DIAMOND

Industrial European regions at risk within the Fit for 55: How far implementing CBAM can mitigate?

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- **EU Fit 55 & Climate Neutrality**: Energy transition with social impacts

- Conventional narrative of **Carbon Border Adjustment Mechanism** (CBAM): competitiveness, leakage and welfare

- Besides competitiveness: Political acceptability of CBAM related to **regional employment**

- Broad consensus: policies impact differently across sectors and regions

- Most negatively impacted sectors are fossil energy sectors and energy-intensive industries

- Political resistance to climate policy tends to be more pronounced in these regions

Funded by the European Union

Research question: What are the impacts of the Fit for 55 on jobs at EU regional level?

- We run scenarios of the fit for 55 **without**/**with** CBAM

- We couple a CGE model with regional statistics

- We look to exposed regions and regional vulnerability in EU's energy transition

- Horizon 2030

- GEMINI-E3 with 27 Member States+UK+China+ROW

- GTAP 9 database, base year 2011

- Regional database based on Eurostat with NUTS 2

- 278 European regions (including UK)

- We look on fossil energy sectors and energy intensive industries (EII)

- CBAM implemented on all good from EII

Table 1: Mapping between GEMINI sector and NOGA classification

GEMINI-E3 sector	Noga code	Noga Definition
Energy Intensive Industries	C17	Manufacture of paper and paper products
	C20	Manufacture of chemicals and chemical products
	C21	Manufacture of basic pharmaceutical products and pharmaceutical preparations
	C22	Manufacture of rubber and plastic products
	C23	Manufacture of other non-metallic mineral products
	C24	Manufacture of basic metals
	C25	Manufacture of fabricated metal products, except machinery and equipment
Coal	B05	Mining of coal and lignite
Crude oil Natural gas	B06	Extraction of crude petroleum and natural gas
Refined petroleum products	C192	Manufacture of refined petroleum products

Funded by the European Union

- Reference scenario
- **Fit for 55**
- Fit for 55 with CBAM scope 1
- Fit for 55 with CBAM scope 1 + sub export
- **Fit for 55 with CBAM scope 2**
- Fit for 55 with CBAM scope 3

