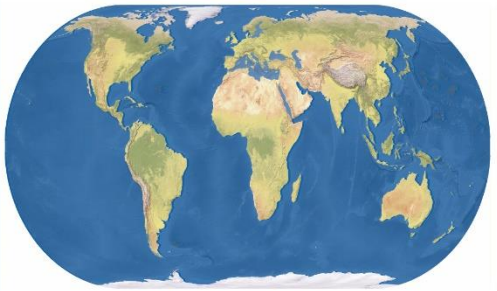
Carbon footprint for the University of Castilla-La Mancha

UCLM
UNIVERSIDAD DE CASTILLA-LA MANCHA



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- Motivation and Introduction
- Literature Framework
- Methodological Proposal
- Variables and Results
- Conclusions

Some general issues:

Carbon Footprint:

- I-O methodology: Total emissions
- Multiregional model
- CO2 Equiv

All emissions derived form day to day running of the university:

- Extended Carbon Footprint (induced)

Motivation

Scope 1

Direct GHG emissions (from sources directly owned or controlled by the UCLM)

Scope 2

GHG emissions generated when producing electricity, heat and steam (purchased by UCLM)

Scope 3

Any other thing…

Indirect GHG emissions (from sources not directly owned or controlled by the UCLM)

Some general issues:

Carbon Footprint:

- I-O methodology: Total emissions
- Multiregional model
- CO2 Equiv

All emissions derived form day to day running of the university:

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Literature framework

- Literature on CF:

  Peters et al (2013), Wiedmann et al (2010), Cadarso et al (2010)

  Druckman & Jackson (2009), Duarte et al (2010)

- Literature on Universities CF:

  Alvarez et al (2014), Larsen et al (2010), Ozawa-Meida et al (2013)

Methodological Proposal

- Carbon footprint

$$CF = \hat{e}(I - A^d)^{-1}\hat{U}_{\exp}$$

- Extended Carbon footprint

$$ECF = \hat{e}(I - A^d)^{-1}\left[\hat{U}_{\exp} + \hat{U}_{W\&S}\right]$$

	2005	2006	2007	2008	2009	2010	2011	2012	2013
Budget UCLM	Available	Available	Available	Available	Available	Available	Available	Available	Available
Households Expenditure	Available	Available	Available	Available	Available	Available	Available	Available	Available
WIOD	Available	Available	Available	Available	Available				

- e: Multiregional (WIOD)
- A: Multiregional (WIOD)
- U_{exp}: University Budget
  % Int: Mlt (WIOD)
- U_{wag}: University Budget
  % Household Stats. (INE)
  % Int: Mlt (WIOD)

	2010	2009	2008	2007	2006	2005
Budget UCLM	Available	Available	Available	Available	Available	Available
Households Expenditure	Available	Available	Available	Available	Available	Available
WIOD		Available	Available	Available	Available	Available

