Place-based Economic Recovery Network (PERN) Academic Steering Group[1] submission to the BEIS Select Committee call for evidence on post-pandemic economic growth

An integrated 'system of systems' place-based approach to 'building back better': Illustrated using housing retrofit schemes.

'Building back better' after the pandemic poses the challenge of how to move forward forcefully on the problems of ecological and social sustainability that constituted our pre-Covid-19 focus. This submission proposes an analytical tool for combining the logic of renewing economic growth with the need to meet climate and social-inclusion metrics. That tool, the 'system of systems' approach, has been under development over the past decade, as academics and policy-makers in (or linked to) West Yorkshire undertook projects on recycling, infrastructure, finance, circular economy, and health and well-being. These projects crossed disciplinary lines; what emerged as a shared core involves insights from the 'triple e' disciplines of economics, ecology, and engineering. Each discipline's insights about any given problem, we learned, could best be captured and put into practice by understanding the multiple - 'system of systems' – logics at work.

When the Covid-19 pandemic arrived, then, many academics in West Yorkshire universities had established working relationships, with one another and with officers in the combined authority and local authorities in the region, exploring ways of bolstering the care economy, climate preparedness, and social inclusion. Under the leadership of 'Yorkshire Universities' and the West Yorkshire Combined Authority WYCA), we created a vehicle for developing a joined-up, cross-university, cross-sector strategy for economic recovery: the 'Place-based Economics Recovery Network' (PERN).

This submission, then, introduces PERN, sets out a short description of the 'system of systems' approach, and illustrates its potential value by applying it to one possible component of a climate-friendly post-pandemic economic recovery plan: housing retrofit.

PERN, the Place-based Economic Recovery Network: PERN brings together experts from West Yorkshire Combined Authority (WYCA), Leeds City region Enterprise Partnership, 'Yorkshire Universities,' and universities within and outside of Yorkshire, with the aim of playing a key role as 'anchor institutions' in regional recovery and development.[2] The creation and mission of PERN bear directly on the Committee's call and its terms of reference.[3]

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[2] Yorkshire Universities (2020) Yorkshire's universities are crucial to the region's recovery, Yorkshire Universities, Leeds: https://yorkshireuniversities.ac.uk/2020/06/09/yorkshires-universities-are-crucial-to-the-regions-recovery/
And:
https://www.universitiesuk.ac.uk/covid19/supporting-national-effort/Pages/we-are-together- campaign.aspx

[3] Issues of 'inactivity, regional imbalances, poor productivity, declining manufacturing and slow progress on net zero …' https://committees.parliament.uk/call-for-evidence/160/postpandemic-economic-growth/

System of systems. This comprehensive, multi-dimensional approach to a policy challenge begins by bringing together a collaborative multi-disciplinary expert network; then the experts involved are asked to highlight and address gaps, tensions, and unintended consequences that may arise because of siloed or modular approaches to policy. The thinking 'across gaps' which this enables can lead to integrated governance solutions that link central, regional, and local levels.

A 'system of systems' approach is particularly appropriate to situations of flux where people are operating in contexts of uncertainty. Prior conventions are not well-adapted to a situation like the pandemic, in which there can be no 'return to normal', but what that means is itself unknown. Policy planning and implementation must go back to basics. A viable society requires an economy that provisions for its residents, providing the goods and services that secure their existence. A sustainable economy is one that makes decisions that secure this provisioning across time. Some goods and services can be exchanged through arms-length markets, but much of what we value cannot be.

In system of systems thinking, value does not fit into any quantitative scale; indeed, some qualitative aspects of value may resist quantification. So a method is needed that recognizes the validity of multiple bases of value and avoids 'lock-in' policy trajectories. A place-based approach provides a means of balancing among economic, ecological, engineering, and human values.

- Commitment to a place and its people can permit what Mariana Mazzucato has termed long-term value-creation analysis. This can, by recognizing the importance of qualitative changes, drive both synergies and better quantitative outcomes – *real* productivity gains.

