Future of Ireland's Energy Policy and Challenges of Decarbonisation

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ERI
ENVIRONMENTAL RESEARCH INSTITUTE
UNIVERSITY COLLEGE CORK

EPMG
ENERGY POLICY & MODELLING GROUP

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A TRADITION OF INDEPENDENT THINKING

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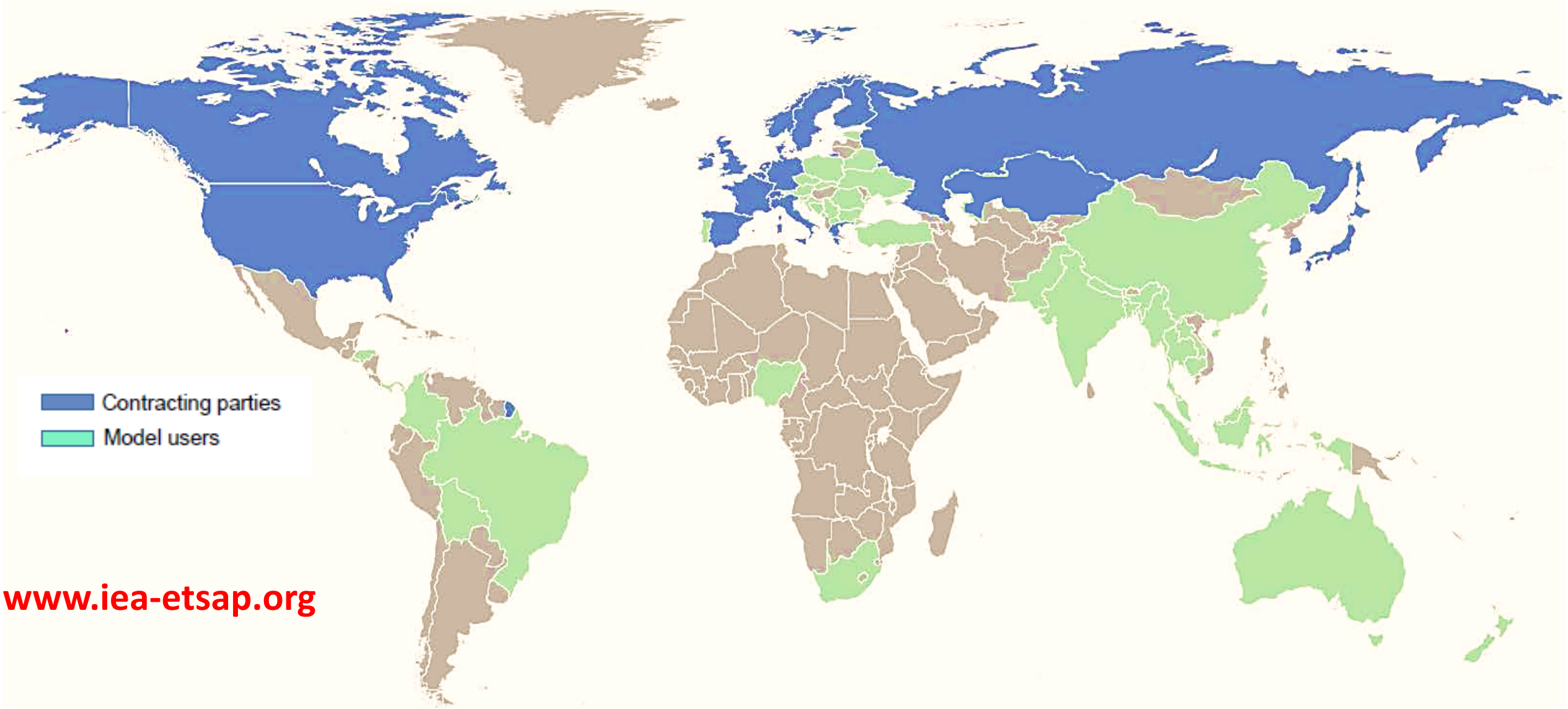
Future of Ireland's Energy Policy

- Ireland's Transition to a Low Carbon Energy Future
- Climate Action & Low Carbon Development Act 2015
- EU Policy (ETS sector & non-ETS targets)
- The Paris Agreement

Irish TIMES Energy Systems Model

- integrated model of Ireland's **entire** energy system
- medium to long term analysis (2020 - 2030 - 2050)
- meets future energy needs at **least cost**
- optimal **technology** selection (1300 technologies)
- environmental constraints (e.g. **max CO_2 emissions**)
- **price-elastic** demands

TIMES Energy Modelling Community



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Scenario analysis to explore alternatives & impact of…

