



Energy Solutions for Sustainable Development

Delivering a National Strategy to Local Communities

Building Research Establishment - Ireland

Sustainability Conference

Limerick Institute of Technology

Limerick

17th June 2008



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- Top – Down policy
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- Bottom Up approach
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- Challenges & Opportunities



Policy Developments – '07

- United Nations
- IPCC – 4th Assessment, WG1 rpt 4th January '07 – Physical Science
- IPCC – 4th Assessment WG2 rpt 9th April '07 – C.C. Adaptation
- EU Policy
- Kyoto & Post Kyoto
- Proposal for EU Common Energy Policy – March '07
- Renewables, Targets & Action Plans
- National Policy
- EPA Climate Change Adaptation Report – 1st January '07
- Energy Performance Buildings Directive - BER – 1st January '07
- Micro generation planning exemptions, domestic – 6th March 2007
- White Paper on Energy – 12th March '07
- National Climate Change Strategy – 28th March '07
- National Energy Efficiency Action Plan – 2008
- Micro Generation planning exemptions – Industry-Commerce 2008



White Paper on Energy

- Key points
- 15% of electricity from renewables by 2010.
- 33% of electricity from renewables by 2020.
- 500 MW of installed ocean energy by 2020.
- 5% renewables for heat market by 2010.
- 12% renewables for heat market by 2020.
- 5.75% Biofuels penetration by 2010.
- 10% Biofuels penetration by 2020.
- National Biofuels obligation for fuel suppliers of 5% by 2009.
- 100% Pure Plant Oil (PPO) used in Local Authority & Public Bodies vehicle fleets.
- 20% energy savings on electricity & heat by 2020.
- 30% energy savings on electricity & heat by 2020, indicated if international agreement reached on Post – Kyoto measures.



White Paper on Energy

- Key points
- 33% electricity & heat savings from Public Sector.
- Promotion of IS 393 Energy Management Standard for SME's.
- Review National Building Regulations (next review 2008).
- Introduction of Building Energy Rating labels, 2007.
- Introduce "Smart Meters for all electricity consumers over next 5 years.
- €150 million investment in Energy Research, Development & Innovation (RD&I).
- Eirgrid take ownership of Electricity Transmission Grid.
- ESB subsidiary established to manage Electricity Distribution Grid.
- Gas distribution managed by BGE subsidiary.
- Inter-Departmental agency to tackle fuel poverty.
- Publish Energy Efficiency Action Plan by June 2007.



Local Interpretation of National Policy

- Established a Local Energy Agency
- Researched & Published the Limerick Clare Energy & Emissions Balance
- Researched & Published the Limerick Clare Climate Change Strategy
- Working groups established to deliver the Climate Change Strategy
- L.A. have designed offices & houses to exceed Building Regulations
- Limerick & Clare chosen to pilot new Home Energy Saving Scheme in partnership with SEI
- Energy Efficient Benchmarking scheme offered to SME's in partnership with NSAI



