



European  
Commission

# Joint Research Centre

the European Commission's in-house science service



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Joint  
Research  
Centre

## Covenant of Mayors

### Regional Covenant of Mayors for India 1st Coordination Meeting

### EU Covenant of Mayors methodologies *May 8<sup>th</sup> 2017*





- Role of JRC
- Mitigation : Baseline emission inventories and mitigation actions
- Adaptation: Risk and vulnerabilities assessments and adaptation actions
- Evaluation; key criteria
- Monitoring requirements
- Adaptation to Com East and South

# 1. Role of JRC

# The Joint Research Centre is a Directorate General of the European Commission

- **Vision:**

- *"To play a central role in creating, managing and making sense of the collective scientific knowledge for better EU policy."*

- **Mission:**

- *"As the science and knowledge service of the Commission our mission is to support EU policies with independent evidence throughout the whole policy cycle."*

# The role of JRC in the Covenant of Mayors



Three JRC units are involved in the Covenant of Mayors:

- Energy efficiency and renewables
- Air and climate
- Disaster risk management

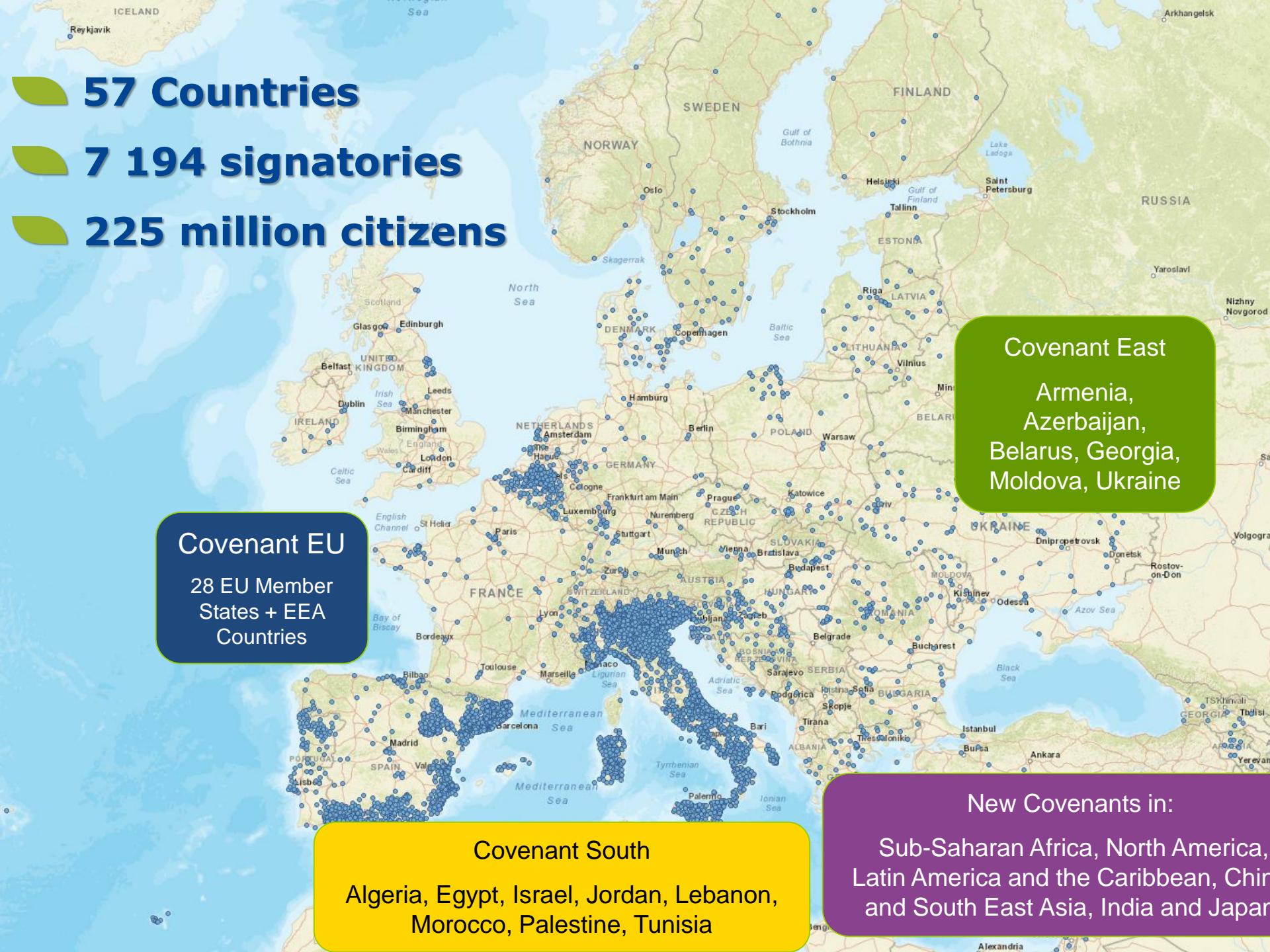
Their role is to ensure the overall scientific coherence of the initiative, by providing scientific-technical support to the development, implementation and monitoring of the CoM



## Scientific-technical support to the development, implementation and monitoring of the CoM since its start in 2008

- Research on existing methodologies and tools for the development of a SEAP
- Development of the **guidebook** "How to develop a SEAP"
- Continuous improvement of data collection process
- **Evaluation** of submitted SEAPs, with **feedback** to Covenant cities
- Development of a specific **monitoring template** & instructions for signatories
- Overall assessment of the initiative and publication of **reports**
- **Capacity building** (technical trainings for cities and regions)





**57 Countries**



**7 194 signatories**



**225 million citizens**

### Covenant EU

28 EU Member  
States + EEA  
Countries

### Covenant East

Armenia,  
Azerbaijan,  
Belarus, Georgia,  
Moldova, Ukraine

### Covenant South

Algeria, Egypt, Israel, Jordan, Lebanon,  
Morocco, Palestine, Tunisia

### New Covenants in:

Sub-Saharan Africa, North America,  
Latin America and the Caribbean, China  
and South East Asia, India and Japan

