The **CLIMSAVE** Project

Climate Change Integrated Assessment Methodology for Cross-Sectoral Adaptation and Vulnerability in Europe

Report of the first CLIMSAVE regional stakeholder workshop

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Introduction

Participatory scenario development processes have played an increasingly significant role in major climate change and environmental studies over the past few decades and already play a crucial role in adaptation assessment by providing a glimpse of the different socio-economic trends that will form the back-drop to long term adaptation measures. Moreover, planning an adaptation measure will have to take into account the uncertainty of future climate impacts, and participatory scenarios are a useful method for incorporating this uncertainty into decision-making.

CLIMSAVE will advance the state-of-the-art in participatory scenario development and analysis, especially for climate impact and adaptation assessment, by developing a new and innovative methodology for participatory scenario development and analysis specifically geared towards interactive climate impact and adaptation assessment. This new methodology will include: [1]

- A careful stakeholder selection procedure;
- Kick-starting the scenario process;
- Developing integrated and dynamic stories focusing on socio-economic elements;
- Using fuzzy sets to quantify model parameters; and
- Producing multiple products to improve communication.

The composition of the stakeholder panel for the CLIMSAVE European case study was carefully put together on the basis of a newly developed methodology. The careful selection of stakeholders for a participatory scenario development process such as undertaken in CLIMSAVE is an important factor in the exploration of plausible futures, as the inclusion of perspectives from stakeholders provides not only important information for the process and research conducted in CLIMSAVE, but also creates potential for higher relevance of the process results for stakeholders.

CLIMSAVE scenarios are being developed up to the 2050s, with an intermediate time slice in the 2020s. The time horizon of 2055 is sufficient to include the impacts of climate change and the effect of (some of) the adaptation options. The methodology will be developed for the European case study and tested in a regional case study. Within CLIMSAVE, Scotland acts as the regional case study.

This deliverable reports on the results of the first regional CLIMSAVE workshop. The first regional CLIMSAVE workshop was organised in Edinburgh on 27-28 June 2011.

[1] A more detailed explanation of the scenario methodology and stakeholder selection process is given in Kok et al. (2011). Report on the new methodology for scenarios analysis, including guidelines for its implementation and based on an assessment of past scenario exercises. Available from www.climsave.eu.

1. Overview of the workshop

Below is a summary of the activities that took place during the two-day workshop for the regional Scottish CLIMSAVE case study. A detailed agenda can be found in Annex I. A list of participants can be found in Annex II.

Day 1:
The first day of the workshop started by giving stakeholders the opportunity to get to know each other, the CLIMSAVE research team and by providing stakeholders with the necessary background information. Presentations were given on:

- CLIMSAVE and the role of Scotland within CLIMSAVE by Professor Mark Rounsevell, University of Edinburgh;
- The role of the Scottish Climate Change Impacts Partnership in CLIMSAVE by Joseph Hagg, SCCIP; and
- The future scenario development methodology by Dr. Marc Gramberger, Prospex.

Following these presentations, the scenario development process started with a plenary discussion on drivers, certainties and uncertainties on the basis of a candidate list of drivers and uncertainties, which led to a revised list of drivers and uncertainties. This revised list of drivers and uncertainties was then put to the vote to determine the most important and at the same time most uncertain drivers.

The outcome of the voting was then used to establish in plenary the scenario logic. Next, the stakeholder panel characterised the scenario logic by attributing main characteristics to each quadrant of the scenario logic. For the remainder of day one the stakeholder panel was divided into four groups, with each group developing scenario elements and dynamics for their assigned quadrant of the scenario logic. These elements and dynamics fed into the development of preliminary scenario storylines. A professional facilitator and a content supporter from the CLIMSAVE research team assisted each group.

Day 2:
On the morning of day two, each group presented the scenario they developed in plenary to the rest of the stakeholder panel and the CLIMSAVE research team. Feedback was given on each of the storylines to help refine them further. Following this, the stakeholder panel was asked to quantify a number of statements.

The quantification exercise consisted of a group exercise and an individual exercise. During the group exercise, each scenario group was asked to make qualitative statements about changes in a set number of variables in line with the storyline the group had developed. In the individual exercise each stakeholder was asked to quantify what they meant by the qualitative statements in the group exercise.

Following the quantification exercise, Dr. Ian Holman (University of Cranfield), presented a mock-up version of the Integrated Assessment Platform and explained the importance and role of the scenarios for the development of the Platform.

The workshop drew to a close by explaining to the stakeholder panel what will happen in the second workshop. This workshop will also be held in Edinburgh on 27-28 February 2012.

2. Identification of main certainties and uncertainties

2.1. The process

The process of developing future scenarios on climate change adaptation within the CLIMSAVE project makes use of a so-called "kick-start" approach to identify the main uncertainties and drivers. These drivers, together with their main uncertainties, form a long list out of which two drivers, together with their uncertainties, were combined to establish the scenario logic.

The kick-start approach consists of the following steps:

1. Research was conducted by CLIMSAVE on the main drivers and uncertainties used in other scenario exercises or research projects to establish a similar list of main drivers and uncertainties. For the regional Scottish case study the following sources were consulted:

    - A presentation on "Scenarios to 2025", and specifically the results of a scenario building conference of Scotland's Futures Forum, 10-11 November 2009, St Andrews.
    - Scotland's Future Forums (2009). Scotland 2030. Sustainable Communities in Scotland Scenarios for the Future, Edinburgh, Scottish Parliament.
    - Scottish Government (2009). Changing Land Use in Rural Scotland - Drivers and Decision-Making: Rural Land Use Study Project 1, Edinburgh, Queens Printers of Scotland.

2. On the basis of this research, CLIMSAVE established a list of 12 socio-economic candidate drivers and main uncertainties. No biophysical drivers were included in the list as these drivers are already included in the Integrated Assessment Platform. The list of candidate drivers (including definition and main uncertainties) can be found in Annex III.

3. The list of 12 candidate drivers together with their main uncertainties was presented to the stakeholder panel at the start of the workshop.

4. At the workshop, the stakeholder panel was asked to review the candidate list and propose amendments to it.

CLIMSAVE opted for this fast track approach for a number of reasons:

- It makes it possible to concentrate most of the workshop effort on the actual development of the scenario logic and scenario storylines;
- It makes the most of the opportunity to work with stakeholders; and
- It makes use of existing research.

In general, this fast track approach was well received by Scottish stakeholders. This can be partly explained by the limited geographical spread (compared to the Europe scale), the carefully selected multi-sector stakeholder panel, as well as the familiarity of the stakeholders with the sources used to draw up the list of uncertainties.

2.2. The outcome

After having had the opportunity to revise the list of candidate uncertainties, the stakeholders jointly decided to reduce the list to from 12 drivers to 11 drivers (Table 1). The following drivers were eliminated, modified, added or merged with other drivers from the list in comparison to the original list[2]:

- The driver "Influence of local communities" was eliminated from the original list of uncertainties.
- The name of the driver "Food and energy security" was further refined to "Resource security". The uncertainties remained the same.
- The driver "Social and environmental responsibility of non-state actors" was eliminated from the original list of uncertainties.
- The driver "Lifestyle" was further specified to "Well-being and lifestyle". Hence, its uncertainties changed from "green and unsustainable" to "equitable and disparate".
- The driver "Consumption" was added to the list. Its uncertainties are "accepted limits and no limits".
- The driver "Globalisation" was eliminated from the original list of uncertainties.
- The driver "Power level of decision-making" was added to the list. Its uncertainties are "local and central".

2.3. Voting on level of importance and uncertainty

Stakeholders ranked the drivers and uncertainties on the degree of importance and the degree of uncertainty through a voting procedure in which stakeholders were asked to vote on what for them were the most important and most uncertain factors (Table 2). Each stakeholder had three votes for importance and three votes for uncertainty. Those key driving forces that scored highly on importance and uncertainty were examined further to assess their suitability for serving as key drivers to establish the scenario logic.

[2] The original list of candidate drivers (including definition and main uncertainties) can be found in Annex III.

Table 1: Main drivers related to climate change adaptation in Scotland and the main uncertainties as identified and agreed by the Scottish stakeholder panel.

Individualised	Social behaviour	Collectivised
Gradual	Economic growth	"Rollercoaster"
Surplus	Resource security	Deficit
Pervasive	Adoption of technological innovation	Patchy
Integrated	Environmental regulation	Sectoral
Out-migration	Population/migration	In-migration
High	Threat of war, crime and violence	Low
Accepted limits	Consumption	No limits
Equitable	Well-being and lifestyle	Disparate
High	Climate change impact on human society	Low
Local	Power level of decision-making	Central

Table 2: Results of voting on level of importance and uncertainty of drivers.

