

GLASGOW AND THE CLYDE VALLEY GREENHOUSE GAS INVENTORY

A Summary Guide



Tyndall°Centre
for Climate Change Research

GLASGOW AND THE CLYDE VALLEY
STRUCTURE PLAN JOINTcommittee

North East South West
INTERREG III C

grip for Europe
The Greenhouse Gas Regional Inventory Project



Introduction

The Glasgow and the Clyde Valley Structure Plan Joint Committee (GCVSPJC) has been a partner in the INTERREG IIIC funded InterMETREXPlus project promoted by METREX, a partnership of European Metropolitan Regions, working with the Tyndall Centre for Climate Change to analyse metropolitan greenhouse gas (GHG) emissions.

The project utilised the **GRIP** (Greenhouse Gas Regional Inventory Project) **model**, developed by the Tyndall Centre to audit greenhouse gas emissions at the Glasgow and the Clyde Valley metropolitan scale.

This document presents a summary of the first greenhouse gas inventory for the Glasgow and the Clyde Valley (GCV) area for the year 2004.

More information on the GRIP model available at www.grip.org.uk

Detailed inventory information available at www.gcvcore.gov.uk/climatechange

Inventory Headlines

- In 2004, the Glasgow and the Clyde Valley area emitted a total of **12.54 million tonnes of greenhouse gases**, compared to Scotland emissions of 55.7 million tonnes and UK emissions of 657 million tonnes.
- In 2004, 14,719,000 tonnes of CO₂ equivalent emissions were produced from the Glasgow and the Clyde Valley area.
- Overall CO₂ equivalent emissions from the region work out at **8.4 tonnes per person**; this is below the national average and reflects the region's economic profile.
- **Carbon dioxide** was the most common greenhouse gas emitted – **97%** of all the six main GHGs in 2004.
- In 2004, **89%** of CO₂ equivalent regional emissions were from the **Energy sector**, other sectors' emissions were Industrial processes (2%); Waste (4%); and Agriculture (5%).
- In 2004, the main sub-sectors of the energy sector emissions were **Domestic** (36%); **Transport** (26%) and **Industry** (17%).

