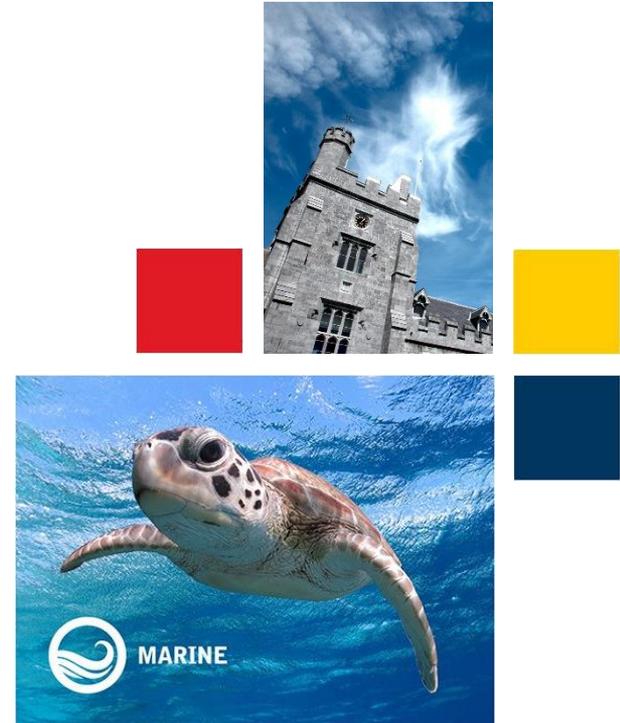


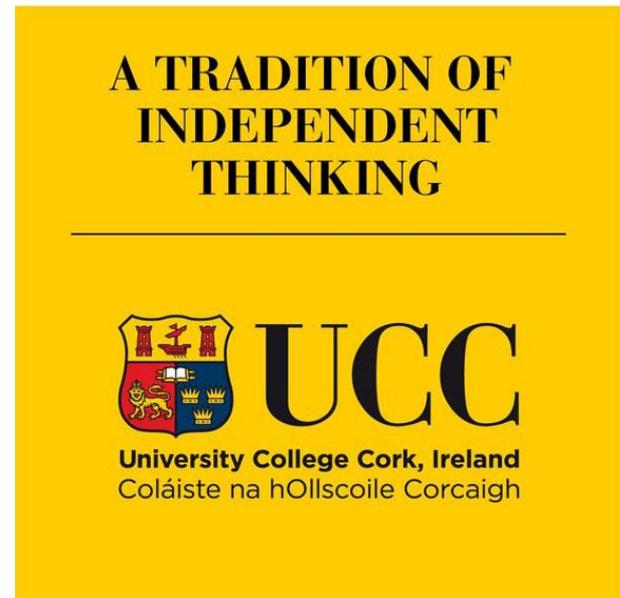


ENVIRONMENTAL RESEARCH INSTITUTE
UNIVERSITY COLLEGE CORK



Spatial socioeconomic indicators of suboptimal space heating choices

James Glynn, John Curtis, Brian Ó Gallachóir
International BE₄ Workshop - UCL Energy Institute
20th - 21st April 2015



Outline

- Explore drivers of Energy Poverty in Ireland
- Simple Method for comparing spatial socioeconomic and energy infrastructure data
- Data driven mapping analysis as opposed to theoretical or statistical frameworks
 - Need for a socio-economic optimised method for gas grid development
 - Currently simple population growth based
 - Capacity utilisation maximisation now an interest
- Purpose is to spatially focus surveying for development of an econometric behavioural model for fuel choice
- Research objective is to establish & model socioeconomic drivers of residential heating fuel choice and demand

Context

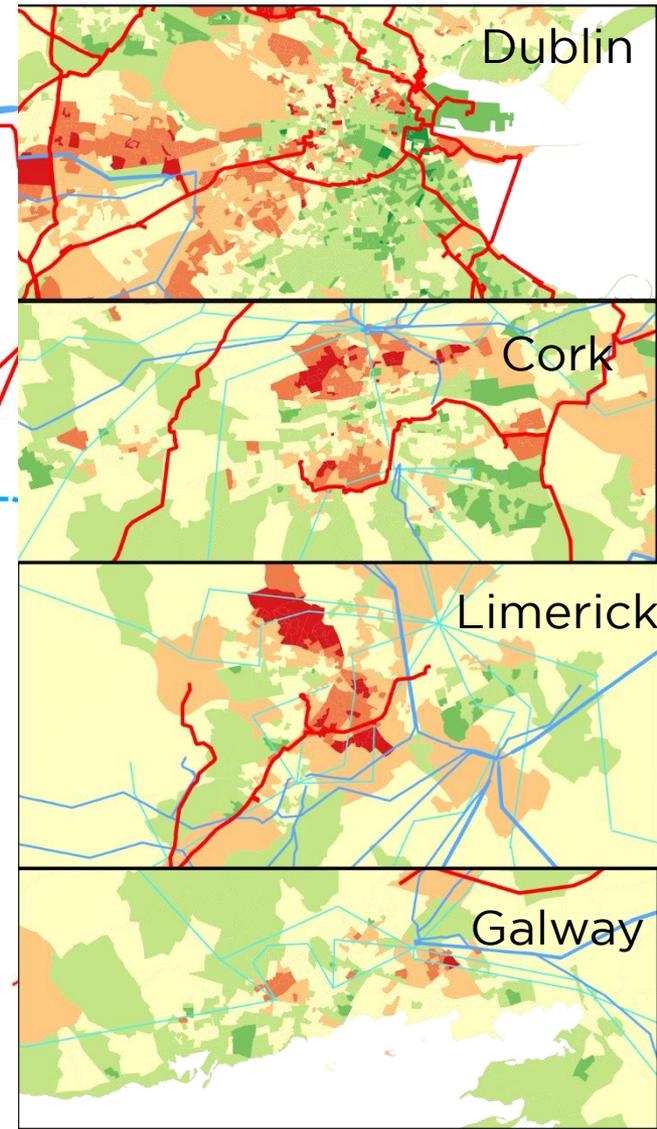
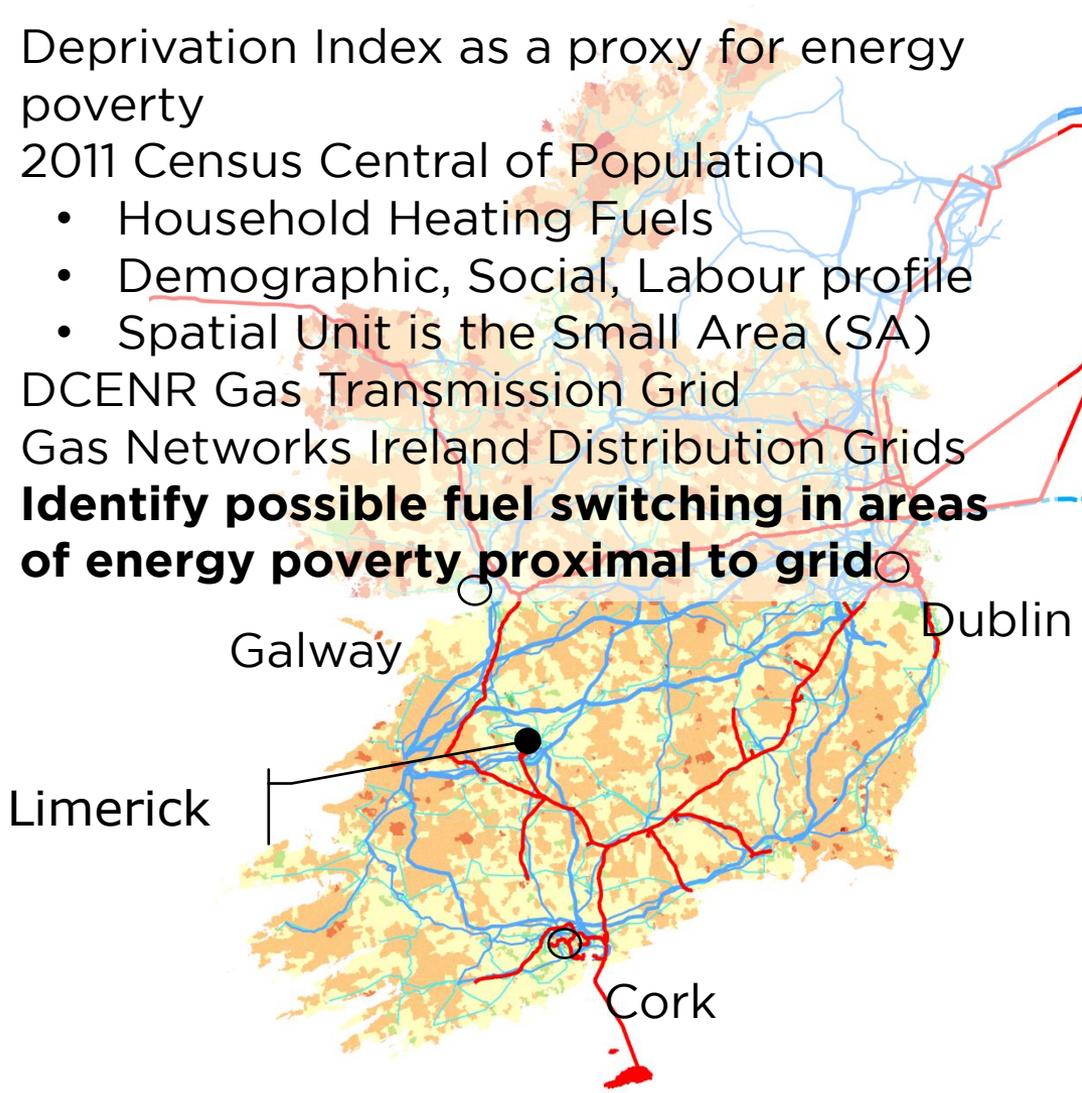
- 300,000 Irish households that are currently heavily reliant on peat, coal, or oil have the option to connect to mains gas, within 50m, but choose not to do so even though it would be financially advantageous for them to do so.
- 100,000 Irish Households have switched in the last 5 years to more expensive prepaid pricing options
- Over €400 million spent last year on Fuel allowances and Home heating packages
- Lowest 20% income households spend ~6% expenditure on Fuel and Light
- Lowest 10% income households spend >13% disposable income and Fuel and Light
- Spatially heterogeneous home heating choices
- Limited success to date with retrofit towards RES-H targets
- our understanding of fuel choice behaviour is limited.
 - this limits our ability to
 - i) understanding fuel choice rationality in Ireland
 - ii) determine future gas network utilisation
 - iii) develop strategies for connecting more households to the gas network.

