Climate Action Plan 2021

For Discussion

May, 2021

An Roinn Comhshaoil,
Aeráide agus Cumarsáide
Department of the Environment,
Climate and Communications

Context

The Climate Action Plan, 2019 set out a pathway to reduce Ireland's GHG emissions by ~30-35% by 2030. This represents a 3-4% p.a. reduction from 2021 to 2030.

The Climate Action and Low Carbon Development (Amendment) Bill 2021 increased Ireland's climate ambition and committed to reduce emissions by 51% by 2030. This represents a 7% p.a. reduction from 2021 to 2030. In addition, the Programme for Government committed to achieving net zero emissions by 2050.

To deliver the PfG ambition, a revised Climate Action Plan will be published in June 2021. This revised plan will be developed over the coming months. The plan will detail Ireland's target emissions reduction pathway and will provide input to the National Development Plan (NDP).

This document contains

Measures which could be added to the 2021 Climate Action Plan (CAP) on top of the 2019 CAP work such that the 2030 PfG abatement targets can be met

These measures are designed as input to the Working Groups that are detailing the measures and actions to inform the Climate Action Plan

Climate action is essential and a well-designed national-level climate action can help, not hinder, the economy

The need for global climate action is clear…

Limiting warming to 1.5C substantially reduces the risks associated with climate change

An "orderly transition" to a 1.5C pathway would have four key features:

1. **Reduce emissions by 50-55% by 2030**
2. **Remain within the carbon budget of 570 Gt CO2**
3. **Reach net zero CO2 emissions by 2050**
4. **Steeply mitigate methane and nitrous oxide**

…and well-designed national-level climate action will likely help, not hinder, the economy

Transition can be net-positive at societal level, with no adverse impacts on household costs, increased employment, increased energy security and price stability, reduced pollution and more livable cities

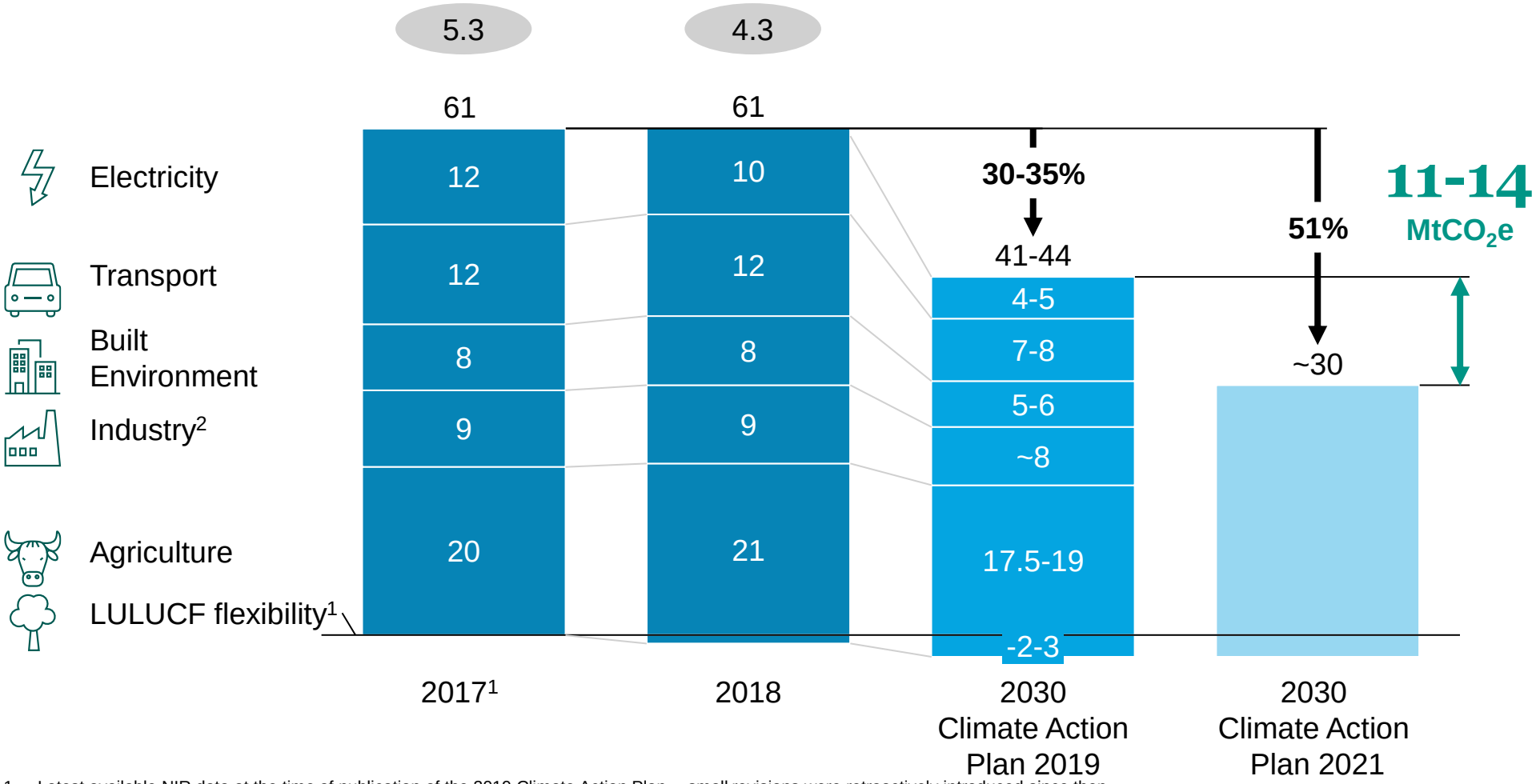
Given strong global commitment to net-zero and 'race to the top', **not acting carries a real risk of being left behind** – producing outdated products for changing markets and consumer demands - critical to bear in mind that **change is inevitable**; **maintaining status quo is not an option**. Can **either lean in and help transition key sectors at pace, or delay and risk scrambling to catch up**

