District heating: rescaling sociotechnical relationships

Lessons from mature systems for the UK

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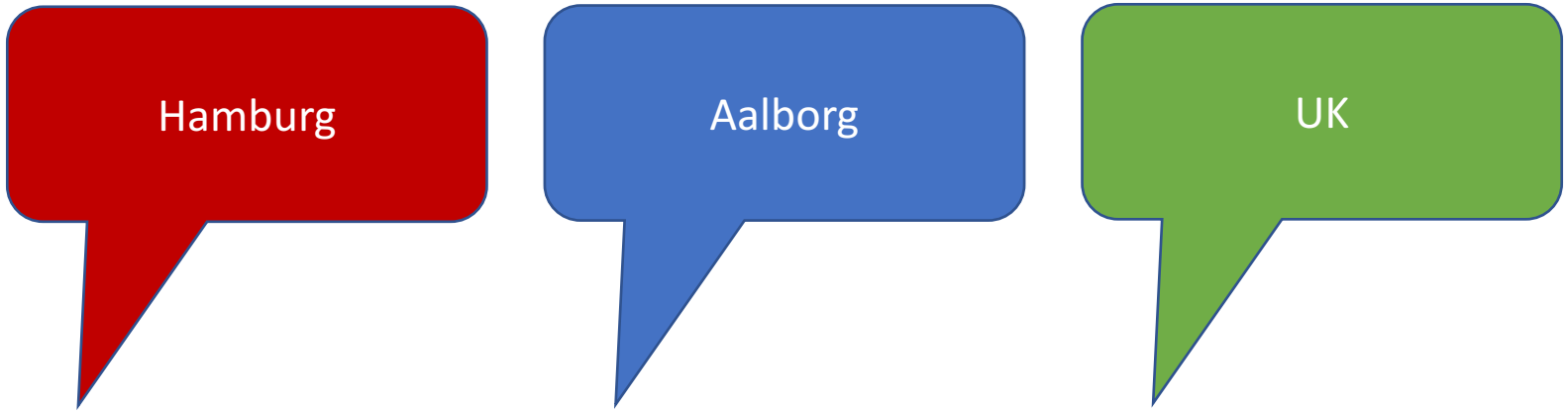
Cities as incomplete societies

- *European cities are incomplete societies: they constitute only one of the levels at which social actors interact, represent themselves, and are mutually interdependent* (Le Galès, 2002: 184)
- How do characteristics of district heating influence sociotechnical relations
  - within cities
  - between cities and other levels
- What does this imply for public authorities seeking to promote district heating in the UK?

Approach

- Case study cities: Hamburg, Aalborg, various UK
  - Sociotechnical dynamics
  - (Rather than pros and cons of contrasting ownership)
- Thematic presentation

