

# The Green Knowledge Economy

This Brief outlines a new model for sustainable economic development that integrates two paradigms – the Knowledge Economy and the Green Economy. We refer to this model as the “Green Knowledge Economy” (GKE).

The GKE model reflects emerging UK and EU policy trends. The Coalition Government is committed to building ‘a low carbon and eco-friendly economy’ – a Green Economy. The goal of the EU 2020 Strategy is to make Europe ‘a competitive and greener knowledge-based economy’. These long-term policy directions are evident in North America and other regions of the world. Within countries, cities and regions are actively planning ahead for ‘carbon-free prosperity’, and marketing themselves to investors and citizens as ‘green cities’, ‘eco-towns’ and ‘low-carbon economic areas’.

- The first areas of the UK to adopt the GKE framework for economic development are: the Sub-Region of Bournemouth, Dorset and Poole (where a Multi Area Agreement is in place) and Taunton, the county town of Somerset. Both of these areas are located in the South West of England.

The GKE concept refers to the ‘greening’ of the *existing* economy through product and process innovations that are used to tackle climate change, reduce greenhouse gas emissions, improve resource efficiency and conserve ecosystems and biodiversity. Given the consensus definition of our *existing* economy as a Knowledge Economy (wealth creation is driven by investments in intangible capital), I coined the term ‘green knowledge economy’ to reflect the new policy directions mentioned above.

We hope this Brief will stimulate widespread interest in the GKE model of economic development.

## The GKE Policy Schema

Chart 1 gives a high level view of the policy shifts associated with ‘greening’ the

knowledge economy. These shifts can be seen as a transition towards a more sustainable model of knowledge-based economic development.

Chart 1: A Paradigm Shift

The Knowledge Economy 20C Vision	The Green Knowledge Economy 21C Vision
Competitiveness	Sustainable Development <i>economic, social and environmental</i>
Intangible Capital	Intangible, Produced and Natural Capital
Wheels and Wires (2W)	Wheels, Wires, Watts, Waste and Water (5W)
Services and High Technology <i>Financial &amp; Business Services/ICT</i>	All Sectors <i>Environmental Goods and Services/ICT</i>
Skills - Graduates	Skills – Graduates & Skilled Manual/Process Supervisory

## Setting Goals: Grow and Green

The knowledge economy agenda has centred on international competitiveness since the mid 1990s, in response to globalisation and the IT revolution. In parallel, “sustainable development” became the avowed goal of structural and spatial policies. At long last these competitiveness and sustainability agendas have converged. Governments recognise that national policies aimed at tackling climate change and encouraging the use of renewable energy will have a direct impact on competitiveness – and the economic recovery. The Green Economy can help to tackle both the economic crisis and the environmental crisis. The Coalition Government will ‘use a wide range of levers to cut carbon emissions, decarbonise the economy and support the creation of new green jobs and technologies’ (Programme for Government).

- Policy-makers must be willing to pursue an integrated approach to the environment and the economy, in measuring outputs and assessing risks and opportunities. The GKE Strategy Matrix shown in Chart 4 is a helpful tool for encouraging a more integrated approach.
- Policy-makers should set goals for the *composition* and the level of economic growth, with “a presumption in favour of sustainable development” (Coalition Government Programme). We can ‘grow’ the local economy, and rely less on the global economy, but to work more, drive less, and use renewable energy more and fossil fuels less. These substitution effects and other countless shifts in economic behaviour can be transformative, impacting on prices and wages, investment incentives and businesses and jobs. Policy-makers need to illuminate the hard and soft choices of ‘grow and green’ economic development strategies. They need to clearly spell out the opportunity costs and benefits for businesses and communities.
- Policy-makers should embed this ‘green and grow’ vision in their economic development strategies, bringing it to life through a negotiated consensus amongst stakeholders at all levels, but particularly at the local level – given the changes in

individual behaviour and in economic culture needed. The big question everyone needs to ask and answer is: how *green* do we want this place to be? Given that Britain is a mosaic of local economies characterised by different knowledge and carbon intensities, this question is bound to be answered differently around the country. Charts 2 and 3 underline this point.

