



# The Scottish Government

Riaghaltas na h-Alba

Research into  
existing  
non-domestic  
buildings in Scotland



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Building Standards Division  
24 March 2010



# Sullivan: Existing Non-domestic Buildings

A Low Carbon  
Building Standards  
Strategy For Scotland

Report of a panel appointed by Scottish Ministers  
Chaired by Lynne Sullivan  
2007

- Carbon/ energy assessment and upgrade
- Public bodies to check assessments.
- Guidance for different types of non-domestic buildings
- Encourage owners to implement recommendations



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# Climate Change (Scotland) Act 2009

Climate Change (Scotland) Act 2009 (asp 12)



## Climate Change (Scotland) Act 2009 2009 asp 12

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- Scottish Parliament 4 Dec 2008
- Royal Assent 4 Aug 2009
- Commencement date 1 Apr 2010
- Progress report 1 Apr 2011

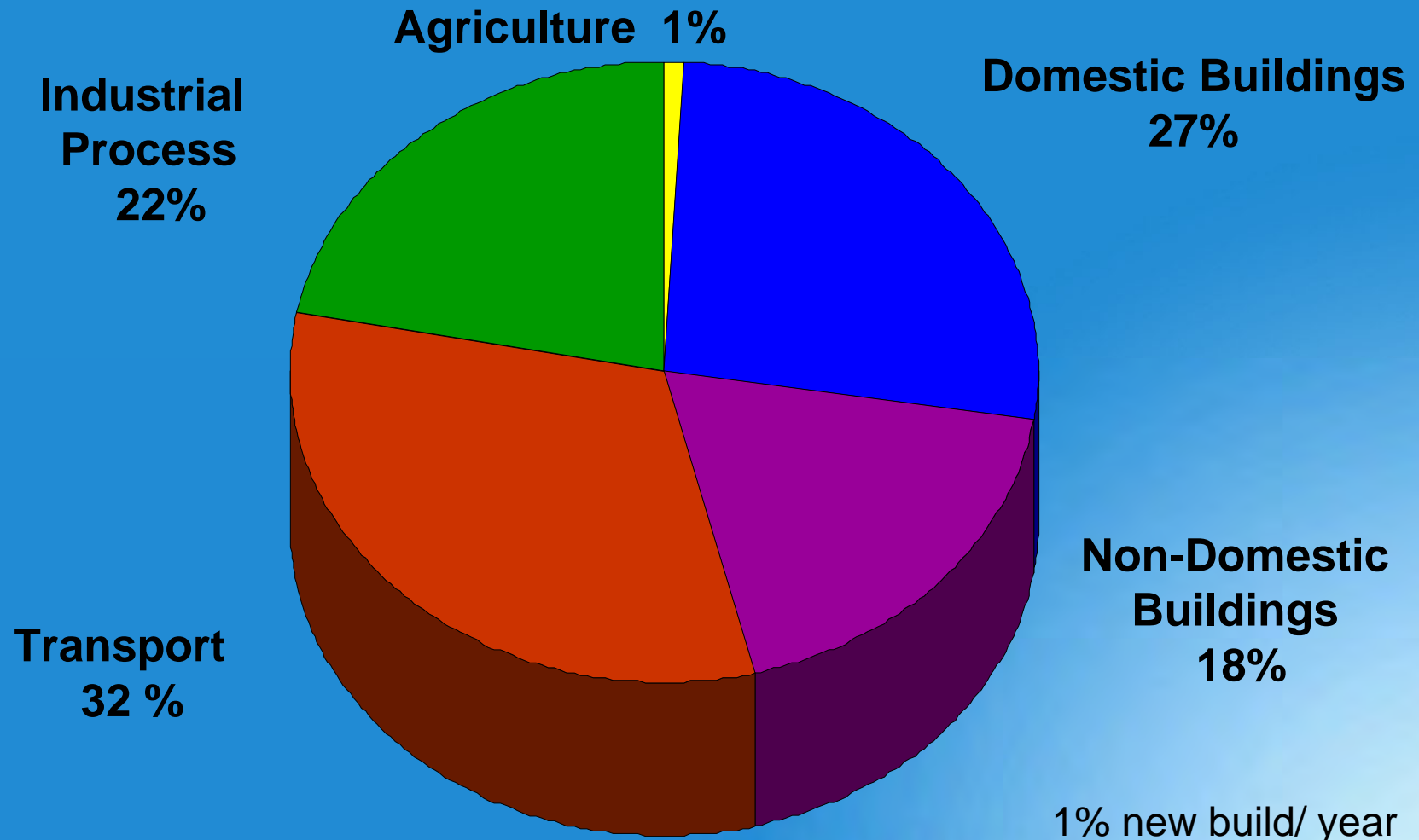
- 80% reduction by 2050
- 42% reduction by 2020