National-level climate action will be critical to drive change and protect and expand industrial competitiveness and prosperity

- System-level change required; e.g., green power is a competitiveness factor for manufacturing
- Collaborative multi-stakeholder approaches; e.g., CCS requires pooling demand to get 'critical mass'
- Policy-support; ensuring level playing field and bridging cost gaps

The PfG targets aim to drastically reduce emissions and would require a further 11-14 MtCO2e abatement on top of the 2019 Climate Action Plan

Total greenhouse gas emissions $MtCO_2e$



The 2030 abatement target is just a stepping stone towards the 2050 climate ambition of achieving net zero emissions

1. Latest available NIR data at the time of publication of the 2019 Climate Action Plan -- small revisions were retroactively introduced since then
2. Including waste management

Source: Climate Action Plan, 2019; Programme for Government 2020

In the context of Ireland's net-zero goal, the long-term trajectory for all sectors is relatively clear

Sector	2050 outlook	Benefit
Electricity	Fully decarbonised electricity sector, through: • Build-out of renewable generation capacity, incl. onshore wind, offshore wind, and solar PV • Deployment of zero emissions gas (e.g. hydrogen, natural gas & CCS, biomethane) to manage inter-seasonal variability • Upgrade of transmission and distribution networks to support significantly increased electricity demand in 2050	Improve import/export balance Significant potential opportunity to generate commercial opportunities and jobs in all parts of Ireland
Transport	Fully decarbonised transport sector through: • Delivering demand reduction to reduce share of urban journeys in private cars including through 'modal shift' to public and shared transport and decrease in kilometers travelled • Electrification of passenger and light-duty road transport • Adoption of zero-emissions fuels for heavy-duty transport (e.g., electrification, hydrogen fuel cells)	Improved local air quality Improved safety Increased liveability of cities More affordable transport
Built Environment	Near fully decarbonised Built Environment sector, through: • Retrofit of existing dwellings incl. electrification of water and space heating • Deployment of a range of zero-emissions solutions for other buildings (incl. district heating, zero-emissions gas)	Improved comfort and indoor air quality Lower household bills and reduced waste heat
Industry	Fully decarbonised Industry sector through: • Driving material efficiency in construction to reduce embodied energy in materials • Employing heat pumps for low-temperature heat and bioenergy for high-temperature heat • Utilising CCS and innovative binders in cement • Fully switching fuel used for cement (e.g., waste, bioenergy) and alumina (e.g., hydrogen, biomethane)	Improved commercial opportunities for Irish enterprise driven by sustainability leadership
Agriculture and LULUCF	Accelerate sustainability transformation in agriculture, including through: • Scaling-up GHG-efficient food production • Diversifying farm activates (incl. in forestry and peatland) • Deploying next-horizon technologies (e.g., methane inhibiting feed-additives). • Increasing sequestration by delivering increased forestation and bioenergy crop production. Other land use improvements include peatland rewetting and improved grassland management.	Maintain Irish agri-food exports "green" reputation and support carbon offsets in other sectors (e.g., through natural carbon sequestration)

On the path to Net-Zero 2050, all core and some further measures are required to meet the 2030 milestone (1/2)

Two categories of measures:

Core measures

- Acceleration of “no/ low regret” measures that:
  - Build on and extend existing CAP19 actions
  - Are required to deliver emissions reduction beyond 2030 and to reach net zero by 2050

Examples

- Renewable electricity system (incl. storage)
- Electrification in transport, built environment, and industry
- GHG-efficient farming practices
- Forests, soils, and peatlands

Further measures

- Larger system choices for Ireland
- Measures are technically and societally more challenging, do not exist at scale in Ireland today but are essential to deliver net-zero target.
- Some currently exist mostly at research/ pilot stage or with challenging commercial viability.

