Influence of global megatrends on the state of environment in Slovenia:

Conclusions and key messages

**Final report**

**DRAFT**

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# Introduction

## Introduction to this report

This report is the final output of the project *Influence of global megatrends on the state of environment in Slovenia* (henceforth ‘the project’). Specifically it is the final report for Task 5 of the project which has a focus on bringing together all project outcomes, and in particular the results of the two project workshops on impacts of global megatrends for the state of the environment in Slovenia and potential responses. More information on the project is provided in sub-section 1.2 and 1.3 below.

This report brings together all of the main outputs from the work completed, and in particular provides key messages distilled from t two workshops held as part of the project and related background research. Following this introduction this report sets out:

* An overview of the methodology used and how it was applied to the case of a national study in Slovenia (Section 1.3).
* An overview of implications of selected global megatrends for the state of the environment in Slovenia and a synthesis of 10 key messages, capturing the available evidence and expert opinions on risks, opportunities and responses related to these implications (Section 2).
* An assessment of the significance of risks and opportunities from GMT implications for Slovenia in meeting its strategic goals (Section 3).

Various annexes are also included which provide additional background materials relevant to different sections of the report.

## Background and objectives

### Background

In October 2017 the Slovenian Ministry of the Environment and Spatial Planning and the Slovenian Environment Agency commissioned Collingwood Environmental Planning (CEP) to support them in undertaking a study to understand the *Influence of global megatrends on the state of environment in Slovenia*.

The aim of this project was to adapt and apply the methodology described in the EIONET[[1]](#footnote-1) report *‘Mapping Europe's environmental future: understanding the impacts of global megatrends at the national level’[[2]](#footnote-2)* (henceforth ‘methodological toolkit’) to analyse the potential implications of global megatrends (GMTs) on the state of the environment in Slovenia and the ability of Slovenia to meet environmental goals set out in national strategic documents and the UN Sustainable Development Goals (SDGs).

This project considered global megatrends as analysed by the EEA in their European Environment State and Outlook Report (SOER) 2015[[3]](#footnote-3). The EEA identified 11 GMTs of relevance to Europe, and at the request of the Ministry of the Environment and Spatial Planning this project focused on identifying potential implications of two specific GMTs: *GMT 7: Intensified global competition for resources*; and *GMT 9: Increasingly severe consequences of climate change*.

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| --- |
| ***What are global megatrends?****The EEA SOER 2015 defines global megatrends (GMTs) as ‘large-scale, high impact and often interdependent social, economic, political, environmental or technological changes’ that can have decisive and critical implications. The megatrends analysed in the EEA SOER 2015 provide a research- and expert-judgement-based perspective on how interrelated and connected global drivers and trends are likely to evolve over time. The EEA SOER 2015 assessment of GMTs analyses 11 megatrends that are considered to be of key importance to Europe’s long-term environmental outlook.**EEA’s Global Megatrends:**1. Diverging global population trends**2. Living in an urban world**3. Changing disease burden and risks of pandemics**4. Accelerating technological change;**5. Continued economic growth?**6. An increasingly multipolar world**7. Intensified global competition for resources**8. Growing pressures on ecosystems**9. Increasingly severe consequences of climate change**10. Increasing environmental pollution load**11. Diversifying approaches to governance.* |

### Objectives

The main objectives of the project were to:

* Collect and review background materials of how GMTs 7 and 9 may influence the environment of Slovenia.
* Prepare and facilitate a scoping workshop for national experts to discuss in an open manner how the two megatrends, as described by the EEA, might impact the state of environment in Slovenia.
* Consult with relevant national experts to identify information and evidence that would facilitate the preparation of summary factsheets on national information and outlooks related to GMT implications identified during the scoping workshop.
* Prepare and facilitate a second workshop to assess risks and opportunities as well as policy gaps and needs related to the prioritised implications from GMTs 7 and 9.
* Produce a final report bringing together all project outcomes, and in particular the results of the two project workshops on impacts of GMTs 7 and 9 for the state of the environment in Slovenia and potential responses.

### Value-added of the project

The methodology adopted was centred on participation and the input of national experts, through two project workshops focussed on: scoping implications (November 2017); risks, opportunities and responses (April 2018). Requests for feedback and information were also sought through emails to national experts and bilateral discussions organised by the Slovenian Environment Agency.

The key value added of the approach for Slovenia has been:

* Providing opportunities for national experts to meet and exchange knowledge and expertise, including with experts in different technical and policy fields.
* Enabling the identification and prioritisation of ways in which Slovenia may be influenced now and in future by global drivers and trends (GMT implications).
* Bringing together existing evidence (reporting, indicators etc.) from national sources related to the prioritised implications, including some national insights and preparing factsheets to present this information. This information is published as part of the final reporting on this project and is available for use by experts in the region.
* Facilitating discussion about national responses to long-term risks and opportunities from global drivers of change affecting Slovenia’s environment and strategic goals which can be used as part of national long-term strategic planning.
* Possibility to follow up with activities for example in the process of state of the environment reporting.

## Methodological approach

The methodology used for this project followed the process described in the methodological toolkit and adapted them to the needs of this national study. This involved five steps each delivered through a specific project task:

* Step 1: Preparation and objectives (Task 1)
* Step 2: Scoping implications (Task 2)
* Step 3: Linking implications to national evidence (Task 3)
* Step 4: Identifying risks and opportunities (Task 4)
* Step 5: Reporting (Task 5)

A central aspect of the methodology was the participation of national experts in two national workshops. More than 20 experts participated in each workshop. Experts were invited by the Slovenian Ministry of the Environment and Spatial Planning and the Slovenian Environment Agency, and included national experts in following areas: Land use and spatial planning; Water quality and ecological status; Soil and agriculture, Energy efficiency and public health. Experts included those from national ministries, universities, research institutes, the private sector (insurance) and NGOs.

A more detailed description on the activities in each of the steps as well as brief summaries of the two workshops are presented in Annex 1.

Chapter 2 introduces the key messages that include data from national indicators (see Annex 2), the desk-based research undertaken as part of this project, and the perspective of experts from the workshop discussions.  In the key message descriptions in Chapter 2 where specific references are not included the information included has come from expert discussion in the participatory workshops.

# Key messages related to global megatrend implications for Slovenia

## Introduction: Synthesis of GMT implications, risks and opportunities for Slovenia

The identification of implications of GMTs 7 and 9 for the state of environment in Slovenia was a key outcome of the scoping workshop and formed the basis for consideration of key messages as one of the main outputs for this project.

In particular the six implications selected by participants as being of most importance for further consideration were the contextual foundation of the key messages as, based on the discussions during the two workshops they were selected as reflecting the key national issues related to both of the GMTs. These priority implications are listed in the table 2.2.1 below.

Furthermore in the second workshop experts discussed the priority implications and identified specific risks and opportunities for Slovenia, and this has provided additional context to the preparation of the key messages. The risks and opportunities considered when identifying key messages are presented in Annex 3.

The following key messages were prepared by looking across the risks and opportunities identified considering the context of each prioritised implication:

Emerging challenges for Slovenia’s agricultural sector and the security of food production.

Slovenia’s relationship with Europe and the world: trade and resource dependence.

Pressure on Slovenia’s limited land resource.

Transport as a key driver for environmental change and health related risks.

Economic development a challenge for Slovenia’s pristine environment.

Recognising trade-offs and setting common sectoral objectives can help Slovenia to a more sustainable future.

As traditional lifestyles evolve, many people may become vulnerable.

Technological and behavioural change may drive Slovenia towards more sustainable and secure future.

Slovenia as a high-value tourism destination.

Joined-up resource management that recognises the value of Slovenia’s natural capital.

The outcome of this synthesis is presented in the sub-chapters below. In the key message description where specific references are not included the information has come from expert discussion in the participatory workshops.

**Table 2.2.1.** **Implications prioritised through scoping**

| **GMT ‘driving’ the implications** | **Implications prioritised as ‘important’** | **Timescale over which implication may occur[[4]](#footnote-4)** | **National issues potentially affected**  |
| --- | --- | --- | --- |
| GMT7 Intensified global competition for resources  | Increasing environmental burden | Short term (increased burden)Long term (decreased/increased burden) | This implication may in particular lead to pressures on air pollution especially (due to large numbers of small domestic biomass firing installations) further affecting human health. Likely decrease in biodiversity and water quality was also noted. |
| Pressure on water quality and supply | Long term | Pressure is created by drinking water demand, use of water for renewable energy sources, agriculture (irrigations du to more frequent draughts) and tourism. |
| Economic and Energy import dependence | short /medium /long term | The energy in/dependency of Slovenia will depend on how much renewable energy sources it will have in future. Economic dependency will remain on EU due to the strongly related EU market. Slovenia’s industries continue to depend on fossil fuel and gas, energy, and raw materials (metals, minerals) import |
| Increased privatisation of natural resources | medium term(has already started but the implications are not felt yet) | This implication is caveated that it is possible privatisation of water resources will be prevented with policy mechanismsHowever the workshops concluded that this phenomena is already happening with corporations having / or will have the support in international trade treaties like NAFTA and CEFTA. |
| GMT9 Increasingly severe consequences of climate change | Extreme weather events and Infrastructure damage | short term (increase in time) | Extreme weather likely to affect all types of infrastructure including transport and energy.  |
| Food security | short term (low magnitude)medium/long term (some present aspect will significantly increase with time) | Much will depend on the situation in global markets – it could be that some opportunities could arise for Slovenia’s agriculture sector. The impact is already seen in terms of food prices in certain products. |

## Emerging challenges for Slovenia’s agricultural sector and the security of food production

Slovenia’s agricultural management faces multiple risks to food supply and decline in crop yields, in particular due to climate change and related extreme weather events that may become an increasingly significant threat. Likely adverse consequences include changes in vegetation period, irrigation vulnerability from droughts and declining groundwater levels, higher costs in agricultural production and abandonment of agricultural land.

***What is happening?***

This key message is linked to the implications “*Extreme weather events and Infrastructure damage*” and “*Food security*” (both related to GMT 9: Increasingly severe consequences of climate change).

The following factors are potentially influential for the agricultural sector and food security in Slovenia:

* Food security will largely depend on the global (food) market.
* Developments in the global market will affect the domestic food prices.
* Increase in the occurrence of extreme weather events and related damage to crops which in turn will impact the food quality and variety as well as agricultural production, and availability of food for livestock.
* Additional investments may be needed in chemical (e.g. plant protection products) and physical (e.g. anti-frost windmills) measures for crop protection due to extreme weather conditions.
* Increase in biofuel production and subsequent change in the use of agricultural land
* Abandonment of agricultural land.
* Opportunities arising from possible extension of growing season and more sustainable. production of qualitative food.

Among these factors climate change and related extreme weather events are becoming an increasingly important topic in Slovenia as evidence shows that in the past few years the production of crops in the country has been strongly affected by the occurrence of such events. In Slovenia’s recent history there have been reports of the following extreme weather events:

* Droughts
* Heavy rainfall and Flooding (riverine, flash floods)
* Tornado like winds
* Storms

As reported by the Agricultural Institute of Slovenia (2017) the continuing trend of changing weather conditions strongly affected crop yields in 2017. The warm autumn in 2016 saw above average temperatures, whilst the winter was colder than usual. Both seasons were marked by below average precipitation levels. Due to very warm and sunny weather in March 2017, the vegetation period started early. This was followed by an abrupt drop in temperatures and severe frost in May, which most affected fruit trees and grapevines across the country. Crop growth and subsequent yields were further affected by early drought, above average summer temperatures, five heat waves with interim cooling, and low rainfall (Agricultural Institute of Slovenia, 2017).

Due to a general dependence on rain fed irrigation, the agriculture sector is particularly vulnerable to short and intense summer droughts. According to Slovenian Environment Agency, the groundwater level at the end of August 2017 was low to very low in the greater part of the country. The Drought Monitoring Bulletin for southeast Europe[[5]](#footnote-5)report that in some aquifers of south-eastern and south-western Slovenia, groundwater levels at certain locations reached the lowest values on record[[6]](#footnote-6). The European Drought Observatory reported several heat waves in summer of 2017 which hit major agricultural areas in Slovenia with negative effects especially on grain maize and sugar beet[[7]](#footnote-7). Agricultural drought is causing lost or heavily reduced maize crops, grassland, severely affected were also fruit and olive trees as well as vines.