Variables and results

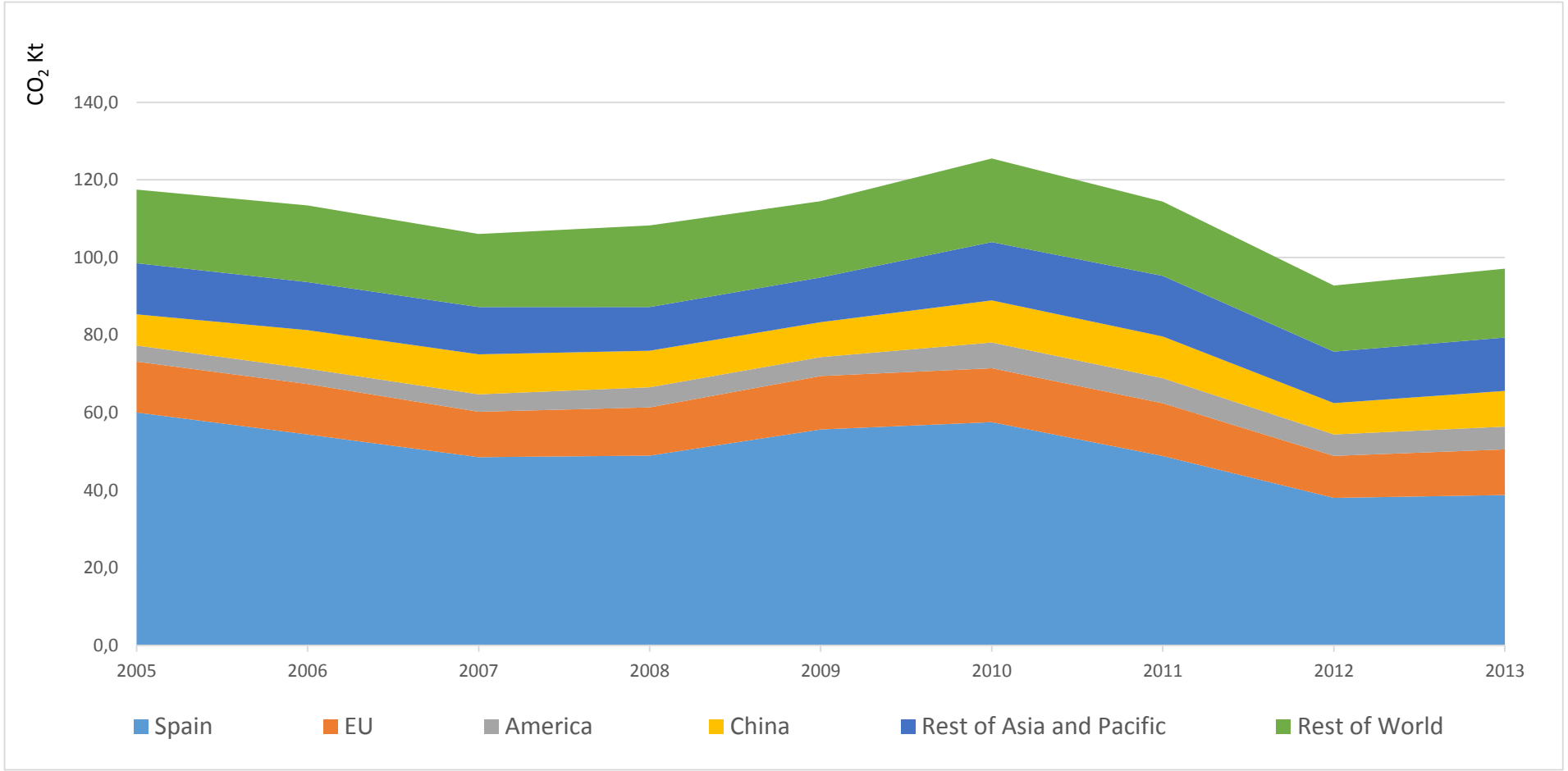
	2005		2010		2013		Variation
Expenditure chapters	Expenditure in constant €	%	Expenditure in constant €	%	Expenditure in constant €	%	%
I. Personnel costs	119.681.917	67,91	146.878.394	60,17	129.817.331	71,53	8,47
II. Currents assets and services	50.280.099	28,53	54.435.410	22,30	33.270.724	18,33	-33,83
III. Financial expenditures	1.602.187	0,91	370.230	0,15	101.280	0,06	-93,68
IV. Current transfers	3.339.148	1,89	4.150.159	1,70	3.100.899	1,71	-7,14
VI. Real investments	31.219.031	17,71	49.783.536	20,40	7.605.161	4,19	-75,64
VII. Capital transfers	0	0,00	0	0,00	0	0,00	0,00
VIII. Changes in financial assets	294.000	0,17	259.680	0,11	0	0,00	-100,00
IX. Changes in financial liabilities	9.483.378	5,38	8.224.282	3,37	7.601.000	4,19	-0,20
Total	215.899.760		264.101.691	22,33	181.496.395		-15,93

