



Irish Planning Institute

Settlement Patterns and Energy Consumption

Whites Hotel, Wexford.

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Sustainable Communities

- Irish Guidelines - Sustainability
 - Sustainable Urban Housing Guidelines [3]
 - Design Standards for New Apartments [2]
 - Sustainable Rural Housing Guidelines [2]
 - National Spatial Strategy [7]
- UK Guidelines
 - Sustainable Communities Act [0]
 - Creating Strong, Safe and Prosperous Communities [0]



Sustainable Communities

- **Sustainability tools**
- BREEAM Code for Sustainable Communities
 - ***Climate & Energy***
 - Place making
 - Community
 - Ecology
 - ***Transport***
 - Resources
 - ***Business***
 - ***Buildings***

Energy components



Sustainability Boundaries

Republic of Ireland



Key Statistics:

Population, 2008 = 4,422,100 (CSO)

GDP – 2007 = €160,603 million

Energy use – 2007 = 16,132 ktoe

Energy Import dependence = 89%

Fossil Fuel use = 96%

Source: Energy in Ireland, SEI, 2008

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Sustainability Boundaries

Mid West Region

GWh	North Tipperary	Limerick County	Limerick City	Clare County	Total
1990	1,439.4	2,701.8	1,167.7	2,182.5	7,501.2
2005	2,557.1	4,782.9	1,763.5	4,129.6	13,213.0
BAU 2010	3,068.6	5,726.1	2,108.5	4,950.7	15,850.9
BAU 2020	3,418.0	6,399.9	2,355.9	5,538.8	17,710.6

Key Statistics:

Population; 2008 = 361,038 (CSO)

GDP; 2007 = €11,840 million (estimated)

Energy use; 2007 = 1,200 ktoe

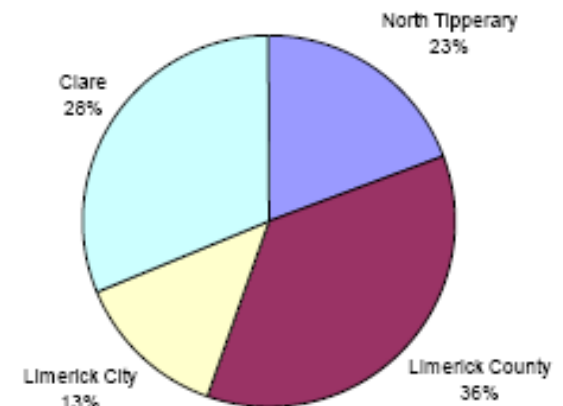
Energy Import dependence = 90%

Fossil Fuel use = 94.5%

Residential sector; 1990 = 30%; 2020 = 20%

Transport sector; 1990 = 28%; 2020 = 46%

Source: Mid West Regional Energy Balance, MWRA, 2007
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Energy for Communities

- **EU & National Targets**
- **White Paper**
 - 40% of electricity from renewables by 2020
 - 12 % of heat energy from renewables by 2020
 - 10% bio fuels in transport by 2020
- **Mid West Region**
- **Biomass Working Group Report – White Paper target**
 - 61,500 tonnes below target for 2010
 - BAU; 111,000 tonnes below target by 2020
 - Benefits of developing a biomass market
 - 420 full time jobs
 - >60 million litres of oil import avoided
 - >170,0000 tonnes of CO₂ avoided



Energy for Communities

- **Individual Responsibility**
- Sustainability Checklists
- Building Regulations TGD – L
- Building Energy Rating
- Renewable Energy Minimum

- Micro Generation Exemptions
- Grants & Incentives
 - Greener Homes Schemes
 - Micro generation feed in tariffs
 - Home Energy Saving Scheme





Energy for Communities

- **Residential Energy Needs**
 - Typical C1 house, 150 Square meters
- **Heat, Power & Light**
 - Typical C1 house, 150 Square meters
 - Heating (typical) 20,000 kWh p.a.
 - Light & Power (Typical) 20,000 kWh p.a.
- **Transport**
 - Car (Typical) 30,000 kWh p.a.
- **Total** per residential unit 70,000 kWh p.a.



Energy for Communities

- Residential Energy Needs {C1 house}
- Heating (typical) 20,000 kWh p.a.

– Heating oil	= 1,900 litres
– Natural Gas	= 20,000 kWh
– Coal (standard)	= 2.5 tonnes
– Peat sods	= 5.0 tonnes
– Wood Chip (40% mc)	= 6.0 tonnes
– Wood Pellet (8% mc)	= 4.1 tonnes
– Geothermal heat pump (COP 3.5)	= 5,700 kWh
– Solar Thermal (800 kWh / m ²)	= 25 Sq. meters

Biomass (wood) requires 1.5 – 2 acres to produce energy



Energy for Communities

- **Limerick City** (typical house size 120 m²)
Area 2,086 ha
- Households = 19,550 (census 2006)
- Heat Energy Market worth approx €50 million
- Biomass needs
 - 70,000+ tonnes biomass fuel pellet
 - 100,000+ tonnes of wood chip
- Land required
 - 4,200+ hectares
 - equals 40% of the private forest in Limerick presently
 - Miscanthus, presently 415 ha in Limerick.)
- Delivery & Storage difficulties



Energy for Communities

- **Settlements**
- Large Urban Settlements
 - Growth dependant on cheap fossil fuels
 - Expansion includes old suburbs
 - Population often close to work,
 - Public transport infrastructure – reasonable but under utilised
 - Energy distribution infrastructure – weak
 - Little economic benefit of energy use to hinterland
- Sub urban settlements / Rural urban
 - Same energy infrastructure difficulties as town / city
 - Opportunity to integrate sustainable energy infrastructure
 - Reconnection to hinterland for energy & food
- Rural
 - Transport energy significant
 - Building energy efficiency can be very good
 - Self sufficiency possible
 - Energy distribution infrastructure non existent & difficult



