Influence of global megatrends on the state of environment in Slovenia

**Workshop 2 record**

**Risks and opportunities, response needs and gaps**

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|  |  |  |  |  |

Abbreviations

CEP – Collingwood Environmental Planning

EEA – European Environment Agency   
GMT – Global Megatrend

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# Introduction

This report represents the record of a workshop held on 11th 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 workshop was undertaken as part of the Slovenian Ministry of the Environment and Spatial Planning and the Slovenian Environment Agency commissioned project ‘Influence of global megatrends on the state of environment in Slovenia’ (henceforth ‘the project’). The workshop represents the work to deliver Task 4 of the project. More information on the overall project (i.e. background and objectives) can be found in the Interim Report.

The project outcomes including the outputs of this workshop are intended to support Slovenian Ministry of the Environment and Spatial Planning and the Slovenian Environment Agency and national experts in having:

* Improved knowledge and understanding of the risks and opportunities from GMTs to Slovenia’s environment and strategic goals
* Materials and knowledge related to the risks and opportunities from GMT implications considered a priority and may need to be integrated into national responses
* Possibility to follow up with activities for example in the process of state of the environment reporting

Table 1 summarises the key details of the workshop.

Table 1 Key workshop details

|  |  |
| --- | --- |
| ***VENUE*** | Ljubljana, Slovenia: Ministry of Culture, Maistrova ulica 10 |
| ***DATE*** | 11 April 2018 |
| ***PARTICIPANTS:*** | 20 participants (See Annex 1 for full list) |
| ***CHAIR:*** | Rolands Sadauskis |
| ***FACILITATORS:*** | Collingwood Environmental Planning (CEP) ,European Environment Agency (EEA) and Slovenian Environment Agency |
| ***RAPPORTEUR:*** | Collingwood Environmental Planning (CEP); |
| ***Presentations and Workshop documents:*** | Agenda, Workshop background note (including factsheets), CEP presentations,  Assessment of global megatrends (SOER 2015) <https://www.eea.europa.eu/soer-2015/global/action-download-pdf>  GMT 7 (SOER 2015)  <https://www.eea.europa.eu/soer-2015/global/competition>  GMT 9 (SOER 2015)  <https://www.eea.europa.eu/soer-2015/global/climate> |

This record provides an overview of:

* The discussions held during the workshop, including working sessions and plenary discussions (Section 2).
* The workshop participant list and workshop agenda (Annex 1 and 2).
* The completed worksheets from working sessions 1, 2 and 3(Annex 3, 4 and 6).
* A note describing the assessment criteria used to assess risks and opportunities (Annex 5)

## Workshop background and objectives

This workshop was the second and final of two expert workshops under the project, and provided an opportunity to follow-up on the discussions held in the scoping workshop November 2017 where the focus was on a scoping exercise to identify and prioritise implications of GMTs in the region with elaboration of policy relevant issues.

The objectives of the second 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.

## Participants and agenda

The workshop convened 20 experts from government institutions, academia, and private sector (e.g. insurance sector). Invited experts were chosen to represent a range of expertise that covers the thematic focus on environment in relation to resource and climate trade-offs.

Slovenian Environment Agency invited EEA representative Ms Anita Pirc Velkavrh, to join the workshop and to present background on European SOER and GMTs. The participants got a clear overview on needs for major systems (like food, mobility, energy systems) changes to enable transition, as well as the needs for new knowledge. The focus of next SOER 2020 report in the long-term outlook part of the report was presented. The info regarding the similar GMT projects in different countries was shared with the participants.

The project team was represented by 5 workshop facilitators and a representative from EEA. The full list of 26 participants and the organisations represented is included in Annex 1.

The workshop agenda is included in Annex 2.

# Workshop record

This section presents a record of each session of the workshop. The record provides a summary of the discussions and outcomes recorded from each session.

## Introduction to the working sessions and background information

Prior to the working sessions the project team presented background information and context relevant to the workshop, including an overview of the project and its’ objectives, information on activities at EEA related to GMTs, as well as the results of Workshop 1 and the desk based research carried out in preparation for Workshop 2 (separate document sent before the workshop: “GMT implications: Scoping of implications for the state of environment in Slovenia and draft implication factsheets”).

Two key presentations were given by the workshop facilitators, the first was focussed on ‘setting the scene’ for the workshop and included background provided by the EEA as well as information on the work previously undertaken under the project, and the second summarised the work completed by the project team in terms of ‘linking GMT implications to national evidence’ which formed the basis of the discussions during the workshop.

Six potential implications were identified in the scoping workshop as being potentially important for the region. Given some of the close links between implications highlighted in the Scoping Workshop, and the limitations of time for their detailed consideration, the project team merged:

* + Economic dependence and Energy import dependence
  + Extreme weather events and Infrastructure damage

Following a request from the Slovenian Environment Agency the project team also prepared a factsheet on ***Food security***.

The resulting implications for discussion in the Risks and Opportunities workshop were presented in three ‘clusters’:

* Environmental pressures cluster:
* Increasing environmental burden
* Pressure on water quality and supply
* Resources and economy cluster:
* Economic and Energy import dependence
* Increased privatisation of natural resources
* Climate cluster:
* Extreme weather events and Infrastructure damage
* Food security

## Working session 1: Identifying risks and opportunities

### Objectives and approach to the working session

The objectives of working session 1 were to:

* Consider the evidence compiled by the project team (with input from experts) and presented in ‘factsheets’ describing each implication and presenting available evidence and outlooks.
* Discuss the implications based on the evidence available, and identify specific potential risks and opportunities for the state of environment in Slovenia.
* Complete worksheets related to each implication discussed to note down identified risks and opportunities as well as the time-frame over which they are expected to occur.

The working session was run as three parallel small working groups, each discussing a thematic ‘cluster’ of implications. Each group was assigned a facilitator from the project team who help guide the discussions and encouraged the nomination of a rapporteur from the group to complete the worksheets and report back at the end of the session.

In the working session, each group was invited to consider the available evidence (as presented in each implication factsheet) and then discuss the ways in which the implication may lead to risks and opportunities for the state of environment in Slovenia. Following discussion the facilitator encouraged each group to agree on up to three risks and three opportunities related to each implication, although some groups identified and noted down more than three.

### Summary of working session 1 outcomes

The outcome of working session 1 was a completed worksheet for risks and opportunities for each implication discussed. The completed worksheets for each cluster of GMT implications are included in Annex 3.

|  |  |  |
| --- | --- | --- |
| ***Environmental pressures cluster*** | | |
| **Implications** | **Risks** | **Opportunities** |
| *Increasing environmental burden*  *(*discussed in the context of GMT 7: Intensified global competition for resources) | **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** |
| *Pressure on water quality and supply*  *(*discussed in the context of GMT 7: Intensified global competition for resources) | **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 implications cluster*** | | |
| --- | --- | --- |
| **Implications** | **Risks** | **Opportunities** |
| *Economic and Energy import dependence*  *(*discussed in the context of GMT 7: Intensified global competition for resources) | **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) |  |
| *Increased privatisation of natural resources*  *(*discussed in the context of GMT 7: Intensified global competition for resources) | **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 implications cluster*** | | |
| --- | --- | --- |
| **Implications** | **Risks** | **Opportunities** |
| *Extreme weather events and Infrastructure damage*  *(*discussed in the context of GMT 9: Increasingly severe consequences of climate change) | **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) |  |
| *Food security*  *(*discussed in the context of GMT 9: Increasingly severe consequences of climate change) | **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) |
| **Self-sufficiency in food production / quality of food** (dependency on food import, importing possibly low quality food; Export good quality meat for example, import by-products from slaughtering; the price for meat product 3-4 EUR/kg mean there is no good quality of meat in the product; Standards are not in place). On the other hand some participants didn’t agree with the second part of the statement.\* | **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) |

\*The experts from Statistical Office of Slovenia does not agree with the information on food export since it is not proved with data or other verifiable facts.

Additional key observations from the working session include:

* The number of opportunities identified by experts match the anticipated risks as groups recognised the importance of taking advantage of the expected implications from GMTs 7 & 9.
* Some of the groups recognised that a risk at the same time can be an opportunity from a particular GMT implication
* From the plenary it was noted that some of the risks and opportunities link directly or indirectly to implications discussed in other groups

Following expert feedback on the record for outcomes of working session 1, we acknowledge receiving a comment from Statistical Office of Slovenia that does not completely agree with the information reported on risks related to food security. Their opinion is that opinion included regrading food export should be removed from the record.

## Workshop session 2: Assessment of risks and opportunities

### Objectives and approach to the working session

The objectives of session 2 were to:

* Discuss each risk and opportunity noted during working session 1.
* Apply the risk and opportunity assessment approach described in the methodological toolkit to assess each risk and opportunity for likelihood and magnitude.
* Complete worksheets to record the risk and opportunity assessment outcomes and select one key risk and one key opportunity related to each implication for discussion in working session 3.

Following the same approach used in working session 1, working session 2 was run as three parallel small working groups, each discussing the same thematic ‘cluster’ of implications as in working session 1. Each group was assigned a facilitator from the project team who help guide the discussions and encouraged the nomination of a rapporteur from the group to complete the worksheets.

Before the working session the project team presented the assessment approach, including a description of the criteria to be used in the assessment (see Annex 5).

During the working session, each expert *individually* completed an assessment of each risk and each opportunity, which were then compared and discussed to agree a consensus assessment outcome. This proved an effective way of involving all experts in the assessment discussions. Each group then completed a worksheet for the assessment of risks and opportunities associated with each of their implications.

### Summary of working session 2 outcomes

The outcome of working session 2 was a completed worksheet for the assessment of risks and opportunities for each implication discussed, together with a proposal for one ‘key’ risk and one ‘key’ opportunity from each implication to be discussed further in working session 3 (highlighted in the worksheets in blue). A summary of the assessment of risks and opportunities noted by each group is included in the tables below. Where a ‘-‘ mark is included this indicates that no notes were added to the worksheet by the group. The completed worksheets for working session 2 are included in Annex 4.

***Environmental pressures cluster implications***

|  |  |  |
| --- | --- | --- |
| **Increasing environmental burden** | | |
| **Risks** | **Timeframe** | **Overall assessment** |
| **Increase waste and waste-water production and its impact on the natural environment** | - | High/Medium |
| **Air pollution affecting health (mainly due to transport and biomass burning for energy)** | - | High/Medium |
| **Poor harmonisation between the objectives of various sectors (including insufficient consideration of external costs in pricing)** | - | High |
| **Loss of long-term value of natural capital, and risk of green washing** | - | High |
| **Opportunities** | **Timeframe** | **Overall assessment** |
| **Linking environmental and health risks (i.e. the risks to health of environmental issues) for communication and policy responses** | - | High/Medium |
| **Development of new products and services with lower environmental impact / related to R&D** | - | Medium |
| **Taking green tourism seriously, e.g. focussing on low-impact high value tourism** | - | Medium |
| **Improved harmonisation between the objectives across sectors** | - | Medium |

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| **Pressure on water quality and supply** | | |
| **Risks** | **Timeframe** | **Overall assessment** |
| **Areas with high fertiliser run-off** | - | High/Medium |
| **Decreasing level of geothermal water in some areas (due to over-extraction)** | - | High/Medium |
| **Changes due to hydromorphological pressures (hydropower, irrigation, flood defences etc.)** | - | High |
| **Opportunities** | **Timeframe** | **Overall assessment** |
| **Better management of rainwater (harvesting etc.)** | - | Medium/Low |
| **Improved management of water in agricultural sector (links also to changes in the systems of agricultural subsidies)** | - | Medium |
| **Changes in diet and lifestyle (e.g. reduced meat consumption)** | - | Medium |

***Resource and economy cluster implications***

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Economic and Energy import dependence** | | | | |
| **Risks** | **Timeframe** | **Overall assessment** | | |
| **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) | short term (to 2020) | Energy | Resources /material | |
| Medium | Low | |
| medium term (2020–2030) | Medium | Medium | |
| long term (2030–2050) | Low | High/ Medium | |
| **Risk of energy and resources supply due to political tensions** (e.g. 100% gas import, mainly from Russia) | short term (to 2020) | Medium | | |
| medium term (2020–2030) |
| long term (2030–2050) |
| **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) | short term (to 2020) | Medium/Low | | |
| medium term (2020–2030) | Medium | | |
| long term (2030–2050) | Medium | | |
| **Opportunities** |  | **Overall assessment** | | |
| **RES and technologies development** (prompted by the need of Slovenia to become less economically and energy dependent)  \*Magnitude of the effect could also be negative due to risks posed by new RES (e.g. hydro power plants and risks related to biodiversity) | short term (to 2020) | Medium | | |
| medium term (2020–2030) | High/Medium | | |
| long term (2030–2050) | High | | |
| **Reduces energy consumption and increased energy efficiency** (due to increased behavioural and technological change) | short term (to 2020) | Transport | | Other (e.g. housing) |
| Low | | Medium |
| medium term (2020–2030) | Medium | | Medium |
| long term (2030–2050) | High | | Medium |

|  |  |  |  |
| --- | --- | --- | --- |
| **Increased privatisation of natural resources** | | | |
| **Risks** | **Timeframe** | **Overall assessment** | |
| **Higher water prices** | long term (2030–2050) | Low | |
| **Loss of the countries serenity over the water resources** (subsequently catering a weaker position of the country in international policy) | long term (2030–2050) | Medium | |
| **Risk of water supply due to private ownership of the resources** | long term (2030–2050) | Medium | |
| **Opportunities** | **Timeframe** | **Overall assessment** | |
| **Increased profit from foreign investments** (from selling natural resources e.g. water to private ownership) | short term (to 2020) | Water | Forest |
| Low | Low |
| medium term (2020–2030) | Low | Low |
| long term (2030–2050) | Low/ Medium | Low |
| **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) | short term (to 2020) | Low | |
| medium term (2020–2030) | Low | |
| long term (2030–2050) | Low | |

***Climate cluster implications***

|  |  |  |
| --- | --- | --- |
| **Extreme weather events and Infrastructure damage** | | |
| **Risks** | **Timeframe** | **Overall assessment** |
| **Agricultural management & food production** (hail, frost, droughts) | Short term (to 2020) | High |
| **Energy supply** (system is not resilient to such shocks as heat waves) | Medium term (2020 - 2030) | High/Medium |
| **Droughts** (lack of systemic solution – if drought occurs, Slovenia has intervention regulation only at such event) | Short term (to 2020) | High |
| **Opportunities** | **Timeframe** | **Overall assessment** |
| **Prioritised resource management (water & forest)** | Short term (forest)  Medium term (water) | High |
| **Urbanisation development** | Long term (2030 - 2050) | Medium |
| **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.)** | Short term | Medium |

|  |  |  |
| --- | --- | --- |
| **Food security** | | |
| **Risks** | **Timeframe** | **Overall assessment** |
| **Climate change global risks leading to irrigation vulnerability, use of pesticides, decrease in yields** | Shortterm | High |
| **Abandonment of agricultural land → decrease of agricultural land** (due to urbanisation, climate change, land abandonment) | Short term (municipalities, fragmentation, trend is already in place) | High |
| **Self-sufficiency in food production / quality of food** (dependency on food import, importing possibly low quality food; Export good quality meat for example, import by-products from slaughtering; the price for meat product 3-4 EUR/kg mean there is no good quality of meat in the product; Standards are not in place) | Short term (meat, milk - already existing due to costs to be profitable) | High |
| **Opportunities** | **Timeframe** | **Overall assessment** |
| **Better use of water sources** | Medium term (or long term) | High |
| **Local and organic food production** | Short term (just to decide and put in policy, educate farmers) | Medium/High |
| **New knowledge / technology** (new crops; increase of organic matter in soil) | Short term | High |

## Workshop session 3: Response gaps and needs

### Objectives and approach to the working session

The objectives of session 3 were to:

* Consider the outcomes of working sessions 1 and 2, and in particular discuss the key risks and opportunities selected at the end of working session 2.
* Provide each expert with an opportunity to reflect on the extent to which existing policy or other responses exist in Slovenia that can manage the risks and/or maximise the opportunities identified, and whether new responses may be needed.
* Enable experts to discuss together the potential need for additional responses, such as through research, collaboration between different sectors (public/private etc.) and others.
* Complete worksheets recording the discussion of potential response needs and gaps.

