

	A	B	C	D	E	F	G	H	I	J	K	L
1												
2												
3	<b>Why invest in gas? Benefits of natural gas infrastructure for the North West</b>											
4												
5	<b>WDC Policy Briefing no. 5</b>											
6												
7	This file contains the source data and calculations for the estimates and figures in the Policy Briefing											
8												
9	If you have any queries please contact <a href="mailto:helenmchenry@wdc.ie">helenmchenry@wdc.ie</a>											
10												
11												
12	<b>Contents</b>											
13	Formulae Carbon Charge (2)											
14	Carbon Charge (3)											
15	Fuel Cost Save Formulae (4)											
16	Fuel Cost Save (5)											
17	Tables Emissions Bth (6)											
18	I&C Carbon Emission Saving (7)											
19	Domestic (8)											
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21	Domestic Carbon Emission (10)											
22												

	A	B	C	D	E	F
1	<b>To calculate the amount of Carbon Charge paid in 11 North Western Towns compared to that which would be paid if using natural gas (Policy Briefing page 10)</b>					
2	<b>Calculations for both I/C and Domestic</b>					
3						
4	Data on fuel use by I/C users is taken from Work sheet on fuel cost savings estimate.					
5	This combined data for all I/C users (large with medium and small) to estimate percentage rate of change from different fuel types (see fuel cost worksheet for full explanation).					
6						
7		<b>MFO</b>	<b>Gas oil</b>	<b>Electricity</b>	check	
8	All I/C (proportions of estimated load and proportions of fuel types combined.	0.69260124940537	0.242584554123585	0.064814196471045	1	
9						
10	<i>To calculate carbon charge payable total estimated load for 11 North West Towns from Gaslink New Towns Analysis Phase III is used.</i>					
11						
12	<b>Conversion of carbon charges as given in Finance Act into carbon charge in € per MWh</b>					
13						
14	Rates used in this calculation are from Schedule 2A Finance Act 2010.					
15	The Act does not provide specify rates for all different forms of fuel oil so it is assumed that Gas oil is the same rates as 'other fuel oil'					
16						
17	(as is indicated in table below which provided details for carbon charge returns to revenue) and that MFO is the rate for 'fuel oil (as also in table from revenue.ie)					
18	<b>Natural gas</b>	<b>Rate</b>				
19	Rate €3.07 as stated in Finance Act **para 67	<b>3.07</b>	€/MWh			
20						
21						
22	<b>MFO</b>					
23	Charge is €45.95 per 1,000 litres (Finance Act 2010 Schedule 2A) which is 4595c per 1,000					
24	NCV^ (Net Calorific Value (i.e. how many kWh of energy from a litre) of HFO^ is 10.786 kWh per litre or 10,786 kWh per 1,000 litres					
25	Therefore carbon charge (c/kWh) is 4595/10786	=4595/10786	c/kWh			
26	Converting to € per MWh	=B25*1000/100	€/MWh			
27						
28	<b>Gas Oil</b>					
29	Charge is €41.30 per 1,000 litres (Finance Act 2010 Schedule 2A) which is 4130c per 1,000					
30	NCV^ (Net Calorific Value (i.e. how many kWh of energy from a litre) of Gas Oil is 10.169 kWh per litre or 10,169 kWh per 1,000 litres					
31	Therefore carbon charge (c/kWh) is 4130/10169	=4130/10169	c/kWh			
32	Converting to € per MWh	=B31*1000/100	€/MWh			
33						

	A	B	C	D	E	F
34	<b>Kerosene</b>					
35	Charge is €38.02 per 1,000 litres (Finance Act 2010 Schedule 2A) which is 3802c per 1,000					
36	NCV^ (Net Calorific Value (i.e. how many kWh of energy from a litre) of Kerosene 9.821 kWh per litre or 9,821 kWh per 1,000 litres					
37	Therefore carbon charge is 3802/9821	=3802/9821	c/kWh			
38	Converting to € per MWh	=B37*1000/100	€/MWh			
39						
40	<b>LPG</b>					
41	Charge is €24.64 per 1,000 litres Finance Act 2010 which is 2464c per 1,000 litres					
42	NCV^ (Net Calorific Value (i.e. how many kWh of energy from a litre) of LPG is 6.84 kWh per litre or 6840 kWh per 1,000 litres					
43	Therefore carbon charge is 2464/6840	=2464/6840	c/kWh			
44	Converting to € per MWh	=B43*1000/100	€/MWh			
45						
46	^ NCV from SEAI See below (end of worksheet)					
47	^^NCV not given for MFO. HFO rate assumed.					
48						
49	<b>Carbon charge rates (€ per MWh)</b>	<b>€ per MWh</b>				
50	Natural gas	=B19				
51	MFO	=B26				
52	Gas oil	=B32				
53	Electricity*	0				
54	Distillate (Kerosene)	=B38				
55	Peat**	0				
56	Coal**	0				
57	LPG	3.6				
58						
59	* No carbon charge					
60	**carbon charge not yet introduced. Currently no carbon charge					
61						
62	Town	Estimated Industrial and Commercial Annual Consumption in	Carbon tax payable if fuels used in proportions above €	Carbon tax payable if natural gas were used €	Difference € for one year	
63	<b>TOTAL</b>	570601	=(B63*\$B\$8*\$B\$26)+(B63*\$C\$8*\$B\$32)+(B63*\$D\$8*\$B\$53)	=B63*\$B\$50	=C63-D63	
64						
65	If I/C users were able to switch to natural gas then the overall carbon charge payable by I/C users would be €494,032 less than currently					
66						