Original Rationale: Energy Poverty

Data Sets for Comparison

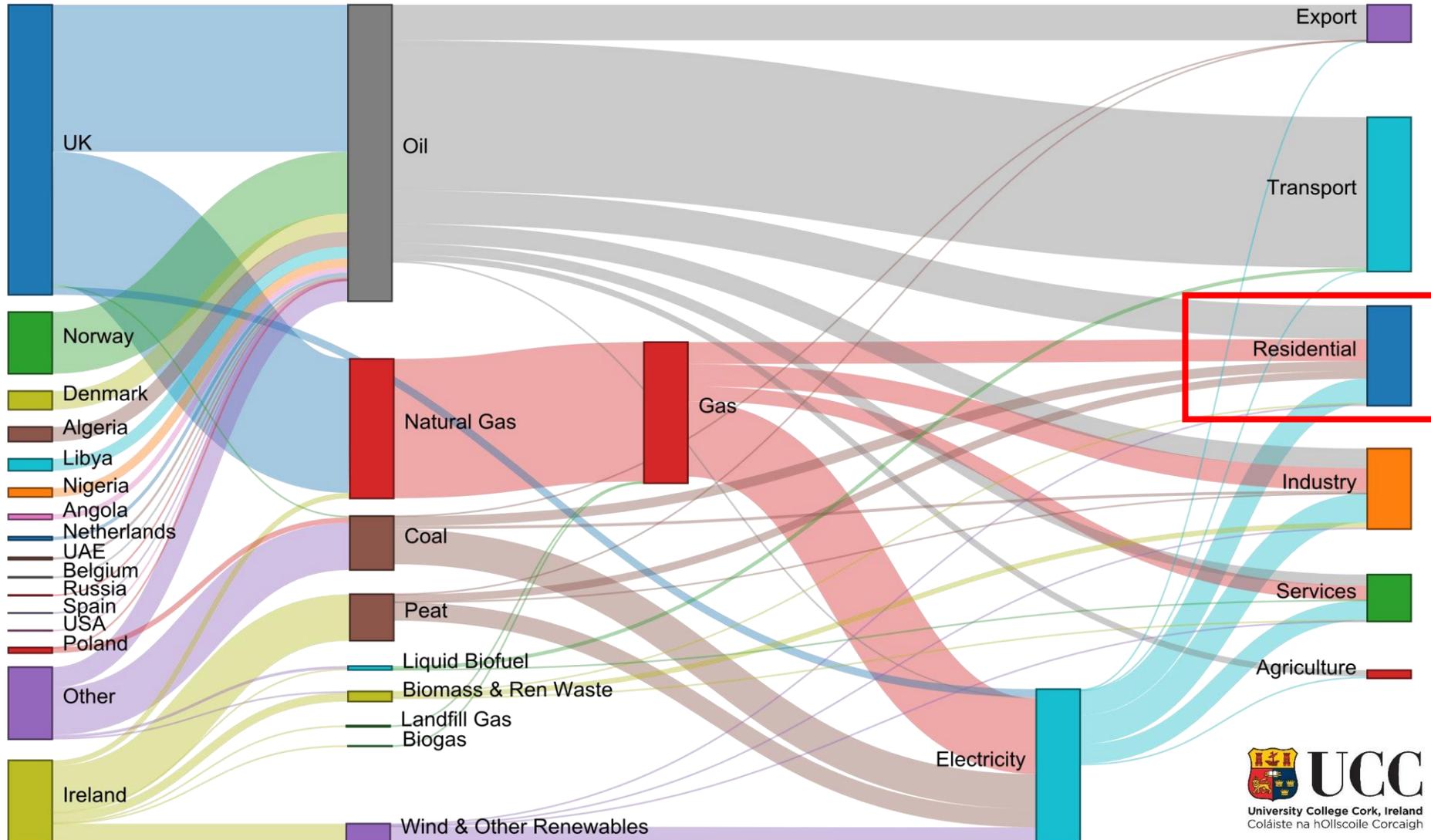


- Deprivation Index as a proxy for energy poverty
- 2011 Census Central of Population
 - Household Heating Fuels
 - Demographic, Social, Labour profile
 - Spatial Unit is the Small Area (SA)
- DCENR Gas Transmission Grid
- Gas Networks Ireland Distribution Grids
- **Identify possible fuel switching in areas of energy poverty proximal to grid**

