Mitigation and Adaptation Indicators

D2.6

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LOCALISED

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List of Abbreviations

BEI	Baseline Emission Inventory
EUCalc	European Calculator
GW	Gigawatts
kg	Kilogram
kW	Kilowatt
LUCAS	Land Use and Cover Area frame Survey
NUTS	Nomenclature of Territorial Units for Statistics
MW	Megawatt
MWh	Megawatt hours
RVA	Risks and Vulnerability Assessment
SECAP	Sustainable Energy and Climate Action Plan
SDGs	Sustainable Development Goals
TWh	Terawatt hours

Executive Summary

The objective of LOCALISED is to downscale national decarbonisation trajectories consistent with Europe's net-zero target to the local levels and provide the results to **local administrations, citizens and businesses**, in order to speed up the uptake of mitigation and adaptation actions. To this end, the project will create tools that transform localised data from decarbonisation pathways into knowledge for action. The tools are the (1) Decarbonisation Profiler for municipalities, regions and their citizens; and (2) the Net-Zero Business Consultant tool targeted primarily at businesses. The tools will inform local administrations, and businesses on viable combinations of (sectoral) mitigation and adaptation measures; facilitate the implementation and monitoring of SECAPs; and inform citizens how climate change and EU net-zero scenarios positively and negatively affect their life and what share of mitigation can be enhanced via key behavioural change.

Defining and selecting the most appropriate and practicable indicators can be a challenge, due to factors such as data availability but also because of the degree of usability or understanding them in an easy and practical way. This deliverable aligns the wealth of information stemming from energy and climate models with the information needs of the project target groups. It connects the information needs of the targeted audiences in LOCALISED with the tools that are developed, ready to respond them. Hence, the proposed mitigation and adaptation indicators need to be defined in an early project stage in order to clearly understand the input data and the data processes (calculations) required as well as the output data provided. Additionally, they are important elements feeding into the co-creation processes. That said, the proposed list of indicators will be subject of revision as stakeholder consultation ramps up and prototypes of tools are developed.

It is crucial, to choose indicators which reflect the information needs as closely as possible and to harmonise them, providing a useful resource for the development of a decision support tool. It is also important to standardize the description of the resources used (input) the measures of the effects (output) and the contextual specifics that may facilitate or serve as barriers for the transformation of the inputs into outputs (context). In line with the above, the document is addressed to all partners involved in the identification and selection of mitigation and adaptation indicators tailored to the target groups.

1.Introduction

The overarching objective of LOCALISED is to downscale national decarbonisation trajectories consistent with Europe's net-zero target to the local levels and provide the results to local administrations, citizens and businesses, in a way that would speed up the uptake of mitigation and adaptation actions[1]. While the full set of downscaled model outputs are directly useful for scientists, for local administration, businesses and citizens, the information provision will demand a better understanding of their requirements. Local actors need and deserve to know why they might have to take different decisions or call on different or additional resources in conducting their livelihoods. Thus, they need to know about the changing risk context, how it may affect them, and what they can do to prepare and protect themselves. This can range from simple re-wording of model outputs to make them more intelligible to a target group, to the formulation of a new indicator tailored to the user needs. Accordingly, in the overall process of LOCALISED (see Figure 1) there needs to exist an alignment between data provision, target group needs and tool functionality.

Hence, this report will present a first set of proposed mitigation and adaptation indicators needed for each target group within the project as well as select them to be simple to understand. Those indicators must be defined early at the project in order to clearly understand the input data required, the data processes (calculations) required and the output data provided; serving as input for models and impact evaluation, setting baseline values or used with different scenarios climate change. **The methodological approach and detailed description of indicators, including feedback from the engagement process with stakeholders, will be part of respective deliverables to come in the project.** The identification, selection and implementation of indicators is an ongoing activity, this report an undertaking to harmonise them and to check the availability of data.

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[1] Firus, K., et al. (2022). Dissemination and communication strategy (LOCALISED Deliverable 9.1) https://www.localised-project.eu/wp-content/uploads/2022/09/LOCALISED_Dissemination-and-communication-strategy_D9.1.pdf

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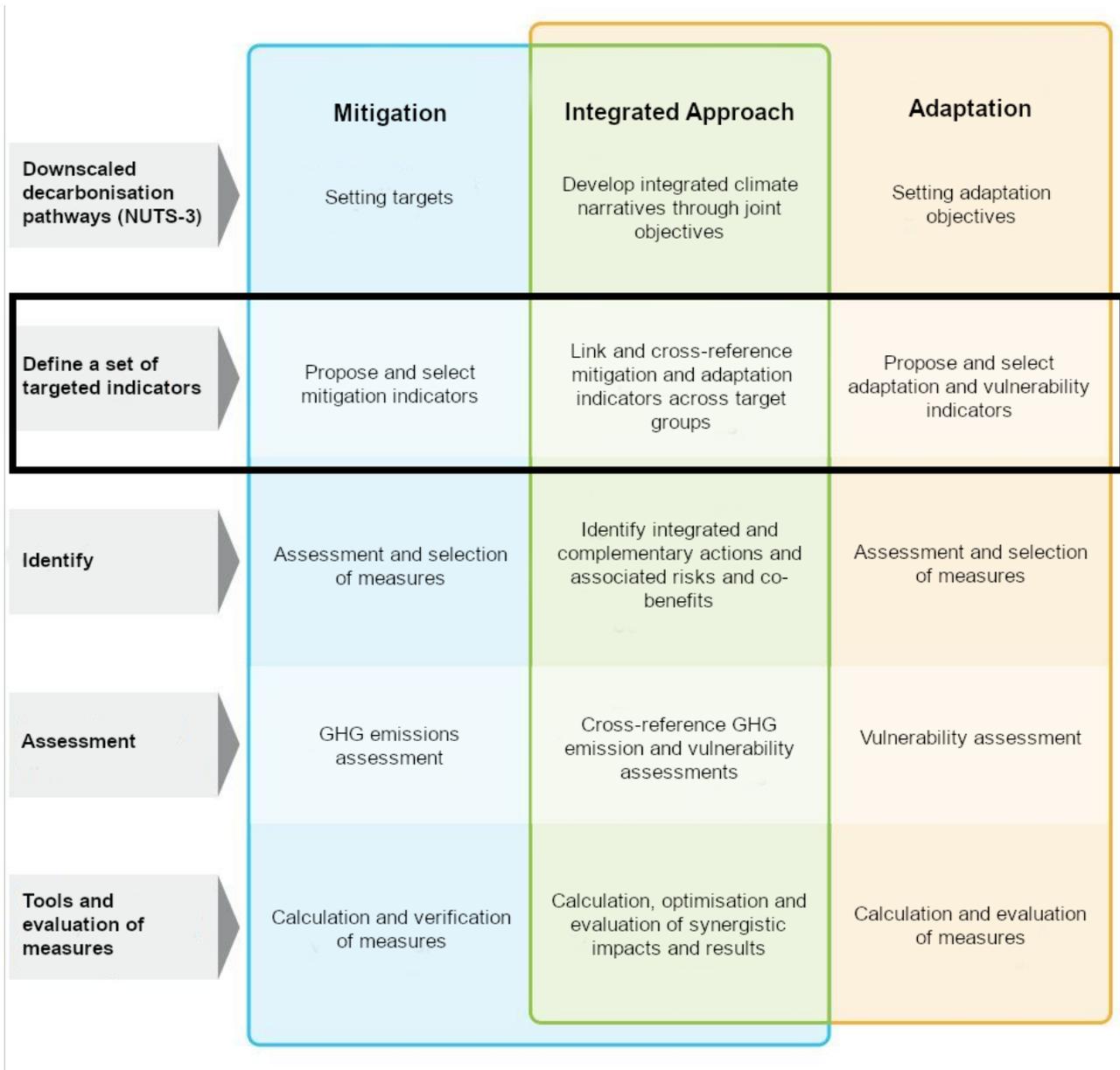|	**Mitigation**	**Integrated Approach**	**Adaptation**
Downscaled decarbonisation pathways (NUTS-3)	Setting targets	Develop integrated climate narratives through joint objectives	Setting adaptation objectives
Define a set of targeted indicators	Propose and select mitigation indicators	Link and cross-reference mitigation and adaptation indicators across target groups	Propose and select adaptation and vulnerability indicators
Identify	Assessment and selection of measures	Identify integrated and complementary actions and associated risks and co-benefits	Assessment and selection of measures
Assessment	GHG emissions assessment	Cross-reference GHG emission and vulnerability assessments	Vulnerability assessment
Tools and evaluation of measures	Calculation and verification of measures	Calculation, optimisation and evaluation of synergistic impacts and results	Calculation and evaluation of measures

Figure 1: LOCALISED's integrated approach of mitigation and adaptation actions

In this report, we present a first step towards the identification and selection of a coherent framework of mitigation and adaptation indicators, intended to stimulate discussion among the communities of target groups and practitioners. It is the aim, to open the silos and to harmonise solutions with the same objectives and scales. Hence, they should be made easier to upscale and replicate in a systematic mode to achieve the much-needed impact in timely addressing climate change and building resilience. Feedback to the indicators will be gathered in multiple stakeholder interactions for the tool's co-design to understand the questions and needs of the end users of the project's results and services. The integrated approach proposed here also addresses the capacity of target groups to undertake effective climate actions and that it is matched to the impacts of interventions of vulnerability, as shown in Figure 1.

2. Mitigation and adaptation indicators in LOCALISED

The increasing recognition of the necessity to integrate adaptation and mitigation measures in our society's response to the climate crisis has led to an understanding of the need for making targeted, justified, and effective policy decisions. As it is known, data and information alone have limited power to driving action. On top of that, stakeholder interactions have shown that this information is on the one hand patchy and scattered and on the other hand it is provided in a very complex way or only national data are available which are not easily usable without being an expert.

Because it is impossible to claim knowledge on all the information and knowledge requirements of our broader focus groups, the project will engage - both as partners or associates - representatives of local administrations, businesses and groups of citizens in order to conduct co-creation sessions to define, refine and test the project tools. Not all variables or indicators are meaningful for the range of user groups targeted by LOCALISED. In this sense, the starting point is to identify relevant mitigation and adaptation indicators for citizens, regions and businesses.

In order to succeed in this endeavour, it is necessary to understand very well the specific needs of the users of these services, as key stakeholders of the value-chain, differentiated along dimensions like group, experience, country and size of the administration or company. The understanding we gain (cf. D8.1[2]) needs to be taken into account and integrated in the tools to be developed.

Table 1 is the result from initial stakeholder interaction carried out in LOCALISED, putting the information needs and expectations of target groups on the table. In dedicated meetings at the projects meetings with the city partners involved in the project, the outreach to associated partners of business associations and desk research on mitigation and adaptation actions lead to the following. In respond, LOCALISED will take into consideration their specific needs and individual starting points in developing the tools and services. In addition to that, continuous stakeholder interaction will ensure that the feedback and suggestions on the design and usability are implemented in a meaningful and proper way.

Table 1: Target groups, information needs and LOCALISED's solutions

Target group…	…their information needs	…and what LOCALISED delivers
Local administrations	Easy access to sectoral energy demand in the same granularity as the Sustainable Energy and Climate Action Plans (SECAPs) template.	Downscaled material, energy demand and emissions that are consistent with nationally-defined decarbonisation pathways.