	A	B	C	D	E	F
67						
68	<b>DOMESTIC/RESIDENTIAL</b>					
69	<b>Residential users expected to switch to natural gas from fuels in percentages below</b>					
70		Distillates	Coal	Electricity	Peat	
71	Residential	0.7	0.1	0.1	0.1	
72						
73						
74	Town	New Housing Load (Forecast Summary, year 10) (MWh)	Carbon tax payable if fuels used in proportions above €	Carbon tax payable if natural gas were used €	Difference € for one year	
75	<b>TOTAL</b>	<b>139447</b>	$=(B75*B71*B54)+(B75*C71*B56)+(B75*D71*B53)+(B75*E71*B55)$	428102.29	$=C75-D75$	
76	If Domestic users were able to switch to natural gas then the overall carbon charge payable by new domestic connections users would be €50,214 less than currently paid (as carbon charges not on coal, peat or electricity)					
77						
78						
79						
80	Overall in the 11 NW towns if both I/C users and Domestic users could switch to natural gas the amount of carbon tax payable would be less				$=E63+E75$	
81						
82	<b>Notes</b>					
83						
84	<b>What net calorific values do you use?</b>					
85		toe/tonne	kWh/litre			
86	Kerosene	1.0556	9.821			
87	Crude Oil	1.0226	11.146			
88	Gasoline(Petrol)	1.065	9.348			
89	Diesel /Gasoil	1.0344	10.169			
90	Heavy Fuel Oil	0.9849	10.786			
91	LPG	1.1263	6.84			
92	Biodiesel	0.8901	9.113			
93	Bioethanol	0.6304	5.865			
94	Pure Plant Oil	0.8907	9.53			
95						
96	<b>Source:</b> <a href="http://www.seai.ie/Publications/Statistics_Publications/Statistics_FAQ/data_and_data_manipulation_FAQ/#What_net_calorific">http://www.seai.ie/Publications/Statistics_Publications/Statistics_FAQ/data_and_data_manipulation_FAQ/#What_net_calorific</a>					
97						
98	Rates used in this calculation are from Schedule 2A Finance Act 2010.					
99	The Act does not provide specify rates for all different forms of fuel oil so it is assumed that Gas oil is the same rates as 'other fuel oil' (as is indicated in table below which provided details for carbon charge returns to revenue) and that MFO is the rate for 'fuel oil (as also in table from revenue.ie).					

	A	B	C	D	E	F										
100																
101																
102	3	The rates of Carbon Charge applicable from 01/05/2010 are as follows:														
103		<table border="1"> <thead> <tr> <th>Description of Mineral Oil</th> <th>Rate</th> </tr> </thead> <tbody> <tr> <td>Marked Gas Oil.....</td> <td>€0.0413 per litre</td> </tr> <tr> <td>Marked kerosene.....</td> <td>€0.03802 per litre</td> </tr> <tr> <td>Fuel oil.....</td> <td>€0.04595 per litre</td> </tr> <tr> <td>LPG.....</td> <td>€0.02464 per litre</td> </tr> </tbody> </table>		Description of Mineral Oil	Rate	Marked Gas Oil.....	€0.0413 per litre	Marked kerosene.....	€0.03802 per litre	Fuel oil.....	€0.04595 per litre	LPG.....	€0.02464 per litre			
Description of Mineral Oil	Rate															
Marked Gas Oil.....	€0.0413 per litre															
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	A	B	C	D	E
1	<b>To calculate the amount of Carbon Charge paid in 11 North Western Towns compared to that which would be paid if using natural gas (Policy Briefing page 10)</b>				
2	<b>Calculations for both I/C and Domestic</b>				
3					
4	Data on fuel use by I/C users is taken from Work sheet on fuel cost savings estimate.				
5	This combined data for all I/C users (large with medium and small) to estimate percentage rate of change from different fuel types (see fuel cost worksheet for full explanation).				
6					
7		<b>MFO</b>	<b>Gas oil</b>	<b>Electricity</b>	<b>check</b>
8	All I/C (proportions of estimated load and proportions of fuel types combined)	69.3%	24.3%	6.5%	100.0%
9					
10	To calculate carbon charge payable total estimated load for 11 North West Towns from Gaslink New Towns Analysis Phase III is used				
11					
12	<b>Conversion of carbon charges as given in Finance Act into carbon charge in € per MWh.</b>				
13					
14	Rates used in this calculation are from Schedule 2A Finance Act 2010.				
15	The Act does not provide specify rates for all different forms of fuel oil so it is assumed that Gas oil is the same rates as 'other fuel oil'				
16	(as is indicated in table below which provided details for carbon charge returns to revenue) and that MFO is the rate for 'fuel oil (as also in				
17	table from revenue.ie)				
18					
19	<b>Natural gas</b>	Rate			
20	Rate €3.07 as stated in Finance Act **para 67	3.07	€/MWh		
21					
22	<b>MFO</b>				
23	Charge is €45.95 per 1,000 litres (Finance Act 2010 Schedule 2A) which is 4595c per 1,000				
24	NCV^ (Net Calorific Value (i.e. how many kWh of energy from a litre) of HFO^ is 10.786 kWh per litre or 10,786 kWh per 1,000 litres				
25	Therefore carbon charge (c/kWh) is 4595/107	0.426	c/kWh		
26	Converting to € per MWh	4.26	€/MWh		
27					
28	<b>Gas Oil</b>				
29	Charge is €41.30 per 1,000 litres (Finance Act 2010 Schedule 2A) which is 4130c per 1,000				
30	NCV^ (Net Calorific Value (i.e. how many kWh of energy from a litre) of Gas Oil is 10.169 kWh per litre or 10,169 kWh per 1,000 litres				
31	Therefore carbon charge (c/kWh) is 4130/101	0.406	c/kWh		
32	Converting to € per MWh	4.06	€/MWh		
33					
34	<b>Kerosene</b>				
35	Charge is €38.02 per 1,000 litres (Finance Act 2010 Schedule 2A) which is 3802c per 1,000				
36	NCV^ (Net Calorific Value (i.e. how many kWh of energy from a litre) of Kerosene 9.821 kWh per litre or 9,821 kWh per 1,000 litres				
37					
38	Therefore carbon charge is 3802/9821	0.387	c/kWh		
39	Converting to € per MWh	3.87	€/MWh		
40					