- Basket of GHG - Carbon dioxide, methane, NOX etc.



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# Carbon Dioxide Emissions





# Section 63 Non-domestic buildings: assessment of energy performance and emissions

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Scottish Ministers **must**, by regulations,

(a) provide for **assessment** of—  
energy performance of non-domestic buildings; and  
emission of greenhouse gases

(b) Require owners of such buildings to **take steps to improve** the energy performance of such buildings and reduce such emissions



# Section 63

## Non-domestic buildings

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- Circumstances ?
- Which ND buildings ?
- Period of time ?
- Methodology ?
- Certificates ?
- Register ?
- Enforcement ?



- Which ND buildings?





- Which ND buildings?
- Mapping the non-domestic building stock of Scotland



# Data Framework

## Existing datasets:

1. Scottish  
assessors

2. Public sector  
estates

3. EPC data



# Data Framework

## Data captured:

COMPREHENSIVE

1. Scottish assessors

Some valuation boards in Scotland

Bulk classes

29 000 premises

SELECTIVE SECTORS

2. Public sector estates

Schools  
EPIMS  
NHS estates

SELECTIVE SECTOR/ SIZE

3. EPC data

1500 buildings

Public/ private sector

Types/ geography



# Data Framework

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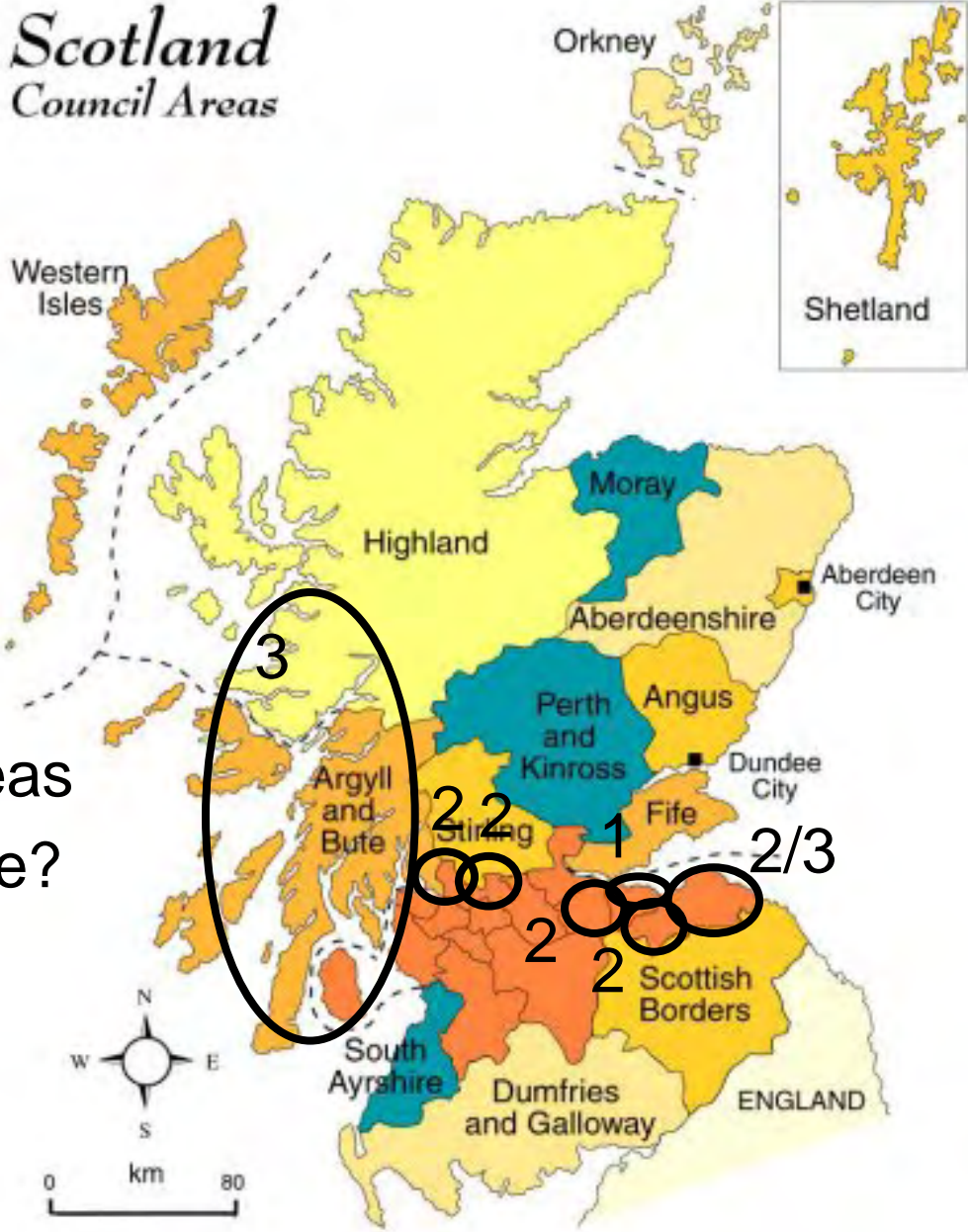
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# Scotland Council Areas



Are these areas representative?

