

Construction Sector Report

A INTRODUCTION

0 Legal Base & Wider Concerns

0.1 1997 Kyoto Protocol to the 1992 United Nations Framework Convention on Climate Change (UNFCCC).

Annex A of the Kyoto Protocol lists the following Greenhouse Gases:

- Carbon Dioxide (CO₂) ;
- Methane (CH₄) ;
- Nitrous Oxide (N₂O) ;
- Hydrofluorocarbons (HFC's) ;
- Perfluorocarbons (PFC's) ;
- Sulphur Hexafluoride (SF₆).

Discussing compliance with the Protocol's legally binding emission targets in terms of Carbon Dioxide Equivalents runs the risk, particularly in the European Construction Sector, of missing significant emissions from the fluorinated gases, i.e. HFC's, PFC's and SF₆.

Use of SF₆ in the Irish Construction Sector was overlooked in the 2003 Environmental Protection Agency Report on 1998 Emissions of Industrial Greenhouse Gases (HFC's, PFC's and SF₆).

At the time of writing (June 2007), the first signs of a future surge in Air Conditioning, even in simple building types, e.g. housing, can already be witnessed in Ireland. This should have been foreseen back in the 1990's.

Article 3.2 of the Kyoto Protocol required that each Party to the Protocol made demonstrable progress in achieving its commitments by 2005. This did not happen in Ireland.

At the time of writing, Ireland is far adrift from meeting even its modified E.U. commitments under the Kyoto Protocol.

0.2 Beyond the 1997 Kyoto Protocol.

Following the E.U. Council's Brussels Summit on 8th and 9th March 2007 and the recent G8 Summit in Heiligendamm, Germany, from 6th to 8th June 2007 the Kyoto Protocol must now be seen as the beginning of a long-term process. It is very probable that there will be a Kyoto II Instrument agreed within the United Nations System.

Although not ambitious in its performance targets (from the viewpoint of 2007!), the 1997 Kyoto Protocol has served as a valuable indicator of Political Will and Institutional Capacity in each of the E.U. Member States.

The implications for Ireland of a Kyoto II Instrument will be harsh !

0.3 Policy Integration.

Targeting the Construction Sector's performance solely towards reducing Kyoto Greenhouse Gas (GHG) emissions, i.e. in a manner which is not properly integrated into wider concerns, e.g. Sustainable Human & Social Development, will pose significant dangers both for the future of the Irish Construction Industry and for our Social Wellbeing in Ireland.

To take an example from Europe, the panic to conserve energy in the late 1970's and early 1980's led to a dramatic reduction in rates and quantities of direct, natural ventilation to the habitable spaces of buildings. This, in turn, had an adverse impact on Indoor Air Quality (IAQ), and led to a sharp rise in Asthma among building occupants.

It is important to note, however, that Article 2.1 of the Kyoto Protocol states:

*' Each Party, in achieving its quantified emission limitation and reduction commitments under Article 3, **in order to promote sustainable development**, shall: '*

0.3.1 Sustainable Development (1987 WCED Report: 'Our Common Future'):

Development that meets the needs of the present without compromising the ability of future generations to meet their own needs. It contains within it two key concepts :

- the concept of 'needs', in particular the essential needs of the world's poor, to which overriding priority should be given; and
- the idea of limitations imposed by the state of technology and social organization on the environment's ability to meet present and future needs.

The abridged version of the above definition (in red italics) is the one most often quoted in the Developed World. In isolation from the remainder of the definition, however, it is so ambiguous that it has little meaning and, more importantly, it has been rejected by the Developing World.

0.3.2 Sustainable Human & Social Development (2004 Rio Declaration on Sustainable Social Development, Disability & Ageing):

Development which meets the responsible needs, i.e. the Human & Social Rights, of this generation - without stealing the life and living resources from future generations, especially our children ... and their children.*

*As defined in the 1948 Universal Declaration of Human Rights (UN Office of the High Commissioner for Human Rights).