Following the same approach used in working sessions 1 and 2, working session 3 was run as three parallel small working groups, each discussing a thematic ‘cluster’ of implications. Each group was assigned a facilitator from the project team who help guide the discussions and encouraged the nomination of a rapporteur from the group to complete the worksheets and report back at the end of the session. In working session 3 within each group, experts considered response needs and gaps individually, before coming together in groups to discuss individual reflections and complete a worksheet for each risk and opportunity discussed.

The working session focussed discussion on one key risk and one key opportunity from each implication to try and ensure the discussions were feasible in the time available. The group discussing the implication *Increased privatisation of natural resources* decided to focus on implication *Economic and Energy import dependence* as the former is considered hypothetical and highly unlikely to ever happen. Thus, at the incentive of the experts, the implication was not further evaluated in working session 3, and two risks and two opportunities of *Economic and energy dependence* implication were considered instead.

### Summary of working session 3 outcomes

The outcome of working session 3 was a completed worksheet for noting down reflection on response needs and gaps associated with the selected risks and opportunities from working session 2.

A summary of the outcomes of the discussion of response needs and gaps is included below. It should be noted that due to time constraints, not all risks and opportunities were discussed in detail. Where a ‘-‘ mark is included this indicates that no notes were added to the worksheet by the group. The completed worksheets for working session 3 are included in Annex 6.

***Environmental pressures cluster implications***

|  |  |  |
| --- | --- | --- |
| **Increasing environmental burden** | | |
| **Risk / opportunity** | **Identified gaps and needs in responses** | **How gaps and needs may be addressed** |
| **Risk:** Air pollution affecting health (mainly due to transport and biomass burning for energy) | 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) | Energy/biomass:   * Providing finance to subsidise district heating projects (e.g. co-financing with municipalities) * Bringing together / making better use of climate and eco funds from e.g. loans from EBRD and national taxation (energy taxation etc).   Transport:   * 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 – does exist (ride.org / prevoz.org) but quite limited * Car clubs – also quite limited, one example in Ljubljana with electric cars but limited mass take-up. |
| **Opportunity:** Linking environmental and health risks (i.e. the risks to health of environmental issues) for communication and policy responses | People do not look at or use environmental data to communicate or understand health issues / implications  Lack of knowledge of the cause – effect relationships between environmental issues and health | Targeted research on how environmental issues (and products, behaviours etc.) are negatively affecting health (but was noted this is research that may need to draw on existing international / EU research rather than be done nationally)  Ministries of Health, Environment, Agriculture, Economy should sit down together and work together on the connection between health and environment |

|  |  |  |
| --- | --- | --- |
| **Pressure on water quality and supply** | | |
| **Risk / opportunity** | **Identified gaps and needs in responses** | **How gaps and needs may be addressed** |
| **Risk:** Changes due to hydromorphological pressures (hydropower, irrigation, flood defences etc.) | Lack of expert knowledge of sustainable management of catchment areas  Lack of knowledge and how to manage construction and development projects close to nature areas / sites (e.g. approach tends to be ‘just pouring concrete’)  Lack of understanding and knowledge of green infrastructure – benefits and management/creation  Lack of a coherent national spatial development strategy  Lack of understanding of how to manage issues across the nexus (water, energy, food)  Fragmented management of water resources, in part due to management being at municipal level with no regional management level in Slovenia  No specific management plan for hydromorphology | Improved expertise through changes to formal education (both changing school curriculum for longer term, and encouraging new courses at universities)  Training for civil servants and national and local level  Learning through good practice examples and exchange (e.g. with other countries in EU). |
| **Opportunity:** Changes in diet and lifestyle (e.g. reduced meat and animal products consumption)  \*In discussion was noted there is a link to low national self-sufficiency in vegetable and fruit products | Research and evidence on the environmental impacts of Slovenian agriculture, especially meat production / animal farming  Communication on the benefits of low-meat or meat-free diets (i.e. bring together existing research)  Need for ‘warming up’ on societal level to changes in eating habits due to lack of public support | Tap into youth movements / internet, especially around meat-free / vegan lifestyle  Better coordination across department e.g. Education (school meals, curriculum), Agriculture (farming practices), Health (benefits of reduced meat), Environment. Harmonising objectives and campaigns.  Awareness raising of the benefits of low-meat or meat-free diets (i.e. bring together existing research) |

***Resource and economy cluster implications***

|  |  |  |
| --- | --- | --- |
| **Economic and Energy import dependence** | | |
| **Risk / opportunity** | **Identified gaps and needs in responses** | **How gaps and needs may be addressed** |
| **Risk:** 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) | Here are no alternative infrastructure connections for gas supply for example, which comes to Slovenia now through pipeline from Italy. | Gas pipeline is being built going from Italy through Slovenia to Hungary. This is also an opportunity for Slovenia to get gas from both sides from Italian side (Algeria) and Hungary (connection to Russia).  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. |
| **Risk:** 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) | Although energy poverty in Slovenia is recognised as a serious issue at a policy level, at the level of society there is low awareness of this issue. | More frequent and efficient awareness raising actions, and targeted communication |
| **Opportunity:** RES and technologies development (prompted by the need of Slovenia to become less economically and energy dependent) | The biggest challenge in Slovenia is acceptance of RES facilities by local inhabitants. E.g. 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 of civil initiatives against the development of RES in Slovenia is 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, facilities. Criteria for allocating the funds should reflect the cost-efficiency of the measure implemented. | The acceptability of RES facilities could possibly be improved by looking at good practices from other countries. However, Slovenia is specific as it is very small but at the same time the settlement is dispersed.  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 |
| **Opportunity:** Reduces energy consumption and increased energy efficiency (due to increased behavioural and technological change) | Although there are quite a few documents ad 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).  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. | Slovenia should develop better public transport infrastructure. However, it is challenging to build accessible infrastructure and create feasible/profitable public transport links and routs due to hilly and mountainous terrain and dispersed settlements. |

***Climate cluster implications***

|  |  |  |
| --- | --- | --- |
| **Extreme weather events and Infrastructure damage** | | |
| **Risk / opportunity** | **Identified gaps and needs in responses** | **How gaps and needs may be addressed** |
| **Risk:** Energy supply | Energy concept should be improved  Goals (strategy) | Research of new technologies  Existing centralised system should be adapted for renewable energy sources |
| **Opportunity:** Prioritised water and forest management | Climate change impact analysis are needed more in detail at local level by types of impacts. And link them to national level analysis.  Better coordination between different sectors  Abundance of water, but not managed – who is the responsible body? | Systematic monitoring – collecting appropriate data (Copernicus)  Manage regional differences |

|  |  |  |
| --- | --- | --- |
| **Food security** | | |
| **Risk / opportunity** | **Identified gaps and needs in responses** | **How gaps and needs may be addressed** |
| **Risk:** Climate Change global risk (leading to irrigation vulnerability, use of pesticides, decrease in yields) | In general even where legislation is available and good, the implementation is weak.  Research on appropriate crops on local level  Greening of EU policy is also not well developed. More responsibilities to countries  Increase of irrigated land is needed (2% too little) to manage droughts. Spatial procedures lengthy, inappropriate all levels from local to state. Too many levels included in the procedure. Also is recommended to use existing, but inefficient big systems i.e. accumulations, to capture water at peaks for example. | Need to develop system food analysis, also on local level.  Research of different technologies and practices for agriculture (increase humus in soil) |
| **Opportunity:** Local & organic food production  (example of a problem: Slovenia high quality beef and import low quality foods) | Appropriate subventions are needed. Currently corn is grown in inappropriate land and subsidised there also only due to profitability. Purpose is only to support meat production. Climate change impacts and risks should be for example part of the criteria for subvention to avoid big damages and losses, insurance companies should be involved. Rayonization (different categories of land for different purposes) of land to grow corn is needed.  Offers of alternatives to farmers (different agricultural practices – especially for vulnerable natural areas)  Individual & food footprints should be assessed together comprehensively  Standards for food are not prescribed across the different food groups  Food system should be analysed and managed as a whole to achieve structural changes but develop sustainable system. | Include in agricultural policy (not yet)  Assessment of transport costs (extended costs) to make local food profitable  Sustainable pesticide report (85% of drinking water samples have pesticides present – no one reacts)  Benefits from research and assessment, and policy for organic /local food that applies for whole agriculture of Slovenia (land, economy, well-being – health) |

## Next steps

Following this workshop the project team will prepare the ‘Influence of global megatrends on the state of environment in Slovenia’ report that is intended to be submitted to the Slovenian Ministry of the Environment and Spatial Planning and the Slovenian Environment Agency in September 2018. A summary of key impacts of GMTs 7 and 9 for the state of the environment in Slovenia and potential responses, in the form of 10 key messages will also be provided to be applied for presentation at relevant Ministry and other high-level meetings.

##### Workshop participants

The workshop participant list and project team members at the workshop are presented in Tables A.3.1 and A.3.2 respectively.

Table A.2.1 Participant list

|  |  |  |  |
| --- | --- | --- | --- |
| **No.** | **Institution** | **Participant name** | **E-mail** |
| **1** | Zavarovalnica Triglav | Aleš Zupan | ales.zupan@triglav.si |
| **2** | Statistical Office of Slovenia | Barbara Kutin-Slatnar | barbara.kutin@gov.si |
| **3** | Ministry of the Environment and Spatial Planning | Barbara Simonič | barbara.simonic@gov.si |
| **4** | Ministry of the Environment and Spatial Planning | Darja Piciga | darja.piciga@gov.si |
| **5** | Ministry of the Environment and Spatial Planning | Jasmina Karba | jasmina.karba@gov.si |
| **6** | Agricultural Institute of Slovenia | Jože Verbič | joze.verbic@kis.si |
| **7** | Institute of Macroeconomic Analysis and Development of the Republic of Slovenia | Jure Povšnar | jure.povsnar@gov.si |
| **8** | Stritih, Sustainable development consulting | Jurij Stritih | jurij@stritih.com |
| **9** | The Government Office for Development and European Affairs | Marjana Dermelj | marjana.dermelj@gov.si |
| **10** | Institute of Macroeconomic Analysis and Development of the Republic of Slovenia | Mateja Kovač | mateja.kovac@gov.si |
| **11** | The Jožef Stefan Institute, Energy Efficiency Centre | Matjaž Česen | matjaz.cesen@ijs.si |
| **12** | The Slovenian Environment Agency | Mojca Dolinar | mojca.dolinar@gov.si |
| **13** | Statistical Office of Slovenia | Mojca Žitnik | mojca.zitnik@gov.si |
| **14** | Circular Change | Niko Korpar | niko@circularchange.com |
| **15** | Ministry of the Environment and Spatial Planning | Peter Skoberne | peter.skoberne@gov.si |
| **16** | Umanotera, The Slovenian Foundation for Sustainable Development | Renata Karba | renata@umanotera.com |
| **17** | Ministry of the Environment and Spatial Planning | Robert Grnjak | robert.grnjak@gov.si |
| **18** | The Institute for Youth Participation, Health and Sustainable Development | Tomaž Gorenc | tomaz.gorenc@imztr.si |
| **19** | Ministry of the Environment and Spatial Planning | Vesna Kolar Planinšič | vesna.kolar-planinšič@gov.si |
| **20** | University of Maribor, Faculty of Agriculture and Life Sciences | Martina Bavec |  |

Table A.2.2 Project team

|  |  |  |
| --- | --- | --- |
| **No.** | **Institution** | **Team member name** |
| 1 | CEP, UK | Rolands Sadauskis |
| 2 | CEP, UK | Owen White |
| 3 | CEP, UK | Špela Kolarič |
| 4 | The Slovenian Environment Agency, Slovenia | Nataša Kovač |
| 5 | The Slovenian Environment Agency, Slovenia | Barbara Bernard-Vukadin |
| 6 | European Environment Agency (EEA) | Anita Pirc-Velkavrh |

##### Workshop agenda

|  |  |  |
| --- | --- | --- |
| **Time** | **Item** | **Agenda item** |
| **09:00 – 09:15** | 1 | Arrival and registration |
| **09:15 – 09:30** | 2 | Introductions and welcome |
| **09:30 – 10:15** | 3 | Setting the scene:   * EEA to present background on European SOER and GMTs * Overview of the up-to-date project plan and timeline * Key outcomes expected |
| **10:15 – 10:45** | 4 | Linking implications to national evidence   * Presentation:   + Overview of initial scoping work   + Linking implications to national evidence: description of method used (e.g. implication factsheets) * Introduction to Working session 1 |
| **10:45 – 11:00** | **COFFEE** | |
| **11:00 – 12:20** | 5 | Working session 1: Identifying risks and opportunities |
| **12:20 – 12:30** | 6 | Working session 1: feedback and plenary |
| **12:30 – 13:30** | **LUNCH** | |
| **13:30 – 13:45** | 7 | Introduction to working session 2 |
| **13:45 – 14:45** | 8 | Working session 2: Assessment of risks and opportunities (magnitude, likelihood and time scales of effects) |
| **14:45 – 15:00** | 9 | Working session 2: review / sticky-dot prioritisation |
| **15:00 – 15:15** | **COFFEE** | |
| **15:15 – 15:30** | 10 | Introduction to Working Session 3 |
| **15:30 – 16:45** | 11 | Working Session 3: Responses to risks and opportunities |
| **16:45 – 17:00** | 12 | Working session 3: feedback and plenary |
| **17:00 – 17:15** | 13 | Closing reflections and next steps |
| **17:15** | **CLOSE** | |

##### Working session 1: risks and opportunities worksheets

Where a ‘-‘ mark is included this indicates that no notes were added to the worksheet by the group.

