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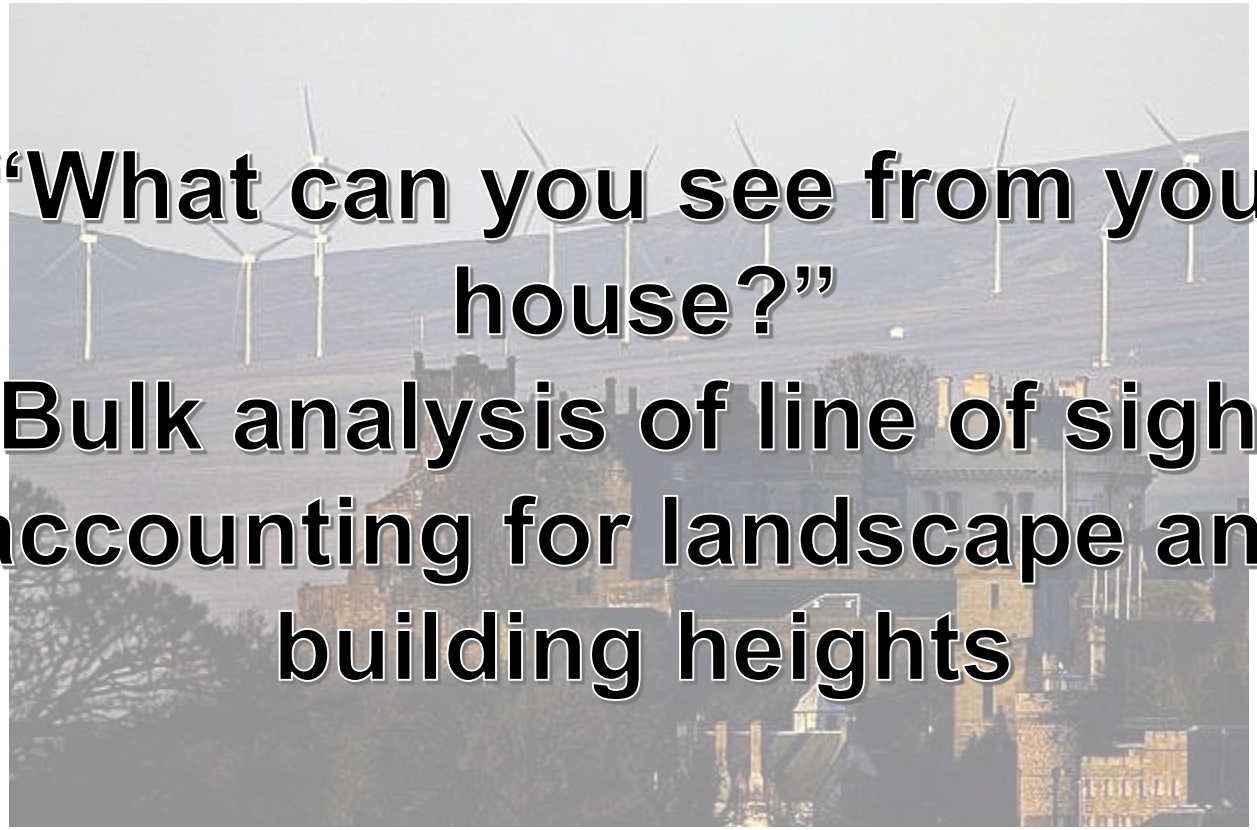

"What can you see from your house?" Bulk analysis of line of sight accounting for landscape and building heights

Stephan Heblich, **Dan Olner**, Gwilym Pryce, Christopher Timmins

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What's "bulk analysis of line of sight?"

- Model for finding line of sight between many properties and points in the landscape.
- Where other buildings may block that line of sight...

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Two examples

- **One: Scottish wind farms.** Which properties can see wind turbines?
  - (and what difference does that make?)
- **Two: how much green space can properties see?**

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The line of sight model

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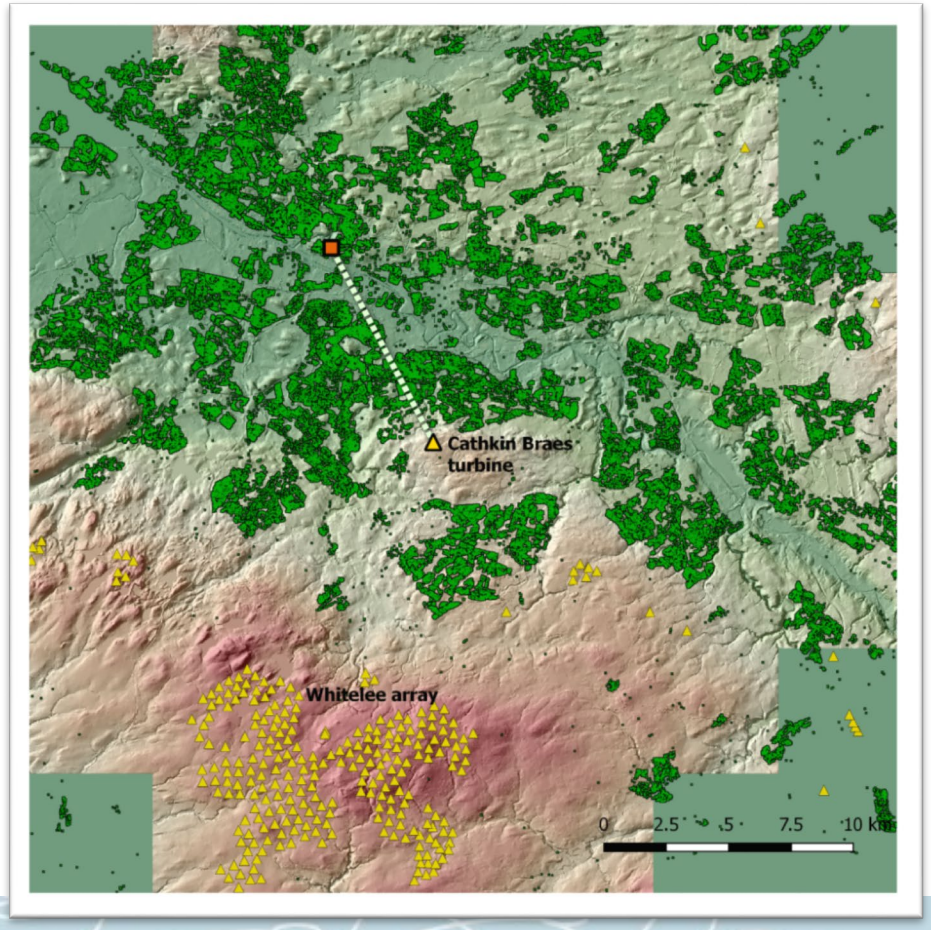
Landscape model for line-of-sight

- Example property in Glasgow…
- Buildings laid on a 5m grid landscape
- Cathkin Braes ...



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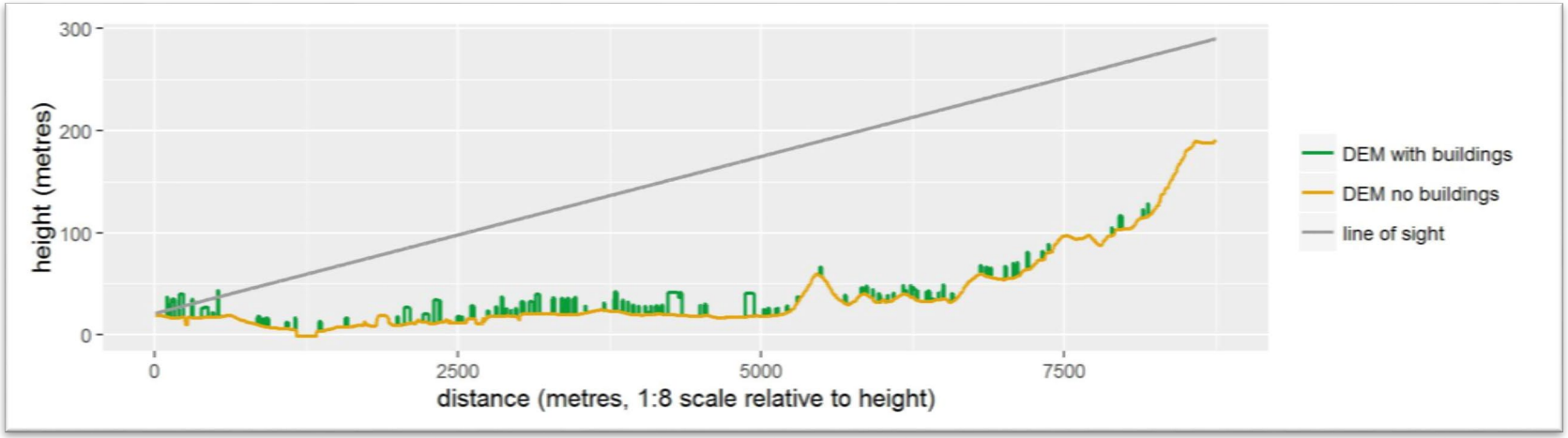
That line of sight in cross-section (buildings vs terrain)



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... then use this approach for many properties.

For example:

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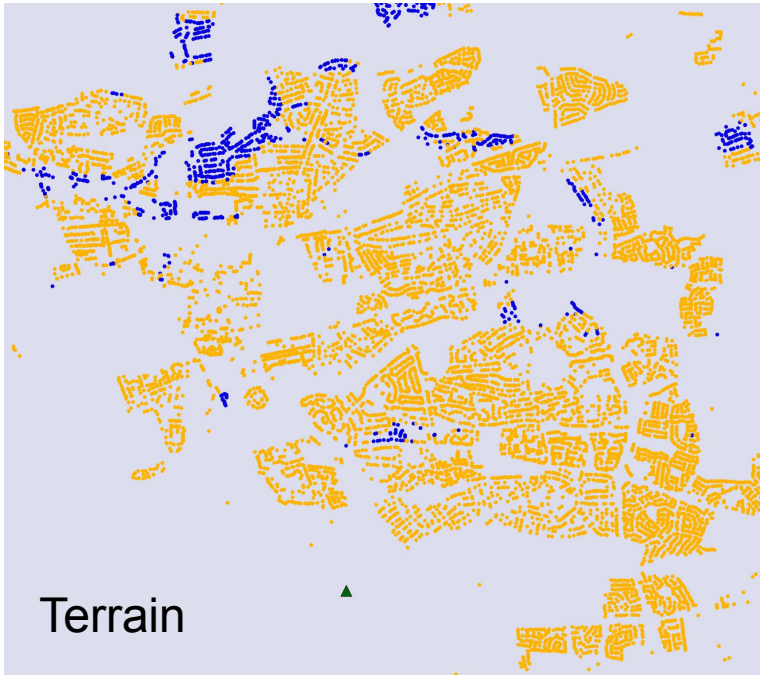
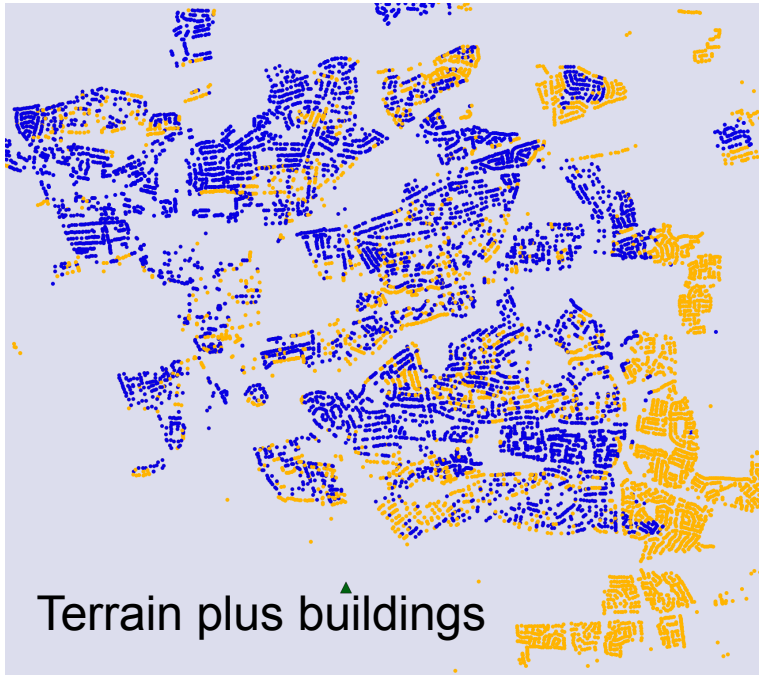
Just terrain vs building heights (Dunfermline)

Yellow = can see turbine / blue = **cannot** see





For whole of Scottish data we have buildings for:
Just terrain = 80% can “see” at least one turbine within 15km.
Building heights = 32%.