0.4 Sustainable Development & Climate Change Mitigation (WMO-UNEP IPCC 4th Assessment Report, Working Group III Contribution, May 2007)

Making development more sustainable by changing development paths can make a major contribution to climate change mitigation, but implementation may require resources to overcome multiple barriers. There is a growing understanding of the possibilities in choosing and

implementing mitigation options in several sectors which realize synergies and avoid conflicts with other Aspects of Sustainable Development.

- Irrespective of the scale of mitigation measures, adaptation measures are necessary.
- Addressing climate change can be considered an integral part of Sustainable Development Policies. National circumstances and the strengths of Institutions determine how development policies impact on GHG emissions. Changes in development paths emerge from the interactions of public and private decision processes involving government, business and civil society, many of which are not traditionally considered as Climate Policy. This process is most effective when actors participate equitably, in partnership, and decentralized decision-making processes are co-ordinated.
- Climate Change and other Sustainable Development Policies are often, but not always, synergistic. There is growing evidence that decisions about Macro-Economic Policy, Agricultural Policy, Multilateral Development Bank Lending, Insurance Practices, Electricity Market Reform, Energy Security and Forest Conservation, for example, which are often treated as being separate from Climate Policy, can significantly reduce emissions. On the other hand, decisions about improving rural access to modern energy sources, for example, may not have much influence on Global GHG Emissions.
- Climate Change Policies related to Energy Efficiency and Renewable Energy are often economically beneficial, improve energy security and reduce local pollutant emissions. Other Energy Supply Mitigation Options can also be designed to achieve Sustainable Development benefits, such as avoided displacement of local populations, job creation, and health benefits.
- Reducing both loss of Natural Habitat and Deforestation can have significant biodiversity, soil and water conservation benefits, and can be implemented in a socially and economically sustainable manner. Sustainable forestation and bioenergy plantations can lead to restoration of degraded land, manage water run-off, retain soil carbon and benefit rural economies, but could compete with land for food production and may be negative for biodiversity, if not properly designed.
- There are also good possibilities for reinforcing Sustainable Development through mitigation actions in the Waste Management and Transportation Sectors and in Construction.
- Making development more sustainable can enhance both Mitigative and Adaptive Capacities, and reduce emissions and vulnerability to Climate Change. Synergies between mitigation and adaptation can exist, for example properly designed Biomass Production, formation of Protected Areas, Land Management, Energy Use in Buildings, and Forestry. In other situations, there may be trade-offs, such as increased GHG Emissions due to increased consumption of energy related to adaptive responses.

0.5 Construction Life Cycle & Life Cycle Costing

It is generally not understood that the Full Life Cycle of a Construction Project is lengthy and complex.

To take the various and interlinked stages of the design, construction and use of a Building, for example

- Expression of the needs/wants/desires/requirements of the Client/Client Organization ;
- Planning Brief and Performance Specification for the Building ;
- Site Analysis and Evaluation ;
- Design ;
- Preparation for Construction - begins after completion of design ;
- Construction ;
- 'Early Life' of the Building in Use - including management, maintenance, servicing ;
- Adaptable 'Middle Age' of a Building in Use - including renovation, refurbishment, modification, alteration, and extension ;
- De-Construction ;
- Disposal.

Too much emphasis, in Ireland, continues to be placed on the Initial Capital Investment required to complete a building. This conceals the considerable costs of Building Use from the Client/Client Organization. Costing over the Full Building Life Cycle must become standard practice and, if necessary, be legally regulated to become such.

B ISSUES

1. Construction Sector Background

1.1 Output & Structure of the Construction Industry (CSO, for 2005*):

- It was estimated that the Value of Output in the construction industry was almost €32 billion. This compares to €17.6 billion in 2000.
- Construction was estimated to have accounted for 20% of Gross Domestic Product (GDP), or 23% of Gross National Product (GNP).
- Residential Construction output more than doubled from €9.5 billion in 2000 to €20.9 billion in 2005.