	Without CBAM	Scope 1	Scope 1 + Export	Scope 2	Scope 3
GDP	-1.89%	-1.85%	-1.90%	-1.82%	-1.80%
ETS price (in €$_{2022}$)	98	101	102	104	106
Leakage rate	20.8%	18.7%	19.0%	16.7%	12.5%
EII production	-9.3%	-7.7%	-5.9%	-5.9%	-4.6%
Employment (Job FTE)					
Energy Intensive Industries	-491,700	-362,900	-220,800	-225,800	-117,700
Fossil Industries	-156,900	-156,000	-193,200	-155,100	-153,400
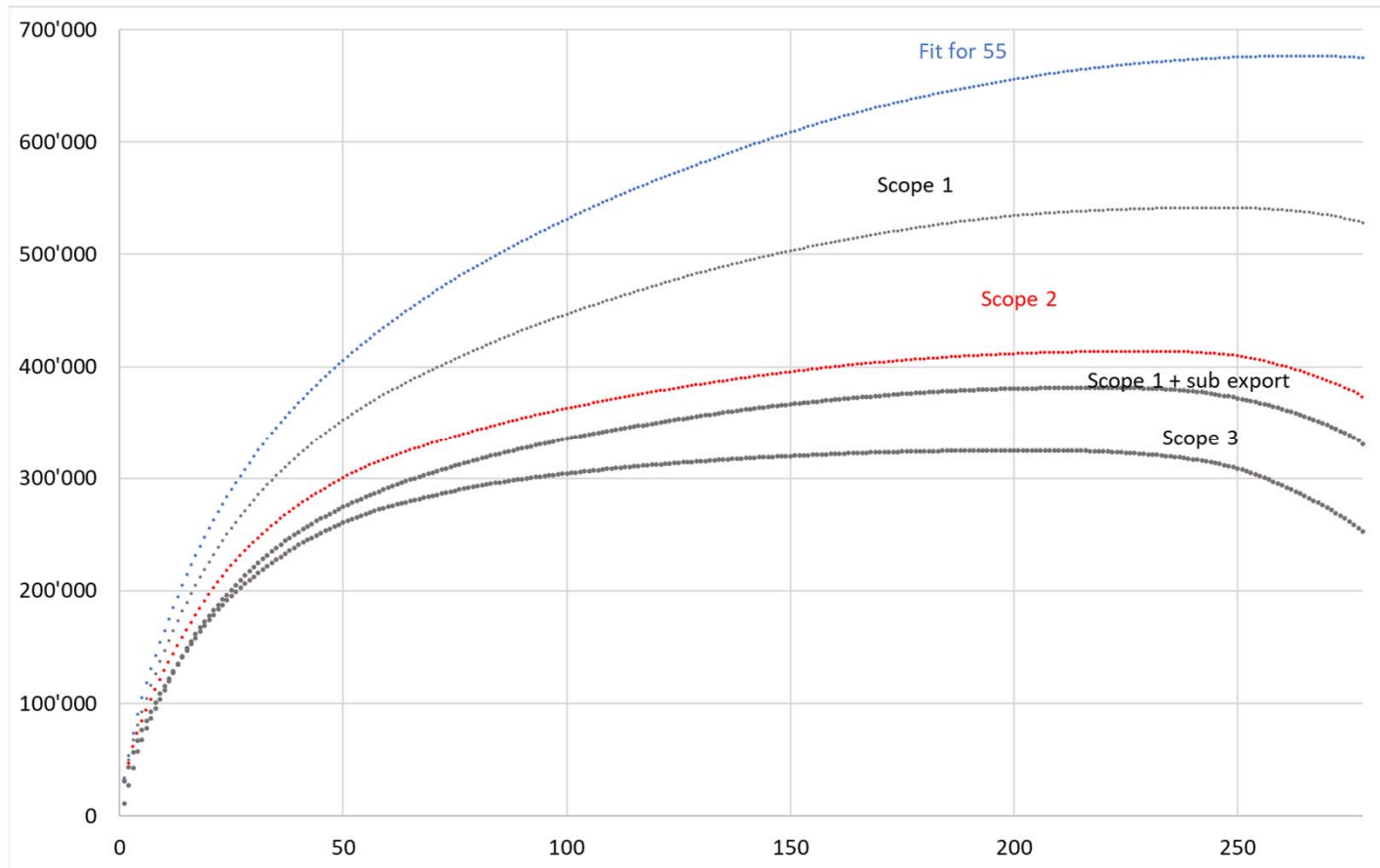
The top 50 regions account for 80% of job losses

$$Exposure = \frac{Job\ Loss}{Employment}$$

- **Germany = 28 regions**

- **Austria = 5 regions**

- **Bulgaria, Belgium, UK = 3 regions each**

Dytiki Macedonia: Energy heart of Greece - Major center of coal and lignite

Slaskie: One most carbon-intensive region in EU (coal metallurgic, chemical)

