[29] Although research and documentation is insufficient, the Biodiversity Strategy specifies that 44,200 species and sub-species have been officially registered, but this number could reach 60,000.

Overall, the total protected areas of the Republic of Serbia is equivalent to 5.86 per cent of its area.[30] The **Biodiversity Strategy of the Republic of Serbia for the period 2011-2018**, as well as the NPEP, provide further information on these subjects.

Table 3. Biodiversity in Serbia

Resource	Current scenario
Groundwater capacity	21 000 liters per capita (current)*
	60 000 liters per capita (potential)
Wetlands	9 Ramsar Sites (55 627 ha)**
Freshwater resources per inhabitant – long-term average	23 900 m^3 per capita***
Biodiversity	The Republic of Serbia holds: • 39 % of European vascular flora • 51 % of European fish fauna • 49 % of European reptile and amphibian fauna • 74 % of European bird fauna • 67 % of European mammal fauna • 700 to 800 plant communities • Over 5 million ha agricultural lands • Over 4 200 plant genetic resources (national collection)**
Forest inventory	2 252 400 ha**

* National Programme for Environmental Protection (2010)
** MESP, Biodiversity Strategy of the Republic of Serbia for the period 2011–2018
*** European Commission Eurostat (2009)

In terms of the country's ecosystem diversity, four of the world's twelve terrestrial biomes have been identified: Zonobiome of deciduous (broadleaf) forests; Steppe zonobiome; Zonobiome (orobiome) of conifer boreal forests; and Zonobiome (orobiome) of highland tundra.

The challenges that are of particular concern to biodiversity are: impacts of uncontrolled tourism, illegal construction activities, transportation and forest management of protected areas.[31] In addition, degradation due to land use change, use of obsolete technologies, inappropriate use of chemicals for pest control and exploitation of flora and fauna are all cited as biodiversity concerns. Furthermore, the effects of climate change could compound existing pressures. The direct threats to biodiversity include: conversion of native habitats, alteration of flow regimes of natural waterways, construction of infrastructure, logging, mining, livestock, tourism, exploitation and illegal harvesting.[32]

The Biodiversity Strategy sets out a 2011-2018 action plan for addressing related needs, including over 170 individual actions across 11 thematic areas designed to address biodiversity issues and challenges in the country.[33]

2.1.4 Forests

The share of natural forestry land and forested land cultivated in Serbia totals 35.33 per cent,[34] of which 29.1 per cent is considered forest and 4.9 per cent thickets and brush. Ownership of forest resources is divided between private (47 per cent) and state (53 per cent).[35] **The Forest Development Strategy of the Republic of Serbia**[36] outlines that 39.6 per cent of forests is of seed origin, coppice represents 34.6 per cent, and the rest representing plantations (14.5 per cent), scrub (5.6 per cent) and brushwood (5.5 per cent).[37]

The overall state of the forests is considered "unsatisfactory"[38], which is due to insufficient production volume, unfavourable age structure, unsatisfactory density and cover percentage, unfavourable stand condition and unsatisfactory health. This assessment is backed by NPEP, which identifies a number of issues,[39] including:

- lack of forest cover in some parts of Serbia (Vojvodina);
- illegal logging, conversion of forest and forest land to other uses;
- widespread deterioration of forests;
- inadequate management of forests;
- pressure on other sectors of the forest area; and
- fires and other natural disasters (water flood, drought, ***vetroizvale, snegoizvale***).

Serbia's forest resources have played an important role throughout its history and continues to provide significant products to Serbians in the form of wood and wood products, food, livestock feed, medical

services, fuel (wood accounts for 14 per cent of final energy consumption),[40] recreation, wildlife protection and landscape diversity. Forests are also recognized for their irreplaceable role in the mitigation of climate change. Over 540,000 ha of Serbia have been designated for some form of protection.[41]
At present, there are five national parks in Serbia: Đerdap, Fruška Gora, Kopaonik, Šar-planina and Tara[42]. In addition, there are 14 nature parks, 17 regions of exceptional features, 73 nature reserves, 312 nature monuments and [43] protected areas of cultural and historical significance, and one biosphere reserve.[43]

Recognizing the environmental importance of forests to the Serbian economy and its biodiversity, the Forestry Development Strategy set out a number of measures to support the sustainable development of the forestry sector. These include sectoral and cross-sectoral planning and coordination, investment, institutional reform, forest legislation, international and regional cooperation, and follow-up and evaluation.

2.2 Socio-economic profile

Serbia's population is approximately 7.24 million,[44] but has been steadily declining for a period of over 20 years. There are claims that Serbia has lost as much as 5 per cent of its population in recent years,[45] in part due to declining birth rates and massive emigration in the 1990s when families left to raise their children in other countries and often did not return. The poor economic conditions and high unemployment rate are also cited as drivers for low birth rate, as people do not feel secure enough to start large families.

The country is also facing an aging population. The United Nations Population Fund reveals that more than 17 per cent of its citizens are over 65 years old, making it one of the highest rate of elderly people in the world.[46] The challenge of caring for seniors are exacerbated at a time of population decline and high unemployment, where many pensioners have to deal with inflation and an unstable economy, as well as their own inability to make savings from their pensions. They also have to deal with rising health care costs, which reached 10.4 per cent of the country's GDP in 2010[47], even as housing and subsistence aid increased simultaneously.

In terms of employment, 45 per cent of Serbia's working age population (from 15 to 64 years old) are employed, making it one of Europe's lowest employment rates.[48] The main employers reflect a diversified economy, with a slightly higher representation from agriculture – 24 per cent of total employment – versus its share of GDP; whereas employment in industry is relatively equal to its share of GDP – 25 per cent – while the services sector represents 50.1 per cent of total employment, but lower than its relative share of GDP.[49]

The percentage of Serbia's population living below the poverty line is also growing, after a period of decline following critical rates in the 1990s and early 2000s. After falling to a low of 6 per cent in 2008, the poverty rate has risen again in the wake of global economic downturn to over 9 per cent.[50]

Poverty, unemployment and population decline are all linked to the challenges Serbia has faced in its transition to democracy and a market economy. The economy collapsed due to war and economic sanctions in the 1990s, while the "battered educational system"[51] had to recover and create a trained and skilled workforce. Unemployment was tied to lack of education[52] and, conversely, those who are educated faced long periods of unemployment following graduation of up to three years.[53]

The government has implemented significant reforms and the transition to a market economy continues. Moreover, international economic sanctions have since been lifted but in spite of these efforts economic

growth remains unstable. The country's recovery were subsequently set back by poor global economic conditions, which put to test an already fragile situation. Beyond doubt, most of Serbia's social challenges are directly tied to its precarious economic situation and difficult transition.

A green economy approach must therefore be cognizant of these challenges and seek to undertake the necessary reforms in a manner that will also address environmental concerns such as GHG emissions and water pollution, as well as the social challenges of high health care expenses, low birth rate and inadequate education. Policy reforms that adopt this approach should ensure that any negative side effects, such as increased GHG emissions or water pollution due to industrial expansion, are also properly considered and mitigated. While improving economic stability is a top priority for Serbia, it is important to achieve economic growth without overlooking environmental sustainability and social development.

The greening of the targeted sectors – energy supply and demand, and agriculture – has a direct impact on access to food and jobs (agriculture represents nearly a quarter of national employment). It could lead to reduction in air and water pollution, as well as lower energy cost for the population. Adopting a green economy approach could also address job creation in sectors directly concerned, such as renewable energy development, or indirectly bring about improved environmental protection and increased security in ecosystem services.[54] As UNEP Green Economy Report highlights, there are links between a green economy and sustainable development as many target sectors have direct links to environmental protection and social improvement, which are referred to as "public goods qualities".[55]

With such potential benefits acknowledged, it is likewise essential to underline that a green economy approach is not a blueprint for sustainable development. It must be supported by a strong national policy framework that enables the transition to a green economy. This implies building on multiple supporting policies, rather than a single policy, that seek to address all aspects of sustainable development. In this regard, Serbia has attempted to shape this policy framework and has taken an active approach to developing the landscape that will allow the success of its transition to a green economy.

2.3 Policy landscape

Serbia's policy landscape for the development of a green economy is rooted in a number of national development plans across multiple sectors. Table 4 highlights a cross section of these plans and strategies covering economic development, energy, employment, health and social development, agriculture and forestry, and environmental protection. These are also supported by international submissions and documents, including the country's contribution to the Rio+20 process and outcomes.

The government has recognized the urgent need for reform, many of which are influenced by sustainable development objectives. It has been very active in driving the plans, led by the **National Sustainable Development Strategy**[56] which serves as a centrepiece for national sustainable development across sectors. Other sustainable development challenges have been identified by the government in its various strategies, including the **National Strategy for Waste Management** (NSWM, 2010), NPEP (2010), **National Strategy for Sustainable Use of Natural Resources** (NSSUNR, 2011), **National Sustainable Development Strategy** (NSDS, 2007),[57] as well as the NEAS (2011). Specifically, :

- **Environmental challenges (NPEP)**[58]
  - High degrees of water pollution, and rarity of Class I and I/II clean water sources;
  - Air pollution caused by uncontrolled burning in landfills and agricultural land, high concentrations of soot and particulate matter due to municipal and individual boiler use in

heating season, incomplete data and monitoring of GHG emissions; and
  - Excessive and uncontrolled exploitation of limited capacity natural resources.

- Economic challenges
  - Lack of natural resources, especially oil;
  - Inadequate education (only 7 per cent of the population have a university degree); and
  - The antiquated education system is in great need of update and reform.

- Social challenges
  - Concentration of wealth and increase in poverty;
  - Re-emergence of past (pre-2000) social problems; and
  - Unfamiliar sustainable development ideas and principles.

As a result, NSDS is based on three pillars: care for the environment, knowledge-based economy and social solidarity.[59] Each of these pillars is specifically defined for what they mean and what they should imply: [60]

- Knowledge-based economy
  - Dynamic development and economic growth to achieve equity, with emphasis on employment and increase in personal income within a more competitive private sector; and
  - Wealth, resources and potential shared in such a way that all citizens may enjoy the minimum standards of security, human rights and other privileges.

- Social solidarity
  - Prevention of new poverty which may occur due to economic reform, by enabling vulnerable persons to take advantage of new economic opportunities; and
  - Maintenance and improvement of social security networks for the most vulnerable groups, particularly those living in underdeveloped areas, through efficient application of existing programmes, measures and activities, as well as the creation of new ones.

- Care for the environment
  - Preservation of the planet for future generations and appeal for responsibility, and
  - Every human being is equally entitled to have all the freedom which does not imperil other people's freedom.

These definitions serve as guiding principles for a more detailed solution in the Serbian context. NSDS also outlines the national priorities for sustainable development and conducts a strength-weakness-opportunity-threat (SWOT) analysis related to undertaking sustainable development in Serbia. Following this groundwork, NSDS provided an institutional framework (in collaboration with the Office for Sustainable Development and Sustainable Development Council as its focal point), a financing scheme and a plan (including key indicators) to monitor the implementation strategy.

