CIVITAS
Sustainable and smart mobility for all
2030

TRANSITION PATHWAYS Lesson on ‘Policy Strategy Mix selection’

Choosing the right policy strategy mix to meet long-term visions and carbon targets

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vectos. | PART OF SLR

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1

What is the tool + why is there a need?

What is this lesson about?

- Climate change and the need for dramatic carbon reduction from transport related activity is a particular aspect of city planning that has become increasingly important in policy decision making in recent years.
    - Emerging climate targets typically look forward 30 years to 2050.
- The transition to achieve net-zero carbon targets by 2050 requires radical and urgent change to existing policies.
- However, cities often lack the knowledge and expertise to understand how different scales and timings of policy strategies impact on carbon emissions…….especially when dealing with such long timescales.
- This lesson will provide guidance and introduce a tool to fill that knowledge gap and help cities understand the implications of different policy strategies.

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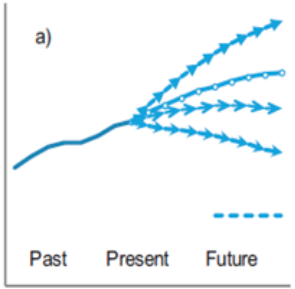
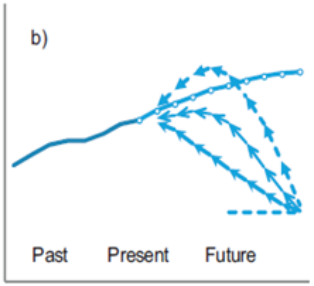
The need for a new approach to policy strategy selection

- Traditional approaches to policy making tend to be based on the ‘predict and provide’ approach to transport planning – in which future travel demands are ‘forecast’ from the current situation, the implications assessed and policy choices made based on this forecasting.
- Making decisions based on forecasts of how mobility demand will evolve in the future may be feasible for up to 10-year timescales…. …..but becomes non-viable for longer term predictions up to 30 years in the future as uncertainty becomes too great to allow fact-based decision making.
- To be able to plan policies to address longer term (and more radical) goals and targets requires a different approach.
- The approach described in this lesson provides a ‘backcasting’ frame to identify policy strategies needed to reach the desired future, rather than ‘forecasting’ from the current situation.
- Backcasting rather than forecasting is also more suitable where radical change is proposed, which is necessary if net-zero carbon targets are to be reached.



Forecasting approach



Backcasting approach

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How the policy strategy mix selection relates to the Transition Pathway methodology

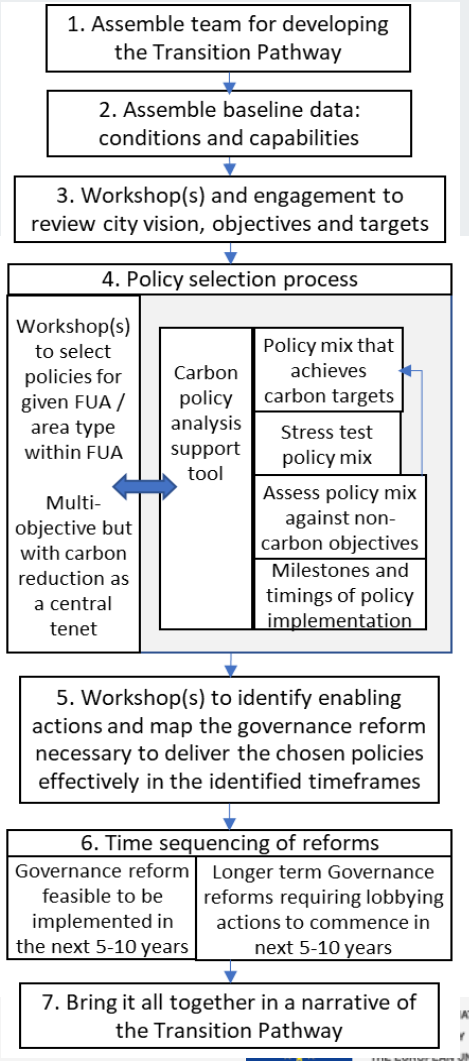
Policy strategy selection within the Transition Pathway process

The task of establishing the most suitable policy strategies for long-term planning sits within the wider process of transition - from where we are now to where we need to be by 2050. This transition involves not only identifying the policies needed to get us there, but also the reforms in governance and the strengthened cross sector collaboration required to support and enable the delivery of these policies.

This process of transition is described through a Transition Pathway (TP). Within the SUMP-PLUS project the Transition Pathway methodology has been developed and is explained in the resources found under the introductory section of the Transition Pathways module.