Yugoiztochen: Fossil energy industries leading sectors

| NUTS	Country	Regions	Expos.	♯	NUTS	Country	Regions	Expos.	♯
EL53		Dytiki Makedonia	3.92%	1	EE00		Eesti	0.78%	26
PL22		Slaskie	1.96%	2	BE31		Brabant Wallon	0.77%	27
BG34		Yugoiztochen	1.56%	3	DE40		Brandenburg	0.76%	28
DEA5		Arnsberg	1.20%	4	DE23		Oberpfalz	0.76%	29
DEB3		Rheinhessen-Pfalz	1.06%	5	DE12		Karlsruhe	0.72%	30
UKM5		North East. Scotland	1.02%	6	DEA4		Detmold	0.71%	31
DEA3		Münster	1.02%	7	DEA2		Köln	0.71%	32
DE13		Freiburg	1.01%	8	DE94		Weser-Ems	0.69%	33
RO41		Sud-Vest Oltenia	1.00%	9	DEB2		Trier	0.66%	34
DEG0		Thüringen	1.00%	10	DE26		Unterfranken	0.63%	35
DE24		Oberfranken	0.98%	11	DE25		Mittelfranken	0.61%	36
DEE0		Sachsen-Anhalt	0.97%	12	BE22		Limburg	0.59%	37
DEB1		Koblenz	0.97%	13	BG32		Severen tsentralen	0.59%	38
CZ04		Severozápad	0.95%	14	DE11		Stuttgart	0.58%	39
AT34		Vorarlberg	0.94%	15	AT12		Niederösterreich	0.57%	40
DED4		Chemnitz	0.92%	16	AT22		Steiermark	0.57%	41
CZ08		Moravskoslezsko	0.92%	17	DE92		Hannover	0.56%	42
DE14		Tübingen	0.89%	18	RO42		Vest	0.56%	43
DEC0		Saarland	0.87%	19	SE31		Norra Mellansverige	0.54%	44
DE22		Niederbayern	0.84%	20	UKD1		Cumbria	0.54%	45
DE72		Gießen	0.84%	21	BE21		Antwerpen	0.53%	46
DED2		Dresden	0.82%	22	UKE1		East Yorkshire, North. Lincolnshire	0.50%	47
DEA1		Düsseldorf	0.82%	23	BG42		Yuzhen tsentralen	0.49%	48
DE27		Schwaben	0.80%	24	DE71		Darmstadt	0.49%	49
AT31		Oberösterreich	0.78%	25	AT33		Tirol	0.49%	50

- Relatively no significant change for the Top 50 exposed regions

- As CBAM imposed to EII, no direct impact to employment on the Fossil Fuels Industries

