

# Un nouveau sens pour la planification

Développement durable et métropoles

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# The EU $\text{CO}_2$ Project

## The Greenhouse gas Regional Inventory Protocol (GRIP)

EU $\text{CO}_2$  Stage 1: Emissions inventories  
in 18 European Regions

Dr Sebastian Carney

# Agenda

- What is GRIP?
- Participating Regions
- Greenhouse gas Emissions Inventories
- The GRIP approach to emissions inventories
- The results from EU $\text{CO}_2$  Stage 1
- The GRIP Scenario approach

# The Greenhouse Gas Regional Inventory Protocol (GRIP)

- It is a stakeholder orientated approach focused on mutual learning with three steps:
  - Set up a regional greenhouse gas inventory (or several)
  - Develop 'Energy Scenarios'
  - Use the scenario outputs to inform plans

# Participating Regions (EUCO<sub>2</sub>)

- Attica (Athens), Bologna Province, Brussels-Capital Region, Frankfurt/Rhein-Main, Glasgow and the Clyde Valley, Hamburg MR, Comunidad de Madrid, Napoli, Oslo, Osrednjeslovenska regija (Ljubljana), Ile de France (Paris), Porto, Rotterdam, Stockholm, Stuttgart MR, Torino, Veneto...

# What is in an Emissions Inventory?

- Energy - ( $\text{CO}_2$ ,  $\text{CH}_4$ ,  $\text{N}_2\text{O}$ )
  - Energy combustion, extraction, distribution, transformation
- Industrial Processes ( $\text{CO}_2$ ,  $\text{CH}_4$ ,  $\text{N}_2\text{O}$ , HFC, PFC,  $\text{SF}_6$ )
  - Non combustion chemical reactions, leakage.
- Waste - ( $\text{CO}_2$ ,  $\text{CH}_4$ ,  $\text{N}_2\text{O}$ )
  - Landfill, waste water, composting, incineration
- Agriculture - ( $\text{CH}_4$ ,  $\text{N}_2\text{O}$ )
  - Animals, fertiliser application, animal wastes

# How do you measure/estimate regional emissions?

- Activity
  - The frequency and type
- How the emissions are allocated
- How the emissions are estimated / measured – eg UNFCCC
  - Bottom-up
  - Top down

## GRIP

- Level 1 - Green
- Level 2 - Orange
- Level 3 - Red

Inventory Project [Help](#) | [Energy Calculator](#) [Load](#)

**Energy** [Industrial Processes](#) [Waste](#) [Agriculture](#)

[Sources](#) [Transport](#) [Fugitive](#)

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**Enter data from your national inventory. National Data from UNFCCC National Inventory table**

Energy (TJ)	CO <sub>2</sub> Released Nationally	CH <sub>4</sub> Released Nationally	N <sub>2</sub> O Released Nationally	Regional Energy (TJ)
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Energy (GWh)	CO <sub>2</sub> Released Nationally	CH <sub>4</sub> Released Nationally	N <sub>2</sub> O Released Nationally	Regional Energy (GWh)
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**Enter data from your national energy statistics**

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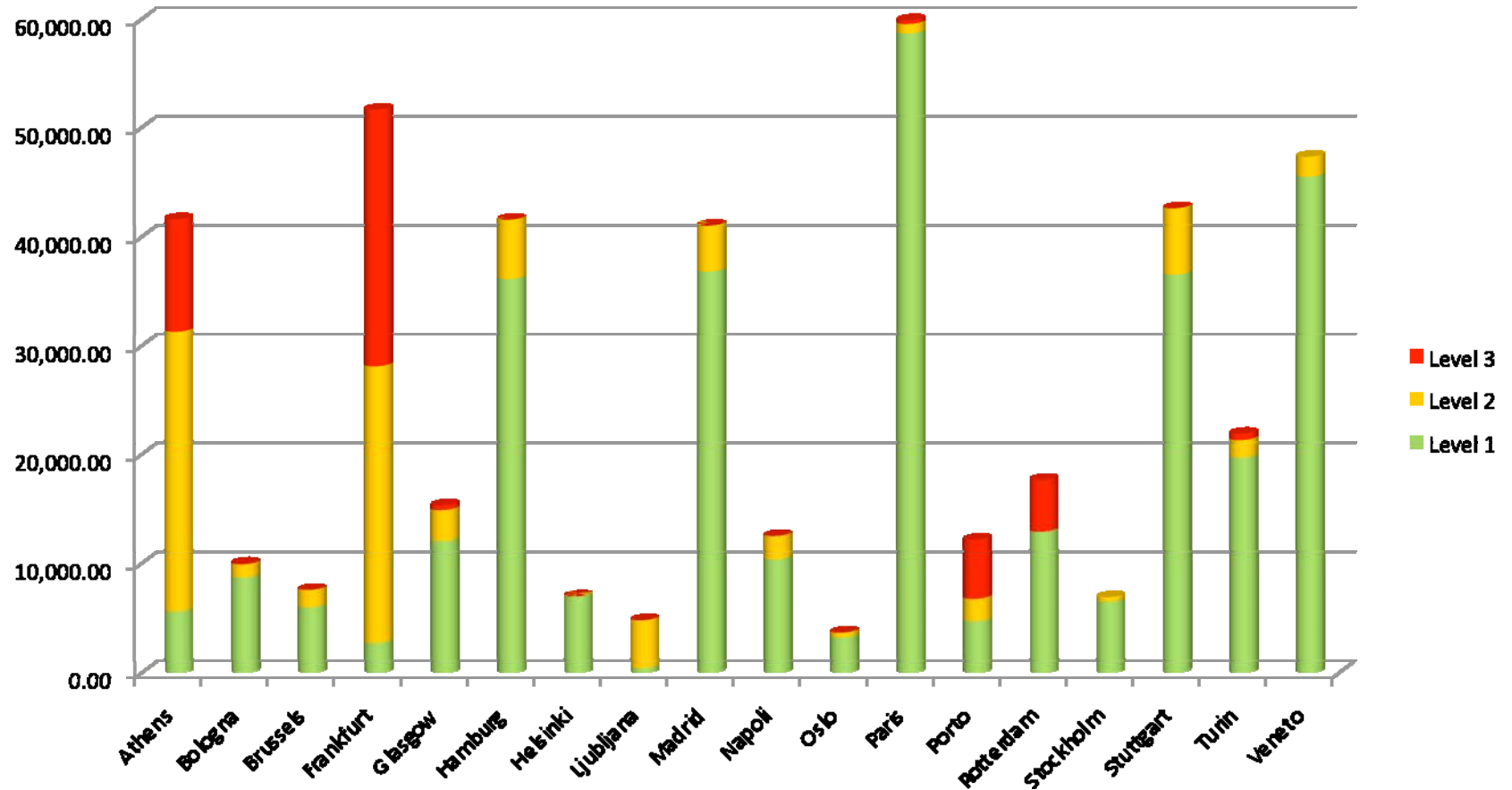
Energy (GWh)	CO <sub>2</sub> Released Regionally	CH <sub>4</sub> Released Regionally	N <sub>2</sub> O Released Regionally
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The **Greenhouse Gas** Regional Inventory Project**Results Viewer**[Download as Excel Spreadsheet](#)

