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Case study

Oil depletion: What does this mean for Scottish tourism?

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Abstract

Over the next 10 years, Scottish tourism is expected to grow by 50%. One of the keys to that growth is transport which is a sector that is dependent upon oil. This paper considers oil and the global economy and its relationship to Scottish tourism. Consideration is given to the key variables such as oil forecasts, security of supply, cost of production, world demand, alternative forms of energy including renewables and nuclear power.

The combination of these facts means that high oil prices are here to stay. Two scenarios are constructed called *Energy Inflation* and *Paying for Climate Change*. These were developed using a triangulation of methods including the use of systems thinking models to construct the scenarios to computable general equilibrium modelling to analyse the impact of oil and energy price rises on Scottish tourism.

The *Energy Inflation* scenario presumes mass belief in the plenitude of available oil reserves and the failure to respond quickly enough to alter demand. This triggers a sudden and prolonged period of economic shocks, political instability and environmental disasters. The *Paying for Climate Change* scenario assumes rising energy prices, combined with conservation measures such as carbon taxes. Both scenarios raise a number of policy issues for the future including oil and fossil fuels being the main sources of energy as there is no real alternative. Renewables and nuclear power will continue to grow and countries will try to reduce further their reliance on oil. Rising oil prices are also noted as a positive feature, driving innovation and new technologies, which will become more economic as oil prices rise. For Scottish tourism, the impact of rising oil prices could mean a bumpy ride with carbon taxes, more wind farms and the possible end of the low cost carrier.

Keywords: Energy; Oil; Scotland; Tourism; Scenario planning; Computable general equilibrium modelling

1. Oil and tourism

Tourism by its very nature entails the movement of tourists from their source to the destination. Tourism and the industries that support it are therefore reliant on mobility, transport, and ultimately because of the heavy reliance on air and car transport, on oil as a fuel source. The majority of tourism trips that are undertaken worldwide entail the use of oil at some point, and many of these trips could not be undertaken by using alternative fuel sources, such as electricity derived from renewable power sources, with current technologies. There are means, however, for tourists to switch away from oil, and in the event of extreme oil price rises it would be inevitable that some would take this course of action. Over the course of 15 years or more, there may be increased use of non-oil-based transport systems that exist today (such as electric

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railways and cars) and of non-oil-based electricity generation. Tourists may travel shorter distances, using lower-cost transport that may for example be more time consuming, and they may stay longer at their destination (perhaps taking one longer holiday instead of two shorter ones; or combining business trips to avoid making the same journey more than once on different occasions). Despite the possibility of shifting demand away from oil-based transport, it would however be inevitable that higher oil prices would feed through to make tourism trips more expensive overall, and lead to reduced tourism demand at the global level.

2. Oil depilation: what does it mean for Scottish tourism?

Scottish tourism over the next 10 years is expected to grow by 50%. One of the keys to that growth is transport (Yeoman & Lederer, 2005), a sector that is dependent upon oil. It is the low cost model of the budget carrier which is driving the growth of Scottish tourism. But with the price of oil presently at over $60+ a barrel and some commentators forecasting this to go even higher in 2007 (Fenton, 2005), oil has become once again an important issue. Goldman Sach's is forecasting a $100 oil spike with a dramatic impact on the economy (Anon, 2005). Where is the price of oil going and what does this mean for tourism? The purpose of this paper is to analyse the long-term effects of changes to oil and energy prices on Scottish tourism. In order to do that this paper considers the global economic and geopolitical background, the economic impact of oil and energy prices, the economic impact of policy interventions such as carbon taxation, short-term impacts on Scottish tourism and long-term implications on policy. As such, this paper is not concerned with the wider environmental footprint as examined by a number of influential authors in this field (Gossling, Borgstrom Hanson, Horstmeier, & Saggel, 2002; Olsthoorn, 2001) as climate change and sustainability is a complex subject which is beyond the scope of this paper. However, for a detailed analysis of climate change and its impact on Scottish tourism, readers are referred to the forthcoming paper by Yeoman and McMahon-Beattie (2006).

3. The global economy and oil

Research by the United Nations World Tourism Organisation (UN-WTO) (2006) examining the impact of rising oil prices on international tourism concludes that at present there has been no impact on international tourism like previous shocks in the 1970s. However, the UN-WTO did not look at the long-term consequences, and this is the purpose of this paper.

Oil prices have become big news; prices have risen rapidly in the last twelve months, peaking at their early 1980s levels. According to Fenton (2005), the Royal Bank of Scotland concludes that previous episodes of rapid oil price inflation in 1974, 1979 and 1990 preceded global recession. Furthermore, the UK economy's two worst episodes of post-war inflation (when it averaged 26% in 1975 and 22% in 1980) both followed oil price shocks. Stagflation (weak output growth combined with rapid inflation) is a particularly economic problem and one to be avoided if at all possible. Fenton's analysis suggests that if oil prices were to rise to $80 per barrel and remain there until 2007, the impact would be serious but not catastrophic. However, in the short term, consumer-facing industries such as tourism would see significant reduction in discretionary spending. In the longer term, structural changes to the transport sector would impact upon tourism due to the viability of the low-cost carrier model. Against this background, it is very important to understand the impact of such changes and the underlying causes.