Clearly, to pick up and support these synergies requires multiple metrics and innovative approaches to valuation – for example, looking more holistically at how we 'provision'. This speaks to the consensus position for reform of Green Book methodology.[4]

A more immediate example is provided by the need to avoid 'carbon lock-in' in post-pandemic economic recovery. The UK has statutory obligations to significantly reduce carbon emissions, enhance its Nationally Determined Contributions under the Paris agreement and meet its future 5-year carbon budgets overseen by the Committee on Climate Change. According to the ONS Environmental Accounts, UK emissions levels remain stubbornly high, and households are their single largest source.[5] Department for Business, Energy and Industrial Strategy (BEIS) residential category statistics confirm that, in addition to transport[6], inefficient heating and insulation deficits are a major source of emissions problems in the UK.[7] Government has recognized that both require attention and increased funding, and a place-based system of systems approach can 'build back better' by avoiding adverse lock-ins.[8]

Housing retrofitting schemes

Housing retrofitting schemes must contend with the potential gaps between stated commitment and funding scale, and between centrally-initiated funding provision and uptake at a local level. Still,

[4] See https://yorkshireuniversities.ac.uk/2020/04/20/hm-treasury-green-book-review/
[5] ONS. 2019. *UK Environmental Accounts: 2019*, London, Author; p. 4.
[6] See on Carbon 'lock-in and transport: https://www.sciencedirect.com/science/article/pii/S2214629620300633
i electric vehicle trends: https://doi.org/10.1093/cje/beaa022
[7] BEIS. 2018. *Annex: 1990–2016 UK Greenhouse Gas Emissions, Final Figures by end User*, London, Author
[8] As the Prime Minister has stated, 'we owe it to future generations to build back better and base our recovery on solid foundations, including a fairer, greener and more resilient global economy' (https://www.gov.uk/government/news/uk-pm-addresses-financing-for-development-event-via-video-28-may-2020).

as funding becomes available, a key question becomes how to engage the public to ensure best possible outcomes? Here, appropriately focused strategies can lead to local employment solutions, immediate quasi-automatic stabiliser effects for incomes (especially since previously key sectors, notably retail and hospitality, may not be able to re-absorb labour), and the acquisition of transition skills, which reduces 'scarring' and 'hysteresis' problems. Moreover, locally administered and organized schemes can create a sense of 'ownership', building on the 'we psychologies' revealed by the pandemic. If policy works toward the growth of community resilience, social and economic goals can converge with a 'levelling up' agenda. Such an approach to local economic recovery seems particularly apt prior to the delayed Glasgow COP, as it can showcase realistic, results-based 'green job-centred' and socially responsible policy.

The scope for and scale of regional retrofitting[9]

Retrofitting to reduce housing's carbon footprint can be placed in two broad categories: replacement of carbon energy with renewable energy sources and energy efficiency measures. Both are important, but the former is more complex and requires greater technological and infrastructure transformations, whilst the latter can be driven locally and addressed immediately.[10] Typical 'energy efficiency' housing retrofitting measures include loft insulation, solid wall insulation (the insulation of external and internal walls), floor insulation and glazing improvements. West Yorkshire Combined Authority's (WYCA) target is that the metropolitan county become carbon neutral by 2038. The region has a significant housing stock currently below 'C' level in the Energy Performance Certificate (EPC) scale. According to modelling done by Element Energy for WYCA, improving the energy efficiency of around 680,000 homes would provide a major contribution to WYCA's carbon target.[11] A Local Government Association report has found that 17,815 workers will be required to undertake retrofitting work in West Yorkshire. This is a conservative estimate, since it assumes a 2050 – not 2038 – net zero carbon target, and accounts only for direct employment, not employment generated in the entire retrofit chain of activity.

However:

1. **Current real employment effects**: most of the retrofitting work taking place in the Yorkshire region is currently delivered by large national building companies, working for large clients, typically local authorities or social housing providers.[12] These large companies operate through subcontracting arrangements. Typically, these national building companies choose from their own lists of pre-approved subcontractors, the vast majority of which are based *outside* the Yorkshire region. This means that although local authorities may wish to employ local firms, their use of national firms for high volume energy efficiency work does little to

[9] This section draws on the PERN webinar series, July 2020, which included presentations by 29 academic experts in economic recovery. Especially relevant here were these PERN webinars: 'Global supply network evolution and Covid-19: a paradigm shift in resilience', Gary Graham; 'Freight and logistics: towards a resilient and green recovery', Tony Whiteing; 'Regional food system resilience post Covid-19', John Lever; and 'Entrepreneurship and regional recovery - is there a silver bullet?', David Devins.

[10] A 'fabric first' approach recognises that reducing energy demand is the 'low hanging fruit' of housing retrofitting; *GM Low Carbon Retrofit*: https://www.instituteforsustainability.co.uk/uploads/File/2236_KeySummary03.pdf
Also: Stafford, A., Gorse, C., & Shao, L. (2011). *The retrofit challenge: Delivering low carbon buildings*. York: Centre for Low Carbon Futures.