- 1. City
- 2. Town
- 3. Rural

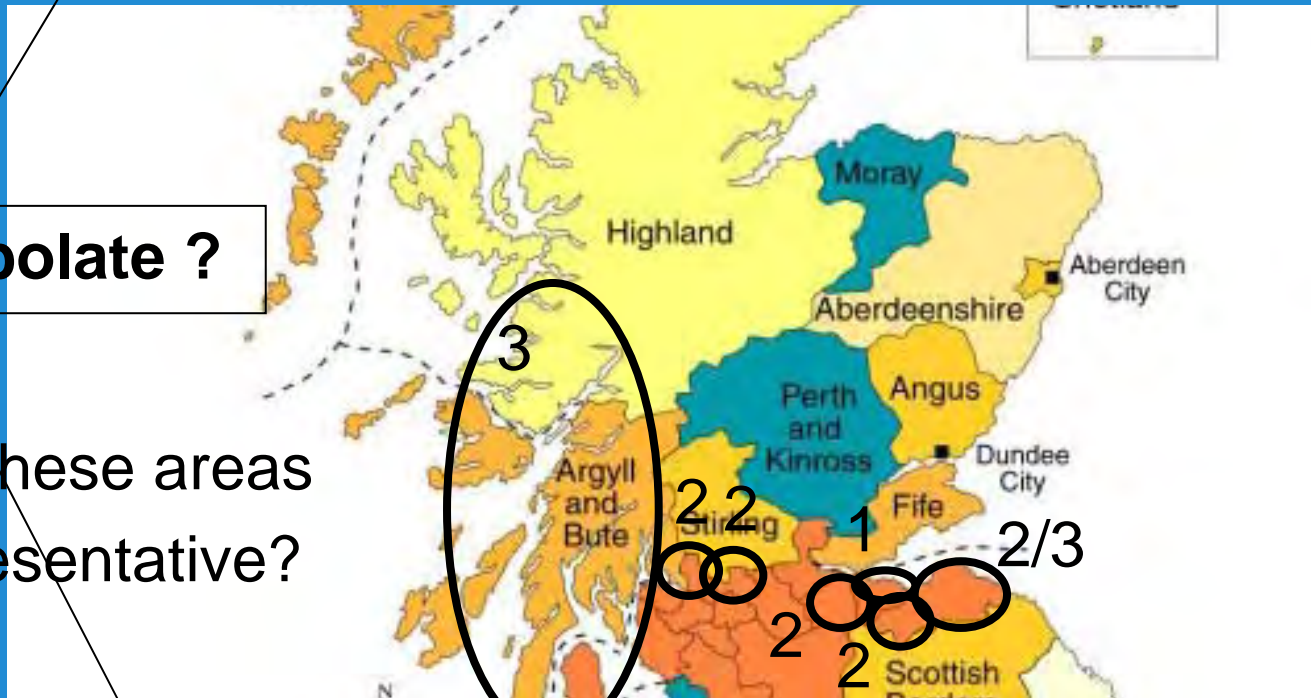


# Data Framework

## A stock profile for Scotland?

Extrapolate ?

Are these areas representative?



