



## Reacting to Transport and Energy Game Changers

### Game changers

There are a whole range of possible futures facing transport planners, municipalities and societies as a whole. In the past, the rise of the motor car and cheap air travel were game changers; altering the way that life is lived, municipalities are planned and governed and bringing economic, social and environmental threats and opportunities.

The energy crisis of the 1970's and increasing awareness about climate change were other game changers, and were partly responsible for the emergence of the sustainability agenda and the move away from the US suburban sprawl, predict and provide, philosophy to the greener, more energy efficient agenda that has been embraced by many countries, municipalities and organisations. It can be argued that these game changers of the 1970's and 1980's were indirectly responsible for projects such as CARE North plus!

Technology continues to advance ever more rapidly, fossil fuels are finite and production costs are rising, the World economy is increasingly globalised and prone to global shocks. In short, we just do not know what the future will bring, the nature of the next 'seismic shift' for transport and energy, and whether municipalities and organisations across Europe will be well placed to embrace and adapt to the opportunities and threats associated with that next game changer.

In reflecting these issues, the CARE-North plus project considered one potential game changer in more detail: a future fuel price shock, where fuel would rise to €5 a litre.

### Coping with Game Changers: Dynamic Modelling

A team from West Yorkshire Combined Authority were able to use their Urban Dynamic Model (UDM) to examine how a fuel price shock would impact the region. The UDM can simulate how the equilibrium of the region would be impacted by €3 and €5/litre fuel prices by modelling the complex interactions between transport, economic activity, demand for housing and land use.

The work concluded that a rise in fuel prices to €5/litre by 2026 would result in:

- A net loss of over 80,000 jobs in West Yorkshire (a 7% reduction), equivalent to a reduction of over £5bn GVA per annum
- Refocusing of economic activity and employment around Metropolitan areas – particularly the city of Leeds – at the expense peripheral, rural areas and highway-dependent localities
- 20% reduction in car trips – resulting in a 50% reduction in total car distance, and a significant increase in non-car trips
- 25% reduction in commuting distances



## Net Jobs by Zone (2026)

€5/l Test to...