INPUTS

- Technologies
- Fuel prices
- Resource availability
- Policy goals

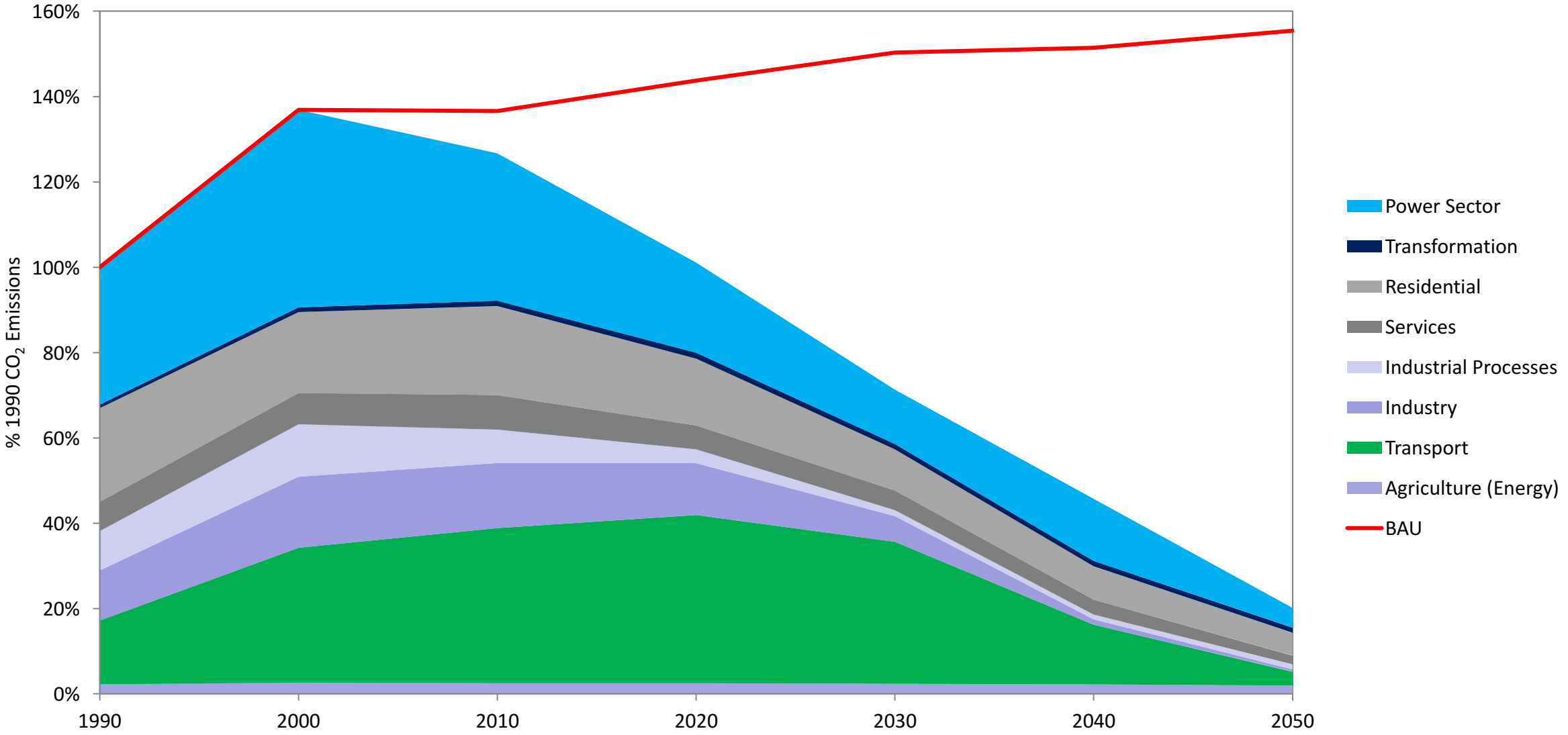
OUTPUTS

- Energy flows & costs
- Emissions
- Fuel & technology mix
- Timing (path dependency)

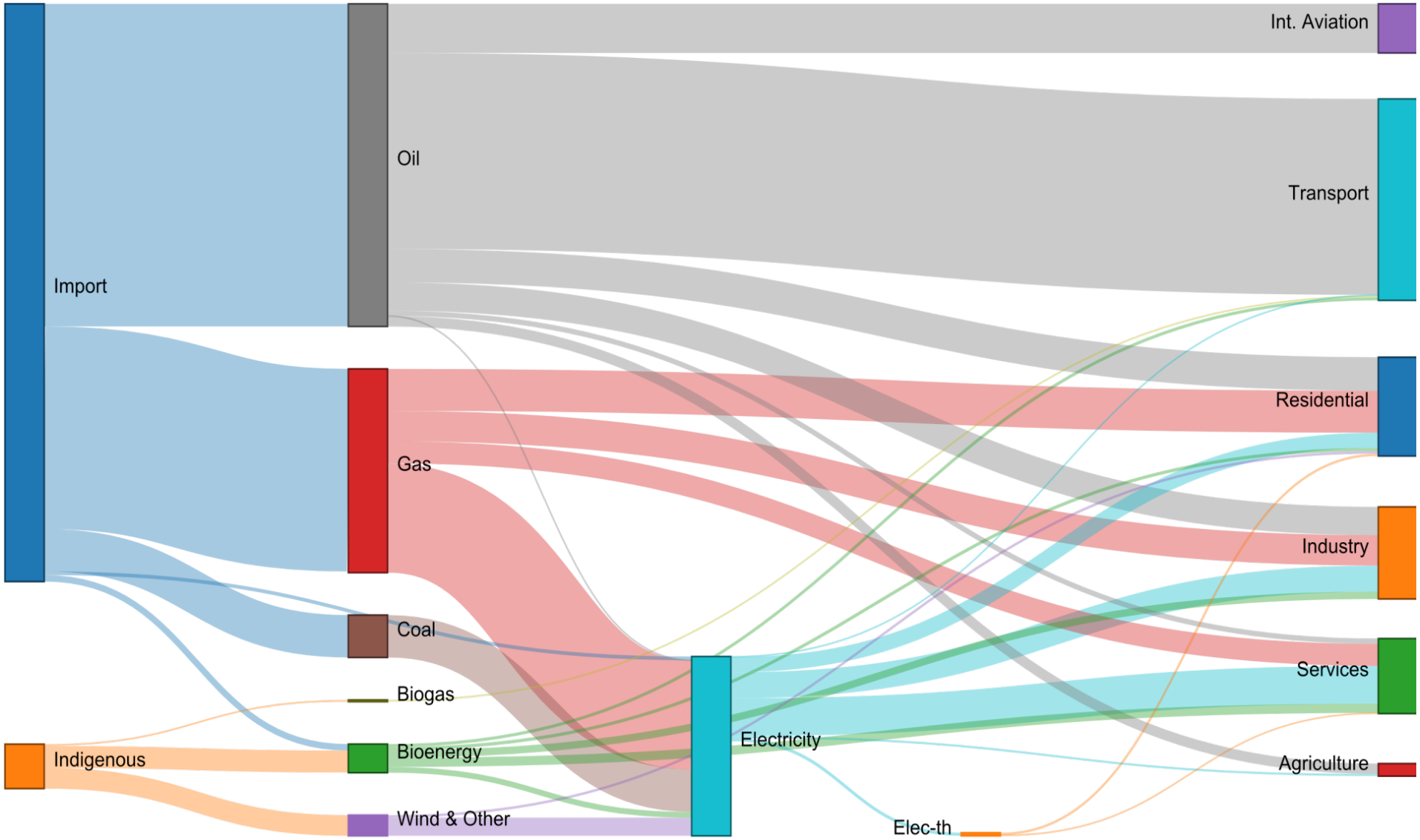
Examples of Scenarios

- Business-as-usual
- 80% reduction in CO_2 emissions
- Key technologies (e.g. CCS, SNSP) restricted/constrained
- Key fuels (e.g. gas, imported biomass) price adjusted/restricted
- Policy scenarios (higher ambition (> 80%); ETS price profile, non-ETS target; equitable carbon budget scenarios)

A Low Carbon Pathway to 2050



Ireland's Energy System 2050 (BaU Scenario)

