Rethinking value for place-based economic recovery:

A ‘System-of-systems’ approach to housing retrofit and ‘Green Book’ reform

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EXECUTIVE SUMMARY

This document constitutes a policy synthesis report on regional economic recovery that has been prepared by economists who are members of the Place-based Economic Recovery Network (PERN). PERN was created by Yorkshire Universities and the West Yorkshire Combined Authority (WYCA) in June 2020, as a vehicle for channeling West Yorkshire universities’ expertise into WYCA’s plans for leading regional economic recovery from the Covid-19 pandemic. PERN’s initial contribution was a series of 4 closed webinars featuring 28 speakers; these explored how social and economic sustainability can be built into recovery efforts.

Underlying the suggestions of many speakers was that the arrival of Covid-19 on top of the pre-existing double crises of inequality and climate change requires new approaches to planning and implementing recovery activities. Once the webinar series was over, members of PERN’s economics subgroup obtained a short-term IAA grant from the University of Leeds, enabling them to begin taking some steps toward mapping out an alternative approach.

This IAA-funded research then focused on identifying some of the core elements of that alternative, and then illustrating how this might work by using two examples: the cases of housing retrofit and of Green and Blue infrastructure valuation. The latter is of special interest as it has led to an effort to rethink the basis of economic value in infrastructure projects in the HM Treasury Green Book.

This report argues that there are two anchors of an alternative approach to economic recovery: a rethinking of the basis of economic value; and building place-based analysis and participation into the planning and implementation process.

The key step in rethinking economic value is to introduce a ‘system of system’ vision of economic and social processes, doing so by focusing on how provisioning activities in the economy fit into overall patterns of social reproduction and community building. THis approach permits economic growth to be linked to the urgent need to meet climate and social-inclusion metrics. The acknowledged need to engage in housing retrofit across the region provides a useful case example of the challenges entailed in financing and implementing forward-looking policies assisting both households and businesses.

This short-term study shows how these principles can help steer academic research for public purpose and public value. The PERN academic steering group is committed to helping academics across West Yorkshire’s universities make productive links both with policymakers and with the diverse communities they represent across the region.

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**1. INTRODUCTION**

This study explains two key building blocks required for restoring the vibrancy of British economic life after the Covid: rethinking value and strengthening the capacity for ‘place-based’ renewal. Putting these building blocks into place will require reimagining centralization and localization in economic decision-making, and seeing economic relations as inseparable from social relations in everyday life.

To explore how a place-based rethinking of value might be put into practice, the authors of this report have participated in, and learned from, the deliberations of the West Yorkshire Combined Authority and of its local authorities; they have also joined with colleagues from West Yorkshire universities – guided by Yorkshire Universities – in creating the Place-Based Economic Recovery Network (PERN). It will be useful to introduce PERN at this stage of this report, as it is an unusual, if not innovative, institutional response to the societal challenges posed by the Covid-19 pandemic.

**The Place-based Economic Recovery Network (PERN).** When the Covid-19 pandemic arrived 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). PERN brings together experts from 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]](#footnote-2) For its first activity, PERN held a series of webinars in July 2020, where 30 academic experts addressed key elements of regional economic recovery strategy feeding into the West Yorkshire economic recovery board. We are now in the process of developing ways to harness this wealth of academic expertise to further regional economic recovery. This chapter will bring out the underlying ‘system-of-system’ economic principles of value that can and do cohere multiple disciplines and approaches to economic recovery within PERN.

**The structure of this report.** The remainder of this document presents the report that members of PERN have assembled. The next section sets out the two key premises of this approach. We then go into detail on how the logic of economic recovery can be developed on the basis of these two anchoring insights. After setting out the general principles of this approach, we turn next to a case example of a localized approach – housing retrofit. Finally, we take our approach to the national level, to examine how assessments at that level can be consistent with more localized efforts. What we show there is that HM Treasury are in an advanced stage of rethinking the premises underlying the ‘Green Book’ that provides the analytical backbone for assessing infrastructure proposals. The core of this reevaluation involves rethinking the basis of economic value; and as will be seen, this rethinking is in line with some of the guiding principles suggested here.

