Meeting Kyoto Targets

- EU Obligation: 8% reduction in greenhouse gases on 1990 levels by 2010
- UK Obligation: 12.5% reduction of overall emissions & 20% of CO2
- NI targets will operate as part of UK Obligation
- Northern Ireland Renewable Obligation operational from April 2005 (DETI)
- *Action Renewables* (DETI & Veridian) to undertake Awareness raising
- *"Environment & Renewable Energy Fund"* (Feb 2006) includes a £59m budget
  - Research
  - Householder grant aid (30%-50%)
  - Capability building
  - Leverage a further £300m private sector investment

Rigged Hill Wind Farm

Action Renewables
the future of energy, today

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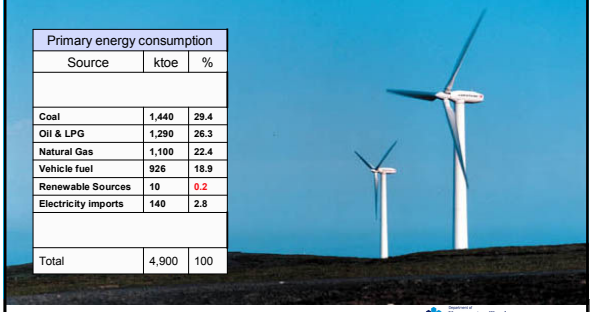
Energy Consumption: Northern Ireland

Primary energy consumption		
Source	ktoe	%
Coal	1,440	29.4
Oil & LPG	1,290	26.3
Natural Gas	1,100	22.4
Vehicle fuel	926	18.9
Renewable Sources	10	0.2
Electricity imports	140	2.8
Total	4,900	100



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Northern Ireland's Renewable Energy Options

- Wind Power
- Geothermal:
  - Ground heat pumps
  - Low enthalpy fluids in deep aquifers
  - Hot water and hot rock applications
- Wave & Tidal Power
- Compressed Air storage

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Wind Energy

- Wind & rugged topography
- NI currently has 16 wind farms approved(165 turbines / 168.75MW)
- 9 operating (113 turbines / 88.7 MW)
- Applications for 31 new sites and extensions to existing sites (359 turbines / 838.65MW)

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Environmental Impacts of Wind Farms

GSNI contributes to the "Environmental Impact Assessment" process
Ensures that potential impacts on peat stability, surface water and groundwater

- Provides geological information to the developer
- Advise Planning Service on geological aspects of applications
- And hopefully prevent events such as peat slides

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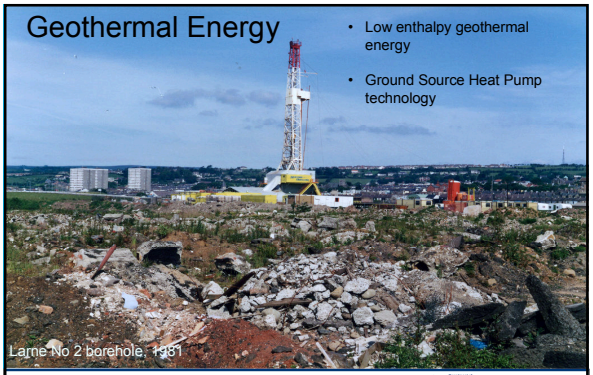
Geothermal Energy

- Low enthalpy geothermal energy
- Ground Source Heat Pump technology



Larne No 2 borehole, 1981

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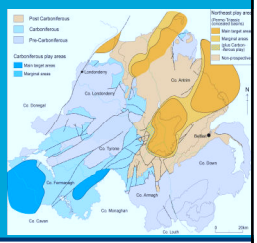
Low Enthalpy Geothermal System

- Heat exchange using hot water in deep aquifers
- Applicable in areas with "normal" geothermal gradients
- Most suitable for area heating & industrial use
- Major infrastructural costs



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Borehole Temperatures in Northern Ireland

