



# Introduction to the Bioenergy Roadmap to 2050

Bioenergy will be an essential element in contributing to Ireland's future energy needs, and has the potential to provide significant economic and environmental benefits.



Bioenergy can also deliver jobs and support farmers. Ireland already has an active bioenergy sector, with increasing use in industry, transport and in our homes. This is just the beginning.

Much of the energy and climate debate focuses on short term goals, as it should. However, energy is a long term issue involving infrastructure and investment decisions with far-reaching consequences. There is, I believe, growing understanding of the changes we are facing and of the need to start acting now. I also think many people realize that, far from being purely a risk or a challenge, this process of change is a huge opportunity for Ireland. An export-oriented high value sector will find plenty of markets seeking to solve the same energy issues we face here in Ireland. Our success in farming food is a great template for becoming the equivalent world leader in farming energy.

Innovation is key. There are many exciting development in energy

crops and other resources, and in conversion technologies. But the sector is still small and costs are sometimes too high due to scale or due to the developmental nature of the technologies. There is an urgent need to build a solid supply chain and fully mature market that gives confidence and certainty to all actors so that investment can be secured and growth can be accelerated.

This Roadmap, the first of its kind in Ireland, is designed to start a debate. We know the nature of our ambition – to exploit indigenous, clean energy sources in a way that generates wealth and employment while producing the sustainable energy system we need for the future. We also know that bioenergy is a great resource for Ireland that could play a major role in delivering our ambition. The issue now is how to make this a reality.

This Roadmap makes clear that there is undoubtedly great potential for bioenergy in Ireland. As can be seen in the detailed modeling for the sector between now and 2020, our targets are challenging, but can drive growth of a range of resources, technologies and businesses. This can form the basis of a longer term trajectory to 2050. Clearly, anticipating the state of bioenergy in 2050 requires some degree of speculation. We make assumptions about growth and other factors in order not to predict the future, but to present one plausible scenario of how the sector might develop. For this Roadmap we have been fortunate to be able to draw on the work of the national Bioenergy Working Group, an expert panel that

has been deliberating these issues for some time. This work has formed the basis for this analysis and has allowed us to take account of many expert views as well as considerable modeling work. In looking to 2050 we have set a scenario of an 80% carbon reduction, since this is the ambition that is the focus of most international discussion. Whether our goal ultimately is higher or lower than this, it is a good way to illustrate the nature of the action required, and is I think the kind of ambition we should be setting for ourselves.

This is the beginning of a process of debate, analysis and action. We will refine this and all our Roadmaps as data becomes available and our understanding improves. I would like to thank all those that contributed to this process. We will engage is wider consultation about our vision and also about how to achieve it. Bioenergy, as all energy issues, involves many interested people, businesses and institutions. We welcome all comments from interested parties, and I would ask you to submit your views to us at [roadmaps@seai.ie](mailto:roadmaps@seai.ie). All must be involved in building a sector that can meet our ambition for it.

Ireland is well-placed to be a leader in bioenergy, but we must act if we are to secure this position.

**Prof. J Owen Lewis**  
Chief Executive Officer, SEAI

# Bioenergy Key Points

## This roadmap outlines the growth potential of bioenergy in Ireland to 2050

Total available resource by 2050



Bioenergy can deliver abatement of over 11 Mt of CO<sub>2</sub> annually by 2050



Bioenergy demand to 2050 has been forecast using specialist in-house modelling, with the impact of technology development considered to determine the primary bioenergy demand. The main goal of the 2050 model is to indicate the challenge, and the need for action if we are to achieve the internationally discussed 80% reduction in CO<sub>2</sub> emissions to curb global warming. What is presented is just one possible scenario of how we can approach this challenge, and the contribution of bioenergy.