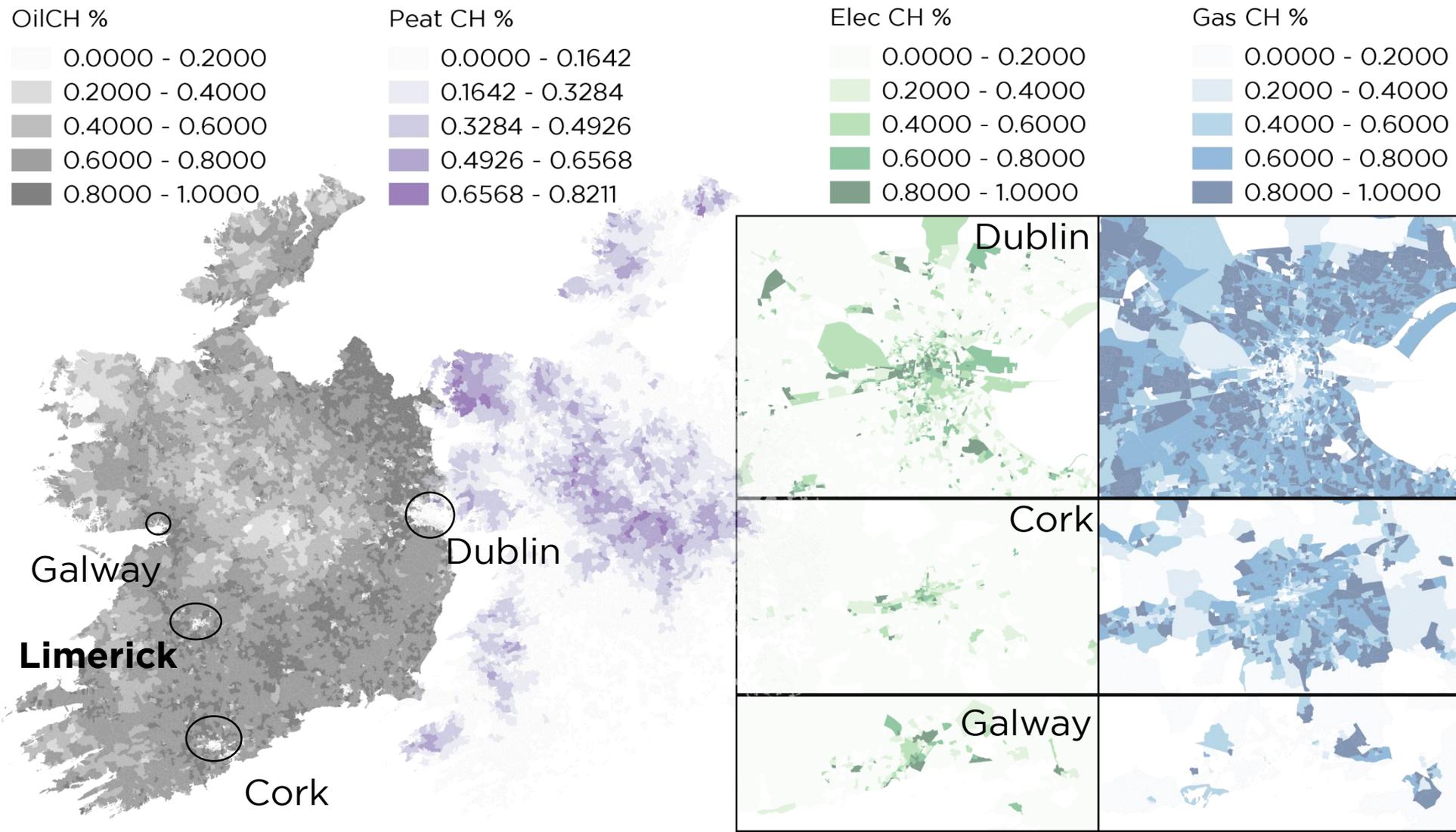


Residential Sector Energy Balance

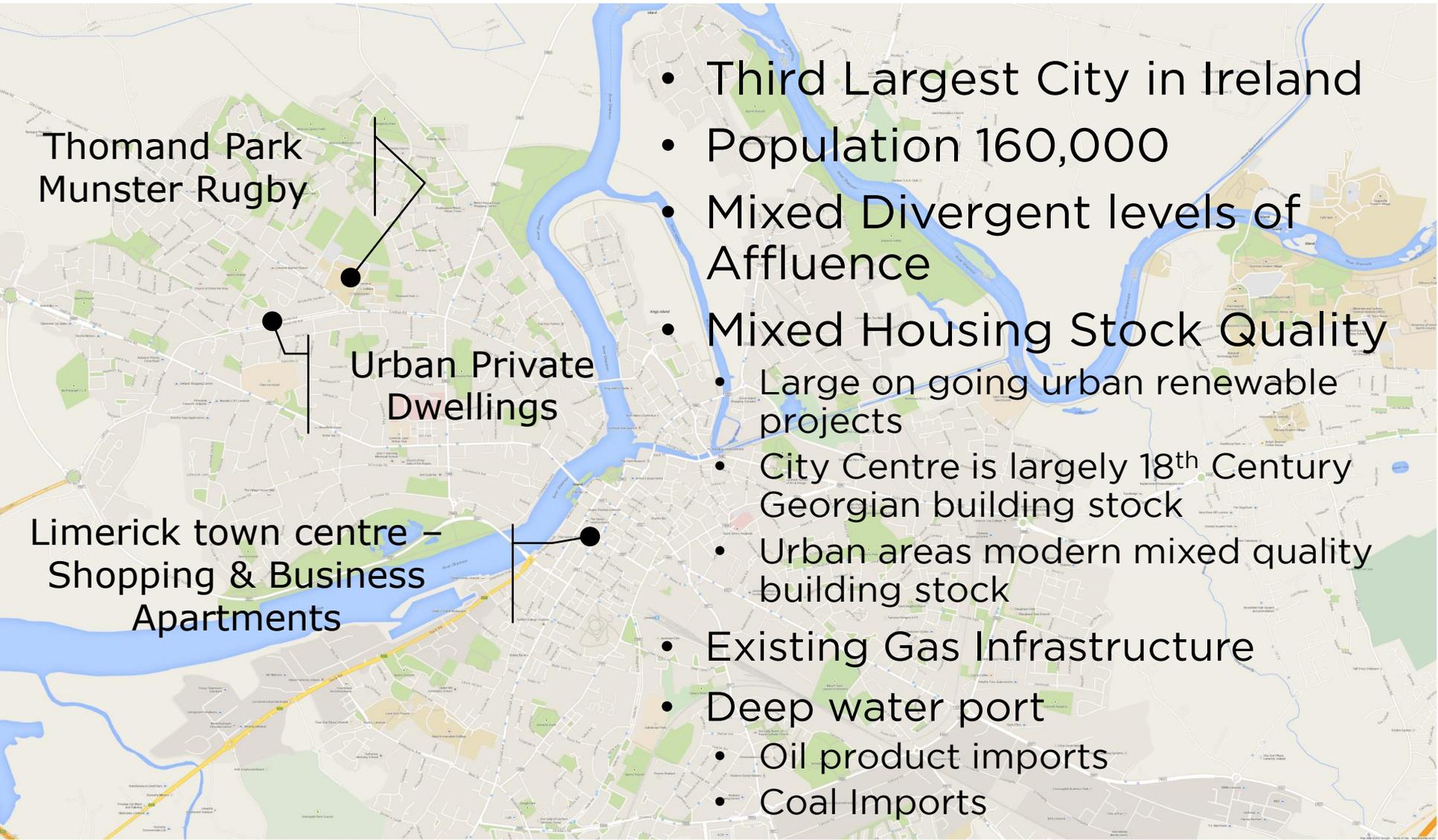
Oil Dominates - Dispersed Low Population Density



Heterogeneous Urban/Rural Central Heating Choices



Focus on Limerick - Basemap



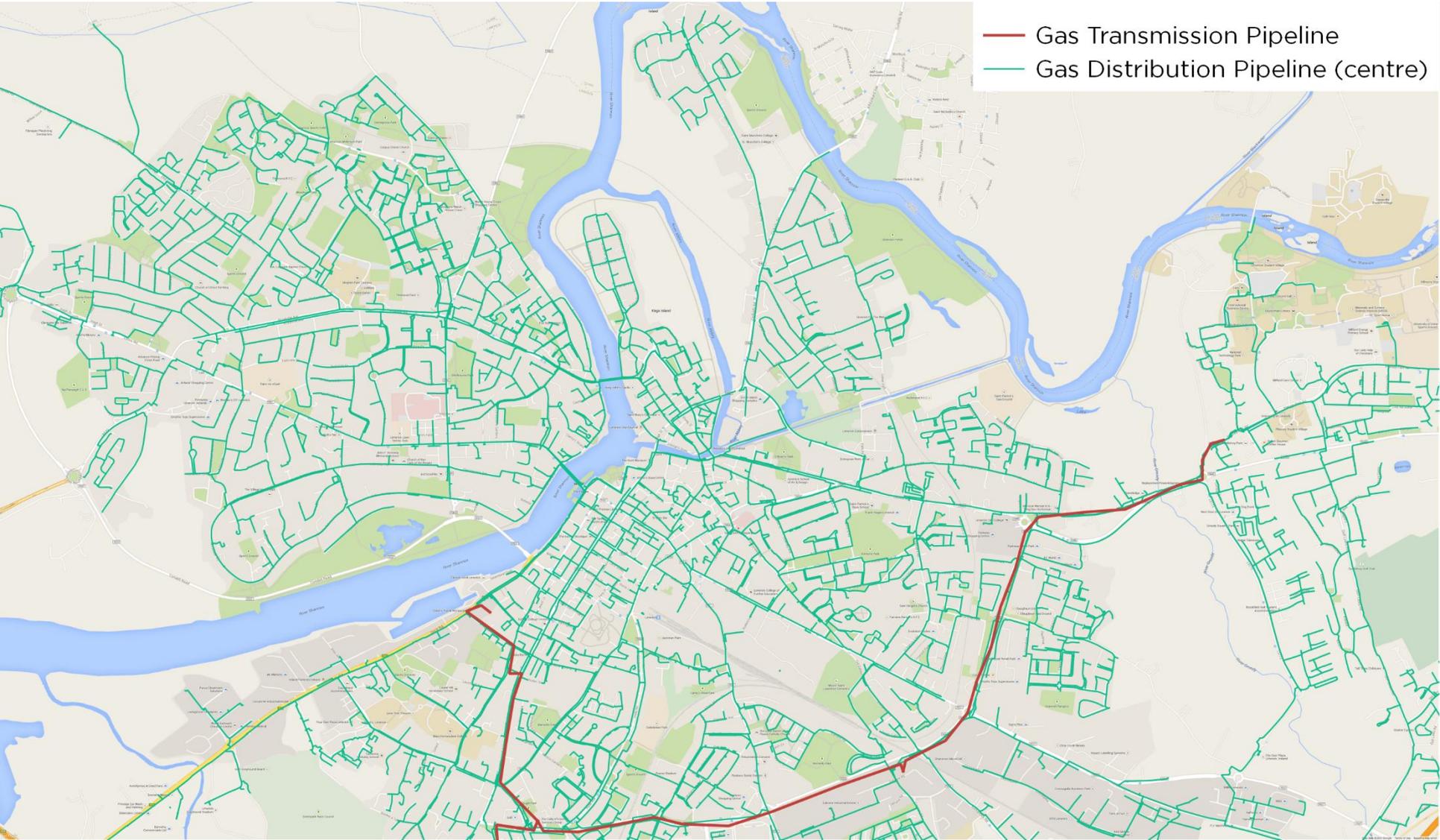
Thomand Park
Munster Rugby

Urban Private
Dwellings

Limerick town centre –
Shopping & Business
Apartments

- Third Largest City in Ireland
- Population 160,000
- Mixed Divergent levels of Affluence
- Mixed Housing Stock Quality
 - Large on going urban renewable projects
 - City Centre is largely 18th Century Georgian building stock
 - Urban areas modern mixed quality building stock
- Existing Gas Infrastructure
- Deep water port
 - Oil product imports
 - Coal Imports