	A	B	C	D	E
41	<b>LPG</b>				
42	Charge is €24.64 per 1,000 litres Finance Act 2010 which is 2464c per 1,000 litres				
43	NCV^ (Net Calorific Value (i.e. how many kWh of energy from a litre) of LPG is 6.84 kWh per litre or 6840 kWh per 1,000 litres				
44					
45	Therefore carbon charge is 2464/6840	0.360	c/kWh		
46	Converting to € per MWh	3.60	€/MWh		
47					
48	^ NCV from SEAI See below (end of worksheet)				
49	^^NCV not given for MFO. HFO rate assumed.				
50					
51	<b>Carbon charge rates (€ per MWh)</b>	<b>€ per MWh</b>			
52	Natural gas	3.07			
53	MFO	4.26			
54	Gas oil	4.06			
55	Electricity*	0			
56	Distillate (Kerosene)	3.87			
57	Peat**	0			
58	Coal**	0			
59	LPG	3.6			
60	* No carbon charge				
61	**carbon charge not yet introduced. Currently no carbon charge				
62					
63	Town	Estimated Industrial and Commercial Annual Consumption in year 7(MWh)	Carbon tax payable if fuels used in proportions above €	Carbon tax payable if natural gas were used €	Difference € for one year
64	<b>TOTAL</b>	570,601	€2,245,777	€1,751,745	€494,032
65					
66	If I/C users were able to switch to natural gas then the overall carbon charge payable by I/C users would be €494,032 less than currently				
67					
68	<b>DOMESTIC/RESIDENTIAL</b>				
69	<b>Residential users expected to switch to natural gas from fuels in percentages below</b>				
70		<b>Distillates</b>	<b>Coal</b>	<b>Electricity</b>	<b>Peat</b>
71	Residential	70%	10%	10%	10%
72					
73	Town	New Housing Load (Forecast Summary, year 10) (MWh)	Carbon tax payable if fuels used in proportions above €	Carbon tax payable if natural gas were used €	Difference € for one year
74	<b>TOTAL</b>	139,447	€377,888	€428,102	-€50,214
75					
76	If Domestic users were able to switch to natural gas then the overall carbon charge payable by new domestic connections users would be €50,214 less than currently paid (as carbon charges not on coal, peat or electricity)				
77	(though as noted elsewhere actual fuel savings are higher)				
78					

	A	B	C	D	E
79	Overall in the 11 NW towns if both I/C users and Domestic users could switch to natural gas the amount of carbon tax payable would be less				€443,819
80					
81	<b>Notes</b>				
82					
83					
84					
85	<b>What net calorific values do you use?</b>				
86		toe/tonne		kWh/litre	
87	Kerosene	1.0556		9.821	
88	Crude Oil	1.0226		11.146	
89	Gasoline(Petrol)	1.065		9.348	
90	Diesel /Gasoil	1.0344		10.169	
91	Heavy Fuel Oil	0.9849		10.786	
92	LPG	1.1263		6.84	
93	Biodiesel	0.8901		9.113	
94	Bioethanol	0.6304		5.865	
95	Pure Plant Oil	0.8907		9.53	
96					
97	<b>Source:</b> <a href="http://www.seai.ie/Publications/Statistics_Publications/Statistics_FAQ/data_and_data_manipulation_FAQ/#What_net_calorific">http://www.seai.ie/Publications/Statistics_Publications/Statistics_FAQ/data_and_data_manipulation_FAQ/#What_net_calorific</a>				
98	Rates used in this calculation are from Schedule 2A Finance Act 2010.				
99	The Act does not provide specify rates for all different forms of fuel oil so it is assumed that Gas oil is the same rates as 'other fuel oil' (as is indicated in table below which provided details for carbon charge returns to revenue) and that MFO is the rate for 'fuel oil' (as also in table from revenue.ie).				
100	3 The rates of Carbon Charge applicable from 01/05/2010 are as follows:				
101					
102					
103					
104					
105					
106					
107					
108					
109					
110					
111					
112					
113					
114					
115	<b>Source:</b> <a href="http://www.revenue.ie/en/tax/excise/forms/refund-mineral-oil-tax-carbon-charge.pdf">www.revenue.ie/en/tax/excise/forms/refund-mineral-oil-tax-carbon-charge.pdf</a>				