### Key Findings

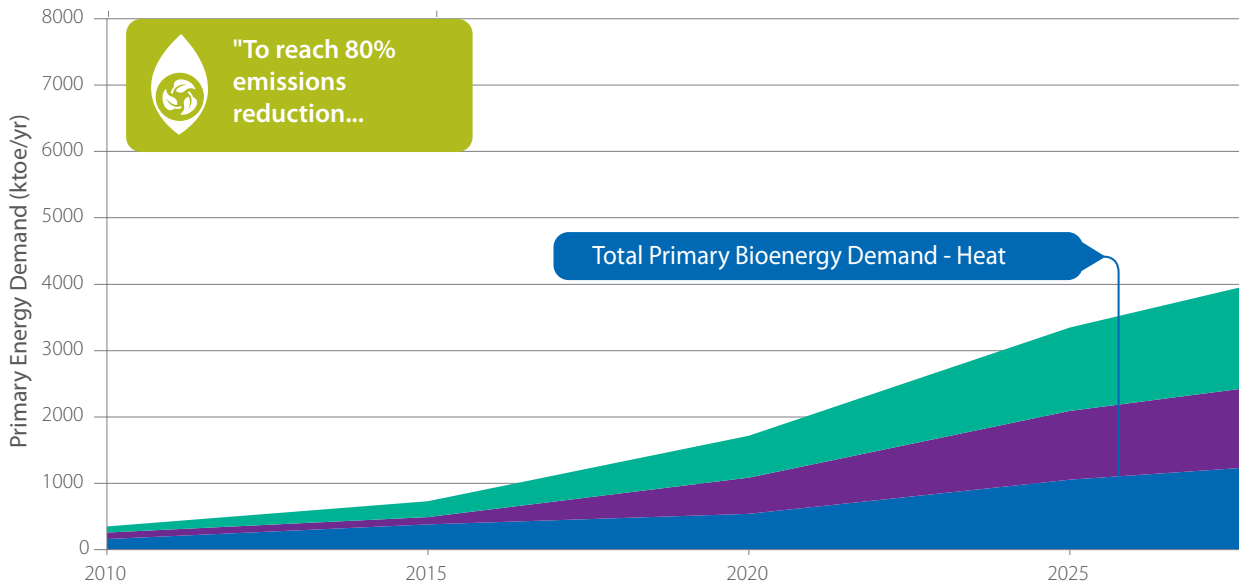
- Bioenergy has the potential to be an indigenously derived cornerstone of national energy requirements to 2050 across transport, electricity generation and heat
- Bioenergy is highly suitable for inclusion in a national distributed energy network
- Over 3500ktoe of indigenous resources are available for the bioenergy supply chain by 2050
- The industry has a key role to play in sustainable rural development and employment
- Over 11 Mt of CO<sub>2</sub> can be abated annually
- Our available resource can rapidly increase through policies and actions across energy, waste, forestry, agriculture and RD&D
- Maximize delivery of bioenergy by investing in and supporting research and innovation in the development of diverse bioenergy technologies and processes
- A fully mature energy infrastructure will minimize costs in delivery of a competitive bioenergy sector
- The industry will be supported to develop best practise in management for energy purposes
- Emphasize high yield, demand driven energy crops
- Develop systems to maximize the utilization of available biomass.

# Total bioenergy primary demand scenario for an 80%

2010

2020

Total primary energy demand in 2008 – 16,350 ktoe



## POLICY & SUPPORT MEASURES

- Introduction of carbon tax supports renewable sources of energy and energy efficiency
- REFIT introduced for biomass electricity generation technologies
- Domestic incentives for heat production - renewable biomass to contribute significantly towards RES-H
- Biofuels obligation scheme to meet RES-T of 10%
- Continue increases in biofuel blending in transport fuels
- Drive afforestation to 20,000 ha per year
- Promote and facilitate energy recovery from non-reusable; non-recyclable biodegradable waste

## INFRASTRUCTURE

- Facilitate a fully evolved infrastructure to reduce costs in the bioenergy sector
- Adopt a multi-organisational approach to bioenergy development, regulation and policy implementation
- Create and support a single bioenergy information service that links into all relevant departments and agencies
- Facilitate development of the bioenergy industry through actions to reduce or eliminate non-cost barriers and increase market confidence
- Provision of public sector leadership
- Introduce a sustainable energy skills strategy