In short, developing a Transition Pathway is a Participatory process – it is developed through a series of workshops involving active engagement of a broad range of city stakeholders at each step. There are 7 steps in the TP process as illustrated in the adjacent diagram.

Policy strategy selection is the 4th step in the process.



Policy strategy selection within the Transition Pathway process

Policy strategy selection must be undertaken with multiple objectives in mind (e.g. safety, congestion reduction, equity and inclusion, economic growth, etc), but with carbon reduction as a central focus.

Because climate change is a multi-sectorial problem, the links between mobility and other sectors that generate mobility demand, or impact on transport carbon emissions, need to be better developed and integrated in the policy planning process (spatial planning, health, tourism, retail, energy, etc.)

This is undertaken through a series of workshops to decide on the mix of policy strategies that are required to meet the long-term city vision objectives related to urban mobility. The lesson in the Stakeholder Engagement sub-course provides guidance on how to undertake this type of multi-stakeholder participatory workshop.

Participatory workshops

- So within Step 4 of the transition pathway we are establishing the policy strategy choices (and their timings) that will achieve the future 2050 vision carbon targets. There may be multiple different policy strategy mixes that reach the target.
- In doing so we consider the impacts of these carbon focussed policy choices on other mobility objectives ……. to promote those with synergies and avoid those that conflict.
- Then assess the governance reforms needed to enable delivery of the policy choices that address long-term carbon targets……..revisiting policy choices where necessary reforms associated with the policy are viewed as impossible.

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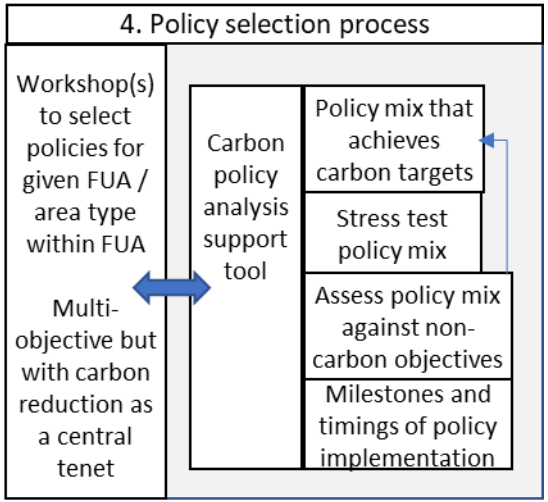
The Carbon Reduction Strategy Support Tool

The Carbon Reduction Strategy Support Tool



- The Carbon Reduction Strategy Support Tool has been developed by the SUMP-PLUS project to assist cities in identifying a suitable mix of high-level policy strategies, and their timings, that will achieve carbon targets while also respecting and supporting the other objectives that cities are looking to deliver.
- The tool is useful for cities as a stakeholder and political engagement tool to help inform workshop discussions and decision making when developing their long-term policy strategies and defining transition pathways to net-zero carbon.
- The tool provides a ‘backcasting’ frame to identify strategies needed to reach the desired future, rather than ‘forecasting’ from the current situation.
- This section introduces the logic behind the carbon calculation in the tool and then the next section describes how to use the tool and the outputs the tool provides.

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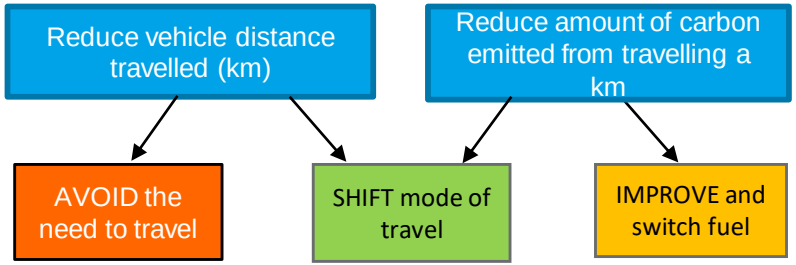
The Carbon Reduction Strategy Support Tool

Fundamentally there are 2 factors that impact on carbon emissions from transport. These are the number of kilometres vehicles travel and the amount of carbon emitted from travelling a km, defined by the fuel efficiency and carbon intensity of the vehicle used.



Reducing carbon requires

i. **Avoiding** the need to travel by substituting physical travel with digital access to services/home delivery or avoiding the need to travel long distances through localisation;

ii. **Shifting** mode of travel from car to more sustainable alternatives;

iii. **Improving** engine efficiency/carbon intensity of fuel so that each kilometre of travel emits less carbon (including switching vehicle fleet to battery electric and accounting for the level of electricity generation by source (renewables/nuclear/fossil fuels).