In November 2012 more than 100 municipalities in Slovenia were affected by floods with total damage exceeding 200 million Euros. These floods caused damage to agricultural areas, industry, civil engineering works (transport infrastructure, distribution piping, water facilities, etc.), water courses and buildings[[8]](#footnote-8).

From 2010-2018 there have been 272 occurrences of extreme weather events (e.g. ‘gustnadoes’[[9]](#footnote-9), large hail, heavy rain, tornadoes, severe wind gusts, heavy snowfalls/snowstorms) recorded in Slovenia as reported in the European Severe Weather Database[[10]](#footnote-10).

The following statistics, presented by the Slovenian Statistics Office (SORS, 2016) for the period from 2006 to 2015, further underlines the challenges related to security of food production:

* The area of arable land per capita has decreased by 6%.
* The area of cereals per capita has decreased by 2 %.
* The number of agricultural holdings (majority of which are family farms) in this period has declined by 7% from 75,340 in 2007 to 70,063 (2016).
* The utilised agricultural area per capita has declined by 5%.

Slovenia has traditionally been, and continues to be a net importer of food, as it does not meet its own national demand for agricultural products (SORS, 2014), highlighting its vulnerability to security of food production. As reported in 2016 the level of self-sufficiency (showing the percentage of its own consumption needs that the country meets) was the lowest for vegetable (42%), fresh fruit (44%), and potato (55%) (SORS, 2017). However, in comparison to 2013, the level of self-sufficiency in 2016 for potato has risen by nearly 10% and same for vegetables (SORS, 2014; 2016). Nevertheless, despite the relatively low rates some experts still believe that Slovenia has enough arable land and water resources that it could reverse the negative trend and significantly increase its self-sufficiency by 2030 (Plut, 2012).

***Why is it important?***

The following risks related to the challenges for Slovenia’s agricultural sector and the security of food production were identified:

* Agricultural management and food production (disruption of food supply / yields).
* Climate change global risks leading to new plant diseases, higher costs in agricultural production, irrigation vulnerability, use of pesticides, decrease in yields.
* Abandonment of agricultural land, decrease of agricultural land (due to urbanisation, climate change).
* Insufficient food production to meet domestic need, low quality of food (e.g. importing possible low quality food).

In addition the following opportunities related to the challenges for Slovenia’s agricultural sector and the security of food production were identified:

* More efficient use of water sources (rainwater, reduce abstractions, reduce groundwater use).
* Incentivise local and organic food production considering that local food systems are more resilient to climate change.
* Gaining new knowledge and technology (new crops; increase of organic matter in soil).
* Increase in yields from longer vegetation seasons (use of higher altitudes for food production).

***How might Slovenia respond?***

There are various strategies and plans that address aspects of the challenges of Slovenia’s agricultural sector and the security of food production.

The Strategic Framework for Climate Change Adaptation (Ministry of Environment and Spatial Planning of the Republic of Slovenia, 2016) provides a strategic framework, objectives and guidelines for integration of climate change impacts into policies and practice in Slovenia on national, regional and local level. The main objective of this framework is to reduce Slovenia’s exposure, sensitivity and vulnerability to climate change impacts and increase the climate resilience and adaptive capacity of society. The document complements the activities taken by the EU in shape of the Common Agricultural Policy (CAP) which recognises that sustainable agriculture is key for sustainable economic development.

Additionally, the new Slovenian Development Strategy 2030 includes two goals, which are closely linked to this implication:

* “Sustainable and efficient resource management” is the 9th goal of the Strategy and recognises the importance of high quality natural resources (water, food, timber etc.) for ensuring a higher level of self-sufficiency. Additionally, this goal acknowledges the importance of food as a high quality domestic resource for ensuring a higher level of self-sufficiency. It also notes the negative impacts of climate change on food systems emphasising the dependency of food production on weather conditions.
* “Safe and globally responsible Slovenia” is the 11th goal of the Strategy with one of the measures to achieve this target being “to promote prevention and capacity building for the comprehensive management of natural and other hazards”.

On an international level to mitigate the occurrence of extreme weather events and damage to agriculture such events cause, Slovenia a signatory to the UN Sustainable Development Goals (SDGs), of which SDG13 (climate action) is particularly relevant. A couple of key European directives relevant to challenges from extreme weather events include the Water Framework Directive, Floods Directive and the EU Adaptation Strategy.

Looking across the identified gaps and needs in responses to the GMT implications a number of key themes linked to agriculture and food production are apparent:

* Improved policy implementation requires attention even for issues where legislation is available and good.
* Need for research on appropriate crops to improve self-sufficiency in food production.
* Need for improved environmental policy integration into EU sectoral policies with more responsibilities to countries.
* Increased area of irrigated land is required to manage droughts (currently approximately 2% of agricultural land is being irrigated which is considered insufficient to ensure resilience to extreme weather events)
* Spatial planning procedures are considered lengthy (too many levels included in the procedure) and inappropriate, at all levels from local to state.

In relation to how these gaps and needs may be addressed:

* An analysis of the food system at a micro / local level to better understand needs and opportunities
* Research into different technologies and practices for agriculture to improve yields and limit diseases (e.g. increase humus in soil).

## Slovenia’s relationship with Europe and the world: trade and resource dependence

Slovenia is largely dependent on the EU market, as well highly reliant on European funds for key investments creating jobs and supporting the economy. Economic and energy (in)dependence of the country are strongly interrelated as the macroeconomic importance of energy sector in Slovenia is significantly higher than in other EU countries. The country sees solutions in transition to renewable energy and circular economy, however, trends show that this will require significant changes.

***What is happening?***

This key message is linked to the *“economic and energy import dependence”*, implication of GMT 7 (*Intensified global competition for resources*). In relation to trade and resource dependency of Slovenia the following trends and observation were emphasised:

* Economic dependence of the country is long term. Slovenia has a small internal market and therefore it is and will remain strongly interrelated to EU and global markets.
* Industries in Slovenia depend on imported energy, fossil fuels (mainly oil), gas, and other raw materials (minerals, metals).
* Economic dependence of Slovenia is highly affected by the energy import dependence of the country. Thus, factors that might contribute to country’s energy (in)dependence, will also significantly influence its economy. The energy dependence of the country could in long term increase due to: (1) shutting down the nuclear power plant by 2050; and (2) relying on the new (imported) coal powered thermoelectric plant (TEŠ)[[11]](#footnote-11). Therefore, sustainable energy technologies, circular economy transition, and common EU energy policy could be key factors influencing country’s economic end energy (in)dependence.
* In terms of energy and economic stability, transport was also identified as strongly related to the risk of critical resources supply and price volatility (predominantly fossil fuels).

Data from Eurostat show that in terms of economic activity, after suffering a 7.8% decrease in 2009 and fluctuating for the following 5 years, GDP of Slovenia has increased by an average of 2.6% per year since 2014.[[12]](#footnote-12)The export/import ratio reported for Slovenia in November 2017 was 99.9% which means that the country imports about the same amount of goods that it exports. In 2017 the exported goods amounted to 28,250 m €, whilst the import was 27,526 m €[[13]](#footnote-13), of which 76.7% of total exports and 80.1 % total imports was generated by trade with EU Member States. About a fifth (20.4%) of total Slovenian exports goes to Germany, 11.5% to Italy, followed by Croatia (7.6%), Austria (7.6%) and France (5.7%). Goods are mostly imported in similar percentages from the same countries. This shows that Slovenian trade is heavily dependent on the EU market.

Slovenian Industrial Policy (SIP; 2013) emphasises that internationalisation of business and use of the globalisation effects is becoming an increasing necessity for the country’s economy, mainly due to uncertain domestic market growth and demand. However, foreign direct investment (FDI) flows in Slovenia, which are also important indicator of internationalisation of the economy, have been extremely low since the 2008 crisis (over -200m € in 2009). A paper by Blăjuţ (2015) shows that between 2013-2014 Slovenia had the lowest percentage of foreign investors/companies among all 11 Central and Eastern EU countries. In 2014 the country had an unexpectedly strong tenfold FDI recovery (746m €) in comparison to a previous year (71m €)[[14]](#footnote-14).

In terms of economic dependence on EU, the National Reform Programme 2017-2018 reflects high reliance of the country on the European funds for strengthening the competitiveness of the businesses as well as promoting key investments (i.e. roads and railways, sustainable mobility, and RES and energy efficiency) which are intended to create new jobs and boost economic growth, as well as reduce Slovenia’s dependence on imported resources.

The interrelation between economic and energy dependency in Slovenia is also emphasised by the European Commission which states that macroeconomic importance of energy sector in Slovenia is significantly higher than in other EU countries, in terms of the gross value added (3.0%) as well as the total employment (about 1.0%) generated by the sector (EC; 2015). Furthermore, looking at data for 2006 to 2014, EC also reports that in comparison to EU28 Slovenia’s energy trade deficit is constantly higher, largely due to the amount of oil imports. Overall, the energy import dependency of the country in 2013 (EC, 2015) was in line with the EU average for all fuels together (about 50%). However, it was much higher for petroleum products (SI:96%; EU28:87%) and natural gas, which was 100% imported (EU28: 65%), mainly from Russia. In 2016, energy dependence of the country was 46%, with all petroleum and gas being imported[[15]](#footnote-15).

The largest energy consumer in Slovenia is the transport sector (39% in 2016)[[16]](#footnote-16), which supports the observations that the country’s economy is highly dependent on the fossil fuel imports. The transport sector in Slovenia has been growing over the last few decades, and the trend is continuing, as described in “*Transport as a key driver for environmental change and related risks”* key message (section 2.5). Road transport significantly contributes to the negative picture of the high energy intensive Slovenian economy (SIP, 2013; EC, 2015).

Assumptions, predominantly based on the Slovenia’s current energy policy, are that in future the country will be less energy dependent. However, due to shutting down two important power plants the energy (in)dependency of the country could largely depend on its future amounts of RES. Some projections for 2055, when a new nuclear power plant is no longer an option, TEŠ 6 is terminated in 2053, and the lost capacity is being replaced by solar energy and gas, show increased energy dependency reflected in net energy import (E3. Modelling. Energy, Economy and Environment, 2017).

The overall share of RES in the gross final energy consumption has been increasing since 2006 and has reached a maximum of 22.41% in 2013, meaning Slovenia was on track to achieve the 25% target by 2020 (EC, 2015). However, the percentage of RES has since declined by 1.12% reaching 21.29%[[17]](#footnote-17) in 2016. As shown by the EC (2015) report Slovenia is some way behind the EU average in terms of low-carbon technology patent applications as well as share of public energy and environment R&D expenditure. A report from EC (2018) states that small and medium sized enterprises (SMEs) in Slovenia have low ambitions regarding energy savings as well as material and waste reduction. Only 14% of SMEs reported they will take actions towards energy efficiency, and only 10% plan to minimise waste, with similar percentage aiming to save material (11%), recycle (7%), and save water (10%; EC, 2018). This suggests that significant changes will be required if Slovenia is to achieve its’ ambition to transit to a low-carbon economy through large-scale uptake of RES, and through this reduce the economic and energy dependence challenges the country faces.

***Why is it important?***

In the context of Slovenia’s international relationships regarding trade and resources dependence, the following challenges were identified:

Risk of energy and resources supply due to import dependence (e.g. if one country has a monopoly over a resource that an industry in Slovenia depends on, the whole industry can collapse).

Energy poverty (Related to high energy import dependence and lack of control over volatility of energy prices. The energy prices need to be looked at in relation to individual/ household incomes).

Identified opportunities related to trade and resources dependence of Slovenia were:

* RES and technologies development (prompted by the urgent need of Slovenia to become less economically and energy dependent).
* Reduces energy consumption and increased energy efficiency (due to increased behavioural and technological change).

***How might Slovenia respond?***

Slovenia has several polices and strategies which address challenges related to trade and resources dependence such as Slovenian Industrial Policy (2013) and Smart Specialisation Strategy (2017) both supporting technological development, RES, and green innovation.