NSDS has been followed by a number of programmes designed to assist in ensuring environmental integrity. For example, in 2010, NPEP was adopted to modernize the development of environmental policy and to provide a legal and institutional basis for current and future programmes.[61] The principles under which NPEP was formulated include:

- sustainable development (as defined by the 1992 Rio Summit);
- conservation of natural resources;
- compensation (mitigation of adverse effects);
- integrity (State, province and local government providing integration of protection and environmental improvement);
- "polluter pays" (paying for causing environmental pollution);
- "userpays" (paying a fair price for use of natural resources);
- incentives (economic and otherwise);
- shared responsibility (amongst all parties responsible for pollution);
- subsidiarity (decentralization of decision making);
- prevention and precaution;
- raising awareness;

- information and public participation;
- polluters and successor (successors cannot avoid obligation in regards to environmental remediation and pollution);
- right to a healthy environment and access to justice (before authorities or courts); and
- harmonization of natural legislation with the EU Acquis (as part of the process to join the EU).

Moreover, NPEP includes a series of specific measures to meet the objectives of the environmental protection programme, including a short-term 2010-2014 action plan for environmental policy. This is in addition to a funding strategy and a monitoring plan to ensure successful implementation.

Another, the NEAS,[62] aims to push for sustained progress on environmental issues by focusing on three particular areas: transposition of the EU's environmental legislation into national legislation; putting in place the administrative capacity to implement, monitor and enforce that legislation; and establishing the infrastructure required to be able to comply with the legislation.[63] As NEAS states, the costs associated with complying with existing EU environmental legislation are high. As a result, the government of Serbia is focused on optimizing its activities to effectively use limited resources.

NEAS also updates the original environmental policy work and environmental indicators of NPEP, and identifies three overarching policies to achieve full compliance with EU Acquis in this area:[64]

- **Serbian legislation should mirror the EU Acquis.** Any additional requirements or stricter standards would only be deployed if environmentally and economically justifiable, and not in contradiction with EU laws;

- **Use of donor funds should be maximised.** This involves the establishment of appropriate absorption capacity, i.e. adequate institutions and pipelined projects. Private sector involvement should be further stimulated by creating favourable conditions to attract investment and a balanced economic strategy that will in turn minimise the needed intervention from Serbian public budgets should be maintained;

- **Implementation should focus on EU requirements.** Work on approximation and implementation of the EU Acquis should have an absolute priority over other national agendas; financial and staff resources should be reallocated to reflect this preference, especially in light of budgetary restrictions on expenditures and staff promotion.

Additional policies such as the NSWM and the NSSUNR provide related targets in these sectors. NSWM proposes the following steps to achieve sustainable waste management:[65]

- Define the basic orientation of waste management for the next period, in accordance with EU policy and the strategic goals of the Serbia;
- Harmonize Serbian legislation and activities with the process of EU legislation;
- Identify major waste producers and the importance and role of directing equity capital;
- Set targets for waste management for the short and long term; and
- Determine the measures and actions for achieving the set goals.

In addition to a strategic framework, a series of waste management options and a financial plan have been set up. Its goal is to ensure the achievement of sustainable development goals, in line with NSDS and other strategies, as well as to follow-up on the previous waste management strategy, 2003-2008.

NSSUNR outlines the challenges, goals, framework and objectives related to sustainable use of extensive

categories of resources, including mineral, renewable energy, forests, biodiversity, geodiversity, fisheries, water and land use. The economic and social impacts of a national strategy are examined by identifying the objectives that contribute and benefit the implementation plan, as well as by establishing a timeline for specific actions and measures. Overall, the different strategies converge in a single national strategy with a view to achieving the sustainable development of Serbia.

Internationally, Serbia's commitment to sustainable development and green economy policymaking are supported by key international submissions, including the Initial National Communication to the UNFCCC[66] and Serbia's contribution to the Rio+20 outcome document.[67] In particular, the latter document highlights the country's commitment to a global sustainable development framework "ensuring integration of the social, environmental and economic dimensions, and … supporting international environmental governance."[68]

Table 4 presents a list of national and international policies, strategies and actions plans that have an unquestionable influence on Serbia's transition to a green, outlining the context under which this transition will occur.


Kosovo territory
under UN interim
administration

Table 4. National and international policy frameworks to support sustainable development in Serbia

State Programme / Strategy / Action Plan		Inception or implementation period (years)
Umbrella Strategy for Sustainable Development		
	National Sustainable Development Strategy	2007
Economic and Regional development		
	National Economic Development Strategy of the Republic of Serbia	2006-2012
	Poverty Reduction Strategy	2003
	Regional Development Strategy of the Republic of Serbia	2007-2012
Energy		
	Energy Development Strategy of the Republic of Serbia by 2015	2005-2015
	Energy Strategy Implementation Programme for the period 2007 to 2012	2007-2012
	National CDM Strategy for the Energy Sector	2009
Employment		
	National Employment Action Plan	2006-2008
	National Employment Strategy	2005-2010
	National Employment Strategy	2011-2020
Health/Social development		
	Strategy for Youth Health in the Republic of Serbia	2006
	National HIV/AIDS strategy	2005-2010
	Social Welfare Development Strategy	2005
	Republic of Serbia Public Health Strategy	2005
Agriculture/Forestry		
	Forestry Development Strategy for the Republic of Serbia	2006
	National Forestry Action Plan/Programme	2008
	Development Strategy of Agriculture in Serbia	2005
	Serbian Agriculture Strategy	2004
Environmental protection		
	National Environmental Strategy of the Republic of Serbia	2005
	Biodiversity Strategy of the Republic of Serbia	2011-2018
	National Strategy on the Inclusion of Republic of Serbia into Clean Development Mechanism of the Kyoto Protocol for the Waste Management Sectors, Agriculture and Forestry	2010
	National Cleaner Production Strategy	2009
	National Strategy for Waste Management	2010-2019
	National Strategy for Sustainable Use of Natural Resources and Goods	2012
	National Programme for Environmental Protection	2010
UN submissions		
	National Report of the Republic of Serbia to the UN Convention on Biological Diversity	Four National Reports (2010)
	Initial Communication of the Republic of Serbia under the United Nations Framework Convention on Climate Change	2010
	Republic of Serbia – Contribution to the zero draft of the Rio+20 outcome document	2011-2012
	Study on Achievements and Perspectives towards a Green Economy and Sustainable Growth in Serbia	2012

3 Key sectors identified for a transformation to a green economy

3.1 Overview

A consensus was reached among Serbia's stakeholders to highlight the following key sectors: energy demand (efficiency), energy supply (renewable energy) and agriculture. All three are central to the long-term sustainable development of the country in view of their contribution to the national economy, including employment, as well as their impact on the country's environmental and social development.

The analysis of the sectors presented in this study was developed as part of the **Study on Achievements and Perspectives towards a Green Economy and Sustainable Growth in Serbia**, in support of the country's contribution to the United Nations Conference on Sustainable Development, Rio+20, held in Brazil in June 2012. It involved the design of customized simulation models that are based on existing national and international statistics.

Data collection was carried out to gather the most suitable and valid data for inclusion in the models. There were some sectors and selected indicators (e.g., organic agriculture) that did not have sufficient data but models were nonetheless created to match available information and generate projections that could be directly compared with existing national, regional and global databases. Assumptions from previous research and literature, even if they do not specifically reflect Serbia's context, were used in certain instances to simulate the scenarios.

The methodology employed is System Dynamics (SD), which relies on causal relations, feedback loops, delays and nonlinearity in order to correctly represent the complexity of the scenario. This allows the generation of generate projections that do not extensively rely on historical data, not as much as optimization and econometrics studies would require. Validation was carried out using behavioural and structural tests.

The simulation starts in 2004 and reaches 2030, allowing historical behavioural validation over a period of approximately six years (for most variables, depending on data availability).

The specific interventions and assumptions simulated in the GE scenario vs BAU for the target sectors are:

Energy efficiency

- Using **Directive 2006/32/EC of the European Parliament** and the **First Energy Efficiency Plan of the Republic of Serbia for the Period from 2010 to 2012** (NEEAP), scenarios were simulated for a 9 per cent energy efficiency improvement by 2018, and 1 per cent per year till 2030 (20 per cent total).[69] Two additional scenarios were simulated, for a 10 per cent-weaker and 30 per cent-more aggressive improvement in energy efficiency by 2030.
- Specific assumptions and interventions in the transport sector include the lowering of vehicles' age and increasing the fuel efficiency of passenger vehicles through the purchase of new and more efficient vehicles, e.g., hybrids (source: **Strategy of railway, road, air and intermodal transport development in the Republic of Serbia, 2008-2015**). In order to reach the target for energy efficiency sector, the main interventions simulated include the reduction of the lifetime of vehicles (e.g., by providing incentives to purchase more efficient vehicles), and the increase of market penetration of hybrid and other low carbon vehicles (up to 12 per cent by 2030).
- Initial energy efficiency improvements are allocated as follows: industry (45 per cent), transport (36 per cent), residential and other sectors (19 per cent).[70]

> The main indicators calculated include the investment required, energy and CO_2 savings, cost avoided, employment and potential income generated.

Renewable energy

- Increase in the use of new renewable sources for power generation. By using the Energy Policy of Serbia is the New Renewable Energy Source Selective Utilization Program, the share of new renewable energy sources in final energy consumption is assumed to rise to 5 per cent by 2015. An additional scenario was tested for a consumption increase reaching 10 per cent by 2030.

- Increase in the use of biomass for energy generation. By using the **Biomass Action Plan for the Republic of Serbia 2010–2012** as the main source, biomass combined heat and power (CHP) capacity is assumed to reach a total of 800 MW of its capacity by 2015 (about 400 MW more than its current value). While the potential for energy generation is higher (2.7 Mtoe, 1.0 Mtoe from wood biomass and 1.7 Mtoe from agriculture biomass), specific investment scenarios (e.g., on secondary biofuels) could not be simulated due to the lack of cost information.

The main indicators calculated include the investment required, energy and CO_2 savings, cost avoided, employment and potential income generated.

Agriculture

- Increase in the land area under High Nature Value Farmland (HNVF), with organic agriculture chosen as one example of intervention.[71] By using the **National Action Plan for the Development of Organic Farming in Serbia**,[72] the expansion of the organic agriculture area is assumed to reach 50,000 ha by 2016 and expand to 150,000 ha by 2030 (or 3 per cent of current agricultural land). An additional scenario projects a less aggressive expansion, reaching 96,000 ha by 2030, or 2 per cent of the current agriculture land (calculated by doubling the organic agriculture area every five years, starting from its current value).

The main indicators calculated include the investment required, production increase and employment, and potential income generated.

Simulation results are presented in this report with an upper and lower range, for two main reasons:

- Data availability and quality is uneven across the variables and sectors analysed. There were also certain indicators which were calculated using existing global literature/data sets, where assumptions do not necessarily apply to the specific socio-economic and environmental context of Serbia (e.g., transport and energy efficiency, employment).
- Most of the results projected assume the correct and effective implementation of investments and/or regulatory measures up to 2030. Since the future development of the sectors analysed depends on the specific policies and interventions implemented (i.e. setting economic incentives, regulations, soft measures), projections may change considerably if a different mix of interventions was simulated. Identifying the best intervention option is beyond the scope of this study and, as a consequence, it is more appropriate to indicate a range of results, rather than a single-point estimation.

