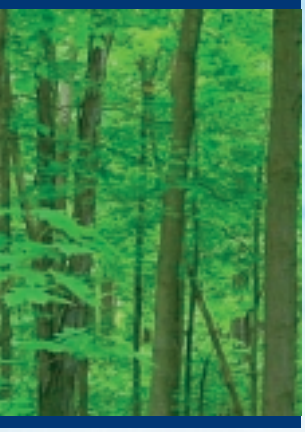
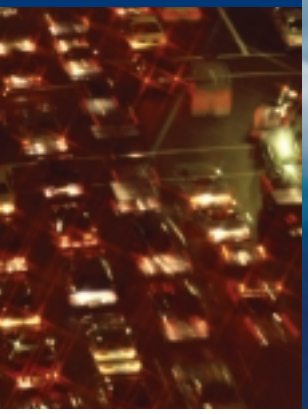


Limerick and Clare Climate Change Strategy

LIMERICK CLARE energy agency

Energy Solutions for Sustainable Development

EXECUTIVE SUMMARY



Limerick and Clare Energy & Emissions Balance

Limerick County Council

Clare County Council

sallyhouts development limited

RURAL RESOURCE DEVELOPMENT

West Limerick Resources

UNIVERSITY of LIMERICK

Aerobord

NDP PLEAN FORBARTHA NÁISIÚNTA

EUROPEAN UNION STRUCTURAL FUNDS

May 2006

Acknowledgements

This report summarises the information contained in two reports on the important topics of:-

- Limerick & Clare Energy & Emissions
- Limerick & Clare Climate change Strategy

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1. Background

The quantity of global energy consumption is increasing as the economy of developed and developing countries expand their economies. The developed nations of the world account for the majority of energy usage. Within the Organisation for Economic Cooperation and Development (OECD) North America accounts for over 50% of energy consumption at present, with the European Union (EU) accounting for approximately 34%. Within the EU 25 the change in energy consumption data has been significant in countries such as Ireland, Poland, Spain and Greece showing significant increases between 1990 and 2003. Oil remains the dominant fuel in the EU followed by Natural Gas. Renewables continue to account for only 1.5% of the market.

The Kyoto Protocol, ratified in 2005, sets out legally binding requirements and fines, which signatories will have to abide by. The EU agreed a target reduction of 8% in Green House Gas (GHG) emissions, compared to 1990 levels, by the assessment period (2008-2012). As part of a burden sharing agreement, ***Ireland agreed a target of maintaining emissions to a 13.2% increase above 1990 levels***.

The Department of Environment, Heritage and Local Government (DoEHLG) is the lead Department assigned with the responsibility of ensuring Ireland meets its commitments. The DoEHLG published a Natural Climate Change Strategy (NCCS) in 2000 to outline policies to achieve these targets. A consultation document on the NCCS is anticipated to be published in mid 2006.

The Economic Social Research Institute (ESRI) has predicted that Ireland's overall GHG emissions are projected to be ***26% above the 1990 levels by 2010*** i.e. almost double the Kyoto target. Energy accounts for 64% of all emissions in Ireland. This report is concerned specifically with GHG Emissions related specifically to energy production and consumption.

Data from a range of sources at a National level indicates that energy consumption in Ireland is increasing, and is projected to continue. The majority of energy related emissions in Ireland result from the use of oil and electricity. Oil is projected to continue to be the main fuel source based on scenarios reported by the ESRI (ESRI, 2005). The Transport Sector has shown the greatest increase since 1990 becoming the dominant sector, accounting for 33% of emissions in 2004. Current projections indicate that Ireland will face a potential carbon levy of between €250 and €600 million by 2015 (Bank of Ireland Global Markets, 2006).

Energy Inflation in Ireland has been running at 30 – 50% per annum for oil and gas and 15 – 30% for electricity. The escalating energy costs and fears about security of supply have focused attention on energy and the sustainability of our economic and social development.

Sustainability for the Limerick & Clare region (like any other) is dependant upon securing a supply of energy. In order to plan for the sustainable development of Limerick and Clare counties, we must first identify the amount of energy currently being produced and consumed. The environmental implications of this energy activity must be assessed in relation to our national obligations under international agreements. Having identified the scale of needs we must then determine how we can meet those needs in a sustainable way. In order to address this need for information, the Limerick Clare Energy Agency has commissioned two reports; the Limerick Clare Energy & Emissions Balance, and the Limerick Clare Climate Change Strategy.

2. Introduction

2.1 Limerick Clare Energy Agency

The Limerick Clare Energy Agency (LCEA) was established in July 205 by co investment from: -

- Limerick County Council,
- Clare County Councils.

The Agency is also fortunate to receive sponsorship from: -

- Rural Resource Development Ltd. (LEADER) in County Clare
- West Limerick Resources Ltd. (LEADER) in County Limerick
- Ballyhoura Development Ltd. (LEADER) in County Limerick
- University of Limerick.
- Aerobord Ltd.

The support of the sponsors enables the Agency to conduct a number of important projects in both counties as well as operating from a centre of excellence in the University of Limerick.

The mission statement for the agency is: -

"The Limerick Clare Energy Agency aims to provide energy solutions for sustainable development in the region. The agency will provide energy services to all economic sectors and the general public, promoting and facilitating efficiency sustainability in the production and consumption of energy".

2.2 Regional Planning for Sustainable Development

The Limerick Clare Energy Agency determined that it was necessary to complete two studies for Clare and Limerick, to support the sustainable development in both counties. The studies are: -

1. Limerick Clare Energy and Emissions Balance
2. Limerick Clare Climate Change Strategy.

Thanks in particular to the support of the LEADER sponsors the reports were commissioned to be written and researched by the Tipperary Energy Agency Ltd.

These reports will reflect the national studies, and are the first such reports to be published in the country. With the information and recommendations contained in the studies, each county can take ownership of their own sustainable development. In addition it is hoped that the reports can form the basis of a Mid Western Region Climate Change Strategy, with the inclusion of data for Tipperary North Riding.

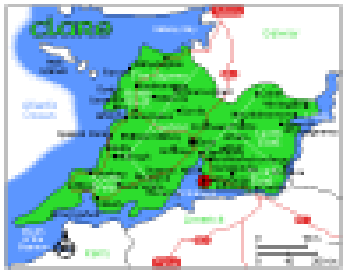
2.3 Regional Study Area

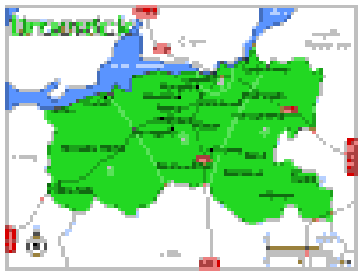
The study area of Limerick and Clare is part of a larger Mid West Region of Ireland. The relationship between the study area, the mid west region and national data is illustrated below. It is hoped that this Limerick Clare study can form the major part of a Mid West Regional Energy & Emissions Balance and Climate Change strategy.