Description of Mineral Oil	Rate
Marked Gas Oil.....	€0.0413 per litre
Marked kerosene.....	€0.03802 per litre
Fuel oil.....	€0.04595 per litre
LPG.....	€0.02464 per litre



	A	B	C	D	E	F	G	H
1	<b>Fuel cost savings for I/C users in 11 towns, *Large and Small and medium users</b>							
2	<b>(Policy Briefing page 7)</b>							
3								
4	<i>To estimate fuel to be switched from Gas to the North West* study used. Percentage estimates given in report Appendix G</i>							
5	<i>*Fingleton White et al., 2007, Gas to the Northwest Feasibility Study commissioned by DCMNR.</i>							
6								
7	Assumptions that 'fuel oil' is Medium Fuel Oil (MFO), that Distillates are Gas oil; that the electricity rate payable is SEAI medium band (for 500-2000 MWh per annum). Natural gas rate Band I2 >=1000<10,000 GJ per annum							
8	Prices for MFO and Gas oil and Electricity from SEAI Fuel cost comparison Commercial/ Industrial Fuels Comparison of Energy Costs 01 July 2011							
9								
10	<i>To estimate fuel to be switched from (from Gas to the NW study). Percentage estimates given in report Appendix G</i>							
11								
12	<b>Users expected to switch to natural gas from fuels in percentages below</b>							
13		<b>MFO</b>	<b>Gas oil</b>	<b>Electricity</b>				
14	Large I/C users	0.9	0.05	0.05				
15	Medium & Small users	0.2	0.7	0.1				
16								
17								
18	<i>Then to Estimate proportion of Large and Small and Medium users.</i>							
19								
20	Gaslink New towns analysis gives total estimated load for each town. However while it lists the number of large users it does not give information of size of large loads. It was therefore necessary to use the figures from the Gas to the NW study to estimate proportion of load which could be categorised as large (and small and medium). The report gave potential loads estimated for Large, Medium and Small I/C for two different route options. Route A included Castlebar, Route C included Ballyhaunis, Claremorris and Ballaghaderreen. An average of the two routes was taken to give an estimate of the proportion of the load which can be considered Large I/C and that which can be considered Small and Medium I/C.							
21								
22		<b>Route A (k therms)</b>	<b>%</b>	<b>Route C (k therms)</b>	<b>%</b>	<b>Average%</b>	<b>Combining M&amp;S I/C</b>	
23	Large I/C	3967	=B23/\$B\$26	7679	=D23/\$D\$26	=(C23+E23)/2	=F23	
24	Medium I/C	880	=B24/\$B\$26	846	=D24/\$D\$26	=(C24+E24)/2	=F24+F25	
25	Small I/C	1412	=B25/\$B\$26	1401	=D25/\$D\$26	=(C25+E25)/2		
26	Total	=SUM(B23:B25)	=B26/\$B\$26	=SUM(D23:D25)	=D26/\$D\$26	=(C26+E26)/2		
27								
28								
29	<i>Then combine data for all I/C users (large with medium and small) to estimate percentage rate of change from different fuel types.</i>							
30								
31		<b>MFO</b>	<b>Gas oil</b>	<b>Electricity</b>	<b>check</b>			
32	All I/C (proportions of estimated load and proportions of fuel types combined..	=(B14*\$G\$23)+(B15*\$G\$24)	=(C14*\$G\$23)+(C15*\$G\$24)	=(D14*\$G\$23)+(D15*\$G\$24)	=B32+C32+D32			

	A	B	C	D	E	F	G	H
33								
34	<i>To Calculate Fuel Cost savings total estimated load for 11 North West Towns from Gaslink New Towns Analysis Phase III is used.</i>							
35	<b>Town</b>	<b>Estimated Industrial and Commercial Annual Consumption in year 7 (MWh)</b>						
36	Ballyshannon	9588						
37	Bundoran	10349						
38	Donegal	43934						
39	Lifford	4650						
40	Letterkenny	50969						
41	Sligo	70379						
42	Boyle	6310						
43	Carrick on Shannon	248744						
44	Roscommon	32820						
45	Strokestown	4407						
46	Ballaghaderreen	88451						
47	<b>TOTAL</b>	<b>=SUM(B36:B46)</b>						
48								
49		<b>MFO</b>	<b>Gas Oil</b>	<b>Electricity*</b>	<b>Natural gas^</b>			
50	<b>Price c/kWh (SEAI I/C fuel comparison July 2011)</b>	8.09	9.16	12.75	4.25			
51								
52	<i>To Estimate fuel cost savings if switch to natural gas</i>							
53	<b>Fuel Cost Savings</b>	<b>MFO</b>	<b>Gas Oil</b>	<b>Electricity*</b>	<b>Total for 3 fuels</b>	<b>Natural gas*</b>	<b>Diff between cost of natl gas &amp; alternative fuels</b>	
54	Proportion of load for each fuel MWh	=B47*B32	=B47*C32	=B47*D32		=B54+C54+D54		
55	Price c/kWh (SEAI I/C fuel comparison July 2011) less	=B50*0.8	=C50*0.8	=D50		=E50		
56	Price €/MWh	=B55*1000/100	=C55*1000/100	=D55*1000/100		=F55*1000/100		
57								
58	Cost of estimated load for mix of 3 fuels	=B54*B56	=C54*C56	=D54*D56	=B58+C58+D58	=F54*F56	<b>=E58-F58</b>	
59								
60	* Band IC . =500<2000 MWh per annum							
61	**20% rebate assumed, SEAI Fuel cost comparison Note 2: 'Rebate may reduce the fuel cost in the region of 20-25% depending on various market conditions							
62	^Natural gas rate Band I2 >=1000<10,000 GJ per annum							
63	<b>The estimated annual saving for users in the 11 towns if they could switch to natural gas would be €16,185,416</b>							