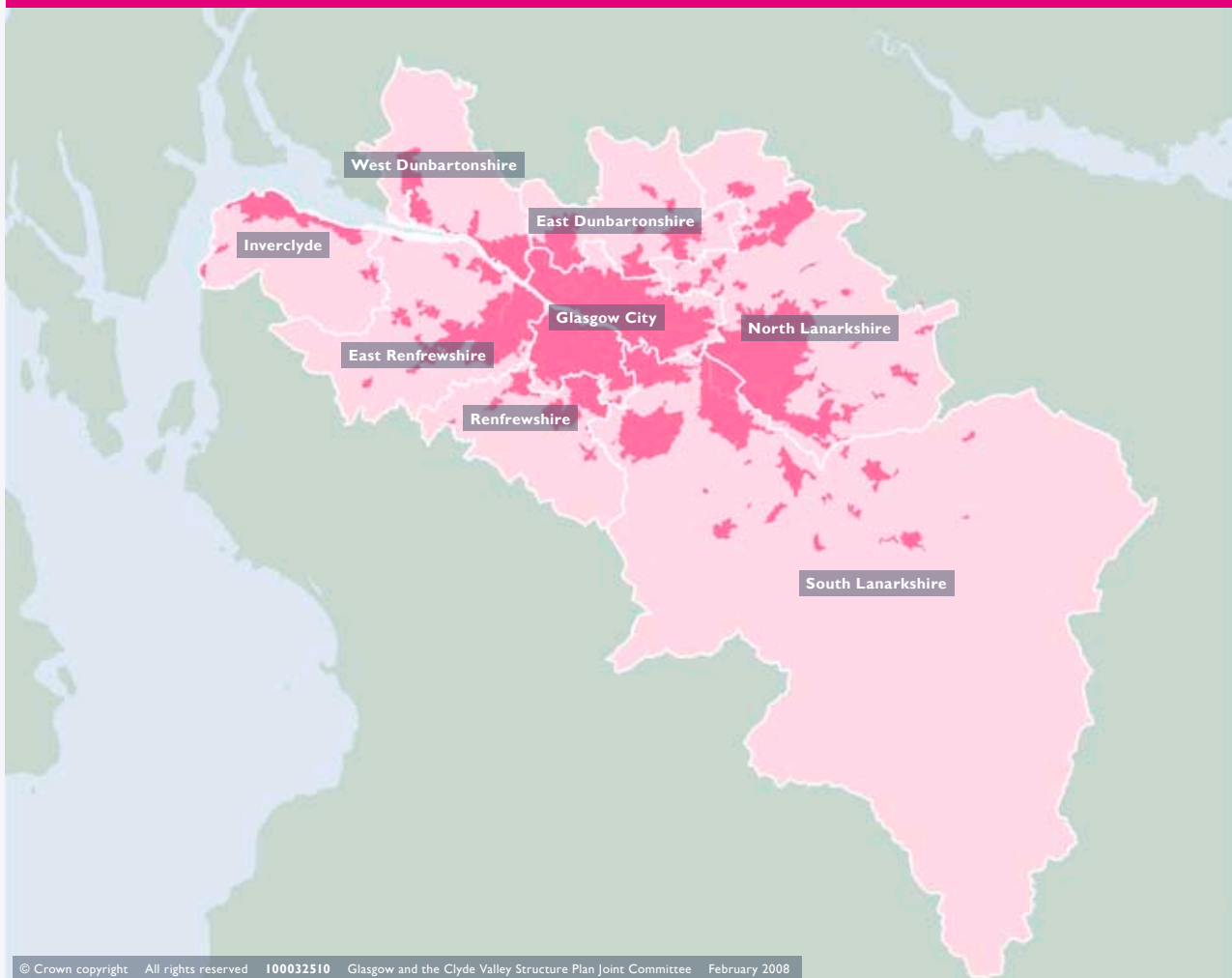
Regional Context

The GCVSPJC is comprised of eight local authorities: East Dunbartonshire, East Renfrewshire, Glasgow City, Inverclyde, North Lanarkshire, Renfrewshire, South Lanarkshire and West Dunbartonshire, who work together on strategic development planning matters through a Local Government Joint Committee. **Table I** provides a summary socio-economic context for the inventory.

Table I Characteristics Summary: Glasgow and the Clyde Valley Area 2004

Area	3,405 km ²
Population	1,747,000
Households	787,000
Gross Domestic Product	£29.3 billion
GDP per capita	£16,791

Glasgow and the Clyde Valley Area



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Inventory Methodology

The GRIP model approach is similar to national inventory reporting formats and the methods used are congruent with Intergovernmental Panel on Climate Change (IPCC) international standards¹.

There are six main direct greenhouse gases considered in the inventory: These include:

- **Carbon dioxide** (CO₂)
- **Methane** (CH₄)
- **Nitrous oxide** (N₂O)
- **HFCs** (HFC)
- **PFCs** (PFC)
- **Sulphur hexafluoride** (SF₆)

The different gases vary in their contribution to anthropogenic global warming and can be compared using their global warming potential (GWP). The most commonly used timeframe for comparison is 100 years (GWPI00). The GWP of a greenhouse gas is usually expressed in terms of its potency in comparison to the reference gas CO₂.

Table 2 shows the GWPI00 of the six main greenhouse gases, by multiplying the weight of the gas released by its carbon dioxide equivalent value can be drawn. In this document the GWPI00 is used to calculate the CO₂ equivalent (CO₂e) values.

Table 2 Global Warming Potential of main greenhouse gases

Greenhouse Gas	Global Warming Potential (GWPI00)
Carbon dioxide	1
Methane	21
Nitrous oxide	310
Hydrofluorocarbons	between 140 - 12,100
Perfluorocarbons	between 6,000 - 9,200
Sulphur hexafluoride	23,900

The GHG inventory report necessarily presents some considerable technical detail regarding emissions occurring with the GCV area, for a base year of 2004, the most recent year of data availability. The inventory draws upon a mix of datasets including:

- Scottish Environment Protection Agency's Waste Digest
- SLIMS economic forecasts
- Transport Trends
- Regional Trends
- Digest of United Kingdom Energy Statistics (DUKES)
- the Scottish Environmental Inventory, and
- the Agricultural Census, among others

These data, together with the international standard emission factors included in the GRIP model, are used to produce the emissions inventory, along with recognition of the geographical location of the area studied, transport links and economy.

¹ Where detailed data exists. See interMETREX Project Extension Report for detailed methodology at www.gvcvcore.gov.uk/downloads/GRIP_InterMETREXPlus.pdf



Inventory Sectors

The audit divides these greenhouse gas emissions into four sectors:

The Energy Sector (89% regional CO₂e emissions)

The energy sector includes all energy users, including the energy industry itself, but also all domestic, services, agricultural, industrial and transport (all modes) consumption, and also *fugitive emissions*, i.e. methane released from the gas distribution network, electricity losses from the grid and methane leakage from coal mining. This sector accounts for 99.9% of the GCV area CO₂ emissions (12.271 million tonnes), with CH₄ and N₂O emissions from this sector contributing 936 thousand tonnes of CO₂ equivalent.

The breakdown of energy sector greenhouse gas emissions into its components is shown in **Table 3** below. In the GCVSPJC area, domestic consumption is the greatest source at 36%, with transport (26%) and industry (17%) as the other main emissions sources.

Table 3 Carbon dioxide equivalent emissions in the GCV area from energy sub-sector 2004

Energy sub-sector	Percentage of Emissions
Domestic	36%
Transport	26%
Industry	17%
Services	11%
Fugitive emissions / Energy transformation	10%

The Industrial Process Sector (2% regional CO₂e emissions)

Industrial processes sector emissions result from either the greenhouse gas release from industrial chemical reactions or from the consumption of greenhouse gas sources directly. They do not include emissions that occur as a result of the combustion of fossil fuels as these emissions are incorporated in the energy sector results. There are a relatively small amount of industrial process emissions being released in the GCV area, none of which are included in the relevant international measuring standards. Therefore, limited emissions are reported for this sector in the GCV area.

