



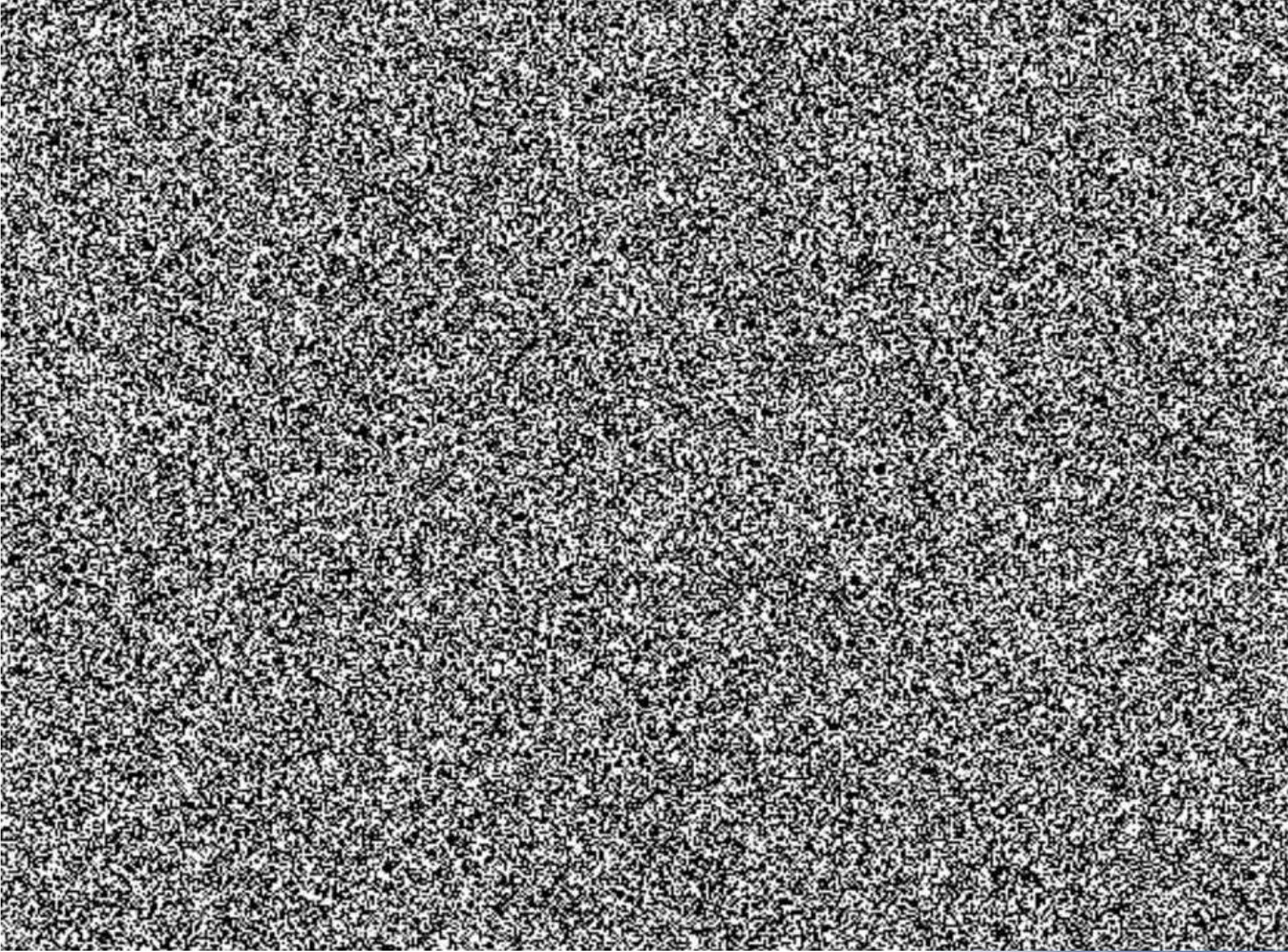
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Developing a prescient awareness of groundwater in city planning policy – what roles and types of knowledge exchange are required