## 2. Mitigation

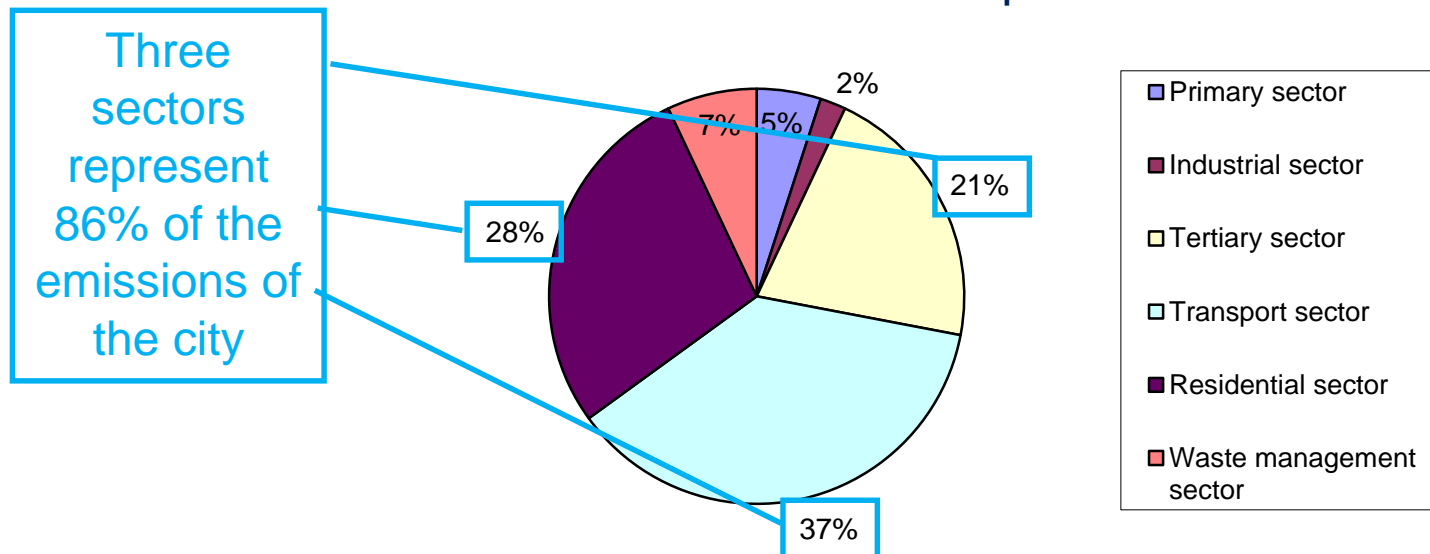


# The Baseline Emission Inventory (BEI)



- BEI quantifies the amount of CO<sub>2</sub> emitted due to final energy consumption in given activity sectors on the municipality's territory within a calendar year and it helps to select the appropriate actions.

Share of emissions per sector



Example: Castelldefels (Spain)

# The Baseline Emission Inventory (BEI)



- BEI is an **instrument** to follow progress towards the CO<sub>2</sub> reduction objective taken by signatories: >20% by 2020 or >40% by 2030.
- **Simplicity** of use and **flexibility**: the BEI should not be a barrier for action. Should suit very different situations, from the largest capitals to very small communities, from newcomers to very experienced cities.
- It is mandatory to cover only those sectors which are most emitting and which could be influenced by the local authority's actions (such as Municipal, Residential and Tertiary Buildings and urban Transport, further defined as **Key Sectors**). The inclusion of other sectors is optional.
- Focuses mainly on GHG emissions occurring due to final energy consumption and mainly on **CO<sub>2</sub>** emissions (**CH<sub>4</sub>** and **N<sub>2</sub>O** are optional).

# The Baseline Emission Inventory (BEI)



## 1.) Identifying the emission sources and collect activity data:

- ❑ Final energy consumption:
  - in buildings, equipment/facilities and industries
  - in transport
- ❑ Local generation of grid distributed energy (electricity, heat, cold)
  - *Considered indirectly, via emission factors, if included in SECAP*
- ❑ Other emission sources (not related to energy consumption) (e.g. waste ...)
  - *Only emissions reported, no activity data required*

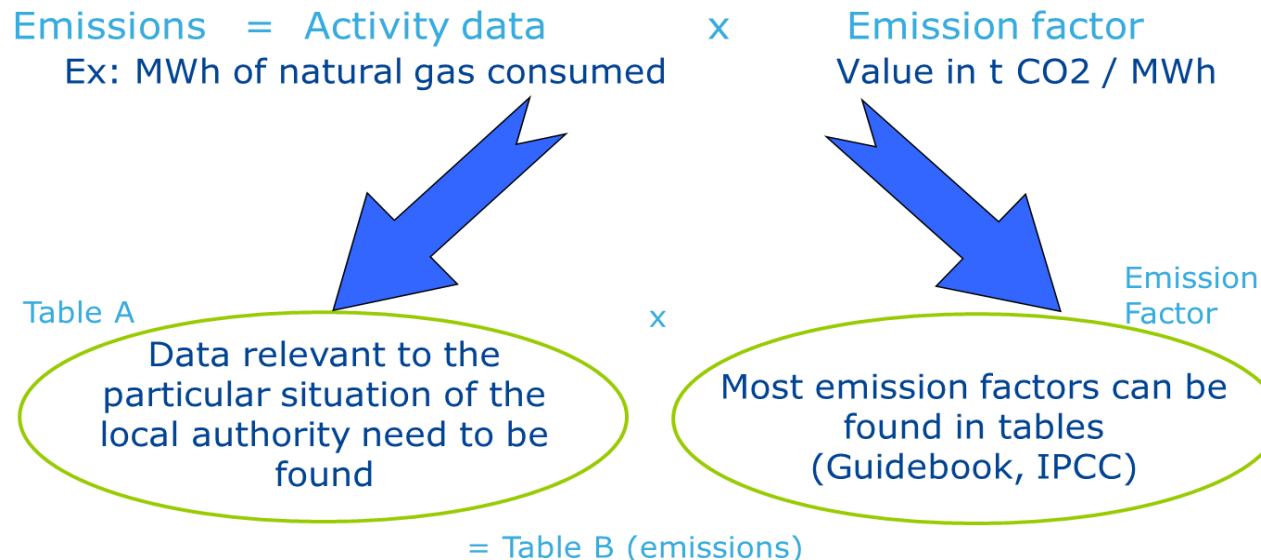
## 2.) Choosing the emission factors

## 3.) Calculating the GHG Emissions

## Baseline emission inventory QUANTITATIVE APPROACH

### How to calculate the emissions?

**It is just a multiplication!**



**MEI :Monitoring emission inventory**  
**Emissions inventory reported for a different year**



## **Summary of the energy action plan developed and submitted by the signatory**

Include actions tackling the CoM sectors, trying to reduce the total emissions by the selected year in at least 40%.