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[2] Hezel, B., Broschkowski, E., Lamberty, R., Firus, K., Shayegh, S. (2022), Stakeholder interaction methodology and schedule (LOCALISED Deliverable 8.1) https://www.localised-project.eu/wp-content/uploads/2022/09/LOCALISED_Stakeholder-interaction-methodology_D8.1.pdf

	Mapping climate risk indicators to NUTS3 level. Prioritising occurring impacts, especially the ones that are projected to become severe in the future. Evaluate the likelihood and severity of impacts over the near, the medium and the long term. Matching the goals and objectives as laid down in SECAPs with concrete mitigation and adaptation measures and actions, needed to reach a specific target.	Regional assessment of SECAP-oriented climate hazards and vulnerable sectors/groups. Combinations of adequate adaptation and mitigation options. With the LOCALISED tools, interregional collaboration in mitigation and adaptation should receive a boost to ensure the broad implementation of solutions at reduced (shared) risk. LOCALISED aims to translate and disaggregate highest-level European climate targets and ambitions to the regional level, where they are actually being operationalized a firm commitment is needed.
Citizens and local communities	Break down the effects and impacts of climate change not only on average, but also how vulnerable groups and genders are affected by climate change and the energy transition. There is a potential bottleneck of data that cannot be directly delivered, e.g. the EUCalc cannot provide energy cost data. If this is an important indicator for citizens, we need to find another way of assessing this.	Use pathways to evaluate how diverse groups of citizens are affected by both climate change and climate policies. This includes the impact on living standards, the transformation of the labour market, the pass-through of carbon costs in energy bills, the health benefits, etc. Supporting decisions and activities by translating knowledge into action is most visibly undertaken at the local level, and usually by individuals, households and other communities. Provide quantified impacts of measures. Achieving regionally representative samples of case study regions, citizens' perceptions and attitudes towards potential decarbonising behaviour changes are surveyed, with focus on vulnerable groups.
Businesses	Businesses, and particularly SMEs, which make up the backbone of the EU economy, have a hard time obtaining relevant information when it comes to mitigation and adaptation pathways. Also in the case of businesses, relevant adaptation and mitigation indicators need to be explored. Support in evaluating businesses core activities vulnerability to climate impacts, of the impacts that decarbonisation pathways will have on them and of possible ways to overcome negative impacts, including emerging mitigation and adaptation technologies and access to financing.	To calculate the vulnerability index, information is needed on exposure, vulnerability, and adaptation. Data on exposure will comprise both climate change indicators and regional decarbonisation pathways. Vulnerability will comprise supply chain, energy input or emissions. Adaptive capacity is assessed via technologies. Industries will be selected in terms of share of economic output/ employment. LOCALISED provides information on emerging technologies in manufacturing,

	Provide context-specific information on environmental, social and economic co-benefits.	transportation[3] and agriculture sectors as a response to changes in the natural, social, and business environment. This will increase the number of successful scale-up and uptake of innovation and climate-friendly best practice solutions across Europe.

This deliverable supports the need for a growing climate resilience and adaptation by offering a flexible and integrated approach through which planners, policy makers and anyone interested in running an initiative for climate mitigation and adaptation can clarify their own priorities for adapting to and/or mitigating climate change and implement responsive strategies, policies and actions. As it is the main objective of this deliverable, a number of indicators are proposed by the consortium (see Chapter 3) for evaluating mitigation and adaptation, many of which will need to be operationalised in the course of LOCALISED by translation them into context-specific indicators relevant to particular situations and target groups. The indicators take into account the differing preferences and solutions in how to achieve climate mitigation and adaptation in European regions, businesses and on an individual citizen level. In order to bring the anticipated benefit, mitigation and adaptation measures must be integrated across specific key communities (target groups) and must be better coordinated among them. Without addressing the challenges in tandem, the underlying linkages between the climate, economic, social, technological and organisational issues go unaddressed and unresolved. It is the aim of this deliverable, to harmonise a set of global indicators, providing a useful resource for the development of a decision support tool. It is also important to standardize the description of the resources used (input) the measures of the effects (output) and the contextual specifics that may facilitate or serve as barriers for the transformation of the inputs into outputs (context).

Adaptation and mitigation indicators serve a range of purposes, including tracking progress in the implementation of an strategy or plan, monitoring the spending of adaptation funds, mainstreaming measures in different sectors and communicating information to policy-makers, to mention a few. Evidently, climate change and climate change adaptation are rather complex issues, and hence different types of indicators have been developed and used for different purposes. Unlike climate change mitigation, the success of which ultimately may be measured in terms of a single metric such as greenhouse gas emissions avoided or atmospheric greenhouse gas concentrations, there is no single metric for adaptation, because functions and goals of adaptation will be different in different contexts and target groups. For example, adaptation interventions might seek to reduce mortality from climate-related disasters, improve agricultural productivity and nutrition, make infrastructure more robust in the face of

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[3] This refers to the transportation sector evaluated in Task 7.1. The indicators collected here under transportation will be used to define the objective vulnerability of the regional transportation sector.

climate-related stresses, improve water use efficiency in the face of reduced water availability, preserve natural resources and ecosystems, and so on.

Where adaptation outcomes cannot be measured directly because of timescale issues, one approach is to assess the impact of adaptation interventions on vulnerability. Vulnerability in LOCALISED is defined in terms of the factors that make individuals (e.g. citizens), populations and businesses more or less likely to experience adverse outcomes when exposed to an external stress, in this case a climate-related risk. Vulnerability may therefore be seen as comprising societal and other (e.g. local environmental) factor that mediate the outcomes of climate-related hazards and risks.

For the purpose of LOCALISED, finding a common understanding about which indicators are useful and which data best underpin them to measure the progress towards policy objectives and business strategies against dynamic business risks is part of the respective deliverable. Vulnerability indicators are selected carefully, and will vary according to context and the climate (change) hazard(s) with which adaptation is concerned. However, there is no one size-fits-all indicator, which is why it is essential to understand the assumptions and limitations of the indicators, the uncertainties and possible risks in using them and their data availability.

2.1.   Local administrations

Two main instruments are being considered to establish a set of oriented indicators for local administrations, the Sustainable Development Goals (SDG), supported by the United Nations, and the **Sustainable Energy and Climate Actions Plans (SECAP)**, created under the umbrella of the Covenant of mayors. Both instruments have a predefined set of indicators which are used to verify the achievement of specific goals and are frequently used to oversee the implementation of mitigation and adaptation actions at local and other levels. Nevertheless, even though there is a wide range of indicators available, there is a lack of coordination between the initiatives, and indicators are sometimes conceptualized considering a different scale, such a national implementation. In addition, some of them are not clearly established, such as the ones related to adaptation strategies, therefore relying on the hands of public administrations. As a consequence, the lack of harmonization entails an extra effort to align the objectives established in both instruments and hinders the implementation and benchmarking.

Moreover, even so nowadays more than 9,000 towns and cities have joined the Covenant of Mayors framework, and the achievement of SDG is already considered by some advanced local administration, the lack of resources and the difficulty of obtaining the necessary data is a clear barrier to assess the current situation and establish appropriate measures. The main objective of the project is to provide downscaled and completed real, adapted to case, and local data, that allows the concretion,

implementation and monitoring of SECAPs and the Sustainable Development Goals (SDGs) at Municipality and NUTS3 levels. Thus, the platform will offer reliable data to establish the **Baseline Emission Inventory (BEI)** and the **Risks and Vulnerabilities Assessment (RVA)** on the territory, and provide feasible adaptation and mitigation options to municipalities.

The BEI and the RVA will be defined using consistent geo-located public information with the aim of providing reliable data to establish and, above all, identify the crucial aspects to be assessed in long-term plans to achieve decarbonisation. Adaptation and mitigation capabilities and feasibilities will be introduced as available layers for SECAPs. Special emphasis will be given to key pillars for decarbonisation, such as large-scale building retrofit actions, and local energy communities. As regards to adaptation, the project will define relevant and feasible remaining adaptation measures on the regional level. Consequently, local authorities will gain knowledge on their remaining risk profiles and be provided with knowledge on feasible solutions. Moreover, since currently SECAP plans are often based on static administrative documents, which difficult the monitoring of the objectives over the years, the project will introduce a dynamic model that will allow an active control of the targets for assessment and dynamic adaptation.

Additionally, and based on the analysis of the targets and available indicators, the platform will gather a set of oriented specific indicators to help local authorities define the steps and measures to successfully implement both SECAPs and the 2030 Agenda. The alignment between SECAP plans and SDG targets and indicators will provide a clear robust framework[4] to define the necessary measures and effectively allocate resources, leading to comprehensible, feasible, and effective long-term strategies.

2.2. Citizens and local communities

Citizens are not only a target group of the project, as governments and local administrations should also act in their best interest. Thus, their wellbeing and attitudes provide guidelines for policies. From this perspective, three dimensions are vital for the evaluation of adaption or mitigation measures: Firstly and obviously, it is necessary to know how citizens are affected by climate change and transformation of the energy system. We label this **(1) Climate Change Effects (CCE)**. In addition, the effects on certain vulnerable groups like elderly, children, women, transgender persons, people in poor health, people on low incomes, tenants, illiterate groups, groups with limited knowledge of the official language or isolated people, who are less likely to receive information - need to be differed. Second, adverse or positive consequences of measures or policies for citizens need to be to be taken into account. We can summarize this as **(2) Effects Of Measures (EOM).** This dimension will, among others, encompass economic indicators (e.g. unemployment rate, income), but also social

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[4] As detailed in Deliverable D5.1 – Report on SOIs for SECAPs definition and assessment

aspects like gender justice (e.g. gender pay gap, gender pension gap) or different education levels and health issues. The third dimension is **(3) the Acceptance Of adaptation/mitigation Measures and Policies (AOM)**. This is a crucial aspect, when the most promising options of similar effective scenarios are to be singled out. Indicators for each of the three dimensions need to be defined, whereby the complexity increases from 1 to 3.

A local community refers to one or several groups of people, usually with shared economic and cultural interests, living in close proximity at the local scale. Communities are themselves aggregates of individuals, households, and other local institutions. As such, they are complex and dynamic, with identifying factors such as geography, culture, economic status, livelihood activities, language and/or religion creating divisions or linkages between people living in the same area.

At the same time, citizens are not just a source of data, but play an important role in the co-decision and co-creation of mitigation measures. As a result of citizen engagement activities, information needs of citizens will ultimately feed into both the design of the online tools and measures. Again, different prospects on mitigation policies and different consequences (vulnerable) groups have to be taken into consideration.

Through the planned activities, the exploitable results of LOCALISED will be rooted in the reality of life of citizens. It will be more tailored to prevailing needs and prospects. For local administrations and decision makers, LOCALISED will deliver not just deliver a tool that calculates emission pathways, but integrates the viewpoints of citizens to some degree. Citizens as a target group will benefit from a fine-grained and intersectional analysis along different groups and (dis)advantages. This allows the research for *more just* and *more accepted* options amongst the calculated pathways. Furthermore, the possibility to evaluate different lifestyle choices for individual citizens will be provided by the online tools.

To quantify and measure the impact of social measures and instruments on citizens, a dedicated **Social Impact Assessment (SIA) Group** has been established within LOCALISED. The group will focus on social impacts on vulnerable groups and start from the definitions provided in Deliverable 6.1. Social Impact Assessment (SIA) is defined as *"the processes of analysing, monitoring, and managing the intended and unintended social consequences, both positive and negative, of planned interventions (policies, programs, plans, projects) and any social change processes involved by those interventions"*[5]. The results of the assessment allow the identification of alternative actions to stop harmful consequences and boost benefits.

