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Experience with energy data sharing: The Covenant of Mayors

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with contributions from other members of the JRC CoM team and material from CoM Office

1st EUSALP experts' workshop "EUSALP Energy Observatory", Bolzano, Italy, 20th March 2018

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Experience with energy data sharing: The Covenant of Mayors

1. **What is the Covenant of Mayors (CoM) and what is the role of the Joint Research Centre (JRC)?**
2. **Which local energy data?**
3. **What are the potential challenges and barriers?**

- **Outcome from the JRC analysis of CoM signatories' data and documents**
- **Lessons learnt and actions from other CoM partners and EU initiatives**

4. **EUSALP Energy observatory: potential contribution of the JRC**

Covenant of Mayors for Climate & Energy

European Commission

1. Covenant of Mayors and the role of the JRC

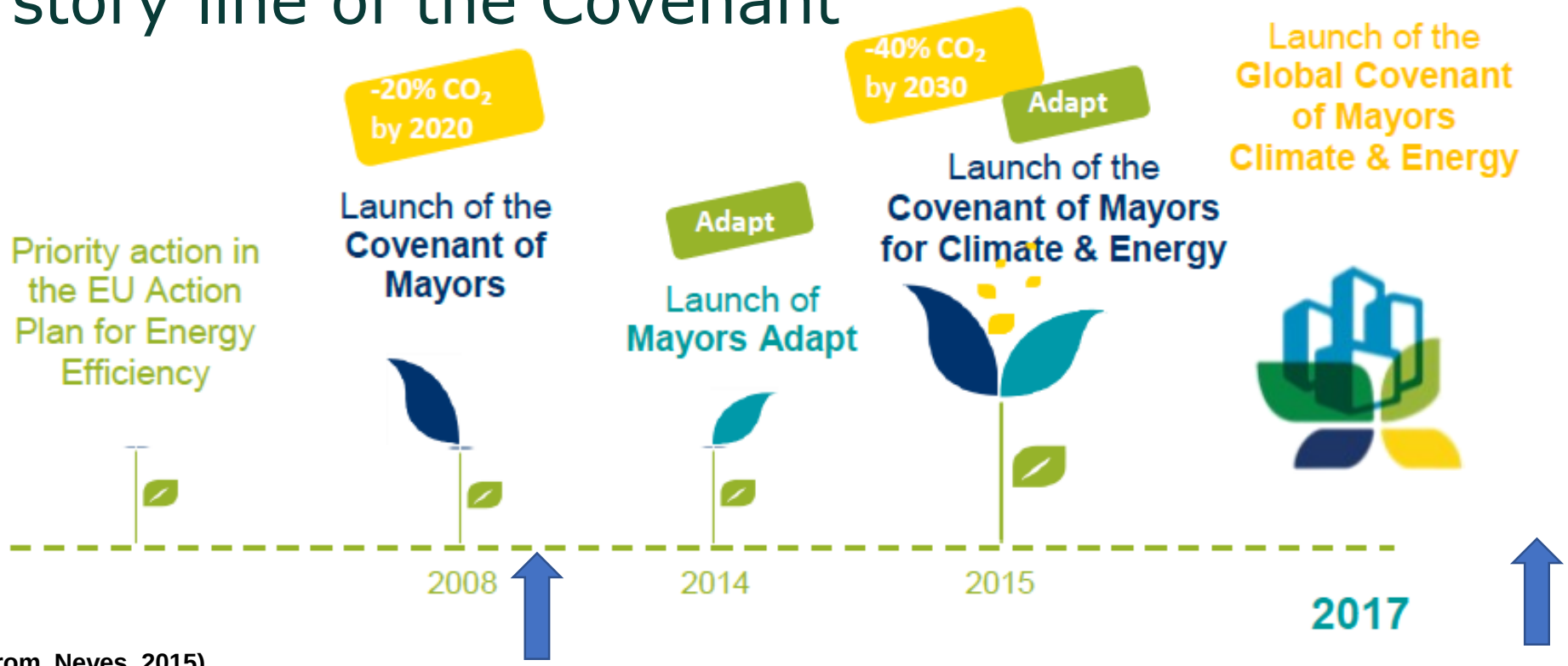
- **Covenant of Mayors (CoM) was launched in 2008** in Europe with the ambition to gather **local governments** voluntarily committed to achieving and exceeding the **EU climate mitigation targets**: 20% and 40% cut in Greenhouse gas emissions (GHG) by 2020 and by 2030 as compared to 1990 levels, respectively.

- **The JRC CoM team** role includes the definition of the **Sustainable Energy and Climate Action Plan (SECAP) methodology** and the provision of **Guidebooks and other scientific and technical** support **(helpdesk, trainings**) as well as the **evaluation of the SECAP** submitted.

- **The JRC CoM team** also contributes to the **definition of the reporting platform,** and to the **promotion of the CoM initiative** in international events and workshops, in close collaboration with the CoMO Office located in Brussels.

Covenant of Mayors for Climate and Energy

The story line of the Covenant



(adapted from Neves, 2015)