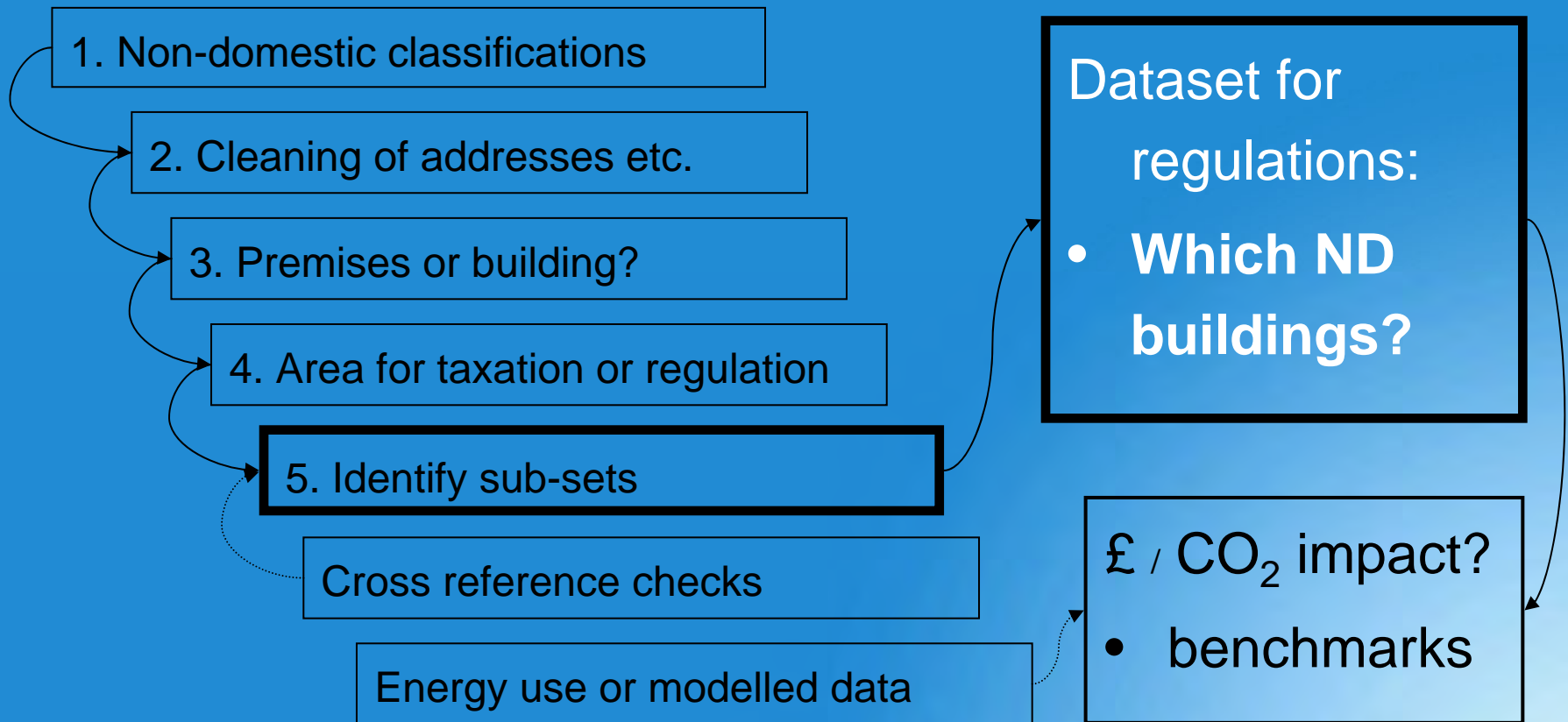
- 1. City
- 2. Town
- 3. Rural

Non-domestic stock for  
sample areas



# Data Framework

## A stock profile for Scotland?



# Research 1: Series of existing ND buildings

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## Principles:

- Engage with owner/ occupier
- Understand the case study buildings and how they relate to modelling software
- Look to profile all ND building stock
- 25 year life cycle costs for all improvements

## Pilot Study :

- Fabric improvement of cavity wall insulation on a primary health care building
- Inform the design of further case studies
- Simple payback period analysis (>2 years)



# Research 2: Retail

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1990's purpose built then extended

## Results:

- No economic/ environmental justification for more insulation due to high internal gains (people, lighting)
- Heating control recommendations don't affect model results although likely to reduce energy consumption
- Passive cooling or ventilation should be considered

1. Lighting
2. Heat recovery or DHW controls
3. Solar thermal
4. Renewables (wind)



# Research 3: Office

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2000 purpose built. Research looked at improvements to existing when extended

## Results:

- Maintenance and facilities management capabilities should be considered

1. Existing services: fan VSD, lighting, heat recovery, water heating. (2-7 yr paybacks)
2. Solar thermal
3. Solar film to windows
4. Wind/ Biomass and GSHP judged not viable



# Research 4: Hotel

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1890's Grade A listed. Various improvements whilst refurbishment and limited extension planned. Reasonably practical options considered that reflect commercial operation

- Occupied rooms = income!
- Passive measures or renewables - limited in scope

## Results:

1. Upgrade lighting (1 year payback)
2. Existing CHP, therefore little gain from heating