1.2 Investment, Taxation & Revenue (CSO, for 2005*):

- Public Capital Programme investment in productive infrastructure reached almost €4.3 billion, while investment in social infrastructure was approximately €3.5 billion.

* Although later construction-related statistics are available from the Central Statistics Office in Ireland, the issue of statistical reliability has discouraged us from moving past the CSO Report (July 2006) on 'Construction & Housing in Ireland'.

- Over €2.4 billion, or 29% of the total Public Capital Programme, was spent in the Transport Sector while in excess of €1.5 billion was spent on housing.
 - Stamp Duty on property transactions amounted to €2 billion and this accounted for 75% of the total revenue raised from stamp duty.
- 1.3 House Completions & Housing Stock (CSO, for 2005*):
- Over 86,000 dwelling units were completed in Ireland. This compares to less than 20,000 completed in 1990 and 50,000 in 2000.
 - New dwellings were completed at a rate of 21 units per 1,000 of population, and added over 5% to Existing Housing Stock.
 - Close to half of the Units Completed in Ireland in 2004, the latest year for which data is available, were Semi-Detached Houses. This compares to about 30% in 2000.
 - In the April 2006 Census of Population, the CSO identified a total of 1.8 million Private Residences and Communal Establishments throughout the State. Of these, about 275,000 were vacant at the time of the Census.
- 1.4 Planning Permissions & Land (CSO, for 2005*):
- Planning Permission was granted for the construction of 55,000 Multi-Development Houses, 21,000 One-Off Housing Units and 24,000 Apartments.
 - The Average Floor Size for Houses granted planning permission in a Multi-Unit Development was 125m². For One-Off Houses, the average floor area was 214m².
 - The amount of Zoned Serviced Land for residential construction increased from 10,800 hectares (with a potential for over 263,300 Units) in 2000 to almost 14,800 hectares (with a potential of almost 460,000 Units). The potential housing density of this available land increased from 24 Units per hectare in 2000 to more than 31 Units per hectare in 2005.
- 1.5 Regional Analysis (CSO, for 2005*):
- The Dublin Region accounted for 34% of Total Construction Output in 2000 and for less than 28% in 2004.
 - In the second quarter, there were over 242,000 Workers in the Construction Sector. Of these, almost 53,000 lived in Dublin while 37,500 lived in the South-West.
 - According to the DEHLG, the Average Price of a New House in Dublin was €386,000 in 2005. A New House in Galway cost €275,000 and in Cork €265,000.
 - Almost one in every three Dwelling Units completed in 2004 were located in Dublin or the Mid-East region.

* Although later construction-related statistics are available from the Central Statistics Office in Ireland, the issue of statistical reliability has discouraged us from moving past the CSO Report (July 2006) on 'Construction & Housing in Ireland'.

- 1.6 European Construction Industry (CSO, for 2005):
- Ireland's House Completion Rate (21 units per 1,000 of population) was four times the average for other European countries.
 - In Ireland, 77% of Homes are Owner-Occupied. Hungary, Spain, Slovakia and Norway had higher ownership rates. In contrast to this, 45% of German Homes and 35% of Homes in Switzerland are Owner-Occupied.
 - Construction Output per Capita is highest in Ireland, at approximately €7,600 in 2005. This is more than double the corresponding average figure for E.U. Member States.