		Importance	**Uncertainty**
1	Social behaviour	3	7
2	Economic growth	3	9
3	Resource scarcity	16	11
4	Adaptation of technological innovation	5	4
5	Environmental regulation	3	3
6	Population/migration	2	3
7	Threat of war, crime and violence	0	5
8	Consumption	7	2
9	Well-being and lifestyle	8	7
10	Climate change impact on human society	4	2
11	Power level of decision-making	9	5

3. Scenario logic and key characteristics of each scenario

3.1. Scenario logic and characteristics

Following the voting, a number of attempts to combine two different drivers were made to establish the final scenario logic. The driver "Resource scarcity" clearly came out as one that is according to the Scottish stakeholders both highly important as well as highly unsure in Scotland. This driver was paired with "Well-being and lifestyle", which also scored high on uncertainty and importance. The stakeholder panel unanimously decided to use these two drivers as axis for the scenario logic and hence the development of scenarios for Scotland.

Stakeholders also characterised each of the four quadrants. The key characteristics of each scenario can be found in the Figure 1.

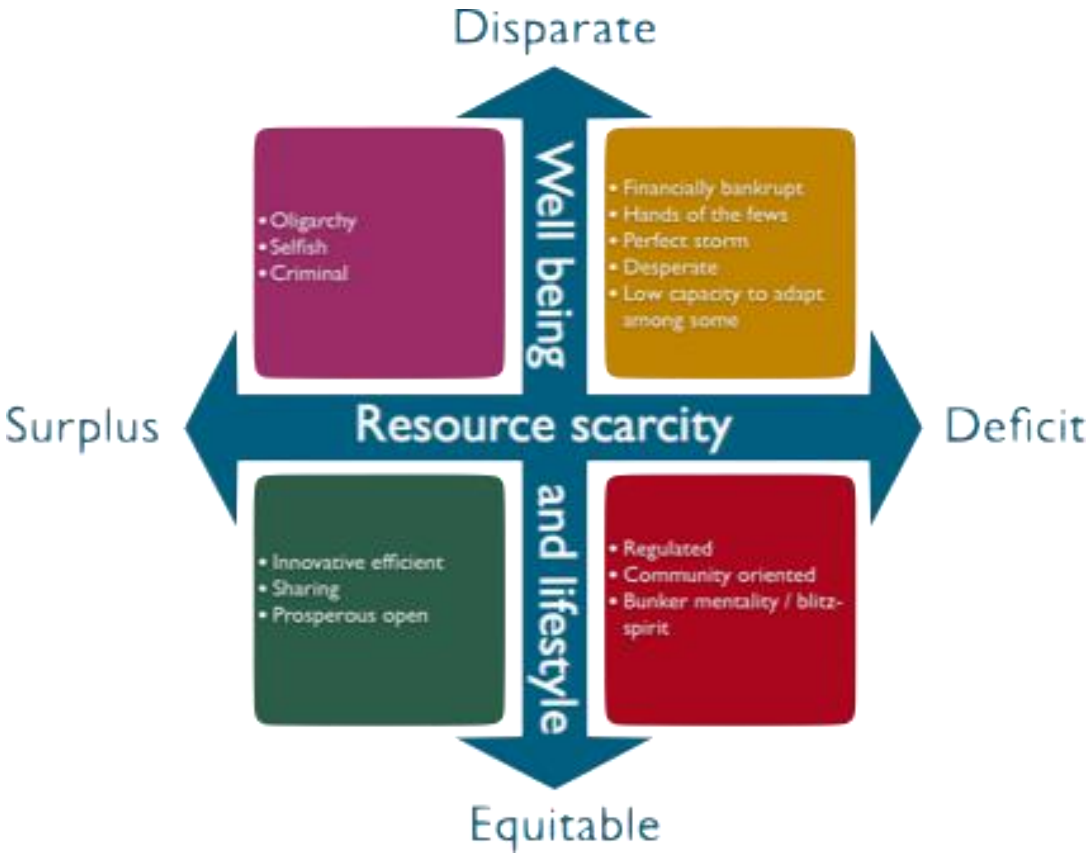


Figure 1: Scenario logic, together with key characteristics for each quadrant of the scenario logic.

3.2. The Scenarios

The Scottish regional case study is developing four scenarios (Figure 2):

- *Tartan Spring* is characterised by a disparate well-being and lifestyle and a resource surplus.
- *Mad Max* is characterised by a disparate well-being and lifestyle and a resource deficit.
- *The Scottish Play* is characterised by an equitable well-being and lifestyle and a resource deficit.
- *Mactopia* is characterised by an equitable well-being and lifestyle and a resource surplus

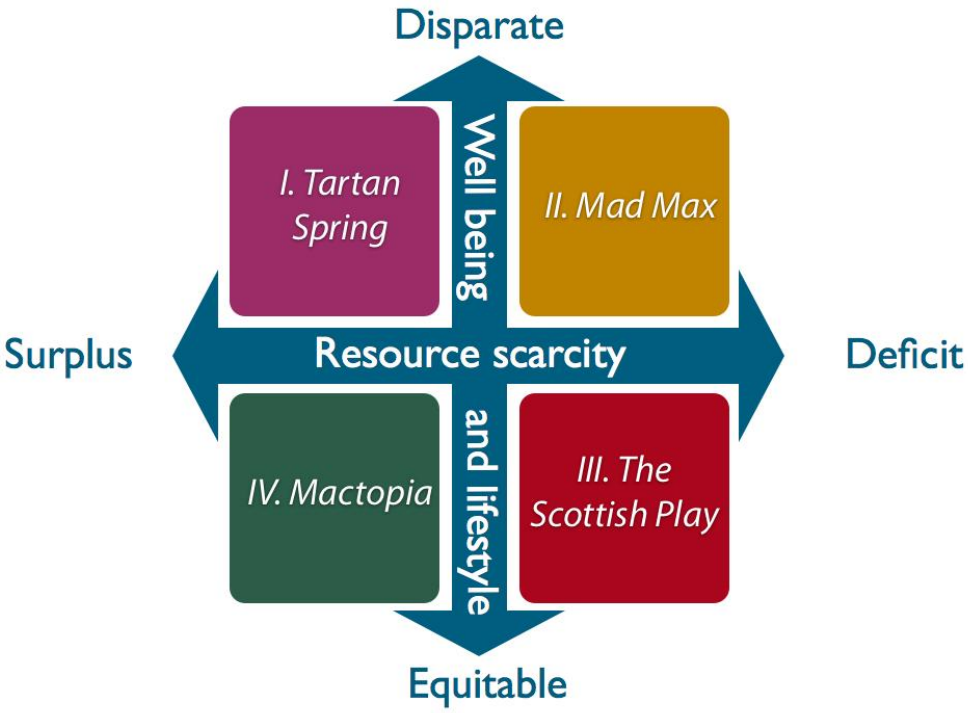


Figure 2: Scenario logic, together with the name of each scenario.

4. The scenarios

4.1. The process

The group of stakeholders was divided into four groups. Each group was composed of four to six people from different sectors of society, age groups and gender, ensuring a multi-disciplinary stakeholder group for each of the to be developed scenarios. Each group was also assigned a professional facilitator and a resource person from the CLIMSAVE research team to answer specific questions or to conduct additional research. The CLIMSAVE research team member did not actively take part in the discussions.

The following guidelines were given to the stakeholders at the start of the scenario development process:

Scenario elements

- Discuss and write down on a white board events which could occur in your scenario;
- Place the events on a timeline. The timeline has two times slices: 2011-2025 and 2025-2050.

Scenario dynamics

- Develop the dynamics of your storyline by linking the different scenario elements to one another so that it becomes a coherent story. Write down the scenario dynamics. If necessary, make use of an influence diagram.

Although the stakeholders had little time to come up with the scenario elements and scenario dynamics, the process in all four groups resulted in rather detailed information on important aspects of their storyline. Only one of the four groups used an influence diagram to illustrate the scenario dynamics.

It is important to point out that at this stage of the process the emphasis lies on developing the scenario dynamics rather than developing a full-fledged storyline.