2010 CoM guidebook

2018 CoM guidebook

Covenant of Mayors for Climate & Energy

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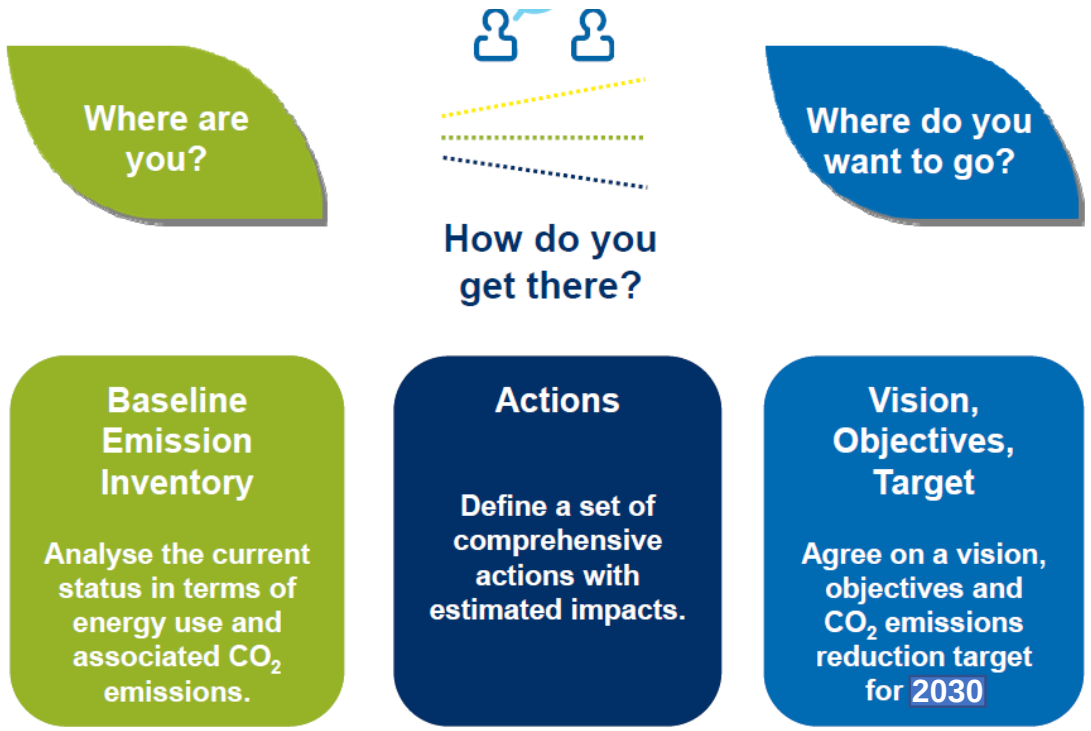
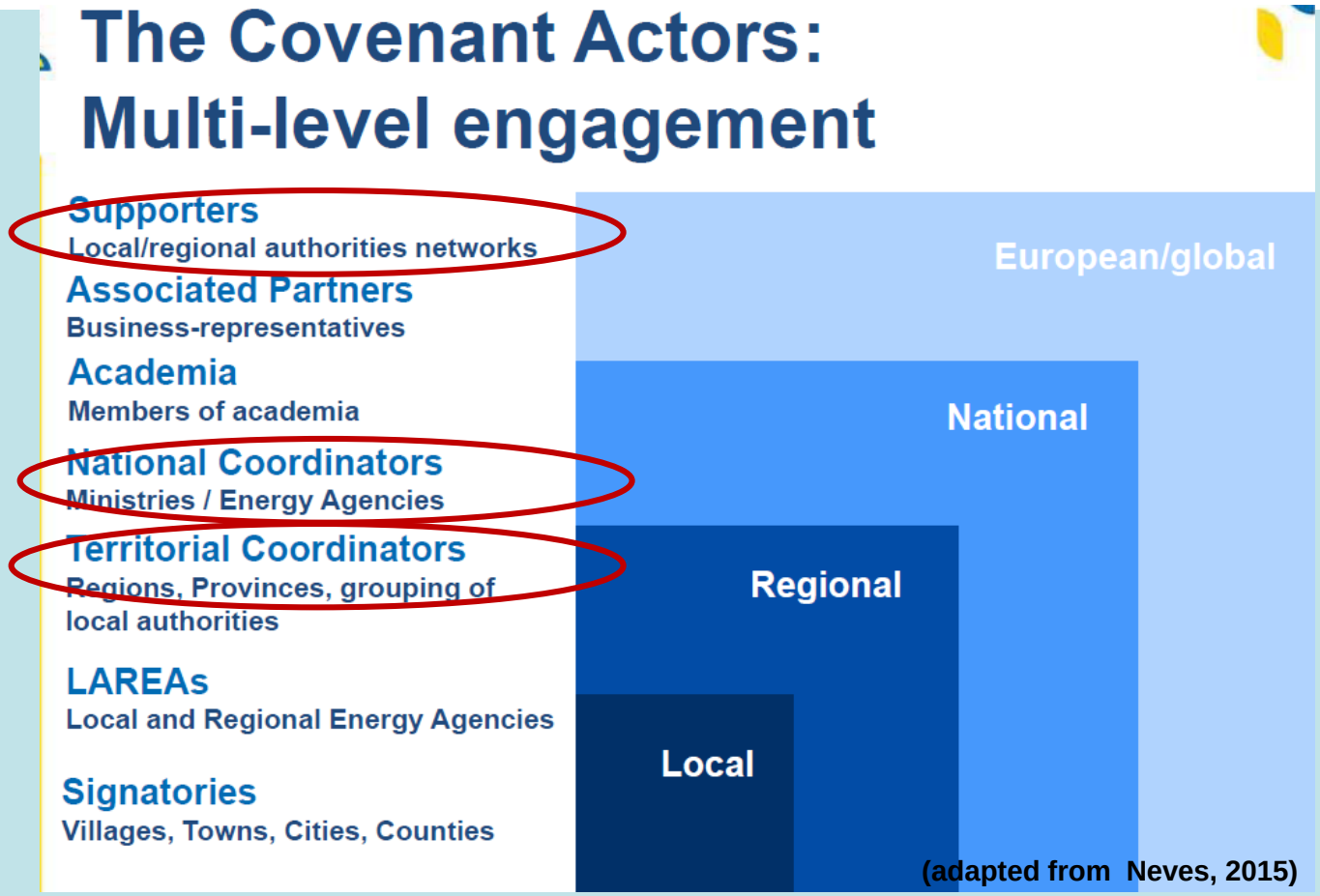
The SECAP process: a multi-level engagement

Sustainable Energy and Climate Action Plan (mitigation)



(adapted from Neves, 2015)



(adapted from Neves, 2015)

‘Multi-level governance’ refers to the effective interaction between the different political levels for an improved coordination and coherence between the local, regional, national and European policy level“.