Main results

The main results of the analysis indicate that the green economy interventions would:

- effectively reduce energy consumption and emissions, as well as reduce energy expenditure in all sectors, while creating employment.
- increase organic agriculture production (e.g., HNVF), thus generating additional value (revenues and GDP) in certain production sub-sectors, with certain enabling conditions (e.g., price premiums).

From an economic perspective, it can be concluded that with the assumptions utilized (based on national reports and international peer-reviewed studies) the return on investment for agriculture could be positive in the following scenarios:

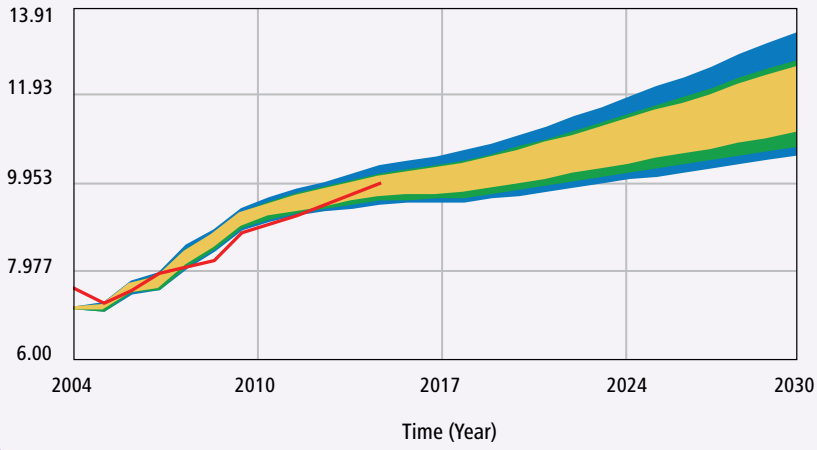
- when costs are offset by increased (or maintained) yields, and/or a decline of yields is offset by price premium for organic production; and
- when investments addressing energy demand (energy efficiency) and energy supply (renewable energy) would reduce the reliance on fossil fuels, increase the resilience of the sector to fossil fuel price variability, but may have high upfront capital costs resulting in long returns.

These main impacts have several ramifications across the sectors, such as employment creation or the cost of production in energy-intensive sectors, which would vary in strength and relevance depending on the policies and mechanisms utilized to reach the goals projected in this study.

3.2 Energy demand

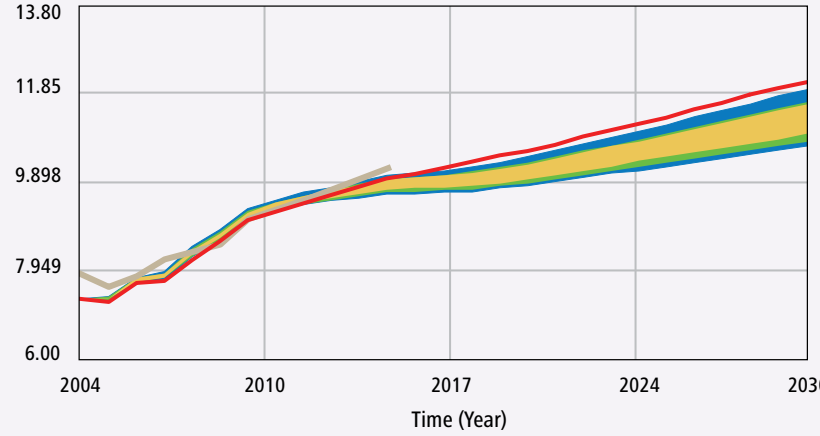
Serbian energy demand is projected to reach 9.7 Mtoe and 10.5 Mtoe by 2020 and 2030 respectively, or 8 to 12 per cent below BAU. The value could be higher or lower, depending on assumptions used for GDP growth.

Figure 4. Final energy consumption – BAU



The country's transport sector accounted for 2.361 Mtoe, or about 28 per cent of the total energy consumption in 2008 (excluding air transport, which is not included in the energy efficiency action plan, representing 2.31 Mtoe). Compared with the majority of Serbia's neighbouring and other European countries, this sector is somewhat different for the following reasons:

Figure 5. Final energy consumption – GE



- High average age of vehicles. The key problem in terms of energy efficiency (aside from environment and safety factors) is the age of the vehicle fleet. At the end of 2005, the average age of road vehicles was 15.3 years and more than 400,000, or 20 per cent, were over 20 years old. At the end of 2004, the average age of the rolling stock was 31.1 years and that of river vessels, 37 years.
- Dynamic modernization of vehicle fleet in the last few years (growing number of vehicles followed by reduction of the average age of fleet); and
- Shortage of the data needed to assess and plan in this sector.

With regard to oil consumption, Serbia is now fourth in southeastern Europe, after Romania, Bulgaria and Croatia. However, it consumes more efficiently (being either more efficient or less reliant on energy) than Slovenia (whose population is almost 75 per cent smaller than that of Serbia) and Bulgaria. On the other hand, compared with Croatia, whose population is around 45 per cent smaller, Serbia spends only 10 to 15 per cent less energy in the transport sector.

The expected increase in the number of vehicles and travel distance, as well as the expected decrease in car occupancy rate and increase in air conditioned vehicles, will result in the growth of total consumption in this sector. Among the new developments expected to mitigate the increase in energy consumption include:

- Energy efficiency improvement in passenger vehicles has increased in the last 10 years by about 1 per cent a year;

- Expected penetration of hybrid vehicles in the market, with overall efficiency growing considerably (the electric battery substitutes over 30 per cent of

petrol or diesel fuel consumption in city driving and over 25 per cent on motorways); and

- Substitution of petrol and diesel fuel with other hydrocarbons (liquid petroleum gas (LPG) and natural gas (NG)) and biofuels (bioethanol and biodiesel, and biogas in the long-run), thus reducing costs and increasing efficiency.[73] (For more information on interventions considered in the NEEAP framework, see Table 2.7.)[74]

Figure 4 shows final energy consumption, calculated as the sum of all energy consumption across sectors and influenced primarily by GDP, population, energy prices and energy efficiency in the BAU scenarios. It shows results for a range of simulations assuming, a varying range of real GDP growth (1 to 4.62 per cent, including the PED and SED scenarios) and urbanization (assumed to reduce km driven per vehicle, per year, by 5 per cent and by 10 per cent in 2030).

The coloured areas in Figure 4 indicate the potential future values for demand, under varying assumptions for GDP and urbanization in the BAU and GE scenarios. The red area represents historical data and existing projections to 2015 (defined by the energy sector development strategy). The yellow area represents a high probability (>50 per cent), the green area a medium probability (between 25 per cent and 50 per cent), and the blue area a low probability (between 25 per cent and 5 per cent), but smaller than 5 per cent.

Figure 5 shows final energy consumption for the GE scenarios, which are always below the baseline. The red area represents the BAU projection and existing projections to 2015 (defined by the energy sector development strategy). The green area represents the historical data and the coloured area indicates GE values.

3.2.1 Investment required

The total investment required in the GE scenario for energy efficiency improvements reaches a total amount of €2.7 billion by 2030. The average annual investment amounts to €147 million. This was calculated by estimating the energy consumption that would be avoided when reaching the energy efficiency target assumed for the GE scenario (20 per cent by 2030); by calculating the corresponding fossil fuel emissions that would be avoided as a result; and by multiplying the amount of emissions by the assumed cost required to achieve such reduction (US$ 50 per ton of emissions).

Transport is projected to require approximately €1.05 billion, or €58 million per year, lowering consumption and emissions by 17 per cent below BAU by 2030.

The residential, commercial and industrial sectors are projected to require approximately €1.7 billion in total (or €89 million per year) and improve efficiency by 12 per cent across sectors relative to BAU, lowering emissions to 32.8 million tons or 11 per cent by 2030.

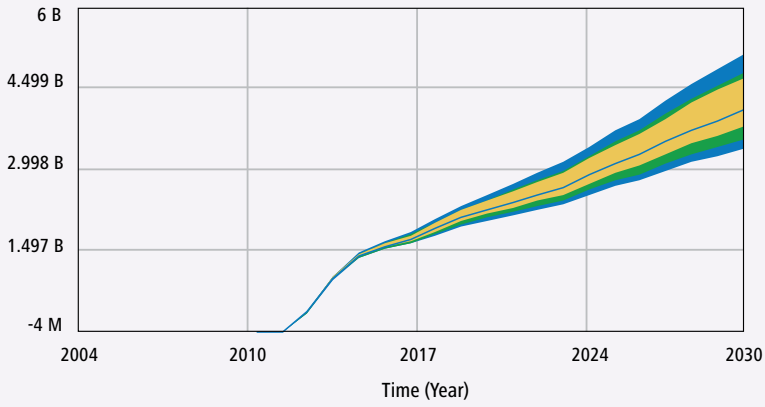
The total investment for energy efficiency estimated and the cost of intervention would change under varying assumptions (see Figures 6 and 7). Our analysis indicates that reaching a more aggressive improvement (30 per cent by 2030), when considering the residential, commercial and industrial sectors as an example, would require €2.8 billion in total, or €148 million per year – approximately 67 per cent more than in the 20 per cent energy efficiency case (or possibly an even higher value, depending on the policies implemented).

The central blue line in Figures 6 & 7 represents the median GE scenario. The coloured area indicates the potential future values for both variables, under varying assumptions for the energy efficiency target and cost of intervention.

Investment is shared between the main actors of the economy – public or private, domestic or foreign – and according to the policies implemented to reach the targets. Incentives, among others, are instruments designed to stimulate private investment. They attract favourable investment conditions, through government

interventions. For example, a 20 per cent incentive to stimulate the required investment for a 20 per cent energy efficiency scenario by 2030 would represent a total expenditure of €25 to 35 million per year.

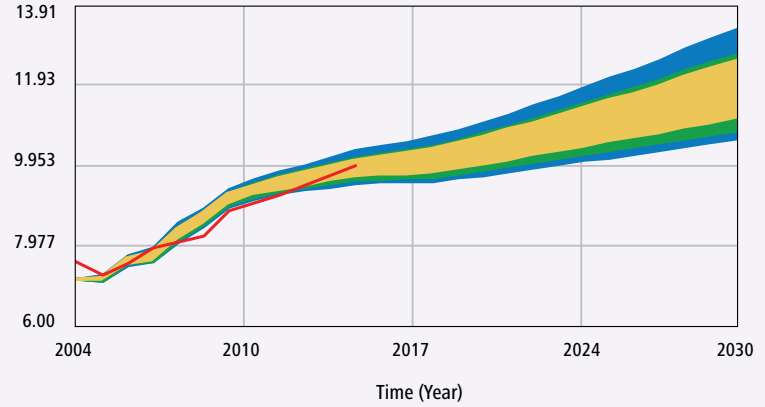
Figure 6. Cumulative investment for transport, residential, commercial and industrial sectors, and energy supply



3.2.2 Avoided cost and net investment

The total investment implemented in the GE scenario is projected to have several impacts. These include, among others, a reduction in energy demand and emissions. The savings on energy consumption, or avoided costs, could be used to estimate the overall (or economy-wide) net investment required to achieve the targets stated, calculated as investment minus avoided costs.