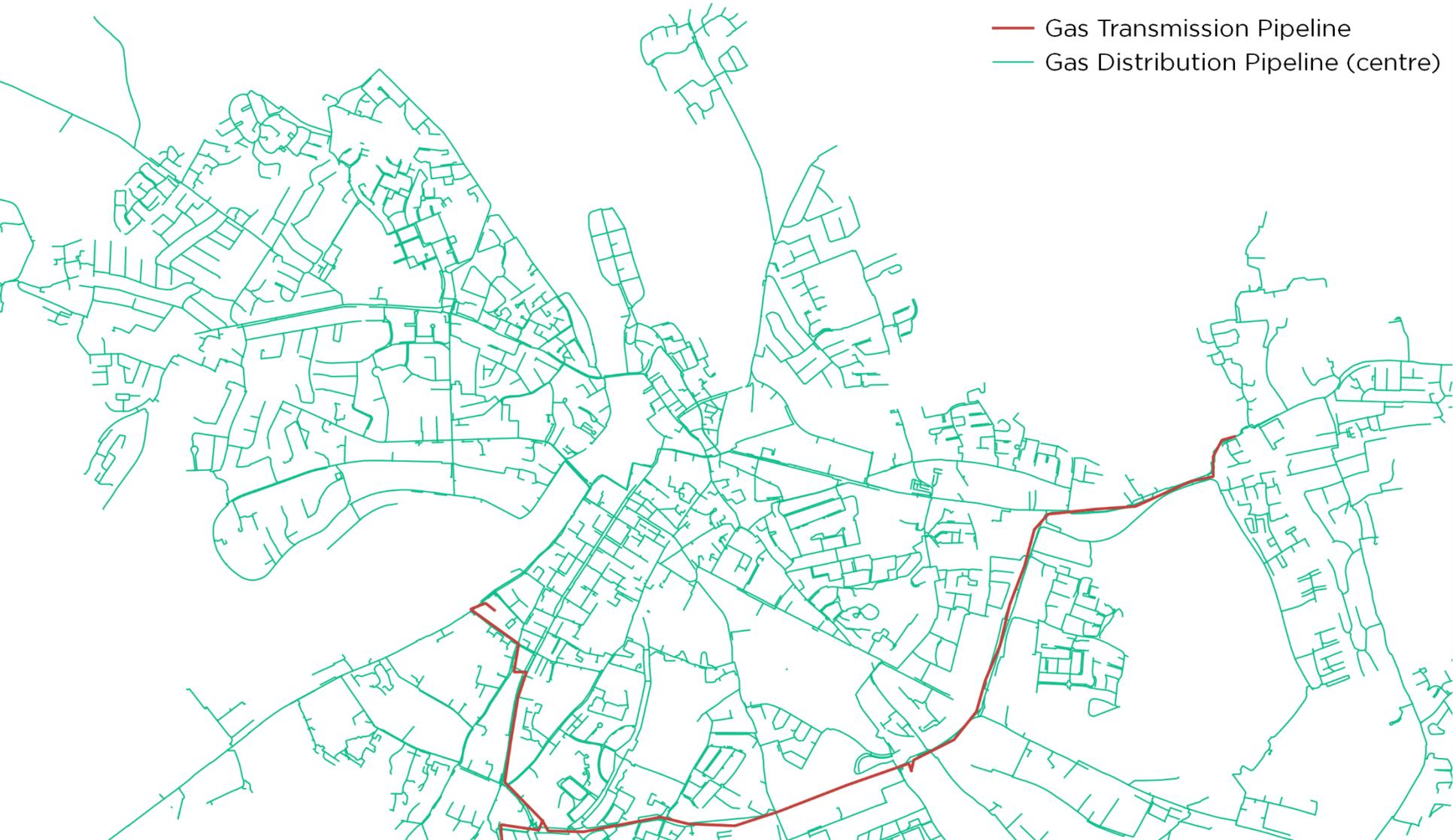
Low Pressure Gas Distribution Grid



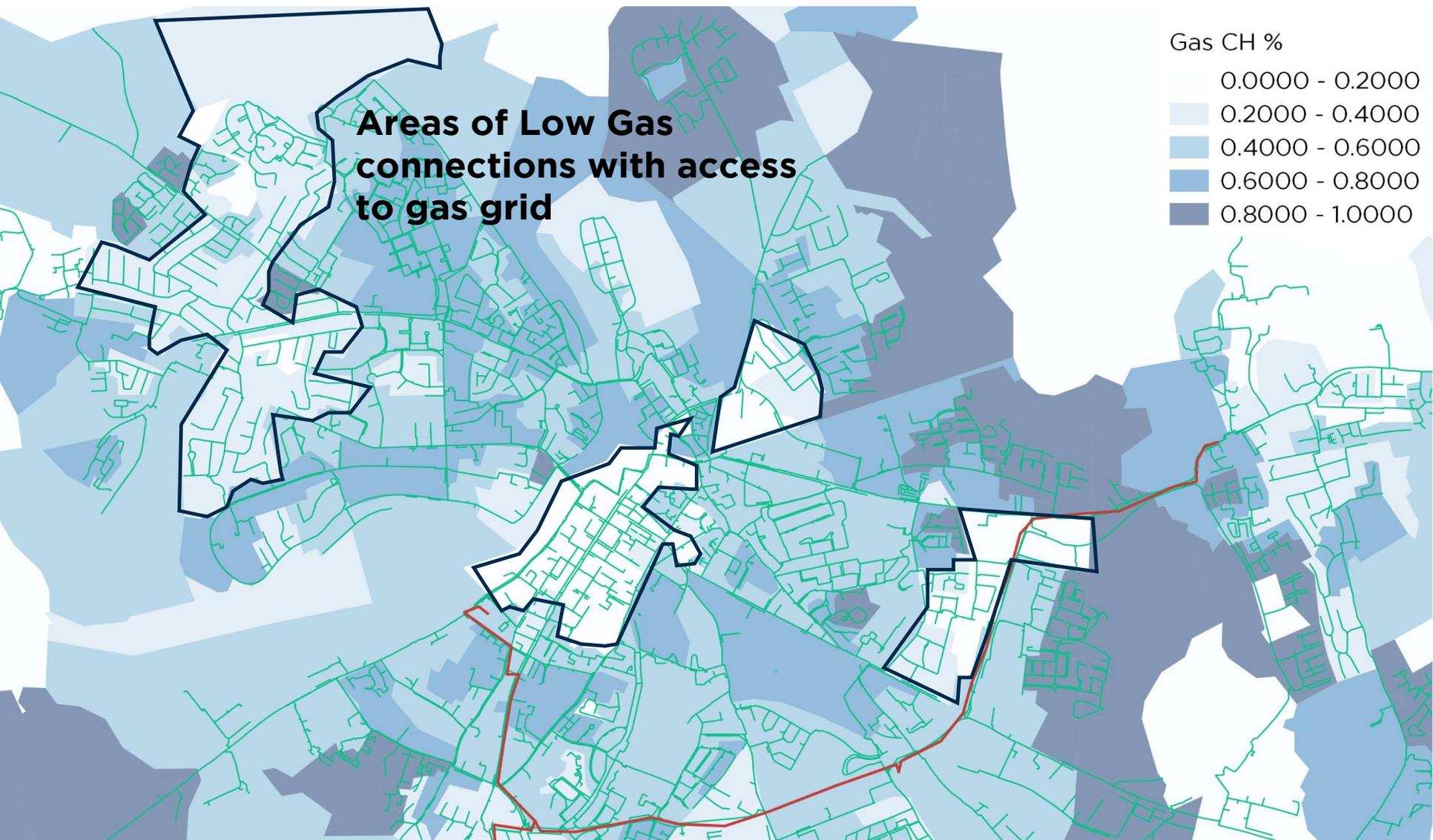
Low Pressure Gas Distribution Grid



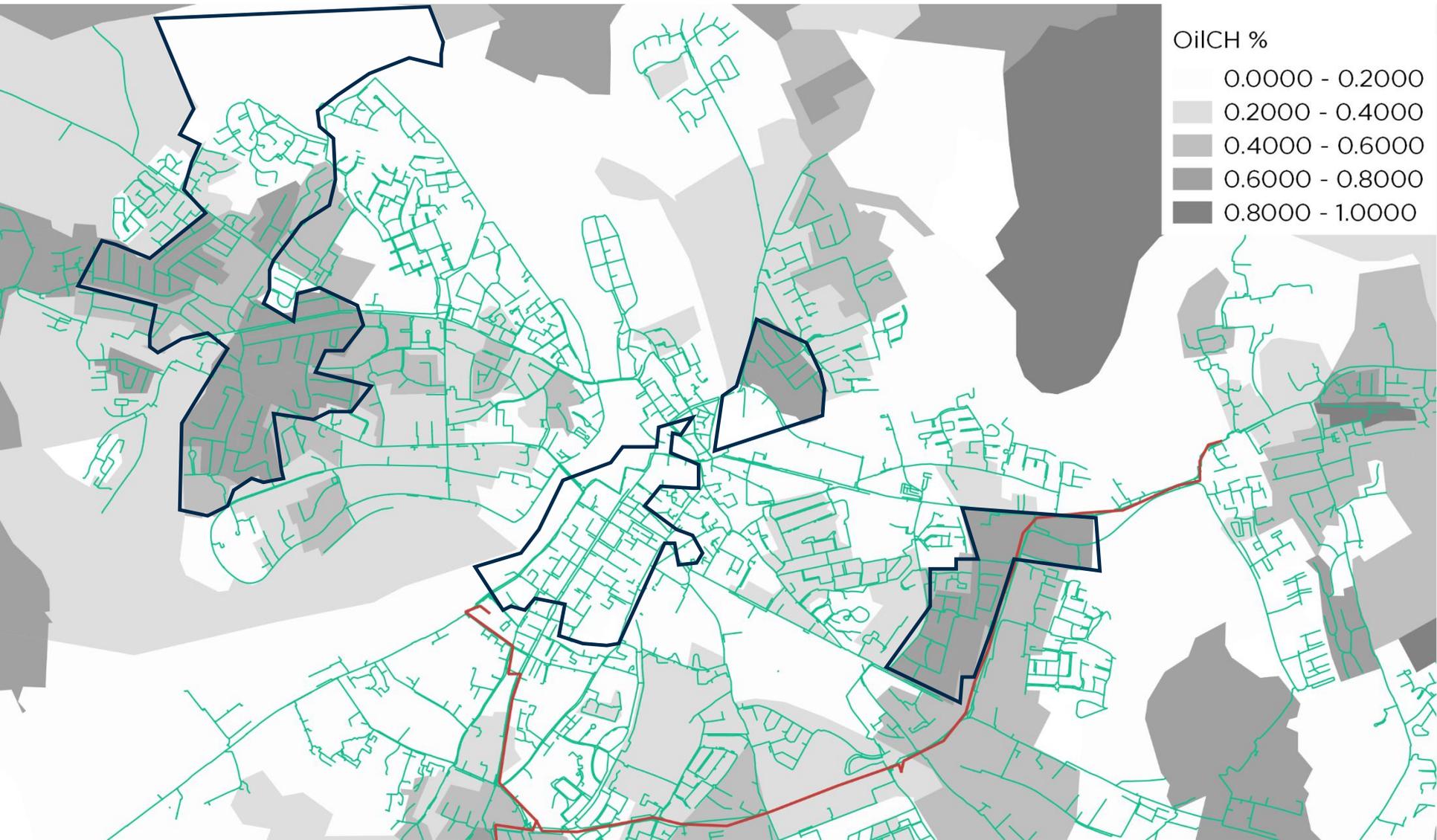
- Gas Transmission Pipeline
- Gas Distribution Pipeline (centre)