Covenant of Mayors for Climate & Energy

European Commission

Covenant in Figures : EU signatories

http://www.covenantofmayors.eu/about/covenant-initiative/covenant-in-figures.html

17/03/2018

Submitted Action plans and Coordinators in EUSALP countries Mid May 2017 (Melica and Bertoldi 2018)

	ITALY	GERMANY	FRANCE
Signatories with action plan	3043	58	78
supported by coordinators	70%	16%	6%

AT, LI, SI, CH: < 30 signatories; 0 coordinator

17/03/2018 (EU)

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2. Which local energy data ?

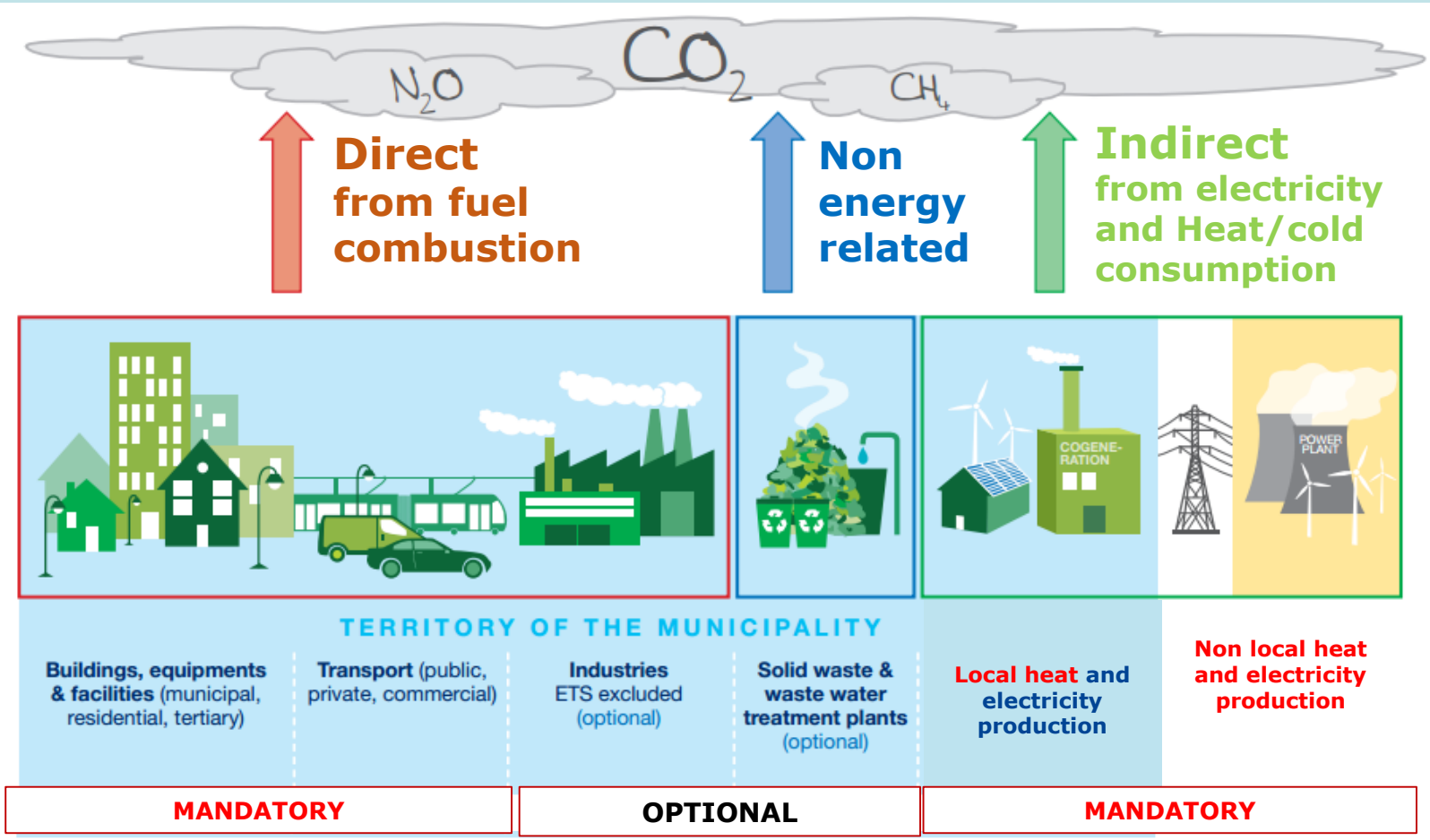
Scope and guiding principles of CoM Mitigation Action plan

- Focus is on the **final energy consumption in activity sectors under the direct influence or potential control of the Local Authority** (LA)
- Geographical coverage: **Local territory (administrative boundaries)**
- **Sound knowledge of the local situation** in terms of energy and GHG emissions
- Encourages **bottom up collection of data**
- Allows for the **monitoring to capture the results of the local actions**

=> Bottom-up data of final energy consumption within the administrative boundaries of the local territory for key activity sectors (non exhaustive inventory)

2. Which local energy data ?

Local sources of Greenhouse gas emissions



(adapted from CoMO material)

Mandatory sectors/sources

- **"Buildings":** Energy consumption in Buildings, equipment, facilities
- **Transport:** Energy consumption in road and rail transport
- **Heat and electricity consumption** in all included relevant sectors
- **Local heat production**

+ "recommended" (local electricity production) and "optional" (if measures planned in the SECAP) cases

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2. Which local energy data ?