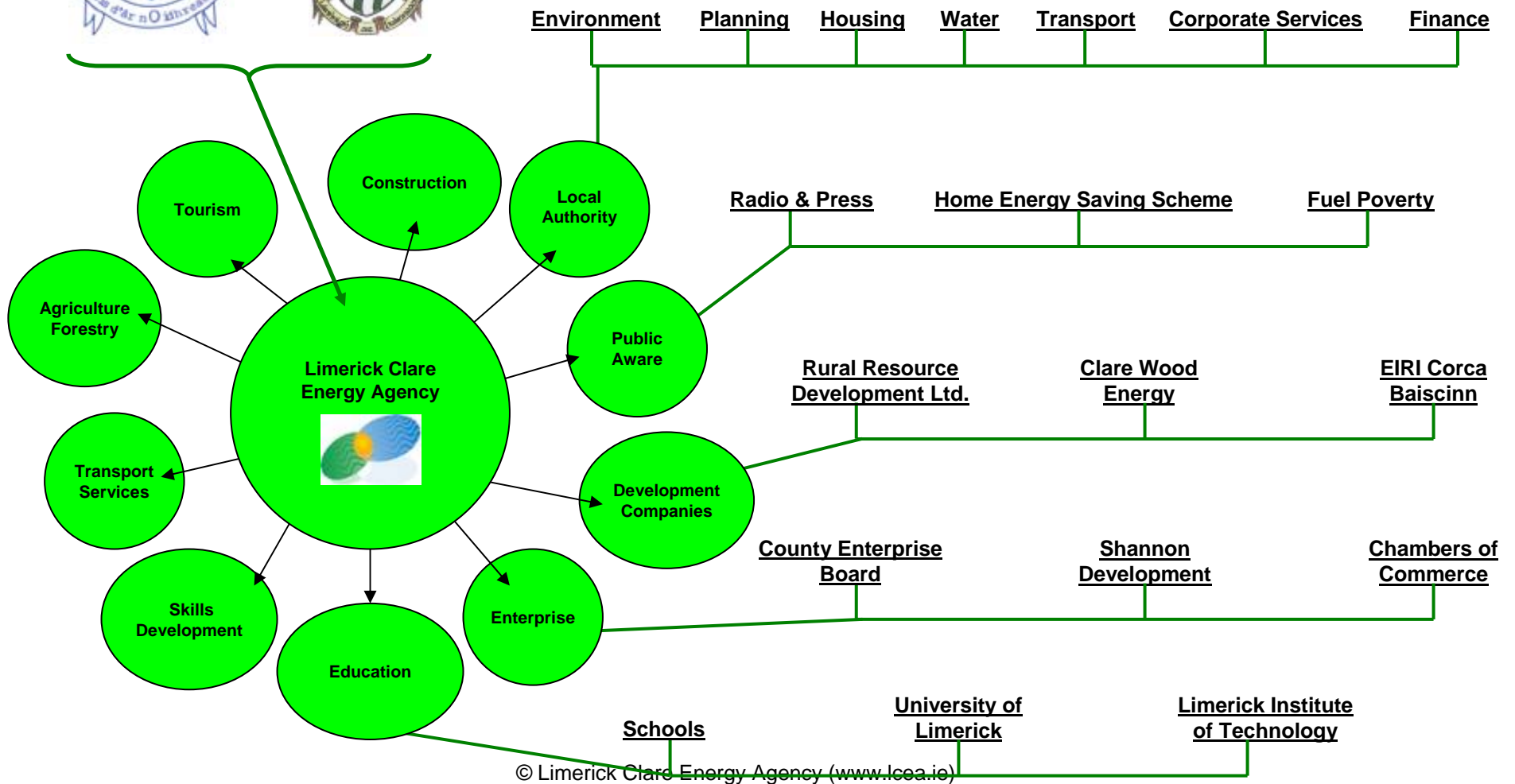
Local Interpretation of National Policy

County Limerick is in the process of creating a low carbon society and economy. Limerick County Council is endeavouring to provide local delivery of the various national policy documents on energy and climate change. Toward this end, Limerick County Council has established a local energy agency in partnership with Clare County Council; the Limerick Clare Energy Agency (LCEA). The LCEA has published a Climate Change Strategy, which sets targets for CO₂ reductions across various sectors of the local economy.

To achieve a low carbon economy & society it is important that every sector addresses the sustainable use and utilisation of resources. This requires that where practicable everybody should seek to efficiently meet their resource requirements from local indigenous resources. Those indigenous resources shall be harnessed to the optimum potential in order to meet or exceed local needs, having due consideration for national targets and the local planning guidelines.

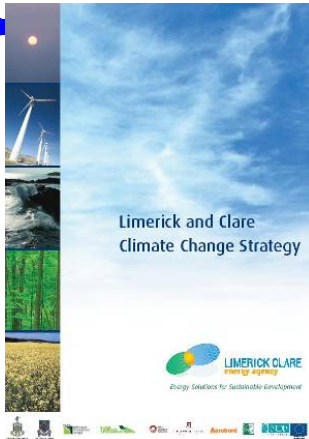


Limerick Clare Energy Agency

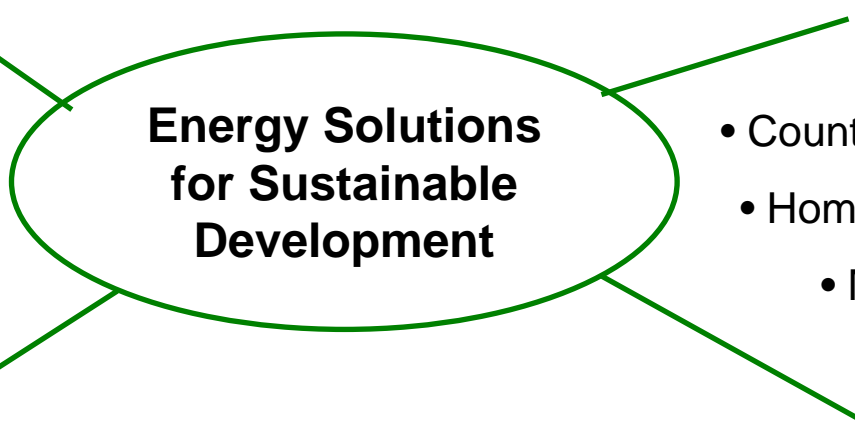
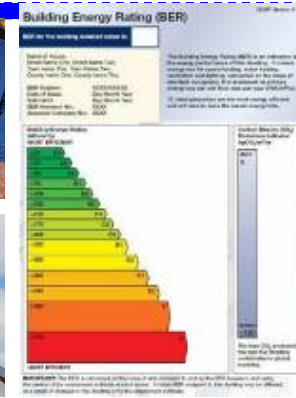