Examples

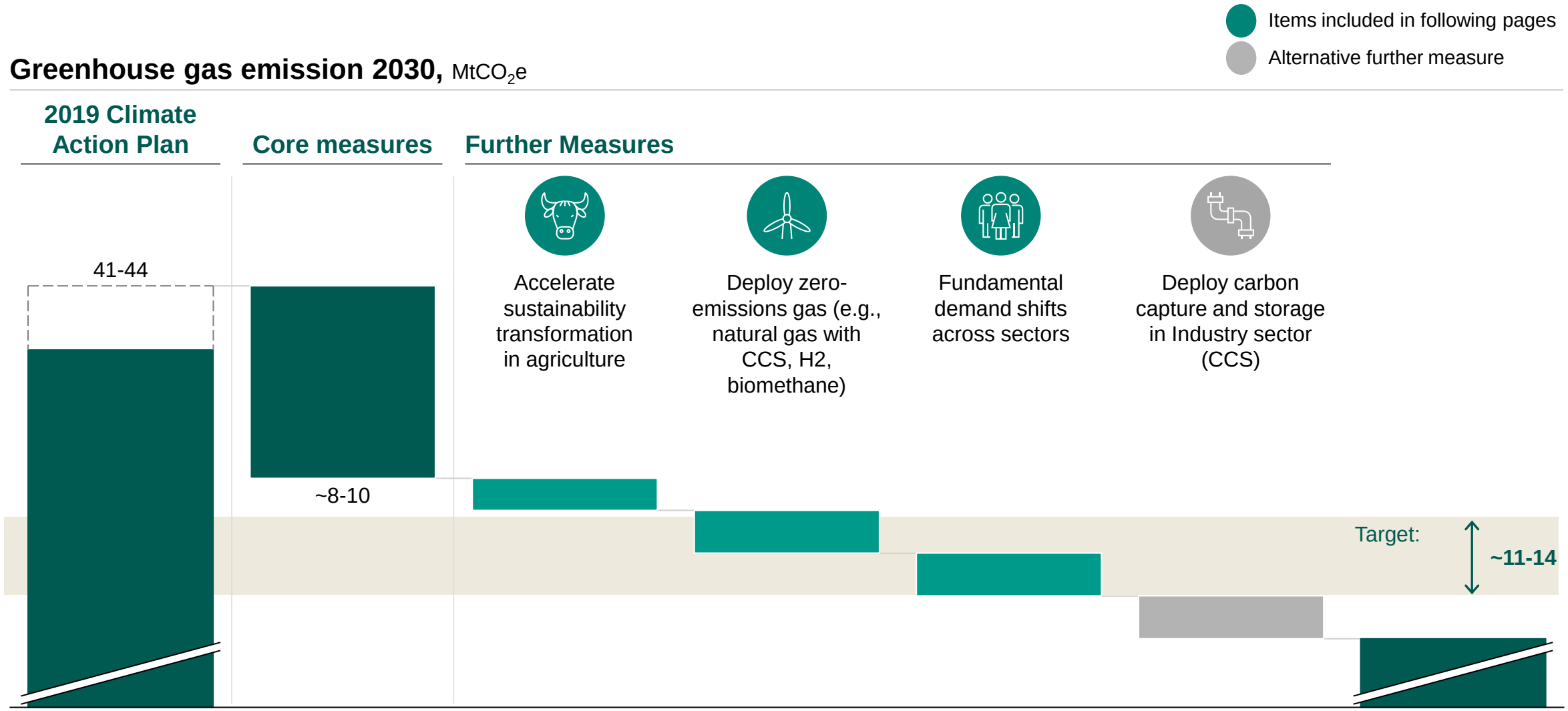
- Accelerate sustainability transformation in agriculture
- Deploy zero-emissions gas (e.g., natural gas in CCS, H2, biomethane)
- Fundamental demand shifts across sectors
- Deploy carbon capture and storage in Industry sector (CCS)

Approach:

Climate Action Plan 2021 will include clear commitments to core measures, including sector targets, technology targets (if relevant) and actions to implement

Climate Action Plan 2021 will set-out the high-level aspiration on further measures. A programme of work will then be undertaken to refine the potential and to set targets/ pathways. These will be reflected in Climate Action Plan 2022

On the path to Net-Zero 2050, all core and some further measures are required to meet the 2030 milestone (2/2)



Source: Climate Action Plan, 2019; Programme for Government 2020; team analysis

In total, we identified a menu of 30 options to drive decarbonisation across all sectors (1/2)