Renewable and non renewable energy sources

Non renewable energy sources (fossil fuels)

EU most commonly used:

- Natural gas
- Liquid gas
- Heating oil
- Diesel
- Gasoline
- Lignite
- Coal
- Waste (non-biomass fraction)

Renewable Energy Sources (RES)

- Biofuels
- Plant oil
- Other biomass
- Solar thermal
- Geothermal
- *Wind power (indirect emissions)*
- *Hydroelectric power (indirect emissions)*
- *Photovoltaic (indirect emissions)*

Electricity **(from fossil fuels and RES)**
Heat/Cold **(from fossil fuels and RES)**

Nuclear is excluded

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GHG emissions as derived from local energy data

Example 1: Natural gas consumption in "Buildings"

Activity Data	*	Emission factors	=	Emissions
Natural gas consumed in buildings [MWh]		Amount of CO_2 emitted per MWh of fuel [tCO_2/MWh]		CO_2 emitted from the specific fuel [tCO_2]
↓		↓		
Find the proper **data on specific fuel consumption in all "Buildings"**		Find the fuel specific emission factor (EF): 0.202 tCO_2/MWh		

CoM Default Emission Factors
for energy carriers the most commonly used in EU (IPCC and LCA)

Local Emission Factor?
Fossil fuels, standard approach: no (IPCC, 2006)
LCA approach and Bioenergy: local EF might be more adapted

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GHG emissions as derived from local energy data

Example 2: electricity consumption in "Buildings"

Activity Data	*	Emission factors	=	Emissions
Electricity consumed in municipal buildings [$MWh_{electricity}$]		Amount of CO_2 emitted per MWh electricity [$tCO_2/MWh_{electricity}$]		Total amount of CO_2 emitted from electricity [tCO_2]

↓

Find the proper data on **local consumption of electricity**

↓

Emission Factor for Electricity consumption (EFE)

National EFE (NEFE) provided in CoM guidelines (Koffi et al. 2017)

The National EFE is kept constant but **a more local specific EFE** can be calculated, accounting for :

- **Local production and supply of electricity**
- **Green Electricity purchase by the municipality**

Encouraging production of green electricity

European Commission

Covenant mandatory activity sectors

Buildings

- Municipal buildings, equipment/facilities
- Public lighting
- Tertiary buildings equipment/facilities
- Residential buildings

Direct emissions

+ consumption of electricity and heat

On condition (if actions included in SECAP):

- **Non–ETS Industries**
- **Others (Agriculture/Forestry/Fisheries)**

Covenant mandatory activity sectors

Transport

Direct emissions

+ consumption of electricity

Road transport

- **Municipal fleet**
- **Public transport**
- **Private and commercial transport**

Rail transport

Aviation and shipping are excluded

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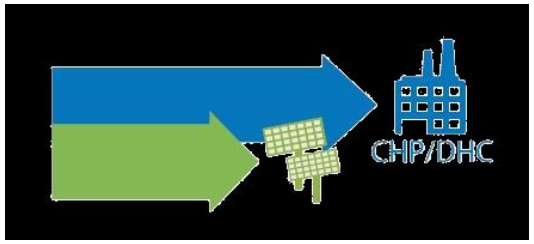
Local production and supply of energy



- **Local production and supply of Heat/cold**
- **Local production and supply of electricity** (recommended)

For the calculation of indirect **emissions from** heat/cold and electricity consumption

As for the direct emissions, this includes consumption or use of **renewable** (wind, hydroelectric, photovoltaics, geothermal, biomass) and **non-renewable** (fossil fuels, wastes,..) **energy sources** (nuclear excluded)

3. What are the potential challenges and barriers?

CoM data reporting: Outcome

Energy data collection can be challenging for many reasons (data ownership, commercial sensitivity, lack of resource, CoM-specific sectors,….),

which are **hardly identifiable from the data analysis only**, although some assumptions can be made.

Data quality and level of details of CoM on-line date are:

- **Country specific**
- **Energy specific**

  Electricity c**onsumption** and its split by Covenant sub-sectors are generally reported; Data on **energy production are scarce**

  When relevant, data on **Natural Gas** consumption are indicated, even though the split by Covenant sub-sectors seem more challenging
- **Activity (sub-)sector specific:** the split by Covenant sub-sectors seems to be the most challenging

(adapted from Melica and Zancanella, 2017)

CoM data reporting: Outcome

CoM activity sectors

- Municipal Buildings, equipment/ facilities
- Tertiary Buildings, equipment/ facilities
- Residential Buildings, equipment/ facilities
- Public lighting
- Industries (non ETS)
- Municipal Fleet
- Public transport
- Private and Commercial transport

Data quality and level of details by (sub-)sector

- Energy consumption in buildings, vehicles, lightning systems and other facilities operated by **municipality** is usually adequately registered
- Energy consumption data in **residentia**l & **commercial** sectors are of a poor quality (more difficult to gather)
- **Transport sector** estimations are based on statistics and often outdated assumption (fuel sold method), with a frequent lack of detail by sub-sectors.

(adapted from Melica and Zancanella, 2017)

Challenges

CoM sectors specificities

CoM activity sectors

- Municipal Buildings, equipment/ facilities
- Tertiary Buildings, equipment/ facilities
- Residential Buildings, equipment/ facilities
- Public lighting
- Industries (non ETS)
- Municipal Fleet
- Public transport
- Private and Commercial transport

National/regional Energy data

Sweden

(T. Serrenho, 2015)

Challenges

CoM sectors specificities

Example of a german signatory with no disaggregated data

Legend of colours and symbols:

Green fields are compulsory | Grey fields are non editable

Does not fulfill the eligibility criteria

A. Final energy consumption

Please note that for separating decimals dot [.] is used. No thousand separators are allowed.