The Carbon Reduction Strategy Support Tool allows cities to explore different options for a number of strategies related to these Avoid/Shift/Improve policy areas to gauge their likely effectiveness.

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The Carbon Reduction Strategy Support Tool

The policy strategies included in the tool are:

AVOID policy – 4 strategies

Avoid the need to travel by substituting physical travel with digital access to services/home delivery

a. commuting trips avoided due to home working
b. personal trips (e.g. banking, health) avoided due to digital access to services
c. shopping trips avoided due to home delivery

Avoid the need to travel long distances through localisation

d. daily trips for shopping, leisure, personal trips, education activities localised within 15-minute walkable neighbourhood

Related to each of these strategies, the user can select from different levels of uptake or levels of improvement they expect by a certain date that they provide. The tool then estimates the likely levels of carbon reduction associated with the user inputs.

SHIFT policy - Shift mode of travel from car to sustainable modes

<3km: promote shift from car to walk / cycle
3km-8km: promote shift from car to cycle / PT
>8km: promote shift from car to PT / carpool

IMPROVE policy - impact on average gCO2e/km

a. Improving fuel efficiency of conventional petrol/diesel engines
b. Improving fuel emissions by switching vehicle fleet to battery electric
c. Improving electricity generation by switching to renewables
d. Improving energy efficiency of electric batteries

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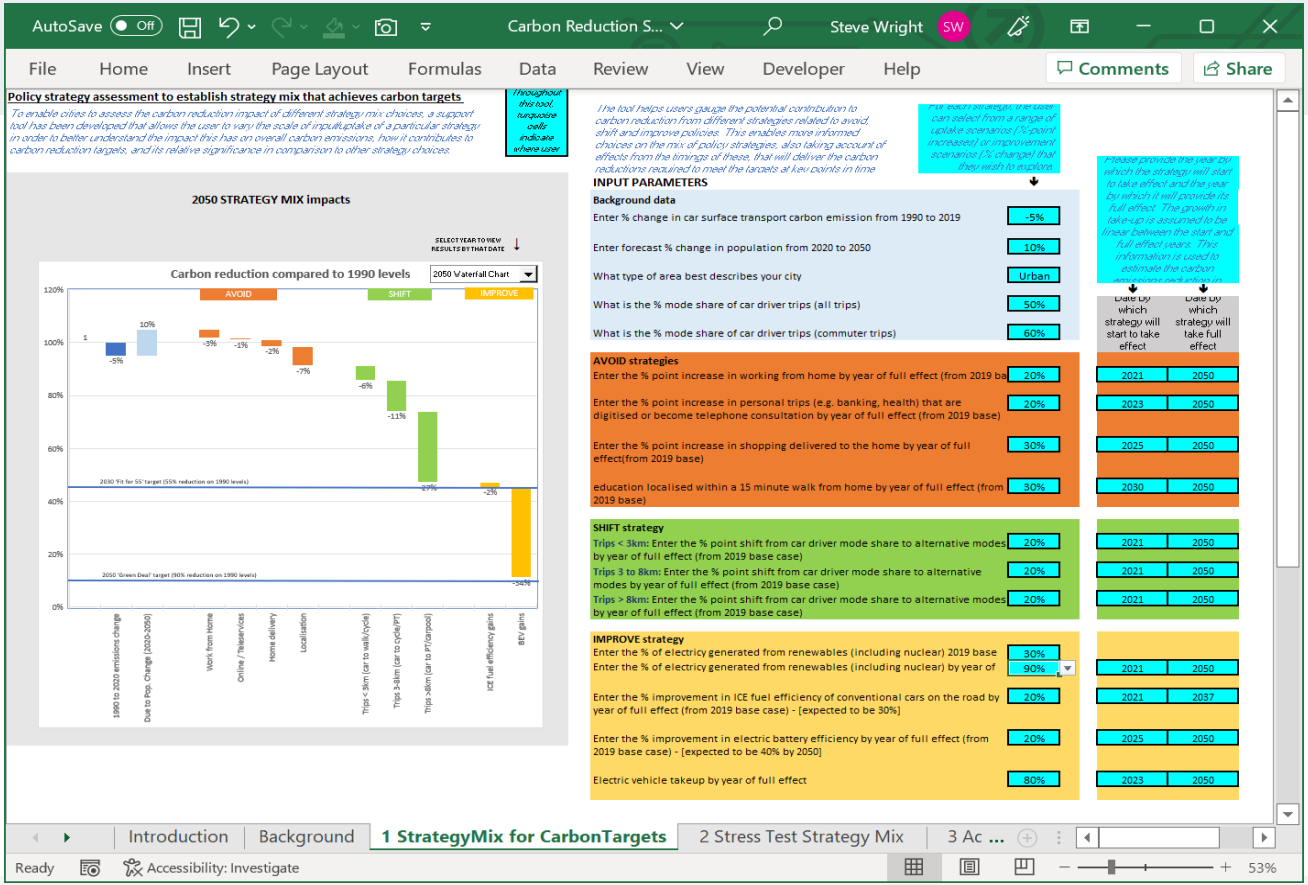
Applying the Carbon Reduction Strategy Support Tool

