

# A CGE analysis of differentiated carbon pricing for the Irish land transportation sector

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12th MaREI Climate & Energy Research Seminar

06 June 2024

# ETS2

## Framework:

- Separate Emissions Trading System (ETS) for the
  - buildings,
  - road transport, and
  - additional (mainly small industry) sectors
- Price effectively capped at €45 per permit (initially)
- Exemption: national carbon tax > ETS2

# *Research question*

Implement differentiated carbon prices in the land transportation sector (LTS) and examine the impact on the

- macroeconomy,
- LTS sector, and
- households

## *Overview of key findings*

Across the different "regimes",

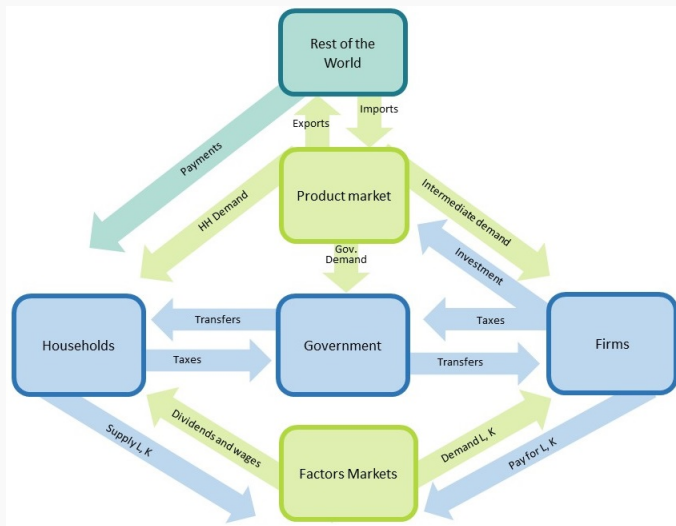
- the macroeconomy, LTS's value-added (VA), and household welfare are relatively unchanged, but
- LTS's total emissions vary substantially

# Methodology

The Ireland Environment, Energy and Economy (I3E) model is the first fully dynamic general equilibrium model for the Irish economy and includes

- 39 sectors producing 49 commodities,
- 10 representative household groups,
- a government,
- enterprises, and
- the rest of the world accounts.

# Interlinkages



# *ETS vs. carbon tax*

## Interaction:

- Mixed emission regulation (completely or partially)
- ETS emissions exempt from carbon tax (avoid double taxation)
- Price of all commodities include carbon tax
- Add ETS and rebate carbon tax

# Scenario definitions

<b>No change</b>	
BaU	Includes key realisations between 2014 and 2021
<b>Main scenarios</b>	
CT	Carbon tax increases gradually and reaches €100 in 2030
ETS2_20	20% (80%) of LTS emissions are subject to €45 (CT)
ETS2_100	100% of LTS emissions are subject to €45
ETS_20	20% (80%) of LTS emissions are subject to €82 (CT) with free allowances <sup>a</sup>
ETS_100	100% of LTS emissions are subject to €82 with free allowances <sup>a</sup>
<b>Sensitivity scenarios</b>	
h_ETS	ETS price increases in line with EU price projections <sup>b</sup>
h_ETS_20	20% (80%) of LTS emissions are subject to increasing ETS price (CT) with free allowances <sup>a,b</sup>
h_ETS_100	100% of LTS emissions are subject to increasing ETS price with free allowances <sup>a,b</sup>

<sup>a</sup> 10% of 2018 emissions.

<sup>b</sup> €82, €87 and €164 in 2030, 2040 and 2050, respectively.