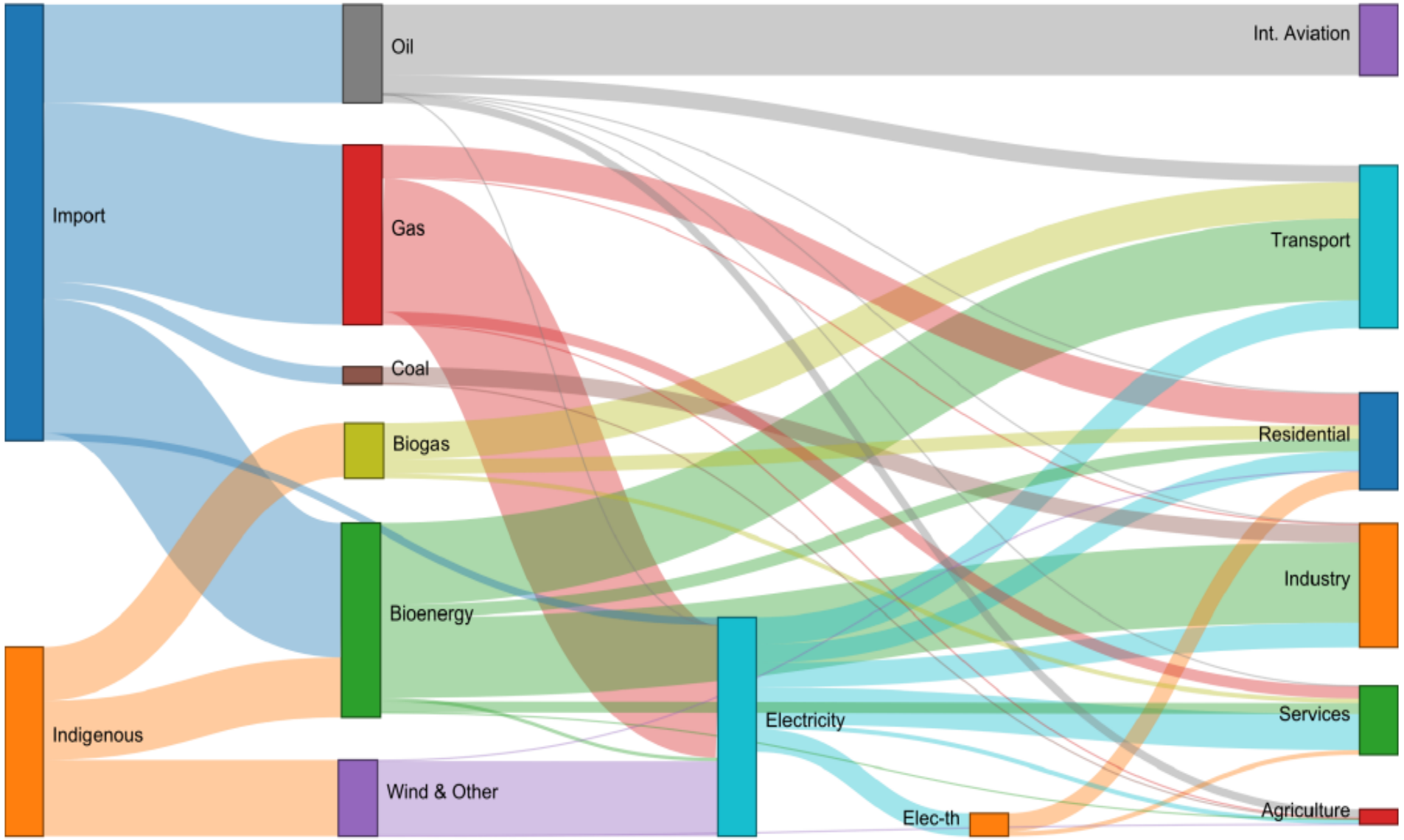


TFC
200 TWh

Elec = 17%
=34 TWh

=33% growth
on 2015

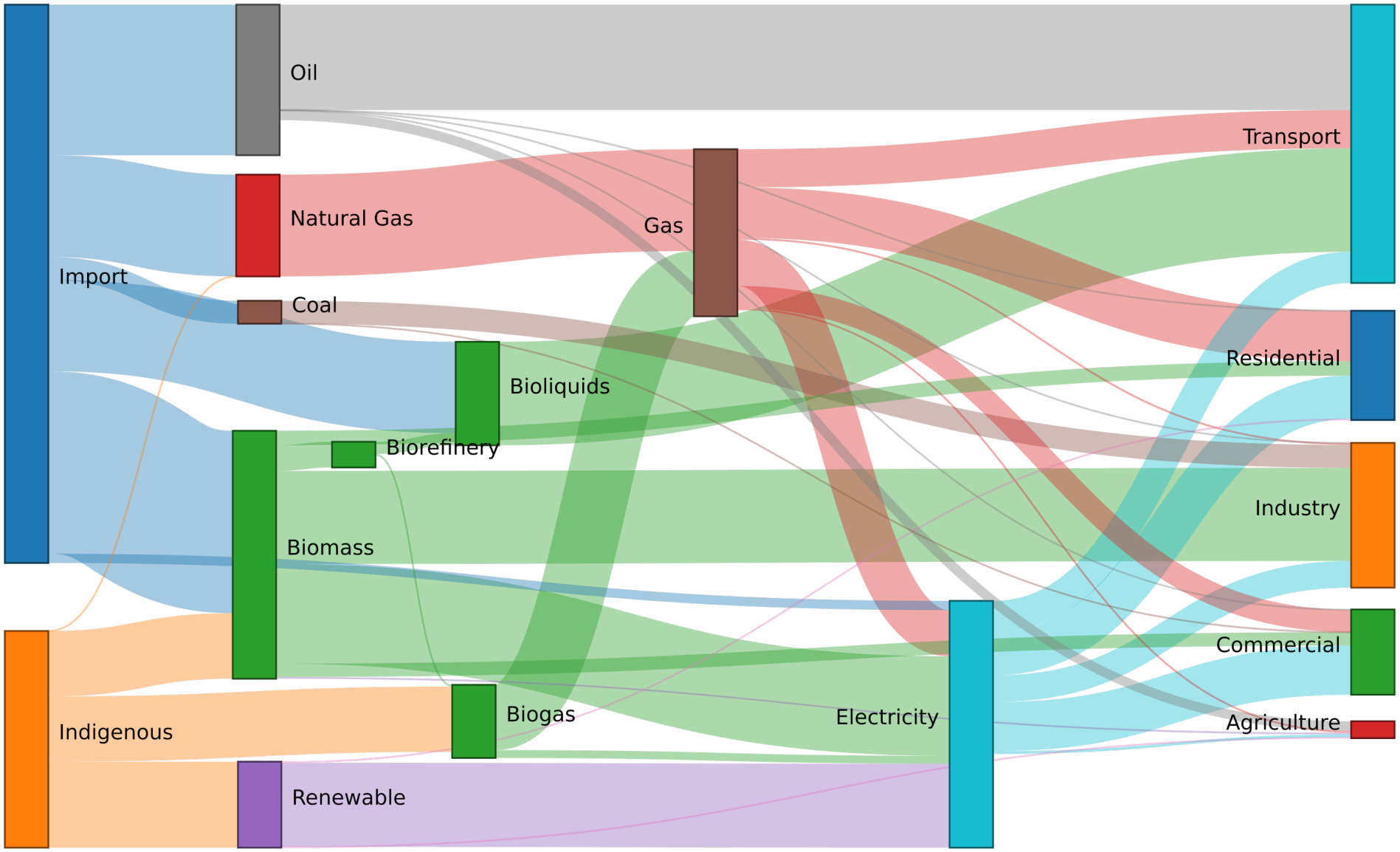
Ireland's Energy System 2050 (-80% CO_2 Scenario)