Limerick Clare Energy Agency



- Think Globally, Act Locally
- Burden sharing of national problem
- Opportunity for low carbon economy
- Foundation of first regional CCS (MWRA)



- County Fuel Poverty Strategies
- Home Energy Saving Scheme
- Micro generation planning exemptions



- Energy Efficient County Offices & houses

- Free advice, support certification



- Promoting indigenous energy industry

- NSAI support

- Renewable energy in L.A. housing

- Partnership with local enterprise



- Benchmarking L.A. facilities

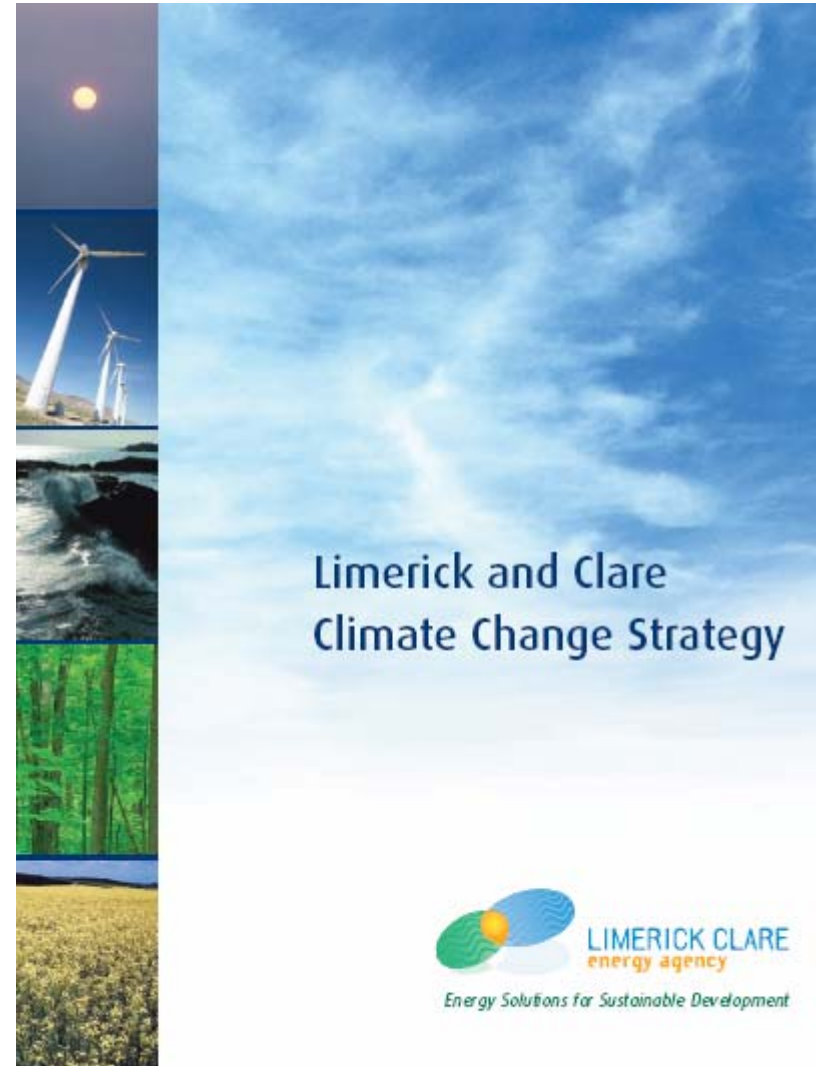
- Pilot project for Shannon 2008





Climate Change Strategy

- Emissions analysis by fuel
- Emissions analysis by sector
- Emissions – Kyoto Commitment
- Summary emissions reduction
- Emissions Reductions by Sector
- Sustainable Energy Technologies
- Energy Crops and Forestry
- Carbon Abatement Costs
- Individual Responsibility