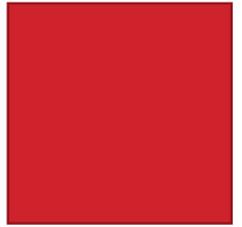
Gas Central Heating Overview



Oil Central Heating



Electrical Central Heating



Elec CH %

0.0000 - 0.2000

0.2000 - 0.4000

0.4000 - 0.6000

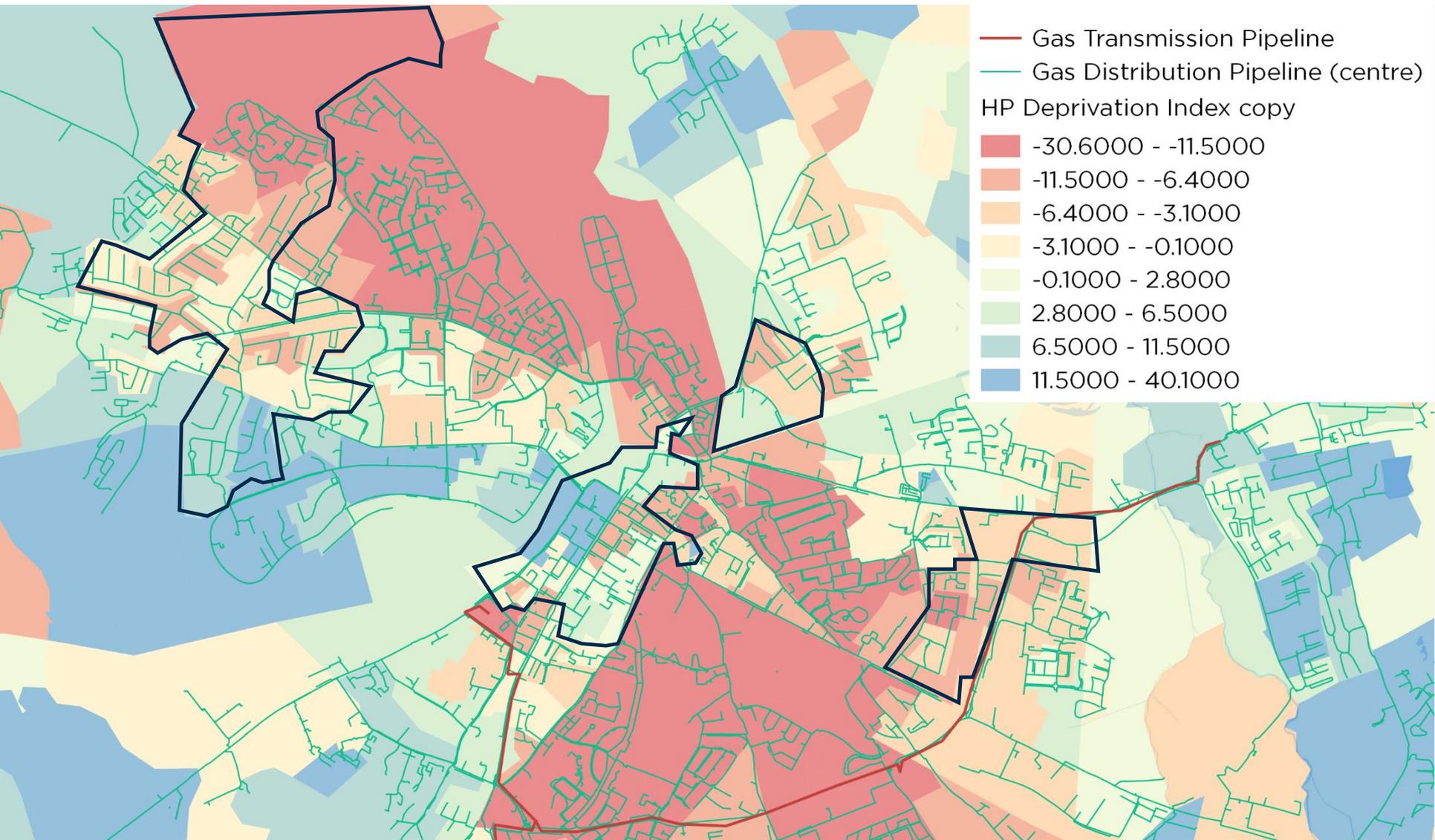
0.6000 - 0.8000

0.8000 - 1.0000



Levels of Affluence

