Wales Housing Energy Efficiency

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Research Aim

What are the potential impacts of improvements in household energy efficiency across Wales?

- **House Pricing:** How will housing prices change based on improvements in Energy Performance Certificate ratings?
- **Environment:** How will an increase in energy efficiency impact emissions?

Background

What will we study?

- What is the Energy Performance Certificates (EPC)?
- When was it established?
- What is the EPC for?
- Why Wales?

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What others have found?

- Statistically significant relationship between house prices and the EPC bands (Fuerst et al., 2016).
- Decarbonisation strategies have localised consequences for the most vulnerable households (Roberts, 2020).

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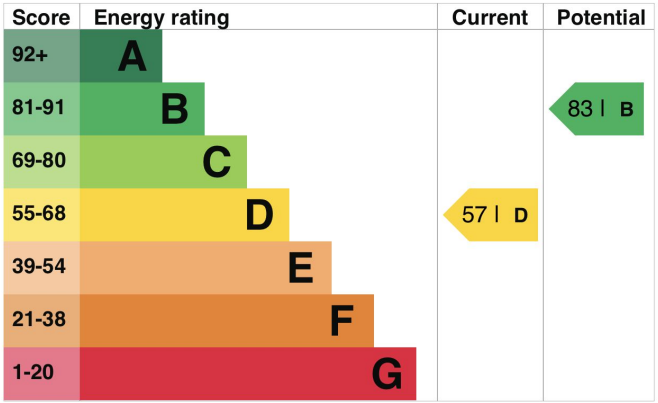
EPC rating graph



Source:
https://find-energy-certificate.digital.communities.gov.uk/energy-certificate/8947-6523-5960-5667-3902#energy

Background

What is our motivation?

- Growing concern about climate change and the effects of energy consumption in the environment.
- Validate the efficiency of an energy policy.

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What will be our contribution?

- Implement a recently released dataset in an applied analysis.
- Provide a study over time on the impact of an energy policy on a social and environmental level.
- Energy policymaking.

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Adam Dennett @adam_dennett · Feb 26

So here's something cool - our new linked house price / housing attributes dataset is now available for download from the @UKDataService - reshare.ukdataservice.ac.uk/854240/ it links several years of Land Registry Price Paid data to property attributes from Energy Performance Certificates

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Adam Dennett @adam_dennett · Feb 26

All the hard work carried out by @BINCHI16 and the result is an impressive 5,732,838 individual property transactions at address-level (with postcode & OA attached) between 2011 and 2019, linked to useful attributes like floor area and number of rooms...

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Adam Dennett @adam_dennett · Feb 26

And the full range of energy performance data such as the energy rating, glazing type, heating type etc. Nothing like this has been available for researchers before so I recommend you fill your boots!

1 1 10

Source: https://twitter.com/adam_dennett/status/1365248621420163073?s=20

Data Sources

Dataset: Residential transactions data from Land Registry Price Paid Data (PPD), representing 79% of the full market sales between 2011-2019, linked to Domestic Energy Performance Certificates (EPCs).

Data creators: Bin Chi, Adam Dennett, Thomas Oléron-Evans and Robin Morphet

Type	Variables
Identifiers	ID, postcode, LSOA
Transaction	date, price, price per sqm, inspection date
Property features	type, antiquity, floor area, number of rooms
Energy efficiency	current rating, potential rating, environment impact, CO2 emissions, lighting, heating, energy tariff, sources of energy