Variables and results

	2005	2006	2007	2008	2009	2010	2011	2012	2013	Variat. %
Emis. (Kt CO2e)	117,49	113,41	106,05	108,26	114,52	125,51	114,39	92,76	97,11	-17,34
Expenditure (Mll €)	215,90	217,96	217,93	226,07	260,17	264,10	239,82	176,28	181,35	-16,00
Emissions per € (CO2 Kl/€)	0,54	0,52	0,49	0,48	0,44	0,48	0,48	0,53	0,54	-1,60

Variables and results

Graph 1: UCLM ECF by economic region

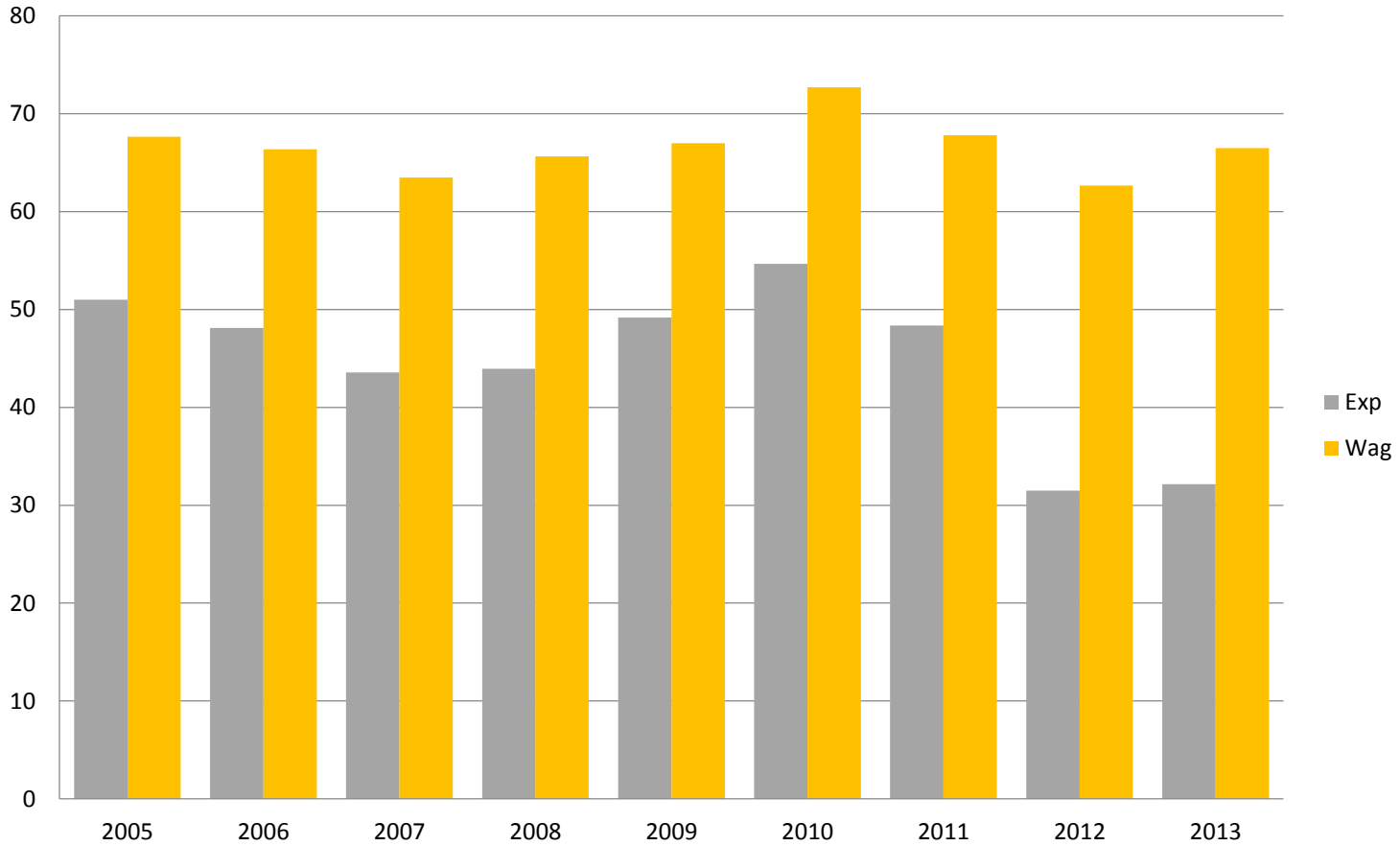


Source: Own calculation from WIOD and INE data

Variables and results

	2005	2013	Variat. %
Expenditure (Mll €) Wag	110,07	119,37	8,45
Expenditure (Mll €) Exp	105,83	61,99	-41,43
Emissions per € (CO2 Kl/€) Wag	0,61	0,56	-9,38
Emissions per € (CO2 Kl/€) Exp	0,48	0,52	7,63

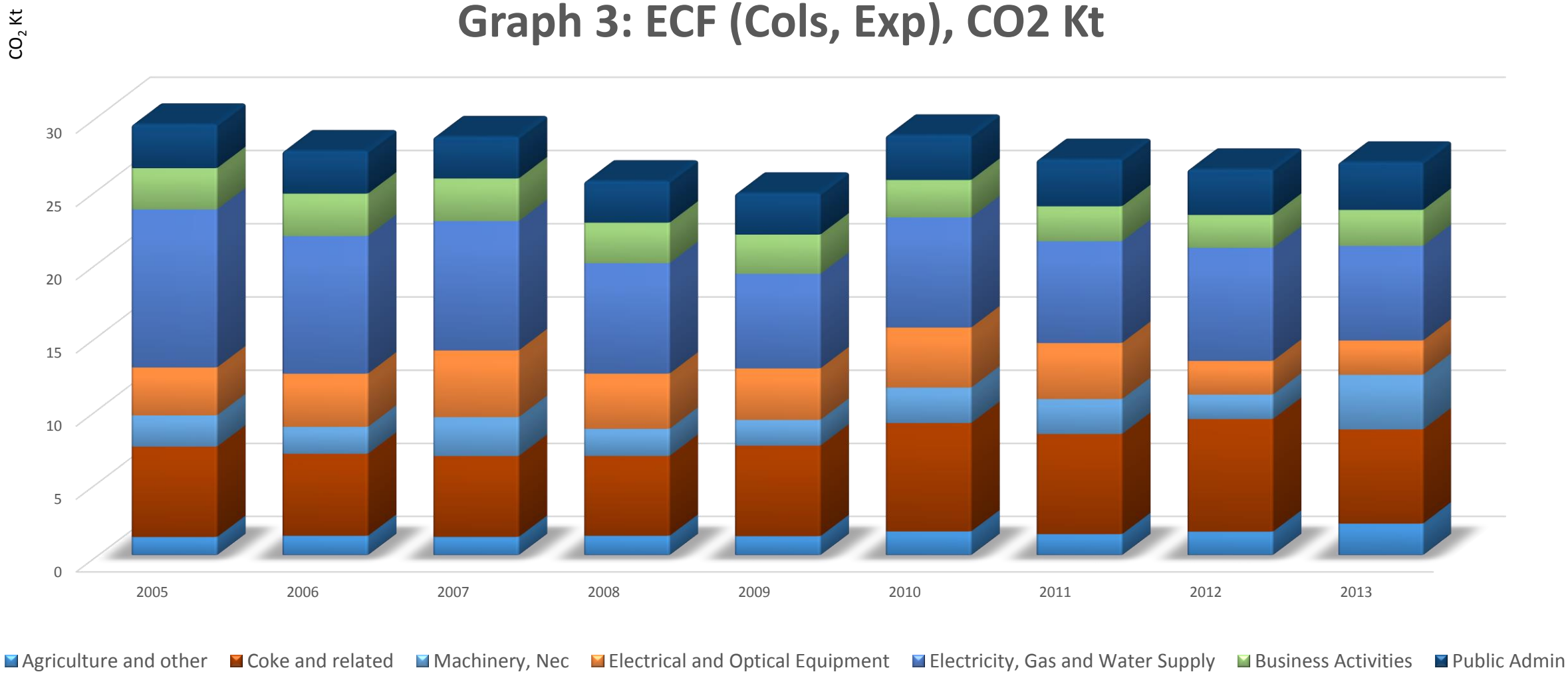
Graph 2: UCLM ECF by type of expenditure