At national level the implementation of the following 4 objectives of Slovenian Development Strategy would decrease the economic as well as energy import dependence:

* “Economic stability”, the 5th SDS goal, is a prerequisite for the high life quality and standard. Achieving the goal by supporting sustainable development, innovation and green growth to diminish the development gap between Slovenia and other countries would also strengthen economic and energy independence of the country.
* “Competitive and socially responsible corporate and research sector”, the 6th goal of the strategy, is looking to address the issue of Slovenian reduced competitiveness by putting research and innovation towards green technologies in the focus of development polices. This would encourage investments in green technologies and support the uptake of RES in Slovenia which would have positive impacts on economy and decrease energy imports.
* Transition to “Low carbon-circular economy” (goal 8) is envisaged to be central to the country’s economy over the next decades. It is considered to contribute to the energy and material use efficiency and support implementation of RES which would diminish energy use and currently high dependency on imported sources. The document recognises the importance of suitable (public) transport infrastructure and mobility to support the transition to a low carbon circular economy and to close the material loop and support the logistics of sources return.
* Goal 9 “Sustainable resource management” is to ensure the protection of strategic national goods such as quality water and food, to decrease country’s vulnerability by implementing ecosystem management of natural resources.

The strategic policy documents that will further support the uptake of RES to decrease energy imports and economic dependence are Energy Concept For Slovenia (EKS-when adopted) and National Energy Efficiency Action Plan 2017-2020.

As an EU member state and signatory to international treaties Slovenia is bound to implement the EU legislation and among others follow the UN Sustainable Development Goals (SDGs). The EU energy sector Directives (e.g. Energy Efficiency Directive, Energy efficiency of Buildings Directive, RES Directive) as well as the SDGs, in particular SDG 7 (affordable and clean energy), SDG 9 (industry, innovation, and infrastructure) and SDG 13 (climate action) could encourage the country’s efforts to increase energy efficiency, and become less resource and energy import dependent on other countries. This would also to some degree decrease economic dependence.

Needs and gaps in repossess to risks and opportunities discussed in relation to resource and trade dependence of the country are:

* There are no alternative infrastructure connections for gas supply for example, which comes to Slovenia now through pipeline from Italy.
* Although energy poverty in Slovenia is recognised as a serious issue at a policy level, at the level of society the awareness of this issue is low.
* Regarding the development of sustainable energy production, the biggest challenge in Slovenia is acceptance of RES facilities by local inhabitants. For example wind power plants are considered as visually disturbing, which also goes for solar power plants. However solar panels are also perceived as dangerous due to causing fire. The raise and strong opposition of civil initiatives against the development of RES in Slovenia is fairly frequent.
* There is a need to allocate the subsidies for the development and implementation of RES more flexibly so that anyone willing to invest in RES can apply and is eligible for the funding. The eligibility is currently limited for example to certain types of houses and facilities. Criteria for allocating the funds should reflect the cost-efficiency of the measures implemented.
* Although there are quite a few documents and initiatives addressing sustainable transport, public transport (infrastructure) in Slovenia is underdeveloped. There are issues with frequency, speed, accessibility and quality of public transport (particularly in railway but also bus transport services). Thus people mainly drive cars.
* External energy and other costs of transport are not taken into account. For example, due to poorly developed infrastructure the fright transport on railways is not feasible as it is too slow and therefore more expensive. Thus the majority of fright transport in Slovenia takes place on the roads.

To address the identified needs and gaps suggestions include:

* Gas pipeline is being built from Italy through Slovenia to Hungary. This might be an opportunity for Slovenia to also get gas from Hungarian side (another connection to Russia) in addition to Italian (gas pipeline from Algeria) and Austrian (gas pipeline from Russia) side where the gas comes from now.
* Increase in RES and transition to circular economy if successfully implemented could lead to higher energy independence of the country.
* Higher diversification of energy resources could positively impact energy supply.
* More frequent and efficient awareness raising actions, and targeted communication regarding energy poverty.
* The acceptability of RES facilities could possibly be improved by looking at good practices from other countries. Increased awareness (e.g. by organising public events) about other (not just environmental) benefits of RES (e.g. improved health, economic and energy independence) could also contribute to better acceptability of RES facilities.
* Slovenia should develop better public transport infrastructure.

## Pressure on Slovenia’s limited land resource

Recognising Slovenia’s limited land availability as an unrenewable natural resource that might present the most vulnerable asset due to different pressures and trade-offs for example between land use for agriculture and expansion of built-up areas.

***What is happening?***

Pressure on land is Slovenia is linked to the implications of GMT 7 (*Intensified global competition for resources*): *“pressure on water quality and supply”* and “*increasing environmental burden*”, as well as GMT 9 (Increasingly *severe consequences of climate change)*: “*extreme weather events and infrastructure damage*”. It has been recognised that:

* Land, especially agricultural and open space, is under the pressure of urbanisation (e.g. infrastructure development and the spread of settlements).
* Agricultural land and forests are being affected by increasingly stark and more and more common extreme weather events (e.g. sleet, draughts, storms, floods, and frost) which among other cause severe soil erosion.
* Farming and consequently agricultural land abandonment has been a trend over the last few decades.
* There are challenges related to spatial planning and decision making (e.g. technocracy and lack of data) resulting in profligacy and irrational use of land.

Although the population in Slovenian cities and towns during the past decade has been fairly steady or rising slowly (e.g. by about 20.000 inhabitants in Ljubljana[[18]](#footnote-18)) the land is still under pressure of (dispersed) settlement expansion (e.g. trend of building developments along the motorway) and infrastructure (including transport) development leading to change in land use. Land use change might contribute to increased environmental burden reflected in decreased water and air quality as well as soil pollution.

In relation to water quality, the land use change in catchment basins can cause degradation of surface water resources. The expanding settlements in coastal areas are problematic for Slovenia[[19]](#footnote-19)in terms of potential for pollution of coastal waters (e.g. due to increased effluent discharge).

Dispersed settlements, poor public transport connections and infrastructure push people towards unsustainable transport choices. Ownership of private vehicles in Slovenia has in the last decades surpassed many more economically advanced EU countries reaching 523 cars per 1,000 inhabitants in 2015[[20]](#footnote-20). In addition, the territory of Slovenia is crossed by some of Europe’s major south-north transit routes which carry a high volume of international road freight[[21]](#footnote-21). The use of motorised transport significantly affects the air quality (e.g. increased concentrations of PM10/m3) and in turn human health increasing risks for cardiovascular and respiratory diseases especially in children as reflected in key message *Transport as a key driver for environmental change and health related risks* (section 2.5). Soil is also affected by transport. Slightly higher values of metals and nitrogen have been recorded in moss in the peripheries of bigger towns and cities as well as industrial and thermal energy plants, indicating an increased risk of soil acidification[[22]](#footnote-22).

In 2012 Environmental Performance review for Slovenia OECD reported that urban sprawl and transport infrastructure has caused habitat fragmentation including the fragmentation of continuous forests (OECD, 2012). This reflects challenges in Slovenian spatial planning, which is believed to be inefficient due to lengthy and technocratic procedures and a lack of a coherent national spatial development strategy.

Pressures on land as a resource are perhaps the most obvious in relation to agricultural land which has historically been the most desirable for settlements as well as infrastructure development. Although arable land is limited, it is still being used for build and infrastructure expansions while brown fields remain undeveloped. However, agricultural land is also being abandoned due to ceasing of agricultural production. The statistics for 2006 to 2015 shows that during this time the area of arable land per capita has decreased by 6%, and the utilised agricultural area per capita has declined by 5% (SORS, 2016). Pressures on agricultural land also pose risk to the country’s food security as described in key message *Emerging challenges for Slovenia’s agricultural sector and the security of food production* (section 2.2).

The land and forests are also affected by increasingly stark and more and more common extreme weather events (e.g. sleet, draughts, storms, floods, and frost) causing soil erosion and damage to crops. Due to the damaging effects of extreme weather in 2017, 6,761 agricultural holdings applied for the state financial aid for 348,527 ha of land, indicating a 2% increase in the damaged land from the year before (Agricultural Institute of Slovenia, 2017). At the end of January and at the beginning of February 2014, severe and long-lasting sleet storm affected Slovenia. It caused considerable damage to forests and forest roads, as well as energy infrastructure. Forest Service of Slovenia reported that the storm had damaged more than half a million hectares of forest. Seven million cubic meters of timber had to be felled, while 660 hectares of forest were planned to be cut down completely to plant new trees[[23]](#footnote-23).

***Why is it important?***

As a non-renewable source, perseveration and protection of land in Slovenia is challenged due to:

Increased exposure of land to more and more common extreme weather events (sleet, flooding, draught, storms and frost).

Land and in particular share of agricultural land is in decline which poses increasing risk to secure food production in the country.

Irrational land management and spatial planning pose risks to the quality of natural environment (e.g. air, water, soil quality) as well as potentially deteriorates other environmental issues (e.g. climate change, protection of plants and wildlife).

There are several opportunities related to protection of land in Slovenia:

* Implementation of local and organic food production might seem more competitive as well as more attractive to young generations of farmers. This might contribute to the reversibility of the land abandonment trend, as well as mitigation of environmental pressures (e.g. use of pesticides, food transport), and increased food security.
* Prioritised resource management especially of and forest and water (including catchment basins) could improve resilience to extreme weather events (e.g. decrease soil erosion, mitigate draught and heat, reduce and slow down storm water runoff) .
* Reaching higher levels of urbanisation in bigger cities with more condensed building developments, would perhaps curb dispersed settlement and enable more efficient public transport connections as well as provision of other infrastructure (e.g. heating and water supply, telecommunications).

***How might Slovenia respond?***

Slovenia has a spatial development strategy from 2004, which already recognisees some of the issues stated above (e.g. protection of agricultural land, encouragement of urban development in towns and cities). However, a new Spatial development strategy 2050 is being prepared and should be published in 2019 and will hopefully be more powerful in integrating relevant sectors (e.g. transport and infrastructure, agriculture, environment and spatial planning) to address some of the here identified challenges, especially issues related to the dispersed settlement and protection of agricultural land.

Several objectives of the Slovenian Development Strategy 2030 recognise the importance of land and spatial planning in Slovenia and if properly implemented could decrease the identified pressures:

* It is recognised that arrangement of space and living conditions is an important “societal subsystem” necessary for the adaptation to the population’s age structure changes and thus supports the “Healthy and active life”, the 1st goal of the strategy.
* Supporting “Low carbon circular economy”, the 8th objective of the strategy, it is envisaged that spatial planning will be used to create hubs of a low carbon circular economy and development solutions at regional and local level.
* The 9th objective of the strategy, “Sustainable resource management”, is to ensure sustainable resource management by providing quality living space through responsible and efficient land management, also in the light of more coherent regional development.

Other relevant strategy objectives reflect on the need to manage increased risks of natural hazards related to inadequate land developments (objective 11: “Safe and globally responsible Slovenia”) and importance of integrated spatial development to achieve “Effective governance and high quality public service” (objective 12).

As an EU member state and signatory to international treaties Slovenia is bound to implement the EU legislation and among others follow the UN Sustainable Development Goals (SDGs). In the context of sustainable land use SDG 11 (Sustainable cities and communities), SDG 14 (Life below water), SDG 15 (life on land) and SDG 13 (climate action) are of particular importance.

Among the gaps and needs associated with risks and opportunities regarding the pressures on land the following were recognised:

* In relation to local and organic food production current subsidy system should be adjusted and there should be higher availability of alternative production practices for framers (especially for vulnerable natural areas).
* To better manage extreme weather events prioritised water and forest management is needed that would include local and national level climate change impacts analysis, better sectoral coordination, and clear delegation of responsibilities to appropriate institutions.

To address the identified needs and gaps the following is suggested:

* Local organic food production could be included in the agricultural policy, and it cloud be further supported by reporting on benefits identified through research for land, economy, wellbeing and health on a national level.

Prioritised water and forest management would require systematic monitoring and collection of appropriate data, as well as management of reginal differences.

## Transport as a key driver for environmental change and health related risks

Transport trends in Slovenia, in particularly the increase of road transit transport, but also the growing numbers in private vehicles ownership, and poor public transport are creating environmental challenges as well as pose health risks to the inhabitants.

***What is happening?***

This key message is linked to the “increased environmental burden”, and perhaps less obviously also to “economic and energy import dependence”, both implications of GMT 7 (*Intensified global competition for resources*).

In terms of environmental burden and health related risks in Slovenia the following observation related to transport was highlighted:

* Transport and transit transport were identified as one of the main drivers of increased environmental burden in Slovenia.

Transport sector has also seen significant growth in Slovenia with implications for air quality and ecosystem integrity. In the period from 2000-2010 freight transport (tonne/km) increased by 18.1%, private cars (passenger/km) by 23.9% and vehicle stock by 21.4% (OECD, 2012). Ownership of private vehicles has increased rapidly in the previous couple of decades exceeding the rate of many more economically advanced EU countries and reaching 531 registered cars per 1000 inhabitants in 2015[[24]](#footnote-24). In addition, the territory of Slovenia is crossed by some of Europe’s major south-north transit routes which carry a high volume of international road freight. The freight transport by road reached 81.1% of total land goods transport in 2016 (measured as tonnes/km), with the remaining share carried by railway transport[[25]](#footnote-25).