With West Texas Intermediate Crude Oil hovering at $60 a barrel, the tourism industry is seeing a series of energy surcharges being added to the price of air tickets and business complaining that oil is driving up costs (Sorid, 2005). In 1956 (Gresser & Cusumano, 2005), the Shell Oil geologist, M King Hubbert, predicted that US oil production (barrels pumped per year) would peak in the early 1970s. Most geologists at the time rejected Hubbert's analysis until 1970 when oil production peaked in the USA (except Alaska). Since then, numerous respected geologists have refined Hubbert's methodology and applied it to worldwide oil production, country by country. They concluded that world production of oil will peak between 2004 and 2008 (today's time zone). Most geologists estimate that 2 trillion barrels of oil were formed in the earth over millions of years. To date we have pumped out half of this supply. British Petroleum (BP) predicts there are 40 years left of oil supplies. But the implications of this forecast are not straightforward. As world demand grows and supply diminishes, prices will soar.

The oil shocks between 1973 and 1990 demonstrated the economic effects on international tourism. The oil price rose dramatically, but then declined over time. The response by consumers was shown to be the same in each situation. The increases in the oil price did not have a direct impact on international tourism revenue. The indirect impact was felt in each case as economic growth rates faltered through inflationary effect of energy prices. Declining consumer spends adversely affected tourism demand resulting in slow or negative growth in international tourism (UN-WTO, 2006).

In 2006, oil supplies 40% of the worlds energy needs and 90% of transportation requirements. Global economic growth of over the next 15 years will increase petroleum's share of energy generation to 60%, with most of the demand coming from the transportation and tourism sector. For example, the UN-WTO is forecasting international arrivals to grow to 1 billion in 2010 and 1.6 billion in 2015 (Yeoman, Munro, & McMahon-Beattie, 2006). Much of this growth is fuelled by the desire for faraway destinations, growing consumer wealth and the affordability of travel, driven by the low cost airlines. With

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emerging economies of the world, such as India and China, growing at 10% per annum, the pressure and need for energy sources will intensify (International Energy Agency, 2004; Sommer, 2005).

The world is a lot more uncertain than the 1970s. Terrorism is a bigger threat to oil suppliers than it was then (Adams, 2002; Yeoman et al., 2005a, b). Combined with the fact that nations like the United States, Norway, China and Nigeria will not be oil-producing nations in 2020, this means that by 2020, 80% of the global oil reserves will be the control of Middle Eastern countries.

But it is not all doom and gloom (Anon, 2000). There are good reasons to believe that the economic consequences of a jump in oil prices will be less severe now than they were in the 1970s. Energy conservation is stronger than in the 1970s, due to government taxation policies. Additionally, a shift to other fuels and a decline in heavy industries have made rich economies much less dependent on oil than they used to be. Since the early 1970s, the amount of oil consumed per real dollar has fallen by almost half in rich countries.

Not all of the rise in energy prices is about oil. It is also about gas. UK consumers have been experiencing rapid increases in energy prices since late 2003. Many consumers saw household energy prices rise between 14% and 24% in 2006. The cause has been an unprecedented increase in the wholesale price of gas paid by UK suppliers (Energy Watch, 2005) as:

- North Sea gas suppliers have declined.
- European suppliers link gas prices to oil, which has had a knock-on effect to UK import prices.
- Import and storage capacity in the UK has not increased in line with declining North Sea production.
- There is a lack of infrastructure and storage facilities.
- 40% of the UK electricity production comes from gas, leading to further consumer energy price increases (Ofgem, 2005).

On the oil capacity side, the lack of investment in additional refinery capacity to meet rises in world demand, the operating costs of ageing infrastructure and disasters such as the Bruncefield fire (BBC, 2005a) and Hurricane Katrina (BBC, 2005b), impacts on oil prices. Historically, oil finds have been described as large and frequent; however future finds will be described as smaller and difficult to extract (Wilkinson, 2006), all contributing towards the future costs of production.

4. Is there an alternative?

The most logical way to anticipate and mitigate this risk would be to implement a 'quantum leap' jump into energy conservation, hydrogen development and alternative forms of fuel. But alternative energy polices are not easy to implement. For example, the present opposition to wind farms, not just in Scotland but across the world from consumers, is gathering pace. Residents in New England are complaining about the wind farms spoiling their view from Cape Cod. Wind farms are a political issue that is transforming local politics to the extent that political parties have to take sides.

The much talked about hydrogen economy is still in its infancy. Hydrogen is an industrial gas commonly used in the chemical and other industries and is an essential element in the fuel processing industries. Interest in hydrogen as an energy source stems from energy and environmental concerns including climate change, air quality, noise pollution, security of energy supply and advances in fuel cell technology. In 2001 the European Commission awarded €18.5 million to nine cities as part of the Clean Urban Transport for Europe demonstration project to encourage the use of hydrogen zero emission fuel cells in public transport systems (Environmental News Service, 2001). Hydrogen can be stored and transported by road, rail, sea, or pipeline. To refuel vehicles, new dispensing technology will be required and appropriate adaptation in consumer behaviour and knowledge will be necessary. Indeed, BMW have already developed a group of demonstration vehicles burning hydrogen in an internal combustion engine. However, in the car industry, mass marketing is unlikely to occur before 2015.

In order to advance the hydrogen economy there will be a need to move beyond incremental advances. Furthermore, the transition to hydrogen will necessitate major infrastructure development that will be far from straightforward, given that much of the existing oil infrastructure was developed by public bodies or monopolies (Crabtree, Dreiselhaus, & Buchanan, 2004). Operational demonstration, cost reduction and rapid infrastructure transition will potentially frustrate full development of the hydrogen economy in the medium term.

Whilst the future of hydrogen appears far from certain the re-emergence of nuclear power, following the labour party's re-election in the UK, is now more than mere debate and hypothesis. Gordon Campbell (Chairman of British Nuclear Fuels) has publicly stated that a new Labour government will build a new generation of nuclear power stations (Chittenden, 2005). The Labour Party has set a target for 2020 of reducing carbon dioxide emissions by 20%. About a third of all emissions come from power stations burning fossil fuels. Britain's twelve emission-free nuclear power stations provide 23% of the nation's electricity, but they create radioactive waste which is expensive to store and process. Yet informed opinion within the industry remains convinced of the centrality of nuclear power as a key element of energy policy (Chittenden, 2005).