Source: Own calculation from WIOD and INE data

Variables and results

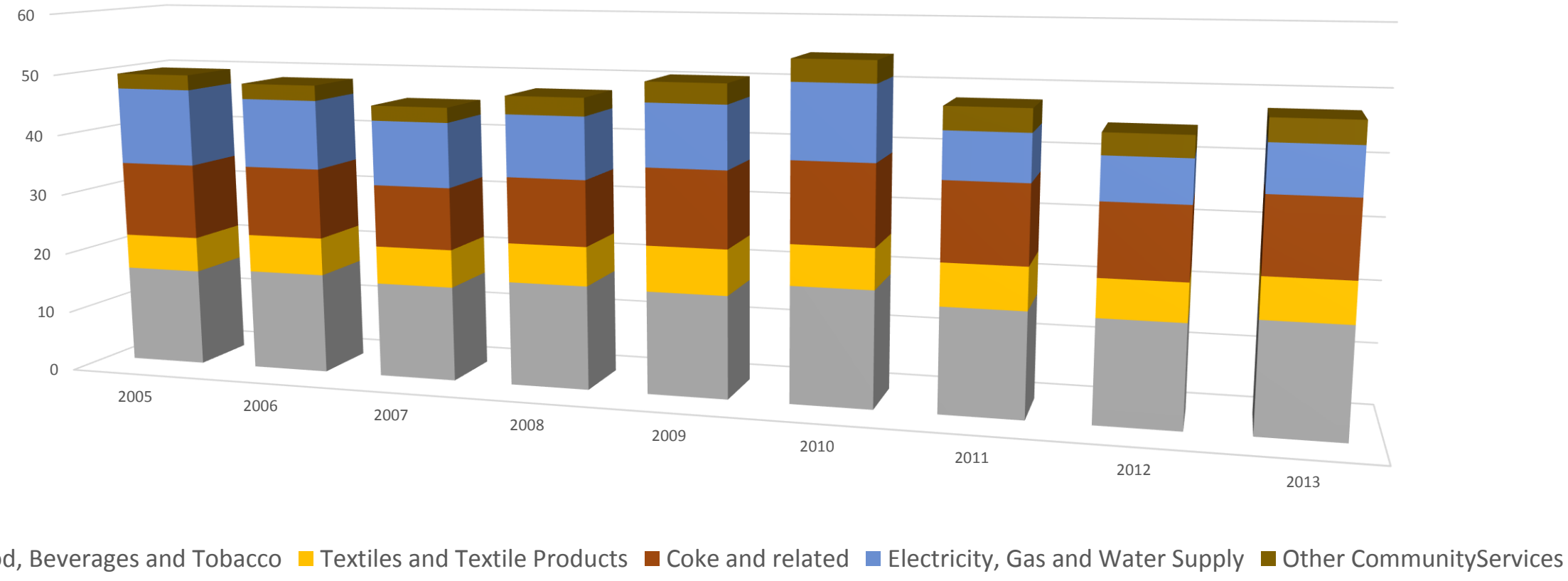
Graph 3: ECF (Cols, Exp), CO2 Kt



Source: Own calculation from WIOD and INE data

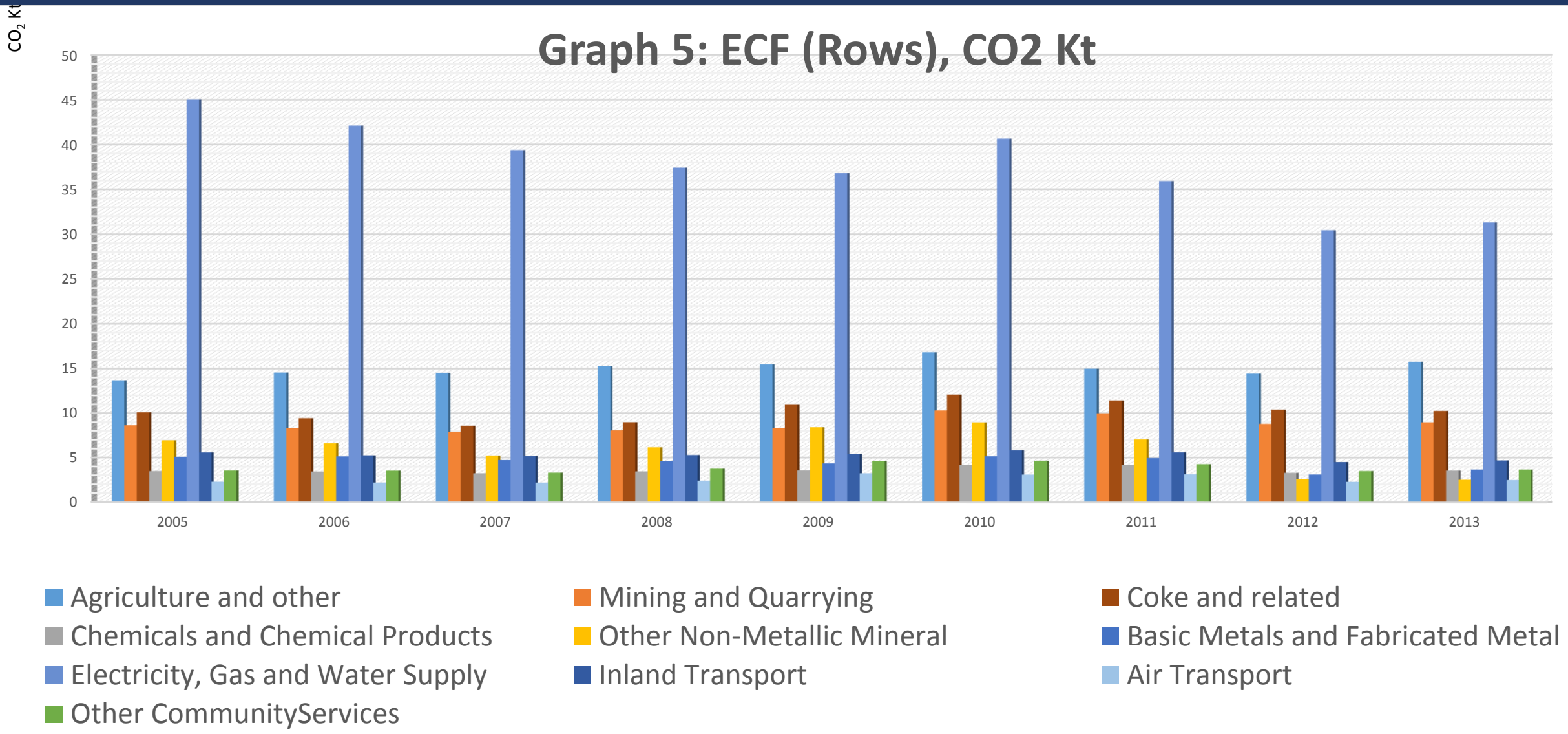
Variables and results

Graph 4: ECF (Cols, Wag), CO2 Kt



Source: Own calculation from WIOD and INE data