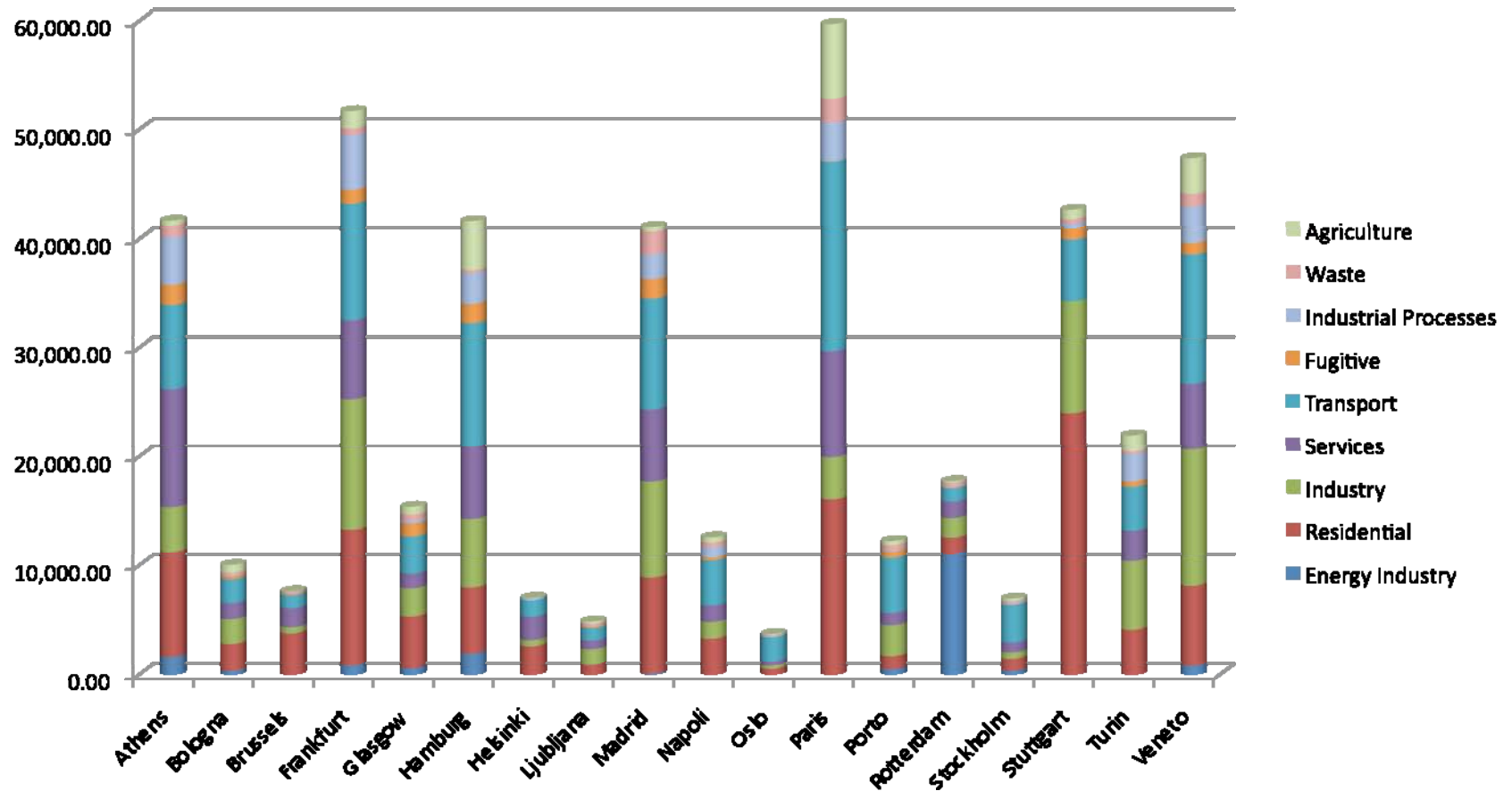
## Petroleum Refineries

	Energy	CO <sub>2</sub>	CH <sub>4</sub>	N <sub>2</sub> O	National CO <sub>2</sub> per unit GV
Liquid	24177	1727.1357105331	0.051999057964702	0.038999293473527	172.7167
Solid	0	0	0	0	0
Gaseous	1747	99.741001754401	0.0019399611341501	0.00019399611341501	9.9743
Biomass	0	0	0	0	0
Other Fuels	0	0	0	0	0
Electricity [Grid]	400	179.91424088118	0.001174141111194	0.0011248871003908	19.18709
Heat [National Distribution]	0	0	0	0	0
Cooling [National Distribution]	0	0	0	0	0
Electricity [Regional CHP]	NO DATA	0	0	0	
Heat Energy [Regional Distribution]	NO DATA	0	0	0	
Cooling Energy [Regional Distribution]	NO DATA	0	0	0	
Electricity [On-Site]	300				
Heat [On-Site]	400				
Cooling [On-Site]	0				
TOTAL	27024	2000.7909531487	0.057313160412047	0.042517956687332	