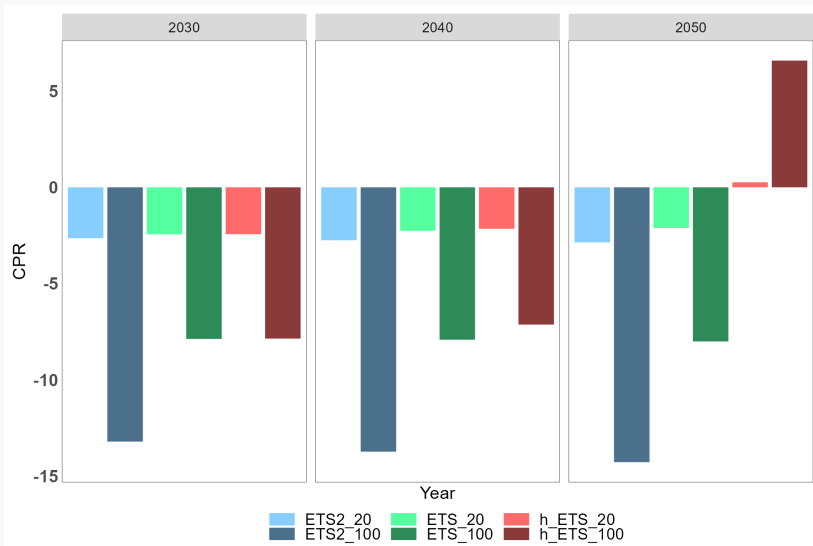


# Land transportation sector

% change w.r.t. BaU

	Real Value Added			Total Emissions		
	2030	2040	2050	2030	2040	2050
CT	-1.78	-2.25	-2.46	-9.15	-9.89	-10.48
ETS2_20	-1.80	-2.26	-2.47	-7.53	-8.22	-8.75
ETS2_100	-1.85	-2.32	-2.54	-0.29	-0.68	-0.91
ETS_20	-1.80	-2.26	-2.47	-7.67	-8.54	-9.23
ETS_100	-1.81	-2.28	-2.49	-4.27	-5.02	-5.59
h_ETS	-1.81	-2.29	-2.88	-9.10	-10.14	-12.01
h_ETS_20	-1.82	-2.30	-2.88	-7.63	-8.86	-12.24
h_ETS_100	-1.84	-2.31	-2.83	-4.24	-5.85	-16.04

# Cost-price ratio



# *Policy implications*

## Availing of the exemption

- Won't change outcomes for the economy, households or LTS VA
- Will change breakdown of ETS and non-ETS emissions and LTS total emissions
  - Rollback of climate policy?
  - Lack of fairness?

*End*

Thank you for listening!

Any Questions?

# Macroeconomic results

% change w.r.t. BaU

Year	Scenario	Economic Activity				Emissions		
		GDP <sup>a</sup>	Investment <sup>a</sup>	Total Employment	Trade Balance-to-GDP Ratio	Total	ETS	Non-ETS
2030	CT	-1.14	-1.99	-1.30	-0.10	-5.43	-1.60	-7.09
	ETS2_20	-1.14	-1.98	-1.29	-0.10	-5.37	-0.62	-7.73
	ETS2_100	-1.10	-1.92	-1.27	-0.10	-5.12	3.65	-10.58
	ETS_20	-1.14	-1.98	-1.29	-0.10	-5.38	-0.62	-7.74
	ETS_100	-1.12	-1.94	-1.28	-0.09	-5.25	3.42	-10.60
	h_ETS	-1.35	-2.22	-1.44	-0.95	-5.43	-1.82	-7.02
	h_ETS_20	-1.35	-2.21	-1.44	-0.96	-5.38	-0.85	-7.68
h_ETS_100	-1.33	-2.19	-1.43	-0.99	-5.25	3.19	-10.54	
2040	CT	-1.33	-1.80	-1.43	-0.49	-6.29	-2.27	-7.94
	ETS2_20	-1.33	-1.79	-1.43	-0.48	-6.23	-1.30	-8.57
	ETS2_100	-1.29	-1.74	-1.40	-0.46	-5.95	3.01	-11.32
	ETS_20	-1.33	-1.79	-1.43	-0.48	-6.24	-1.30	-8.58
	ETS_100	-1.30	-1.76	-1.41	-0.46	-6.10	2.74	-11.36
	h_ETS	-1.47	-1.71	-1.51	-1.95	-7.03	-4.20	-8.11
	h_ETS_20	-1.47	-1.70	-1.51	-1.96	-6.98	-3.24	-8.75
h_ETS_100	-1.45	-1.67	-1.49	-2.00	-6.87	0.75	-11.52	
2050	CT	-1.41	-1.33	-1.49	-0.90	-6.87	-2.69	-8.52
	ETS2_20	-1.40	-1.32	-1.49	-0.90	-6.80	-1.70	-9.14
	ETS2_100	-1.36	-1.29	-1.46	-0.86	-6.50	2.68	-11.87
	ETS_20	-1.40	-1.32	-1.49	-0.90	-6.82	-1.71	-9.16
	ETS_100	-1.37	-1.30	-1.47	-0.86	-6.67	2.38	-11.91
	h_ETS	-1.68	-1.50	-1.76	-1.95	-13.13	-17.47	-9.85
	h_ETS_20	-1.67	-1.50	-1.75	-1.95	-13.13	-16.54	-10.54
h_ETS_100	-1.66	-1.49	-1.75	-1.96	-13.25	-13.05	-13.25	