Limerick - Clare CO₂ Emissions

	Clare County			Limerick County		
	Emissions (‘000 T-CO ₂)	Kyoto Target Exceedance (‘000 T-CO ₂)	Annual Carbon Levy (€millions)	Emissions (‘000 T-CO ₂)	Kyoto Target Exceedance (‘000 T-CO ₂)	Annual Carbon Levy (€millions)
1990	828.3	0	0	989	0	0
Kyoto Target (1990 + 13%)	<u>936.0</u>	0	0	<u>1,117.6</u>	0	0
1995	914.0	0	0	1,094.3	0	0
2000	1,172.8	236.8	0	1,374.8	257.2	0
2002	1,222.5	286.5	0	1,437.6	320.0	0
2004	1,206.9	270.9	0	1,421.8	304.2	0
2005 est	1,235.3	299.3	8	1,456.1	338.5	9.1
BAU 2010	1,425.6	489.6	€17.1	1,680.5	562.8	€19.7
BAU2015	1,531.5	595.5	26.8	1,805.9	688.3	31.0



Limerick County Energy Sectors

Limerick County Energy Consumption by Sector

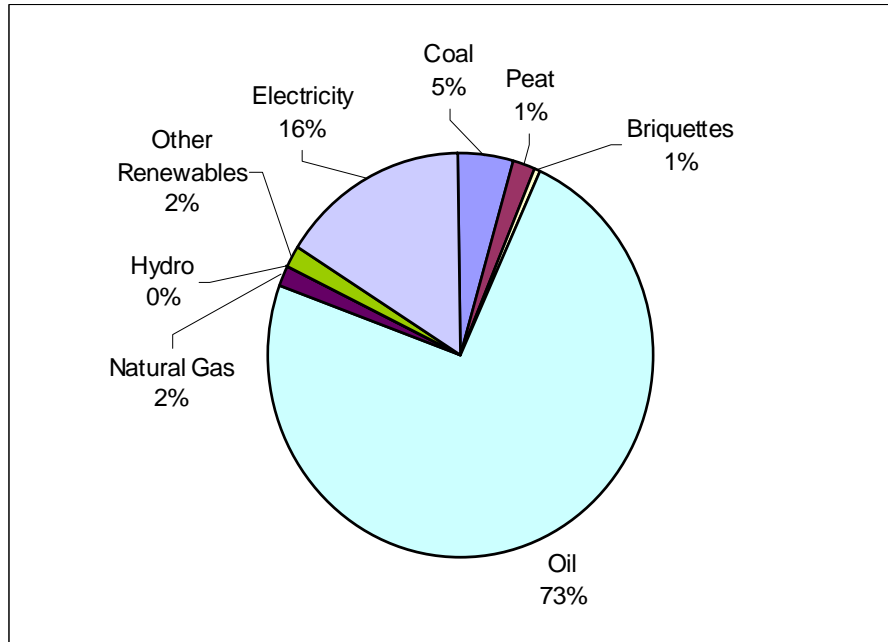
GWh	1990	1995	2000	2002	2004	2005 est	BAU 2010	BAU 2015
Transport	815.8	1,003.5	1,524.4	1,757.0	1,831.4	1,876.2	2,399.4	2,635.5
Residential	755.2	757.3	893.1	928.6	1,047.1	1,072.8	1,192.6	1299
Industry	681.2	693.4	966.7	972.4	955.7	979.1	960.2	1,080.6
Commercial	327.1	399.4	447.0	451.2	473.8	498.7	577.1	576.3
Agriculture	134.0	151.2	176.7	175.2	166.1	163.5	162.4	148.1
Total	2,713.3	3,004.8	4,007.9	4,284.4	4,474.2	4,596.8	5,014.6	5,365

Clare County Energy Consumption by Fuel

Fuel - G W h	1990	2000	2004	2005 E st	B A U 2010
Coal	258.5	170.6	183.0	165.8	101.2
Peat	172.6	55.0	55.1	50.5	32.7
Briquettes	50.0	37.8	27.9	25.6	16.6
Oil	1,420.4	2,544.8	2,800.7	2,883.0	3,422.6
Natural Gas	-	3.5	65.0	83.9	109.7
Hydro					
Other RES	34.0	45.9	65.8	65.6	64.6
Electricity	320.7	549.2	608.9	631.4	757.2
TFC	2,256.2	3,406.8	3,806.3	3,905.7	4,504.6