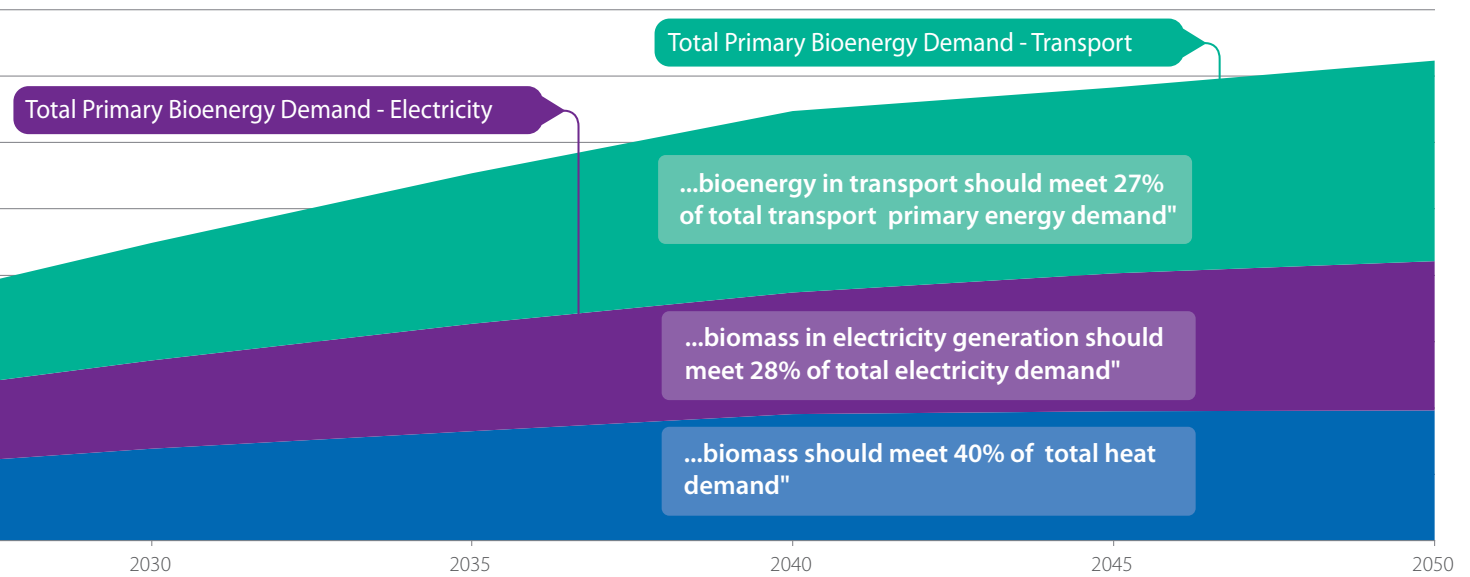
## RESOURCE

- Promote & support growers of energy crops
- Emphasis on high yielding and demand driven energy crops
- Support industry to attain best practice in management for energy purposes
- Implement measures to overcome supply chain barriers and ensure a greater percentage of available resource is utilised

## TECHNOLOGY & RESEARCH

- Promote and support research into bioenergy technology with co-generation of high value extracted products
- Bio-methane injection to the grid
- Continuously adopt new technologies

# reduction in CO<sub>2</sub> emissions by 2050



"Achieving 2020 bioenergy targets will create up to 8,000 net new jobs, mostly in rural locations"

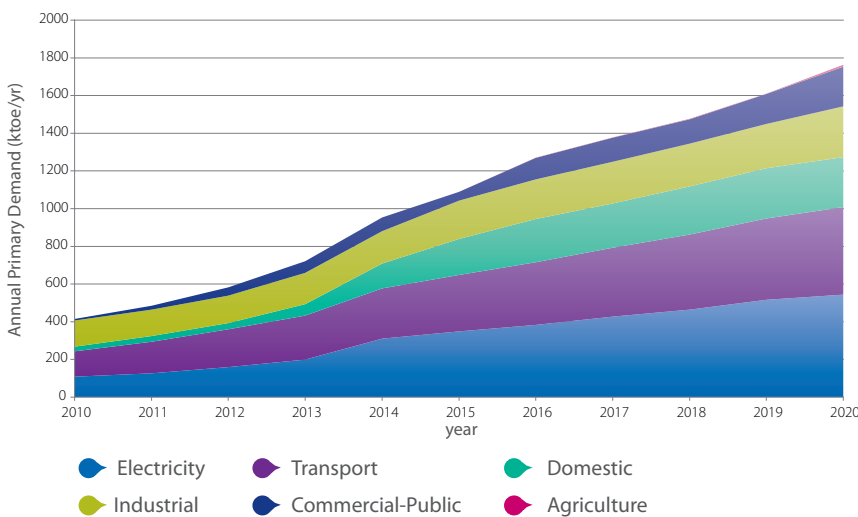
"Bioenergy - reducing imported energy; improving Irish exchequer returns; improving farm incomes; and buffering consumers from energy price volatility"