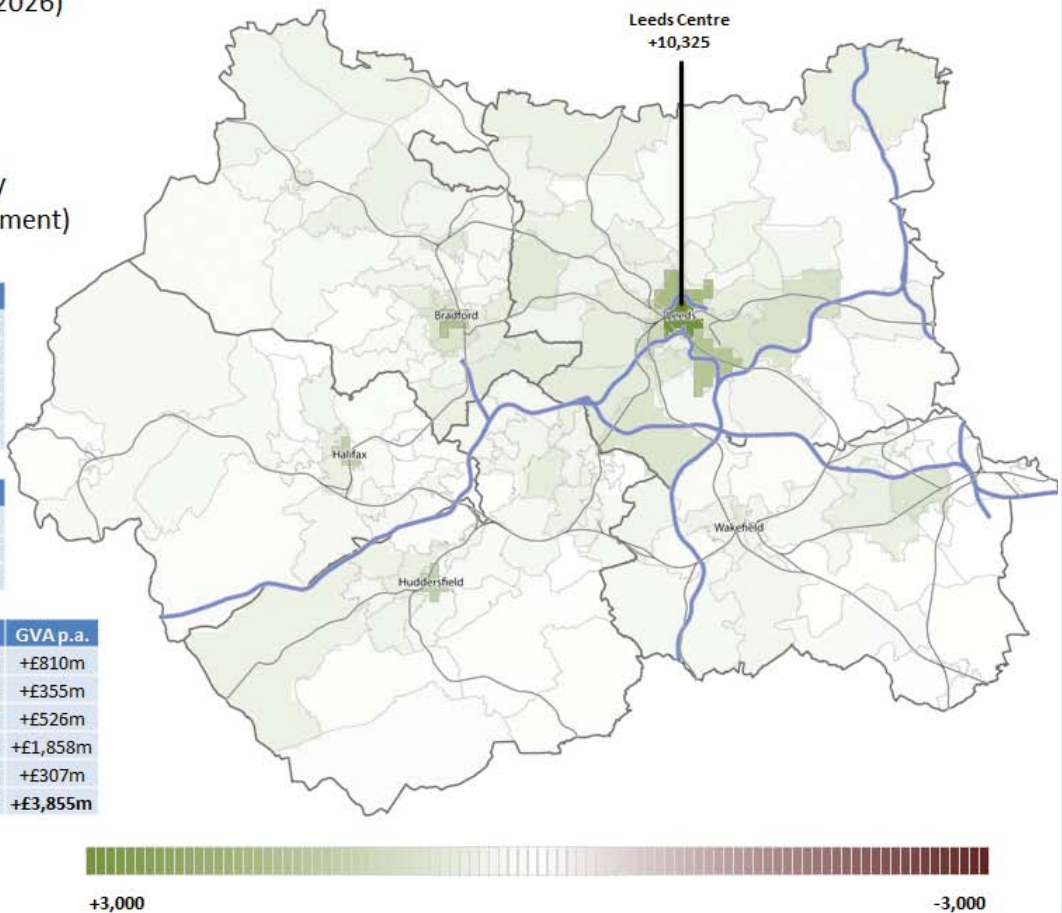
### Land Use Policy 1

+10% density globally  
(housing and employment)

Commuting	Change
Car	+27,727 +5%
Bus	+11,043 +6%
Rail	+2,257 +5%
Active	+10,528 +5%
<b>West Yorks</b>	<b>+51,555 +5%</b>

Carbon	Change
Ave Dist	-0.0km -0%
Car km	+67.8m +4%
CO <sub>2</sub>	+11.9kt +4%

Jobs	Change	GVA p.a.
Bradford	+11,911 +5%	+£810m
Calderdale	+5,081 +5%	+£355m
Kirklees	+8,226 +5%	+£526m
Leeds	+26,936 +6%	+£1,858m
Wakefield	+5,147 +4%	+£307m
<b>West Yorks</b>	<b>+57,301 +5%</b>	<b>+£3,855m</b>



In mitigating the impact of the fuel prices shocks, a number of policies and approaches were tested, and the most effective was found to be the land use test; increasing land use density by 10% for housing and employment. According to the dynamic model, this would lead to:

- Almost 60,000 jobs regained within West Yorkshire – a 5% increase from the 2026 5€/litre low.
- An increase of around £4bn GVA per annum from the 5€/litre low
- Significant employment increases in urban centres (with 10,000 jobs created in Leeds alone)
- New housing focused on metropolitan areas at the expense of rural/peripheral areas
- Increase in trips across all modes – reflecting increased employment
- No change in commuting distances over 5€/litre scenario
- Strong growth in non-car trips – particularly bus and active modes

Another test which performed strongly was the investment in transport infrastructure proposed through the West Yorkshire Transport Fund.

Interestingly, the impact of a fuel prices shock – and the most effective policies for mitigating it – were found to be those which are closely aligned to the redensification agenda that is associated with many progressive municipalities. Redensification involves avoiding further decentralisation of housing, retail and economic activity, encouraging more intensive land use and living and working at higher densities, repopulating city centres and improving accessibility by expanding public transport networks.

Redensification is regarded a logical natural response to the challenges posed by climate changes and the need to shift to non-fossil energy. While West Yorkshire would struggle to cope with the loss of jobs from the oil price shocks, some of the consequences might leave the region better placed to further embrace the low energy, low carbon, high-quality agenda and move forward.

Not all of the impacts of game changers are always negative in the long term.

## Net Jobs by Zone (2026)

Baseline to...