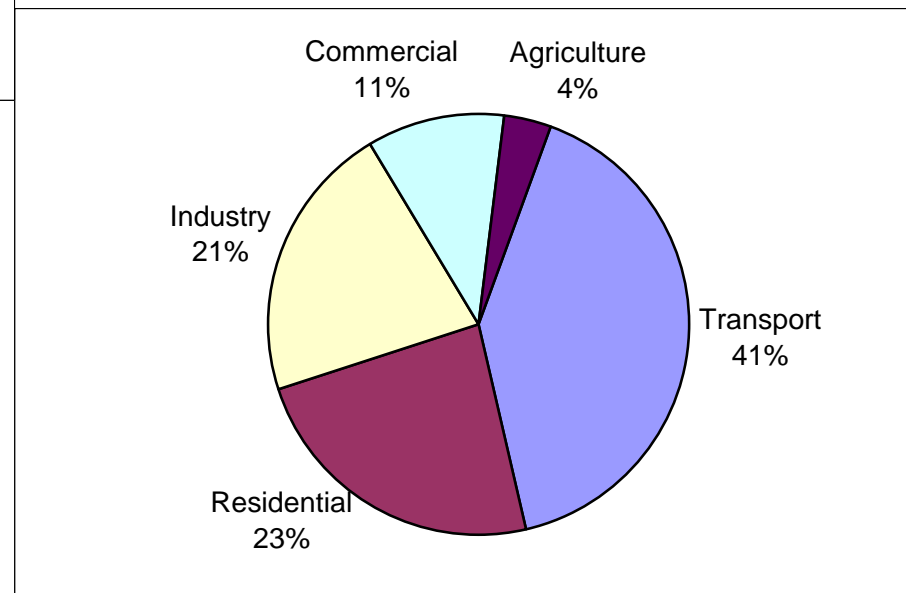


Limerick County Energy Sectors



Oil & Gas Dependence	75%
Electricity (coal)	16%
Renewables	2%

Transport & Residential account for 64% of all energy consumption





Limerick Climate Change Strategy

- Identify opportunities for energy production & conservation
- Support Development through promotion of an indigenous energy industry
- Local approach to energy and emissions will enable the utilisation of future support measures
- Highlight any barriers to the sustainable development.



Limerick Climate Change Strategy

'000 Tonnes CO ₂	Clare		Limerick	
	2010	2015	2010	2015
Energy Production & Supply	208.4	306.9	255.3	353.7
Transport	50.7	66.5	58.2	76.9
Built Environment	38.4	51.9	35.5	45.5
Industry/Commercial Services	47.0	49.2	55.4	58.0
Agriculture	12.0	22.2	16.1	29.4
Waste	5.4	5.4	19.3	19.3
Total	361.8	502.1	439.7	582.8
Target (Kyoto)	489.0	595.0	562.0	688.0
Gap to Target	127.2	92.9	122.3	105.2



Limerick Clare Electricity Needs

Electricity Consumption [GWh] 2010 - 2020

Total Electricity - GWh	2010 (BAU)			2020 BAU		
	Lge. Users	General	Total	Lge. Users	General	Total
Clare County	1,236	757	1,993	1,355	830	2,185
Limerick County	2,509	892	3,401	2,742	975	3,717
Limerick City	-	375	375	-	410	410
Totals	3,744	2,024	5,768	4,097	2,215	6,312

Electricity Demand [MW] 2010 - 2020

Total Electricity MW	2010 (BAU)			2020 BAU		
	Lge. Users	General	Total	Lge. Users	General	Total
Clare	206	126	332	226	138	364
Limerick County	418	149	567	457	163	620
Limerick City	-	63	63	-	68	68
Totals	624	337	961	683	369	1,052

Source: Limerick Clare Energy & Emissions Balance 2006



Limerick & Clare Electricity Match

Electricity Consumption – (incl. large users)

Total Electricity Consumption - GWh	2010 (BAU)			2020 BAU		
	Lge. Users	General	Total	Lge. Users	General	Total
Clare County	1,236	757	1,993	1,355	830	2,185
Limerick County	2,509	892	3,401	2,742	975	3,717
Limerick City	-	375	375	-	410	410
Totals	3,744	2,024	5,768	4,097	2,215	6,312

Electricity Production– (fossil & renewables)

Total Electricity Production- GWh	2010 (BAU)			2020 BAU		
	Fossil	Renew	Total	Fossil	Renew	Total
Clare County	4,575	509	5,084	<i>4,575</i>		
Limerick County	725	471	1,196	<i>725</i>		
Limerick City	-	-	-	-		
Totals	5,300	981	6,281	<i>5,300</i>	2,083	
% Renewables		16%			33%	