Figure 7. Cumulative investment for residential, commercial and industrial energy efficiency

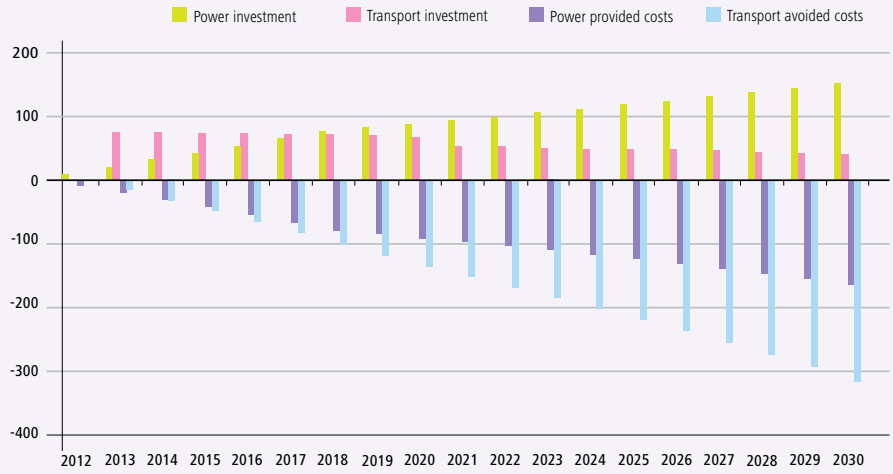


The avoided costs from energy efficiency investments in the residential, commercial and industrial sectors reach a maximum value of approximately €170 million in 2030, and a total cumulative value of €1.8 billion throughout the simulation (or €95 million per year on average, as opposed to €89 million of investment per year). In a scenario where the market price of electricity would grow in real terms (when accounting for inflation), the cost savings could be more consistent.

Avoided costs in the transport sector amount to a total of €2.9 billion to a maximum estimated of €5.5 billion, or approximately €155 to 290 million per year on average, against investments of a little over €1 billion. The broad range estimated takes in consideration investments in energy efficiency (low range of avoided costs) and efforts to improve mass transport or non-motor transport (high range of avoided costs). An effective strategy could reduce fuel use considerably, and support an "avoid, shift, improve" strategy.[75] Likewise, transport liquid fuel prices are assumed to increase in real terms going forward (following historical trends for the past 10 years), which is an important factor that increases avoided energy costs from energy efficiency interventions.

Avoided costs will be higher than investments by 2030, reaching a cumulative net benefits amount of €1 to 2 billion, or approximately €50 to 100

Figure 8. Comparison of annual investments (positive values) and avoided costs (negative values) for power and transport



million per year. The overall payback time is seven to 10 years, considering the assumptions simulated, with the break-even point (from an economy-wide perspective) being reached in 2019-2022. However, this calculation does not include additional potential avoided health costs, especially in the transport sector.

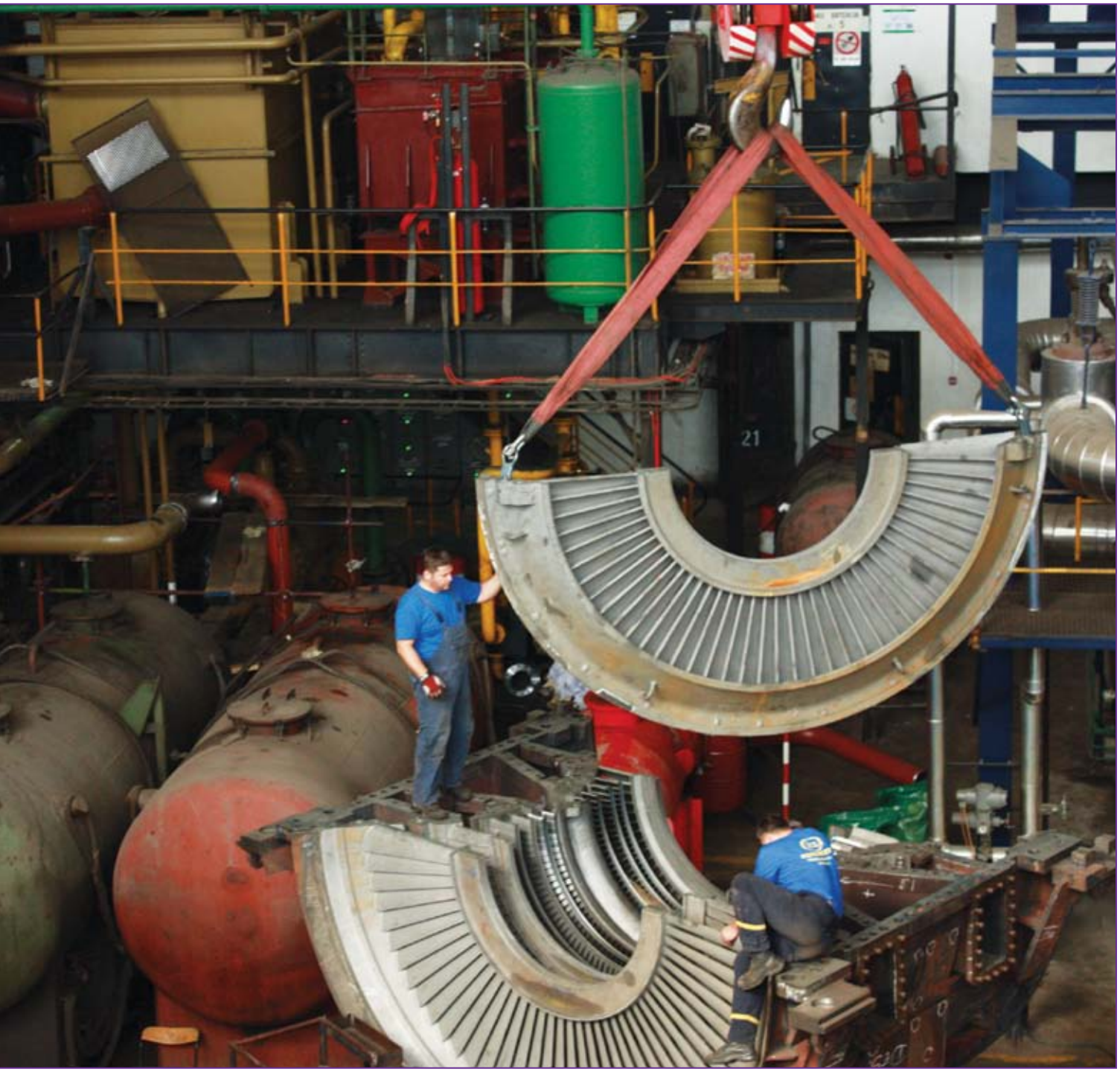
While the residential, commercial and industrial sectors are projected to yield positive returns within three to five years, the transport sector shows a comparatively worse economic performance in the short- and medium-term, but offers higher returns in the long-term (with a payback of, on average, 10 years). This is due to a variety of factors, including the cost of intervention and energy prices. In fact, the projected higher liquid fuel prices increase the profitability of transport investment in the longer term, with the short-term performance being affected by comparatively high intervention costs.

Although it was not possible to include potential avoided health costs from green economy investments, especially in the transport sector, into the modelling to project avoided costs, the savings from the avoided health costs could be relevant. While specific statistics for Serbia are not available, several studies have been carried out to estimate the impact (or the greening) of transport on health and other costs.[76]

3.2.3 Employment

The investments simulated project the potential to create 5,000 to 8,000 jobs by 2030, depending on the specific policies implemented. Of these, 2,000 to 3,000 would be created by 2030 in the residential, commercial and industrial sectors and the remainder in the transport sector. These numbers should be considered with caution, as specific statistics on green jobs in Serbia are currently not available. Thus, the simulation adopted peer-reviewed regional and global data where necessary, making it difficult to make projections.

Nonetheless, there is a particular interest relates in transport interventions, which have the potential to generate considerable employment, if investments target the expansion of the public transport infrastructure. According to international sources, e.g., International Trade Union Confederation,[77] more conventional investments could create up to 80 jobs per €1 million invested, leading to the potential creation of 6,000 jobs during the initial years of green transport investment. On the other hand, job creation would be limited if transport energy efficiency improvements are to be achieved only through the importation of passenger vehicles.



3.3 Energy supply

Serbia depends mostly on oil and gas imports for about 40 per cent of its energy requirements, despite increased exploration of local resources (large deposits of coal and hydropower). Electricity supply is projected to reach 40 and 44 GWh by 2020 and 2030, respectively, in the GE scenarios, or 11.3 per cent below BAU in 2030. The energy mix comprises thermal generation (61 per cent, instead of 73 per cent in the BAU case in 2030), hydro (26 per cent in GE and 25 per cent in BAU in 2030), and new renewable energy sources such as solar, wind and cogeneration (13 per cent in the GE case against 2 per cent in the BAU scenario in 2030). Specifically, cogeneration and wind are projected to reach each 6 per cent of power supply and solar PV 1 per cent.

In recent years, the electricity sector has encountered problems with investments needed on the supply side (production, as well as transmission and distribution), as demand grows (also supported by artificial low prices). Serbia's renewable electricity generation is dominated by hydropower. So far, biomass, geothermal and wind energy sources have not been explored for electricity generation although there is potential for all of them. However, the third priority of the country's energy policy is the new **Renewable Energy Source Selective Utilization Programme**, which includes a plan for the utilization of biomass, geothermal, solar, wind power and small hydropower. The programme aims for a 1.5 to 2 per cent share of new renewable energy sources in final energy consumption by 2015.[78]

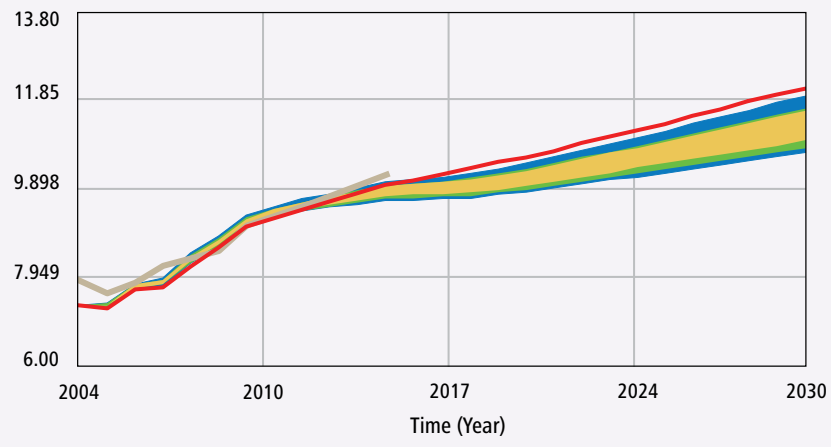
In this regard, various scenarios were simulated, which are driven by different targets. Figure 9 presents the results, where an increase in capacity is assumed in the short- and medium-term, with more conservative expansion in the long-term.