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1. Scottish Wind Farms

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1. Scottish Wind Farms

Price impact…
and a quick look at whether there's unequal exposure

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- We were asked: have wind farms impacted on house prices in Scotland?
  - Cf. Steve Gibbons: finds there is a **negative impact** in England
- Does it matter whether properties can **see** turbines? (Or is it just proximity?)
- Is there a difference if **line of sight** is blocked by other buildings (not just terrain)?
- **Spoiler alert**: price impact results were inconclusive / insignificant. Scotland seems to be different to England.
- Will come back to that, but first…

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The data and model...

- Bought together data on:
  - Wind turbines
  - Property prices (1990-2014)
  - Landscape
  - Built environment

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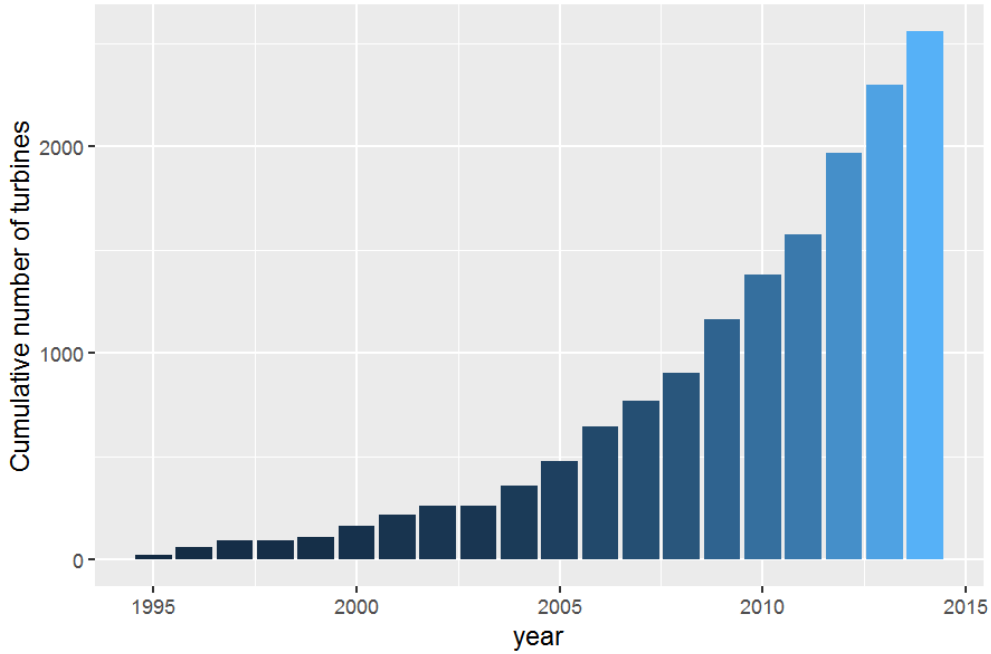
Cumulative no of turbines ’95-’15



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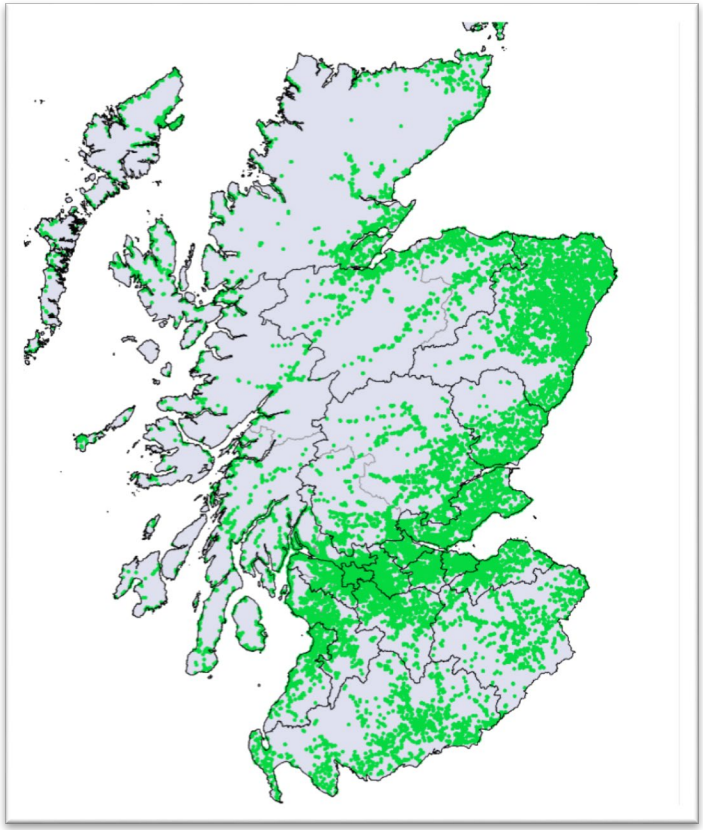
RoS: property sales 1990 - 2014



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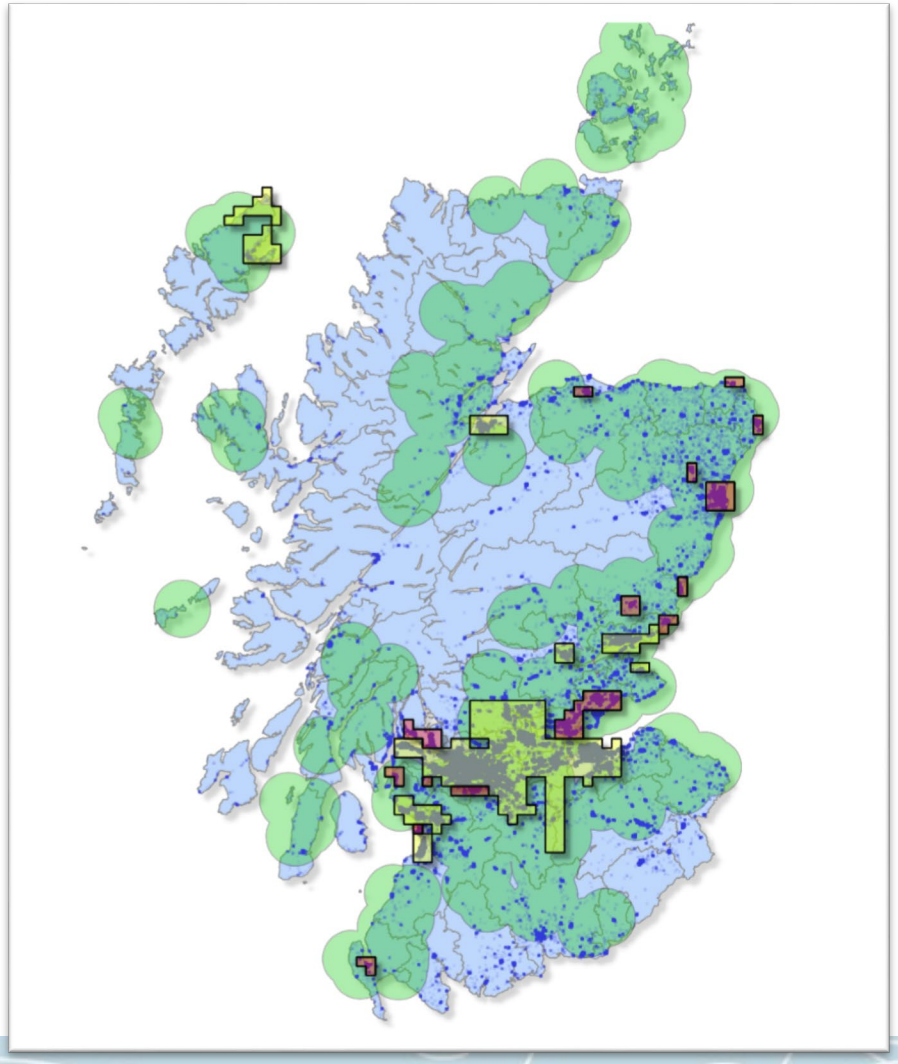
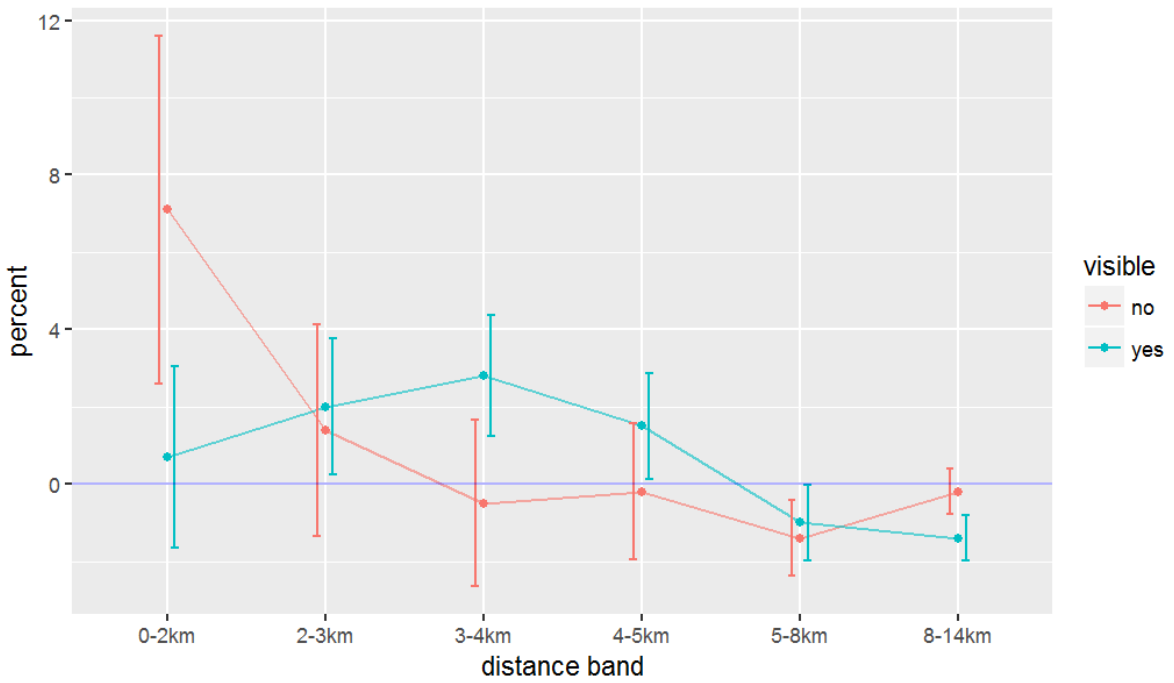


% diff in house price (terrain)