2.3.1 Combined Study Area

The area under study is comprised of: -

- Clare County
- Limerick County
- Limerick City





The study area is located within the Mid West Region of Ireland. The table below identifies the counties and their physical area. The total study area is 6,227 square kilometres

Table 2.1 Combined study area

NUTS 3 Midwest		
County	**Ha**	**Sq km**
Clare	*345,004*	*3,450*
Limerick County	*275,591*	*2,756*
Limerick City	*2,086*	*21*
North Tipperary	202430	2024
Mid West	**825,111**	**8251**

The following table illustrates the growth in population in the study area since 1971.

Table 2.2 Combined study area population growth

Population	CSO Census 1971	CSO Census 1979	CSO Census 1981	CSO Census 1986	CSO Census 1991	CSO Census 1996	CSO Census 2002
Clare	75008	84919	87567	91344	90,918	94,006	103,277
Limerick County	83298	96742	110925	108920	109873	113,003	121,281
Limerick City	57161	60665	60736	56279	52,083	52,039	54,023
National	2978248	3368217	3443405	3540643	3525719	3,626,087	3,917,203

3. Study Approach

The approach taken in the studies was to present the data by study area first (Limerick & Clare) then by Clare County, Limerick County and Limerick City. This allows for analysis of energy and emissions within each County and also on a Combined Study Area basis.

The general approach that has been taken is to proportion data at a National level using appropriate ratios. The total energy consumed in the country is called "Total Final Consumption" and denoted as TFC. Using TFC as a basis helps to relate county analysis to national data for comparison.
The study area has been analysed using the same fuel categories and sectors that are used in national documents. However as has been pointed out, the area is unusual in that it has a number of large energy producers and consumers: -

i. Moneypoint electricity largest energy generating station
ii. Aughinish Alumina, large energy consumer and soon electricity producer (CHP)
iii. Irish Cement Ltd, large energy consumer
iv. Shannon airport, large energy consumer

These four sites have been estimated to be responsible for over 12,300,000 tonnes of CO_2 per annum. All these sites except Shannon Airport are dealt with under the National Emissions Trading scheme and therefore the LCEA will have a limited input to action in these areas. These sites are shown separately to avoid distorting the typical fuel and Sectoral analysis for the study area.

Economic and Environmental indicators were developed as a basis for analysis and comparison within the report. These included assessment of energy consumption per capita and CO_2 emissions per capita. At a National level Irelands emissions per person are above the EU average, while our energy consumption per person is approximately equal. However, national energy usage per unit of Gross Domestic Product (GDP) is above the EU average. This has been driven particularly by the economic growth in Ireland.

The reports study the political areas of Clare County, Limerick County and Limerick City. The region is situated in the Mid-West of Ireland. It has a range of natural resources which present significant opportunities for development of indigenous energy sources. Some of the key statistics are: -

- The Area accounts for approximately 6% of the National Population.
- The study area covers over 6,000 square kilometres.
- Total number of households of approximately 91,000,
- Oil is the main source of heating.
- Vehicle ownership has increased dramatically in the region, mirroring the National trends, with a 100% increase evident between 1990 and 2004.
- 6.5% of the National employment in the Industrial and Commercial Sectors is based in the study region.

4. Summary Energy Data

Within the region a number of energy resources are available which warrant specific mention.

4.1 Wind Speeds & Direction

Wind energy has been the primary renewable energy resource which has been developed in Ireland since 1995. Figure 6.3 illustrates the annual wind speeds within Ireland.

At present in Ireland there is 495.5 MW (SEI, 2006) of wind energy installed. A considerable amount is also under development and within the planning process or awaiting connection to the electricity grid (estimated to be 2000 MW in 2005 (SEI, 2005).

As can be seen Limerick and Clare lie within the region of Ireland with some of the highest wind speeds (between 6-7 m/s). Specific wind speeds at wind farm sites can exceed these wind speeds considerably. Figure 6.4 illustrates the Irish National Electricity Grid Network and the Mean Wind Speeds around Ireland at a height of 50 metres.

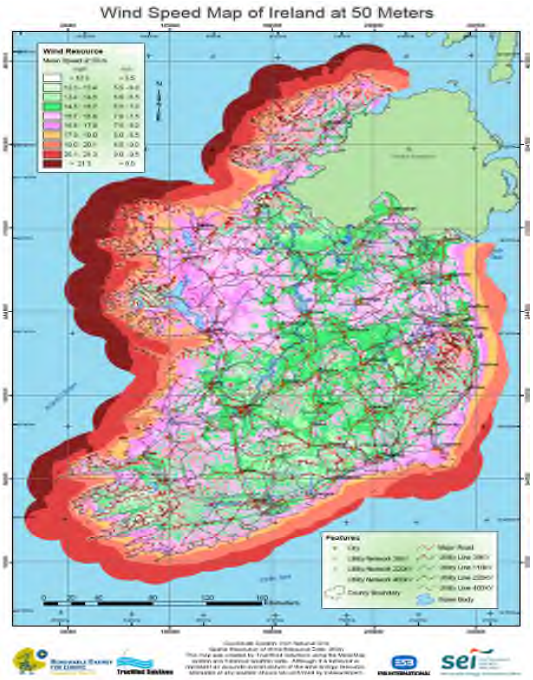


Figure 4.1: Irish Electricity Network and Mean Wind speeds **Source: ESB (2003), SEI (2005) AMSTruewinds (2006)**

4.2 Hydroelectricity

Ireland's largest hydroelectric site is located in the Limerick/Clare region – at Ardnacrusha in Co. Clare. This was developed in 1927 and has a capacity of 89.6 MW. There are a number of other small scale (<10 MW) hydro electric sites throughout Ireland and within Limerick and Clare. Micro hydro sites (<100 kW) are limited.

Figure 4.2: Ardnacrusha power station
Source: ESB I(2000)

4.3 Peat Bogs

Peat has been the main indigenous fuel source in Ireland. This has been used in domestic/commercial solid fuel boilers and for the production of electricity. The Limerick Clare region has a significant concentration of mountain blanket bogs and some raised bogs. The use of peat as a fuel has declined in recent years and increasing peat bogs are being classified as areas of environmental importance.

Figure 4.3: Distribution of peatlands in Ireland
Source: Bord Na Monal(2001)

4.4 Tidal and Wave

The West Coast of Ireland has considerable resources in relation to Tidal and Wave Energy. Based on meteorological correlations, the mean overall power available in deep water (100 m) off the Irish coast has been estimated at about 25 GW, of which about 12 GW (Marine Institute 2004) could be convertible into electricity (Marine Institute 2004). Figure 6.6 illustrates the potential resource in Ireland. The Shannon Estuary and the Atlantic Ocean off Clare presents particular opportunities for the Limerick and Clare region in this regard.

