

40 by 30

Media Briefing, 05/05/21

A 40% Renewable Heat Vision by 2030 Delivering 7% CO₂ Abatement per Year

40 By 30

Report prepared by

Renewable Energy Ireland

Overview of the study





Heat - a fundamental part of our energy system



National heat usage in 2018

- 21% of national GHG emissions
- 40% of national energy use
- €3 billion expenditure
- 90% from fossil fuels
- 65% import dependency

XD Consulting

Heat demand to grow by 14% by 2030



Heat Demand (TWh/yr)



X) Consulting

Ireland is endowed with sufficient renewable energy resources to meet 100% of its total heating requirement, and more.



X) Consulting











250

100

20

rgy Engineers



40 by 2030 On track to achieve 7% CO2 abatement per year

- **District heating** meets 10% of the national heat demand with surplus heat from power plants, waste-to-energy plants, industry and data centres.
- Solid biomass from forestry and energy crops for high temperature applications in industry and buildings, to replace oil, coal and peat.
- Heat pumps for low-temperature heat applications in buildings (600,000 homes) and via district heating using medium-temp heat sources.
- Biomethane from anaerobic digestion plants start decarbonising the gas network, and bioLPG acts as a substitute to oil and solid fuels in off-grid applications.

Consulting

60.00 Solar 50.00 RES-gas Biomass 40.00 Ambient energy Electricity (heat pumps) Electricity (direct) 30.00 ■ Surplus heat & deep geothermal ■ Wastes (non-res) 20.00 Peat Coal 10.00 Gas Oil RES-H 7%

Total Final Energy Consumption (TWh/yr)



- Set a 40% renewable heat target by 2030 in the revised Climate Action Plan
- **40 actions recommended** for Government & industry:
 - Update Building Regulations and BER assessment method
 - Widen subsidies and simplify procedures
 - Implement Article 23 of REDII (mandatory renewable heat share)
 - Green procurement targets (+20% renewable heat every year)
- Socio-economic dividends:
 - 23,000 new full-time jobs
 - €1 billion savings on imported fuels



About IrDEA

- "The Irish District Energy Association (IrDEA) was set up by its Directors, Dr David Connolly and Donna Gartland, in 2017.
- IrDEA is the only trade organisation representing the district heating and cooling (DHC) sector in Ireland.
- Our mission:

We act on behalf of our members to support and promote the growth of the DHC industry, creating a new heating market for Ireland which offers greater opportunities to utilise indigenous low-carbon and renewable sources of heat.

IrDEA is one of the main sponsors of the '40 by 30' Renewable Heat Plan study.





About district heating systems

The fundamental idea of **district heating** is to use local fuel or heat resources that would otherwise be wasted to satisfy local customer heat demands by using a heat distribution network of pipes as a local marketplace.

This idea contains the three obligatory elements of a competitive district heating system: a) suitable low-cost heat source, b) the heat demand/market,

c) the pipes as a connection between source and demands.





Ireland, walking in the footsteps of giants



In Finland, Sweden and Denmark, district heating has a market share above 50%.

This energy infrastructure was built steadily over a period of 80 years.

District heating & cooling systems are in their 5th generation of technological development.

The direction of travel is now to become 100% renewable, super efficient and fully integrated in the overall energy system.

High penetration of district heating coincides with high renewable energy fraction in overall energy supply:

Finland: 56% RES in final energy mix (2019)

Sweden: 43%

'40 by 30' Renewable Heat Plan Support measures advocated by IrDEA and its members

Policy & Regulation Asks:

- DH1: Zone for DH with mandated connections over time
- DH2: Heat Supply Tariff
- DH3: Capital investment supports
- DH4: DH Delivery Company
- DH5: Community & LA DH support
- All RES-H1: Building Regulations Part L
- All RES-H2: Simplify regulatory & administrative requirements
- All RES-H3: Renewable Heat Obligation Scheme
- All-RES-H4: Public sector green procurement Policy for RES-H
- All RES-H5: Mandatory boiler carbon rating & annual maintenance
- All RES-H6: Non-residential sectors, incl. industry & ETS sector
- All RES-H7: Wider domestic grant supports
- All RES-H8: Training & Education



