



Environmental Protection Agency



Policy pathways for Ireland – How much energy efficiency is residential retrofitting delivering?

ESRI-UCC-MaREI energy research: climate action conference

Tomás Mac Uidhir, Fionn Rogan

Friday May 17th, 2019

EU Targets 2020/30



EU Targets 2020/30

2020

20%

20%

16.2%

EU Target

Irish Target

IE Expected Outcome



EU Targets 2020/30

2020

20%

20%

16.2%

EU Target

Irish Target

IE Expected Outcome

2030

32.5%

?

?



Energy Efficiency Targets & Progress to 2016

31,925
GWh



Energy Efficiency Targets & Progress to 2016

20% Reduction Target

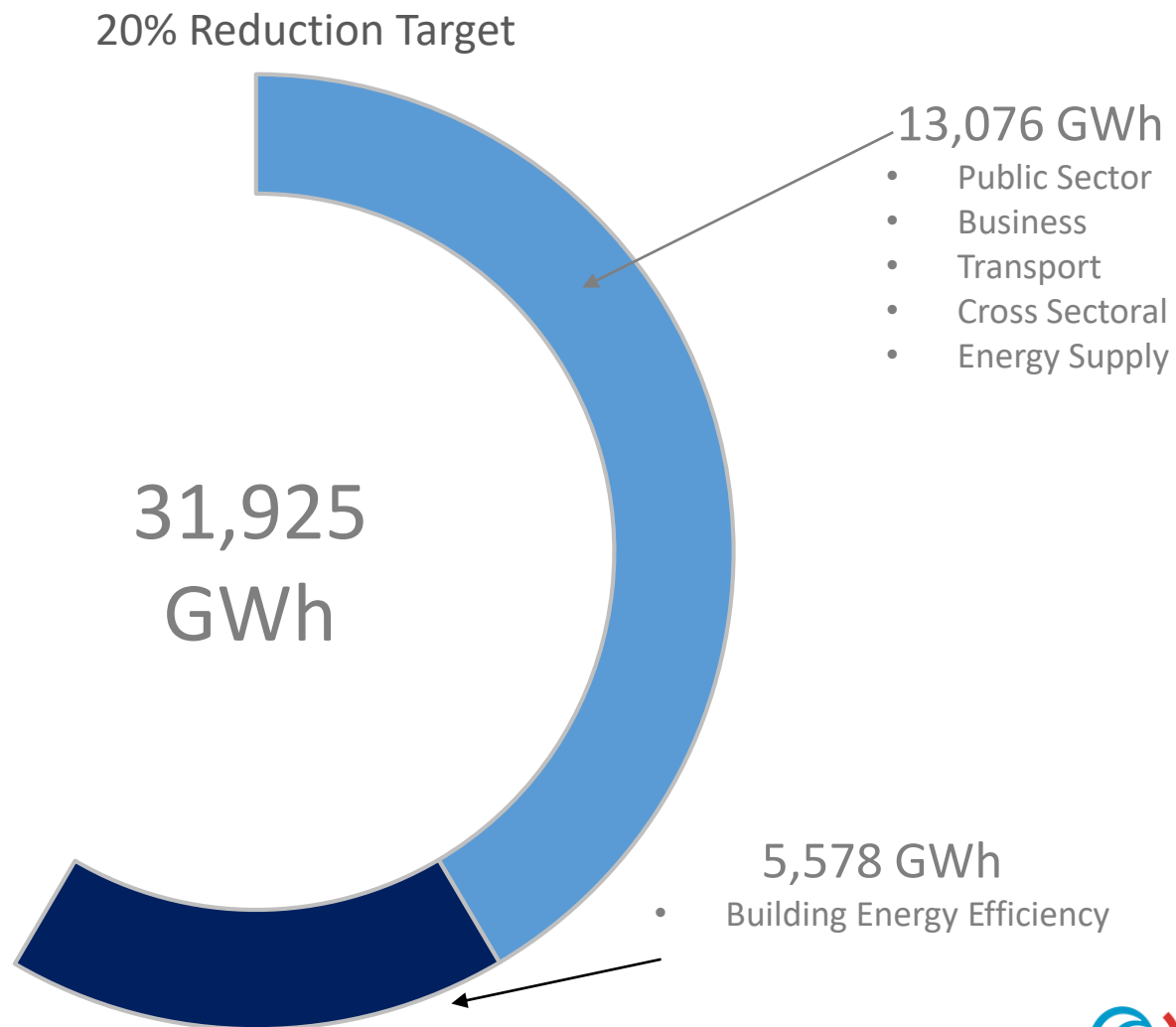
31,925
GWh

13,076 GWh

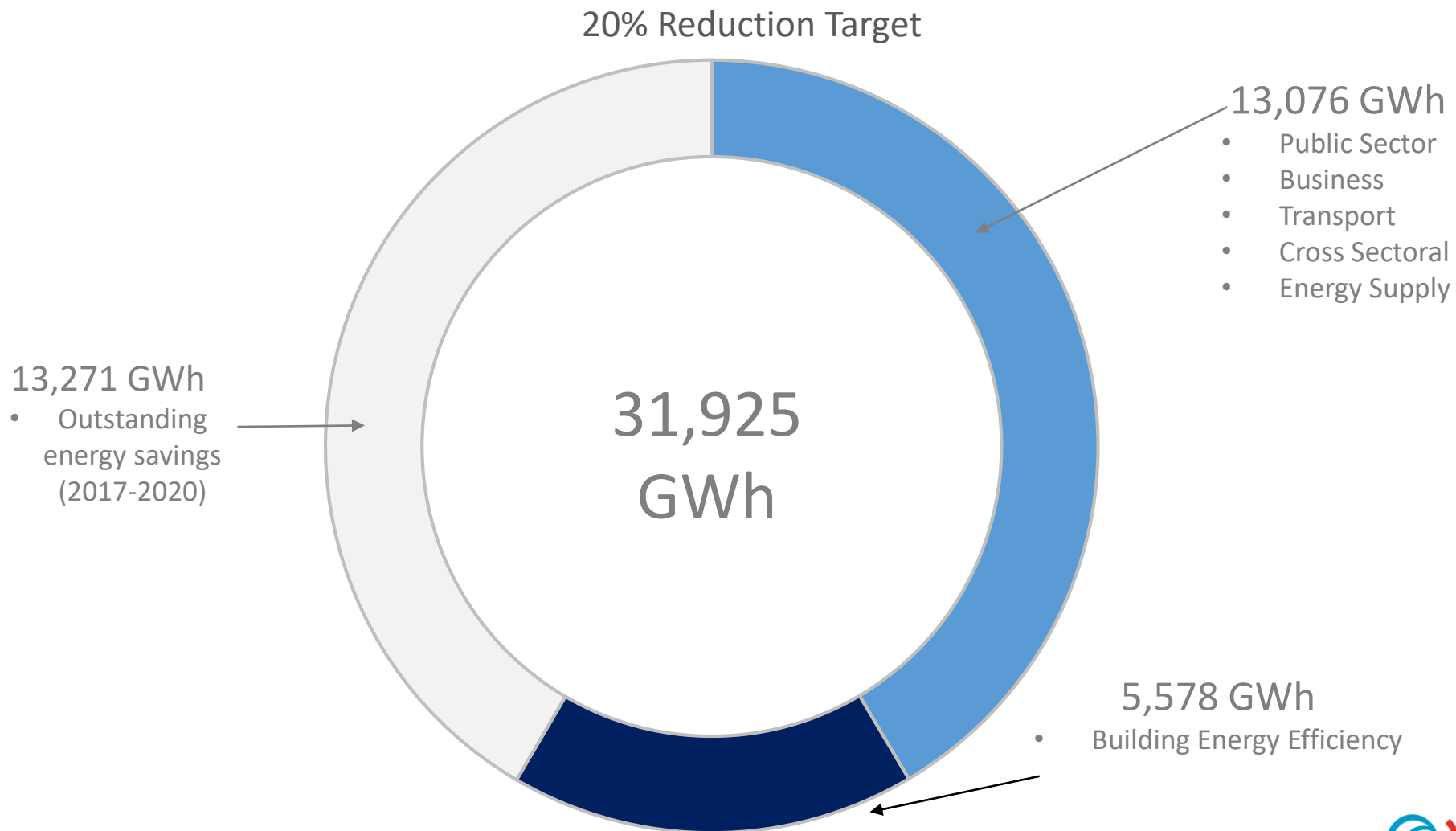
- Public Sector
- Business
- Transport
- Cross Sectoral
- Energy Supply