## Environmental pressures cluster of implications

**Potential risks**

|  |  |  |  |
| --- | --- | --- | --- |
| **Implication title** | **Increasing environmental burden** | | |
| **Potential risks** | **Who / what is likely to be affected?** | **Geographical scale(s)**  (e.g. w*hole region, specific country etc.)* | **Timeframe which risk is expected to occur**  *Short term (to 2020); medium term (2020–2030); long term (2030–2050)* |
| **Increase waste and waste-water production and its impact on the natural environment** |  | Whole country | - |
| **Air pollution affecting health (mainly due to transport and biomass burning for energy)** | All people but especially young/old and vulnerable | Whole country, but especially urban | - |
| **Poor harmonisation between the objectives of various sectors (including insufficient consideration of external costs in pricing)** | - | Whole country | - |
| **Loss of long-term value of natural capital, and risk of green washing** | - | Whole country | - |

|  |  |  |  |
| --- | --- | --- | --- |
| **Implication title** | **Pressure on water quality and supply** | | |
| **Potential risks** | **Who / what is likely to be affected?** | **Geographical scale(s)**  (e.g. w*hole region, specific country etc.)* | **Timeframe which risk is expected to occur**  *Short term (to 2020); medium term (2020–2030); long term (2030–2050)* |
| **Areas with high fertiliser run-off** | - | North-east and central Slovenia  Karst regions | - |
| **Decreasing level of geothermal water in some areas (due to over-extraction)** | - | North-east and South-east Slovenia | - |
| **Changes due to hydromorphological pressures** | - | Whole country | - |

**Potential opportunities**

|  |  |  |  |
| --- | --- | --- | --- |
| **Implication title** | **Increasing environmental burden** | | |
| **Potential opportunities** | **Who / what is likely to be affected?** | **Geographical scale(s)**  (e.g. w*hole region, specific country etc.)* | **Timeframe which opportunity is expected to occur** (choose 1 based on likely first appearance)  *Short term (to 2020); medium term (2020–2030); long term (2030–2050)* |
| **Linking environmental and health risks (i.e. the risks to health of environmental issues) for communication and policy responses** | All, but government / policy makers especially | Whole country | - |
| **Development of new products and services with lower environmental impact / related to R&D** | Industry and manufacturing | Whole country | - |
| **Taking green tourism seriously, e.g. focussing on low-impact high value tourism** | Tourism sector | Whole country | - |
| **Improved harmonisation between the objectives across sectors** | - | - | - |

|  |  |  |  |
| --- | --- | --- | --- |
| **Implication title** | **Pressure on water quality and supply** | | |
| **Potential opportunities** | **Who / what is likely to be affected?** | **Geographical scale(s)**  (e.g. w*hole region, specific country etc.)* | **Timeframe which opportunity is expected to occur**  *Short term (to 2020); medium term (2020–2030); long term (2030–2050)* |
| **Better management of rainwater (harvesting etc)** | - | - | - |
| **Improved management of water in agricultural sector (links also to changes in the systems of agricultural subsidies)** | - | - | - |
| **Changes in diet and lifestyle (e.g. reduced meat consumption)** | - | - | - |

## Resource and economy cluster of implications

**Potential risks**

|  |  |  |  |
| --- | --- | --- | --- |
| **Implication title** | **Economic and Energy import dependence** | | |
| **Potential risks** | **Who / what is likely to be affected?** | **Geographical scale(s)**  (e.g. w*hole region, specific country etc.)* | **Timeframe which risk is expected to occur**  *Short term (to 2020); medium term (2020–2030); long term (2030–2050)* |
| **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) | Industry, private sectors , all citizens | Whole country | All time scales |
| **Risk of energy and resources supply due to political tensions** (e.g. 100% gas import, mainly from Russia) | All citizens | Whole country | All time scales |
| **Environmental risk related to increased local production in Slovenia** (increased production is related for example to economic growth) | All citizens | Whole country | All time scales |
| **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.) | All citizens | Whole country | All time scales |
| **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) | All citizens, industry | Whole country | All time scales (short term it is already happening that some people can’t afford energy/heating |

|  |  |  |  |
| --- | --- | --- | --- |
| **Implication title** | **Increased privatisation of natural resources** | | |
| **Potential risks** | **Who / what is likely to be affected?** | **Geographical scale(s)**  (e.g. w*hole region, specific country etc.)* | **Timeframe which risk is expected to occur**  *Short term (to 2020); medium term (2020–2030); long term (2030–2050)* |
| **Higher water prices** | Citizens, companies | Whole country | Long term |
| **Loss of the countries serenity over the water resources** (subsequently catering a weaker position of the country in international policy) | Country, citizens | Whole country | Long term |
| **Risk of water supply due to private ownership of the resources** | Citizens | Whole country | Long term |

**NOTE:** 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.

**Potential opportunities**

|  |  |  |  |
| --- | --- | --- | --- |
| **Implication title** | **Economic and Energy import dependence** | | |
| **Potential opportunities** | **Who / what is likely to be affected?** | **Geographical scale(s)**  (e.g. w*hole region, specific country etc.)* | **Timeframe which opportunity is expected to occur**  *Short term (to 2020); medium term (2020–2030); long term (2030–2050)* |
| **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) | Industry and research and innovation (most directly)  Other: economy; energy sector; citizens | Whole country | All time scales |
| **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) | All sectors (e.g. industry, transport, buildings, district heating) | Whole country | All time scales |

|  |  |  |  |
| --- | --- | --- | --- |
| **Implication title** | **Increased privatisation of natural resources** | | |
| **Potential opportunities** | **Who / what is likely to be affected?** | **Geographical scale(s)**  (e.g. w*hole region, specific country etc.)* | **Timeframe which opportunity is expected to occur**  *Short term (to 2020); medium term (2020–2030); long term (2030–2050)* |
| **Increased profit from foreign investments** (from selling natural resources e.g. water to private ownership) | Small group of people, investors, no benefits for citizens, small profits for the country | Whole country, water resources | All time scales, however, the financial benefits/ opportunities for increased profit from foreign investments will increase with time as the prices will rise (e.g. price of bottled water) |
| **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) | Local communities, SMEs, tourism businesses | Whole country, where there are resources (e.g. thermal water eastern and central Slovenia) | All time scales, however the opportunities for the development of SMEs will increase with time |

## Climate cluster of implications

**Potential risks**

|  |  |  |  |
| --- | --- | --- | --- |
| **Implication title** | **Extreme weather events and Infrastructure damage** | | |
| **Potential risks** | **Who / what is likely to be affected?** | **Geographical scale(s)**  (e.g. w*hole region, specific country etc.)* | **Timeframe which risk is expected to occur** (choose 1 based on likely first appearance)  *Short term (to 2020); medium term (2020–2030); long term (2030–2050)* |
| **Droughts (e.g. for insurance policy as droughts are not factored in)** | - | - | - |
| **Agricultural management and food production (disruption of food supply / yields)** | - | - | - |
| **Water management / quality** | - | - | - |
| **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 title** | **Food security** | | |
| **Potential risks** | **Who / what is likely to be affected?** | **Geographical scale(s)**  (e.g. w*hole region, specific country etc.)* | **Timeframe which risk is expected to occur**  *Short term (to 2020); medium term (2020–2030); long term (2030–2050)* |
| **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, land abandonment)** | - | - | - |
| **Decreased self-sufficiency in food production / quality of food (food preferences for consumers, eco-food, local food)** | - | - | - |

**Potential opportunities**

|  |  |  |  |
| --- | --- | --- | --- |
| **Implication title** | **Extreme weather events and Infrastructure damage** | | |
| **Potential opportunities** | **Who / what is likely to be affected?** | **Geographical scale(s)**  (e.g. w*hole region, specific country etc.)* | **Timeframe which opportunity is expected to occur** (choose 1 based on likely first appearance)  *Short term (to 2020); medium term (2020–2030); long term (2030–2050)* |
| **Prioritised resource management (water and forest – well managed forests improve resilience to extreme weather events)** | - | - | - |
| **Urbanisation development** | - | - | - |
| **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.)** | - | - | - |

|  |  |  |  |
| --- | --- | --- | --- |
| **Implication title** | **Food security** | | |
| **Potential opportunities** | **Who / what is likely to be affected?** | **Geographical scale(s)**  (e.g. w*hole region, specific country etc.)* | **Timeframe which opportunity is expected to occur**  *Short term (to 2020); medium term (2020–2030); long term (2030–2050)* |
| **Better use of water sources** | - | - | - |
| **Local and organic food production (local food more resilient to climate change + less risks)** | - | - | - |
| **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)** | - | - | - |

##### Working session 2: assessment of risks and opportunities worksheets

## Environmental pressures cluster of implications

**Assessment of risks**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Implication title** | **Increasing environmental burden** | | | |
| **Risks** (from session 1) | **Timeframe expected to occur** (from session 1) | **Assessment**  (See handout for criteria description) | | |
| *Likelihood* | *Magnitude* | *Overall assessment* |
| **Increase waste and waste-water production and its impact on the natural environment** | - | High/Medium  (Depends on policy implementation) | High/Medium | ⬤⬤\* |
| **Air pollution affecting health (mainly due to transport and biomass burning for energy)** | - | High  (Urban areas and roads) | Medium  (But considered H for biomass and traffic) | ⬤⬤⬤⬤⬤  ⬤⬤⬤⬤⬤ |
| **Poor harmonisation between the objectives of various sectors (including insufficient consideration of external costs in pricing)** | - | High  (with some examples of good practice) | High |  |
| **Loss of long-term value of natural capital, and risk of green washing** | - | High | High | ⬤ |

\* the number of black dots indicate the total number of sticky dots received from experts in selecting one risk and one opportunity to discuss in Working session 3

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Implication title** | **Pressure on water quality and supply** | | | |
| **Risks** (from session 1) | **Timeframe expected to occur** (from session 1) | **Assessment**  (See handout for criteria description) | | |
| *Likelihood* | *Magnitude* | *Overall assessment* |
| **Areas with high fertiliser run-off** | - | High | Medium  (Due to being limited to specific areas) |  |
| **Decreasing level of geothermal water in some areas (due to over-extraction)** | - | High | Medium  (Due to being limited to specific areas) |  |
| **Changes due to hydromorphological pressures (hydropower, irrigation, flood defences etc)** | - | High | High |  |

**Assessment of opportunities**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Implication title** | **Increasing environmental burden** | | | |
| **Opportunities** (from session 1) | **Timeframe expected to occur** (from session 1) | **Assessment**  (See handout for criteria description) | | |
| *Likelihood* | *Magnitude* | *Overall assessment* |
| **Linking environmental and health risks (i.e. the risks to health of environmental issues) for communication and policy responses** | - | High | Medium  (Need for more research to understand) | ⬤⬤⬤⬤\*  ⬤⬤⬤ |
| **Development of new products and services with lower environmental impact / related to R&D** | - | Medium | Medium  (But rebound effect may negate the benefit) | ⬤⬤⬤ |
| **Taking green tourism seriously, e.g. focussing on low-impact high value tourism** | - | Medium | Medium/High | ⬤⬤⬤ |
| **Improved harmonisation between the objectives across sectors** | - | Low | High | ⬤⬤⬤  ⬤⬤⬤ |

\* the number of black dots indicate the total number of sticky dots received from experts in selecting one risk and one opportunity to discuss in Working session 3

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Implication title** | **Pressure on water quality and supply** | | | |
| **Opportunities** (from session 1) | **Timeframe expected to occur** (from session 1) | **Assessment**  (See handout for criteria description) | | |
| *Likelihood* | *Magnitude* | *Overall assessment* |
| **Better management of rainwater (harvesting etc)** | - | Medium | Low/Medium  (But with good potential) |  |
| **Improved management of water in agricultural sector (links also to changes in the systems of agricultural subsidies)** | - | Medium | Medium | ⬤⬤\* |
| **Changes in diet and lifestyle (e.g. reduced meat consumption)** | - | Low | High | ⬤⬤⬤⬤  ⬤⬤⬤⬤ |

\* the number of black dots indicate the total number of sticky dots received from experts in selecting one risk and one opportunity to discuss in Working session 3

## 

## Resource and economy cluster of implications

**Assessment of risks**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Implication title** | **Economic and Energy import dependence** | | | | | | |
| **Risks** (from session 1) | **Timeframe expected to occur** (from session 1) | **Assessment**  (See handout for criteria description) | | | | | |
| *Likelihood* | | *Magnitude* | | *Overall assessment* | |
| **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) | short term ( to 2020) | energy | resources/material | energy | resources/ material | energy | resources/ material |
| Medium | Low | Medium | Low | Medium | Low |
| medium term (2020–2030) | Medium | Medium | Medium | Medium | Medium | Medium |
| long term (2030–2050) | Low (energy supply will decrease due to increased RES, diversification of resources) | High (material dependence will increase) | Low | Medium (it will not be high assuming we will recycle) | Low | High/Medium |
| **Risk of energy and resources supply due to political tensions** (e.g. 100% gas import, mainly from Russia) | short term ( to 2020) | Medium (all time scales)  The risk considered to be a wildcard and therefore difficult to assess | | Medium (all time scales) | | Medium | |
| medium term (2020–2030) |
| long term (2030–2050) |
| **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) | short term ( to 2020) | Medium | | Low | | Medium/Low | |
| medium term (2020–2030) | Medium | | Medium | | Medium | |
| long term (2030–2050) | Medium | | Medium | | Medium | |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Implication title** | **Increased privatisation of natural resources** | | | |
| **Risks** (from session 1) | **Timeframe expected to occur** (from session 1) | **Assessment**  (See handout for criteria description) | | |
| *Likelihood* | *Magnitude* | *Overall assessment* |
| **Higher water prices** | long term (2030–2050) | Low | Low | Low |
| **Loss of the countries serenity over the water resources** (subsequently catering a weaker position of the country in international policy) | long term (2030–2050) | Low | High | Medium |
| **Risk of water supply due to private ownership of the resources** | long term (2030–2050) | Low | High | Medium |

**NOTE:** As stated before the assessment of the *Privatisation of natural resources* implication is hypothetical, as it was an opinion of experts that it is highly unlikely for it to ever happen. Thus, at the incentive of the experts, the implication was not further evaluated in working session 3, and two risks and two opportunities of *Economic and energy dependence* implication were considered instead.