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1	<b>Fuel cost savings for I/C users in 11 towns, *Large and Small and medium users</b>							
2	<b>(Policy Briefing page 7)</b>							
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5	<i>*Fingleton White et al., 2007, Gas to the Northwest Feasibility Study commissioned by DCMNR.</i>							
6								
7	Assumptions that 'fuel oil' is Medium Fuel Oil (MFO), that Distillates are Gas oil; that the electricity rate payable is SEAI medium band (for 500-2000 MWh per annum). Natural gas rate Band I2 >=1000<10,000 GJ per annum							
8	Prices for MFO and Gas oil and Electricity from SEAI Fuel cost comparison Commercial/ Industrial Fuels Comparison of Energy Costs 01 July 2011							
9								
10	<i>To estimate fuel to be switched from (from Gas to the NW study). Percentage estimates given in report Appendix G</i>							
11								
12	<b>Users expected to switch to natural gas from fuels in percentages below</b>							
13		MFO	Gas oil	Electricity				
14	Large I/C users	90%	5%	5%				
15	Medium & Small users	20%	70%	10%				
16								
17								
18	<i>Then to Estimate proportion of Large and Small and Medium users.</i>							
19								
20	Gaslink New towns analysis gives total estimated load for each town. However while it lists the number of large users it does not give information of size of large loads. It was therefore necessary to use the figures from the Gas to the NW study to estimate proportion of load which could be categorised as large (and small and medium). The report gave potential loads estimated for Large, Medium and Small I/C for two different route options. Route A included Castlebar, Route C included Ballyhaunis, Claremorris and Ballaghaderreen. An average of the two routes was taken to give an estimate of the proportion of the load which can be considered Large I/C and that which can be considered Small and Medium I/C.							
21								
22		<b>Route A (k therms)</b>	<b>%</b>	<b>Route C (k therms)</b>	<b>%</b>	<b>Average%</b>	<b>Combining M&amp;S I/C</b>	
23	Large I/C	3,967	63%	7,679	77%	70%	70.4%	
24	Medium I/C	880	14%	846	9%	11%		
25	Small I/C	1,412	23%	1,401	14%	18%	29.6%	
26	Total	6,259	100%	9,926	100%	100%		
27								
28								
29	<i>Then combine data for all I/C users (large with medium and small) to estimate percentage rate of change from different fuel types.</i>							
30		<b>MFO</b>	<b>Gas oil</b>	<b>Electricity</b>	<b>check</b>			
31	All I/C (proportions of estimated load and proportions of fuel types combined.	69.3%	24.3%	6.5%	100.0%			

	A	B	C	D	E	F	G	H
32								
33	To Calculate Fuel Cost savings total estimated load for 11 North West Towns from Gaslink New Towns Analysis Phase III is used.							
34								
35	<b>Town</b>	<b>Estimated Industrial and Commercial Annual Consumption in year 7 (MWh)</b>						
36	Ballyshannon	9,588						
37	Bundoran	10,349						
38	Donegal	43,934						
39	Lifford	4,650						
40	Letterkenny	50,969						
41	Sligo	70,379						
42	Boyle	6,310						
43	Carrick on Shannon	248,744						
44	Roscommon	32,820						
45	Strokestown	4,407						
46	Ballaghaderreen	88,451						
47	<b>TOTAL</b>	<b>570,601</b>						
48								
49		<b>MFO</b>	<b>Gas Oil</b>	<b>Electricity*</b>	<b>Natural gas^</b>			
50	<b>Price c/kWh (SEAI I/C fuel comparison July 2011)</b>	8.09	9.16	12.75	4.25			
51								
52	<i>To Estimate fuel cost savings if switch to natural gas.</i>							
53	<b>Fuel Cost Savings</b>	<b>MFO</b>	<b>Gas Oil</b>	<b>Electricity*</b>	<b>Total for 3 fuels</b>	<b>Natural gas*</b>	<b>Difference between cost of natural gas and alternative fuels</b>	
54	Proportion of load for each fuel MWh	395,199	138,419	36,983		570,601		
55	Price c/kWh (SEAI I/C fuel comparison July 2011) less 20%**	6.47	7.33	12.75		4.25		
56	Price €/MWh	€64.72	€73.28	€127.50		€42.50		
57								
58	Cost of estimated load for mix of 3 fuels	€25,577,277	€10,143,344	€4,715,338	€40,435,959	€24,250,543	<b>€16,185,416</b>	
59								
60	* Band IC .=500<2000 MWh per annum							
61	**20% rebate assumed, SEAI Fuel cost comparison Note 2:'Rebate may reduce the fuel cost in the region of 20-25% depending on various market conditions.							
62	^Natural gas rate Band I2 >=1000<10,000 GJ per annum							
63	<b>The estimated annual saving for users in the 11 towns if they could switch to natural gas would be €16,185,416</b>							