Industry-Led Actions:

- DH1: Roll-Out Plan
- DH2: DH Centre of Excellence
- DH3: Bring international expertise to Ireland
- DH4: Standardised Designs
- DH5: Develop voluntary Consumer Protection
- All-RES-H1: Training & upskilling
- All RES-H2: Decarbonisation of low energy efficiency houses
- All RES-H3: Large Heat Users Awareness Campaign

Extracts from '40 by 30' annex 5: 5 x DH Policies

 Policy Improvement Policy Improvement Description Aim Lead Supporting Role Next Step Next Step DH 2010 Policy Improvement DH 2010 Policy Improvement DH 2010 Policy Improvement DH 2010 DH 2010											DH3 Capital	DH network deployment with	and bankability of DH capital	SEAI, ERDF	authorities, EC, IrDEA	a. Allocate a €650 million capital investment fund to build networks for 10%	H2 2021	stalled as developers
DH1 Publish heat planning and DH2 community with mandated deployment of DH naress with heat density > 120 TJ/km2 evelopment for baring concertions over time and chevelopments, or upon bolic replacement. DHL GH DH Delivery (see DH5), Local DH L2(s) and transfer planning and DH roll-out, and renewable heat savailable. DHL GH planning and DH roll-out, and renewable heat sources, including dep planning regulations to mandate connection to DH nervers with heat density > 120 TJ/km2 DHL GH planning and DH roll-out, and renewable heat sources, including dep planning regulations to mandate connection to DH nervers with heat developments, or upon bolic replacement. DHL GE planning and DH roll-out, and renewable heat sources, including dep planning regulations to mandate connection to DH networks where in place, for all new developments and major redevelopments, or upon bolic replacement. DHL CE planning and district heating development to be issued to Regional Assemblies & Local Authorities. DHL ZI (see DH2) DHL ZI (see DH2) DHL (see DH2) DHL (see DH2) DECC, to Clubelines for heat planning and district heating development to be issued to Regional Assemblies & Local Authorities. Replanning and district heating development to be sized to Regional Assemblies & Local Authorities. Replanning and district heating development to be replacement. Protects to Campany assemblies & Local Authorities. Protects to Campany assemblies & Local Authorities. Protects to Campany assemblies & Local Authorities. Protects to Campany assemblies & Local Authorities. Protects to Campany assemblies & Cocal Authorities. Procose legislation to be sized to Regional Assemblies &	Sector	Policy Improvement	Description	Aim	Lead	Supporting Role	Next Step	Target Date	Impact of delay on achieving 2030 targets	ectorial	supports • National DH De Company (See D • Local Authoritie:	 National DH Delivery Company (See DH5) Local Authorities 	reach 10% penetration by 2030.			Action Fund and/or a DH Price Control. b. Secure low-cost guaranteed loan facility		their projects. DH remains uncompetitive against
DH networks where in place, for all new developments and major redevelopments, or upon boiler replacement. DH networks where in place, for all new developments, or upon boiler replacement. Development Plans, c. Guidelines for heat planning and district heating development to be issued to Regional Assemblies & Local Authorities. Image: Stablish a utility, or madate an existing one, to develop DH networks in areas with high heat demand density. PH4 Betworks at scale. FM4 Betworks at scale. FM4 Betworks at scale. Propose legislation to establish a UH infrastructure DH networks in areas with high heat demand density. DECC, DHLCH, DF, DPR infrastructure DH networks in areas with high heat demand density. DECC, DHLCH, DH networks in areas with high heat demand density. DECC, DH networks infrastructure DH networks for supply into DH networks for supply into DH networks for supply into DH networks DECC, NEW AME CRU, I/DEA Amend SSRH T&Cs to add surplus heat eligibility. H2 2021 heat not captured and DH remains uncompetitive DH4 DH is the community & DP DH networks infrastructure opportunities in pattership with the national DH DECC, In DEA Amend SSRH T&CS to add surplus heat and renewable heat opportunities for supply into DH networks SEAI DECC	ross-sectorial	DH1 Zone for DH with mandated connections over time	Publish heat planning and DH zoning at local authority level to mandate deployment of DH in areas with heat density > 120 TJ/km2 and renewable heat sources, including deep geothermal, are available. Planning regulations to mandate connection to	County/City Development Plans to zone for district heating networks and renewable heating deployment as a priority.	