3. Fabric upgrades: long payback (>30 yrs) but consider with drivers such as draught-proofing or acoustic privacy (increases hotel revenue)



# Research 5: School and Glazed Office

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Both 1970's construction.

Apply 6 no. of the same improvement measures.

Discussions with owner and tenant on proposals.

## Results:

Knock-on effects of improving occupant studying or working comfort is not accounted for, nor is increased rental value for offices.

1. Lighting controls and T5 retrofit (4-12 yr paybacks)
2. Building Fabric upgrades (roof and wall insulation, double glazing) all long payback (30 years or more)



# Research 6: Ongoing

## 1. Establish types for GHG reductions:

- Leisure, office, school, healthcare, retail, library
- Small and large sizes
- Which buildings will deliver greatest CO<sub>2</sub> reduction?
- Identify most cost effective measures
- Different regulatory eras to be looked at next?

## 2. Options for the management of the energy performance of existing buildings

- If not viable to improve fabric or services in buildings (the asset)- Unacceptable level of costs? Historic status?
- So, look at options for operational assessments



# Research : Summary

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1. For practicality + cost-effectiveness:  
**Services upgrades usually beat fabric improvements**
2. But understand the building, maintenance regime and planned upgrades. Then identify appropriate measures.
3. Making comfort conditions in existing buildings **better** for those who **work, rest, play, study or shop** in them -  
Can this be accounted for?
4. Carbon Trust: **Better buildings...used better**



# Research : Next steps

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1. Make further use of case study research
2. Mapping work completion
3. Establish categories for Assessment of Carbon and Energy Performance (ACEP)
4. Consider impacts on historic buildings in more detail