- Diff in diff
- Little/ no significant difference
- Some positive / some neg



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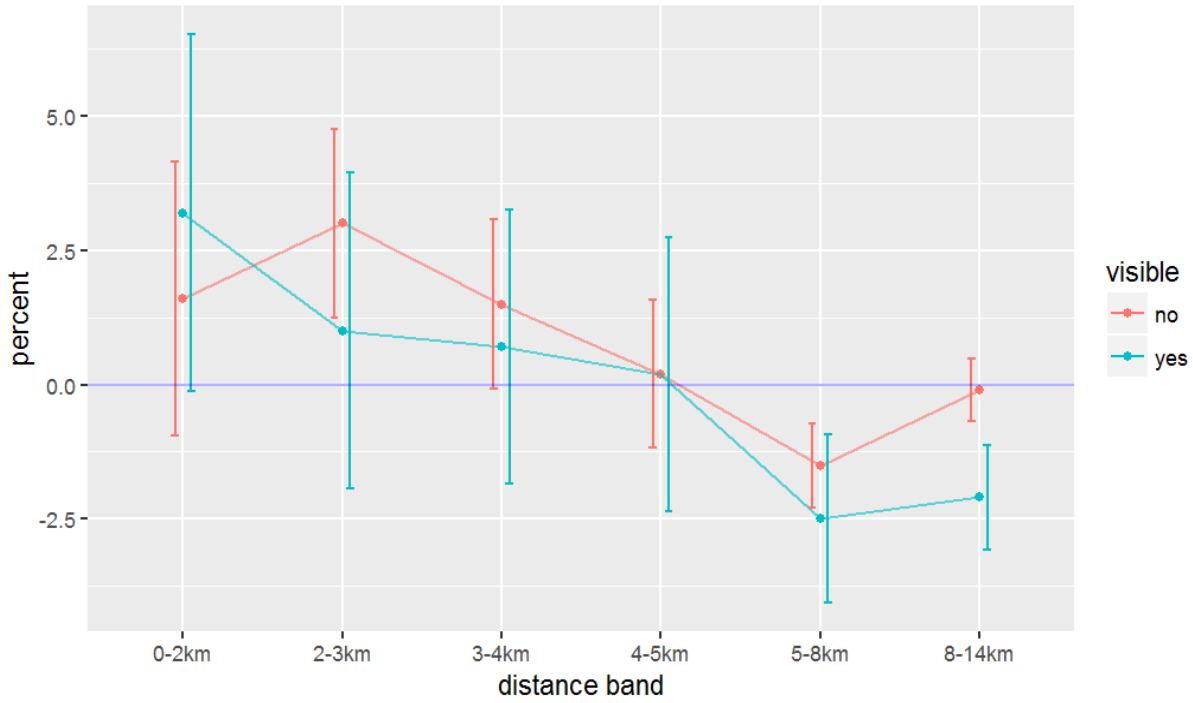
% diff in house price **inc. building heights**



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… then a couple of extra wind-farm related bits looking at overall exposure to wind turbines…

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Exposure to turbine visibility

- We can ask:
  what's the **difference in exposure** to wind turbine visibility for particular regions?
- For distance / terrain / accounting for building heights: what percent of houses have **at least one turbine** in each distance bin?
- Possibly: think of 'terrain' as 'can I see turbine from my area if not my house'

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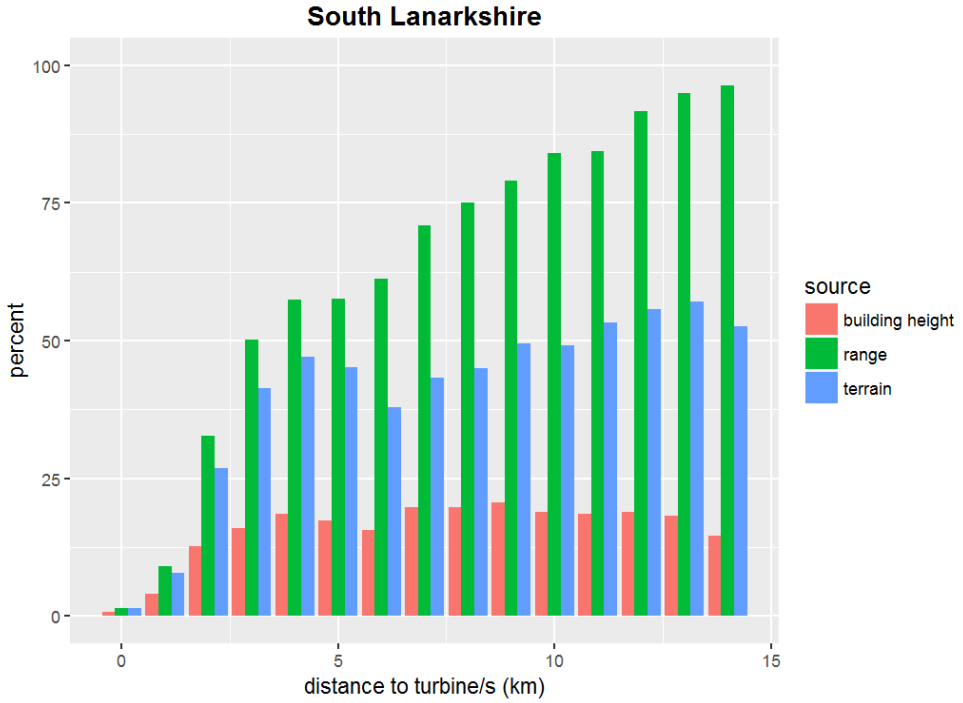

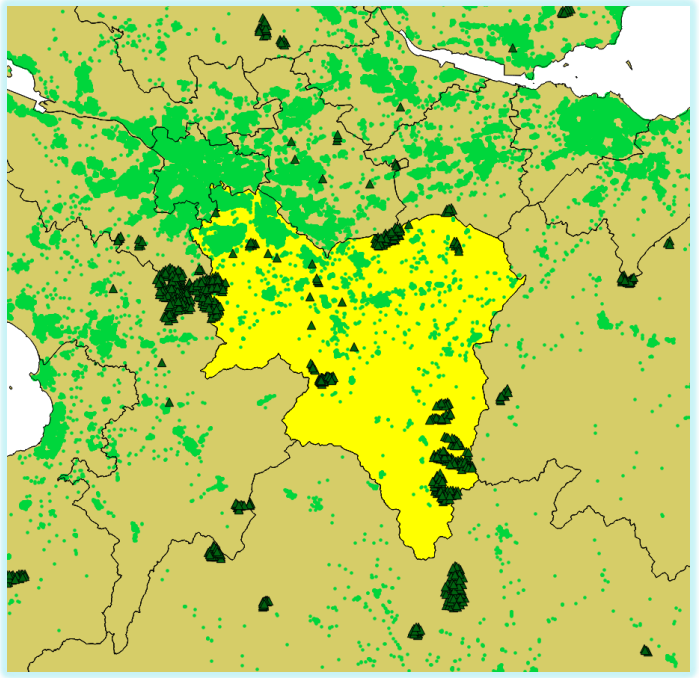

(Example of high visibility past buildings)

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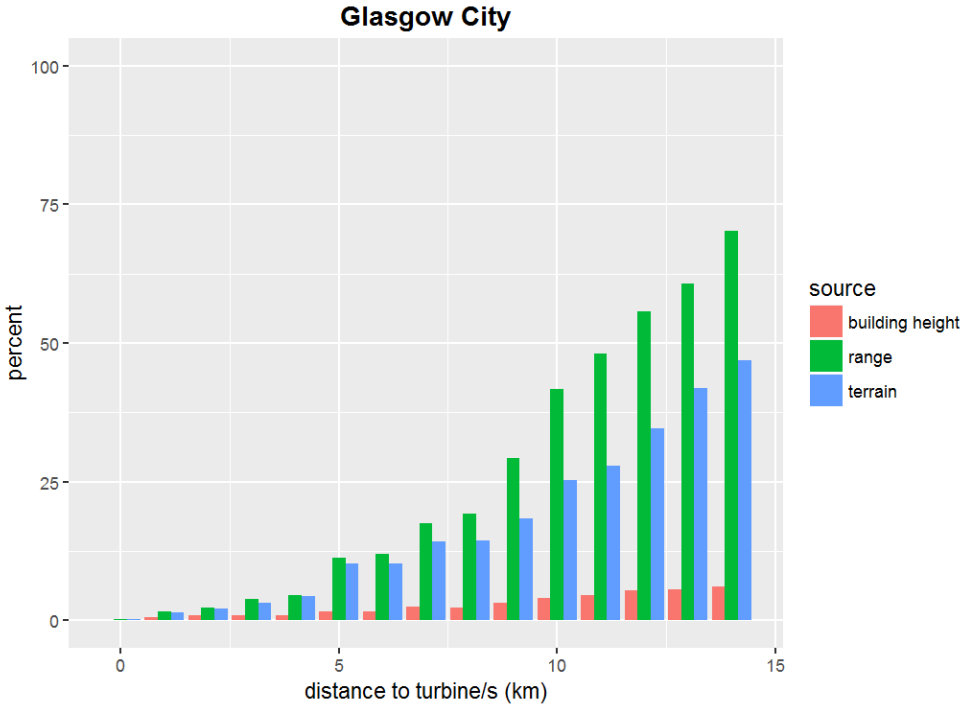

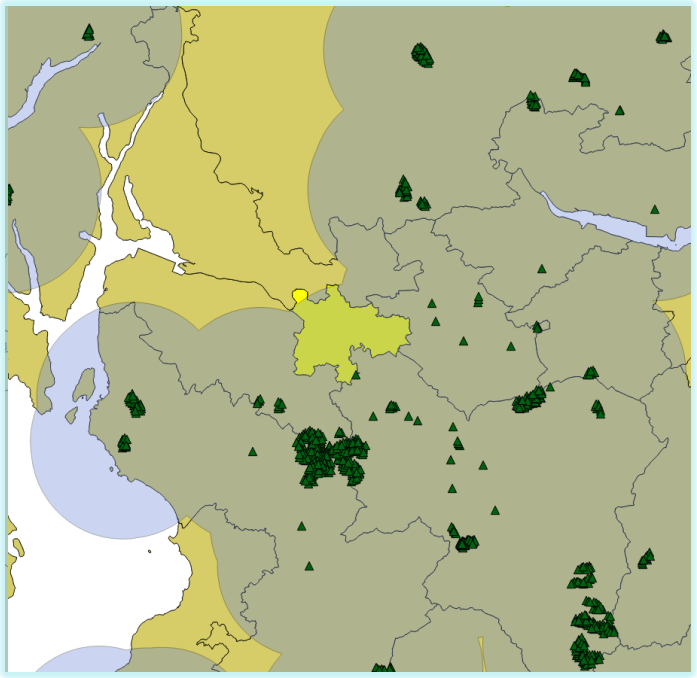

Glasgow: showing typical urban pattern

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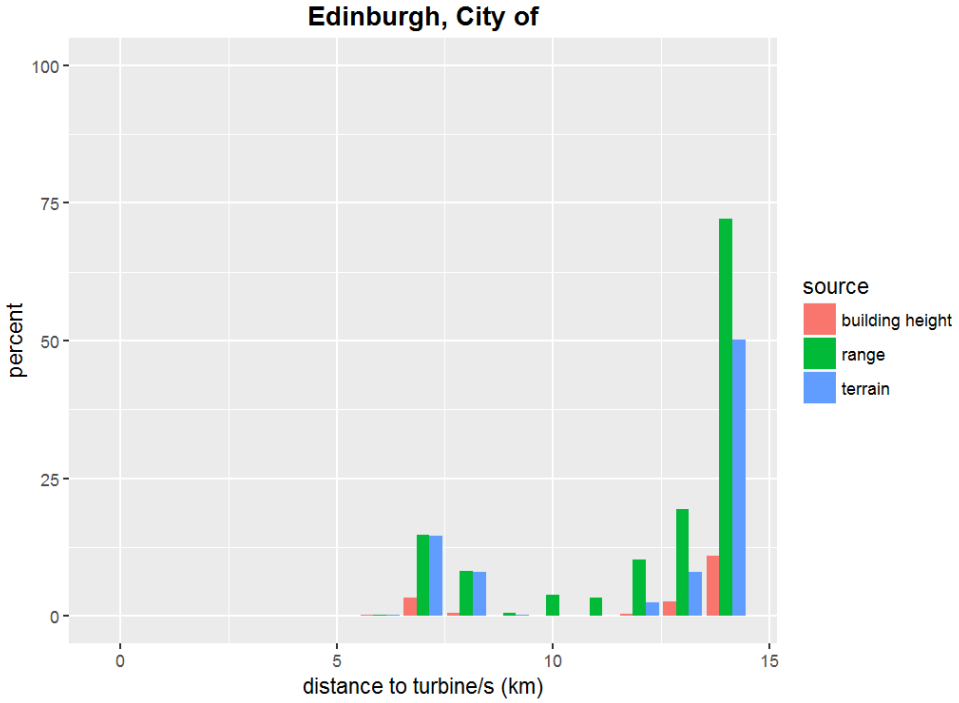

