NETS CHALLENGE 2020

Analysis of abatement potentials in respect of Ireland's 2020 Non-Traded Sector Target using **GAINS Ireland**

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Irish Integrated Modelling Project

Funded under the **EPA Strive Programme 2007-2013** and led by AP EnvEcon Limited

Presentation Structure

Context

- The Non-ETS Target in Europe
- Ireland's Non-ETS Challenge

Model Overview & Methodology

- Overview of the GAINS and GAINS Ireland models
- Calibration of abatement options

Results and Recommendations

- Outcomes of the Analysis
- Discussion and Recommendations

THE NON-ETS TARGET IN EUROPE

Non Emissions Trading Sector Target (NETS)

EU wide target …

With individually agreed/negotiated national targets

Includes all 'Non' ETS sectors.
The big three are :
Agriculture, Transport, Heat

Annual limits applied from 2013 to 2020 to keep countries on track

EU Target is a 10% reduction in NETS emissions by 2020 relative to 2005

Trading expected to feature – but yet unclear

NETS covers approximately 60% of 'EU' GHGs

IRELAND'S NON-ETS CHALLENGE

Figure 1:   **Official Non-traded sector 2020 GHG emissions targets, relative to 2005 levels International Effort Distribution**
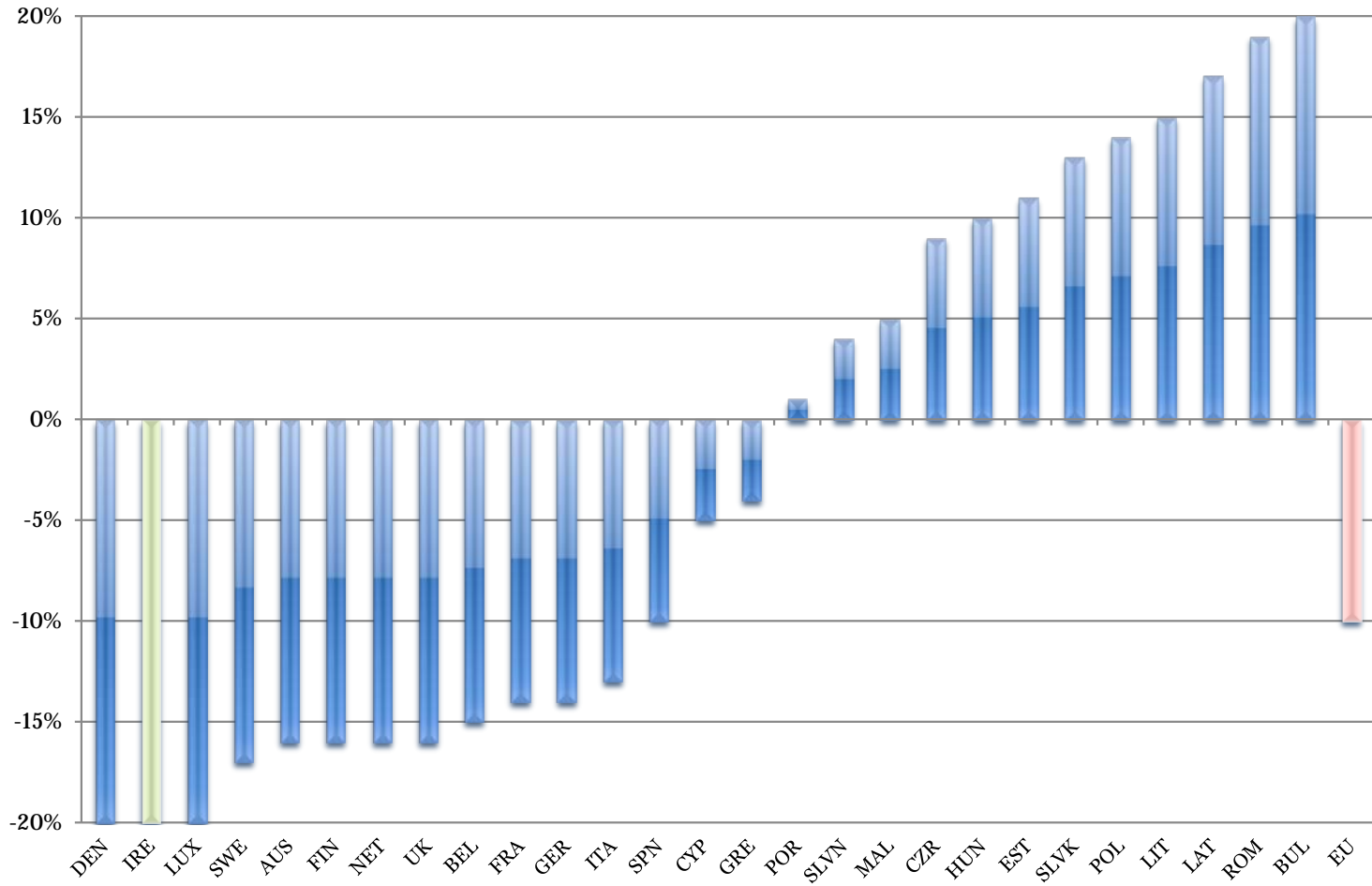
Figure 2   Ireland's NETS Sector 2013 – 2020 Greenhouse Gas Emissions Pathways and Target Estimates (EPA Forecast 2012)
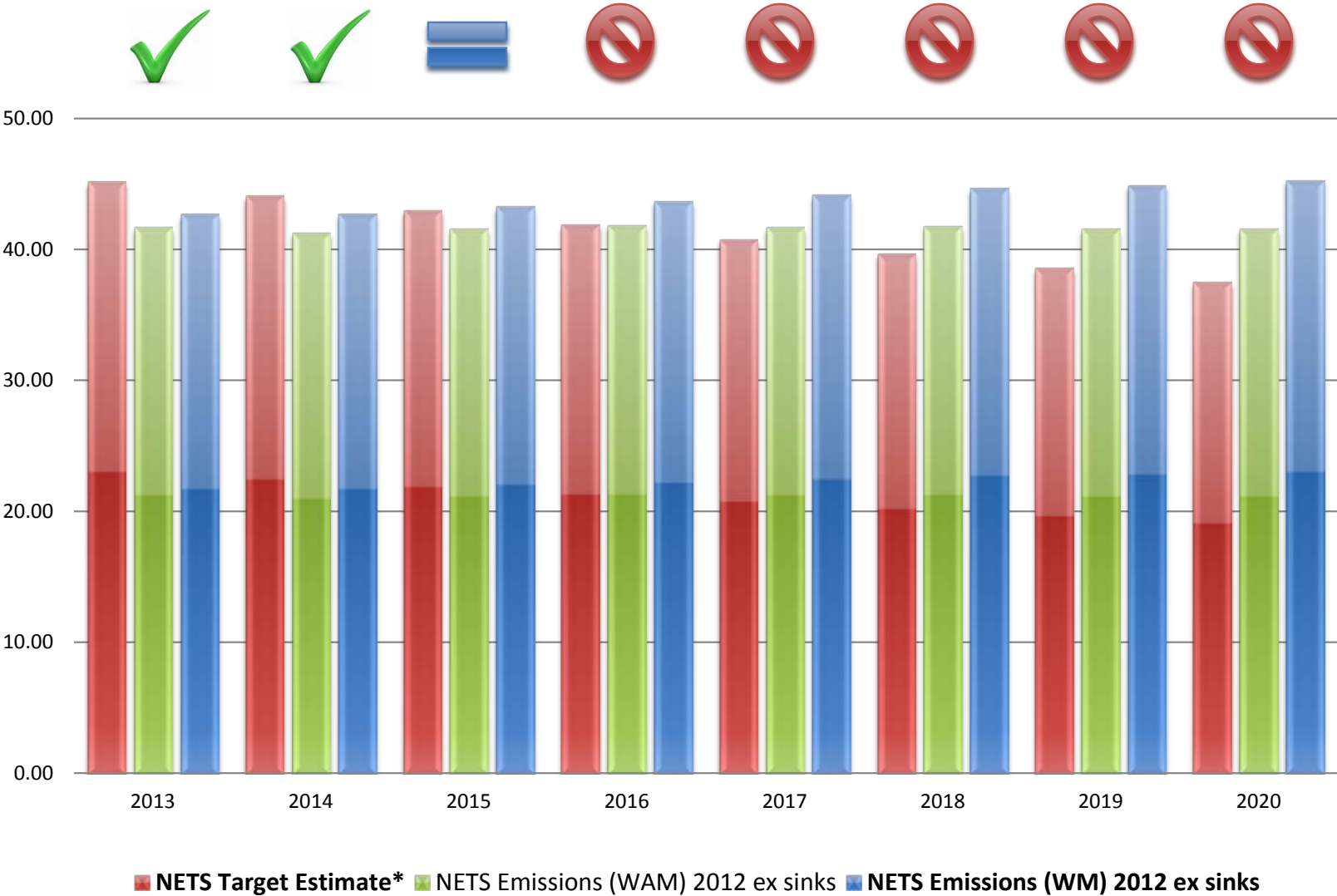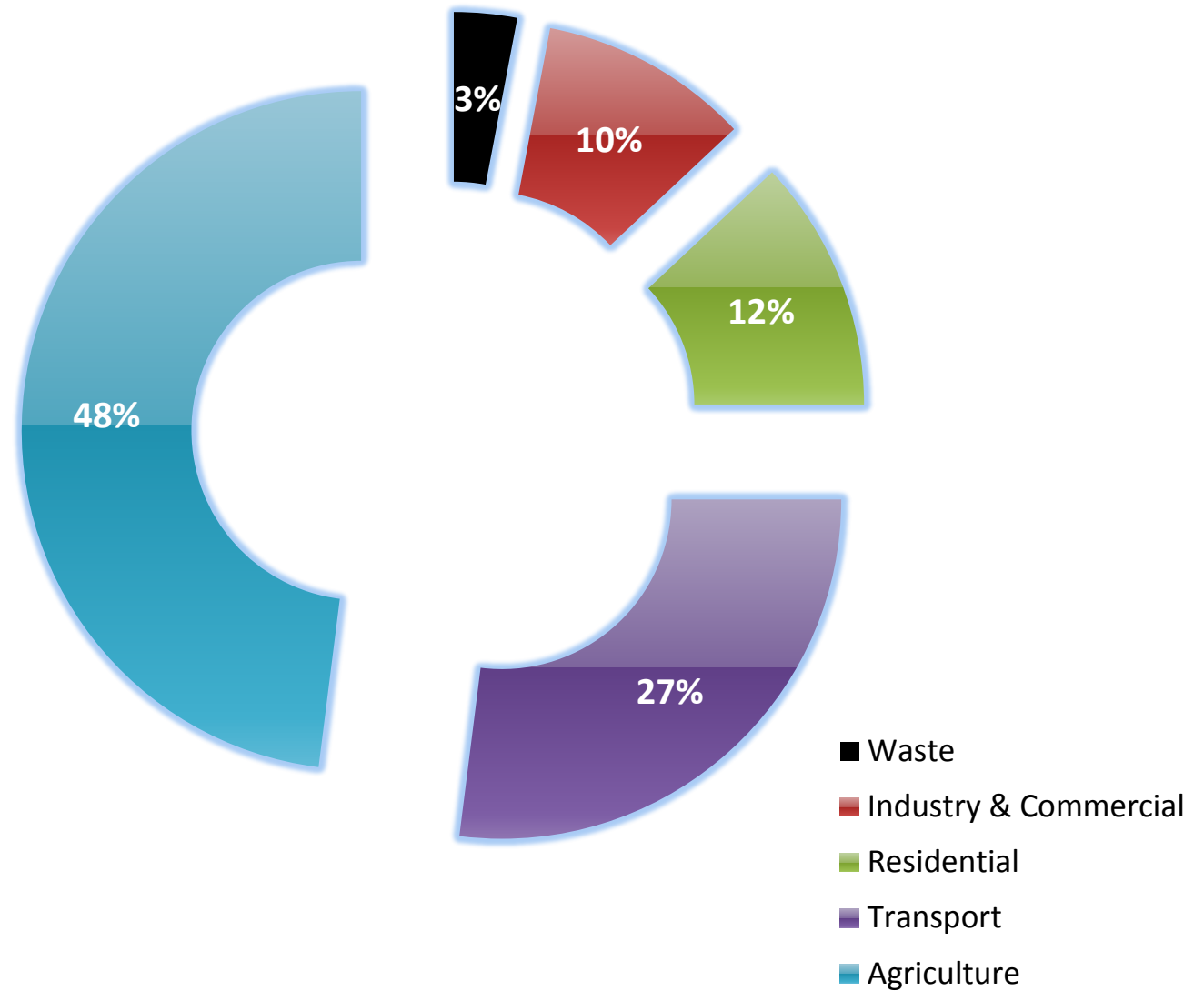
**Figure 3   Sectoral Shares of 2020 NETS GHG Projections in Ireland (EPA 2012)**