The coloured area indicates the potential future values for the share of new renewables, which are calculated as the ratio between power generation from these sources and total energy consumption. The red line represents the BAU case, and the central blue line represents the GE simulation (reaching 5 per cent penetration of final energy demand). The coloured area represents additional possible results obtained by changing assumptions, such as investments or the cost of intervention. The yellow area represents a high probability, the green area a medium probability and the blue area a low probability.

3.3.1 Investment required

The total investment required to expand renewable energy supply in the GE scenario reaches a total amount of €1.5 to 2.5 billion by 2030 for the 5 per cent and 10 per cent new renewable energy penetration scenarios ,respectively. The average annual investment is around €80 million to 130 million. While the high renewable expansion scenario allows the considerable reduction of the planned expansion of coal-fired power generation (30 per cent below BAU by 2030), it should be noted that other

Figure 9. New renewables share of total energy consumption



intervention options, such as the replacement of old power plants with more efficient ones ("clean coal"), should be explored.

As in the case of energy demand, and taking in consideration existing incentives that support the expansion of new renewables in power generation, the investment would be shared between the public and private sector. Given the projected fast growth of supply the current structure of feed-in tariffs many need to be revised, but it clearly indicates willingness to share costs. In the case of solar PV and wind, the public sector would contribute tens of millions of Euros by 2020. A possible phase out of the incentive, when the capital costs and efficiency of new renewables will be competitive with other supply options (even large scale), would make it so that public investment would progressively decline.

3.3.2 Avoided cost and net investment

Avoided costs in the case of power supply would be the reduced construction of thermal power capacity when investments in renewable energy are implemented. As such, the avoided consumption of coal (as a variable cost) would be a saving. On the other hand, the capital cost of renewable energy capacity is generally higher than conventional thermal energy.[79] The avoided power generation from coal reaches 5,000 to 10,000 GWh in 2030, generating capital savings of up to €1.3 billion.
The net investment for energy supply, making rough assumptions on the current and future cost of coal for power generation, reaches a total of €10 to 40 million in 2030 (roughly assuming €20 per ton), or reaching up to 50 per cent of the annual investment. The overall payback time in this case would be shortened. Specific estimations could not be made as coal price information for power generation in Serbia was not available at this stage. In fact, any figure could change considerably when taking different projections for coal price, as well as variations to the cost assumption for power generation capacity from renewables.

3.3.3 Employment

The employment generated in the power supply sector was calculated for all energy sources utilized and intended for construction, as well as operation and management. The total additional employment generated ranges between 1,500 (operation and management) and 2,600 jobs (operation and management as well as construction with temporary peaks at 5,000 jobs), but this range is highly contingent on the policy utilized and on the domestic manufacturing potential for power generation capacity from renewables. In fact, several studies indicate that renewables are more labour intensive for the manufacturing of capacity (up to eight times more than thermal power capacity), but have about the same labour intensity for operation and management (cf. Wai et al., 2010). As a consequence, if solar panels and wind turbines, among others, are imported and only installed domestically, the potential new job creation would be confined to a small percentage of the full potential, and employment creation in 2030 would be estimated to average 1,500 to 1,600 jobs.

Table 5. Main results of the analysis of the impact of energy efficient and renewable energy interventions

Sector		2018	2025	2030
Transport sector				
Average investment	Euro/year	58 M		
Energy consumption reduction (Includes interventions beyond those for which investments could be calculated)	Mtoe/year	0.17	0.35	0.48
Avoided energy cost	Euro/year	103 M	222 M	318 M
Employment energy efficiency	Person	Potential for 3 000 – 5 000 in 2030		
Residential, commercial and industrial sectors				
Average investment	Euro/year	89 M		
Energy consumption reduction	Mtoe/year	0.52	0.8	1
Avoided power cost	Euro/year	82 M	126 M	167 M
Employment energy efficiency	Person	Potential for 2 000 – 3 000 in 2030		
Energy supply (renewable energy)				
Average power supply additional investment	Euro/year	80 M – 130 M		
Biomass capacity	MW	800 – 1 150 by 2030		
Solar capacity	MW	300 – 750 by 2030		
Wind capacity	MW	700 – 1 700 by 2030		
Thermal capacity	MW	minus 600 – 1 000 by 2030		
Reduction in electricity consumption (by 2030), contributing to a reduction in required power capacity	GWh	4 900		
Average fuel input consumption reduction	Mtoe/year	1.3 – 1.9	2.1 – 3.0	2.3 – 3.5
Employment power generation sector	Person	Potential for 1 500 – 2 600 in 2030		
		2 300 (2012-2017)	1 150 (2018-2024)	1 800 (2025-2030)

3.4 Agriculture

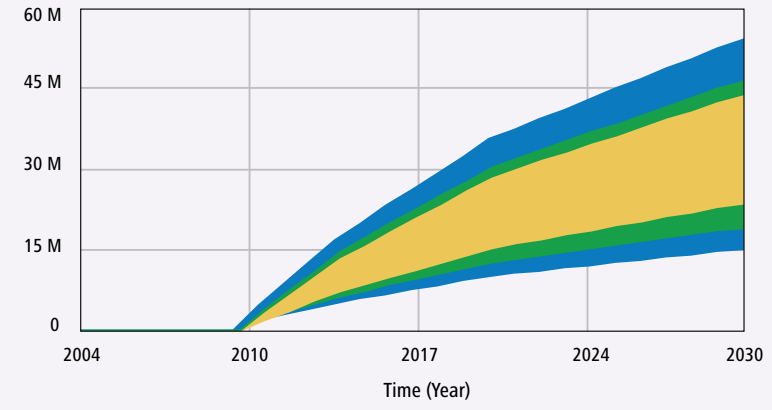
Today, after years of determined effort, the organic agriculture sector in Serbia has attained a respectable position the economy. This is illustrated in various forms:

- Several associations promote the organic sector and develop it systematically as lobby organizations.
- Governmental institutions and ministries; spearheaded by the Ministry of Agriculture, Forestry and Water Management (MAFWM), monitor and address the sector's needs;
- About 20 academic institutes, faculties, research and development facilities and affiliated bodies help to design and propagate most appropriate farming and cropping systems; and
- In 2010, five certification bodies made sure that international rules for organic practices are respected and that the resulting product, manufactured by more than 116 farmers and partially processed in about 30 special companies, complies with all international standards and requirements.

At the same time, organic agriculture is struggling to achieve a satisfactory growth rate. The country's more than 8,000 hectares of agricultural land generates a farm-gate value of merely €25 million from a product portfolio consisting mostly of fruits, berries, vegetables, some cereals and oil crops. Most of these products are exported, particularly to the EU, as domestic market development is hampered by the insufficient purchasing power of consumers.

Demand for organically grown products exists in many countries and Serbia has excellent eco-climatic and technical conditions to cultivate a more diverse range of products in response to this demand. To do this, however, organic farms need assistance to further procure the appropriate machinery and other technical devices, as well as capital, in order to raise production efficiency to levels that ensure their competitiveness in the national, regional and EU markets.

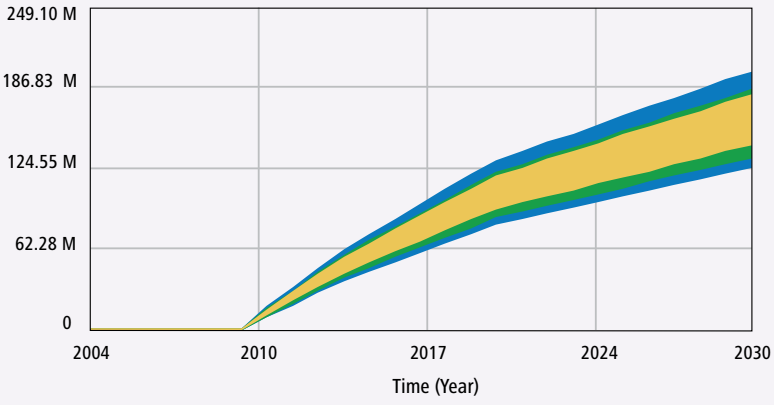
Figure 10. Agriculture cumulative investment



In 2010, MAFWM drafted the **National Rural Development Programme 2011-2013**,[80] setting forth the objectives and visions of future agricultural and rural development, particularly within the envisaged WTO accession and EU integration. The goals and objectives of the programme include the development of:

- dynamic and competitive agricultural farms, operating according to modern and environment-friendly standards;
- a profitable processing industry, capable of manufacturing products of high demand for domestic and international markets; and
- rural areas to maintain its attraction for people to live and work in, and at the same time evolve their own identity.

Figure 11. Organic agriculture, annual value added



In summer 2009, MAFWM and Germany's Gesellschaft für Internationale Zusammenarbeit (GIZ) drafted the **National Action Plan for Organic Production,** which expects to convert or cultivate a total land area of 50,000 ha up to 2014 as certified organic. This document could be described as the Serbian version of the European Commission's **Action Plan for Organic Food and Farming**[81].

Projections on the organic land area indicate that production (or the yield) could increase when the land is managed with more ecological practices, especially for certain types of production. Thus, using current estimates (see Table 6), apart from maize (which shows an average decline in yield of about 4 per cent), all other crops and fruits have higher yields (generally in the range of 9 per cent above BAU), or lower/similar yields but marked improvements over the last two years. It could therefore be assumed that in the future, organic production could concentrate on those crops and fruits that provide higher yield, or on those market segments that guarantee a higher price. However, to simplify the modelling, simulation was run based on the assumption that the current composition of crops and fruits would remain the same.

3.4.1 Investment required

In the first scenario, which foresees reaching 150,000 ha by 2030, the total investment required would be between €15 and 55 million, or €720,000 to 2.75 million per year on average. This estimate was calculated based on costs related to operations and

Table 6. Observed yields for organic vs. conventional agriculture (%)

Yield	2008	2009	2010	Average
Maize	98	96	93	96
Wheat	81	94	103	93
Soya	92	100	91	94
Apples	110	105	113	109
Raspberries	114	110	102	109
Strawberries	115	109	105	109
Plums	103	107	106	105
Sour cherries	115	99	114	109

(Source: MoA)

management of the farming activity, and assuming that costs would be 30 to 300 per cent higher than figures available in other studies carried out in developing countries (i.e. costs ranging around US$100 per hectare).

In the second scenario, which sets a more conservative objective of 96,000 ha by 2030, the total investment required would be €9 to 36 million, or €0.5 to 1.5 million per year on average.

The coloured area in Figure 10 indicates the potential future values for the total agriculture investment, calculated as the product of organic land area (scenario assumption) and conversion cost, ranging between €100 and 300 per hectare. The yellow area represents a high probability, the green a medium probability and the blue a low probability.

3.4.2 Revenues and net investment

Shifting to organic agriculture will contribute to boost revenue through the increase in market price, increase of yield and other additional economic benefits, i.e. revenue from carbon sequestration.