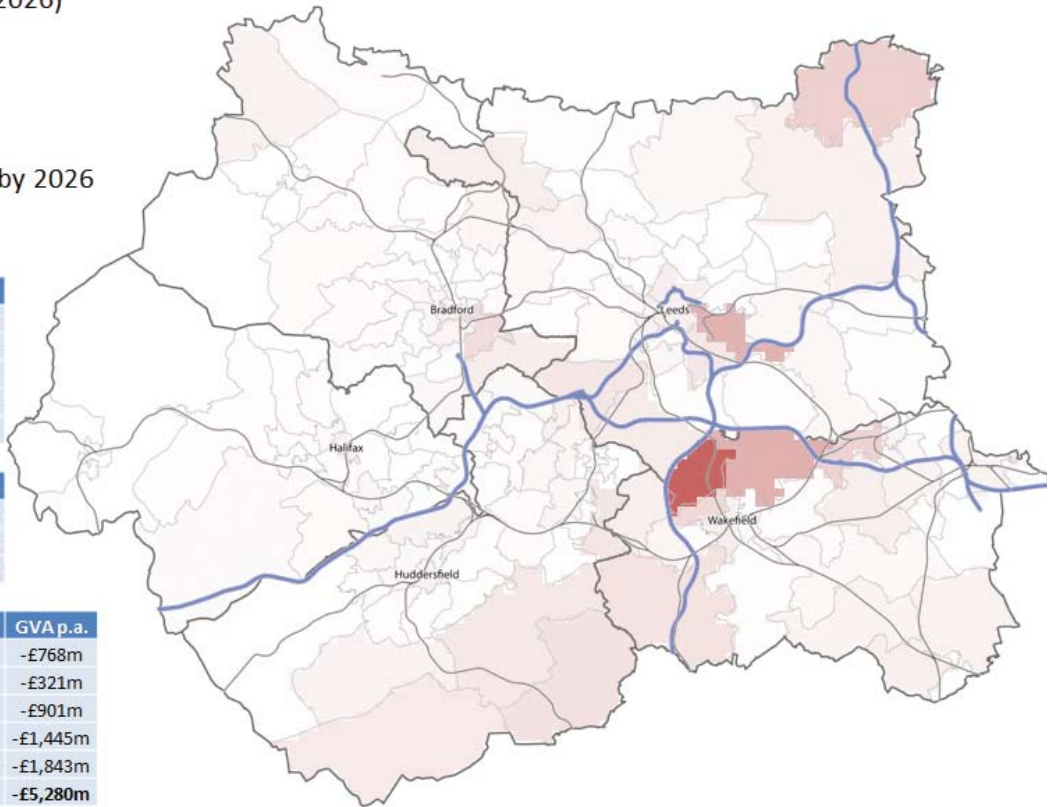
**€5/l Test**

Fuel cost rise to €5/l by 2026

Commuting	Change	
Car	-148,875	-20%
Bus	+27,195	+18%
Rail	+1,901	+4%
Active	+47,338	+30%
<b>West Yorks</b>	<b>-72,441</b>	<b>-7%</b>

Carbon	Change	
Ave Dist	-2.5km	-25%
Car km	-1,582.7m	-50%
CO <sub>2</sub>	-277.0kt	-50%

Jobs	Change	GVA p.a.
Bradford	-11,151	-5% -£768m
Calderdale	-4,842	-5% -£321m
Kirklees	-14,588	-8% -£901m
Leeds	-20,777	-4% -£1,445m
Wakefield	-30,534	-18% -£1,843m
<b>West Yorks</b>	<b>-81,892</b>	<b>-7% -£5,280m</b>



+10,000

-10,000

## Coping with Game Changers: Scenario Building

In exploring the potential impact of game changing, a scenario building workshop was organised in Aviemore, Scotland to consider the potential impact of the future fuel price shocks and price volatility with the aim of producing a range of plausible scenarios.

In seeking to produce a set of concrete scenarios for the future, the exercise proved to be difficult. Not least, because the impact of fuel prices might itself be mediated by the emergence of technological or social 'game changers' such as autonomous vehicles or the sharing economy.