Contributions: NGU, Oslo Municipality, Glasgow City Council, Scottish Government, Key Agencies Group Scotland, EU COST Action Sub-Urban

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Cities cover

3% Earths surface

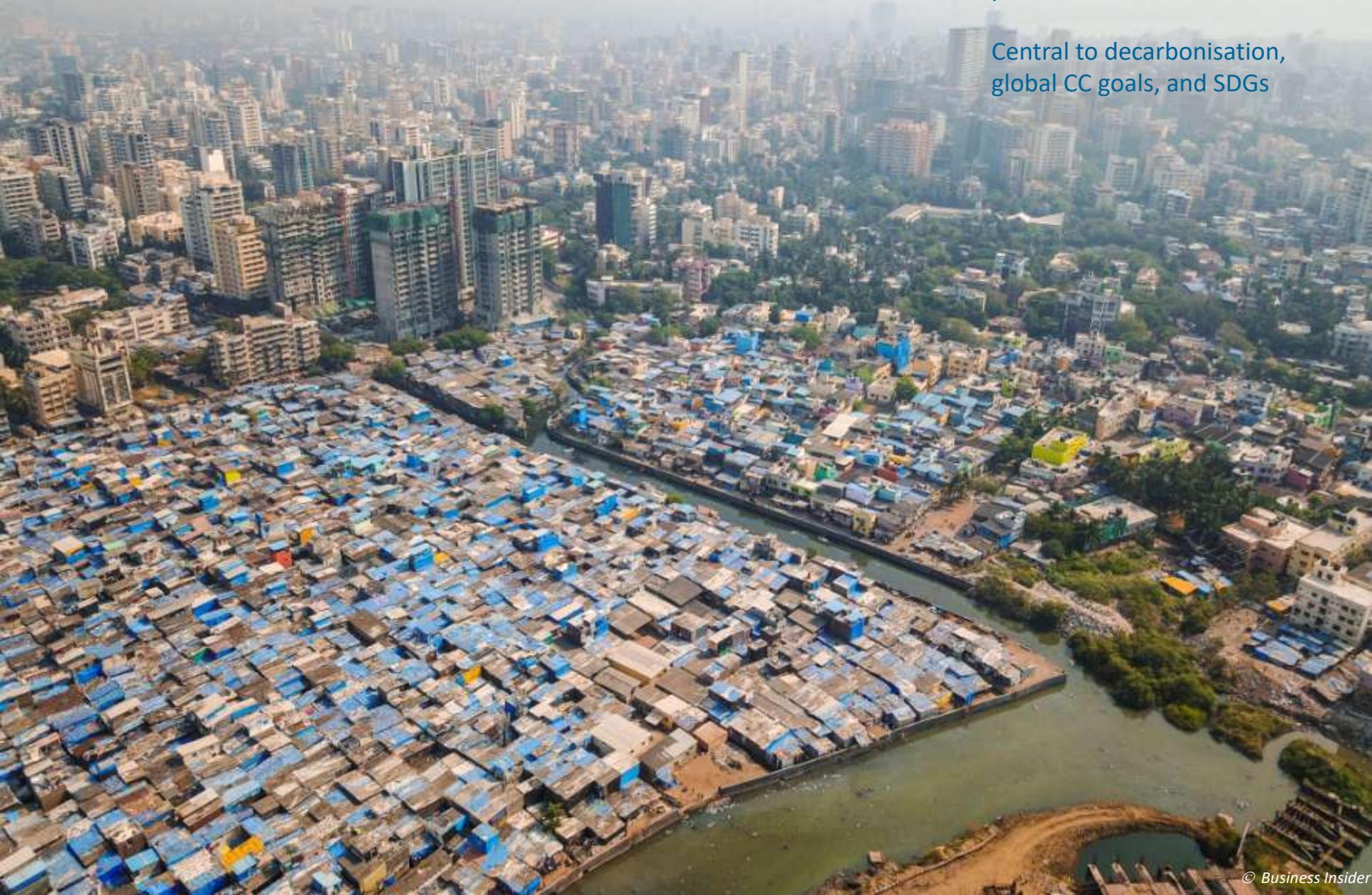
54% population

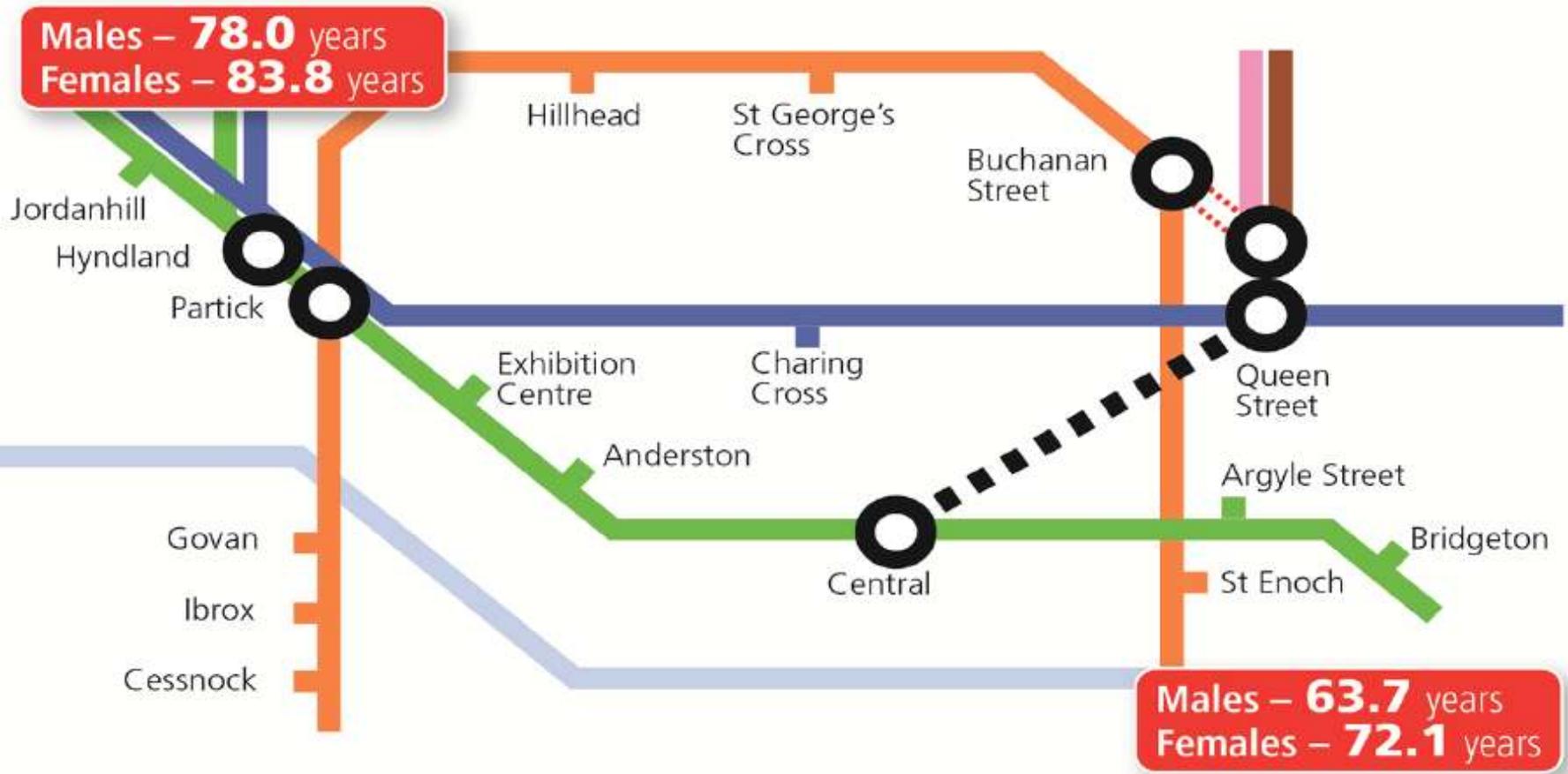
2050 urban population
= 2004 total population
(UN 2018)

Cities are highly dense, complex, inter-connected places - socially and physically

Resource intense; Multiple layered land use at any one point

Central to decarbonisation, global CC goals, and SDGs





Cities are highly dense,
complex, inter-connected
places - socially and physically