## The Economic Value of Natural Capital

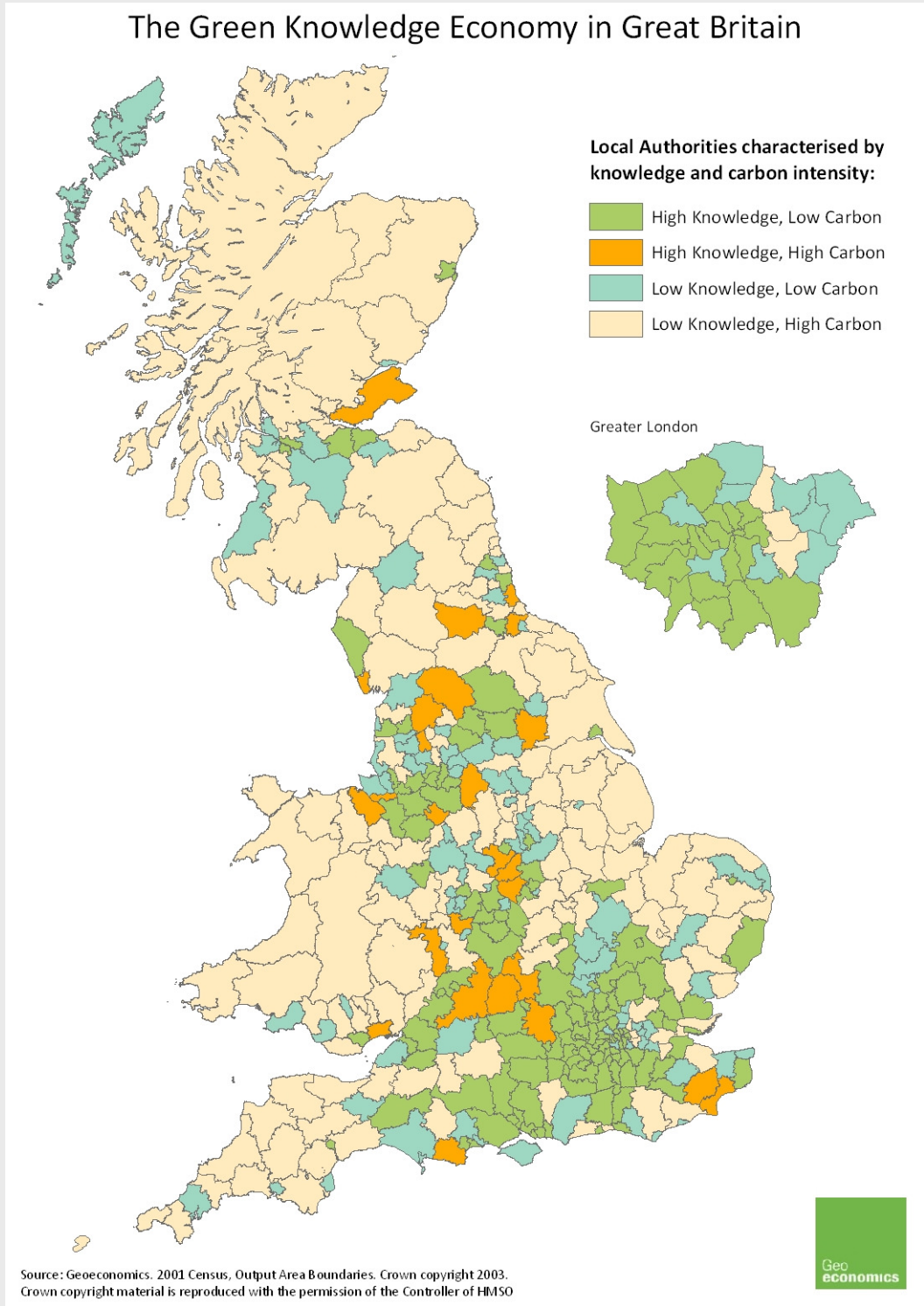
Natural capital and the environment are grossly under-valued in government economic accounts – just like intangible capital, the asset base of the Knowledge Economy. It is absurd that the two ‘model economies’ the UK and the EU are committed to building – the Knowledge Economy and the Green Economy - are apparently being constructed without proper measurement tools! We need to ‘green’ the ONS statistical accounting system as soon as possible.