- Actions can be grouped by sectors
- Business and usual approach (BAU)
- Administrative fields
- Economic fields
- Data fields
- Synergies with adaptation ( "Adaptigation")

**The more accurate , the better  
(mandatory and optional fields)**

- **Buildings, equipment/ facilities**
  - Municipal
  - Tertiary (commercial & non-municipal services)
  - Residential
- **Urban transport** (municipal, public, private)

**STRONGLY  
RECOMMENDED**

= the CoM EU  
key sectors

## Local production of grid distributed energy:

- Electricity
- Heat/Cold

**RECOMMENDED IF  
IN SEAP**

## Other energy related sectors:

- Industries not involved in the EU ETS\*
- Agriculture, Forestry, Fisheries (only energy consumption)
- Other road transportation (e.g. highways)

## Non energy related sectors:

- Wastewater and/or solid waste treatment (non energy related)

\* **European Union Emissions Trading System (EU ETS)**



Industries involved in the EU ETS

**EXCLUDED**

Aviation, Shipping,

Agriculture

(non energy related: enteric fermentation, fertilizer application, etc...)

*A more comprehensive list of sectors to be included in the BEI is provided in the CoM Guidebook (JRC, 2010).*

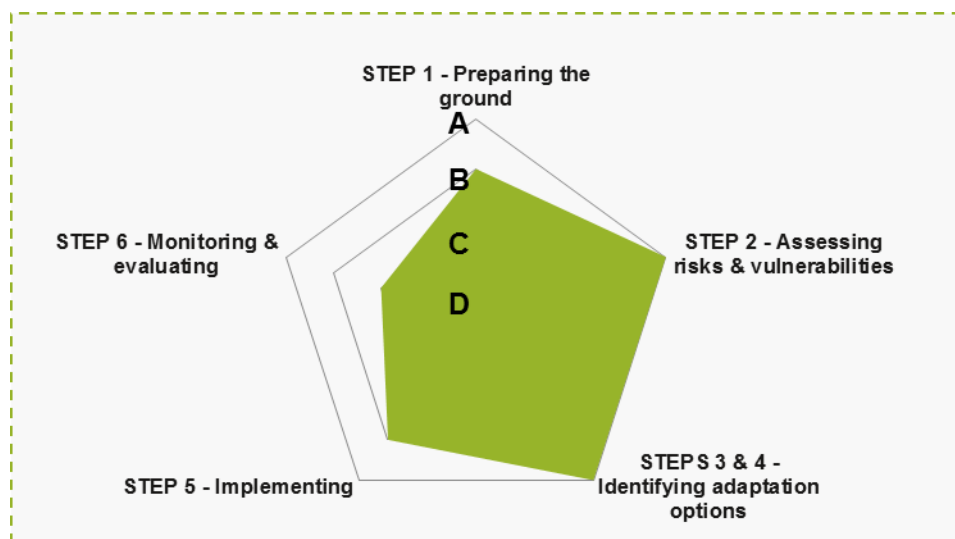
# 3. Adaptation

## Five key requirements

1. Identification of current and future climatic hazards
2. Identification of critical infrastructure
3. Active stakeholder participation
4. Avoid maladaptation
5. Estimate implementation action costs

## Adaptation self- assessment QUALITATIVE APPROACH

**Overview of the capacity, status and principals of the  
Risk and vulnerability study developed**



*From SECAP of GHENT (Belgium)*

## Summary of the risk and vulnerability assessment developed and submitted by the signatory

- Qualitative systems
- Drop menu based
- Main sections:
  - Climate hazard
  - Vulnerabilities
  - Impacts

Climate Hazard Type	Current hazard risk level	Expected change in intensity	Expected change in frequency	<u>Timeframe</u>	Risk-related indicators
<u>Extreme Heat</u>	Low	Increase	Increase	Long-term	
<u>Extreme Cold</u>					
Extreme Precipitation	Moderate	Increase	Decrease	Medium-term	
<u>Floods</u>	Moderate	Increase	Increase	Medium-term	Pluvial flooding
Sea Level Rise	Moderate	Increase	Increase	Medium-term	
<u>Droughts</u>					
<u>Storms</u>	Moderate	Decrease	Decrease	Medium-term	Severe wind, rain storm
<u>Landslides</u>					
Forest Fires					
<u>ther</u>	[please specify]	[Drop-Down]	[Drop-Down]	[Drop-Down]	[Drop-Down]
<small>rows that do not concern your local authority</small> <small>① To be completed for the climate hazards that concern your local authority only.</small> <small>② Click here to see examples of risk-related indicators</small>					

**From municipality of Bologna SECAP**

# Adaptation actions



## Summary of the adaptation actions proposed in the plan

Same scheme as for mitigation  
Synergies with mitigation

Adaptation Actions								
<div> <div></div> <div>500 characters left</div> </div>								
2) Adaptation Actions								
① List your adaptation actions in the table below. Actions can be comprehensive or representative, taken from one or more of the documents cited by the local authority in the section above.								
Sector	Title (max. 120 chars)	Short description (max. 300 chars)	Responsible body/department	Implementation timeframe		Implementation status	Select as <u>Key</u> <u>Action</u> (↔)	Sta
				Start	End			
Other	Developing indicators for monitoring, review and risk prevention within the Municipal Strategy for Adaptation to Climate Change (EMAAC)	It allows you to frame the future response to all kinds of events, impacts and vulnerabilities identified for the municipality.	Municipality of Barreiro	2016	Not known	Ongoing	[Please select]	
Water	Monitoring and analysis of the Tagus-Sado aquifer, incorporating the potential impacts arising from climate change (lack of scenarios and / or contamination of the aquifer - only producer of drinking water in the region)	Regional study in order to assess / monitor the Tagus-Sado aquifer for research on the potential effects of climate change on groundwater	Municipality of Barreiro	2016	Not known	Ongoing	[Please select]	
Other	Education and awareness of adaptation to climate change in schools and for the general population	Awareness of the impacts generated by the climatic events that affect the municipality of Barreiro, and better perception of the type future vulnerabilities, responses and adaptation needs the most significant (sea level rise, excessive rainfall, strong winds and heat waves).	Municipality of Barreiro	2016	Not known	Ongoing	[Please select]	
Land Use Planning	Systems of water retention basins, the	Promoting a naturalized infrastructure in some cases with double function, retention of rainwater and leisure, will allow for a sustainable solution	Municipality of Barreiro	2014	Not known	Ongoing	[Please select]	

**From municipality of Barreiro SECAP**



## Benchmark of excellence

Signatories need to select 3 measures/actions to be highlighted  
On those, a first approach is applied to obtain financial  
figures to assess the economic potential of the initiative

National Funds & Programmes   
 EU Funds & Programmes   
 Private Partnerships   
 Other   
 Public-Private Partnerships   
① Select x for the ones that are applicable.