4.2. Tartan spring

4.2.1. *Tartan spring scenario elements*

Resources	Scottish whisky continues to grow. More popular than ever	Scottish government meets 100% renewable energy target	Carbon accounting a viable system	Massive utilisation of forests	Scotland becomes world's major producer of uranium		
	Innovation	Major gas find in NW Atlantic	Massive increase in re-use, recycling waste				
		Wind / tidal energy target exceeded	Other energy sources maximised	Scotland signs trade agreement with China on critical minerals			
			Renewables allow for development of hydrogen fuel cells	Scotland exports water to SE England			
Power/ Decision Making	Top down decision-making	Land use dictated by a central organisation			Scotland spends 30% of GDP on overseas conflicts to secure ownership of access to resources		
	Independence started	Most public services privatised	Scotland run by 10 private companies who control main assets for top 10 %	Independence completed	Top 10% of Scots live in ghettos of multi-millionaires		
				Scotland a major player in the global markets/politics	Increased urbanisation into gated eco-communities	Human capital maximised: The slave economy	
Disparity					Access to services limited to a minority	Food shortages for less well off due to speculation on grain markets	
		Public sector funded by resource surplus trading	Scotland attracts highest level of FDI due to the outcomes of climate change	20% of electricity "stolen" by unauthorised slum dwellers	Disparity in wealth and power	Police no-go areas in the big cities	Scottish Government overthrown by the dispossessed
			Welfare state stopped	Scotland becomes the new tax heaven	Increased polarity and wealth distribution	Life expectancy of bottom 50% of Scots reaches 50 years average	"Tartan spring"
				Scotland mafia - increase in black market	Record high for Scottish families living below the poverty line	Massively reduced road transport	
				Birth rates going down	Travel restricted to those with access to fuel		Some poor people head back to the land. Many work in service to the super rich

2011 2025 2050

4.2.2. *Tartan spring scenario dynamics*

The stakeholders did not provide an influence diagram to illustrate the dynamics of the Tartan spring scenario.

4.2.3. *Tartan spring scenario storyline*

The scenario logic, dynamics and elements are the building blocks for the development of the scenario storyline. The preliminary, first version, of the scenario has been written by the CLIMSAVE project, but is based on a short presentation of the scenario elements (by one of the participants of the scenario development group) during the workshop and additional notes taken by the CLIMSAVE research team during the discussions.

The first scenario storyline below is a preliminary one. Stakeholders will be given the opportunity to refine it during the second stakeholder workshop.

Storyline

Towards the 2020s

After 2011, Scotland continues to be a prosperous country with a strong socio-economic middle class. All layers of the Scottish society enjoy the benefits of a strong government-led management of its (natural) resources, of which it has a large surplus. This surplus fosters prosperity in the short term and also boosts technological innovation, which ensures prosperity over the long term. Technological innovation leads to more efficient use of resources, the exploration of new stocks, and the possibility to turn previously invaluable resources into valuable ones. The thriving engines behind this technological development are excellent schools and science centres on the one hand, and the private sector on the other hand. Because of this high degree of prosperity, Scotland is increasingly being seen as a good place to live. Young people immigrate to Scotland and the domestic birth rate goes up, as does life expectancy.

Through innovation there is a massive increase in recycling activities and the use of natural resources is optimised. Also, hydrogen fuel cells are being developed successfully. As a result, Scotland meets 100% of its renewable energy targets by 2015. Moreover, a major gas find in the Atlantic helps to secure growth in Scotland for the years to come. To capture the full potential of all these technological developments the Scottish government decides to open resource access to the private sector and establish liberal market structures. As a result, by 2020 the influence of the private sector in Scotland has become very strong.

The prosperity of Scotland influences the voting behaviour of the Scottish people for the 2014 referendum on independence. The fact that Scotland is a successful country with abundant resources convinces people to vote for independence. The Scottish people believe independence is the best way to safeguard their wealth. Resource security thus fosters independence. However, Scottish independence does not happen overnight. The outcome of the 2014 referendum sets in motion an incremental process leading to full independence by 2030.

Towards the 2050s

In the period after the referendum and before full independence, the private sector further increases its grip on society. As the private sector is already very large, it is a small step for private enterprises to offer health care plans for employees. Public and welfare state related services are also being privatised. However, the privatisation process is poorly regulated and thus safeguards are not put in place for those not able to benefit from such privately organised schemes. By 2025-2030, the welfare state ceases to exist and it is estimated that Scotland is now run by ten private enterprises controlling the main assets of the country. Because increasingly more people depend on the private sector and the services of major international companies, the social fabric erodes and the influence of the local, community level decreases.

Together with independence in 2030, a new government comes into power. From this moment the full effects of developments since the vote for independence start to pan out. The power of the private sector, together with its independence, now makes it possible for Scotland to become a major player on the global market. Scotland signs trade agreements with China on the use of critical minerals and becomes the world's major producer of uranium. It also exports water to southeast England. By 2040, Scotland spends 30% of its GDP on overseas conflicts to secure ownership of access to resources.

This market driven society also experiences a number of unintended, negative consequences. The disparity between the poor and the wealthy is more pronounced. This disparity largely arises because technological innovation makes it possible to eliminate jobs and manpower. Those that have a job still benefit from privately organised health care schemes, but a large part of the workforce services the super rich and has only limited social security, barely enough for a decent life. Some commentators speak of a modern slave economy. As such, most people cannot sustain their standard of living. Standards in education and science cannot be sustained. Unemployment rates increase, while social welfare decreases rapidly as there is no social safety net for those that are unemployed. A class of poor citizens emerges.

The wealthy move into eco-communities and the top 10% of Scottish multi-millionaires start living in multi-millionaire ghettos. Scotland also becomes a new tax heaven. The poor start to feel the burden of no longer being able to benefit from the welfare state. The government (unsuccessfully) tries to regain a grip on society, but fails to do so because long lasting contracts and binding agreements on tax cuts for the private sector are deemed legally binding. The poorly regulated privatisation operation in the 2020s has left the Scottish treasury empty, and there are very few public resources available. Only the wealthy can still afford to travel and access certain services. This also stimulates a large illicit economy, run by the Scottish mafia. People are unhappy and at each election a landslide takes place. But, the Scottish Government fails to have an impact.

The effects of this disparity become seriously visible by 2040. A record number of Scottish families live below the poverty line and as a result the life expectancy of the bottom 50% of Scots is around 50 years. The divide between poor and rich is 80:20. Initially, the poor are not yet upset because they are being told they live in a very successful country, no matter at what level they are. But this changes towards 2050 when continuous strikes (also in the private sector) and protests of the dispossessed paralyse the country. In 2051, insecurity ends up in a "Tartan spring" revolution. The Scottish government is overthrown by the dispossessed. Scotland enters turbulent times.

4.3. Mad Max

4.3.1. *Mad Max scenario elements*

	Increased organised crime groups	Increasing Scottish seaside holidays	Increasing gun ownership	Increase of emigration	Government introduces "Just in time" adaptation policy			
	Collapsing public transport	Tourism levels low	Decline of social sciences	Population growth	Rich adapt in self-interest/Poor forced to adapt	Centralised planning	Social elite meets to consider historic concept of "sustainability"	
	Willingness to invest in public good is low	Scotland unable to meet social targets	Scotland unable to meet social targets	Aged population at risk	Service standards for the wealthy	Decision-making (centralised and quick)	Boat based population reaches 10%	
	Stockpiling resources	Energy deficits (blackouts)	Energy exported to Scandinavia	Fuel poverty reaches 80%	Strong partnerships externally to acquire resources	Protests to introduce a national health service	Increasing church attendance	
		Hunger march on Edinburgh	Squatting and poaching	Green belt rules repealed	Health care shortages	Looting for limited water	Surprise visit by philanthropist	
	Food prices rocket	Food riots	Short term profit driven policy-making	Despite rains water shortage as globally enforced export increases	Scottish power buys the Cairngorms National Park	Asset stripping	Families limited to one child	
	Fat cats make fortune on food hoarding	Intensification of agriculture	Return to the land	Crisis of food standards	Resurgence of cooperatives		Multinationals own 90% of Scotland	Scotland misses 2050 emissions target by 30%
	Commodity volatility + speculation	Food vs fuel land conflicts	Pressure from Brussels/EU or Scotland leaves EU	GMO!	Land grabs (feudal system)	Increase of aquaculture (small scale)	Stronger NGO Community	Water price > 50 pounds
	Decision level not important	Political level not important	Collapse of cooperatives	Waste from China	Recycling ('Mad Max')	Resourcefulness		
			Gold investment at all time high	China rations computer suppliers		Innovation from grass roots		
			Red squirrels and wildcats finally wiped out	Maximised profit				

2011 2025 2050

4.3.2. *Mad Max scenario dynamics*

The stakeholders did not provide an influence diagram to illustrate the dynamics of the Mad Max scenario.

4.3.3. *Mad Max scenario storyline*

The scenario logic, dynamics and elements are the building blocks for the development of the scenario storyline. The preliminary, first version, of the scenario has been written by the CLIMSAVE project, but is based on a short presentation of the scenario elements (by one of the participants of the scenario development group) during the workshop and additional notes taken by the CLIMSAVE research team during the discussions.

The first scenario storyline below is a preliminary one. Stakeholders will be given the opportunity to refine it during the second stakeholder workshop.