These increases in the use of motorised transport and transit of freight by road through Slovenia lead to impacts on air quality, for example by exceeding the limit values of particles (PM10) and, in the summer, of ozone. In addition to the negative impact that polluted air has on environment, there are also significant impacts on human health. As indicated by the Institute of Public Health of the Republic of Slovenia, children are being regularly exposed to concentrations of particulates in the region of 30–40 µg PM10/m3, which is above the level recommended by the World Health Organization (20 µg PM10/m3). Being exposed to this pollutant can progress cardiovascular diseases and respiratory diseases especially with children. There are also negative effects of these pollutants for ecosystems as they become more susceptible to eutrophication and acidification. Slightly higher values of metals and nitrogen in the peripheries of bigger towns and cities as well as industrial and thermal energy plants have been recorded in moss indicating an increased risk of soil acidification[[26]](#footnote-26).

As also reflected in the key message “*Pressure on Slovenia’s limited land resource*”, transport infrastructure in combination with urban sprawl poses risks of habitat fragmentation, mainly lowland forests.

The transport sector is also the largest consumer of the energy in Slovenia (39% in 2016)[[27]](#footnote-27), making the country’s economy highly dependent on the fossil fuel imports related to this sector. Road transport also significantly contributes to the negative picture of the high energy intensive Slovenian economy (SIP, 2013; EC, 2015). In the energy sector since 2000, final energy consumption has increased by 7.95% with 4,931,000 tonne of oil equivalent been consumed in 2016[[28]](#footnote-28) (a ~4% increase in comparison with the previous year). In addition to environmental issues the growing energy demand leads to increasing risks for the stability of power system operation to meet the growing needs.

***Why is it important?***

In relation to the environmental and health challenges related to transport in Slovenia the following risk was identified:

* Air pollution from transport also affecting health.

One opportunity regarding the environmental and health challenges related to transport in Slovenia was also identified:

* Linking environmental and health risks (i.e. the risks to health of environmental issues) for better communication and policy responses.

***How might Slovenia respond?***

There are various strategies, plans and programmes in place in Slovenia to tackle the environmental and health risks resulting from transport.

There are two objectives in the Slovenian Development Strategy 2030, which, if realised, would have a mitigating effect on this risk:

* “Healthy and active life” is the 1st goal which aims to reduce risk to human health from environmental pollution and climate change. It also intends to change consumer behaviour as well as adjust transport structures and systems which impact the life quality of all generations towards reducing the burden on the environment.
* In particular under the 8th Goal “Low-carbon circular economy”, aiming to increase the material use efficiency that could contribute to decrease in resource use and extraction therefore relieving some environmental burden, transport sector recognised as an important source of greenhouse gas pollution. Thus, the strategy indicates that Slovenia will strive to use and implement new innovative mobility concepts, develop better public transport, and optimise transit transport. The country will also work on replacing the fossil fuels with encouraging efficient energy use and the use of renewable energy sources.

To address environmental burden, Slovenia is as an EU member state committed to an overarching sustainable development objective, which strives for a ‘high level of protection and improvement of the quality of the environment’, as well as implementation of the Renewable Energy Directive, which in particularly encourages the use of renewable energy sources in transport sector.

To address the issues of ensuring good environmental quality Slovenia is also bound to meet UN Sustainable Development Goals (SDGs). The once more relevant to transport sector are SDG7 (affordable and clean energy), SDG9 (industry, innovation and infrastructure), SDG11 (sustainable cities and communities), SDG12 (responsible consumption and production), and SDG13 (climate action).

The following gaps and needs related to the risks and opportunities (i.e. air pollution from transport effecting health, linking environmental and health risks) were reflected:

* Lack of public transport, including poor infrastructure and lack of intermodal connectivity – leading to low levels of use and people preferring (or needing) to use cars.
* Poor spatial planning pushing people to unsustainable transport choices.
* Funding often goes to road projects but not others (public transport etc.).

To address these needs and gaps suggestions include:

* Improve inter-modality of public transport, e.g. connection between trains and buses, making it easy to take bikes on trains and buses etc.
* Bike sharing schemes, such as the one in Ljubljana could be seen more widely.
* Car sharing could be expanded. Although it does exists (ride.org / prevoz.org) it is quite limited.
* Car clubs also exist but are quite limited. One example is in Ljubljana with electric cars. Clubs like that should reach a mass take-up.

## Economic development a challenge for Slovenia’s pristine environment

Slovenia's efforts to grow economy and increase self-sufficiency is driving production that has led to increased greenwashing, causing negative consequences for natural capital.

***What is happening?***

This key message is linked to the implications “Increased environmental burden” and “*Economic and energy import dependence*” (both related to GMT 7: *Intensified global competition for resources*).

Discussing economic growth and associated environmental pressures the following observations were highlighted:

* Broad middle class[[29]](#footnote-29) (including a declining rate in people living under the poverty threshold - 0.4% reduction in at-risk-of-poverty rate in 2016 compared to 2015 – with 13.9% of population living below the threshold) with “western lifestyle” and national trend for population relocation to coastal areas are important for increased environmental pressure in Slovenia.
* Increased pressure on water management (including water supply) in coastal areas and the rising use of chemicals for water quality treatment are also likely having an effect on local ecosystems and biodiversity.

Additionally, dominance of other interests (e.g. political, economic) that outweigh environmental protection, add to the increasing environmental burden in Slovenia, implying the need for improved decision making that would recognise the value of natural capital.

The growth of gross domestic product is commonly associated with shifts in consumption patterns, resource use and production of waste. According to OECD real GDP growth in Slovenia has annually surpassed 2% since 2014 with the latest evidence projecting that in 2017 the growth was 4.86%[[30]](#footnote-30).

To increase economic resilience and take advantage of global economy Slovenia is continuously seeking increased foreign investment. In recent years FDI flows in Slovenia, have indicated a significant rise. As reported by the Ministry of Economic Development and Technology (2018), after a slight decline in 2016 FDI flows are expected to surpass 1,450 m €in 2018. Such large influx of foreign investment in national economy could lead to notable growth in manufacturing, industry and services sectors that could cause increasingly negative consequences to Slovenia’s natural capital.

Historically economic growth and energy consumption are coupled as an economy rapidly grows, increased employment increases incomes, resulting in higher domestic demand for goods and services – including higher demand for energy. Recognising Slovenia’s GDP growth, in the energy sector since 2000 the final energy consumption has increased by 7.95% with 4,931,000 tonne of oil equivalent been consumed in 2016[[31]](#footnote-31) (a ~4% increase in comparison with the previous year with transport sector being the largest consumer - 39%[[32]](#footnote-32)). The growing energy demand leads to increasing risks for the stability of power system operation to meet the growing needs. One of the options to address this issue, is development of new energy infrastructure. According to a 2015 study on hydropower projects on Balkan rivers there were 181 hydropower projects planned in Slovenia and five being under construction (Schwarz, 2015) – the large number of planned projects is assumed to include small hydropower projects. This possesses increased risks for aquatic ecosystems (biodiversity, water stagnation etc.) as well as water availability as a result of increased exploitation.

***Why is it important?***

The following risks are related to the challenges to preserve Slovenia’s pristine environment:

* Environmental risk related to increased local production in Slovenia.
* Loss of long-term value of natural capital, and risk of green washing.

The opportunities related to the challenges to preserve Slovenia’s pristine environment include:

* Improved harmonisation between the objectives across sectors.
* Development of new products and services with lower environmental impact / related to R&D.
* RES and technologies development (prompted by the need of Slovenia to become less economically and energy dependent. If Slovenia will have no other resources the development of RES will be faster and investments in technological development will increase).
* Decoupling economic growth and energy demand: reduced energy consumption and increased energy efficiency due to increased behavioural and technological change (e.g. behavioural: active mobility and use of public transport, waste reduction and recycling; technological: shifting toward advanced manufacturing, which uses technologies that tend to be less energy-intensive; use and implementation of energy efficient technologies in buildings).

***How might Slovenia respond?***

Slovenia’s government is bound to exercise concern for natural environment through its membership of the EU. Sustainable development is an overarching objective for the EU, which is committed to a ‘high level of protection and improvement of the quality of the environment’.

As discussed in key messages *Slovenia’s relationship with Europe and the world: trade and resource dependence* (section 2.3) and *Technological and behavioural change may drive Slovenia towards more sustainable and secure future* (section 2.9), Slovenian Industrial Policy (2013) as well as Slovenia’s Smart Specialisation Strategy (2017) encompass the principles of sustainable development by encouraging investments in green innovation and technologies, as well as development of RES.

There are five goals in the Slovenian Development Strategy 2030, which, if realised, would have a positive effect on preserving Slovenia’s pristine environment:

* “Healthy and active life” is the 1st goal which aims to reduce risk to human health from environmental pollution and climate change. It also intends to change consumer behaviour which has a negative impact on ensuring quality of life for all generations and reducing the burden on the environment.
* Objectives of the 5th goal “Economic stability” intend for Slovenia’s economic growth to be inclusive and green based on high competitiveness and innovation. This is foreseen to enable sustainable development, and reduce burden on the environment.
* “Competitive and socially responsible corporate and research sector” is the 6th Goal of Slovenian Development Strategy 2030. Among the objectives to achieve this goal is to place innovations and research in the centre of Slovenia’s development policies which should be directed towards environmentally acceptable technologies and eco-innovations. Environmental responsibilities of enterprises and research organisations will be promoted. Such policies would have positive impact on competitiveness as well as contribute to decrease in environmental burdens.
* The 8th Goal “Low-carbon circular economy” is looking to increase the material use efficiency that could contribute to decrease in resource use and extraction therefore relieving some environmental burden. Transport sector is also recognised as an important source of environmental burden under this goal – especially by greenhouse gas pollution. The strategy indicates that Slovenia will strive to implement new mobility concepts and other measures to promote sustainable mobility (e.g. e-mobility, public transport).
* “Sustainable and efficient resource management” is the 9th goal of the Strategy and is striving to increase the quality of natural resources by implementing ecosystem-based management of these resources. Other objectives include efficient and sustainable water, soil, and forest management, biodiversity preservation, and sustainable agriculture.

## Recognising trade-offs and setting common sectoral objectives can help Slovenia to a more sustainable future

Limited collaboration (harmonisation of objectives) between sectors (often disregarding external costs of their actions) cause mismanagement of natural capital adding to the environmental burden

***What is happening?***

There is lack of integrated working between stakeholders and sectors at different governance levels (local, regional, and national) which is considered as a major challenge for resource management policy. Additionally, common lobbying practices within natural resource sectors may be influencing public decisions and undermining social and environmental interests and objectives, which could increase pressures for privatisation of natural resources.

***Why is it important?***

Poor harmonisation between the objectives of various sectors is considered a risk in Slovenia that requires consideration which could be addressed by joined-up resource management.

Additional reflections to be added in final version.

***How can Slovenia respond?***

The Slovenian Development Strategy 2030 includes two goals, which are closely linked to the recognition of trade-offs and common sectoral objectives:

* The 8th goal “Low-carbon circular economy” recognises the de-coupling of economic growth and the growth in the use of resources and GHG emissions (through education, raising awareness, and innovation) as key aspects to achieve this.
* “Sustainable and efficient resource management” is the 9th goal of the Strategy that aims to implement the ecosystem management of natural resources, ensure efficient management of surface and ground water, and soil, maintain high biodiversity levels and provide sustainable forest management.

## As traditional lifestyles evolve, many people may become vulnerable

Projected increase in extreme weather events, risk of energy poverty, increasing resource prices for energy, water and food and restricted supply could escalate social vulnerability in Slovenia

***What is happening?***

This key message is linked to the “*Economic and Energy import dependence*” implication of GMT 7 (Intensified global competition for resources) and *“extreme weather events and infrastructure damage”* implication of GMT 9 (Increasingly severe consequences of climate change*)*. It has been recognised that:

* Extreme weather events and infrastructure damage are potentially important issues for Slovenia’s state of the environment with flooding, strong winds and droughts foreseen to become more frequent and severe in the future, thus the magnitude of such effects on local communities is considered high.
* Supply of drinking water is uncertain in certain regions in Slovenia (Primorska, Prekmurje).
* Supply and price volatility of critical resources (mainly fossil fuels, but not excluding other resources).
* Developments in the global markets and changing consumption patterns will affect domestic prices of natural resources and food.