Energy Efficiency Targets & Progress to 2016



Energy Efficiency Targets & Progress to 2016



Residential Retrofit Schemes



Residential Retrofit Schemes

- Residential Support available under the Better Energy Programme operated by SEAI
 - Home Energy Saving Scheme (HES) – now Better Energy Home Scheme (BEH) – *financial incentive to private home owners*
 - Warmer Home Scheme (WHS) – *those living in, or at risk of, energy poverty – free of charge*
 - Warmth & Wellbeing Pilot Scheme – *vulnerable people living with chronic respiratory conditions*
 - Deep Retrofit Pilot Scheme – *investigates challenges/ opportunities with Deep retrofit in Ireland.*



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Residential Retrofit Schemes



Residential Retrofit Schemes

Measure	Category	Sub-Category	Scheme 1	Scheme 2	Scheme 3	Scheme 4	Scheme 5	Scheme 6
			Mar-09	Jun-10	May-11	Dec-11	Mar-15	Apr-18
			€	€	€	€	€	€
Roof	Attic Insulation		250	250	200	200	300	400
Wall	Cavity Wall Insulation		400	400	320	250	300	400
	Internal Dry-Lining		2500	2500	2000	-	-	-
		Apartment(any) OR Mid-Terrace House	-	-	-	900	1200	1600
		Semi-detached OR End of Terrace	-	-	-	1350	1800	2200
		Detached House	-	-	-	1800	2400	2400
	External Wall Insulation		4000	4000	4000	-	-	-
		Apartment(any) OR Mid-Terrace House	-	-	-	1800	2250	2750
		Semi-detached OR End of Terrace	-	-	-	2700	3400	4500
		Detached House	-	-	-	3600	4500	6000
Boiler	High efficiency boiler (oil or gas) upgrade with heating control		700	700	560	560	700	-
	Heating Controls Upgrade Only		500	500	400	400	600	700
Heat Pumps		Air To Water	-	-	-	-	-	3500
		Ground Source to Water	-	-	-	-	-	3500
		Exhaust Air to Water	-	-	-	-	-	3500
		Water to Water	-	-	-	-	-	3500
		Air to Air	-	-	-	-	-	600
Solar	Solar Water Heating		-	-	800	800	1200	1200
BER	Building Energy Rating		100	100	80	50	50	50
Bonus	3rd Measure		-	-	-	-	300	300
	4th Measure		-	-	-	-	100	100



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Data & Methodology



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 - representative of 191,338 retrofitted homes during 2009-2016
2. BER database (~ 700,000 records, all sold and rented dwellings)
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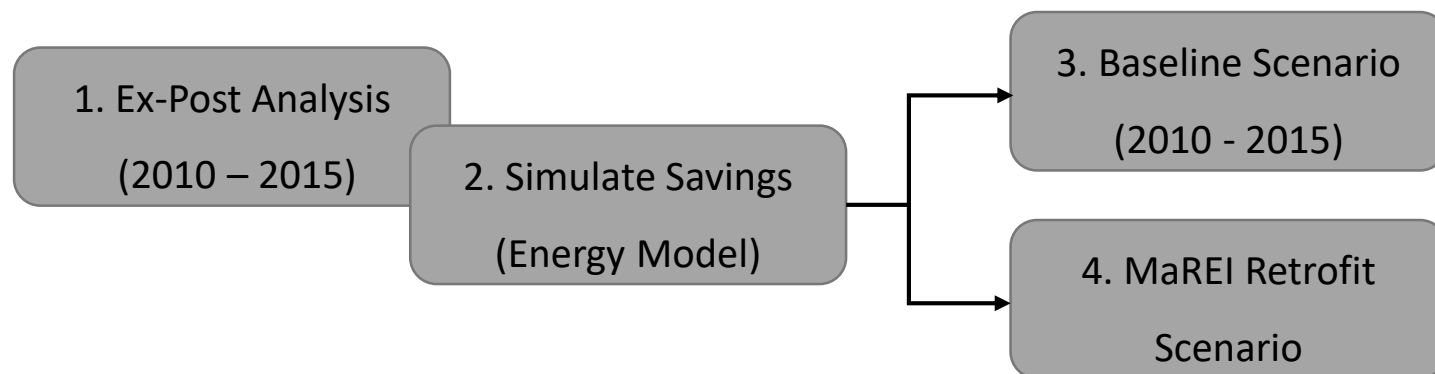
1. Ex-Post Analysis
(2010 – 2015)