**2. THE RATIONALE FOR A NEW APPROACH TO ECONOMIC RECOVERY**

One phrase has been used more than any other to describe how the United Kingdom can rekindle its economic growth once the grip of the Covid-19 weakens: we should ‘build back better.’ But despite being constantly repeated, it’s not clear that this is what Britain needs. For one thing, the Covid pandemic has not levelled the country’s physical plant and left a job of reconstruction behind. For another, the economy was scarcely flying along before the lockdown began: productivity was stagnant, public services were at risk, and regional inequalities were spiking. Returning the economy to its pre-Covid trajectory would, if anything, exacerbate these problems rather than addressing them. A new approach to economic well-being and prosperitys is needed, now – post-Covid, once we get there – more than ever.

Place-based strategies are the necessary first step. People are hurting and are confused. Rebuilding the economy by consulting with and relying on the voices and ideas of those who live in the diverse communities, towns, and cities of the British nation will provide everyone to share their grief over lives lost and to express what they value and want to renew as daily lives and community cash-flows begin to circulate again. Everyone has to see their losses recognized and their plans to overcome them writ into the maps of what comes next, and this can be done only by validating the voice of the everyday person.

This brings us to the second element, the need to rethink value. In the economy that has emerged over the post-war period, the location of factories, firms, commercial outlets, and jobs, as well as the price and availability of housing, has been shaped by decisions made primarily by private owners of financial and real capital. Those who inhabit places across the country have had to structure their daily routines – the commutes to work, school pickups and dropoffs, shopping trips, and so on – on the basis of where the jobs are and where they can afford to live. Those who controlling this lived infrastructure are likely to live elsewhere, and indeed to have established offshore facilities for declaring income and paying taxes.

Before the Covid pandemic, hustling to make your personal life fit the demands of your work life, then, was the priority. The importance of living places was often discounted, given that priority had to be given to linking with places that could generate the cash flows required for meeting living, commuting, and housing costs.

But Covid cast the tensions in those lives into sharp relief. We all needed health facilities and stores and ‘frontline workers’ in the places we lived; when we have lacked those, we suffered and even died. The pandemic has rebalanced the scale between economic and social life, between cash-flows and communities, in favor of the latter.

**THe origins of ‘system-of-systems’ and place-based thinking in West Yorkshire.** This report introduces key aspects of an approach for combining the logic of economic recovery with the need to meet climate and social-inclusion goals. The approach, a ‘system-of-systems’ and place-based approach, has been co-developed over the past decade, as interlinked networks of academics, policy-makers and stakeholders have undertaken projects on recycling, infrastructure, finance, circular economy, health and wellbeing. The ‘Place-based Climate Action Network’ (PCAN), and the ‘integrated Catchment Area Solutions Programme’ (iCASP) are two current examples. These projects have permitted the researchers involved to experiment, developing ideas about economic value that remain applicable when the standard equation of value with money breaks down. These experiments have shown that the way forward involves two elements: first, multi-dimensional valuation, including environmental and social metrics; second, a way of harmonizing these multiple dimensions with decision metrics that show the gains, losses, and tradeoffs involved from a 360-degree economic, social, and environmental perspective.

It is worth noting that there are close connections between this evolving system-of-system value theory and the theory of ‘public value’ that underpins Government industrial and innovation strategy (MOIIS 2019). This suggests that it should be feasible to link national and regional strategies using consistent criteria.

**3. USING THE SYSTEM-OF-SYSTEM APPROACH TO RETHINK VALUE AND SPUR REGIONAL RECOVERY**

We have noted above that one basis for seeking a new approach to the logic of regional growth and recovery is that extreme impacts of Covid-19 on local residents and businesses. A second basis, and our starting point here, is the current Government’s adoption of a ‘mission orientated’ approach to policy, and especially to industrial and innovation strategy. To take on a government mission is to aim at achieving public purpose through the creation of ‘public value’ (Mazzucato and Kattel 2019). As this section shows, ‘system-of-system’ economic principles of value relate closely to the concept of ‘public value’, and as such can steer the development of a theoretical and evidence base to support regional economic recovery. It will be useful to first contrast the standard and system-of-system valuation approaches in economics.

