

FLEXIS

SMART ENERGY FOR OUR FUTURE
YNNI CALL AR GYFER EIN DYFODOL

USING QUALITATIVE SOCIAL SCIENCE TO INVESTIGATE THE DESIRABILITY OF DECARBONISATION PATHWAYS: EVIDENCE FROM THE FLEXIS PROJECT

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FLEXIS: ENGINEERING & SOCIAL SCIENCE

- Project funded from 2016 – 2023
- 3 Welsh Universities
- Partnerships with local authorities and industry
- 8 Principal Investigators and 18 work packages



SOCIAL SCIENCE WITHIN FLEXIS



Research questions

- What **unanticipated social impacts** may decarbonization have?
- How can social intelligence from publics help **evaluate the desirability** of decarbonization pathways?
- How can **responsible development** of energy system change be undertaken?

WS1: Flexible Energy Systems & Expert Visions

- What expectations do Flexis experts have about the **possible futures** of energy transition?

WS2: System Change and Everyday Life

- How do people in communities hosting demonstration projects use energy now?
- How do energy services and infrastructures contribute to **'lives worth living'**?
- What expectations do they have about local/national/global energy futures?

WS3: Communities, Energy Controversies and Risk Governance

- What place-related concerns and sources of controversy arise in relation to the demonstration projects for energy system change?
- Can engagement with communities provide **social intelligence** to inform and guide research and commercialisation (responsible development)?

WS1: FLEXIBLE ENERGY SYSTEMS & EXPERT VISIONS

- Programme of 20 expert interviews with FLEXIS PIs and researchers, and project partners from local government, multinationals and SMEs
- Data shows experts contrasting ‘stressed’ centralized system and a more decentralized future
- Flexibility
 - Restructuring of electricity distribution networks within a national transmission system
 - Some degree of localisation of production/distribution of power and heat
- Integration
 - Multiple vectors including ammonia, H2 for energy storage
 - Heterogeneous decarbonization solutions for regional/local contexts

‘[...] part of the argument in those earlier days of the establishment of the wind electricity industry was we’re not going to cause problems with the system’

(Interviewee 20)

‘A lot of the areas in Wales [...] are at capacity so if you want to connect to the Grid you have to reinforce the Grid and that takes... it’s very difficult to get industry into parts of Wales because they can’t get the power supply.’

(Interviewee 13)

WS2: SYSTEM CHANGE AND EVERYDAY LIFE

- Study site: Caerau near Bridgend, South Wales
- Ex-mining community with high levels of deprivation, ill health, unemployment
- Minewater 'smart heating' district heating demonstrator with participation from FLEXIS WP9, connected to local windfarm
- 18 interviews, 23 participants, longitudinal approach repeating interviews every 12 months (4 rounds to date)



WS2: SYSTEM CHANGE AND EVERYDAY LIFE

- Vulnerability to lack of access to adequate energy services created by
 - Housing
 - Finances
 - Social relationships
- And by how people adapt to these conditions



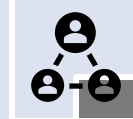
housing

- Material fabric (damp & cold)
- Inefficient heating systems



finances

- Low or unpredictable income
- Prepayment meters and higher costs



Social relationships

- Landlords (private and social)
- Caring for dependents – higher costs

'We've got no thermostats or anything, so it is purely on or off. So you either bake or you freeze'

(Debbie, 30 s, I1).

"Me asking them [social landlord] to do something is always 'no, can't do this, we haven't got enough money for that' ... [...] In the end, I said 'I've had enough. You coming out to do my walls, I've had enough, I'm phoning environmental health'"

(Amanda, 30s, I1)

WS2: SYSTEM CHANGE AND EVERYDAY LIFE

- People describe various ways of adapting to these conditions, such as
 - Careful budgeting, which in some cases is very short term, *'surviving from week to week'* (Terry, 60s, I2)
 - Trimming preferences: *'prioritising, I suppose you can say'* (Jessica, 30 s, I1)'
- Energy is a priority for many aspects of everyday life; energy system change needs also to address the conditions which make people vulnerable to energy poverty
- People are sceptical that 'smart' energy systems will help reduce costs: *'I'm the smart meter'* (Terry, 60s, I1)

'I've been there where I've got no gas and no electric and I can't wash my child and, do you know what I mean ... when there's no gas or electric, you're stuck. You've got nothing, and that's your life ... Whether it's darkness, or whether it's like at a certain of time, you know, when it's pitch black in, in the winter, and what are you gonna do then? You've got no hot water to do anything, you can't warm wash your dishes, you can't have food.'