Website   
 Video link

**Key energy and financial figures**

U<sub>2</sub> reduction (t/a)   
 Energy savings (MWh/a)   
 Renewable energy produced (MWh/a)   
 Implementation cost (€)   
 Jobs created (number)   
 Other figures  Please specify  Unit

② In order to visualize the outcome of the table below and to make a financial assessment of the results achieved/forecasted by measure you will need to fill in all the relevant white cells related to the year of investment.

Life expectancy of the action (years)																			
Discount rate applied (%)																			
First year of investment	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Financial savings (€)	-																		
Investment costs	-																		
Additional costs	-																		
Net cash flow	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PV of Financial savings	10																		
NPV of investment	10																		
Discounted Payback period	not reached	years	0	months															
Return on Investment (ROI)	8DIV70!																		

ESCO involved?

**Upload Benchmarks of Excellence related files**

Upload document   
 Upload picture

# Monitoring reports



## For mitigation and adaptation

Automatically generated figures showing the progress regarding commitments, estimations and achievements made by the signatory

### Key Results of the Baseline Emission Inventory

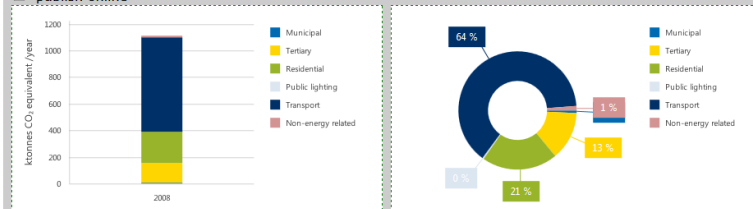
Baseline year: 2008

#### 1) Greenhouse gas emissions and final energy consumption per capita

Emission factor	tonnes CO <sub>2</sub> equivalent/capita	MWh/capita
IPCC	5.6	22.8

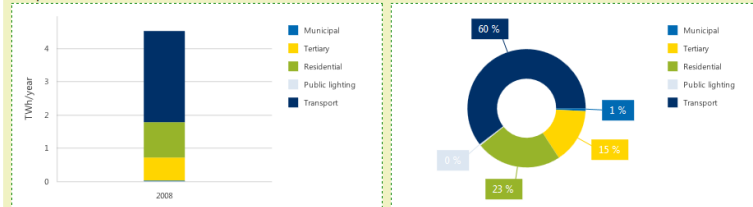
#### 2) Greenhouse gas emissions per sector

☒ publish online



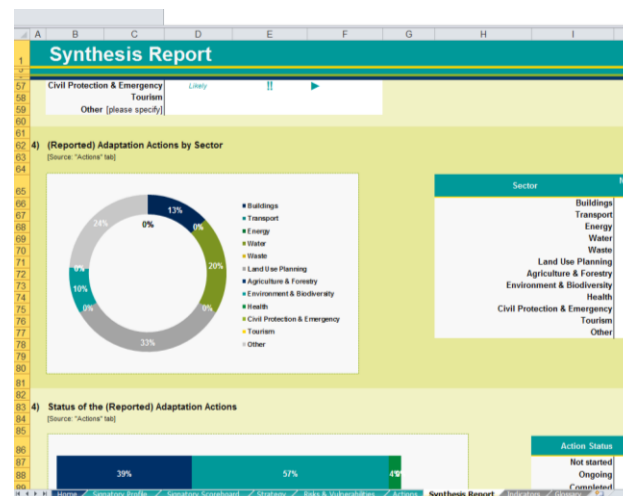
#### 3) Final energy consumption per sector

☒ publish online



#### 4) Final energy consumption per energy carrier

☒ publish online



Adaptation report. City of Ghent, Belgium

Mitigation report. City of Pamplona, Spain

## 4. SEACAP evaluation

## ANNEX I

### THE COVENANT OF MAYORS STEP-BY-STEP PROCESS & GUIDING PRINCIPLES

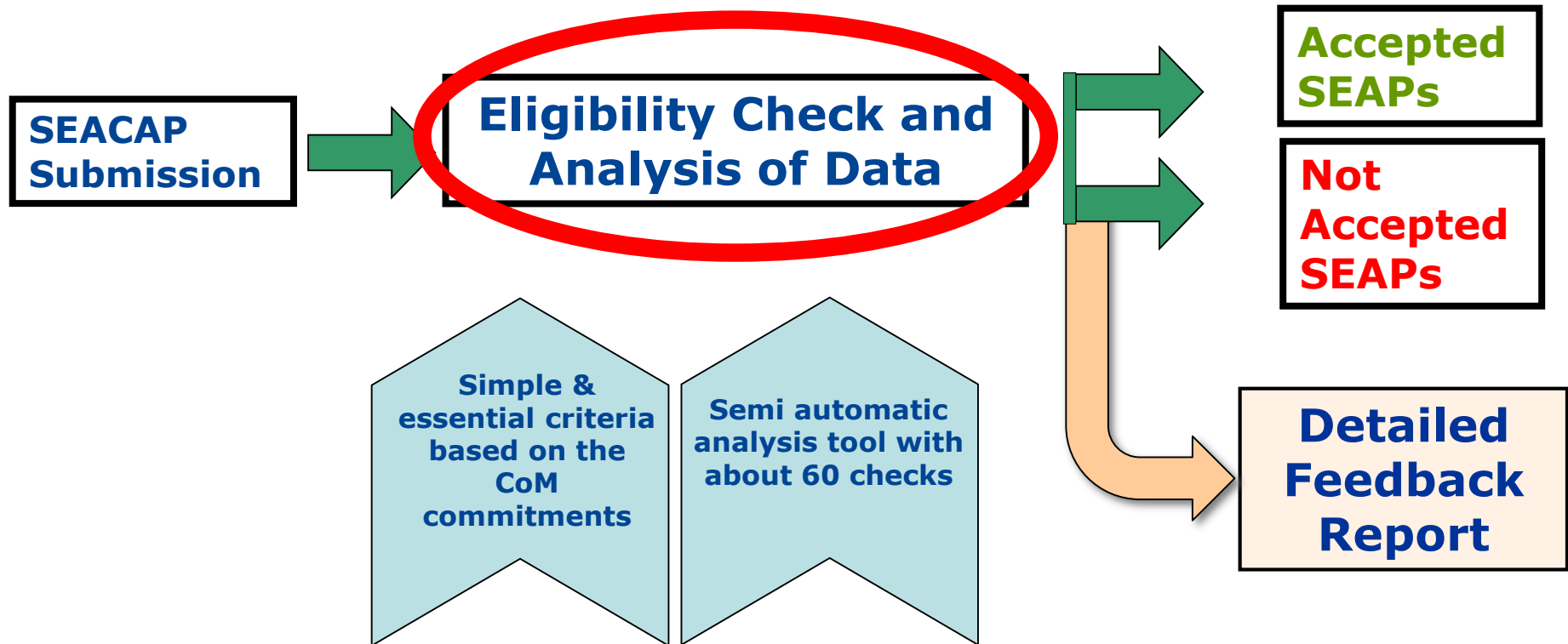
#### A COMMON ROADMAP FOR A SHARED VISION:

In order to meet their mitigation and adaptation targets, Covenant of Mayors Signatories commit to a series of steps:

STEPS \ PILLARS	MITIGATION	ADAPTATION
1) Initiation and baseline review	Preparing a <b>Baseline Emission Inventory</b>	Preparing a <b>Climate Change Risk and Vulnerability Assessment</b>
2) Strategic target setting & planning	Submitting a <b>Sustainable Energy and Climate Action Plan (SECAP)</b> and mainstreaming mitigation and adaptation* considerations into relevant policies, strategies and plans_ <u>within two years following the municipal council decision</u>	
3) Implementation, monitoring and reporting	<b>Report progress</b> <u>every second year following the SECAP submission</u> in the initiative's platform	

\* The adaptation strategy should be part of the SECAP and/or developed and mainstreamed in (a) separate document(s). Signatories can opt for the format of their choice – see the “adaptation pathway” paragraph hereafter.

# The SEACAP Evaluation Process



## 3 steps

### 1. Eligibility check

To check that the SEACAP is consistent with the Covenant formal commitments and principles (as defined in the commitment document)

### 2. Data coherence check

To check that the data in the template are coherent and complete (mainly based on a computer-assisted analysis)

### 3. Feedback report

To provide the Signatory with the results of the analysis and concrete recommendations for improvement



# The SEACAP Evaluation Process



## Eligibility check

1. The SE(C)AP must be **approved by the municipal council** or equivalent body
2. The SE(C)AP must contain a clear reference to the **CO<sub>2</sub> reduction objective by 2030** ( $\geq 40\%$ )
3. The **results of BEI** and of the climate **R&VA** must be provided
4. The SE(C)AP must include a **set of actions in the key sectors** of activity
5. The SE(C)AP **template** must be **correctly filled-in**
6. The **data** provided must be **coherent and complete**

The SE(C)AP template must reflect the content of the document officially approved by the Council

SECAPs that do not comply with all the above criteria cannot be accepted

# The SEACAP Evaluation Process



Sectors / Fields of action	
<b>Municipal &amp; public lighting</b>	✓
<b>Residential</b>	✓
<b>Tertiary</b>	✓
<b>Transport</b>	✓
<b>Local energy production</b>	<b>Optional</b>
<b>Local heat/cold production</b>	<b>Optional</b>
<b>Industries (excl. ETS sector)</b>	<b>Optional</b>
<b>Other sectors</b>	<b>See guidebook</b>

**4 KEY SECTORS**  
whose inclusion is  
highly recommended



**For mitigation, to be eligible a SE(C)AP must include:**

- ✓ **BEI**, covering at least 3 out of 4 key sectors
- ✓ **A list of concrete measures**, covering at least the municipal sector and one or more other key sectors