- Some regions gain benefit by CBAM, others don't

North-East Scotland: Major oil & gas fields

Sud-Vest Oltenia: Lignite mining industry

NUTS	Country	Regions	Expos.	♯	Δ♯	NUTS	Country	Regions	Expos.	♯	Δ♯
EL53		Dytiki Makedonia	3.97%	1	-	DE23		Oberpfalz	0.57%	26	+3
PL22		Slaskie	1.77%	2	-	DEA2		Köln	0.57%	27	+5
BG34		Yugoiztochen	1.44%	3	-	CZ08		Moravskoslezsko	0.56%	28	-11
UKM5		North East. Scotland	0.95%	4	+2	BE31		Brabant Wallon	0.55%	29	-2
RO41		Sud-Vest Oltenia	0.92%	5	+4	DE12		Karlsruhe	0.55%	30	-
DEA5		Arnsberg	0.91%	6	-2	DEA4		Detmold	0.54%	31	-
DEA3		Münster	0.88%	7	-	DE94		Weser-Ems	0.53%	32	+1
DEB3		Rheinhessen-Pfalz	0.81%	8	-3	AT31		Oberösterreich	0.50%	33	-8
DE13		Freiburg	0.77%	9	-1	DEB2		Trier	0.50%	34	-
DEE0		Sachsen-Anhalt	0.76%	10	+2	DE26		Unterfranken	0.48%	35	-
DEG0		Thüringen	0.76%	11	+7	DE25		Mittelfranken	0.46%	36	-
DE24		Oberfranken	0.74%	12	-1	DE11		Stuttgart	0.44%	37	+2
DEB1		Koblenz	0.73%	13	-	DE92		Hannover	0.43%	38	+4
DED4		Chemnitz	0.69%	14	+2	RO42		Vest	0.43%	39	+4
DED2		Dresden	0.68%	15	+7	BE22		Limburg	0.42%	40	-3
DE14		Tübingen	0.68%	16	+2	BE21		Antwerpen	0.41%	41	+5
DEC0		Saarland	0.67%	17	+2	BG32		Severen tsentralen	0.40%	42	-4
DE22		Niederbayern	0.64%	18	+2	DED5		Leipzig	0.39%	43	+9
DEA1		Düsseldorf	0.64%	19	+4	MT00		Malta	0.38%	44	+9
DE72		Gießen	0.64%	20	+1	AT12		Niederösterreich	0.38%	45	-5
DE40		Brandenburg	0.64%	21	+7	DE71		Darmstadt	0.37%	46	+3
EE00		Eesti	0.63%	22	+4	AT22		Steiermark	0.36%	47	-6
DE27		Schwaben	0.61%	23	+1	DE91		Braunschweig	0.35%	48	+8
AT34		Vorarlberg	0.60%	24	-9	DE93		Lüneburg	0.34%	49	+6
CZ04		Severozápad	0.60%	25	-11	BG42		Yuzhen tsentralen	0.33%	50	-2
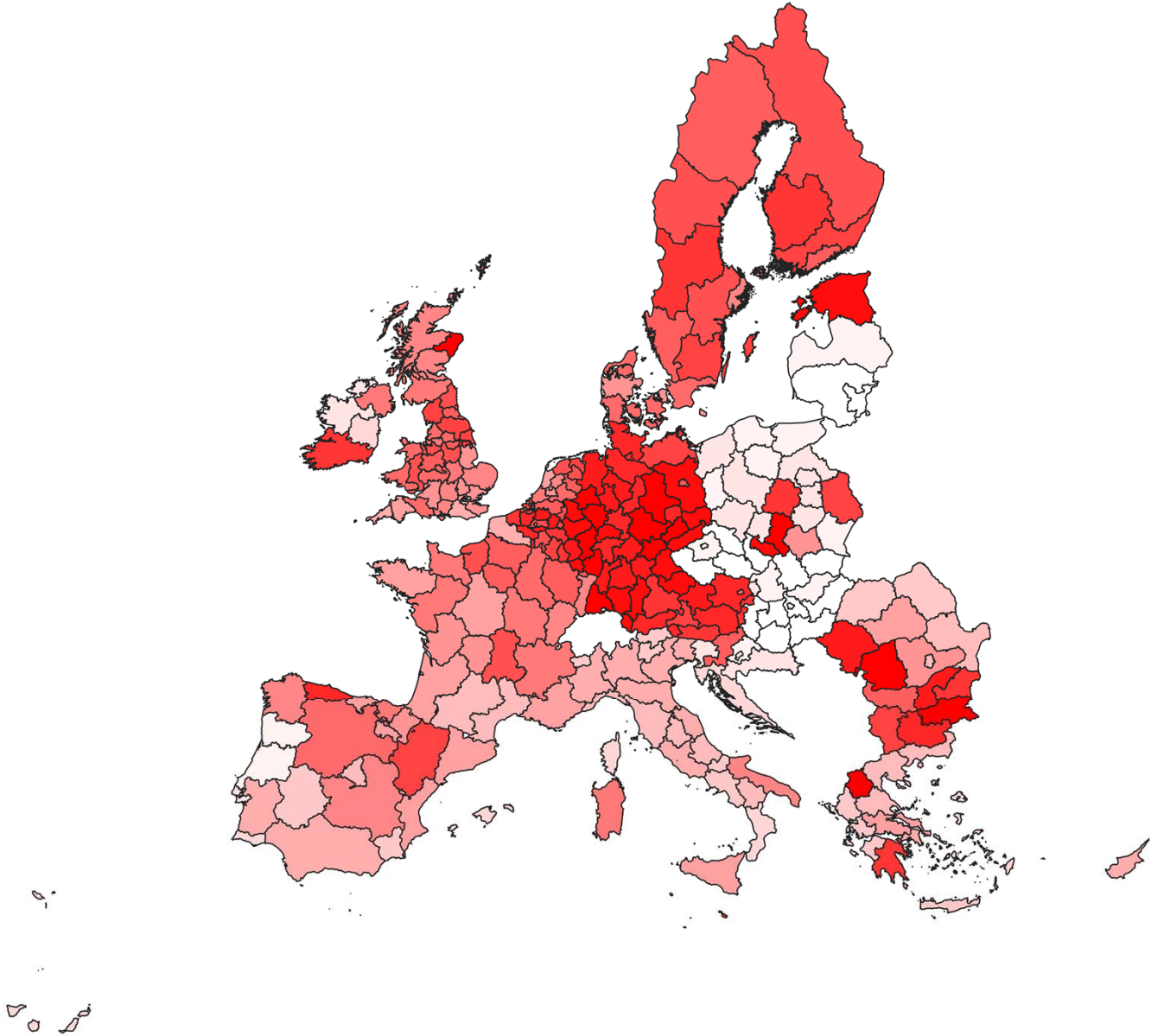
IPCC's conceptual framework for vulnerability