[11] WYCA, July 2020: https://www.westyorks-ca.gov.uk/media/4277/west-yorkshire-carbon-emission-reduction-pathways-technical-report-draft-v7-1.pdf

[12] According to research undertaken at Sheffield University:
https://www.sheffield.ac.uk/polopoly_fs/1.119440!/file/FinalRep.pdf

stimulate local employment. Those firms based in the region that do undertake a significant level of home energy efficiency work are almost exclusively microbusinesses, working to small turnover, and usually also engaged in other types of construction activity alongside energy efficiency work. Overall, the home energy efficiency sector in the region is currently a small one, as compared to other types of building and construction work. Those that work in energy efficiency are almost all owners-workers within non-specialist microbusinesses. These microbusinesses often lose out on larger contracts, because they lack certification to prove the quality of their work. They stress that certification procedures are expensive and unwieldy. Training for energy efficiency installation is typically 'on the job' within these microbusinesses.

2. **Quality control issues**: a recent government-sponsored report states, 'Whilst the majority of installations are carried out in a professional manner and to high quality, the inappropriate and poor quality delivery of a proportion of retrofit improvements has been acknowledged for some time.'[13] This presents a problem if scaling up provision (the need to address certification, training *and* a 'performance gap' which otherwise diminishes heat saving potential of insulation measures).[14]
3. **Current real procurement/sourcing synergies**: the main materials used in housing retrofitting are polystyrene beads, polyurethane foam, spray foam, fibreglass blankets, and glass. Analysis of firms' sourcing patterns suggests the majority of these materials are currently purchased from *outside* the region, and in some cases from outside of the country, likely following supply chain priorities of larger regional or national firms. Overall, the supply chain is 'fractured', leading to inefficiencies and extra expense in procurement.[15]

And:

4. **Funding**: as yet, there have been no estimates of the costs of retrofitting 680,000 properties to EPC C standards. A conservative assumption of £5000 per household would yield a £3.4 billion cost, far outstripping resources currently available to public authorities in West Yorkshire.[16] However, linear extrapolation of costs is unlikely to be realistic, since supply chain fracture can be addressed and economies of scale can be applied, reducing unit costs.

Place-based system of systems recommendations

There are clear benefits from combining:

- An increase in public funding directed to housing retrofit.
- The adoption of bridging strategies that facilitate local uptake of available funding.
- A reassessment of regionally available training in order to support more localised employment effects – combined with direction of resources to local education institutions to support skills transitions.
- Reform of the current certification system.
- A reassessment of current contracting priorities to enhance local effects.

[13] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/578749/Each_Home_Counts__December_2016_.pdf p. 40

[14] http://eprints.whiterose.ac.uk/114101/3/8-207-17_Topouzi%20et%20al_Paper020317.pdf

[15] https://www.sheffield.ac.uk/polopoly_fs/1.119440!/file/FinalRep.pdf p. 29

[16] Note that a study conducted in the Greater Manchester region, which is similar in population size and housing characteristics to West Yorkshire, found that £12 billion was required for retrofitting spending to meet the region's previous climate targets.

- Supply-chain tracing to address procurement/sourcing issues – combined with multi-disciplinary measurement of value creation and real emissions reductions.

Current policy recognises skills and performance gaps, acknowledges growing demand for retrofitting, and places great emphasis on 'continuing professional development', with the suggestion:

> 'The number of home energy improvements and installations will help drive the availability of such courses and greater innovation in training delivery. A robust and thriving retrofit market should lead to a similarly strong training market with its own supply chain also prepared to invest in the actions that are needed.'[17]

This assumes that coherence will spontaneously emerge across several domains of action. Training in the skills required for mass retrofitting cannot realistically be undertaken by the small number of small firms already providing the training that is inadequate meet the standards required.[18] This risks perpetuating current problems. What is needed is a scaled approach to training delivery, drawing on anchor institution expertise to develop programs that combine the best retrofitting techniques with other 'spillover-ready' skillsets for the green economy. Government's proposed £2.5 billion National Skills Fund may provide much-needed resources and schools, further education colleges and universities can fill gaps, acting as hubs for training and the development of techniques required to meet the challenges of net zero by 2038.[19] A place-based approach would recognise the advantages and synergies this represents.