Source: Limerick Clare Climate Change Strategy; Latene “Irish Energy Map”

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Electricity - Renewable Targets

Renewable Energy Targets – General supply only

Renewables Targets - Gen.	2010			2020		
GWh	15% GWh	Wind MW	Bio MW	33% GWh	Wind MW	Bio MW
Clare	114	32	16	274	78	39
Limerick County	134	38	19	322	92	46
Limerick City	56	16	8	135	39	19
Totals general	304	87	43	731	209	104

Renewable Energy Targets – Total supply (incl. large users)

Renewables Targets - Total.	2010			2020		
GWh	15% GWh	Wind MW	Bio MW	33% GWh	Wind MW	Bio MW
Clare	299	85	43	721	206	103
Limerick County	510	146	73	1,227	350	175
Limerick City	56	16	8	135	39	19
Totals incl. lge. users	865	247	124	2,083	595	298

Source: Limerick Clare Climate Change Strategy; Latene “Irish Energy Map”

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Limerick Clare Electricity Production

2010 Generation Capacity - MW	Clare County	Limerick County	Limerick City	Total
Coal - (heavy oil)	915.0	-	-	915.0
Oil	-	-	-	-
Gas (Generation)	-	5.0	-	5.0
Gas - CHP	-	140.0	-	140.0
Peat / Turf	-	-	-	-
Biomass	-	-	-	-
Hydro	86.0	0.5	-	86.5
Wind	65.0	139.0	-	204.0
Wave	-	-	-	-
Solar PV	-	-	-	-
AD / Land fill gas	2.0	2.0	-	4.0
Other Renewable	-	-	-	-
Total Fossil	915.0	145.0	-	1,060.0
Total Renewable	153.0	141.5	-	294.5
Total Generation	1,068.0	286.5	-	1,354.5

Source: Limerick Clare Climate Change Strategy; Latene "Irish Energy Map"

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Heating Energy Market

Estimated Heat Energy For Limerick / Clare (Sector & County)

Estimated Clare & Limerick By National Data				
2010 ktoe	Clare	Limerick County	Limerick City	Limk-Clare
Residential	69.92	81.75	35.77	187.44
Commercial	28.84	33.71	14.75	77.30
Industrial	38.82	45.39	19.86	104.07
Total ktoe	137.57	160.85	70.39	368.82

Estimated Heat Energy For Limerick / Clare (Heating Oil V Wood Chip)

Estimated Clare & Limerick By National Data				
	Clare	Limerick County	Limerick City	Limk-Clare
*Heating oil Ltres	151,332,319	176,937,225	77,428,601	405,698,145
**Wood Chip Tonnes - 50%	797,934	932,942	408,260	2,139,136
**Wood Chip Tonnes - 40%	632,844	739,919	323,792	1,696,556



Heating Energy Market

Bio Heat Targets by County with Wood Chip 50% MC

**Wood Chip Tonnes - 50%	Clare	Limerick County	Limerick City	Limk-Clare
Targets - 5% 2010 - Tonnes	39,897	46,647	20,413	106,957
Targets - 10% 2015 - Tonnes	79,793	93,294	40,826	213,914
Targets - 12% 2020 - Tonnes	95,752	111,953	48,991	256,696

Bio Heat Targets by County with Wood Chip 40% MC

**Wood Chip Tonnes - 40%	Clare	Limerick County	Limerick City	Limk-Clare
Targets - 5% 2010 - Tonnes	31,642	36,996	16,190	84,828
Targets - 10% 2015 - Tonnes	63,284	73,992	32,379	169,656
Targets - 12% 2020 - Tonnes	75,941	88,790	38,855	203,587



Heating Energy Market

Bio Heat Market Implications - Clare

**Wood Chip Tonnes - 40%	Clare	Installed Boiler Capacity - MW	Installed Boiler Cost - €	Fuel Value	Job Creation
Targets - 5% 2010 - Tonnes	31,642	40	€9,776,383	€2,847,799	55
Targets - 10% 2015 - Tonnes	63,284	79	€9,552,765	€5,695,598	111
Targets - 12% 2020 - Tonnes	75,941	95	€17,463,318	€6,834,718	133

Bio Heat Market Implications - Limerick

**Wood Chip Tonnes - 40%	Limerick	Installed Boiler Capacity - MW	Installed Boiler Cost - €	Fuel Value	Job Creation
Targets - 5% 2010 - Tonnes	36,996	46	€3,122,500	€3,329,640	65
Targets - 10% 2015 - Tonnes	73,992	92	€6,245,000	€6,659,280	129
Targets - 12% 2020 - Tonnes	88,790	111	€5,493,750	€7,991,100	155