Social vulnerability to climate change is likely to become an increasingly important issue in Slovenia. Since 2010 there have been 272 occurrences of climate induced extreme weather events (e.g. ‘gustnadoes’, large hail, heavy rain, tornadoes, severe wind gusts, heavy snowfalls/snowstorms) recorded in Slovenia as reported in the European Severe Weather Database[[33]](#footnote-33). Such circumstances are causing significant damage to transportation, energy infrastructure, agricultural land and forests further leading to increased social vulnerability in many communities across the country.

Globally, prices of natural resources are rising due to the changing consumption patterns and influences from global markets. It was discussed that changing consumption patterns could lead to an increase in resource (i.e. water) prices in global and consequently national market, which would affect the accessibility or affordability of resources for Slovenians. Academic and grey literature identified in this study does not confirm the global or European water prices are increasing, whilst data on water prices in Slovenia is currently not available.

Although energy poverty in Slovenia is recognised as a serious problem at a policy level, in society there is low awareness of this issue.

***Why is it important?***

The following risks related to vulnerability of different social groups in Slovenia were identified:

Some communities in Slovenia may be disproportionately affected by climate change having less capacity to prepare for, respond to, and recover from climate-related hazards.

Risk of energy poverty (Communities being affected by volatile energy prices - would require to be looked at in relation to individual/ household incomes).

Energy supply (the system is not resilient to such shocks as heat waves – thus communities could be affected by shortages of supply).

Risk of resource supply due to import dependence (e.g. if one country has a monopoly over a resource that an industry in Slovenia depends on, the whole industry can collapse leading to mass unemployment).

Risks related to transition to low carbon economy (e.g., slow restructuring processes possibly resulting in job losses etc.).

Agricultural management and food production (disruption of food supply / yields could affect food accessibility and affordability in particular for the most socially vulnerable groups in Slovenia).

The opportunities that could address vulnerability of different social groups in Slovenia are:

RES and technologies development (Slovenia to become less economically and energy dependent continuing to ensure energy supply and affordability to all social groups in Slovenia).

Reduced energy consumption and increased energy efficiency due to behavioural and technological change could relieve pressures on existing energy production capacities and ensure continuous energy supply for all social groups in Slovenia.

Include local and organic food production in agricultural policy to support alternative food supply and reduce dependency on imports.

Research of different technologies and practices for agriculture (increase humus in soil) to increase local food production and minimise dependence on food imports.

***How might Slovenia respond?***

Available evidence in Slovenia indicates a notable variability in the occurrence and impacts of extreme weather events[[34]](#footnote-34);[[35]](#footnote-35). It is important to recognise those communities being most vulnerable to such events and introduce measures that would increase their resilience.

The following recommendations were identified that could have a positive impact on reducing vulnerability of communities in Slovenia, in particular related to energy poverty:

Humanitarian aid could actively help in dealing with problems related to energy poverty.

* More frequent and efficient awareness raising actions on energy poverty, and ensure targeted communication.
* Increased awareness about positive aspects of RES such as health and economic benefits improve the acceptability of RES facilities among people.

There are three goals in the Slovenian Development Strategy 2030, which, if realised, would have a positive effect on addressing social vulnerability:

* “Economic stability” which is the 5th SDS goal, is a prerequisite for the high life quality and standard. Achieving that by supporting sustainable development, innovation and green growth to diminish the development gap between Slovenia and other countries would strengthen economic and energy independence of the country and ensure communities are insusceptible to the risks associated with energy poverty, increasing energy, water and food and restricted supply.
* “Low carbon-circular economy” is the 8th Goal of Slovenian Development Strategy 2030. Among the priorities for this goal is to increase the energy and material use efficiency and uptake of RES, which would lead to decreased energy use and diminished sources import on which the country is currently heavily dependent. Lowering the risk of energy supply would address possible vulnerabilities of household consumers that rely on continued energy supply to meet their needs.
* One of the measures within the “Safe and globally responsible Slovenia” goal (11thgoal) which could address social vulnerability to extreme weather events is to promote prevention and capacity building for the comprehensive management of natural and other hazards.

## Technological and behavioural change may drive Slovenia towards more sustainable and secure future

Application of new technology and ideas/practices to existing issues on energy dependence, food security and environmental pressures together with change in social behaviour concerning consumption, mobility and energy efficiency in Slovenia could have an important role to achieve its ambitions on sustainable and secure future.

***What is happening?***

This key messages links to “increasing environmental burden” and related “pressure on water quality and supply”, as well as “economic and energy import dependence”, all implications of GMT 7 (*Intensified global competition for resources*). It also relates to “food security”, implication of GMT 9 *(Increasingly severe consequences of climate change*). In relation to technological and behavioural change to reach sustainability the following observations were noted:

* It is likely that the air pollution will increase due to growing motorisation and transit transport, as well as large numbers of small domestic biomass firing installations which would also affect human health. However, when discussing long term timescales (2030-2050) it was suggested that environmental burdens could decrease, as also reflected in the Energy Concept of Slovenia. This will be supported by the introduction of new/sustainable technologies, increased energy production from RES and greater use of electric cars.
* Economic and energy dependence are strongly interrelated (see key message *Slovenia’s relationship with Europe and the world: trade and resource dependence,* section 2.3). Future energy supply might be at risk due to shutting down the nuclear power plant by 2050, and relying on the new (imported) coal powered thermoelectric plant (TEŠ)[[36]](#footnote-36) in the future. Thus, the development of sustainable energy technologies, production, storage and share of renewable energy sources (RES), and the envisaged transition to circular economy could play the crucial roles in the extent to which Slovenia will be economic end energy (in)dependent.
* Technological innovations could further raise pressures on water in Slovenia, as it is potentially an abundant renewable energy source, as well as due to increased use of water in agriculture (irrigation due to more frequent draughts) and tourism. However, new technologies can also result in less resource-intensive lifestyles that could relieve the pressure on water demand.
* Moving towards more sustainable food production, partly driven by increasingly severe consequences of climate change, might show as an opportunity in terms of the food quality. On the other hand, there might be trade-offs among food quality and sufficient amount of food as well as biodiversity. For example, the options to transit to extensive, organic or ecological farming to improve food quality and at the same time contribute to biodiversity, could be limited as food productivity in these forms of agriculture is generally lower.

It is thought the energy import dependency and thus economic dependency could be significantly decreased by the envisaged transition of Slovenia to a circular economy and most importantly the percentage of RES in the future energy mix of the country. As also recognised by the European Commission the macroeconomic importance of energy sector in Slovenia is significantly higher than in other EU countries (EC, 2015). In terms of energy dependence, projections for 2055 show the capacity of gas and solar energy, predicted to replace nuclear power plant and TEŠ (expected to be shut down in 2053), will not be sufficient, which is reflected in increased net energy import (E3. Modelling. Energy, Economy and Environment, 2017). In terms of trade Slovenia is heavily dependent on the EU market as 76.7% of total exports and 80.1 % of total imports in 2017 was generated by trade with EU Member States[[37]](#footnote-37).

Slovenian Industrial Policy (2013) suggests, the country should invest in green innovation and develop eco products in order to tackle the issue of low material productivity (GDP/resources used) and create a less energy intensive economy. This is further supported by the Slovenia’s Smart Specialisation Strategy (2017) aiming for production of sustainable bio-balanced materials, and supporting development of technologies for (re)use of (secondary) materials and waste, and production of energy from RES.

In 2013 a seven year increase the share of RES in the gross final energy consumption has reached 22.41% and Slovenia was in a good position to reach the 25% target by 2050 (EC, 2015). However, by 2016 the percentage of RES declined to 21.29%[[38]](#footnote-38). As also discussed in the key message *Slovenia’s relationship with Europe and the world: trade and resource dependence* (section 2.3) Slovenia lags behind the EU average in terms of low-carbon technology patent applications and R&D expenditure related to public energy and environment (EC, 2015). As reflected by EC (2018) report the ambitions of small and medium sized enterprises (SMEs) in Slovenia towards energy savings, material and waste reduction are at the tail end of EU countries. This implies that if technological and behavioural change is to drive Slovenia towards better future, significant societal and governance shifts will be required.

***Why is it important***

In relation to technological and behavioural change the following risks were identified:

* Changes in water quality and supply due to hydromorphological pressures including hydropower as RES.

The following opportunities regarding societal change and technological development were also identified:

* Changes in diet and food production (e.g. reduction of meat and animal products consumption (e.g. uptake of more sustainable agriculture practices) as well as lifestyle (e.g. ways of travelling, commuting) to tackle consequences of climate change.
* Development of RES and technologies, and increased energy and resource efficiency prompted by the need of Slovenia to become less economically and energy dependent.

***How might Slovenia respond?***

Slovenia has a variety of policies and strategies aiming to encourage positive behavioural change towards sustainable development, food and energy production, and use of resources, driven by technological innovation and transition to circular economy. All these ideas are also strongly reflected in the objectives of Slovenian Development Strategy 2030:

* “Economic stability” which is the 5th SDS goal, is to be achieved by supporting sustainable development, innovation and green growth to diminish the development gap between Slovenia and other countries.
* The 6th goal “Competitive and socially responsible corporate and research sector” is looking to put research and innovation towards green technologies in the focus of socially and environmentally responsible development polices, enable the environment for creating digital trends, and encourage creativity and thereby strengthening the participation of science and art.
* According to the Strategy goal 8 “Low carbon-circular economy” is a priority development objective of the entire national economy aiming to achieve decoupling of economic growth and resources use, driven by research, technology, innovations and education leading to change in consumption patterns.
* The goal 9 “Sustainable resource management” is striving towards ecosystem management of natural resources of strategic national importance (e.g. high quality food and water) in order to increase countries resilience and independency.

The move to technological development and behavioural change in Slovenia is also strongly supported by EU as well as international SDGs, in particular SDG 7 (affordable and clean energy), SDG 9 (industry, innovation, and infrastructure), SDG 11 (sustainable cities and communities), SDG 12 (responsible production and consumption) and SDG 13 (climate action).

Gaps that have been noted in relation to identified risks and opportunities are:

* Poor acceptance of RES facilities by local inhabitants.
* Positive behavioural change in transport is hindered by underdeveloped public transport infrastructure.
* There is a lack of research, evidence and communication on the environmental impacts of Slovenian agriculture, especially animal farming and meet production, and benefits of low meet or meet free diets.

These gaps could be addressed by:

* Looking at good RES facilities placement practices from other countries and increasing awareness about health, economic and other benefits of RES, not just environmental.
* Investing in and developing modern transport infrastructure supporting elements like intermodal public transport, bike and care sharing schemes, and making a better use eco funds (e.g. EBRD and national taxation).
* Striving for better coordination across department e.g. education (school meals, curriculum), agriculture (farming practices), health (benefits of reduced meat), and environment, and taping into youth movements around less meat heavy or meet free diets and lifestyle.

## Slovenia as a high-value tourism destination

The tourism sector could increasingly contribute to Slovenia’s economic growth by mainstreaming high value – low impact tourism practices that reduce environmental burden and resulting from gained advantage on regional/global scale due to projected better climate conditions than regions in the south.

***What is happening?***

This key message is linked to the implications “*Increasing environmental burden*” (*related to GMT 7: Intensified global competition for resources*) and “*Extreme weather events and Infrastructure damage*” (*related to GMT 9: Increasingly severe consequences of climate change*).

Since 2006 Slovenia’s tourism sector has experienced a steady growth as 2016 recorded record numbers of tourist arrivals to date. The industry had a 12.0% (3,032,256) increase in international tourist arrivals compared to 2015, placing it above the European average. As presented in Figure 2.10.1, the total number tourist arrivals (including domestic) and their share corresponds to 4,317,504 arrivals and 11,179,879 overnight stays, which is 9.9% and 8.1% more than in 2015 respectively[[39]](#footnote-39). The foreign inflow from tourism in 2016 reached [[40]](#footnote-40)2.35 billion euros.