Finally, high oil prices over the next ten years maybe a positive feature. According to Spencer Reiss (see Box 1), writing in *Wired,* high oil prices could subsidise research into new technologies which could result in fresh-frozen natural gas buried in the Artic permafrost and under sea beds being extracted. According to Reiss, Alan Greenspan

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Box 1
Why high oil prices are a good thing

As oil prices rise—new technologies will emerge
Adapted from Spencer Reiss, Wired—December 2005

As the price of oil rises, it becomes economic for once seemingly expensive alternatives to become profitable alternatives. So let's looks at a future price range …

When the long term price of oil is $50–70 a barrel, the economic alternatives are …

Ultradeep offshore wells
Futuristic gear for tapping formerly inaccessible deposits

Gas to liquid
Natural gas converted into diesel fuel

Tar Sands
A sludgy melange of petroleum gravel

Digital oil fields
Networked drilling rigs and remote-controlled wells

At $60–80
Natural gas
Conventional compressed methane—clean, efficient and explosive

Coal to liquid
An abundant energy source resource transformed into diesel

Bio diesel
Vegetable oil press from soybeans and palm

Ethanol
Gasoline-compatible alcohol fermented from corn, sugar, and cellulose

At $80–120

Methane hydrates
A crystal amalgam of methane and frozen water

Hydrogen
The most common element in the universe, and a super clean energy source

Plug-in hybrids
Grid electrons propelling cars for short trips

Oil shale
High-grade petroleum melted out of sedimentary rock

noted that the US had methane reserves estimated at 200 quad trillion cubic feet—33 times the global reserves of natural gas. As yet, no one has developed a technology to exploit them. For transportation, a more readily accessible alternative hydrocarbon resource is Tar Sand. Tar sand or oil sand is a combination of clay, sand, water and bitumen. Whereas conventional oil is extracted by drilling wells, tar sand is mined using strip-mining techniques. Tar Sand has recently been judged a "proven resource", or economically extractable under current technology (Government of Alberta, 2004).

5. Sustainability and paying for it

In 1997, 160 nations met in Kyoto, Japan to negotiate binding limitations on greenhouse gases for developing nations, pursuant to the objectives of the framework convention on climate change of 1992. The outcome was the Kyoto Protocol in which the developed nations agreed to limit emissions relative to levels emitted in 1990 (Energy Information Administration, 2002).

It is interesting that, with the exception of the energy industry, travel and tourism is one of the industries that

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inflict the greatest damage to the environment. Indeed environmentalists highlight airlines as one of the worst polluting forms of transport with over 16,000 commercial jets producing more than 600 million tonnes of carbon dioxide each year. The intra-EU tourism transport alone contributes 11% of all greenhouse gas emissions in the EU (in 2000) which will rise to 18% (by 2020) (Peeters, 2000). The UN Intergovernmental panel on climate change estimates aviation causes 3.5% of man-made global warming and that figure could rise to 15% by 2050 (Reuters, 2004). Yet, at the third session of the Kyoto agreement, international aviation emissions were not included in the agreed targets because of the difficulties that had arisen over methodologies for allocating emissions. Yet, despite improvements in fuel economy and efficiency, emissions continue to grow. Sir David King (The UK Government's Chief Scientific Advisor in 2005) indicated that air transport's radiative facility does probably three times more damage to the atmosphere than carbon emissions. Furthermore, short-haul flights are the most damaging according to the Royal Commission for Environmental Pollution (Hall, 2004). The European airline industry has set a target of 50% reduction in emissions per passenger kilometre by the year 2020, with 2000 as the benchmark year. Cleaner, more efficient engines will produce a 20% reduction but the remaining 30%—more than half the total figure—is uncertain (Millar, 2005). Hydrogen fuel cells are not a feasible option in air transport in the near to medium future, as the research is still in its infancy. For example, AeroVironment (Black, 2005) has just tested the first unmanned flight using liquid hydrogen. However, there is a technological gap between this technology and the new Rolls Royce Trent 9000 engine which powers the Airbus A380.

Whilst much debate continues on introducing aviation fuel tax as an emissions trading scheme for airlines it must be borne in mind that, for many developing nations, reliance on the benefits derived from tourism are considerable. Cheap airfares, thanks to the success of budget carriers, are appearing throughout the developing world, leading to increases in passenger volumes (Energy Information Administration, 2002). The UN-WTO has stated that, unless some form of control is instituted, the growth in tourism forecast will have significant and highly detrimental effects on the environment (Todd, 2003).

6. Research methodology

6.1. Scenario planning

VisitScotland is the national tourism organisation for Scotland. Its vision is to be the world's best tourism organisation. This means that the approach adopted for strategic planning is proactive and futures based. It is the only tourism organisation in the world with an in-house and comprehensive scenario planning function (Yeoman and McMahon-Beattie, 2005).

So what are scenarios and scenario planning? There is no single, universal definition of either. For example, Michael Porter (1985) talks about scenarios as an 'internally consistent view of what the future might turn out to be', whereas Peter Schwartz (1991) describes 'scenario planning as a tool for ordering one's perception about alternative future environments'. One aspect that is sure is that scenario planning is not a forecasting methodology, but a means to think about the future. It is a description of multiple futures. The history of scenario planning lies in two worlds (Lindgren & Hans Bandhold, 2003). The first was futurism, where scenario analysis became an important method for generating futures thinking and scenarios became an effective presentation format. The second was strategy, where strategists and managers since the 1970s have searched for new and more relevant tools to work with complex issues. While futurists used scenarios as a means to analyse, debate and communicate the 'big issues', the strategists where interested in them as a powerful planning instrument. Modern scenario planning is attributed to Herman Kahn (Van Der Heijden, Bradfield, Burt, Cairns, & Wright, 2002) and the RAND Corporation. Kahn developed a technique called 'future-now' thinking and he adopted the term 'scenario'.