**The standard approach** to economic value applies when explaining what are termed ‘marginal’ changes. These are small-scale, short-run changes in value allocation, in an otherwise stable system. In such suitable cases *public value is directly proportional to money value*. Therefore, in these cases, public value can be captured money value added, and assessed through monetisation in standard cost-benefit analysis.

This coincidence of monetary value and public value is expressed in Government guidelines by labelling of cost-benefit analysis as ‘social’ cost benefit analysis. Here ‘social value’ is a synonym for ‘public value.’ Within the standard approach, economists have a distinct role, monetising costs and benefits, when working in interdisciplinary teams (e.g. with engineers, environmental scientists or health services researchers). Yorkshire academics are world leaders in health, transport and environmental economics, which are based on this standard approach.

**System-of-system economic principles and public value.** The system-of-system approach applies for cases of ‘non-marginal’ change. This means it is applicable for explaining large-scale, long-run value creation (or destruction), in a dynamic system (involving ‘feedback’). In such cases, *public value is not directly proportional to money value*. Several consequences follow:

* **Public value is multidimensional** - Public value stretches across social, environmental, health, and technical dimensions, not just financial.
* **Value creation processes have a *direction* as well as a *rate -*** For example, in recent years, the direction of growth has been towards deleterious climate change and, on some measures, increasing inequality.
* **Value creation processes and outcomes are co-shaped by the state -** For the system-of-systems approach, the rationale for Government policy is not just ‘market fixing’ (applicable only in standard approach) but what Mazzucato calls ‘market shaping,’ more broadly *shaping the processes of value creation and capture, for public purpose, via public value* *creation*.
* **Value creation processes and outcomes vary by *good or service*; by *time*; and by *place -*** Time and place-based variegation in value creation co-shapes, and is shaped by, individual systems of provision. Analyses must encompass both the whole system and each individual sub-system – that is, they must take a *system-of-systems*approach. These elements of variegation deserve some further elaboration.

***Good or service variegation***: Different kinds or categories of good or service involve different systems of value creation and capture: e.g. in health, food, water, energy, and so on. We call each a ‘**system of provision**.’ Each differentially influences the direction and rate of growth and requires bespoke theoretical and empirical analysis, combining disciplinary expertise in unique ways.

***Temporal variegation*:** There are distinct historical periods of value creation. For example, in the post-war boom finance was heavily regulated and the welfare state emerged. By contrast, the past 35 years involved financial and labour deregulation and varied outsourcing of welfare provision.

***Place-based variegation***: The changing forms of value creation are not uniform across place: e.g. there are well-known spatial variegation in welfare provision (‘welfare regimes’) and degree of labour market flexibility.

**Co-shaping regional economic recovery.** In crisis periods, then the system-of-system approach is of especial importance, as the stability required for the standard approach is disturbed, and we must reimagine future provisioning systems. It is no coincidence that West Yorkshire economists led the largest ever EU funded project across the economics and social science, in response to the last major economic crisis, that of 2007-8, drawing numerous disciplinary perspectives and stakeholder together (see [www.fessud.eu](http://www.fessud.eu)). But system-of system economics is also important in more normal times (and *vice versa*, there is a role for standard economics in crises too). What is remarkable is that West Yorkshire academics and their networks are world leading in *both* standard and system-of-systems approaches. We stand ready to support regional economic recovery via PERN. Ch.3 and Ch.4 will illustrate different applications of the system-of systems approach crucial to place-based economic recovery.