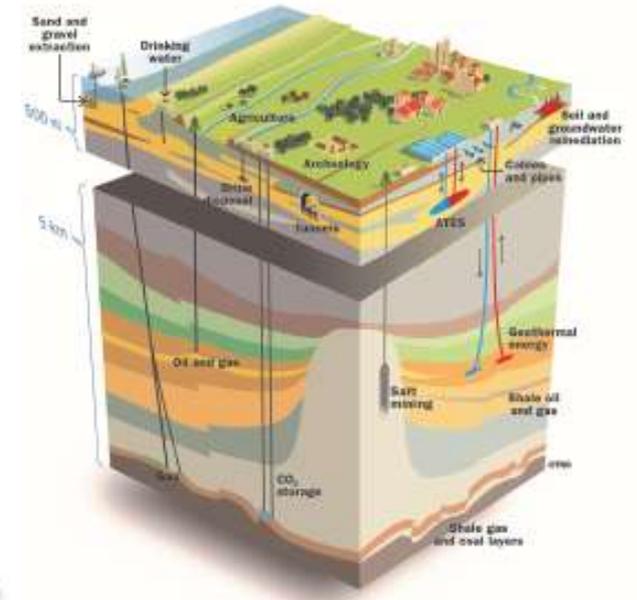
© NHS Health Scotland



Groundwater – has many different roles to play in cities



© Glasgow City Council



Good management helps us save money.
Source: TNO



Groundwater – has many different roles to play in cities



© COST Sub-Urban

A need for strategic connected approaches

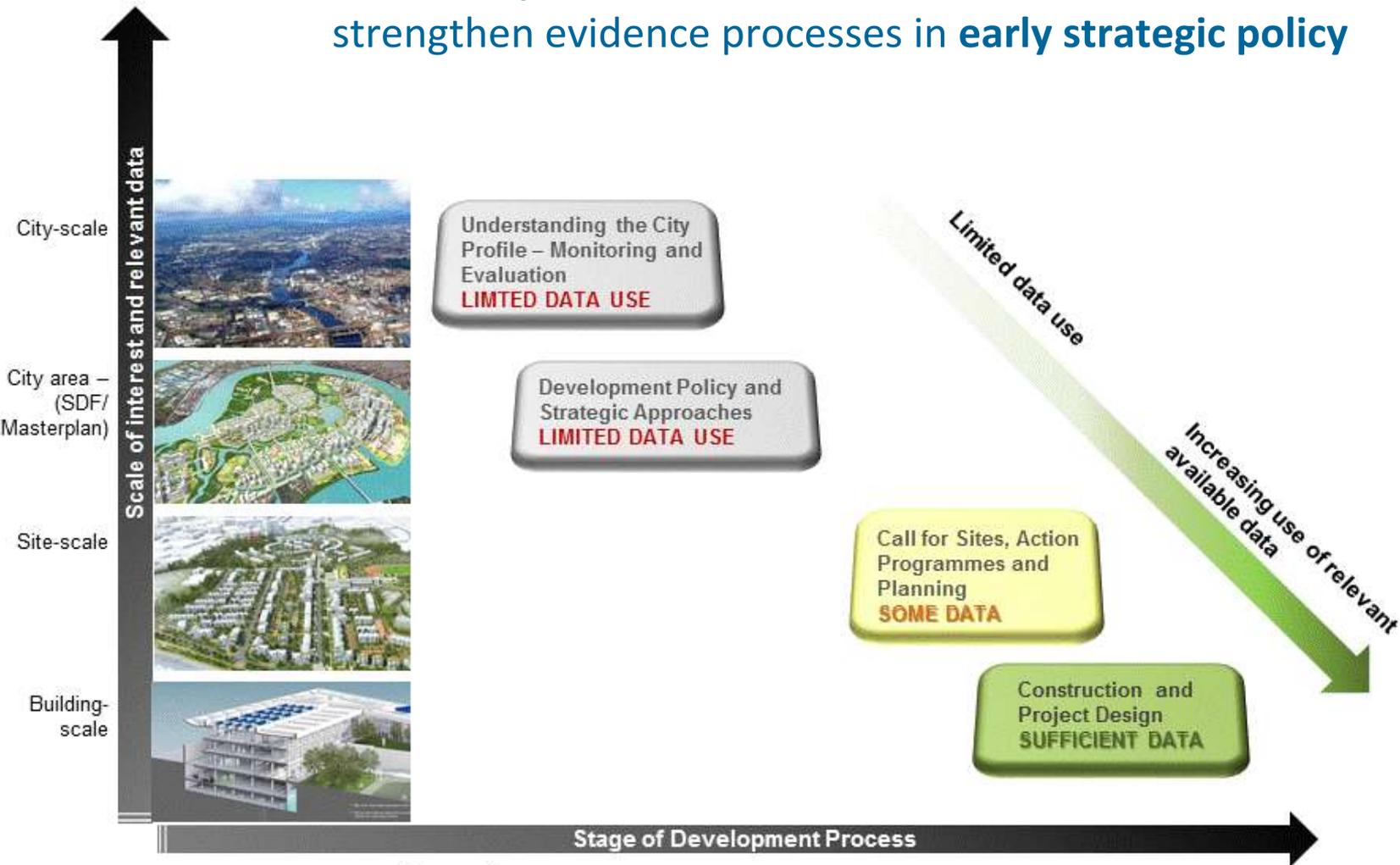
GLASGOW

CITY DEVELOPMENT PLAN

City Development Plans and National Planning Policy are *the* key spatial strategies which will deliver our future cities



Current picture? There is a need to significantly strengthen evidence processes in **early strategic policy**



(Bonsor 2018)

Strategic



Need better utilisation of Research

Realisation



Need increased use of existing GI and Council data – integrated above-below ground design

Standard information widely used to inform LDP policy & Strategic Env. Assessments
 – not all by any one LDP team

Infrastructure, Socio-economic, Land Supply

- Census data + projections
- VDL
- IBS
- Greenbelt
- Housing market areas
- Council land and property (int)
- Scottish Gas Network + Electricity Network buffers
- SIMD
- Drainage/sewerage infrastructure (int)
- Main transport corridors and accessibility

Conservation (Historic, Natural)

- Inventory of Historic Battlefields
- Ancient Monuments
- Listed Buildings
- Wild Land areas
- Wildlife sites (int)
- World heritage sites
- SSSI
- National Nature reserves
- Sites for nature conservation/protection (int)
- Archaeological remains

Landscape, Open/Green space, Core paths

- OS greenspaces dataset 2017
- Core path network (int/ext)
- Gardens and Designed Landscapes
- Landscape character Assessment areas (LCA)
- Green network and open spaces
- Country parks
- Wind Turbine Landscape capacity