DHLGH Regional Assemblies	DH Delivery Company (see DH5), Local Authorities, Energy Agencies, IrDEA, DHGLG, DECC	 a. National Planning Framework and National Development Plan to introduce planning policy that will support heat planning and DH roll-out. b. Regional Spatial & Economic Strategy to formally recommend heat planning and designation of low-carbon heat zones in County & City 	a. H1 2021 b. H2 2021 c. H1 2022	Zoning is required in order to de-risk the market, and delays will significantly impact roll-out targets to 2030.	Cross-sectorial		 Community cooperatives Private developers Heat users. 				such as the Strategic Banking Corporation of Ireland's energy efficiency scheme. c. Launch grant scheme for connection to DH network and installation of heat user interface units. For example, by offering grants equivalent to those available for heat pump and bioenergy boilers.		incumbents.
DH2 Surplus heat and renewable heat injected harnessing Incentivise renewable heat injected harnessing Incentivise renewable heat injected harnessing Incentivise barnessing DCAE, SEAI CRU, IrDEA Amend SSRH T&Cs to add surplus heat eligibility. Opportunities to harness surplus heat not captured and DH remains uncompetitive Opportunities to harness surplus heat not captured authorities & community LADH Incentivise barnessing Enable local community & groups to develop loch Enable local community & groups to develop loch SEAI DECC, IrDEA, group to cheme authorities & community opportance SEAI DECC, IrDEA, groups to develop loch a. SEAI to create guidance/training for community opportance			DH networks where in place, for all new developments and major redevelopments, or upon boiler replacement.				Development Plans. c. Guidelines for heat planning and district heating development to be issued to Regional Assemblies & Local Authorities.			cross-sectorial	DH4 DH Delivery Company	Establish a utility, or mandate an existing one, to develop DH networks at scale. The transmission & distribution infrastructure would primarily be in public ownership with co-	Prioritise large scale roll-out of 'essential public infrastructure' DH networks in areas with high heat demand density.	DECC, DHLGH, DoF, DPER	Local Authorities, CRU, SEAI	 a. Propose legislation to establish a DH state company. b. Allocate €50 million per year of OPEX under a Price Control. c. CAPEX allocation (see DH4). d. Passign 40-50 people 	a. H2 2021 b. Budget 2022 c. Budget 2022	The target for DH by 2030 is 10%, for every year delay it will decrease this target by ~1%.
Tariff qualifies for support for the SSRH. renewable heat opportunities renewable heat opportunities and DH remains uncompetitive DH5 Support for local authorities & community groups to develop local DH schemes, with SEAI DEC, InDEA, a. SEAI to create guidance/training for community DH schemes.	ctorial	DH2 Heat Supply	Surplus heat and renewable heat injected into DH network	Incentivise harnessing surplus heat and	DCCAE, SEAI	CRU, IrDEA	Amend SSRH T&Cs to add surplus heat eligibility.	H2 2021	Opportunities to harness surplus heat not captured	0		ownership & operation models possible where appropriate.				with expertise in planning, procurement, financing and others. ³²		
support appropriate guidance company (see	Cross-se	Tariff	qualifies for support for the SSRH.	renewable heat opportunities for supply into DH networks.					and DH remains uncompetitive	unities	DH5 Community & LA DH support	Support for local authorities & community groups to develop local DH schemes, with appropriate guidance	Enable local communities in partnership with the national DH company (see	SEAI	DECC, Irdea, RGFI, Irbea	 a. SEAI to create guidance/training for community DH schemes. b. Establish 'trusted intermediaries' to provide 	H1 2022	Energy transition is no just, with open participation, and lack of
and support from and support from and support from trusted intermediaries. The support and guidance in DH project development. Trusted intermediaries with community benefit/ ownership.										Local comm	σαρμοιτ	and support from trusted intermediaries.	DH5) and LAs to develop local DH networks with community benefit/ ownership.			guidance in DH project development.		community acceptance.