**Figure 2.10.1. Total number of tourist arrivals and overnight stays in Slovenia 2006-2016.** Source: Slovenian Tourist Board

Located in Central Europe and bordering the Mediterranean climate change pose serious and diverse threats to tourism industry in Slovenia considering the variety of experiences it can offer in a small geographical area. The recently approved Sustainable Development Strategy for Slovenian Tourism has identified four distinct macro destinations: Mediterranean Slovenia, Alpine Slovenia, Thermal Pannonian Slovenia and Central Slovenia & Ljubljana illustrate the diversity of destinations where extreme weather events could have potentially significant costs. However the latest assessment report (AR5) from the International Panel on Climate Change (IPCC, 2013) highlights the Mediterranean as one of the most vulnerable regions in the world to the impacts of global warming with central Europe being less affected by climate induced heatwaves and droughts. In Mediterranean the increase in average surface temperatures is projected in the range of 2.2 and 5.1 °C for the period 2080-2100. For the same period, the report notes that estimated precipitation decline in the southern regions of Mediterranean might vary between -4% and -27%.

***Why is it important?***

As tourism sector grows the environmental pressures are expected to intensify from:

* Increased demand for water, in particular for drinking and sanitation could put additional pressure on existing groundwater management strategies. Tourism and leisure activities can be a significant factor in water consumption at the national level. According to Gössling et al. (2012) water consumption rates are in the range of 84-2,000 litres per tourist per day, and up to 3,423 litres per bedroom per day.
* Changing global consumption patterns and the related demand for goods and services.
* Urbanisation, especially hospitality infrastructure (e.g. hotels) to meet the growing demand. This further leads to land use change due to construction of infrastructure (including transport). The urbanisation of coastal land is considered to be a particular issue for Slovenia[[41]](#footnote-41) and the potential for pollution of coastal waters (e.g. due to increased effluent discharge).

The opportunities for Slovenia’s tourism industry include:

* Competitive advantage for tourism sector as in global terms Slovenia is less impacted by heatwaves and droughts than other regions in the south (e.g. Greece, Spain etc.) leading to tourists choosing more pleasant conditions especially over summer period.
* Opportunities for development of SMEs arising from spa (thermal water) tourism that could benefit local communities in eastern and central Slovenia.

***How might Slovenia respond?***

The Strategy for Sustainable Development of Slovenian Tourism for 2017–2021 defines key policies for reorganisation of macroregions and tourism products, institutional and legal framework, accommodation, development of tourism infrastructure, human resources, spatial planning, natural and cultural assets, and small and medium-sized companies. The main ambition for the strategy is for Slovenia to become a green, active and healthy destination offering five-star experiences. Simultaneously it foresees to achieve the following tourism development objectives that could further add to the environmental pressures from increasing consumption of resources, urbanisation and pollution:

* Increase in currency inflow from 2.35 billion EUR[[42]](#footnote-42) in 2016 to 3.7 - 4 billion EUR by 2021.
* Increase in tourist arrivals from 4.3 million in 2016 to 5-5.5 million by 2021.
* Increase in tourist overnight stays from 11.1 million overnights in 2016 to 16-18 million overnights by 2021.
* Average length of stay 3.1-3.4 days by 2021.
* Increase in new tourist rooms by 18,000 to 22,000, of which 8,500 renovated and 6,500 new rooms in the hotel sector.

For Slovenia’s tourism sector to remain attractive and competitive both on a regional and global level it has to be based on pristine environment ensuring that short term economic gains from growing tourist arrivals do not compromise the natural resources that attract visitors in the first place.

In order to ensure sustainable tourism in Slovenia the new tourism strategy does recognise the need to introduce measures to define specific areas (destinations) for the development of tourism, establish a sustainable model for visitor management and draft a national plan for green (sustainable) tourism. However for Slovenia to maintain its reputation as a green tourism destination it might be necessary to limit the number of tourist arrivals and focus on high value tourism to ensure actual quality of tourist experience with the ‘green’ promise it promotes.

## Joined-up resource management that recognises the value of Slovenia’s natural capital

Slovenia has an opportunity to improve its resource management (especially water and forest) to preserve its pristine environment while ensuring abundant resources across sectors (e.g. water for agriculture).

***What is happening?***

This key message is linked to the implications “*Increasing environmental burden*” and “pressure on water quality and supply” (both *related to GMT 7: Intensified global competition for resources*).

Generally there is a trade-off between sustained growth of national economy and growing demand for natural resources as the buying of products and services that fuel economic growth requires more resources to meet the growing demand. International companies in natural resource industries can also add to the pressure on natural capital by seeking better access to resources in the form of substantially increased FDI in resource-rich countries. According to Invest Slovenia[[43]](#footnote-43), forming part of the Slovenian Public Agency for Entrepreneurship, Internationalisation Foreign Investment and Technology, Slovenia is prioritising on building a strong business-friendly environment as a precondition to capturing growth-fuelling FDI investments. The institution recognises the importance of FDI to Slovenia’s economic growth and notably, the FDI flows in the country have continued to grow last 12 months since early 2017[[44]](#footnote-44).

In the light of the international trade agreements like NAFTA[[45]](#footnote-45) and CETA[[46]](#footnote-46)and increased FDI in resource extraction might increase privatisation of abundant high quality natural resources in Slovenia. As discussed extraction of abundant high quality water resources in Slovenia might be an interesting long term investment for foreign corporations, which could possibly be supported by the country’s political interest for economic prosperity. This could lead to increased pressures on the country for privatisation of natural resources.

Water is a primary resource across industry, energy and agriculture sectors. The intensification of water use has been observed since 2002 and peaking in 2014 with 125,577,489 thousand/m3 used. In the period from 2002 – 2016 the use of water in industry has grown by 35.3%.Although water resources in Slovenia are considered abundant and of high quality, these trends indicate a necessity for improved water management to ensure long term water availability in key sectors like agriculture.

Forests in Slovenia form an important role in the landscape being rich in diversity and alleviating the impact of natural disasters and human pollution. According to Ministry of Agriculture, Forestry and Food, 74% of forests in Slovenia are private property, while 26% are public (owned by the state or communes). The Ministry has recognised that the large fragmentation of forest property and the number of private forest owners and co-owners (314,000 individual forest owners), is presenting a serious obstacle to ensure professional maintenance of private forests[[47]](#footnote-47).

Although the area covered by forests in Slovenia has been constantly increasing since the beginning of 20th century the trend is not equally distributed across Slovenia. The forest cover is mostly increasing in areas where there is much forest, while areas with intensive agriculture and suburban areas are facing strong pressures which gradually lead to clearance of already scarce remains of forests (Ministry of Agriculture, Forestry and Food, 2007).

***Why is it important?***

Ensuring sustainable management of natural resources in Slovenia in a more joined-up process would have a lasting economic, social and environmental benefits. This approach could ensure that those that manage natural resources, those that benefit from good quality, reliable natural resources and those that have the potential to have an impact on natural resources, are part of the agenda setting and decision making process. One of the opportunities related to the challenges to ensure joined up resource management is to ensure harmonisation between the objectives across sectors.

***How might Slovenia respond?***

“Sustainable and efficient resource management” (9th goal) is the main goal in the Slovenian Development Strategy 2030, which, if realised, would have a positive effect on natural capital. The main aim of this goal is to increase the quality of natural resources by implementing ecosystem-based management of these resources. Other objectives include efficient management of surface and ground water, and soil, sustainable forest management, maintaining high levels of biodiversity, and sustainable agriculture.

# Challenges for meeting environmental goals in Slovenia

## Risks and opportunities for the achievement of selected Slovenian Development Strategy 2030 goals

This sub-section provides and overview assessment of the extent to which risks and opportunities associated with GMT implications may make it harder for Slovenia to achieve Slovenian Development Strategy 2030 goals considered relevant to the scope of this study.

The four selected goals assessed here:

* 1st Goal: Healthy and active life
* 5th Goal: Economic stability
* 8th Goal: Low-carbon circular economy
* 9th Goal: Sustainable and efficient resource management

Drawing on the knowledge of a range of national experts in environmental, agriculture and resource related research, planning and policy, together with the collection and review of available evidence (literature, indicators) enabled the project to identify and prioritise risks and opportunities associated with the implications of GMTs considered in this study.

Considering the risks and opportunities presented in Tables 3.1.1 and 3.1.2 a qualitative assessment of the likely impact of the risks and opportunities on the four selected Slovenian Development Goals was carried out. This assessment was performed by looking at each risk and opportunity in the context of the targets of each particular goal, and considering the evidence collected and presented in the key messages (Section 2) an judgement based assessment was made of the impact it will have on the ability of Slovenia to achieve each goal using the following:

**↑** risk / opportunity is judged as being likely to facilitate achieving the development goal in Slovenia

**→** risk / opportunity is judged as being unlikely to have a significant impact on the achievement of the development goal in Slovenia

**↓** risk / opportunity is judged as likely to act as a barrier to achieving the development goal in Slovenia

The outcomes of this assessment are quite diverse, but illustrate some of the key ways in which Slovenia’s environment and policy is being and will be affected by global megatrends. As might be expected, the risks associated with GMTs are assessed as predominantly likely to act as a barrier to the achievement of meeting the Slovenia Development Strategy goals. Some reflection on the ways in which GMT risks may influence the achievement of the development goals include:

Changes in water quality and supply due to hydromorphological pressures are likely to obstruct the achievement of all four selected development goals. For example an increased number of hydropower plants and other physical alterations of Slovenia’s water bodies modifying their shores, water level and flow could hinder the achievement of the target of 9th Goal (Sustainable and efficient resource management) on *effectively managing surface and groundwater, coastal and maritime resources, and achieving their good status*.

Multiple risks related to the energy domain were discussed during the workshops and are present among those prioritised. Assessing their impact on the selected development goals, two of the “energy” risks in particular are likely to interfere with Slovenia’s ability to achieve the development goals: Risks to energy supply from extreme weather events and infrastructure damage and risk of energy poverty**.** Both of these risks are likely to put increased pressure on one the targets of the 5th Goal (Economic stability) *designing sustainable solutions in order to maintain balanced public finances and sustainably reduce public debt.* High energy import dependence and increasing damages to existing energy infrastructure from extreme weather events would put growing pressure on public spending to disproportionately invest in energy sector possibly leaving other sectors underinvested.

The success of both “Healthy and active life” (1st Goal) and “Economic stability” (5th Goal) is likely to be hindered by most of the prioritised risks. Air pollution from the increasing use of transport combined with potentially growing pressures on sustainable, affordable and secure energy and water supply as well as climate change risks are issues that would all need to be considered when looking at policies, strategies and plans to achieve “Healthy and active life” in Slovenia. Most of these issues would also hinder the achievement of the “Economic stability” goal. With the additional reflection that energy and resource import dependence could destabilise key economic sectors and prevent this to goal to be achieved.

Notably not all GMT risks were judged to be in conflict with the development goals. It was considered that the risk of energy and resource supply due to import dependence coupled with energy poverty might motivate policy and decision makers to apply new technologies, ideas and practices to address these existing issues. Assuming that these solutions could include sustainable and environmentally responsible actions this would help to provide conditions for the transition to low-carbon circular economy (8th Goal).

**Table 3.1.1: Impact of prioritised GMT risks on selected Slovenian Development Goals 2030**

| **Prioritised risks** | **1st Goal: Healthy and active life**  | **5th Goal: Economic stability** | **8th Goal: Low-carbon circular economy** | **9th Goal: Sustainable and efficient resource management** |
| --- | --- | --- | --- | --- |
| **Air pollution affecting health** (mainly due to transport and biomass burning for energy) | **↓** | **→** | **→** | **→** |
| **Changes in water quality and supply due to hydromorphological pressures** (hydropower, irrigation, flood defences etc.) | **↓** | **↓** | **↓** | **↓** |
| **Risks to energy and resources supply due to import dependence** (e.g. if one country has a monopoly over a resource that an industry in Slovenia depends on, the whole industry can collapse) | **→** | **↓** | **↑** | **↓** |
| **Risk of energy poverty** (related to high energy import dependence and volatility of energy prices) | **↓** | **↓** | **↑** | **↓** |
| **Risks to energy supply from extreme weather events and infrastructure damage** | **↓** | **↓** | **↓** | **→** |
| **Climate change global risk** (leading to irrigation vulnerability, use of pesticides, decrease in yields) | **↓** | **↓** | **↓** | **→** |

The assessment of opportunities from GMT implications provides a more positive outlook as none were judged to act as a barrier to the achievement of the selected development goals. Some key reflections on impacts on these goals and which of those are likely to be most straightforward to achieve include:

The two opportunities: prioritising sustainable water and forest management and expanding local & organic food production would likely facilitate achieving all of the selected development goals. For example, the benefits from healthy natural environment (e.g. prioritising clean and accessible water, sustainably managed forests) could help provide health benefits and wellbeing of local populations (1st Goal). Sustainably managed water and forest systems could also align with the aim of inclusive and green economic growth for Slovenia that will ensure economic stability (5th Goal). Additionally, forest management practices that ensure trees are sustainably harvested and replaced could provide a renewable source for circular economy (8th Goal) as timber uses low energy processes, is durable and generates little waste that cannot be recycled or used as a source of renewable fuel. Finally, prioritising sustainable water and forest management would directly reflect the targets of the 9th development goal.