**KEY** ● Government & governing bodies ● Industry ● Power systems & regulators

# Bioenergy to 2020

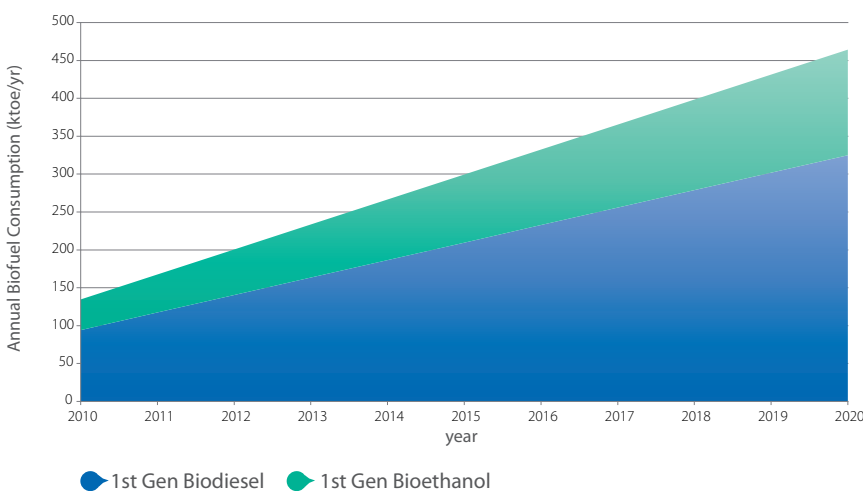
Ireland has undertaken detailed planning and analysis of bioenergy to map a path to achieving 2020 targets. The bioenergy working group, including all major bioenergy stakeholders, developed a recommended policy set to reach these targets. The detailed Bioenergy Analysis Model (BEAM) was then utilised to study the impact of this policy mix on bioenergy development to 2020. The results of this analysis are now presented as a series of graphs detailing the expected bioenergy development to 2020.

Total bioenergy resource demand by sector to 2020



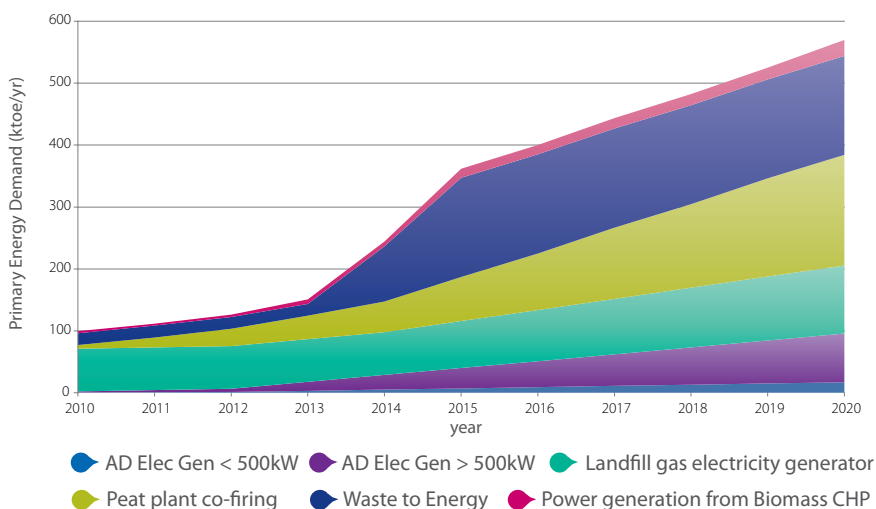
**Key Point:** The bioenergy industry will be driven by growth in all sectors to 2020