Sector	Policy Improvement	Description	Aim	Lead	Supporting Role	Next Step	Target Date	Impact of delay on achieving 2030 targets
Residential and non-residential	All RES-H1 Building Regulations Part L	Update Building Regulations Part L compliance procedure and BER methodology to reflect properly the decarbonisation benefit of renewable heat options such as bioenergy, surplus heat and district heating.	Remove Part L compliance & BER methodology barriers to the adoption of renewable heat technologies & district heating.	DHLGH	SEAI, REI, RGFI, IrBEA, IrDEA	 a. Cross-sectorial working group to prepare recommendations for BER methodology revisions & update to associated software. b. Publication of revised methodology and software update. c. Raise awareness and educate BER assessors & technical advisors. 	a. H1 2021 b. H2 2021 c. H2 2021	Decision-makers will continue to be disincentivised to adopt cost- effective decarbonisation solutions.
Cross-sectorial	All RES-H2 Simplify regulatory & administrative requirements	Terms & conditions and procedures associated with application and payment of financial supports for renewable heat technologies to be streamlined and simplified with a customer-centric policy. Accelerate digitalisation of processes to increase productivity and reduce compliance burden. Foster a collaborative approach between funding authorities & industry in design and implementation of quality assurance & consumer protection policy.	Remove red tape and accelerate access to financial supports by consumers.	SEAI, DECC, DHLGH (Building Regulations), DAFM	rei, rgfi, Irbea, Irdea	 a. All parties to engage in meaningful consultation and co-design of financial support schemes' administrative requirements & procedures. b. Publish joint Quality Assurance and Consumer Protection Charter defining principles, commitments and implementation plan. c. Investment in development and management of efficient administrative systems. d. Annual review of progress by steering committee representing stakeholders. 	a. H1 2021 b. H2 2021 c. H2 2021 d. Annual	Failure to mobilise private and state investment in RE technologies and continuing dependence on fossil fuels in the heat sector.
Cross-sectorial	All RES-H3 Renewable Heat Obligation Scheme	Implement Article 23 of REDII with a mandatory high ambition of at least 3% per annum. Mandated incorporation schemes have proven to be both cost efficient and effective in achieving the objective.	To mandate fuel suppliers to increase the share of RES-H in their supply by 3% per year.	DECC, Department of Transport, NORA	rei, rgfi, Irbea, Irdea	 a. Establish administrative system for certification, M&V and quality control. b. Introduction of Renewable Heat Obligation Scheme, in line with transposition of REDII. c. Annual review in CAP by steering committee. 	a. H1 2021 b. H1 2021 c. H2 2021 d. Annual	 Consumer carrying financial burden on lack of choice. Anti- competitiveness, non-compliance with SDG's, ESG's.
Non-residential	All-RES-H4 Public sector green procurement Policy for RES-H	Public sector to lead in decarbonising its heat supply by setting Green Procurement targets at a minimum of a 20% annual increase in RES- H. All new or replacement of heating systems procured to be 100% renewable.	Public sector to be driver for adoption of renewable heat through green procurement policy and practices.	DPER, all C public F bodies II	ogp, rei, Rgfi, Irbea, Dea	 a. Mandate an annual increasing share of renewable heating in the Green Procurement Guidance for the Public Sector. b. Establish M&V system with annual reporting. 	H2 2021	Prevent 'locked in' fossil fuels in the public sector.
Cross-sectorial	All RES-H8 Training & education	Resource provision of training for trades people in RES-H technologies installation and maintenance to ensure quality and consumer protection.	Huge need to train heating system designers and heat pump installers- SEAI estimates 1,600 additional FTE installers are needed.	SEAI, HPA, 3rd level institutes, SOLAS	HPA members, DECC, IrBEA	 a. Investment in training facilities to equip and resource for the delivery of RES-heat installation & maintenance courses. b. Mandate QQI level 6 accredited training and manufacturer training for installations. 	H2 2021	Immense – targets will be missed if the delivery capacity falls.