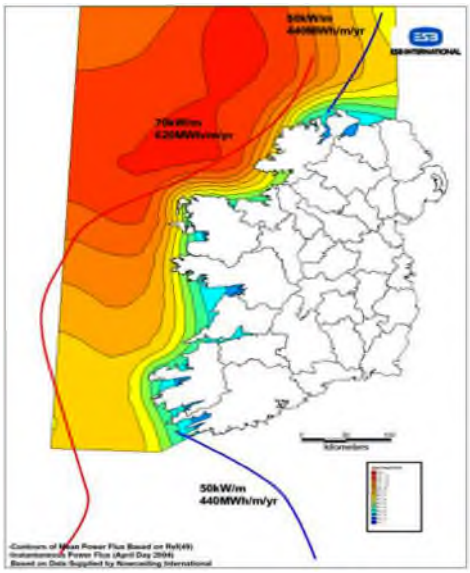


Figure 4.4: Wave Energy Potential Resource in Ireland
Source: Marine Institute (2004)

4.5 Forestry

Clare has total area of 43,694 Ha under forestry in 2000 (Dept of Agriculture 2001) This equates to approximately 14% of the land area which is above the National Average of 9.9% (Clare CDB 2001) 47% of this forestry is privately owned with the balance 53% in public ownership. Broadleaf trees make up 15% of the total area (Dept. of Agriculture 2001)

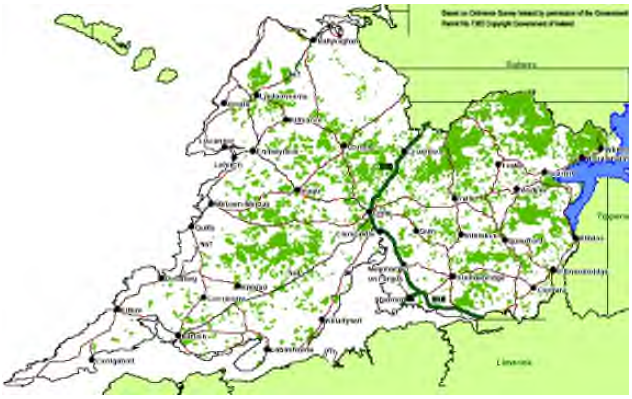


Figure 4.5: Forestry Map of Clare
Source Clare CDB (2001)

County Limerick has a total area of 20,256 Ha under forestry. This equates to 8% of the land area of the county. 42% of the forestry is privately owned with the balance of 58% in public ownership (Dept. of agriculture 2001). Broadleaf trees make up 13.5% (Limerick CDB 2004)

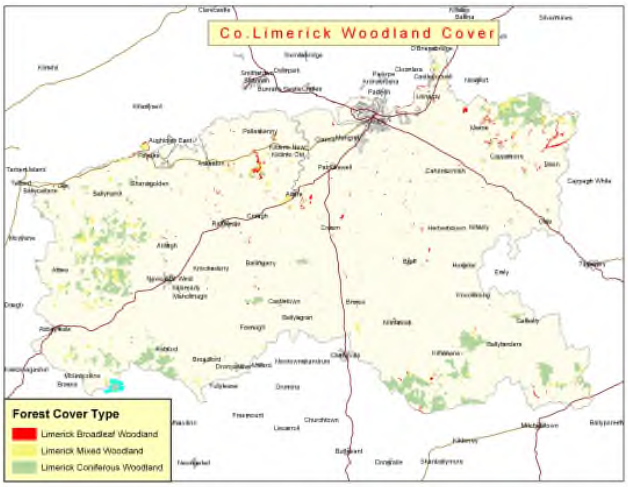


Figure 4.6: Forestry Map of Co. Limerick
Source: Dept of Agriculture (2006)

4.6 Summary of Renewable Energy Projects in Limerick and Clare Region

There is 122.12 MW of Renewable Energy installed in the Limerick Clare area generating electricity reference table 6.1 for further details. This equates to ***40%*** of the electricity consumed in the Limerick Clare Area.

Table 4.1: List of installed Renewable Energy Sources in Limerick and Clare

County	Location	Type	Capacity MW	Year Connected
Clare	ESB Ardnacrusha	Hydro	89.6	1929
Clare	Booltiagh, Connolly	Wind	19.5	2006
Clare	Moanmore, Kilrush	Wind	12.6	2004
Limerick	Askeaton	Hydro	0.24	1984
Limerick	The Millstream, Abbeyfeale	Hydro	0.18	2004
		Total	**122.12**	

Source: ESB(2006),, IWEA(2006), DCMNR(2005)

5. Limerick Clare Energy & Emissions Balance

The Energy and Emissions Balance addresses energy production and consumption on a sectoral and fuel basis. Building on this data the energy related Green House Gas (GHG) emissions are calculated, which presents the LCEA with the data to target actions in meeting the regions Kyoto Protocol requirements. This report focuses on the emission of Carbon Dioxide (CO_2) directly related to energy production and use.

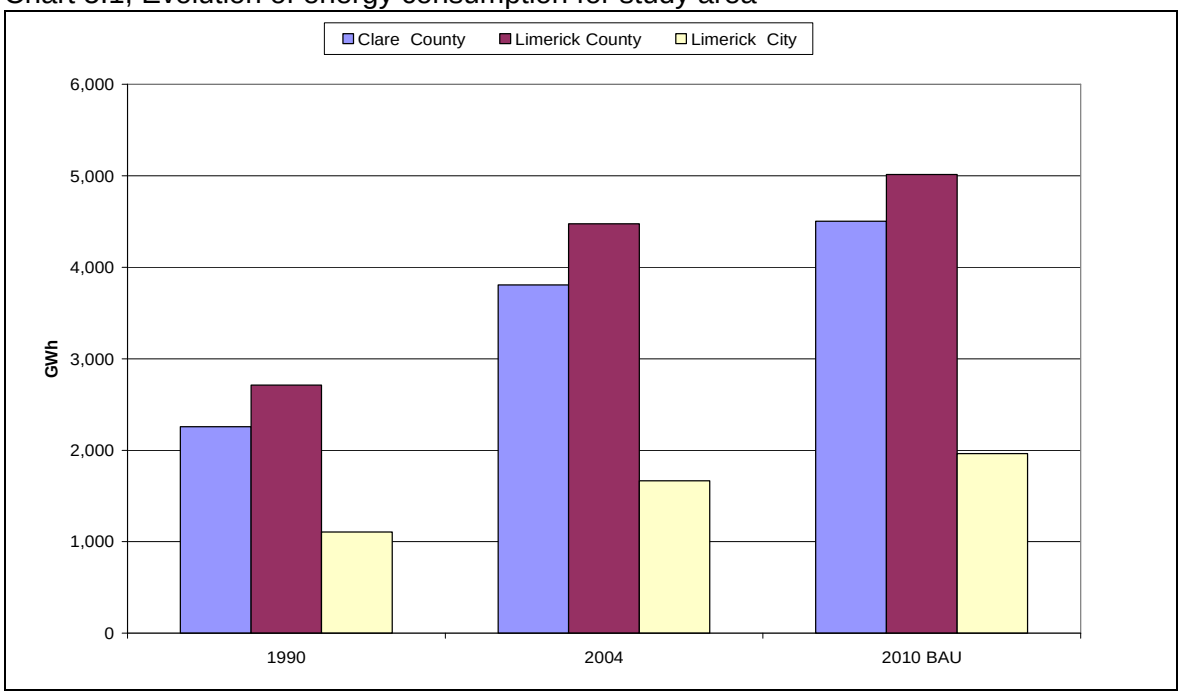
5.1 Evolution of Energy Consumption

The table and chart below illustrates the evolution of energy consumption in the study area from 1990 and estimated to 2010, on a Business As Usual (BAU) basis. Within the study region the two Counties (Clare and Limerick) account for approximately 83% of energy consumed and 85% of CO_2 energy emissions.