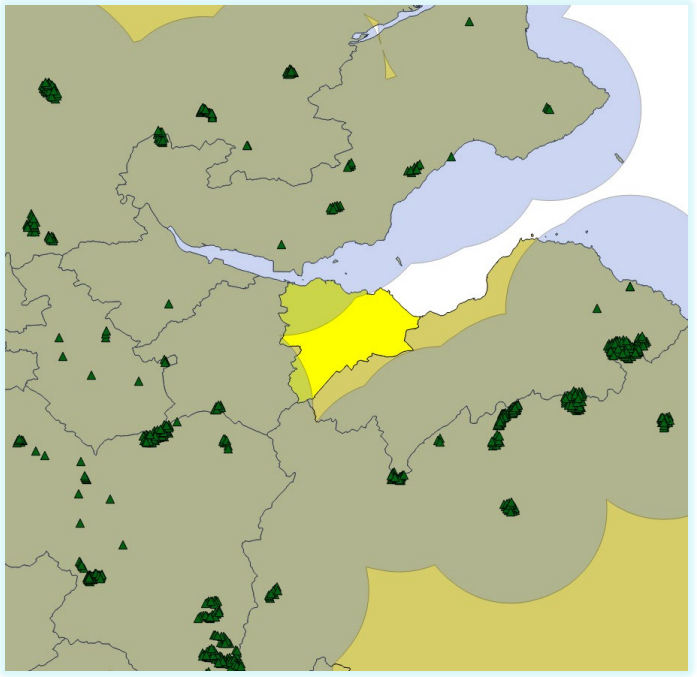

Edinburgh: much lower exposure

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Are poorer areas more “exposed” to wind farms?

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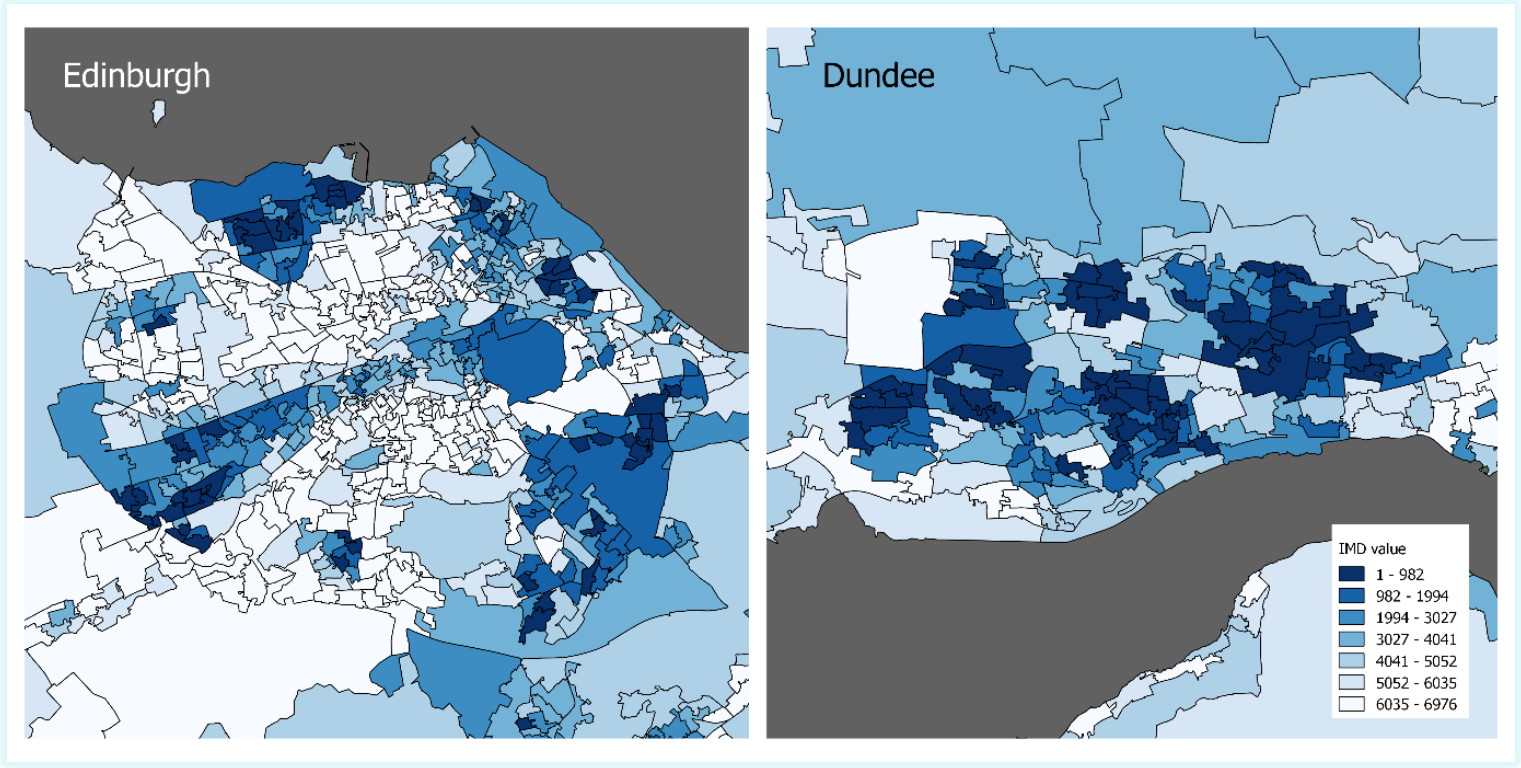
Comparing line of sight with Scottish Index of Multiple Deprivation (SIMD)



SIMD darker zones / lower values are more deprived, higher values less

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Following graphs

- All Scotland's SIMD zones into equal sized groups, more deprived on left
- For 3 distance bands:
  - What percentage of each group's zones have 80% or more properties that can see a turbine?

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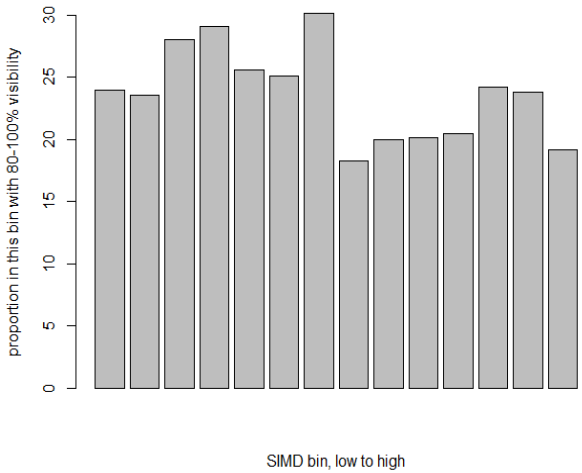
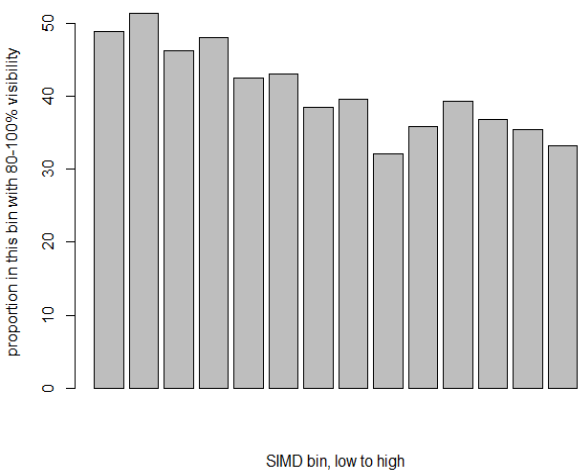
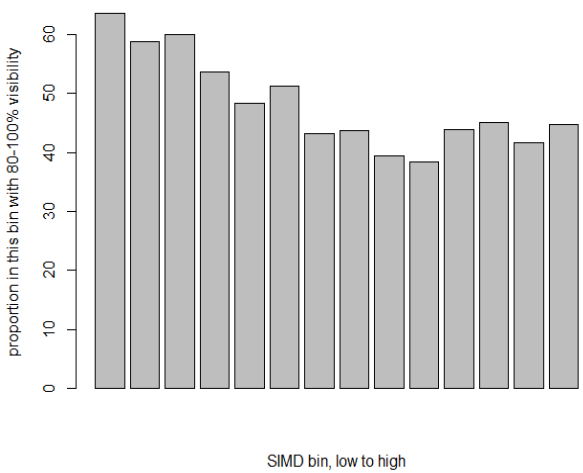
SIMD vs turbine visibility (**terrain**)

0 to 5km	5 to 10km	10 to 15km







Overall: declining -> less deprived areas are less exposed

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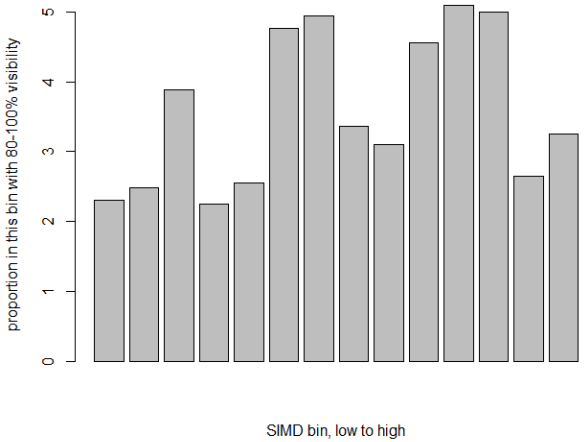
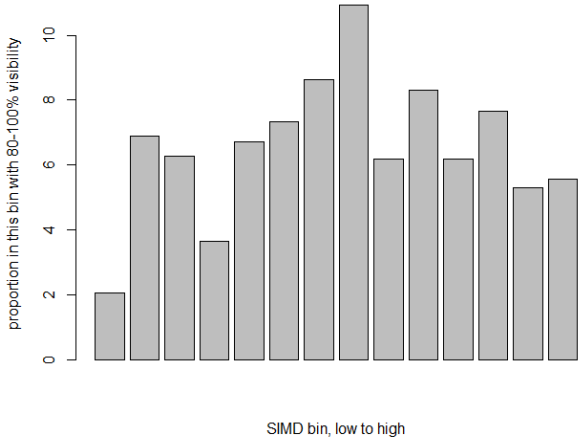
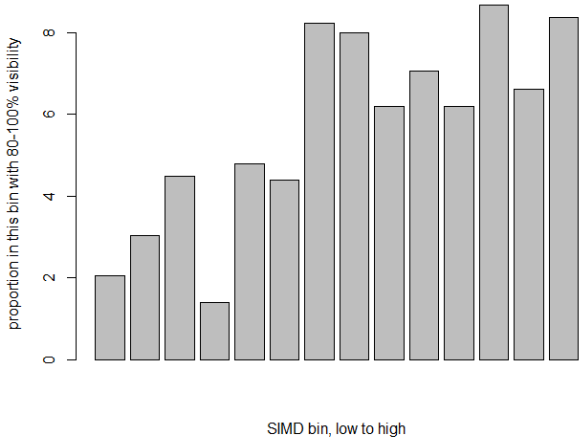
SIMD vs turbine visibility (**building height**)

0 to 5km	5 to 10km	10 to 15km







Overall: increasing?? Mixed? -> poss. **more** deprived areas are less exposed
.... Urban / rural difference?