The Green Economy involves putting a price on ecological systems, making markets out of Nature. At the international level, there are government and commercial pressures to assign an economic value to ‘ecosystems services’, such as the role of healthy forests in curbing global CO<sub>2</sub> emissions. The very idea of making Nature an integral sector of the national economic accounts – alongside the ‘Keynesian Trio’ of Consumption, Investment and Government - contains enough dynamite to blow traditional economics and policy into orbit!

- Policy-makers should promote applied research and place-based laboratories to systematically assess the economic value of green infrastructure and ecosystems services. Local innovation and knowledge transfer systems should be organised around university research, business practice and community participation. These natural capital partnerships are social innovations.
- Policy-makers should recognise that most of rural Britain is natural capital-rich, but rural economies are knowledge-poor and highly carbon-intensive – please see Charts 2 and 3. There is a clear and

Chart 2: The Geography of the Green Knowledge Economy (2006)

### The Green Knowledge Economy in Great Britain



The knowledge intensity of economic activity is measured by the proportion of employment in private knowledge intensive sectors. The latter are industries that satisfy two basic criteria: at least 25 per cent of the workforce must be qualified to degree level and at least 30 per cent must be employed in professional, managerial and scientific and technical occupations. Source: Annual Business Inquiry

The carbon intensity of economic activity is measured by the total emitted carbon-dioxide divided by the total Gross Value Added (GVA) of an area. Here total workplace earnings is used as a proxy for GVA. Sources: Local and Regional CO<sub>2</sub> Emissions Estimates for 2005-6 (Defra), Annual Survey of Hours and Earnings

definite need for a national rural economic development strategy based on natural capital assets and the GKE principles of 'grow and green'.

- Policy makers, at the same time, should 'grow and green' Britain's towns and cities. Urban Britain has its own natural capital endowments of fields and parks, tree-lined streets and watercourses and 'city farms' and other places of environmental learning. The GKE framework can be used to integrate the management of these environmental assets into sustainable economic development strategies.

### 5W Infrastructure and Network Marketplaces

The GKE transition is characterised by a more technologically advanced '5W' infrastructure, and the growth of high value 'network marketplaces'. 'Sleeping giants' like waste and water systems are being retrofitted and revitalised. Yesterday's 'bad neighbour' sector – waste - is today's Cinderella green industry. Waste-to-energy businesses are part of the "Industrial Biotechnology Sector". The Coalition Government is committed to promoting a huge increase in energy from waste through anaerobic digestion. Clean Energy as new technologies (solar, bio fuel, wind, wave etc) is the vast blue sky area of the Green Knowledge Economy. Intelligent Transport Systems - necessary but not sufficient for sustainable transport - continue to generate market growth in converging sectors – vehicles manufacturing, electronics, ICT, media and information services and civil engineering consultancy. Green ICT – next generation broadband and nanotechnology applications – is creating a 'pay-per revolution' in the energy sector through smart metering and feed-in tariffs. A mass market for electric cars supported by road-side charging infrastructure will help to lower the carbon-intensity of cities – although it is most needed in urban, suburban and rural areas outside of the cities (see Chart 3).

- Policy-makers should see the 5W infrastructure as dynamic 'network marketplaces' underpinned by ICT. Instead of thinking of each infrastructure separately, they should be prioritised as multi-sector clusters characterised by

blurring' market boundaries, technological innovation and long-term growth potential. Decision-makers from the 5W sectors need to be represented in all GKE-led economic development partnerships.

- Policy-makers should lever sustainable procurement in the public sector to help build critical mass in early-stage, high-risk markets – for example in clean energy and building retrofit. Local authorities, hospitals, colleges, and schools are the main customers for 5W services in most areas. Innovative sustainable procurement strategies could 'grow and green' supply chains, creating business opportunities for local SME suppliers. This would be consistent with the Coalition Government's commitment to increasing SME participation in public sector markets. There is a national sustainable procurement strategy in place – and also forward procurement programmes to stimulate innovation – but they need to be more effectively implemented. Green investment banks are also helpful in eliminating 'bottlenecks'.
- Policy-makers should implement managed telecommuting programmes – car-based commuting is the biggest emitter because it is multiplied by 250 days a year. Again this needs to be most actively pursued outside big cities - and in rural areas particularly. Public and private sector employers are already using part-time telecommuting to reduce office costs and retain staff. If we can routinely send information work to India electronically, why can't GKE Britain become a 'nation of telecommuters'? A national telecommuting policy and programme is preferable given the trans-local and trans-regional nature of car-based commuting.