The proposed indicators in this deliverable will be subject to an assessment via this group, aiming to identify and analyse social impacts. Other than the indicators for

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[5] Vanclay, F. (2003). International Principles for Social Impact Assessment. Impact Assessment and Project Appraisal, 21(1), 5–12. https://doi.org/10.3152/147154603781766491

businesses and local administrations, the list of social indicators are still discussed and will be finalised according to their data availability and potential impact, especially on vulnerable groups.

2.3. Businesses

The EU industrial strategy supports the transformation of EU energy-intensive industries to enable a climate-neutral, circular economy by 2050, promotes advanced technologies, and supports the move to a climate-neutral economy. In light of such transition, EU businesses and industries will be subject to an array of environmental, technological, economic, social, and institutional changes which challenge their status quo by threatening their bottom line and affecting their workforce but also by providing new business opportunities for innovation and mitigation/adaptation solutions. In order to help businesses at the regional level to prepare for the outcome of such developments, their vulnerability (or resilience) to decarbonisation pathways should be quantified and measured in a transparent and harmonised fashion.

Business vulnerability index (BVI) is a composite indicator of business vulnerability to decarbonization pathways, developed for three main sectors of agriculture, manufacturing, and transportation. The main components of the BVI are identified through an interactive co-design and co-creation process with the engagement of key business stakeholders. This index will incorporate both the subjective insights into the vulnerability of businesses at the firm level, and the objective assessment of such vulnerabilities aggregated at the regional level. As a result, a composite BVI including both subjective and objective estimates will be developed to provide an overall vulnerability assessment of EU businesses in these three sectors.

The indicators presented in this deliverable comprises objective factors related to both vulnerability and adaptive capacity of regional businesses. The subjective assessment will be provided through the business vulnerability assessment survey in Task 7.1. The combination of these objective and subjective BVIs allows businesses and local authorities to quantify and compare business vulnerability under different pathways and across sectoral, geographical, and temporal dimensions. The objective indicators comprise three types:

- Vulnerability: these are regional indicators showing the sensitivity of businesses to decarbonization at the regional level.
- Adaptation: these are regional indicators showing the implemented efforts in reducing the vulnerability of businesses.
- Exposure: these are regional indicators showing the risk of businesses to the environment changes.

Unlike existing indexes used in various economic sectors and businesses, the proposed BVI (Task 7.1) will focus on the vulnerability of businesses to decarbonization pathways in contrast to climate-related hazards. For example, while climate-related disclosures are developed by the Task Force on Climate-related Financial Disclosures (TCFD) for companies and financial institutions to inform investors, shareholder, and the public of their climate-related financial risks, our proposed BVI aims to evaluate and compare the potential impact of decarbonization pathways on local and regional businesses. It will allow EU businesses and investors to identify decarbonization risks and its impacts on their energy, labour, and supply chain practices and explore opportunities for investment in development and adaptation of emerging decarbonization solutions (Task 7.2).

3. Proposed mitigation and adaptation indicators

The following tables include the first set of proposed mitigation and adaptation indicators used within LOCALISED. They include the indicator name, as short description of the indicator, the metric, and some categorisation to cross-link and group them.

Contextual information, aiming to support the understanding and interpretation vulnerability, identifying adaptation needs and evaluation strategies. Set of indicators in the context of a given category, are as follows:

- Geophysical (**Geo**)
- Environmental (**Env**)
- Economic (**Econ**)
- Technological (**Tech**)
- Social (**Soc**)
- Institutional (**Inst**)

To facilitate the implementation in the LOCALISED framework, all indicators are classified into three tiers based on their level of methodological development (also new indicators can be proposed), and the known availability of data, either the downscaling procedure is already clear or has to be defined yet:

- **Tier 1**: Indicator conceptually clear, data for calculation available and downscaling procedure clear.
- **Tier 2**: Indicator conceptually clear, data for calculation to be sourced from external sources; downscaling procedure clear.
- **Tier 3**: New indicator, data needs to be generated and downscaling procedure defined.

3.1. Local Administrations

Table 2: Proposed mitigation and adaptation indicators for local administrations

Indicator name	Category	Indicator short description	Metric	Tier level
Mitigation and adaptation indicators relevant for public administrations				
People at risk of income poverty after social transfers	Soc	People at risk-of-poverty are persons with an equivalized disposable income below the risk-of-poverty threshold, which is set at 60 % of the national median equivalized disposable income (after social transfers).	percentage	1
Families or households that allocate more than 40% of their resources to housing expenditures or services or housing cost burden	Soc	Share of persons / households spending more than a specific percentage of their incomes on energy services putting them in a situation of energy poverty.	percentage	1
Cost of final residential energy Consumption compared to Gross Family Income	Soc/ Econ	This indicator measures the share of gross family income used for housing expenses such as water, electricity, gas or heating.	percentage	1
Number of deaths, missing persons and persons affected by disaster per 100,000 people - Drought	Soc	This indicator measures the number of people who died, went missing or were directly affected by Drought per population.	Rate, Nº deaths/ 100.000 inhabitants	1
Number of deaths, missing persons and persons affected by disaster per 100,000 people - Earthquakes	Soc	This indicator measures the number of people who died, went missing or were directly affected by earthquakes per population.	Rate, Nº deaths/ 100.000 inhabitants	1
Number of deaths, missing persons and persons	Soc	This indicator measures the number of people who died, went missing or were directly affected by volcanic activity per population.	Rate, Nº deaths/	1

affected by disaster per 100,000 people - Volcanic activity			100.000 inhabitants	
Number of deaths, missing persons and persons affected by disaster per 100,000 people - Floods	Soc	This indicator measures the number of people who died, went missing or were directly affected by floods per population.	Rate, Nº deaths/ 100.000 inhabitants	1
Number of deaths, missing persons and persons affected by disaster per 100,000 people - Mass movement	Soc	This indicator measures the number of people who died, went missing or were directly affected by mass movement per population.	Rate, Nº deaths/ 100.000 inhabitants	1
Number of deaths, missing persons and persons affected by disaster per 100,000 people - Storm	Soc	This indicator measures the number of people who died, went missing or were directly affected by storm per population.	Rate, Nº deaths/ 100.000 inhabitants	
Number of deaths, missing persons and persons affected by disaster per 100,000 people - Landslides	Soc	This indicator measures the number of people who died, went missing or were directly affected by landslides per population.	Rate, Nº deaths/ 100.000 inhabitants	1
Number of deaths, missing persons and persons affected by disaster per 100,000 people - Wildfires	Soc	This indicator measures the number of people who died, went missing or were directly affected by wildfires per population.	Rate, Nº deaths/ 100.000 inhabitants	1
Number of deaths, missing persons and persons affected by disaster per 100,000 people - Extreme temperature	Soc	This indicator measures the number of people who died, went missing or were directly affected by extreme temperature per population.	Rate, Nº deaths/ 100.000 inhabitants	1
Population exposed to flood risk or flood prone population	Soc/ Env	The indicator shows the number of people who are directly exposed to floods in a 1-in-100-year flood event, thus posing significant risk to lives and livelihoods	Number of people or %	1

Exposure of vulnerable people to Heat waves	Soc	This indicator tracks the change in the number of heatwave exposure events (with one exposure event being one heatwave experienced by one person aged over 65 or child from birth to 1 year old) and days of heatwave exposure in these populations compared with the average number of events in the reference period (1986–2005)	index	
Terrestrial protected areas	Geo	The indicator provides information of whether the region has implemented regulations to protect areas or regulated the use of chemicals in agricultural practices.	square kilometer	1
Organic crop area as a percentage of total agricultural area	Env	This indicator measures progress in achieving more productive and sustainable agriculture. The indicator measures the share of total utilized agricultural area (UAA) occupied by organic farming. Farming is recognized to be organic if it complies with Council Regulation (EC) No 834/2007, which has set up a comprehensive framework for the organic production of crops and livestock and for the labelling, processing and marketing of organic products, as well as for governing imports of organic products into the EU. This indicator was called "Proportion of agricultural area under productive and sustainable/organic agriculture" before.	percentage	1
Traffic accidents with victims (injuries and deaths) per 100 000 inhabitants	Soc	The indicator measures the number of fatalities and injuries caused by traffic accidents, including drivers and passengers of motorized vehicles and pedal cycles as well as pedestrian. This metric shows how safe roads and traffic systems are.	number	1
Health situation	Soc	The indicator informs on the share of the population aged 16+ perceiving itself to be in "good" or "very good" health. The data stem from the EU Statistics on Income and Living Conditions (EU SILC). Indicators of perceived general health have been found to be a good predictor of people's future health care use and mortality	Share of population	1
CO_2 emissions from households	Env	The indicator estimates the emissions/yr emitted by households	Mt CO2 eq/year	1
CO_2 emissions from tertiary sector	Env	The indicator estimates the emissions/yr emitted by tertiary buildings	Mt CO2 eq/year	1

CO₂ emissions from non-ETS industries	Env	This indicator estimates the emissions yearly emitted by industry buildings	Mt CO2 eq/year	1
Number of deaths due to accidental poisoning by and exposure to noxious substances per 100000 people	Soc	The indicator provides information on mortality patterns due to unintentional poisoning. It describes mortality in relation to the total population. Expressed in deaths per 100 000 inhabitants. Originally the KPI was "Mortality rate attributed to unintentional poisoning".	number	1
Mortality rate attributed to unsafe water, unsafe sanitation and lack of hygiene	Soc	The indicator provides information on mortality patterns attributed to unsafe water, unsafe sanitation, and lack of hygiene. It describes mortality in relation to the total population. Expressed in deaths/ inhabitants.	number	1
years of life lost due to air pollution	Soc	The indicator estimates the number of deaths that can be attributed to ambient pollution (outdoor) and household (indoor). It is calculated by combining information on increased (or relative) risk of a disease resulting from exposure, with information on how widespread the exposure is in the population (the annual mean concentration of particulate matter the population is exposed to).	number	1
Education and Training (female)	Soc	This indicator shows the participation rate of female, 25-64 years, in education and training (last 4 weeks)	percentage	1
As Education Index: Population with tertiary education	Soc	The indicator shows the share of population with tertiary education. Tertiary education is defined as those having completed the highest level of education, by age group. This includes both theoretical programs leading to advanced research or high skill professions such as medicine and more vocational programs leading to the labour market. Calculated value: (number of people with tertiary education/population)*100	percentage	1
Gender pay gap	Soc	This indicator is defined as the difference between the average gross hourly earnings of men and women expressed as a percentage of the average gross hourly earnings of men.	percentage	1
Share of women in regional assemblies	Soc	This indicator is a measure for the political power women are holding on a regional level. Lower rates of women participation in policy making would indicate that mechanisms of exclusion come into play and policies would tend to be not gender sensitive	index	1