2 Construction - Legal & Regulatory Frameworks

- 2.1 Legislation in Ireland:
- Spatial Planning Law is concerned with the appropriateness of development in any particular part of the country.
 - Building Regulations are concerned with the adequacy of building construction. Currently, these only specify minimum construction performance within a limited framework of health and safety objectives.
[The model used for Building Regulations in Ireland continues to be the Building Regulations for England & Wales, with minor modifications. This model is inadequate.]
 - Safety at Work Law (implements E.U. Law at national level) is concerned with the protection of workers during the process of construction and, when buildings are occupied, in places of work.
 - Environmental Impact Law (implements E.U. Law at national level) is concerned with mitigating the adverse 'environmental impacts' of construction projects.
 - Public Procurement Law (implements E.U. Law at national level) is concerned with ensuring that Public Contracting Authorities treat Economic Operators equally, transparently and in a non-discriminatory manner.
- 2.2 Regulatory Framework.
- Regulation of the Construction Sector in Ireland is primarily 'bureaucratic' and, in actual practice, is often poorly executed and piecemeal. A confusing array of national and local bodies is responsible for 'control', which leads to disjointed and inefficient monitoring. Insufficient attention is paid to 'real' building or construction performance. Institutional Capacities within the relevant national authority having jurisdiction, i.e. the Department of Environment, Heritage & Local Government, and Local Authorities are poor.

3. Construction Data & Statistics

- 3.1 Ireland does not have a National Construction Database. No reliable statistics can be presented with regard to building or construction performance in 1990, or 2005. No coherent predictions, therefore, can be made for the years 2010, 2020, or 2050 under any futures scenario.
- 3.2 Construction is not identified as a separate Sector, by either the EPA (Ireland) or the EEA (Denmark), in European GHG Emission Databases.
- For the purposes of this IEA Climate Change Project alone, the manufacture of Building Products and the processing of Building Materials are being disregarded in the Construction Sector Report.

C SECTORAL OPTIONS

4 Current Policies & Measures

- 4.1 GHG Emission Trends (WMO-UNEP IPCC 4th Assessment Report, Working Group III Contribution, May 2007)
- The largest growth in Global GHG emissions between 1970 and 2004 has come from the energy supply sector, with an increase of 145%. The growth in direct emissions (direct emissions in each sector do not include emissions from the electricity sector for the electricity consumed in the building, industry and agricultural sectors or of the emissions from refinery operations supplying fuel to the transport sector) in this period from transport was 120%, industry 65% and land use, land use change, and forestry (LULUCF is used here to describe the aggregated emissions of CO₂, CH₄, N₂O from deforestation, biomass and burning, decay of biomass from logging and deforestation, decay of peat and peat fires. This is broader than emissions from deforestation, which is included as a subset. The emissions reported here do not include carbon uptake/removals.) 40%. Between 1970 and 1990 direct emissions from agriculture grew by 27% and from buildings by 26%, and the latter remained at approximately at 1990 levels thereafter. However, the buildings sector has a high level of electricity use and hence the total of direct and indirect emissions in this sector is much higher (75%) than direct emissions.
- 4.2 Bearing in mind the earlier contents of this Report's Sections 2 and 3 above, the Construction Sector in Ireland does not have any Options.
- 4.3 Article 2.1(a) of the 1997 Kyoto Protocol places 'energy efficiency' first in a lengthy list of policies and measures to be implemented and/or further elaborated in accordance with the national circumstances of each Party to the Protocol.

- 4.4 The enormous potential for improving energy efficiencies and conserving energy in the design, construction and management of buildings in Ireland has hardly been tapped. For that reason, it is recommended that existing policies and measures be re-engineered.