2. Simulate Savings
(Energy Model)



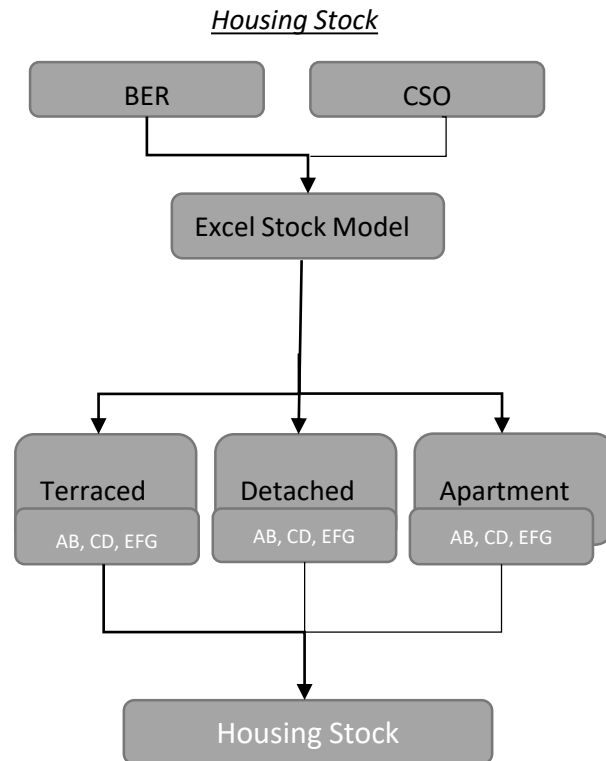
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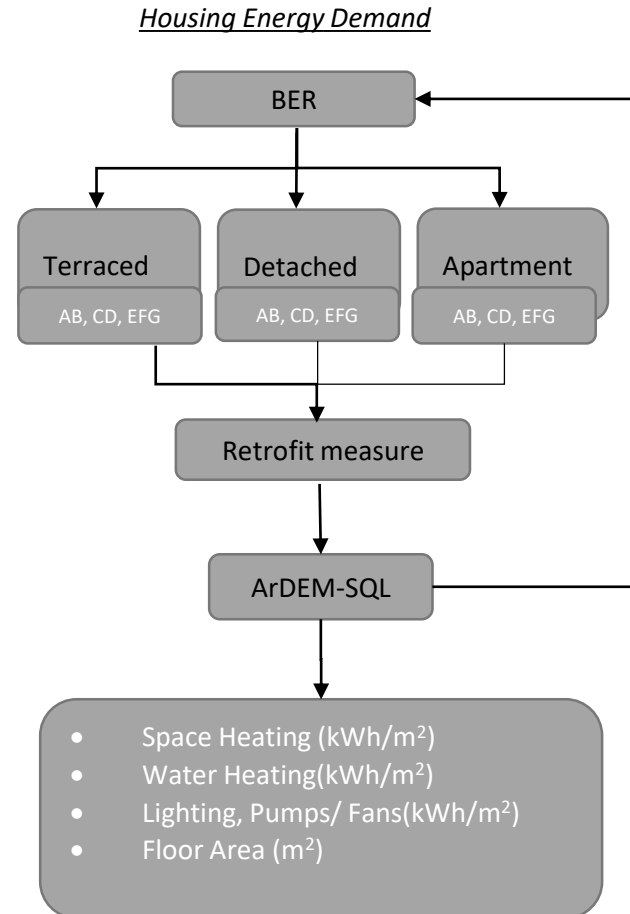
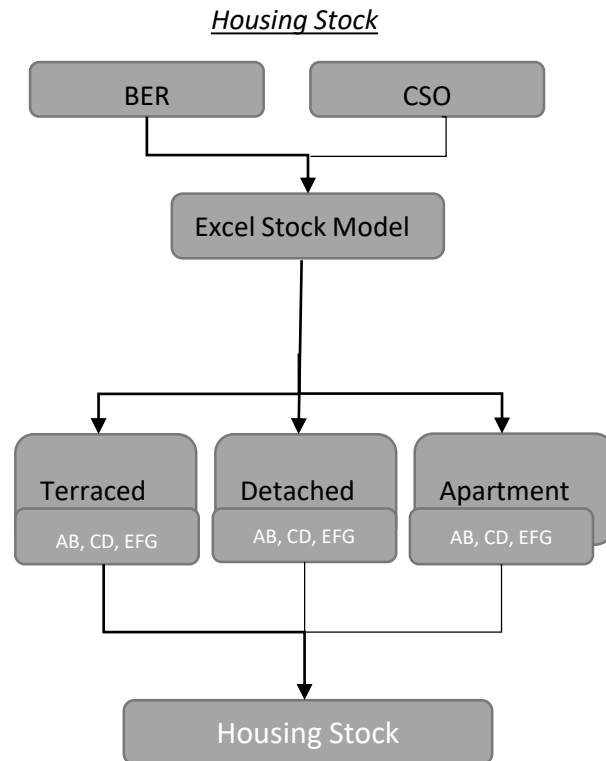


The Model (ArDEM-SQL)