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Gini-Index	Soc	This indicator measures the (in)equality of income in society therefore the extent to which the distribution of income within a country deviates from a perfectly equal distribution. A coefficient of 0 expresses perfect equality where everyone has the same income, while a coefficient of 100 expresses full inequality where only one person has all the income.	index	1
Proportion of population with access to electricity	Soc/ Env	The indicator measures the share of population that has access to electricity as a basic good necessary to satisfy basic needs. Electricity access entails a household having initial access to sufficient electricity to power a basic bundle of energy services – at a minimum, several lightbulbs, phone charging, a radio and potentially a fan or television – with the level of service capable of growing over time.	percentage	1
Residential final energy consumption from electricity	Env	This indicator covers the final energy consumed by end users, such as industry, transport, households, services, and agriculture; it excludes energy consumption of the energy sector itself and losses occurring during transformation and distribution of energy. It is the main information requested in SECAP mitigation pillar to calculate the emissions of the different sectors.	MWh	1
Residential final energy consumption from natural gas	Env	This indicator covers the final energy consumed by end users, such as industry, transport, households, services, and agriculture; it excludes energy consumption of the energy sector itself and losses occurring during transformation and distribution of energy. It is the main information requested in SECAP mitigation pillar to calculate the emissions of the different sectors.	MWh	1
Residential final energy consumption from liquid gas	Env	This indicator covers the final energy consumed by end users, such as industry, transport, households, services, and agriculture; it excludes energy consumption of the energy sector itself and losses occurring during transformation and distribution of energy.	MWh	1
Residential final energy consumption from heating oil	Env	This indicator covers the final energy consumed by end users, such as industry, transport, households, services, and agriculture; it excludes energy consumption of the energy sector itself and losses occurring during transformation and distribution of energy.	MWh	1

Residential final energy consumption from diesel	Env	This indicator covers the final energy consumed by end users, such as industry, transport, households, services, and agriculture; it excludes energy consumption of the energy sector itself and losses occurring during transformation and distribution of energy.	MWh	1
Residential final energy consumption from gasoline	Env	This indicator covers the final energy consumed by end users, such as industry, transport, households, services, and agriculture; it excludes energy consumption of the energy sector itself and losses occurring during transformation and distribution of energy.	MWh	1
Residential final energy consumption from lignite	Env	This indicator covers the final energy consumed by end users, such as industry, transport, households, services, and agriculture; it excludes energy consumption of the energy sector itself and losses occurring during transformation and distribution of energy.	MWh	1
Residential final energy consumption from coal	Env	This indicator covers the final energy consumed by end users, such as industry, transport, households, services, and agriculture; it excludes energy consumption of the energy sector itself and losses occurring during transformation and distribution of energy.	MWh	1
Residential final energy consumption from other fossil fuels	Env	This indicator covers the final energy consumed by end users, such as industry, transport, households, services, and agriculture; it excludes energy consumption of the energy sector itself and losses occurring during transformation and distribution of energy.	MWh	1
Residential final energy consumption from biogas	Env	This indicator covers the final energy consumed by end users, such as industry, transport, households, services, and agriculture; it excludes energy consumption of the energy sector itself and losses occurring during transformation and distribution of energy.	MWh	1
Residential final energy consumption from plant oil	Env	This indicator covers the final energy consumed by end users, such as industry, transport, households, services, and agriculture; it excludes energy consumption of the energy sector itself and losses occurring during transformation and distribution of energy.	MWh	1
Residential final energy consumption from biofuel	Env	This indicator covers the final energy consumed by end users, such as industry, transport, households, services, and agriculture; it excludes energy consumption of the energy sector itself and losses occurring during transformation and distribution of energy.	MWh	1

Residential final energy consumption from other biomass	Env	This indicator covers the final energy consumed by end users, such as industry, transport, households, services, and agriculture; it excludes energy consumption of the energy sector itself and losses occurring during transformation and distribution of energy.	MWh	1
Residential final energy consumption from solar thermal	Env	This indicator covers the final energy consumed by end users, such as industry, transport, households, services, and agriculture; it excludes energy consumption of the energy sector itself and losses occurring during transformation and distribution of energy.	MWh	1
Residential final energy consumption from geothermal	Env	This indicator covers the final energy consumed by end users, such as industry, transport, households, services, and agriculture; it excludes energy consumption of the energy sector itself and losses occurring during transformation and distribution of energy.	MWh	1
Total residential final energy consumption	Env	This indicator covers the final energy consumed by end users, such as industry, transport, households, services, and agriculture; it excludes energy consumption of the energy sector itself and losses occurring during transformation and distribution of energy.	MWh	1
Final energy consumption in agriculture, forestry and fisheries from electricity	Env	This indicator covers the final energy consumed by end users, such as industry, transport, households, services, and agriculture; it excludes energy consumption of the energy sector itself and losses occurring during transformation and distribution of energy.	MWh	1
Final energy consumption in agriculture, forestry and fisheries from natural gas	Env	This indicator covers the final energy consumed by end users, such as industry, transport, households, services, and agriculture; it excludes energy consumption of the energy sector itself and losses occurring during transformation and distribution of energy.	MWh	1
Final energy consumption in agriculture, forestry and fisheries from liquid gas	Env	This indicator covers the final energy consumed by end users, such as industry, transport, households, services, and agriculture; it excludes energy consumption of the energy sector itself and losses occurring during transformation and distribution of energy.	MWh	1
Final energy consumption in agriculture, forestry and fisheries from heating oil	Env	This indicator covers the final energy consumed by end users, such as industry, transport, households, services, and agriculture; it excludes energy consumption of the energy sector itself and losses occurring during transformation and distribution of energy.	MWh	1

Final energy consumption in agriculture, forestry and fisheries from diesel	Env	This indicator covers the final energy consumed by end users, such as industry, transport, households, services, and agriculture; it excludes energy consumption of the energy sector itself and losses occurring during transformation and distribution of energy.	MWh	1
Final energy consumption in agriculture, forestry and fisheries from gasoline	Env	This indicator covers the final energy consumed by end users, such as industry, transport, households, services, and agriculture; it excludes energy consumption of the energy sector itself and losses occurring during transformation and distribution of energy.	MWh	1
Final energy consumption in agriculture, forestry and fisheries from lignite	Env	This indicator covers the final energy consumed by end users, such as industry, transport, households, services, and agriculture; it excludes energy consumption of the energy sector itself and losses occurring during transformation and distribution of energy.	MWh	1
Final energy consumption in agriculture, forestry and fisheries from coal	Env	This indicator covers the final energy consumed by end users, such as industry, transport, households, services, and agriculture; it excludes energy consumption of the energy sector itself and losses occurring during transformation and distribution of energy.	MWh	1
Final energy consumption in agriculture, forestry and fisheries from other fossil fuels	Env	This indicator covers the final energy consumed by end users, such as industry, transport, households, services, and agriculture; it excludes energy consumption of the energy sector itself and losses occurring during transformation and distribution of energy.	MWh	1
Final energy consumption in agriculture, forestry and fisheries from biogas	Env	This indicator covers the final energy consumed by end users, such as industry, transport, households, services, and agriculture; it excludes energy consumption of the energy sector itself and losses occurring during transformation and distribution of energy.	MWh	1
Final energy consumption in agriculture, forestry and fisheries from plant oil	Env	This indicator covers the final energy consumed by end users, such as industry, transport, households, services, and agriculture; it excludes energy consumption of the energy sector itself and losses occurring during transformation and distribution of energy.	MWh	1
Final energy consumption in agriculture, forestry and fisheries from biofuel	Env	This indicator covers the final energy consumed by end users, such as industry, transport, households, services, and agriculture; it excludes energy consumption of the energy sector itself and losses occurring during transformation and distribution of energy.	MWh	1

Final energy consumption in agriculture, forestry and fisheries from other biomass	Env	This indicator covers the final energy consumed by end users, such as industry, transport, households, services, and agriculture; it excludes energy consumption of the energy sector itself and losses occurring during transformation and distribution of energy.	MWh	1
Final energy consumption in agriculture, forestry and fisheries from solar thermal	Env	This indicator covers the final energy consumed by end users, such as industry, transport, households, services, and agriculture; it excludes energy consumption of the energy sector itself and losses occurring during transformation and distribution of energy.	MWh	1
Final energy consumption in agriculture, forestry and fisheries from geothermal	Env	This indicator covers the final energy consumed by end users, such as industry, transport, households, services, and agriculture; it excludes energy consumption of the energy sector itself and losses occurring during transformation and distribution of energy.	MWh	1
Total final energy consumption in agriculture, forestry and fisheries	Env	This indicator covers the final energy consumed by end users, such as industry, transport, households, services, and agriculture; it excludes energy consumption of the energy sector itself and losses occurring during transformation and distribution of energy.	MWh	1
Final energy consumption in ETS industries from electricity	Env	This indicator covers the final energy consumed by end users, such as industry, transport, households, services, and agriculture; it excludes energy consumption of the energy sector itself and losses occurring during transformation and distribution of energy.	MWh	1
Final energy consumption in ETS industries from natural gas	Env	This indicator covers the final energy consumed by end users, such as industry, transport, households, services, and agriculture; it excludes energy consumption of the energy sector itself and losses occurring during transformation and distribution of energy.	MWh	1
Final energy consumption in ETS industries from liquid gas	Env	This indicator covers the final energy consumed by end users, such as industry, transport, households, services, and agriculture; it excludes energy consumption of the energy sector itself and losses occurring during transformation and distribution of energy.	MWh	1
Final energy consumption in ETS industries from heating oil	Env	This indicator covers the final energy consumed by end users, such as industry, transport, households, services, and agriculture; it excludes energy consumption of the energy sector itself and losses occurring during transformation and distribution of energy.	MWh	1

Final energy consumption in ETS industries from diesel	Env	This indicator covers the final energy consumed by end users, such as industry, transport, households, services, and agriculture; it excludes energy consumption of the energy sector itself and losses occurring during transformation and distribution of energy.	MWh	1
Final energy consumption in ETS industries from gasoline	Env	This indicator covers the final energy consumed by end users, such as industry, transport, households, services, and agriculture; it excludes energy consumption of the energy sector itself and losses occurring during transformation and distribution of energy.	MWh	1
Final energy consumption in ETS industries from lignite	Env	This indicator covers the final energy consumed by end users, such as industry, transport, households, services, and agriculture; it excludes energy consumption of the energy sector itself and losses occurring during transformation and distribution of energy.	MWh	1
Final energy consumption in ETS industries from coal	Env	This indicator covers the final energy consumed by end users, such as industry, transport, households, services, and agriculture; it excludes energy consumption of the energy sector itself and losses occurring during transformation and distribution of energy.	MWh	1
Final energy consumption in ETS industries from other fossil fuels	Env	This indicator covers the final energy consumed by end users, such as industry, transport, households, services, and agriculture; it excludes energy consumption of the energy sector itself and losses occurring during transformation and distribution of energy.	MWh	1
Final energy consumption in ETS industries from biogas	Env	This indicator covers the final energy consumed by end users, such as industry, transport, households, services, and agriculture; it excludes energy consumption of the energy sector itself and losses occurring during transformation and distribution of energy.	MWh	1
Final energy consumption in ETS industries from plant oil	Env	This indicator covers the final energy consumed by end users, such as industry, transport, households, services, and agriculture; it excludes energy consumption of the energy sector itself and losses occurring during transformation and distribution of energy.	MWh	1
Final energy consumption in ETS industries from biofuel	Env	This indicator covers the final energy consumed by end users, such as industry, transport, households, services, and agriculture; it excludes energy consumption of the energy sector itself and losses occurring during transformation and distribution of energy.	MWh	1