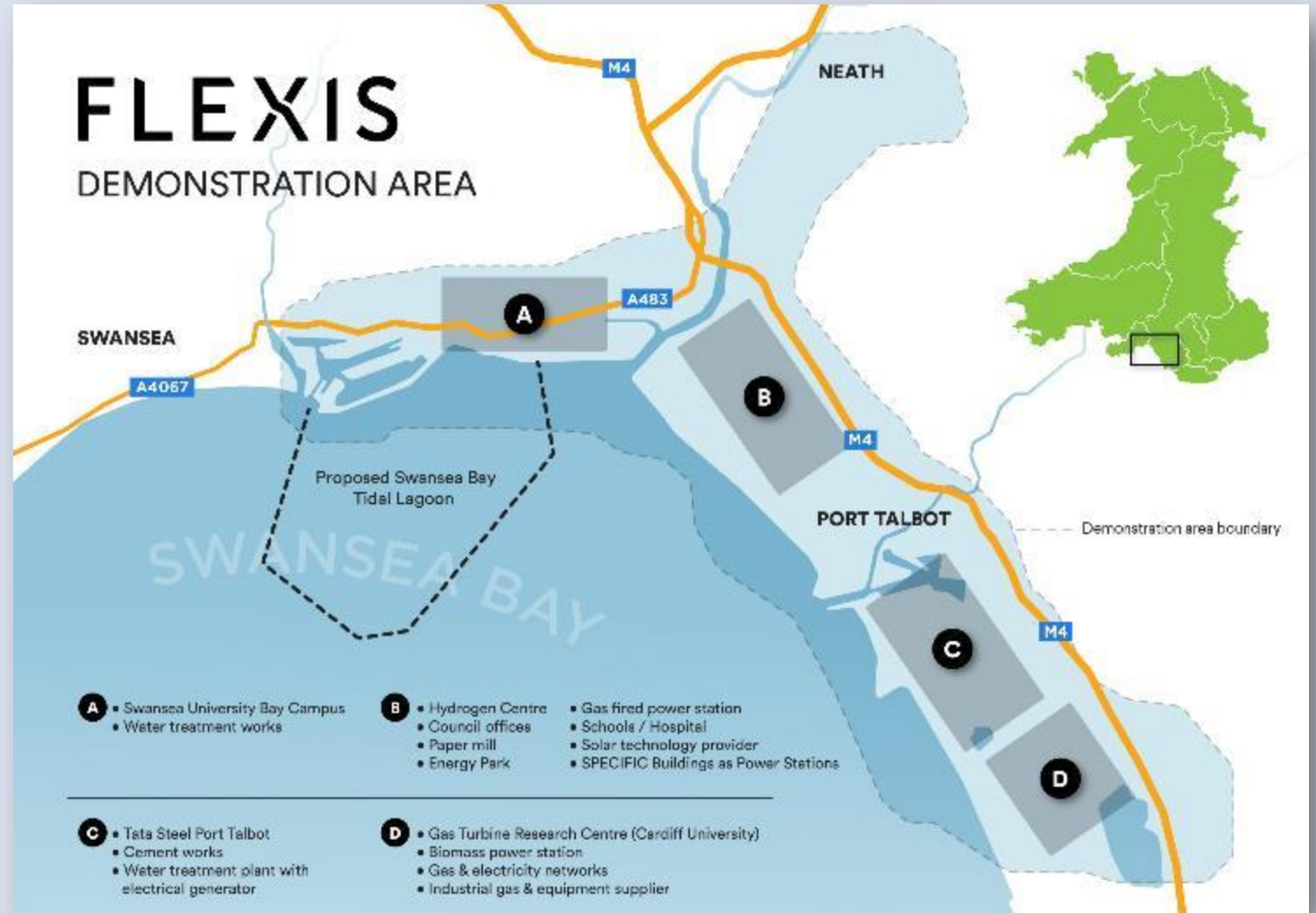
(Stacey, 30 s, I3)'

'the bills are like a brick wall[...] it doesn't matter how little income you're on, you've still got to pay your bills'.