Table 5.1 Evolution of energy consumption in the study area

GWh	Clare County	Limerick County	Limerick City	Total
1990	2,256.2	2,713.3	1,104.9	6,004.4
2004	3,806.3	4474.2	1665.2	9,945.7
2010 BAU	4,504.6	5,014.6	1,963.4	11,482.6

Chart 5.1, Evolution of energy consumption for study area



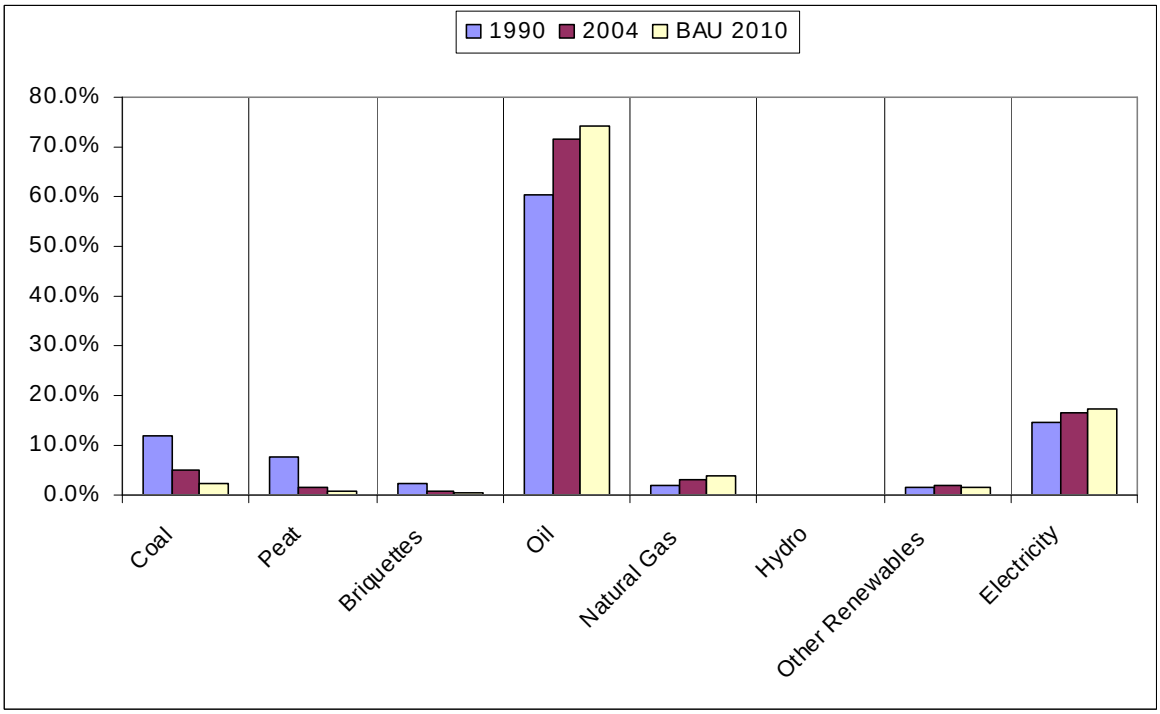
Analysis of energy usage per capita in the study region indicated that Limerick City is lower than the national average, while the two county areas are above the national average. This can be explained by the increased transport costs, restricted access to cleaner, more efficient fuels such as natural gas and higher percentage usage of solid fuels in the rural context. A similar trend is experienced when assessing CO_2 emissions per person.

Table 5.2 Energy Consumption by fuel in the study area

GWh	Coal	Peat	Briquettes	Oil	Natural Gas	Hydro	Other Renewables	Electricity
1990	714.4	477.5	138.8	3,662.8	105.5	0.0	94.8	878.2
2004	495.8	149.8	75.9	7,117.4	301.3	0.0	177.9	1,627.3
2010 BAU	274.2	89.0	45.2	8,714.8	438.1	0.0	174.7	2,023.7

Oil is the predominant fuel used in the area and it accounted for 58% of all CO_2 emissions in 2004.

Chart 5.2. Evolution of energy consumption by fuel in the study area



The Transport sector has emerged as the sector with the greatest share of energy consumption in 2004 at 40%. Transport also accounted for the highest share of CO_2 emissions at 31%, this is expected to increase to 44% by 2010. The residential sector is next highest at 26.5%.

Table 5.3 Energy Consumption by sector in the study area

GWh	Transport	Residential	Industry	Commercial	Agriculture	Totals
1990	1,737.6	1,787.6	1,568.5	773.7	276.3	6,143.7
2004	3,968.3	2,443.4	2,067.2	1,126.2	339.3	9,944.4
BAU 2010	5,174.4	2,716.9	2,144.5	1,393.0	330.9	11,758.7

All areas within the study region are projected to exceed the requirements as set out under the Kyoto Protocol in terms of CO_2 emissions. The total quantity of CO_2 savings that will be required in the study region is estimated to be 1,200,000 tonnes of CO_2 by 2010. This equates to a value of 4.6 Tonnes of CO_2 per person in the County areas and 2.8 Tonnes CO_2 within the City.

5.2 Clare and Limerick Counties

Some common trends appeared across Clare and Limerick Counties: -

- Oil is the predominant fuel of choice and accounts for almost 60% of TFC.
- Natural Gas has had limited penetration to date and the majority of the remainder of fuel supply is from electricity.
- Solid fuels has experienced a reduction in usage and it is reasonable to assume that this is as a result of a move to (historically) more efficient systems which use oil or gas.
- Biomass (processed wood and energy crops) is seeing a dramatic increase in popularity, thanks to the large quantity of forestry in both counties and the recent developments in the automation of wood pellet and wood chip boilers.
- The transport sector is the largest energy user in the two counties with a 40% share of TFC.
- The residential and industrial sectors are the next highest users in terms of fuel consumption, accounting for 24.5% and 20.8% respectively.
- Electricity accounts for approximately one third of all energy related CO_2 emissions.

Clare County could exceed the 2010 Kyoto limit by 490,000 tonnes of CO_2. This could equate to a Carbon Levy of €17 million. ***Limerick County*** could exceed the 2010 Kyoto limit by 562,000 tonnes and incur a levy of €19.7 million.

5.3 Limerick City

Some key points of note for Limerick City are: -

- Fuel supply differs in Limerick City given the increased access to Natural Gas (13% of TFC in 2004 compared to 2% in the County areas).
- Transport has a lower share of TFC and emissions compared to the County areas, as a result of higher density and more public transport
- Other trends tend to mirror the regional and national trends in terms of increased share of energy consumption and emissions for the transport sector, with the residential sector being the next most important sector.