In the 1970s companies like Shell International adopted scenarios as part of their strategy repertoire. Shell's ability to foresee possible futures and to act quickly has been credited as the primary reason behind Shell's success during the Yom Kippur war. More recently, in a world in which uncertainty, insecurity and turbulence are evident (Yeoman & McMahon-Beattie, 2005), scenario planning has received a renewed interest. The focus of scenario planning today is around 'scenario thinking', in which mental models of the future are shifted. De Gues (1997) and van der Heijden et al. (2002) make considerable use of Kolb's learning loop in their explanation of how learning takes place for individuals and groups during scenario planning. The learning loop describes the strategy development process in its integration of experience, sense making and action into one holistic phenomenon. But learning is ineffective in isolation. Eden and Ackermann (1998) contend that learning must happen in parallel with stakeholders in order to action change. It is stakeholders, whether in business or public policy that have the power to create change. Hence, scenario planning is both a social and political process as well as a mechanical task process of scenario construction.

The scenario planner. Ratcliffe (2003) discusses the scenario planner as a *bricoluer,* in which the planner mixes and matches a variety of methods and practices. A bricoluer is a 'Jack of all trades' or 'professional do it yourself', as defined by Levi-Strauss (1996). Here, the scenario planner uses a crystallisation or triangulation of methods, which is a familiar concept in the research literature (Denzin & Lincoln, 2002). The concept of triangulation is a critical element in dealing with the veracity of different issues, trends and assumptions

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surfaced by scenarios. This process of triangulation is the foundation of Yeoman and McMahon-Beattie's (2005) work in scenario planning for the tourism industry. By using a triangulation of methods, both qualitative and quantitative data can be used for interpretation and the construction of scenarios. The importance of dual data overcomes many of the problems of scenario planning, in which policy makers and business strategists have dismissed qualitative data as 'too visionary and science fiction', whereas quantitative data is dismissed by social scientists 'as unrealistic in a problematic world'.

6.2. Scenario planning at VisitScotland

Historically, the use of scenario planning in tourism has received little attention. Although scenario planning has been used in tourism much of the work is confidential and has not been published. What has been published has in the main stems from the authors of this paper (Hay & Yeoman, 2005; McMahon-Beattie & Yeoman, 2006; Yeoman, 2004; Yeoman & Lederer, 2005; Yeoman et al., 2005a, b). VisitScotland's holistic approach to scenario planning involves environmental scanning, scenario construction and economic modelling in order to drive policy and strategy. For a comprehensive understanding of scenario planning at VisitScotland, readers are referred to *Designing A Scenario Planning Process Using A Blank Piece of Paper* (Yeoman & McMahon-Beattie, 2005).

6.3. Scenario construction

In order to understand the impact of the future of oil on Scottish tourism, two scenarios have been constructed which capture the essence of policy issues and discourses about oil. These scenarios *Energy Inflation* and *Paying for Climate Change* were constructed from secondary data and expert interviews as part of VisitScotland's environmental scanning process. Environmental scanning is a qualitative process that captures world mega trends through systematically identifying, interpreting and qualifying uncertainty and tracking change (Lennon & Gait, 2005). From this research, oil as a mega trend was identified as a variable that in near and medium term futures will have a direct and high impact upon tourism. These impacts included, availability of supply, future of Middle East politics, low-cost air transport, carbon taxes and lack of alternative technologies. The next step meant modelling the complexity of the issues that surround oil and how this could affect Scottish Tourism.

The literature was explored and a number of experts contacted to gather their opinion on those issues. The combined knowledge from these sources was coded using a process known as 'IDONS' (Hodgson, 1992). IDONS is a process of rendering tacit knowledge shareable by the use of representation mapping. Concepts, snippets of information, or statements are noted down on a magnetic hexagon, then placed onto a whiteboard. The hexagons are then clustered to show related concepts and connections to ideas. By following this process, a number of systems thinking models can be built up, which are the foundation of the scenarios. The models are captured using IDONS for Thinking[1] software, which allows the modeller builder or scenario planner to reflect, amend and build systems thinking models for use throughout the scenario construction. These models become the foundation of the scenarios script. Once the scenarios had been constructed, they were tested in a workshop environment with a variety of experts from the fields of terrorism, transport, tourism, economics and climate change. The discourses that took place in the workshop focused on the degree of economic impact, policy options and systemic relationships. At the workshop stage, it was important to identify options and numerical weighting which could be used to model the scenarios using the principles of computable general equilibrium (CGE) modelling.

6.4. Economic modelling

In order to measure the impact of the scenarios, CGE modelling is used. CGE models have a well-established record of providing detailed estimates of the effects of a range of actual or possible tourism-related events on economies (Blake, Sinclair, & Sugiyarto, 2003; Blake, 2005). They are also well suited to examining the effects on tourism of major shocks such as terrorism (Blake & Sinclair, 2003) or foot and mouth disease (Blake et al., 2003). They can quantify the effects of policy changes, such as changes in value added tax or air passenger duty, as well as of a range of optimistic and pessimistic scenarios relating to the future of the economy (Blake, 2005).