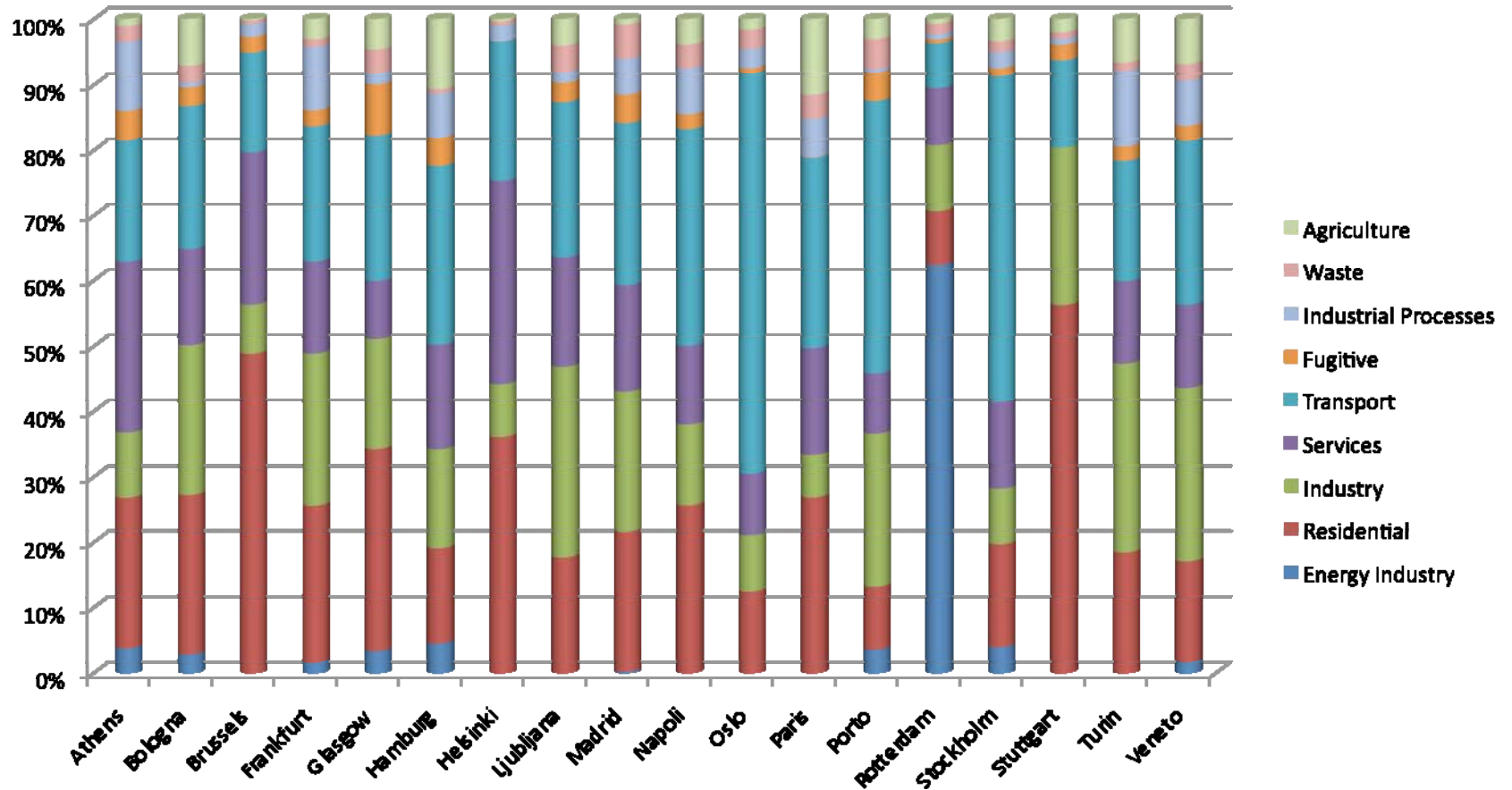
# Emissions, with GRIP level



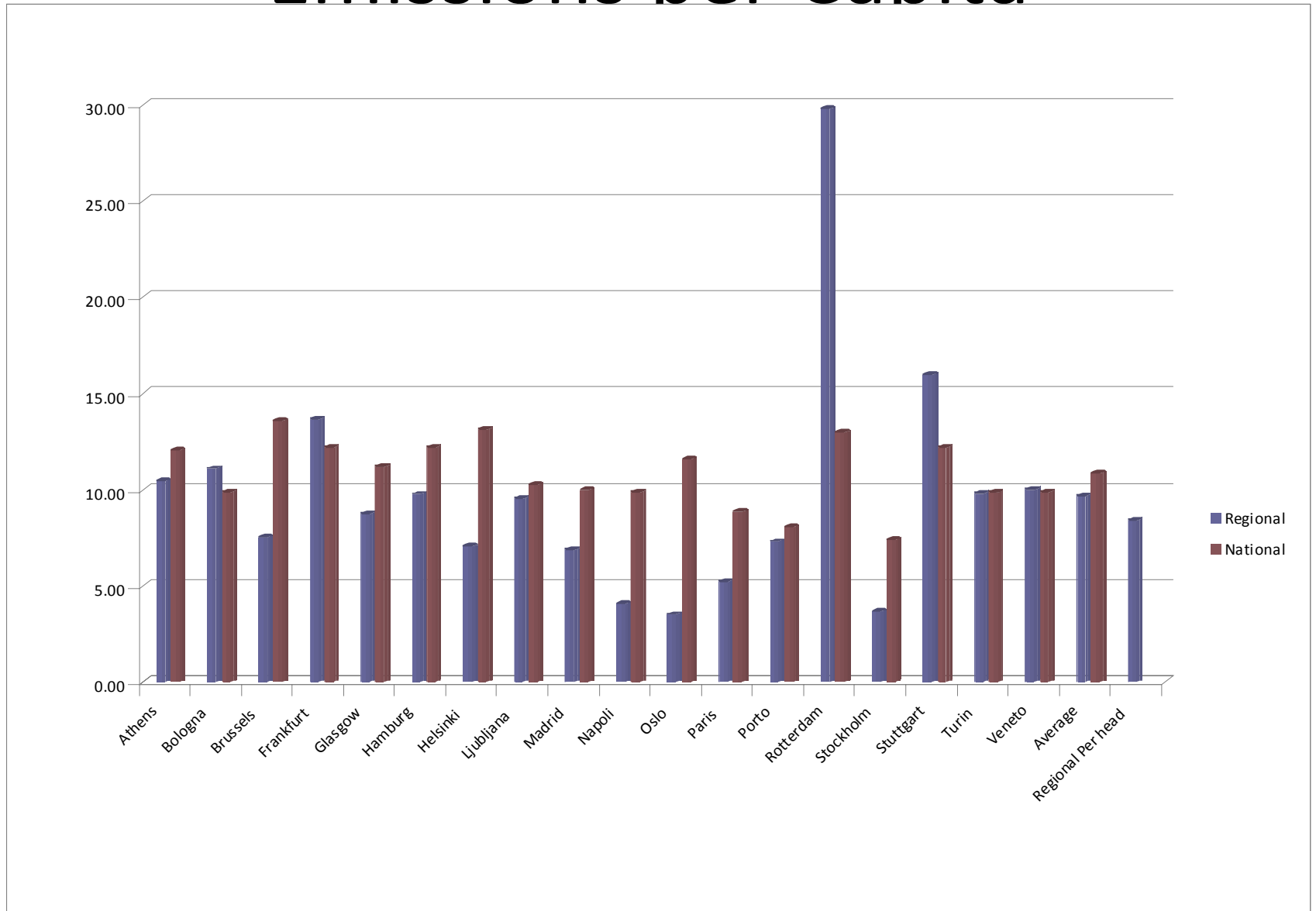
# Emissions by Sector & Sub-Sector



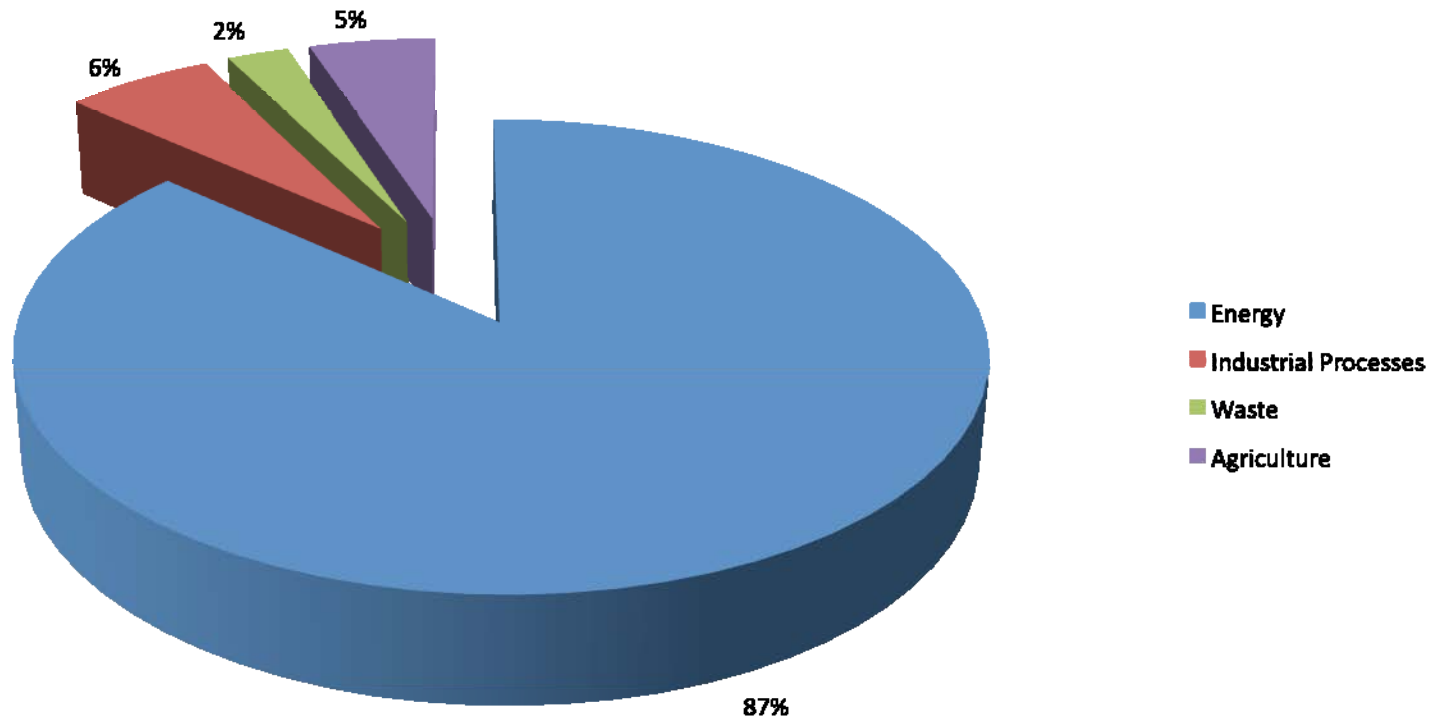
# Emissions by Sector & Sub-Sector 2



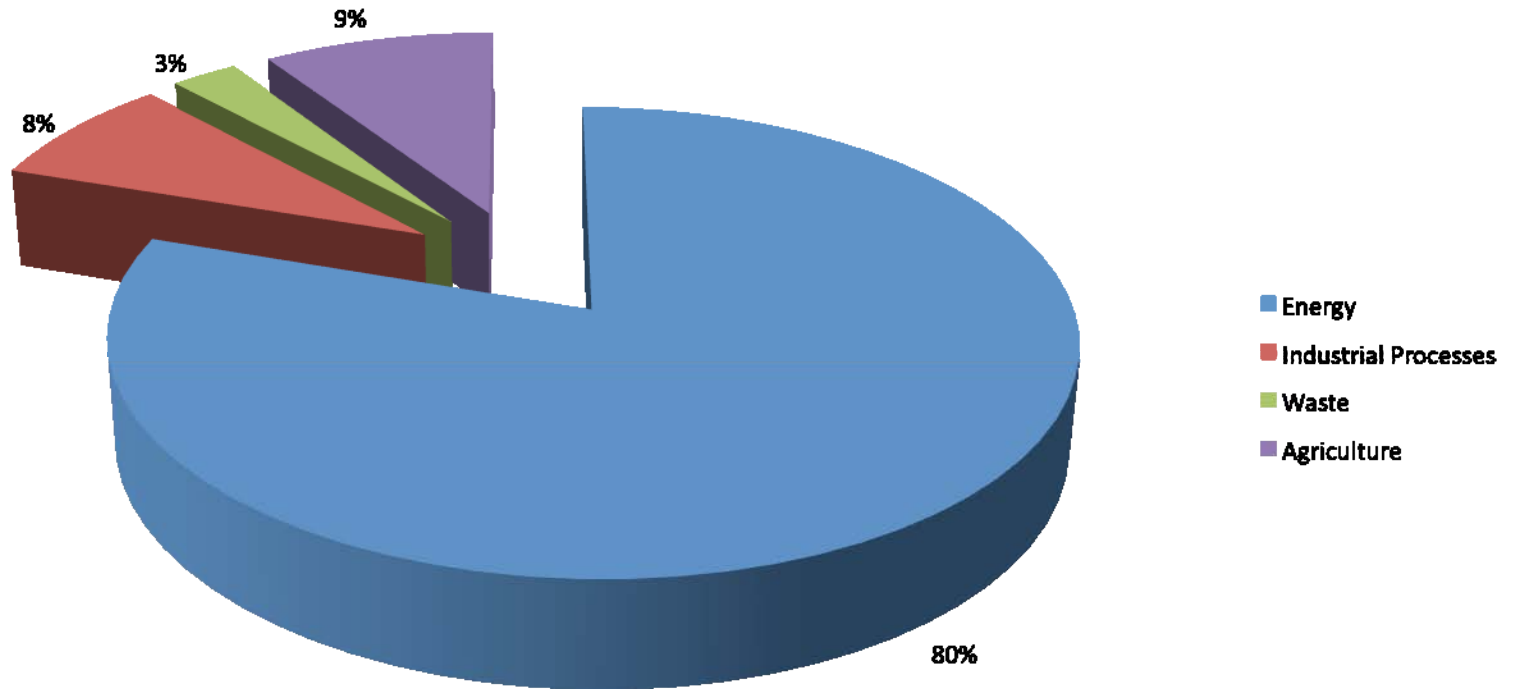
# Emissions per Capita



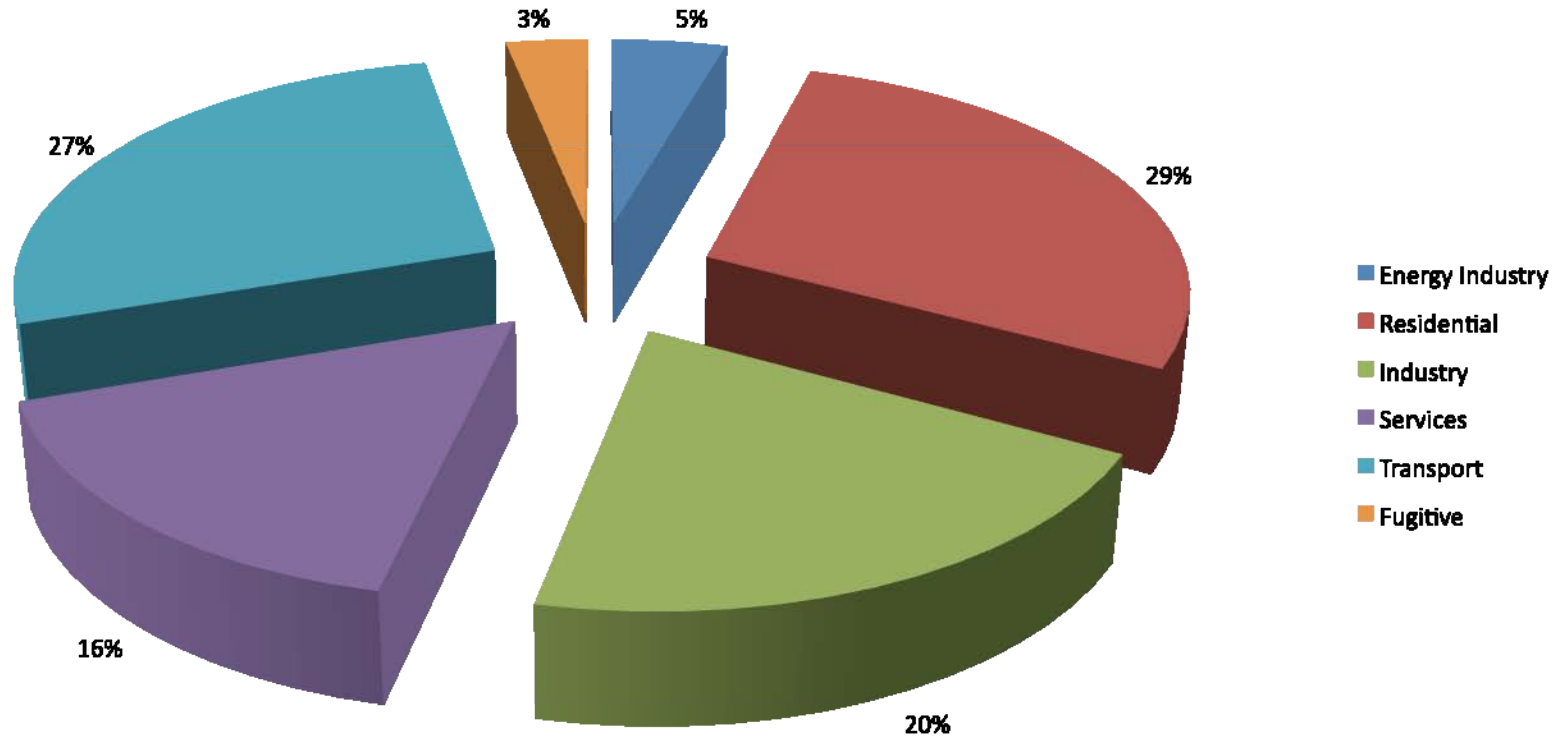
# Emissions total Regions



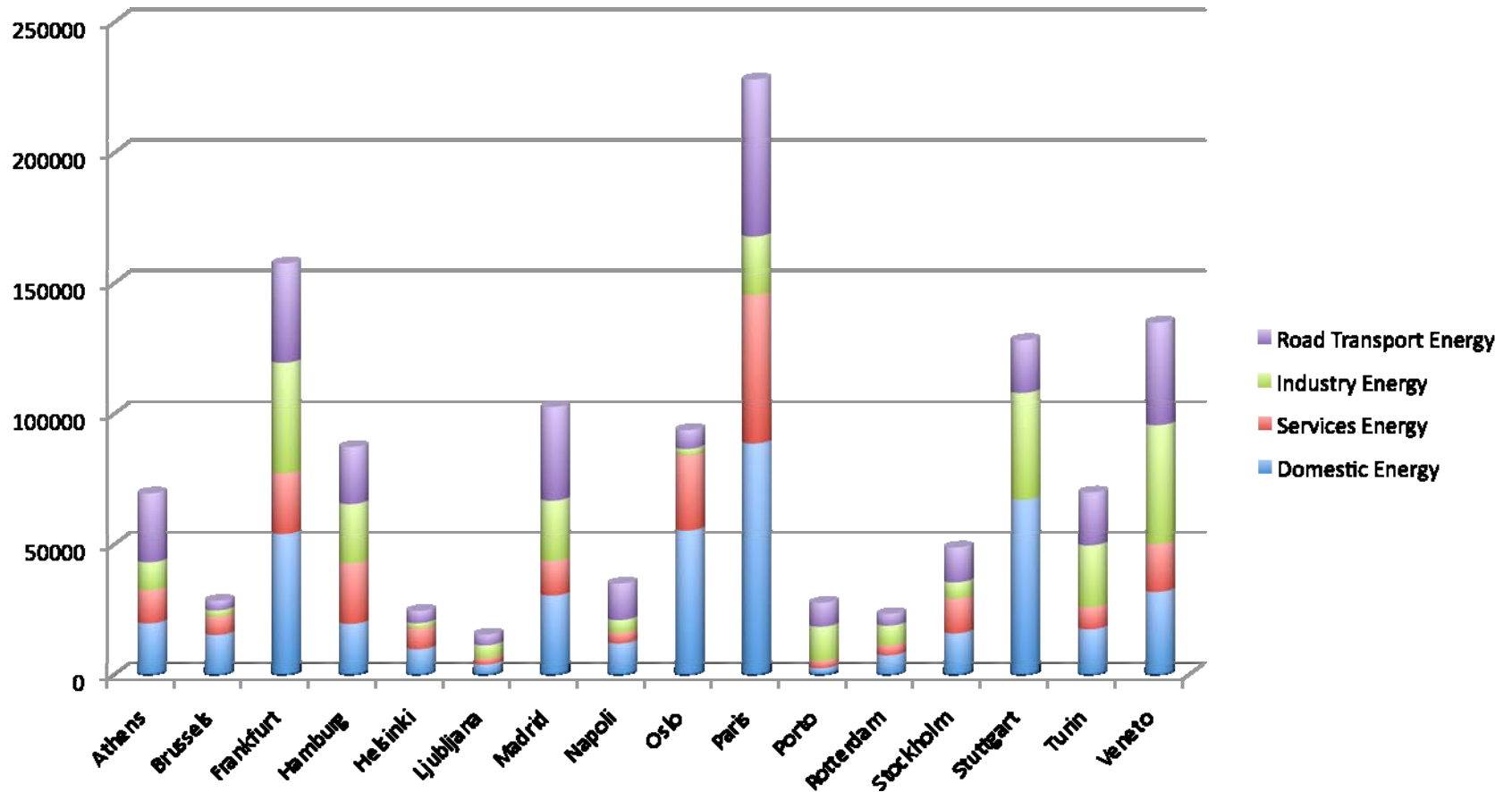
# Emissions EC



# Emissions Split Energy Overall

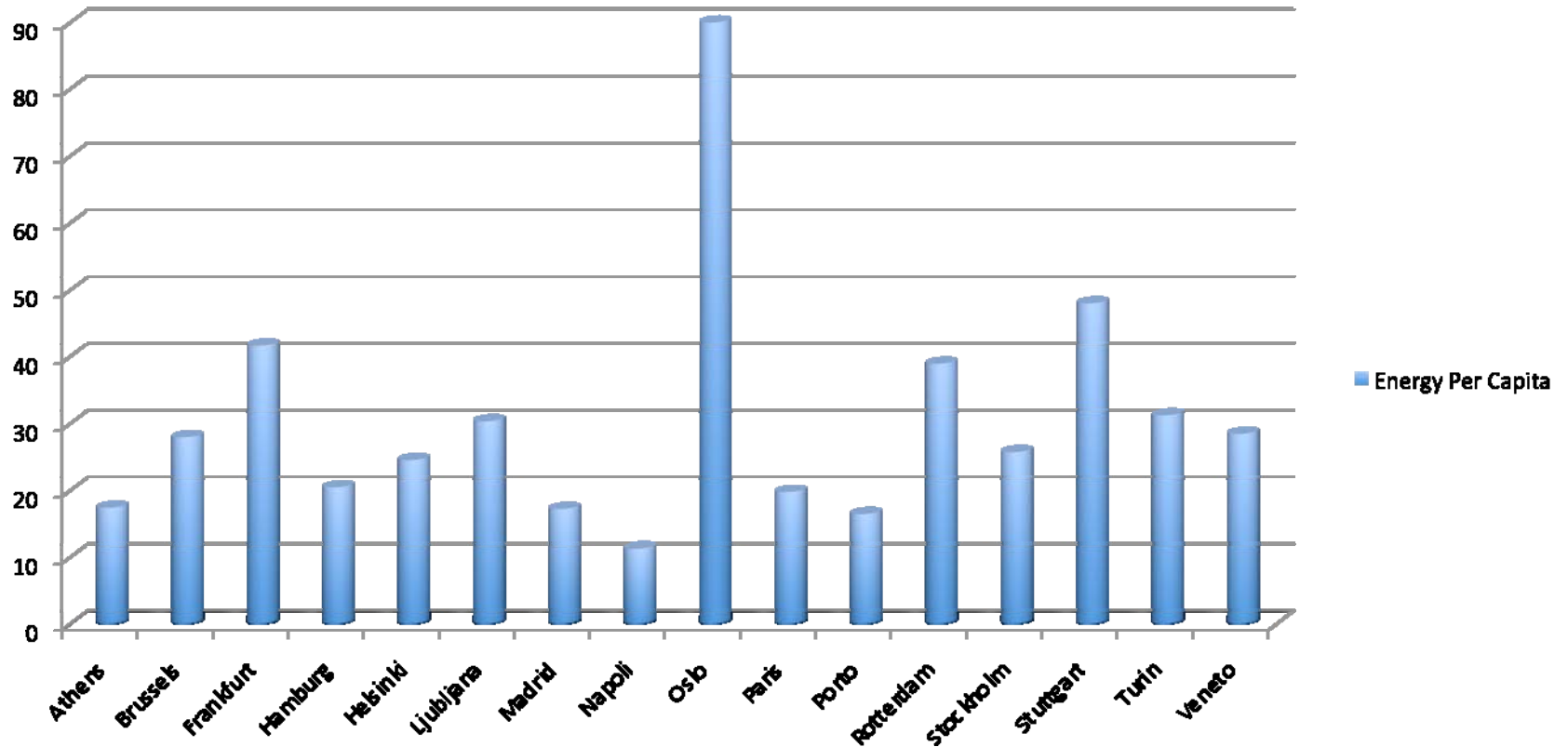


# Energy by Sector

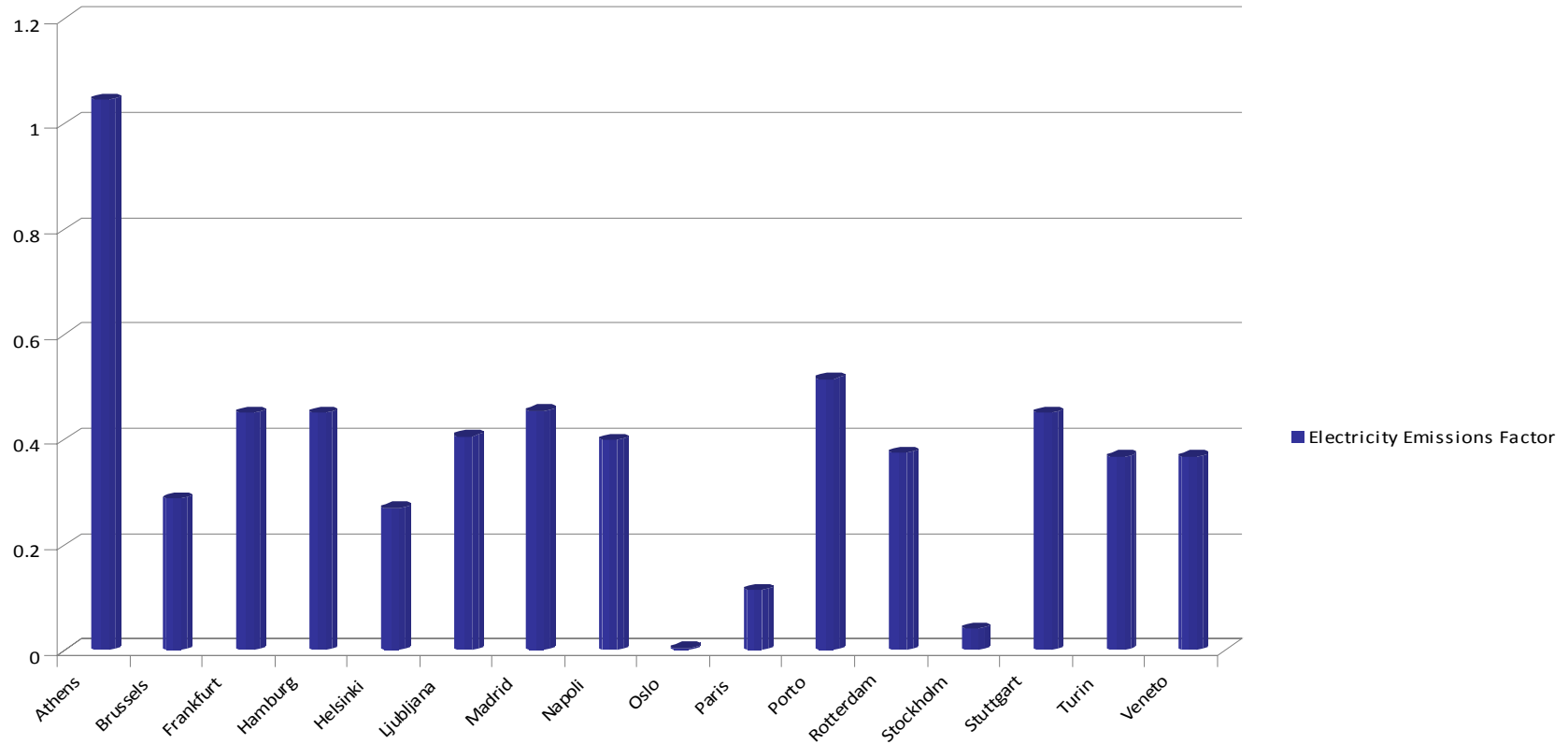


# Energy Consumption

## Energy Per Capita



### Electricity Emissions Factor



# How do 'we' reduce CO<sub>2</sub> emissions from energy?

- 1) Change the amount of energy we consume