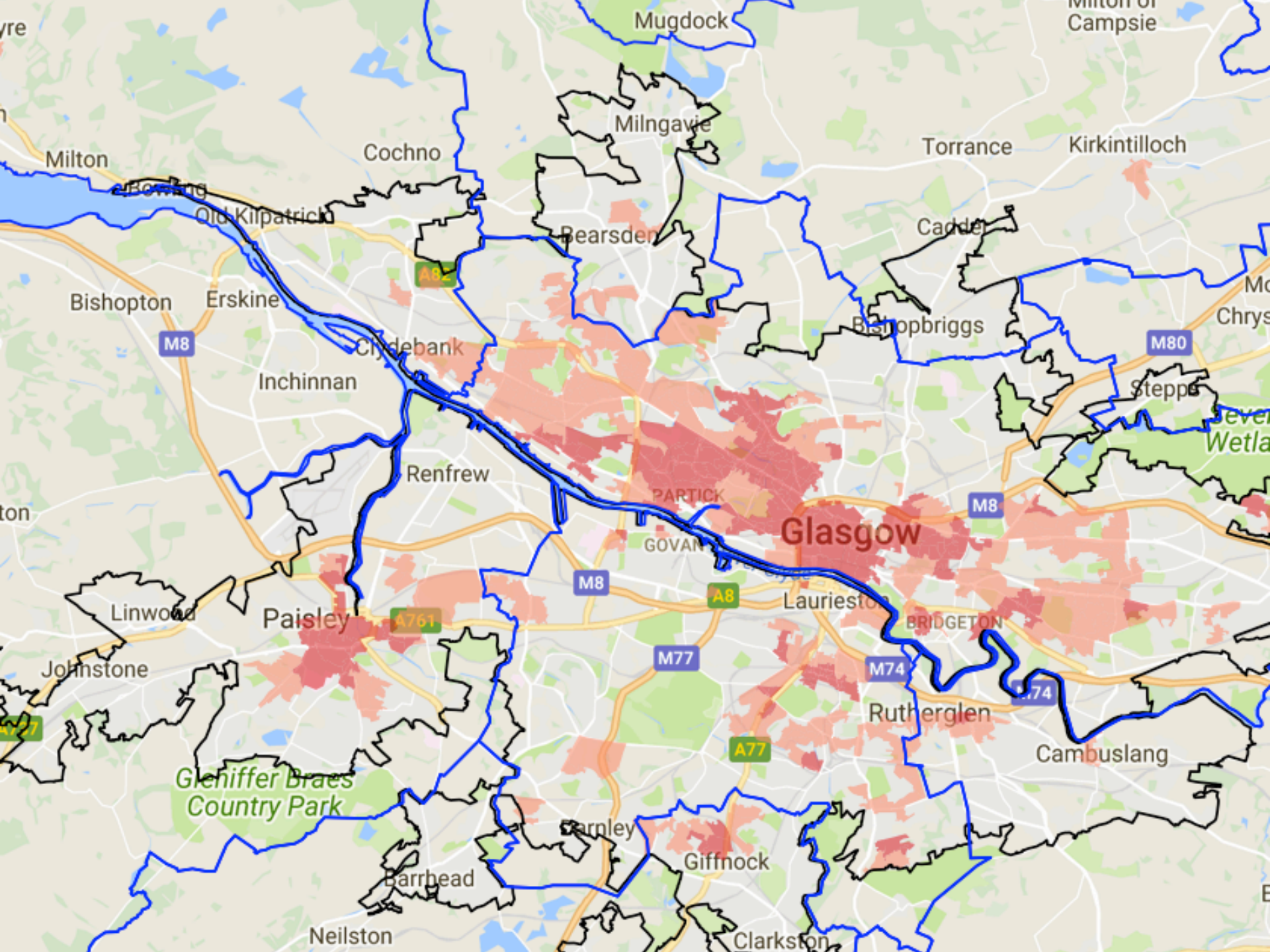


Case 1: Hamburg

- Large, old district heating network privatised in 1990s
- Citizen-initiative referendum to ‘remunicipalise’ gas, electricity and district heating networks
- Controversies around new coal CHP contributed to referendum debate
- Buy-back of gas and electricity complete
  - District heating buy-back ongoing and contentious