### Diversifying the Economy

The recession and financial crisis have exposed the narrowness of the UK economic base. Our analysis of 1998-2008 employment and enterprise trends showed that Business Services and Public Services papered over the cracks of a credit-fuelled economy bereft of industrial diversity. By the time the recession hit we had already become a 'nation of consultants and agents' (employment, real estate and travel agents). These mainly micro-

Chart 3: Knowledge and Carbon Intensity of Local Economies by ONS Area Classification (2006)

Type of Area <sup>1</sup>	Carbon Intensity of Economic Activity (tonnes CO <sub>2</sub> per £million)	GKE Typology	% of LAs within Dominant GKE Class	Carbon Footprint (tonnes CO <sub>2</sub> per household)		
				Domestic	Road Transport	Industrial (per employee)
Centres with Industry	774.3	High Knowledge, Low Carbon	47.6	5.50	2.60	6.18
Coastal and Countryside	1483.7	Low Knowledge, High Carbon	62.2	5.59	4.87	7.71
Industrial Hinterlands	1121.5	Low Knowledge, High Carbon	34.8	5.48	3.05	8.67
London Centre	273.2	High Knowledge, Low Carbon	87.5	4.52	2.86	5.25
London Cosmopolitan	747.3	High Knowledge, Low Carbon / Low Knowledge, Low Carbon	42.9	4.92	2.86	5.69
London Suburbs	828.5	High Knowledge, Low Carbon	66.7	5.66	3.19	5.11
London Periphery	533.4	High Knowledge, Low Carbon	100	5.22	3.31	4.67
Manufacturing Towns	1262.0	Low Knowledge, High Carbon	45.2	5.89	3.51	10.04
New and Growing Towns	723.8	High Knowledge, Low Carbon	60.9	5.54	3.40	6.53
Prospering Smaller Towns	1158.1	Low Knowledge, High Carbon	42.3	6.05	5.11	7.78
Prospering Southern England	791.5	High Knowledge, Low Carbon	86.7	6.53	4.68	5.50
Regional Centres	636.5	High Knowledge, Low Carbon	63.2	5.05	2.32	5.01

<sup>1</sup> The type of area is defined using the Office of National Statistics 2001 Area Classification. The classification is used to group together areas according to key characteristics common to the population in those classes. Sources: ONS, Defra

firm and self-employed activities are ‘parked’ under “Business Services” in the Standard Industrial Classification. However a good part of these services are purchased by private individuals, so they should rightly be called “Consumer Services”. My view is that they mask the big problem facing the UK at all levels – the lack of economic diversity. (Note, for example, that more than half of London’s forecasted job growth is in Business Services – The Mayor’s Draft Economic Development Plan).

The GKE model is important and timely because it favours economic diversity. It promotes high and low technology sectors, old and new sectors, and manufacturing and services – and because of this diversity, it favours a decentralised model of ‘grow and green’ economic development. There are ubiquitous entry points to the GKE – for people wanting jobs and careers and would-be entrepreneurs – all roads don’t lead to London, or the regional capitals!

- Policy-makers should take a wide-angled view of 'green industrialisation'. Tomorrow's 'green industries' are evolving from processes of innovation and technological convergence that transcend familiar market boundaries. Green ICT and Green Finance are 'hybrid industries of the future'. Mapping and measuring the green knowledge economy will require 'lateral thinking'. Sector-based forecasts and narrowly-defined cluster policies should be set aside in favour of more appropriate research-intensive Francophone 'filiere' and commodity chain models. The latter are already used by 'green innovation' researchers.
- Policy-makers should promote *but also* recognise that the "Environmental Goods and Services" sector is the 'tip of an iceberg': below the 'water line' are qualitative changes in products and processes that are 'greening' and 'refreshing' familiar sectors of the economy – including manufacturing, construction, utilities and agriculture. Picking 'winners' and 'industries of the future' will be a hazardous and unnecessary activity. Policy-makers need to let the market pick the winners, whilst building in flexibility and room for industries and institutions to change and innovate, based on market conditions and the emergence of new technologies.
- Policy-makers should build the new GKE economy as a *decentralised* model of innovation, growth and change. Local economies should be seen as building blocks of the new economy and underpinned by appropriate governance systems. As Charts 2 and 3 clearly show, place-based assets for GKE development and also the nature and scope of the 'grow and green' challenge will vary across Britain's landscape.