We have just stated the impact of game changers can be positive. Rather than representing an emerging crisis, rising fuel prices may simply give the travelling public, planners and policy makers further encouragement to engage in and promote the kind of sustainable travel and land use behaviours that are already main stream for some progressive municipalities.



This raises some interesting issues. From our workshop, we concluded that while all transport authorities are concerned about their exposure to rising fuel prices, some municipalities wondered whether they were agile and responsive enough to take advantage of the opportunities that also accompany a game changer. These tended to be the more



progressive municipalities – with strong public sectors – who already had a competitive advantage in terms of the sustainable, low carbon, high quality of life agenda, which they rely on to attract inward investment.

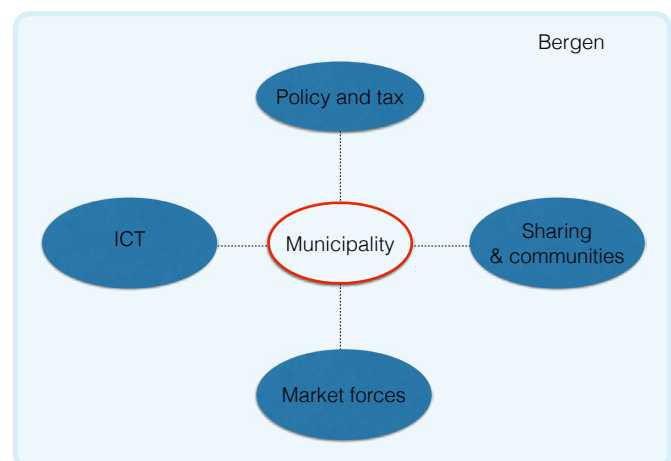
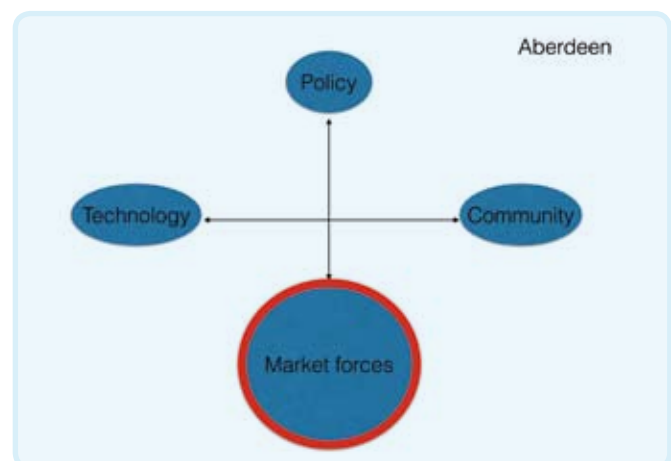
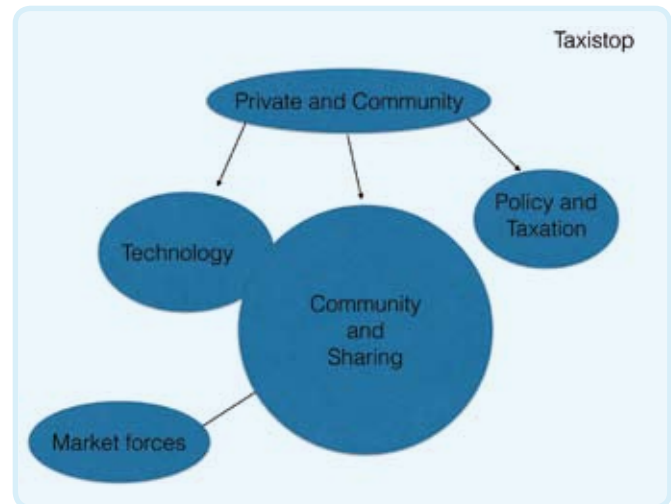
These insights are perhaps the most interesting outcome of the scenario building workshop. Partners found that there was little common ground in agreeing how municipalities and other organisation would cope with and embrace a game changer like a fuel price shock because their decision making and governance was constrained by a different combination of factors that were instrumental in driving change.