**4. 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, 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.**[[3]](#footnote-3)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.[[4]](#footnote-4) 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.[[5]](#footnote-5) 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.[[6]](#footnote-6) 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 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.’[[7]](#footnote-7) 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).[[8]](#footnote-8)
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.[[9]](#footnote-9)

And:

1. **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.[[10]](#footnote-10) 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.
* 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.’[[11]](#footnote-11)

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.[[12]](#footnote-12) 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.[[13]](#footnote-13) 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’[[14]](#footnote-14), 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.[[15]](#footnote-15) 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 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.[[16]](#footnote-16) 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’.[[17]](#footnote-17) 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).[[18]](#footnote-18) 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.[[19]](#footnote-19)

**5. GREEN BOOK REFORM: INCORPORATING THE SYSTEM-WIDE ECONOMIC, ENVIRONMENTAL AND SOCIAL VALUE OF INFRASTRUCTURE**

It is a commonplace that successful economic recovery requires an approach to economic valuation that goes beyond any unidimensional value metric (e.g. beyond GDP, beyond NPV). At the very least environmental and social value metrics must also be employed. This is not just a measurement issue – we need a *theory* of economic value that goes beyond GDP and beyond NPV, not just *metrics* that do so. We need a *theory* of how the economic system works when the standard assumptions, equating monetary value and wellbeing, break down. It may surprise the reader that current Government valuation guidelines, as contained in HMTs ‘Green Book,’ spell out the conditions under which standard (unidimensional) economic value theory breaks down. Moreover, these guidelines stress how valuation must adopt ‘system-of-system’ principles, hinting at, but not specifying, an economic theory that can operationalise systems-of-systems principles. We do not have to go far to find the requisite economic value theory: it is embodied in the Government’s adoption of industrial strategy ‘missions.’

Government industrial strategy, as Mazzucato and colleagues (2019) have stressed, employs a theory of value creation (recently advocated as ‘heterodox’ economic theory by the OECD (2020) but surely the new orthodoxy in current times) that repudiates the ivory towers economics that emerged in the ‘formalist revolution’ after the second world war. Strategic ‘missions’ take a systems-of-systems perspective on value creation, identifying the interdependencies and complementarities between, for example, public and private sector systems that enable valuable innovation. A mission orientation to value creation is precisely a system-of-systems orientation. This chapter, grounded in HMT’s Green Book fundamental principles, supplemented by the Government’s mission oriented industrial strategy, will suggest further developments of Green Book guidelines and of their practical operationalisation by public sector bodies (such as WYCA), to better capture system-wide economic, environmental and social value. The chapter will take the specific case of ‘green and blue infrastructure’ as its example, drawing from the iCASP ‘Green and Blue Infrastructure’ project.

**System-of-systems thinking in HMTs Green Book: valuing infrastructure and industry.** HM Treasury’s Green Book guides assessment of public sector policies programmes and projects, in terms of affordability, fit with strategic objectives and value for money. The Green Book is based upon the conceptual principles of ‘neoclassical welfare economics.’ These principles set out the nature and conditions of applicability of standard value theory, as taught in microeconomics textbooks. As noted above, the alternative theory required when these conditions are not met is hinted at in current Green Book guidelines, though their advocacy of system-of-systems thinking. In a range of previous research, we have developed such a ‘systems-systems’ economic theory, consonant with the theory of value creation underpinning Government’s industrial strategy ‘missions,’ and with related bodies of economic thought (including Sen’s approach). A comparison is summarised in the table below: [[20]](#footnote-20)

|  |  |  |
| --- | --- | --- |
|  | 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 |
| 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’) |

The table can be explained as follows:

Wellbeing not reducible to single dimension of money (first two rows of table):

*…Brief explanation with refs to PERN research…*

Visions and basic principle (rows 3-4):

*…Brief explanation with refers to PERN research…*

Theory of change (row 5):

*…Brief Explanation with refs to PERN research…*

Decision-making under uncertainty (row 6):

…*Brief explanation with refs to PERN research…*

Preference shaping (row 7)

*…Brief explanation with refs to PERN research…*

Scale of applicability (row 8)

… *brief explanation with refs to PERN research…*

Infrastructure typically displays characteristics that fit the ‘system-of-system’ assumptions. One example discussed in chapter 3 above is that of housing retrofitting schemes. Below, we take as an example the typical characteristics of ‘Green and Blue infrastructure’ (GBI)).