Bridging strategies are also important. Over the last two decades, government policies have sought to achieve uptake in available funding by appealing to individuals making 'rational choices', sometimes augmented by 'nudge' behavioural inducements. Whether this approach applies to the decision to 'invest' in insulation and other retrofitting measures is unclear. Since installing energy saving insulation in homes can save a considerable sum over the long term, the government-sponsored Green Deal programme encouraged households to use an 'Energy Efficiency Calculator'[20], which sets out how the 'investment' by a household in energy saving measures will be more than returned within a few years. But this places responsibility on the individual household to seek out information, explore the possibility and make an isolated decision with upfront costs. Yet it is areas with older housing stock, areas of deprivation, unemployment and debt-dependence that are least likely to access funding on an individual level and most likely to benefit from it (to the benefit of all in terms of carbon budget targets).

The Green Deal offered limited grants to some households, and assumed a loan system would encourage uptake. This did not occur as expected because it did not fully consider how to appropriately engage the public to ensure best possible outcomes.[21] Moreover, it seems even more unlikely in current circumstances that individual households will want to or feel they can afford to undertake this kind of 'investment'. There is, therefore, a clear mismatch between unsupported

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[17] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/578749/Each_Home_Counts__December_2016_.pdf p. 41

[18] See also PERN webinar on 'Green Innovation and Management Practices', Vania Sena.

[19] See also PERN webinars 'Creating opportunities for enterprising students', Leigh Morland and 'SMEs, scale ups and regional recovery', Sarah Underwood.

[20] https://www.gov.uk/green-deal-energy-saving-measures

[21] https://www.theguardian.com/environment/2016/apr/14/green-deal-scheme-did-not-deliver-energy-savings-audit-finds

behaviour (the isolated individual household), financing and broader collective social and economic goal achievement.

Local and regional government and third sector organizations have already looked to address the observed mismatch but what is required here are greater resources and coherence, which builds capacity.[22] Rather than leave a gap between central and local activity to be filled sporadically, it makes more sense for central government to plan and fund coordinated bridging activity. For example, with appropriate funding, postcode teams can be recruited and trained to target whole communities, adopting street-by-street strategies of persuasion that engage households on a community level, activating or reinforcing a 'we psychology'.[23] This overcomes a key context barrier: an individual calculative marginal gains approach, subject to information asymmetries and other 'transaction costs'. Local ownership of scheme administration and implementation can encourage take up and can provide a vehicle that combines opportunities for general community 'green transition' awareness and specific skills education (in the context of potential employment for locally recruited retrofitters and community organisers).[24] A shift in orientation towards community coherence can reduce the dissipation consequences for local investment and consumption multipliers that are intrinsic to current tendering and contracting procedures. The health and social benefits of reducing fuel poverty is a further consideration. However, despite new funding commitments, current infrastructure valuation models remain an impediment to more effective public initiatives.[25]

Conclusion: Provisioning sustainable places in the twenty-first century

A place-based system of systems approach works with a holistic approach to sustainable development. It is rooted in the idea that people invested in places, aided by experts in dialogue with each other and with residents, can reach fair balances among the different dimensions of value that comprise their communities' economic provisioning and social reproduction activities. This can sustain the communities that provide the fabric of national life.

APPENDIX

	Standard ('microeconomics')	Alternative ('system of systems' economics)
Wellbeing is…	One-dimensional 'subjective utility'	Multi-dimensional 'human flourishing'
Money is…	Measure of wellbeing	Not sole measure of wellbeing
Vision of…	Market allocation of scarce resources	Profit system of social provisioning

[22] See also PERN webinar 'Exploring the role of the UK public sector in supporting business start-ups and scale-ups: evidence from the Leeds City Region', Sherif Youssef. PERN webinar 'Green economic recovery, infrastructure and wellbeing: implications for decision-making', Katy Roelich.

[23] Community focused 'we psychology' approaches allow for multiple beneficial contexts. See, for example, PERN webinar 'The fifteen minute neighbourhood', Paul Chatterton.

[24] See also PERN webinar on 'Metrics for Post-Covid19 Recovery', Arpita Bhattacharjee. And PERN webinar 'Recovering towns and cities with a circular economy', Anne Velenturf.

[25] See also PERN webinar on 'Rethinking value for regional recovery', Elke Pirgmaier and Andrew Brown. 'Citizen financing' initiatives provides another funding dimension. See PERN webinar 'Financing for society', Mark Davis and Laura Cartwright.

Basic principle is…	Monetise costs and benefits to assess options	Analyse value creation and distribution to develop and assess options
Theory of change is	Static equilibrium	Dynamic process
Decision-making under…	Probabilistic risk	Fundamental uncertainty
Preferences are…	Pre-given and unchanging ('exogenous')	Shaped by, and change with, provisioning ('endogenous')
Applicable scale is…	Small-scale interventions impacting on part of system ('marginal')	Large-scale interventions impacting on system-of-systems ('non-marginal')