# The SEACAP Evaluation Process



**For Adaptation still discussions ongoing**

**Criteria of conformity**

**Criteria of completeness**

**Criteria of coherence**

**Criteria of Quantification**

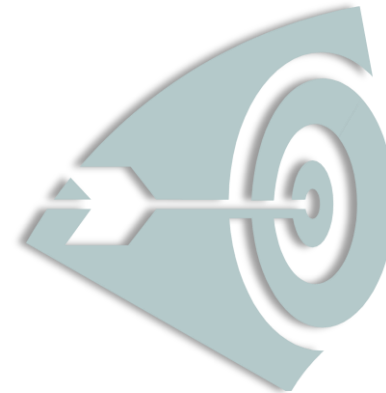
**Criteria of technical robustness**

## 5. The CoM Monitoring requirements

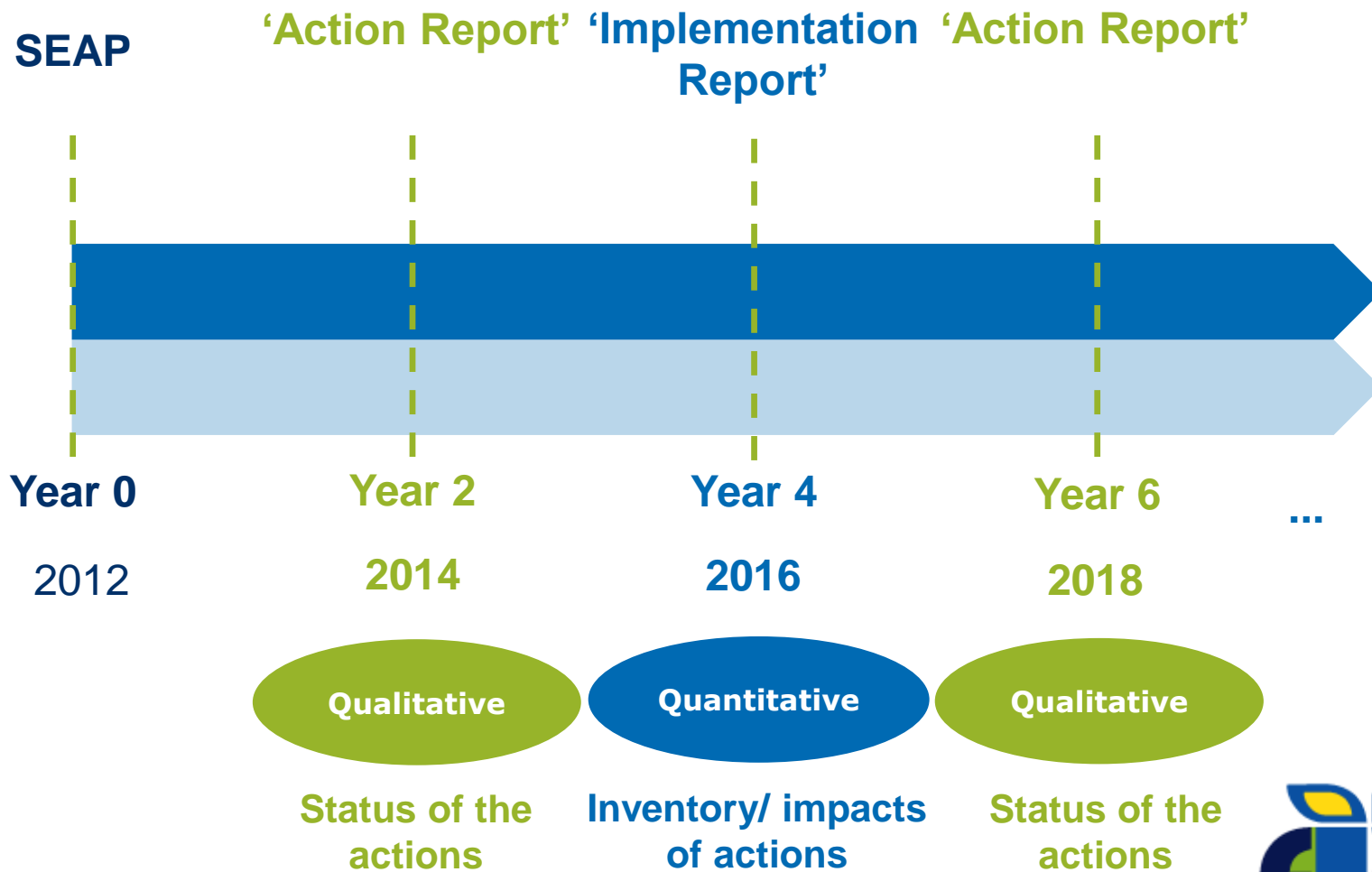
## Why is monitoring important?

- To monitor how actions defined in SE(C)APs are progressing and evaluate their effects towards the targets
- To identify the need of adjustments to the plan, e.g. corrective measures
- To take new opportunities not initially foreseen, e.g. changes to the national/international context

***Is the signatory on track to reach the target?***



# The CoM monitoring requirements



## Examples [1]

### Municipal - Residential - Tertiary Buildings

Building envelope	Number/surface area of buildings insulated [- /m2]
Energy efficiency in space heating and hot water	Number of boilers replaced [-]
Energy efficient lighting systems	Number of lamps replaced [-]
Energy efficient electrical appliances	Number of electrical appliances replaced [-]
Renewable energy for space heating and hot water	Surface area of solar thermal panels installed [m2]
Integrated action	Number/surface area of buildings retrofitted [- /m2]
ICT	Number of buildings with smart meters installed [-] / Number of new buildings with domotic systems [-]
Behavioural changes	Number of participants in awareness raising campaigns [-] / Number of CFLs distributed [-]

## Examples [2]

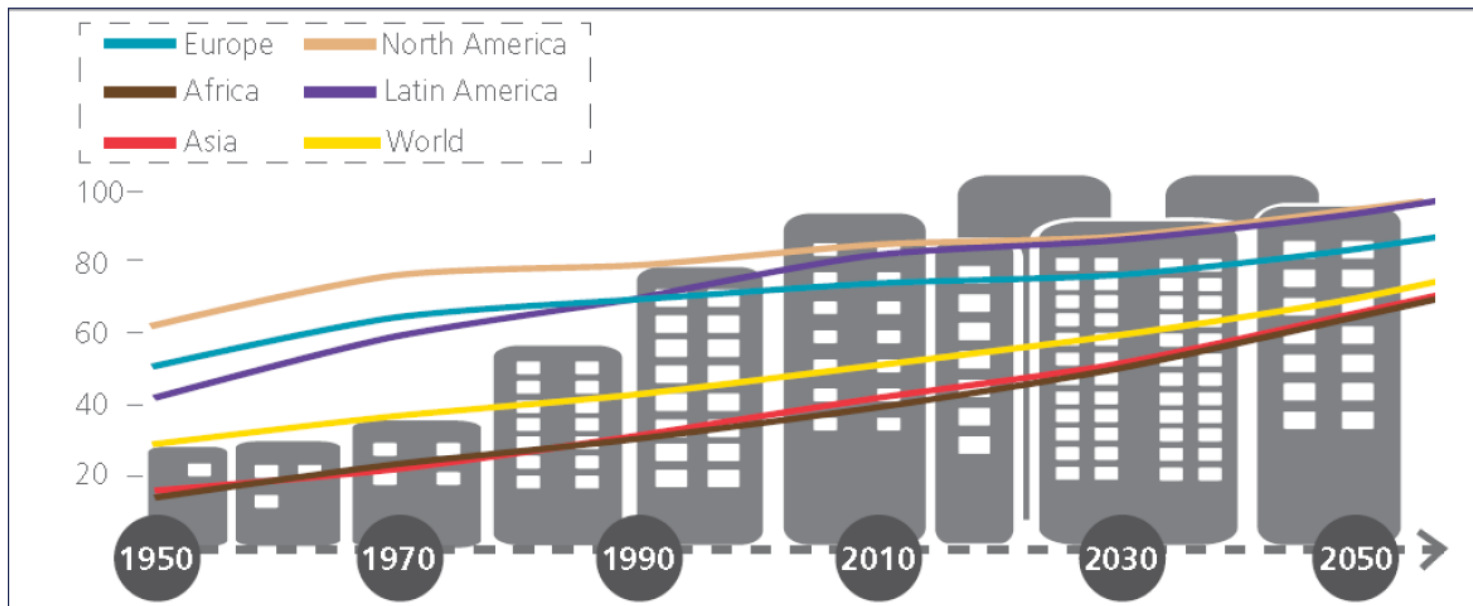
Municipal - Public - Private Transport	
Cleaner/efficient municipal vehicles	Number of vehicles replaced [-]
Municipal fleet - efficient driving behaviour	Example: no. of courses given on total planned (%)
Cleaner/efficient public transport	Number of new buses purchased [-]
Public transport infrastructure, routes and frequency	Network extension (km) / Number of services per day [-]
Electric vehicles infrastructure	Number of charging points [-]
Car sharing	Number of car share vehicles and locations [-]
Walking & cycling	Number of bicycle parking spaces [-]
ICT	Number of roads with Variable Speed Limits (VSB) introduced [-] / Number of teleworking schemes in place [-]
Efficient driving behaviour	Example: no. of courses/campaigns realised on total planned (%)