- Land Cover map 2007
- Special Landscape areas
- National Parks
- National Scenic areas

Flood Risk

SEPA Flood risk

Forestry

Ancient and Important Woodlands
 National Forest Inventory
 Native woodland survey (int)

Habitats

Wetlands
 CSGN integrated habitat network

Geology, Soils

Land capability for Agriculture

Air/Noise quality

Air quality management areas (Int AQMAs)
 Local background concentrations (int)
 Noise management areas (Int)

*Very limited awareness of:
 Evidence made freely available
 under central government licence
 arrangements*



Current picture? Despite many portals & visualisation formats existing....

The image shows a screenshot of the Scotland's Environment SEweb map interface. The browser address bar displays <https://map.environment.gov.scot/sewebmap/>. The navigation menu includes HOME, OUR ENVIRONMENT, MAPS, DATA, GET INVOLVED, EDUCATIONAL RESOURCES, NEWS, and ABOUT US. The 'Map contents' section has tabs for About, Map data, Legend, and Base map. The main content area features the 'Scotland's environment' logo and a welcome message: 'Welcome to our map. To start adding content to the map click on the "Add Map Data Layers" button below.' Below this is a blue button 'Learn more about the map START THE TOUR' and a green button 'Add Map Data Layers'. A 3D visualization of a map data layer is shown in the foreground. To the right, a donut chart displays usage statistics: 'Use SEweb to access Env Info' with 'Yes, 36%' in an orange segment and 'No, 64%' in a grey segment. Below the chart is a map of Scotland with city labels: INVERNESS/INBHIR NIS, ABERDEEN, PERTH, DUNDEE, STIRLING, EDINBURGH, GLASGOW, and CARLISLE. A scale bar shows 100km and 60mi. The BGS logo is in the bottom right corner.