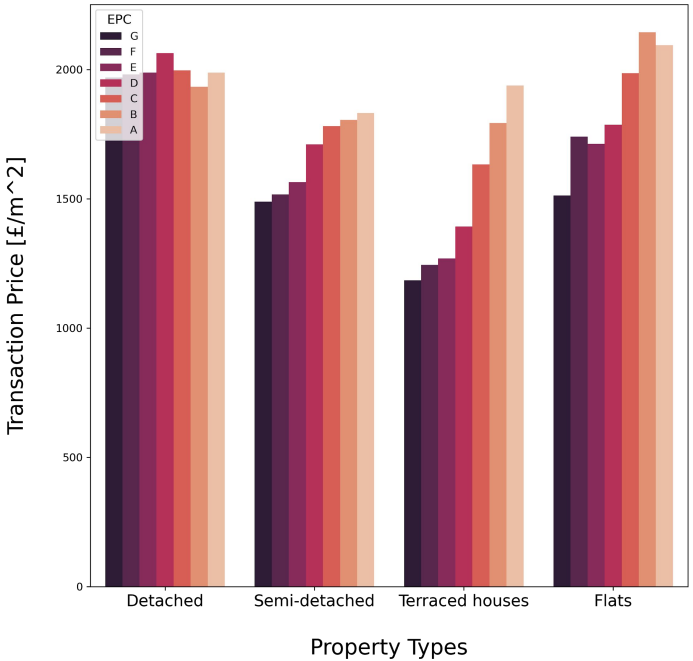
Data Sources

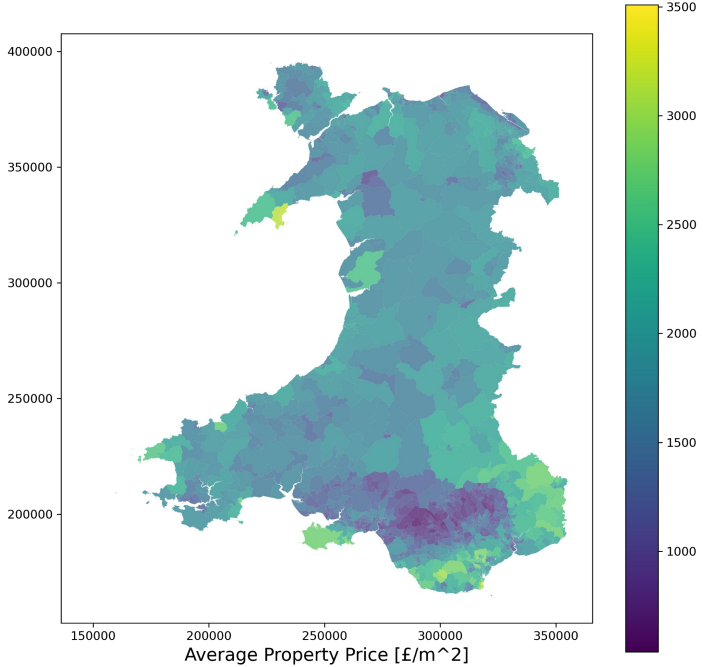
Dataset: 2019 Welsh Index of Multiple Deprivation. Identifies areas with the highest concentrations of deprivation. It is based on area and quantifies relative deprivation within Wales.

Data creators: Welsh Government

Type	Variables
Identifiers	LSOA Code, Name, Local Authority Name
Deprivation Indicators	WIMD 2019, Income, Employment, Health, Education, Access to Services, Housing, Community Safety, Physical Environment