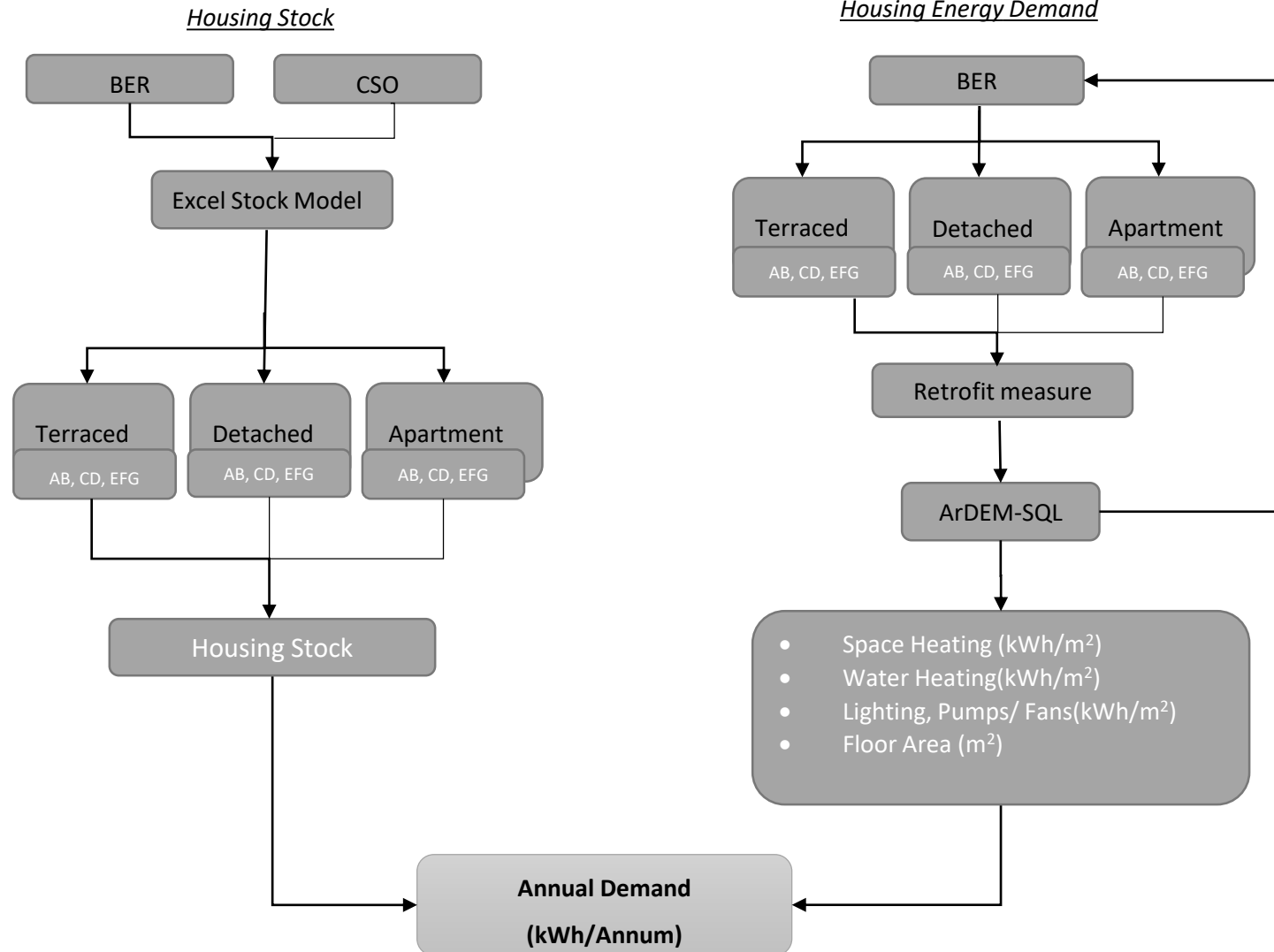
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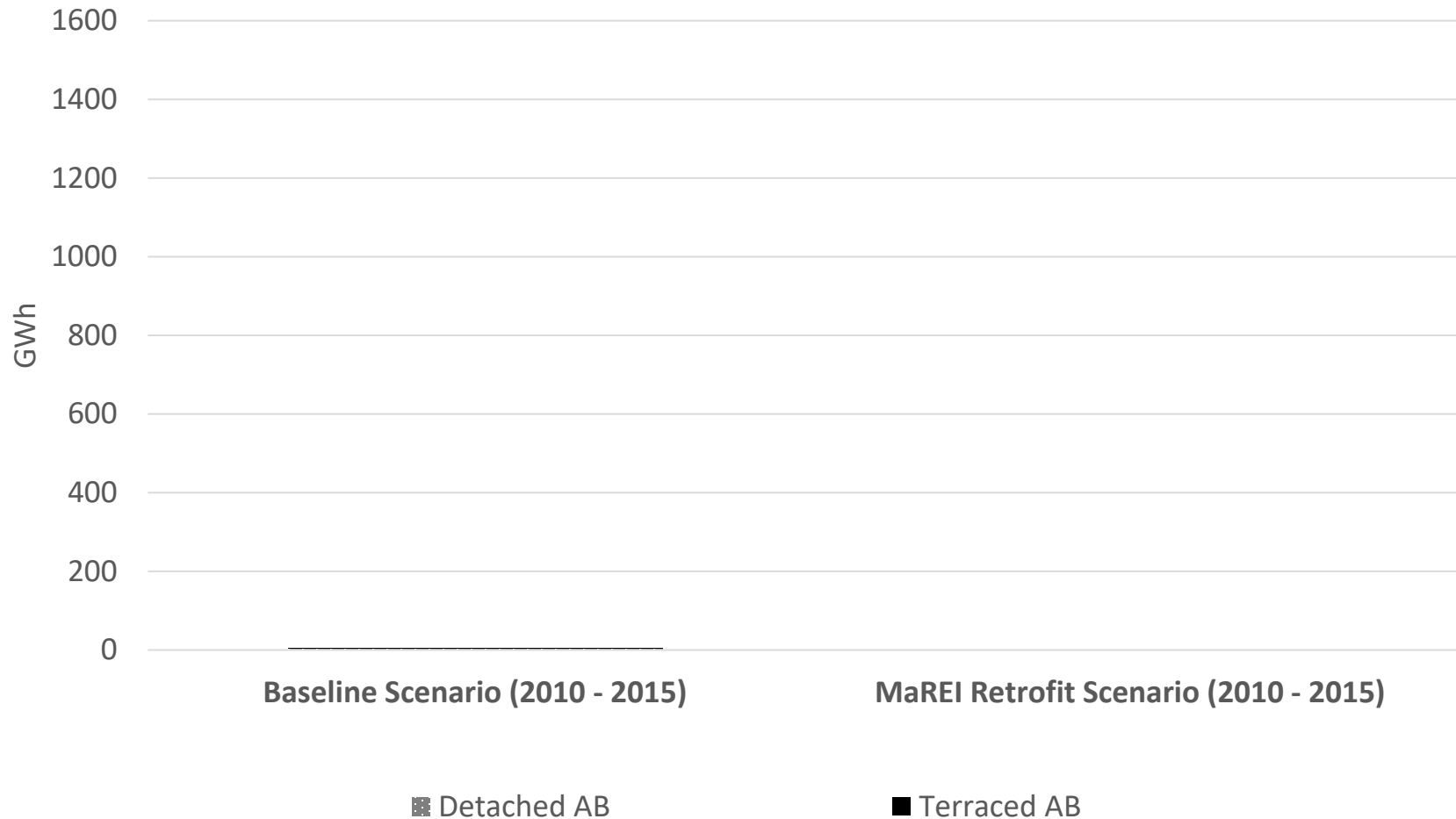
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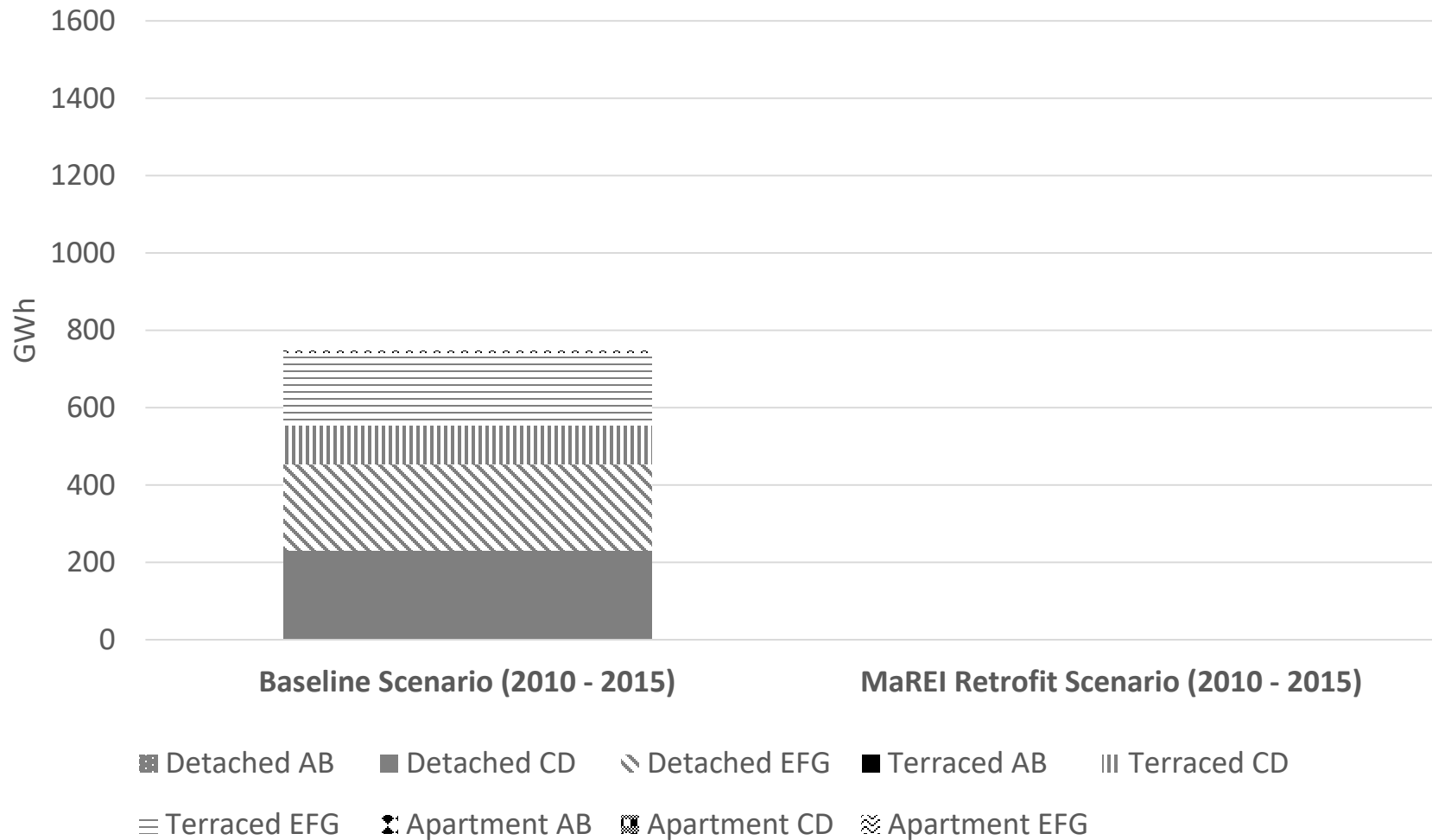
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Results (GWh Energy Savings)