Response	Percentage
Yes	36%
No	64%

So what roles and types of knowledge exchange are required?

Tools & Solutions?

Portals?

**Visualisation & Dissemination -
3D city models with gw
information?**

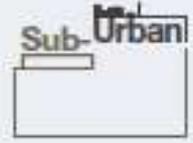
**Digital transformation and
capacity?**



Range of initiatives in KE across Europe – learning and outcomes



COST is supported by the EU Framework Programme Horizon 2020



5 year EU COST Action - SUB-URBAN - A European network to improve understanding and use of the ground beneath our cities



Published series of City Reports Thematic Reports





Developed a shared awareness and pan-European city network of interested specialists which has endured

Led to further platforms of KE and work



The Geological Surveys of Europe
Expert Urban Geology



Geothermal technologies and resources

Three in-depth KE Fellowships (2015-18) – Scotland, Norway and Sweden

Funded separately by different models



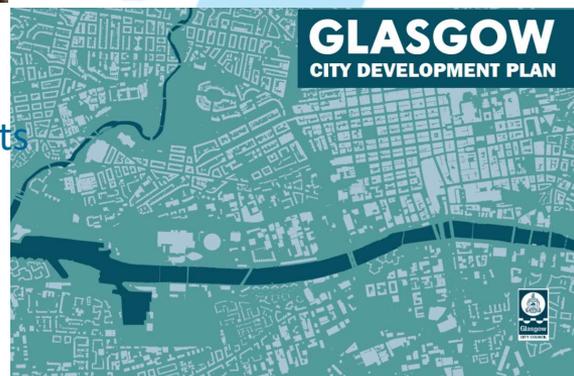
All included:

Multi-year secondments of specialists

In depth understanding across
specialists of:

Planning policy frameworks

Current information use & key questions



All led to significant knowledge and change:

Long-term KE roles continued
New organisational interactions
Oslo – political interest in subsurface
masterplan draft

Identified:

- Key intervention points
- Types and scales of information

Integrating groundwater knowledge into city planning policy
– requires communicating groundwater knowledge as part
of the process

One part of the jigsaw



In the context of strategic planning policy

Critical forms of Knowledge Exchange

Significant time –

- **Long-term (>5 years) relationships** to build sufficient mutual understanding
- **Trust and creativity of thought** between disciplines and organisations

A much wider system approach – not driven by individual project / specific outputs

A focus on outcome and process

In depth learning over years before 'innovation' or change is possible

- Ongoing dialogue
- Data & knowledge literacy across specialisms.
- Exploratory work



In the context of strategic planning policy

Critical forms of Knowledge Exchange

Significant time –
Long-term (>5 years) relationships
Trust and creativity of thought

A much wider system approach
A focus on outcome and process

In depth learning over years & exploration needed
before any innovation & change is possible



Institutional interaction – local and national government, agencies, research organisations