TFC
136 TWh

Elec 25%
=34 TWh

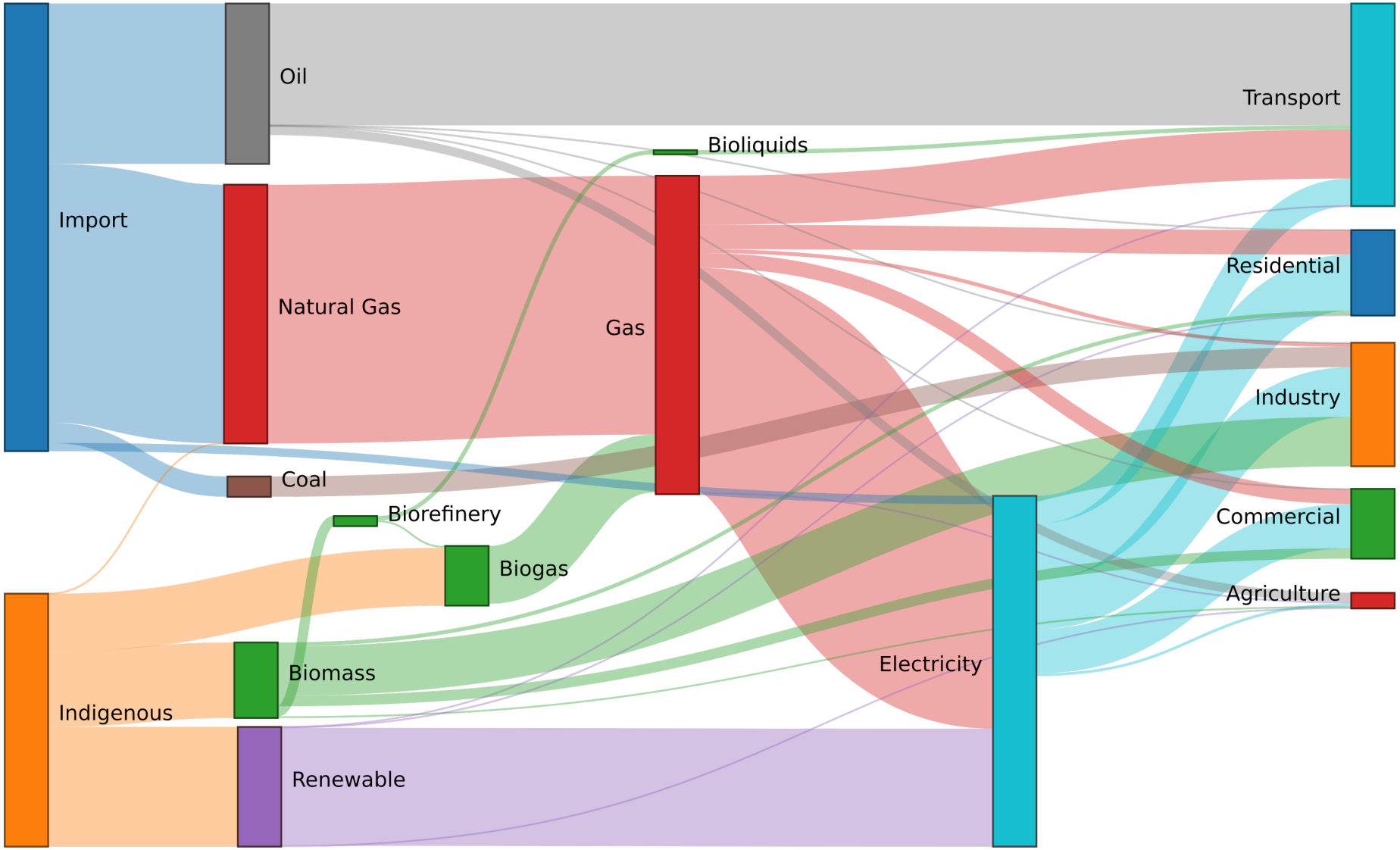
Ireland's Energy System 2050 (-80% CO_2 no CCS Scenario)



TFC
134 TWh

Elec 25%
=33 TWh

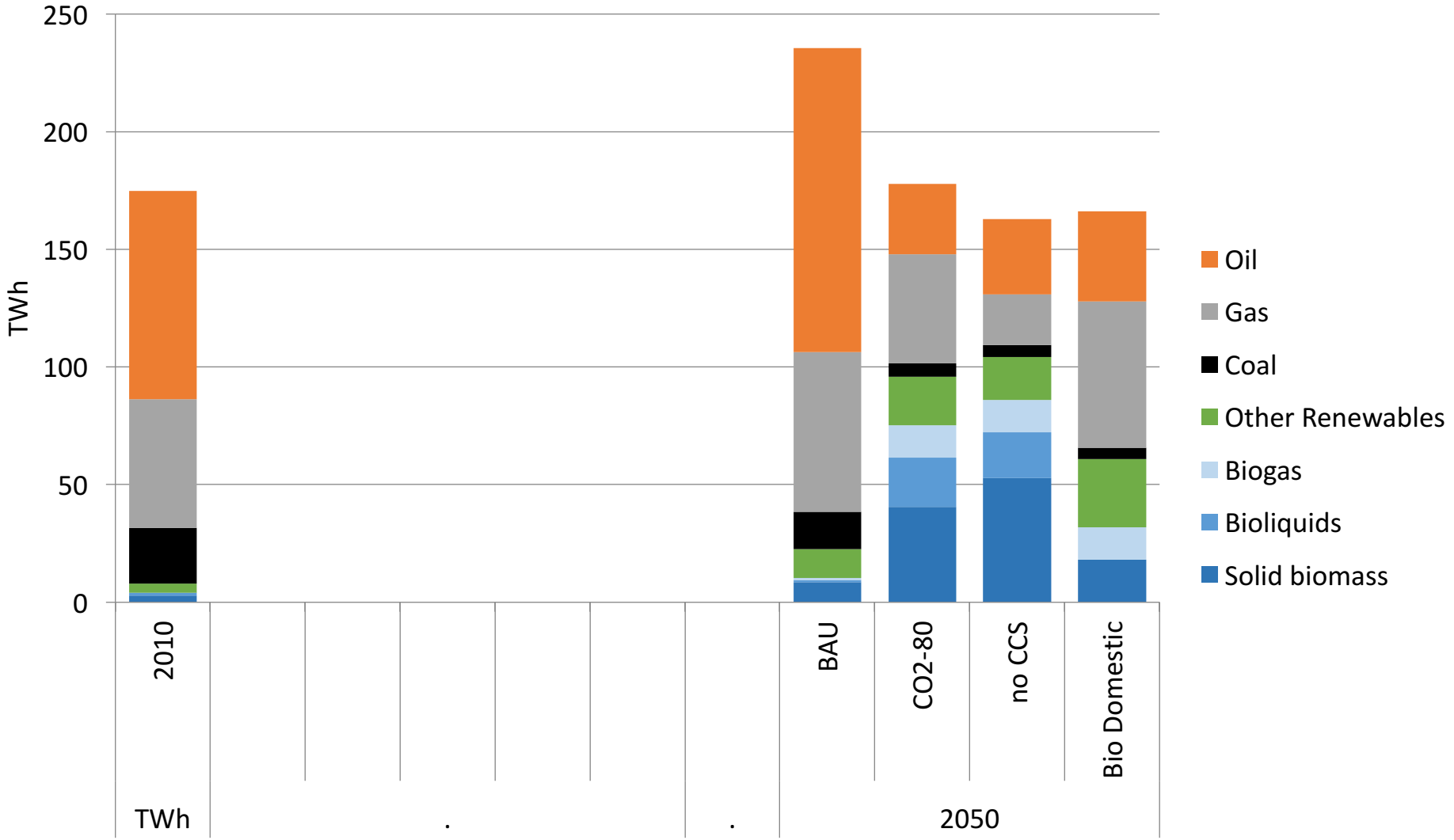
Ireland's Energy System 2050 (-80% CO_2 no Bio-Imports Scenario)