Biofuels in Ireland to 2020



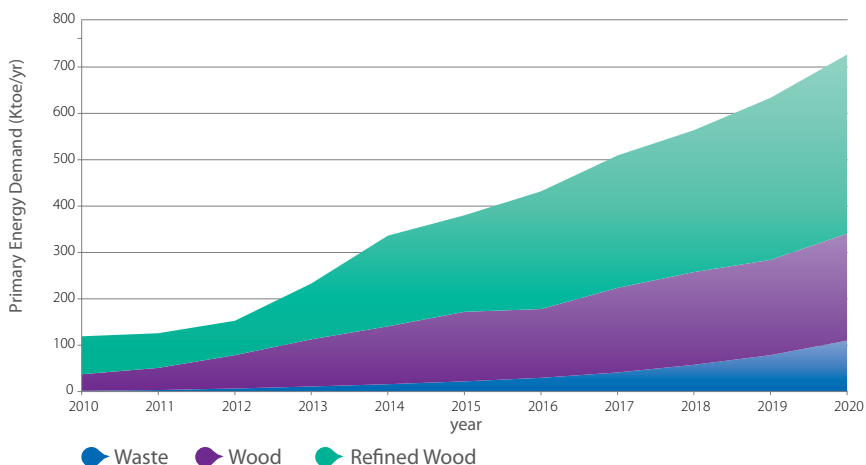
**Key Point:** Significant increases in biofuels are required to meet our 10% RES-T targets to 2020

## Electrical generation satisfied by bioenergy to 2020



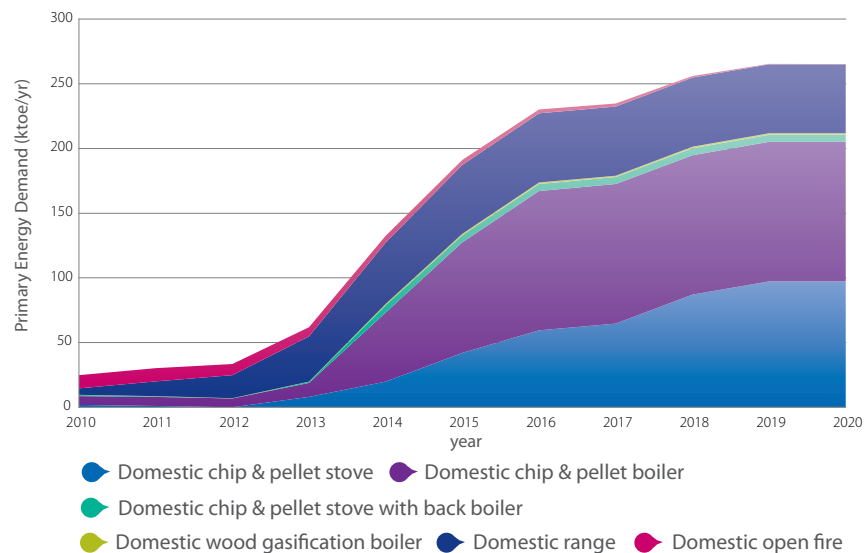
**Key Point:** Waste to energy and co-firing of biomass are significant contributors to bioenergy by 2020