Waste — 3%
Industry & Commercial — 10%
Residential — 12%
Transport — 27%
Agriculture — 48%

OVERVIEW OF GAINS & GAINS IRELAND

GAI**NS** Ireland

- G-IRL is a **mirror** of a leading global Integrated Assessment Model – **GAINS**

- G-IRL benefits from international **collaboration** on the core model calibration and development

- G-IRL is a well **structured** and **adaptive** model that can offer analysis of complex systems e.g. NETS

- G-IRL offers a **foundation** for effective multi-sectoral abatement strategy development

- GAINS Europe is a focal point for many key **International policy** developments

- G-IRL is therefore a strong basis for international **engagement** and **negotiation**
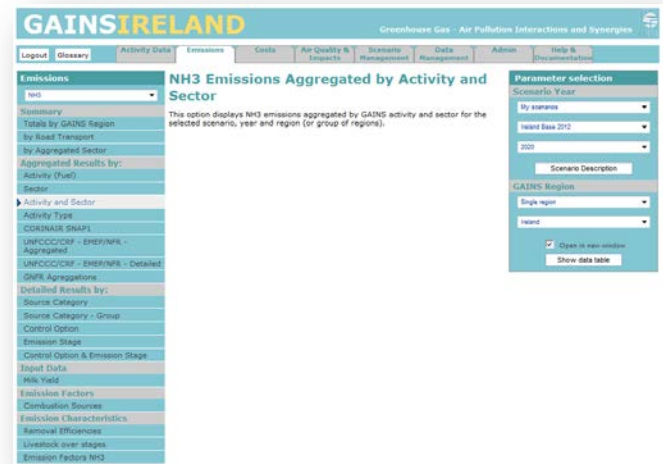
The **GAINS** Model
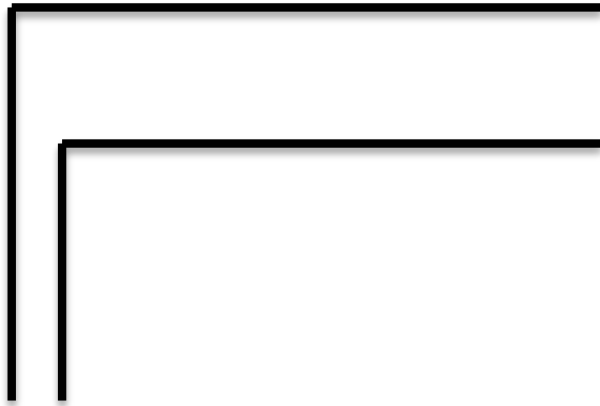
Greenhouse Gases

Air Pollution

Synergies

INteractions

Greenhouse Gases   Carbon Dioxide   Methane   Nitrous Oxide   Carbon Monoxide   Fluorinated GHGs