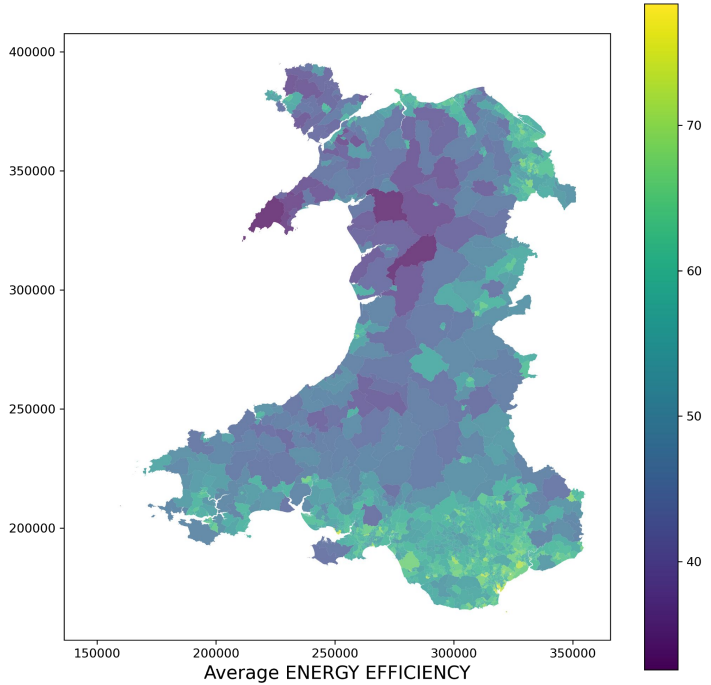
Descriptive Statistics





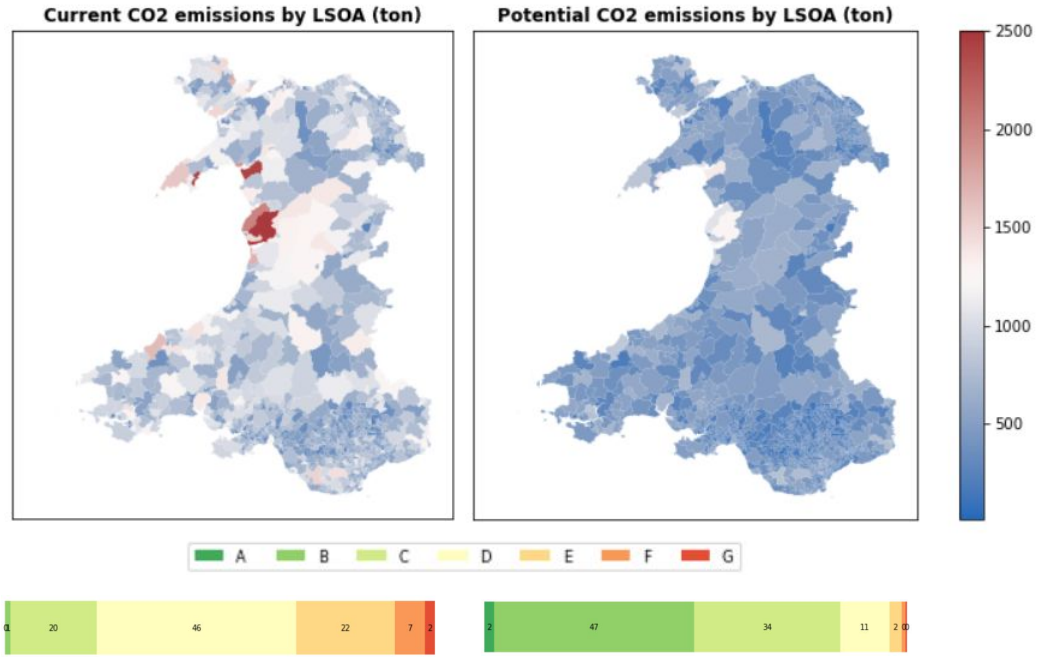
Methodology

Establish a meaningful **Multilinear Regression Model** to estimate the impact of the energy efficiency rating on the price of the property in Wales between 2011-2019, taking into account the time of the transaction and sociodemographic characteristics of the LSOAs.