## Total resource demand for generation of heat - All Sectors to 2020



**Key Point:** Refined wood to be the key driver in meeting RES-H targets by 2020

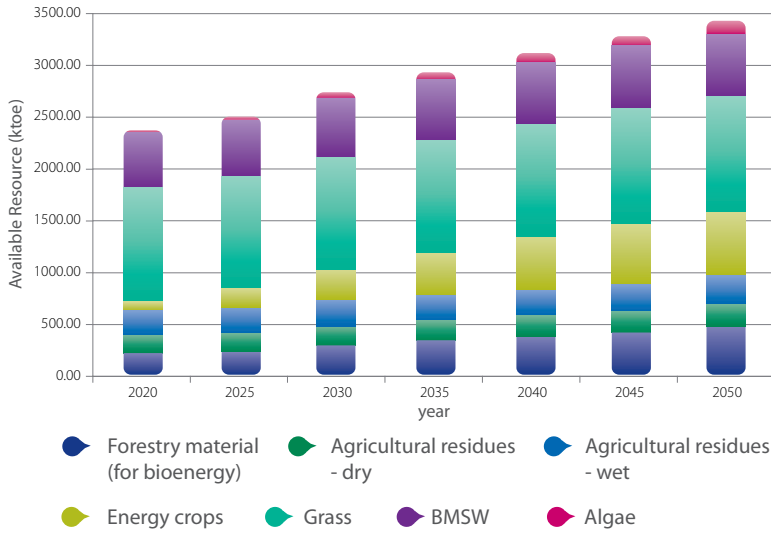
## Domestic thermal consumption demand from bioenergy to 2020



**Key Point:** Domestic chip and pellet boilers and to drive domestic RES-H growth to 2020

# Bioenergy to 2050

## Total biomass resource for bioenergy to 2050

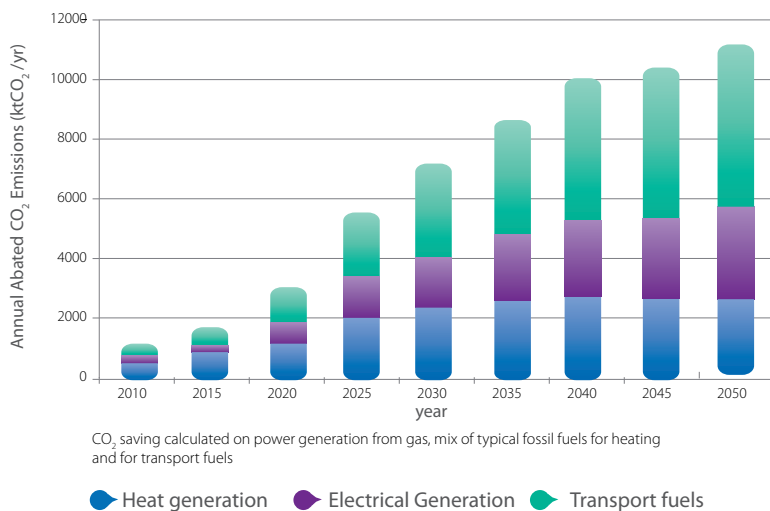


“Innovation in diverse technologies and processes is key to harnessing our potential”



**Key Point:** Grass & wastes can be significant energy resources in the coming decades

## Contribution of bioenergy to abated CO<sub>2</sub> emissions to 2050



“Indigenous, secure energy production”

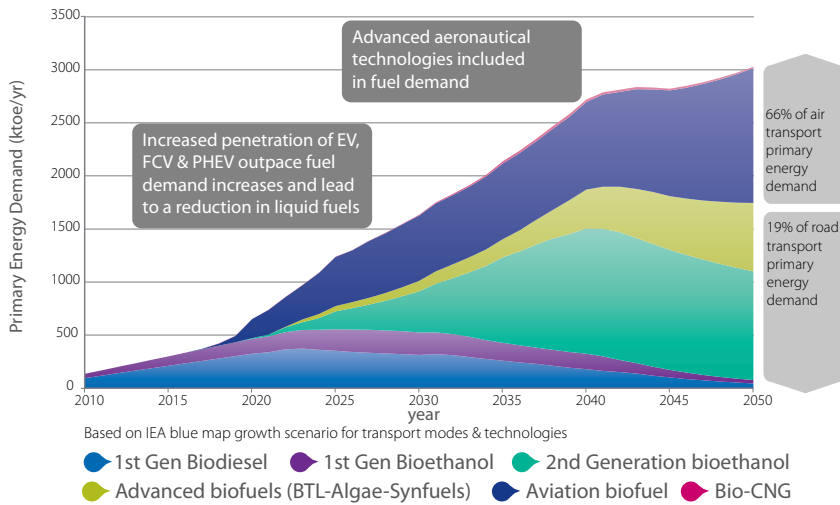


**Key Point:** Almost 11 MtCO<sub>2</sub>/yr displaced through a sustainable bioenergy program across transport, electricity and heat generation in 2050