Kesidential	All RES-H5 Mandatory boiler carbon rating & annual maintenance	Introduce energy & carbon rating system for existing and new heating systems to foster adoption of renewable heat options at replacement. Mandate minimum carbon rating for sale of new heating appliances. Gradually raise minimal requirement towards phasing out of fossil fuel appliances. Introduce mandatory annual/bi- annual preventative maintenance scheme for heating appliances to ensure ongoing performance, emissions and safety standard.	Inform and encourage consumers to adopt renewable heating solutions at critical purchase decisions. Improve the performance of heating appliances in operation.	SEAI, DECC	REI, RGFI, IrBEA, IrDEA	 a. Revise heating appliance rating system to reflect carbon performance. b. Integrate with Part L compliance requirements, subsidy schemes, RES-H Obligation Scheme, etc. c. Promote new rating system & labelling among consumers and supply chain. d. Regulate carbon rating of heating appliances being sold, raising standards to gradually phase out fossil fuel appliances. 	Phase approach	Much of the olde housing stock wi remain on fossil fuels for the foreseeable future as the disruption and cost from deep retrofit will prove prohibitive.
lemary & industry	All RES-H6 Non- residential sectors, incl. industry & ETS sector	Widen and improve supports for RES-H in the non-residential sectors. Seek ways to incentivise large users of heat to adopt RES-H, including in hard to decarbonise sectors, in particular industry and ETS sector.	Support the decarbonisation of the industrial sector and encourage efficient use of RES resources. X All S-H icies	DECC	REI, RGFI, IrBEA, IrDEA	 a. SEAI to improve and widen SSRH supports (grants and tariffs), including for biomass & RES-Gas heating, biomass & RES-Gas CHP systems, heat pumps, incl. hybrid heat pumps, district heating, and solar thermal systems. b. DECC to remove carbon tax exemption for fossil- fuel based CHP. c. DECC to increase carbon tax in line with budgetary steps process towards €100/tCO₂ by 2030. d. SEAI to introduce measures to make the SSRH scheme more attractive to large industry. e. SEAI to carry out detailed study of ETS and non-ETS sectors to identify all high heat demand users and suitable measures to decarbonise heat demand. 	H2 2021	RES-H remains uncompetitive with incumbent fossil fuels. Hard to decarbonise sectors lagging and their economic activity being impacted by lack of 'carbor competitiveness.
Kesidential	All RES-H7 Wider domestic grant supports	Expand range RES-H technologies eligible for Home Energy Grants and offer more options to homeowners, including for hard to retrofit homes.	Remove barriers to adoption and incentivise a wider range of RES-H options.	SEAI, DECC	C Irbea, HPA, Rei, RGFi, Irdea	 a. Include Eco Design labelled biomass heating solutions and district heating substations. b. Relax max HLI requirement and facilitate cost-optimal home energy retrofits with heat pumps. c. Incentivise off-gas grid homeowners to switch from oil to BioLPG, including with hybrid heat pumps. 	Budget 2022	Much of the existing housing stock will remain on fossil fuels for the foreseeable future, and Climate Action targets for heat pumps won't be met.