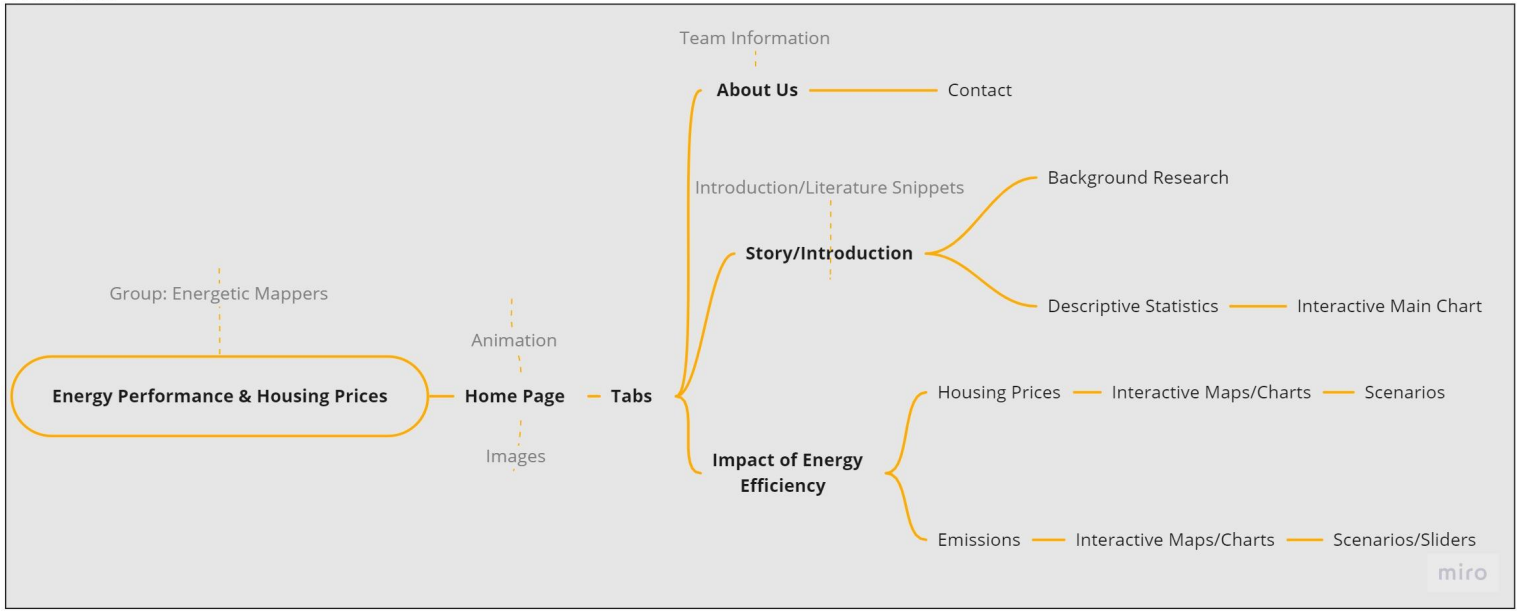
Methodology: Environment

Predict CO2 emissions according to LSOA and efficiency composition of the market. Visualize changes in the total emissions with an interactive composition of house efficiency.