**Assessment of opportunities**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Implication title** | **Economic and Energy import dependence** | | | | | | |
| **Opportunities** (from session 1) | **Timeframe expected to occur** (from session 1) | **Assessment**  (See handout for criteria description) | | | | | |
| *Likelihood* | | *Magnitude* | | *Overall assessment* | |
| **RES and technologies development** (prompted by the need of Slovenia to become less economically and energy dependent) | short term ( to 2020) | Medium | | Medium | Risk in all time scales \* | Medium (low risk\*) | |
| Low\* |
| medium term (2020–2030) | Medium | | High | Low\* | High/Medium (low risk\*) | |
| long term (2030–2050) | High | | High | Low\* | High (low risk\*) | |
| **Reduces energy consumption and increased energy efficiency** (due to increased behavioural and technological change) | short term ( to 2020) | transport | Other (e.g. housing) | transport | Other (e.g. housing) | transport | Other (e.g. housing) |
| Low | Medium | Low | Medium | Low | Medium |
| medium term (2020–2030) | Medium | Medium | Medium | Medium | Medium | Medium |
| long term (2030–2050) | High | Medium | High | Medium | High | Medium |

\*Magnitude of the effect could also be negative due to risks posed by new RES (e.g. hydro power plants and risks related to biodiversity)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Implication title** | **Increased privatisation of natural resources** | | | | | |
| **Opportunities** (from session 1) | **Timeframe expected to occur** (from session 1) | **Assessment**  (See handout for criteria description) | | | | |
| *Likelihood* | *Magnitude* | | *Overall assessment* | |
| **Increased profit from foreign investments** (from selling natural resources e.g. water to private ownership) | short term ( to 2020) | Low | water | forest | water | forest |
| Low | Low | Low | Low |
| medium term (2020–2030) | Low | Low | Low | Low | Low |
| long term (2030–2050) | Low | Medium | Low | Low/Medium | Low |
| **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) | short term ( to 2020) | Low | Low | | Low | |
| medium term (2020–2030) | Low | Low | | Low | |
| long term (2030–2050) | Low | Low | | Low | |

## Climate cluster of implications

**Assessment of risks**

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| --- | --- | --- | --- | --- |
| **Implication title** | **Extreme weather events and Infrastructure damage** | | | |
| **Risks** (from session 1) | **Timeframe expected to occur** (from session 1) | **Assessment**  (See handout for criteria description) | | |
| *Likelihood* | *Magnitude* | *Overall assessment* |
| **Agricultural management & food production (hail, frost, droughts)** | Short term (to 2020) | High | High | High |
| **Energy supply (system is not resilient to such shocks as heat waves)** | Medium term (2020 - 2030) | Medium | High | High/Medium |
| **Droughts (lack of systemic solution – if drought occurs, Slovenia has intervention regulation only at such event)** | Short term (to 2020) | High | High | High |

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| --- | --- | --- | --- | --- |
| **Implication title** | **Food security** | | | |
| **Risks** (from session 1) | **Timeframe expected to occur** (from session 1) | **Assessment**  (See handout for criteria description) | | |
| *Likelihood* | *Magnitude* | *Overall assessment* |
| **Climate change global risks leading to irrigation vulnerability, use of pesticides, decrease in yields** | Shortterm | High | High | High |
| **Abandonment of agricultural land → decrease of agricultural land (due to urbanisation, climate change, land abandonment)** | Short term (municipalities, fragmentation, trend is already in place) | High | High (loss 1ha land = food to feed 50 people\*) | High |
| **Self-sufficiency in food production / quality of food (dependency on food import, importing possibly low quality food; Export good quality meat for example, import by-products from slaughtering; the price for meat product 3-4 EUR/kg mean there is no good quality of meat in the product; Standards are not in place)** | Short term (meat, milk - already existing due to costs to be profitable) | High | Medium | High |

\*estimate made during workshop by participants – not verified. Web search indicates wide range of estimates.

**Assessment of opportunities**

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| --- | --- | --- | --- | --- |
| **Implication title** | **Extreme weather events and Infrastructure damage** | | | |
| **Opportunities** (from session 1) | **Timeframe expected to occur** (from session 1) | **Assessment**  (See handout for criteria description) | | |
| *Likelihood* | *Magnitude* | *Overall assessment* |
| **Prioritised resource management (water & forest )** | Short term (forest)  Medium term (water) | Medium (political will) | High | High |
| **Urbanisation development** | Long term (2030 - 2050) | Low (uncertainties) | High | Medium |
| **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.)** | Short term | Medium (politics influence) | Medium (uncertainties) | Medium |

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| --- | --- | --- | --- | --- |
| **Implication title** | **Food security** | | | |
| **Opportunities** (from session 1) | **Timeframe expected to occur** (from session 1) | **Assessment**  (See handout for criteria description) | | |
| *Likelihood* | *Magnitude* | *Overall assessment* |
| **Better use of water sources** | Medium term (or long term) | High | High (to agriculture and society) | High |
| **Local and organic food production** | Short term (just to decide and put in policy, educate farmers) | Medium (Ministry is not sure it will agree with this) (High if EU CAP influence) | Medium for Slovenia, (If leads to increased exports - High) | Medium/High |
| **New knowledge / technology (new crops; increase of organic matter in soil)** | Short term | Medium (farmers & agriculture sector would need to be educated - is it economic?) Easier to apply individually – not all over Slovenia. Sustainable transition of food system is needed; Support to small farmers is needed. | High | High |

##### Assessing risks and opportunities

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| --- |
| Introduction  The assessment should use the criteria presented below for magnitude and likelihood, considering three timescales: short term (now until 2020); medium term (2020–2030); and long term (2030–2050).  Exact criteria to assess magnitude and likelihood will depend on the type of risk and opportunity being considered, and it is not possible to provide specific criteria in this method. The guidance below provides an outline of the type of signifiers that should be considered. As part of the completion of this assessment of magnitude and likelihood for each risk and opportunity, the reasons for arriving at a particular magnitude and likelihood weighting should be recorded in order to support/explain the scores and to ensure that the decisions made are transparent and can be communicated to people not involved in the assessment itself.  Using the template provided, groups should discuss and agree on the following for each risk/opportunity and timescale. If necessary, an 'unknown' score can be used (indicated by a '?') if a group does not feel that it is possible to estimate the magnitude or likelihood of an opportunity or risk. |
| *Magnitude of risk/opportunity (positive opportunity (+) or negative risk (–)):* |
| High (+++ or - - -):  The opportunity/risk is expected to lead to direct and lasting effects on nationally important environmental assets (such as ecosystems or natural resources), and these effects may be irreversible and/or have ongoing or increasing impact over time. A high magnitude may result from opportunities/risks that effect different environmental receptors/assets across the entire country, or have large and irreversible effects on one or more smaller areas deemed of national significance (e.g. a national park or area with valued natural resources). A high magnitude is also likely to be associated with opportunities/risks that influence different domains, e.g. environmental risks that compromise (or support in the case of opportunities) economic or social well-being and may undermine (or enhance) existing economic and social systems. A risk of high magnitude may also compromise the ability of the country to meet national environmental priorities (such as resource-efficiency or pollution‑reduction targets), perhaps with implications for meeting international environmental commitments. |
| Medium (++ or – –):  The opportunity/risk is expected to have indirect or direct effects on the environment or the ability of the country to meet environmental policy goals and targets. Such effects may require mitigation action, and if not managed or minimised, could have significant implications for environmental, economic and social systems. Although significant effects are possible, these may affect only specific environmental receptors/issues, and perhaps only specific geographical areas or types of ecosystems. |
| Low (+ or –):  The opportunity/risk may have some effects at the national level, but these are considered to be within existing levels of acceptable/expected change. A low magnitude may also be associated with opportunities or risks which, although expected to have effects, are already well understood and managed/mitigated/enhanced and therefore not expected to disrupt national environmental receptors/issues. |
| *Level of likelihood that the opportunity/risk will occur:* |
| High (●●●):  Based on the available evidence, it is considered that there is a high likelihood that the opportunity/risk will occur and will have effects for the country. The likelihood of the opportunity/risk is judged to be 60 % or higher. |
| Moderate (●●):  Based on the available evidence, it is considered that there is a moderate likelihood that the opportunity/risk will occur. The likelihood of the opportunity/risk is judged to be between 20 % and 60 %. |
| Low (●):  Based on the available evidence, it is considered that there is a low likelihood that the opportunity/risk will occur. The likelihood of the opportunity/risk is considered to be less than 20 %. |
| Assessment matrices |
| Table 1: Assessment of risks   |  |  |  |  |  | | --- | --- | --- | --- | --- | |  |  | **Likelihood** | | | | **Magnitude of risk** |  | High | Medium | Low | | High | **–––/●●●** | **–––/●●** | **–––/●** | | Medium | **––/●●●** | **––/●●** | **––/●** | | Low | **–/●●●** | **–/●●** | **–/●** |   Table 2: Assessment of opportunities   |  |  |  |  |  | | --- | --- | --- | --- | --- | |  |  | **Likelihood** | | | | **Magnitude of opportunity** |  | High | Medium | Low | | High | **+++/●●●** | **+++/●●** | **+++/●** | | Medium | **++/●●●** | **++/●●** | **++/●** | | Low | **+/●●●** | **+/●●** | **+/●** | |

##### Working session 3: Response gaps and needs worksheets

## Environmental pressures cluster of implications

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| Implication title | Increasing environmental burden |
| Risk | **Air pollution affecting health (mainly due to transport and biomass burning for energy)** |
| Notes on existing policy, strategy, research or cooperation related to the risk | * Each municipality with air quality issues had to adopt and air quality management plan * Climate change fund from aviation emission quotas providing support for sustainable mobility and biomass (more efficient boilers and district heating) * Climate path 2050 project also providing support for sustainable biomass and district heating * Funding for energy efficiency measures (eco-funding) * Subsidies available for converting cars to electric. * Sustainable mobility plans (but noted implementation is lacking) * Alternative and low emission strategy (ministry of infrastructure) |
| Identified gaps and needs in responses | * 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) |
| Notes on how gaps and needs may be addressed | Energy/biomass:   * Providing finance to subsidise district heating projects (e.g. cofinancing with municipalities) * Bringing together / making better use of climate and eco funds from e.g. loans from EBRD and national taxation (energy taxation etc).   Transport:   * 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 – does exist (ride.org / prevoz.org) but quite limited * Car clubs – also quite limited, one example in Ljubljana with electric cars but limited mass take-up. |

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| Implication title | Increasing environmental burden |
| Opportunity | **Linking environmental and health risks (i.e. the risks to health of environmental issues) for communication and policy responses** |
| Notes on existing policy, strategy, research or cooperation related to the opportunity | * Monitoring of water quality, food contamination with heavy metals etc. – data is published (but not used much especially in communicating about health) * Historical industrial land remediation plan – example of the Meziska valley remediation was noted, and area of historic lead smelting * EU rules and standards for air quality (and other environmental topics) |
| Identified gaps and needs in responses | * People do not look at or use environmental data to communicate or understand health issues / implications * Lack of knowledge of the cause – effect relationships between environmental issues and health |
| Notes on how gaps and needs may be addressed | * Targeted research on how environmental issues (and products, behaviours etc.) are negatively affecting health (but was noted this is research that may need to draw on existing international / EU research rather than be done nationally) * Ministries of Health, Environment, Agriculture, Economy should sit down together and work together on the connection between health and environment |

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| Implication title | Pressure on water quality and supply |
| Risk | **Changes due to hydromorphological pressures (hydropower, irrigation, flood defences etc.)** |
| Notes on existing policy, strategy, research or cooperation related to the risk | * Action plan on renewable energy * Energy concept (but noted has no targets) * Operational programme of the EU Cohesion programme * National water management plan (WFD) * National flood plan (Floods Directive) * Plan for coastal and marine areas (Marine Directive) * National irrigation plan * Programme for rural development * Natura 2000 implementation |
| Identified gaps and needs in responses | * Lack of expert knowledge of sustainable management of catchment areas * Lack of knowledge and how to manage construction and development projects close to nature areas / sites (e.g. approach tends to be ‘just pouring concrete’) * Lack of understanding and knowledge of green infrastructure – benefits and management/creation * Lack of a coherent national spatial development strategy * Lack of understanding of how to manage issues across the nexus (water, energy, food) * Fragmented management of water resources, in part due to management being at municipal level with no regional management level in Slovenia * No specific management plan for hydromorphology |
| Notes on how gaps and needs may be addressed | * Improved expertise through changes to formal education (both changing school curriculum for longer term, and encouraging new courses at universities) * Training for civil servants and national and local level * Learning through good practice examples and exchange (e.g. with other countries in EU). |

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| Implication title | Pressure on water quality and supply |
| Opportunity | **Changes in diet and lifestyle (e.g. reduced meat and animal products consumption)**  In discussion was noted there is a link to low national self-sufficiency in vegetable and fruit products |
| Notes on existing policy, strategy, research or cooperation related to the opportunity | * Active lobby to eat more Slovenian meat * Ministry of Health strategy related to food and health * Public institute for national health research into food and health * Vegan association and activism (although it was noted this may be counterproductive) * Example of good practice: Ministry of Finance and Ministry of Agriculture came to agreement on Tax/VAT for food to make it easier to give-away food that is past use-by dates – to reduce food waste. |
| Identified gaps and needs in responses | * Research and evidence on the environmental impacts of Slovenian agriculture, especially meat production / animal farming * Communication on the benefits of low-meat or meat-free diets (i.e. bring together existing research) * Need for ‘warming up’ on societal level to changes in eating habits due to lack of public support |
| Notes on how gaps and needs may be addressed | * Tap into youth movements / internet, especially around meat-free / vegan lifestyle * Better coordination across department e.g. Education (school meals, curriculum), Agriculture (farming practices), Health (benefits of reduced meat), Environment. Harmonising objectives and campaigns. * Awareness raising of the benefits of low-meat or meat-free diets (i.e. bring together existing research) |

## Resource and economy cluster of implications

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| Implication title | Economic and Energy import dependence |
| Risk | **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) |
| Notes on existing policy, strategy, research or cooperation related to the risk | * The objectives of Slovenian Development Strategy (SDS) addressing low carbon circular economy, sustainable resource management and economic stability, could if implemented potentially decrease energy and resource import dependency. Same goes for regulations and strategies addressing energy efficiency ( e.g. Action plans for RES and energy efficiency, National Energy Concept etc.). * However, as explained by the expert group there are no regulations that they would know about that would specifically address the risk of energy and resource supply due to import dependence. |
| Identified gaps and needs in responses | * Here are no alternative infrastructure connections for gas supply for example, which comes to Slovenia now through pipeline from Italy. |
| Notes on how gaps and needs may be addressed | * Gas pipeline is being built going from Italy through Slovenia to Hungary. This is also an opportunity for Slovenia to get gas from both sides from Italian side (Algeria) and Hungary (connection to Russia). * 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 |

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| Implication title | Economic and Energy import dependence |
| Risk | **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) |
| Notes on existing policy, strategy, research or cooperation related to the risk | * Measures for addressing energy poverty are recognised as a category of expenses that are fully subsidised form Slovenian Climate fund. * Humanitarian air also actively help in dealing with problems related to energy poverty |
| Identified gaps and needs in responses | * Although energy poverty in Slovenia is recognised as a serious issue at a policy level, at the level of society there is low awareness of this issue. |
| Notes on how gaps and needs may be addressed | * More frequent and efficient awareness raising actions, and targeted communication |

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| Implication title | Economic and Energy import dependence |
| Opportunity | **RES and technologies development** (prompted by the need of Slovenia to become less economically and energy dependent) |
| Notes on existing policy, strategy, research or cooperation related to the opportunity | * There are lots of publications/policies available that support the development of RES and new technologies:   + Slovenian Development Strategy (SDS)   + National Energetic Concept (NEK)   + Action plan for RES   + Action Plan for Energy Efficiency   + Action Plan on GHG Emissions   + National Energy Plan in preparation * There are also awareness raising actions and programmes in place. Thera are research actions on the topic that are supported by the EU. Slovenia has a map of areas suitable for wind power plants. |
| Identified gaps and needs in responses | * The biggest challenge in Slovenia is acceptance of RES facilities by local inhabitants. E.g. 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 of civil initiatives against the development of RES in Slovenia is 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, facilities. Criteria for allocating the funds should reflect the cost-efficiency of the measure implemented. |
| Notes on how gaps and needs may be addressed | * The acceptability of RES facilities could possibly be improved by looking at good practices from other countries. However, Slovenia is specific as it is very small but at the same time the settlement is dispersed. * 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 |