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2. GREEN SPACE

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Green space...

- For all kinds of “green space”: parks, moors, grass verges, gardens…
- How much green space can properties **see?**
  - **Starting with Glasgow:** using all Glasgow properties we have price data for (~152,000)
- Different approach needed from wind farm analysis...

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3 sources of green space data...

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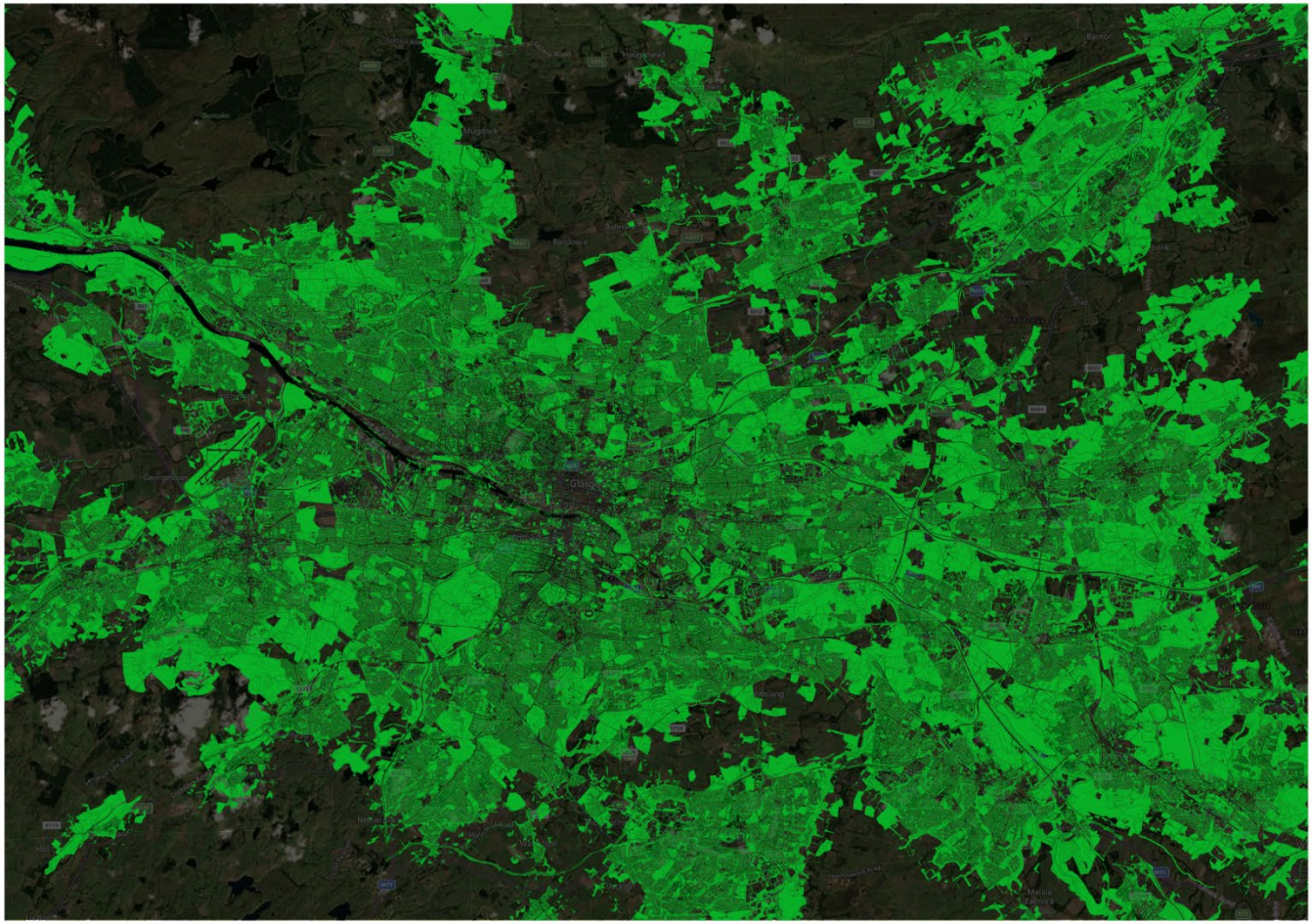

Mastermap Green Space: highly detailed but ends at city edge

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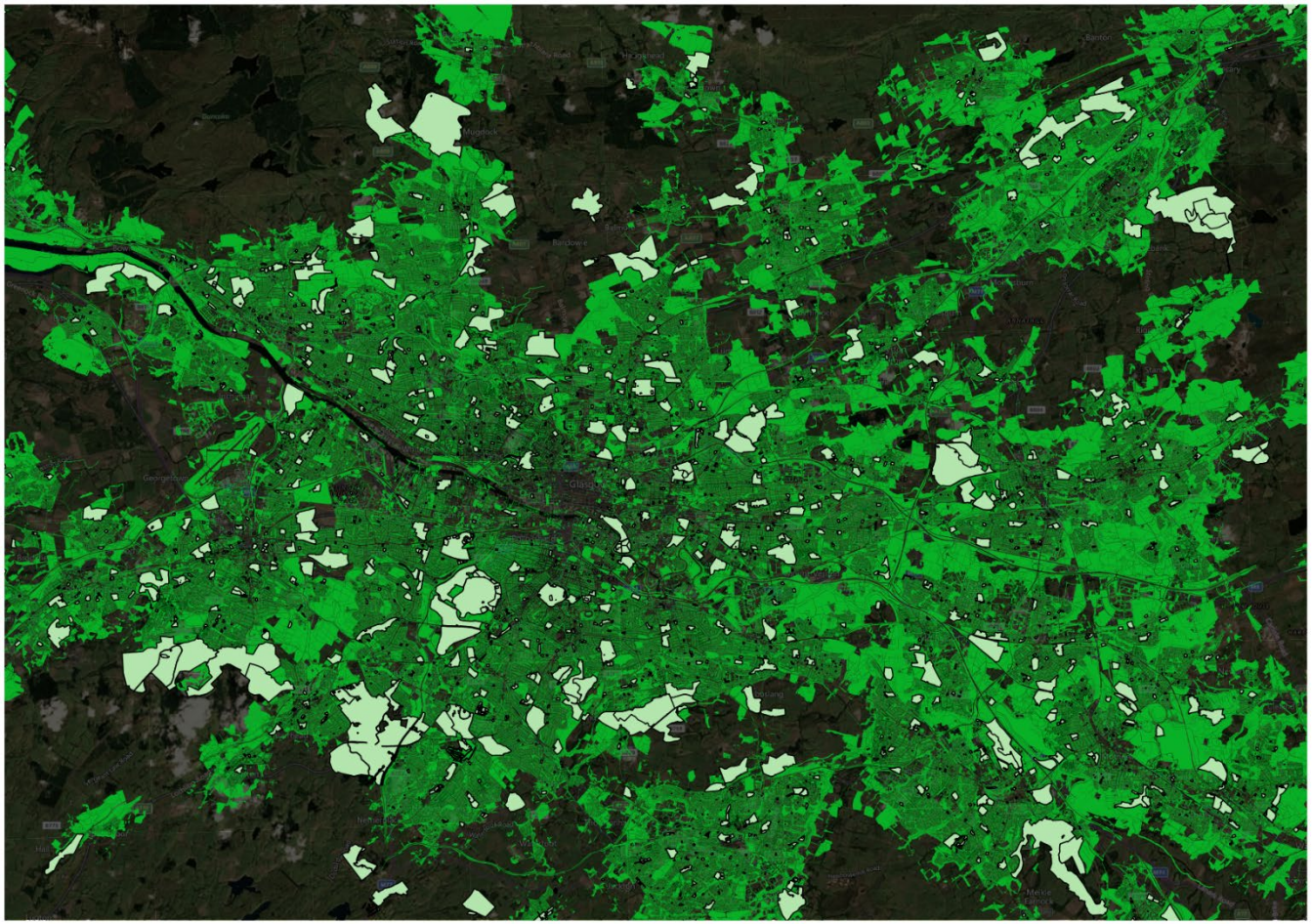

Open Greenspace (gives park names plus extra)

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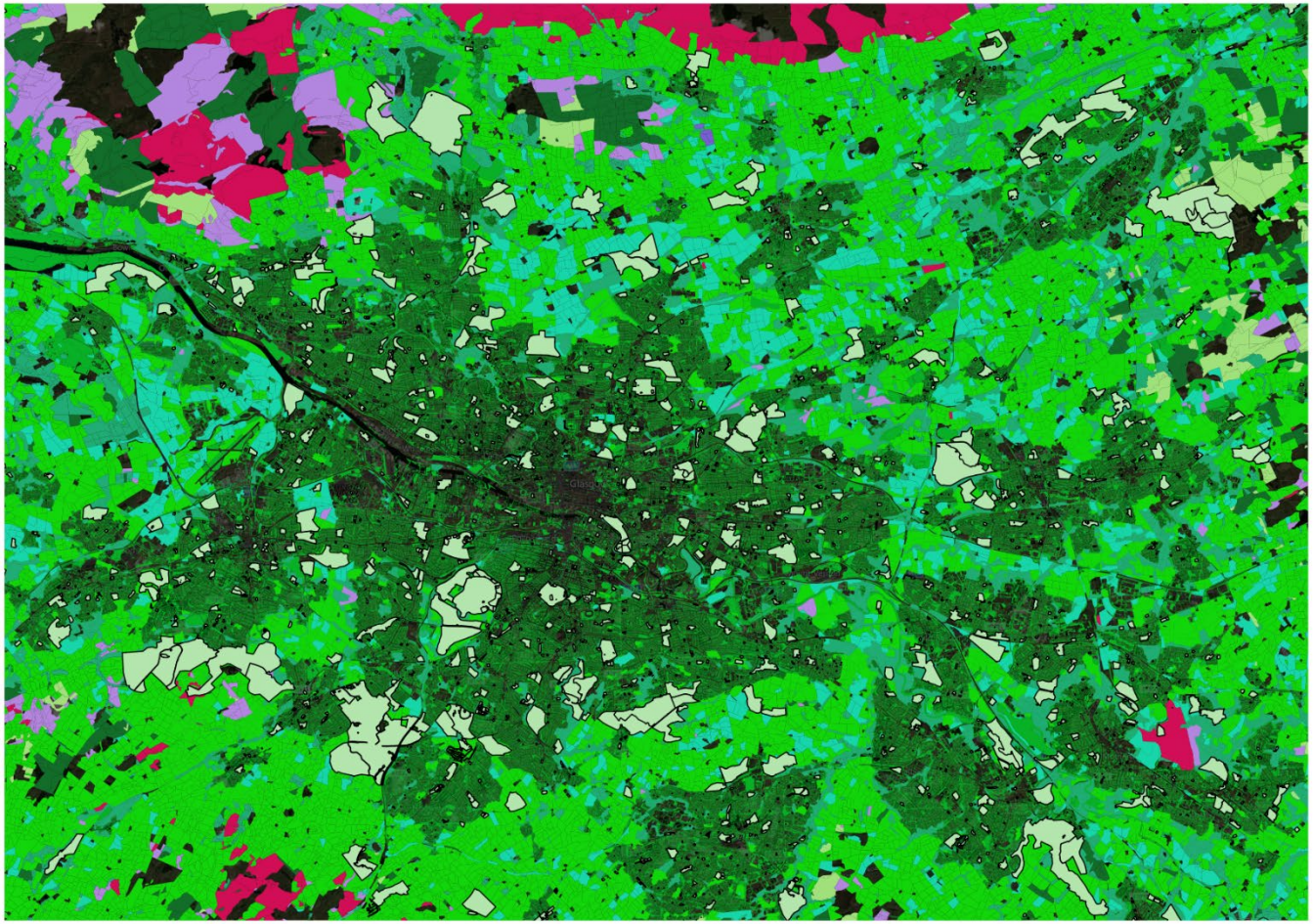