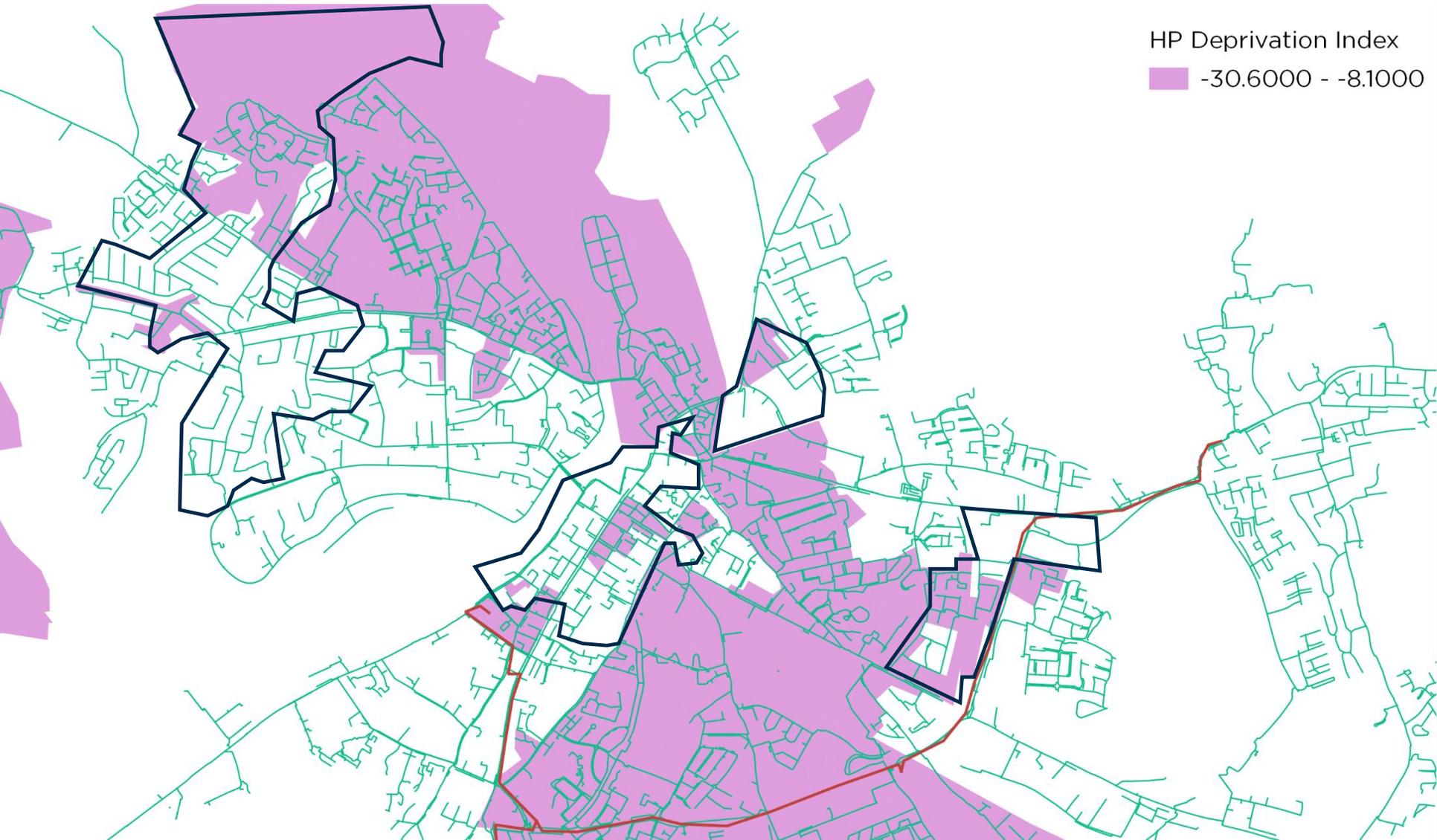
Cross cutting low gas connections



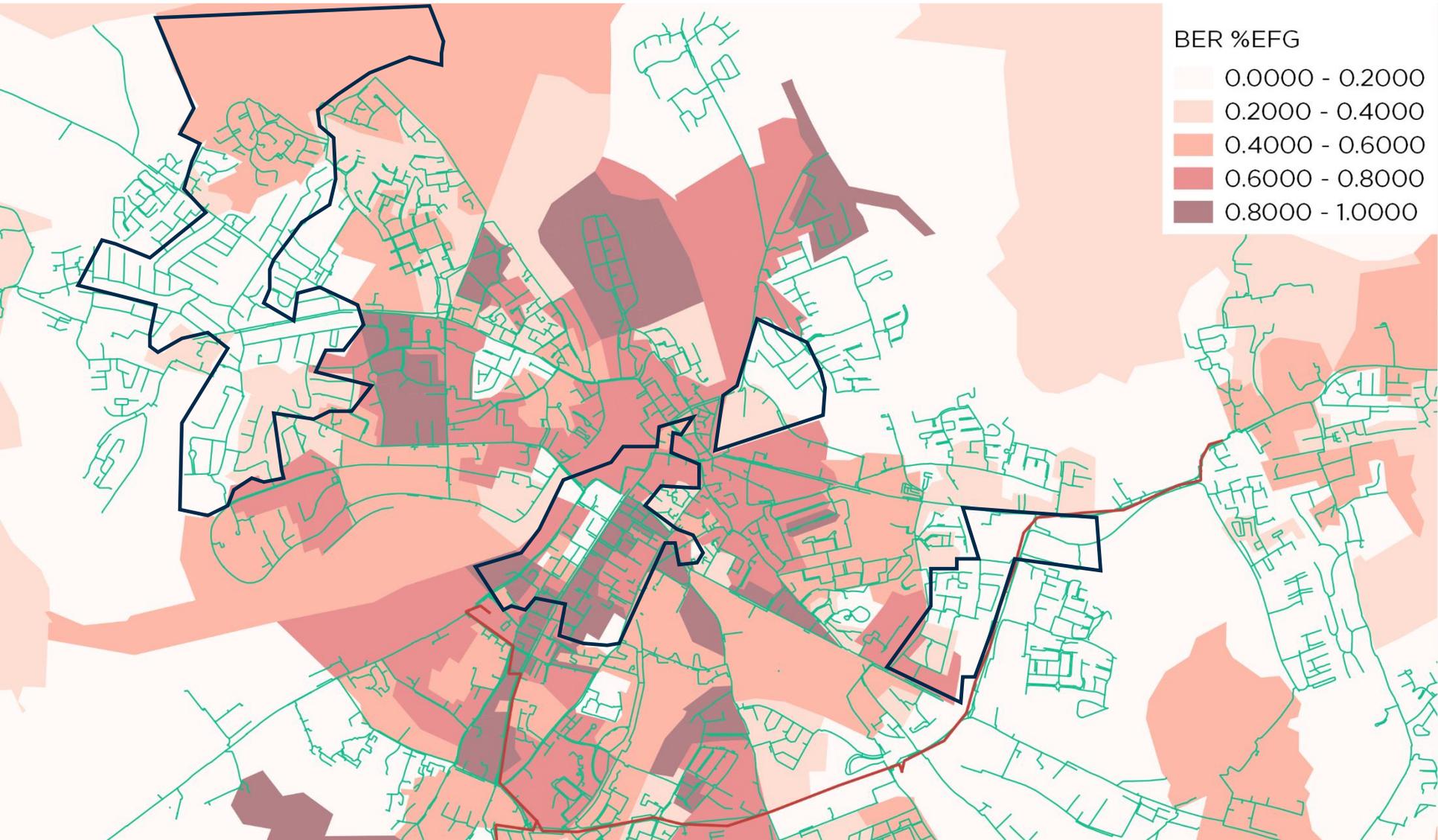
Low Levels of Affluence



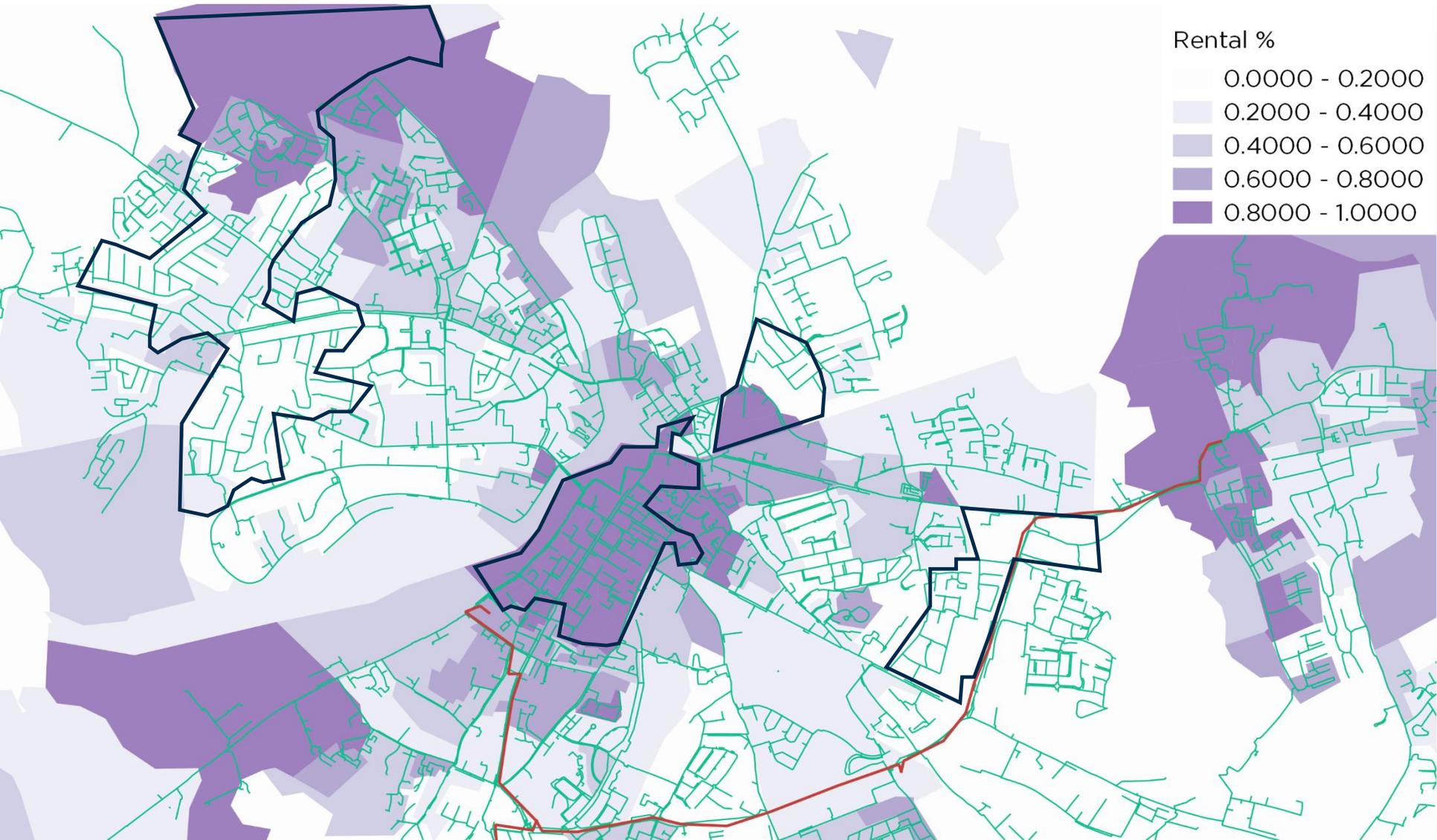
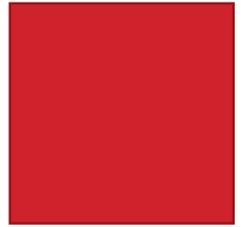
HP Deprivation Index
-30.6000 - -8.1000