5 x Industry Led DH Actions

Sector	Industry-led actions	Description	Aim	Lead	Supporting Role	Next Step	Target Date	on achieving 2030 targets
District Heating	DH1 Roll-Out Plan	Create a strategic roll- out plan for DH in Ireland with 2030 and 2050 targets, including required upskilling, capacity building and customer acceptance, and examining sector integration opportunities.	To reach full DH potential across Ireland, which is 35-55% of the heat demand in buildings.	IrDEA, SEAI, National DH Company	DECC, LAs, EirGrid/ ESBN	Publish 2030/2040/2050 roll-out plan in consultation with sector stakeholders, targeting highest impact areas as a priority.	H2 2021	Without a long- term strategy for DH, the 2030 roll-out may not be optimally designed for a zero carbon energy sector in 2050.
District Heating	DH2 DH Centre of Excellence	Create a partnership between industry and academia to bring best practice and research on DH to Ireland.	To upskill Irish energy sector and stay up to date on and apply latest DH technological developments.	IrDEA	An Irish University/ College, Industry Partners, IDA/SFI	IrDEA to identify relevant partners.	H1 2022	Lack of expertise and innovation impairs rapid development of DH in Ireland according to best practice.
District Heating	DH3 Bring international expertise to Ireland	Connect with EU companies which are well-established in DH and attract to Ireland due to opportunity available.	Encourage scaling-up of Irish DH industry building on capacity of leading EU companies.	IrDEA	Industry Members	IrDEA to promote findings of the heat study and role of DH across U markets.	Ongoing	Irish DH industry too small and inexperienced to upscale DH deployment.
District Heating	DH4 Standardised Designs	Create a catalogue of designs for typical Irish buildings e.g. housing estates, and technical guidance for M&E designers of secondary side DH installations.	Upskill and bridge knowledge gap, increase efficiency in secondary side systems.	IrDEA	CIBSE Engineers Ireland	a. Secure funding.b. Develop the code and consult with stakeholders.c. Publish the code.	a. H1 2021 b. H2 2021 c. H1 2021	DH system engineering of sub-standard or not adapted to Irish conditions.
District Heating	DH5 Develop voluntary Consumer Protection	In the absence of market regulation, establish a voluntary customer service standard for DH operators (e.g. Heat Trust UK) as an independent, non-profit consumer champion that holds the industry to account for the benefit of everyone involved.	To protect and give confidence to the consumer and add transparency and high standards to DH operations in Ireland.	IrDEA	DECC, CRU	a. Secure funding & buy-in. b. Establish voluntary body. c. Operate the service.	a. H2 2022 b. H1 2023 c. H2 2023	Poor customer protection results in lack of confidence in DH and adoption.

Sector	Industry-led actions	Descrip ti on	Aim	Lead	Supporting Role	Next Step	Target Date	Impact of delay on achieving 2030 targets
Cross-sectorial	All-RES-H1 Training & upskilling	Roll out industry-led training programme for designers and installers, as well as BER assessors & other building professionals.	Increase the number of skilled professionals with RES-H competence.	REI members	Industry Members	Associations to identify knowledge gaps in their sector and continue rolling out CPD programmes.	Ongoing	Lack of indigenous know- how slows down RES-H deployment and arms quality.
	All RES-H2 Decarbonisati on of low energy efficiency houses	Explore options for using biomass as a solution for homes where retrofit is not an option due to excessive capital cost of retrofit, or architectural/ heritage reasons.	To identify technology options to decarbonise homes that otherwise would have no option to move from fossil fuels. Identify support measures to encourage adoption.	IrBEA, RGFI	SEAI	Develop proposals and financial models of support measures that will incentivise home owners to replace fossil fuel systems with cost effective renewable heating systems. For consideration by SEAI / DECC for the introduction of support measures.	H4 2021	Many homes will remain on fossil fuels for the coming decade and beyond.
Cross-sectorial	All RES-H3 Large Heat Users Awareness Campaign	Engage in an awareness campaign with high temperature heat users on the options to transition to renewable heat sources such as biomass, biogas/ biomethane, bioLPG and electrification, along with how they can provide surplus heat to district heating networks.	Highlight resources available. Improve the knowledge of the industry to the options available, sustainability of biogas and biomass, highlight the benefits for transition.	REI, RGFI, Irbea, Irdea	SEAI, IDA, IBEC	 a. Develop a list of large heat users. b. Prepare a targeted campaign. c. Roll-out multi-annual awareness-raising campaign & CPD. 	H2 2021	Slow decarbonisation of industrial sector, impacting on international competitiveness of Irish goods and economy.