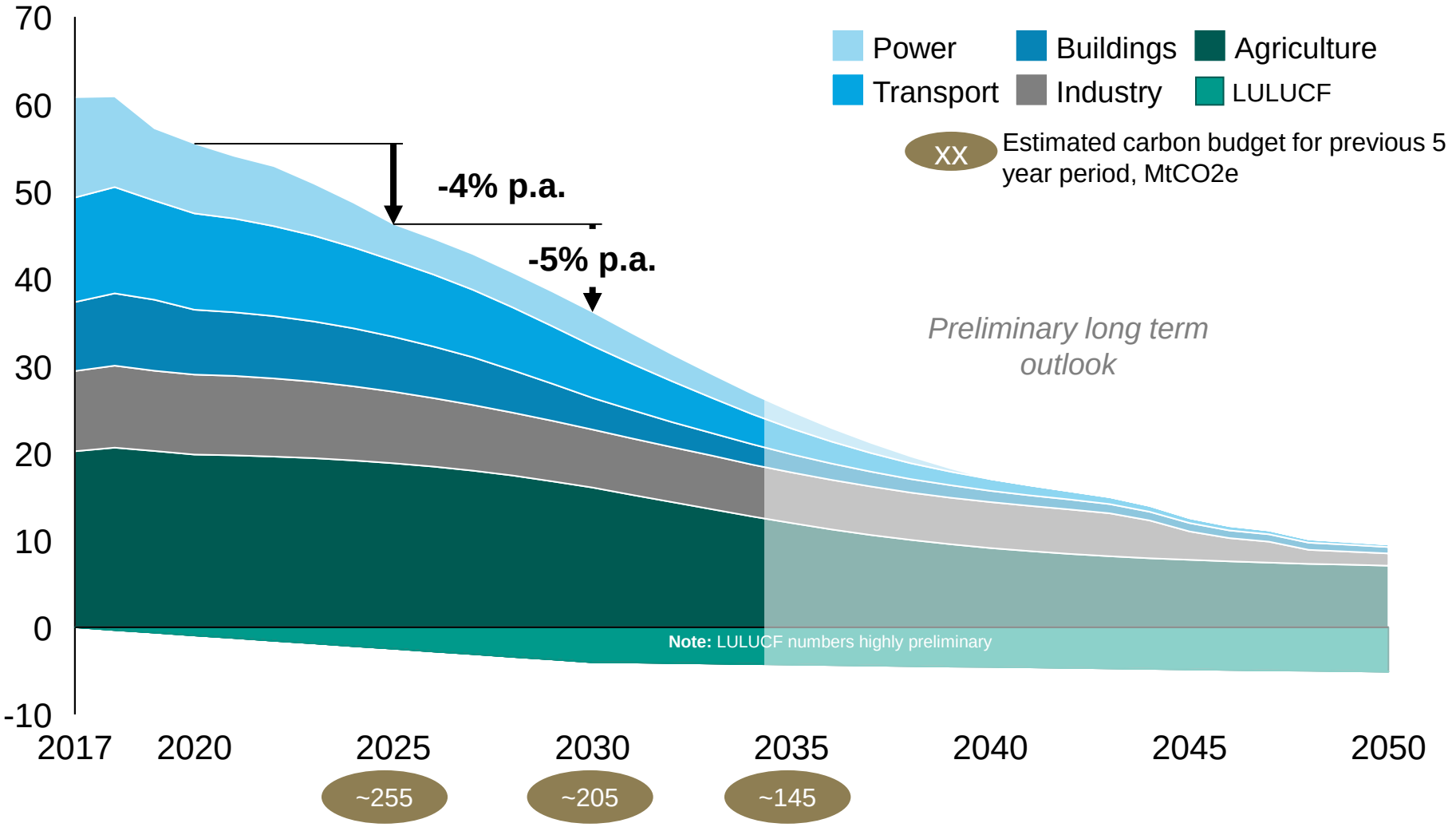
			Menu option	KPI 2030	2030 Impact incremental to CAP 2019, MtCO2e
Electricity	**Core measures**	E1	Pursue CAP19 targets on onshore wind and PfG targets on offshore wind and solar PV (pushing renewable generation share to ~80%)	**8 GW** onshore, **5** GW offshore wind, **1.5** GW solar PV	~1
	Further measures	E2	Deploy zero emission gas generation (e.g., biomethane, hydrogen, natural gas and CCS)	**n/a**	~2
Transport	**Core measures**	T1	Fleet composition: Accelerate the adoption of passenger EVs (reach ~45% of new vehicle sales by 2025, >90% by 2029)	**+180-225k** EV cars (~1m EV in total)	~0.4
		T2	Fleet composition: Accelerate the adoption of zero-emissions commercial vehicles (reach ~50 % of new vehicle sales by 2026, ~100% by 2028)	**+50k** EV trucks/vans (~140k EV in total)	~0.3
		T3	Increase biodiesel blend-rate from 12% to 20% in 2025	**20%** biodiesel blending by 2025	~0.3
		T4	Adjust fleet mix to skew towards vehicles with lower energy consumption per kilometre	Drive shift to lower energy consumption vehicles (e.g. 50% J-class new registrations shifted to C/D)	~0.4
		T5	Zero emissions domestic goods and passenger mass transportation incl. rail, aviation and marine (e.g. EV, hydrogen fuel)	**All** replacements to be green before 2030 or mode shift to green alternative	~0.1
		T7	Mode shift passenger vehicle kilometres (e.g. to active, public transport)	**>60%** increase in both active and public transport	~0.3
	Further measures	T7	Drive shift in behaviour to reduce overall kilometres travelled	**n/a**	~0.5
Buildings	**Core measures**	B1	Bring forward effective ban on fossil fuels in new homes	**50k -80k** new homes w/o fossil heat	~0.2
		B2	Ramp-up zero-emissions heat in commercial buildings	**2x** CAP 2019 ramp-up speed	~0.5
		B3	Meet ~10% of heating demand through district heating roll-out in urban areas	**2.7 TWh** of district heat supplied **e.g., ~195k homes** and **~16k commercial buildings** connected to district heating network	~0.7
		B4	Achieve 50% emissions reduction for public sector buildings	**50%** public buildings emission abatement	~0.1
	Further measures	B6	Change consumer behaviour to lower household heat demand	**n/a**	0.5 ~1.0