Case 2: Aalborg

- Municipally owned heat network taking heat from
  - Cement works (commercial),
  - waste incinerator (inter-municipal)
  - large coal CHP (private -> purchased by municipality)
- ‘Municipalisation’ of Nordjyllandsværket CHP
  - Sale by Vattenfall part of exit from Danish thermal generation
  - Loss-making plant
- Extension of central DH system to satellite towns in municipal jurisdiction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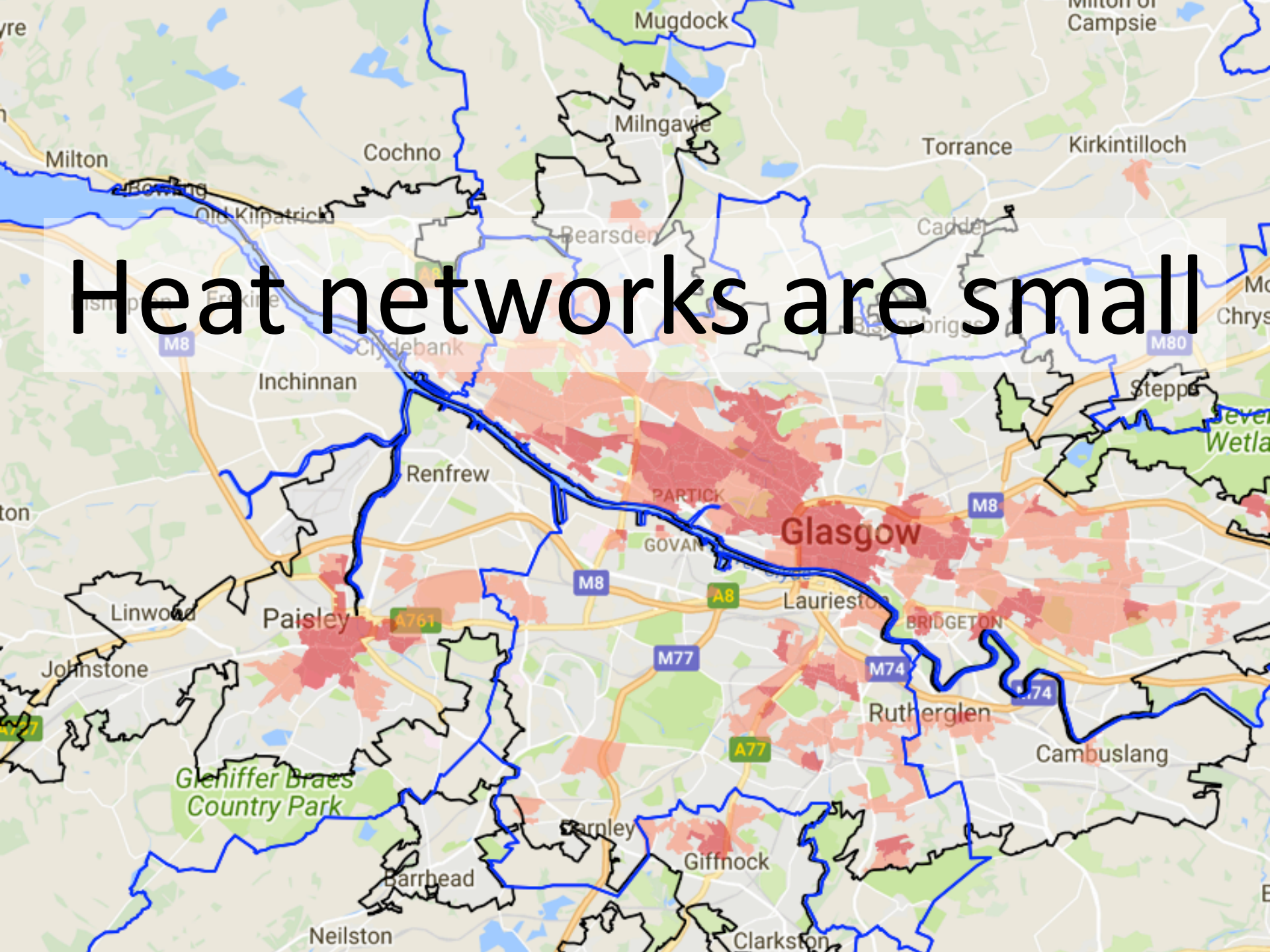
Heat networks are small
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Heat networks are energy facilities a