Storyline

Towards the 2020s

The financial and economic crisis hits Scotland in 2012, but in a more severe way than it hit Ireland a few years ago. On top of this, Scotland is also confronted with a series of extreme weather events causing a poor harvest. This mix of financial crisis and extreme weather events hits the agricultural sector hard. Because of a shortage in agricultural resources and volatile financial markets, commodity speculation takes place, notably on food, land and housing. The price of a patch of land goes up, which forces landowners towards intensive land cultivation. This has an upward effect on the wheat price. The markets become very volatile, with the energy market being the most volatile market of them all.

Increasingly more people have problems buying food and water. A hunger march is organised in Edinburgh and a few days later there is a riot on a local market over the cost of potatoes as farmers abandon the price control agreement. These commodity speculations and riots demonstrate that it is every man for himself. Because of the financial crisis and difficult economic conditions, solidarity with others is not a priority. The aim of most people is to safeguard their lifestyles at the expense of others in society during these torrid times. The cooperative system collapses, which illustrates the new self-centred paradigm of Scottish society. Some characterise this as a return to the feudal system. The steady increase in the use of private cars over public transportation reinforces this paradigm.

Energy starts to become an increasingly valuable resource and in order to maximise those resources the Scottish Government sells energy to the highest bidder. As such, multi-nationals increase their grip on society. The self-centred, profit driven system leads to a disparity between the “haves” and the “have-nots”, the rich and the poor. The “haves” have access to drinking water, health care services, energy and are able to buy patches of land, while the “have-nots” are deprived of most essential services. The “have-nots” start squatting in order to find shelter and poaching increases due to a lack of access to food. By 2030, people are looting the limited water supplies.

Towards the 2050s

This whole system is now characterised by short-term thinking. People have the idea that things could change overnight, so why invest in long-term solutions and investments. A

survival from day-to-day, getting the sandbags out type of mentality prevails over a long-term structural approach. The policy of the Scottish government is also based on this "just-in-time" approach, which makes it more of a crisis management team than a stable government with a long-term vision for the future of Scotland. A lack of long-term (public) investments also makes this society vulnerable to new shocks, such as energy blackouts. Unlike in some other countries, crisis and despair do not bring the people closer together, but rather drives them apart. The health care system that was built on the principles of solidarity goes through a crisis.

The rich are the most resilient to shocks as they have the financial resources to adapt to crises. As a result they increase their grip on society. The rich have private health care and protest against the introduction of a national publicly financed health service. But even the rich cannot escape the volatility of Scottish society in the 2020s completely. Asset stripping becomes common practice amongst those on the management boards of major multi-nationals. The pressure on the poor increases further as rising house prices force them to live on houseboats. Ghettos of poor people living on boats emerge just off the Scottish coast. Initially, the social cohesion in these ghettos is low, but over time religion, faith and spiritualism brings the poorer Scots closer together.

The image of a split country is reported to the rest of the world and causes a crisis in the tourism sector. Tourists are afraid of being robbed and stay away. Scotland is also facing external pressure from the EU to restore its budget deficit and to ensure a proper functioning parliamentary democracy, which does not solely serve the short-term interests of multi-nationals. The EU even warns Scotland to think about leaving if these issues are not properly addressed.

As of 2035 both the "haves" and "have-nots" get used to this system and learn to live with instability, albeit both in very different ways. The "haves" and "have-nots" organise themselves internally. Within each strata of society the overall situation starts to improve as the cooperatives are reinstated and a sufficient degree of innovation ensures survival. By the same token, Scotland remains inequitable and real fundamental problems between the different strata continue to exist. There is no, or very limited contact between the different strata. The poorer Scots work for the richer Scots, but that is the only interaction between them.

In 2045 a small part of the Scottish social elite comes to realise that Scotland can no longer continue to live like this. It has already missed its emission targets by 30% and the water price is over 50 pounds. A small movement of the Scottish social elite considers the historic concept of "sustainability". The movement pleas for a sustainable society in which poor and rich can live in harmony with one another. Initially, the idea is not well received by the poor, nor the rich. The poor have lost their faith in any solution coming from the rich, while the rich are not eager to invest into a transition to a sustainable Scotland. In 2050, part of the Scottish elite starts to fund NGOs to promote sustainable initiatives. A small minority of "have-nots" do welcome this and also increasingly more of the "haves" start to see the potential of a more sustainable development of the Scottish economy. Despite efforts to decrease the gap between both groups, inequality remains a problem because the government is not powerful enough to put measures in place to ensure a sustainable Scottish society.

4.4. The Scottish Play

4.4.1. *The Scottish play scenario elements*

		Profiteers go to community service		Government starts to stockpile grains and cereals	Scottish values, Scots will continue to be Scots	Extreme weather events everywhere	
	Digging for victory	Another poor EU harvest		We are hungry, not starving	Food subsidies	Crop failure	We are hungry too
		Reduce fertiliser use due to energy water costs, use of clover instead	Drought in southeast England		Marginal land becomes more productive		Government sends aid to disaster city
	Scottish government providing bottled water to Northern Ireland	Prioritising social equity, scarce resources may be directed towards social issues benefiting society as a whole - with less emphasis on adaptation measures which may be to the benefit of specific locations	North sea fishing collapses. Fish farming expands	Scottish industry limited by need for raw materials	Fertiliser limited to recycled resources	Reduced meat diet	Malaria eradication
		Education a priority to enhance social opportunity	Quality education: food and health education			Change diet: reduce meat and chocolate	
	Community support	Free education for all	Government focussing efforts on child poverty	Free public transport		Growth in recycling industry	
	Education, climate change someone elses problem	Free health services	Government makes good investment for the future			Accepting immigrants	Political unrest outside of Scotland
	No money for climate change	Stronger Scottish government socially responsible	Scotland becomes more resourceful with recycling innovations		Greater community action	Health Glasgow policy succeeds	Fear of future
	No cash for climate adaptation measures		Greater personal responsibility	Blackouts this winter	Greater use of electricity e.g. transport		
	CC mitigation is more important than adaptation		Free cycles for all	Fear over energy security	Bio-phone project failed		
			More money for adaptation		Renewables not delivered	No wind to power turbines	

2011 2025 2050

4.4.2. *The Scottish play scenario dynamics*

The stakeholders did not provide an influence diagram to illustrate the dynamics of The Scottish play scenario.

4.4.3. *The Scottish play scenario storyline*

The scenario logic, dynamics and elements are the building blocks for the development of the scenario storyline. The preliminary, first version, of the scenario has been written by the CLIMSAVE project, but is based on a short presentation of the scenario elements (by one of the participants of the scenario development group) during the workshop and additional notes taken by the CLIMSAVE research team during the discussions.

The first scenario storyline below is a preliminary one. Stakeholders will be given the opportunity to refine it during the second stakeholder workshop.

Storyline

Towards the 2020s

Like many other countries in Europe, Scotland feels the effects of the financial crisis and climate change. Extreme weather events cause a number of poor harvests. The government bails out the agricultural sector by investing more money in climate change mitigation. As a result, the Scottish Government is forced to significantly cut down on public spending. Several health care programmes take budget cuts and funds for climate change adaptation are also low. At the same time, the oil price peaks, increasing the revenues for Scotland. The Scottish Government decides to not cut down on subsidies for education and invests a lot of the oil revenues in educating children about healthy lifestyles and eating habits. Despite the crisis, all children are able to enjoy free education, while the Scottish people still have access to affordable health care. In spite of these difficult times, the economy is still growing marginally by 2020.

The Scottish are very supportive of this approach because the agricultural sector is the backbone of the Scottish economy. Without barley the whisky industry would cease to exist. Moreover, the majority of the Scottish people believe in the government priorities of not cutting spending for education. In the face of these difficult times the Scottish people come together to take on the challenges as a whole. The traditional Scottish values of getting on with it, no desire for excess, and sense of solidarity take the upper hand.

By 2018, the crisis starts to affect the fishery industry and further crop failures occur due to droughts. Because of slow economic growth, Scotland has not invested a lot in renewable energy sources and struggles with the high cost of energy. This cost weighs on normal households budgets across the country. In spite of all this, the Scottish people manage to adapt quite well to problems in the food chain and high energy prices. Some people move to the countryside seeking a better quality of life and cheaper living cost.

Towards the 2050s

The key to making the Scottish people resilient lies in the education system. The decision not to cut education budgets in 2012 now pays off. People have strong confidence in the

education system and the education system teaches the Scottish how to cope with changing conditions. Courses on recycling and food habits feature in the curriculum of most schools by 2025. All strata of society bear the fruit of the investments in the education system. Specific programmes focus on elevating children from poverty through education.