Digimap land use cover (minus a few)

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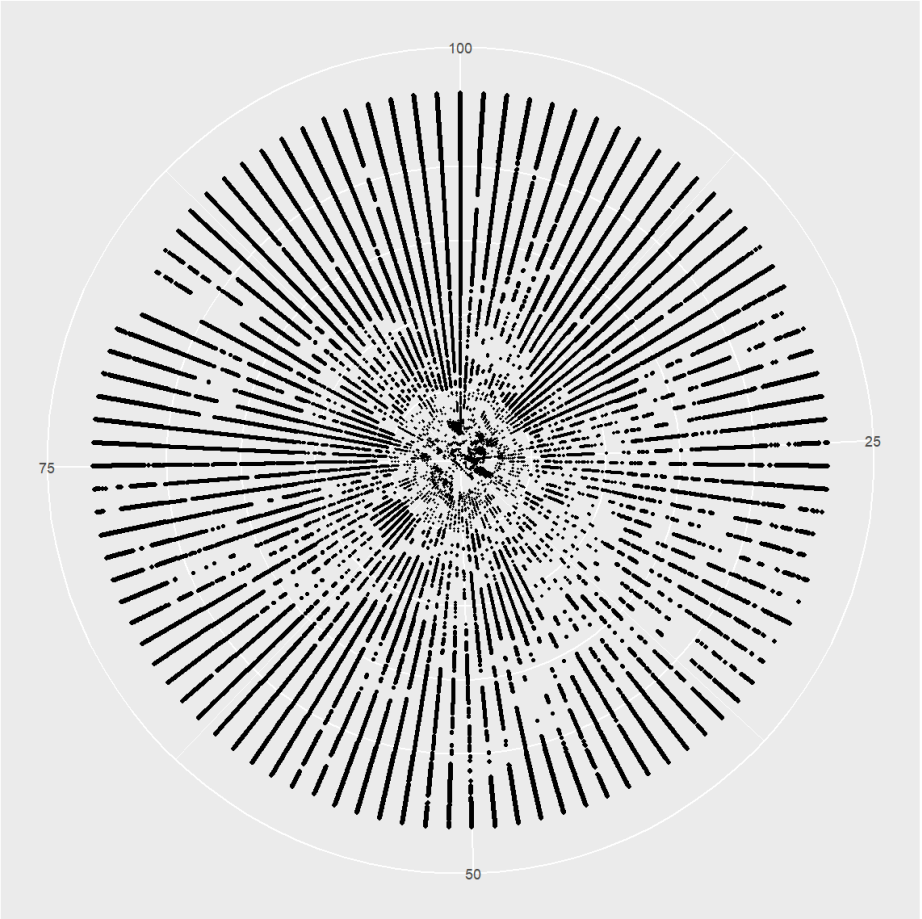
- GREEN SPACE LINE OF SIGHT:
- To make computationally manageable...
- For each property, find 100 lines of sight around the compass
- Get record of **all** green space out to 15km
- Along each: 500 points, 30 metres apart (15000 points per property in total)
- **This example**: typical city centre property – black marks = green space within range (not nec. visible)



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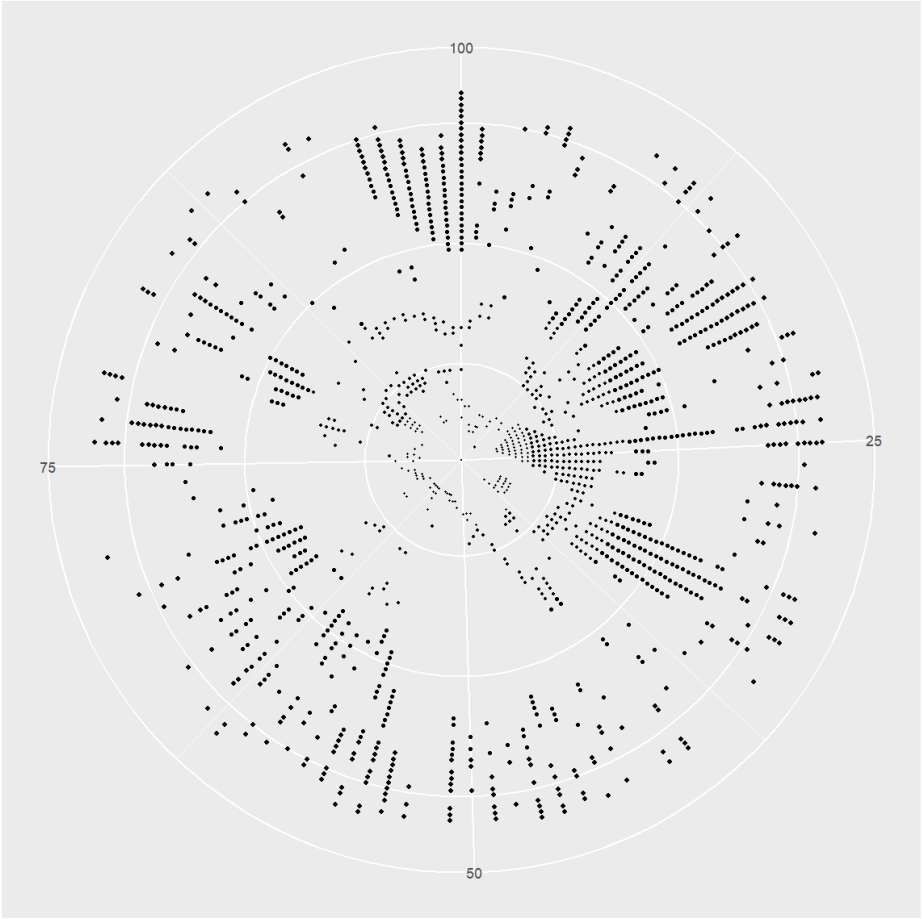
- Zooming in...
- Same city centre property up to 2km



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- Then run the green space viz model for all Glasgow properties...
- Maps of overall green space visibility for Glasgow

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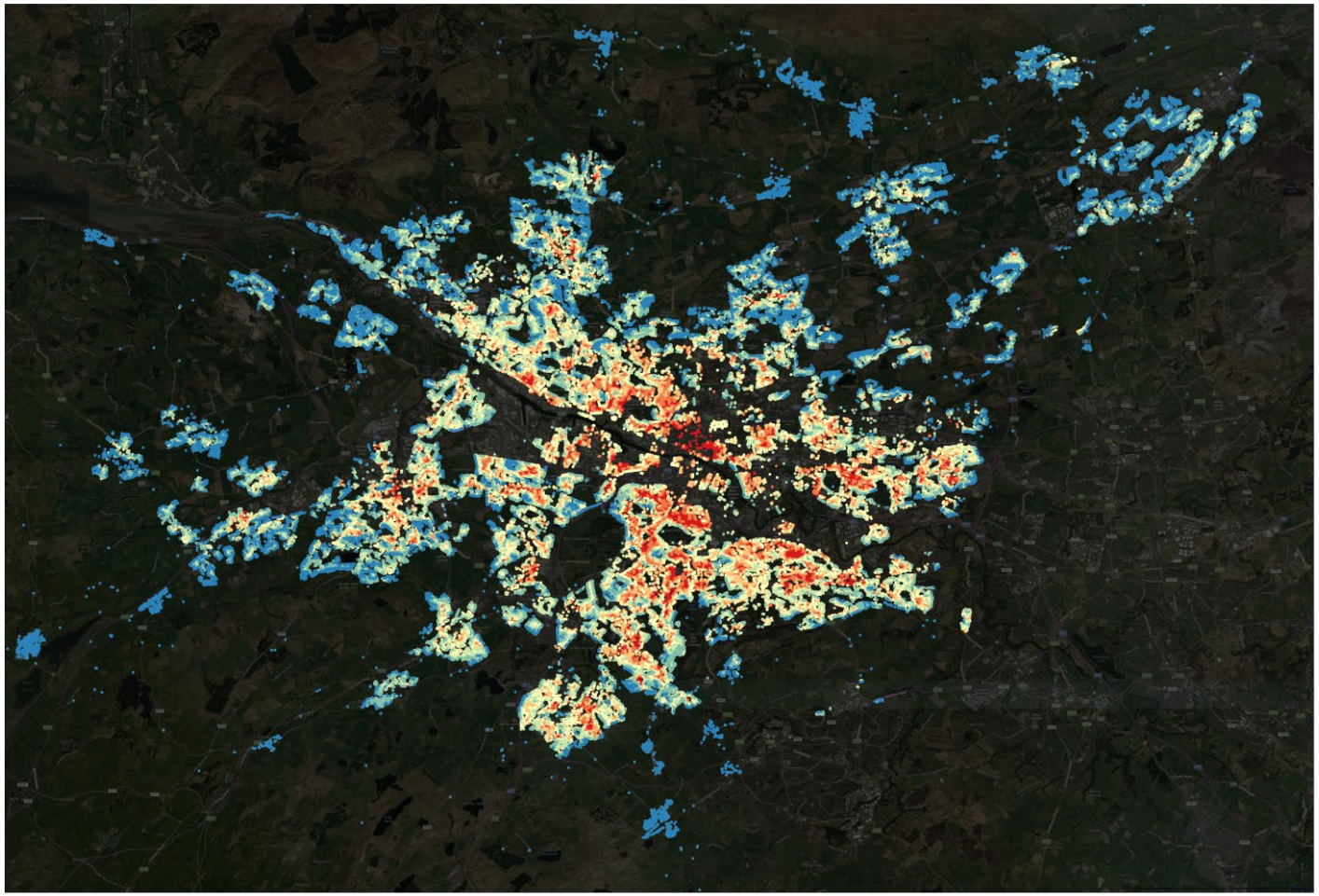