Energy for Communities

- **Large urban settlements**
 - Re-evaluate the energy distribution infrastructure
 - Develop the public transport infrastructure
 - Establish low carbon commercial centre's
 - Innovation in transport systems & pricing (public & private)
- **Sub urban – Rural Urban (New Suburbia)**
 - Move to introduce local energy distribution infrastructure
 - Establish Energy supply companies
 - Public sector leadership in alternative energy use
 - Innovation in transport systems & pricing (public & private)
- **Rural (one off)**
 - Strict sustainability guidelines
 - Identify connection & contribution to rural economy



New Suburbia

- **Shannon Housing Example**

- 604 housing units
- Energy Efficient buildings
- TGD – L 2010 & better
- 4 community buildings
- 1 retail outlet

- District Heating preferred heat energy distribution



Source: Shannon DH Study, Luker & Associates, 2009

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Shannon DH Example

- Shannon Housing Example

Phases	Detached House Units	Other House Units	Comm'ty / Crèche	Retail	Total Units	Area [acre]	Energy Consum'n kWh p.a.
1	7	52	1	0	60	8.77	673,000
2	0	46	0	0	46	3.73	460,000
3	0	71	0	0	71	5.61	686,500
4	0	38	0	0	38	4.94	380,000
5	0	109	0	0	109	10.53	1,056,500
6	0	57	2	1	60	8.87	764,500
7	11	94	1	0	105	13.54	1,122,500
8	51	68	0	0	119	14.14	1,332,000
Totals	69	535	4	1	608	70.13	6,475,000

Phases	Energy use MWh	Energy input MWh	Oil Equivalent Litres	Wood Equivalent Tonnes@3 5% mc
1	673	774	73,365	240
2	460	529	50,142	164
3	686.5	790	74,834	244
4	380	437	41,421	135
5	1057	1,215	115,165	376
6	765	879	83,336	272
7	1,123	1,291	122,370	400
8	1,332	1,532	145,213	474
Totals	6,475	7,446	705,806	2,305



Source: Shannon DH Study, Luker & Associates, 2009



Shannon DH Example

- **Local Authority lead on District Heating**
 - Initial investment = **€3,500 per unit (over std. cost)**
 - **> €180,000 spent in local energy economy**
 - **2,000 tonnes of CO₂ avoided**
 - **3 to 4 full time jobs created**

Option	Boiler capital cost	Net costs of connection	Costs DH pipe	Total costs
Phase 1 without scope to extend	€175,000	€51,000	€105,000	€331,000
Phase 1 with scope to extend	€220,000	€51,000	€105,000	€376,000
Phase 1 extended to 2 and 3	€90,000	€150,450	€212,000	€452,450
Phase 1, 2 and 3	€285,000	€150,450	€212,000	€647,450
Whole site	€1,305,000	€517,650	€599,000	€2,151,650

Source: Shannon DH Study, Luker & Associates, 2009



Shannon DH Example

- **Indigenous Resource**

- Wood chip 35 – 40 % mc
- 2,300 tonnes per annum
- Available within 40 km
- Thermal energy intensity is 10,000 kWh / dwelling / annum

- **Transport**

- Potential for biofuel / electric public transport
- Electric vehicle charging points
- Shannon Master plan seeking reduction in car use
- Energy intensity reduced (20,000 kWh p.a.)
- CO₂ intensity reduced due to energy source (bio fuel / electric)

- **Electricity**

- Potential for biomass CHP plant – 1 MW
- Integration of wind and hydro electricity



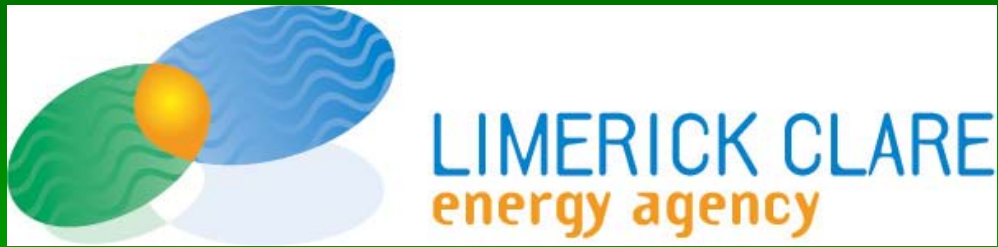
Rural Eco Communities

- **Cloughjordan Example**
- Permaculture life style
- Self sufficiency a key goal
- Energy efficiency & sustainability essential
 - Low energy houses (A rated < 75 kWh / m² / yr)
 - District Heating network served by solar & wood
 - Car sharing & pooling the norm
 - Public transport (train & bus) utilised
 - Low energy intensity businesses
 - Total Dwelling Energy Intensity < 40,000 kWh p.a.
- Cottage & Service industries work best
- Transport needs greatly reduced
- Community decision making



Conclusions

- Transition to low carbon society & economy must be led by national & local government
- Public sector buildings & employees must take lead in building & transport energy efficiency
- Individual responsibility is important but cannot be the only method of delivery
- Indigenous energy production should be aligned with regional / local potential, not just arbitrary external targets
- Benefits of Indigenous energy development
 - Economy; (80% of value remains local)
 - Society; local jobs, rural-urban links re-established
 - Environment; reduced harmful emissions



Energy Solutions for Sustainable Development

Thank You

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