	A	B	C	D	E	F	G	H
64								
65	<b>Fuel</b>	<b>Estimated load (MWh)</b>	<b>Price €/MWh*</b>	<b>Cost</b>				
66	Medium Fuel Oil (MFO)	395,199	€64.72	€25,577,277				
67	Gas Oil	138,419	€73.28	€10,143,344				
68	Electricity	36,983	€127.50	€4,715,338				
69	<b>Total</b>	<b>570,601</b>		<b>€40,435,959</b>				
70	Natural gas	570,601	€42.50	€24,250,543				
71	<b>Annual Saving</b>			<b>€16,185,416</b>				

	A	B	C	D	E	F	G
1	Policy Briefing Page 10						
2							
3							
4	<b>Estimate of carbon emission savings if switch to natural gas.</b>						
5	<b>Fuel Cost Savings</b>	<b>MFO</b>	<b>Gas Oil</b>	<b>Electricity</b>	<b>Total for 3 fuels</b>	<b>Natural gas</b>	
6	Proportion of load for each fuel MWh	395,199	138,419	36,983	570,601	570,601	
7	Emissions Factors^ (g CO2/kWh)	273.6	263.9	533.0		205.6	
8	EF tonnes CO2/MWh	0.2736	0.2639	0.5330		0.2056	
9	Emissions for fuel (t CO2)	108,126	36,529	19,712	164,367	117,316	
10			Tonnes CO2 saved annually		47,052		
11			Value (annually) if CO2 €15/t		€705,774		
12							
13							
14		<b>Kerosene</b>	<b>Coal</b>	<b>Electricity</b>	<b>Peat</b>	<b>Total for 4 fuels</b>	<b>Natural gas</b>
15	Proportion of load for each fuel MWh	97,613	13,945	13,945	13,945	139,447	139,447
16	Emissions Factors^ (g CO2/kWh)	257.0	340.6	533.0	374.4		205.6
17	EF tonnes CO2/MWh	0.2570	0.3406	0.5330	0.3744		0.2056
18	Emissions for fuel (t CO2)	25,087	4,750	7,433	5,221	42,490	28,670
19			Tonnes CO2 saved annually			13,819	
20			Value (annually) if CO2 €15/t			€207,288	
21							
22							
23							

Tables emissions bth (6)

	A	B	C	D	E	F	G
1	<b>Fuel cost savings for I/C users in 11 towns, *Large and Small and medium users</b>						
2	<b>(Policy Briefing page 10)</b>						
3							
4	<i>To estimate fuel to be switched from (from Gas to the NW study). Percentage estimates given in report Appendix G</i>						
5	Assumptions that 'fuel oil' is Medium Fuel Oil (MFO), that Distillates are Gas oil; that the electricity rate payable is SEAI medium band (for 500-2000 MWh per annum). Natural gas rate Band I2 >=1000<10,000 GJ per annum						
6	Prices for MFO and Gas oil and Electricity from SEAI Fuel cost comparison Commercial/ Industrial Fuels Comparison of Energy Costs 01 April 2011						
7							
8	<i>To estimate fuel to be switched from (from Gas to the NW study). Percentage estimates given in report Appendix G</i>						
9							
10	Users expected to switch to natural gas from fuels in percentages below						
11		<b>MFO</b>	<b>Gas oil</b>	<b>Electricity</b>			
12	Large I/C users	90%	5%	5%			
13	Medium & Small users	20%	70%	10%			
14							
15	<i>Then to Estimate proportion of Large and Small and Medium users</i>						
16							
17	Gaslink New towns analysis gives total estimated load for each town. However while it lists the number of large users it does not give information of size of large loads. It was therefore necessary to use the figures from the Gas to the NW study to estimate proportion of load which could be categorised as large (and small and medium). The report gave potential loads estimated for Large, Medium and Small I/C for two different route options. Route A included Castlebar, Route C included Ballyhaunis, Claremorris and Ballaghaderreen. An average of the two routes was taken to give an estimate of the proportion of the load which can be considered Large I/C and that which can be considered Small and Medium I/C.						
18							
19		<b>Route A</b>	<b>%</b>	<b>Route C</b>	<b>%</b>	<b>Average%</b>	<b>Combining M&amp;S I/C</b>
20	Large I/C	3,967	63%	7,679	77%	70%	70.4%
21	Medium I/C	880	14%	846	9%	11%	29.6%
22	Small I/C	1,412	23%	1,401	14%	18%	
23	Total	6,259	100%	9,926	100%	100%	
24							
25	<i>Then combine data for all I/C users (large with medium and small) to estimate percentage rate of change from different fuel types.</i>						
26		<b>MFO</b>	<b>Gas oil</b>	<b>Electricity</b>	<b>check</b>		
27	All I/C (proportions of estimated load and proportions of fuel types combined.	69.3%	24.3%	6.5%	100.0%		
28							