(Terry, 60s, I2)

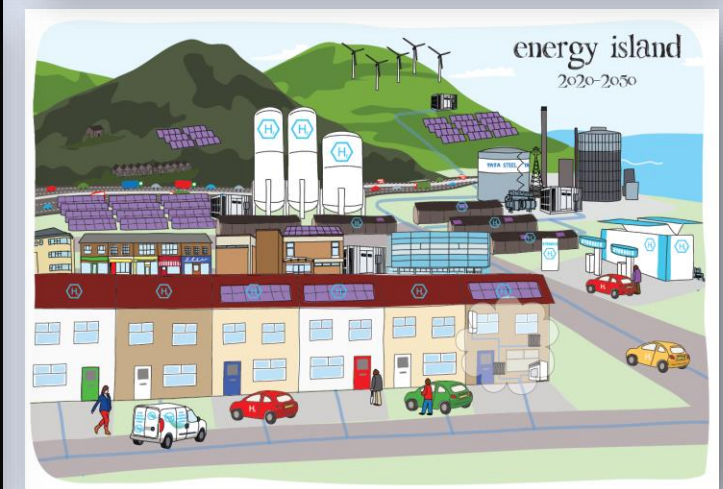
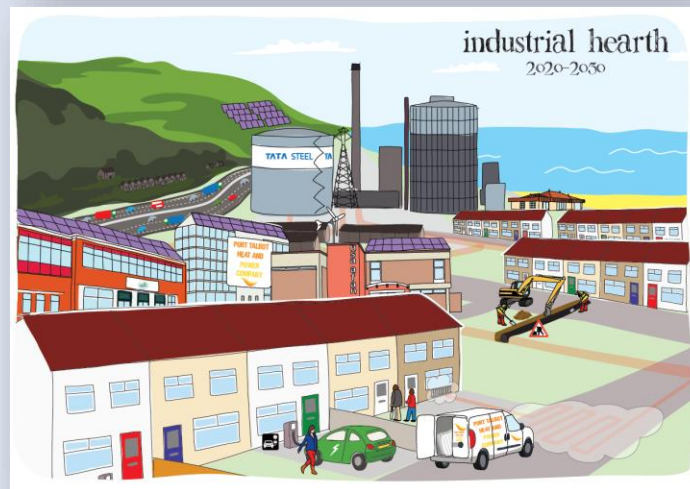
WS3: COMMUNITIES, ENERGY CONTROVERSIES AND RISK GOVERNANCE

- Focus on Port Talbot, designated as a demonstration area by FLEXIS
- 5 scenario workshops with residents, each group having a different connection to the town
- Key question: can people's local attachments and knowledge of places help anticipate impacts of decarbonization?