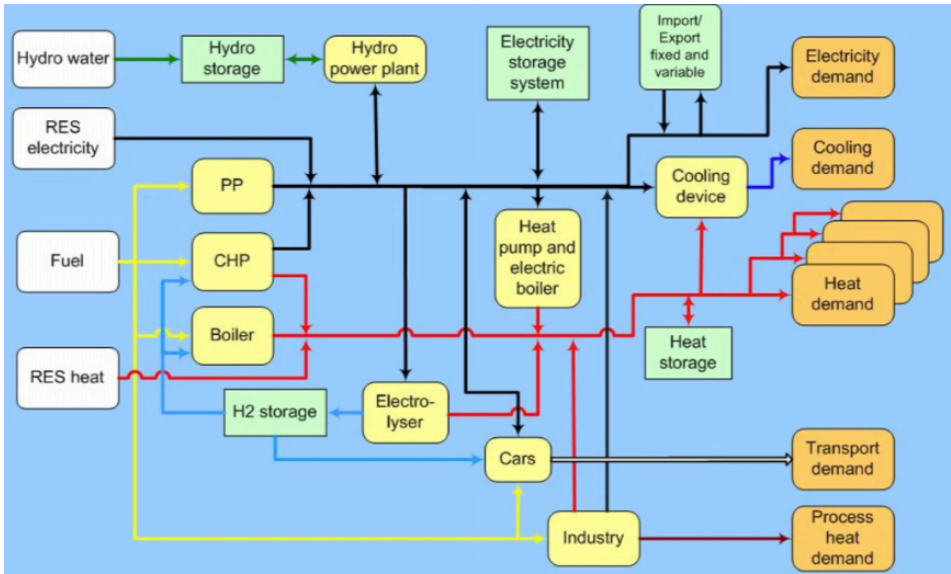
- Citizens in closer proximit
  - Water source heat pumps
  - Energy from waste facilitie
  - CHP (Biomass / hydrogen /
- Hamburg Moorburg contr
  - Controversial new coal-fired
  - Heat off-take pipe planned th gh Altona district
  - Protest groups formed
    - Then engaged with ideas about remunicipalisation
  - Controversy contributed to negative perceptions of Vattenfall

I heard from some neighbours that Vattenfall was planning […] to make a huge tunnel to bring heating from their new power plant in Morburg […]. [T]hey wanted to go to the green zone of Altona, […] but it's strange that no one heard it, it was secret...the biggest point was that some guys were living the whole winter in the trees. (Community activist, 2015)

Heat networks are small – local energy strategies

- Scale at which local authorities can shape energy
  - Environmental performance
  - Energy economy
- Gas and electrici*more* dependent on processes at other scale

[The mayor] said that after he's been re-elected he would like […] district heating for all the small towns in the municipality. […] lowering the bills for these towns was the main issue but also […] to make the entire system more green (Municipal energy officer, 2016)