Total (0 to 15km) visibility per property:
blue = highest %, red = lowest %

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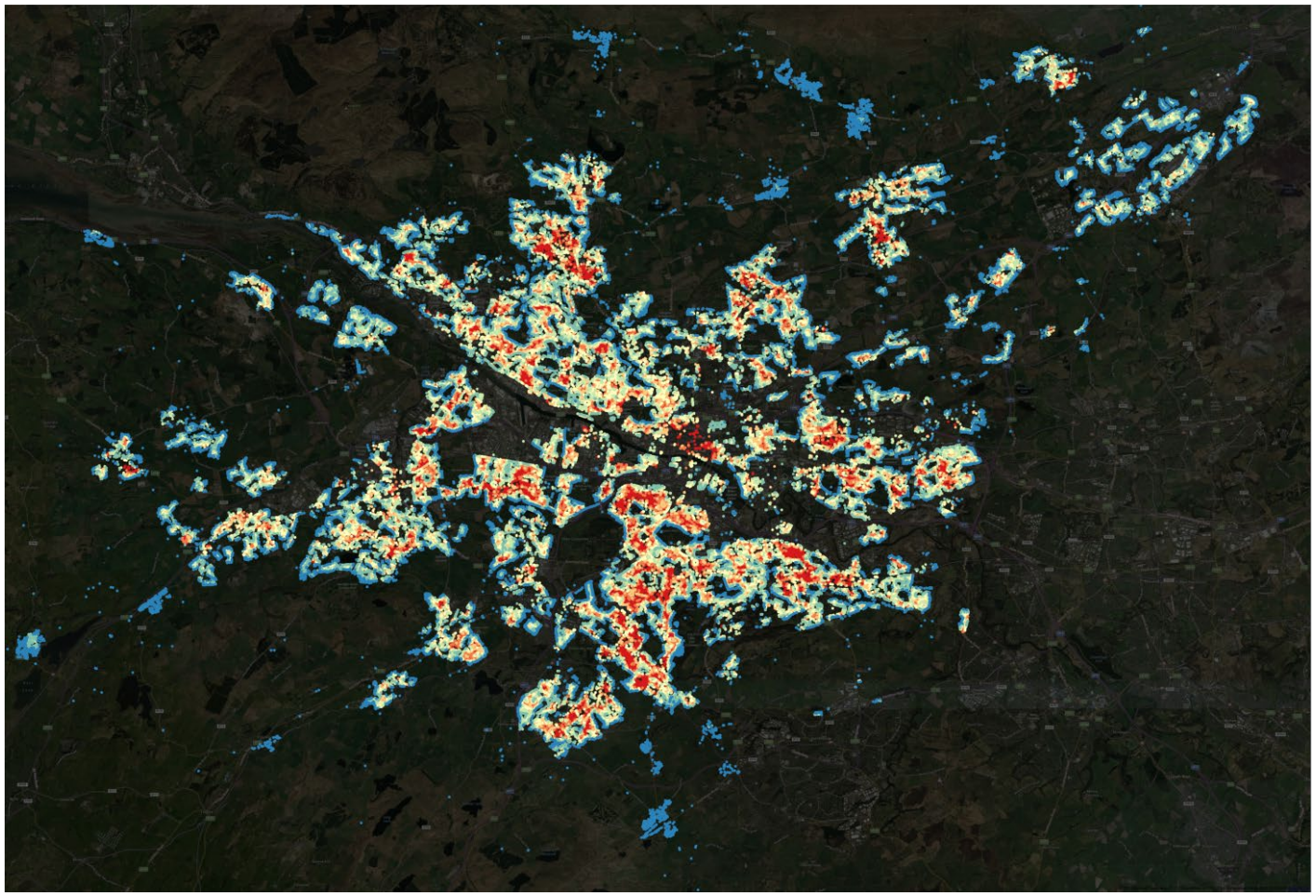

0 to 500m visibility per property:
blue = highest %, red = lowest %
Number of highest viz properties now closer to city centre

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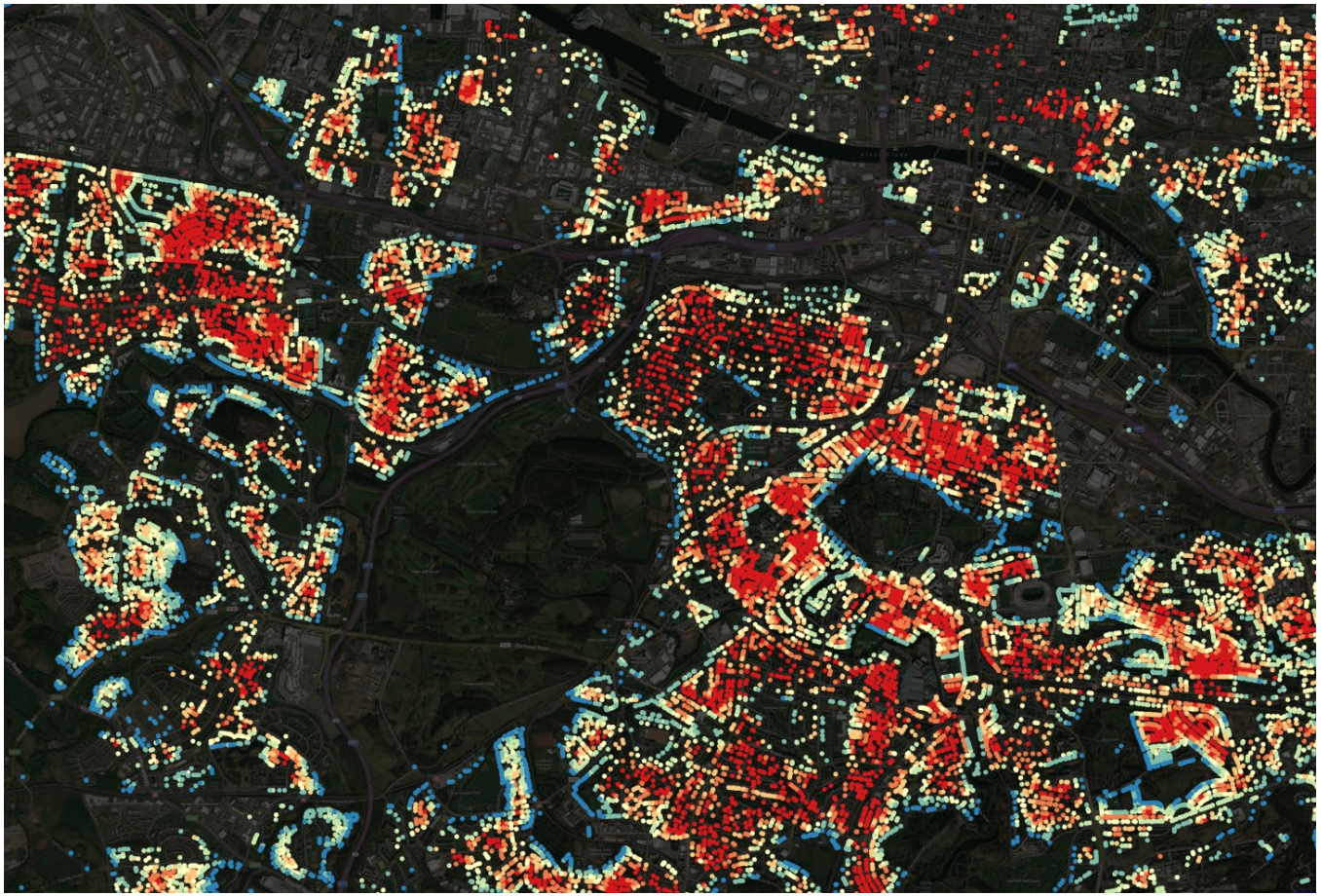

Zooming in on 0-500m. Blue: highest percent. Red: lowest.
Showing properties bordering parks with highest % visibility (phew...)

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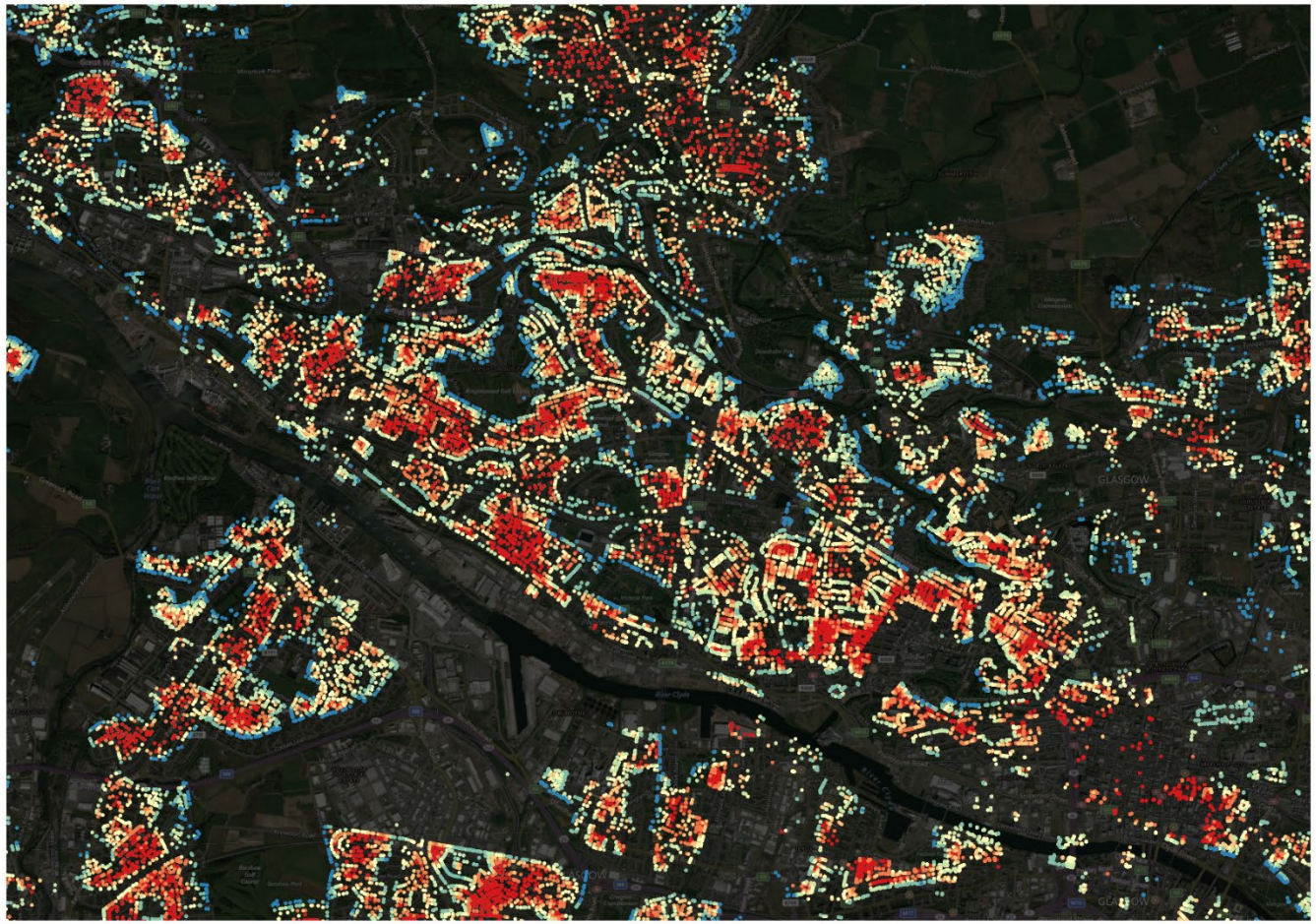

0-500m again: many places with low local visibility...

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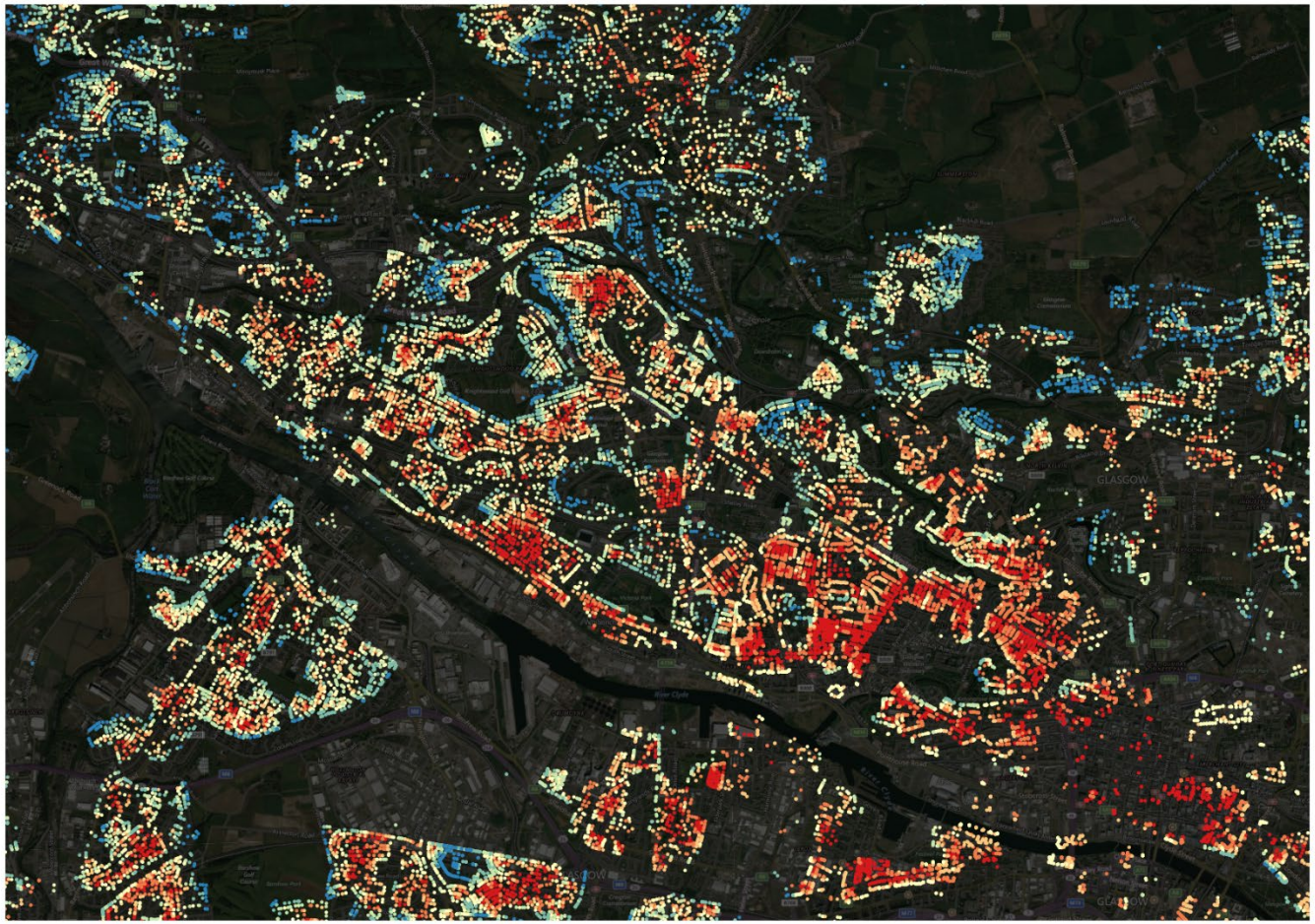