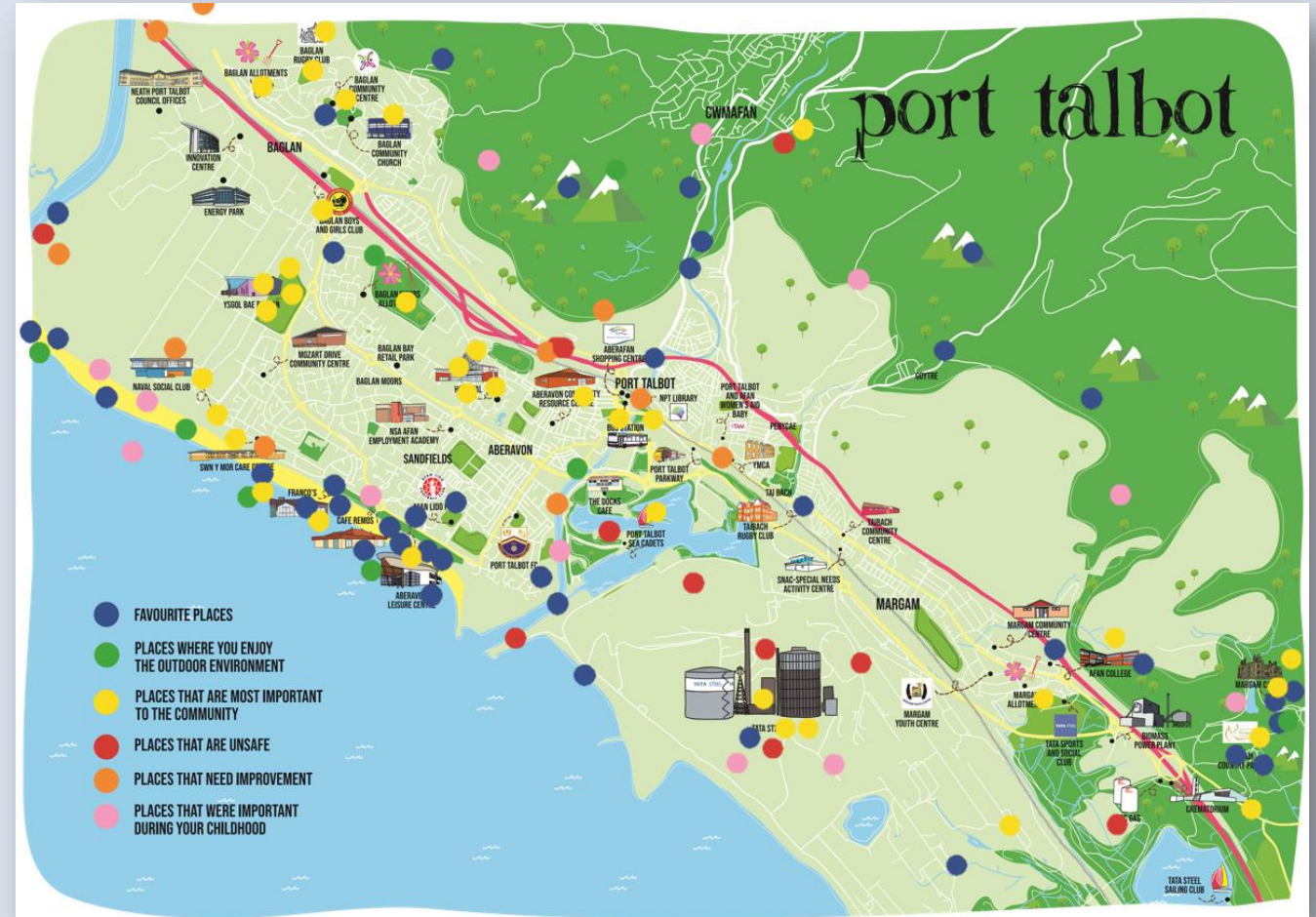
WS3: COMMUNITIES, ENERGY CONTROVERSIES AND RISK GOVERNANCE

- Expert interview data from WS1 on potential decarbonization futures used to construct scenarios
- Four pathways for local, smart energy systems (including options like peer-to-peer trading, H₂, district heating)



WS3: COMMUNITIES, ENERGY CONTROVERSIES AND RISK GOVERNANCE

- Before each workshop, interview and mapping task with each participant
- Identified areas of personal & community significance with coloured dots.
- Used to frame discussion of scenarios in workshops, positioning socio-technical change in relation to local knowledge



WS3: COMMUNITIES, ENERGY CONTROVERSIES AND RISK GOVERNANCE

Participants identified key concerns about possible social & environmental impacts but also aspirations

CONCERNS

1. Will financial costs from energy system change be levied on vulnerable households?
2. Will smart systems exacerbate energy vulnerability, due to inequalities in competencies between households?
3. Do residents want to live in an industrial town? Will decarbonization change Port Talbot's trajectory?
4. Can local institutions be trusted to realise benefits and mitigate risks?

ASPIRATIONS

1. Possible to promote locally beneficial forms of ownership and control over renewable energy resources?
2. Will environmental indicators (e.g. air quality) improve, potentially enhancing health, broader well-being and place character?
3. Can energy system change create opportunities for socio-cultural & socio-economic regeneration – e.g. linking tourism to environmental improvement, linking decarbonised energy system to Welsh socio-economic heritage.

REFLECTIONS ON THE DESIRABILITY OF DECARBONIZATION PATHWAYS

- One central message
- Understanding the significance of place and a range of social conditions can help assess
 - What trajectories for whole energy system change may be more desirable
 - How specific place-based projects may be planned to make them more desirable

REFLECTIONS ON THE DESIRABILITY OF DECARBONIZATION PATHWAYS

WHOLE SYSTEM LEVEL

- Decarbonization may result in localized systems for heat and power which are likely to vary in form across regions and localities, depending on locally available energy sources and constraints
- Smart systems may exacerbate existing socio-economic inequalities and vulnerabilities, and therefore need to take account of how people adapt to such conditions.

These findings are informing an agenda for the development of a **responsible research and innovation agenda** around energy system change (with colleagues from TU Delft and University of Leiden [Netherlands] and the University of Basel [Switzerland])

PLACE BASED PROJECTS

- Issues surrounding trust and distrust in present and future energy system actors can often be rooted in the history of particular places
- The negative and positive impacts of particular pathways for decarbonization can extend beyond energy - particularly true in the Welsh context (history of post-industrial economic deprivation), these values relate chiefly to **economic regeneration, community identity, and well-being**

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