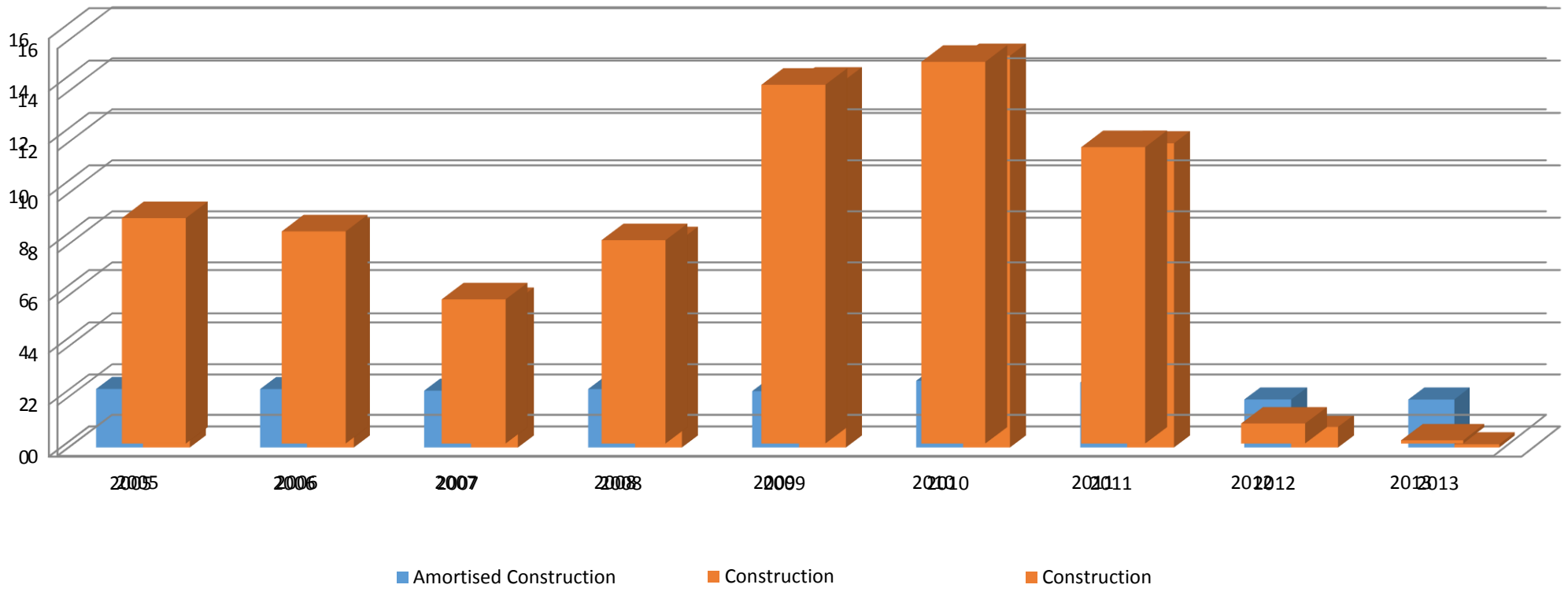
Variables and results



Source: Own calculation from WIOD and INE data

Variables and results

Graph 6, Construction emissions



Source: Own calculation from WIOD and INE data

- EE-MRIO with a hint of a SAM
- ECF measure is calculated
- UCLM emissions were not affected by the crisis in 2005-2010
- University workers consumption choices are key to reduce CO2 emissions
- Energy sector improvements would have a radica effect on households and institutional emissions

Future work:

- Decomposition Analysis
- Budget further disaggregated
- To integrate Regional IOT into WIOD
- More detailed information on travel expenditures
- Consider students travels
- And so on and so forth…