Air Pollution   *Particulate Matter*   *Ammonia*   *Sulphur Dioxide*   *Nitrogen Oxides*   *Volatile Organic Compounds*

Analysis   Emissions   Costs   Health Impacts   Environmental Effects

The GAINS Model

Multi Effect

Multi Pollutant

All Sectors of the Economy

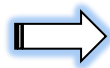Power Generation   Processes & Waste   Domestic & Commercial   Industry   Agriculture   Transport
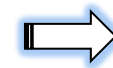
The GAINS Model

Simplified Function

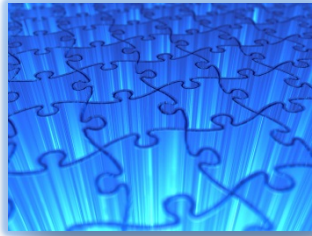Activity $\Rightarrow$ Controls $\Rightarrow$ Emissions

The level of 'activity' from a source of emissions such as dairy cattle or a petrol passenger car

Information relating to the abatement technologies or practices in place that influence the emission 'factor' for the activity

The emissions of all types that are thereby estimated as associated with both the controlled and uncontrolled activities

The **GAINS** Model   **Calibration Complexity**

Activity

Controls

Emissions

All Sectors means a lot of activities

We need historical and Forecast Data

Data changes over time

For all activities we link parameters on:

- Control Penetration
- Potential Penetration
- Control Costs
- Control Performance

Again both historical and forecast Data

Most non-technical policy measures examined exogenously and integrated

For all activities there are also:

Many pollutants to consider

Pollutant Interactions

Impact and Effect mapping
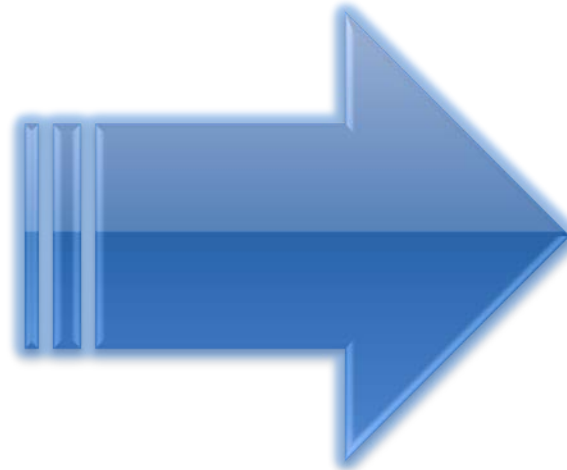
Scenario Mode

Every Sector

Calibration & Processing

Historical & Forecast :

- Activity for each sub-sector (SS)
- Unabated emission factor (UEF) at SS level
- Controls in Place at SS level
- Control performance at SS level (AEF)
- Control cost at SS level

- *Control Potential at SS level*

Outputs

Emissions

Effects

Costs

Scales

International

National

Sectoral

Sub-Sectoral

Optimisation Mode

GENERAL APPROACH

Build the starting Scenario

Calibrate options and parameters

Set the Constraint for the scenario

Optimise (i.e. solve) for the solution

SPECIFIC APPROACH

Scenario Developed	1st Stage Menu Created	Constraint Defined	Output Delivered
Official Data Available in 2011 for Energy & AG	1st round work for GHG abatement menu options	The NETS Target for 2020 Various marginal cost* constraint levels per tonne of $CO2_{eq}$. *Cost requires separate presentation*	Results delivered in terms of emissions reduced and distance to target Broader model data also available e.g. ETS impact, Air Quality impact

CALIBRATION OF ABATEMENT OPTIONS

Agriculture

Power

Industry

Fertiliser App Control

Animal Feed

Farm Scale AD

Advanced Agro-Chemicals

Precision Farming

Fuel Switching

CHP

Efficiency Improvement

Integrated Gasification
Combined Cycle

Fuel Switching

Energy Efficiency Stages

Good Practices

N_2O and F-Gas Controls

Waste

Res/Comm

Transport

Diversion & Treatment

Flaring & Gas Utilisation

Wastewater management

Waste burning Regs

Energy Saving *Stages* by:

HVAC of old/new apartments/houses

HVAC commercial

Appliances

Advanced engines

Efficiency Improvements

~~Hybrids – Plugins - Electrics~~

Selected Specific Calibration Example Notes

Liaising directly with DAFM in regard to perceived potential of measures in Ireland

Adaptation and modification of measures to comparable categories in the model

Variations persist with core model and further evidence will be incorporated over time from multiple sources

Estimation of HVAC performance by aggregate categories *House v Apartment* and *Old v New (post 2005)*

Utilisation of two approaches. BER and separate modelling of stock to reconcile energy balance for sectors with housing data and perceived HVAC demands

Behavioural influence a difficulty as is variations in the housing stock and setting cost profiles

THE MENU
Version 1

G-IRL builds and extends upon the international modelling efforts

Constraints

Potentials Not Unlimited - Boundaries

Omissions

Incomplete Menu – Retrofit NTM shortlist
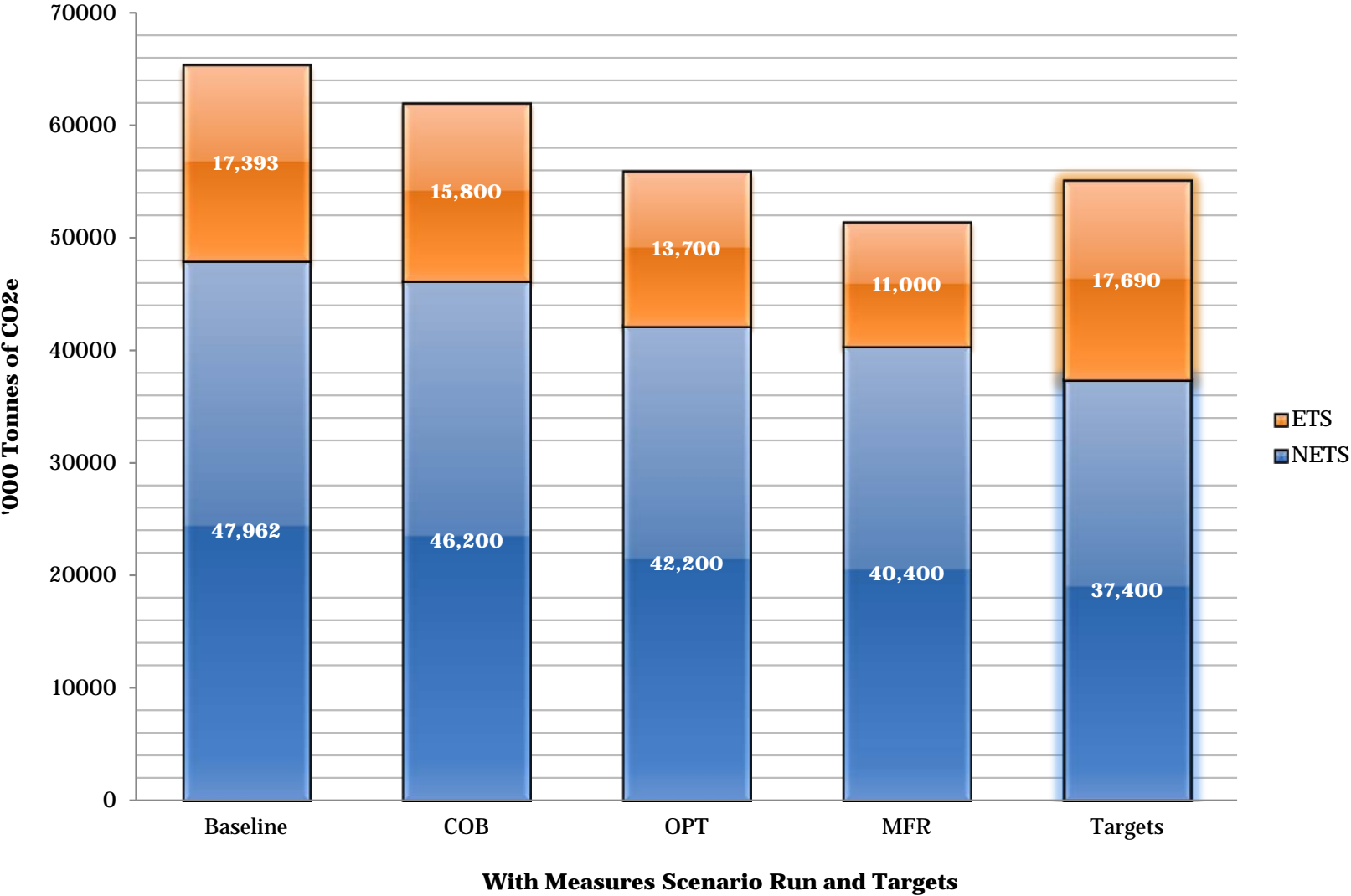
Prices