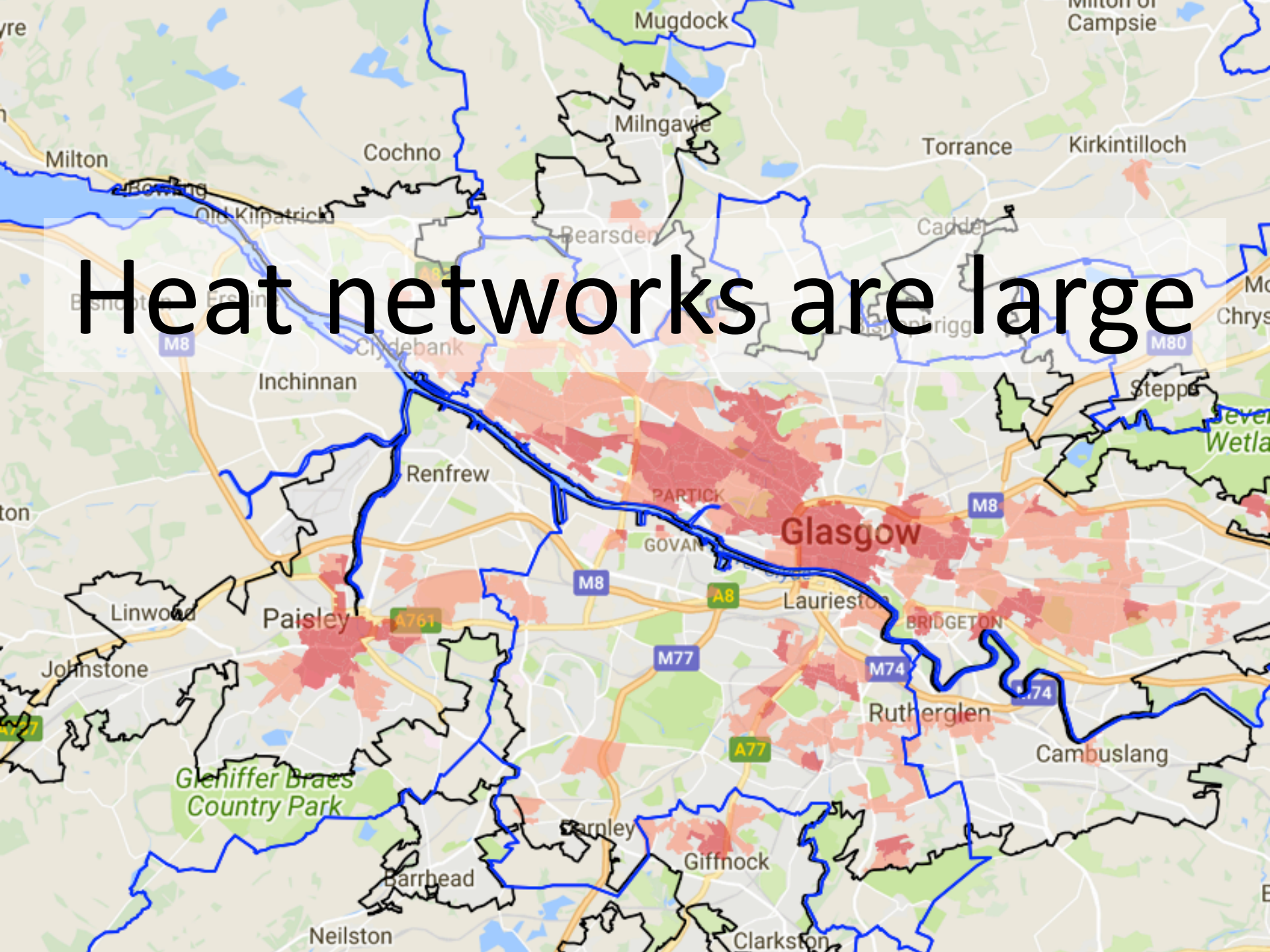
Heat networks are small – local regulation

- Greater role for locally bespoke regulation
  - No heat transmission system
- Hamburg re
  - Gas and
    concessi
    - Deadli
  - District h
    complex

20 years ago when [the Hamburg government] sold it to Vattenfall, they established a contract which is similar to the concession procedure and 15 years later Vattenfall said this contract was not valid (Energy cooperative director, 2015)

So what?

- Heat networks are small
  - Concentrated sites for local energy politics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Heat networks are large – scale and integration economies

- Use heat sources that otherwise wouldn't be available
- Optimise use of different heat sources across network
- UK has not committed to large scale heat networks
  - Option value under uncertainty?

just two weeks ago the electricity price went […] very low price so we purposely stopped the [coal CHP] plant for five days […] in the past the plant had to deliver more or less if the municipality said so they couldn't just stop. (Municipal energy officer, 2016)