The Carbon Reduction Strategy Support Tool



Worksheet 1

Adjacent is an example of the initial Strategy Mix selection worksheet.

Some simple background data for the city is entered and then the user selects the levels of uptake or levels of improvement for each strategy between a pair of 'start' and 'full effect' dates.

The 'waterfall chart' on the LHS is output – see next slide.

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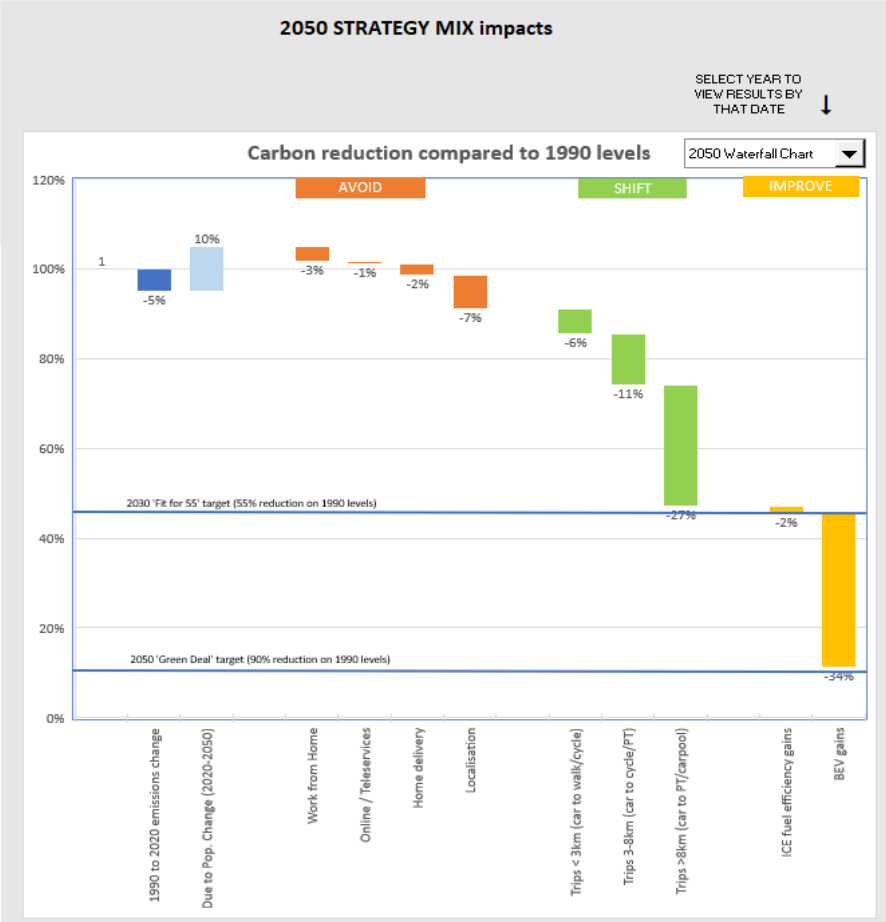
The Carbon Reduction Strategy Support Tool

Worksheet 1 - Tool outputs

The output displays the amount of carbon reduction related to each strategy input scenario in the form of a waterfall chart showing carbon reductions at a point in time (e.g. 2030 or 2050) - see adjacent Figure.

These enable the user to see how close their input choices bring them to the defined carbon reduction targets.