Category	FINAL ENERGY CONSUMPTION [MWh]															
			Fossil Fuels								Renewable energies					Total
	Electricity	Heat cold	Natural gas	Liquid gas	Heating oil	Diesel	Gasoline	Lignite	Coal	Other fossil fuels	Plant oil	Biofuel	Other biomass	Solar thermal	Geothermal	
BUILDINGS, EQUIPMENT / FACILITIES & INDUSTRIES																
Municipal buildings, equipment/facilities		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tertiary (non municipal) buildings, equipment/facilities	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Residential buildings	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Public lighting		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Industries (excluding industries involved in the EU Emission trading scheme - ETS)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Subtotal	2564000	856000	3617000	0	4475000	0	0	0	318000	0	0	0	0	0	0	1183000
TRANSPORT																
Municipal fleet	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Public transport	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Private and commercial transport	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Subtotal	138000	0	0	0	0	0	5360000	0	0	0	0	0	0	0	0	5498000
TOTAL	2702000	856000	3617000	0	4475000	0	5360000	0	318000	0	0	0	0	0	0	1732800

Municipal purchases of certified green electricity (if any) [MWh]:

0

(T. Serrenho, 2015)

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Challenges

CoM scope/sectors specificities

Local emission factor for electricity consumption

Requires data on the local production that is consumed locally:

- **Data on the share consumed locally is available or easily assessable**

e.g. in case of direct supply to the consumers, domestic installations, small-scale on-site stand-alone power generation systems, district/decentralized energy generation.

-> Direct contact to the local private/public electricity provider (e.g. local energy cooperatives), energy consumer, plant owner and/or operator

- **Data on the share consumed locally is not available or easily assessable**

e.g. in case of supply through grid distribution and/or no access to the data

-> Additional data or assumptions are required: Statistics on number of permits or subsidies granted; Energy market operators (certified green electricity not sold outside the local territory) and use of proxies/default methods (size of the combustion plant, share of the plant owned by the LA).

Challenges

Sector specificities

Road Transport

- **Mobile source with no direct access to the amount of fuel consumed**
- **Different approaches exist (all are demanding)**
- **Private and commercial transport are generally the most difficult data to gather**

- **At local scale, the "Fuel sale method" is usually not suitable** because the amount of fuel consumed is different from the amount of fuel sold

- **Estimates of the fuel used** based on:

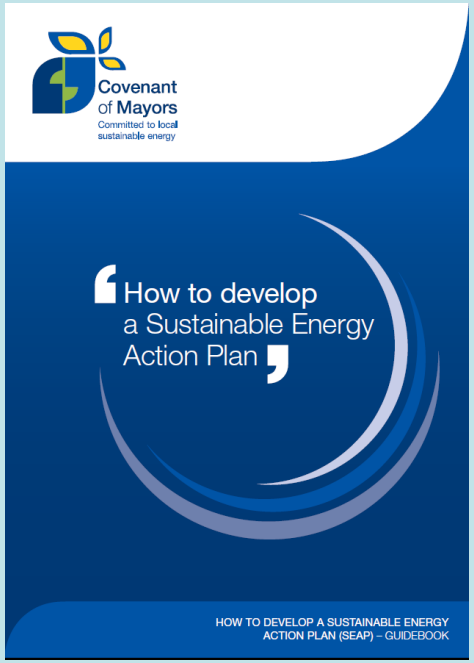
- Mileage* driven in the territory of the LA [km]
- vehicle fleet in the territory of the LA (cars, buses, two-wheelers, heavy and light-duty vehicles)
- average fuel consumption of each vehicle type [litres/km].

- **Information on mileage driven** taken from:
- transport department
- traffic counts (by national or local authorities)
- surveys

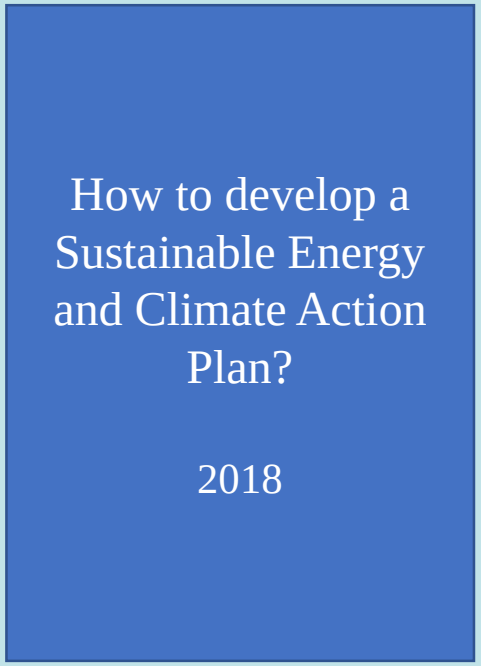
*=Vehicle-kilometres travelled

CoM guidebooks

2010



2018



2010 edition [Bertoldi et al., 2010]

- **General guidance on data collection** in the Building macro sector and sources of data: Invoices (e.g. for the own buildings of the local authority), Market operators (energy suppliers, grid operators), Ministries (energy, statistics, environment), agencies, regulatory authorities; Inquiries to energy consumers
- **General guidelines** on road transport

2018 edition [Part IIa; Koffi et al. 2018, in prep]

Further guidance and information on data collection based on:

- Lessons learnt from CoM data reporting
- New knowledge, methodologies or tools (e.g.. road transport)
- **Support actions from CoM coordinators**
- **MESHARTILY project***
- **Data4Action* (Energy observatories)**

* co-financed by the EC through the "Intelligent Energy Europe (IEE)" programme

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Support from the Covenant coordinators

185 EU Coordinators (17/03/18)

- **Territorial Coordinators (~ 95%)**
- **National Coordinators**

2 examples

European Commission

MESHARTILITY project

http://www.meshartility.eu/en/

Measure and share data with utilities for the Covenant of Mayors

April 2012- April 2015

- co-financed by the EC through the "Intelligent Energy Europe (IEE)" programme
- **12 EU countries**: Bulgaria, Croatia, Cyprus, Estonia, Germany, Italy, Latvia, Malta, Poland, Romania, Slovenia, Spain.