Name	Location	Depth m	T °C	Rock
Big Dog	Fermanagh	1026	34	mdst
Glenoo	Fermanagh	1383	41	mdst
Owengarr	Fermanagh	2035	53	mdst
Wilson Bridge	Armagh	292	20	lst
Killary Glebe	Tyrone	1155	53	sst
Langford Lodge	Antrim	1020	48	mdst
Ballycarry A1	Antrim	593	34	mdst
Castle Dobbs	Antrim	398	38	mdst
Lisburn No. 2	Antrim	166	13	sst
Ballymacilroy 1	Antrim	2236	78	sst
Larne	Antrim	2880	88	sst

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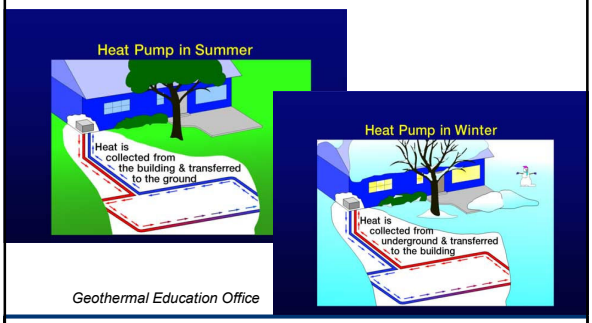
Geothermal:Ground Source Heat Pump



Geothermal Education Office

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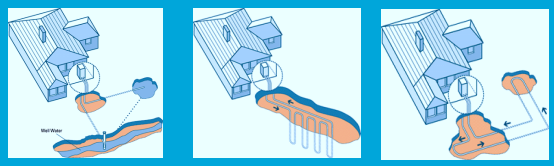
GSHP Installations

Each residential GSHP installation can save about 1-2t of CO_2 emissions annually, compared with electrical heating



Open-loop system fed by groundwater from a well

Closed-loop system with borehole heat exchangers

Closed-loop system with shallow, horizontal heat exchanger pipes

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Geothermal: Ground Source Heat Pumps

Advantages:

- Local application (can be installed almost anywhere) using boreholes or horizontal arrays
- Energy and cost efficient
- Installation & running costs comparatively low c £5000 (£3800 after grant)
- Clean heat and cooling with no emissions (a domestic GSHP will save 1-2 tonne CO_2 emissions annually, compared with electrical heating

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Wave & Tidal Energy

- Queens University of Belfast has pioneered wave generation technology
- In 1990, "Wavegen" installed the worlds first commercial wave generator "Limpet" (500W) on Islay

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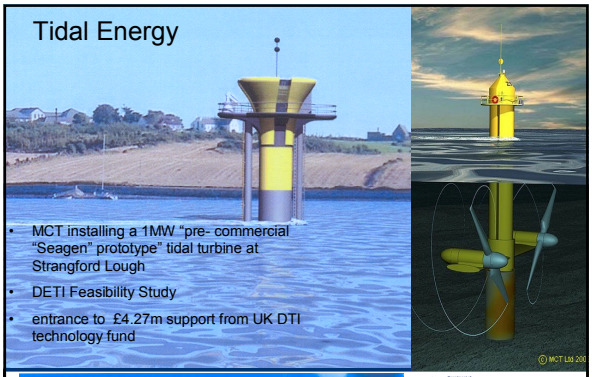
Tidal Energy



- MCT installing a 1MW "pre- commercial "Seagen" prototype" tidal turbine at Strangford Lough
- DETI Feasibility Study
- entrance to £4.27m support from UK DTI technology fund

Marine Current Turbines
Running with the tide of renewable energy

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Cavity Storage

DETI currently promoting commercial exploration of Permian & Triassic salt deposits in SE Antrim with a view to creating cavities

- Provide strategic capacity for NI gas network and electricity generators
- Help moderate fluctuations in supply and cost of gas
- Provide potential for compressed air storage to manage electricity base loads

Environment & Renewable Energy Fund (Feb 2006)

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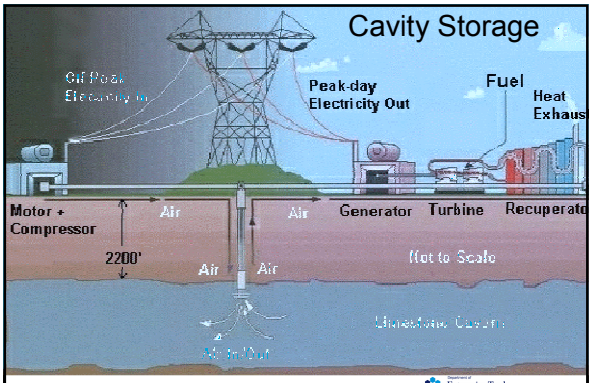
Cavity Storage