Results (GWh Energy Savings)



Results (Combinations of Retrofit Measures)

BEH Retrofit Combination, All Archetypes	Post-Works BER Records	% Total Records	BEH Retrofit Combination, All Archetypes	Post-Works BER Records	% Total Records
Attic + Cavity	57542	51.4%	Attic + Cavity + Boiler w/ HC + Solar	177	0.2%
Boiler w/ HC	20649	18.4%	Attic + Dry-Lining + Boiler w/ HC + Solar	172	0.2%
External Wall	7385	6.6%	Attic + External + HC only	120	0.1%
Solar	5859	5.2%	Attic + Cavity + Solar	99	0.1%
Attic + Cavity + Boiler w/ HC	2652	2.4%	Dry-Lining + HC only	84	0.1%
Attic + Dry-Lining	2321	2.1%	Attic + External + Boiler w/ HC + Solar	72	0.1%
HC Only	2297	2.1%	External + HC only	71	0.1%
Attic + External	2033	1.8%	Attic + Cavity + HC only + Solar	70	0.1%
Attic + Boiler w/ HC	1667	1.5%	External + Boiler w/ HC + Solar	65	0.1%
Attic + Cavity + HC only	1297	1.2%	Attic + Solar	46	0.0%
Internal Dry-Lining	1155	1.0%	Cavity + Boiler w/ HC + Solar	38	0.0%
Attic + Dry-Lining + Boiler w/ HC	1063	0.9%	Dry-Lining + HC only + Solar	37	0.0%
Attic	983	0.9%	Cavity + Solar	31	0.0%
Cavity	933	0.8%	External + Solar	30	0.0%
Boiler + Solar	674	0.6%	Attic + Dry-Lining + HC only + Solar	27	0.0%
Cavity + Boiler w/ HC	430	0.4%	Attic + Dry-Lining + Solar	16	0.0%
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Dry-Lining + Boiler w/ HC	318	0.3%	External + HC only + Solar	11	0.0%
Attic + Dry-Lining + HC only	285	0.3%	Attic + External + Solar	9	0.0%
External + Boiler w/ HC	281	0.3%	Sry-Lining + Solar	7	0.0%
Cavity + HC only	185	0.2%	Dry-Lining + Boiler w/ HC + Solar	0	0.0%