3 x Industry Led Actions for All RES-H

'40 by 30' Renewable Heat Plan Complementary analysis by IrDEA for the RES-H_7% scenario for 2030.

The following slides outline the changes in the heat sector and associated systems anticipated by the RES-H_7% scenario core to the proposed Renewable Heat Plan for Ireland advocated in the '40 by 30' study.

Please note all percentages here are a % of the heat demand which they serve, so the fuel equivalent can be found by multiplying fuels by their typical technology efficiencies.





Today's Heat Supply Mix for Each Sector





2030 Heat Supply Mix for Each Sector With 7% CO2/Year Reduction





Residential Sector: 2030 Vs. Today for 7% CO2/Year Reduction

Add

Remove

- 30% Heat Savings
- 600k Heat Pumps
 - (rural & suburban, mainly oil boilers)
- 150k District Heating
 - (urban e.g. gas and direct elec heaters)
- 100k Biomass Boilers
 - (rural difficult to abate e.g. peat/coal)

- 500k Oil Boilers (-60%)
- 200k Natural Gas Boilers (-40%)
- 75k Direct Elec Heaters (-50%)
- 75k Peat (All)
- 60k Coal (All)



Tertiary/Commercial Sector: 2030 Vs. Today for 7% CO2/Year Reduction Add Remove

- 15% Heat Savings
- 22.5% Heat Pump Share
 - (rural & suburban, mainly oil boilers)
- 12.5% Biomass Share
 - (rural difficult to abate e.g. peat/coal)
- 10% District Heating Share
 - (urban e.g. gas and direct elec heaters)

- All Oil (from almost 30% today)
- 33% Gas
 - from 57% today to just under 40% in 2030)



Add

Remove

- 15% Heat Savings
- 25% Biomass Share
 - Just over double of the 11% share today
- 5% Heat Pumps
 - For applications <100°C, so could also be DH if in urban areas
- 3.5% Renewable Gas

- Half Oil
 - From almost 30% today to 15%
- 20% Gas
 - Down from 45% share today to 35% in 2030





Total Changes (note: total heat demand = 61 TWh) 2030 Vs. Today for 7% CO2/Year Reduction

Adding

- 10 TWh Heat Savings
 - 5 TWh in Residential, 2 TWh Tertiary and 3 TWh Industry
- 10 TWh Heat Pumps
 - Growth mainly in buildings: 6.5 TWh Residential and 2 TWh Tertiary
- 6.5 TWh Biomass
 - 9 TWh total vs. 2.5 TWh today
 - Growth mainly industry: +4 TWh to 6 TWh total
- 3 TWh District Heating: all urban buildings, but could supply <100^oC heat if industry is urban
- 1.5 TWh Renewable Gas
 - Half in industry and half in buildings (prioritise for 'hard to abate' areas)
- (Further Analysis: Using electricity for high-temp (>100^oC) heat applications in industry)

Removing

- (10 TWh of heat demand)
 - (5 TWh in Residential, 2 TWh Tertiary and 3 TWh Industry)
- -13 TWh Oil (-62%)
 - Significant reductions across all sectors: 60% residential, 100% tertiary and 25% industry
- -5 TWh Natural Gas (-25%)
 - Significant reductions across all sectors: 50% residential, 20% tertiary and 15% industry
- -1 TWh Peat (-100%)
 - Almost all from residential sector
- -1 TWh Direct Elec Heat (-31%)
 - Primarily from residential sector