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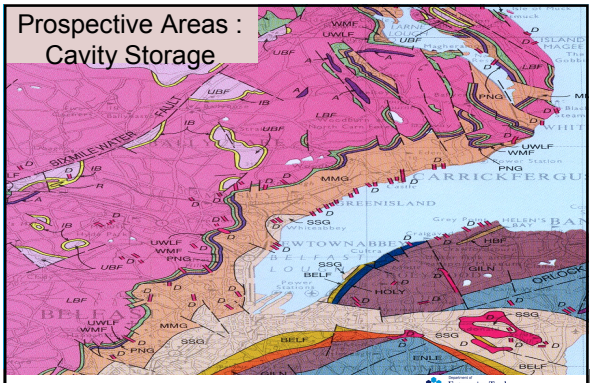
Prospective Areas : Cavity Storage



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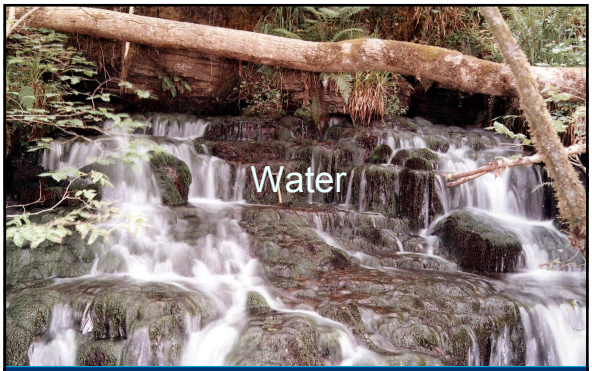

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Water

Arguably Ireland's most ubiquitous natural resources

- Almost all bedrock and superficial formations contain groundwater (c.15% of NI water supply from groundwater)
- NI Water & pollution control regulations ensure that surface and groundwater is protected and managed to high standards as required by the EU Water Framework Directive (WFD)
- GSNI hydrogeologists have a major role assisting DoE with WFD compliance

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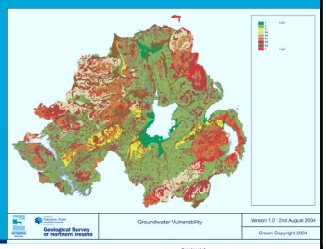
Water

GSNI provide much of the technical support the Environment & Heritage Service (Water Management Unit) including:

- *Groundwater body characterisation*
- *Groundwater vulnerability mapping*
- *Groundwater monitoring network*
- *River Basin Management*
- *Geological aspects of Environmental Impact Assessment*



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Landscape Heritage

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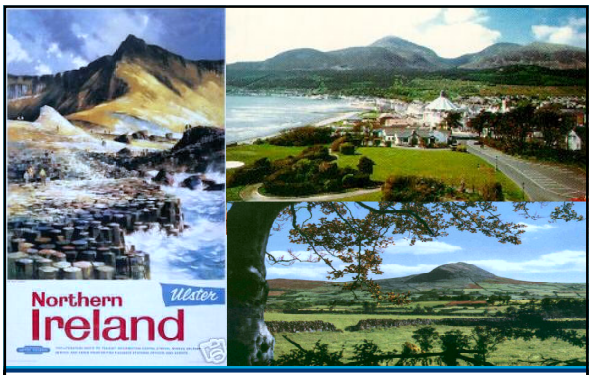

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Landscape Heritage

- Geology & landscape is a valuable natural resource with spin off for tourism & local economies
- Geological Survey of Northern Ireland is helping develop concept of Landscape Tourism

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Landscapes From Stone (1994-

Project Leaders:
Geological Survey of Northern Ireland
Geological Survey of Ireland

Strategic Partners:
Bord Fáilte, NITB, local councils

Aims:
- Increase awareness of geology natural heritage.
- Develop & market 12 northern counties as a destination for geological / landscape based recreational & educational tourism