**System-of-system recommendations: the example of Green and Blue infrastructure (GBI)**

GBI centrally involves ecological-economic interdependencies that are large-scale and irreversible in nature. This makes ‘fit’ with standard value theory very difficult because the crux our comparison (see the final row of the table) is that:

* ***The principles of standard value theory are tailored for small-scale projects and impacts***, i.e. they apply for interventions that cause negligible or little ‘feedback’ from the wider system.
* ***These principles have limited applicability for valuing the system-wide impact typical of GBI.***
* ***By contrast, alternative system-of-systems principles are well-suited to valuing GBI*.**

Thus the characteristics of GBI strongly favouring a switch to alternative, system-of-systems valuation.

… explain the distinction between ‘strategic case’ and ‘economic case’ in Green Book… then..

This context informed co-development of the following recommendations and guidelines.[[21]](#footnote-21)

***RECOMMENDATION 1: Greater weight should be placed on the ‘strategic case’ of the 5 case model. Specifically,***

* ***For very large-scale GBI-related programmes the ‘strategic case’ of the 5 case model is the most appropriate, and the ‘economic case’ should not be applied.[[22]](#footnote-22)***
* ***For smaller GBI-related interventions, the strategic case should carry extra weight in the context of climate crisis***.

HM Treasury’s *Green Book* identifies correctly the ‘strategic case’ of the 5 case model as the appropriate location for ‘system-of-system’ principles (e.g. non-marginal impacts, fundamental uncertainty). In the ‘strategic case,’ limitations in GBI valuation tools and evidence matter less than in the ‘economic case’ (see our tool review). This is why our conceptual recommendations focus on the ‘strategic case’ (note that the 4 subsequent cases, including the ‘economic case,’ must be linked with the ‘strategic case’).

***RECOMMENDATION 2: System-of-system valuation principles should underpin improvements in GBI business case guidelines and developments***. ***Specifically, improvements in:***

1. ***Future development (refresh) of HMT’s guidelines for the ‘strategic case’ in 5 case model;***
2. ***Development and appraisal of the ‘strategic case’ for specific interventions involving GBI;***

For example, the system-of-systems analysis of *value creation and value capture* can aid stakeholder analysis[[23]](#footnote-23) and the system-of-systems principles of *decision-making under fundamental uncertainty* can inform deliberative procedures that have the flexibility to cope with fundamental uncertainty.[[24]](#footnote-24)

1. ***Incentivisation of GBI at the ‘strategic outline business case’ stage of regional assurance processes***

For example, our case study with WYCA aimed to change regional business case template guidelines to emphasise the strategic importance of GBI through system-of-system principles and thereby (a) help prioritise GBI at early stage of decision-making; (b) help better integrate GBI into appraisal.

1. ***Development of GBI value narratives***

In our case studies, stakeholders emphasised the importance of developing a clear, convincing and integrated narrative articulating the value of GBI. The system-of-systems approach proved helpful in narrative development for GBI. A system-of-systems value narrative aids in: developing and communicating strategic rationale; identifying key elements of the system; identifying system boundaries; stakeholder management; and integration of diverse disciplines, approaches and teams.

For example, the Kirklees A62 corridor Business Case and project was underpinned by the Green Streets systemic framework, bringing together diverse relevant teams and perspectives from very early at the strategic design stage, and meeting regularly throughout the project to foster communication, establish common goals, shared values, and organisational cohesiveness.

***RECOMMENDATION 3:* *It is preferable to develop large-scale GBI programmes, that can be valued at programme-wide scale, so avoiding project by project appraisal where the systemic GBI benefits may be missed***

For example, the OUR SPACES programme within Leeds City Council emphasised the need for a long-term GBI programme underpinned by a strategic narrative (co-developed with us) rather than a series of discrete projects.

***RECOMMENDATION 4: The importance of integrated provisioning*, avoiding silos, cannot be overemphasised**

System-of-system GBI business case valuation should be part of a broader ethos, integrating systems locally, regionally and nationally**.**[[25]](#footnote-25)

**6. CONCLUSION**

This report has summarized the academic efforts to assist in West Yorkshire economic recovery, which have resulted in the creation of PERN, and developed some ideas about a new way of approaching the next stages of economic recovery. These new ideas, drawing on both prior research activities undertaken by local researchers and HM Treasury efforts to rethink its ‘Green Book’, present an alternative to standard economic thinking. Specifically, this report has shown how system-of-system rethinking of value can underpin sustainable and place-based economic recovery, and can help to harness a wealth of academic expertise across the region for this purpose.