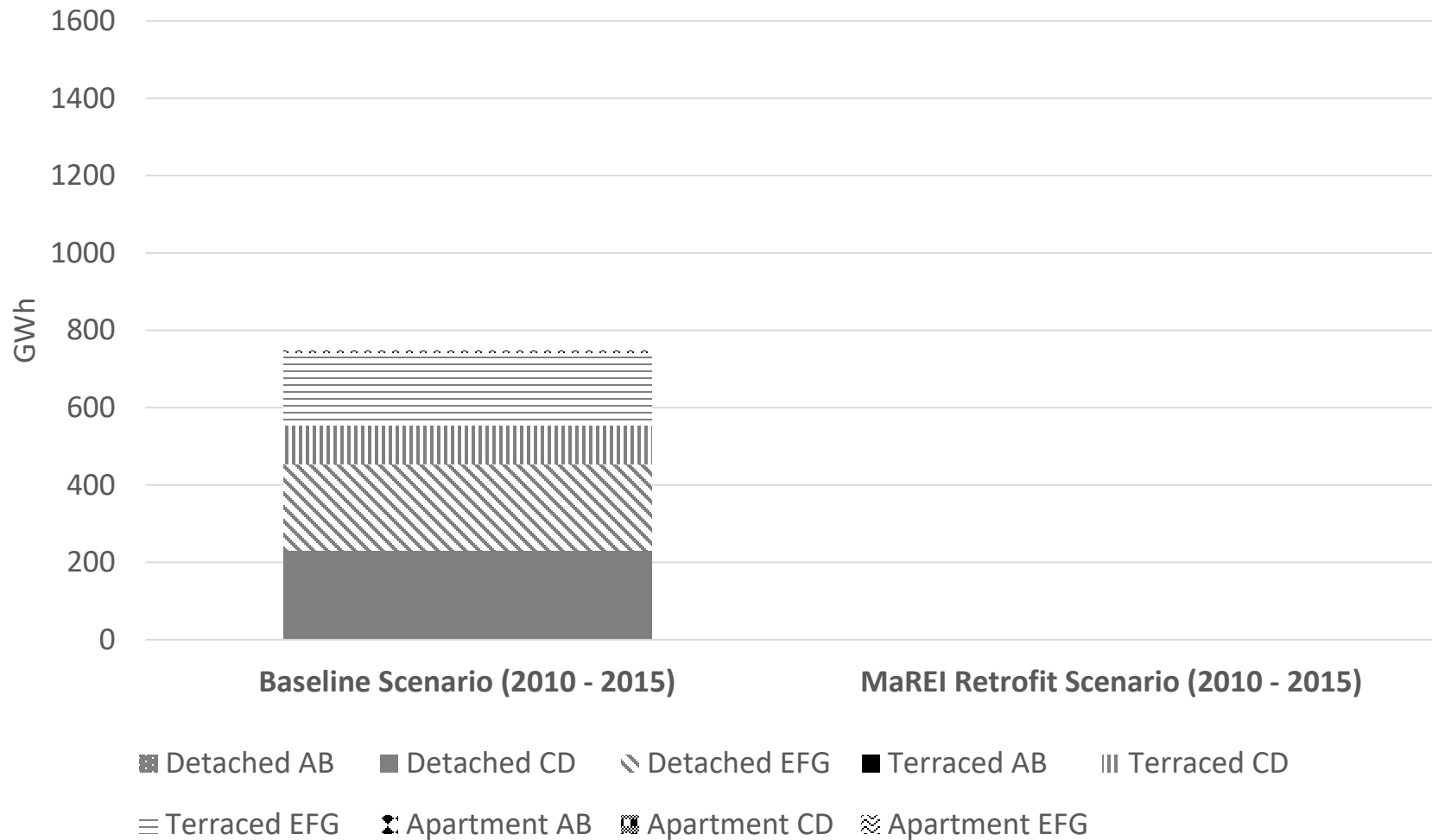
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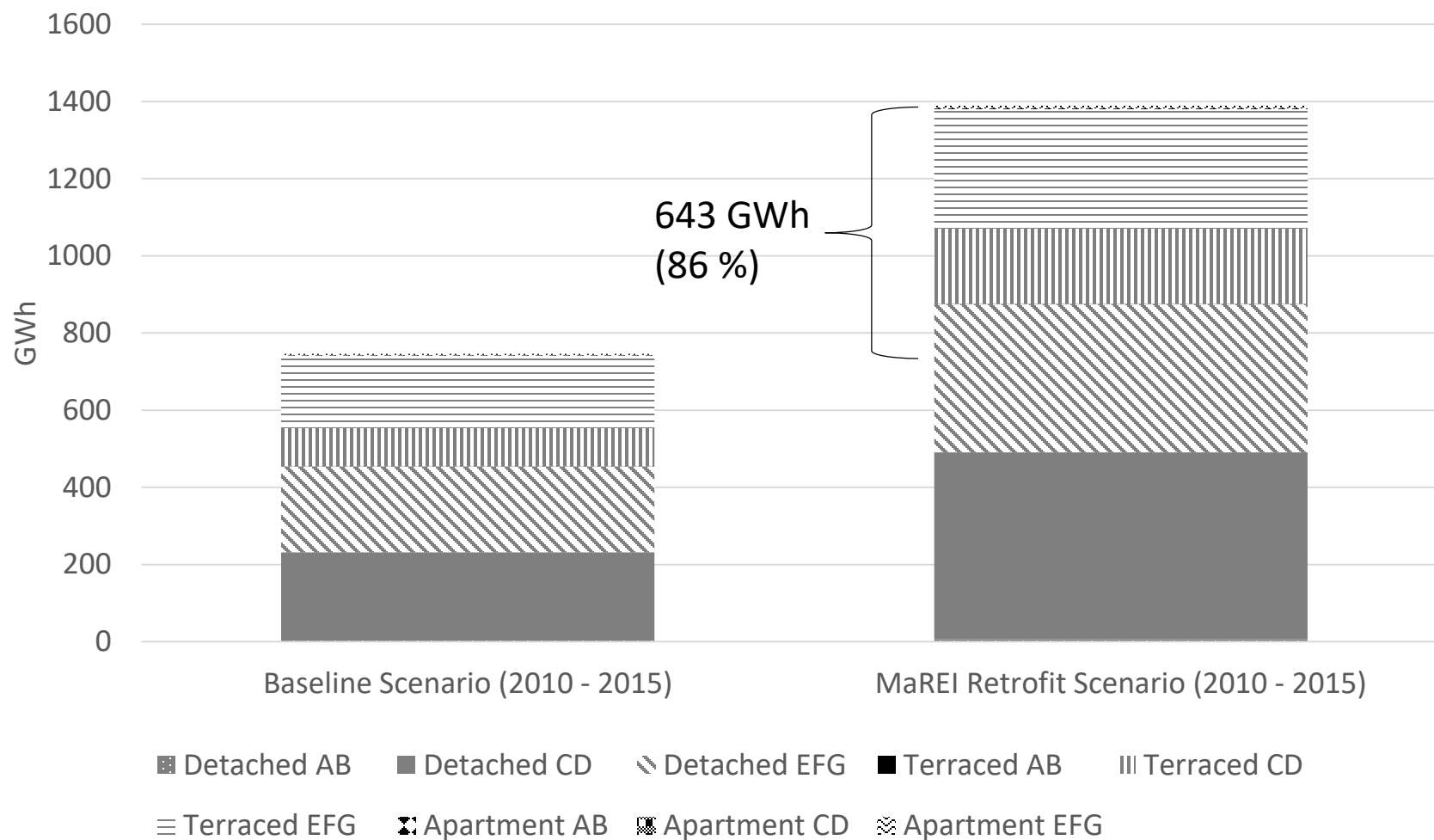
	Detached	Terraced	Apartment
AB	Ext. Wall	Ext. Wall	Boiler w. HC
CD	Attic, Cavity, Boiler w. HC	Attic, Cavity, Boiler w. HC	Attic, Cavity, Boiler w. HC
EFG	Attic, Cavity, Boiler w. HC	Attic, Cavity, Boiler w. HC	Attic, Cavity, Boiler w. HC