Outputs:
Information, maps, walks /drives packages & marketing

Funding:
International Fund For Ireland , EU Peace & Reconciliation 1, Intereg 2 , local councils

GSI

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Geoparks

A Geopark is a territory, with a particular geological heritage and a sustainable territorial development strategy supported by a European program to promote development

Geoparks

UNESCO

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Marble Arch Caves & Cuilcagh Mountain Geopark

- Marble Arch /Cuilcagh Mountain is first UK geopark in the European Geopark Network
- Currently 25 European Geoparks in 10 Countries
- Part of UNESCO World Geopark Network
- Features caves and limestone karst of Marble Arch area & mountain bog of Cuilcagh

Geological Survey of Northern Ireland

- GSNI pioneering geological tourism
- Advisor to UNESCO
- UNESCO 2nd International Geoparks Conference
- Waterfront Hall Belfast Sept 2006
- 300 delegates from 40 countries

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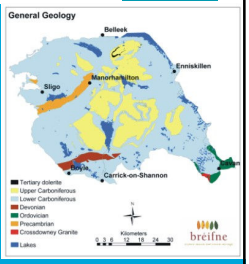
bréifne

- Launched 2004
- Cross-border,community based
- Partners: Cavan, Leitrim, Roscommon and Sligo Fermanagh Councils, GSNI, GSI, University of Ulster, Cavan Enterprise Board.
- Funding: Special EU Programmes Body (SEUPB) under the Support Programme for Peace and Reconciliation (€1.6million) with € 0.8 co-funding from project partners

http://www.gsi.ie/everyone/breifne/gsi_breifne_project.htm



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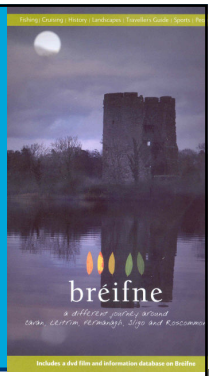
Breifne Aims:

To develop a sustainable cultural, heritage environmental and eco-tourism product in what has been a non-traditional tourist destination.

Products & Outcomes:

- comprehensive, GIS-based natural and cultural resource inventory and database for the entire region,
- heritage guide overview publication,
- suite of district-based walking, cycling and tour publications
- "Landscapes From Stone" web-site,
- common branding and marketing strategy for the region.



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Giant's Causeway

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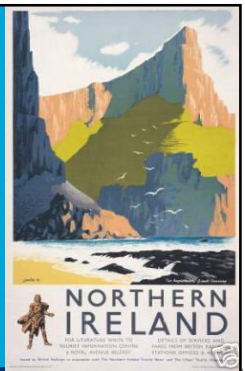
Giant's Causeway

- Iconic Images of Northern Ireland
- World Heritage Site & Nature Reserve
- Northern Ireland's premier visitor attraction (464,243 in 2005)
- GSNI is part of management team planning new visitor's Centre



World Heritage Site

THE NATIONAL TRUST

MOYLE DISTRICT COUNCIL

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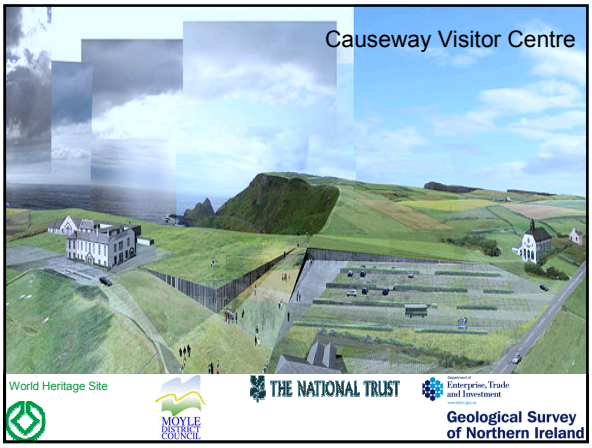

Summary

- Outlined the wide range of Northern Ireland's natural resourcesfrom minerals & petroleum to water, renewables & landscape
- Demonstrated their value to the N Ireland's economy our overall well-being
- Role of the GSNI plays in helping develop these resources in a sustainable manner
- As geologists we need to look beyond the traditional view of what natural resources are

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