The education system stimulates innovation and creativity in the domains in which Scotland has been struggling for the last 15 years. New techniques are being used to provide fish farms with food, while newly graduated agronomists now manage to cultivate land which was previously uncultivated due to climate change. Because of the wonderful education system the Scottish make better use of what they have and try to adjust to things they don't have. Car owners trade in their cars for free bus passes for the entire family. Health care services are restrained, but because people are better educated they live healthier lives and reduce demands on the health system. People also start to live longer. Immigration into Scotland means that the population is growing.

By 2035, pretty much all Scots have learned to cope with difficult and quickly changing living conditions. By now they know a modest approach, together with a strong social fabric, will help them through the toughest of times. Only a handful of Scots defect from this and still have an unhealthy lifestyle and drive powerful 4x4s.

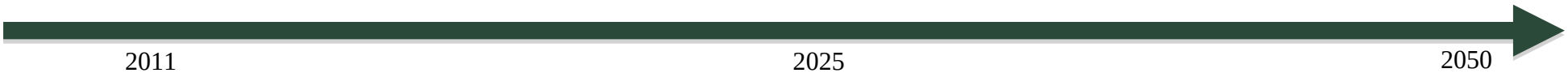
After 10 years of relative sustainable growth, extreme weather events lead again to resource shortages and crop failure. Again people need to adjust their diets. By now Scots are used to the state of flux and adapt quite easily. Deliveries of fossil fuels through pipelines are no longer taking place on a daily basis. Despite a strong emphasis on recycling and renewables, renewables (notably solar energy and hydro power) have not sufficiently lived up to the expectations. The Scottish government now pins all its hope on wind power. But wind power also fails to deliver.

By 2050 the Scots have learned to adapt to changing situations. Communities are coming together in the face of recurring economic troubles, natural hazards or extreme weather events. Economically there might be losses, but a strong degree of social capital mitigates this effect. Outside of Scotland, countries lack the necessary flexibility to deal with natural hazards. This leads to political unrest in some European countries.

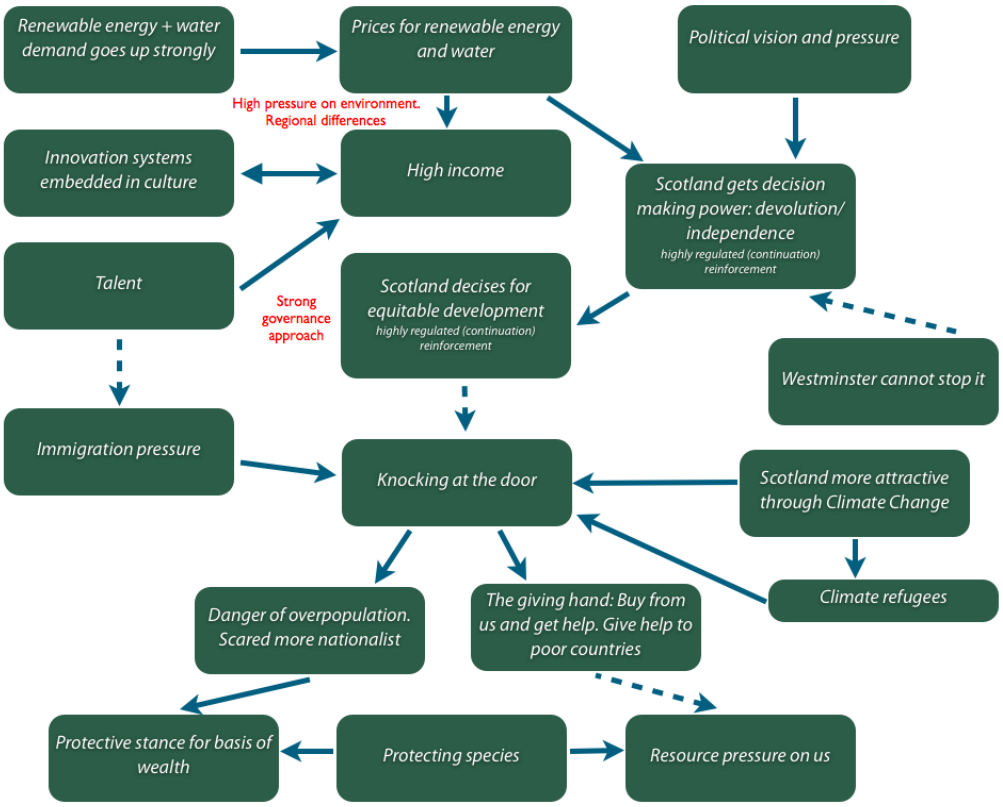
4.5. Mactopia

4.5.1. *Mactopia scenario elements*

					2030 further concerns over immigration from England	Scotland becomes hydrogen exporter	Gender pay gap is closed
				Strong government research policies	Scotland is world leader in new IT sector manufacturing	Scotland opts out of CAP	Scotland's population of 7.5 million reached
				2025: Scotland forest reaches 25% of land cover	Scotland demonstrates low carbon high value living is possible	Scottish hedonistic expat communities in London, France, Poland	2050: Water pipeline to Spain opened
				Scotland spins out more companies/capita than anyone else	Resource wars in Africa and South America	Scotland takes over Norway in terms of wealth + equitable distribution	Homelessness in Scotland hits zero
			Harsh penalties for resource inefficient housing	Share of land for agriculture increases as climate warms	Medical care free to all		Scotland becomes Europe's orchard
			2020 : 25% increase in timber use in construction	Remote communities protest infringement on traditional lifestyle	2030: 1000 miles of rail network in Scotland	Education at all levels free to all	Concerns about immigration from countries who have resource deficit
		Positive economic development	Tax evasion and smuggling attempts	CBI+RSPB Forum agrees on genetic modification of barley	2030: GM drought resistant barley crop saves Scottish whisky industry	Strong communities each self sufficient in energy needs by 2040	
		Sovereign Scotland fund inaugurated	Own Scottish currency	Development of trade with other countries	Rise of nationalist sentiment, inward looking society	Scotland gives renewable technology to poor countries	Value/price of carbon reaches € 500/tonne
		Independence or federal system for UK	Biodiversity damage due to invasive species	Scotland exports water to England	National security concerns about other countries who don't have surplus	Surplus resources used to help other countries, environmental projects	2050: house insulation: 90 % coverage in Scotland
	Inverness conversations on phasing out oil as energy source	Sell surplus resources at high prices		First shipments of water to Mediterranean	People healthier and living longer. Large increase in population. Baby rationing introduced in 2030	Improved climate supports healthier population	
	All homes have broadband internet	National grid 100% energy	Scotland net exporter of renewable energy to Europe	Scotland becomes very attractive tourism destination	Scottish water tanker hijacked on way to Mediterranean		



4.5.2. *Mactopia scenario dynamics*



4.5.3. *Mactopia scenario storyline*

The scenario logic, dynamics and elements are the building blocks for the development of the scenario storyline. The preliminary, first version, of the scenario has been written by the CLIMSAVE project, but is based on a short presentation of the scenario elements (by one of the participants of the scenario development group) during the workshop and additional notes taken by the CLIMSAVE research team during the discussions.

The first scenario storyline below is a preliminary one. Stakeholders will be given the opportunity to refine it during the second stakeholder workshop.

Storyline

Towards the 2020s

In 2011, Scotland takes a conscious decision to embrace the concept of equitable development. To live up to this commitment Scotland makes some important and big decisions to make the concept work for the Scottish people. At the Inverness conversations, which gather representatives from all layers of society, it is decided that oil will be phased out as an energy source in Scotland in favour of renewable energy resources such as hydropower. Moreover, a plan to give all Scottish citizens broadband internet is approved in the Scottish Parliament. This plan creates the possibility for teleworking and increases the level of information for all citizens of Scotland. Many of the transitions towards an equitable and sustainable society require strong regulation from the government. But because the whole of society is behind the transition to an equitable society, it is widely supported and local

communities also contribute to the transition. By the same token, harsh penalties are attributed to those households not switching to renewable energy sources.

This evolution towards equity comes at the backdrop of a positive economic development and a further political widening from the UK. The few years of economic and financial turmoil are now firmly behind Scotland and thus resources become available to make this transition possible. Further devolution from the UK gives Scotland the autonomy it needs to make the transition towards an equitable society possible. Additional incomes are generated from the selling of resources such as water, of which Scotland has a surplus. Because of its comparative advantage over others in the field of water, it can obtain good trade agreements with other countries on innovative resources such as information technology.

Towards the 2050s

The export of water and other products increases the global role of Scotland. A part of the profit of selling the resource surplus is invested in a Sovereign Scotland fund. This fund gives Scotland on the one hand the possibility to ensure the well-being of its population, regardless of its social status, and on the other hand the resources to invest in innovation and other sustainable investments such as a reforestation programme, which would cover 25% of Scotland by 2025, a railway network of 1000 miles by 2030 and research programmes to boost innovation in the field of renewable energy and IT. Resource abundance, and its benefits, bring about the realisation that it would be good to be an independent country, as it would help Scotland to grow even more in the future. A further step is its own currency.