Results (Additional GWh Energy Savings)



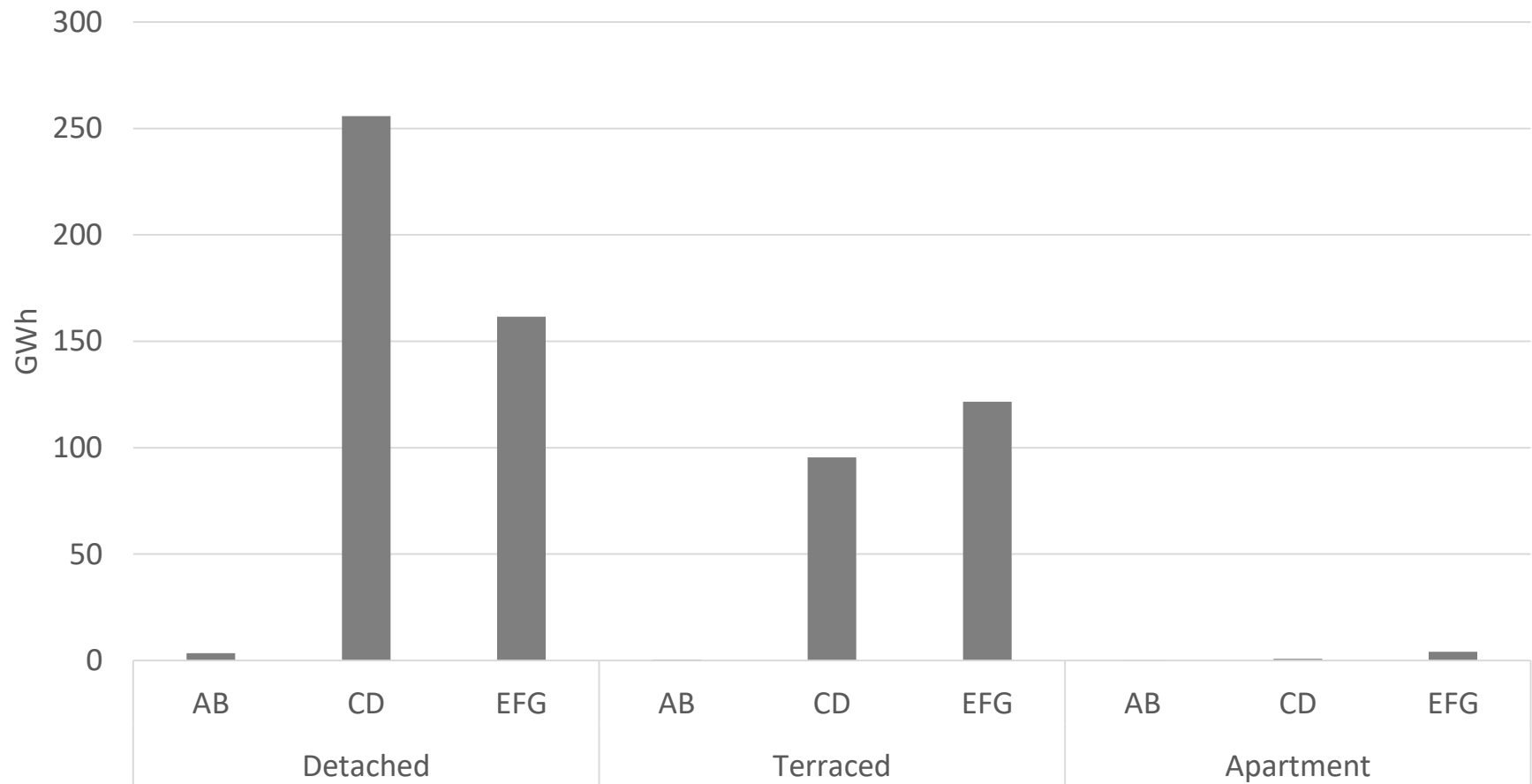
Results (Additional GWh Energy Savings)



Results – distribution of additional energy savings



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Policy Implications

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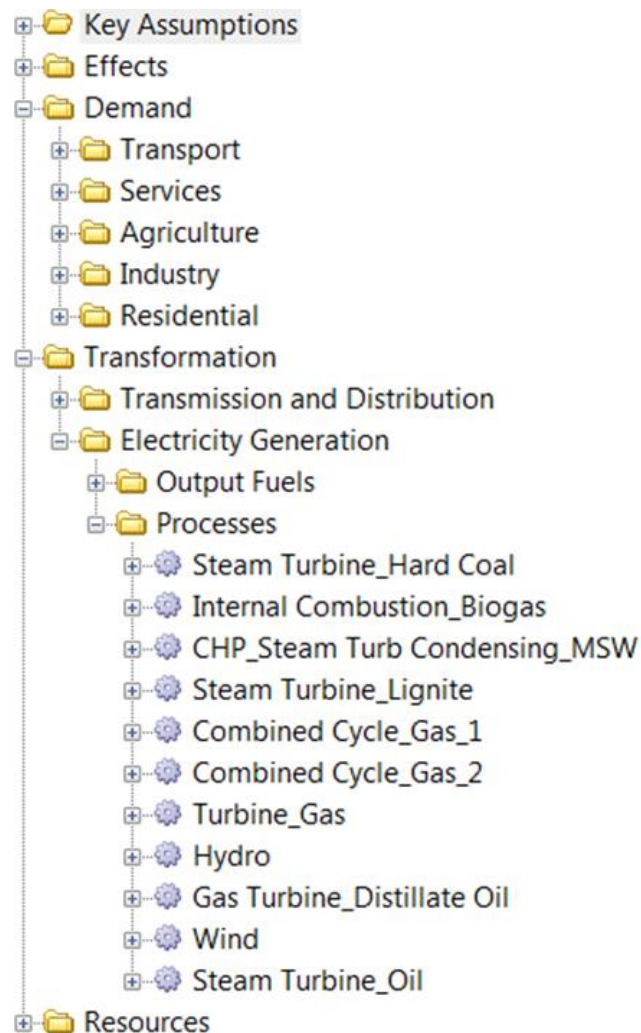
- Significant **additional** energy savings possible with alternative retrofit combinations: 86 % improvement relative to baseline scenario
- **Less energy efficient dwellings** have greatest potential for energy efficiency savings: > 90% additional savings coming from four archetypes
- Grant scheme has already evolved – further adjustment to incorporate the **pre-works condition** of the dwelling could lead to greater energy savings
- Implementation and scalability challenges remain – how can these be overcome?