CGE models include the entire range of sectors in the economy, covering primary and secondary activities, as well as services and are able to take full account of the interrelationships that occur between all of the sectors. They are able to trace the effects of changes in non-tourism activities on tourism-related sectors, as well as the effects of changes in tourism on the remainder of the economy. They quantify the macroeconomic impacts of alternative scenarios on income, employment, welfare, the balance of trade and government revenue, as well as on individual sectors of the economy.

Assessing the economic effects of large shifts in energy prices is made difficult because there are so few historical instances of similar events, and those that might be considered similar occurred decades ago. Additionally, the technologies that govern the ways in which energy prices effect the economy have changed significantly in the intervening time. Such assessments cannot be made therefore on econometric analysis, which would require a reliable time series containing similar events of similar magnitudes. A structural approach is required that examines the impact through the economic structure of the current economy. It is also important that the price transmission of energy prices is analysed, for example how oil prices affect refined

[1]Further details available at http://www.idonresources.com/.

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petroleum prices and how these affect prices for other goods and services. While input–output models would allow the analysis of the structural relationships in an economy, they lack appropriate price transmission mechanisms to show how energy prices affect prices of other products. CGE models include both structural effects and price transmission effects, and are therefore an appropriate methodology for analysing this issue.

The CGE model (known as the Moffat Model[2]) was developed for VisitScotland by The Christel DeHaan Tourism Research Institute at Nottingham University (Blake, 2005). The model includes 82 industries and 82 corresponding commodities. These include the tourism-related sectors of hotels, bed and breakfast establishments and guesthouses, self-catering accommodation, caravans and camping, restaurants and catering, transport, recreational services and retail distribution. Within the model, industries pay factors of production in return for factor services, pay taxes and purchase intermediate inputs. Labour is mobile between sectors but capital is specific to the sector in which it is employed. Labour (in total) and capital in each sector is not fixed in supply, as the 'open' nature of the Scottish economy allows changes in wages (and rental rates of capital) to induce changes in the supply of factors in Scotland. Exports and imports occur for each of the 82 commodities (except where data show these flows to be zero) and are modelled separately for trade with the rest of the UK and the rest of the world. Scotland faces exogenous world prices and imported products are differentiated according to region of origin. Exports are differentiated from goods produced for domestic use.

Particular attention is paid to the accurate representation of tourism demand and different types of tourism expenditure are considered (tourists originating from within Scotland, from the rest of the UK, international tourists and day visitors). The equations that were used in the Moffat CGE model are summarised in Blake (2005).

Within the scenarios, CGE modelling has being used to measure if the Scottish economy could or could not absorb higher oil and energy prices and subsequent policy measures. This absorption is then measured for impact on tourism demand and how this affects the different tourism sectors. Throughout the scenarios we have presumed Scottish tourism will grow by 50% over the next ten years, meaning that tourism in 2015 will be worth £7.5 bn, therefore enabling us to measure the impact of energy policies and oil on growth rates.

6.5. The scenarios

6.5.1. Scenario 1: energy inflation

Mass belief in the plenitude of available oil reserves, limited intervention of supply and failure to respond quickly enough to alter demand, triggers a sudden and prolonged period economic shocks, political instability and environmental disasters. The low priced oil economy has ended. Oil becomes scare and crude prices rocket. The world is transformed into those with or without access to oil. The USA embarks on a major conservation programme away from oil to other fossil fuels. In 2015, coal is the new energy currency. The consequences of these measures mean a permanent and growing damage to the environment, major economic and social disruption—for the masses—and an end to wealth creation amongst the rising middle classes of the world. Developing nations experience severe setbacks and the situation is underdeveloped countries is dire. World economic growth is slow. Travel is more expensive. Culture shock, safety, security and health issues abound. This is a world of market forces and where the economics of Adam Smith drove policy. The United Nations was too weak to impose and action any change. International agreements such as Kyoto lacked power and action. The United States was the key force in the world and nobody was going to challenge its power.

The consequences of these events meant that oil prices across the world grew by 500% over the last decade, meaning energy prices also rose by 300%. These increases meant that the low cost model of international travel was particularly hit. It was the impact of global energy prices on inflation and subsequent impact upon tourism that was underestimated. Tourism economies disappeared across the world as people found travel expensive.

The main economic assumptions in this scenario include:

500% increase in the price of oil over 10 years;
300% increase in gas prices over 10 years;
200% increase in electricity prices over 10 years; and
−10% drop in petroleum capacity in Scotland, due to falling oil reserves.

6.5.2. Scenario 2: paying for climate change

Claude Mandil, the Executive Director of the International Energy Agency made an appeal on the 26 October 2006 for more vigorous action to steer the global system onto a more sustainable path. Soaring oil and gas prices, increasingly vulnerability of the energy supply routes and ever increasing emissions of climate change destabilising carbon dioxide are "symptoms of a considerable malaise in the world of energy. We can expect an inexorable increase in global energy demand with oil extraction peaking in 2015". In this scenario, there is a heavy reliance on carbon emitting fuel, which has risen by 59% by 2015, some 85% of that from carbon emitting fossil fuels, coal, oil and natural gas. Two-thirds of the demand will be coming from the developing world, in particular China and India. Oil demand is expected to continue to expand at 1.6% per year from 82 mbd today to 121 mbd by 2030. Interregional trade will double 65 mbd, most of that additional trade having to

[2]Named after its benefactor—James H Moffat, the co-founder of A.T. Mays. A donation was received from the Moffat Charitable Trust. Details of the charity are available at http://www.moffattrust.org.uk/.

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pass through vital choke points. In order to pay for the future a number of carbon taxes were levied and renewable technology programmes were initiated.