Several studies show that certified organic production would normally enjoy a premium price (e.g., 40 to 200 per cent in Switzerland), but the magnitude and extent to which this premium is available depends on market conditions (e.g., demand).[82]

In the simulations tested, utilizing the assumptions mentioned previously (historical yields, low intervention costs), it is estimated that the market price would be approximately 9 per cent higher than crops from conventional agriculture production. This would ensure the same level of profitability observed in the BAU scenario, without having to pay back the additional investment. In this respect, to have a positive return on investment, a 10-year payback time would require a price premium lower than 20 per cent (on average and across all crops currently cultivated with organic practices). Serbia's proximity to EU countries and its export potential to the EU market could provide a good chance to enjoy a higher end of price premium.
With cumulative investments totalling €15 to 55 million for the high expansion scenario, three possible price premium scenarios were tested:

- If the price premium is 60 per cent, an additional €51.7 million will be generated per year between 2012 and 2030 (or a total of €981 million);
- At 40 per cent, an equivalent of €34.4 million of extra value added per year on average (or a total of €654 million); and
- At 20 per cent, a yield of €17.2 million per year on average (or a total of €327 million). This extra value added, even in the 20 per cent case, would largely allow for full repayment of costs (depending on the assumptions used for investment and yield) (see Table 5 for more details).

The coloured area of Figure 11 indicates the potential future values for the annual agriculture value added, calculated as the product of organic agriculture production and value added per ton (scenario assumption), including a premium price up to 60 per cent. The difference between the bottom and the top of the coloured area represents the €70 million additional value-added creation mentioned above.

Considering that, even in a worst case scenario, the total cost of intervention would amount to €6.75 million per year on average, or a total of €135 million, the availability of a price premium would be a relevant enabling condition for certain crop production

(e.g., wheat, maize and soya). In addition, a 20 per cent premium would already allow to pay back the investment six times by 2030. Furthermore, if the transition to organic agriculture would mean more jobs as several studies suggest,[83] the price premium should be even higher to offset the increased labour costs.

In terms of its environmental impact, and adding to the opportunity provided by market price premiums, organic agriculture practices reduce soil erosion and allow higher carbon sequestration in the soil, relative to conventional practices. It is estimated that, in northern Europe, the additional carbon sequestration is two tons of CO_2 per hectare per year.[84]

Thus, applying this value to the projected expansion of organic agricultural land in Serbia, and considering an average market value of carbon estimated in the range of US$5 to 15 per ton (€3.85 to 11.5 per ton) used in studies similar to this one, the value of carbon sequestered in 2030 alone could reach €0.6 million to 1.7 million in the ambitious expansion scenario (150,000 ha by 2030). The total value of carbon throughout 2030, assuming that a carbon price will be implemented immediately (a strong, but perhaps unlikely assumption), reaches €6.7 to 20 million in the two pricing scenarios, respectively.

In addition, avoided health cost from the use of synthetic pesticides might also be taken in consideration, according to the extent to which health is affected by the use of these production inputs.[85]

Ultimately, the return of the investment in organic agriculture will be positive if the price premium of organic agricultural products will be in the range of 9 per cent or higher, and where yield is higher than current observations (at least 9 per cent above BAU on average), or if a carbon pricing mechanism is implemented. Policy interventions, such as subsidies and incentives, could be introduced to support the transition to organic agriculture (e.g., ensure market access), especially in light of the uncertainties mentioned earlier. While more data would certainly be needed, targeted intervention is called for as some

Table 7. Main results of the analysis of the impact of green agriculture interventions

		2016	2020	2030
Organic agriculture area	Ha	50 000 12 000	100 000 24 000	150 000 96 000
Total investment	Euro	15 – 55 million 9 – 36 million		
Average annual investment	Euro/year	0.72 – 2.75 million 0.5 – 1.5 million		
Share of current agriculture investment	%	0.25 to 1.25 % in the low and high cost		
GE additional value added	Euro/year	With no price premium: -9 per cent on average or €6 million in the high expansion case.		
		With price premium: between €17.2 and 51.7 million in the 20 and 60 % cases, respectively.		
GE value of carbon sequestration	Euro	In the range of 6.7 to 20 million in total.		
GE required price, yield increase, or subsidy	%	9 % for 2030 payback		
		20 % for 2022 payback		

organic production is already yielding more than conventional practices. Moreover, there is a possibility that there may already be a premium price in the European market for Serbian organic agricultural products.

3.4.3 Employment

There are currently no data to estimate whether organic agriculture in Serbia is creating additional jobs relative to conventional agriculture. On the other hand, research finds that in developing countries, the potential to create more jobs rises to up to 30 per cent when organic agriculture is adapted. This is the case of developing and transitioning countries in Africa and Southeast Asia.[86] While this value seems high for Serbia, where agricultural production is certainly more mechanized than in these countries, it is also possible that organic agriculture would either bring about additional jobs or simply require more work hours for farmers. Nonetheless, an expansion of the organic agriculture area is expected to generate additional value added and employment (see Table 7). This could be considered a positive development for job creation and income. However, unless yields or prices increase more than jobs, the per capita revenue (and profits) of farmers could decline. It is therefore crucial to evaluate and monitor the overall performance and the profitability of the sector, in order to plan successful interventions such as formulating targeted policies and investments.

Figure 12. Value chain in Serbia's organic agriculture (the case of apple juice, left, and agricultural land organically certified by crop, right), 2010

Category	Crop	Area fully converted (ha)	Area in conversion (ha)	Total (ha)
Perennials	Apples	1 325	5	1 330
	Strawberries	423	92	515
	Plums	1 075	13	1 089
	Cherries	148	2	150
	Others	195	46	241
Subtotal		3 289	163	3 452
Annuals	Maize	14	321	334
	Wheat	73	161	234
	Soybean	57	449	506
	Vegetables and others	150	159	309
Subtotal		293	1 090	1 383

4 Policy enabling conditions

A successful development strategy that integrates a green economy approach would require appropriate enabling conditions. The sustainable development pathway should be one that is preferable to traditional economic development, either through incentives or by avoiding penalties, in order to inspire both the public and private sectors, as well as the citizens, to make choices in favour of a green economy. Otherwise, traditional development practices that often sacrifice environmental integrity and social improvement in the name of improving economic conditions are likely to endure.

In Serbia's situation, some of the major actions to undertake and ensure a successful green economy strategy[87] are:

- Addressing environmental externalities and existing market failures, where the production or consumption of goods and services has negative effects on third parties, and the cost of which is not fully reflected in market prices.

- Limiting government spending in areas that deplete natural capital, such as subsidies that stimulate production by lowering costs or increasing prices, resulting in the overexploitation or depletion of natural resource stocks.

- Promoting investment and spending in areas that stimulate a green economy, such as those that (a) promote innovation in new technologies and behaviours that are vital to green markets; (b) expand infrastructure that is required for certain green innovations to flourish; and (c) foster infant green industries, as part of a strategy to build comparative advantage and drive long-term employment and growth.

Concretely, some of the enabling conditions could also include the establishment of sound regulatory frameworks that would create incentives that drive green economic activity, removal of barriers to green investments and regulation of the most harmful forms of unsustainable behaviour. In addition, the establishment of proper economic and fiscal policy instruments that drive green economic choices, it is also essential to ensure that they promote rather than hinder policy implementation. Furthermore, institutional and policy processes to support reform are also required. Serbia has started to develop its portfolio of development strategies (see Table 4), and now needs to continue to ensure a durable long-term success. A green economy also emphasizes education and training to meet the needs of a greener and more sustainable future. Providing relevant education and training opportunities for a new, green workforce would be critical to achieving a successful transition to a green economy.

4.1 Regulations and standards

Regulations and standards are among the most direct means to create the conditions that will promote a shift to a green economy. Such measures influence entities and individuals to act in ways that foster transition and improve practices in a sustainable development context. As the UNEP Green Economy Report outlines, robust regulatory frameworks, coupled with effective enforcement "reduces regulatory and business risks, and increases the confidence of investors and markets."[88]

Standards and regulation effectively mandate transition, and in this sense could be a powerful tool. For this reason, their application must also be carefully monitored to avoid undue pressure on industry and potentially worsen already fragile economic conditions, particularly in a country with significant economic challenges such as Serbia. Consequently, careful study must be made of the economy's ability to enact and apply green economy standards effectively. Likewise, there must be flexibility and support, where necessary, to enable public and private sector entities to adopt the new technologies and practices required as the country transitions to a green economy. Training of employees should also be part of the national plan.

In Serbia's context, some of the existing and suggested enabling conditions are:

- Private, domestic and foreign investment in the urban centres of Serbia resulted in the development of new buildings that comply with the most rigorous EU energy efficiency standards and have become landmarks and cutting-edge examples in the region. This tendency is evident in the most recently constructed buildings, where the average consumption of heating energy amounts to 100 kWh/ m^2. At the same time, the average annual heating energy consumption in most of the existing buildings in these is significantly higher, i.e. as much as two to three times more than in new buildings.

  According to the Implementation Program of the Energy Development Strategy, the average specific final energy consumption for heating and hot water preparation is estimated at 220 kWh/m^2, which is much higher than the EU average. Thermal building codes have been changing over time from simple standards on building components to more complex standards, reaching those of the most advanced countries energy performance standards (five-year mandatory revisions are now required in the EU). Most building codes now are performance-based (e.g., California, Germany and France, or the EU building Directive). These types of standards could be implemented jointly with those related to specific equipment or materials (e.g., insulation, windows, boilers), in order to ensure the use of the most efficient equipment to retrofitting existing buildings (e.g., France).

- With regard to fuel efficiency standards and performance: implement and periodically strengthen mandatory fuel-efficiency standards for light- and heavy-duty vehicles; and put in formulate policies that improve the performance of tyres, air conditioning, lighting and other non-engine components that affect a vehicle's fuel efficiency. In Serbia, the regulation of technical and other requirements of liquid biofuels[89] also define the technical requirements for biodiesel and biofuels.

- On the energy supply side, electric utility quota obligations, or renewable portfolio standards (RPS), is mandatory. They are set by the government on a utility company, a group of companies or consumers to provide or use a pre-determined minimum share from renewables of either installed capacity, electricity generated or electricity sold. Details on the opportunities in Serbia for biomass as a renewable energy source are available in Annex I.

The following are some examples of existing enabling conditions in the EU:

- Most European countries have set up mandatory energy efficiency standards for new dwellings and service sector buildings. A new Directive on the energy performance of buildings introduces harmonised standards in all EU countries for new buildings and makes mandatory building certificates for the sale or rent of dwellings. Measures on buildings are focused so far on new buildings.[90] More recently, the trend is to extend regulations to existing buildings and impose the introduction of energy efficiency certificates each time there is a change of tenant or a sale. Such a measure was first introduced in Denmark in 1999 and recently to all EU countries in the form of a Directive on Buildings (in 2006/2007).

- Labelling and efficiency standards. Mandatory labelling for several electrical appliances exists in all EU countries. This has resulted in market transformation that could be attributed to both the increased interest of consumers in energy efficiency and to changes in the models made available by manufacturers, as well as to other accompanying measures (e.g., rebates, information campaigns). In the transport sector, adopting measures such as labelling, combined with incentives and taxes, encourages the sale of more energy efficient vehicles.

- Energy efficiency obligations in Europe are a recent and innovative measure, whereby energy companies (supplier/retailer or distributor) have a legal obligation to promote and stimulate investment,

as well as save energy in customers' premises or households. Such measures are applied in some EU countries , e.g., Denmark, France, Ireland, Italy and the United Kingdom.