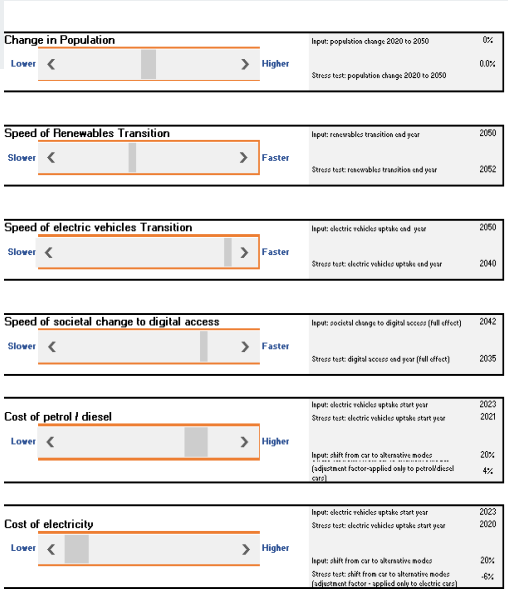
The user can then explore the input scenarios required in order to reach the future target – this is done by adjusting levels of uptake / levels of improvement associated with different strategies.

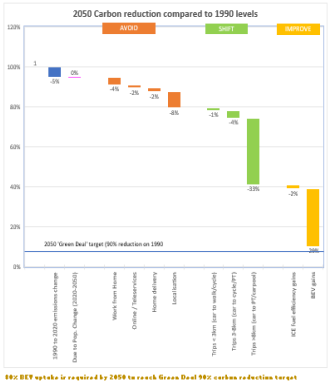


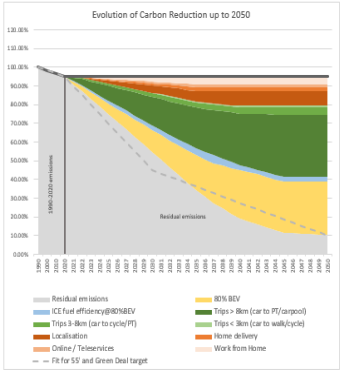
The waterfall diagram above shows the estimated % carbon reduction at a single point in time, in this case 2050 (compared to 1990 levels), likely to be delivered by each policy strategy given the inputs (levels of uptake/improvement) specified by the user. It shows one possible mix in levels of uptake in avoid, shift and improve strategies that is likely to achieve the Green Deal target of 90% reduction by 2050.

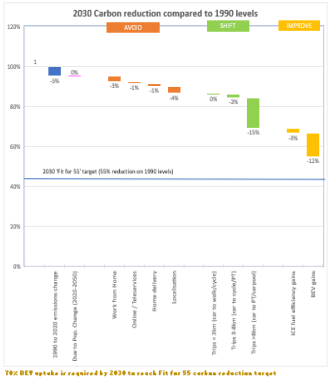
The Carbon Reduction Strategy Support Tool

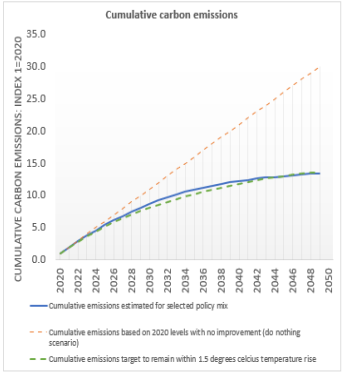
Tool outputs











Worksheet 2 Tool outputs

This figure shows the Tool outputs relating to the Stress Testing. Using the slider bars, the user can explore the effects of different futures. The diagrams to the right of the slider bars illustrate the impact on carbon reduction of these different futures.

Worksheet 2

Having obtained an initial policy mix that is likely to attain carbon reduction targets for future years, the resilience/ robustness of the policy strategy choices can be stress tested in the face of alternative futures.

This is done in the second worksheet of the tool by exploring the impacts of changes in key external factors (population growth/decline, speed of renewable energy transition, speed of societal transition to digital technologies, cost of petrol/diesel/electricity etc.).

If the stress testing reveals the policy strategy mix to be weak in the face of plausible alternative futures, then mix inputs should be adjusted in Worksheet1 to strengthen resilience to change.