Assuming the identified opportunities are realised, they would all help Slovenia to successfully meet the various targets outlined in the 9th development goal. In particular the target on *sustainable soil management and preservation of soil ecosystem services, preventing further soil degradation and rehabilitating degraded soil* could be achieved through local & organic food production. Organic agriculture practices encourage soil fauna and flora, improve soil formation and structure in turn increasing the nutrient and energy cycling. Soil management techniques applied in organic agriculture also play an important role in soil erosion control.

**Table 3.1.2. Impact of prioritised GMT opportunities on selected Slovenian Development Goals 2030**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Prioritised opportunities** | **1st Goal: Healthy and active life**  | **5th Goal: Economic stability** | **8th Goal: Low-carbon circular economy** | **9th Goal: Sustainable and efficient resource management** |
| **Linking environmental and health risks for communication and policy responses**(i.e. the risks to health of environmental issues) | **↑** | **→** | **→** | **↑** |
| **Changes in diet and lifestyle** (e.g. reduced meat and animal products consumption) | **↑** | **→** | **↑** | **↑** |
| **Renewable Energy Sources and technologies development** (prompted by the need of Slovenia to become less economically and energy dependent) | **→** | **↑** | **↑** | **↑** |
| **Behavioural and technological change** in relation to energy consumption and efficiency | **→** | **↑** | **↑** | **↑** |
| **Prioritise water and forest management** | **↑** | **↑** | **↑** | **↑** |
| **Local & organic food production** (example of a problem: Slovenia high quality beef and import low quality foods) | **↑** | **↑** | **↑** | **↑** |

## Trends and outlooks for selected UN SDGs in Slovenia based on Key Messages from this GMT study

This sub-sections provides an overview of current trends and outlooks related to the achievement of UN SDGs in Slovenia. The assessment is based on the evidence presented in the key messages (Chapter 2) and collected through the two expert workshops and associated research. The scope of the study means that the evidence base only supports an assessment of selected SDGs, and those considered relevant to the study are:

SDG 2: End hunger, achieve food security and improved nutrition and promote sustainable agriculture.

SDG 3: Ensure healthy lives and promote well-being for all at all ages.

SDG 7: Ensure access to affordable, reliable, sustainable and modern energy for all.

SDG 11: Make cities and human settlements inclusive, safe, resilient and sustainable.

SDG 12: Ensure sustainable consumption and production patterns.

SDG 13: Take urgent action to combat climate change and its impacts.

SDG 14: Conserve and sustainably use the oceans, seas and marine resources for sustainable development.

SDG 15: Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss.

The assessment of current trends and outlook to 2030 (see Table 3.2.1) was completed by initially identifying the relevant key messages for each of the selected UN SDGs. Following the listing of relevant key messages, each was analysed in the context of the targets presented for the selected UN SDGs. Considering the relevant GMT implication, identified evidence and risks and opportunities embedded in each of the key messages the assessment was completed using the following criteria to present an indicative assessment of trends:

|  |  |
| --- | --- |
|  | Improving trends dominate |
|  | Trends show mixed picture |
|  | Deteriorating trends dominate |

The assessment assumed a business as usual trajectory. It is noted that if existing national strategies (such as the Slovenia Development Strategy) were to be implemented in full and all goals and targets achieved, then the outlook would be generally positive (improving). However the evidence collected and the perspectives reflected through this study suggest that many challenges remain for Slovenia to achieve such strategic goals.

It is also recognised that the evidence base used in this assessment is limited to that collated through the study on GMT implications in Slovenia. The assessment should therefore be seen as indicative and selective rather than comprehensive, and is intended to give an overview of the potential ‘direction of travel’ in relation to selected SDGs in Slovenia.

The outcome of analysis presented in Table 3.2.1 indicates the type of trends (improving/mixed/deteriorating) that are considered to be dominant in Slovenia in the context of a particular SDG. This could allow policy and decision makers to recognise the likely degree of difficulty in achieving the selected UN SDGs in Slovenia.

While Slovenia’s policies largely have delivered many improvements to successfully reach the UN SDGs by 2030, substantial challenges remain, for example:

Slovenia’s settlements are not yet resilient and sustainable in line with the SDG 11. The country has large number of dispersed settlements with half of the population living on the countryside. The process of suburbanization has been occurring with higher intensity, additionally supported by the construction of new infrastructure systems like highways and road. The risk of continuous suburbanisation trend could increase the dispersion of small settlements across the whole region and in areas which should be protected (e.g. natural parks or drinking water supply zones) which has negative effects on the spatial development and the environment.

The available national evidence indicates that the high quality of water resources and rich biodiversity means that Slovenia is well positioned to meet the targets of SDGs 14 (Life below water) and 15 (Life on land) by 2030. However if the various risks identified in this study (e.g. hydromorphological pressures, poor harmonisation of objectives on resource use between sectors etc.) remain disregarded, this would deteriorate Slovenia’s pristine environment and potentially jeopardise the achievement of both SDGs.

**Table 3.2.1. An indicative summary of existing trends from GMT implications**

| **UN SDGs** | **Current trend**  | **Outlook to 2030** | **Relevant to Key message**  |
| --- | --- | --- | --- |
| SDG 2:End hunger, achieve food security and improved nutrition and promote sustainable agriculture |  |  | Emerging challenges for Slovenia’s agricultural sector and the security of food productionSlovenia’s relationship with Europe and the world: trade and resource dependencePressure on Slovenia’s limited land resourceEconomic development a challenge for Slovenia’s pristine environmentAs traditional lifestyles evolve, many people may become vulnerable |
| SDG 3: Ensure healthy lives and promote well-being for all at all ages |  |  | Transport as a key driver for environmental change and health related risksAs traditional lifestyles evolve, many people may become vulnerable |
| SDG 7: Ensure access to affordable, reliable, sustainable and modern energy for all |  |  | Slovenia’s relationship with Europe and the world: trade and resource dependenceTechnological and behavioural change may drive Slovenia towards more sustainable and secure future |
| SDG 11: Make cities and human settlements inclusive, safe, resilient and sustainable |  |  | Pressure on Slovenia’s limited land resource |
|  SDG 12: Ensure sustainable consumption and production patterns |  |  | Pressure on Slovenia’s limited land resourceEconomic development a challenge for Slovenia’s pristine environmentRecognising trade-offs and setting common sectoral objectives can help Slovenia to a more sustainable futureTechnological and behavioural change may drive Slovenia towards more sustainable and secure futureJoined-up resource management that recognises the value of Slovenia’s natural capital |
| SDG 13: Take urgent action to combat climate change and its impacts |  |  | Emerging challenges for Slovenia’s agricultural sector and the security of food productionSlovenia as a high-value tourism destination |
| SDG 14: Conserve and sustainably use the oceans, seas and marine resources for sustainable development |  |  | Economic development a challenge for Slovenia’s pristine environmentTechnological and behavioural change may drive Slovenia towards more sustainable and secure futureSlovenia as a high-value tourism destinationJoined-up resource management that recognises the value of Slovenia’s natural capital |
| SDG 15: Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss |  |  | Emerging challenges for Slovenia’s agricultural sector and the security of food productionPressure on Slovenia’s limited land resourceTransport as a key driver for environmental change and health related risksEconomic development a challenge for Slovenia’s pristine environmentRecognising trade-offs and setting common sectoral objectives can help Slovenia to a more sustainable futureTechnological and behavioural change may drive Slovenia towards more sustainable and secure futureSlovenia as a high-value tourism destinationJoined-up resource management that recognises the value of Slovenia’s natural capital |

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Abbreviations

To be completed

CEP – Collingwood Environmental Planning

EEA – European Environment Agency
GMT –Global Megatrend

Mapping Europe's environmental future - process flow chart

The process of adapting the method tool kit was carried out by following the steps presented in table below in a sequential manner.

|  |  |
| --- | --- |
|  | In Task 1 (Step 1), the project focussed on two GMTs at the request of the Slovenian Ministry of Environmental and Spatial Planning, GMT 7: Intensified global competition for resources and GMT 9: Increasingly severe consequences of climate change, as they were felt to be most relevant to and likely to have strongest effects on the state of environment in Slovenia. The collation and review of national indicators related to GMT 7 and GMT 9, was completed focusing on two thematic clusters: ecosystem vulnerability and energy stability which were agreed based on discussions between the project team, the Slovenian National Environment Agency and the Ministry of Environment and Spatial Planning, with the aim of enabling a focused discourse at the scoping workshop. |
| In Task 2 (Step 2) the consultant team collected and reviewed the background materials followed by a scoping workshop in Ljubljana - prepared and facilitated by the project team. Following the workshop a report on potential implications of GMTs 7 and 9 on the state of the environment in Slovenia was prepared. |
| For 6 priority GMT implications selected at the scoping workshop in Task 3 (Step 3) desk based research was completed and evidence requested from experts. This evidence was compiled into factsheets on each implication. |
| The key activity in Task 4 (Step 4) was a workshop on risks, opportunities and responses related to each priority GMT implication using the evidence collected in Step 3 as a basis for assessment of risks and opportunities. |
| In Task 5 (Step 5) all outcomes of the study were brought together in a final report outlining the method used, summarising the outputs and including key messages and challenges for meeting Slovenia’s environmental goals.  |

The two workshops in Step 2 and Step 4 comprise the most significant aspects of this methodology by engaging with national experts and generating outcomes. Firstly, a scoping workshop (Step 2) was held in November 2017 in Ljubljana to discuss the potential implications of global megatrends for the state of environment in Slovenia. The main objectives of the workshop were to:

* Discuss in an open manner **how the selected megatrends**, as described by the EEA, **might impact Slovenia’s environment**, with a particular focus on ecosystem vulnerability and energy stability.
* Provide a space for **experts to share their knowledge and expertise**.
* **Generate workshop outcomes** which will serve as the first step in a process of analysing the impacts of GMTs on the environment of Slovenia and national environmental goals.

In total 29 specific potential GMT implications for ecosystem vulnerability and energy stability thematic clusters were identified, including: increasing demand on natural resources consequently increasing environmental burden; direct and indirect pressures on biodiversity and ecosystems for example due to land-use changes, water quality and supply; import and economic dependency with risks to energy and food supply and, climate change impacts, in particular floods and droughts, which already afflict Slovenia’s agriculture and soil quality and are expected to become more frequent and severe.

The complete list of identified potential implications for the state of environment in Slovenia, were further explored in an exercise where participants were given the opportunity to select from this list those implications they consider most important, using a sticky-dot ‘voting’ process. Following this exercise the facilitators selected the top six highest voted implications from each GMT - 12 implications in total.

Following a qualitative scoping assessment of each of the 12 implications’ likelihood, significance and expected timeframe, 6 implications were selected by participants as being of most importance for further consideration.

The key workshop outcomes were:

* A long-list of potential implications of global megatrends for the state of environment in Slovenia, based on expert judgement
* Causal chain diagrams exploring the logic of how slected GMTs drive changes in Slovenia leading to the implications identified by experts
* An initial assessment of the potential key implications, considering likelihood, extent and time-frames

After the scoping workshop, national evidence was collated and reviewed for all priority implications and implication factsheets developed (Step 3) for each setting out: the title of the implication; short implication description; summary of identified evidence / information about how the implication may be having effects / have effects in the region; overview of existing policies and strategies that are relevant to the implication; overview of any response needs and gaps / vulnerabilities.

In preparing the implication factsheets the implications were ‘clustered’ in three groups: environmental pressures related; resource and economy related; and, climate related.