The Agriculture Sector (5% regional CO₂e emissions)

The Glasgow and Clyde Valley area agricultural sector emissions result from fertiliser application which produces 1,300 tonnes of Nitrous Oxide emissions, whilst enteric fermentation and animal waste emissions produce 14,240 tonnes of methane emissions. The emissions in the GCV area total to 724,000 tonnes of CO₂ equivalent.

The Waste Sector (4% regional CO₂e emissions)

The GCV area waste sector emissions relate to only waste emissions produced in the area. Waste Disposal in landfill produces 18,900 tonnes of methane emissions whilst wastewater handling produces another 4,260 tonnes. Waste Incineration produces 12,500 tonnes of carbon dioxide.

Emissions Summary

Table 4 summarises the emissions for each of the four sectors.

Table 4 GCV area – Total emissions (x1,000 tonnes)¹

		CO ₂	CH ₄	N ₂ O	HFC	PFC	SF ₆	CO ₂ e
Energy sector	Total	12,199	40.44	0.25	0	0	0	13,126
Domestic		4,666	1.53	0.10	0	0	0	4,729
Industry		2,247	0.25	0.08	0	0	0	2,277
Services		1,479	0.18	0.04	0	0	0	1,495
Fugitive Emissions / Energy Transformation		412	38.40	0.00	0	0	0	1,218
Transport		3,395	0.07	0.03	0	0	0	3,406
Industrial sector	Total	0	0	0	242.86²	2.65²	0	322
Waste sector	Total	12.50	23.20	0.4	0	0	0	750
Agriculture sector	Total	0	14.24	1.37	0	0	0	606
Total (all sectors)		12,211³	77.88³	2.02³	242.86²	2.65²	0	14,719
GCV Population: 1,747,080								
Per capita (tonnes)		6.99	0.04	0	0.14	0	0	8.42
GVA €42,954.2m								
Per unit GVA		0.28	0	0	0.01	0	0	0.36

¹ These figures have been estimated using a combination of national, regional and local data and although they are deemed to be the most accurate data available currently, the results carry a degree of uncertainty.

² Figures for HFC and PFC relate to GWPI00 rather than kilo tonnes.

³ Figures require to be multiplied by their global warming potential (GWPI00) to derive the CO₂ equivalent value total.

Total emissions (in tonnes) in the GCV area amount to 12.54 million tonnes
(CO₂ = 12,211 + CH₄ = 78 + N₂O = 2 + HFC = 243 + PFC = 3 + SF₆ = 0)

CO₂ equivalent emissions totalled 14,719,000 tonnes in the GCV area
(Domestic 13,126 + Industrial 322 + Waste 750 + Agriculture 606)

Domestic emissions in the GCV area are higher relative to the rest of the UK, the GCV area is responsible for a low level of industrial process emissions, emissions from waste are on a per capita basis in line with the national average and agricultural emissions are higher than average due to a proportionally larger dairy farming sector in the GCV area.

Overall emissions from the region work out at 8.4 tonnes per person; this is below the national average and reflects the region's economic profile. The GCV area greenhouse gas emissions equate to 0.3 tonnes per unit of GVA.

Future Plans

The GCVSPJC seeks to mitigate the impact of climate change through its spatial planning strategies. **Table 5** shows how spatial planning strategies could effectively consider climate change mitigation.

Table 5 Stages in climate change preparation

Stage	Mitigation
1	Establish robust baseline data GHG emissions
2	Detailed analysis of the potential impacts of new policy options assessed against baseline conditions
3	Establish transparent GHG reduction trajectories
4	Policy action to reduce emissions in line with reduction targets. This should emphasise delivery and consider all available mechanisms.
5	Effective monitoring and review

Source: **Town and Country Planning Tomorrow series paper 9, Shaw, 2007** from www.tcpa.org.uk/press_files/pressreleases_2007/20070924_TS.pdf

The InterMETREXPlus project has enabled the GCVSPJC to start to address several of these stages:

- The GCV area inventory has provided an initial baseline for Stage 1 of the above process.
- The inventory has also provided the basis for the further investigation of new policy options as suggested in Stage 2. It has also demonstrated the spatial implications of some of the sectoral aspects of the energy scenarios developed by stakeholders within the InterMETREXPlus project.
- These scenarios have also enabled initial discussions on broad greenhouse gas emissions reduction trajectories through the backcasting of scenario targets to 2025 as suggested in Stage 3.
- The establishment of more detailed series of greenhouse gas emissions reduction trajectories will be undertaken as part of the INTERREG 4C project EUC02, if a funding bid submitted in January 2008 is successfully approved in mid-2008.
- Stage 4 will be addressed through discussions on the new Strategic Development Plan which is required by the Planning etc. (2006) Act to replace the existing Structure Plan.
- Stage 5 will be addressed by undertaking a further GCV area inventory as either part of the EUC02 project or other regional joint-working with other statutory stakeholders.

Further information

The InterMETREXPlus project see www.gcvcore.gov.uk/climatechange

The proposed EUC02 project see www.euco2.org

If you have any questions then contact **George Eckton** on 0141 229 7730 or via email george_eckton@gcvcore.gov.uk