- **Exposure to some source of disruption**

- **Sensitivity to that disruption**

- **Adaptive capacity to respond and recover**

$$Vulnerability = I_e^{\alpha_e} \cdot I_u^{\alpha_u} \cdot (1 - I_a)^{\alpha_a}$$

Mapping regional vulnerability in Europe's energy transition: development and application of an indicator to assess declining employment in four carbon-intensive industries

Will McDowall[1] · Tobias Reinauer[2] · Panagiotis Fragkos[3] · Michal Miedzinski[1] · Jennifer Cronin[1]

I_e Exposed indicator

I_u Unemployment indicator

I_a Adaptive capacity indicator

Sensitivity indicator

- Region with high level of unemployment are particularly sensitive to job losses

- Eurostat Data % Unemployment rate per Labor Force

Adaptive capacity: Innovation potentials

- European Regional Innovation Scoreboard (RIS) (JRC, 2019)

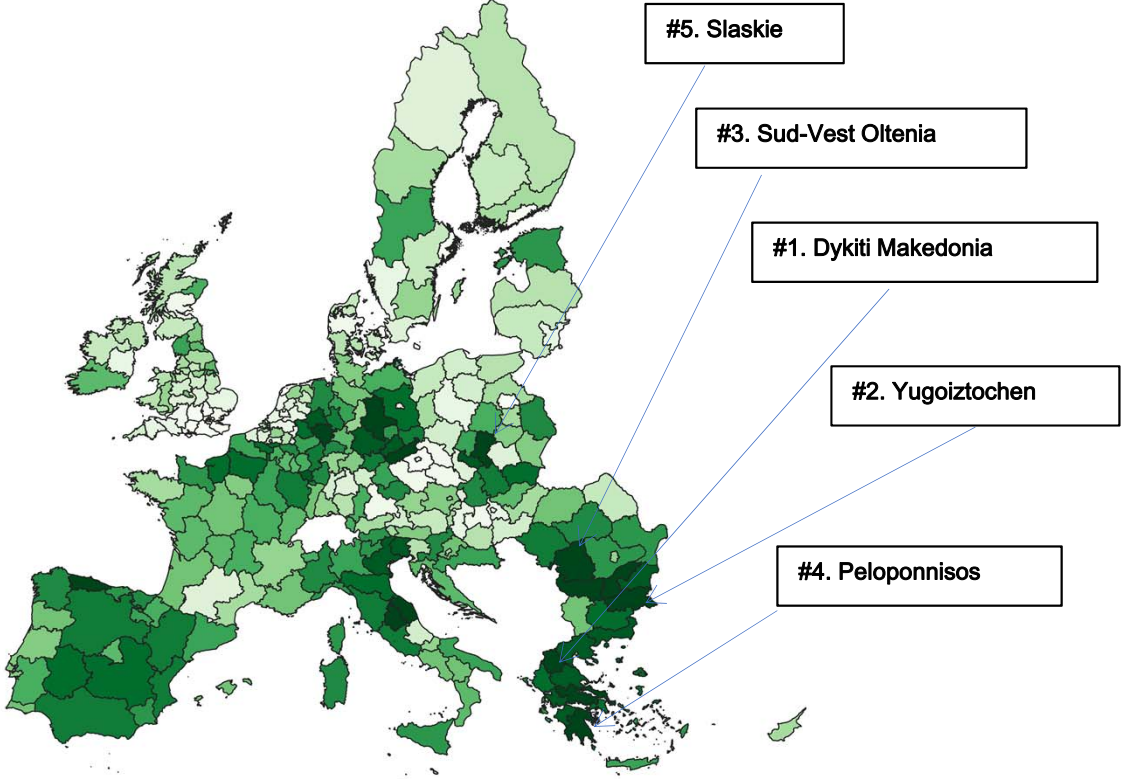- RIS: innovation capacity including education, labor skill, infrastructures etc.