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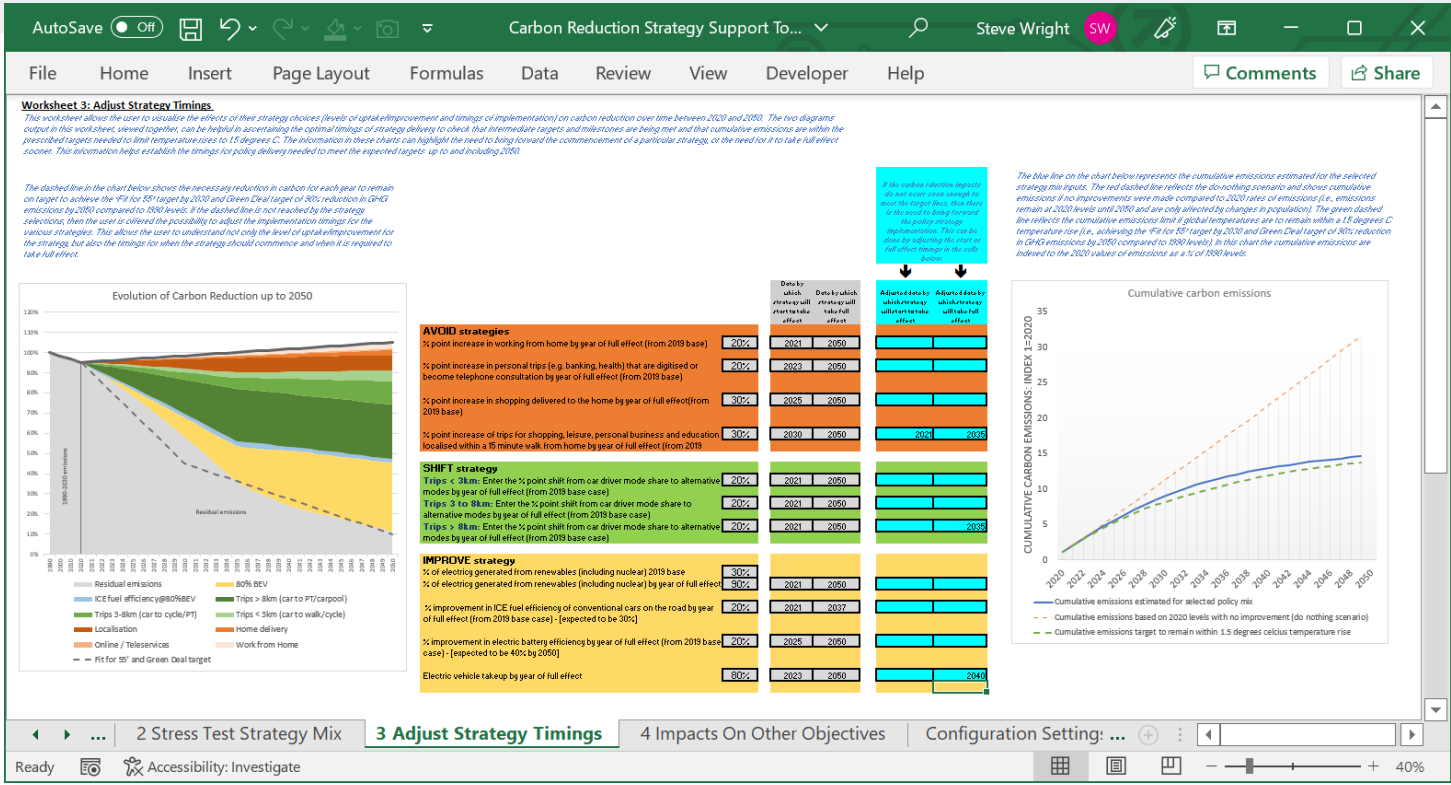
Worksheet 3

The timings of strategy implementation can also be explored by viewing how changes to this can affect overall (cumulative) carbon emissions as well as contributions to intermediate targets prior to 2050.

Worksheet 3 allows the user to adjust the strategy implementation start date and fully-effective date to asses the impact of this.