The new carbon tax was the equivalent of a 2.5% increase on value added tax (VAT). VAT is now at 20%. As tourism was identified as a world polluter in the eyes of government, especially the airline sector, road, sea and airlines now had to pay for the pollution though exemptions were made for hydrogen cell and electric cars. The government also encouraged travellers to travel by train, which received a 20% government subsidy per mile travelled. Over the next decade we saw a massive expansion of public transport as consumers' behaviour was changed.

The main economic assumptions in this scenario that have been used for economic modelling include:

250% increase in oil prices over the next 10 years,
100% increase in gas and electricity prices,
20% VAT rate for the economy, including tourism and transport,
20% subsidy on rail transport,
−10% drop in petroleum capacity in Scotland, due to falling oil reserves.

6.5.3. Comparison of results

In Table 1, the baseline for Scottish tourism is £7.5 bn industry in 2015[3] which has grown at 4.0% per annum since 2005. This baseline scenario is used to measure the degree of difference against the two scenarios. For example, from Box 1, we can establish that the economic impact on overnight tourism is £1.3 bn for *energy inflation* and £1 bn for *paying for climate change*. Therefore the growth rate is reduced from 4% per annum to 2.8% in the *energy inflation scenario*, reducing subsequent growth from 50% to 28%, whereas in the *paying for climate change scenario*, the growth rate is 2.2% per annum, with tourism growing in total by 22% since 2005.

In the *paying for climate change* scenario, the combined net loss to the government is £24.4 bn based upon loss of GDP, welfare and government revenues. In comparison, in the *energy inflation* scenario the net loss is £17 bn. Therefore, the direct impact of an increase in VAT across all industries has a greater net loss for government revenues compared to energy inflation.

In Tables 1 and 2, the largest percentage changes occur the further the tourist has to travel. International expenditure drops by 37% and 27%, respectively, as the oil has no technology substitute for long distance travel by aeroplane. As 86% of visitations for UK tourism is by car, as prices rise, the impacts on this market increase the further the tourist has to travel. Whatever the scenario, the consequences on Scottish tourism are profound. As the future of Scottish tourism depends upon inbound tourists rather than the Scottish residents themselves, Scotland's declining population and lower than average GDP growth per capita will not be able to absorb the subsequent loss of this revenue (Table 3).

From Table 5, the *paying for climate change scenario* highlights how the effect of subsiding rail transport has ensured that revenues in this sector grow by 7.2%, buffering the impact of oil prices and encouraging displacement from car to rail. However, from Table 4, the jobs losses across all sectors and scenarios reflect a down-turn in tourism. However in the *climate change scenario*, the impact of higher taxes has a greater impact on job losses than could be expected—4.7% compared to 2.5% in the *energy inflation scenario*.

In the *Paying for Climate* scenario, carbon taxation has a bigger effect on employment than revenue. This is driven by a 9.4% reduction in employment (FTEs) in the airline and sea transport sector (see Table 4). This is a sector which would not previously been affected by VAT.

Table 1
£m change against 2015 baseline

	Baseline 2015	£m change energy inflation	£m change paying for climate change
GDP	84,548	1340	−4223
Welfare	66,936	−14,851	−20,276
Employment (FTE jobs)	2,163,269	−31,682	−56,096
Government revenue	27,018	−3476	79
Daytrips expenditure	3468	−32	−52
Domestic tourism expenditure	2095	13	13
Rest of UK tourism expenditure	3514	−680	−545
International tourism expenditure	1842	−686	−501
Domestic plus Rest of UK tourism expenditure	5610	−668	−532
Overnight tourism expenditure	7452	−1354	−1033
Tourism plus daytrips expenditure	10,920	−1386	−1084

Table 2
% change against 2015 baseline

	Energy inflation	Paying for climate change
GDP	1	−4
Welfare	−17	−24
Employment (FTE jobs)	−2	−3
Government revenue	−10	0
Daytrips expenditure	−1	−1
Domestic tourism expenditure	1	1
Rest of UK tourism expenditure	−19	−16
International tourism expenditure	−37	−27
Domestic plus Rest of UK tourism expenditure	−12	−9
Overnight tourism expenditure	−18	−14
Tourism plus daytrips expenditure	−13	−10

[3]When measuring and definition purpose, we use the World Tourism Organisation definition of overnight stays, rather than including day visitors.

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Table 3
% change by type of expenditure against 2015 baseline

	Energy inflation	Paying for climate change
Domestic daytrips	−0.9	−1.5
Domestic tourism (business)	0.6	0.7
Domestic tourism (VFR)	0.1	0.5
Domestic tourism (holidays 1–3 nights)	0.7	0.7
Domestic tourism (holidays 4–7 nights)	0.9	0.8
Domestic tourism (holidays 8 + nights)	0.4	0.1
Domestic tourism (other)	0.1	0.8
Rest of the UK tourism (business)	−20.6	−17.9
Rest of the UK tourism (VFR)	−21.2	−17.6
Rest of the UK tourism (holidays 1–3 nights)	−19.5	−15.4
Rest of the UK tourism (holidays 4–7 nights)	−18.3	−13.9
Rest of the UK tourism (holidays 8 + nights)	−18.2	−14.0
Rest of the UK tourism (other)	−20.2	−16.9
International tourism (business)	−37.3	−27.2
International tourism (VFR)	−37.3	−27.2
International tourism (holidays)	−37.3	−27.2
International tourism (other)	−37.3	−27.2

Table 4
Change in employment % against 2015 baseline

	Energy inflation	Paying for climate change
Large hotels	−2.5	−3.4
Small hotels	−2.5	−3.3
B&B guest house	−2.5	−3.3
Self catering	−2.9	−3.6
Caravan and Camping	−2.7	−3.4
Restaurants etc.	−2.3	−3.6
Railways	−0.4	1.9
Other land transport	−1.0	−9.0
Sea and air transport	−1.1	−9.4
Transport services	−0.7	−3.4
Recreational services	−1.3	−2.5
Retail distribution	−3.7	−5.4
Average	2.5	4.7

Simultaneously, the percentage change in GVA[4] (−35.2%) is significantly higher in this sector compared to other sectors of the industry (see Table 5). In both scenarios, the retail sector depends on high yielding visitors who tend to come from further afield. Therefore, the impact on retail tourism is significant in comparison to the other sectors.