Climate change also has a number of positive effects on Scotland. The share of land for agriculture in eastern Scotland increases due to a warmer climate. The warmer climate also attracts more tourists to Scotland. The Sovereign Scotland fund now bears fruit. In spite of the fact that Scotland is a good place to live by 2025, problems do occur. Tax evasion increases in the heavily taxed Scotland as do illegal activities such as the smuggling of water outside of Scotland to other parts of the world.

By 2035, Scotland attracts a large number of immigrants, notably coming from England. This gives rise to a sentiment of nationalism. Scotland is shocked when a Scottish water tanker is hijacked on the way to the Mediterranean to deliver tap water. This event plus a resource war in Africa and South America leads Scotland to rethink its national security strategy in view of the ever more visible threats of countries having a resource deficit. The strategy aims at protecting all the resources Scotland has, not only commodities, but also its biodiversity and variety of species. But because Scotland is firmly attached to values such as equity and solidarity the protection of its resources does not happen by having an inwards/protective attitude. Establishing healthy trade relationships with rich countries, as well as helping with the (economic) development of poor countries should enable those countries to develop sufficient resources themselves and to keep them at bay.

By 2050, this protective stance has a number of unintended effects. Some remote communities do not buy into this way of life. They like the feudal or clan system and don't want to change. At the other end of the spectrum, some Scots are fed up with the highly regulated society and the fact they are no longer able to live their hedonistic lifestyle. Tax exiles move to London or other major European cities. Although there is some discontent, these are all events at the fringes of Scottish society. By 2055 the Scottish population peaks at 7.5 million, but homelessness hits zero.

5. Quantification of selected key variables and capitals

5.1. The quantification exercise explained

At the workshop stakeholders were asked to take part in both group and individual exercises on quantifying key drivers for input to the set of meta-models within the Integrated Assessment Platform of CLIMSAVE. As only a limited amount of time was available within the workshop, the maximum number of model parameters that could be quantified by stakeholders was estimated to be seven. These seven model variables were selected to provide guidance on the quantification of a much wider range of socio-economic variables used within the meta-models. In addition to these seven model variables, a further five variables relating to capitals (natural, human, social, manufactured and financial) used in the adaptive capacity and vulnerability parts of CLIMSAVE were quantified. The interest in capitals[3] is threefold:

- as a performance measure of the overall wealth of society, showing the ability to sustain standards of human welfare;
- as an indicator of the vulnerability of a system. The higher the exposure to a pressure and the lower the capital stocks the higher is the vulnerability of this system to the pressure; and
- as an indicator of the ability of a society (or region, or sector) to adapt to changing circumstances (such as the increasing exposure to weather extremes). The indicator can be altered by the adaptation options taken.

The following variables were considered:

1. GDP
2. Population
3. Protected areas for nature
4. Food import ratio
5. Arable land used for biofuels
6. Oil price
7. Household size
8. Natural capital
9. Human capital
10. Social capital
11. Manufactured capital
12. Financial capital

Two time scales were distinguished from the present to the 2020s and from the 2020s to the 2050s. Stakeholders were asked to quantify the variables for these two time scales for Scotland as a whole. Further, two Scottish regions were distinguished (lowlands and highlands) to obtain some regional differentiation in the trends and values of the socio-economic variables across Scotland if necessary. Details of the fuzzy sets approach used in the quantification process are reported in Dubrovsky et al. (2011) [4].

[3] For further information on the use and definitions of capitals in CLIMSAVE see Omann et al. (2010). Report on the development of the conceptual framework for the vulnerability assessment. Available from www.climsave.eu.

[4] Please note that in the workshop only Steps one and two of the quantification exercise were undertaken. Step three in which the results are analysed was undertaken by the CLIMSAVE research team. Further information on the fuzzy sets methodology is given in Dubrovsky et al. (2011). Report on the European driving force database for use in the Integrated Assessment Platform. Available from www.climsave.eu.

The fuzzy sets approach consisted of three steps.

Step One: Group exercise
Stakeholders were asked to indicate in linguistic form the scenario trends for the 12 key variables. For example, the population in Scotland in the period 2010-2025 will be "high". Participants were asked to discuss this with the other participants of their scenario developing group and to come up with a group answer. To this end, each group was provided with one page for each of the variables in which they could fill in their best estimates about how that variable might develop under the specific storyline assumptions. To assist the stakeholders with this exercise a number of reference figures or tables were provided. Each group was also supported by a CLIMSAVE expert and a facilitator.

Expressing these trends in linguistic form is consistent with the linguistic form of the storylines developed by the stakeholders. Key variables described in word form can be more easily and naturally included in the storylines. Furthermore, it is much more practical for a group of stakeholders to agree on a qualitative description of a key variable ("medium increase") than on a numerical value ("2% per year"). Moreover, it is also likely that the stakeholders are more competent to specify qualitative values of different key variables than exact numerical values.

Step Two: Individual exercise
In order to translate these (qualitative) linguistic variables into (quantitative) information the stakeholders were asked in a second step to individually complete a work sheet in which they provided information on what they meant by, for example, a "medium" value. For the individual exercise stakeholders were not allowed to discuss their choices with others.

Step Three: Defining the translation key and computing the numerical values
The answers from the individual work sheets were analysed by the CLIMSAVE research team to define a "translation key"[11] that can be used to convert the trends of the key variables in word form to numerical form. This is then applied to the scenarios to produce the quantitative values needed to run the different meta-models of the Integrated Assessment Platform.

5.2. Step One: Results of the group exercise

The stakeholders were asked to give an answer to the following questions:

1. What is the GDP growth in the 2020s/2050s in percent per annum?
2. What is the annual growth rate in population in the 2020s/2050s?
3. What is the ratio of land protected for nature in the 2020s/ 2050s?
4. What is the percent of food that is imported in the 2020s/2050s?
5. What is the percentage of arable land used for biofuel production in the 2020s/2050s?
6. What is the oil price per barrel in the 2020s/2050s?
7. What is the household size in the 2020s/2050s?
8. What will be the changes in natural capital in the 2020s/2050s?
9. What will be the change in human capital in the 2020s/2050s?
10. What will be the change in social capital in the 2020s/2050s?
11. What will be the change in manufactured capital in the 2020s/2050s?
12. What will be the change in financial capital in the 2020s/2050s?

For the questions on GDP, population, protected areas for nature, food import ratio, arable land used for biofuel production, oil price and household size the stakeholders could choose one of the following answers:

vl = very low
l = low
m = medium
h = high
vh = very high

For the questions on the capitals the stakeholders could choose one of the following answers:

h+ = high increase
m+ = moderate increase
0 = no changes
m- = moderate decrease
h- = high decrease

Table 3 shows the qualitative trends for the seven key modelling variables for the whole of Scotland. Only two scenarios specified regional differences for a single variable. In the Mad Max scenario, regional disparities in population become apparent in the 2050s with the highlands indicated as "low" and the lowlands indicated as "medium". In the MacTopia scenario, regional differences in the ratio of land protected for nature were indicated for the 2020s time slice with the highlands indicated as "very high" and the lowlands as "medium".

Table 3: Specification of trends in key variables in linguistic terms for the four scenarios for the whole of Scotland.

	GDP	**Population**	**Protected areas**	**Food imports**	**Arable land for biofuels**	**Oil price**	**Household size**
2020s:							
Tartan spring	h	m	m	m	l	h	m
Mad Max	l	l	vl	l	h	h	h
The Scottish play	l	l	vl	m	vl	h	l
MacTopia	vh	h	h	m	m	vh	m
2050s:							
Tartan spring	vh	l	l	m	vl	vh	h
Mad max	l	m	vl	l	l	l	vh
The Scottish play	vl	m	vl	vl	vl	l	m
MacTopia	h	m	m	h	vl	h	m

Table 4 shows the qualitative trends for the five capital variables for the whole of Scotland. No regional differentiation was indicated for any scenarios or capitals, but the Tartan spring scenario did differentiate human capital between the 20% of the population who were rich (human capital indicated as m+ in the 2020s and h+ in the 2050s), the 40% who were poor

(human capital indicated as 0 in both time periods), and the 40% who were very poor (human capital indicated as 0 in the 2020s and h- in the 2050s).

Table 4: Specification of trends in capitals in linguistic terms for period for the four scenarios for the whole of Scotland.