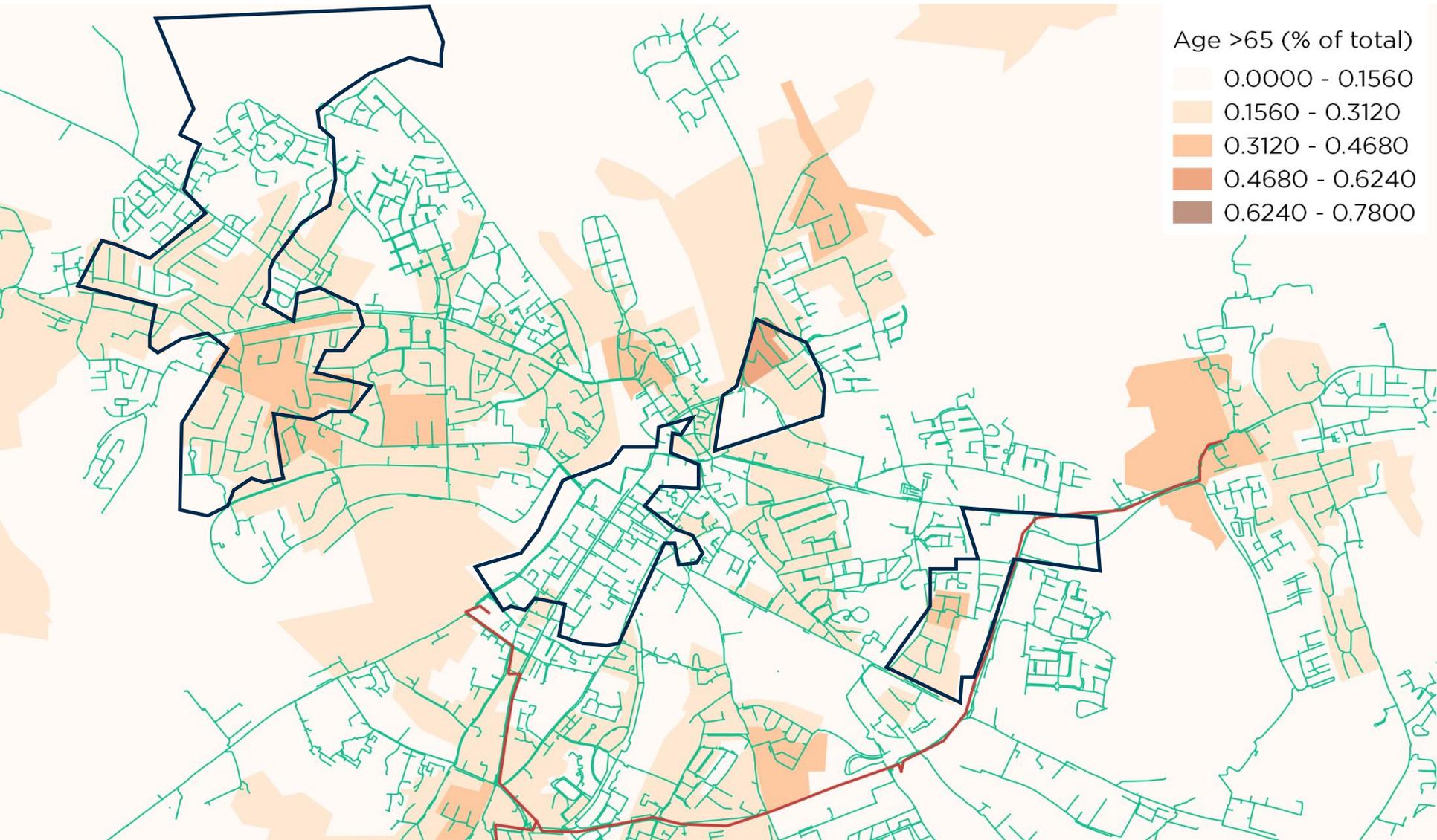
Low BER "EFG" Households



Rental Market

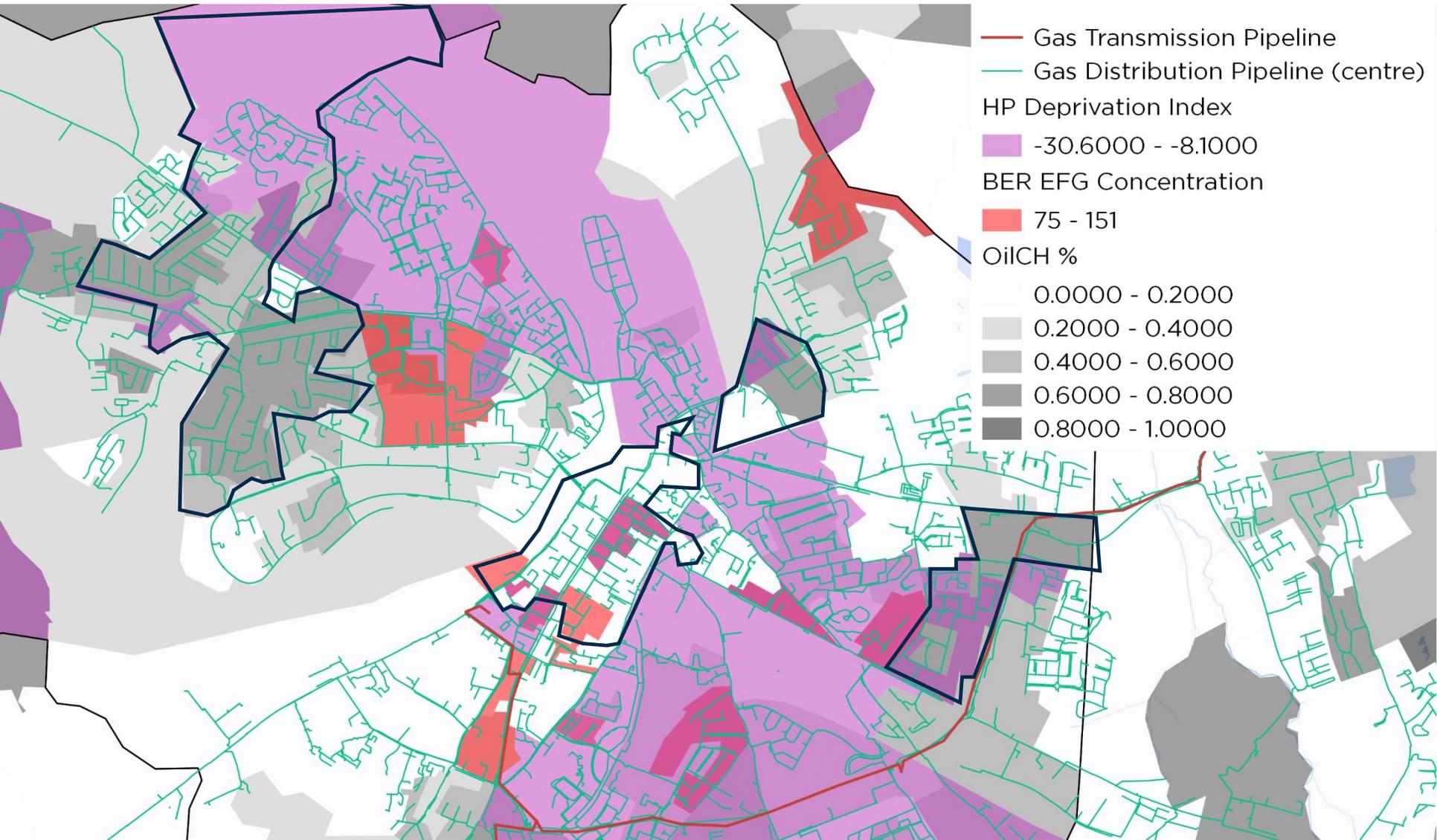


High Proportions of Retirees

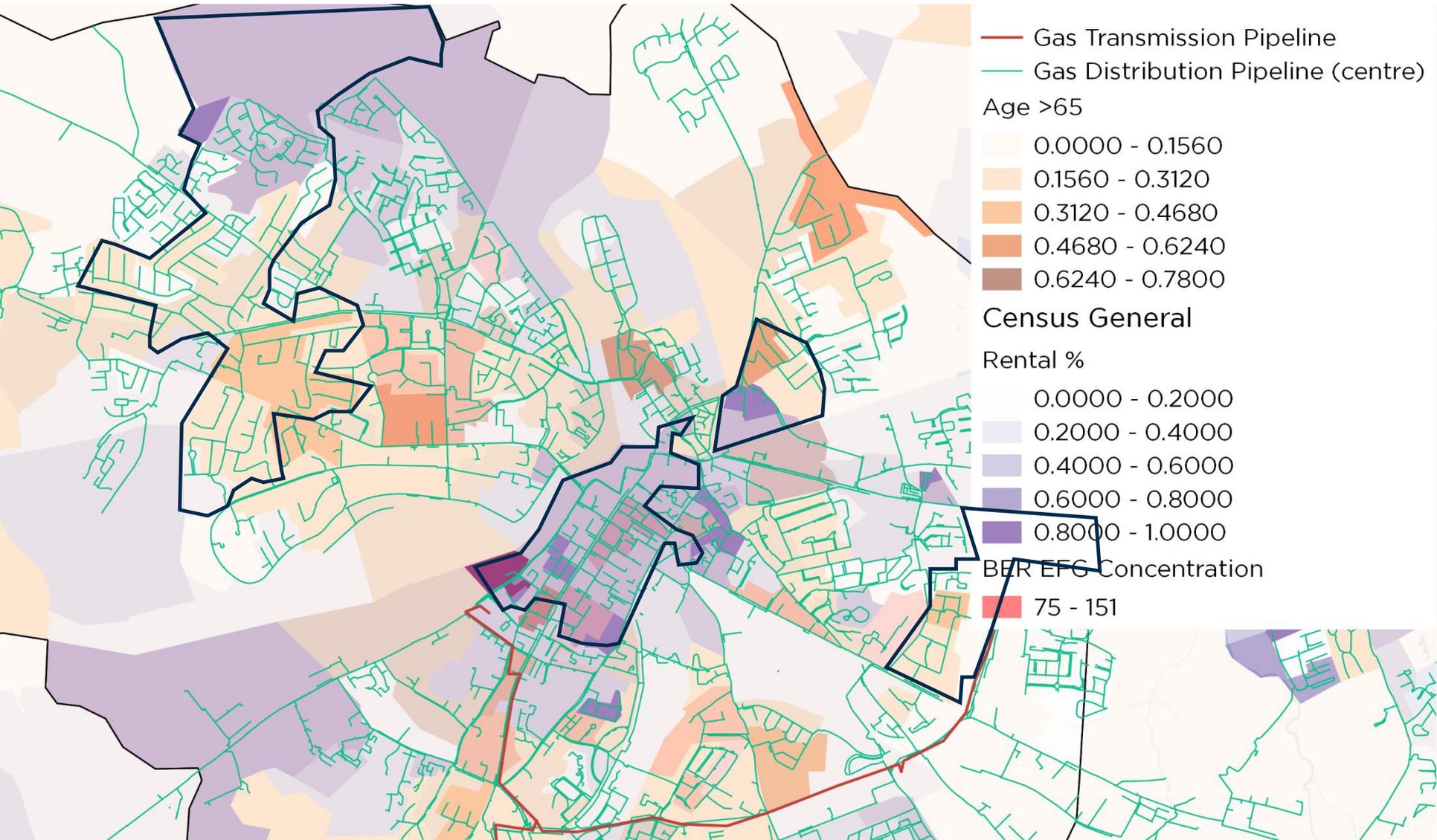
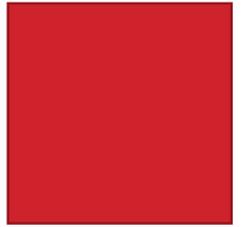


Affluence and Building Quality

Not the dominant factors we suspected



Age and Rental Markets



Conclusions

- Many factors other than price influencing fuel choice and fuel consumption
- Are regional division and definition of energy service demands in energy system models accurate enough or appropriate?
 - Irish TIMES Classification of households
 - Rural / Urban
 - Apartment / House
 - ETSAP TIAM Classification of Household types by sub-regional disaggregation
- Socio-demographic parameters could/should be used to define energy service demand drivers and fuel choices
 - Long Term projections an issue
- Targeted surveys required to estimate census variable strength as predictors of fuel choice and energy service demand

Future Work – Econometric Fuel Choice Behaviour

- Utilising Individual Geocoded household level census data
- “Household characteristics and the choice of mains gas as a fuel” using bivariate / multi-variate probit type models
- “Gas connections by housing estate and associated socio-demographic characteristics” analysis at housing estate level using count data models (e.g. Poisson or Negative Binomial)