## 6. Adaptation to CoM East and CoM South

# Why adapting EU CoM methodology to non EU-28 countries?

## Proportion of Urban population in the world



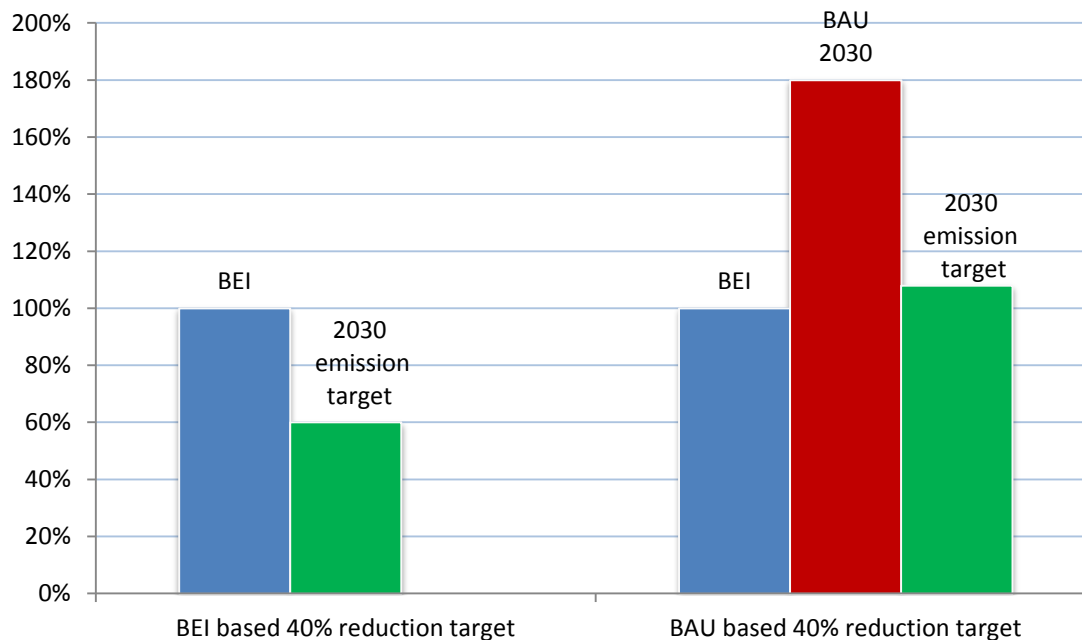
- Urban areas emit up to 70% of global greenhouse gases (UNHABITAT, 2011).
- It is predicted that by 2050 about 64% of the developing world and 86% of the developed world will be urbanized (UNHABITAT, 2012).

## Why adapting EU CoM approach to non EU-28 countries?

- It has the aim of supporting those municipalities that are on a rapid economic growth path **to develop their economies in a sustainable manner**
- The possibility of setting the reduction target using a **Business-As-Usual (BAU) scenario** is notably given to these countries. The **BAU scenario explores the future situation when no further climate and air pollution policies are implemented beyond what is in place**. The trend in energy consumption is therefore driven by population and economic growth but not by energy efficiency/climate change policies.
- **Other key principles** for a successful SECAP have been adapted to suit the specific situation of those countries

	<b>EU-28</b>	<b>Eastern Partnership Cities</b>	<b>Southern Partnership Cities</b>
<b>Target</b>	40% by 2030	30% by 2030	Beyond the NCDs
<b>Reduction target</b>  <i>as compared to BEI emissions</i>	Absolute terms [tCO <sub>2</sub> ]	Absolute terms [tCO <sub>2</sub> ]	Absolute terms [tCO <sub>2</sub> ]
	Relative terms [tCO <sub>2</sub> /capita]	Relative terms [tCO <sub>2</sub> /capita]	Relative terms [tCO <sub>2</sub> /capita]
<i>as compared to BAU emissions</i>	<b>Not allowed</b>	Absolute terms [tCO <sub>2</sub> ]	Absolute terms [tCO <sub>2</sub> ]
<b>Base year</b>	1990 recommended	A recent year representative of current situation	1990 recommended or if data is not available more recent year
<b>Key sectors</b>	CoM EU key sectors	As CoM EU + solid waste and waste water recommended	As CoM EU + solid waste and waste water recommended

## Setting the emission reduction target



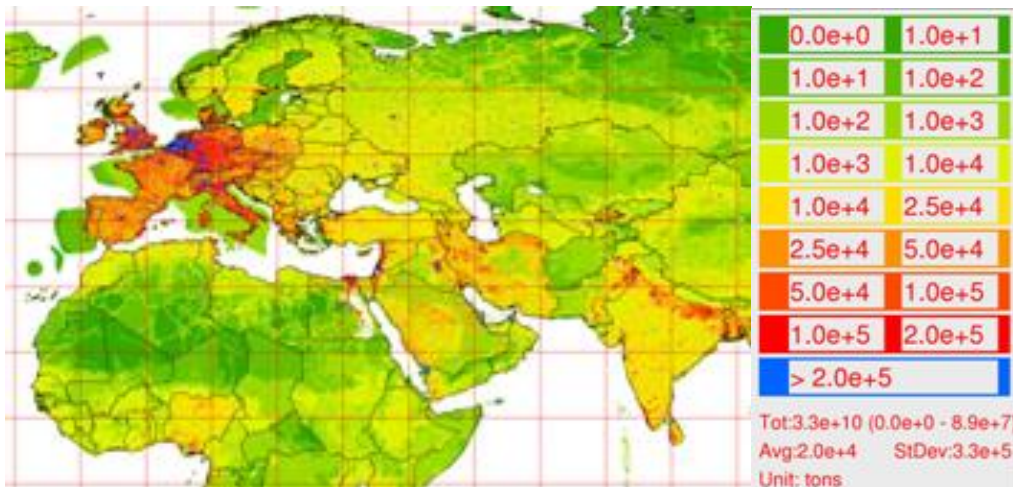
When using a BAU-based approach, the 2030 targeted emissions may be higher than the BEI emissions