Final energy consumption in ETS industries from other biomass	Env	This indicator covers the final energy consumed by end users, such as industry, transport, households, services, and agriculture; it excludes energy consumption of the energy sector itself and losses occurring during transformation and distribution of energy.	MWh	1
Final energy consumption in ETS industries from solar thermal	Env	This indicator covers the final energy consumed by end users, such as industry, transport, households, services, and agriculture; it excludes energy consumption of the energy sector itself and losses occurring during transformation and distribution of energy.	MWh	1
Final energy consumption in ETS industries from geothermal	Env	This indicator covers the final energy consumed by end users, such as industry, transport, households, services, and agriculture; it excludes energy consumption of the energy sector itself and losses occurring during transformation and distribution of energy.	MWh	1
Total final energy consumption in ETS industries	Env	This indicator covers the final energy consumed by end users, such as industry, transport, households, services, and agriculture; it excludes energy consumption of the energy sector itself and losses occurring during transformation and distribution of energy.	MWh	1
Final energy consumption in non-ETS industries from electricity	Env	This indicator covers the final energy consumed by end users, such as industry, transport, households, services, and agriculture; it excludes energy consumption of the energy sector itself and losses occurring during transformation and distribution of energy.	MWh	1
Final energy consumption in non-ETS industries from natural gas	Env	This indicator covers the final energy consumed by end users, such as industry, transport, households, services, and agriculture; it excludes energy consumption of the energy sector itself and losses occurring during transformation and distribution of energy.	MWh	1
Final energy consumption in non-ETS industries from liquid gas	Env	This indicator covers the final energy consumed by end users, such as industry, transport, households, services, and agriculture; it excludes energy consumption of the energy sector itself and losses occurring during transformation and distribution of energy.	MWh	1
Final energy consumption in non-ETS industries from heating oil	Env	This indicator covers the final energy consumed by end users, such as industry, transport, households, services, and agriculture; it excludes energy consumption of the energy sector itself and losses occurring during transformation and distribution of energy.	MWh	1

Final energy consumption in non-ETS industries from diesel	Env	This indicator covers the final energy consumed by end users, such as industry, transport, households, services, and agriculture; it excludes energy consumption of the energy sector itself and losses occurring during transformation and distribution of energy.	MWh	1
Final energy consumption in non-ETS industries from gasoline	Env	This indicator covers the final energy consumed by end users, such as industry, transport, households, services, and agriculture; it excludes energy consumption of the energy sector itself and losses occurring during transformation and distribution of energy.	MWh	1
Final energy consumption in non-ETS industries from lignite	Env	This indicator covers the final energy consumed by end users, such as industry, transport, households, services, and agriculture; it excludes energy consumption of the energy sector itself and losses occurring during transformation and distribution of energy.	MWh	1
Final energy consumption in non-ETS industries from coal	Env	This indicator covers the final energy consumed by end users, such as industry, transport, households, services, and agriculture; it excludes energy consumption of the energy sector itself and losses occurring during transformation and distribution of energy.	MWh	1
Final energy consumption in non-ETS industries from other fossil fuels	Env	This indicator covers the final energy consumed by end users, such as industry, transport, households, services, and agriculture; it excludes energy consumption of the energy sector itself and losses occurring during transformation and distribution of energy.	MWh	1
Final energy consumption in non-ETS industries from biogas	Env	This indicator covers the final energy consumed by end users, such as industry, transport, households, services, and agriculture; it excludes energy consumption of the energy sector itself and losses occurring during transformation and distribution of energy.	MWh	1
Final energy consumption in non-ETS industries from plant oil	Env	This indicator covers the final energy consumed by end users, such as industry, transport, households, services, and agriculture; it excludes energy consumption of the energy sector itself and losses occurring during transformation and distribution of energy.	MWh	1
Final energy consumption in non-ETS industries from biofuel	Env	This indicator covers the final energy consumed by end users, such as industry, transport, households, services, and agriculture; it excludes energy consumption of the energy sector itself and losses occurring during transformation and distribution of energy.	MWh	1

Final energy consumption in non-ETS industries from other biomass	Env	This indicator covers the final energy consumed by end users, such as industry, transport, households, services, and agriculture; it excludes energy consumption of the energy sector itself and losses occurring during transformation and distribution of energy.	MWh	1
Final energy consumption in non-ETS industries from solar thermal	Env	This indicator covers the final energy consumed by end users, such as industry, transport, households, services, and agriculture; it excludes energy consumption of the energy sector itself and losses occurring during transformation and distribution of energy.	MWh	1
Final energy consumption in non-ETS industries from geothermal	Env	This indicator covers the final energy consumed by end users, such as industry, transport, households, services, and agriculture; it excludes energy consumption of the energy sector itself and losses occurring during transformation and distribution of energy.	MWh	1
Total final energy consumption in non-ETS industries	Env	This indicator covers the final energy consumed by end users, such as industry, transport, households, services, and agriculture; it excludes energy consumption of the energy sector itself and losses occurring during transformation and distribution of energy.	MWh	1
Share of renewable energy in gross final energy consumption	Env	The indicator provides information about the proportion of energy consumed in the city that comes from renewable sources. Renewable generation is an indicator reported in SECAP mitigation pillar and is used to calculate the final emissions.	percentage	1
Electricity production with natural gas	Env	The indicator provides information about the gross electricity production from fossil fuels. Primary energy supply is defined as energy production plus energy imports, minus energy exports	MWh	1
Electricity production with liquid gas	Env	The indicator provides information about the gross electricity production from fossil fuels. Primary energy supply is defined as energy production plus energy imports, minus energy exports	MWh	1
Electricity production with heating oil	Env	The indicator provides information about the gross electricity production from fossil fuels. Primary energy supply is defined as energy production plus energy imports, minus energy exports	MWh	1
Electricity production with lignite	Env	The indicator provides information about the gross electricity production from fossil fuels. Primary energy supply is defined as energy production plus energy imports, minus energy exports	MWh	1

Electricity production with coal	Env	The indicator provides information about the gross electricity production from fossil fuels. Primary energy supply is defined as energy production plus energy imports, minus energy exports	MWh	1
Heat production with natural gas	Env	The indicator provides information about the gross electricity production from fossil fuels. Primary energy supply is defined as energy production plus energy imports, minus energy exports	MWh	1
Heat production with gas liquids	Env	The indicator provides information about the gross electricity production from fossil fuels. Primary energy supply is defined as energy production plus energy imports, minus energy exports	MWh	1
Heat production with heating oil	Env	The indicator provides information about the gross electricity production from fossil fuels. Primary energy supply is defined as energy production plus energy imports, minus energy exports	MWh	1
Heat production with lignite	Env	The indicator provides information about the gross electricity production from fossil fuels. Primary energy supply is defined as energy production plus energy imports, minus energy exports	MWh	1
Heat production with coal	Env	The indicator provides information about the gross electricity production from fossil fuels. Primary energy supply is defined as energy production plus energy imports, minus energy exports	MWh	1
Percentage of total electricity production that comes from fossil fuels (excluding coal)	Env	The indicator provides information about the percentage of gross electricity production coming from fossil fuels. Primary energy supply is defined as energy production plus energy imports, minus energy exports.	percentage	1
Percentage of renewable electricity production	Env	The indicator provides information about the percentage of gross electricity production coming from renewable sources. Renewables can include hydro, geothermal, solar, wind, tide and wave sources, biofuels, and energy recovered from municipal waste present in the site. The production of renewable electricity is part of the SECAP mitigation template and is used to calculate the final emissions.	percentage	1
Renewable sources installed capacity	Env	The indicator estimates the maximum net amount of energy that a certain region can produce. Including: solar PV, onshore wind, offshore wind, nuclear, hydroelectric, geothermal, marine, CSP, biomass & biogas and district heating. The indicator is relevant to	MW	1

		monitor Tech development, increase the renewable share and reduce CO_2 emission.		
Electricity consumption per capita	Env	This indicator covers the final electricity consumption excluding transmission, distribution, and transformation losses and own use power plants weighted by the average population of the reference year	MWh	1
Final energy consumption of public buildings per year	Env	This indicator covers the final energy consumption of public buildings. Public buildings are one of the key sectors included in the SECAP mitigation pillar and one of the main areas of intervention for municipalities	TWh	1
Final energy consumption in homes including all types of energy	Env	This indicator covers the final energy consumption of households by citizen.	TWh	1
Energy consumption of households for heating	Env	This indicator covers the final energy consumption in households dedicated to heating.	TWh	1
Vehicle energy consumption of the different transport modes	Env	The indicators measure the fuel required to travel a unit of distance (L/100km). This metric is calculated for each vehicle model through standardized testing procedures and drive cycles. Including passengers automotive, passengers 2-wheel, passengers aviation, passengers' marine, regional public transport, commercial, freight automotive, commercial freight aviation, commercial freight marine, commercial freight rail. Technologies that improve vehicle fuel efficiency are important for CO_2 emission reductions.	TWh/pkm	1
Transport energy consumption	Env	This indicator covers the final energy consumption of the transport sector. Transport is one of the key sectors included in the SECAP mitigation pillar and one of the main areas of intervention for municipalities	TWh	1
Energy demand of buildings	Env	The indictor provides information about building energy demand. The indicator is relevant to monitor Tech development and efficiency of the systems and retrofitting actions to reduce CO_2 emission	TWh	1

Energy demand of residencies	Env	The indictor provides information about energy demand by dwelling. The total demand is weighted by the total number of dwellings.	TWh	1
Index value of GDP growth per employed person	Env	The indicator measures the changes in productivity over time in relation to employment	Index	1
Unemployment rate	Soc	Measures the share of people without formal income as a percentage of the labour force. An unemployed person is defined by Eurostat, according to the guidelines of the International Labour Organization, as someone aged 15 to 64 not employed during the reference week according to the definition of employment, currently available for work and actively seeking work.	percentage	1
Residential energy demand - space heating	Env	The indictor provides information about the energy demand for the residential space heating.	TWh	1
Residential energy demand - space cooling	Env	The indictor provides information about the energy demand for the residential space cooling.	TWh	1
Non-residential energy demand - space heating	Env	The indictor provides information about the energy demand for the non-residential space heating.	TWh	1
Non-residential energy demand - space cooling	Env	The indictor provides information about the energy demand for the non-residential space cooling.	TWh	1
Number of tourist accommodation places with respect to the residential population	Env	The indicator provides information of the number of tourist accommodations in relation to the total population of the region. It is relevant to control uses in the urban area, and balance tourism and housing needs.	percentage	1
Access to public transport	Env	Indicator measures the access to basic goods and the chance to satisfy basic needs based on road and rail coverage.	index	1
Percentage of people very satisfied with public transport	Env/ Soc	This indicator provides information on the quality of the public transport network.	percentage	1
Percentage of people rather satisfied with public transport	Env/ Soc	This indicator provides information on the quality of the public transport network.	percentage	1

Percentage of people rather unsatisfied with public transport	Env/ Soc	This indicator provides information on the quality of the public transport network.	percentage	1
Percentage of people not at all satisfied with public transport	Env/ Soc	This indicator provides information on the quality of the public transport network.	percentage	1
Percentage of people with unknown satifactory level with public transport	Env/ Soc	This indicator provides information on the quality of the public transport network.	percentage	1
Income of households	Soc	This indicator provides information regarding the total income by household, it measures the wealth and is a proxy measure for well-being.	Euros	1
Migration: foreign born population	Soc	The indicator provides information about the share of people born in foreign countries	percentage	1
Tenancy	Soc	The indicator provides information about the distribution of population by tenure status; therefore, the percentage of owners and tenants disaggregated by income group and type of household	percentage	1
Share of demand for passenger two-wheelers	Env	Modal split of passenger transport is defined as the percentage share of each mode of transport in total inland transport, expressed in passenger-kilometers (pkm). It is based on transport by passenger cars, buses and coaches, and trains. This indicator informs on the share of passengers using two-wheelers.	percentage	1
Share of demand for passenger buses	Env	Modal split of passenger transport is defined as the percentage share of each mode of transport in total inland transport, expressed in passenger-kilometers (pkm). It is based on transport by passenger cars, buses and coaches, and trains. This indicator informs on the share of passengers using two-wheelers.	percentage	1
Share of demand for passenger trains	Env	Modal split of passenger transport is defined as the percentage share of each mode of transport in total inland transport, expressed in passenger-kilometers (pkm). It is based on transport by passenger cars, buses and coaches, and trains. This indicator informs on the share of passengers using two-wheelers.	percentage	1