The menu of options includes 30 core and further measures across all sectors (2/2)

			Menu option	KPI 2030	2030 Impact incremental to CAP 2019, MtCO2e
Industry		**Core measures**	I1 Accelerate uptake of carbon-neutral heating in industry	**~40% increase in electrification** for heating in industry	~0.4
			I2 Regulate F-Gases in line with EU policy	**-80%** versus 2014 (in line with EU policy)	~0.5
			I3 Reduce embodied energy in construction by 10%	**10%** cement demand displaced	~0.3
			I4 Reduce alumina emissions by using both gas and electric heating	**100%** of steam production from gas-electric hybrid heating	~0.5
		Further measures	I5 Deploy Carbon Capture and Storage (CCS)	**n/a**	~1.5
			I6 Significantly reduce embodied energy in construction	**n/a**	0.5 ~1.9
Agriculture		**Core measures**	A1 Increase adoption of GHG-efficient farming practices incl. incorporating methane inhibiting feed additives	**~1.5x** Climate Action Plan 2019 ramp up	~1.3
		Further measures	A2 Diversify farm activities (e.g., through forestry, bioenergy, ecosystem services)	**n/a**	~1.2
			A3 Create new business opportunities through biomethane generation	**n/a**	0.2 ~0.8
LULUCF		**Core Measures**	L1 Increase sequestration through forestry	**~8,000 ha** planted per year in 2021-2030	~0.0
			L2 Restore peatlands and wetlands	**~33-63 kha** peatland rewetted	~0.4
			L3 Improved mineral grassland sequestration	**~450 kha** grassland managed better to increase grassland sequestration	~0.3
			L4 Improved organic grasslands management	**~40 kha** organic grassland soils rewetted	~0.4
			L5 Increase use of cover crops	**~80 kha** cropland with cover crops	~0.1
			L6 Incorporate straw into tillage	**25%** of tillage area to incorporate straw directly into soil	0.1

Action on further measures is critical to achieving 2030 PfG target and 2050 Net Zero ambition

Total greenhouse gas emissions Ireland with core measures executed, $MtCO_2e$



Commentary

Core measures can achieve ~40% reduction in GHG emissions by 2030 and a surplus of ~4Mt CO2e by 2050.

Incorporation of further measures is required to achieve -51% target by 2030 and net zero by 2050 i.e. average 7% reduction per annum

Source: DSE Ireland 2021

Despite the balance of impact being in second half of the 2020s; the most significant ramp up effort to deliver targets is needed in the coming 5 years

Effort by time horizon

	2021-2025	2026-2030	2031-2050
Cross sector	**Major ramp up of activity across all sectors, invest in infrastructure needed in decades to come**	**Maintain 2021-25 momentum**	**Achieve net-zero emissions through further decarbonization and offsetting**
Electricity	Build-out of renewable electricity generation achieve ~55% renewable share of generation	Maintain 2021-25 momentum; achieve >75% renewable generation	Achieve 100% renewable power generation by ~2040
Transport	Convert ~45% of new vehicle registrations to electric by 2025 Roll out EV charging points	Deliver mode shift to active or public transport Convert ~95% of new vehicle registrations to electric by 2030	Drive further demand reduction for vehicle kilometers travelled
Buildings	Eliminate installation of fossil fuel boilers Build capacity to retrofit 50-60k homes p.a. Establish district heating networks to meet 5% of heat demand by 2025	Maintain momentum on retrofitting homes Maintain momentum on district heating networks, meet 10% of demand by 2030	Maintain momentum on retrofit rates
Industry	Roll out electric or other zero emissions low and medium temperature heating Regulate F-gas emissions	Maintain momentum on electric or other zero emissions heating solutions	Roll out CCS in the cement sector, pursue demand reduction Pursue deep electrification in heating
Agriculture	Increase uptake of GHG agricultural practices Diversify farm incomes	Incorporate new technologies e.g., feed additives Diversify farm incomes	Pursue deep decarbonization e.g., incorporating feed additives, driving demand shift, adopting tech. solutions
LULUCF	Build capacity to plant ~8 kha forestry p.a Rewet 3.3-5.8 kha peatland p.a	Maintain 2021-25 momentum, increase pace to counter any missed targets early in the decade	Continue to deploy interventions across soil, peatlands, and forests to sequester carbon and help offset difficult to decarbonize sectors

A total of ~125 bn EUR investments in cleantech will need to be mobilised under the CAP 2021 plan – diverse sources of financing exist