Limerick City is projected to also exceed its Kyoto Limit by approximately 150,000 tonnes of CO_2 thereby potentially resulting in a Carbon Levy of €5.3 per annum.

5.4 Quantified Indicative Reductions

The National Climate Change Strategy (DCMNR, 2000) identified indicative amounts of CO_2 that could be saved if certain measures were adopted. The term used to describe these amounts is "Quantifiable Indicative Reductions" (QIR).

Potential CO_2 reductions that have been identified (QIR's) would indicate that with immediate action across a range of sectors the Kyoto Target could be almost achieved by 2012. The following approximate reductions have been identified in the region of:-

- 510,000 tonnes CO_2 for Clare County
- 590,000 tonnes CO_2 in Limerick County
- 160,000 tonnes CO_2 in Limerick City

Achieving these reductions will require commitment, financial, technical and administrative support and in some cases specific national action.

5.5 Conclusions – Limerick Clare Energy & Emissions Balance

Overall it is clear that the limited action at a national level to seriously tackle climate change combined with the strong economic growth in Ireland has resulted in our inability to date to meet the Kyoto Targets. Unlike other countries there has been limited support or opportunity for this issue to be tackled at a regional level. This Energy & Emissions Balance is the beginning of a process to identify the key trends and target areas for action in relation to sustainability and climate change by the Limerick Clare Energy Agency. Extending this study to include the area of North Tipperary to produce a combined Mid West Regional Area (MWRA) Energy and Emissions Balance would be beneficial.

Energy production and transport are the key areas that will have the greatest future impact in terms of meeting the Kyoto Requirements. The worrying trend of the increased dependence on oil in the study area is set to continue unless immediate action is taken. There is a clear responsibility on all people and sectors to play their part in terms of reducing CO_2 emissions. The challenge for the LCEA and its partners will be to provide the information, supports and technology to ensure these responsibilities are met.

6. Limerick Clare Climate Change Strategy

The aim of the Climate Change Strategy for Limerick and Clare is to clearly identify the solutions to the challenge of reducing energy related emissions and to outline the actions to be taken to meet the requirements under the Kyoto Protocol. Estimates of the impact of these actions in terms of CO_2 reductions have been made and areas for future work identified.

The general approach that has been taken is to group the actions and measures which should be implemented in a similar fashion as that adopted in the National Climate Change Strategy. This allows for National comparisons. It was hoped that the National Climate Change Strategy consultation process would have been on-going in parallel with this study but this has not been possible.

Actions and measures have been grouped into standard and extraordinary measures. Standard measures are terms as those which can be implemented based on current political, social and regulatory frameworks. Extraordinary measures are those measures which would require significant changes in approach and structures locally, regionally and nationally.

The Energy and Emissions Balance used a top down approach in terms of estimating Total Final Consumption and CO_2 emissions by fuel and by sector in the study area. This approach was beneficial in determining the scale of the problem which needs to be addressed in the region and the relevant trends.

The Climate Change Strategy is generally based on a bottom up approach which involves analysis of the existing work, actions and projects within the region in relation to energy efficiency and renewable energy and estimating the CO_2 emission reduction impacts these will have.

It is acknowledged that the approach taken has had to include a number of assumptions and methodologies which affect the accuracy of the data presented. However, it is important to note that access to relevant data at a County level is limited and a balance between accuracy, resources and impact had to be achieved by the project partners.

6.1 Key Results

Analysis has been completed for Clare County, Limerick County and Limerick City. Clare County and Limerick County energy related emissions amount to 85% of total emissions for the study area. The Energy and Emissions Balance indicated the level of excess above the Kyoto target by 2010 to be:-

- County Clare: 489,000 tonnes CO_2
- County Limerick: 562,000 tonnes CO_2
- Limerick City: 150,000 tonnes CO_2

The analysis conducted has indicated that, based on a range of standard measures, the Kyoto Targets will not be met. In all cases, the gap between meeting the Kyoto Requirements is projected to 25% below the Kyoto Target.

The table below illustrates the quantity of energy related emissions ('000 tonnes of CO_2 ; kT-CO_2).

Table 6.1 Energy Emissions (CO_2) and potential cost for study area

	Clare County			Limerick County			Limerick City		
	Emissions kT-CO_2	**Kyoto Target Excess** kT-CO_2	**Annual Carbon Levy** millions	**Emissions** kT-CO_2	**Kyoto Target Excess** kT-CO_2	**Annual Carbon Levy** millions	**Emissions** kT-CO_2	**Kyoto Target Excess** kT-CO_2	**Annual Carbon Levy** millions
1990	828.3	0	0	989	0	0	418.6	0	0
1995	914	0	0	1,094	0	0	466	0	0
2000	1,172	236.8	0	1,374	257.2	0	541	68.9	0
2002	1,222	286.5	0	1,437	320	0	537	64.3	0
2004	1,206	270.9	0	1,421	304.2	0	531	58.2	0
2005 est.	1,235	299.3	€ 8.0	1,456	338.5	€ 9.1	543	70.4	€ 1.9
BAU 2010	1,425	489.6	€ 17.1	1,680	562.8	€ 19.7	623	150.8	€ 5.3
BAU 2015	1,531	595.5	€ 26.8	1,806	688.3	€ 31.0	667	194	€ 8.7
Kyoto Target (1990 + 13%)	936			1,118			473		

The table shows that by 2010 Limerick and Clare could be 1,203,000 tonnes of CO_2 over the Kyoto target, and should this progress on a "Business As Usual" basis to 2015 the level of excess could be 1,478,000 tonnes. The financial implications for the study area are also identified. The reductions that are sought in order to avoid this excess are tabled below.

Table 6.2 Summary of CO_2 Reductions in Study Area.

'000 tonnes CO_2	Clare		Limerick		Limerick City	
	2010	2015	2010	2015	2010	2015
Energy Production & Supply (electricity)	208.42	306.90	274.53	395.04	45.00	54.00
Transport	54.29	70.34	54.94	73.22	24.00	28.80
Built Environment	38.37	51.86	34.13	44.11	15.00	18.00
Industry/Commercial Services	47.00	49.23	55.40	58.04	22.50	27.00
Agriculture	12.00	22.20	16.08	29.41	7.50	9.00
Waste	5.36	5.36	19.30	19.30	4.50	5.40
			-	-		
Total	365.45	505.88	454.38	619.13	118.50	142.20
Target Excess	489.00	595.00	562.00	688.00	150.00	194.00
Gap to Target	123.55	89.12	107.62	68.87	45.00	54.00[s1]

This table shows that significant progress toward meeting out Kyoto target can be achieved using standard measures. However in order to avoid the financial implications outlined above the counties in the area must employ some extra ordinary measures.