Occupancy - two wheelers	Env	The indicator provides information about the average number of passengers in a vehicle (cars, buses and trains). Utilization efficiency is one of the main parameters that determine energy and emission efficiency. High occupancy rates are usually assumed to reduce emissions.	Passengers per vehicle, % of passenger seats occupied	1
Occupancy - busses	Env	The indicator provides information about the average number of passengers in a vehicle (cars, buses and trains). Utilization efficiency is one of the main parameters that determine energy and emission efficiency. High occupancy rates are usually assumed to reduce emissions.	Passengers per vehicle, % of passenger seats occupied	1
Occupancy - rail	Env	The indicator provides information about the average number of passengers in a vehicle (cars, buses and trains). Utilization efficiency is one of the main parameters that determine energy and emission efficiency. High occupancy rates are usually assumed to reduce emissions.	Passengers per vehicle, % of passenger seats occupied	1
Soil sealing or artificial coverage	Env	The indicator estimates the increase in sealed soil surfaces with impervious materials due to urban development and construction (e.g., buildings, constructions and laying of completely or partially impermeable artificial material, such as asphalt, metal, glass, plastic or concrete). This provides an indication of the rate of soil sealing when areas change land use towards artificial and urban land use. The indicator builds on data from the imperviousness High Resolution Layer (a product of the Copernicus Land Monitoring Service)	square kilometer	1
Percentage of total area protected as natural sites	Env	The indicator measures the surface of terrestrial protected areas. The indicator comprises nationally designated protected areas and Natura 2000 sites. A nationally designated area is an area protected by national legislation. The Natura 2000 network comprises both marine and terrestrial protected areas designated under the EU Habitats and Birds Directives with the goal to	square kilometer	1

		maintain or restore a favourable conservation status for habitat types and species of EU interest.		
Percentage of green urban areas	Env	The indicator provides information about the percentage of natural areas in the city. Green urban areas: Public green areas for predominantly recreational use such as gardens, suburban natural areas that have become and are managed as urban parks, forests or green areas extending from the surroundings into urban areas are mapped as green urban areas when at least two sides are bordered by urban areas, and traces of recreational uses are visible. Not included are: private gardens, buildings within parks, patches of natural vegetation or agricultural areas enclosed by built-up areas without being managed as green urban areas, natural areas (: forests, herbaceous vegetation with a minimum coverage, beaches, dunes and sand, bare rocks, sparsely vegetated areas such as steppes or tundra, burnt areas such as forest or shrubs and snow and ice such as glaciers).	percentage	1
Urban Flood Risk or areas exposed to flooding	Env	The indicator shows the areas potentially exposed to flooding or in floodplains.	meter	1
CO_2 emissions per capita	Env	This indicator estimates the tons of CO2 equivalents yearly emitted by a city weighted by the average population of the reference year (per capita).	Mt	1
Number of motor road vehicles per 100 people	Env	The indicator provides information about the vehicle stock. The indicator is derived by dividing the vehicle stock by the number of inhabitants	number	1
Average air pollution due to $PM_{2.5}$	Env	This indicator provides information on reported fine particle concentrations annual average. This indicator was called "Percentage of people exposed to PM2.5, NO2 and O3" previously.	Ug/m^3	1
Average air pollution due to NO_2	Env	This indicator provides information on reported NO2 concentrations annual average. This indicator was called "Percentage of people exposed to PM2.5, NO2 and O3" previously.	Ug/m^3	1

Average air pollution due to O₃	Env	This indicator provides information on reported O3 concentrations annual average. This indicator was called "Percentage of people exposed to PM2.5, NO2 and O3" previously.	Ug/m³	1
Hazard Current probability (Low, moderate, high, not known) - heatwaves	Env	Indicator with the aim of assessing and evaluating climatic hazards in the regions and adaptation measures needed.	Qualitative: low to high	1
Hazards Impact (Low, moderate, high, not known) - heatwaves	Env	Indicator with the aim of assessing and evaluating climatic hazards in the regions and adaptation measures needed. Hazard impact is defined the hazard effect on human and natural systems following the SECAP guidelines. Accordingly, this indicator is concerned with evaluating what is called second-order impacts, that is, impacts of climate change on infrastructure, production, population, or ecosystems services values by society.	Qualitative: low to high	1
Hazards Expected change in intensity (increase, decrease, no *change, not known) - heatwaves*	Env	New indicator with the aim of assessing and evaluating climatic hazards in the regions and adaptation measures.	Qualitative: increasing, decreasing or no-change	1
Hazards Expected change in frequency (increase, decrease, no change, not known) - heatwaves	Env	Indicator with the aim of assessing and evaluating climatic hazards in the regions and adaptation measures needed.	Qualitative: increasing, decreasing or no-change	1
Hazards Timeframe (current, short-term, medium-term, long-term, not known) - heatwaves	Env	Indicator with the aim of assessing and evaluating climatic hazards in the regions and adaptation measures needed.	Qualitative: short-, medium-, and long-term	1
Hazard Current probability (Low, moderate, high, not known) - coldwaves	Env	Indicator with the aim of assessing and evaluating climatic hazards in the regions and adaptation measures needed.	Qualitative: low to high	1

Hazards Impact (Low, moderate, high, not known) - coldwaves	Env	Indicator with the aim of assessing and evaluating climatic hazards in the regions and adaptation measures needed. Hazard impact is defined the hazard effect on human and natural systems following the SECAP guidelines. Accordingly, this indicator is concerned with evaluating what is called second-order impacts, that is, impacts of climate change on infrastructure, production, population, or ecosystems services values by society.	Qualitative: low to high	1
Hazards Expected change in intensity (increase, decrease, no change, not known) - coldwaves	Env	New indicator with the aim of assessing and evaluating climatic hazards in the regions and adaptation measures.	Qualitative: increasing, decreasing or no-change	1
Hazards Expected change in frequency (increase, decrease, no change, not known) - coldwaves	Env	Indicator with the aim of assessing and evaluating climatic hazards in the regions and adaptation measures needed.	Qualitative: increasing, decreasing or no-change	1
Hazards Timeframe (current, short-term, medium-term, long-term, not known) - coldwaves	Env	Indicator with the aim of assessing and evaluating climatic hazards in the regions and adaptation measures needed.	Qualitative: short-, medium-, and long-term	1
Hazard Current probability (Low, moderate, high, not known) - Heavy precipitation	Env	Indicator with the aim of assessing and evaluating climatic hazards in the regions and adaptation measures needed.	Qualitative: low to high	1
Hazards Impact (Low, moderate, high, not known) - Heavy precipitation	Env	Indicator with the aim of assessing and evaluating climatic hazards in the regions and adaptation measures needed. Hazard impact is defined the hazard effect on human and natural systems following the SECAP guidelines. Accordingly, this indicator is concerned with evaluating what is called second-order impacts, that is, impacts of climate change on infrastructure, production, population, or ecosystems services values by society.	Qualitative: low to high	1

Hazards Expected change in intensity (increase, decrease, no change, not known) - Heavy precipitation	Env	New indicator with the aim of assessing and evaluating climatic hazards in the regions and adaptation measures.	Qualitative: increasing, decreasing or no-change	1
Hazards Expected change in frequency (increase, decrease, no change, not known) - Heavy precipitation	Env	Indicator with the aim of assessing and evaluating climatic hazards in the regions and adaptation measures needed.	Qualitative: increasing, decreasing or no-change	1
Hazards Timeframe (current, short-term, medium-term, long-term, not known) - Heavy precipitation	Env	Indicator with the aim of assessing and evaluating climatic hazards in the regions and adaptation measures needed.	Qualitative: short-, medium-, and long-term	1
Hazard Current probability (Low, moderate, high, not known) - Fire risk	Env	Indicator with the aim of assessing and evaluating climatic hazards in the regions and adaptation measures needed.	Qualitative: low to high	1
Hazards Impact (Low, moderate, high, not known) - Fire risk	Env	Indicator with the aim of assessing and evaluating climatic hazards in the regions and adaptation measures needed. Hazard impact is defined the hazard effect on human and natural systems following the SECAP guidelines. Accordingly, this indicator is concerned with evaluating what is called second-order impacts, that is, impacts of climate change on infrastructure, production, population, or ecosystems services values by society.	Qualitative: low to high	1
Hazards Expected change in intensity (increase, decrease, no change, not known) - Fire risk	Env	New indicator with the aim of assessing and evaluating climatic hazards in the regions and adaptation measures.	Qualitative: increasing, decreasing or no-change	1
Hazards Expected change in frequency (increase,	Env	Indicator with the aim of assessing and evaluating climatic hazards in the regions and adaptation measures needed.	Qualitative: increasing, decreasing	1

decrease, no change, not known) - Fire risk			or no-change	
Hazards Timeframe (current, short-term, medium-term, long-term, not known) - Fire risk	Env	Indicator with the aim of assessing and evaluating climatic hazards in the regions and adaptation measures needed.	Qualitative: short-, medium-, and long-term	1
Hazard Current probability (Low, moderate, high, not known) - droughts	Env	Indicator with the aim of assessing and evaluating climatic hazards in the regions and adaptation measures needed.	Qualitative: low to high	1
Hazards Impact (Low, moderate, high, not known) - droughts	Env	Indicator with the aim of assessing and evaluating climatic hazards in the regions and adaptation measures needed. Hazard impact is defined the hazard effect on human and natural systems following the SECAP guidelines. Accordingly, this indicator is concerned with evaluating what is called second-order impacts, that is, impacts of climate change on infrastructure, production, population, or ecosystems services values by society.	Qualitative: low to high	1
Hazards Expected change in intensity (increase, decrease, no change, not known) - droughts	Env	New indicator with the aim of assessing and evaluating climatic hazards in the regions and adaptation measures.	Qualitative: increasing, decreasing or no-change	1
Hazards Expected change in frequency (increase, decrease, no change, not known) - droughts	Env	Indicator with the aim of assessing and evaluating climatic hazards in the regions and adaptation measures needed.	Qualitative: increasing, decreasing or no-change	1
Hazards Timeframe (current, short-term, medium-term, long-term, not known) - droughts	Env	Indicator with the aim of assessing and evaluating climatic hazards in the regions and adaptation measures needed.	Qualitative: short-, medium-, and long-term	1

Hazard Current probability (Low, moderate, high, not known) - floods	Env	Indicator with the aim of assessing and evaluating climatic hazards in the regions and adaptation measures needed.	Qualitative: low to high	1
Hazards Impact (Low, moderate, high, not known) - floods	Env	Indicator with the aim of assessing and evaluating climatic hazards in the regions and adaptation measures needed. Hazard impact is defined the hazard effect on human and natural systems following the SECAP guidelines. Accordingly, this indicator is concerned with evaluating what is called second-order impacts, that is, impacts of climate change on infrastructure, production, population, or ecosystems services values by society.	Qualitative: low to high	1
Hazards Expected change in intensity (increase, decrease, no change, not known) - floods	Env	New indicator with the aim of assessing and evaluating climatic hazards in the regions and adaptation measures.	Qualitative: increasing, decreasing or no-change	1
Hazards Expected change in frequency (increase, decrease, no change, not known) - floods	Env	Indicator with the aim of assessing and evaluating climatic hazards in the regions and adaptation measures needed.	Qualitative: increasing, decreasing or no-change	1
Hazards Timeframe (current, short-term, medium-term, long-term, not known) - floods	Env	Indicator with the aim of assessing and evaluating climatic hazards in the regions and adaptation measures needed.	Qualitative: short-, medium-, and long-term	1
Heating degree-days needed to maintain an average building indoor temperature of 15.5 degree Celsius	Env	This indicator measures the total effort needed to keep a decent indoor temperature / exposure to cold temperatures.	heating degree days	1
Cooling degree-days needed to maintain an average building indoor temperature of 22 degree Celsius	Env	This indicator measures the total effort needed to keep and decent indoor temperature / the exposure to hot temperatures	cooling degree days	1