A second expert workshop was held (Step 4) on April 2018 in Ljubljana to discuss risks and opportunities from Global Megatrend (GMT) implications for the state of environment in Slovenia, as well as response needs and gaps. The main objectives of the workshop were to:

* To provide an opportunity to **reflect on the evidence** on whether or not GMTs will have implications for the state of environment in Slovenia, and when these implications may occur;
* To identify the **risks and opportunities posed by the GMTs** for the state of environment in Slovenia in the short, medium and long terms;
* To assess the **likelihood and magnitude of these risks and opportunities** in Slovenia: building on the initial scoping assessment completed in the scoping workshop and using the evidence collected through desk based research and discussion with experts (Linking implications to national evidence). This evidence is presented in the workshop background note;
* To consider the extent to which **current responses and strategic planning in Slovenia is “fit for the long-term”, and what gaps** there may be with regard to managing risks and maximising opportunities.

During the workshop the identified national evidence related to each of the six selected implications, was discussed by experts, and through these discussions potential risks and opportunities for Slovenia’s environment and environmental policy were identified. In total the experts noted 21 specific risks and 18 opportunities, which were then assessed using criteria related to the likelihood (of the risk or opportunity occurring) and magnitude (of the risk or opportunity should it occur).

Due to limited time available during the workshop, experts were invited to agree on one risk and one opportunity from each implication to discuss in terms of gaps and needs in terms of policy and other responses (e.g. practice, research/data etc.). Experts considered what existing responses are present in Slovenia when looking at a particular risk or opportunity and what shortcomings are apparent in the existing responses.

The key workshop outcomes were:

* A long-list of potential implications of global megatrends for the state of environment in Slovenia, based on expert judgement;
* Causal chain diagrams exploring the logic of how slected GMTs drive changes in Slovenia leading to the implications identified by experts;
* An initial assessment of the potential key implications, considering likelihood, extent and time-frames.

Summary of indicators used in each of the key messages

To be completed

|  |  |  |
| --- | --- | --- |
| **Key message** | **Indicator title** | **Source** |
|  |  |  |
|  |  |  |
|  |  |  |

Risks and opportunities considered for identifying key messages

| **Risks (and timeframe[[48]](#footnote-48))** | **Opportunities (and timeframe)** |
| --- | --- |
| **Environmental pressures thematic cluster of implications** |  |  |  |  |
| **Implication: Increasing environmental burden**  |
| **Increase waste and waste-water production** and its impact on the natural environment | Linking environmental and health risks (i.e. the risks to health of environmental issues) for communication and policy responses |
| **Air pollution affecting health** (mainly due to transport and biomass burning for energy) | Development of new products and services with lower environmental impact / related to R&D |
| **Poor harmonisation between the objectives of various sectors** (including insufficient consideration of external costs in pricing) | Taking green tourism seriously, e.g. focussing on low-impact high value tourism |
| **Loss of long-term value of natural capital**, and risk of green washing | Improved harmonisation between the objectives across sectors |
| **Implication: Pressure on water quality and supply** |
| **Areas with high fertiliser run-off** | Better management of rainwater (harvesting etc) |
| **Decreasing level of geothermal water in some areas** (due to over-extraction) | Improved management of water in agricultural sector (links also to changes in the systems of agricultural subsidies) |
| **Changes due to hydromorphological pressures** | Changes in diet and lifestyle (e.g. reduced meat consumption) |
| **Resource and economy cluster of implications** |
| **Implication: Economic and energy import dependence** |
| **Risk of energy and resources supply due to import dependence** (e.g. if one country has a monopoly over a resource that an industry in Slovenia depends on ,the whole industry can collapse) | **RES and technologies development** (Prompted by the need of Slovenia to become less economically and energy dependent. Perhaps we will have no other resources thus the development of RES will be faster and investments in technological development will increase) |
| **Risk of energy and resources supply due to political tensions** (e.g. 100% gas import, mainly from Russia) | **Reduced energy consumption and increased energy efficiency due to increased behavioural and technological change** (e.g. behavioural: active mobility and use of public transport, waste reduction and recycling; technological: use and implementation of energy efficient technologies in buildings) |
| **Environmental risk related to increased local production in Slovenia** (increased production is related for example to economic growth) |  |
| **Risks related to transition to low carbon economy** (e.g., slow restructuring processes possibly resulting in job losses, collapse of “undesired” industries, energy deficits etc.)  |  |
| **Risk of energy poverty** (Related to high energy import dependence and no control over volatility of energy prices. The energy prices need to be looked at in relation to individual/ household incomes) |  |
| **Implication: Increased privatisation of natural resources** **\***As explained by the experts, water in Slovenia at the moment can’t be privatised, as it is protected by the Constitution. Therefore, the experts stated they cannot consider the implication *Increased privatisation of natural resources* in a comprehensive manner. Thus, the potential risks and opportunities where considered hypothetically, reflecting on potential privatisation of natural resources in Slovenia in the future. An opinion was raised that that although water resources are currently protected by Constitution, this could potentially change however the experts feel this scenario is highly unlikely. |
| **Higher water prices** | **Increased profit from foreign investments** (from selling natural resources e.g. water to private ownership) |
| **Loss of the countries serenity over the water resources** (subsequently catering a weaker position of the country in international policy)  | **Opportunities for development of SMEs** (arising from awarded concessions: for example establishment of businesses which the water for drinking, opportunities for development of SMEs arising from (thermal water) spa tourism) |
| **Risk of water supply due to private ownership of the resources** |  |
| **Climate cluster of implications** |
| **Implication: Extreme events and infrastructure damage** |
| **Droughts** (e.g. for insurance policy as droughts are not factored in) | **Prioritised resource management** (water and forest – well managed forests improve resilience to extreme weather events) |
| **Agricultural management and food production** (disruption of food supply / yields) | **Urbanisation development**  |
| **Water management / quality**  | **Competitive advantage for sectors such as tourism as in global terms Slovenia is less impacted by these events than other regions** (e.g. Greece, Spain etc.) |
| **Vulnerability of different social groups** (disrupted social systems) |  |
| **Lack of spatial planning** |  |
| **Energy supply** (system is not resilient to such shocks as heat waves) |  |
| **Implication: Food security** |
| **Climate change global risks leading to new plant diseases, higher costs in agricultural production, irrigation vulnerability, use of pesticides, decrease in yields** | **Better use of water sources**  |
| **Abandonment of agricultural land → decrease of agricultural land** (due to urbanisation, climate change, land abandonment) | **Local and organic food production** (local food more resilient to climate change + less risks) |
| **Decreased self-sufficiency in food production / quality of food** (food preferences for consumers, eco-food, local food)  | **New knowledge / technology** (new crops; increase of organic matter in soil) |
|  | **Increase in yields from longer vegetation seasons** (use of higher altitudes for food production)  |

1. <https://www.eionet.europa.eu/> [↑](#footnote-ref-1)
2. <https://www.eea.europa.eu/publications/mapping-europes-environmental-future-understanding> [↑](#footnote-ref-2)
3. See: <http://www.eea.europa.eu/soer#tab-global-megatrends> [↑](#footnote-ref-3)
4. Short term (to 2020); medium term (2020–2030); long term (2030–2050) [↑](#footnote-ref-4)
5. An output from the Drought Management Centre for South-eastern Europe project in the framework of the Transnational Cooperation Programme [↑](#footnote-ref-5)
6. <http://www.dmcsee.org/uploads/file/427_dmcsee_bulletin_august2017.pdf> [↑](#footnote-ref-6)
7. <https://ec.europa.eu/jrc/sites/jrcsh/files/jrc-mars-bulletin-vol25-no9.pdf> [↑](#footnote-ref-7)
8. <http://www.vlada.si/en/media_room/government_press_releases/press_release/article/36th_government_session_the_first_report_on_the_floods_that_occurred_in_slovenia_between_4_and_7_no/> [↑](#footnote-ref-8)
9. <http://forecast.weather.gov/glossary.php?word=GUSTNADO> [↑](#footnote-ref-9)
10. <http://www.eswd.eu/cgi-bin/eswd.cgi> [↑](#footnote-ref-10)
11. TEŠ- Thermal Power Plant Šoštanj [↑](#footnote-ref-11)
12. [http://ec.europa.eu/eurostat/statistics-explained/index.php/File:Real\_GDP\_growth,\_2006-2016\_(%25\_change\_compared\_with\_the\_previous\_year;\_%25\_per\_annum)\_YB17.png](http://ec.europa.eu/eurostat/statistics-explained/index.php/File%3AReal_GDP_growth%2C_2006-2016_%28%25_change_compared_with_the_previous_year;_%25_per_annum)_YB17.png) [↑](#footnote-ref-12)
13. <http://www.stat.si/StatWeb/en/News/Index/7227> [↑](#footnote-ref-13)
14. <https://www.investslovenia.org/business-environment/fdi-in-slovenia/> [↑](#footnote-ref-14)
15. <http://www.stat.si/StatWeb/en/News/Index/6672> [↑](#footnote-ref-15)
16. <http://www.stat.si/StatWeb/en/News/Index/7001> [↑](#footnote-ref-16)
17. <http://pxweb.stat.si/pxweb/Dialog/Saveshow.asp> [↑](#footnote-ref-17)
18. <http://www.stat.si/StatWeb/News/Index/6697> [↑](#footnote-ref-18)
19. <http://www.arso.gov.si/en/soer/freshwater.html> [↑](#footnote-ref-19)
20. <http://kazalci.arso.gov.si/print?ind_id=756&lang_id=94> [↑](#footnote-ref-20)
21. [↑](#footnote-ref-21)
22. <http://www.arso.gov.si/en/soer/air_pollution.html> [↑](#footnote-ref-22)
23. <http://www.rtvslo.si/news-in-english/ice-storms-are-not-rare-in-slovenia/330696> [↑](#footnote-ref-23)
24. <http://kazalci.arso.gov.si/print?ind_id=756&lang_id=94> [↑](#footnote-ref-24)
25. <http://pxweb.stat.si/pxweb/Dialog/Saveshow.asp> [↑](#footnote-ref-25)
26. <http://www.arso.gov.si/en/soer/air_pollution.html> [↑](#footnote-ref-26)
27. <http://www.stat.si/StatWeb/en/News/Index/7001> [↑](#footnote-ref-27)
28. <http://www.stat.si/StatWeb/en/News/Index/6679> [↑](#footnote-ref-28)
29. According to Pew Research Center analysis of data from the World Bank PovcalNet database – in 2011, 85% of Slovenia’s population had middle (**$10.01-20 daily**) or upper-middle($20.01-50 daily)income. [↑](#footnote-ref-29)
30. <https://data.oecd.org/gdp/real-gdp-forecast.htm> [↑](#footnote-ref-30)
31. <http://pxweb.stat.si/pxweb/Dialog/varval.asp?ma=1817902E&ti=&path=../Database/Environment/18_energy/01_18179_balance_indicators/&lang=1> [↑](#footnote-ref-31)
32. <http://www.stat.si/StatWeb/en/News/Index/7001> [↑](#footnote-ref-32)
33. <http://www.eswd.eu/cgi-bin/eswd.cgi> [↑](#footnote-ref-33)
34. <http://www.arso.gov.si/en/soer/alps.html> [↑](#footnote-ref-34)
35. <http://www.dmcsee.org/uploads/file/426_dmcsee_bulletin_july2017.pdf> [↑](#footnote-ref-35)
36. TEŠ- Thermal Power Plant Šoštanj [↑](#footnote-ref-36)
37. <http://www.stat.si/StatWeb/en/News/Index/7227> [↑](#footnote-ref-37)
38. <http://pxweb.stat.si/pxweb/Dialog/Saveshow.asp> [↑](#footnote-ref-38)
39. <https://www.slovenia.info/en/business/research-and-analysis/slovenian-tourism-in-numbers> [↑](#footnote-ref-39)
40. <http://www.sloveniatimes.com/slovenia-to-focus-on-increasing-tourism-inflows-govt-says> [↑](#footnote-ref-40)
41. <http://www.arso.gov.si/en/soer/freshwater.html> [↑](#footnote-ref-41)
42. <http://www.sloveniatimes.com/slovenia-to-focus-on-increasing-tourism-inflows-govt-says> [↑](#footnote-ref-42)
43. https://www.investslovenia.org/business-environment/fdi-in-slovenia/ [↑](#footnote-ref-43)
44. http://www.sloveniatimes.com/slovenia-s-inward-and-outward-fdi-rise [↑](#footnote-ref-44)
45. NAFTA-North American Trade Agreement [↑](#footnote-ref-45)
46. CETA- new trade agreement between EU and Canada [↑](#footnote-ref-46)
47. <http://www.mkgp.gov.si/en/areas_of_work/forestry/> [↑](#footnote-ref-47)
48. Short term (to 2020); medium term (2020–2030); long term (2030–2050) [↑](#footnote-ref-48)