	A	B	C	D	E	F	G
29	<b>To Calculate Fuel Cost savings total estimated load for 11 North West Towns from Gaslink New Towns Analysis Phase III is used.</b>						
30							
31	<b>Town</b>	<b>Estimated Industrial and Commercial Annual Consumption in year 7 (MWh)</b>					
32	Ballyshannon	9,588					
33	Bundoran	10,349					
34	Donegal	43,934					
35	Lifford	4,650					
36	Letterkenny	50,969					
37	Sligo	70,379					
38	Boyle	6,310					
39	Carrick on Shannon	248,744					
40	Roscommon	32,820					
41	Strokestown	4,407					
42	Ballaghaderreen	88,451					
43	<b>TOTAL</b>	<b>570,601</b>					
44							
45	<b>Estimate of carbon emission savings if switch to natural gas</b>						
46	<b>Fuel Cost Savings</b>	<b>MFO*</b>	<b>Gas Oil**</b>	<b>Electricity***</b>	<b>Total for 3 fuels</b>	<b>Natural gas*</b>	
47	Proportion of load for each fuel MWh	395,199	138,419	36,983	570,601	570,601	
48	Emissions Factors^ (g CO <sub>2</sub> /kWh)	273.6	263.9	533.0		205.6	
49	EF tonnes CO <sub>2</sub> /MWh	0.2736	0.2639	0.5330		0.2056	
50	Emissions for fuel (t CO <sub>2</sub> )	108,126	36,529	19,712	164,367	117,316	
51			Tonnes CO <sub>2</sub> saved annually		47,052		
52			Value (annually) if CO <sub>2</sub> €15/t		€705,774		
53							
54	^ <b>Source:</b> SEAI <a href="http://www.seai.ie/Publications/Statistics_Publications/Emission_Factors/">http://www.seai.ie/Publications/Statistics_Publications/Emission_Factors/</a>						
55	* Residual oil EF						
56	**Gas/Diesel oil EF						
57	*** 2009 factor						



	A	B	C	D	E	F	G	H	I
1	<b>Fuel cost savings for Domestic users in 11 towns</b>								
2	<b>(Policy Briefing page 9)</b>								
3									
4	<i>To estimate fuel to be switched from (from Gas to the NW study). Percentage estimates given in report Appendix G</i>								
5	Prices for fuels from SEAI Fuel cost comparison Comparison of Energy Costs 01 July 2011								
6									
7	<i>To estimate fuel to be switched from (from Gas to the NW study). Percentage estimates given in report Appendix G</i>								
8									
9	<b>Residential users expected to switch to natural gas from fuels in percentages below</b>								
10		<b>Distillates</b>	<b>Coal</b>	<b>Electricity</b>	<b>Peat</b>				
11	Residential	70%	10%	10%	10%				
12									
13	Distillates are assumed to be kerosene								
14									
15	<b>Rates used (SEAI July 2011):</b>								
16	Distillates (Kerosene)	7.93c/kWh							
17	Coal (Standard coal)	4.43c/kWh							
18	Electricity (Band DC>=2500<5000kWh per annum)	18.75c/kWh							
19	Peat (Briquettes, Baled)	5.82c/kWh							
20	Natural Gas (Band D>=20<200GJ per annum)	5.27c/kWh							
21									
22	<b>Town</b>	<b>New Housing Load (Forecast Summary, year 10) (MWh)</b>							
23	Ballyshannon	4,420	29 new connections each year				29		
24	Bundoran	3,048	20 new connections each year				20		
25	Donegal	3,658	24 new connections each year				24		
26	Lifford	2,134	14 new connections each year				14		
27	Letterkenny	39,929	262 new connections each year				262		
28	Sligo	64,008	420 new connections each year				420		
29	Boyle	4,572	30 new connections each year				30		
30	Carrick on Shannon	5,486	36 new connections each year				36		
31	Roscommon	7,925	52 new connections each year				52		
32	Strokestown*	1,219	8 new connections each year				8		
33	Ballaghaderreen	3,048	20 new connections each year				20		
34	<b>TOTAL</b>	<b>139,447</b>					915		

	A	B	C	D	E	F	G	H	I
35	* estimated as original as Figure in Report incorrect (estimate based on forecast of 8 new houses per year and demand per house as in New Towns Analysis)								
36									
37	<i>To Estimate fuel cost savings if switch to natural gas.</i>								
38	<b>Fuel Cost Savings</b>	<b>Kerosene</b>	<b>Coal</b>	<b>Electricity</b>	<b>Peat</b>	<b>Total for 4 fuels</b>	<b>Natural gas*</b>	<b>Difference between cost of natural gas and alternative fuels</b>	
39	Proportion of load for each fuel MWh	97,613	13,945	13,945	13,945	139,447	139,447		
40	Price c/kWh (SEAI Domestic fuel comparison July 2011)	7.93	4.43	18.75	5.82		5.27		
41	Price €/MWh	€79.30	€44.30	€187.50	€58.20		€52.70		
42									
43	Cost of estimated load for mix of 3 fuels	€7,740,703	€617,750	€2,614,631	€811,582	€11,784,666	€7,348,857	<b>€4,435,809</b>	
44									
45	* see above for rate used.								
46									
47	<b>The estimated annual saving for new domestic users in the 11 towns if they were connected to natural gas would be €4,435,809</b>								
48									
49	<b>Fuel</b>	<b>Estimated load (MWh)</b>	<b>Price €/MWh*</b>	<b>Cost</b>					
50	Kerosene	97,613	€79.30	€7,740,703					
51	Coal	13,945	€44.30	€617,750					
52	Electricity	13,945	€187.50	€2,614,631					
53	Peat	13,945	€58.20	€811,582					
54	<b>Total</b>	<b>139,447</b>		<b>€11,784,666</b>					
55	Natural gas	139,447	€52.70	€7,348,857					
56	<b>Annual Saving</b>			<b>€4,435,809</b>					
57									
58	New housing connections each year (as estimated for year 10)	915							
59	Total after 10 years	9150							
60									
61	Saving per house per year	€484.79							