TFC
126 TWh

Elec 35%
=44 TWh

Fossil Fuels in 2050



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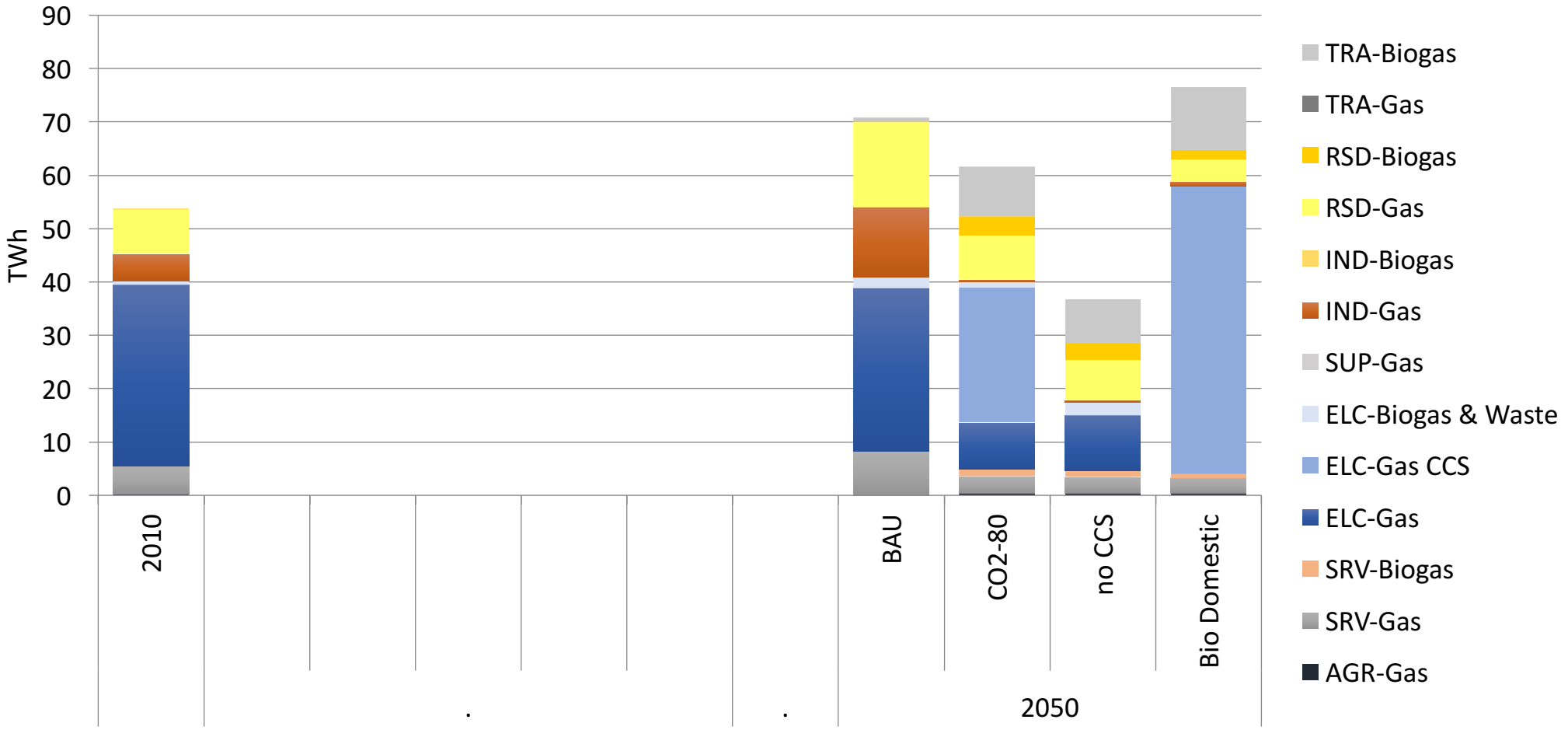
Story of gas in 2050