5 Blueprint for Meeting the Kyoto Process Challenge

- 5.1 Immediately Restore Ireland's Construction Sector Infrastructure:
- Re-establish an independent National Institute for Spatial Planning & Construction Research (formerly known as An Foras Forbartha), having joint responsibility with the CSO for maintaining a Reliable National Construction Database. Research and Innovation must be prioritized ;
 - Establish an independent and fully accredited National Construction Research & Testing Laboratory Complex in Ireland ;
 - Adequately resource the Irish National Accreditation Board (NAB) ;
 - Adequately resource the National Standards Authority of Ireland (NSAI) and ensure that Ireland participates actively in the European Standards Organizations and ISO (International Standards Organization) ;
 - Adequately resource an independent Irish Agrément Board and closely monitor the Quality of its output ;
 - Adequately resource awareness raising, training and education for Competence at all levels in the Sector, including all design disciplines ;
 - Establish an independent and comprehensive National Building Insurance Scheme.
- 5.2 Rationalize and Increase the Effectiveness of Irish Building Regulations as the primary legal instrument in Ireland for setting building performance standards. Ensure that the interpretation and operation of the Building Regulations is uniform, harmonized and competent across the country.
- 5.2.1 Incorporate into National Building Regulations:
- Essential Requirements (Annex I) of E.U. Construction Products Directive 89/106/EEC ;
 - National Measures implementing the E.U. Energy Performance of Buildings Directive 2002/91/EC.
- 5.2.2 Re-Format, Revise & Horizontally Integrate National Building Regulations:
- To ensure adequate building user health, convenience and comfort in Ireland ;
 - To dramatically improve Kyoto Protocol GHG Emission Reductions, and prepare Ireland for the much more stringent requirements of a Kyoto II Instrument. Special attention should be paid to Fluorinated GHG's ;
 - To reduce Adverse Environmental Impacts to a minimum ;
 - To include Renewable Energy/Heat, Recycled Rainwater and Sustainable Drainage, in all construction projects ;
 - To adapt, **now**, to the more severe climatic conditions expected within the next 100 years. Current Design Practice is inadequate ;
 - To incorporate Sustainability Impact Assessment (SIA) for construction activity which is likely to have a significant adverse impact on the environment or wellbeing of the wider community.

- 5.2.3 Introduce and/or Strengthen Requirements concerning building design 'flexibility', 'adaptability', and 'accessibility' for all potential building users, in order to extend Building Life Cycle.

Recommended Building-Related Life Cycles Minima in bold

| | |
|----------------------|------------------------|
| Structure | 100 – 200 yrs ; |
| Building Fabric | 60 – 100 yrs ; |
| Services | 20 – 30 yrs ; |
| Furniture & Fittings | 10 – 20 yrs. |

- 5.2.4 Introduce Requirements concerning the widespread application of **Intelligent Energy Efficiency** and **Remote Energy Management** in all building types new and existing, simple and complex in order to support more energy efficient and energy saving patterns of building use by occupants. Incentivize the installation of **Building Performance Monitoring & Management Systems** throughout the Sector.
- 5.2.5 Incentivize better than Minimum Energy Conservation Performance in all New Buildings and a widespread, significant improvement in Existing Buildings for an initial period of four years. This Transition Period will be necessary for the Construction Industry to up-skill in order to meet new standards of building performance, for the many design practitioners to be re-educated, and design school curricula to be upgraded. The immediate aim of incentivization is for all new buildings to achieve a Minimum Building Energy Rating (BER) of 'A' and existing buildings to achieve a Minimum Rating of 'B'. Innovative Construction Products, Systems and Processes must be speedily introduced to the market, and approved, to facilitate these measures. The costs for Ireland of non-compliance with the 1997 Kyoto Protocol and a Kyoto II Instrument after 2012 must be fully considered when deciding on the levels and range of Incentives. Review, update and improve Building Energy Ratings every 3-4 years.
- 5.2.6 After the 4 Year Transition Period
- Require all New Buildings to achieve a Minimum Building Energy Rating (BER) of 'A'.
 - Require all Existing Buildings to achieve a Minimum Building Energy Rating (BER) of 'B'. Retain Incentive Measures.
 - Require Buildings of Historical, Architectural or Cultural Importance to achieve a Minimum Building Energy Rating (BER) of 'C' Retain Incentive Measures.
- 5.2.7 Incentivize the installation of Renewable Energy Systems in all New and Existing Buildings for an initial period of four years. This Transition Period will be necessary for the Construction Industry to up-skill in order to install these new systems, for the many design practitioners to be re-educated, and design school curricula to be upgraded. The immediate aim of incentivization is for all new buildings to reach 20% of Energy Used/Consumed being, directly or indirectly, from Renewable Energy Sources, and all existing buildings to reach 10%. Innovative Construction Products, Systems and Processes must be speedily introduced to the market, and approved, to facilitate these measures. The costs for Ireland of non-compliance with the 1997 Kyoto Protocol and a Kyoto II Instrument

after 2012 must be fully considered when deciding on the levels and range of Incentives. Review, update and improve Renewable Energy Targets every 3-4 years.