Now 0 to 15km ... Some of those have good long-distance viz.

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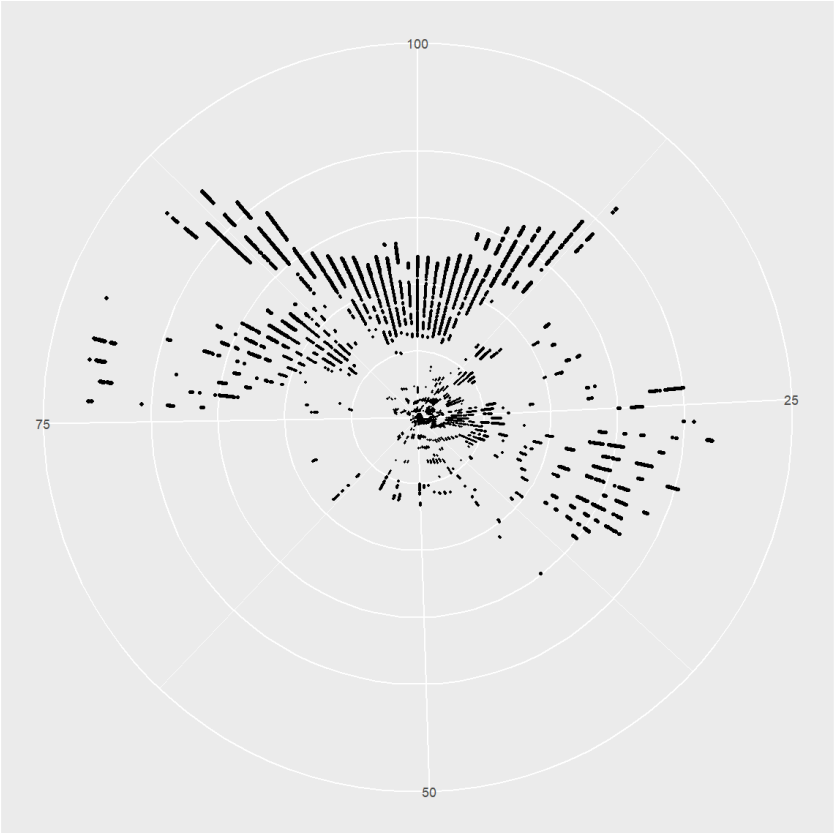
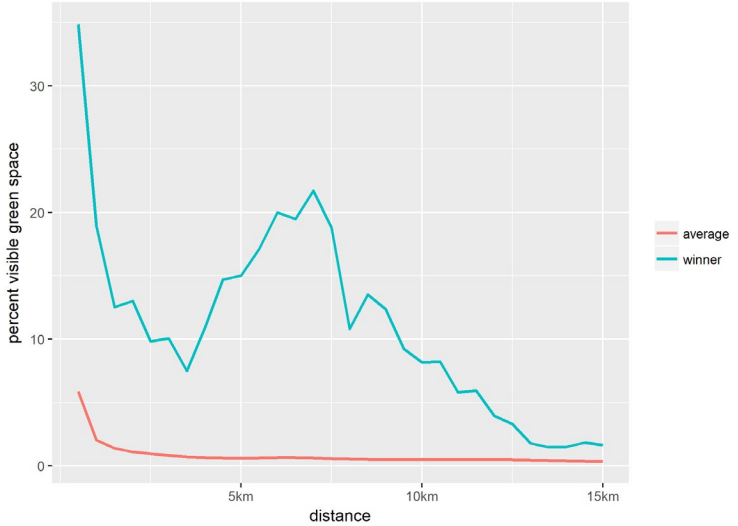
What's the urban property with the best view?





- Graph above: percent of entire view radius that sees green space, in 500m bins up to 15km
- red line = average for all properties.
- Blue is the current % winner (excluding rural properties)

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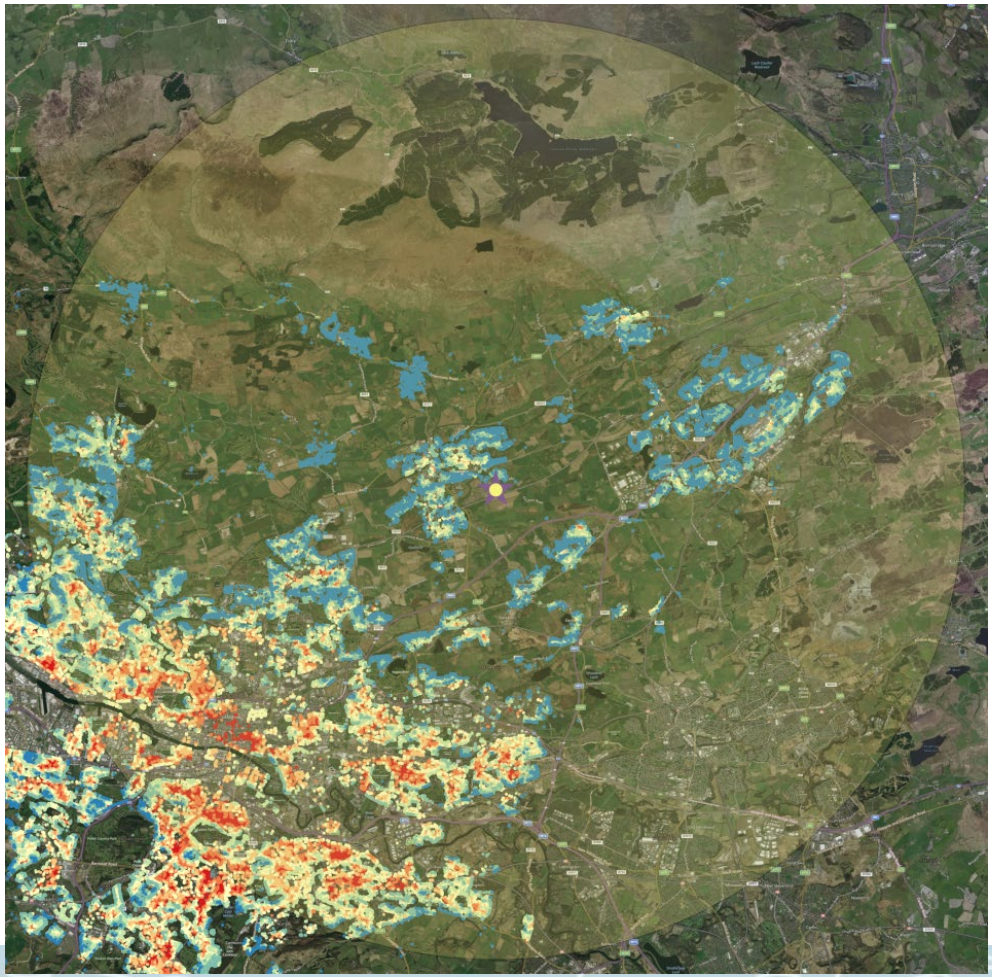
Which is... South side of Kirkintilloch



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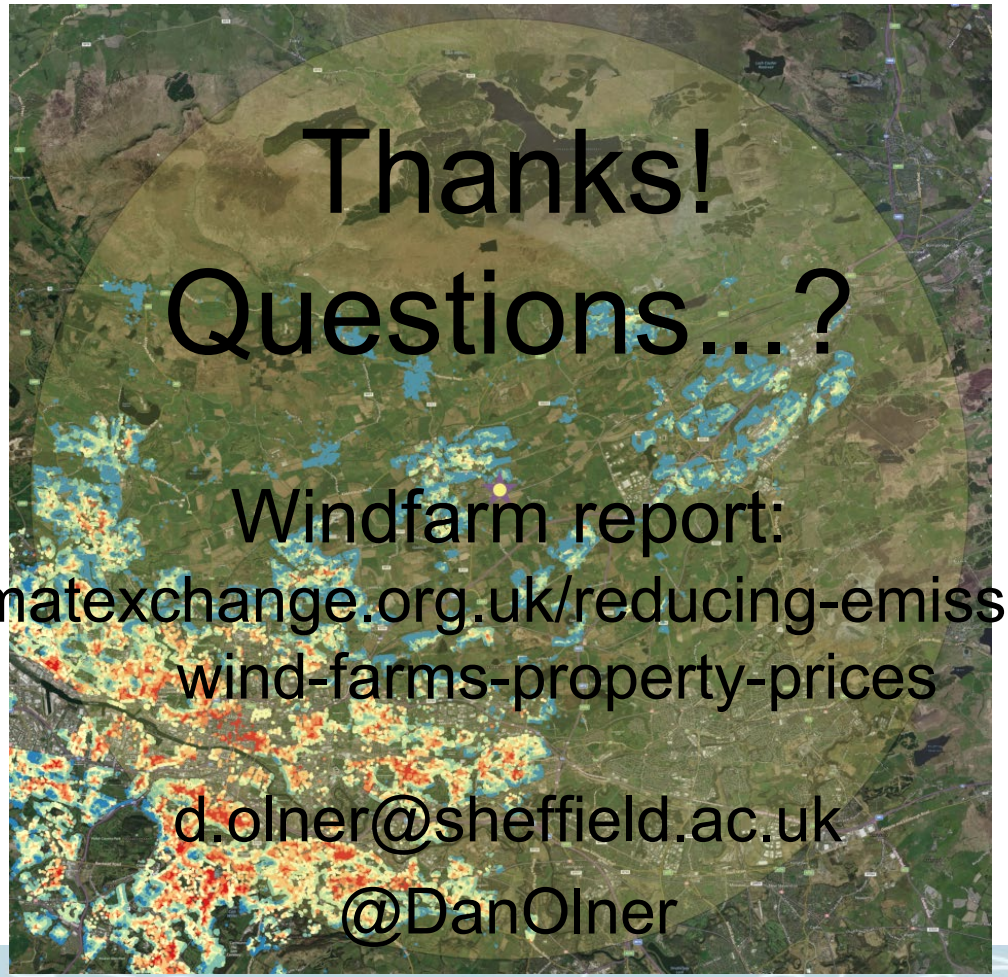

Thanks!
Questions...?

Windfarm report:
www.climatexchange.org.uk/reducing-emissions/impact-wind-farms-property-prices

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