Heat networks are large – UK pursuit of mixed economy

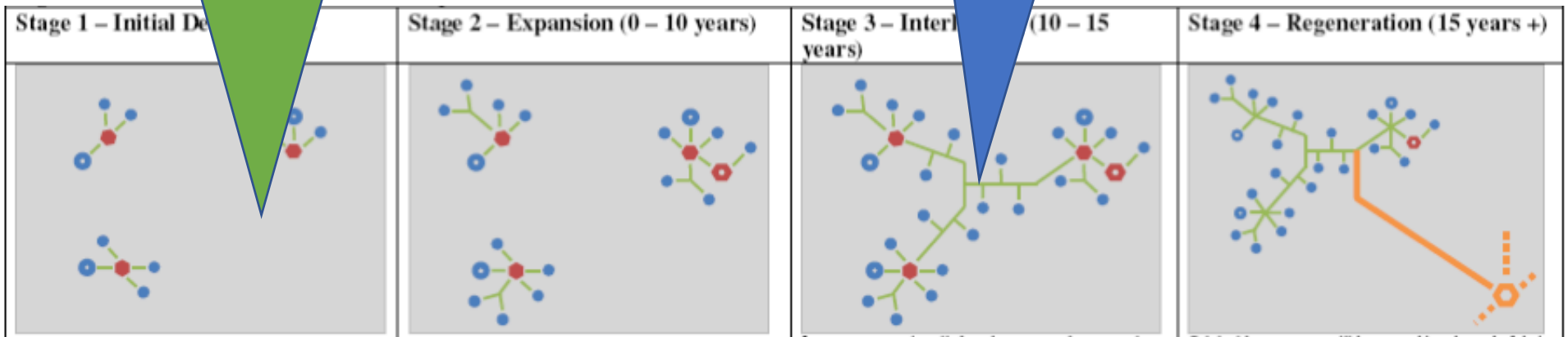
- National and local governments focus on near-term delivery of small networks
  - Emphasis on mixture of public and private development
  - Mobilise private capital

the purpose of [council in-house district heating unit] is to make sure that district heating projects within the city […] continue to be facilitated by the council, but not necessarily owned by the council, not necessarily controlled by the council (UK local government officer, 2017)

Heat networks are large – projects versus infrastructure

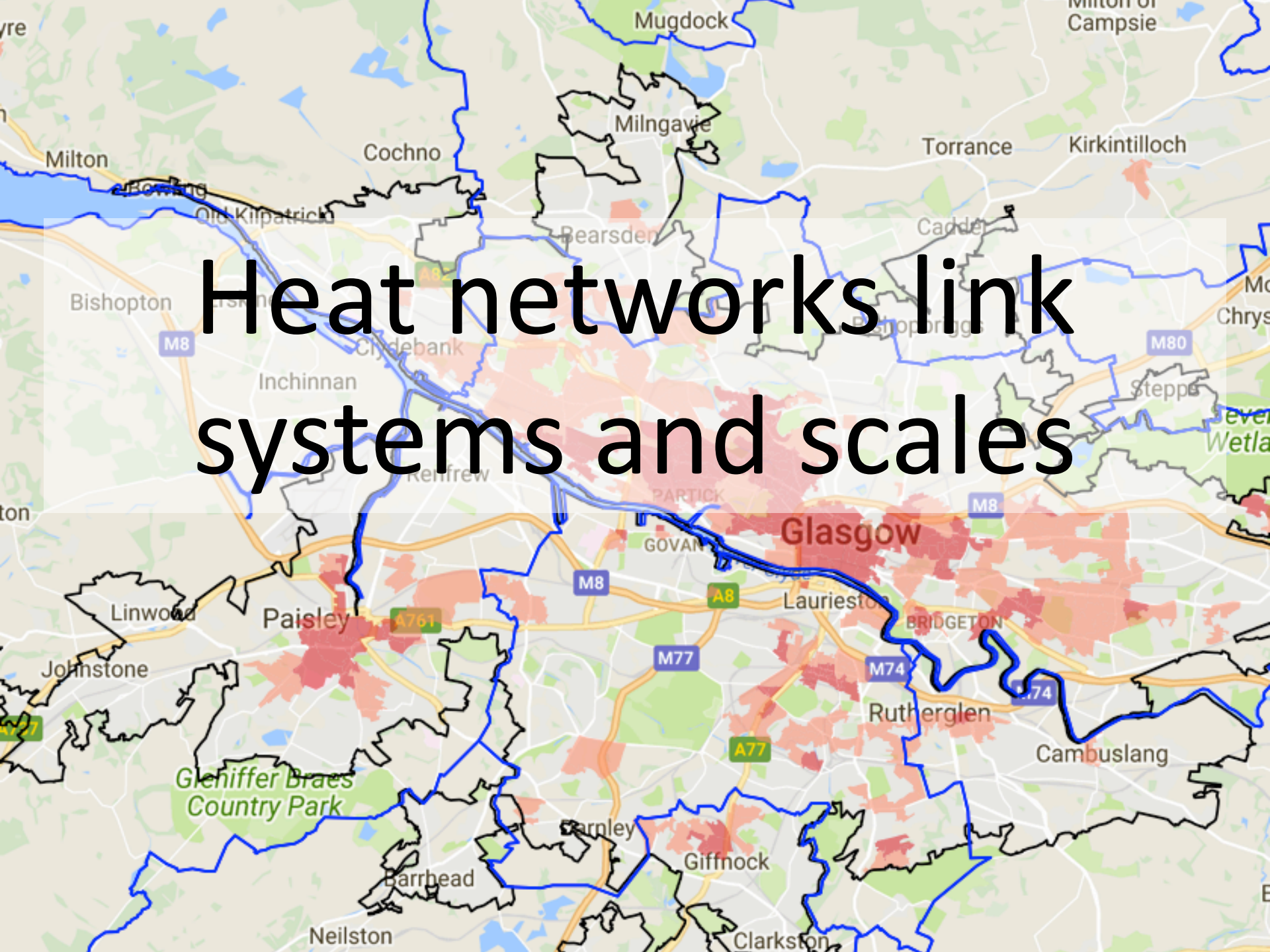
I think anyone would if they had an existing scheme and another one […] you'd always look to interconnect if you could […] I think [connecting to another organisation's network] makes sense if it stacks up for both parties (Regional head, UK district heating company, 2016)