CO₂ Emissions from transport	Env	This indicator estimates the CO₂ emission generated by the transport sector. It is a relevant sector addressed in Sustainable Energy and Climate Action Plans at local level	Mt	
CO₂ emissions (per MWh or gigawatt) electricity consumed or Carbon content in electricity	Env	This indicator estimates the CO₂ emission per MWh of electricity generated to cover energy consumption. The CO₂ emission intensity is calculated as the ratio of CO₂ emissions from electricity generation and gross electricity generation. The GHG intensity of total electricity generation is taken as the ratio of CO2 equivalent emissions from all electricity production	tCO2/MWh	1
CO₂ emissions for buildings	Env	This indicator estimates CO₂ yearly emitted by buildings	Mt	1
Public attitudes to Climate Change and Energy.	Soc	The indicator provides information on how climate change is considered	Index (0-100)	1
Forest area	Env	The indicator measures the proportion of forest ecosystems in comparison to the total land area. Data used for this indicator is derived from the Land Use and Cover Area frame Survey (LUCAS). According to the FAO definitions, Forest is defined as: "land spanning more than 0.5 hectares with trees higher than 5 meters and a canopy cover of more than 10 percent, or trees able to reach these thresholds in situ. It does not include land that is predominantly under agricultural or urban land use" Total land area is the total surface area of a country less the area covered by inland waters, like major rivers and lakes.	percentage	1
Red List Index	Env	The Red List Index measures change in aggregate extinction risk across groups of species. It is based on genuine changes in the number of species in each category of extinction risk on The IUCN Red List of Threatened Species (IUCN 2015) is expressed as changes in an index ranging from 0 to 1. Threatened species are those listed on The IUCN Red List of Threatened Species in the categories Vulnerable, Endangered, or Critically Endangered (i.e., species that are facing a high, very high, or extremely high risk of extinction in the wild in the medium-term future)	Index ranging from 0 to 1.	1

3.2.   Citizens and local communities

Table 3: Proposed mitigation and adaptation indicators for citizens

Indicator name	Category	Indicator short description	Metric	Tier level	Indicator type
Mitigation and adaptation indicators relevant for citizens					
1) Climate Change Effects (CCE)					
Number of deaths, missing persons and persons affected by disaster per 100,000 people	Soc	This indicator measures the number of people who died, went missing or were directly affected by disasters per 100,000 population. Focus on poor and vulnerable groups needed. The ideal disaggregation level: by sex, age, class, (dis)ability, health and pregnancy);	Rate, Nº deaths/ 100.000 inhabitants	2	Exposure & Vulnerability
Heating degree-days needed to maintain an average building indoor temperature of 15.5 degree Celsius	Soc	This indicator measures the total effort needed to keep a decent indoor temperature / exposure to cold temperatures.	Degrees times days	1	Exposure & Vulnerability
Cooling degree-days needed to maintain an average building indoor temperature of 22 degree Celsius	Soc	This indicator measures the total effort needed to keep and decent indoor temperature / the exposure to hot temperatures	Degrees times days	1	Exposure & Vulnerability
Current hazard risk level of cool waves	Soc	Exposure to a risk of a certain hazard leads to higher vulnerability.	Low/ mod/ high/	2	Exposure
Current hazard risk level of heat waves	Soc	Exposure to a risk of a certain hazard leads to higher vulnerability.	Low/ mod/ high/	2	Exposure
Current hazard risk level of floods and sea level rise	Soc	Exposure to a risk of a certain hazard leads to higher vulnerability.	Low/ mod/ high/	2	Exposure

Current hazard risk level of heavy precipitation	Soc	Exposure to a risk of a certain hazard leads to higher vulnerability.	Low/ mod/ high/	2	Exposure
Current hazard risk level of droughts and water scarcity	Soc	Exposure to a risk of a certain hazard leads to higher vulnerability.	Low/ mod/ high/	2	Exposure
Current hazard risk level of mass movement	Soc	Exposure to a risk of a certain hazard leads to higher vulnerability.	Low/ mod/ high/	2	Exposure
Current hazard risk level of forest fire	Soc	Exposure to a risk of a certain hazard leads to higher vulnerability.	Low/ mod/ high/	2	Exposure
Share of imports of staple food	Econ	Measures the dependency on other economies. Scarcity (and price) of staple food poses risk.	%	2	Vulnerability
Share of people who have/had to migrate to another region due to natural hazards	Soc	New indicator; available indicators on forced migration focus on international migration. High hazard risk areas might force people to move to other regions too.	%	3	Vulnerability
Percentage of population with access to at least 1 hectare of green urban areas (parks) and forests within 15 minutes of walking	Soc	Indicator measures the access to basic goods and the chance to satisfy basic needs.	%	2	Adaptation
2) Effects Of Measures and Policies (EOM)					
Energy poverty index (EDEPI)	Soc	Composite index based on four indicators: 1) share of energy expenditures out of total expenditure; 2) share of the first income quintile population unable to keep their homes in winter; 3) share of the first quintile population living in homes not comfortably cool	-	1	

		in summer; and 4) share of the first quintile population living in leaking homes			
Gender pay gap	Soc	This indicator is defined as the difference between the average gross hourly earnings of men and women expressed as a percentage of the average gross hourly earnings of men. Disaggregation needed by age, highest education and income (class).	% (share of male gross earning)	2	Vulnerability
Gender Pension Gap	Soc	This indicator the percentage by which women's average pension income is higher or lower compared with men. Pension income includes old age benefits, survivors' benefits as well as regular pensions from individual private plans. Disaggregation needed by age, highest education and income (class).	%	2	Vulnerability
Tenancy	Soc	Distribution of population by tenure status, type of household and income group	%	2	Vulnerability
Health situation	Soc	How many days of sick leave, or share of disabled people.	Days/%	2	Vulnerability
Migration index	Soc	Share of people with mother tongue other than official administrative language. Language skills (host country language) by migration status and citizenship	%	2	Exposure & Vulnerability
Crime level	Soc	Percentage of people who declared they had faced the problem of crime, violence or vandalism in the local area	%	2	Exposure
Access to internet	Tech	Internet access is defined as the percentage of households who have access to the Internet. It might be via smartphones or personal computer, using a dial-up or cable broadband access.	Index (0-1)	2	Vulnerability
Gini-Index	Soc	This indicator measures the (in)equality of income in society.	Index (0-1)	2	Vulnerability
Age groups	Soc	Distribution of age groups, Demographic change in Europe.	%	3	Demography
Unemployment rate	Soc	Measures the share of people without formal income. Unemployment poses risk. Disaggregation needed by sex, age, disabilities, education.	%	1	Vulnerability
Percentage of single households	Soc	This indicators shows, how many people are living alone. Data on households by type is available.	%	2	Demography

Percentage of population satisfied with the quality of public transportation	Soc	Indicator measures the access to basic goods and the chance to satisfy basic needs.	%	2	Satisfaction & Quality of Life
Access to public transport	Soc	Indicator measures the access to basic goods and the chance to satisfy basic needs.			Mitigation
Percentage of population satisfied with quality of air	Soc	This indicator measures perceived air quality. Decarbonisation policies must not worsen living circumstances for the population or certain groups. Disaggregation is needed by: sex, age, income, disabilities.	%	2	Satisfaction & Quality of Life
Social housing availability: Social housing share compared to total housing stock of main residencies	Soc	This indicator measures affordable housing. Decarbonisation policies must not worsen living circumstances for the population or certain groups. Disaggregation is needed by: sex, age, income, disabilities.	%	2	Satisfaction & Quality of Life
Whether or not the city has adopted and implemented local disaster risk reduction strategies in line with national disaster risk reduction strategies	Inst/ Env	The indicator provides information of the implementation of risk and vulnerability assessments in line with national strategies.	Qualitative (e.g. yes/no)	2	Adaptation
Share of the total green area of the city/municipality	Soc	Measures the chance for citizens to use green and public spaces. Needs to be broken down to: accessible for all/people with disabilities, safe for women and children	%	3	Adaptation
Air quality index (AQI) based on reported value for: Particulate matter (PM10, and PM2.5), NO2 (nitrogen dioxide),	Soc	This indicator measures air quality. Decarbonisation policies must not worsen living circumstances for the population or certain groups. Disaggregation is needed by: sex, age, income, disabilities.	Index	2	Exposure

SO2 (sulphur dioxide), O3 (ozone)					
Share of jobs in environmental industries	Soc	Measures the positive outlook for jobs, if environmentally friendly policies are implemented.	%	1	Vulnerability
Performance of public transport network, ratio between accessibility and proximity to people	Soc	This indicator provides information on the quality of the public transport network.	Index	2	Mitigation
Performance of car transport network, ratio between accessibility and proximity to people	Soc	This indicator provides information on the quality of the public transport network.	Index	2	Mitigation
Proportion of population with access to electricity	Soc	Indicator measures the access to basic goods and the chance to satisfy basic needs.	%	2	Vulnerability
Extent to which (i) global citizenship education and (ii) education for sustainable development are mainstreamed	Soc	New indicator; proxy measure for the level of knowledge and awareness on environment and global justice issues.	Index	3	Vulnerability
3) Acceptance of Adaption/Mitigation Measures and Policies (AOM)					
Education Index	Soc	This index, as part of the Human Development Index, measures the educational attainment. Disaggregated by gender	Index	2	Vulnerability

Income	Soc	This indicator measures the wealth and is a proxy measure for well-being. Disaggregation needed by gender, age, disabilities, education level	Euro (or categories)	1	Demography
Age (median)	Soc	This indicator provides information on who "old" or "young" the citizens of the respective region are.	Years	1	Demography
Political left-right self-placement	Soc	This indicator provides information on the political values held in the public. Disaggregation needed by age and gender.	Index (0-100) (EVS)	2	Political/ Attitudes
Political trust: confidence in government / parties / parliament	Soc	Political trust is a fundamental component of civic culture. It is crucial to the functioning of democratic systems and linked to compliance. Disaggregation needed by age and gender.	Index (0-100) (EVS)	2	Political/ Attitudes
Opinion: Impact of climate change will be very bad on people across the world	Soc	This index provides information on how climate change is considered. Disaggregation needed by age and gender.	Index (0-100) (EVALVE)	2	Political/ Attitudes
Attitudes towards (sexual) minorities	Soc	Tolerance towards minorities; Percentage of people who claimed that they live in a good place for minorities from other countries / European Social Progress Index	-	-	Political/ Attitudes
Post-materialist index	Soc	This constructed variable provides information on respondents' political attitudes towards political freedom, participation, care for the environment a.o. Disaggregation needed by age and gender.	Qualitative (dis/agreement to statements)	2	Political/ Attitudes
Political action	Soc	Provides information on whether respondents have participated in political actions other than voting, for instances: signing a petition, joining in boycotts, attending lawful/ peaceful demonstrations, or joining unofficial strikes.	Qualitative (have done/ might do/ would never do)	2	Political/ Attitudes
Membership in voluntary organizations	Soc	This variable describes membership in voluntary organizations belonging to the sectors of conservation, the environment, ecology, animal rights/ environmental organizations.	Qualitative (active/ non active/ not member) EVS	2	Political/ Attitudes