### Skills and Learning

The salient characteristic of the GKE labour market is its diverse, high-to-low skills base. The 1990-2010 knowledge economy agenda emphasised the role of high skills and university graduates. The 'green collar' workforce is not elitist. The GKE model needs highly qualified environmentalists, carbon financiers and green ICT specialists – but it

also needs skilled and semi-skilled production workers to construct wind-farms, fit solar panels and work in re-fabrication and waste-to-energy plants. This reflects the GKE model's physical and virtual economic balance. Note US policy-influencer Van Jones' profile of a typical 'green collar' worker: 'a family supporting, career track job that directly contributes to preserving or enhancing environmental quality'. The GKE workforce includes 'white collar' and 'blue collar' workers. The GKE is 'open to all', which is why 'greening the economy' is important to a socially inclusive jobs recovery. It can provide job and training opportunities for young poorly qualified people who account for a big part of Britain's unemployment problem.

- Policy-makers should maintain a focus on the fundamentals of skills and workforce development because most of the skills and competences required in the GKE model are not specific to the Green Economy. There is a strong case, however, for promoting ecology (like geography) as a 'frame discipline' in the physical and human sciences. The GKE model calls for a multidisciplinary approach in research and teaching. Geoeconomics is pursuing this approach with the new Centre for the Green Knowledge Economy at Bournemouth University.
- Policy-makers need to integrate training, vocational learning and workforce development initiatives more closely into real 'grow and green' projects in the private, public and community and voluntary sectors. At all levels, the UK must invest in GKE apprenticeships, GKE work experience programmes, GKE Knowledge Transfer Partnerships and so on. The challenge policy-makers face is to generate a sufficient pool of GKE projects for new entrants to the labour market and many people who are looking to re-train or refresh their skill sets. This is where the green investment bank needs to have its greatest impact. GKE Partnerships with business employers – particularly from the 5W sectors – is essential to create a big enough project pool. Judging from our experiences in Taunton and the Bournemouth/Dorset/Poole area, the local public sector is surrounded by lots of GKE project opportunities – enough to 'fill the pool'!

Chart 4: The GKE Strategy Matrix

GREEN POLICY DRIVERS & REGULATIONS	COMPETITIVENESS DRIVERS & WEALTH CREATION							SUSTAINABILITY				
	Intangible Capital					Produced Capital		Natural Capital		Impacts		
	Human and Social Capital					Plant Buildings	Urban Land	Rural Land	Natural Resources	Economic	Environment	Social
<i>EGS = Environmental Goods &amp; Services</i>	Skills	Innovation	Enterprise	Finance	Governance	Infrastructure	Land	Land	Ecosystems	Economic	Environment	Social
<p><b>Clean Energy</b>  <i>EGS Business Growth: Solar/PV, hydro, wave &amp; tidal, biomass, wind, geothermal, renewable consulting, additional energy sources, CCS, Carbon finance, Energy Mgmt</i></p> <p>Increase carbon / GHG reduction activity (finance, solutions)                      Increase renewable energy (electricity &amp; heat) activity                      Increase energy saving activity                      Drive low carbon innovation and skills across sectors &amp; supply chains                      Promote low carbon goods &amp; services (finance, solutions)</p>												
<p><b>Green Building</b>  <i>EGS Business Growth: Building technologies</i></p> <p>Improve energy efficiency &amp; GHG of existing buildings (Retrofit)                      Achieve zero carbon targets for schools, buildings, homes and gov est                      Investment decisions based upon whole life value                      Spatial planning supports sustainable communities                      Drive sustainable design in the construction sector &amp; supply chains                      Reduce embodied carbon of materials and increase local sourcing</p>												
<p><b>Green Transport</b>  <i>EGS Business Growth: Alternative fuels, alternative fuel vehicles</i></p> <p>Reduce vehicle emissions                      Drive low carbon vehicle innovation                      Support low carbon local transport planning                      Increase walk, cycle, bus and train provision                      Increase end-of-life vehicles re-use, recycling &amp; waste reduction                      Promote managed telecommuting</p>												
<p><b>Resource Management &amp; Environmental Conservation</b>  <i>EGS Business Growth: Air pollution, Environmental consultancy, Environmental monitoring, coastal protection, Maritime Pollution control, Noise vibration, Contaminated land, Waste mgmt, Water &amp; Waste Water, recovery &amp; recycling</i></p> <p>Deliver sustainable procurement and enable growth of GKE                      Encourage pro-environmental behaviour through lifetime of project                      Encourage sustainable consumption &amp; production, e.g. eco-designed products or reduced products and waste                      Enhance and restore local land / ecosystems                      Encourage sustainable Food &amp; Farming                      Encourage sustainable water and flooding management                      Increase recycling and reduces resources into the waste stream                      Encourage climate change adaptation</p>												