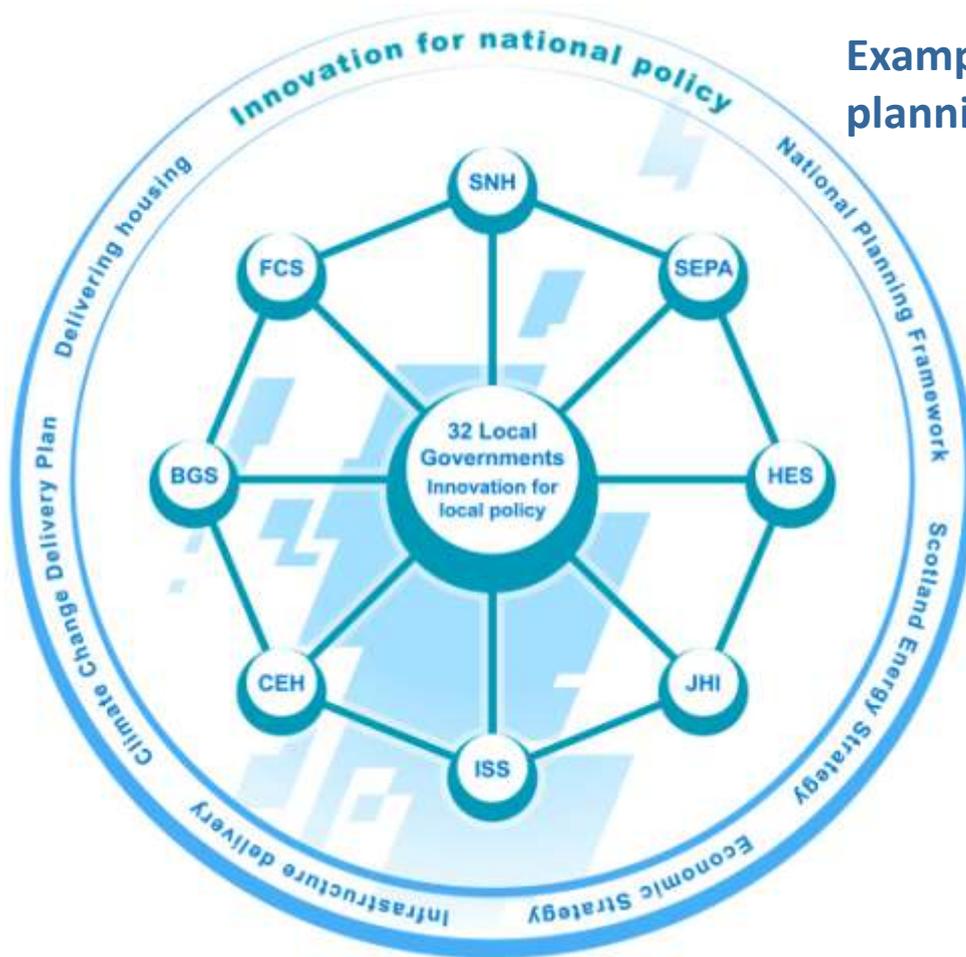
New mechanisms and frameworks for wider professional collaboration in planning

New organisational interactions –integrating disciplines and specialisms in existing decision making processes

Executive and political engagement



Example: New wider professional collaboration in planning policy



Key Agency sub-group 'understanding environmental evidence'

Involving 8 Local Governments, national government, government agencies, regulator and research

Informing

- Future approaches on evidence requirements in planning policy



In the context of strategic planning policy

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professional collaboration in planning

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and specialisms in existing decision making processes

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KE Roles

Need for long-term roles

- Build knowledge literacy across specialisms - knowledge needs, gaps and scalability
- Value of KE Fellowships in middle career professionals



Required KE
is more than
visualisation

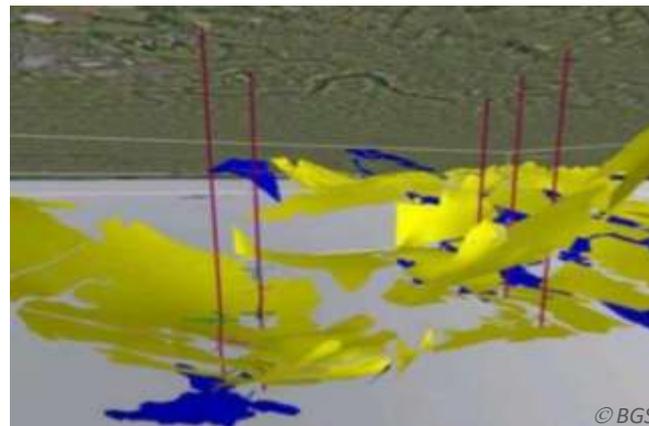
3D presentation of information often doesn't make it more accessible to non-specialist audiences in contrast to specialist users e.g. utility companies and regulators