Heating Energy Market

Bio Heat Market Implications - Clare

<i>Clare Cost Comparison</i>	H. Oil - €	Wood - (40%) €	€Saving	CO ₂ -T saved	CO ₂ Cost Saving
Targets - 5% 2010	€4,918,300	€2,847,799	€2,070,501	18,201	€37,026
Targets - 10% 2015	€9,836,601	€5,695,598	€4,141,003	36,401	€1,274,052
Targets - 12% 2020	€11,803,921	€6,834,718	€4,969,203	43,682	€1,528,862

Bio Heat Market Implications - Limerick

<i>Limerick Cost Comparison</i>	H. Oil - €	Wood - (40%) €	€Saving	CO ₂ -T saved	CO ₂ Cost Saving
Targets - 5% 2010	€7,750,460	€3,329,637	€4,420,823	21,280	€744,808
Targets - 10% 2015	€15,500,920	€6,659,274	€8,841,646	42,560	€1,489,617
Targets - 12% 2020	€18,801,104	€7,991,128	€10,809,975	51,073	€1,787,540



Heating Energy Resource

Forest Resource by County & Age type

Calculation Data				Clare	Limerick
Even Aged				32,580	18,360
Uneven aged				8,040	1,600
Scrub				2,410	-
Temporarily Unstocked				810	400

Source : National Forest Survey 2007

Calculated Biomass Energy From Available Forest thinnings

60% of Forest is "Juvenile", 25% requires no thinning leaving 15%				Clare	Limerick
Yield Estimate (70 M3 / ha)			Cu M	342,090	192,780
Pulp wood available (say 40%)			Cu M	136,836	77,112
Tonnes @ 50% MC			Tonnes	109,469	61,690
Tonnes @40% MC			Tonnes	82,102	46,267



Heating Energy Resource

Forest Resource & Demand by County - Clare

<i>Wood Chip 40% "Balance"</i>	Clare		
	<i>Demand</i>	<i>Resource</i>	<i>Diff</i>
Targets - 5% 2010 - Tonnes	31,642		
Targets - 10% 2015 - Tonnes	63,284		
Targets - 12% 2020 - Tonnes	75,941	82,102	6,160

Forest Resource & Demand by County - Limerick

<i>Wood Chip 40% "Balance"</i>	Limerick		
	<i>Demand</i>	<i>Resource</i>	<i>Diff</i>
Targets - 5% 2010 - Tonnes	36,996		
Targets - 10% 2015 - Tonnes	73,992		
Targets - 12% 2020 - Tonnes	88,790	46,267	(42,523)



Infrastructure is Critical

Electricity

- Correlation / cooperation between Planners, Eirgrid and Renewable Energy developers essential
- Local Authorities must take a lead
- Grid must be established in advance of development
- Inter-connectors IRL – UK; IRL – EU are key