- 2) Change the energy we consume (fuel mix)
- 3) Change the way we produce energy
- 4) A combination of these

# But what next?

- 1) An emissions inventory tells us where we are (or were)
- 2) The science informs us - GCMs - ppmv
- 3) 'We' decide where we want to be,
  - 1) then we must try and work out how we may get there

**Table 1.1** Classification of recent stabilisation scenarios according to different concentration targets

CO <sub>2</sub> concentration (ppm)	CO <sub>2</sub> e concentration (ppm)	Global mean temperature increase above pre-industrial at equilibrium (°C), using "best estimate climate sensitivity"	Peaking year for CO <sub>2</sub> emissions	Change in global CO <sub>2</sub> emissions in 2050 (% of 2000 emissions)	No. of assessed scenarios
350-400	445-490	2.0-2.4	2000-2015	-85 to -50	6
400-440	490-535	2.4-2.8	2000-2020	-60 to -30	18
440-485	535-590	2.8-3.2	2010-2030	-30 to +5	21
485-570	590-710	3.2-4.0	2020-2060	+10 to +60	118
570-660	710-855	4.0-4.9	2050-2080	+25 to +85	9
660-790	855-1130	4.9-6.1	2060-2090	+90 to +140	5

Source: Adapted from IPCC Working Group III Fourth Assessment Table 3.5

Note: Equilibrium temperatures assume a climate sensitivity of 3°C and are different from expected global mean temperatures in 2100 due to the inertia in the climate system.

