



Consolato Generale
EDIMBURGO
in collaborazione con
Ufficio Addetto Scientifico
Ambasciata Londra



Italian Scotland Renewable and Clean Energy Conference

28-29th May 2009

Themes

- CCS
- Wind
- Solar
- Hydro
- Fuel cells
- Marine/Tide
- Electric transport
- Building adaptation
- Development planning
- Osmotic power generation

Issues

- Wind
 - Resource
 - Scotland: Rich – Italy: poor - but greater installed capacity
 - Offshore advantages/challenges
 - UK shallow water – Italy deep
 - Intermittency
 - 35% efficiency (UK) vs 17% efficiency (Italy)
 - Storage
 - Grid
 - Still relatively immature technology
 - Costs
 - Public Acceptance
 - Onshore/Offshore

Issues

- Marine/Tide
 - Resource
 - Scotland: Rich – Italy: ??
 - Offshore advantages/challenges
 - UK shallow water – Italy deep
 - Technology
 - Immature
 - Test Sites (Edinburgh, EMEC)
 - Storage
 - Grid
 - Costs
 - Public Acceptance – unknown!

Issues

- Solar
 - Resource (Scotland ?Poor – Italy Rich)
 - Daytime limit
 - Tracking
 - Storage
 - Grid
 - Submerged PV potential (tracking - reservoirs)
 - Specific timed opportunities for solar

Issues

- **CCS**

- CS Resource

- Sources: Scotland Rich – Italy Richer
 - Sinks: Scotland High Capacity – Italy low capacity

- Storage quantification

- Italy

- Aquifers – 1300Mt capacity

- Scotland's quantified

- Oil - 1200Mtonnes (vs 20Mtonnes production)

- Aquifers - 4000Mtonnes capacity

- 2nd largest in Europe

- Offshore CO2 EOR – is this viable?

- CC – needs to be cheaper, less energy

- Pre-, Post-combustion, Oxyfiring all relatively Immature

- Coal w/CCS cheap option (alternative to gas)

- Policy and regulation development

- Effective European Scientific Research partnership (Co2GeoNET/SEGEC)

- Public Opinion – need to demonstrate storage safe - education

Issues

- **Fuel Cells**

- Variety of cells
- Issues around Hydrogen
 - Need to make it
 - High pressure storage
- Alternatives to hydrogen
 - Methane, Methanol (toxic), Ethanol, Carbon
 - LSCM, Ammonia
 - Solid Oxide and Molten Carbonate
- Fuel processing
- Materials stability
- Infrastructure

Issues

- Energy Conservation
 - Buildings design
 - Building adaptation
 - Climate change forecasts
 - Policy
 - People
 - User acceptability
 - Work on the children (education)
 - 80% target by 2030
 - Role of IT/Heating/Lighting
 - Where is Energy used in Buildings?

New Fuel Opportunities

- IGCC
- Hydrogen
- Oxyfuels
- Osmotic power generation
 - Ammonia - CO₂ osmosis potential
- Power from low waste heat energy
 - Sub-Rankine
- Ocean Thermal energy conversion

Research links

- Funding
 - Government (Scotland – Italy priorities??)
 - Industry (ENI/ENEL?? – c.f. Scottish Power/Iberdrola)
 - Research Councils in both countries
 - EU (CO2GeoNet leverage, SEGEC interest)
 - “European Energy Programme for Recovery” opportunity
- Common issues
 - Importance of Energy to economic development
 - Both countries with CCS demonstrations
- Conflicting issues
 - Focus on geographical solutions
 - Move work where the energy is
- Teaching
 - Visiting Lecturers – “Scotia-Italian Energy Seminar Series” – (4 per year)