6.2 Common Issues

It is clear that locally, regionally and even nationally extraordinary measures will be required to reduce the excess CO_2 emissions, to meet our international commitments under the Kyoto Protocol. The standard measures which have been discussed within this report clearly are not enough. The significant savings in terms of CO_2 projected going forward are expected to arise as a result of private investment in the renewable energy sector. While the private sector can make an impact there is a immediate need for clearly structured and well supported national and regional programmes to meet the challenges of the Kyoto targets.

Some common issues identified within the study area are:-

- A key restriction for the development of renewable energy electricity projects continues to be access to the National Grid for sale of electricity. Continued pressure needs to be applied to facilitate the connection of future projects to the grid.

- The transport sector was shown to account for the highest level of CO_2 emissions. The potential for achieving real reductions in this sector is confined by the growing ownership of cars and increased freight due to economic growth, and in the rural areas by the lack of infrastructure. However, it is perhaps the single most important area where, given appropriate services, individuals can make significant reductions by
    - Increased use of energy efficient modes of transport (walking, cycling, bus etc.)
    - Purchase of energy efficient vehicles
    - Switching to the use of green fuels
    - Car pooling
    - Regional transport strategy, identifying major transport corridors

- The supply infrastructure for wood heating projects will present common issues not only in Clare and Limerick but nationally. The work and experience from the Clare Wood Energy Project should be used to provide experience in the region for future developments

- While the building regulations have improved dramatically nationally and the implementation of the Energy Performance of Buildings Directive is welcome it is vital that these are implemented fully to achieve the full potential savings.

- The Industrial Sector has already achieved significant reductions in energy consumption per unit of production. However, increased use of green energy through development of biomass and solar heating projects presents a particular opportunity in the region. This also applies to the Commercial Sector. A target campaign of energy awareness, monitoring and targeting and energy auditing within these sectors is a priority for the future.

- Some provision has been allowed for the development of Tidal in the region but for the full potential to be realised significant investment will be required.

- The clearest signal from the analysis to date is that all sectors will have to make a contribution to reducing emissions and no one sector or action will meet the requirements in terms of CO_2 reductions.

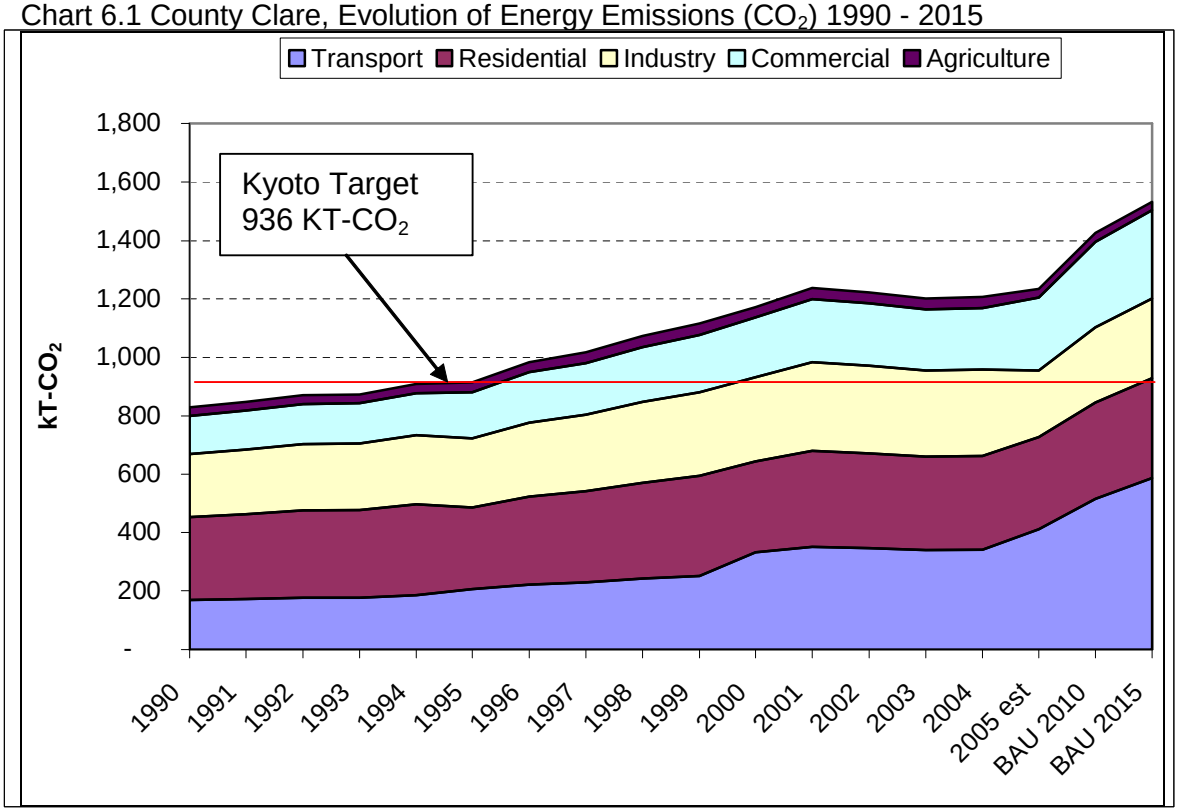
6.3 County Clare

The following table and chart illustrates the dramatic increase in energy related emissions in the county since 1990. The chart is analysed by economic sector.

Table 6.3 County Clare, Evolution of Energy Emissions (CO_2) 1990 - 2015

'000T CO_2	1990	1995	2000	2002	2004	2005 Est.	BAU 2010	BAU 2015
Transport	168.7	205.9	332.2	346.3	341.9	410.4	515.6	586.5
Residential	283.7	280.5	311.6	324.8	320.6	316.9	328.8	341.7
Industry	216.4	235.4	288.1	300.3	296.4	227.3	259.2	273.0
Commercial	131.0	159.6	204.8	213.4	210.7	250.0	292.0	302.0
Agriculture	28.5	32.6	36.2	37.7	37.2	30.7	29.9	28.4
Total	828.3	914.0	1172.8	1222.5	1206.9	1235.3	1425.6	1531.5

Chart 6.1 County Clare, Evolution of Energy Emissions (CO_2) 1990 - 2015



- The Transport sector has shown the highest increase in level of emissions since 1990 with a 143% increase to 2005. This mirrors the increased use of oil as a fuel also.

- Emissions from the residential sector have remained relatively constant with an 11% increase since 1990. This reflects the increase energy efficiency of buildings and heating systems used

- There was a 60% increase in emissions from the Commercial sector since 1990 in the County.

The gap to the 2010 target in County Clare is projected to be 123,000 tonnes of CO_2. As can be seen from Table A the main contributor to the reductions in the County is from the Energy Production and Supply Sector. Some key findings from this sector include:

- By 2010 it is expected that 71 MW of large scale wind will be installed in the County, increasing to 87 MW by 2015

- Renewables (large, medium and small scale) will make the greatest contribution in terms of CO_2 reductions.

- Wood biomass from forestry thinnings should take a significant step forward in 2007 as a result of the Clare Wood Energy Project. This model should present opportunities for replication in the future.