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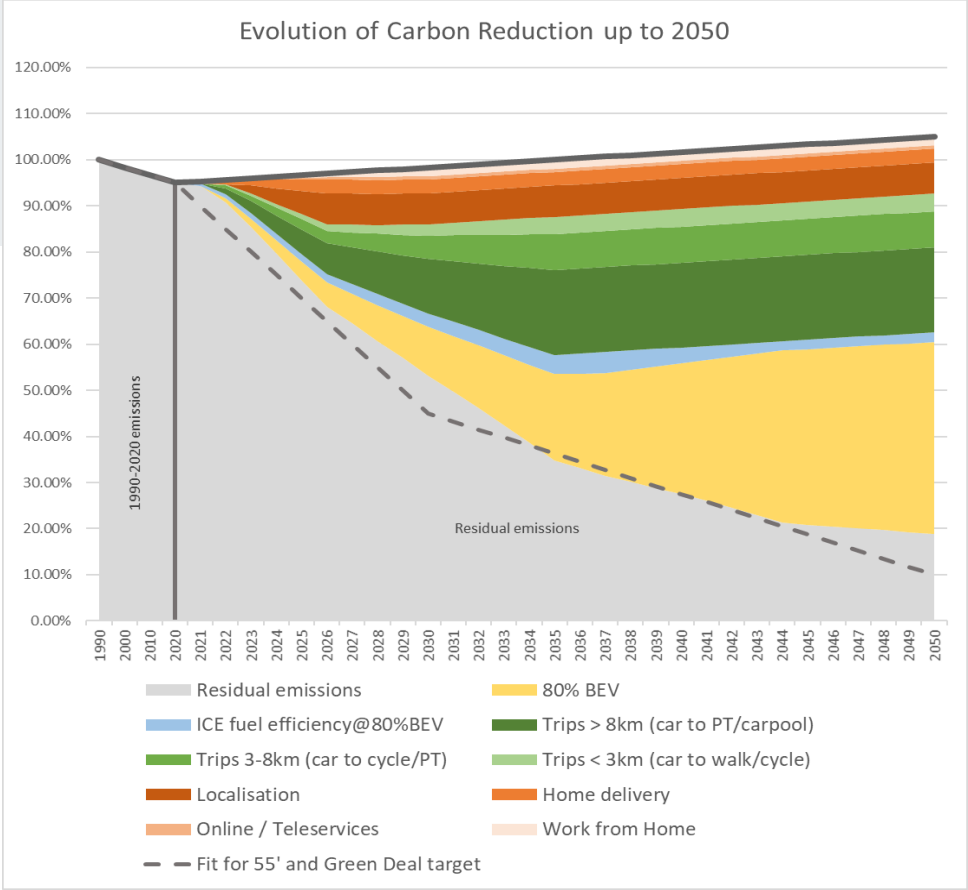
Worksheet3 Tool outputs - Evolution of carbon reduction between 2020 and 2050 for each strategy

The dashed line in the adjacent figure shows the necessary reduction in carbon for each year to remain on target to achieve the 'Fit for 55' target by 2030 and Green Deal target of 90% reduction in GHG emissions by 2050 compared to 1990 levels.

The contribution towards this from the input options selected for each policy strategy is shown for each year by the coloured stacked area plots.

If the dashed line is not reached by the policy strategy selections, then the user is offered the possibility to adjust the implementation timings for the various policy strategies. This allows the user to understand not only the level of uptake/improvement for the policy strategy, but also the timings for when the strategy should commence and when it is required to take full effect.



Example output - Evolution of carbon reduction associated with each policy strategy scenario between 2020 and 2050 for each strategy

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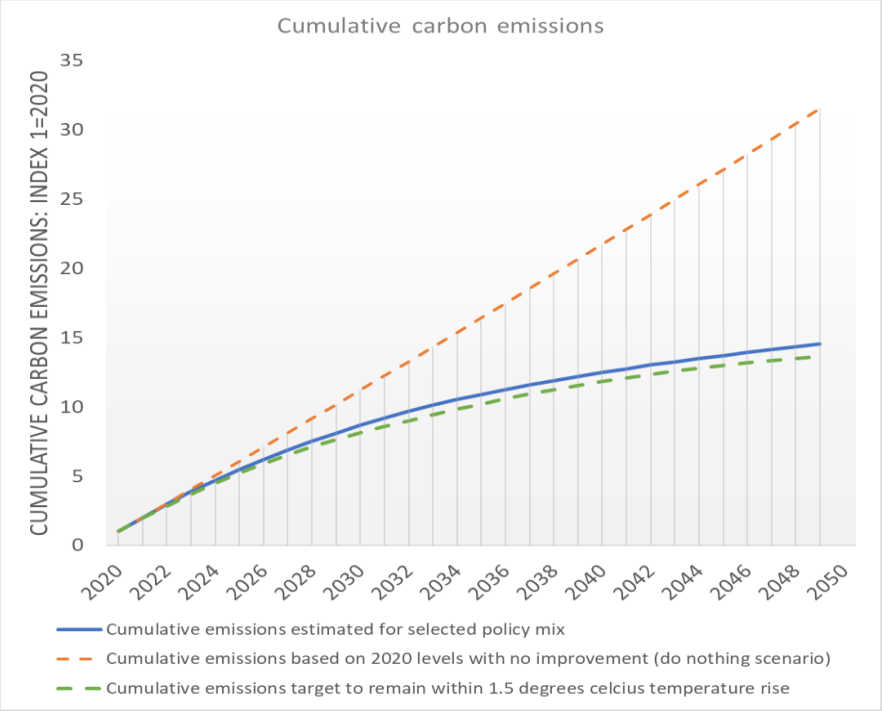
Worksheet3 Tool outputs - Cumulative carbon emissions from 2020 up to 2050

The blue line on the adjacent chart represents the cumulative emissions estimated for the selected policy strategy mix inputs.