4.2 Economic and fiscal policy instruments

Whereas regulations and standards serve as involuntary mandates that require entities to transition to a greener approach, economic and fiscal policy instruments provide more of a guidance mechanism that place the decision in the hands of the entity to either comply with the instrument. In this sense, entities either work towards achieving a desired green economy outcome or decide not to comply but rather forgo an economic incentive, or face a fiscal penalty for non-compliance.

The carbon tax is one of the most basic examples of an economic instrument designed to foster a shift to a green economy. Unlike regulations and standards, this approach is less rigid and relies to a certain extent on market forces, while providing the flexibility for compliance entities. Allowing entities to pay a carbon tax, or offset emissions through other means, could provide this flexibility, if the economic cost of immediately meeting a desired carbon standard through direct regulation is too high. On the other hand, the lack of flexibility could cause economic retrenchment (i.e. job loss). Mitigating economic retrenchment is essential if a green economy transition is would imply meeting all of the required social, environmental and economic dynamics of sustainable development.

It is equally important to put in place economic instruments that offer incentives to change, such as reforming price distortions that discourage transition or prevent the adoption of green technologies and practices.[91] Historically, "artificially low energy prices, due to subsidies and distorting price controls have resulted in Serbia using approximately six times more energy per product unit than average among EU countries."[92] This overconsumption is a direct result of perverse subsidies that encourage wasteful energy use, which in turn contributes to increased environmental damage, most notably increased GHG emissions.

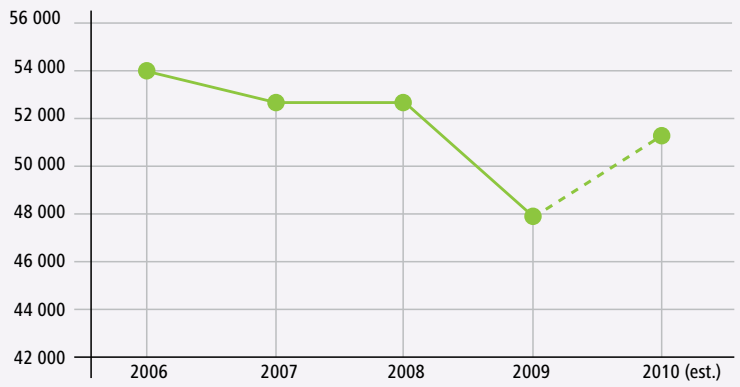
While artificially low prices could allow residents and businesses to cope more easily with energy price fluctuations, investments in energy efficiency measures could achieve similar results. The benefits include not only avoided environmental degradation, but also a decrease in the need for investment in expanded fossil fuel energy supply. In turn, subsidies to keep fossil fuel prices artificially low could be redirected to promote new renewable energy technology investments. It could also lead to social investments to help low-income residents offset energy prices through proactive measures such as energy efficiency retrofits.

In Serbia's context, some of the existing and suggested enabling conditions are:

- Several programmes and strategies support the general "polluter pays" principles, including the NPEP, the NEAS and the NSDS. The principle basically outlines that those who are responsible for pollution are also economically responsible for its remediation. Adherence to that principle could come in a number of ways such as taxes, direct remediation payments and emissions trading. It could open the door for any number of economic and fiscal policy instruments in Serbia. (See also Figure 13 for an overview of CO_2 emissions.)

- NEAS specifies that one of the measures that could meet the financial requirements of sustainable development is the inclusion of tariffs and other charges that will set about "cost recovery"[93] from users and polluters. It is recognized that affordability constraints may initially prevent 100 per cent cost recover. However, the calculation of tariffs and other measures that could help implement the "polluter pays/user pays" principle is an important first step in studying how economic and fiscal policy instruments could assist a transition to a green economy, and what cost these economic instruments could impose on end-users.

Figure 13. Serbian CO_2 emissions (kt)



(Source: World Bank, World Development Indicators)

Some of the challenges that face NEAS as it implements or raises tariffs are:

- existence of a (municipal) policy limiting tariff increases to the rate of inflation setting tariff increase according to the rate of inflation;
- political reluctance to raise service tariffs in the prevailing social context;
- deterioration in bill collection on a short-term basis if tariffs are raised substantially exercising discretionary power when bill collection declines following substantial tariff increase;
- cross-subsidy of households by applying substantially higher industrial and commercial tariffs; and
- when tariffs are calculated on the basis of costs, a collection ratio of 100%.

There are plans to address these issues as much as possible and establish benchmarks for tariff levels that take into account affordability. NEAS recognizes that when combined with loans, a proper tariff system could assist in driving rational investments and improving environmental performance and service delivery.[94]

The following are some examples of existing enabling conditions in the EU:

- Economic incentives that lower the investment barrier and improve cost effectiveness (direct subsidies, low-interest loans, tax exemptions, third-party financing, etc.). In Europe, financial incentives are seen as a key factor in the development of the market for solar water heating systems. Almost all Member States provide financial incentives for their installation. Several European countries have also lowered their VAT rates on solar equipment (e.g., Spain and Austria offers full exemption from VAT). However, unlike subsidies, tax credits do not lower the barrier of the initial up front payment, and therefore do not help low-income households.

- In Spain, the possibility of obtaining low interest loans has greatly facilitated the implementation of legislation on solar installations. It is also possible to adjust loan repayments according to the energy savings produced by solar water heating system. This arrangement is referred to as the principle of "third-party financing", where the party paying for the equipment, usually an ESCO (energy services company), is reimbursed from the savings made. It has been widely used to finance solar installations in the tourism (hotel) sector, but it is only applicable with clean technology.

- In the transport sector, road pricing is a common means of applying economic instruments to promote energy efficiency (i.e. using public transportation or car-sharing). The "corridor" approach involves a toll for the use of a stretch of road, tunnel or bridge where access could easily be controlled. The area scheme implies pricing for an integrated local road network, which not only finances road infrastructure and improves traffic conditions but also reduces the costs of congestion, pollution and noise.

  The cities of Bergen and London have led in this aspect. The London scheme, one of the largest of its kind in the world, charges vehicles driving into central London a flat fee of €12 a day between 7:00 am and 6:00 pm. The results are very successful: car traffic in the zone was reduced by 15 per cent and congestion by 30 per cent. Traffic speed increased by 37 per cent, which led to reduced fuel consumption by 10 per cent and CO_2 emissions by 19 per cent.

- Taxation measures
  - Automobile taxes: Some countries rely only on the value added tax (VAT) system, with cars taxed at the normal rate, and low registration fees. This is generally the case in car-producing countries such as France, Germany, Italy, Sweden and the United Kingdom. In other countries, there may be a specific tax on car purchases, which gives incentives to the consumers to buy less energy consuming cars or cars with lower CO_2 emissions or, more recently, a combined efficiency/CO_2 emissions. This is presently the case in several European countries. Incentives are also given in some countries for low-polluting cars, such as diesel cars equipped with a particle filter (e.g., Austria) or for clean cars (e.g., Germany for cars meeting the Euro IV emissions standard) through a bonus, which is deducted from the purchase tax or from the circulation tax.
  - Car registration tax: In several EU countries, the tax varies according to the fuel consumption and/or CO_2 emissions (e.g., Denmark, Italy and Sweden).
  - Taxation of motor fuels: In Europe, such taxes are much higher than in the rest of the world, for three reasons:
    * Most European countries are oil importers.
    * Revenue from motor fuel tax is an important source of income for national budgets.
    * There is a strong commitment to meet Kyoto targets, and one way of doing this is to regularly increase the tax on motor fuels. In some countries, this is being achieved by adding CO_2/environmental taxes (e.g., Finland, Germany Norway and Sweden).

- Feed-in tariffs (also called FIT, premium payments, advanced renewable tariffs or minimum price standards) could also be a means to promote renewable energy development and technological commercialization. However, its potential inefficient outcomes and negative side-effects must be carefully considered. Several existing FIT policies in Europe are presently under review. Many countries are revising solar PV FITs to dampen the booming rate of installations, which in many cases are far exceeding expectations due to the unprecedented price reductions in solar PV that occurred in 2009 and 2010.

  In late 2010, the Czech Republic passed new legislation to reduce the rate of its PV installations as total capacity increased from 65 MW at the end of 2008 to nearly 2 GW by the end of 2010. This was in part out of concern for the impact of FIT on average electricity prices. As of March 2011, the country cut all FIT rates for ground-mounted PV installations that were not yet interconnected with the grid.

  In May 2011, Italy cut tariffs for solar PV by 22 to 30 per cent for 2011, by 23 to 45 per cent for 2012 and by 10 to 45 per cent for 2013 (ranges apply to different scales of installation). A project ceiling of 1 MW on rooftops and 0.2 MW for ground-mounted systems was also imposed to limit the total cost to €6 to 7 billion by the end of 2016, when roughly 23 GW are expected to be installed.

  - The revisions to FIT policies provide an example of the need to carefully consider subsidies not only in relation to fossil fuels, but also how they apply to renewable energy technologies. A similar situation where perverse clean energy subsidies have proven ineffective is in biofuels. In the United States, it costs US$500 in federal and state biofuel subsidies to reduce one metric ton of emissions.[95] Similar examples could be found around the world.
  - A variation of a FIT policy is a "premium FIT," a market-dependent mechanism developed principally by Spain and emulated elsewhere. In this model, two remuneration components exist instead of one: a reduced FIT payment, plus the hourly market price for electricity. To ensure that the combination of the two does not pay producers either too little or too much, the Spanish version uses a lower floor and upper cap.

4.3 Institutional and policy processes to support reform

Leading by example is essential for a successful transition to a green economy, in particular in countries where the economic situation is fragile or where there is scepticism about the benefits of a green economy. In the case of Serbia, the government could provide guidance and educate the public and private sectors as it leads the transition through its own actions and procurement methods.

The country's industrial sector currently suffers from low competitiveness, relying on traditional imported technologies which dates mainly from the 1970s and 1980s. Insufficient financial resources have prevented a much needed industrial reconstruction and modernization, as well as the introduction of clean technologies. In this context, a transition is likely be a challenging process and would require significant leadership from government.

Education and raising the people's awareness about the benefits of a green economy transition, and how it could be achieved, is essential to achieve public support. It would help encourage employers to invest in green infrastructure, as well as motivate employees to train and improve skills to find long-term employment in green sectors. Although there will be some challenges along the way, active stakeholder engagement, especially the public and private sectors, would facilitate and accelerate this transition.

In Serbia's context, some of the existing and suggested enabling conditions are:

- The largest industrial consumers of energy are the food and chemical industries, followed by iron and steel, non-metallic minerals, pulp and paper, and the non-ferrous metals industries. Energy audits hold promise in the years to come, with the objective to improve energy efficiency and populate coherent data sets on energy consumption.
- The **Implementation of the Programme of the Energy Sector Development Strategy** has estimated the overall potential for energy savings in industrial sector, and identified the following technical measures:
  - **Usage of residual heat.** This measure could affect savings amounting to more than 20 per cent of the current needs of the industry for heating energy in production.
  - **Effective management of existing infrastructure.** According to the experiences of countries that have been applying this measure, the savings could reach 5 per cent of the energy consumption in industry, amounting to 0.1617 Mtoe.
  - **Replacement of existing inefficient electric motors.** By replacing outdated motors with more efficient ones, electrical energy consumption could be reduced by 188 GWh/year, or 0.01617 Mtoe (0.6 per cent of the energy consumption in industry).
  - **Energy integration throughout the production process.** This measure is particularly important for the chemical industry, which could allow energy consumption in the various production processes to decrease by up to 5 per cent, with a relatively low payback period (usually shorter than one year and not longer than three years).