Systems-of-systems rethinking of economic value is not suited to an ivory-tower academic exercise. It demands place-based development and application. To this end, the report has chosen, as one case study, retrofit schemes for housing insulation, which are potentially valuable for regional renewal across economic, environmental and social dimensions. The integrated proposals for a place-based housing retrofit programme that are currently being offered draw on the systems-of-systems approach to synthesise a wide range of research from multiple disciplinary perspectives. Moving to the more general level, the report showed that a value theory rooted in systems-of-systems logic can meet the call for Government valuation guidelines and assurance procedures (especially in HM Treasury’s ‘Green Book’) that better incorporate long-run economic, environmental and social value. The ‘Green and Blue Infrastructure Business case project’ of iCASP provides an important case in point.

What are the next steps for achieving an economic recovery that prioritizes public purpose and public value, and for the Place-based Economic Recovery Network that has come together in the wake of Covid-19? Regarding the first question, much depends on the level of resources that will be made available to undertake a meaningful recovery. Our housing-retrofit case study made clear that this climate-friendly activity can be readily undertaken at a small scale, focusing on city-owned properties; achieving more extensive retrofit, with the benefits in ecological sustainability and economic inclusion that can follow, will require deeper monetary commitments by households or by the Government.

Here it is important to point out that retrofit is only one of several climate-friendly, economically-inclusive areas of investment that could be identified. This is where local voice – the ‘place-based’ component of our thinking – comes into play. Extensive consultation will be needed, not only at the regional level, but within the cities and towns within the region, in deciding what investments best meet the multiple goals (dimensions of value) that West Yorkshire residents hold dear. This idea – of decentralized choice over public investment initaitives, along with the capacity to acquire the financing needed to undertake them – is at the heart of the policy ‘devolution’ that the Government has set out as a policy imperative. How and when these economic-recovery initiatives can be launched, given the crisis that both Covid-19 and the years of macro-austerity policy have induced in core social and human services, remains to be seen.

This leads immediately to the next steps for PERN as a network of academic researchers linked into the combined authority and the local authorities in the region. The webinars sponsored by PERN, as well as reports issued recently by the Commission on a Gender Equal Economy, LSE, and other entities, have highlighted the need to avoid counterposing economic prosperity against social well-being. The economic recovery for West Yorkshire or for any other region in the nation must be built on a continuing commitment to adequate provisioning for health services and – for those who need it – income and life support. Covid-19 has, of course, put many more people and businesses at risk. THe ‘system-of-systems’ logic, providing for the multi-valuation of value, highlights precisely the need to see the social and economic situation of West Yorkshire holistically. Many possible tradeoffs may emerge; and if investment in different projects for recovery becomes feasible, the consequences of different pathways toward a socially and ecologically sustainable region will have to be assessed.

As a network that spans local universities and that can reach out to different areas of research and policy specialization, PERN should be capable of meeting the challenges of identifying both the demands, need, and capacity for alternative investments across West Yorkshire – identifying local variations and common trends; and it should be capable of bringing to bear the wide range of scientific, human, and social disciplines that will be needed. Local universities have, in the past several years, signalled the importance they place on their ‘anchor institution’ role in the city and town regions they serve. This affirmation will help provide the institutional support for the academic and professional staff engaged in this regional recovery effort. THe members of PERN can play a key role in coordinating these staffs’ efforts within their own institutions; and by working across the universities of the region, PERN can assure that one part of the region does not succeed at the expense of another – that the region as a whole can use the current crisis to move decisively toward a socially and ecologically sustainable future.