- The potential for the development of CHP within the County will be restricted by the limited natural gas network, but specific action should be taken to maximise its use

Within the built environment the significant reductions are as a result of savings achieved as a result of legislation and improved building regulations. It is estimated that there will be over 21,000 new houses built in County Clare between 2002 and 2015. Potential savings achievable between these houses compared to ones built prior to the 2002 building regulations are approximately 20,000 tonnes by 2010.

Forestry thinnings from the private sector in Co. Clare has a potential wood energy supply of 80,000 Tonnes of Wood chips. Realising only 10% of this for wood energy use in 2010 could provide 27 GWh of energy per annum in the region. If the Coillte forestry were also to be used as a resource (approximately 23,000 ha in 2004) the wood energy resource would be almost doubled. Already 6 potential sites have been identified for development of wood heating projects which is an important development.

The agricultural sector in Co. Clare currently has limited production of arable crops and this is unlikely to change dramatically in the future. It is likely therefore that resources for liquid biofuels will be imported into the County. However, the County could benefit from experience in Co. Limerick in relation to the growing of Miscanthus as an energy crop.

By exceeding its 2010 limit in terms of CO_2 emissions related to energy the County could face a relative carbon levy of €17 million in 2010. If the savings identified in the report are achieved this could reduce to €4.3 million.

The indicative abatement cost to achieve these reductions has been estimated to be in the region of €450 / Tonne.

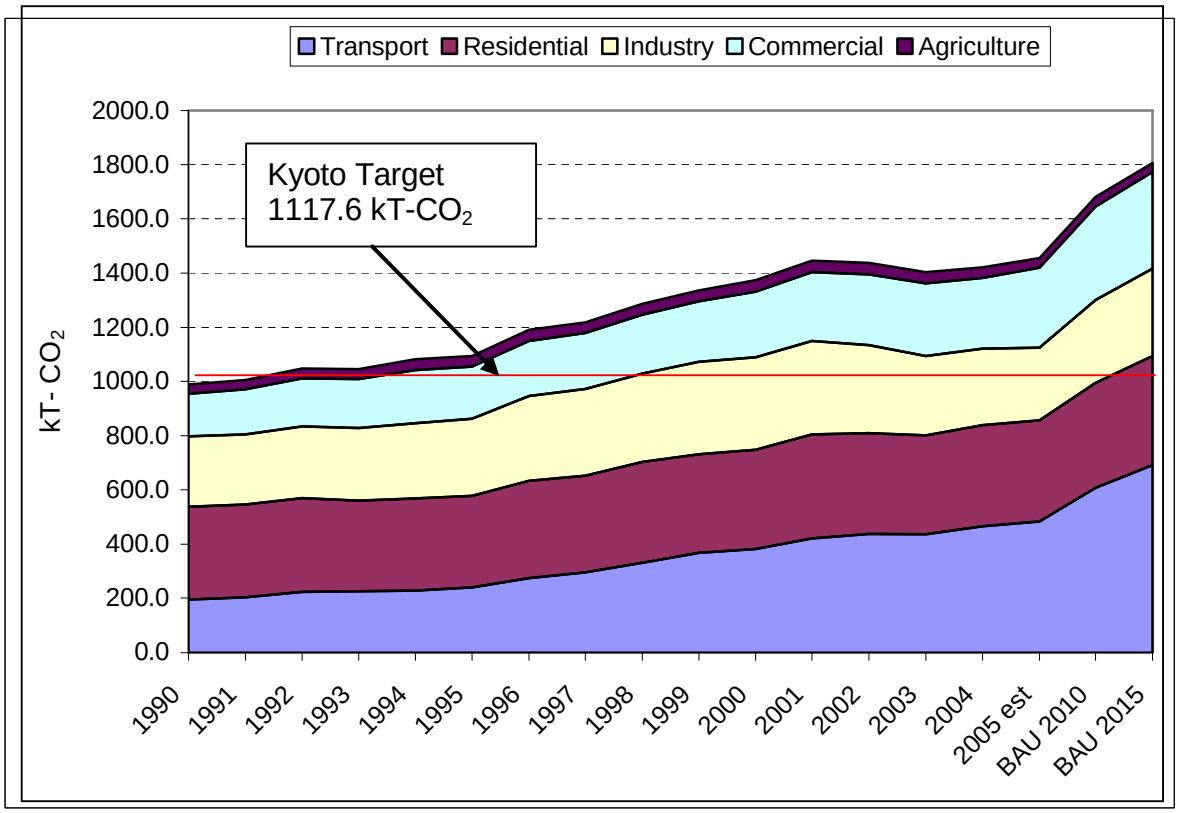
6.4 County Limerick

The following table and chart illustrates the dramatic increase in energy related emissions in the county since 1990. The chart is analysed by economic sector.

Table 6.4 County Limerick, Evolution of Energy Emissions (CO_2) 1990 - 2015

'000T-CO_2	1990	1995	2000	2002	2004	2005 Est.	BAU 2010	BAU 2015
Transport	194.9	239.6	381.4	437.3	465.1	483.8	607.8	691.6
Residential	342.3	338.9	367.0	372.4	374.6	373.6	387.6	403.0
Industry	260.5	284.3	341.5	326.0	281.9	267.9	305.5	321.9
Commercial	157.5	192.4	242.3	260.4	261.2	294.7	344.3	356.1
Agriculture	33.9	39.1	42.6	41.5	39.0	36.2	35.3	33.4
Total	989.0	1,094.3	1,374.8	1,437.6	1,421.8	1,456.1	1,680.5	1,805.9

Chart 6.2 County Limerick, Evolution of Energy Emissions (CO_2) 1990 - 2015



- The Transport sector has shown the highest increase in level of emissions since 1990 with a 148% increase to 2005, and predicted increase of 255% by 2015.

- Emissions from the residential sector have remained relatively constant with a 10% increase since 1990. This reflects the increase energy efficiency of buildings and heating systems.

- The Commercial sector has shown a 87% increase in emissions since 1990.

The gap to the 2010 target in County Limerick is projected to be 107,000 tonnes of CO_2 and this is projected to reduce to 69,000 tonnes by 2015. Energy Production and Supply will result in the greatest CO_2 reductions, another indicator that this sector is responding to the need to develop alternatives in this area.

Some key findings for County Limerick include:

- By 2010 it is expected that 94 MW of large scale wind installed in the County, increasing to 115 MW by 2015
- Renewables (large, medium and small scale) will make the greatest contribution in terms of CO_2 reductions.
- A number of small scale hydro projects have been completed in the area and specific expertise in the field of energy from poultry wastes has been developed.
- The development of Miscanthus as an energy crop is being driven nationally from Limerick. Already 150 ha have been planted and this is expected to increase significantly in the future.

Over 10,000 new houses will be developed in the county between 2002 and 2010. Assuming all are built to the 2002 Building Regulations this could result in CO_2 savings of 16,000 tonnes by 2010. Proper enforcement and inspection will become ever more important to ensure that the regulations are complied with.

The agricultural sector in Co. Limerick has a shown considerable interest in the development of Miscanthus as an energy crop. Similar to the wood energy project in County Clare a key barrier will be the issue of fuel supply infrastructure. In addition, support will be required to overcome the high initial investment costs for the crop.