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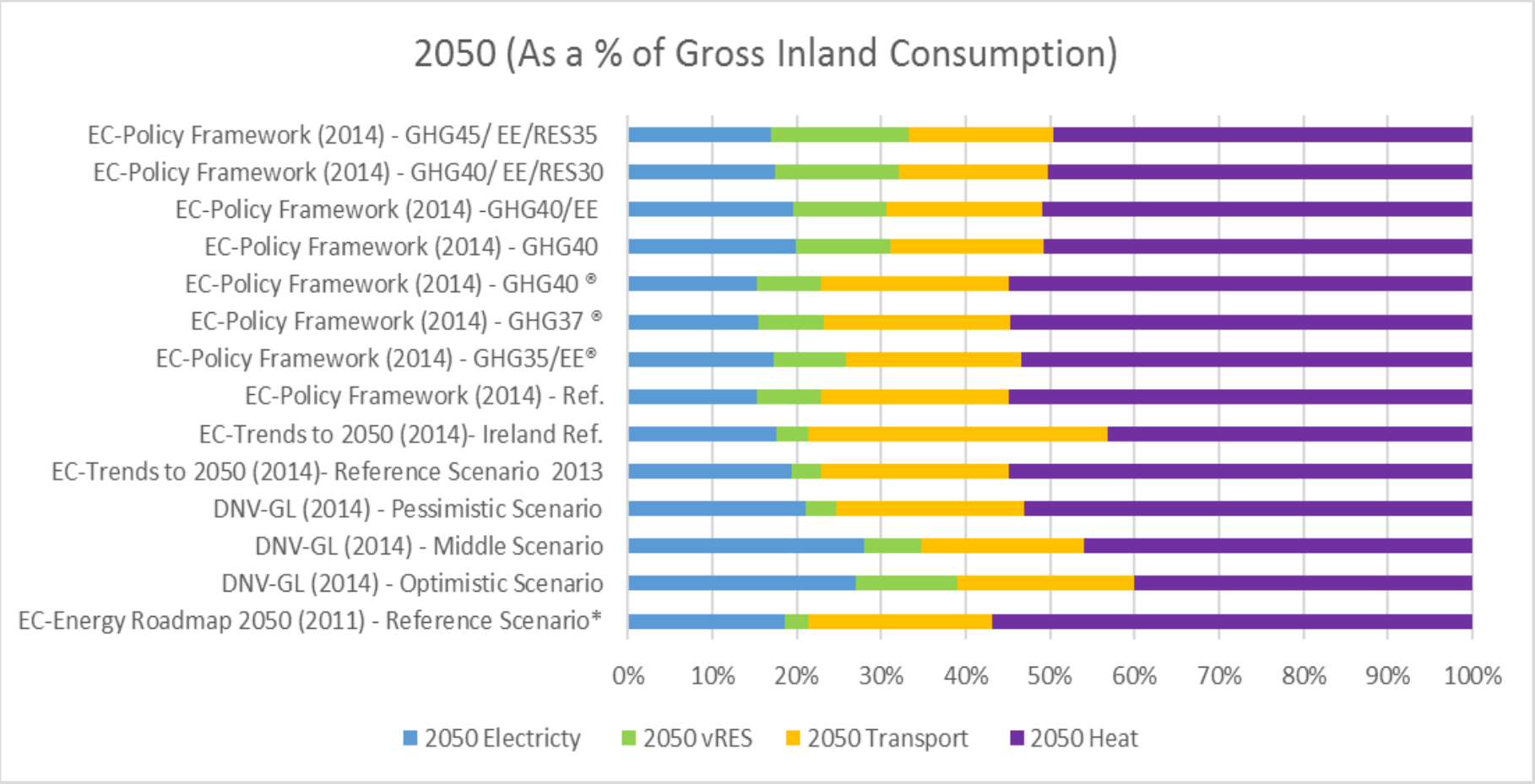
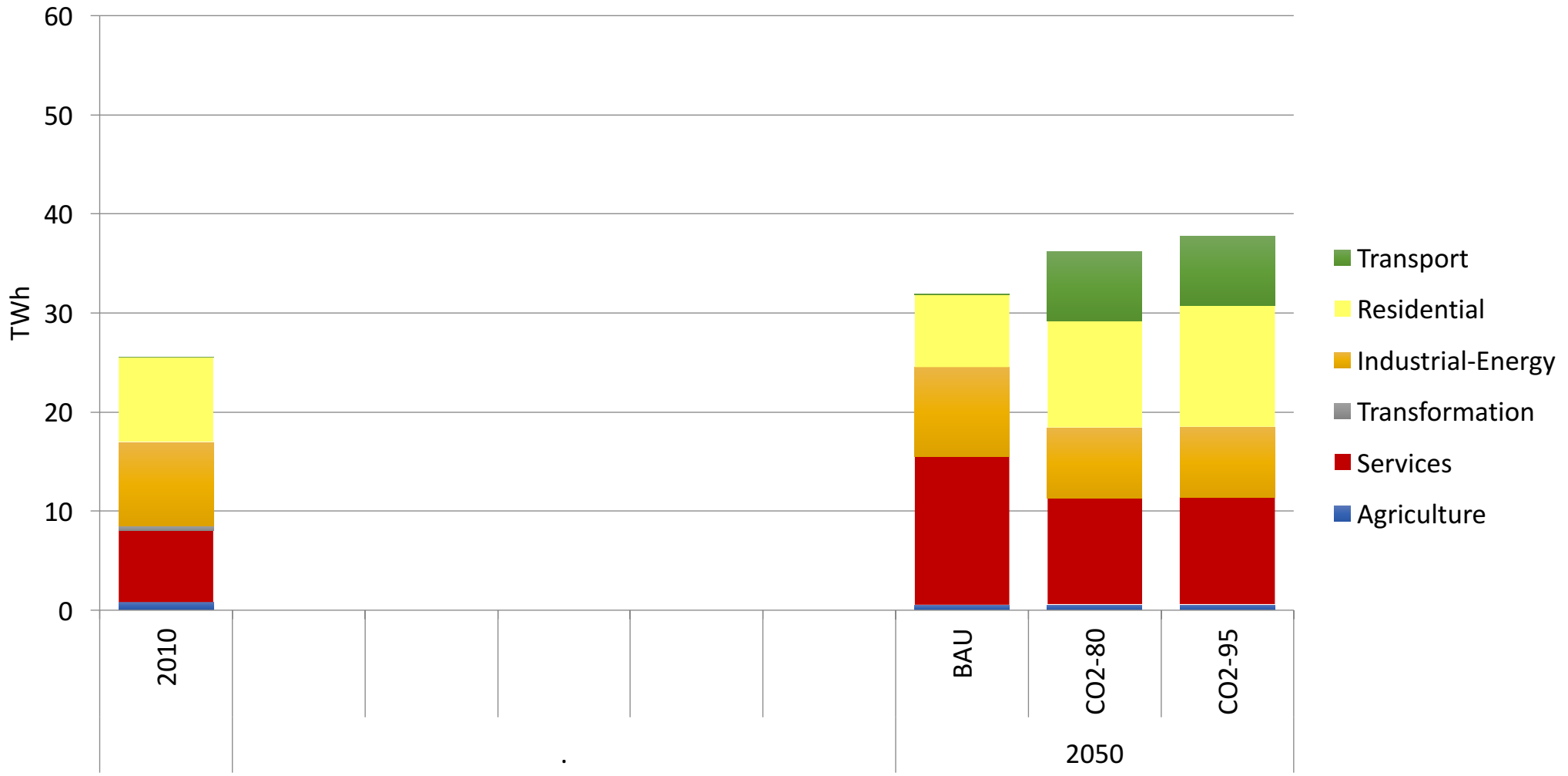
Electricify everything by 2050?



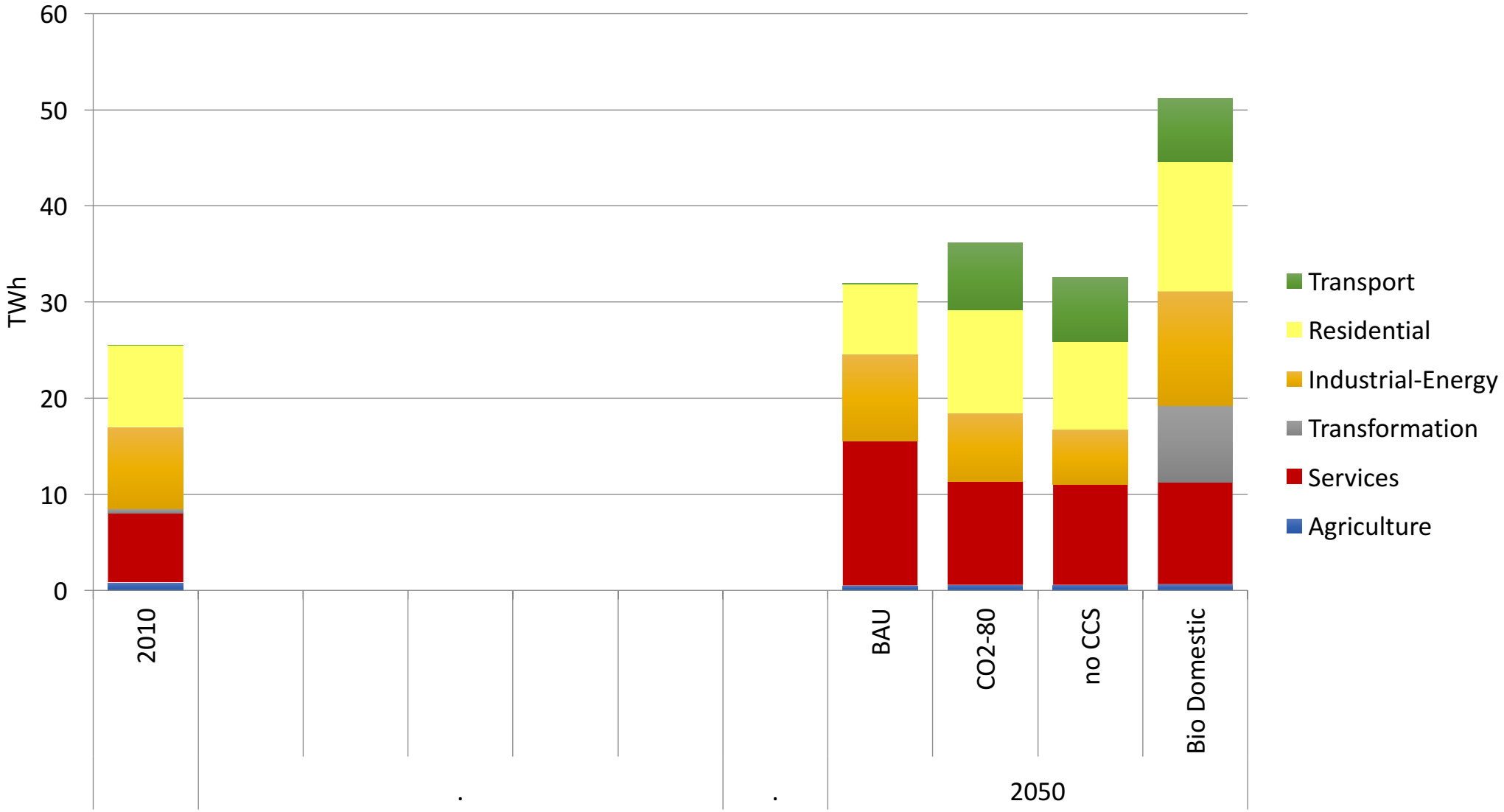
Electricity (blue and green) use may reach 30-40% of total final energy consumption by 2050