	Natural	**Human**	**Social**	**Manufactured**	**Financial**
2020s:					
Tartan spring	m+	m+	m-	m+	m+
Mad Max	h-	m-	h-	m+	m-
The Scottish play	m+	h+	h+	m+	m-
MacTopia	h+	h+	h+	h+	h+
2050s:					
Tartan spring	h+	m+	h-	h+	h+
Mad Max	m+	m-	m+	m-	m-
The Scottish play	m+	m+	h+	0	0
MacTopia	m+	h+	h+	h+	h+

5.3. Steps Two & Three: Results of the individual exercise, defining the translation key and computing numerical trends of key variables

The work sheets from the individual exercise in which stakeholders were asked to provide quantitative ranges for what they meant by each of the linguistic classes, e.g. low or medium, were analysed by the CLIMSAVE researchers to develop a translation key. The centre of gravity was used to calculate a single number associated with a particular scenario and this is used to define the default position of the socio-economic slider in the Integrated Assessment Platform (IAP). This measure takes account of the entire set of numbers and their distribution and hence better considers estimates at the upper or lower edges compared to the average or median value. The maximum and minimum values from the analysis of the results of the individual exercise are used to define the upper and lower "credible" range for the IAP slider. This allows the user to investigate uncertainty associated with the socio-economic variable that is still considered to be consistent with the underlying storyline.

Table 5 shows the translation key for the centre of gravity and Table 6 shows the centre of gravity and minimum and maximum values for the "medium" category for the seven socio-economic variables. Table 7 shows the quantified values of the seven socio-economic variables for the two time slices used in the Integrated Assessment Platform (2020s and 2050s) and the four stories.

Table 5: Translation key for the centre of gravity obtained from the fuzzy sets approach.

	GDP	Population	Protected areas	Food imports	Arable land for biofuels	Oil price	Household size
Very Low	-3.75	-0.43	13.50	20.00	1.77	48.33	1.23
Low	-1.00	0.67	17.33	28.17	4.83	96.67	1.90
Medium	1.33	2.06	20.33	40.00	10.33	151.67	2.50
High	3.83	3.20	26.00	48.83	15.67	243.33	3.10
Very High	5.67	3.28	34.00	63.33	23.92	440.00	3.77

Table 6: Centre of gravity and minimum and maximum values for the "medium" category for the seven socio-economic variables.

Driver	Centre of gravity	Lower margin	Upper margin
GDP [%]	1.33	-1.00	4.00
Population [%]	2.06	0.00	6.00
Protected areas [%]	20.33	12.00	25.00
Food imports [%]	40.00	3.00	70.00
Arable land for biofuels [%]	10.33	1.00	20.00
Oil price [$/barrel]	151.67	55.00	300.00
Household size [number]	2.50	1.75	3.50

Table 7: Quantified values for the centre of gravity for the four Scottish stories.

	GDP	Population	Protected areas	Food imports	Arable land for biofuels	Oil price	Household size
Tartan spring							
2020s	3.83	2.06	20.33	40.00	4.83	243.33	2.50
2050s	5.67	0.67	17.33	40.00	1.77	440.00	3.10
Mad Max							
2020s	-1.00	0.67	13.50	28.17	15.67	243.33	3.10
2050s	-1.00	2.06	13.50	28.17	4.83	96.67	3.77
The Scottish play							
2020s	-1.00	0.67	13.50	40.00	1.77	243.33	1.90
2050s	-3.75	2.06	13.50	20.00	1.77	96.67	2.50
MacTopia							
2020s	5.67	3.20	26.00	40.00	10.33	440.00	2.50
2050s	3.83	2.06	20.33	63.33	1.77	243.33	2.50

6. Concluding remarks

6.1. Remarks on the storyline development process

At the end of the workshop stakeholders were asked to give their view on the scenario development process so far. This resulted in the following comments:

Overall a feeling of satisfaction:
"First time I have been involved in scenario development, interesting process.", "Development of storylines very good, jury still out on quantification", "Excellent and very informative", "I am new to it, very interesting, but it looks to be valuable", "It has been an interesting experience which I have both enjoyed and found interesting", "Engaging and through provoking".

Stakeholders remain cautious over the outcomes/impact of the process:
"Interesting, but insufficient thought about end users", "Not sure it really accommodated global drivers and interactions", "Effective, though I was concerned about the external impacts on the scenarios", "Achieved a lot in available time. Remains to be seen if there are any serious gaps once modellers start working on them".

Random remarks:
"Difficult to keep the linkages to the core work area of climate change adaptation", "As expected", "Perhaps limited by time".

6.2. Remarks on the quantification of the key variables

At the end of the workshop stakeholders were asked to give their view on the quantification of key variables. This resulted in the following comments:

Overall stakeholders were less satisfied with the qualification exercise:
"Not as good as the scenario building", "Less satisfactory than the scenario development. Assigning numbers to parameters I don't know was not easy for me. Perhaps a wider set of parameters is better".

Many stakeholders also found it difficult to give adequate answers:
"Very complex, would have been better done as a group with facilitator", "Could have been better prepared with baseline data", "Not sure my guesswork provides added value". "Complicated, may requires iteration", "Challenging".

Random remarks:
"Numbers session possibly done before - full discussion needed", "Worried about the consistency of quantities between the four scenarios", "5-10 minutes extra on this before the first step would have been good. Was not able to indicate negative growth on a couple of indicators, exercise should have allowed to do this", "Could be better".

6.3. Conclusions

The stakeholders were satisfied with the overall process of the workshop. Most stakeholders indicated their satisfaction with the process and their willingness to return for the second and third workshops. The most frequent criticism was that the quantification session was very

difficult for most of the stakeholders as they believe they don't always have the knowledge to answer adequately.

There was widespread satisfaction with the results that were produced. A list of driving forces and main uncertainties was agreed upon and four preliminary scenarios have been developed. The results provide an excellent basis as input for the different meta-models used in the CLIMSAVE Integrated Assessment Platform.

Content-wise, the scenarios can and will be improved, but the stakeholders provided many concrete points of criticism to base the improvements on.

7. Next steps

The second out of a series of three workshops will be held on 27-28 February 2012 in Edinburgh, Scotland. During this workshop the preliminary storylines will be refined and finalised. At the workshop stakeholders will also have the opportunity to have their first interaction with the Integrated Assessment Platform (IAP). To this end, the CLIMSAVE research team will insert the values of the fuzzy set exercise into their meta-models within the IAP with which the stakeholders will interact.

Annex I: Agenda

Monday 27 June 2011

10.00-onwards Registration

WELCOME & GENERAL INTRODUCTION

10.30 Welcome – Prof. Mark Rounsevell (University of Edinburgh)

Introduction to the CLIMSAVE project – Prof. Mark Rounsevell (University of Edinburgh)

CLIMSAVE input for Scottish policy processes – Dr. Joseph Hagg (SCCIP)

Overview of workshop – Dr. Marc Gramberger (Prospex)

UNCERTAINTIES

11.30 Uncertainties - Prof. Kasper Kok (University of Wageningen) & Dr. Marc Gramberger (Prospex)

Expanding, refining and working out uncertainties - participants

12.30 Lunch

13.30 Continuation of morning session on uncertainties

SCENARIO LOGIC

14.15 Defining scenario logics and characterising the scenarios – participants

15.30 Coffee / Tea

SCENARIO ELEMENTS & DYNAMICS

15.45 Identifying scenario elements and dynamics – participants

DEVELOPING SCENARIO STORYLINES

17.15 Creating scenario timelines – participants

18.15 Wrap-up

18.30 End of day's work

Tuesday 28 June 2011

09.00 Overview of the day – Dr. Marc Gramberger (Prospex)

09.10 Presentation of results – participants

10.10 Incorporating feedback and link to climate change assumptions

11.00 Coffee / Tea

QUANTIFIABLE STATEMENTS

11.15 Making quantifiable statements – participants

12.45 Lunch

13.45 Continuation of morning session on quantifiable statements

14.20 Defining categories – participants

NEXT STEPS AND CLOSURE

15.20 A preview of the IAP: Integrated Assessment Platform – Dr. Ian Holman (University of Cranfield)

15.40 Next steps - Prof. Kasper Kok (University of Wageningen)

Final reactions and evaluation

Closure – Prof. Mark Rounsevell (University of Edinburgh)

16.30 End of workshop

Annex II: List of Participants

Participants:

Baarda	Phil	Scottish Natural Heritage (SNH)
Bauer	Andrew	National Farmers Union Scotland (NFUS)
Brown	Iain	The Hutton Institute
Christie	Mary	Scottish Natural Heritage (SNH)
Crichton	David	AON Benfield Hazard Research Centre
Cook	Graeme	The Scottish Parliament Information Centre (SPICe)
Densham	Jim	Royal Society for the Protection of Birds (RSPB)
Dlugolecki	Andrew	Andlug Consulting
Duncan	Diane	Highlands and Islands Enterprise
Edmond	Graham	Transport Scotland
Esson	Graham	Perth and Kinross Council
Garden	Morag	Scotch Whisky Association
Hagg	Joseph	Adaptation Scotland
Jacques-Turner	Miranda	Scottish Water
Kerr	Andy	Edinburgh Centre for Climate Change
Kosciewicz-Fleming	Linda	The Scottish Government
Lax	Alison	Cairngorm National Park Authority
Matheson	Lyn	Soil Association
Ormiston	David	North Lanarkshire Council
Ray	Duncan	Forest Research
Simpson	James	The Scottish Government
Singleton	Peter	Scottish Environment Protection Agency (SEPA)
Street	Roger	UKCIP
Tarvit	George	Sustainable Scotland Network (SSN)
Tipper	Richard	Ecometrica
Topp	Kairsty	Scottish Agricultural College (SAC)
Wolstenholme	Ruth	SNIFFER