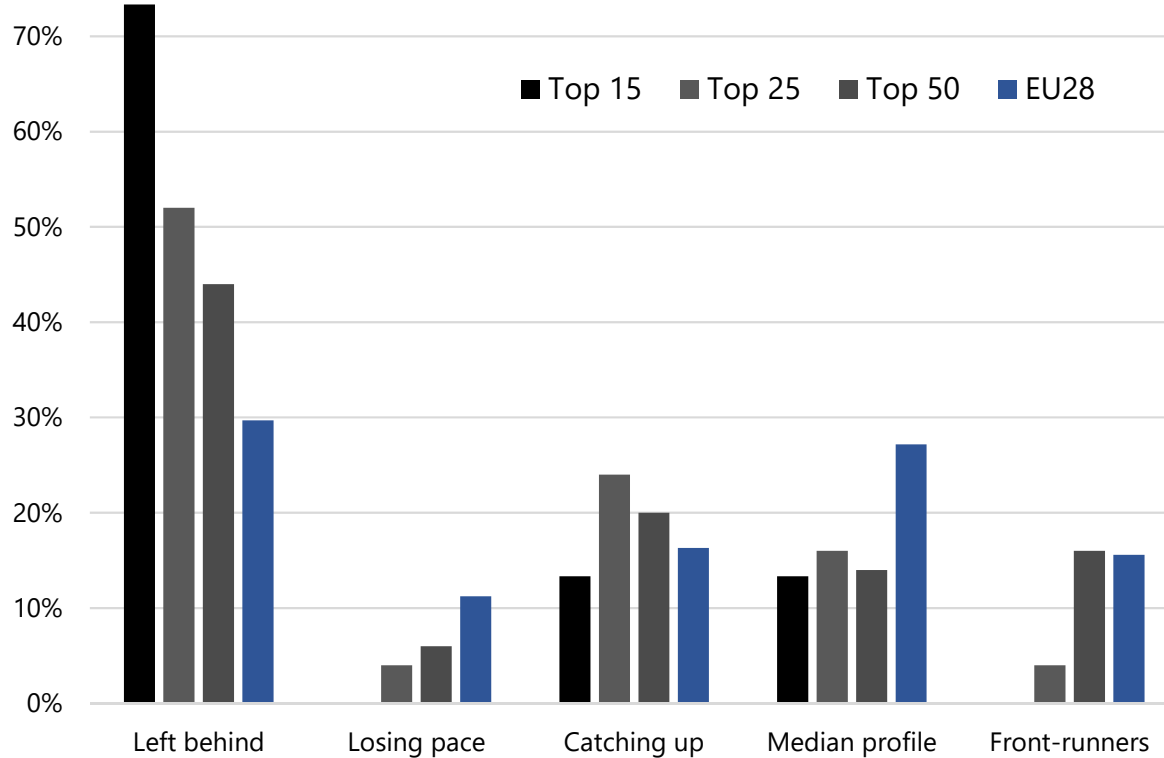Table 5: Top 50 vulnerable regions - Scenario: Fit for 55 with CBAM scope 2 - Year 2030