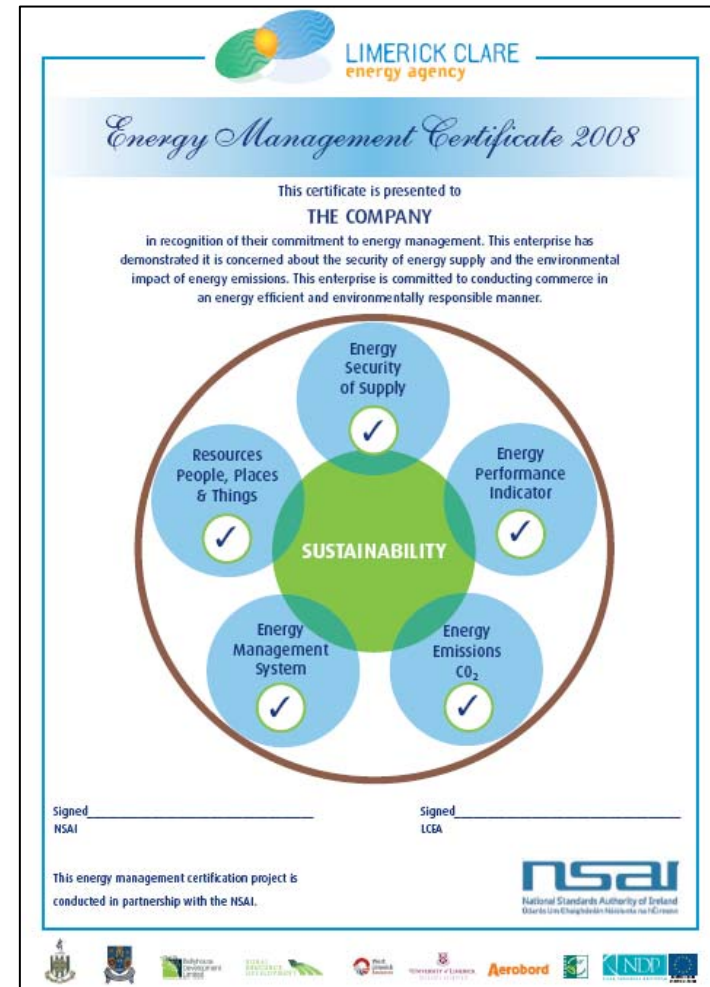
Thermal Energy

- Cooperation between Planners, and Renewable Energy developers essential
- Local Authorities must take a lead
- District heating needs to become a normal method of heating buildings
- Development of new “Bord Na Connadh”



SME Energy Management

- Launch by Minister Tony Killeen – Feb'08
- Partnership with NSAI
- Benchmarking & Advice FOC
- Pilot Development over 2008
- Market analysis of SME's
- 2 Workshops in County Clare
- 2 workshops in County Limerick
- Target of 100+ SME's in group.





Standard Calculator

Excel Spreadsheet

Prepared by LCEA

Download from Web site

www.lcea.ie

LIMERICK CLARE energy agency NPI Calculation Form

1. Convert your energy use into kWh units
 Add your quarterly or monthly use over one year for each fuel and enter below

		Conversion factor		
Natural gas	Therms	x 29.31	=	kWh
	Cubic feet	x 0.303	=	kWh
	Cubic metres	x 1	=	kWh
	kWh	x 1	=	kWh
Liquid petroleum gas (LPG)	litres	x 7	=	kWh
	Therms	x 13900	=	kWh
Gas oil (35 sec)	litres	x 10.6	=	kWh
Light fuel oil (250 sec)	litres	x 11.2	=	kWh
Medium fuel oil (950 sec)	litres	x 11.3	=	kWh
Heavy fuel oil (3500 sec)	litres	x 11.4	=	kWh
Coal	Therms	x 7600	=	kWh
Anthracite	Therms	x 9200	=	kWh
Wood chip (Moisture content 35%-50%)	Therms	x 3500	=	kWh
Wood chip (Moisture content >50%)	Therms	x 2800	=	kWh
Wood pellets	Therms	x 4800	=	kWh
Electricity	kWh	x 1	=	kWh

Total energy use for the year = kWh **A**

2. Find your space-heating energy use. Apply (A) OR (B)

(A) If you can identify any of the fuels above used only for space heating, enter the total energy use in kWh

Description	kWh
1.	
2.	
3.	
Total =	kWh B

(B) For fuels used for space heating and hotwater, where they not separately metered, use 60% of thermal energy used. This figure may also be used for all electrically heated buildings:

Enter total thermal energy by fuel type:

a.	kWh
b.	
c.	kWh
Total =	kWh C

Annual space heating energy (B or C) = kWh **D**

Annual non-space heating energy (A-D) = kWh **E**

3. Space heating energy adjusted for Shannon Region weather
 Adjust the space-heating energy to standard conditions (D x G) = kWh **F**

4. Normalised annual energy use
 Your annual energy use normalised for weather is = kWh **G**

5. Performance Parameter (Treated Floor Area etc.)

Treated Floor area = m² Γ_1

Your Performance Parameter = Γ_2 x Γ_1

6. Find the Normalised Performance Indicator (NPI)

(A) Floor area $NPI = \frac{I}{M}$ kWh / m²

(B) $NPI = \frac{I}{N}$ kWh / x



Energy Policy Elements

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Home Energy Improvement Scheme

- Counties Clare & Limerick chosen for Pilot Project
- BER assessor Surveys - €400
 - Householder pays €100 directly to assessor
 - SEI pays €300 directly to assessor
- Home Improvement Measure – Grants
 - Whole house; 30% to €2,500
 - Warm Zone; 30% to €2,000
 - Cluster; 30% to €1,500
- Expression of Interest open till 30th of May
- Call **1850 927000**.
- Scheme hopes to reduce CO₂ emissions by 20 – 30% per house in the scheme.



Energy Solutions for Sustainable Development

Thank you.

Limerick Clare Energy Agency
Foundation Building
University of Limerick
Limerick

Pat Stephens

Manager

T: 087 0508181

E: info@lcea.ie

W: www.lcea.ie