Some municipalities had strong governmental and fiscal policies, but had a less active private sector. In others, by contrast, the public sector was relatively impotent in the face of a technocratic private sector. For some organisations, the key driver was the community led, sharing economy.

Four key drivers of change were identified in Aviemore:

- Policy and legislation
- The private sector
- ICT and technology
- Community based initiatives and the sharing economy

Subsequent partner workshop sessions were organised to map out the relationship between these four drivers for each partner organisation. Interestingly, the relationship diagram produced for each partner was unique and the relationship between, and relative importance of, the four drivers differed significantly from partner to partner.



## Game changers: opportunities or threats

The methodology that we have developed to look at the impact of game changers has encouraged municipalities and other transport organisations to look deeply at their own situation, their own governance arrangements and their own institutional alignment. While they can indeed learn from other organisations and seek to import best practice, our partners have realised that each municipality or organisation will need to pinpoint its own unique pathway to a low-carbon, high quality of life; a pathway which recognises and takes account of dominant local drivers of change and key local concerns.

All municipalities and organisations are working to move up the sustainability curve towards the 2030 idyll. Some municipalities in the unaligned aspirational centre need to give priority to achieving more effective institutional alignment and governance. However, even those well aligned municipalities – who possess effective low-carbon governance structures and sit higher up the graph – have their concerns.

For example, some municipalities may be concerned that they may not be agile or reactive enough to take advantage of the opportunities provided by fast moving technological game changers (such as autonomous vehicles). Are municipalities whose people and private sectors have embraced technologies such as electric vehicles better placed to embrace autonomous vehicle technology too? And what about a high carbon municipality which possesses a well-developed sense of crises over car dependence, congestion, decentralisation and air quality? How will this act to undermine local well-being, quality of life and economic competitiveness?



Is this authority – which sits towards the bottom of the graph – better placed and more strongly motivated to make the first leap to embrace a game changer like autonomous vehicles? And if so, could it expect to fully reap the benefits in terms of increased economic activity, development of world leading knowledge and an enhanced potential to win European funding? And what, then, does that do to its relative position on the sustainability graph, the quality of life for those living in the region, and the potential to create an environment where people want to live, work, study and invest?

As such, and depending on the nature of an organisation, the next game changer could indeed represent a threat to one municipality's economic competitiveness and its low carbon, high quality of life programme, while for another it might represent a game changing opportunity.



## Main findings:

There are a whole range of possible futures and from our work we can conclude that:

- Game changers such as dramatically increasing fuel prices will affect municipalities in different ways depending on their governance structures and level of institutional alignment.
- There is no one set of responses or policies that are ideally suited to all municipalities across Europe. They are at different places on the sustainability curve, and have a different set of local drivers which constrain their decision making options.

- The methodology set out will assist municipalities in looking deeply at their own situation and their own governance arrangements and institutional alignment, and to identify their own unique pathway to a low carbon, high quality of life, future.



## Partners



## Contact

The Robert Gordon University  
Garthdee Road  
Aberdeen  
AB10 7QE  
UK

Prof. David Gray  
Phone +44 1224 263146  
E-Mail: david.gray@rgu.ac.uk

Prof. Richard Laing  
Phone +44 1224 263716  
E-Mail: r.laing@rgu.ac.uk



European Regional Development Fund  
European Territorial Cooperation 2007 – 2013

The Interreg IVB  
North Sea Region  
Programme



Project Number/Journal ID: 35-2-4-13

Project Name: CARE-North plus – Carbon responsible transport strategies for the North Sea Area – CARENorth plus

Funding Period: 2013 – 2015