The following are some examples of existing enabling conditions in the EU:

- Barriers such as split incentives between tenants and landlords, lack of awareness of efficient technologies, absence of qualified "green" technicians and high initial investment costs threaten market-driven energy savings measures. These barriers could be eliminated and achieve building sector energy savings by increasing stakeholder engagement and education, as well as complementary implementation of a package of regulatory and standards policies (see Section 4.1).

- Some countries promote less energy intensive transport modes and enable policies that increase the overall energy efficiency of national, regional and local transport systems, and publicly promote shifts of passengers and freight to more efficient modes.

- Several countries within and outside Europe have implemented car scrapping schemes during the 1990s to increase the rate of renewal of the car fleet and to improve environmental conditions. The scrapping programs in the EU have produced the highest emissions reductions, when implemented along with the introduction of new technologies with significantly lower emissions, e.g., a three-way catalytic converter and particle filters.

- There are several practices that include components of education of sustainable practices, engagement with stakeholders and, where required, other economic and regulatory measures that support the transition to organic agriculture. The following are some examples:[96]
  – reduction of tillage or direct seeding (Austria, Spain, Germany, Ireland, Netherlands);
  – support to grazing systems (Austria, Ireland, Netherlands);
  – production of biogas (Denmark, France, Hungary);
  – production of biofuels (France, Germany, Ireland);
  – maintenance of grasslands, hedgerows and rangelands (France);
  – culture of leguminous crops (France, Sweden);
  – optimization of fertilizer/slurry use (Germany, Netherlands, Sweden); and
  – breeding of more efficient, genetically high-yielding cows (Ireland, Netherlands and Spain).

4.4 Financing the transition to a green transition

As shown in Section 3, considerable resources will be required to finance a transition to a green economy, amounting to several billions of Euros by 2030. Many of the economic and fiscal policy instruments mentioned earlier could serve as a key source of domestic financing for green economic transition. Funds raised from carbon taxes or averted subsidies related to fossil fuel use, for instance, could be reinvested into the development and implementation of clean technologies, or to assist low-income groups to help cushion the impacts of the transition. There will also be substantial avoided costs such as better energy efficiency which reduces consumption. However, these are often on the long-term, while many capital investments will be required in the short-term.

Serbia has shown through its NSDS how it intends to finance a sustainable development transition. The potential key sources of funding include:[97]

- The government's budget and those of local governments;
- Earmarked funds from various sources;
- Funds generated by the economy; and
- Donor programmes of assistance and loans from international financial institutions.

Achieving financing goals is contingent on achieving GDP and economic growth goals. For the period 2009-2011, over €1.4 billion were allocated for the plan, with approximately 50 per cent allocated to the "environment and natural resources" pillar and the other half split between the "knowledge-based

sustainability" and the "social-economic conditions and perspectives" pillars.[98]

In the long-term, it is recognized that funding for sustainability will have to be brought in line with EU GDP standards and "be adjusted to investment in cleaner production, energy efficiency, reduced emissions and environmental protection; in short, it is necessary to adjust to international environmental standards, as otherwise the degradation and the damage to the environment will lead to increasing economic losses".[99] A "user/polluter pays"[100] principle is supported in the NSDS, and is a wise go-forward strategy with respect to domestic financing in combination with available public sources, which are estimated to be about 70 per cent.

With regards to international sources, a large degree of European Union Pre-Accession Assistance (EU IPA) is also directed to sustainable development initiatives. Lending to Serbia has topped US$500 million each year in 2010 and 2011.[101] For example, the World Bank loan is expected to cover a portion of the cost and fund projects that include initiatives on energy efficiency, agricultural reform, transport rehabilitation, education improvement and pollution reduction.[102] Serbia has also received funding from other international organizations such as the European Bank for Reconstruction and Development,[103] the European Investment Bank[104] and the Global Environment Facility.[105]

5 Conclusion & key findings

There are four major interventions that can influence future trends and achieve stated goals: (1) voluntary behavioral change, (2) capital investment, (3) public targets mandated by law, and (4) incentives (such as tax reductions and subsidies). Defined targets and mandates ensure the achievement of stated goals while controlling expenditure, incentives and capital investments support cost sharing across the key actors in the economy. The EU suggests in its energy efficiency policies that creating a comprehensive package would also allow an analysis of all options.

- More specifically, synergies could be created by using mandates to achieve a stated goal. These could include the enactment of a law that requires the penetration of renewable energy in power supply to reach a specific target by a given year.

- Incentives and capital investments are levers that reduce upfront costs (shared between government and other stakeholders such as households and the private sector). Incentives are especially effective if the upfront cost is contained; capital investments are effective when initial costs are high. These include incentive packages such as FIT, contributions to adopt organic agriculture practices and others.

A comprehensive package that takes in consideration these basic policy options, which are directed at the desired target sectors, could have significant positive economic, social and environmental spinoffs. The need for a sustained economic development in Serbia is well-known, and if it is guided by green economy principles, many of the potential tradeoffs associated with traditional 'brown' development patterns, such as increased pollution or pressures on low-income citizens, could be avoided or at the very least significantly mitigated. Measurable and transparent investments in a green economy could lead to skilled job development, which in turn can improve social status. In addition, a shift away from resource depletion and to sustainable resource management for economic growth ensures the long-term sustainability of industry and environmental integrity.

Nonetheless, concerning investment and market intervention, government action must be stable and predictable to maintain market confidence and avoid major price fluctuations, particularly in key sectors such as energy and food production. Moreover, they must be regularly reviewed and if needed revised to ensure that the desired consequences are achieved and its negative side-effects are mitigated. As studies on solar energy and biofuels subsidies have shown, even the best intended actions could lead to unexpected or ineffective outcomes.

Policy roadmap

Serbia faces a number of economic challenges related to its on-going economic transition and shift to a more open market. The already fragile transition was further affected by the global economic downturn which led to reduced economic growth in most recent years, less than a decade after that transition began in earnest. Soaring unemployment rates are perhaps the most pressing challenge, but they are directly tied to the educational system and continued economic recovery initiatives. Other challenges face Serbia such as a marked and worsening population decline as Serbians who emigrated in the 1990s have not returned, and a low-birth rate and aging population. These have created further pressure and has a potential impact on the country's economic fragility. Finally, the country's reliance on imported fossil fuels has been a key driver in the country's trade imbalance, which continues to grow and impact negatively on domestic debt levels.

Despite all of these challenges, the Serbian government has shown a desire to proactively address these issues through a sustainable development approach. A remarkable number of economy-wide and sectoral strategies have been developed over the past decade with the goal to reform and achieve long-term sustainability. These strategies provide the basis for sustainable development and serve as a starting point for a green economy framework. Internationally, Serbia has also made strides to be more engaged both with the EU and on a global level. It has also strategically utilized international funding to implement sustainable development plans and projects.

Green economy interventions, which often start with an economic disadvantage, require policy packages that include mandates/targets to ensure action, incentives to share costs, and capital investments to stimulate research and development and emerging sectors. The goal is to find a strategy to balance funding responsibilities and shared benefits with all stakeholders and the economy, while providing support to low income and disadvantaged families.

The elements of a specific sectoral roadmap emerging from the study include:

- In terms of data collection, the country needs to update information to better evaluate the potential impact of green economy interventions in Serbia. For example, information regarding job creation, potential salary levels, as well as productivity of green practices, would allow considerable improvement of analyses and informed decision-making.

- Green economy investments in Serbia are currently unattractive because they start from a disadvantaged position. Policies that stimulate inefficiencies (such as fossil fuel energy price subsidies) should be removed to level prices in the energy sectors and stimulate efficiency improvements and low carbon development. Although it is not easy to implement due to domestic production of coal, the gradual removal of electricity subsidies should be considered, especially in the context of a green economy strategy and in light of a future integration in the EU. Removed subsidies could also be reallocated (as avoided expenditure) to support energy efficiency.

- Considering its potential energy and/or agricultural production cost increases, interventions should be designed to simultaneously provide incentives to reduce inputs (e.g., through energy efficiency) and mitigate potential upcoming cost increases. Initial efforts to comply with the EU Directive on energy efficiency should therefore be continued and extended.

- Low carbon transport options, such as public transport, require considerable upfront investments but they lead to considerable medium- and long-term savings. A more efficient public transport sector (for both passenger and freight) will also increase in profitability (leading to higher avoided costs), should energy prices increase in the future.

- In the short-term, the introduction of renewable energy is advised for selected uses (e.g., solar heat water). Likewise, the expanded use of biomass for energy production could support the creation of a local supply chain and reduction of waste.

- Finally, the potential of organic agriculture should be explored, in particular the potential market value of organic products and its role in employment creation. Relevant opportunities may be available for the sector going forward and Serbia could profit from an early positioning in the European market. Similarly, the capacity of organic agriculture to increase carbon sequestration could provide additional revenues should a global (regional or national) carbon price mechanism be enacted in the future.

With a national sustainable development strategy in place, Serbia has the foundation needed to move to the next level in the development of a green economy framework that will assist in achieving the three pillars of its NSDS. This scoping study has provided analyses of some key sectors that are essential to its long-term development, by presenting modelling scenarios for required financing, proposing policy enabling conditions that will spur a transition to a green economy, as well as providing options for the targeted sectors. The government has shown significant resolve to realise Serbia's economic reforms and follow a green economy path, with the financing to support it. While there will be constant challenges, a grounded, transparent and monitored implementation plan will provide a path forward to enable this transition.

As a country with large areas of agricultural and forested lands, Serbia has strong potential for the production of biomass. Forests cover about 30 per cent of the territory and approximately 55 per cent is arable land. In addition to residues from crop farming for food production, there is a strong presence of targeted crop farming for the production of biomass fuel without competing with food production.

Annex. Biomass opportunities

According to recent studies, the most promising options for biomass utilization in Serbia are:

- space heating in households and buildings using biomass pellets or briquettes;
- co-firing or total replacement in district heating plants that currently burn heavy oil or coal; and
- production of biofuels for transport.

Serbia has a **Biomass Action Plan 2010-2012**,[106] which indicates that the technically feasible annual energy biomass potential in the Republic of Serbia is approximately 2.7 Mtoe. The energy potential of wood biomass is estimated at approximately 1.0 Mtoe, while about 1.7 Mtoe could be generated from agriculture biomass (agricultural waste and crop farming residues, including liquid manure).

In order to use biomass as renewable energy, it is necessary to create the appropriate conditions and to overcome different bottlenecks and problems which have been identified and divided into six different areas: security of feedstock supply and demand, licenses, communication, technology and knowledge, financial and economics, implementation and monitoring.

Concrete actions with time frames were laid out in order to address the identified bottlenecks. These can be found in detail in the Biomass Action Plan.

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