[4]Gross value added (GVA) is the standard form of measurement used by UN WTO Tourism Satelitte Accounts systems to measure the economic contribution or value of tourism in countries compared to other countries or industries. GVA is the difference between output and intermediate consumption for any given sector/industry. That is the difference between the value of goods and services produced and the cost of raw materials and other inputs which are used up in production.

Table 5
Change in GVA % against 2015 baseline

	Energy inflation	Paying for climate change
Large hotels	−9.0	−12.7
Small hotels	−9.0	−12.4
B&B guest house	−9.1	−12.4
Self catering	−10.7	−13.5
Caravan and camping	−9.8	−12.6
Restaurants, etc.	−8.5	−13.0
Railways	−1.7	7.2
Other land transport	−3.9	−34.0
Sea and air transport	−3.9	−35.2
Transport services	−2.6	−13.4
Recreational services	−4.8	−9.6
Retail distribution	−13.2	−19.6

7. Immediate impacts on Scottish tourism

Inflation and disposable income. According to the Bank of England Inflation Report (2006), consumer price inflation (CPI) was 2.2%. Fifty percent of this index was attributed to oil and energy prices. Consequently the Bank of England is warning institutions that the threat of staginflation is possible. Staginflation is rising inflation and slow GVA growth which leads to a reduction in disposable income and discretionary spending. Such a proposition is highlighted by Fenton (2005) as the most immediate threat to tourism and service industries. The consequences of this on Scottish tourism would be an overall reduction across all markets on consumer spending.

Impact on transport. According to a Caledonian McBrae ferry spokesman, the price of fuel for Scotland's main ferry operator has trebled over the last 12 months (MacLennan, 2006). As a consequence, fuel prices are now the largest single cost for the operator. Whilst some of this cost has been passed on to the consumer, approximately 40% has been absorbed by the company which reduces its operating profit. Similar surcharges have been witnessed in the airline industry in companies as such Air France, Lufthansa and BA (UN-WTO, 2006).

Can you hedge anymore? Currently the major airlines have benefited from hedging strategies or purchasing fuel "credit" at today's prices for use in the future (UN-WTO, 2006). However rigid administrative and labour costs only allow fuel hedging to provide competitive advantage against other major airlines. Presently low cost carriers, lacking the revenue for fuel hedging, have greater flexibility in running costs and this is passed on to the consumer whilst buffering the increasing fuel prices. Over the medium term many of the smaller low cost carriers could be forced out by increasing fuel costs. A few have sufficient market share and capital to retain a competitive advantage, these include Southwest in the United States, Air Asia and Ryan Air. Ryan Airs share capital largely exceeds that of Air

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France, KLM or Lufthansa, with one-tenth the annual sales (UN-WTO, 2006).

War and disruption. The present geopolitics of the situation in the Middle-East is highlighted by Yeoman et al. (2005a, b) who consider a number of war and terrorism scenarios and their impact on Scottish tourism. Inherent in those scenarios is the relationship between Iran's nuclear programme, the axis of evil and American politics. In 2006, as the Saudi Ambassador to the USA, Prince Turki Al-Faisal, argued 'the idea of somebody firing a missile at an installation somewhere will shoot up the price of oil astronomically … It would treble the price of oil.' Such a scenario is comparable to the 1974 oil shock which stagnated international tourism arrivals (including Scotland) and reduced consumer purchasing power across all industries (UN-WTO, 2006).

8. Long-term policy implications

Energy inflation and absorption. In the *energy inflation scenario*, the economy cannot adjust over a longer time period to cope with the continuous inflationary pressures of energy price rises. Therefore, the importance of this scenario highlights how an energy policy must be implemented and actioned now rather than later. The implementation of these energy policies, as shown in the *paying for climate change scenario*, will not be easy. Transport is the key driver in Scottish tourism. A tourism economy without a sustainable transport policy and system means less tourism in the long term. Resolving the Scottish transport infrastructure deficit is no rapid action solution. Structural shifts away from car based transportation for travel requires major policy shift at both Westminster and Scottish Executive level.

Renewable energy sources will grow. Government and business will have no choice but to further develop the technologies of renewable energy's as the oil runs out. This means Scotland will see more wind farms in its rural landscapes and in urban locations. There will be conflict between those that live in these regions and developers. Politicians will come under pressures not to grant licenses. We will see the election of 'no wind farm' politicians to local councils, because of the introduction of proportional representation. The 'no wind farm' party may even be elected to the Scottish Parliament. Wind farms may even be seen as visual art by some supporters. Wave and solar technology will also see increased investment and application.

We will see VAT on air travel. Air travel is a major contributor to carbon pollution. But engine efficiencies and hydrogen technologies will not be able to fill the gaps when oil runs out. In order to pay for climate change programmes, such as hydrogen technologies, we will see the introduction of VAT on air travel. However, a VAT rate of 20% across all industries is not recommended as this would have a larger negative impact compared to energy inflation.