5.2.8 After the 4 Year Transition Period

- Require 20% of the Energy Used/Consumed in all New Buildings to be, directly or indirectly, from Renewable Energy Sources.
- Require 10% of the Energy Used/Consumed in all Existing Buildings to be, directly or indirectly, from Renewable Energy Sources. Retain Incentive Measures.
- No legal requirements or incentives with regard to Renewable Energies shall apply to Buildings of Historical, Architectural or Cultural Importance.

5.3 Ensure that Initial Construction is Adequate.

5.3.1 Recognising that post-completion repairs and/or system retrofitting always involve compromise and are rarely cost-effective or adequate, require that Initial Construction Performance is adequate through robust inspection and monitoring of buildings during construction, ensuring that all relevant legislation has been complied with and that Construction Products have been Properly Approved, i.e. shown to be 'fit for their intended use'. Where major refurbishment and renovation of existing buildings are necessary to improve their performance, Incentives must be introduced, and maintained at sufficient levels, to ensure that these works are as cost-effective and as efficient as possible.

5.3.2 Adequately resource, with Staff (e.g. building controllers, inspectors, administration, legal), Equipment (e.g. comprehensive range of monitoring equipment) and Technical Support (e.g. training, library facilities, access to research) all Building Control Authorities in the country.

5.3.3 Introduce a Mandatory and Integrated Inspection System (see this Report's Section 2 above) on all Construction Projects, at the following Construction Stages

- Foundations ;
- Drainage ;
- Ground Floor Construction ;
- Super-Structure (above Radon Resisting Membrane) inspections to take place at a level no higher than first floor ;
- Roof.

Such an Inspection System must operate uniformly across the country. Piecemeal variations and maverick procedures introduced by authorities having jurisdiction or individual Local Authorities cannot be tolerated.

5.4 Introduce Certificates of Building Completion Performance.

5.4.1 The current system of RIAI/Law Society 'Opinions on Compliance' is inadequate and offers no protection to the Irish Consumer.

5.4.2 Before any Building can be occupied, a Certificate of Completion Performance must be issued by an Independent Technical Controller. The Certificate will include a check on compliance of the Building with relevant legislation (see this Report's Section 2 above) and its 'Real' Performance.

- 5.5 Sustainable Infrastructure & Engineering Works
- 5.5.1 Introduce and/or Strengthen Requirements concerning Engineering Design 'flexibility' & 'adaptability' in order to extend Infrastructure Life Cycle.
Recommended Engineering Related Life Cycle Minimum in bold
Structure **150** – 250 yrs.
- 5.5.2 Identify geographical 'Areas of Risk' in Ireland, e.g. coasts & river basins, from the more severe climatic conditions expected within the next 100 years. Engineering Works must be commenced, **now**, to protect areas with existing development. Appropriate Spatial Planning Restrictions on Development must be introduced in other areas.
- 5.6 Sustainable Service Utilities (Urban & Rural)
- 5.6.1 Introduce mandatory and stringent Planning, Co-Ordination, Access, Environmental Protection and Energy Efficiency/Conservation requirements to all Service Utility Installations in Ireland, whether urban or rural.
- 5.7 Public Procurement Law
- 5.7.1 Use as an Effective Tool to dramatically improve Ireland's Kyoto Process Performance.
- 5.7.2 In Ireland, revise the 2006 European Communities (Award of Public Authorities' Contracts) Regulations, Statutory Instrument No.329 of 2006, to include Kyoto Process Performance as one additional criterion for inclusion in all Technical Specifications. Three existing criteria are:
- Accessibility for people with disabilities / design for all users ;
 - Environmental performance generally ;
 - Quality performance.
- 5.7.3 Inform the European Commission in Brussels that a Proposal to further revise the E.U. Public Procurement Directives 2004/17/EC and 2004/18/EC should be immediately initiated.