What about the other 60-70% ?

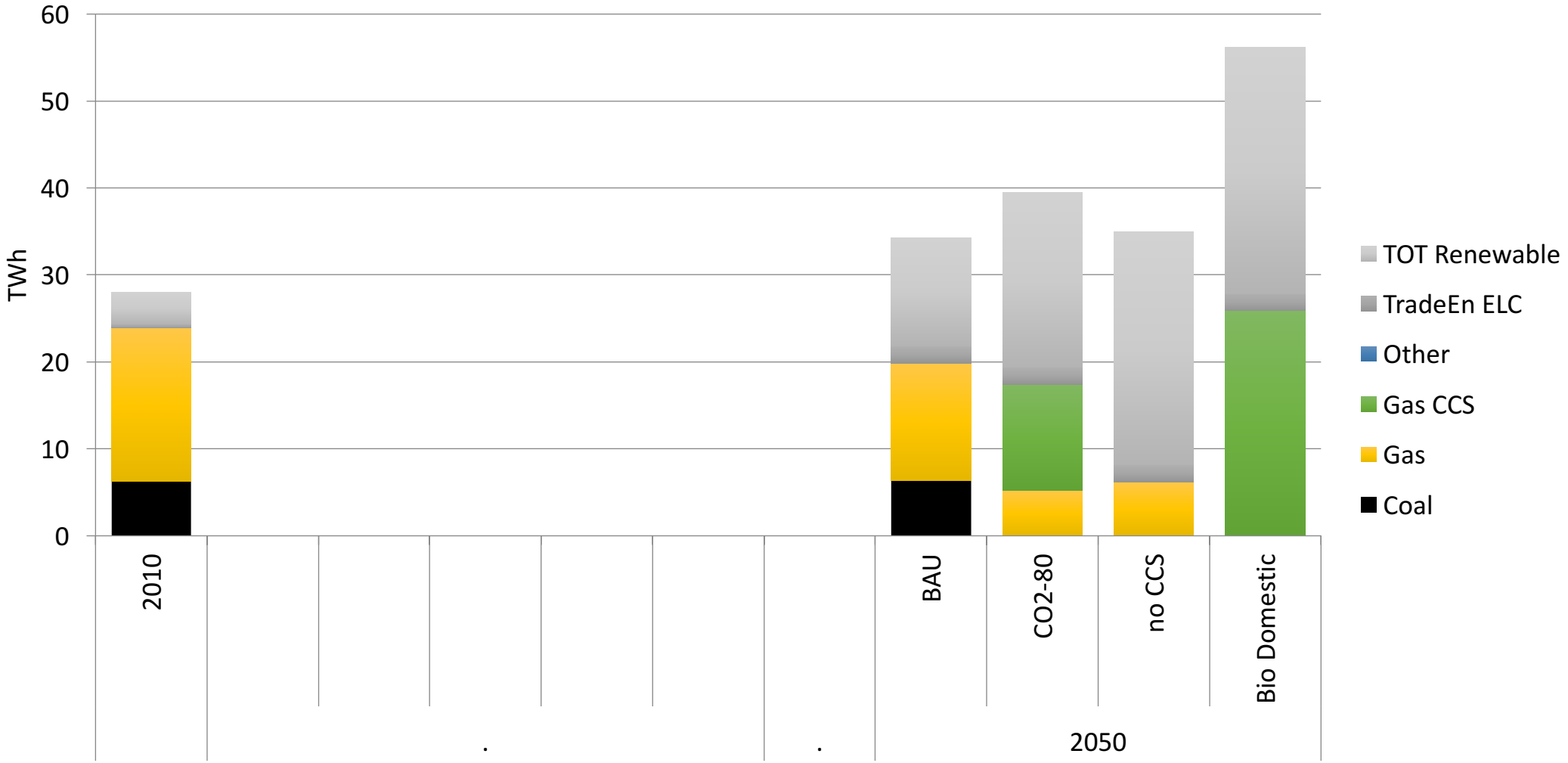
Electricity Demand – Significant Variation