Caution Required - Scope and Method

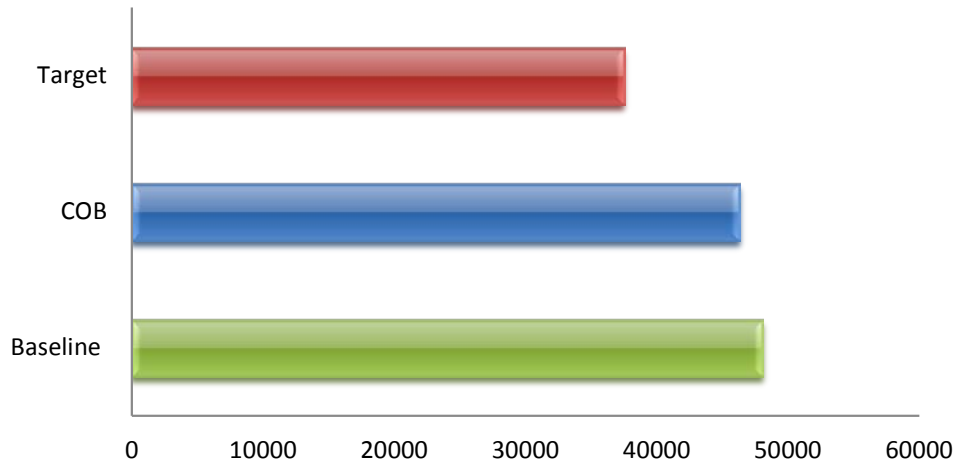## Performance

Estimations – R&D required

OUTCOMES OF THE ANALYSIS

ETS and NETS emissions in 2020 – Baseline, Optimisations and Targets
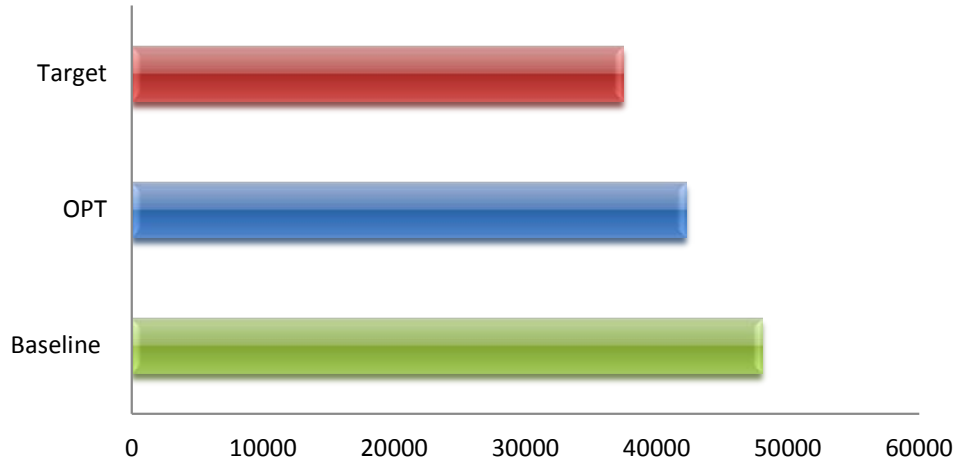
NETS Emissions in 2020 : COB