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| Implication title | Economic and Energy import dependence |
| Opportunity | **Reduces energy consumption and increased energy efficiency** (due to increased behavioural and technological change) |
| Notes on existing policy, strategy, research or cooperation related to the opportunity | * The regulations that support reduced energy consumption and increased energy efficiency are same/similar as the once supporting development of RES:   + Slovenian Development Strategy (SDS)   + National Energetic Concept   + Action Plan for Energy Efficiency   + Regulations from implementing the Directive on Energy Efficiency of Buildings   + Green public procurement regulation (affecting material efficiency but also energy consumption) * Thera are also quite a few documents, plans, and actions related to supporting behavioural change in transport leading to decreased energy consumption:   + Local mobility plans   + Integrated public transport project (IJPP; supported by the EU Cohesion fund)   + Comprehensive transport strategies for Municipalities   + Slovenian Platform for Sustainable Mobility |
| Identified gaps and needs in responses | * Although there are quite a few documents ad 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). * 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. |
| Notes on how gaps and needs may be addressed | * Slovenia should develop better public transport infrastructure. However, it is challenging to build accessible infrastructure and create feasible/profitable public transport links and routs due to hilly and mountainous terrain and dispersed settlements. |

***Climate cluster of implications***

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| Implication title | Extreme weather events and Infrastructure damage |
| Risk | **Energy supply** |
| Notes on existing policy, strategy, research or cooperation related to the risk | * Infrastructure upgrade and maintenance * System assessment (chain analysis) * Consumer consumption patterns change |
| Identified gaps and needs in responses | * Energy concept should be improved * Goals (strategy) |
| Notes on how gaps and needs may be addressed | * Research of new technologies * Existing centralised system should be adapted for renewable energy sources |

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| --- | --- |
| Implication title | Extreme weather events and Infrastructure damage |
| Opportunity | **Prioritised water and forest management** |
| Notes on existing policy, strategy, research or cooperation related to the risk | * Existing forest and water management plans should be updated with climate change adaptation measures |
| Identified gaps and needs in responses | * Climate change impact analysis are needed more in detail at local level by types of impacts. And link them to national level analysis. * Better coordination between different sectors * Abundance of water, but not managed – who is the responsible body? |
| Notes on how gaps and needs may be addressed | * Systematic monitoring – collecting appropriate data (Copernicus) * Manage regional differences |

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| --- | --- |
| Implication title | Food security |
| Risk | Climate Change global risk (leading to irrigation vulnerability, use of pesticides, decrease in yields) |
| Notes on existing policy, strategy, research or cooperation related to the risk | * Analysis of climate change impacts on national level * Currently corn is grown in inappropriate land and subsidised there also only due to profitability. Purpose is only to support meat production. State should not support this (on micro level). * Rayonization of plants * Implementation is weak |
| Identified gaps and needs in responses | * In general even where legislation is available and good, the implementation is weak. * Research on appropriate crops on local level * Greening of EU policy is also not well developed. More responsibilities to countries * Increase of irrigated land is needed (2% too little) to manage droughts. Spatial procedures lengthy, inappropriate all levels from local to state. Too many levels included in the procedure. Also is recommended to use existing, but inefficient big systems i.e. accumulations, to capture water at peaks for example. |
| Notes on how gaps and needs may be addressed | * Need to develop system food analysis, also on local level. * Research of different technologies and practices for agriculture (increase humus in soil) |

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| Implication title | Food security |
| Opportunity | **Local & organic food production**  (example of a problem: Slovenia high quality beef and import low quality foods) |
| Notes on existing policy, strategy, research or cooperation related to the risk | * Action plan for organic agricultural production (most recent one from 2015) * Programme of rural development (the opportunity is addressed only in general) * Exist some local companies * Consumer awareness policy is active! |
| Identified gaps and needs in responses | * Appropriate subventions are needed. Currently corn is grown in inappropriate land and subsidised there also only due to profitability. Purpose is only to support meat production. Climate change impacts and risks should be for example part of the criteria for subvention to avoid big damages and losses, insurance companies should be involved. Rayonization (different categories of land for different purposes) of land to grow corn is needed. * Offers of alternatives to farmers (different agricultural practices – especially for vulnerable natural areas) * Individual & food footprints should be assessed together comprehensively * Standards for food are not prescribed across the different food groups * Food system should be analysed and managed as a whole to achieve structural changes but develop sustainable system. |
| Notes on how gaps and needs may be addressed | * Include in agricultural policy (not yet) * Assessment of transport costs (extended costs) to make local food profitable * Sustainable pesticide report (85% of drinking water samples have pesticides present – no one reacts) * Benefits from research and assessment, and policy for organic /local food that applies for whole agriculture of Slovenia (land, economy, well-being – health) |

##### GMT implication factsheets

***Environmental pressures related implication factsheets***

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| **Implication title** | | *Increasing environmental burden (GMT 7)* | | |
| **Scoping result**  From workshop 1 | **Estimated likelihood**  *(high/low)* | **Magnitude**  **of effect**  *(High/low)* | **Timescale over which implication may occur[[1]](#footnote-1)** |
|  | High | High | short term (increased burden); long term (decreased/increased burden) |
| **Implication description** | | ***Implication summary***  Environmental burden is defined as any activity affecting the environment or any consequence of such activity which, exclusively or simultaneously, has caused or continues to cause environmental pollution, environmental risk or the use of a natural asset (Stevens & Bolton LLP, 2013).  Increasing environmental burden is identified as a global implication in the SOER 2015 (GMT 7: Intensified global competition for resources), with increasing demand and escalating use of resources often triggering ‘harmful processes in the environment’. Increasing environmental burden was identified as a potentially important issue for Slovenia’s state of the environment during the expert workshop held in Ljubljana (November 2017).  ***National trends and observations***  The following ‘observations’ were highlighted by experts as potentially having an effect on the estimated likelihood, magnitude and timescale for the implication during group discussions at the workshop:   * Transport and transit transport identified as one of the main drivers of increased environmental burden. * Broad middle class[[2]](#footnote-2) (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. * Decrease in water quality (Karst, Eastern Slovenia, intensification of agriculture, decreased self-sufficiency).   Through expert consultation after the scoping workshop additional issues were indicated to add to the increasing environmental burden in Slovenia:   * Poor spatial planning resulting in profligacy in the use of land. Lack of data; databases are still being established. * Decision-making – often other interests outweigh consideration to environmental protection   ***Related global drivers and trends***  This implication will be further aggravated by the increasing global population (GMT 1 “Diverging global population trends”) bringing radical changes in global consumption patterns and thus demand for resources. Increasing global economic output and expansion of middle class are expected to contribute to accelerating global resource use/consumption (GMT 5 “Continued economic growth?”) thus increasing environmental burden.  Shift from diffuse rural living to compact urban settlements (GMT 2 “Living in an urban world”) and technological innovations (GMT 4 “Accelerating technological change”) could further raise pressures on the environment, while at the same time new technologies and denser settlement can result in less resource-intensive lifestyles if appropriate policy and strategies are in place. | | |
| **Summary of existing evidence** | | During the expert workshop, the implication *increasing environmental burden* was assessed as being high in terms of likelihood and magnitude of impacts. When assessing the timescale over which implication may occur the experts agreed that in the short term (up to 2020) this implication will continue to be an issue whereas for the long term the opinion varied between decreased/increased burden depending on the development (new technology, energy policy, transport sector etc.) scenarios applied.  ***Increasing consumption***  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%[[3]](#footnote-3). The amount of total municipal waste generated in Slovenia has considerably increased in the period 2013-2016 and has grown from 756,846 tonnes in 2002 to 981,687 tonnes in 2016 – an increase by 29.7%[[4]](#footnote-4). In municipal waste generated per capita per year this corresponds to a rise from 425 kg in 2002 to 476 kg in 2016[[5]](#footnote-5). The quantities of recovered waste in Slovenia are increasing in last years from 2,514,143 tonnes in 2002 to 6,238,840 in 2016[[6]](#footnote-6), however the quantities of disposed waste (although significantly reduced since 2002) have been increasing again in recent years. Waste recovery is important particularly in terms of protecting and reducing pressure on natural resources.  Water resource management in Slovenia is facing multiple challenges with pressures from 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%.  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[[7]](#footnote-7) (a ~4% increase in comparison with the previous year with transport sector being the largest consumer - 39%[[8]](#footnote-8)). 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.  In 2016 there were 3,133 hectares of land being irrigated in Slovenia which is 1.3% less than in 2015[[9]](#footnote-9). However since 2009 the total irrigated territory has expanded by 114% with 1464 ha being irrigated at the time[[10]](#footnote-10). This has likely increased pressure on water supply and intensified competition with other sectors to meet the increasing demands for water.  ***Intensification of agriculture***  Aquatic habitats have been damaged by intensification of agriculture. The gross nitrogen balance (estimating the potential surplus of nitrogen on agricultural land) in Slovenia from 1992-2015 has significantly declined from 60,804 to 21,155 tonnes respectively. However since 2008 the levels of nitrogen surplus have remained similar[[11]](#footnote-11). This nitrogen surplus can indicate potential nitrogen losses from agriculture to the environment, affecting water quality and causing further environmental pressures to groundwater. This is particularly important for Karst systems which are very vulnerable to ground water pollution due to the relatively rapid rate of water flow and the lack of a natural filtration system[[12]](#footnote-12). Other risks from agricultural runoff include nutrient enrichment (eutrophication) of water bodies and acidification of terrestrial ecosystems.  ***Use of private transport and freight transport***  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. Since 2000 the number of all passenger cars used by natural persons per 1,000 population accelerated from 435 to 523 in 2015[[13]](#footnote-13). 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.  These increases in the use of motorised transport in, 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[[14]](#footnote-14).  Additionally, OECD in their 2012 Environmental Performance review for Slovenia has reported that urban sprawl and transport infrastructure has caused habitat fragmentation including the fragmentation of continuous forests (OECD, 2012).  ***Migration***  Recent trends recorded in coastal areas indicate increasing pressures for the environment. In 2016 the municipalities of Koper and Izola have had positive total net migration rate. Considering the mostly positive annual rates since 2008, both municipalities have had an increase in population which is likely to also present increased pressure on the local environment[[15]](#footnote-15). For example, municipal waste generation in the municipality of Koper has risen from 442 kg/per person in 2012 to 557 kg/per person in 2015[[16]](#footnote-16). Also, both municipalities are part of the Coastal–Karst Statistical Region that has recorded increasing pressure on water supply with 4.3% increase from 2012-2016[[17]](#footnote-17). Additionally, increased net migration of foreign nationals to Slovenia was positive for the eighteenth year in a row (mostly from Bosnia and Herzegovina; other common countries of previous residence were Serbia, Kosovo, Croatia and Macedonia). In 2016, 7,006 more foreign nationals immigrated to Slovenia than emigrated from it[[18]](#footnote-18). With possible increase in migration flows to Europe from other regions would also likely add to the environmental pressures in Slovenia.  ***Changes in population***  In the short term relatively slow population growth means this is unlikely to be a key driver for increase in environmental burden in Slovenia however other drivers such as increasing consumption, intensification of agriculture and use of transport are likely to lead to ongoing environmental pressures. Eurostat projections indicate that population growth in Slovenia could peak around 2030 with approx. 2,080,000 people living in the country – only a 0.8% increase from 2015. After 2030 the population is expected to decline and by 2080 it is projected that the national population would be approx. 1.9 million which is a 6% decline compared to 2015[[19]](#footnote-19).  ***Outlook***  Some participants of the 1st expert workshop as part of the project Influence of global megatrends on the state of environment in Slovenia indicated that environmental burden from transport and transit transport are expected to increase in Slovenia. The growth in global middle class and augmenting consumption patterns are increasing global trade and travel which is also likely to have an influence on the transport sector in Slovenia. Possible EU enlargement in East Europe and increased transit transport from growing trade could reach maximum capacities for the existing transit routes.  When discussing future trends the experts also expressed the likely increase in air pollution due to large numbers of small domestic biomass firing installations which would also affect human health. Some experts also felt that there may be a possible decrease in environmental burdens when discussing long term timescales (2030-2050). They argued that this is also reflected in the Energy Concept of Slovenia and the shift will be supported by the introduction of new/sustainable technologies, increase in energy production from renewable energy sources and growth in the use of electric cars. | | |
| **Overview of existing policy/ strategy** | | Slovenia as a member state of the EU has to agree to common rules and standards across the policy areas and ensure its legislation is in line with EU law. 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’.  To address the issues of ensuring good environmental quality Slovenia is also bound to meet the UN Sustainable Development Goals (SDGs), especially SDG15 (life on land), SDG6 (clean water and sanitation), SDG7 (affordable and clean energy), SDG9 (industry, innovation and infrastructure), SDG11 (sustainable cities and communities), SDG12 (responsible consumption and production), SDG13 (climate action) and SDG14 (life below water).  There are five goals in the Slovenian Development Strategy 2030, which, if realised, would have a mitigating effect on this implication.   * “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 management of surface and ground water, and soil, sustainable forest management, maintaining high levels of biodiversity, and sustainable agriculture. | | |
| **Policy gaps and needs/ vulnerabilities** | | To be discussed in the risks and opportunities workshop | | |