LEAP Ireland 2050

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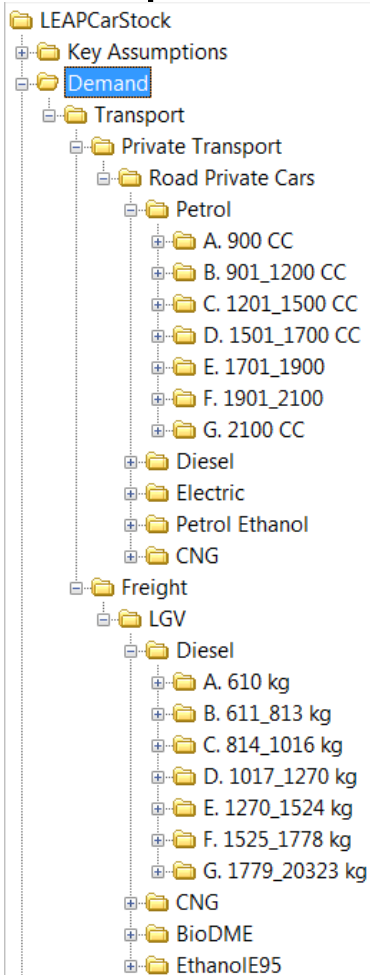
- Multi-sectoral demand model (Transport, Residential, Industry, Services, Agriculture, Elec gen)
- Detailed sub-sectoral models for residential, transport, industry & agriculture. Less detailed Services sector
- Projections to 2050
- Base-Year (BY): 2013



LEAP Ireland 2050

LEAP Ireland 2050

Transport



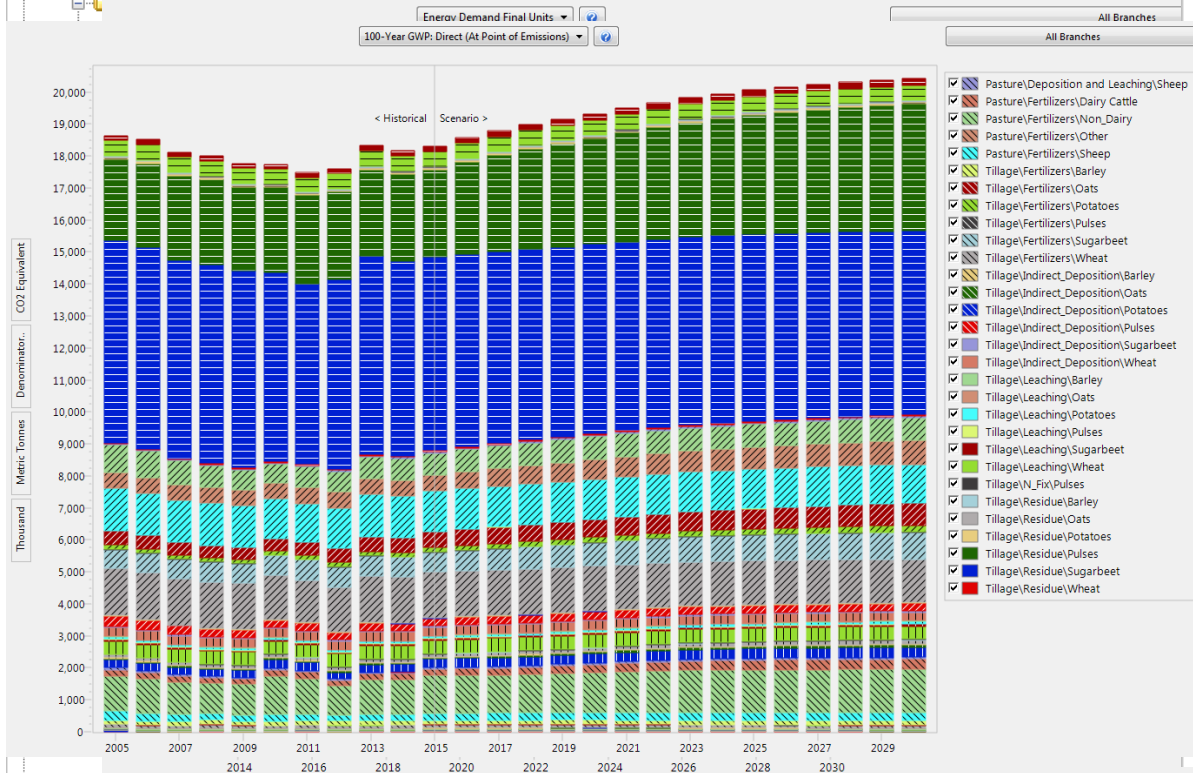
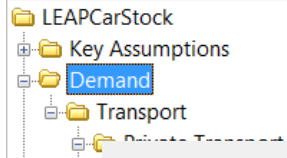
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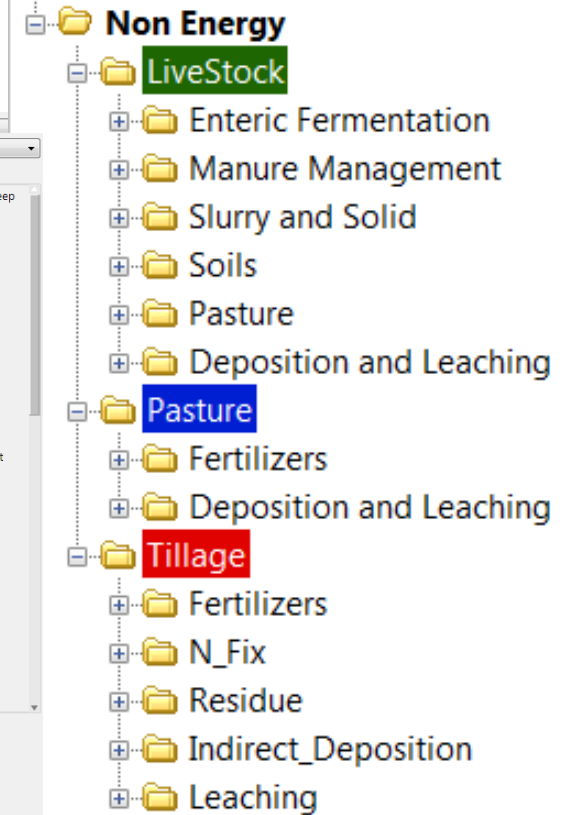
LEAP Ireland 2050

Transport



- BioDME
- EthanolE95

Agriculture



Thank You



Environmental Protection Agency



UCC

University College Cork, Ireland
Coláiste na hOllscoile Corcaigh



Environmental
Research
Institute



A World Leading SFI Research Centre