HIGHLY PRELIMINARY NUMBERS **NOT EXHAUSTIVE**

Key technologies by sectors		Investment, EUR bn	Description of cost
Electricity	Wind & solar	22	Build 8 GW onshore, 5 GW offshore and 1.5GW solar capacity by 2030. Assumed costs: 1.4-1.7 M EUR/MW for onshore, 2.4-3.0 M EUR /MW for offshore, 0.4-0.7 M EUR/MW for solar
	Backup capacity	1	Build new battery storage capacity and zero emission gas capacity (e.g., natural gas with CCS, biomethane and H2-fired plants) for increased flexibility of the power system
Transport	EV passenger cars	40	Replace petrol and diesel passenger cars with fully electric passenger vehicles (assumed ~1.1 Million EV cars in 2030 and ~35,000 EUR per car)
	EV trucks/vans	11	Replace petrol and diesel trucks/vans with zero emissions vehicles (assumed ~150,000 EV trucks/vans in 2030 and 70,000 EUR per truck/van)
Buildings	Insulation in buildings	14	Upgrade of insulation to B2 BER equivalent (assumed ~500,000 residential dwellings at 3,000-25,000 EUR per dwelling incl. insulation, ~20,000 commercial buildings at ~85,000 EUR per building)
	Heat pumps in homes	8	Rollout heat pumps to achieve total of ~600,000 homes with electric heating sources in 2030, at a cost of ~10,000-14,000 EUR per household
	District heating in homes	2	~195,000 homes connected to district heating networks, at an average cost of ~11,000 EUR per home
Industry	Heat pumps and electric boilers	1	Roll-out of electric boilers and heat pumps for low-temperature heat generation in food, beverage, and other industries (e.g., pharmaceuticals, machinery manufacturing)
	Electric boilers and furnaces	<1	Limited deployment of electric furnaces and boilers for high-temperature heat needs (e.g. hybrid system in alumina refining)
Agriculture	Electrification	<1	Limited roll-out of electrification on-farm machinery
Infrastructure	EV charging infrastructure	1	Roll out of ~650k EV chargers, (incl. ~600k chargers with AC<15 kw power rate at an average price of ~550-820 per charger in 2030)
	TSO/DSO upgrades	9-13	Upgrade and expand existing network base (assumed ~10 bn EUR of investment targeted by ESB to 2027). Build out of Greenlink and Celtic interconnectors to assure long-term flexibility. Connection of new offshore wind parks to transmission grid
	Total	~125	

1. Banks, pension funds and other long term investors

Source: DSE Ireland 2021, EPA, World Bank

About 60% of the required measures have a stand-alone business case

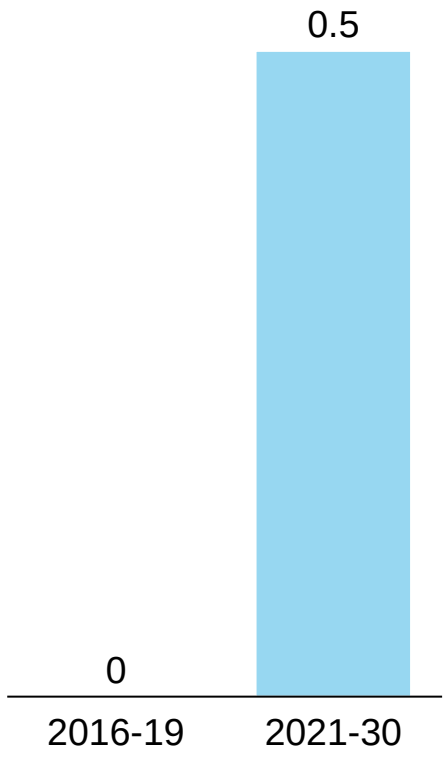
% Share of total investments by 2030, % (100= ~ EUR 125 bn)

	Core measures		Further measures	
Stand alone business case ~60%	T1 Accelerate the adoption of electric passenger vehicles	T2 Accelerate the adoption of commercial vehicles	T7 Drive shift in behaviour to reduce overall kilometres travelled	B6 Change consumer behaviour to lower household heat demand
	T4 Adjust fleet mix to skew towards vehicles with lower energy consumption per kilometre	T7 Mode shift passenger vehicle kilometres e.g. to active, public transport		
	E1 Pursue CAP19 targets on onshore and PfG targets on offshore wind and solar PV	B1 Bring forward effective ban on fossil fuels in new homes (e.g. against oil)		
	B3 Increase targets for roll-out of district heating			
Mixed business case	A1 Increase adoption of GHG-efficient farming practices	B4 Increase targets for public sector buildings	A2 Diversify farm activities (e.g., through forestry, bioenergy)	A3 Create new biomethane business opportunities
	L LULUCF measures	T5 Electrify domestic goods and passenger mass transportation incl. rail		
	I2 Regulate F-Gases			
Negative business case	B2 Ramp-up zero-emissions heat in commercial buildings (e.g., heat pumps)	T3 Increase biofuel blend-rate for diesel from 12% to 20% in 2025	E2 Deploy zero emission gas generation (e.g., biomethane, H2 and CCS)	I5 Deploy carbon capture and storage (CCS)
	B5 Enforce adoption of electric cooking across all homes	I1 Accelerate uptake of carbon-neutral low temperature heating	I6 Significantly reduce embodied energy in construction	
	I3 Reduce embodied energy in construction	I4 Tackle alumina emissions (e.g. gas-electric hybrid heat)		

Delivering these measures implies a major step-up in key decarbonization activities across sectors