D SECTORAL IMPLICATIONS

6 40% Kyoto GHG Emissions Reduction by 2020

- 6.1 Such is the threat to Human Progress caused by current environmental degradation, and the great timelag between implementation of corrective actions and resulting beneficial environmental impacts, that **Sustainability Performance in Ireland** must be uniformly benchmarked at year **1990**.
- 6.2 Determined implementation of a **Credible Strategy** for Sustainable Human and Social Development in Ireland will be a complex, phased, cyclical and iterative process; it will not be easy, and it will certainly involve short term costs. To be gained in the second decade of the New Millennium, however, will be a leaner, more efficient and more competitive Construction Sector capable of effective operation at any level in the

- European Single Market and, in the third decade, positive progress in achieving Social Wellbeing - a general condition in our society of health, happiness, creativity, responsible fulfilment and Sustainable Development.
- 6.3 Recalling that direct and meaningful consultation with people, partnership between all Sectors of society, consensus, transparency, institutional openness, and political accountability, are essential elements in Social Wellbeing for All - a **Social Partnership** is a collective of groups and individuals, i.e. the social partners, business, industry, civil society and experts, which acts as a 'catalyst' in enhancing and broadening implementation in an area of human and/or social policy. The Irish Construction Sector must actively participate in such a process of working.
 - 6.4 Achieving a 40% Kyoto Protocol Greenhouse Gas Emissions Reduction, benchmarked for all Kyoto GHG's at 1990 levels, by 2020 represents a **Technically-feasible, Economically-viable, Ethically-informed, Need-demonstrated (TEEN)** Target for the Construction Sector.
 - 6.5 To date, Ireland has not demonstrated any solid or confident progress in achieving its E.U. modified Kyoto Protocol Commitments. In comparison with a lead-role, ethical and principled position on Development Aid Ireland's current Kyoto Performance can best be described as grudging and entirely unethical; it is also being closely monitored by countries not listed in Annex B of the 1997 Kyoto Protocol.
 - 6.6 No Benchmark exists for Kyoto GHG Emissions in the Construction Sector, and Ireland cannot afford the time to establish such a Benchmark before commencing Implementation. A Reliable National Construction Database is essential linked to EuroStat in Luxembourg and the EEA in Denmark.
 - 6.7 Fundamental Sectoral Re-Skilling, Re-Training and Re-Education at all levels, targeted at 'Real' Implementation, must begin immediately. The Construction Crafts must be properly revived and encouraged to flourish.
 - 6.8 Subsequent to a renewed, rapid and concerted national effort in **Futures Studies**, harmonized and integrated short, medium and long-term Plans in the policy areas of Sustainable Development, Environmental Protection, Energy Efficiency/Conservation and Waste Management must be specified for implementation over the following time frames:
(i) up to 2012 ; (ii) from 2013 - 2040 ; (iii) from 2041 - 2100.
 - 6.9 Detailed **Performance Indicators**, both Quantitative and Qualitative, for all stages of Spatial Planning, Design, Construction/De-Construction, Management, Maintenance and Disposal must be used to target improvements in Construction Related Sustainability Performance and to reliably verify Target Attainment. **Targets** must be continually reviewed, re-adjusted and improved at regular intervals of 3-4 years thereafter.
 - 6.10 A realistic Sustainability Impact Assessment (SIA) must be undertaken for any proposed construction activity which is likely to have a significant adverse impact on the environment or the wellbeing of a community; such an assessment must be subject to proper monitoring and control by competent authorities and institutions in Ireland and the E.U.
 - 6.11 Ireland's legally binding commitments to the European Union and the Global Community of Nations and Peoples, under the UNFCCC's 1997 Kyoto Protocol and a probable Kyoto II Instrument, must be placed within this more coherent and comprehensive framework.

E ANNEX

7 References & Sources

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