Objective

Developing solutions and tools facilitating municipalities' access to energy data and improving cooperation between municipalities and energy utilities who are the main owner of the data."

Target

The project **specifically addressed the municipalities who are part of CoM** and are "working hard to achieve the EU's climate and Energy targets on the local level". **It did not address the transport sector.**

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MESHARTILITY

Main results

- **Analysis of the initial situation**
- **Actions for improving access to local energy data**
- **Recommendations for EU and National policy makers**

- Analysis of **EU and National legal frameworks** on data sharing.
- Analysis of **current data sharing practices** by consulting utilities, LAs and supporting structures
- **Roundtable discussions** on European and national levels
- Development of **local cooperation schemes**
- Development of **new good data sharing process**
- **Support of 74 Municipalities in the development of the baseline CO_2 emission inventories** with reliable bottom up data in cooperation with utilities and reporting good experiences, barriers, lessons learnt for other LAs and utilities
- **Proposals for an EU and National framework cooperation agreements**

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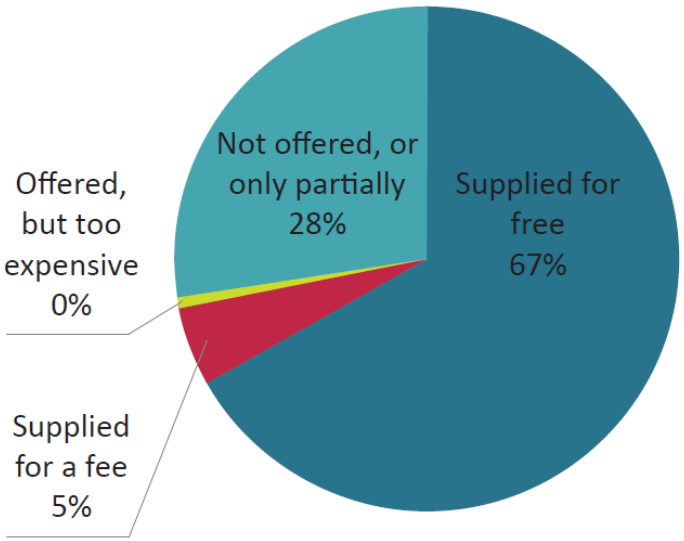
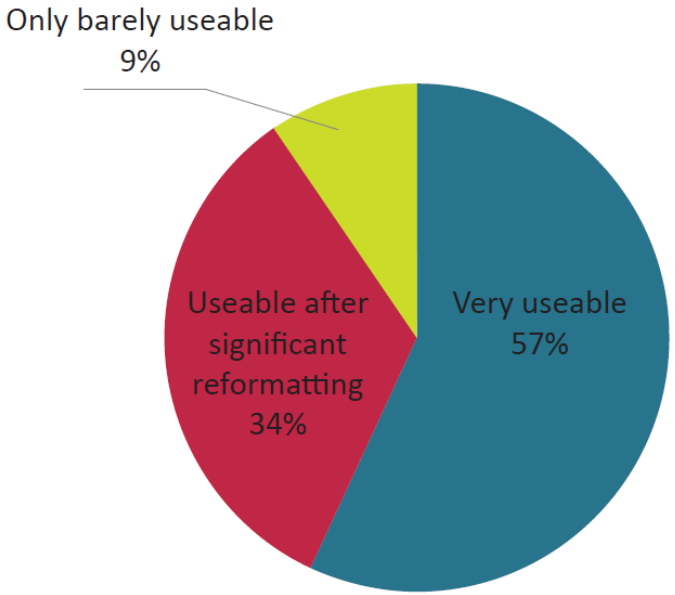
MESHARTILITY
On-line survey on data sharing practices



Energy suppliers reaction to the LA request for energy data



Quality of the energy data provided to LAs

- Significant challenges in terms of data access and data quality
- Main source for data on energy consumption = energy suppliers (retailers or energy system operators)
- **Only very few cases of access to a central database**

250 municipalities and their associations
53 energy suppliers and their associations

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MESHARTILITY

Initial situation: good practices

- **Central data sharing platforms for multiple energy sources**
- Data provision by Distribution Services Providers direct
- Data collection through bilateral agreements
- Measures to improve data collection and sharing

<u>Central energy data platforms</u>
operated by either state departments or non-state agencies., e.g.:

- Database collected by the Cyprus Energy Agency
- Regional database of the province of Genoa
- **Database of Limburg's province (BE)**

The province of Limburg, in collaboration with partners, established a data base containing the results of Baseline Emission Inventory, Renewable energy scan, Sustainable building scan and a Set of climate indicators prepared for each of the 44 municipalities.

Summary report about good data sharing practices at EU level, *2015:*
http://www.meshartility.eu/images/documents/pl/ICLEI_meshartility_report_EN_210x297_Screen_2.pdf

MESHARTILITY

Main results

- **Analysis of the initial situation**
- **Actions for improving access to local energy data**
- **Recommendations for EU and National policy makers**

- Analysis of **EU and National legal frameworks** on data sharing.
- Analysis of **current data sharing practices** by consulting utilities, LAs and supporting structures

- **Roundtable** discussions on European and national levels
- **Local bi-lateral cooperation** schemes
- **New good data sharing process**
- **Support of 74 Municipalities** in the development of the baseline CO_2 emission inventories

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MESHARTILITY
Development of new good data sharing practices

Good practices that were developped as a result of the MESHARTILITY actions include:

- New improved version of the data sharing mechanism introduced in **Italy**

ENEL DISTRIBUZIONE TEMPLATE IN USE TO PROVIDE THE SEAP DATA

Year	Region	Province	Municipality	Type of use	Electricity Consumption (kWh)
				Municipal buildings, equipment/facilities	...
				Tertiary (non municipal) buildings, equipment/facilities	...
				Residential buildings	...
				Municipal public lighting	...
				Agriculture	...
				Industry (with a connection > 20MW)	...
Total yearly amount					...