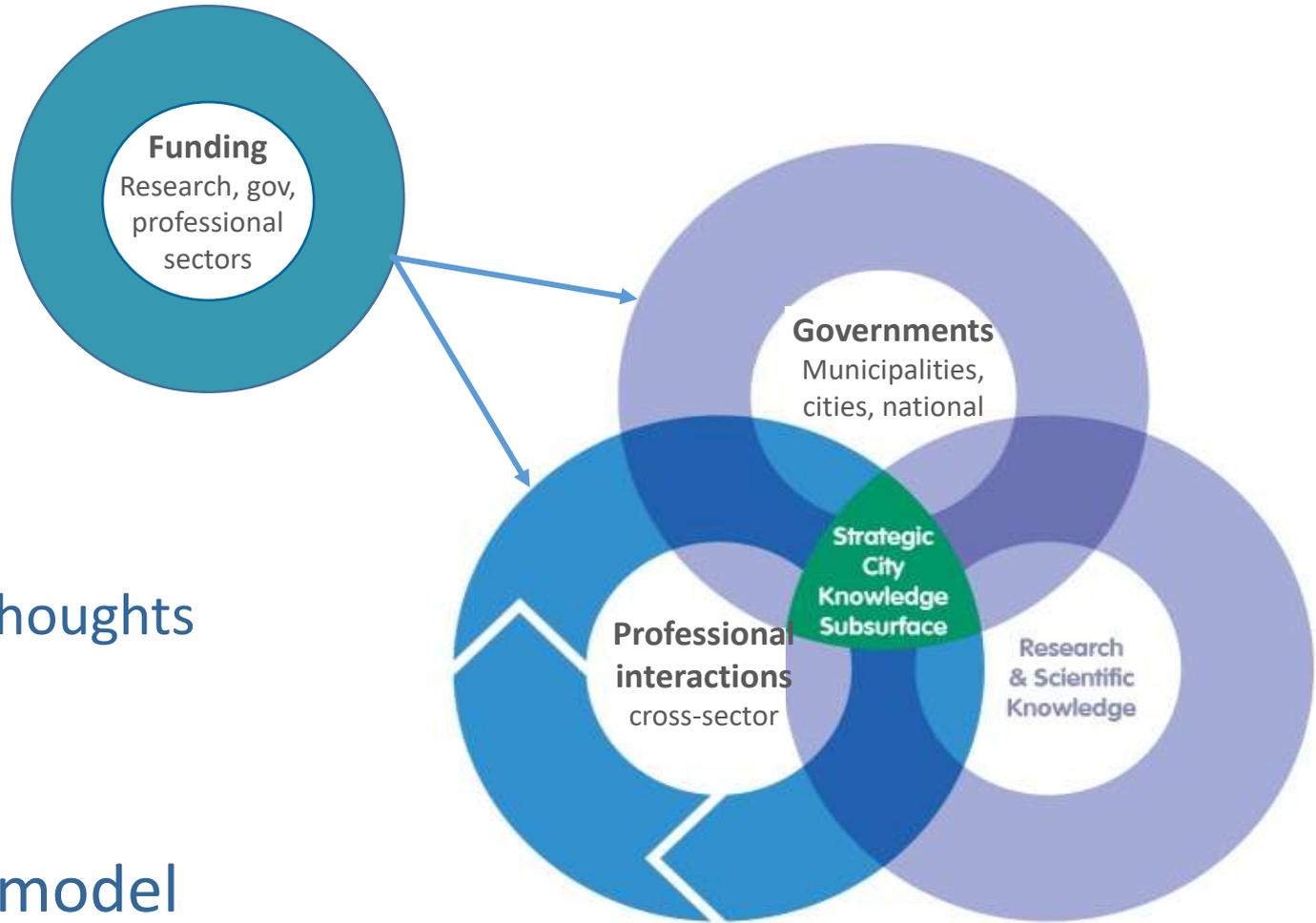
Success of BIM approaches – cant be translated to city scale and policy

To achieve this....



....doesn't necessarily require





Concluding thoughts

A new model
& emerging changes in planning
legislation

Developing a prescient awareness of groundwater in city planning for future places and people



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New evidence approaches can have significant added value – but require significant interdisciplinary expertise, time and collegiate understanding