1. \* The authors are members of the economics sub-group of the Place-based Economic Recovery Network, which has been organized under the joint auspices of Yorkshire Universities and the West Yorkshire Combined Authority (WYCA). Please note that this report represents the views of the authors, and does not represent an official or unofficial statement of the West Yorkshire Combined Authority. Contact: [A.Brown@lubs.leeds.ac.uk](mailto:A.Brown@lubs.leeds.ac.uk) [↑](#footnote-ref-1)
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](https://www.universitiesuk.ac.uk/covid19/supporting-national-effort/Pages/we-are-together-%20campaign.aspx) [↑](#footnote-ref-2)
3. 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. [↑](#footnote-ref-3)
4. 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. [↑](#footnote-ref-4)
5. WYCA, July 2020: <https://www.westyorks-ca.gov.uk/media/4277/west-yorkshire-carbon-emission-reduction-pathways-technical-report-draft-v7-1.pdf> [↑](#footnote-ref-5)
6. According to research undertaken at Sheffield University: <https://www.sheffield.ac.uk/polopoly_fs/1.119440!/file/FinalRep.pdf> [↑](#footnote-ref-6)
7. <https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/578749/Each_Home_Counts__December_2016_.pdf> p. 40 [↑](#footnote-ref-7)
8. <http://eprints.whiterose.ac.uk/114101/3/8-207-17_Topouzi%20et%20al_Paper020317.pdf> [↑](#footnote-ref-8)
9. <https://www.sheffield.ac.uk/polopoly_fs/1.119440!/file/FinalRep.pdf> p. 29 [↑](#footnote-ref-9)
10. 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. [↑](#footnote-ref-10)
11. [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment  
    \_data/file/578749/Each\_Home\_Counts\_\_December\_2016\_.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/578749/Each_Home_Counts__December_2016_.pdf) p. 41 [↑](#footnote-ref-11)
12. See also PERN webinar on ‘Green Innovation and Management Practices’, Vania Sena. [↑](#footnote-ref-12)
13. See also PERN webinars ‘Creating opportunities for enterprising students’, Leigh Morland and ‘SMEs, scale ups and regional recovery’, Sarah Underwood. [↑](#footnote-ref-13)
14. <https://www.gov.uk/green-deal-energy-saving-measures> [↑](#footnote-ref-14)
15. <https://www.theguardian.com/environment/2016/apr/14/green-deal-scheme-did-not-deliver-energy-savings-audit-finds> [↑](#footnote-ref-15)
16. 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. [↑](#footnote-ref-16)
17. Community focused ‘we psychology’ approaches allow for multiple beneficial contexts. See, for example, PERN webinar ‘The fifteen minute neighbourhood’, Paul Chatterton. [↑](#footnote-ref-17)
18. 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. [↑](#footnote-ref-18)
19. 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. [↑](#footnote-ref-19)
20. The section draws form the iCASP GBI Busines case project. Elements of system-of-systems principles are drawn from HMT’s recent rewrite of its *Valuing Infrastructure Spend* guidelines; from discussions of HMT Green Book assessment of strategic ‘missions’ (e.g. Mazzucato et al. 2019); from DEFRA circular economy initiatives (e.g. DEFRA / CVORR report by Brown et al. 2020); and from the ‘new public sector economics’ in the ‘political economy’ tradition (e.g. Lind 2019). They were further co-developed with stakeholders in our case studies (see below). [↑](#footnote-ref-20)
21. These recommendations are intended to complement other GBI-related initiatives such as natural capital accounting. [↑](#footnote-ref-21)
22. In such cases, economic theory must be rigorously applied in the strategic case and must be based upon ‘system-of-systems’ value theory, not standard value theory. [↑](#footnote-ref-22)
23. The ‘CVORR’ framework details such an approach applied to waste infrastructure (Brown et al 2020 DEFRA report) [↑](#footnote-ref-23)
24. Developed for infrastructure decision-making in the MAADM project (<https://maadm.leeds.ac.uk/>). [↑](#footnote-ref-24)
25. Our case studies revealed a respect in which the current UK system is fragmented, to the detriment of GBI. Specifically, greater clarity is needed about what counts as acceptable GBI benefits in business cases across Govt. departments and over time. Without transparency and timely notification of changes then the ‘goal posts’ (categories of accepted benefits) can appear to move (change), without warning, leading to system failure. Fragmentation of ownership is likewise detrimental in the UK – we found that that publicly owned assets are crucial in enabling innovative new business models and business cases (for details on these points see our tool review). [↑](#footnote-ref-25)