1.7m t/CO_2e reduced

8.8m t/CO_2e to target

❖ Cost Optimal Baseline

❖ Measures taken where net annualised savings exceed net annualised costs

❖ Transport efficiency and Domestic electrification and efficiency improvements
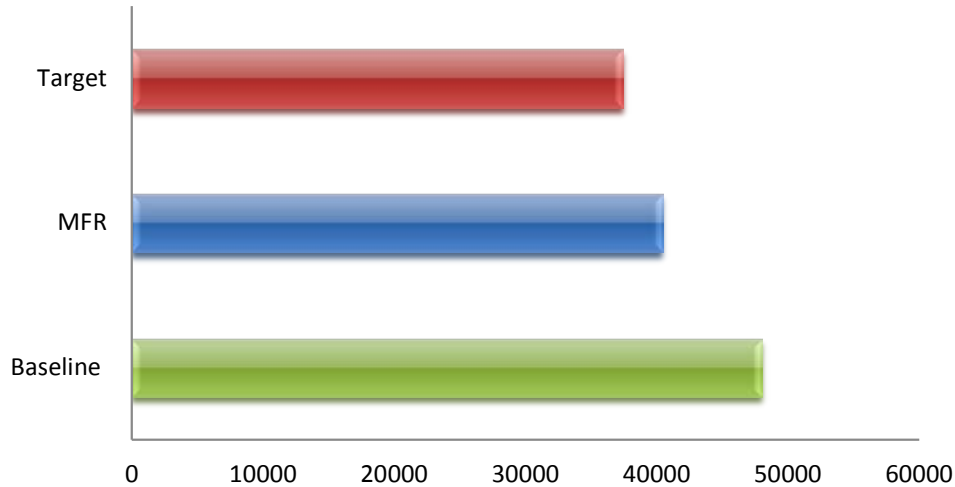
NETS Emissions in 2020 : OPT

5.7m t/CO$_2$e reduced

4.8m t/CO$_2$e to target

❖ An optimisation engaging measures up to a marginal cost of €50

❖ Builds upon COB – *'More of and Less Of approach'*

❖ Further progress in Transport efficiency and Domestic electrification and efficiencies.

❖ Uptake of the set of agricultural measures

NETS Emissions in 2020 : MFR

7.5m t/CO$_2$e reduced

3m t/CO$_2$e to target

❖ The maximum feasible reduction optimisation for the menu defined

❖ Engaging measures up to a marginal cost of €225

❖ Builds on prior options taken (increased levels)

❖ Housing stock 'deeper' energy refits

CONCLUSIONS & RECOMMENDATIONS

I.   Research - Develop the Menu

❖ Technical Measures Research, Innovation and Validation

❖ Selective Research of 'Promising' Non-technical Options

Remember *75% of the emissions are in Two Sectors*

❖ Measures research must be high quality and consider

➢ Costs
➢ Barriers
➢ Uncertainty
➢ Interactions
➢ Potential Application
➢ Expected Abatement Delivery

➢ **'Wide Angle' evaluation of the reasons to act!**

II.   Analyse, Adopt and Adapt

❖ Circumstances, Constraints and Opportunities will change

The analysis to support progress to target must be dynamic

❖ NETS seeks a *'glide path'* to target from 2013

So action needed now to move in the right direction

❖ Multiple innovative initiatives will be required

Hits and Misses are to be expected and technical and non-technical options required
Again ... 75% of the emissions are in Two Sectors

❖ Coordinated support from national analytical and research capacities is needed. Draw on capacity from Research Teams – Government Agencies and Departments - Business

Integrated assessment → Develop Smarter Policy → Support targeted innovations

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