# So why scenario plan?

Many reasons.

- Understand how the changes may be delivered
  - By what sector and by who.
- This needs planning and energy planning at all scales
  - This needs a common understanding
- – with cohesive planning
  - Internationally, Nationally & sub-nationally (regional) (Governance)
- This is because:
  - A 60%, 80% or 90% reduction nationally/internationally
    - does not mean the same for every region
    - Or every sector
- To learn from **each other**,
  - sector representatives, planners, policy makers and academics etc.

# EUCO<sub>2</sub> Stage 2: GRIP Scenario Approach

- Energy component of the GRIP inventory
  - Additional Supply side details
  - Demographic details
- Process:
  - Focus on energy (residential, services, industry, transport)
  - Achieving an emissions reductions in 2050 (through energy changes)
  - Interim emissions, total emissions, back-casting (through energy changes)
  - Short-, medium-, long- term planning

# How it works data and tool

Services	Energy	CO2	CH4	N2O	GWP100, 1997
Liquid	2810.275	745.5293463	0.00024057	0.005589054	747.2670051
Solid	32.09722222	11.32869998	0.00137518	0.000565637	11.53292617
Gaseous	9882.433333	1992.29856	0.00418354	0.012296751	1996.198407
Biomass	610.2138889	0	0.19162984	0.002165921	4.695662303
Other Fuels	37.35833333	4	0	0	0
Electricity [Grid]	7050.21	3178.053411	0.05174823	0.111161754	3213.600267
Heat [National Distribution]	2818.07	1270.313505	0.02068451	0.044432946	1284.522093
Cooling [National Distribution]	0	0	0	0	0
Electricity [Regional CHP]	330	148.7555159	0.00242219	0.005203161	150.4193617
Heat Energy [Regional Distribution]	220	59.45971207	0.00096818	0.002079778	60.1247751
Cooling Energy [Regional Distribution]	0	0	0	0	0
Electricity [On-Site]	23	0	0	0	0
Heat [On-Site]	5	0	0	0	0
Cooling [On-Site]	0	0	0	0	0

# How it is set-up









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# Questions