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| **Implication title** | *Pressure on water quality and supply(GMT 7)* | | |
| **Scoping result**  From workshop 1 | **Estimated likelihood**  *(high/low)* | **Magnitude**  **of effect**  *(High/low)* | **Timescale over which implication may occur[[20]](#footnote-20)** |
|  | High | High | long term |
| **Implication description** | ***Implication summary***  SOER 2015 (GMT 7: Intensified global competition for resources) describes how, in light of global economic growth, the accelerating increase in consumption and use of resources can increase energy demand and lead to pressures on water quality (groundwater and surface water) and supply. The potential for increased water demand and decline in water quality was identified as a potentially important issue for Slovenia during the expert workshop held in November 2017.  ***National trends and observations***  In Slovenia surface water sources are generally used for agricultural, industrial and energy production (RES), while groundwater is generally used for drinking water. Through group discussions in the 1st workshop the experts concluded that competition for both surface and ground water resource is expected to increase as demand is likely to rise resulting from:   * economic growth, expansion of middle class/changing consumption patterns on global level (and the related demand for goods and potentially larger exports), and urbanisation * increased use of water for renewable energy sources (RES) * increased use of water for agriculture (irrigation due to more frequent droughts) * increase in tourist arrivals * uncertain supply of drinking water in certain regions (Primorska, Prekmurje)   Water quality is also likely to be affected due to increased pressures from agriculture and tourism.  ***Related global drivers and trends***  Slovenia’s growing economy[[21]](#footnote-21) is likely to use more resources as a result of changing consumption patterns and increasing energy demand. This is expected to increase pressure on local water resources and, even though Slovenia has abundant water resources, such pressures could result in tensions (perhaps in particular in specific local areas) regarding competing claims for available water (e.g. between agricultural and industrial uses).  This implication will be further aggravated by the increasing global population (GMT 1 “Diverging global population trends”) bringing radical changes in consumption patterns and thus demand for resources. Increasing global economic output and global expansion of middle class are expected to contribute to accelerating global resource use / consumption (GMT 5 “Continued economic growth?”) thus increasing the prospect of intensified global trade. Slovenia’s economy is dominated by exports, in particular automotive and pharmaceutical industries which are likely to expand to meet the increasing global demand. For both industries water is the one of the major commodities used for production processes[[22]](#footnote-22) (Shukshith et al., 2016).  Technological innovations (GMT 4 “Accelerating technological change”) could further raise pressures on water resource stocks if their production and/or use incorporate the use of water. However, new technologies can also result in less resource-intensive lifestyles that could relieve the pressure on water demand.  A continued global shift from diffuse rural living to compact urban settlements (GMT 2: Living in an urban world) could translate into less resource-intensive lifestyles and thus alleviate demand for resources (including water) in the future. In Slovenia there may be a trade off in land-use for agriculture and urban development, as traditionally settlements have grown in valley areas that are also where the best quality agricultural land is. | | |
| **Summary of existing evidence** | During the expert workshop, the implication *Pressure on water quality and supply* was assessed as both being ‘high’ in terms of likelihood and the magnitude of impacts, and that effects will be seen in the long-term (2020 – 2050).  ***Water quality (surface and ground)***  In recent decades drinking water quality in Slovenia has improved. According to the monitoring results, groundwater (which is the main source for drinking water in Slovenia) has a good chemical status in major parts of Slovenia. To provide high quality and safe drinking water, the management of small water supply systems are the most problematic as they are periodically microbiologically polluted. Although the share of samples containing E.coli for small water supply systems have declined, in 2015 they still had the highest share of contamination (5.8%) compared to samples from medium (1.1%) and large (0.2%) size water supply systems[[23]](#footnote-23). Human health is affected to a great extent by the state of the environment, especially by clean drinking water.  Although in recent history the proportion of the population whose wastewater is treated in municipal or communal treatment facilities in Slovenia has considerably increased – it is still lower if compared to other European countries largely due to the scattered nature of settlements[[24]](#footnote-24). Untreated industrial waste water adds additional pressure on surface water quality (rivers, lakes, streams) and potentially groundwater quality. The latest data for Slovenia indicate a reduction in the wastewater discharge from industry with 2016 having the least discharge in the last four years. From the 717 million m3 of wastewater that were discharged from industry in 2016, the majority of wastewater (approx 90%) was heat-polluted. From the remaining wastewater, 24 million m3  (3.3%) was treated before discharge and 44 million m3 (6.1%) was untreated before discharge[[25]](#footnote-25).  ***Water demand***  The growth of gross domestic product is commonly associated with shifts in consumption patterns, resource use and production of waste. According to OECD the real GDP growth in Slovenia has annually surpassed 2% since 2014 with the latest evidence projecting that in 2017 the growth was 4.86%[[26]](#footnote-26).Although the purchasing power of population is expected to increase as economy grows, the number of consumers have remained relatively similar as Slovenia’s population 2009-2017 has increased by 33,533 reaching 2,065,895 people[[27]](#footnote-27).  The growing global middle class is also likely to have an impacts on Slovenia’s trade policies. In 2017 Slovenia exported EUR 28.2 billion worth of commodities which is 13.1% higher than exports in 2016[[28]](#footnote-28). Exports exceeded the pre-crisis level of 2008 already in 2011 and have been growing ever since. The growing exports indicate to increasing use of resources for the production of goods including water. As indicated by Slovenia’s statistical office, the total use of water in industry for production purposes from 2002-2016 has grown by 35.6%[[29]](#footnote-29) The majority of this additional water use by industry is likely to be from surface water sources.  Urbanisation has also been recognised as an important driver for increasing pressure on water supply both by the experts in the workshop and Slovenia’s contributions to SOER 2010. Although the share of urban population in the country from 2006-2016 has remained consistent[[30]](#footnote-30)the main issue for urbanisation is likely to be land use change due to construction of infrastructure (including transport) that leads to a loss or degradation of surface water resources and changes in land-uses in catchment basins. The urbanisation of coastal land is considered to be a particular issue for Slovenia[[31]](#footnote-31) and the potential for pollution of coastal waters (e.g. due to increased effluent discharge).  In the northeast (Mura and Drava river basins) groundwater aquifers are under significant pressure from agriculture activities (pollution, pumping, and drainage).The major groundwater pollutants in Mura valley are nitrates, atrazine, desethyl-atrazine, trichloroethane and tetrachloroethene, most of them stemming from agriculture. Also, agricultural activities are severely affecting groundwater quality in the eastern parts of the country which are generally drier (TC Vode, 2013). A study on Climate change impacts on public drinking water supply recognised that the risk of nitrate and pesticide leaching is very high on 60% of the test area in Mura Valley and Ljubljana (CC-WaterS, 2012).  Observations in the volume of water used for irrigation (generally surface water) indicate significant annual variations. Despite the considerable fluctuations in annual values and the short timescale of available data, it is evident that the water used for irrigation demonstrates a downward trend and constitutes to only 2.1% of the total consumption of water in Slovenia. Only a small fraction of agricultural land is irrigated (3,133 ha in 2016[[32]](#footnote-32)) despite the fact that approximately 60,000 ha of land area is considered suitable for irrigation systems (TC Vode, 2013). However estimations for 2015 and 2016 indicate a surge in irrigation water demand as irrigated area expanded by 36.6% from 2014-2015[[33]](#footnote-33).  http://pxweb.stat.si/pxweb/temp/2700002E20182951532_18485810.gif  **Figure 1: Total water used for irrigation in Slovenia (1000 m3).** Source: Statistical office of the Republic of Slovenia  The growing energy demand leads to increasing risks for the stability of power system operation to meet the growing needs. Among 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) From 2000 to 2007 the actual capacity of hydroelectric stations increased by 18.4 %, a result of refurbishing and was supplemented in 2007 by new small hydroelectric stations[[34]](#footnote-34).  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. Slovenia’s tourism sector in 2016 recorded record numbers 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, 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[[35]](#footnote-35).    **Figure 2. Total number of tourist arrivals and overnight stays in Slovenia 2006-2016.**Source: Slovenian Tourist Board  As tourism sector grows the demand for water, in particular for drinking and sanitation, is also likely to increase, which could put additional pressure on existing groundwater management strategies.  It is reported that there is sufficient quantities of water on average in Slovenia. In 2016, 161.8 million m3 of water were abstracted in Slovenia, which is 1.6% less than in the previous year. Almost all water (approx. 99%) for the public water supply is abstracted from groundwater sources as surface water is predominantly used for energy production. The reliance on groundwater sources for public water supply could lead to increasing pressure on these sources as surface water abstraction declined by 34.8% compared to 2015[[36]](#footnote-36).  The volume of water (m3/capita per year) abstracted for public water supply has steadily declined since 2002 and in 2016 corresponded to a fall of 12.5 %. This corresponds to similar trends for the same timescale in the volume of water supplied for households m3/capita per year (13.6% decline) and the volume of consumed water m3/ capita per year (11.7% decline)[[37]](#footnote-37). On average Slovenia is a country rich in groundwater resources however there is big regional and inter-annual variability of groundwater recharge posing a challenge to water management (Andjelov et al., 2016). Also, the difference in the amount of precipitation between areas in the west and those in the east of the country means that in some places there is regular or occasional flooding, while a few areas face a lack of water and drought[[38]](#footnote-38).  During the scoping workshop experts expressed that Slovenia’s abundant and high quality water resource that is occasionally undervalued could lead to an increase in foreign investment in water extraction. The consequence of such development would be the increasing fragmentation of land ownership that could further complicate the integration of water management policies. An influx of investment could also increase the price of water thus raising profits for the foreign investors (while making water less affordable for Slovenian domestic, agricultural and industrial uses). The lobbying or other influence of public decision making by industry is common, including through formal channels such as industry associations and less formal channels. In some cases corruption may occur which can undermine or weaken political power and environmental or social protections. This could, for example, lead to pressure to privatise natural resources including water supplies.  In the near future construction of irrigation systems in Slovenia will be one of the highest priorities (TC Vode, 2013). | | |
| **Overview of existing policy/ strategy** | Slovenia’s government is bound to exercise concern for water through its membership of the EU and through numerous signed international treaties. The state of water quality and availability therefore is closely monitored in part through fulfilment of obligations under European directives (especially the Water Framework Directive), international conventions and the UN Sustainable Development Goals (SDGs), especially SDG6 (clean water and sanitation) and SDG14 (life below water).  Water management policy in Slovenia is based on the society’s acceptance that natural resources are recognised as a public good administrated by the state. The Water Act defines water as a natural public asset. According to the Law on Water, any special use of water should be based on water right, granted by state. Water permit is needed for drinking water supply (community or private), irrigation, technological use, artificial snow, heat production, etc. Concession is granted in particular for the production of electric energy in hydroelectric power stations, for the production of beverages, for the use of mineral, thermal and thermal-mineral water in touristic resorts, for management of ports and marinas and for fish and shellfish production (TC Vode, 2013).  There is one goal in the new Slovenian Development Strategy 2030, which could have a positive effect on this implication:   * “Sustainable and efficient resource management” is the 9th goal of the Strategy and among the objectives includes and efficient management of surface and ground water. | | |
| **Policy gaps and needs/ vulnerabilities** | Policy integration and involvement of relevant stakeholders at the state, regional and local levels are recognised to be the main problems of the existing Slovenian water management policy. The fragmentation of water management is caused by the lack of horizontal and vertical communication and cooperation (TC Vode, 2013). Additionally, short term policy making is a common practice at the state and especially local levels as strong lobbying is a part of usual business practice. | | |

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***Resources and economy related implication factsheets***

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| **Implications presented** | | *Economic and Energy import dependence (both GMT7)*  The observations of the research team further confirmed by the Slovenian Environment Agency were that the energy import dependence of Slovenia is an important factor underpinning the economic dependence of the country. Therefore, the implications are presented together in this factsheet. | | | | |
| **Implication titles** | | *Economic dependence (GMT 7)* | | | | |
| **Scoping result**  From workshop 1 | **Estimated likelihood**  *(high/low)* | **Magnitude**  **of effect**  *(High/low)* | | **Timescale over which implication may occur[[39]](#footnote-39)** | |
| High | | High | | Short, medium, and long term (for Slovenia it is an ongoing issue) |
| **Implication title** | *Energy import dependence (GMT7)* | | | | |
| **Scoping result**  From workshop 1 | **Estimated likelihood**  *(high/low)* | | **Magnitude**  **of effect**  *(High/low)* | | **Timescale over which implication may occur** |
| High | | High | | Long term |
| **Description of the implications** | | ***Implications summary***  Although *economic dependence* and *energy dependence* of Slovenia were recognised as two separate implications of GMT7 (Intensified global competition for resources; as introduced by SOER 2015) at the workshop held in Ljubljana (November, 2017) in this factsheet they are presented together. This decision is based on the observations of the project team, which were further recognised by the Slovenian Environment Agency that energy import dependence of Slovenia is an important factor in the economic dependence of the country. Thus these two implications are strongly interrelated and driven by the same or similar processes, which are described below.  As recognised in the EEAs SOER 2015 GMT7 - intensified global competition for resources is driven by economic development and current consumption patterns resulting in global trends such as intensified global demand, uncertain access and price volatility of crucial resources. In Europe all these trends pose a risk to the economy as it depends on imported resources, particularly fossil fuels and metals (SOER, 2015). As identified at the workshop in Ljubljana, as an EU country with a fairly small internal market Slovenia is strongly connected to and dependent on economic developments in Europe. The national experts suggested that an important factor determining economic dependence in Slovenia is the large share of imported fossil fuel (mainly oil and gas) which also affects energy dependence and supply.  ***National trends and observations***  During the group discussion at the workshop, the following trends and observations were emphasised by national experts:   * Economic dependence of the country is identified as 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. Due to this strong interrelation, factors that might contribute to Slovenia’s energy (in)dependence, will also significantly influence the country’s economy. The energy import dependence of the country could increase due to: (1) shutting down the nuclear power plant by 2050 (although in the short-term this is not considered significant, which is reflected in the long-term time period for this implication estimated by experts at the scoping workshop); and (2) relying on the new (imported) coal powered thermoelectric plant (TEŠ)[[40]](#footnote-40) in the future which will further increase the energy supply risk. Due to these factors, experts believe the development in sustainable energy technologies, production, storage and share of renewable energy sources (RES) in the future national energy mix, and the envisaged transition to circular economy, as well as common EU energy policy will play the crucial roles in the extent to which Slovenia has economic end energy (in)dependence. * In terms of energy and economic stability, transport was also identified as strongly related to the risk of supply and price volatility of critical resources (mainly fossil fuels, but not excluding other resources).   ***Related global drivers and trends***  Economic and energy dependency of countries are directly linked to increasing global use and demand of material resources (GMT7: Intensified global competition for resources). The growing demand might threaten access to crucial materials, whilst uneven geographical distribution of resources could contribute to geopolitical conflicts, subvert standards of living and aggravate price volatility. As Europe’s economy depends on imports this could have significant effects on the economic and energy stability of EU countries.  The pressure on the global resource consumption, underpinning economic and energy dependence of (European) countries, could be further driven by increased global population (GMT 1: Diverging global population trends), growing global economic output and radically changed consumption patterns (GMT 5: Continued economic growth?), as well as the societal shift to urbanisation and industrial economies (GMT 2: Towards a more urban world).  However, necessary mitigation and adaptation to consequences of climate change (GMT 9: Increasingly severe consequences of climate change), and fast technological innovation (GMT4: Accelerating technological change) could result in transition to more sustainable economic and consumption patterns and increase energy security (GMT 8: Growing pressures on ecosystems). Nevertheless, there are significant ecological risks (e.g. deforestation, nitrogen pollution, and freshwater scarcity) related to rapid expansion in land allocated to cultivating crops for bioenergy (GMT 7). Therefore, development of bioenergy produced from agricultural and forestry sources that do not require additional land should be encouraged (GMT 8). | | | | |
| **Summary of existing evidence** | | Due to the strong interrelation of Slovenian economy to EU markets the experts evaluated the implication *economic dependence* to be high in likelihood and intensity, and to be present in all time-scales short, medium and long term. The related implication *energy import dependence* was identified to be high in likelihood and intensity. Although the experts agreed the implication is going to occur in long term time line, the opinions about whether energy import dependency during this time will increase or decrease were divided.  Expectations of experts, predominantly based on the current objectives of Slovenia’s energy policy, were that the country will be less energy dependent. However, due to shutting down Slovenia’s nuclear power plant by 2050, and the other big power plant TEŠ 6 (Šoštanj) being coal powered, experts agreed that energy (in)dependency of the country will depend on how much RES it will have in future. This is supported by projections for 2055 when a construction of a new nuclear power plant is no longer considered as an option, and the operation of TEŠ 6 is expected to be terminated in 2053 (E3. Modelling. Energy, Economy and Environment, 2017). The capacity is predicted to be replaced by gas and solar energy, which is projected to increase energy dependency reflected in net energy import (E3. Modelling. Energy, Economy and Environment, 2017).  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.[[41]](#footnote-41) 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 €[[42]](#footnote-42), 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 go 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 alongside the exports are another 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 €). As reported by the Ministry of Economic Development and Technology (2018), after a slight decline in 2016 FDI flows are expected to resume growth and surpass 1,450 m € in 2018.  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. These key investments (including expansion of road and railway infrastructure, sustainable mobility, and development and implementation of RES and energy efficiency supported by EU funds) are intended to create new jobs and boost economic growth, as well as reduce Slovenia’s energy import dependence.  The interrelation between economic and energy dependency as recognised by the workshop participants is also emphasised by the European Commission (EC; 2015). EC 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. 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, of 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. In the structure of the total energy supplied for the same year (54% from domestic and 46% from imported energy sources) petroleum products were predominate (34%), 22% was nuclear energy, 17% RES, and about the same percentage of coal, and 10% from natural gas.[[43]](#footnote-43)  The largest consumer of the energy in Slovenia is the transport sector (39% in 2016)[[44]](#footnote-44), which supports the experts’ observations expressed during the workshop that the country’s economy is highly dependent on the fossil fuel imports related to this sector. The transport sector in Slovenia has experienced considerable growth in the decade between 2000 and 2010 (OECD, 2012). The number of personal cars in the country has also significantly increased in the past decades reaching 531 registered cars per 1000 inhabitants in 2016[[45]](#footnote-45). The freight transport by road increased by nearly 3% from 2006 reaching 81.1% of total land goods transport in 2016 (measured as tonnes/km)[[46]](#footnote-46), with the remaining share carried by railway transport[[47]](#footnote-47). Additionally, road transport significantly contributes to the negative picture of the high energy intensive Slovenian economy (SIP, 2013; EC, 2015).  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. Similarly, the national experts 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.  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%[[48]](#footnote-48) 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 the 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. | | | | |
| Overview of existing policy/strategy | | 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 energy import dependent on other countries. This would also to some degree decrease economic dependence.  At national level, the most important strategic document to address the identified implications is the Slovenian Development Strategy (SDS). The implementation of the following 4 objectives of SDS would decrease the economic as well as energy import dependence:   * “Economic stability” which is the 5th SDS * l, 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 also strengthen economic and energy independence of the country. * The 6th goal “Competitive and socially responsible corporate and research sector” 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. * According to the Strategy goal 8 “Low carbon-circular economy” is a priority development objective of the entire national economy. It is envisaged 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. 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. * The 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. | | | | |
| **Policy gaps and needs/ vulnerabilities** | | Share of transit transport (it will be accessible with final installation of the electronic toll collecting system by DARS carried out by summer 2017) | | | | |

Note:

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| **Implication title** | *Increased privatisation of natural resources (GMT 7)*  Note: Discussion with experts following the workshop suggests that this implication in Slovenia is particularly a factor of insufficient governance and management of natural resources | | |
| **Scoping result**  From workshop 1 | **Estimated likelihood**  *(high/low)* | **Magnitude**  **of effect**  *(High/low)* | **Timescale over which implication may occur[[49]](#footnote-49)** |
|  | High | High | Medium term |
| **Implication description** | ***Implication summary***  As described in SOER 2015 GMT7: Intensified competition for resources underpinned by global economic growth, expansion of global middle class, and technological developments will lead to increased resource extraction. Slovenia has abundant and high quality water resources. Therefore, a concern was raised among the national experts at the workshop held in Ljubljana in November 2017 that this increased global competition might lead to increased foreign investments in resource extraction and pressures for privatisation of natural resources (particularly water) in the country.  ***National trends and observations***  At the first workshop the experts considered the following factors might underpin the privatisation of natural resources in Slovenia:   * Some natural resources (e.g. timber ,water and non-metal mineral resources) are undervalued * On the other hand the prices of the natural resources are rising due to the changing consumption patterns and influences from global markets * There are opportunities arising to increase profit from the exploitation of natural resources (especially water), as they might have a long term investment potential, but the system for proper resource control/management should be established first * There are great differences in the quality of public management of natural resources * Land, especially agricultural and open space, are under the pressure of urbanisation (e.g. infrastructure development and the spread of settlements). * Shifts in political power   During the scoping workshop, some experts expressed that the privatisation of natural resources could be prevented by policy mechanisms. However, this opinion was opposed by other experts who felt that the shift in political power could affect the political will and legislation and thus enable the privatisation.  ***Related global drivers and trends***  The increased privatisation of natural resources in Slovenia is strongly related to the global competition for resources (GMT7: Intensified global competition for resources). However, the implication will be further underpinned by the increasing global population (GMT 1: Diverging global population trends), global economic growth and related changes in consumption patterns (GMT 5: Continued economic growth?). There have been concerns expressed by the national experts that in light of the international trade agreements like NAFTA[[50]](#footnote-50) and CETA[[51]](#footnote-51) increased foreign investments in resource extraction might increase privatisation of abundant high quality natural (water) resources in Slovenia. | | |
| **Summary of existing evidence** | The experts at the workshop in Ljubljana evaluated this implication to be high in likelihood. Although the magnitude of the effect was also considered to be generally high, the opinions among experts were divided. Some of them thought the effect of the implication will be less significant (low to medium) as the privatisation of natural resources will be prevented by adequate policy mechanisms. However other experts considered that the privatisation has already started. The consequences were estimated to occur in a medium time frame.  As stated by the experts, and also stated in the Note to the EU Trade Policy Committee (dated 14 September 2016)[[52]](#footnote-52) concerns about the privatisation of national natural water resources are related to the international trade agreements intended to ease the exportation of goods and services between countries (e.g. NAFTA and CETA) and Slovenia’s objectives for economic growth. As introduced by Slovenian development policy documents (e.g. new Slovenian Development Strategy- SDS, and Slovenian Industrial Policy-SIP) internationalisation of the national economy is critical for the country to catch up with more developed EU economies. According to Eurostat, in 2016 the GDP of Slovenia was 19,600 euro/capita which is 1.5 times lower than the EU28 average[[53]](#footnote-53). To increase competitiveness and achieve economic stability of the national economy an increase in (direct) foreign investments is considered crucial (SDS, 2017; EC, 2015; SIP, 2013). As stated by experts during the scoping workshop 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 county’s political interest for economic prosperity. This could lead to increased pressures on the country for privatisation of natural resources.  According to Slovenia Environment Agency in relation to the yearly total water outflow from the country, water consumption presents a fairly small part, with annual water exploitation index (WEI) of 2% in 2014[[54]](#footnote-54). The quality of drinking water supply is considered to be adequate for 85% of population (in large and medium supply areas), whereas the quality of supply in small areas is less controlled and thus more problematic[[55]](#footnote-55). Looking into the quality of groundwater bodies, which would probably be of the highest interest for the potential investors in water extraction, nearly all of the groundwater sources in the country are estimated as “good” (with high or medium reliability). This data confirms that water sources in Slovenia are abundant and of high quality, something which might be attractive for investors.  During the workshop some stakeholders stated that the privatisation of natural resources in Slovenia is already happening, however the consequences of these actions are not expressed yet. The experts have expressed that the privatisation as well as 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 citizens. 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. In terms of access, safe drinking water is, according to data from 2015, available to 93% of Slovenian population. The number of water permits and concessions which are, according to the legislation, needed for the production of beverages, thermal/mineral water spa resorts, community or private drinking water supply, irrigation, technological use etc., increased by about 1,000 from 2014 to 2016. In total more than a half of the concessions and water permits were granted to consumers for their own drinking water supply. From the data available (on prices, concessions, and accessibility) the assumptions that the privatisation of water natural resources is already taking place is difficult to confirm.  The national experts also emphasised the problem of poor public management of natural resources. In their opinion privatisation of natural resources could lead to increased fragmentation of land, which would further hinder implementation of quality resources management processes and practices. The main challenge of Slovenian water management policy is a lack of an integrated approach linking relevant policies and sectors at local, regional, and national level. Furthermore, decision making processes and implementation of water policy objectives is, at state and importantly at local levels, often dependent on sometimes very short-term political interests (TC VODE, 2013). That kind of environment cannot provide stability and creates rather unpredictable conditions for businesses. Thus, in these conditions strong lobbying and influencing public decisions through formal and informal channels are parts of usual business practice. However, as also mentioned by national experts this might sometimes weaken or undermine social and environmental protection interests and objectives and even lead to shifts in political power. Such actions could potentially lead to increased pressures for privatisation of natural resources.  Despite the current lack of evidence of large-scale privatisation of natural resources, the government of Slovenia have acknowledged that the privatisation of natural resources could be a serious threat to the country, and in 2016 added water to the Constitution as a fundamental right for all. Article 70 states “water resources are public good and are primarily to be used for the water supply of the population and are in this context not a commercial commodity.”  Increased privatisation of natural resources could also increase pressure on water quality and supply. Pressure on water quality and supply has been identified as a separate implication of GMT7 at the workshop in Ljubljana and is presented in a separate factsheet. | | |
| **Overview of existing policy/ strategy** | As introduced on the factsheet for the implication “Pressure on water quality and supply”, water sources are addressed by EU Directives (e.g. Water Framework Directive) as well as international policies such as UN Sustainable Development Goals (SDGs; especially SGD 6: clean water and sanitation).  As stated before, a message that water is a fundamental right for all and not a commercial commodity is also a part of Slovenian Constitution.  In Slovenia water resources are managed by the state with the main legislative document being Water Act. Water Act also implements concessions and water permits as obligatory for several water uses.  The 9th goal of Slovenian Development Strategy 2030 “Sustainable and efficient resource management” if achieved it could also contribute to prevent the privatisation of natural resources. | | |
| **Policy gaps and needs/ vulnerabilities** | Lack of integration approach connecting relevant stakeholders and sectors at all governance levels (local, regional, and national) has been recognised as the main challenge of the water management policy that could also be crucial for the protection of water as a high quality resource. Additionally, common lobbying practices within this sector create risks to influencing public decisions and undermine social and environmental interests and objectives, which could increase pressures for privatisation of natural resources. | | |

**Note:**

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***Climate related implication factsheets***

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| **Implications presented** | *Extreme weather events and Infrastructure damage (both GMT9)*  Due to the strong relationship between extreme weather events and damage to infrastructure this factsheet incorporates both of these implications. | | | | |
| **Implication title** | *Extreme weather events (flooding, droughts, winds and hail) (GMT 9)* | | | | |
| **Scoping result**  From workshop 1 | **Estimated likelihood**  *(high/low)* | **Magnitude**  **of effect**  *(High/low)* | | | **Timescale over which implication may occur[[56]](#footnote-56)** |
|  | High | | High | short term (increasing over time) | |
| **Implication title** | *Infrastructure damage (GMT 9)* | | | | |
| **Scoping result**  From workshop 1 | **Estimated likelihood**  *(high/low)* | **Magnitude**  **of effect**  *(High/low)* | | | **Timescale over which implication may occur[[57]](#footnote-57)** |
|  | High | | High | short term | |
| **Implication description** | Note: this factsheet also incorporates the implication *‘infrastructure damage’*, which was also ranked as important by experts during the scoping workshop. These two implications are linked directly as in most cases infrastructure damage is caused by extreme weather events.  The climate is already changing as a result of human activities, and over coming decades, climate change is projected to increase and so will its consequences (GMT 9: Increasingly severe consequences of climate change). The IPCC 5th Synthesis Report (2014) concluded that ongoing emissions of carbon dioxide and other greenhouse gases will contribute to an increase of the global mean surface temperature change in the next two decades by 0.3°C to 0.7°C relative to 1986–2005 (IPCC, 2014).  Flooding, strong winds and droughts foreseen in Slovenia are expected to become more frequent and severe in the future, thus the magnitude of such effects is assessed as being high. Such circumstances are likely to cause infrastructure becoming more vulnerable to damage. Transportation and energy infrastructure, agricultural land and forests are among the various areas where extreme weather events are causing significant damage further leading to economic disruption.  Extreme weather events and infrastructure damage were identified as potentially important issues for Slovenia’s state of the environment during the expert workshop held in Ljubljana (November 2017).  ***Implication summary***  The experts present in the 1st workshop concluded that increasing occurrence of extreme weather events in Slovenia would constitute:   * Tornado-like winds causing disruption to transport etc. * Storms causing increased risks to human health and infrastructure * Flooding (riverine, flash floods)   ***Related global drivers and trends***  Increasingly severe impacts of climate change are anticipated as GHG emissions from fossil fuel burning continue to rise[[58]](#footnote-58). These emissions are mostly driven by industrialisation of economies, accelerating global resource use / consumption (GMT 5: Continued economic growth?) and continuous increase in demand for energy. Human-induced land use changes, such as the conversion of forest to cropland or infrastructure, also account for the release of additional carbon dioxide to the atmosphere, and reduce the absorption of carbon dioxide.  The continuously changing climate will increase the likelihood of more intense and frequent heatwaves and cause considerable variations in global precipitation patterns with more frequent, intense rain in some regions, droughts in others. | | | | |
| **Summary of existing evidence** | During the expert workshop, the implication *Extreme weather events (flooding, droughts, winds and hail)*was assessed as being ‘high’ in terms of likelihood and ‘high’ (and increasing) in terms of magnitude of impacts, and that effects will be seen in the short term (experts noted that the effects are expected to increase over time).  Climate change pose one of the most serious and diverse threats to human wellbeing today with the occurrence of extreme weather events which have potentially significant costs. From 2010-2018 there have been 272 occurrences of extreme weather events (e.g. ‘gustnadoes’[[59]](#footnote-59), large hail, heavy rain, tornadoes, severe wind gusts, heavy snowfalls/snowstorms) recorded in Slovenia as reported in the European Severe Weather Database[[60]](#footnote-60). Slovenia’s contributions to the SOER 2010[[61]](#footnote-61) also recognises the increasing likelihood of extreme weather events occurrence in both intensity and frequency.  Various studies and outlooks conclude that the effects of climate change will not be evenly distributed but rather some areas will be affected more severely than others. Projections indicate above-average warming in the Alpine and Mediterranean region and Southern Europe, with precipitation decrease particularly in summers. Changes in Slovenia are comparable to those in the broader Alpine region (Slovenian Government office of Growth, 2008). The interaction of three major climate systems (Continental, Alpine and sub-Mediterranean) influences the precipitation regime in Slovenia.  According to the reinsurance company Munich RE the overall losses from natural hazards from 2012 – 2017 added up to 800 million dollars with losses of approximately 53 million dollars in 2017[[62]](#footnote-62).  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.   Each of these is described in more detail below.  **Droughts**  Data on temperatures in Slovenia indicate an increase at a rate faster than the global average with the rise in annual average temperature most evident in the last three decades.[[63]](#footnote-63).  In the past decades the number of hot days has been increasing, and extremely low temperatures are no longer considered the norm. A study on development scenarios for Slovenia indicate that some areas of the country show differences in the frequency in rain showers. It reports that the number of days with precipitation above 20 mm show the tendency to increase in the Goričko and Kozjansko regions, whereas the number is declining in the coastal areas, Alpine and Dinar region (Slovenian Government office of Growth, 2008).  Due to 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[[64]](#footnote-64) report that in some aquifers of southeastern and southwestern Slovenia, groundwater levels at certain locations reached the lowest values on record[[65]](#footnote-65). 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[[66]](#footnote-66).  With agricultural drought going back to March 2017, Slovenian Environment Agency reported worse conditions over June and July (see Figure 1). Most affected regions by drought were the northeastern and southern half of Slovenia where maize was completely stopped in growth and little or no discharge was recorded in several rivers.[[67]](#footnote-67)    Figure 1: 3-month overview of SPI index  **Heavy rainfall and floods**  The spatial variability of precipitation is high – annual precipitation varies from 1100 mm in the coastal parts of river basins to more than 3500 mm in the Julian Alps[[68]](#footnote-68).  The geomorphological structure of most of the river basins in Slovenia (i.e. relatively steep slopes and/or impermeable bedrock) makes flash floods the prevailing type of floods along the majority of Slovenian watercourses (Trobec, 2017). Komac, et al. (2008) estimates that more than one eighth of the entire Slovenian territory is threatened by potential flash flooding. In terms of damage caused, flooding falls immediately after droughts and hail events at the top of the list of natural disasters in Slovenia (Zorn, et al.2011).  There is a prevailing opinion in the country that floods are increasingly frequent and violent while induced by the large media visibility and significant physical damage to infrastructure (Trobec, 2017). This is supported by analysis of river discharge rates which suggest that after 1996 there are increasingly frequent high water events, leading to riverine floods in flood-prone areas (Kobold, 2011). Furthermore, the discharge peaks are increasingly approaching historical records and occasionally exceeding them in certain catchments which is particularly true for small watercourses (Trobec, 2017). A recent EEA report highlights a study on economic and health risks from river floods in Europe. While using a high climate change scenario the study concludes that Slovenia is among the countries projected to have the strongest increase in flood risk based on expected annual population affected (EEA, 2017).  In contrast, Frantar, et al. (2008) argue that the existing long term evidence does not point to a statistically significant increase in flood risk. Additionally Šraj, et al. (2016) found a statistically significant increasing trend of 10- year return period discharges in only 5% of studied gauging stations. This study also argues that the generation of river runoff is a complex process, which depends on multiple factors and concludes that no clear pattern of river discharge can be detected in Slovenia. Local characteristics, such as land-use changes, urbanisation, dam construction, and river training works, have an important impact on the analysed trends of river discharge (Šraj et al. 2016).  The peer-reviewed literature suggests that the most frequent and severe floods mainly occur in spring and autumn (Mikoš, et al., 2004), but also in summer, when it is flash flooding that is typically recorded (Trobec, 2017). Furthermore, in different parts of the country seasonal flash flooding occurs at a varying frequency. Trobec (2016), for example, notes that autumnal flash floods occur across most of the country, while summer flash floods occur primarily in the East, where to a greater extent one can already see the influence of continental climatic factors.  In September 2007 Slovenia witnessed one of the most severe meteoro-hydrological natural disasters on record with up to 350–400 mm of rainfall in 12 hours These heavy rains in some municipalities in the Northern, North-Western and North-Eastern Slovenia led to floods, landslides, movement of debris, etc. and caused damage to a number of buildings, infrastructure and agricultural land (Zanon et al., 2010).Changes in precipitation can fundamentally alter environmental conditions as climate influences the landscape, flora and fauna, availability of water resources and their quality, and determine natural capacity of the environment to bear the burden of pollution and eliminate or degrade pollutants.  In the existing outlook studies precipitation data manifests a high degree of ambiguity in the future periods, but simulations agree on a general trend pointing to less precipitation in the summer. A study on climate change impacts on availability and safety of public drinking water indicated trends in the direction of longer duration of dry spells (increasing risk of prolonged droughts) and greater maximum daily rainfall (increasing risk of floods). It concluded that there is no significant summer trend and a strong autumn trend in the direction of greater maximum daily rainfall.[[69]](#footnote-69)  **Winds**  Wind conditions in Slovenia are determined by its geographical position east of the Alps and in the vicinity of the Mediterranean Sea. Bora is the strongest wind in Slovenia with high velocity as it can increase or decrease 10-fold within a moment. Regions with the strongest bora winds are found in the south-western parts of Slovenia (Slovene Littoral) including the city of Koper with its climate being dominated by the bora wind[[70]](#footnote-70). In January 2017 hurricane strong bora winds were reported in western Slovenia with gusts reaching up to 187 km/h[[71]](#footnote-71).  **Storms**  Ice storms (sleet) are reported to take place every few years, especially in the southwest of Slovenia. A strong ice storm which causes considerable economic damage occurs on average every 50 years, while smaller storms are much more frequent[[72]](#footnote-72).Storms are also common over the summer period with strong winds and occasionally large pieces of hail causing risks to human health and infrastructure[[73]](#footnote-73). The number of days with thunderstorms shows a tendency to increase mainly in the East of Slovenia and a decline in the prevailing part of the South Slovenia (Slovenian Government office of Growth, 2008).  According to estimations, in recent history, extreme weather conditions in particular, have brought the rise of mean sea level along the Slovenian coast. Available data indicates that over the past twenty years, the sea level along the Slovenian and Adriatic coast has been rising at a rate surpassing European and global trends. Such ongoing trends could lead to daily flooding of low-lying urban areas along the coast by the end of the century if infrastructure is not adapted accordingly[[74]](#footnote-74).  **Infrastructure damage**  Extreme weather events and infrastructure damage are closely connected to one another because what happens in the natural environment is often causing harm to society. Infrastructure damage is considered as a direct damage which occurs during the disaster itself (e.g., damaged buildings, road/rail and energy infrastructure, destroyed crops etc.).  ***Damage from storms***  At the end of January and at the beginning of February 2014, severe and long-lasting freezing rain affected a major part of Slovenia. It caused considerable damage to forests and forest roads, as well as energy infrastructure. The most affected regions were without electrical power for up to ten days. There was also severe damage to railway infrastructure – in particular the connection between Ljubljana and the coastal city of Koper. The storm had damaged the pylons of power lines and for more than a year only diesel locomotives maintained rail transport from and to the Port of Koper (Markosek et al. 2015). Furthermore, the 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 instead[[75]](#footnote-75). The total damage to forests and forest roads, power and railway infrastructure and the economy was estimated to be 400 million EUR (Markosek et al. 2015).  According to OECD the costs of road and rail infrastructure maintenance has significantly increased for Slovenia from 2000-2015. In this period the road infrastructure maintenance has inflated by 59.4% and rail maintenance by 1471.4%[[76]](#footnote-76).  ***Damage from floods***  In November 2012 more than 100 municipalities in Slovenia were affected by floods with total damage exceeding 200 million Euros. As a result these floods caused damage agricultural areas, industry, civil engineering works (transport infrastructure, distribution piping, water facilities, etc.), water courses and buildings[[77]](#footnote-77).  ***Damage from droughts***  Agricultural drought is causing lost or heavily reduced maize crops, grassland, severely affected were also fruit and olive trees as well as vine. | | | | |
| **Overview of existing policy/ strategy** | In 2016 the Strategic Framework for Climate Change Adaptation which provides a strategic framework and guidelines for integrating adaptation to climate change into policies, measures and actions to a greater extent in Slovenia. 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. Under the conditions of timely and complete implementation of sectoral policies (which are mostly derived from mutually agreed European policies), the adaptation process in Slovenia is expected to run largely automatically and without any major additional costs. Key European directives relevant to these implications include the Water Framework Directive, Floods Directive and the EU Adaptation Strategy.  To mitigate the occurrence of extreme weather events and damage to infrastructure such events cause, Slovenia is bound to meet the UN Sustainable Development Goals (SDGs), especially SDG13 (climate action).  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. This goal acknowledges the negative impacts of climate change on food systems noting the dependency of food production on weather conditions. Considering the close interlinkages between natural resource management and weather conditions it is likely that the implication *Extreme weather events (flooding, droughts, winds and hail)* will have some influence on the success of achieving this goal. * “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”. | | | | |
| **Policy gaps and needs/ vulnerabilities** | * Flood risk assessment including climate change impacts * Drought risk/vulnerability assessment including climate change impacts * Climate scenarios for winds (only precipitation and temperature available so far[[78]](#footnote-78)) * Vulnerability assessment for infrastructure * Improved assessment of climate impacts in SEA and EIA | | | | |

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| --- | --- | --- | --- |
| **Implication title** | *Food security*  *(related to GMT 9: Increasingly severe consequences of climate change)* | | |
| **Scoping result**  From workshop 1 | **Estimated likelihood**  *(high/low)* | **Magnitude**  **of effect**  *(High/low)* | **Timescale over which implication may occur[[79]](#footnote-79)** |
| High | Low | Short term (low magnitude) |
| High | Medium/long term (some present aspects will significantly increase with time) |
| **Implication description** | ***Implication summary***  Acknowledged in SOER 2015, *GMT9: Increasingly severe consequences of climate change*, is largely caused by human activities such as burning of fossil fuels, agriculture and deforestation. Climate projections indicate that in coming decades these activities will induce harm to ecosystems, increase negative impacts on global agriculture, and progressively threaten global food security. National experts at the workshop held in Ljubljana in November 2017, also recognised food security as an implication that might occur and affect Slovenia in future.  ***National trends and observations***  According to experts at the workshop the following factors are potentially influential for 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 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 * Opportunities arising from possibilities of stockbreeding on high altitude grasslands, (which are less suitable for crop growth) such as production of high quality milk products and increased income from the land that would usually be overgrown by shrubs.   Increasing pressures on food security in Slovenia could have further negative implications for human health. Negative consequences for biodiversity were also mentioned by the national experts as they predicted trade-offs between biodiversity and securing sufficient amounts of food. For example, the options to transit to extensive, organic or ecological farming could be limited as food productivity in these forms of agriculture is generally lower.  ***Related global drivers and trends***  Future food security in Slovenia could be at a high risk due to the increasing occurrence of extreme weather events related to climate change (GMT 9: Increasingly severe consequences of climate change) such as hail storms, flooding, droughts, and long-lasting heat waves. The impacts of climate change are anticipated to become more severe as greenhouse gas emissions continue to rise[[80]](#footnote-80). Emissions are mostly underpinned by industrialisation (GMT 5: Continued economic growth?) and increasing global consumption of resources that leads to increased global competition for natural resources (GMT 7: Intensified global competition for resources). Together with the dependency on European and other regional markets this is likely to further affect food security in Slovenia.  Climate change mitigation measures, and rapid technological innovation (GMT 4: Accelerating technological change), coupled with the increased resource consumption (GMT 7) are leading to and encouraging the uptake of alternative energy sources such as biofuels. However, increasing production of biofuels could further aggravate the risks related to food security due to the competition for land to cultivate suitable crops. This was also recognised by national experts as a potential issue for Slovenia at the workshop in Ljubljana. Meanwhile, confronting climate change impacts and ecosystem degradation (GMT 8: Growing pressure on ecosystems), could lead society to more sustainable patterns of food production and consumption, which the Slovenian national experts identified as an opportunity for the country. | | |
| **Summary of existing evidence** | During the expert workshop, the implication *Food security* was assessed as being ‘high’ in terms of likelihood. However, opinions about the time of the occurrence of the implication as well as the magnitude of its effect were divided. Some experts considered that the effects of the implication (e.g. volatility and increase of food prices) are already present and will become more severe with time. Others reasoned that the effects of the implication are not present yet, and although they may occur in the future their magnitude will be low.  Climate change and related food security risk 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 extreme weather events.  As reported by the Agricultural Institute of Slovenia (2017) the continuing trend of the changing weather conditions has also strongly affected crop yields in 2017. The warm autumn in 2016 saw above average temperatures, whilst 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. The growth of agricultural products and the 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).  The need for investments and better knowledge to protect fruit from spring frost and secure production (especially in the valleys of Primorska region) was recognised by the national authorities as early as 2006 (Ministry of Agriculture, Forest and Food, 2006). The damaging effects of extreme weather conditions in Slovenia are further reflected in the (newly) established state financial funds, aid, and subsidies scheme designated to support the affected farmers and beekeepers and those who want to invest in climate adaptation measures (Agricultural Institute of Slovenia, 2017). In 2017, 6,761 agricultural holdings applied for the state financial aid for 348,527 ha of land. Although, the number of holdings applying for aid in 2017 was roughly the same in comparison to 2016, there was a 2% increase in the damaged land. That resulted in payments to farmers of 31.7 million EUR, which is 9% more than a year before (Agricultural Institute of Slovenia, 2017).  Extreme weather events were identified as a separate implication of GMT9 at the workshop in Ljubljana. This is further explored in a separate factsheet titled *Extreme weather events and Infrastructure damage* which includes some reflections on agriculture.  The following statistics, presented by the Slovenian Statistics Office (SORS, 2016) for the period from 2006 to 2015, could further support the concerns related to food security as indicated by the national experts at the workshop:   * 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 also 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). 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).  In the light of climate change, Slovenia is acknowledging the importance of resilient food systems by prioritising self-sufficiency, regulation of the environmental effects in agriculture, traceability and local use of agricultural products (SORS, 2016). | | |
| **Overview of existing policy/ strategy** | 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. As stated, 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.  To mitigate the occurrence of extreme weather events and damage to agriculture, Slovenia needs to meet the UN Sustainable Development Goals (SDGs), especially SDG13 (climate action).  Additionally, the 9th goal of the new Slovenian Development Strategy 2030 (SDS; 2017) “Sustainable and efficient resource management” recognises the importance of food as a high quality domestic resource for ensuring a higher level of self-sufficiency. It also acknowledges the negative impacts of climate change on food systems emphasising the dependency of food production on weather conditions. | | |
| **Policy gaps and needs/ vulnerabilities** | To be discussed in the risks/opportunities workshop | | |

**Note:**

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2. 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-2)
3. <https://data.oecd.org/gdp/real-gdp-forecast.htm> [↑](#footnote-ref-3)
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8. <http://www.stat.si/StatWeb/en/News/Index/7001> [↑](#footnote-ref-8)
9. <http://www.stat.si/StatWeb/en/News/Index/6679> [↑](#footnote-ref-9)
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24. <http://www.arso.gov.si/en/soer/freshwater.html> [↑](#footnote-ref-24)
25. <http://www.stat.si/StatWeb/en/News/Index/6859> [↑](#footnote-ref-25)
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27. <http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=demo_gind&lang=en> [↑](#footnote-ref-27)
28. <http://www.stat.si/StatWeb/en/News/Index/7227> [↑](#footnote-ref-28)
29. <http://pxweb.stat.si/pxweb/Dialog/varval.asp?ma=2750310E&ti=&path=../Database/Environment/27_environment/03_27193_water/03_27503_business_entities/&lang=1> [↑](#footnote-ref-29)
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49. *Short term (to 2020); medium term (2020–2030); long term (2030–2050)* [↑](#footnote-ref-49)
50. NAFTA-North American Trade Agreement [↑](#footnote-ref-50)
51. CETA- new trade agreement between EU and Canada [↑](#footnote-ref-51)
52. Note for the attention of the Trade Policy Committee. Subject: Questions of Slovenia relating to provisions on water in CEFTA (14 September 2016) [↑](#footnote-ref-52)
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78. <http://meteo.arso.gov.si/met/sl/climate/change/> [↑](#footnote-ref-78)
79. *Short term (to 2020); medium term (2020–2030); long term (2030–2050)* [↑](#footnote-ref-79)
80. https://www.carbonbrief.org/analysis-global-co2-emissions-set-to-rise-2-percent-in-2017-following-three-year-plateau [↑](#footnote-ref-80)