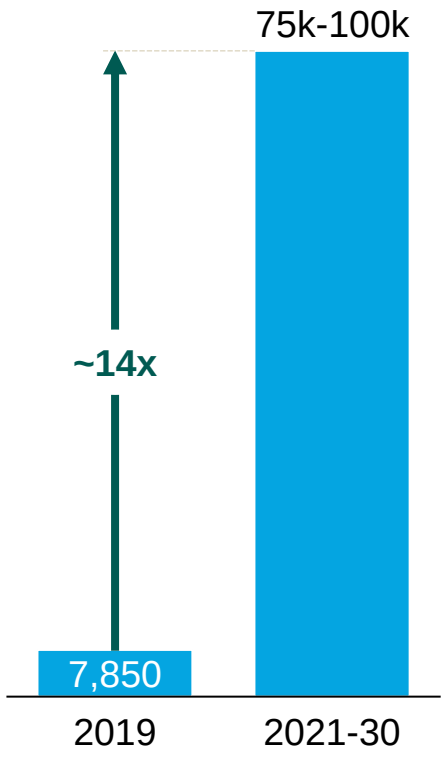
Power

Offshore Wind – annual installation, GW p.a.



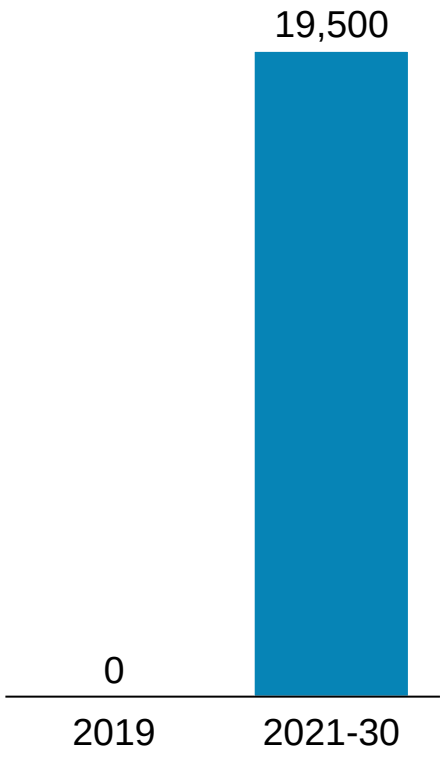
Transport

EV passenger cars– annual new car registrations, # p.a.



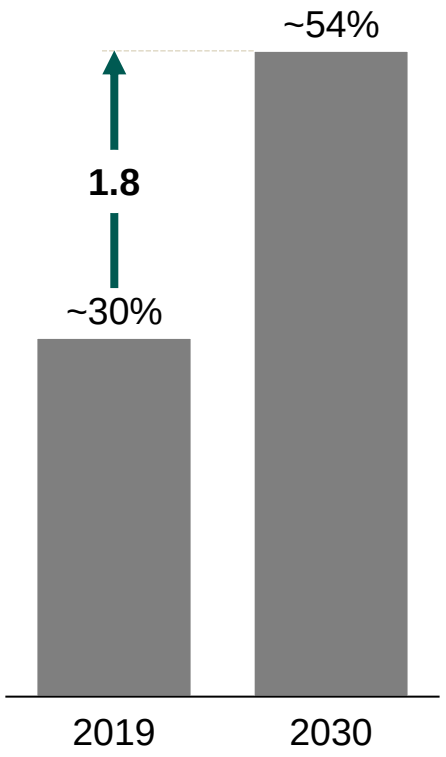
Buildings

Annual district heating connections
# of households p.a.