Scientific advisors:

Harrison	Paula	University of Oxford	Senior Research Scientist
Holman	Ian	Cranfield University	Senior Lecturer
Jäger	Jill	SERI	Senior Researcher
Kok	Kasper	University of Wageningen	Assistant Professor
Metzger	Marc	University of Edinburgh	Senior Research Fellow
Mark	Rounsevell	University of Edinburgh	Professor
Stuch	Benjamin	CESR – University of Kassel	Researcher

Process facilitators:

Gramberger	Marc	Prospex bvba	Lead facilitator
Rakers	Peter	Prospex bvba	Facilitator
Watson	Martin	Prospex bvba	Facilitator
Eraly	Emmanuel	Prospex bvba	Facilitator

Annex III: Proposed socio-economic drivers and main uncertainties

1. Influence of local communities: The degree to which local communities have influence on important (national) regulations, treaties, and laws.
High: local communities are well organised, connected, and have a strong influence on national decision-making.
Low: local communities are unstructured, communicate poorly among each other, and have little influence on the national government.

2. Social behaviour: Behaviour taking place between humans relative to others in a group.
Individualised: Behaviour is highly individual and aims at satisfying individual goals.
Collectivised: Behaviour is highly collective and aims at (also) pursuing goals that benefit the whole group.

3. Economic growth: Growth of Gross Domestic Product both in total and per capita.
Gradual: Economic growth will be largely without recessions or excessive increases.
Rollercoaster: Economic growth will include multiple strong recessions and strong rebounds.

4. Food and energy security: The way in which demand for food and energy are satisfied.
Depend on import: demand for food and energy is satisfied by importing it; there is no focus on biofuel or other forms of energy production.
Self-sufficiency: demand for food and energy are as much as possible satisfied by national production; energy production is increased by programmes to decrease demand.

5. Adoption of technological innovations: The degree to which new technologies are being developed, tested, and adopted in Scotland.
Pervasive: New technologies are readily available for everyone and everywhere, and innovations take place in many sectors.
Patchy: Technological innovation is focused on certain sectors.

6. Environmental regulation: The type of environmental laws and regulations, and the way they are implemented and enforced.
Integrated: Regulations are mostly cross-sectoral address and integrated issues (e.g. land use or climate).
Sectoral: Regulations are mostly sectoral and address specific issues (e.g. water use); and are national.

7. Population & migration: Population development in terms of natural growth as well as migration patterns.
Out-migration: land abandonment and depopulation are dominant in most regions.
In-migration: Tourists, labour, and citizens are attracted leading to a net immigration.

8. Threat of war and amount of violence and crime: the amount of violent incidences; crime rates; and international tensions.
High: the world is increasingly unsafe, with locally high crime rates and violence and with internationally building tensions between power blocks.
Low: the world is increasingly safe, with local stronger community feeling and social control and with internationally increasing levels of trust.

9. Social and environmental responsibility of non-state actors: The efforts of non-state actors to maintain or increase social, human or natural capital such as private universities, hospitals, or certification systems (timber, soya).
High responsibility: Non-state actors take a proactive attitude and active role in solving social and environmental problems.
Low responsibility: Non-state actors put the responsibility for social and environmental issues with the public actors.

10. Lifestyle: Behaviour and activities of consumers.
'Green': activities that lead to the consumption of fewer resources, with increasing attention for environmental consequences.
Unsustainable: activities that are increasingly towards a lifestyle that favours consumerism and materialism, with little attention for environmental consequences.

11. Impact of climate change on human society: The effects of changes in temperature, precipitation, and sea level rise on the functioning of human society.
Low: Climate change impacts on society are low in Scotland. Human society will not be fundamentally altered.
High: Climate change impacts on society are high in Scotland. Human society will be fundamentally affected.
(Note: this does not relate to mitigation or adaptation options, but to the fundamental interactions between the social and environmental subsystems).

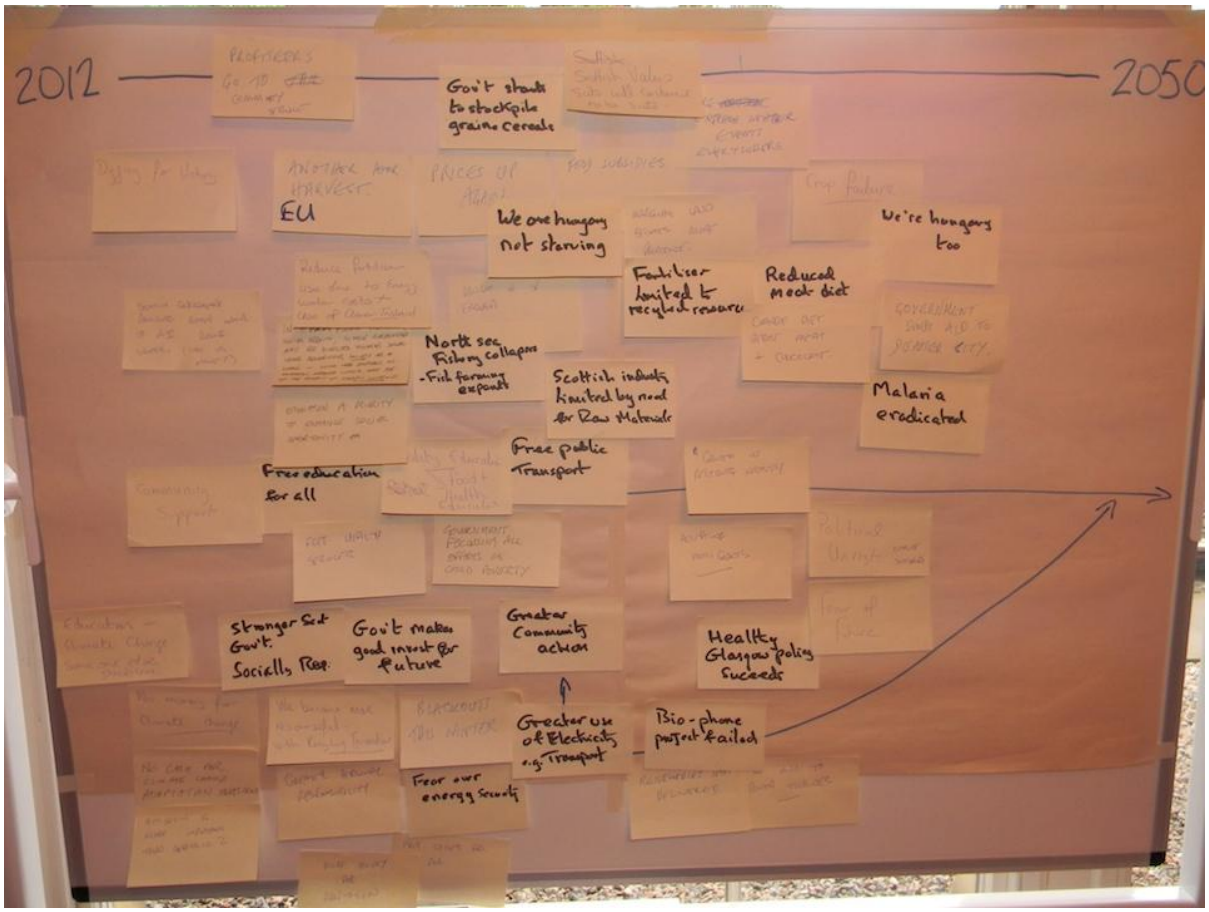
12. Globalisation: The degree and the scale at which flows of materials and knowledge are restricted.
Global: There are little to no limitations to flows of materials and knowledge.
National: There are strong barriers to flows of materials (e.g. trade barriers) and knowledge (e.g. low degree of technology diffusion).

Annex IV: Original workshop outputs

Original flip-chart and post-its of the "Tartan spring" scenario elements:

Original flip-chart and post-its of the “Mad Max” scenario elements:

Original flip-chart and post-its of the “Scottish play” scenario elements:



Original flip-chart and post-its of the “MacTopia” scenario elements:

Original influence diagram of the “MacTopia” scenario: