



Climate proofing of infrastructure projects in 2021-27

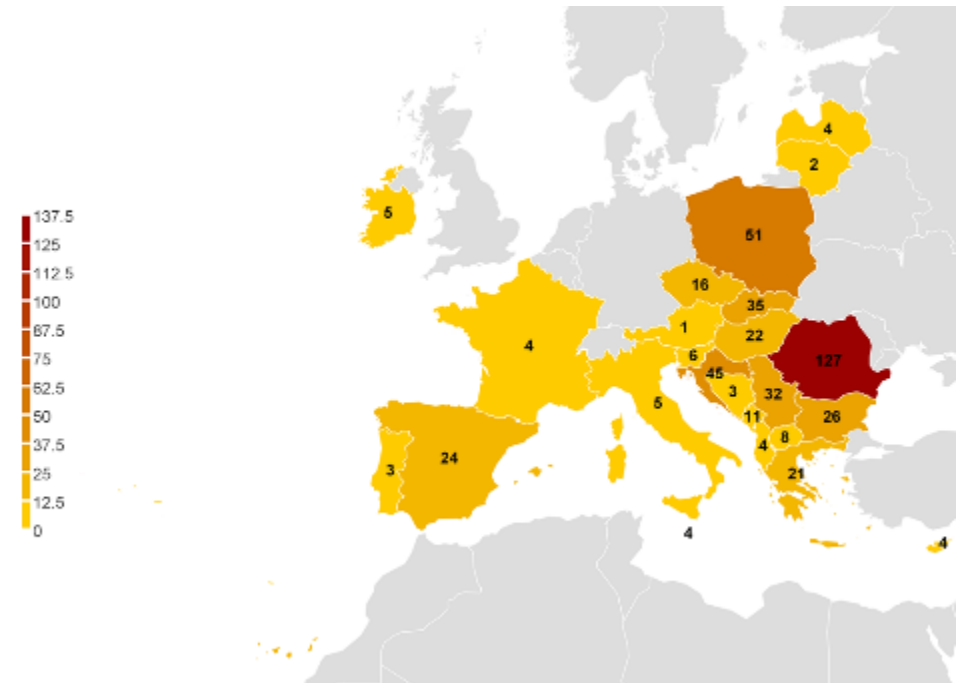
Ljubljana, 21st March 2023

- Part I – Introduction on JASPERS assistance
- Part II – Why we need climate proofing?
- Part III - Overall climate proofing methodology
- Part IV - Slovenian context & case studies

PART I – Introduction on JASPERS assistance

‘Joint Assistance to Support Projects in European Regions’

- A partnership between Commission’s [DG Regional and Urban Policy](#), and [EIB](#) active since 2006.
- Provides **independent advice and capacity building** support to [beneficiary countries](#) to help prepare and assess high quality projects to be co-financed by [EU Structural and Cohesion Funds](#) (including [Just Transition Fund](#)), by the [Instrument for Pre-accession Assistance \(IPA\)](#) and by the [Connecting Europe Facility \(CEF\)](#).
- JASPERS assistance is **funded by EC and EIB**
- **Available to EU 27 + IPA region**
- Supports major/strategic investments, innovative/replicable projects, grouping of investments
- **In 2021-27 increased focus on Knowledge Sharing, Capacity Building** and support to strengthening of public administrations and project promoters.



JASPERS services across the project cycle



Assistance in the preparation
of **sector strategies,**
programmes, plans



Support for the
development of projects



Advice on
Cross-cutting horizontal issues



Support in the **selection /**
assessment / appraisal for
projects



Selective support to
project implementation



Capacity building
networking, training,
knowledge transfer

Areas of expertise



Energy



**Circular economy and
solid waste**



**Innovative industries
& transformation**



Health and education



Ports / Airports



Rail



Sustainable roads



Urban mobility



RDI and ICT & Broadband



Urban development



**Water and waste
water**



**Horizontal: Climate, environment,
economics/CBA, state aid,
innovation, risk management...**

- ✓ JASPERS Networking Platform programme of **EU-level (multi-country) capacity building, training & knowledge sharing** – agreed with DG REGIO
- ✓ **In-country technical capacity building** assignments – based on requests by MSs for targeted capacity building and institutional strengthening assignments (including train-the-trainers)
- ✓ Supporting **development of EC technical guidelines**, preparation of JASPERS **technical notes/working papers**, dissemination of good practices
- ✓ **Advisory on horizontal issues relevant to project preparation** - climate change, environmental issues, economic appraisal, state aid implications for projects
- ✓ Revamped **Knowledge Sharing website**: <https://jaspers.eib.org/knowledge/index>

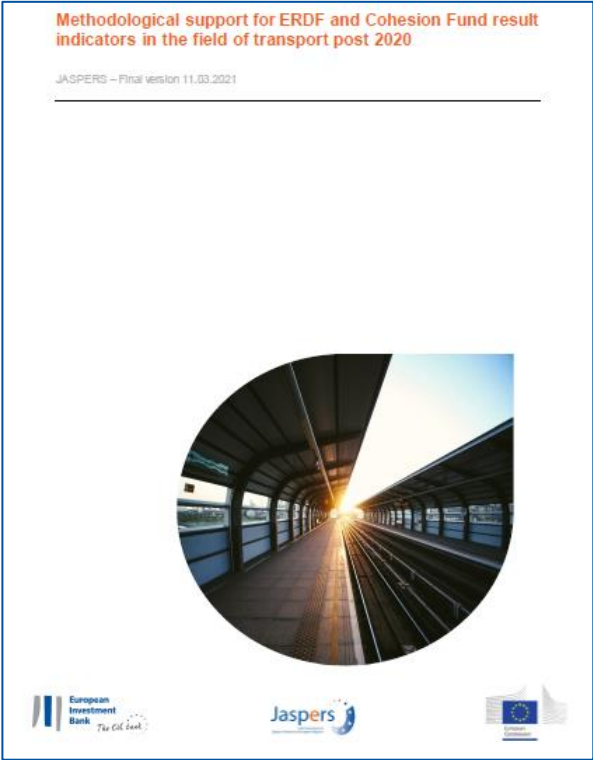


Multi-country assignments for 2023-24

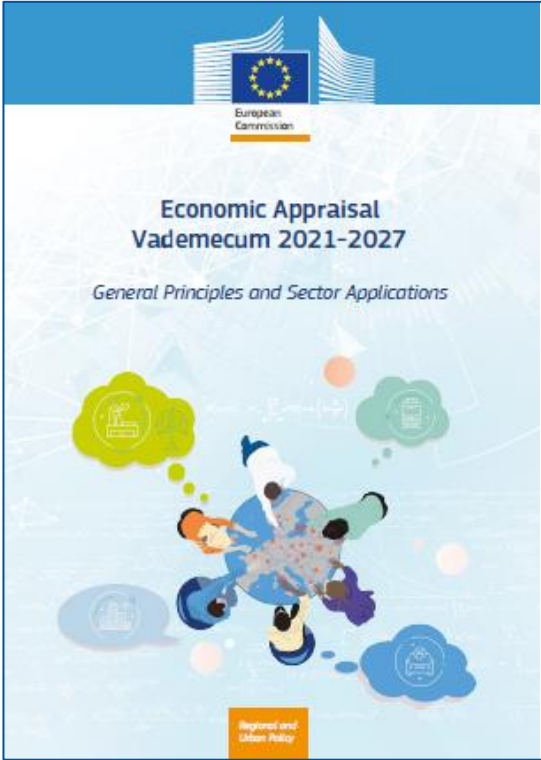


- ✓ Webinar on **Sustainable underground infrastructures**
- ✓ Webinars on good practices and experiences in **JTF projects**
- ✓ Webinars on establishment of **Circular Economy strategies and project pipelines**
- ✓ Dissemination of good practices and lessons learned for **waste management in 2021-27**
- ✓ Good practices and lessons learned for **project assessment and selection in 2021-27**
- ✓ Workshops on **State aid requirements to project preparation.**
- ✓ Good practices and lessons learned for **climate proofing of investments**
- ✓ Practical approaches for the development and implementation of **Energy Communities**
- ✓ **Decarbonisation of District heating** systems
- ✓ Climate **adaptation in Cities**
- ✓ Investing in **bicycle infrastructure** for sustainable urban mobility planning
- ✓ **Energy efficiency in water** sector investments
- ✓ Good practices, methods and tools for **Economic Appraisal of investments in 2021-27**
- ✓ **EWRC** joint JASPERS-REGIO workshop

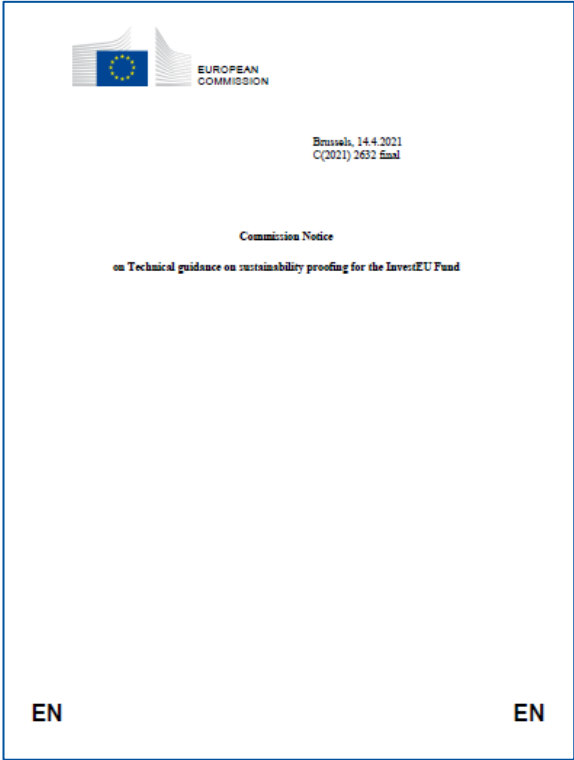
Support to develop EC guidelines for 2021-27



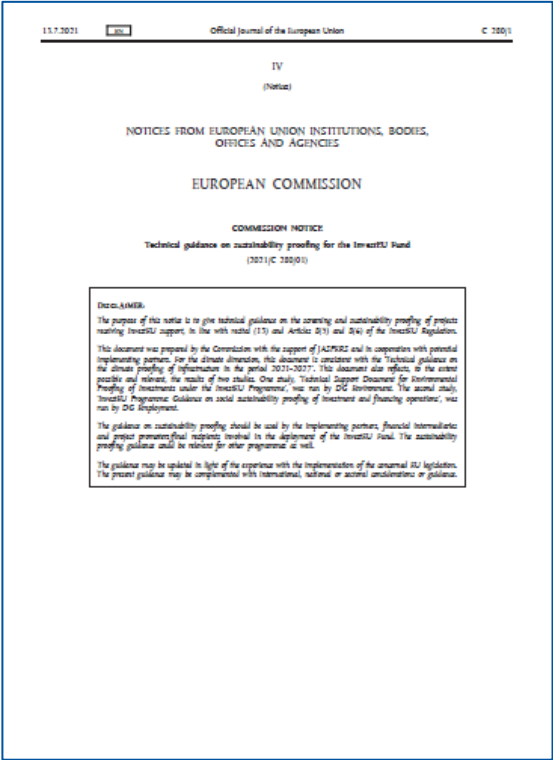
Result indicators in transport



Economic Appraisal Vademecum



InvestEU Sustainability Proofing



Climate Proofing of Infrastructure



Building capacity on Climate Change

Knowledge sharing & dissemination activities at EU-level

- [Third Workshop on Climate Adaptation in Transport – April 2022](#)
- [Second seminar on Climate Change Adaptation in the Transport sector – June 2019](#)
- [Climate Change Adaptation in the Transport Sector – Experience from Project Preparation and Network Management – December 2017](#)
- [Follow-up meeting on climate change requirements for major projects in 2014-2020 - June 2017](#)
- [Knowledge sharing event on climate adaptation in projects - June 2016](#)
- [Climate change requirements for major projects in 2014-2020 - September 2015](#)
- [Climate change adaptation, risk prevention and management in the Water Sector - October 2014](#)

Knowledge transfer & technical capacity building at individual country level

- **On Member States' request** and included in agreed Country Work Programmes
- **Technical capacity building and institutional strengthening** of public authorities and final beneficiaries (e.g. GR, HR, PL, PT, RO, SK, ES, **SI**, RO, IT)
- Support to the development/updates of **national guidelines and toolkits** (PL, **SI**, RO, GR, IT, MT, BG, HR)
- Support in **streamlining climate objectives in strategies/plans, investment programmes and project pipelines** at national and regional level (e.g. IT, ES, PL, PT)



JASPERS Support to Slovenia on Climate Proofing



- ✓ Support for the development of detailed national guidelines for climate proofing of investments in 2021-27 in Slovenia, in line with the EC guidance and reflecting national priorities and specificities.
- ✓ Capacity building on climate proofing of investments, with the view to strengthen the capacity of the managing authority, intermediate bodies and project promoters.
- ✓ Support in the identification and dissemination of good practices and processes for mainstreaming climate change across EU Funds.



PART II – Why we need climate proofing?

October heatwave expected in parts of Europe after countries record hottest ever September



By Euronews Green
Published on 08/10/2023 - 17:11 • Updated 10/10/2023 - 10:01

[Share this article](#)

France, Germany and the UK all recorded their hottest ever September last month.

Countries across Europe experienced their hottest September on record with unseasonably warm weather expected to continue into October.

Austria, Belgium, France, Germany, Poland, Switzerland and the UK all saw record-high temperatures last month, upwards of 3.6°C above seasonal norms.

The EU's Copernicus Climate Change Service (C3S) expects 2023 to be the **hottest year** humanity has ever experienced.

AUGUST CLIMATE BULLETIN NEWS RELEASE

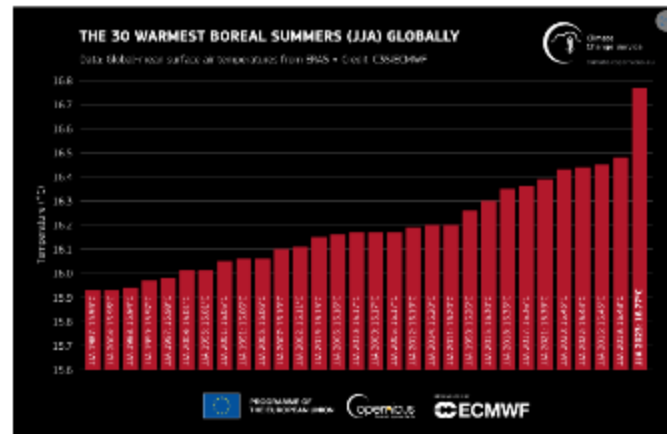
Summer 2023: the hottest on record

26 September 2023



2023 JUNE-JULY-AUGUST SEASON HIGHLIGHTS | AUGUST 2023 - SURFACE AIR TEMPERATURE HIGHLIGHTS | AUGUST 2023 - SEA SURFACE TEMPERATURE HIGHLIGHTS | AUGUST 2023 - SOILICE HIGHLIGHTS | AUGUST 2023 - HYDROLOGICAL VARIABLES HIGHLIGHTS | ABOUT COPERNICUS AND ECMWF

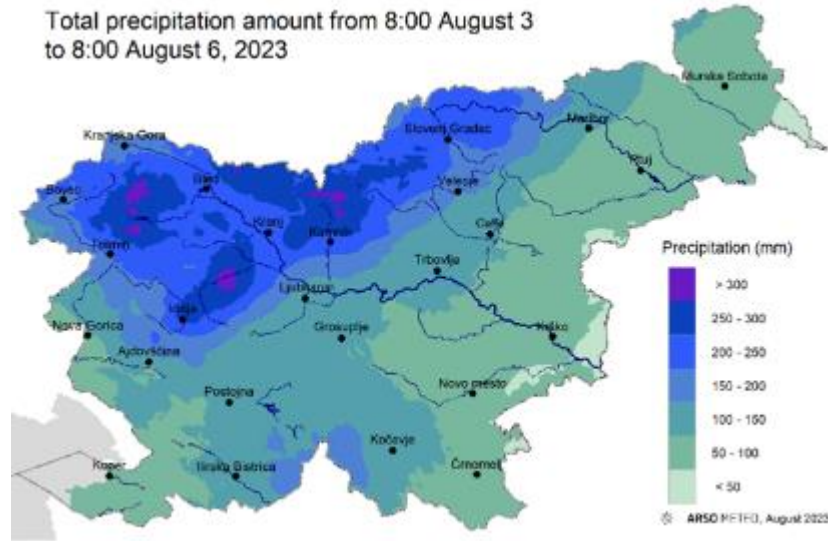
Bonn, 06/09/2023



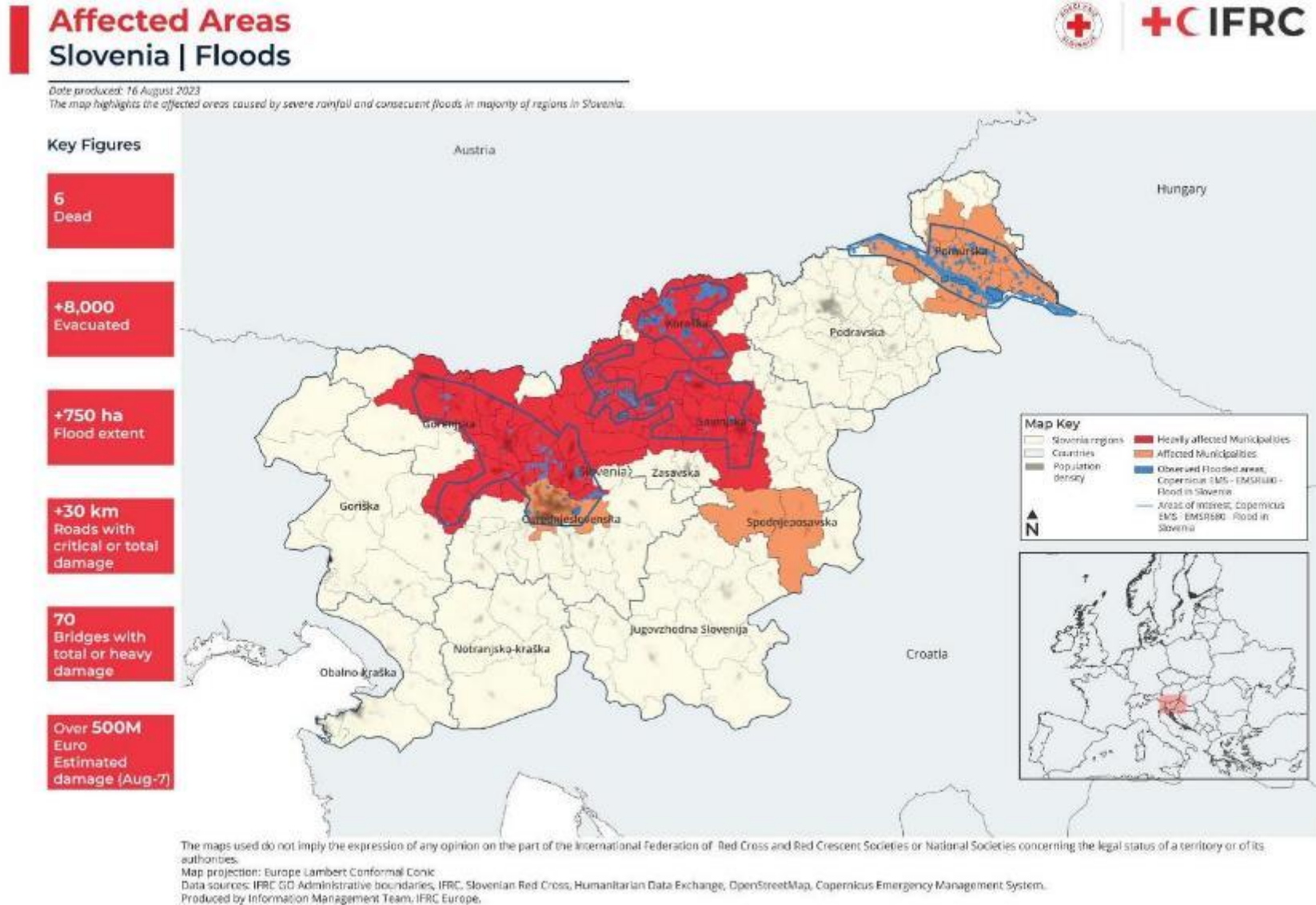
Floods August 2023



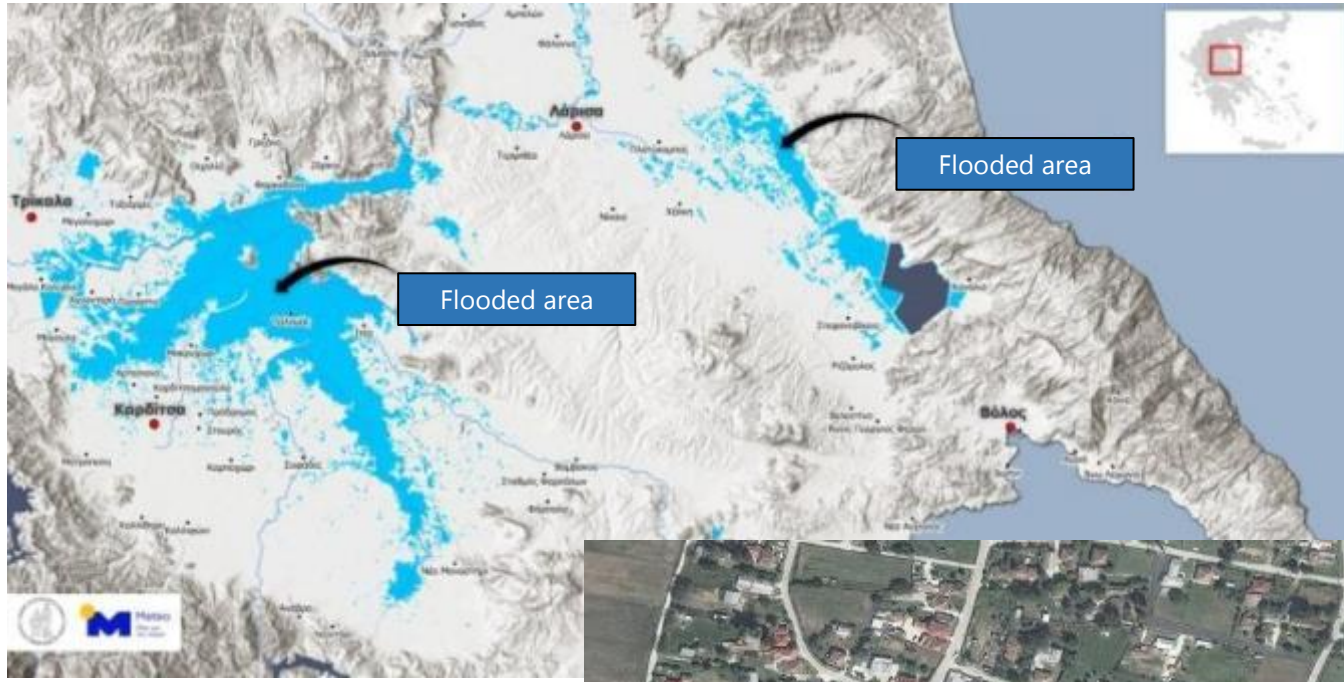
Total precipitation amount from 8:00 August 3
to 8:00 August 6, 2023



Floods August 2023 – Affected area

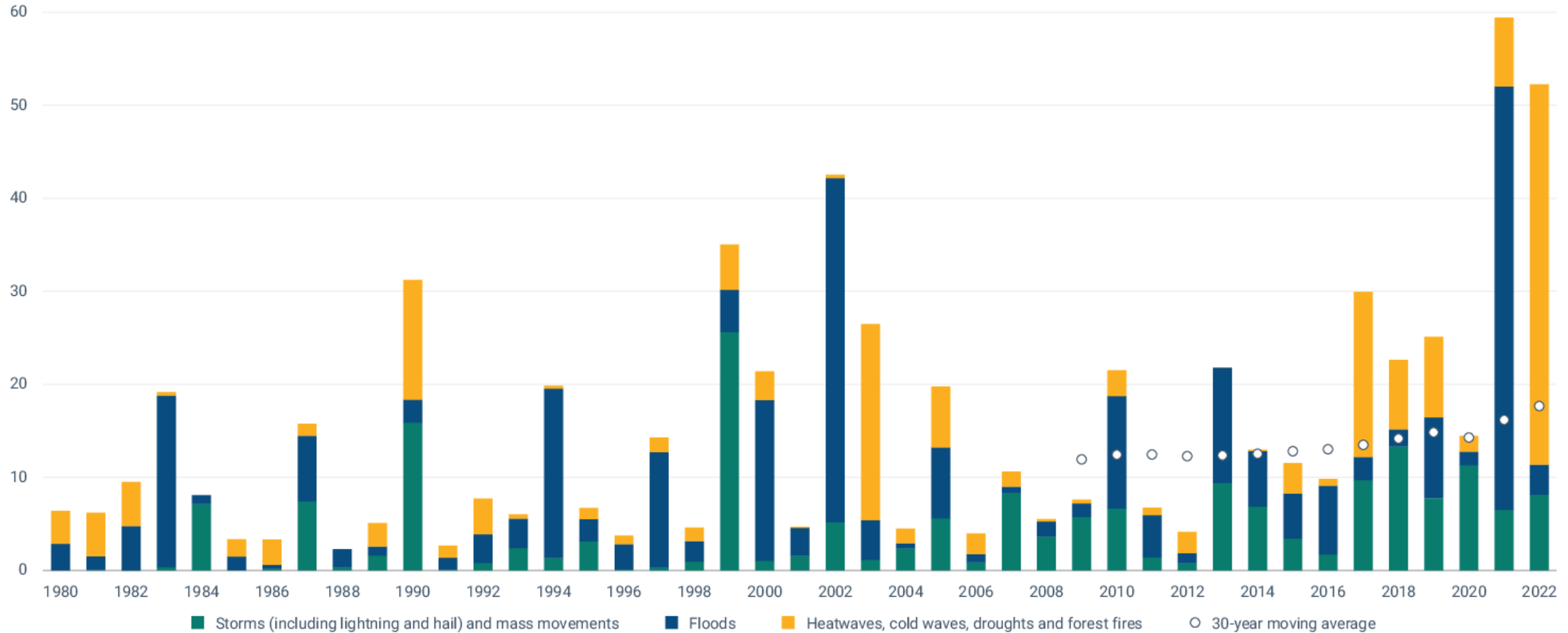


Floods in Greece – September 2023



Annual economic losses caused by weather – and climate-related extreme events in the EU Member States

Billion EUR (2022 prices)



Source: [European Environment Agency](https://www.eea.europa.eu/en/press/2023/04/04)

Economic losses and fatalities caused by weather - and climate - related extreme events (1980-2022) per country

Country	Total losses (Million EURO)	Losses per sq.km (EURO)	Losses per capita (EURO)	Insured losses (Million EURO)	Insured losses (%)	Fatalities
Austria	13216	157566	1626	2333	18	755
Belgium	16208	528524	1543	6310	39	4690
Bulgaria	4741	42715	594	86	2	256
Croatia	3667	64802	830	92	3	906
Cyprus	423	45701	597	7	2	67
Czechia	16274	206334	1567	1896	12	715
Denmark	8881	206896	1646	5459	61	532
Estonia	306	6750	217	44	14	5
Finland	2286	6755	440	70	3	7
France	120613	188907	1947	41727	35	45260
Germany	167299	467879	2065	50391	30	101334
Greece	11934	90622	1129	401	3	4643
Hungary	8919	95894	875	479	5	874
Ireland	3537	50568	869	519	15	68
Italy	111110	367817	1918	5081	5	21758
Latvia	1182	18295	513	64	5	87
Lithuania	1695	25968	511	9	1	102
Luxembourg	1252	482413	2700	622	50	170
Malta	47	148848	118			5
Netherlands	9996	267420	629	3865	39	4315
Poland	18166	58237	480	1214	7	2551
Portugal	15042	163099	1470	535	4	10339
Romania	17525	73513	816	178	1	1438
Slovakia	1773	36159	333	73	4	119
Slovenia	6934	342051	3452	276	4	315
Spain	83782	165582	1977	3990	5	18954
Sweden	3658	8175	402	969	26	43
Total EU-27	650467			126690		220308

Source: [European Environment Agency](#)

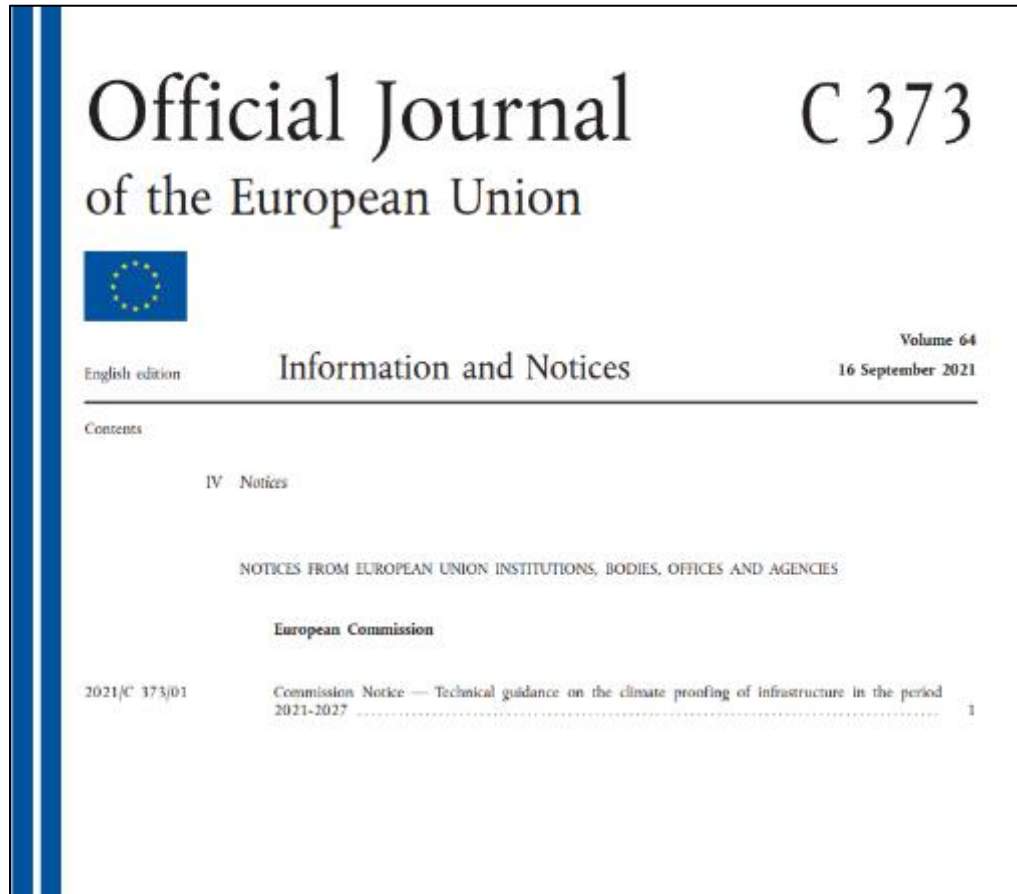
PART III – Overall methodology

Climate proofing considerations in 2021-2027

Climate Proofing: Process to *prevent infrastructure from being vulnerable to potential long-term climate impacts* whilst ensuring that the '*energy efficiency first*' principle is respected and that the level of *GHG emissions* arising from the project is *consistent with the climate neutrality objective in 2050*

- **Recital 10** – “Adequate mechanisms to ensure the climate proofing of supported investment in infrastructure should be an integral part of programming and implementation of the Funds.”
- **Article 9(4):** “The objectives of the Funds shall be pursued in line with the objective of promoting sustainable development as set out in Article 11 TFEU, taking into account the UN Sustainable Development Goals, the Paris Agreement and the “do no significant harm” principle.”
- **Art. 73 (Selection of operations by the MA), point J:** (The MA shall) “ensure the climate proofing of investments in infrastructure which have an expected lifespan of at least 5 years”
- ***Not a new requirement*** – Climate change considerations were required for Major Projects in 2014-2020 but now it applies to all projects with a lifetime of at least 5 years

EC Climate Proofing guidance



- ✓ *“Commission guidance on climate proofing of infrastructure in the period 2021-2027”* published in 2021
- ✓ Provides the overall methodological framework
- ✓ Based on the methodology used for Major Projects in 2014-2020 + applicable to several EU Funds

Climate Proofing in the project cycle

Project cycle management (PCM) stages



Integration of climate considerations into the PCM, particularly in earlier stages (e.g. strategy planning), allows for synergies and potential time and cost efficiency gains

Project stages and actions that are more relevant for project preparation

- Pre-feasibility and feasibility studies (including demand, option and CBA analyses)
 - Integration of climate considerations in the EIA and other environmental assessments required
 - Design of the project
- ❖ If climate considerations were properly addressed at strategy/plan level the relevant information should be taken into account at project level.

Golden rule

Integrate climate proofing concepts as early as possible in the project development cycle:

- Ideally within strategy/plan development, or at the latest in the Feasibility Study stage.
- Initial climate proofing screening before options appraisal can help project development.
- Climate proofing documentation should not result in any surprises or the need to substantially alter a project.

Climate Proofing process

Two pillars of climate proofing

Climate neutrality

Mitigation of climate change

Climate resilience

Adaptation to climate change

The process:

Screening

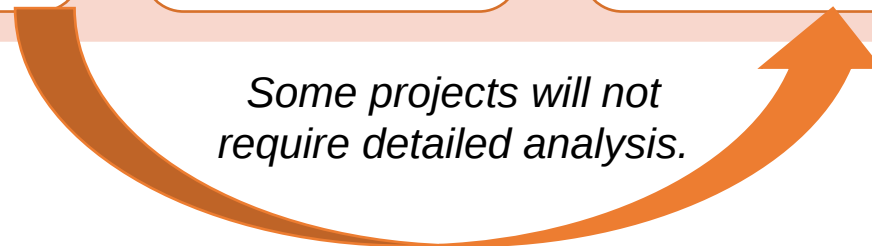
Detailed
analysis

Consolidated
documentation
of both pillars

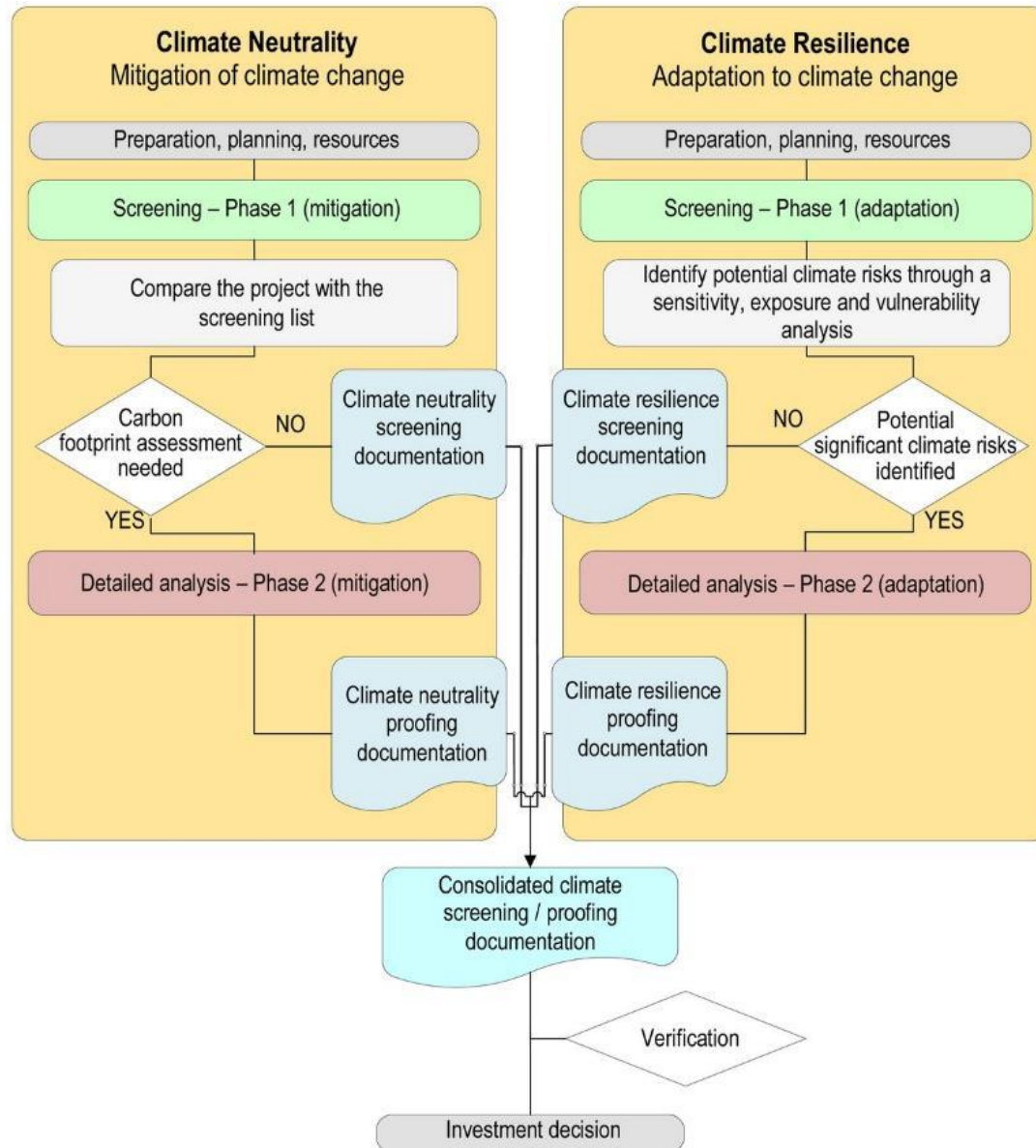
Verification

Investment
decision

*Some projects will not
require detailed analysis.*



Climate Proofing process



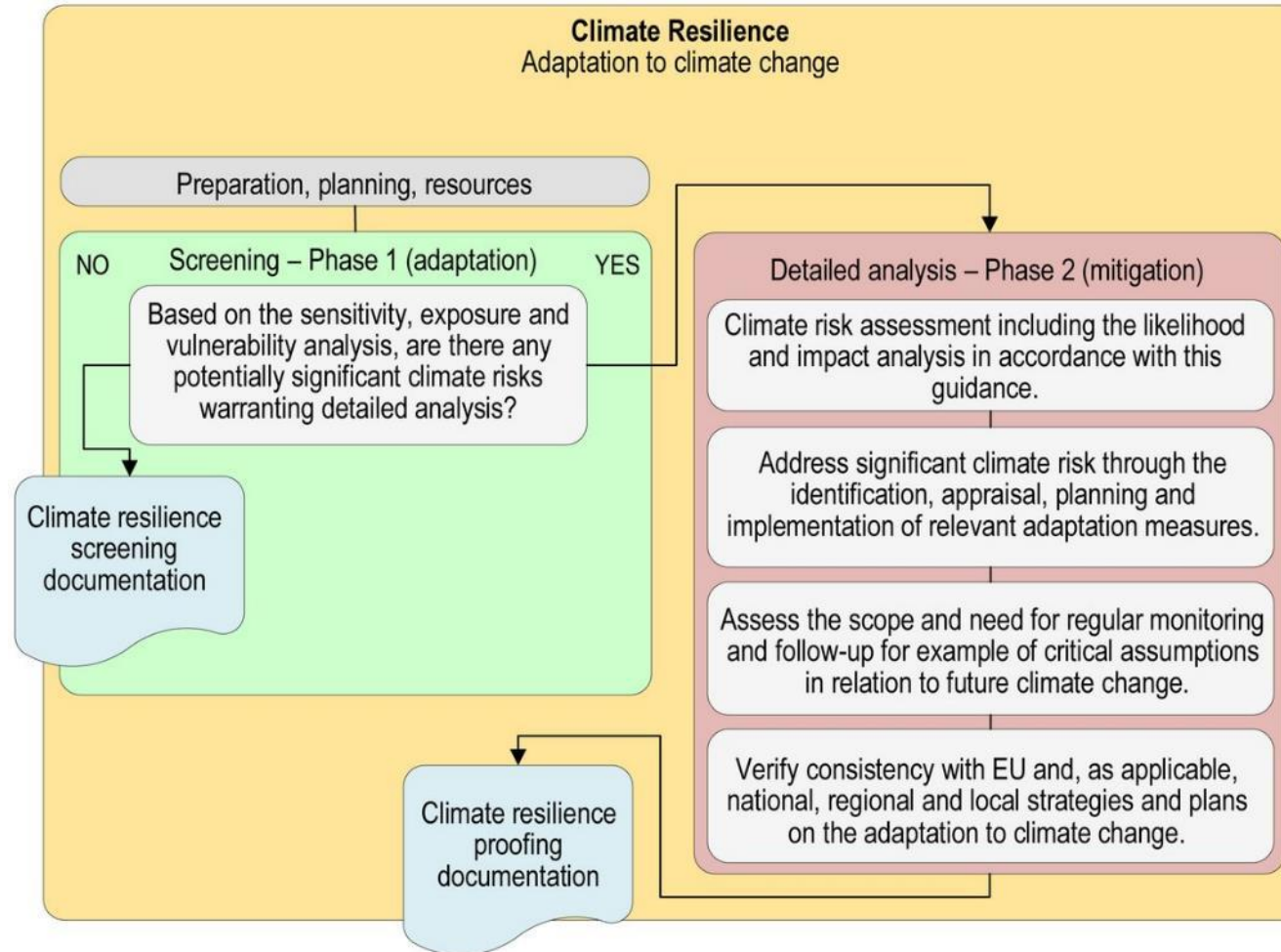
✓ Screening step (Phase 1):

- Neutrality pillar: Assess the need to quantify GHG emissions
- Resilience pillar: Identify potential climate vulnerabilities

✓ Detailed analysis step (Phase 2):

- Neutrality pillar (Climate mitigation):
 - ✓ Quantification and monetisation of GHG emissions
 - ✓ Compatibility with the Slovenian and EU emission targets for 2030 and 2050
- Resilience pillar (climate adaptation):
 - ✓ Climate risk assessment
 - ✓ Consistency with EU and national, regional, and local climate adaptation strategies and plans

Climate Resilience

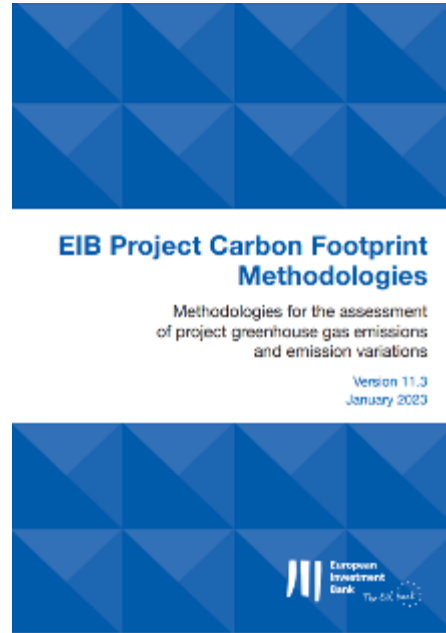


Climate Mitigation - Screening

Screening:	Categories of projects
In general, depending on the scale of the project, carbon footprint assessment WILL NOT be required, unless the project will be leading to significant emissions of CO₂ or other greenhouse gases. If this is not the case, the process in principle concludes with phase 1 (screening).	- Telecommunications services - Drinking water supply networks - Rainwater and wastewater collection networks - Small scale industrial waste water treatment and municipal waste water treatment - Property developments - Mechanical/biological waste treatment plants - R&D activities - Pharmaceuticals and biotechnology - Any other project category or scale of project for which the absolute and/or relative emissions generally are below 20,000 tonnes CO₂e/year (positive or negative)¹
In general, carbon footprint assessment WILL be required	- Municipal solid waste landfills - Municipal waste incineration plants - Large waste water treatment plants - Manufacturing Industry - Chemicals and refining - Mining and basic metals - Pulp and paper - Rolling stock, ship, transport fleet purchases - Road and Rail infrastructure, urban transport - Power transmission lines - Renewable sources of energy - Fuel production, processing, storage and transportation - Cement and lime production - Glass production - Heat and power generating plants - District heating networks - Natural gas liquefaction and re-gasification facilities - Gas transmission infrastructure - Any other project category or scale of project for which the absolute and/or relative emissions could exceed 20,000 tonnes CO₂e/year (positive or negative)

- **Aim:** Identify projects that result in significant GHG emissions or emissions reduction above the recommended threshold
- **Threshold:** Absolute or relative emissions above 20,000 tonnes CO₂e/year - positive or negative
- **Screening table:** Helps to identify investment categories where it is expected that the emissions would most likely be significant
- **Projects with significant GHG emissions would require a detailed assessment**

Climate Mitigation – Detailed analysis



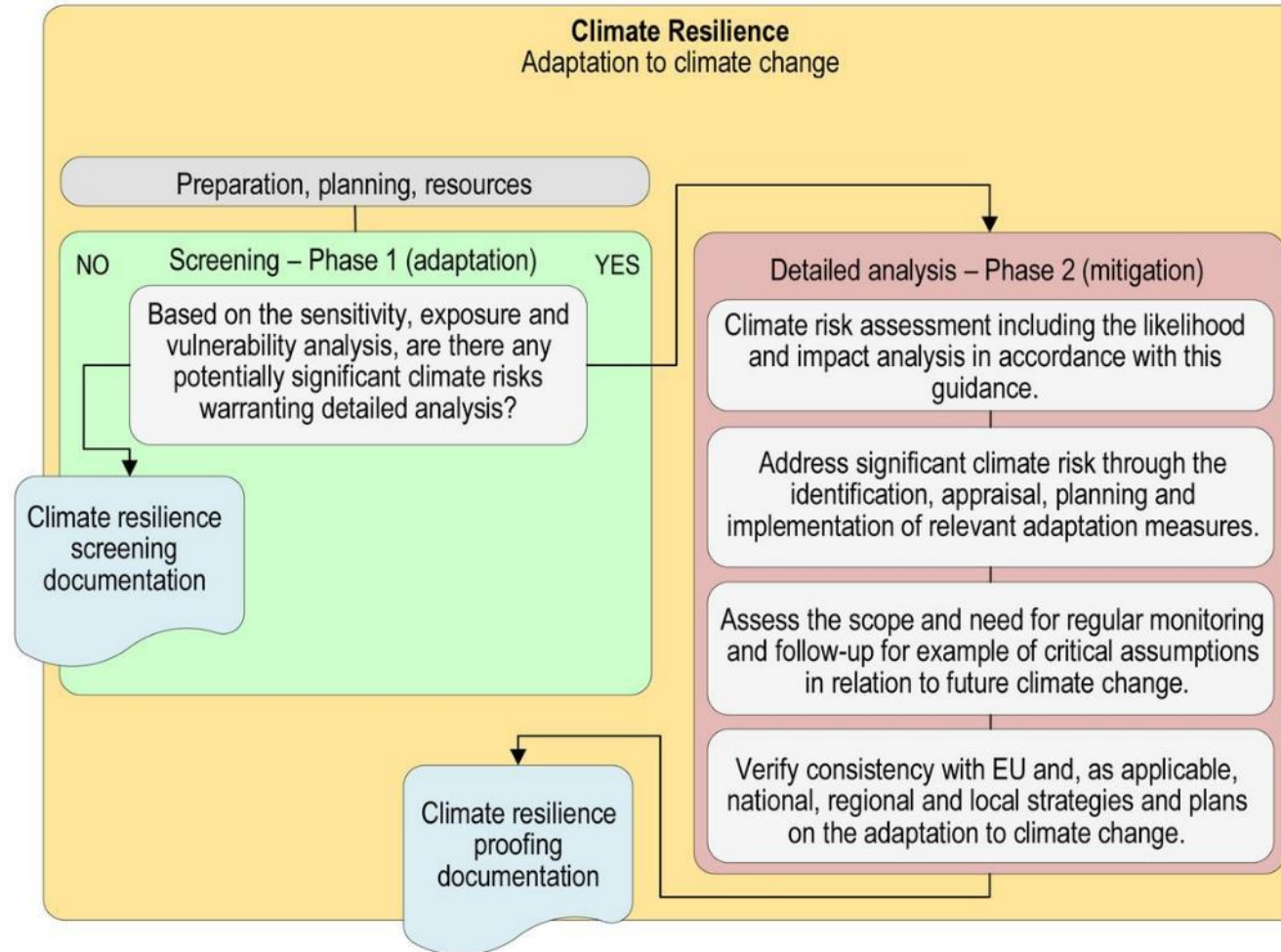
- GHG emissions quantification using the EIB Carbon Footprint methodology
- Present the low-carbon measures integrated in the project and how the principle of “Energy efficiency first” is incorporated
- GHG emissions monetisation using the EIB shadow carbon prices
- Inclusion of monetized GHG emissions in Economic Appraisal – If relevant to the project
- Verify compatibility with the Slovenian and EU emission targets for 2030 and 2050

Table 2 Shadow cost of carbon for GHG emissions and reductions in €/tCO₂e, 2016-prices

Year	2020	2025	2030	2035	2040	2045	2050
€/tCO ₂ e	80	165	250	390	525	660	800

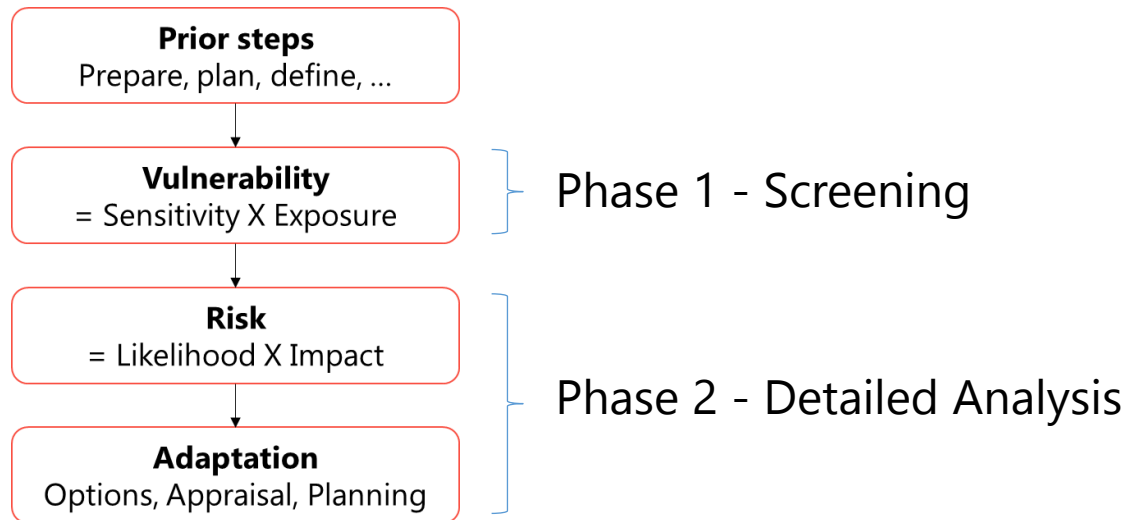
Source: [EIB Group Climate Bank Roadmap 2021-2025](#)

Climate Resilience



Climate Change Vulnerability and Risk Assessment (CCVRA)

- CC VRA as a basis for Climate Change Proofing for adaptation pillar for EU co-financing in 2021-2027 (as in 2014-2020):
 - Identify which climate hazards the project is vulnerable to, assess the level of risk and integrate adaptation measures to reduce that risk to an acceptable level
 - Cover current climate variability and future climate change



- [Climate change and major projects](#)
- [JASPERS Guidance – The Basics of Climate Change Adaptation Vulnerability and Risk Assessment](#)

- Climate Risk Assessment (CRA) is also a key tool for assessing climate resilience of EIB operations.

Climate Resilience – climate hazards

Comprehensive list of hazards needs to be assessed e.g.:

- List of climate hazards included in Commission Delegated Regulation (EU) 2021/2139 Appendix A
- List of climate hazards included in the JASPERS working paper “The Basics of Climate Change Adaptation, Vulnerability and Risk an alternative

II. Classification of climate-related hazards ⁽⁶⁾

	Temperature-related	Wind-related	Water-related	Solid mass-related
Chronic	Changing temperature (air, freshwater, marine water)	Changing wind patterns	Changing precipitation patterns and types (rain, hail, snow/ice)	Coastal erosion
	Heat stress		Precipitation or hydrological variability	Soil degradation
	Temperature variability		Ocean acidification	Soil erosion
	Permafrost thawing		Saline intrusion	Solifluction
			Sea level rise	
			Water stress	
Acute	Heat wave	Cyclone, hurricane, typhoon	Drought	Avalanche
	Cold wave/frost	Storm (including blizzards, dust and sandstorms)	Heavy precipitation (rain, hail, snow/ice)	Landslide
	Wildfire	Tornado	Flood (coastal, fluvial, pluvial, ground water)	Subsidence
			Glacial lake outburst	

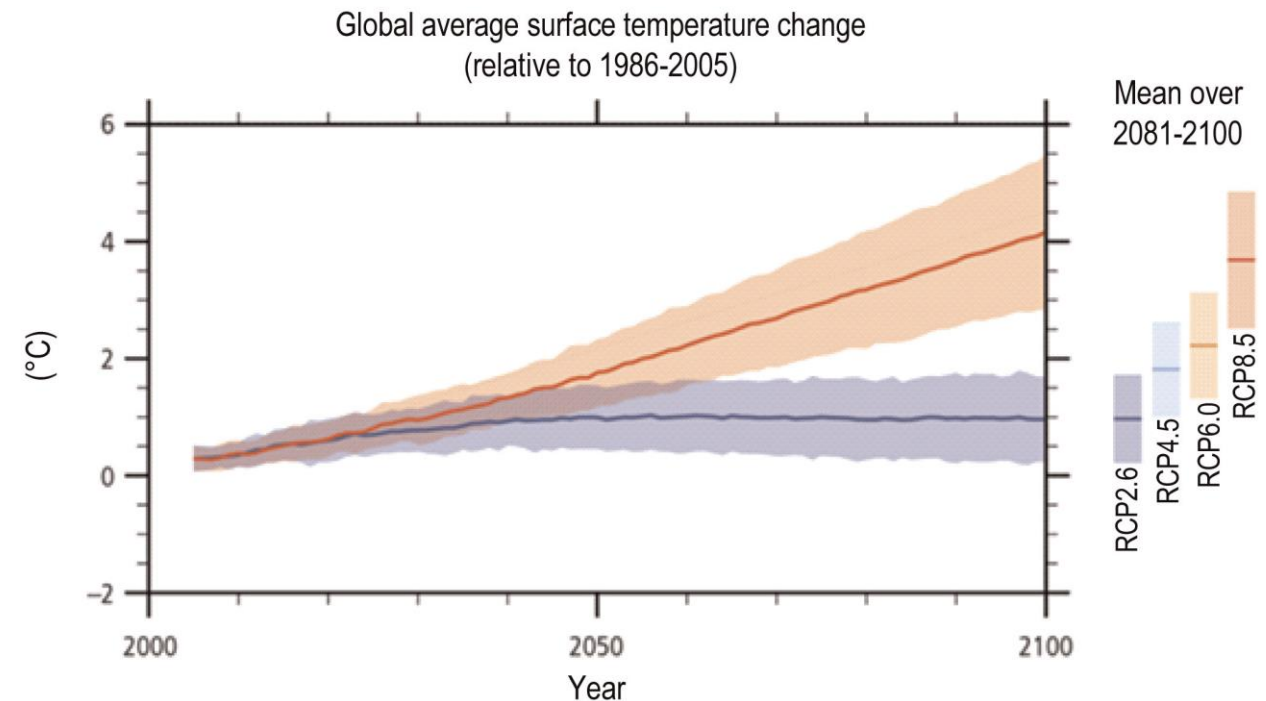
Climate Resilience – climate scenarios

REPRESENTATIVE CONCENTRATION PATHWAYS (RCPs)

Scenarios that include time series of emissions and concentrations of the full suite of greenhouse gases (GHGs) and aerosols and chemically active gases, as well as land use/land cover.

Recommendations for scenarios to be used

- RCP 8.5 for initial screening
- RCP 4.5 more relevant for projects where the level of climate resilience can be increased during the lifetime as and when needed
- If RCP 8.5 is used for the detailed climate vulnerability and risk assessment, there may be no further need for stress testing



Climate Resilience - screening

Aim: Identify the vulnerabilities of the project to climate change

Vulnerability assessment:

- **Sensitivity analysis** - how sensitive is the investment to climate hazards based on the **type of project** (irrespective of the location)
- **Exposure analysis** - which hazards are expected to be present at the **investment location** now and in the future (irrespective of the project type)



Climate Resilience – Detailed analysis

Climate risk assessment

- assessing the **likelihood** of a hazard to occur and the **severity** of the impacts associated with the hazards identified in the vulnerability assessment
- assessing the **significance of the identified risks** for the investment.
- Assessment should be **proportionate** to the **scale of the activity** and its **expected lifespan**

Risk = Likelihood x
Severity of impacts

RISK ASSESSMENT						
Indicative risk table: (example)		Overall impact of the essential climate variables and hazards (example)				Legend:
		Insignificant	Minor	Moderate	Major	Catastrophic
Likelihood	Rare					
	Unlikely		Drought			
	Moderate		Heat	Flood		
	Likely					
	Almost certain					
						Risk level
						Low
						Medium
						High
						Extreme

The output of the risk analysis may be summarised in a table combining likelihood and impact of the essential climate variables and hazards. Detailed explanations are required to qualify and substantiate the assessment conclusions. The risk levels should be explained and justified.

Climate Resilience – Detailed analysis

Adaptation measures

- If risk assessment concludes that there are potential significant climate risks they should be managed and **reduced to an acceptable level**:
 - **Structural measures**: physical change to the design of the project or its location
 e.g. modifications to designs, adoption of alternative solutions
 - **Non-structural measures (soft measures)**: operational and maintenance measures plus relevant monitoring. They are more about how the infrastructure is managed in the long-term.
 e.g. monitoring systems, emergency response programmes, staff training
 - **Risk management**: assessing whether the risks can be accepted and managed.
 - **Flexible/adaptive measures**: monitor the situation and only implement physical measures when the situation reaches a critical threshold
 - Potential use of nature-based solutions or rely on blue or green infrastructure to the extent possible should also be considered

Cost of adaptation measures shall be reflected in the project investment costs including (where relevant) in the cost-benefit analysis/economic appraisal.

Climate Resilience – Detailed analysis

Monitoring

- Risk assessment is a continuous process
- Important to determine any critical assumptions and establish monitoring and follow-up arrangements
- Particularly important for adaptive management of the project and implementing additional adaptation measures as and when needed.

Consistency with adaptation strategies

- Ensure that the project is aligned with the relevant EU and, as applicable, Slovenian, regional and local strategies and plans on the adaptation to climate change.

Climate proofing documentation

➤ **Introduction:**

- Describe the infrastructure project and outline how it addresses climate change, including financial information.
- Contact details (e.g., the organisation of the project promoter)

➤ **Summary of climate-proofing process:**

- Describe the climate-proofing process from initial planning to completion, including the integration into the project development cycle and coordination with environmental assessment processes (e.g., EIA).

➤ **Mitigation of climate change (climate neutrality):**

- Describe the screening and its outcome.
- If a detailed analysis (phase 2) is done:
 - Describe the GHG emissions and compare with the thresholds for absolute and relative emissions. As applicable, describe the economic analysis and the use of the shadow cost of carbon as well as the options analysis and the integration of the principle of ‘energy efficiency first’.
 - Describe the project’s consistency with relevant EU and National Energy and Climate Plans, the EU target for emission reductions by 2030 and climate neutrality by 2050. How is the project contributing to the objectives of these plans and targets.
 - For projects with an intended lifespan beyond 2050, describe the compatibility with operation, maintenance, and eventual decommissioning under circumstances of climate neutrality.
 - Provide other relevant information, for instance about the baseline for the carbon footprint

Climate proofing documentation

➤ **Adaptation to climate change (climate resilience):**

- Describe the screening and its outcome, including the sensitivity, exposure, and vulnerability analysis in adequate detail.
- If a detailed analysis (phase 2) is done:
 - Describe the climate risk assessment including the likelihood and impact analysis and identified climate risks.
 - Describe how the identified climate risks are addressed by relevant adaptation measures, including the identification, appraisal, planning and implementation of these measures.
 - Describe the assessment and outcome regarding regular monitoring and follow-up.
 - Describe the project's consistency with EU and, as applicable, national, regional, and local strategies and plans on the adaptation to climate change, and national or regional disaster risk management plans.

➤ **Information about the verification (where applicable):**

- Describe how the verification was done.
- Describe the main findings.

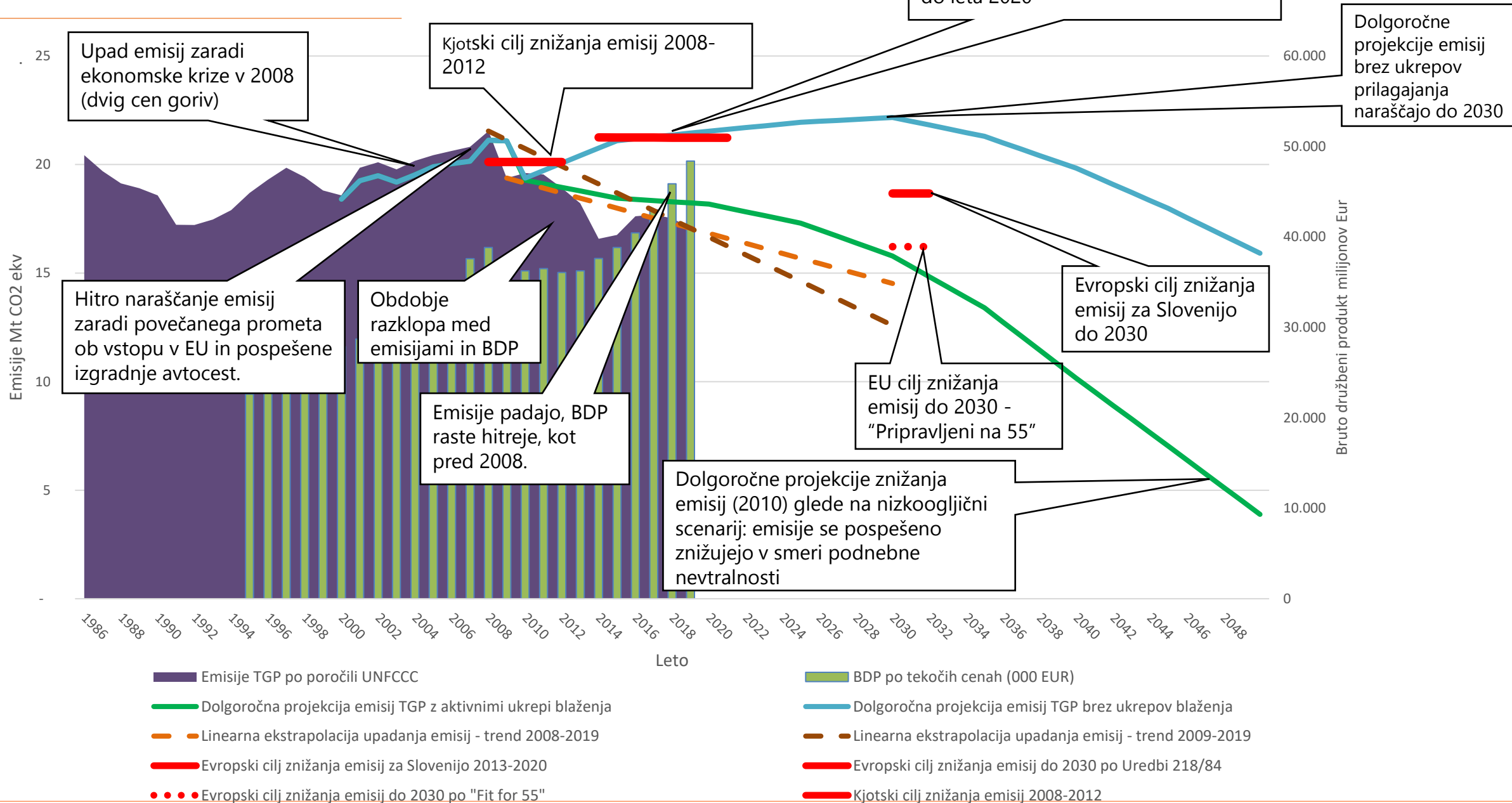
➤ **Any additional relevant information:**

- Any other pertinent issues required by this guidance and other applicable references.
- Describe any tasks related to climate proofing, which are deferred to a subsequent stage of the project development, for instance to be carried out by the contractor during the construction or by the asset manager during the operation.
- List of published documents (e.g., related to the EIA and other environmental assessments).
- List of key documents available with the project promoter.

PART IV – Slovenian context & examples

IV DEL – Slovenski okvir in primeri

Strategija podnebne nevtralnosti



Najpomembnejša zakonodaja za naložbe v infrastrukturo

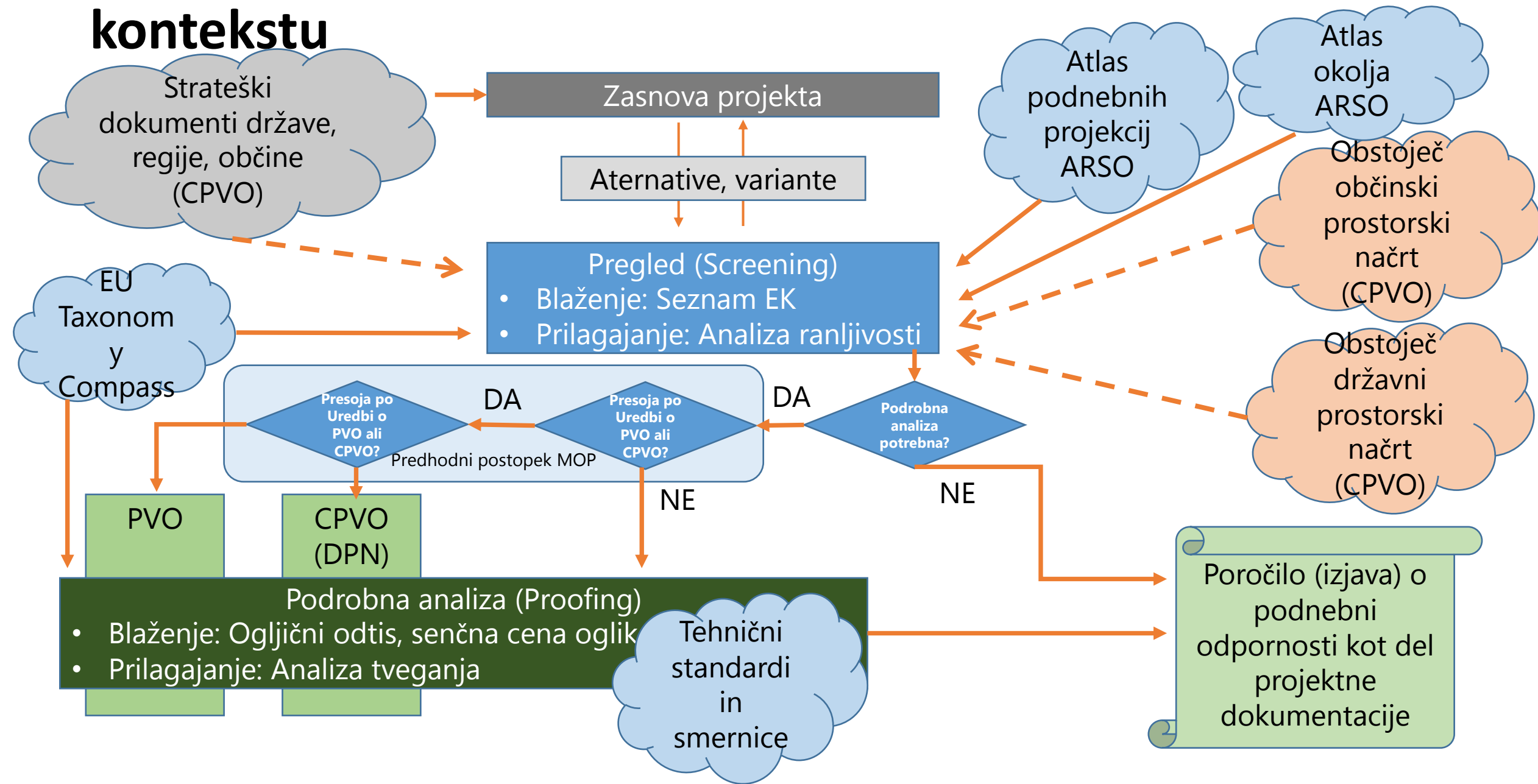
Preverjanje
podnebne
odpornosti
obvezno za
projekte
financirane
iz EU
sredstev

Blaženje in
prilagajanje
na PS že
navedena,
kot
teme/podr
očja
presoje
vplivov na
okolje

- **Gradbeni zakon** **Zakon o graditvi objektov**
- **Zakon o urejanju prostora**
- **Zakon o umeščanju prostorskih ureditev državnega pomena**

- **Zakon o varstvu okolja**
 - **Celovita presoja vplivov na okolje** (Uredba o okoljskem poročilu in podrobnejšem postopku celovite presoje vplivov izvedbe planov na okolje): Ta uredba določa podrobnejšo vsebino in obseg informacij, ki jih mora zagotavljati okoljsko poročilo. Ta uredba podrobneje ureja tudi določena vprašanja glede postopka celovite presoje vplivov izvedbe planov, programov, načrtov, prostorskih ali drugih aktov na okolje, ki se izvaja v skladu z zakonom, ki ureja varstvo okolja.
 - **Presoja vplivov na okolje**: Ta uredba določa vrste posegov v okolje, za katere je presoja vplivov na okolje obvezna; vrste posegov v okolje, za katere je presoja vplivov na okolje obvezna, če se zanje v predhodnem postopku ugotovi, da bi lahko imeli pomembne vplive na okolje; in podrobnejša merila, na podlagi katerih se v predhodnem postopku ugotavlja, ali je za nameravani poseg v okolje treba izvesti presojo vplivov na okolje.
- **Zakon o ohranjanju narave**
 - opredeljuje ukrepe za ohranjanje biotske raznovrstnosti in zavarovanje sistema naravnih vrednot. na posebnih varstvenih območjih zahteva izvedbo presoje sprejemljivosti planov, programov, načrtov, prostorskih ali drugih aktov in presojo sprejemljivosti posegov v naravo.

Shema krepitve podnebne odpornosti v slovenskem kontekstu



Nekaj razpoložljivih virov informacij

Podnebna nevtralnost: Blaženje

- **Strategija Razvoja Slovenije 2030 (SRS 2030)**
https://www.gov.si/assets/ministrstva/MKRR/Strategija-razvoja-Slovenije-2030/Strategija_razvoja_Slovenije_2030.pdf
- **Dolgoročna podnebna strategija Slovenije do 2050**
<http://www.pisrs.si/Pis.web/pregledPredpisa?id=RESO131>
- **Nacionalni Energetsko Podnebni Načrt (NEPN) – v prenovi**
<https://www.energetika-portal.si/dokumenti/strateski-razvojni-dokumenti/nacionalni-energetski-in-podnebni-nacrt-2020/>
- **Akcijski načrt za skoraj nič energijske stavbe**
<https://www.energetika-portal.si/dokumenti/strateski-razvojni-dokumenti/akcijski-nacrt-za-skoraj-nic-energijske-stavbe/>
- **Akcijski načrt za OVE**
http://www.energetika-portal.si/fileadmin/dokumenti/publikacije/an_ove/posodobitev_2017/an_ove_2010-2020_posod-2017.pdf
- **Akcijski načrt za energetske učinkovitost**
http://www.energetika-portal.si/fileadmin/dokumenti/publikacije/an_ure/an_ure_2020_sprejet_maj_2015.pdf
- **Podnebno ogledalo**
<https://www.gov.si/novice/2022-06-15-podnebno-ogledalo-2022/>

Podnebna odpornost: Prilagajanje

- **Strateški okvir prilagajanja na PS**
<https://www.gov.si/assets/ministrstva/MOPE/Okolje/Podnebne-spremembe/SOzP.pdf>
- **Ocena podnebnih sprememb v Sloveniji do konca 21. stoletja**
https://meteo.arso.gov.si/uploads/probase/www/climate/text/sl/publications/OPS21_Porocilo.pdf
- **Atlas podnebnih projekcij**
<https://meteo.arso.gov.si/uploads/probase/www/climate/OPS21/Priloge-app/#/izbor>
- **Atlas voda**
<https://geohub.gov.si/portal/apps/webappviewer/index.html?id=f89cc3835fcd48b5a980343570e0b64e>
- **E-vode**
<http://www.evode.gov.si/index.php>
- **Atlas okolja**
<http://gis.arso.gov.si/atlasokolja/>
- **Načrt upravljanja z vodami (NUV) – Draft:**
<https://www.gov.si/zbirke/javne-objave/osnutek-nacrta-upravljanja-voda-za-vodno-obmocje-donave-za-obdobje-2022-2027-in-osnutek-nacrta-upravljanja-voda-za-vodno-obmocje-jadranskega-morja-za-obdobje-2022-2027/>
- **Program upravljanja Nature 2000:**
<https://natura2000.gov.si/natura-2000/life-upravljanje/program-upravljanja/>
- **Občinski prostorski načrti: študije poplavne varnosti, CPVO poročila**

Podnebne grožnje za Slovenijo

	Povezane s temperaturo	Povezane z vetrom	Povezane z vodo	Povezane s trdnimi masami
Kronične	Zvišanje temperature (zrak, voda, morje)	Spremembe vzorcev vetra	Spremembe vzorcev in vrst padavin (dež, toča, sneg/žled)	Obalna erozija
	Vročinski stres		Nihanja padavin in vodnega režima	Degradacija tal
	Spremenljivost temperature		Zakisevanje morja	Erozija tal
	Topljenje permafrosta		Vdor slane vode	Utekočinjenje tal
			Dvig morja	
			Vodni stres (pomanjkanje vode)	
Akutne	Vročinski valovi	Ciklon, tajfun	Suša	Snežni plazovi
	Vdor hladnega zraka/pozeba	Vihar (vključno s snežnimi, prašnimi in peščenimi)	Polnjenje podtalnice	Zemeljski plazovi
	Požari v naravi	Tornado	Močne padavine (dež, toča, sneg/žled)	Udori
			Poplave (obalne - poplavljanje morja in jezer, poplavljanje rek in hudournikov, poplave meteornih voda, poplavljanje podzemnih voda, mestne poplave, poplave kraških polj)	
			Preboji ledeniških jezer	

Legenda:

Rdeča: Poslabšanje se že dogaja

Rumena: Možno, še ni določeno

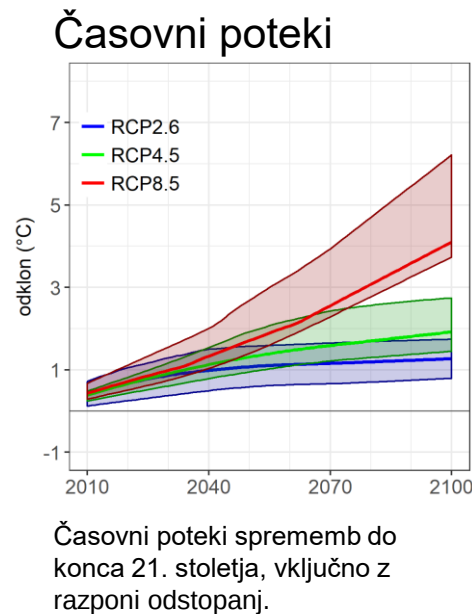
Modra: Ni pomembno oz. se ne pričakuje poslabšanja

Atlas podnebnih projekcij

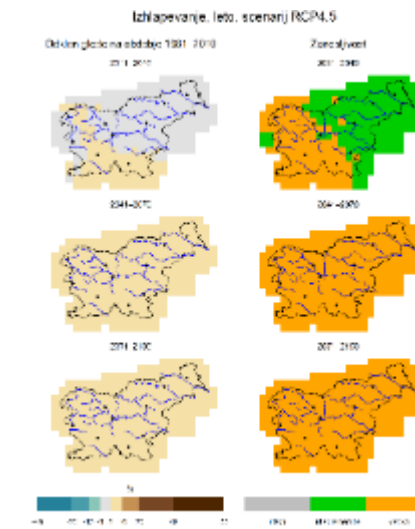
- **Grafična predstavitev predvidenih podnebnih sprememb in podnebnih spremenljivk do 2100**
- **Spremljanje spremenljivk:**
 - Temperatura
 - Padavine
 - Sneg
 - Sončno obsevanje
 - Veter
- **Scenariji:**
 - RCP 2.6
 - RCP 4.5
 - RCP 8.5
- **Razponi sprememb, trendi in zanesljivost napovedi**
- **Geografske regije**

Ocena podnebnih sprememb do konca 21. stoletja Atlas podnebnih projekcij

S pomočjo atlasa podnebnih projekcij raziskujte rezultate projekta "Ocena podnebnih sprememb v Sloveniji do konca 21. stoletja". Dostopate lahko do vseh grafičnih in tabelarnih produktov, ki so opisani v Sinteznem poročilu projekta in objavljeni v prilogah k sinteznemu poročilu. Grafike in preglednice so pripravljene za celo Slovenijo ali različne podnebne regije, za različne letne čase ali na letni ravni, za tri prihodnja tridesetletna obdobja in tri različne scenarije izpustov toplogrednih plinov. Pet različnih grafičnih prikazov osvetljuje različne vidike sprememb podnebja in vam omogoča hiter dostop do informacij, ki vas zanimajo. Podrobnejše razlage prikazov najdete v Sinteznem poročilu.

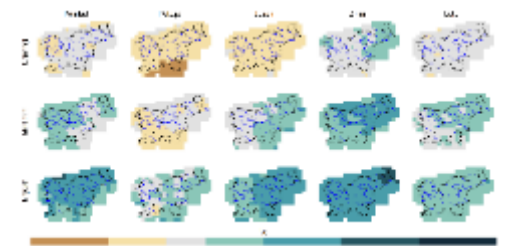


Srednje spremembe z zanesljivostjo



Sprememba izbrane spremenljivke v danih projekcijskih obdobjih glede na obdobje 1981-2010 in pripadajoča zanesljivost spremembe za določen scenarij.

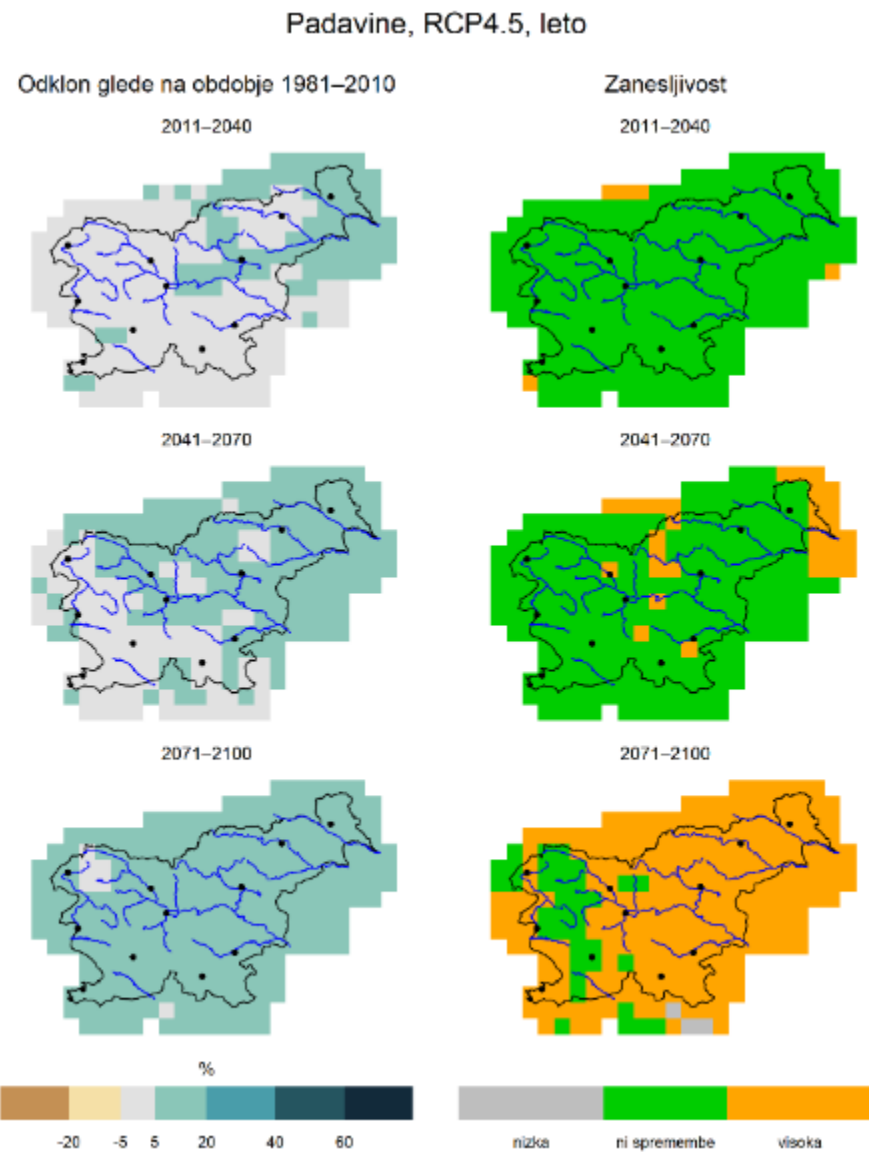
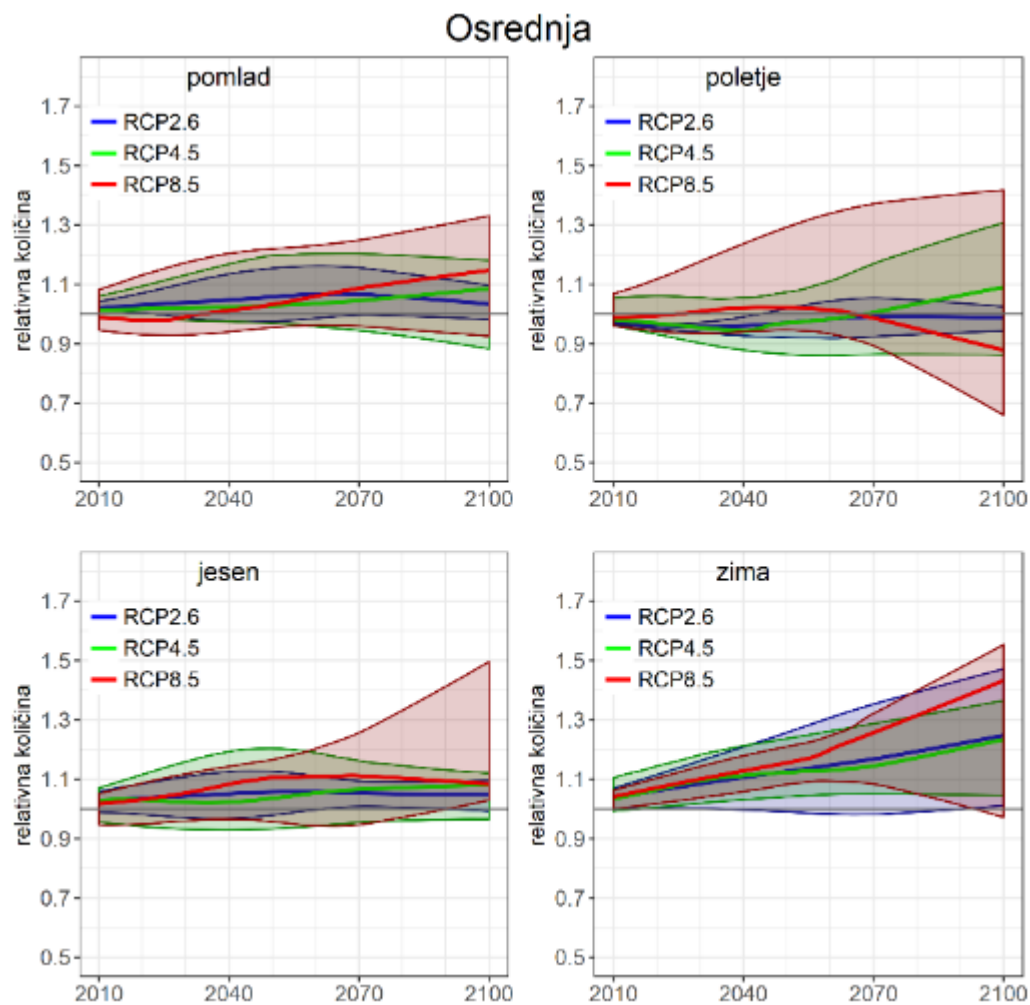
Razponi sprememb



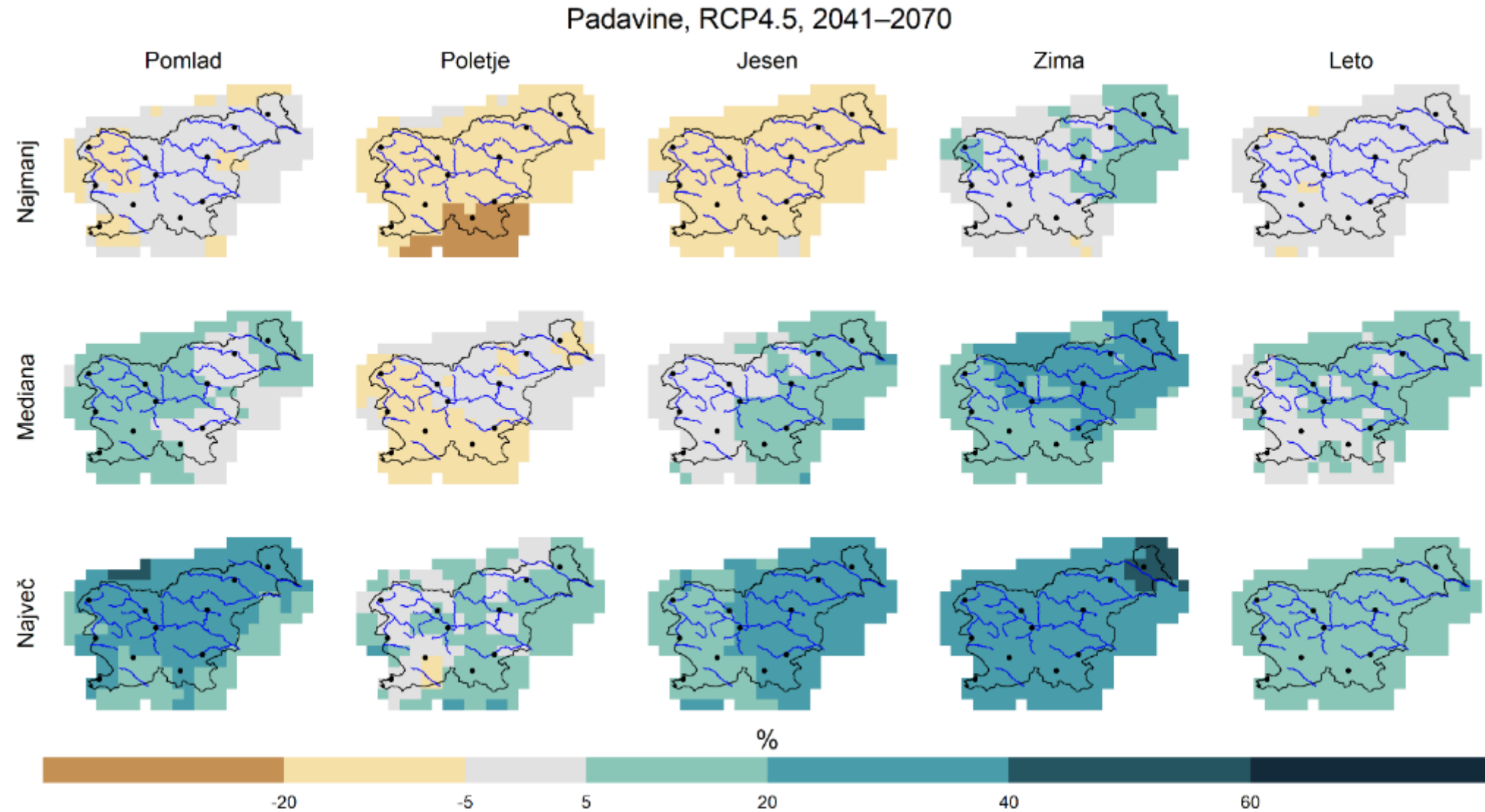
Najmanjša vrednost, mediana in največja vrednost spremembe ansambla modelov v določenem obdobju za izbran scenarij glede na obdobje 1981-2010.

Atlas podnebnih projekcij – pričakovana sprememba padavin zanesljivostjo napovedi

Sprememba padavin za regijo

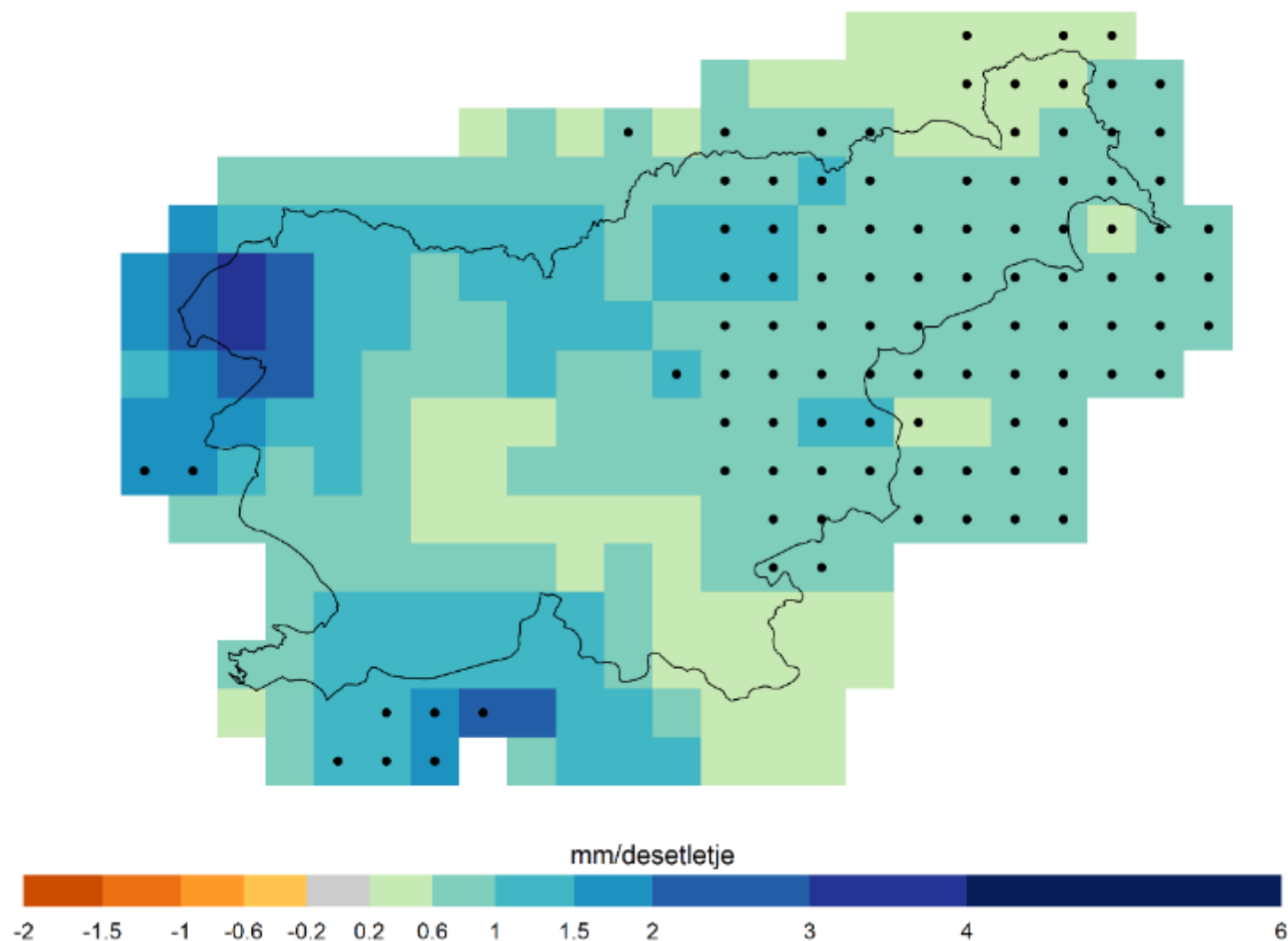


Atlas podnebnih projekcij – Razpon spreembe v padavinah



Atlas podnebnih projekcij – Trend največje petdnevne višine padavin

Trend največje petdnevne višine padavin, RCP4.5, zima





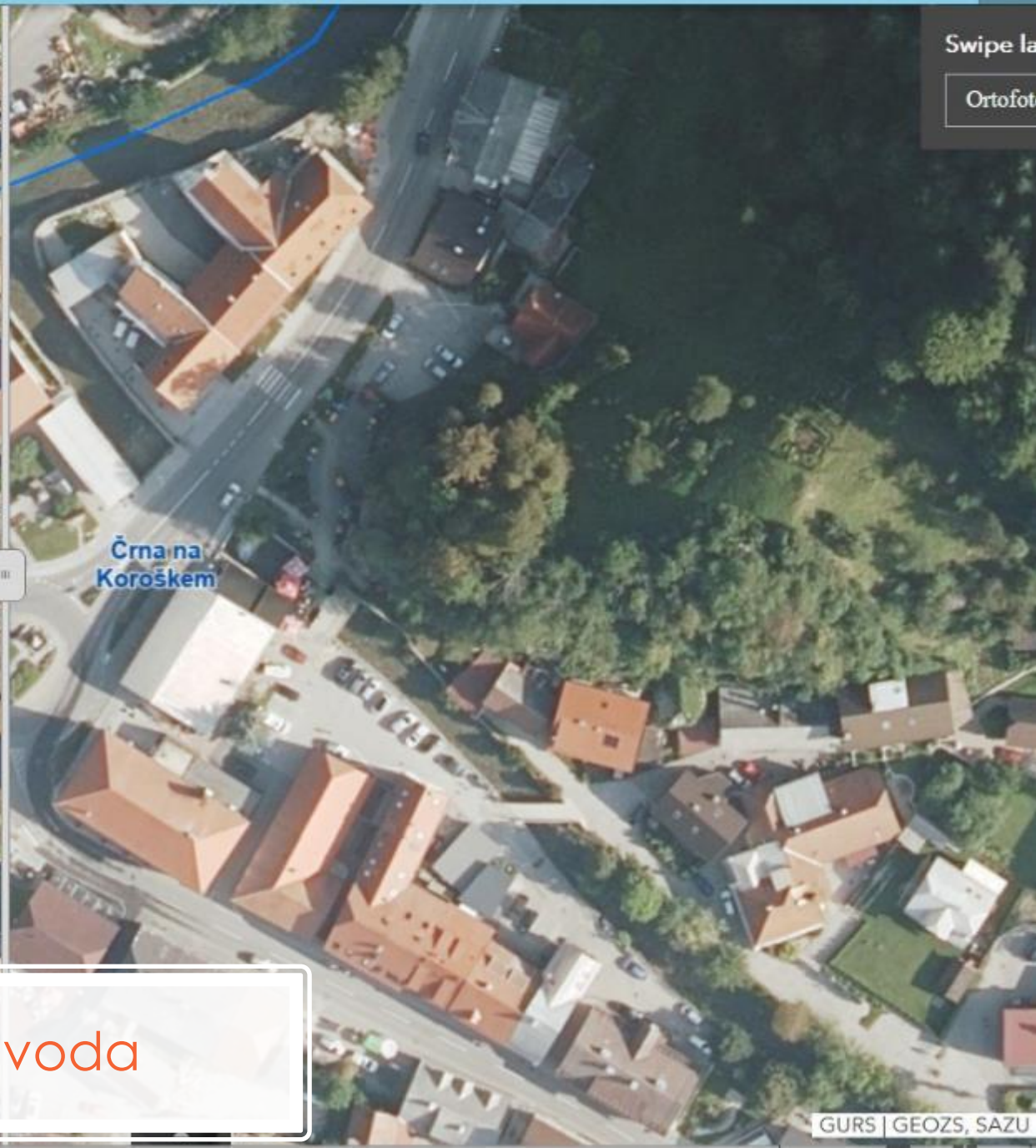
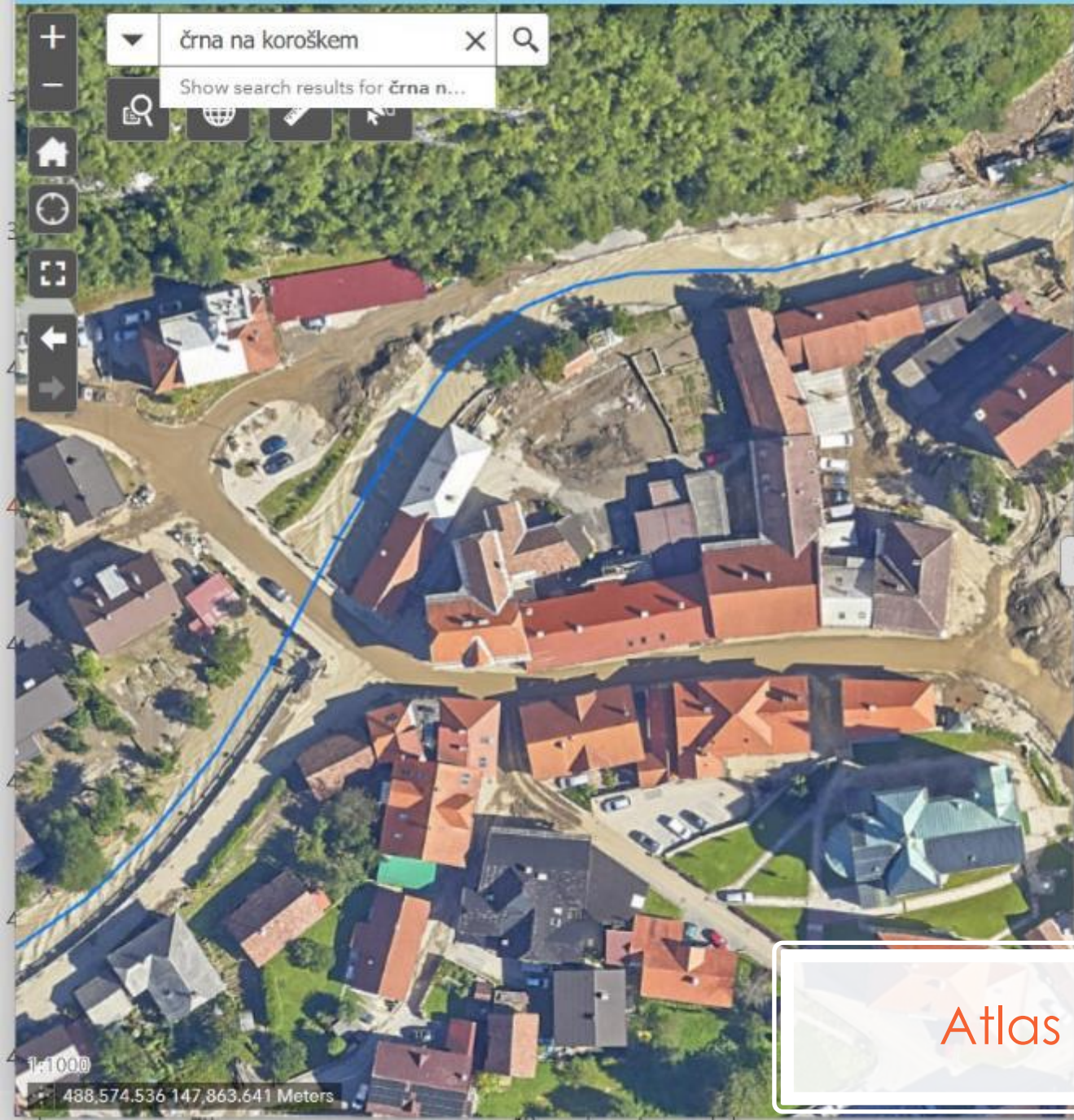
▼ črna na koroškem X Q

Show search results for črna n...



Swipe la

Ortofot



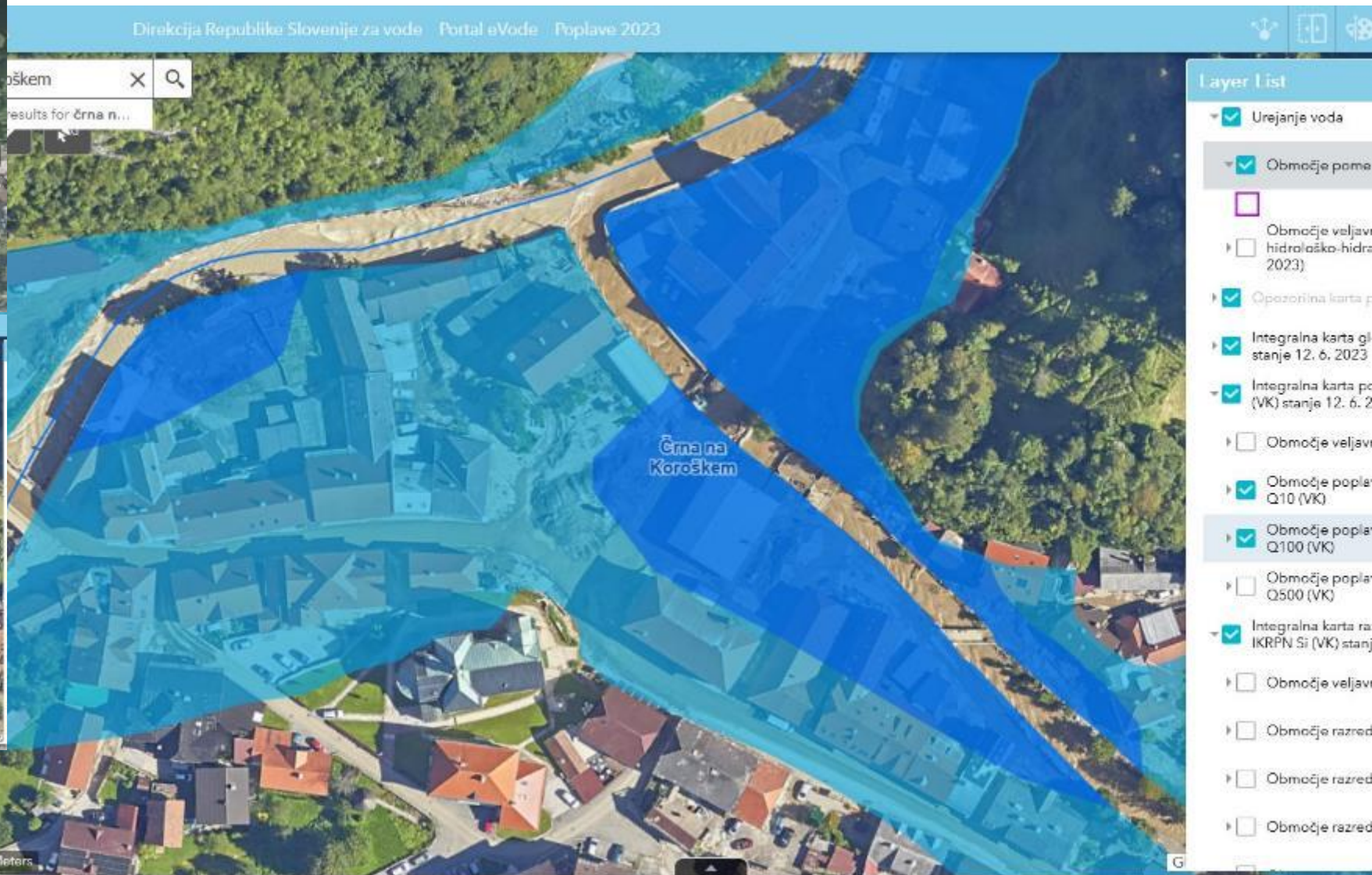
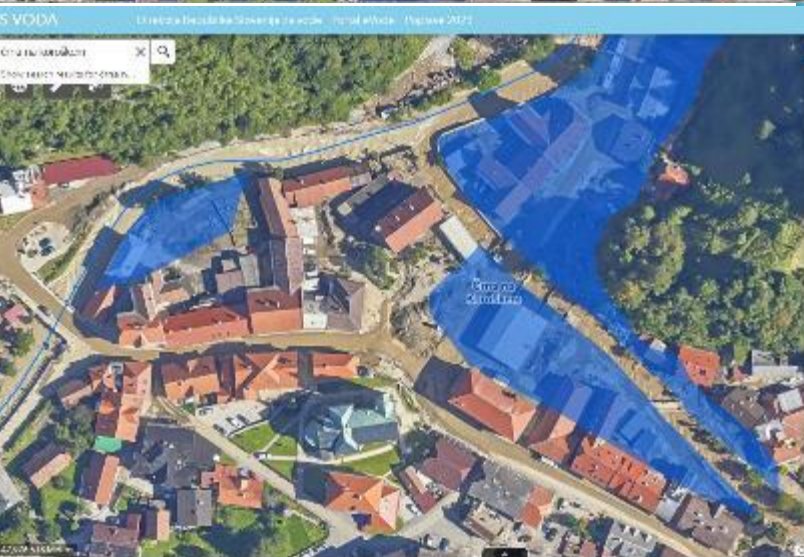
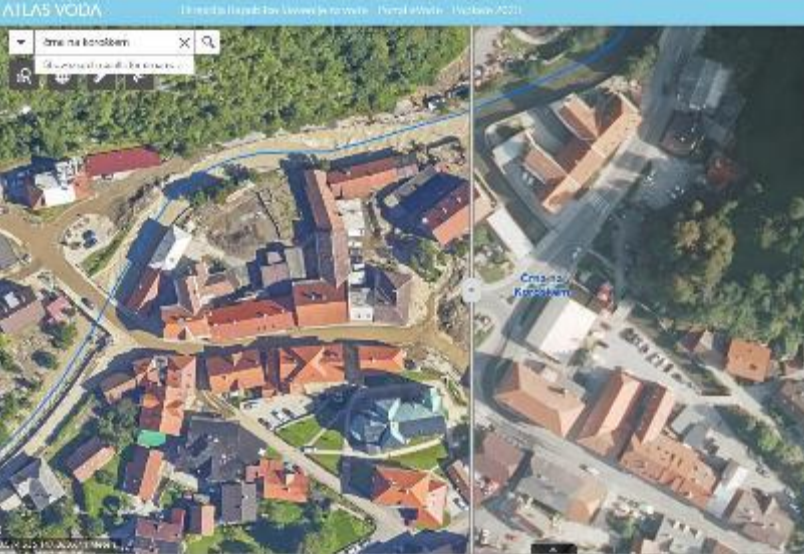
Črna na Koroškem

Atlas voda

1:1000

488,574.536 147,863.641 Meters

GURS | GEOZS, SAZU



Atlas voda

Primer: prenova železniške postaje

**Namen: Podnebna nevtralnost
 Blaženje PS**

Pregled – Faza 1 (blaženje):

Glede na seznam pregledov – blaženje

Podrobna analiza – Faza 2 (blaženje):

Izračun ogljičnega odtisa

- Količinska opredelitev izpustov TGP v tipičnem letu obratovanja
- Finančno ovrednotenje emisij TGP s tabelo prikritih stroškov ogljika
- Preverba združljivosti projekta s cilji zniževanja TGP do 2030 in 2050

**Namen: Podnebna odpornost
 Prilagajanje na PS**

Pregled – Faza 1 (prilagajanje):

**Podnebna ranljivost = Občutljivost x
 Izpostavljenost**

Podrobna analiza – Faza 2 (prilagajanje):

Ocena podnebnega tveganja =

Ocena verjetnosti x ocena vpliva

Poteka v štirih korakih:

- ocena podnebnega tveganja,
- ustrezni ukrepi prilagajanja,
- redno spremljanje in preverjanje,
- preverjanje skladnosti z ustreznimi strateškimi dokumenti in dokumenti prostorskega načrtovanja.

Primer: Obnova železniške postaje in železniške proge

Namen: Podnebna nevtralnost - Blaženje PS

Pregled – Faza 1 (blaženje):

Glede na seznam za pregled – blaženje mora biti za cestno in železniško infrastrukturo opravljena podrobna analiza, tudi če gre za naložbo v vzdrževanje in za prenovo infrastrukture državnega pomena, ki ne potrebuje gradbenega dovoljenja ali PVO.

Primer: Obnova železniške postaje in železniške proge

Namen: Podnebna nevtralnost - Blaženje PS

Podrobna analiza – Faza 2 (blaženje):

Količinsko ocenimo emisije TGP v običajnem letu obratovanja z uporabo priporočene metodologije izračuna ogljičnega odtisa (na primer metodologija EIB). Primerjamo s pragovi absolutnih in relativnih emisij TGP.

- (1) **Opredeliti meje projekta**
- (2) **Opredeliti obdobje ocenjevanja**
- (3) **Obsegi emisij z obsegi 1 in 2**
- (4) **Količinsko opredeliti absolutne emisije projekta (Ab)**
- (5) **Prepoznati in opredeliti izhodiščne emisije (Be)**
- (6) **Izračunati relativne emisije (Re); $Re = Ab - Be$**

Če emisije TGP presežejo prag (20.000 t Co₂ e/leto, povečanja ali zmanjšanja, absolutno ali relativno), se emisije TGP denarno ovrednotijo z uporabo **prikritih cen ogljika**.

Za infrastrukturo z življenjsko dobo po letu 2050 se preveri tudi skladnost projekta z obratovanjem, vzdrževanjem in končno razgradnjo pod pogoji **podnebne nevtralnosti**.

“Proga je elektrificirana, zato neposrednih emisij toplogrednih plinov ni. Emisije toplogrednih plinov v času obratovanja bodo enake kot v obstoječem stanju.”

Primer: prenova železniške postaje in železniške proge

Namen: Podnebna odpornost Prilagajanje na PS

Pregled – Faza 1 (prilagajanje):

Podnebna ranljivost = Občutljivost x Izpostavljenost

Podrobna analiza – Faza 2 (prilagajanje):

**Ocena podnebnega tveganja =
Ocena verjetnosti x ocena vpliva**

Poteka v štirih korakih:

- **ocena podnebnega tveganja,**
- **ustrezni ukrepi prilagajanja,**
- **redno spremljanje in preverjanje,**
- **preverjanje skladnosti z ustreznimi strateškimi dokumenti in dokumenti prostorskega načrtovanja.**

Primer: Obnova železniške postaje in železniške proge

Namen: Podnebna odpornost Prilagajanje na PS

Pregled – Faza 1 (prilagajanje):

Opravi se **analiza podnebne občutljivosti, izpostavljenosti in ranljivosti**.

Analiza občutljivosti železniške postaje in železniške proge v prenovi ugotavlja:

- **velika občutljivost:**
poplave, nestabilnost tal/plazove, erozijo tal, žled,
- **srednja občutljivost:**
ekstremne temperature, nevihte in z njimi povezanimi sunki vetra, požari, ter zmrzovanje.
- **neobčutljivost:**
ekstremne padavine, suše in povprečno hitrost vetra

OBČUTLJIVOST	Ekstremne temperature	Povprečna hitrost vetra	Ekstremni sunki vetra	Ekstremne padavine	NEVIHTE	POPLAVE	EROZIJA TAL	POŽARI	NESTABILNOST TAL / PLAZOVI	SUŠA	ZMRZOVANJE	ŽLED
Lokacija projekta - obstoječe stanje (On-site)												
Koristi projekta (uporabniki, prihodki)												
Prometne povezave												

Legenda:

Občutljivost	Ni občutljivosti	Srednja	Velika
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Primer: Obnova železniške postaje in železniške proge

Namen: Podnebna odpornost Prilagajanje na PS

Pregled – Faza 1 (prilagajanje):

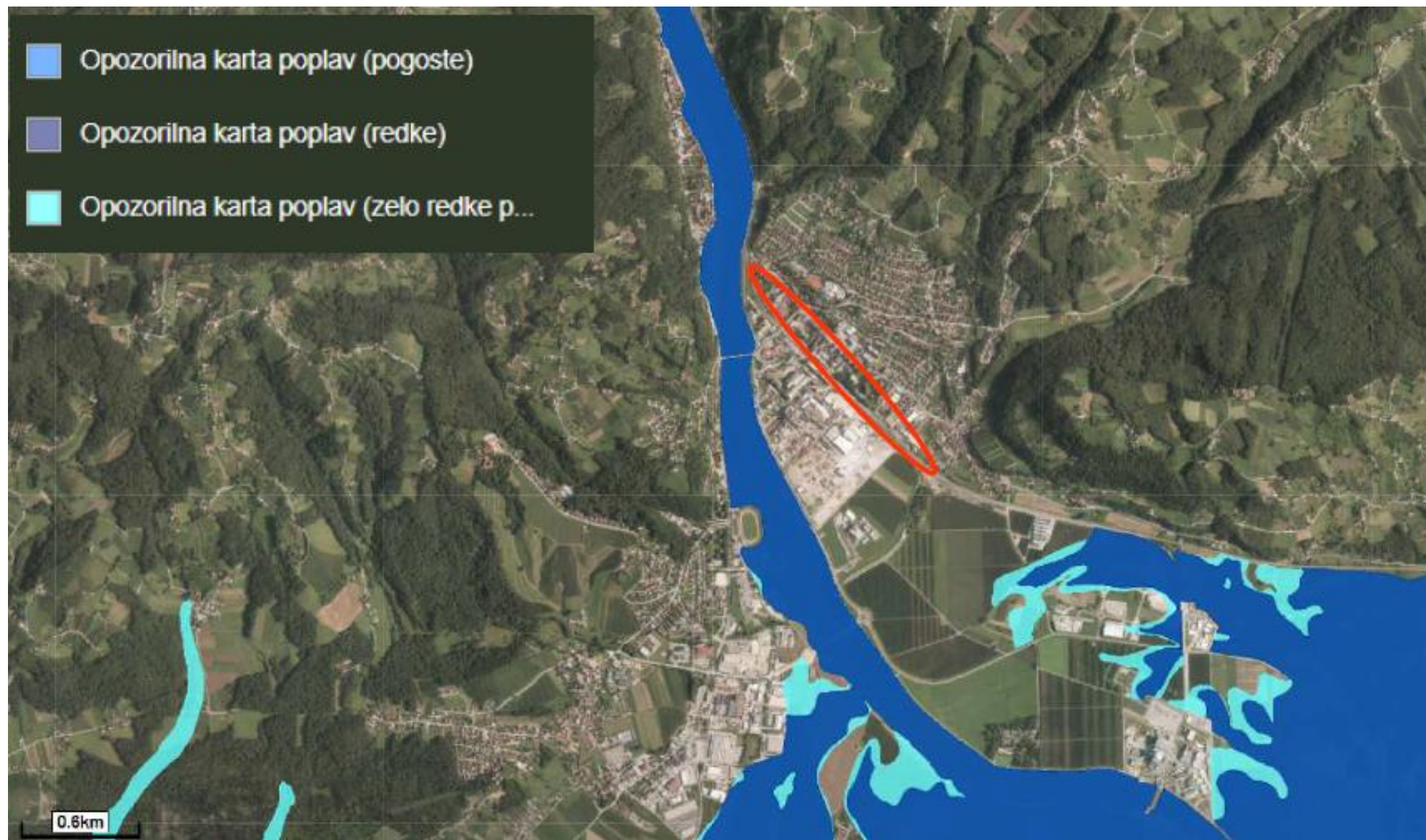
Opravi se **analiza podnebne občutljivosti, izpostavljenosti in ranljivosti**.

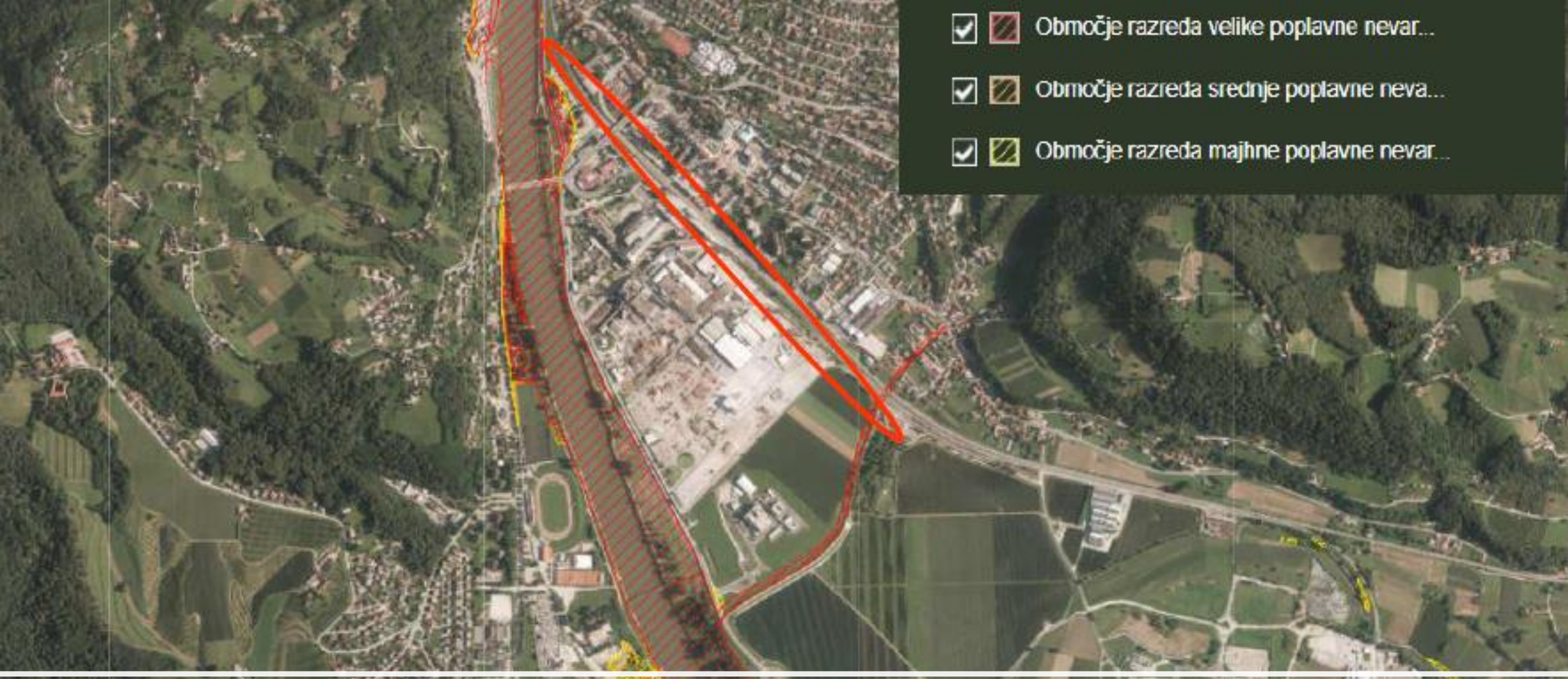
Analiza izpostavljenosti železniške postaje v prenovi je izvedena za podnebne grožnje velike in srednje občutljivosti:

poplave, nestabilnost tal/plazove, erozijo tal, žled, ekstremne temperature, nevihte in z njimi povezanimi sunki vetra, požari, ter zmrzovanje.

Poplave - Na obravnavanem območju nadgradnje železniške postaje in železniške proge je ugotovljena možnost izpostavljenosti na poplave **majhna**.

Primer: Obnova železniške postaje in železniške proge





Primer: Obnova železniške postaje in železniške proge – analiza izpostavljenosti



Primer: Obnova železniške postaje in železniške proge analiza izpostavljenosti - poplave

Ocena analize izpostavljenosti: možnost izpostavljenosti na poplave **majhna**.

Obrazložitev:

Skladno z DPN so izvedene ureditve pritoka v dolžini približno 550 m, za zaščito vasi pred 20- letnimi vodami. Gorvodno od železnice skozi naselje se je povečal pretočni profil in poglobilo dno. Za utrditev dna in razgibavanje vodnega toka so se med nizke pragove vgradili betonsko-kamniti talni pragovi, za premagovanje višinske razlike pa zgradili kamnite drče. Obstoječe premostitve in prepusti so se ohranili in preuredili. Brežina se je zavarovala z vipo, kamnometom ter kamnom v betonu in kamnito zložbo v betonu, pri čemer so se izvedle globoke fuge in razgibanost dna.

Pri nadgradnji železniške postaje ne gre za novogradnjo. Na tem delu gre za tehnično urejen vodotok. V projektu je predvidena le razširitev obstoječega AB prepusta čez potok in sicer gorvodno in dolvodno se razširi z dobetoniranjem preklade 33-47 cm za namestitev AB kinet in robnih vencev. Namesto dveh tirov železniške proge bodo tukaj trije tiri.

Primer: Obnova železniške postaje in železniške proge

Namen: Podnebna odpornost Prilagajanje na PS

Screening – Phase 1 (adaptation):

Opravi se **analiza podnebne občutljivosti, izpostavljenosti in ranljivosti**.

Analiza občutljivosti železniške postaje v prenovi ugotavlja:

- **velika občutljivost:** poplave, nestabilnost tal/plazove, erozijo tal, žled,
- **srednja občutljivost:** ekstremne temperature, nevihte in z njimi povezanimi sunki vetra, požari, ter zmrzovanje.
- **neobčutljivost:** ekstremne padavine, suše in povprečno hitrost vetra

Analiza izpostavljenosti železniške postaje v prenovi je izvedena za podnebne grožnje velike in srednje občutljivosti:

Poplave - Na obravnavanem območju nadgradnje železniške postaje in železniške proge je ugotovljena možnost izpostavljenosti na poplave **majhna**.

Erozija - Ocenjena izpostavljenost projekta na erozijo je **majhna**.

Analiza izpostavljenosti - erozija

Podlage ▾



Sloji Urejanje Iskanje Legenda

☒ prikaži vse

- ☒ ZAČASNI SLOJI
- ☒ PROSTORSKE ENOTE
- ☒ MERILNA MESTA
- ☒ OKOLJE
- ☒ PODNEBJE
- ☒ INFRASTRUKTURA
- ☒ VODE
- ☒ NARAVA
- ☒ TLA
- ☒ POTRESI
- ☒ NAČRT UPRAVLJANJA Z VODAMI

☒  ← Erozijska območja - opozorilna karta erozije

☐  ← Plazovita območja - karta lavinske nevarnosti

30km

Credits: Arso

Primer: Obnova in vzdrževanje železniške infrastrukture – obnova železniške postaje in železniške proge

Namen: Podnebna odpornost Prilagajanje na PS

Analiza podnebne izpostavljenosti železniške postaje v prenovi je izvedena za podnebne grožnje/tveganja **velike** in **srednje** občutljivosti ter za sedanje in prihodnje stanje.

Podnebni dejavnik	Izpostavljenost za prihodnje stanje
Ekstremne temperature	
Nevihte	
Sunki vetra	
Poplave	
Erozija tal	
Nestabilnost tal/plazovi	
Gozdni požari	
Zmrzovanje	
Žled	

Legenda:

	ni/majhna izpostavljenost
	srednja izpostavljenost
	velika izpostavljenost

Primer: Obnova železniške postaje in železniške proge

Namen: Podnebna odpornost Prilagajanje na PS

Screening – Phase 1 (adaptation):

Opravi se **analiza podnebne ranljivosti** = **občutljivost x izpostavljenost**

Analiza ranljivosti železniške postaje v prenovi je izvedena za podnebnih grožnj velike in srednje občutljivosti:

Velika ranljivost za podnebni dejavnik

- žled

Stopnja ranljivosti - žled		IZPOSTAVLJENOST		
OBČUTLJIVOST		NI	Srednja	Velika
	NI			
	Srednja			
	Velika			

Srednja ranljivost za:

- ekstremne temperature, (občut., izpost.)
- poplave, (občut., izpost.)
- nevihte, (občut., izpost.)
- sunki vetra, (občut., izpost.)
- erozija, (občut., izpost.)
- nestabilnost tal/plazljivost (občut., izpost.)
- požari, (občut., izpost.)
- Zmrzovanje (občut., izpost.)

Stopnja ranljivosti - Gozdni požari		IZPOSTAVLJENOST		
OBČUTLJIVOST		NI	Srednja	Velika
	NI			
	Srednja			
	Velika			

Primer: Obnova železniške postaje in železniške proge

Namen: Podnebna odpornost Prilagajanje na PS

Screening – Phase 1 (adaptation):

Velika ranljivost za podnebni dejavnik: Žled

Opravi se :

Podrobna analiza – Faza 2 (prilagajanje):

Ocena podnebnega tveganja =
Ocena verjetnosti x ocena vpliva

Poteka v štirih korakih:

- **ocena podnebnega tveganja,**
- **ustrezni ukrepi prilagajanja,**
- **redno spremljanje in preverjanje,**
- **preverjanje skladnosti z ustreznimi strateškimi dokumenti in dokumenti prostorskega načrtovanja.**

Primer: Obnova železniške postaje in železniške proge

Zaključek podrobne analize – Faza 2 (prilagajanje):

Ocena tveganja

“V fazi 1. je bilo ugotovljeno, da je ranljivost projekta na podnebno grožnjo – žled – Velika. Posledično je bilo potrebno podrobneje obravnavati projektne rešitve in ponovno ocenjevati ranljivost projekta. V projektu je za omilitev posledic pojava žledu na vozni mreži predviden ukrep: Konzole, ki nosijo vodnike, so krajše in lahko nosijo samo vodnike enega tira. Z upoštevanjem projektnih rešitev nadgradnje železniške postaje in strožjih zahtev upravljavca v projektni nalogi ocenjujemo, da bo izpostavljenost projekta na žled majhna.”

“Za dogodke zaradi žleda je bila ugotovljena velika ranljivost. Verjetnost pojava na tem območju je malo verjetna, posledice v primeru žleda pa bi bile srednje. Na podlagi navedenega ocenjujemo, da je tveganje ocenjeno kot **majhno**.”

	Verjetnost	Redko	Malo verjetno	Možno	Verjetno	Zagotovo
Posledica		1	2	3	4	5
Neznatno	1					
Majhno	2					
Srednje	3		Žled			
Veliko	4					
Uničujoče	5					

Primer: Obnova železniške postaje in železniške proge

Zaključek podrobne analize – Faza 2 (prilagajanje):

Poteka v štirih korakih:

- **ocena podnebnega tveganja** izvedena za žled- **majhno tveganje**
- **ustrezni ukrepi prilagajanja** – niso potrebni zaradi omilitvenih ukrepov, ki so del projektnih rešitev
- **redno spremljanje in preverjanje** – ni omenjeno
- **preverjanje skladnosti z ustreznimi strateškimi dokumenti in dokumenti prostorskega načrtovanja** – delno usklajeno (manjka podrobna analiza podnebnih tveganj srednje jakosti – obvezna glede na nacionalne smernice)-
- Nikjer ni opredelitve do scenarija RCP 8.5 podnebnih projekcij le scenariji RCP 4.5. Opredelitev življenske dobe projekta.

“Ugotovljeno je bilo, da za omilitev vpliva pričakovanih podnebnih sprememb niso potrebni prilagoditveni ukrepi. Zadostujejo namreč omilitveni ukrepi, ki so del podanih projektnih rešitev, saj se je pri projektiranju upoštevalo vse predpisane standarde in veljavno zakonodajo, ki vsebujejo tako visoke zahteve, da z njimi preprečimo oz. omilimo vsa morebitna tveganja.”

“Zadostujejo omilitveni ukrepi, ki so del projektnih rešitev, presoja upravičenosti prilagoditvenih ukrepov ni potrebna.”

“Ker dodatni prilagoditveni ukrepi niso potrebni, ni potrebno izdelati akcijskega načrta prilagajanja.”

Thank you

Massimo Marra

Principal Advisor, JASPERS Country Manager for Slovenia (m.marra@eib.org)

Ioanna Kourti

Senior Climate Change Specialist (i.kourti@eib.org)

JASPERS

www.jaspers.eib.org

JASPERS Knowledge Platform

<https://jaspers.eib.org/knowledge/index>

Nataša Beltran

natasa.beltran@stritih.com

www.Stritih.com