	A	B	C	D	E	F	G	H	I
1	(Policy Briefing page 5)								
2									
3	<b>Town</b>	<b>I&amp;C load forecast year 7 (MWh)</b>	<b>New Housing Load (Forecast Summary, year 10) (MWh)</b>			<b>Total</b>			
4	Ballyshannon	9,588	4,420	29 new connections each year		14,008			
5	Bundoran	10,349	3,048	20 new connections each year		13,397			
6	Donegal	43,934	3,658	24 new connections each year		47,592			
7	Lifford	4,650	2,134	14 new connections each year		6,784			
8	Letterkenny	50,969	39,929	262 new connections each year		90,898			
9	Sligo	70,379	64,008	420 new connections each year		134,387			
10	Boyle	6,310	4,572	30 new connections each year		10,882			
11	Carrick on Shannon	248,744	5,486	36 new connections each year		254,230			
12	Roscommon	32,820	7,925	52 new connections each year		40,745			
13	Strokestown*	4,407	1,219	8 new connections each year		5,626			
14	Ballaghaderreen	88,451	3,048	20 new connections each year		91,499			
15	<b>TOTAL</b>	<b>570,601</b>	<b>139,447</b>			<b>710,048</b>			
16									
17	* estimated as original as Figure in Report incorrect (estimate based on forecast of 8 new houses per year and demand per house as in New Towns Analysis)								
18									
19									

	A	B	C	D	E	F	G	
1	<b>Carbon emissions savings for Domestic users in 11 towns</b>							
2	<b>(Policy Briefing page 10)</b>							
3								
4	To estimate fuel to be switched from (from Gas to the NW study*). Percentage estimates given in report Appendix G							
5	*Fingleton White et al., 2007, <i>Gas to the Northwest Feasibility Study</i> commissioned by DCMNR.							
6								
7	Prices for fuels from SEAI Fuel cost comparison Comparison of Energy Costs 01 April 2011							
8								
9								
10								
11	<b>Residential users expected to switch to natural gas from fuels in percentages below</b>							
12		<b>Distillates</b>	<b>Coal</b>	<b>Electricity</b>	<b>Peat</b>			
13	Residential	70%	10%	10%	10%			
14								
15	Distillates are assumed to be kerosene							
16								
17								
18	<b>Town</b>	<b>New Housing Load (Forecast Summary, year 10) (MWh)</b>						
19	Ballyshannon	4,420	29 new connections each year					
20	Bundoran	3,048	20 new connections each year					
21	Donegal	3,658	24 new connections each year					
22	Lifford	2,134	14 new connections each year					
23	Letterkenny	39,929	262 new connections each year					
24	Sligo	64,008	420 new connections each year					
25	Boyle	4,572	30 new connections each year					
26	Carrick on Shannon	5,486	36 new connections each year					
27	Roscommon	7,925	52 new connections each year					
28	Strokestown*	1,219	8 new connections each year					
29	Ballaghaderreen	3,048	20 new connections each year					
30	<b>TOTAL</b>	<b>139,447</b>						
31								
32	* estimated as original as Figure in Report incorrect (estimate based on forecast of 8 new houses per year and demand per house as in New Towns Analysis)							

	A	B	C	D	E	F	G
33	<b>Estimate of carbon emissions savings if switch to natural gas</b>						
34	<b>Fuel Cost Savings</b>	<b>Kerosene</b>	<b>Coal</b>	<b>Electricity</b>	<b>Peat*</b>	<b>Total for 4 fuels</b>	<b>Natural gas*</b>
35	Proportion of load for each fuel MWh	97,613	13,945	13,945	13,945	139,447	139,447
36	Emissions Factors^ (g CO <sub>2</sub> /kWh)	257.0	340.6	533.0	374.4		205.6
37	EF tonnes CO <sub>2</sub> /MWh	0.2570	0.3406	0.5330	0.3744		0.2056
38	Emissions for fuel (t CO <sub>2</sub> )	25,087	4,750	7,433	5,221	42,490	28,670
39				Tonnes CO <sub>2</sub> saved annually		13,819	
40				Value (annually) if CO <sub>2</sub> €15/t		€207,288	
41							
42	*sod peat						
43	* see above for rate used.						
44	<b>The estimated annual saving of emissions for new domestic users in the 11 towns if they were connected to natural gas would be €207,288</b>						
45							