## GLOSSARY

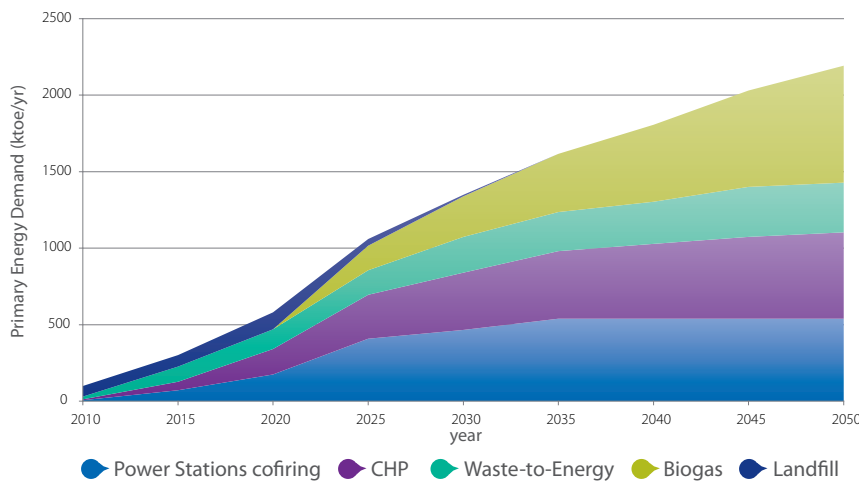
ktoe	Kilotonnes of oil equivalent
BMSW	Biodegradable municipal solid waste
kW	kiloWatt
Mt	Million tonnes
RES-T	Renewable energy share – transport
RES-H	Renewable energy share – heat
RES-E	Renewable energy share – electricity

## Biofuel demand in primary energy for the transport sector to 2050



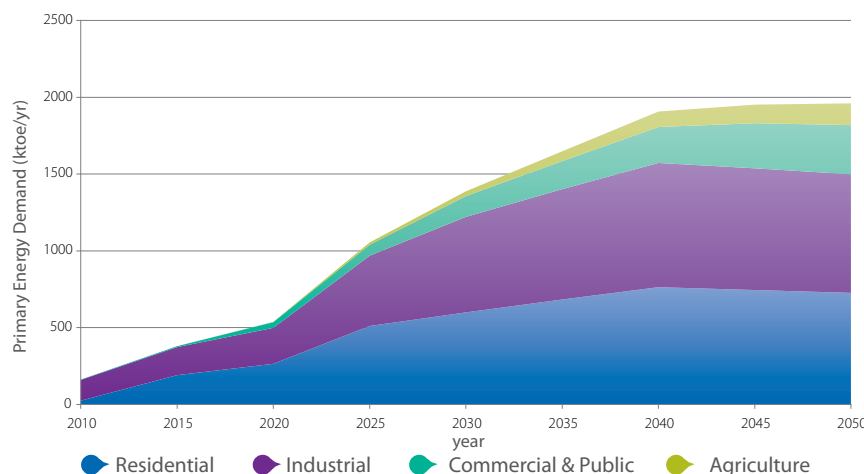
**Key Point:** To achieve an 80% reduction in CO<sub>2</sub> emissions we need to aggressively embrace bioenergy across the transport sector

## Biomass primary energy equivalent in electricity generation to 2050



**Key Point:** Landfill directive takes effect, and so production falls, being replaced by rapid growth in biogas production for electricity generation

## Primary energy heat demand scenario by sector to 2050 for a 40% bioenergy penetration



**Key Point:** Industrial and residential heat demand will be the principal drivers of biomass to heat



**Sustainable Energy Authority of Ireland**  
Wilton Park House, Wilton Place, Dublin 2, Ireland.

t +353 1 808 2100  
f +353 1 808 2002

e [info@seai.ie](mailto:info@seai.ie)  
w [www.seai.ie](http://www.seai.ie)



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