The low cost carrier model is threatened. It was noted in the UN-WTO (2006) report on oil prices that most low cost airlines have decided not to apply fuel surcharges. However, fuel represents a costlier item to them compared to traditional carriers. As such, their strategic position and business model are threatened. Between 2000 and 2005 arrivals from London and the South-East of England to Scotland doubled because of the presence of the low cost carrier. As such, their disappearance would have a major impact on the economic value of Scottish tourism (Hay & Yeoman, 2005). Yet the demise of cheap European and relatively low cost international travel could help drive second and third holidays back to the UK mainland (by UK residents) catalysing stability or even increases in inbound tourism to the urban centres at least.

Oil deprivation and terrorism. The emerging and less developed economies of the world, especially Africa, will see a lack of growth due to shortages of oil. We will see a world in which two scenarios unfold based upon those that have or do not have access to oil. Countries will go to war over the issue, as the commodity becomes scarce. The politics in the Middle East will become the most important influence on price and nation wealth. If countries like Saudi Arabia see the rise of Islamic fundamentalism and anti western culture, this will result in regime change. By 2015, Middle Eastern countries will have a closer alliance with China rather than the Western World. The combined effect of these factors means the Western world may be heading for oil deprivation. From a policy stance, oil must be sourced from further afield and new energy technologies established.

We will see a new generation of nuclear power stations post 2015. As the UK will not be an oil-producing nation by 2015 and in order to meet carbon emissions targets, a new generation of nuclear power stations will be operating across the UK post 2015. There is no alternative to this policy, as nuclear technology is a known technology that does not require the quantum jump that hydrogen technology would. The implications for the 'wilderness' status of Scotland will become increasingly an issue following development of such plants in remote, pristine locations. The long-term impact of Dounreay in Scotland is proof that the nuclear option casts a long shadow on the Scottish landscape.

We will see the introduction of the hydrogen economy. Over the next 10 years the hydrogen carbon economy will develop, meaning more shared fuel cars, exemption from taxation for hydrogen cars and public transport systems in cities based upon these systems. On the islands of Scotland, we may even see the petrol car banned, as these destinations become total hydrogen carbon destinations. Such a scheme is feasible, as Sark in the Channel Islands only allows electric cars. We will see more cycle paths across Scotland and more investment in public transport. Hydrogen technologies will emerge faster and stronger in all forms, whether it is buses, cars, ships or trains. Hydrogen technologies for planes will emerge post 2015.

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The importance and pressures on fossil and other sources. As the price of crude oil rises, we will see the emergence of coal as an important fossil fuel between now and 2015. The extraction of coal becomes a lot more economic as world energy prices rise. It also becomes economical to refine other products for use in cars. For example coal and rape seed oil could be refined for the motor car. On the downside, the pressure for more oil and rising prices will see regions of the world, like the eco-landscape of Alaska, threatened by oil developers.

Ecological consumer behaviour will be mainstream by 2015. Over the next 10 years, the consumer will become conditioned so that ecological behaviour is the norm. The consumer will be aware and concerned about the environment. Normal behaviour will be sorting out rubbish for recycling, using public transport instead of the car where possible and other energy efficiency measures. This means tourism destinations must champion, develop and action green tourism policies. Legislation will occur before 2015 to ensure that business takes energy conservation seriously. Proposed energy rationing may well increase seasonality in Scotland during the majority part of the year when heating and lighting are necessary.

Rail and public transport will be even more important by 2015. In order to reduce dependency upon the car, we will see a number of measures to move people onto public transport. These will include free public transport for all in Scotland, whether this is buses or trains. We will see the development of major transport systems, to make the movement of visitors around cities easier. Cities will introduce toll charges to curb traffic and grid-lock.

The implications of security. The one driver that could reshape energy policy is the real threat of terrorism. If we have a scenario of continuous suicide bombers (Yeoman et al., 2005a, b), some of the above assumptions could be rendered academic as consumers will avoid public transport or air transport and use the car. The car will be perceived as the safest mode of transport. Additionally, the development of nuclear power, means countries like Iran having access to this technology, heightening an already fear-driven society.

Alternatively, market forces and technologies will drive change. Higher oil prices mean market forces, new technologies and innovations will act as a stabilising force in energy markets. Therefore, there would not be a crisis as suggested in the scenarios, as the Scottish and world economies will be able to absorb the price rises.

9. Conclusion

Research by the UN-WTO (2006) into rising oil prices concludes that in the short term, rising oil prices have not had any noticeable impact on international tourism. However, the longer term consequences have not being examined. Hence, this paper has comprehensively explored the long-term implications of rising oil prices on Scottish Tourism. Indeed, many of the changes mentioned are also applicable universally as transport and oil are recognised as one of the key drivers of global tourism. The simple fact is that the world is finding less oil and demand is soaring, meaning prices will inevitably rise. Additionally, the uncertainty of supply is also a key cause for concern. The authors of this paper have assumed that, in 2015, oil will still be the backbone of the world economy mainly because of the time frames needed to build alternative capacity. Ultimately, for Scottish tourism, the impact of rising oil prices could mean a bumpy ride with carbon taxes, more wind farms and the possible end of the budget carrier. However, rising oil prices may be a good thing, as it makes sourcing alternatives to oil economically viable (Reiss, 2006).

In times of uncertainty, national tourism organisations must be able to make sense of the world around them. VisitScotland uses scenario planning to clarify thinking and make sense of those uncertain worlds, whether it is oil prices, shifting exchange rates, climate change, taxation, the geopolitical environment or consumer trends. The world tomorrow will be more complex, but decision makers need a framework to drive thinking and actions forward. At VisitScotland, scenario planning is that framing device. For more information on scenario planning at VisitScotland visit www.visitscotland.org/scenarios.

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