## BAU versus BEI 40% reduction target

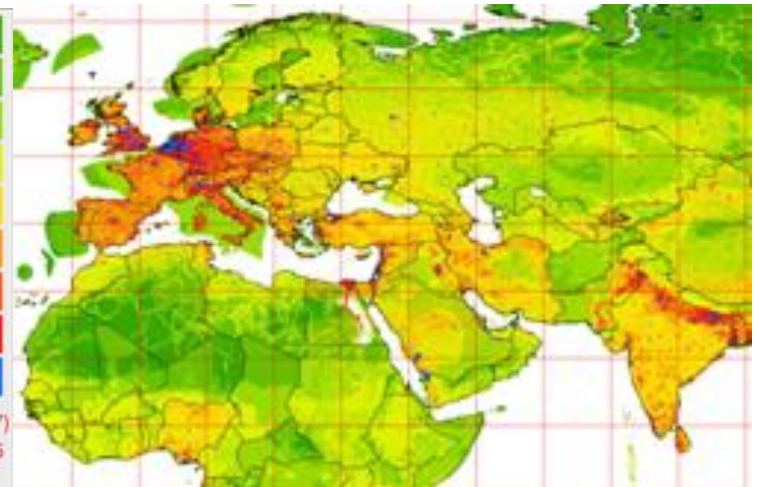
## EC-JRC BAU GHG emission projections

Emission inventory **projections to 2050** calculated, starting from the **base year 2005** with the **sector-specific growth rates and technology-based emission factors** taking into account different abatement measures per regions, calculated in the frame of the FP7 research project CIRCE ([www.circeproject.eu](http://www.circeproject.eu); Doering et al. 2010).

2005 CO<sub>2</sub> emissions

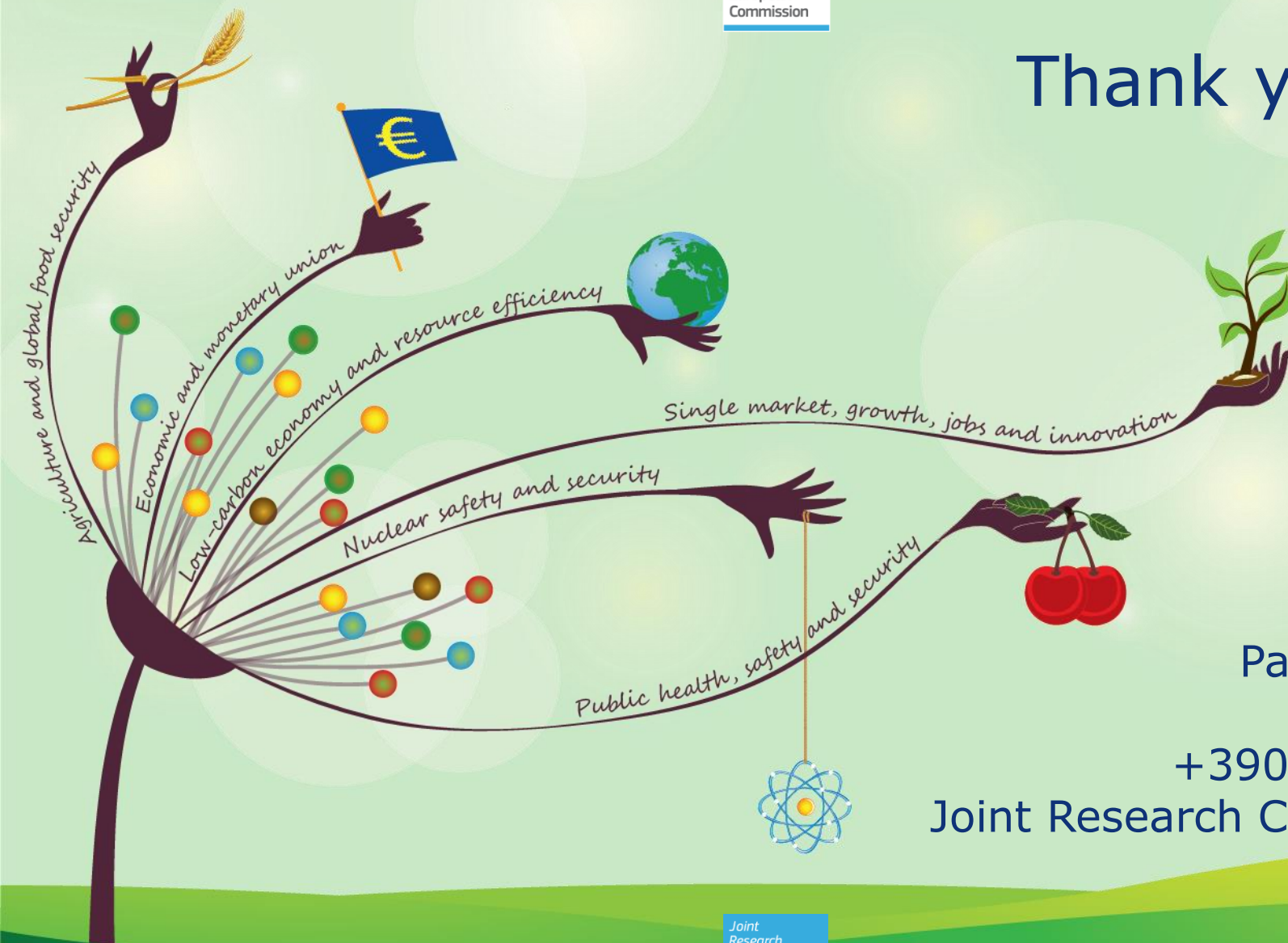


2020 BAU CO<sub>2</sub> emissions



*Globally, about 10% CO<sub>2</sub> increase by 2020*

# Thank you!



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