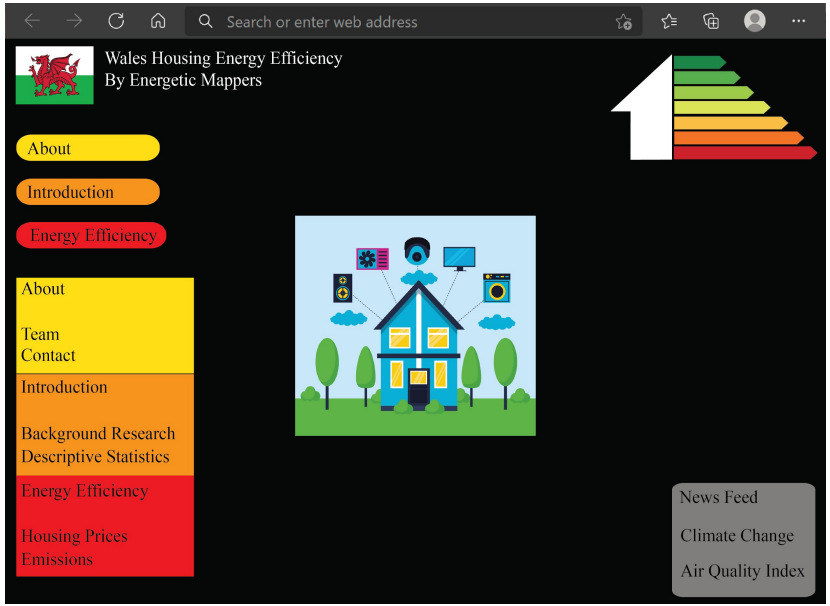


Wireframe

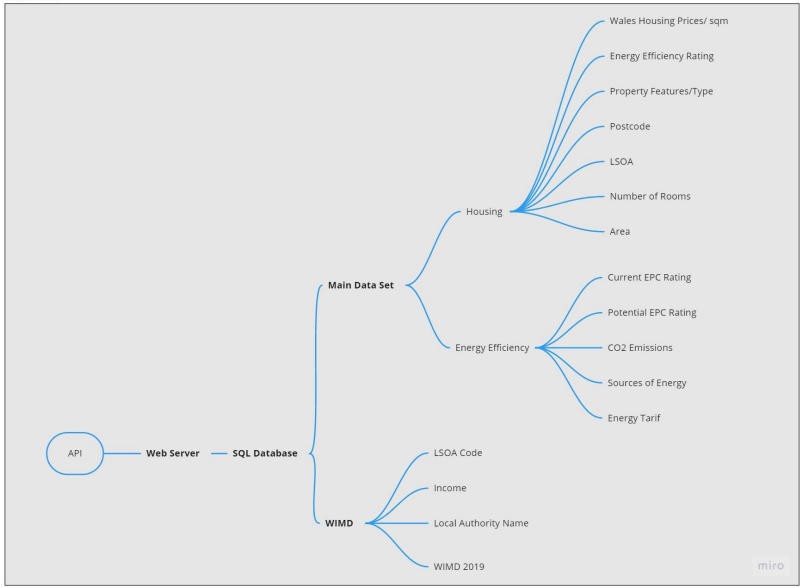
Front End



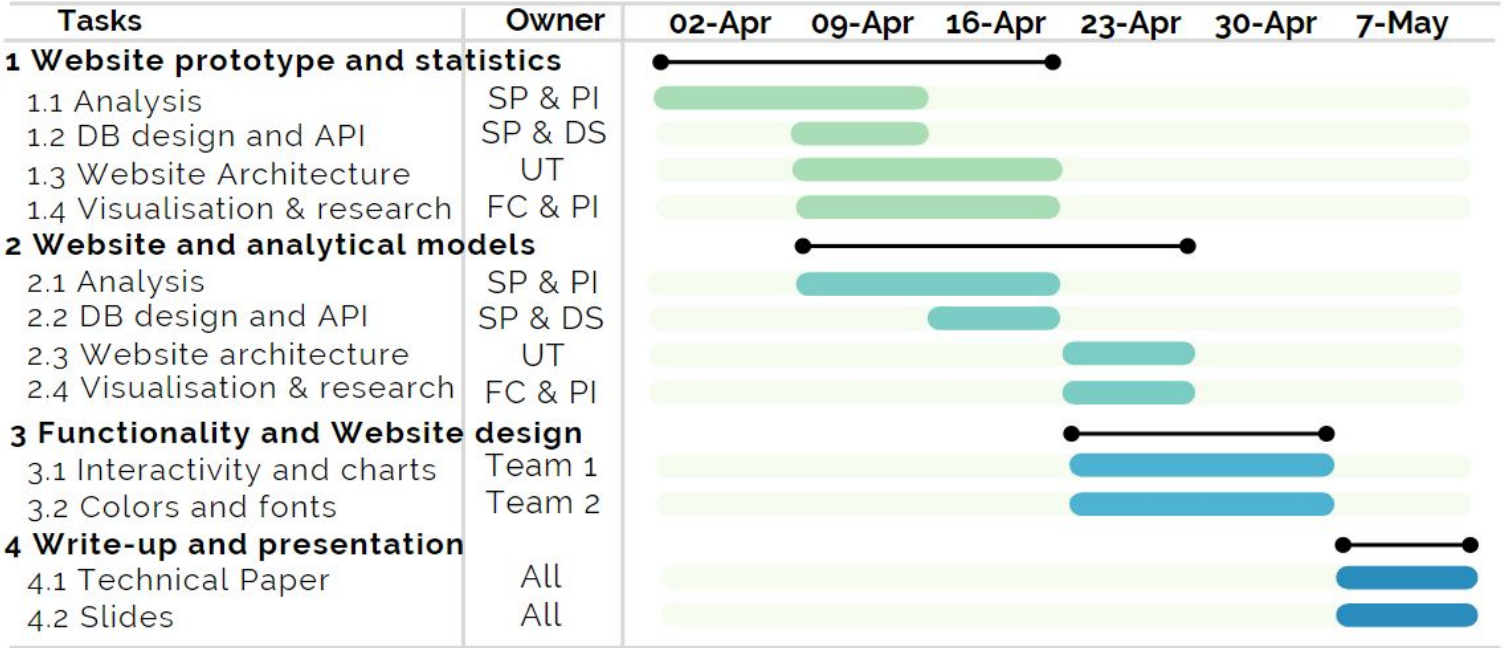
Website



Back End



Gantt Chart


Tasks
Owner
02-Apr
09-Apr
16-Apr
23-Apr
30-Apr
7-May
1 Website prototype and statistics
1.1 Analysis
SP & PI
1.2 DB design and API
SP & DS
1.3 Website Architecture
UT
1.4 Visualisation & research
FC & PI
2 Website and analytical models
2.1 Analysis
SP & PI
2.2 DB design and API
SP & DS
2.3 Website architecture
UT
2.4 Visualisation & research
FC & PI
3 Functionality and Website design
3.1 Interactivity and charts
Team 1
3.2 Colors and fonts
Team 2
4 Write-up and presentation
4.1 Technical Paper
All
4.2 Slides
All

References

Chi, B., Dennett, A., Oléron-Evans, T., Morphet, R., 2020a. A new attribute-linked residential property price dataset for England and Wales, 2011-2019. Colchester, Essex: UK Data Service.

Fuerst, F., McAllister, P., Nanda, A. and Wyatt, P. (2015). 'Does energy efficiency matter to home-buyers? An investigation of EPC ratings and transaction prices in England'. *Energy Economics*, 48, pp. 145–156. doi: 10.1016/j.eneco.2014.12.012.

Fuerst, F., McAllister, P., Nanda, A. and Wyatt, P. (2016). 'Energy performance ratings and house prices in Wales: An empirical study'. *Energy Policy*, 92, pp. 20–33. doi: 10.1016/j.enpol.2016.01.024.

Roberts, E. (2020). 'Warming with wood: Exploring the everyday heating practices of rural off-gas households in Wales'. *Energy Policy*, 142, p. 111451. doi: 10.1016/j.enpol.2020.111451.

Thank you

Appendix

Background: Energy Retrofit Programmes

Optimised Retrofit Programme

- In November 2020, Wales announced a £19.5M programme to retrofit homes for energy efficiency.
- Companies have submitted their applications for home retrofits and are in process of receiving funding for their proposals.

Costs and Benefits of Retrofits

- Retrofitting a home in the UK from EPC rating of E/F/G to D could cost £3,500, as compared to a complete house retrofit costing £70,000.
- It is estimated that an improvement of the EPC rating from E/F/G to D saves £600 in annual energy bills.

Data Sources

Dataset: 2011 Census of population and socio-demographic characteristics used to inform policy and spending decisions, identify community needs and shape local priorities

Data creators: Office for National Statistics

Fields
Population
Households
Economic activity
Qualifications
Health