- “When households connect to mains gas: a socio-economic analysis” using information on the time of gas grid availability and duration/hazard models
- “Household fuel choice decisions: a survey analysis” to identify what are the key decision points and barriers surrounding fuel choice and fuel supplier.

Thank You



Energy Policy &
Modelling Group

www.ucc.ie/energypolicy

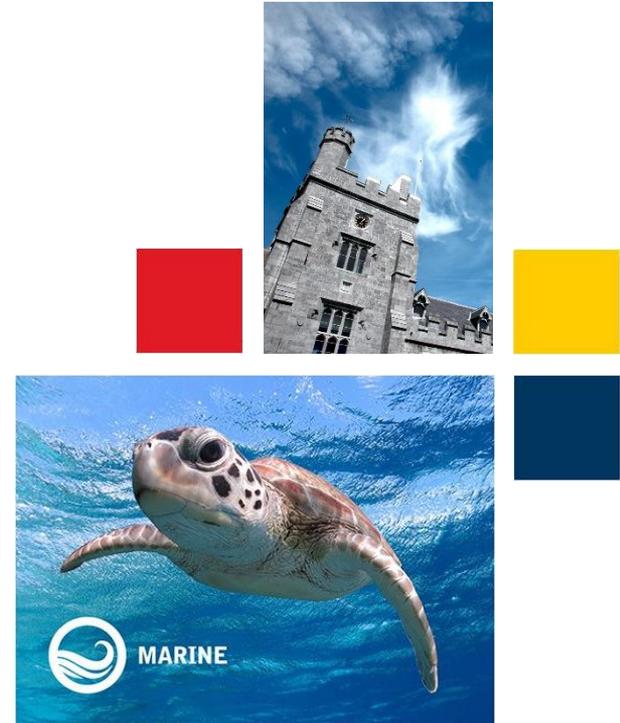


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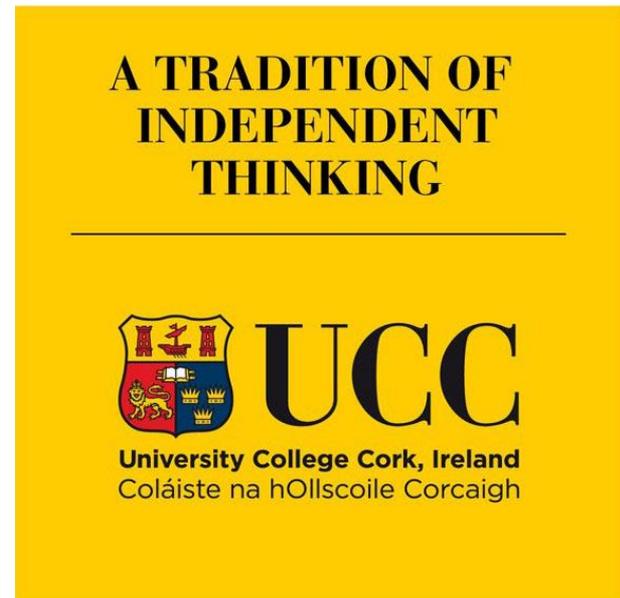


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Trutz Hasse Deprivation Index

- Demographic Profile is measured by five indicators:
 - percentage change in population over the previous five years
 - percentage of people aged under 15 or over 64 years of age
 - percentage of people with low educational achievements
 - percentage of people with a third-level education
 - mean number of persons per room
- Social Class Composition is also measured by five indicators:
 - percentage of people with low educational achievements
 - percentage of people with a third-level education
 - percentage of households of high social class
 - percentage of households of low social class
 - mean number of persons per room
- Labour Market Situation is measured by four indicators:
 - percentage of households with children aged under 15 years and headed by a single parent
 - male unemployment rate
 - female unemployment rate
 - percentage of households of low social class

Ireland Gas and Elec Grids