But this negotiating with these guys took nine years something. […] Ten years I think [laughs] yes.[…] Meetings after meetings and negotiating we would like to pay a little less, we would like you to pay a little more [laughs]. (Municipal energy officer, 2016)



So what?

- Heat networks are small
  - Concentrated sites for local energy politics
- Heat networks are large
  - Too many organisational interfaces make interconnection and optimisation of system difficult


Heat networks link systems and scales
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Heat networks link scales – asset values difficult to pin down

- Sunk investments have minimal recovery value
  - Asset values calculated as value of future net revenues
  - Local heat coupled with wider energy markets
  - National policy regimes
  - Local heating decisions
- Renegotiation of fi arrangements is difficult

[There] had been discussions for several years with the district heating company but of course they stuck to the existing contract. […] if you want to do something about that you had to then terminate that contract […] it would take years and then you probably also have a legal dispute afterwards. (Energy industry executive, 2017)

Vattenfall in German district heating dispute

15/02/2018
By Tildy Bayar
Features Editor

Negotiations for the sale of the German city of Hamburg's district heating system have reportedly fallen through, with arbitration necessary.

Sweden's Vattenfall is the majority owner of Hamburg's district heating business, but in a 2013 referendum the city's voters decided to remunicipalize their power, gas and heating supplies.

Hamburg and Vattenfall then inked a contract which would allow the city to buy the company's 74.9 per

Heat networks link scales – users and remote shareholders

- Heat networks rarely afford retail competition
  - High fixed costs
  - Few heat generators mean little scope for supplier differentiation
  - Risk of generators becoming stranded assets
- Concerns about monopoly rents

since in Hamburg the district heating price has never been an issue you know it's still in comparison to all the you know natural gas prices and it's not higher than the national average […] it is way too high I mean if you look in terms of the profits (Energy policy consultant, 2016)

So what?

- Heat networks are small
  - Concentrated sites for local energy politics
- Heat networks are large
  - Too many organisational interfaces make interconnection and optimisation of system difficult
- Heat networks link systems and scales
  - Asset values are highly contingent making negotiations lengthy
  - Users are embedded in returns-dominated financial model

Conclusions

- When sponsoring new networks public authorities should
  - Recognise a heat network as a focal point for (future) local energy politics
  - Explicitly retain power to direct development of networks
    - Interconnection and joint operation
  - Establish mechanisms to quickly resolve asset values and prevent monopoly rents
    - E.g. regulated accounting and valuation methods
- Local public monopoly is *one* solution
  - Alternatives: concessions, regulation, licencing…