Source: Geoeconomics

- Policy-makers should also pursue consumer learning initiatives that will create an information-rich environment for GKE market growth and policy development. A shift towards greener patterns of consumer behaviour is essential to building a 'zero-waste' economy – the Coalition Government's aspiration. However, it is important to recognise that re-cycling household waste is a post-consumption activity – even if it has considerable merit. Policy-makers need to get in front of consumer decisions through education and learning programmes, as well as websites and on-line information services. There is much to build upon.
- Clean Energy
- Green Buildings
- Green Transport
- Resource Management and Environmental Conservation

Obviously the Matrix will have to be up-dated to incorporate the Coalition Government's policy and regulatory measures – for example, the higher target for energy from renewable sources. The Matrix needs to be read from left to right. Policy-makers need to know how the *four green drivers* impact on the *five competitiveness drivers* of the knowledge economy – and vice versa. Where are the opportunities to 'grow and green' – the win-win situations? What impacts will projects and programmes have on *long-term wealth creation*?

As a decision-support or performance assessment tool the GKE Matrix can be applied at the programme and project levels. Geoeconomics uses separate project information forms to collect the data needed to populate the Matrix.

A final word on the map and the table we have put together in order to illustrate the GKE geography of Britain. In each area of the country, policy-makers should ask the question we raised earlier: HOW GREEN DO WE WANT THIS PLACE TO BE? And, in each area of the country, it is likely that businesses and communities will answer this question differently. Consequently, in each area of the country, the political will to innovate and change will be stronger or weaker. HOW LOCALISED DO WE WANT BRITAIN TO BE?

As Wendell Berry observes:

*If we can think locally, we will take far better care of things than we do now. The right local questions and answers will be the right global ones. The Amish question "what will this do to our community?" tends towards the right answer for the world. (Sex, Economy, Freedom & Community, 1992)*

## From Ideas to Implementation

We are extremely encouraged by the following statement that appears in the Foreword of the Coalition Government's *Our Programme for Government* report:

*We both want to build a new economy from the rubble of the old. We will support sustainable growth and enterprise, balanced across all regions and all industries, and promote the green industries that are so essential to our future.*

The statement resonates powerfully with the GKE model of economic development outlined in this Brief. The GKE model, as we have emphasized, is inclusive and decentralized. This is because greening is a physical process – it needs to happen in real places. The model gives the knowledge economy a physical shape and presence.

We need to move from ideas to implementation. The GKE Strategy Matrix shown in Chart 4 was created by Geoeconomics as a 'think and do' tool for policy-making and delivery. It reflects the conceptual GKE framework we have outlined. The Matrix shows four sets of green policy drivers:

Geoeconomics is a research and strategy consultancy which specialises in sustainable economic development as a global-local agenda for governments, businesses and third sector organisations.

Geoeconomics is developing and applying the GKE model with Professor Adrian Newton and his colleagues at the new Centre for the Green Knowledge Economy at Bournemouth University. We are looking to establish place-based GKE laboratories with local authorities and sub-national economic partnerships. Please contact [mark@geoeconomics.co.uk](mailto:mark@geoeconomics.co.uk) if you are interested in working with us.