3.3. Businesses

Table 4: Proposed mitigation and adaptation indicators for businesses

Indicator name	Category	Indicator short description	Metric	Tier level	Indicator type
Mitigation and adaptation indicators relevant for businesses					
Manufacturing					
Energy					
Energy demand of the different industries: Iron & Steel, Cement, Chemicals & Plastics, Paper & Pulp, Ceramics, Oil Refinement	Tech	The indictor provides information about the energy demand of the following energy-intensive industries are considered to: food, pulp and paper, basic chemicals, refining, iron and steel, nonferrous metals (primarily aluminium), and non-metallic minerals (primarily cement). Together, they account for about half of all industrial sector delivered energy use.	MWh/unit of output	1	Vulnerability
Imported energy dependency in manufacturing	Tech	This indicator shows the portion of energy demand in manufacturing which comes from imported sources such as Russian natural gas	Level (High-Medium-Low)	3	Vulnerability
Energy saving measures in manufacturing	Tech	This indicator shows the relative reduction in energy demand due to the introduction of energy saving measures during the manufacturing process including the adoption of new technologies, alternating working hours or manufacturing procedures	Level (High-Medium-Low)	3	Adaptation
Energy input diversification in manufacturing	Tech	This indicator shows the portion of energy demand in manufacturing which comes from renewable sources including wind, solar, hydro	Level (High-Medium-Low)	3	Adaptation
Labour					

Size of workforce in manufacturing	Inst	The indictor provides information about the number of employees in manufacturing	Person/unit of output	1	Vulnerability
Share of low-skilled labour	Inst	The indictor provides information about the portion of low-skilled employees in manufacturing	Level (High-Medium-Low)	3	Vulnerability
Automation measures in manufacturing	Tech	This indicator shows the relative reduction in labour force due to the introduction of automation measures during the manufacturing process including the adoption of new technologies, digitalization initiatives, and other automation procedures	Level (High-Medium-Low)	3	Adaptation
Input/Output					
Total manufacturing output	Tech	The indictor provides information about the amount of manufactured goods	unit of output	1	Vulnerability
Imported key raw material used in manufacturing	Tech	The indictor provides information about the key raw material used in manufacturing	Kg/unit of output	3	Vulnerability
Material input diversification in manufacturing	Tech	This indicator shows the portion of key raw material in manufacturing which can be procured from domestic/local sources	Level (High-Medium-Low)	3	Adaptation
Emissions					
Emissions from manufacturing	Geo	The indictor provides information about the total CO2 emissions from manufacturing	Kg CO2/unit of output	2	Vulnerability
Fossil fuel energy demand in manufacturing	Tech	This indicator shows the portion of energy demand in manufacturing which comes fossil fuel sources	Level (High-Medium-Low)	2	Vulnerability
Technology diversification in manufacturing	Tech	This indicator shows the portion of emissions from manufacturing which can be avoided using cleaner technologies	Level (High-Medium-Low)	3	Adaptation
Location					

Flooding probability of manufacturing activities	Env	This indicator shows the relative change in the probability of manufacturing activities being flooded due to climate change	Level (High-Medium-Low)	3	Exposure
Proximity of manufacturing activities to rivers	Env	The indictor provides information about the location of manufacturing activities in relation to bodies of water	Level (High-Medium-Low)	2	Vulnerability
Protective measures in manufacturing against flood and rain	Tech	This indicator shows the relative change in manufacturing activities to provide protection against flood	Level (High-Medium-Low)	3	Adaptation
Transportation					
Energy					
Energy demand in transportation	Tech	The indictor provides information about the energy demand of transportation sector	MJ/Km	1	Vulnerability
Imported energy dependency in transportation	Tech	This indicator shows the portion of energy demand in transportation which comes from imported sources such as Middle Eastern oil	Level (High-Medium-Low)	3	Vulnerability
Energy saving measures in transportation	Tech	This indicator shows the relative reduction in energy demand due to the introduction of energy saving measures in transportation including the adoption of more energy efficient technologies	Level (High-Medium-Low)	3	Adaptation
Energy input diversification in transportation	Tech	This indicator shows the portion of energy demand in transportation which comes from renewable sources including wind, solar, hydro	Level (High-Medium-Low)	3	Adaptation
Labour					
Size of workforce in public transportation	Inst	The indictor provides information about the number of employees in public transportation	Person/Km	1	Vulnerability
Share of low-skilled labour	Inst	The indictor provides information about the portion of low-skilled employees in public transportation	Level (High-Medium-Low)	3	Vulnerability

Automation measures in transportation	Tech	This indicator shows the relative reduction in labour force due to the introduction of automation measures in transportation including the adoption of autonomous vehicles, car sharing, and other mobility initiatives.	Level (High-Medium-Low)	3	Adaptation
Emissions					
Total transportation output	Tech	The indictor provides information about the output of transportation	Km travelled	1	Vulnerability
Emissions from transportation	Geo	The indictor provides information about the total CO2 emissions from transportation	Kg CO2/Km	2	Vulnerability
Fossil fuel energy demand in public transportation	Tech	This indicator shows the portion of energy demand in public transportation which comes fossil fuel sources	Level (High-Medium-Low)	2	Vulnerability
Technology diversification in transportation	Tech	This indicator shows the portion of emissions from transportation which can be avoided using cleaner technologies	Level (High-Medium-Low)	3	Adaptation
Location					
Flooding probability of transportation routes	Env	This indicator shows the relative change in the probability of transportation routes being flooded due to climate change	Level (High-Medium-Low)	3	Exposure
Proximity of transportation routes to rivers or seas	Env	The indictor provides information about the location of transportation routes in relation to bodies of water	Level (Close-Far)	2	Vulnerability
Protective measures in transportation against flood and rain	Tech	This indicator shows the relative change in transportation activities to provide protection against flood	Level (High-Medium-Low)	3	Adaptation
Agriculture					
Energy					

Energy demand of agriculture	Tech	The indictor provides information about the energy demand of the agricultural sector. Agricultural energy demand can be divided into direct and indirect energy needs. The direct energy needs include energy required for land preparation, cultivation, irrigation, harvesting, post-harvest processing, food production, storage and the transport of agricultural inputs & outputs. Agricultural energy demand can be divided into direct and indirect energy needs. The direct energy needs include energy required for land preparation, cultivation, irrigation, harvesting, post-harvest processing, food production, storage and the transport of agricultural inputs/ outputs.	MWh/unit of output	1	Vulnerability
Imported energy dependency in agriculture	Tech	This indicator shows the portion of energy demand in agriculture which comes from imported sources such as Middle Eastern oil	Level (High-Medium-Low)	3	Vulnerability
Energy saving measures in agriculture	Tech	This indicator shows the relative reduction in energy demand due to the introduction of energy saving measures during the agricultural process including the adoption of new technologies and practices	Level (High-Medium-Low)	3	Adaptation
Energy input diversification in agriculture	Tech	This indicator shows the portion of energy demand in agriculture which comes from renewable sources including wind, solar, hydro	Level (High-Medium-Low)	3	Adaptation
Labour					
Size of workforce in agriculture	Inst	The indictor provides information about the number of employees in agriculture	Person/unit of output	1	Vulnerability
Share of low-skilled labour	Inst	The indictor provides information about the portion of low-skilled employees in agriculture	Level (High-Medium-Low)	3	Vulnerability
Automation measures in agriculture	Tech	This indicator shows the relative reduction in labour force due to the introduction of automation measures during the agricultural	Level (High-Medium-Low)	3	Adaptation

		process including the adoption of new technologies, digitalization initiatives, and other automation procedures			
Water					
Water demand in agriculture	Tech	This indicator shows the amount of water needed for producing a unit of output in agriculture	m3/unit of output	2	Vulnerability
Dependence of agricultural products to water	Tech	This indicator shows the amount of water needed for producing a unit of output in agriculture	Level (High-Medium-Low)	3	Vulnerability
Water saving measures in agriculture	Tech	This indicator shows the relative reduction in water demand due to the introduction of water saving measures during the agricultural process including the adoption of new technologies and practices	Level (High-Medium-Low)	3	Adaptation
Production					
Suitable temperature for agriculture	Tech	The indictor provides information about the best range of temperature for agricultural production	range (degree C)	3	Vulnerability
Imported fertilizers used in agriculture	Tech	The indictor provides information about fertilizers used in agriculture	Kg/unit of output	3	Vulnerability
Crop diversification in agriculture	Tech	This indicator shows the portion of crops in agriculture which can be changed due to climate change	Level (High-Medium-Low)	3	Adaptation
Emissions					
Total agriculture output	Tech	The indictor provides information about the amount of agricultural goods	unit of output	1	Vulnerability
Emissions from agriculture/land use change	Geo	The indictor provides information about the total CO2 emissions from agriculture	Kg CO2/unit of output	2	Vulnerability

Agricultural land demand	Env	The indictor provides information about the amount of land needed for agriculture	m2/unit of output	2	Vulnerability
Technology diversification in agriculture	Tech	This indicator shows the portion of emissions from agriculture which can be avoided using cleaner technologies	Level (High-Medium-Low)	3	Adaptation
Location					
Flooding probability of agricultural activities	Env	This indicator shows the relative change in the probability of agricultural activities being flooded due to climate change	Level (High-Medium-Low)	3	Exposure
Proximity of agriculture activities to rivers or seas	Env	The indictor provides information about the location of agricultural activities in relation to bodies of water	Level (Close-Far)	2	Vulnerability
Protective measures in agriculture against flood and rain	Tech	This indicator shows the relative change in agricultural activities to provide protection against flood	Level (High-Medium-Low)	3	Adaptation

4. Conclusions

Effective climate policy aimed at reducing the risks of climate change to natural and human systems involves a portfolio of diverse adaptation and mitigation actions. To strengthen the important role of regions in climate actions, and stimulate wide stakeholders' engagement including citizens and businesses, we propose an integrated approach in mitigation and adaptation actions.

In this deliverable we presented a first set of proposed mitigation and adaptation indicators needed for each target group within the project. In order to succeed, it is both necessary to understand the specific user information needs of final LOCALISED tools and services, as well as their expectations. In dedicated meetings at projects meetings with city partners involved in the project, the early outreach to associated partners of business associations and desk research on mitigation and adaptation actions lead to the proposed mitigation and adaptation indicators (see chapter 3).

At this time of the project, the set of indicators may be too broad and exhaustive, however it represents a well justified and formulated "wish list" of indicators to be used in the project. The categorisation into tier levels already showed limitations, both on the methodological approach and the potential data availability, further research will aim finding solutions and suggest new (combined) indicators to be investigated.

The methodological approach and detailed description of indicators, including feedback from the engagement process with stakeholders, will be part of respective deliverables to come in the project. The identification, selection and implementation of indicators is an ongoing activity, this report an undertaking to harmonise them and to check the availability of data.

By submitting this deliverable, the work on the identification, selection and justification on mitigation and adaptation indicators will not come to an end. It may be updated for internal use and to deepen the work on interconnections between various tasks and work packages. It also provides the basis for "matching" key performance indicators derived from the European Calculator and the measures and actions coming from stakeholders.

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