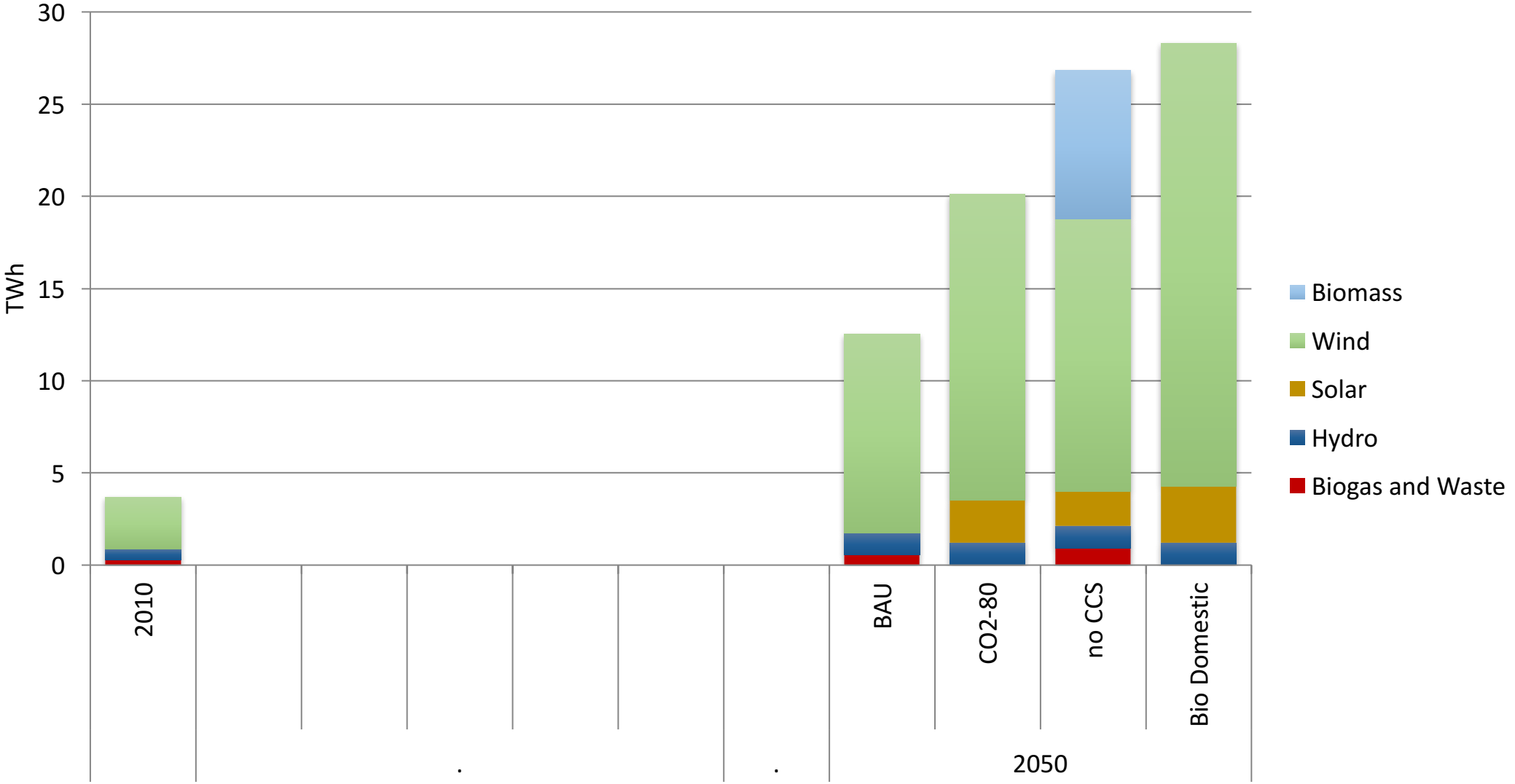
Electricity Demand – What if?



Electricity Generation by fuel



Renewable Electricity Generation by fuel

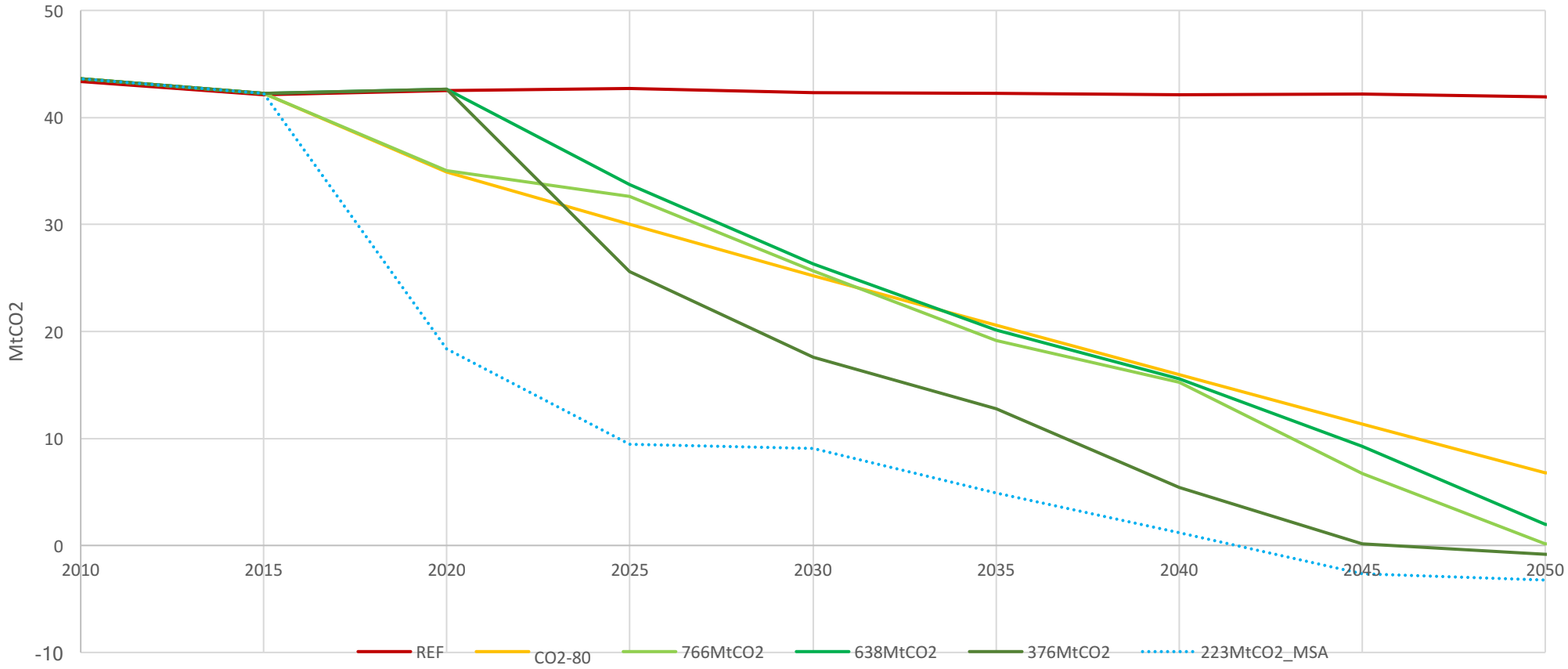


ETS price and non-ETS target

Share of electricity consumption

Year	Scenario	Price	Transport	Residential	Industry	Services	Agriculture
2010	Actual		0.1%	22.5%	33.3%	41.9%	16.3%
2050	CO_2_80		15.2%	44.8%	20.03%	57.1%	16.88%
	ETS/NETS	264 €/tCO_2	16.7%	45.5%	22%	61.2%	16.9%
		360 €/tCO_2	16.3%	44.5%	22%	60.2%	16.9%
		800 €/tCO_2	16.1%	41.8%	22.1%	59.6%	16.9%
	ETS/NETS NoBioImp	264 €/tCO_2	18%	88.3%	21.9%	84.1%	25.2%
		360 €/tCO_2	17.9%	88.5%	23.1%	84.3%	25.2%
		800 €/tCO_2	18.3%	80.2%	42.4%	84.3%	25.2%

Paris Agreement carbon budget scenarios



Conclusions

- Many pathways to decarbonise Irish energy system
- Technology availability, resource availability and cost are important variables
- Policy at Irish and EU level also important variables; for example, ETS market price and non-ETS targets
- Alternative pathways have large variation in share, amount and sources of electricity generation
- Full implications of Paris Agreement still unrealised

Thank you

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www.ucc.ie/energypolicy

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