NUTS	Country	Regions	Vuln.	♯	NUTS	Country	Regions	Vuln.	♯
EL53		Dytiki Makedonia	0.916	1	DEG0		Thüringen	0.221	26
BG34		Yugoiztochen	0.370	2	CZ04		Severozápad	0.220	27
RO41		Sud-Vest Oltenia	0.337	3	ES43		Extremadura	0.218	28
EL65		Peloponnisos	0.278	4	ES70		Canarias	0.217	29
PL22		Slaskie	0.277	5	DEC0		Saarland	0.217	30
DEE0		Sachsen-Anhalt	0.261	6	ITH4		Friuli-Venezia Giulia	0.217	31
ES12		Principado de Asturias	0.259	7	DE40		Brandenburg	0.215	32
BG31		Severozapaden	0.257	8	ES42		Castilla-la Mancha	0.214	33
ES64		Ciudad de Melilla	0.253	9	CZ08		Moravskoslezsko	0.214	34
BG32		Severen tsentralen	0.253	10	BE31		Brabant Wallon	0.213	35
ES63		Ciudad de Ceuta	0.248	11	DEA1		Düsseldorf	0.212	36
EL63		Dytiki Ellada	0.245	12	ES61		Andalucía	0.211	37
DEA5		Arnsberg	0.243	13	BE32		Hainaut	0.210	38
EL64		Sterea Ellada	0.243	14	BG42		Yuzhen tsentralen	0.201	39
EL51		Anatoliki Makedonia, Thraki	0.235	15	ITI4		Lazio	0.201	40
EL61		Thessalia	0.234	16	ITH3		Veneto	0.201	41
EL52		Kentriki Makedonia	0.231	17	DED2		Dresden	0.201	42
EL54		Ipeiros	0.230	18	ES41		Castilla y León	0.199	43
EL41		Voreio Aigaio	0.229	19	DE24		Oberfranken	0.199	44
DEA3		Münster	0.229	20	ES24		Aragón	0.199	45
DED4		Chemnitz	0.227	21	RO42		Vest	0.198	46
ITI3		Marche	0.227	22	EL62		Ionia Nisia	0.198	47
EL30		Attiki	0.226	23	ITH5		Emilia-Romagna	0.198	48
ITI2		Umbria	0.224	24	ITG2		Sardegna	0.196	49
BG33		Severoiztochen	0.223	25	EL42		Notio Aigaio	0.196	50

Among Top 50

- 💎 Greece: 12 regions

- 💎 Germany: 10 regions

- 💎 Spain: 9 regions

- 💎 Italy: 7 regions

- 💎 Bulgaria: 5 regions

- 💎 Belgium, Czechia: 2 regions

- 💎 Poland: 1 region

More regions in Southern Europe (Greece, Italy, Spain)

#5. Slaskie

#3. Sud-Vest Oltenia

#1. Dykiti Makedonia

#2. Yugoiztochen

#4. Peloponnisos

Distribution of Top 50 vulnerable regions

Legend: ■ Top 15　■ Top 25　■ Top 50　■ EU28

Categories (x-axis): Left behind, Losing pace, Catching up, Median profile, Front-runners

◆ **Left behind**: low income, low-medium income growth

◆ **Losing pace**: Medium income, low income growth

◆ **Catching up**: Low-medium income, high income growth

◆ **Median profile**: Medium income & income growth

◆ **Front runners**: High income, medium income growth

- Employment loss is reduced by implementing CBAM

- In 2030, within the fit for 55, we estimate the job losses equal to 500'000 in EII and 125'000 in fossil industries

- CBAM with scope 2 saves 250'000

- The impacts at the regional level are quite different

- Job loss are concentrated in number of regions

◆ Regions in Germany: most Exposed

◆ If we consider adaptive capacity and current unemployment, the most impacted regions would be in Greece, Spain, Italy

◆ Risk of increasing **Territorial Inequality**

◆ Important to use the "**EU Just Transition Fund**" on building adaptive capacity

Funded by the European Union

Thank You

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