Example of Italy

"**According to Law 192/2005 art. 9**, municipalities are authorized to request information about private consumption in their municipal area…".

"The **ENEL company** has defined a **template to share the electricity consumption data** in compliance with the regulation on privacy and the **CoM requirements**."

MESHARTILITY
Recommendations for EU/national policy makers

Recommendations on data collection: The 4 possible solutions

- Introduction of central data collection through legislation
- Introduction of central data collection by voluntary agreements
- Direct data provision by the Distribution Services Operator (DSO)
- Bilateral agreements between energysuppliers and LA

These 4 solutions are not mutually exclusive

Recommendations on data availability

Making the collected data freely available to LAs for the purposes of energy strategy planning

Recommendations on data format

Developping uniform formats for data sharing suitable for the Covenant purpose: sectorial and geographical disaggregation of the data

All these recommendations can be implemented through a number of mechanisms: strenthening of existing EU directives (e.g. the EED), drafting of new EU directives, transposition to national laws, new national rules and regulation, new industry standards,…

4. EUSALP Energy observatory

Potential JRC contribution

1st EUSALP experts' workshop "EUSALP Energy Observatory", Bolzano, Italy, 20th March 2018

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EUSALP EU macro-region

EUSALP* is one of the 4 **EU macro-regional strategies**

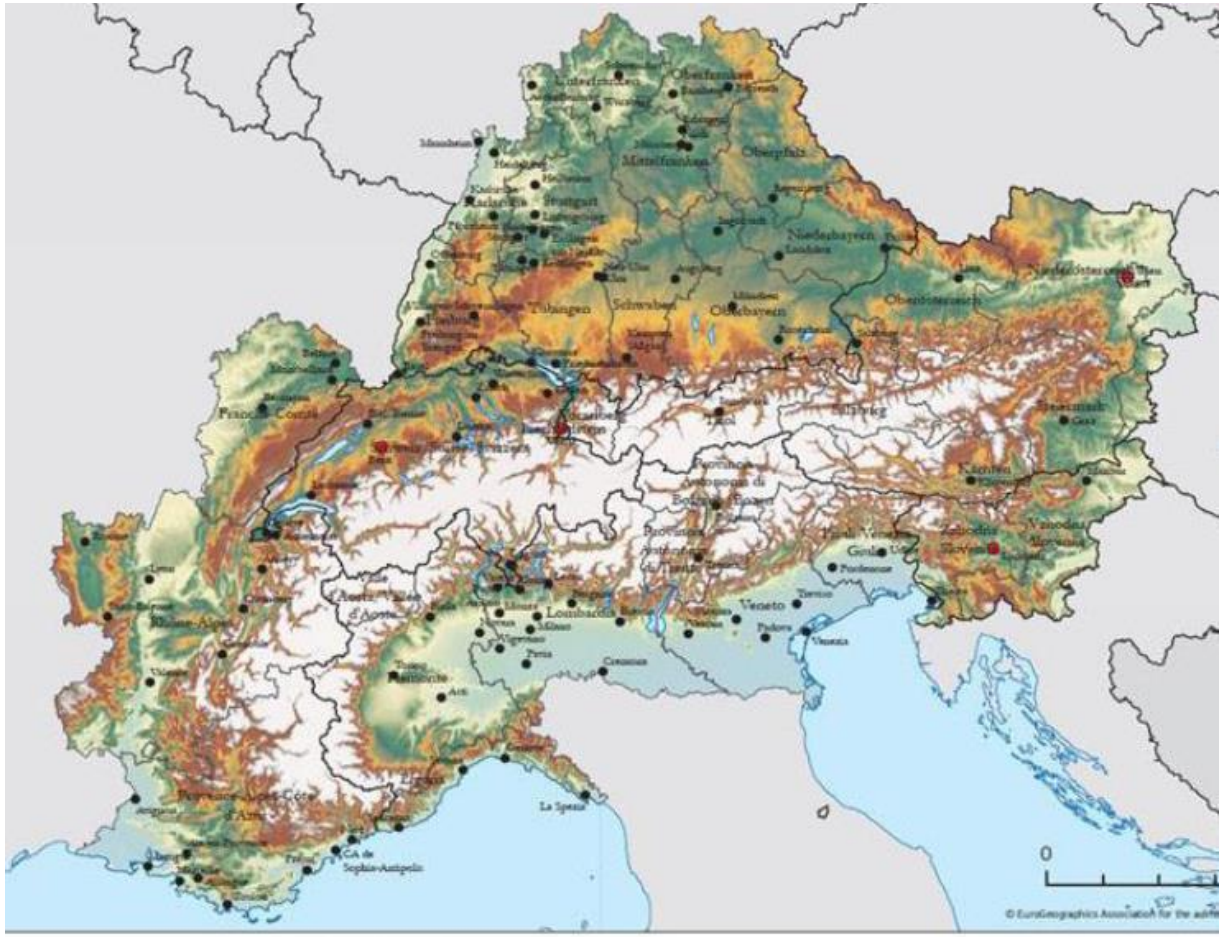
A EU macro-regional strategy is an integrated framework endorsed by the European Council to address common challenges faced by Member States and third countries located in the same geographical area. It **promotes economic, social and territorial cohesion** by strengthening cooperation between relevant actors.