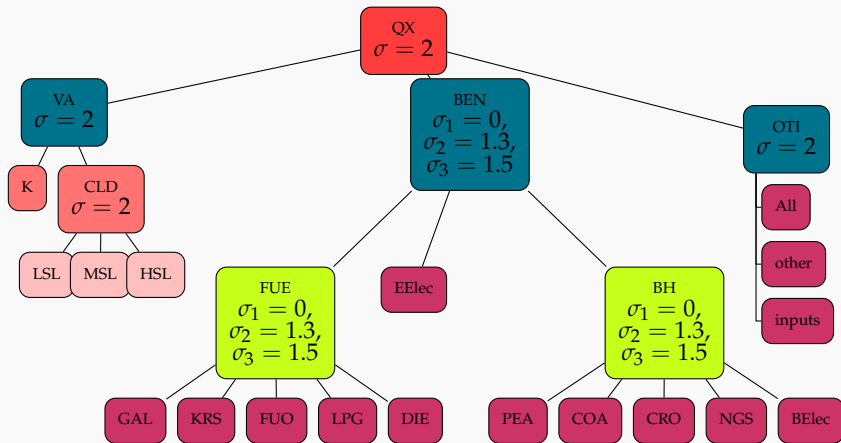
<sup>a</sup>: In real terms.

# Household results - EV (2040)

% of the reference total consumption expenditure, the difference from BaU

	CT	ETS2_20	ETS2_100	ETS_20	ETS_100	h_ETS	h_ETS_20	h_ETS_100
Rural poorest	-1.10	-1.09	-1.06	-1.09	-1.06	-0.51	-0.50	-0.44
r2	-1.72	-1.72	-1.69	-1.72	-1.70	-1.62	-1.62	-1.60
r3	-1.75	-1.75	-1.72	-1.75	-1.74	-1.73	-1.72	-1.71
r4	-2.17	-2.16	-2.14	-2.17	-2.16	-2.38	-2.38	-2.38
Rural richest	-2.23	-2.22	-2.20	-2.23	-2.22	-2.47	-2.46	-2.46
Urban poorest	0.43	0.44	0.46	0.44	0.46	1.46	1.47	1.54
u2	-0.41	-0.40	-0.37	-0.40	-0.38	0.07	0.08	0.12
u3	-0.74	-0.74	-0.70	-0.74	-0.72	-0.41	-0.40	-0.37
u4	-1.04	-1.03	-0.99	-1.03	-1.01	-0.87	-0.86	-0.83
Urban richest	-1.58	-1.57	-1.52	-1.57	-1.54	-1.51	-1.50	-1.47
Total	-1.24	-1.23	-1.19	-1.23	-1.21	-1.05	-1.04	-1.02

# Carbon price & other distortions



Nested Structure of Production,  
except Electricity Production