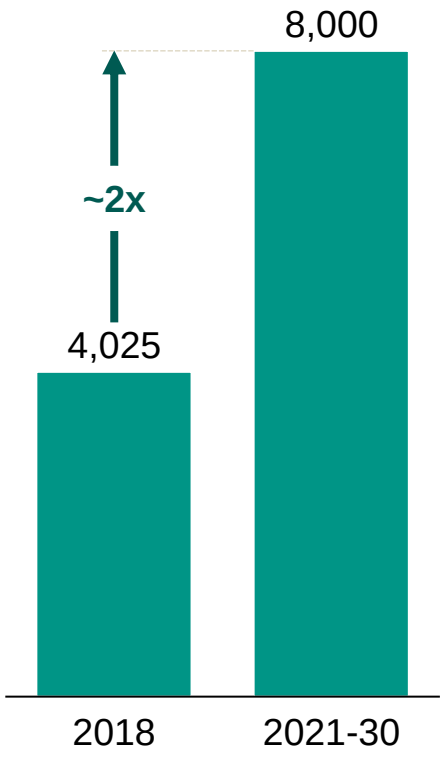
Industry

Share of low carbon heating
% of heat supply

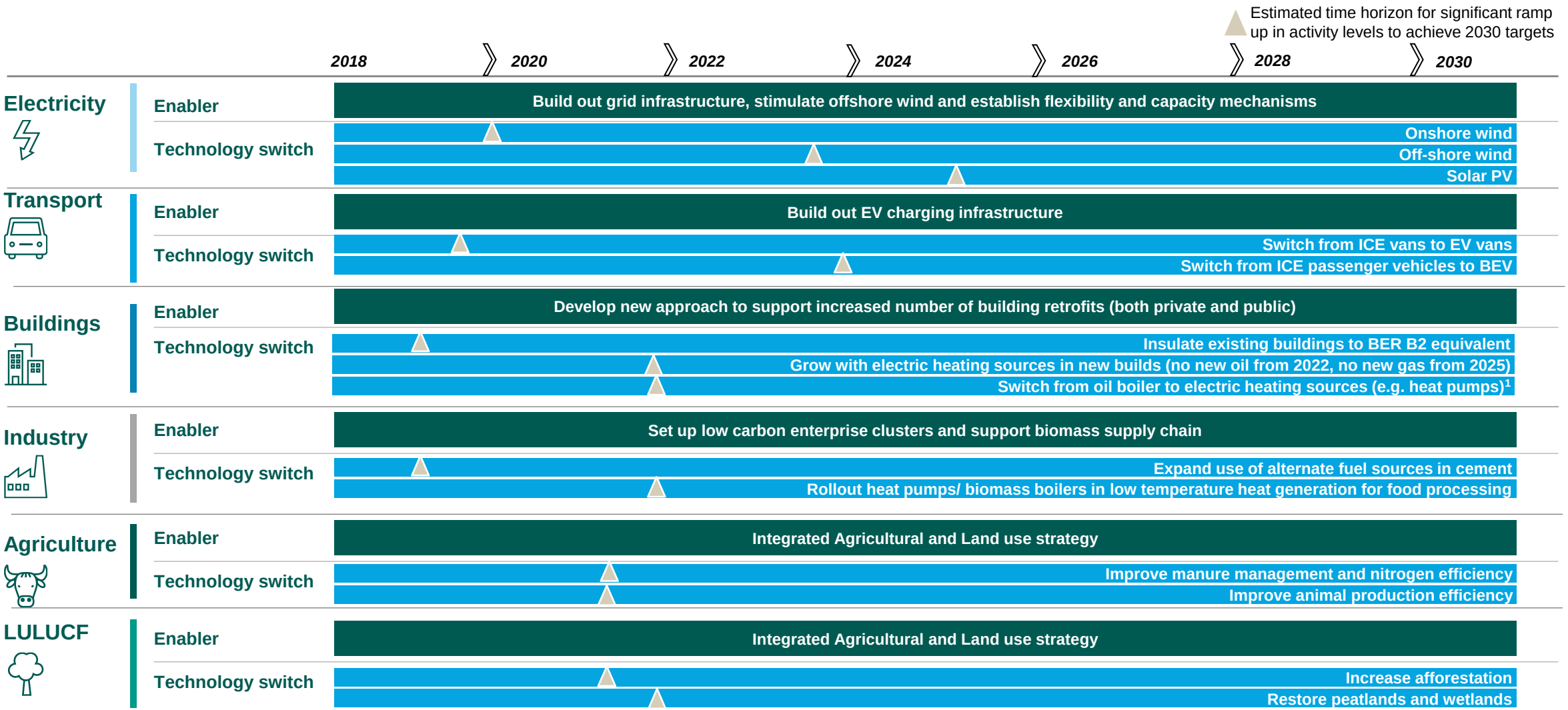


Agriculture & LULUCF

Afforestation rate
ha p.a.



Delivering the potential identified requires a rapid ‘ramp-up’ of abatement technologies across all sectors



1 Residential (existing and new build) and Commercial

Delivering this climate aspiration also requires major cross-governmental initiatives

		Action	Collaborators
Transport	Core Measures	**Develop an integrated urban mobility strategy** to drive a modal shift and deliver emissions reduction (initially focused on the five urban centres)	Dept. of Transport, DFIN, DPER, DECC, SEAI, NTA, TII, Local Authorities, CIE, Private sector
Built Environment	Core Measures	**Identify an approach to rapid expansion of district heating** – most likely to be led by a local authority (e.g., Dublin City Council (as in Nordics)) or by an existing utility (e.g., Ervia, Veolia (as in Berlin, Warsaw, Radet))	DHLGH, DECC, DFIN, DPER, SEAI, Local Authorities, Utility providers
Agriculture	Further Measures	**Develop an integrated agriculture and land use strategy** which seeks to deliver multiple long-term objectives incl. success for agri-food industry, farmers and farming communities; food and energy security; climate mitigation and resilience, and enhanced environmental protection and biodiversity	DAFM, DECC, DETE, DEASP, DRCD, EPA, Teagasc, BIM, Bord Bia
Cross-cutting	Enabler	**Greening the financial system** – cross economy approach to redirecting capital flows to green technologies and companies	DFIN, DPER, NTMA
	Further Measures	**Detail approach to building supply and use of zero-emissions gas**	DECC, DAFM, DETE, DPER, DFIN, DHLGH, SEAI
		Deliver fundamental demand shifts across sectors (e.g., building materials)	DFIN, DPER, Dept. of Transport, DETE, DAFM, DECC, SEAI, NTA
		Deploy Carbon Capture and Storage	DFIN, DPER, DECC, DHLGH, DETE, SEAI

For some measures it is clear where responsibility resides (see appendix)

However there are a large number of measures which will require cross-governmental collaboration