The JRC has been involved in scientific activities on EUSALP

**EU Strategy for the Alpine Region (2015)*
https://www.alpine-region.eu

Map of the EUSALP macro-region.

7 countries entirely (AT, LI, SI, CH) or partially (IT, FR, DE) covered



412 520 km2 **~ 1/10 EU-28 surface** (Eurostat, 2011)
76.5 M inh. **~ 15% of EU-28 population**

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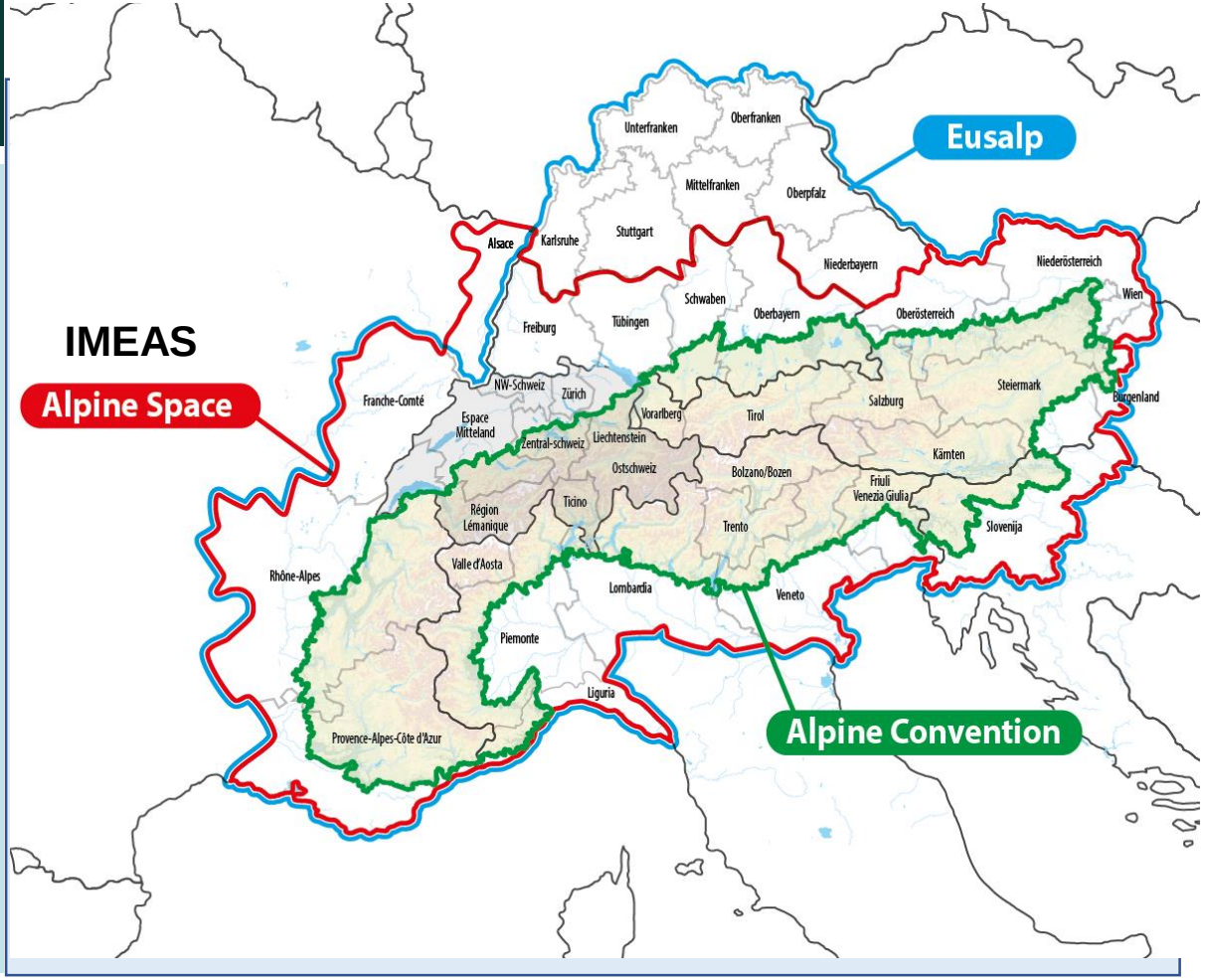
JRC contribution to EUSALP Action Group 9

20.03.2018, Bolzano: "Experience with energy data sharing: the Covenant of Mayors"

- Needs and challenges are (partly) specific to CoM scope and detail of data requirements: Bottom-up data of final energy consumption for key activity sectors, also promoting the local production and consumption of energy (further needs expected)
- Focus on emission inventory aspects
- General analysis (EU + national), mainly based on CoM on-line data and other than JRC's studies

Potential JRC contribution to an alpine observatory (regional energy strategy definition)



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Any questions?

You can find me

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Support from the Covenant coordinators

As Mid-March 2017

39 Covenant Territorial Coordinators using the "CTC grouped approach": Common methodology and only few signatories evaluated

All these CTCs supported the signatories in the elaboration of their emission inventories

Melica and Bertoldi, 2018

CTC grouped approach

Italy: 24 CTCs

Spain: 8 CTCs

Belgium: 5 CTCs

Portugal : 2 CTCs

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Data4Action

http://data4action.eu

Data4Action

- **March 2014- February 2017**
- **Target region: EU28**

Although Data4Action did not only address CoM specific needs, it is of high interest to the Covenant signatories and Coordinators

Objective

- Foster win-win energy data exchange between public authorities and energy data providers.

- The idea is to **move from bilateral data exchange cooperation agreements to regional «one-stop shop » data centres**.

4 main activities:

- **improving conditions for data exchange**
- mobilizing key actors
- **facilitating cooperation through the creation of new energy observatories**
- involving local authorities in the implementation and the monitoring of their action plans.

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