By exceeding its 2010 limit in terms of CO_2 emissions related to energy the County could face a relative carbon levy of €20 million in 2010. If the savings identified in the report are achieved this could reduce to €3.8 million.

The indicative abatement cost to achieve these reductions has been estimated to be in the region of €417 / Tonne.

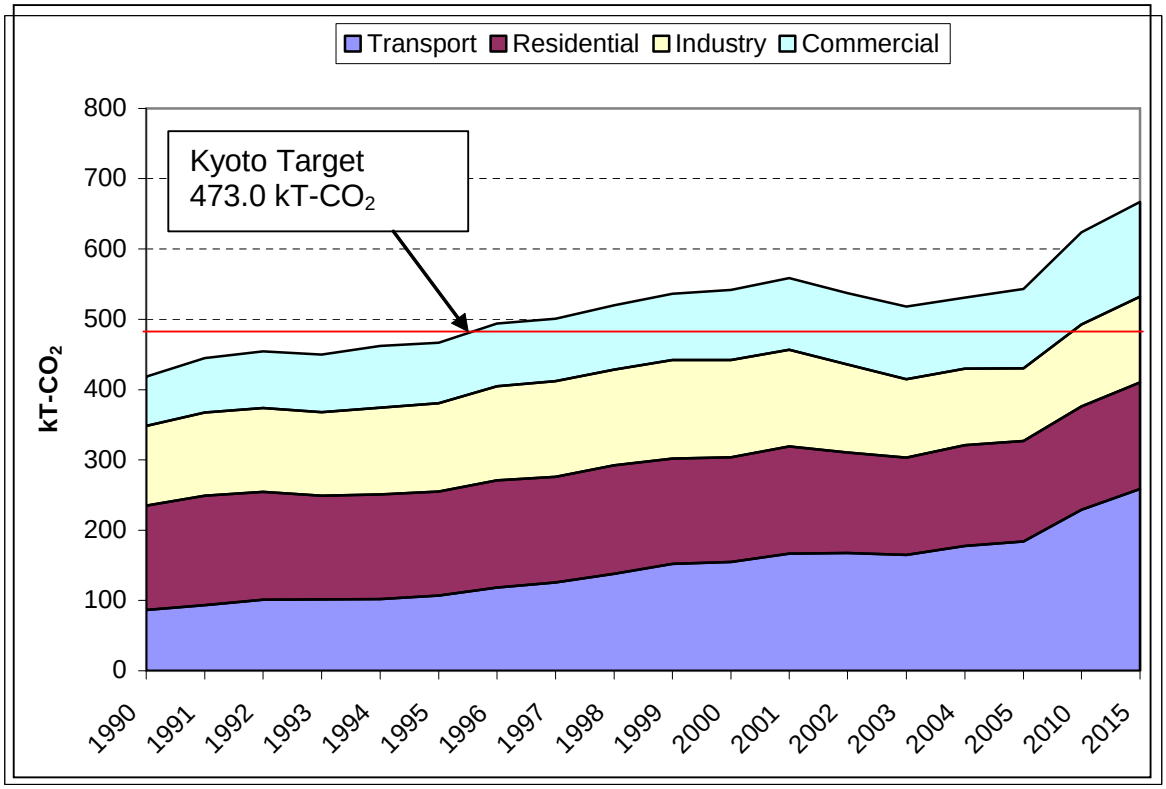
6.5 Limerick City

The following table and chart illustrates the dramatic increase in energy related emissions in Limerick City since 1990. The chart is analysed by economic sector.

Table6.5 Limerick City, Evolution of Energy Emissions (CO_2) 1990 - 2015

kT-CO_2	**1990**	**1995**	**2000**	**2002**	**2004**	**2005 Est.**	**BAU 2010**	**BAU 2015**
Transport	86.1	106.4	154.5	167.3	177.4	183.9	228.9	258.5
Residential	148.4	148.8	148.9	143.1	143.6	142.8	147.2	151.9
Industry	113.8	125.5	138.8	125.7	109.0	103.4	116.7	122.0
Commercial	70.2	86.2	99.7	101.2	101.2	113.3	131.1	134.6
Total	418.6	466.8	541.9	537.3	531.2	543.4	623.8	667.0

Chart 6.3 Limerick City, Evolution of Energy Emissions (CO_2) 1990 - 2015



- The Transport sector has shown the highest increase in level of emissions since 1990 with a 114% increase to 2005, and predicted increase of 200% by 2015.

- The residential sector has seen little or no change in the total emissions in the City since 1990. This is the only sector to see such a trend with the City and surrounding Counties. This reflects increased energy efficiencies within the housing stock and increased use of Natural Gas within this sector.

- The Commercial sector has shown a 61% increase in emissions since 1990.

Limerick City was projected to exceed its Kyoto Target by 150,000 tonnes of CO_2 in 2010. The range of potential measures possible in the City could reduce this to 45,000 tonnes by 2010. Limerick City presents different issues in terms of implementing a Climate Change Strategy when compared to the County Areas.

Some key recommendations include: -

- Particular focus on transport is clearly important for the City area. Further innovation in terms of car-pooling, park and ride, increased services and mobility management is needed.

- The built environment within the City, given its higher density, presents opportunities for the development of district heating, communal energy systems etc.

- The focus in terms of renewable energy development will have to be moved from the area of wind, as is the case in the County areas, to biomass, solar and other technologies which are integrated into buildings in particular.

- Combined Heat and Power developments need to be increased

6.6 Conclusions

It has been shown that significant progress can be made within the study region towards meeting the Kyoto targets. However, based on a wide range of standard measures, the total CO_2 savings identified will still be approximately 25% below that required.

It is clear that measures above and beyond the standard measures proposed will be required for the study region to meet its targets. The Energy Production and Supply sector is currently carrying the greatest share of CO_2 savings. Further action is required in the other sectors in the near future. In particular the Transport sector will require collective and individual action to achieve savings.

While the LCEA and other actors can make a significant contribution to meeting the targets it is clear that this needs to be done in the context of a long-term, focus and funded national policy in this area.

Individual responsibility for energy consumption and emissions will be an important component factor in reaching our Kyoto Targets. Every individual is responsible for the energy that they use at home, at work and in transport. The following table sets out the reductions of CO_2 sought as an individual responsibility.

Table 5.6 CO_2 reductions per capita in Limerick & Clare study area.

Indicator	Clare County	Limerick County	Limerick City
CO_2 Emissions / Capita ($T\text{-}CO_2$ / person)	4.7	4.6	2.8

❖ For Further information

The summary report above is based upon two important studies commissioned by the Limerick Clare energy Agency:-

- Limerick Clare Energy & Emissions Balance
- Limerick Clare Climate Change Strategy.

The reports were researched and written by Tipperary Energy Agency. Both reports were based on data and information received from a wide variety of sources. The contributors to the full reports are acknowledged in those documents.

Further information on the full reports, or this summary report can be obtained by contacting: -

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