The red dashed line reflects the do-nothing scenario and shows cumulative emissions if no improvements were made compared to 2020 rates of emissions (i.e., emissions remain at 2020 levels until 2050 and are only affected by changes in population).

The green dashed line reflects the cumulative emissions limit if global temperatures are to remain within a 1.5°C temperature rise (i.e., achieving the 'Fit for 55' target by 2030 and Green Deal target of 90% reduction in GHG emissions by 2050 compared to 1990 levels).

The cumulative emissions are indexed to the 2020 values of emissions as a % of 1990 levels. For the example adjacent, we see that by 2050 the selected policy mix is estimated to produce cumulative emissions of around 13.5 times the 2020 emissions while the do-nothing scenario would have resulted in 30 times the 2020 emissions.



Example output - Cumulative carbon emissions from 2020 up to 2050 for the selected policy strategy mix inputs

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The Carbon Reduction Strategy Support Tool

Worksheet 4: Impacts on other objectives

Finally, a framework for assessing the impact of carbon focussed policy choices on other objectives is provided to ensure that the carbon focussed policy choices reinforce rather than conflict with other non-carbon objectives that cities have.

A simple assessment framework is provided in Worksheet 4 allowing the user to select between positive (+1), neutral (0) or negative (-1) impact that each carbon focused policy strategy has on the cities non-carbon objectives. Users can undertake the assessment by selecting from any of the 8 pre-defined objectives, or can add their own objectives to the framework.

DEFAULT VALUES	Policy strategy							
	AVOID strategies				SHIFT strategies	IMPROVE strategies		
	Avoid the need to travel through increases in working from home	Avoid the need to travel through increase in personal business trips (e.g. banking, health) that are digitised or become telephone consultation	Avoid the need to travel through increase in shopping delivered to the home	Avoid the need to travel so far through spatial land use planning: increase of trips for shopping, leisure and education localised within a 15 minute walk from home	Shift from car driver mode share to alternative modes: for journeys under 3km promotion of shift from car to walk and cycle; for journeys between 3km and 8km promotion of shift from car to cycle and PT; for journeys over 8km promotion of shift from car to PT and carpool.	Improve ICE fuel efficiency of conventional cars on the road	Improve electric battery efficiency	Improve electric vehicle takeup
Reduce congestion	↑	↑	↑	↑	↑	→	→	→
Imrpove air quality	↑	↑	↑	↑	↑	↑	→	↑
Increase safety	↑	↑	→	↑	→	→	→	→
Enhance accessibility	↑	↑	↑	↑	↑	→	→	↓
Support economic growth	→	→	↓	↑	↑	→	→	→
Meet new housing demand	↑	→	→	↑	↑	→	→	→
Enhance health and wellbeing	→	→	→	↑	↑	→	→	→
Promote equity and social inclusion	→	→	→	↑	↑	→	→	↓

Default values for impact assessment of Avoid, Shift, Improve strategies against other city objectives [positive (green), neutral (yellow) or negative (red) impact ratings]

Note that when making a judgement on the impact that each strategy can have on a particular objective, it is useful to consider the geographic location and scale within the FUA that the strategy would take effect. It is also important to think about the impact of the strategy on different groups of the population identifying those that may be adversely affected and considering the ways in which they can be protected or shielded from potentially negative effects to ensure just transitions for all.

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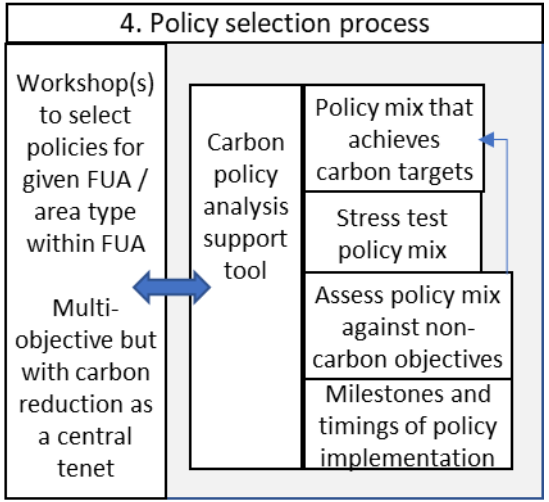
The Worksheet 4 assessment should be undertaken within a 'policy assessment workshop' involving representatives of different municipal departments within the FUA and including the active engagement of a broad range of city stakeholders including local political leaders, public and private representation from other sectors, and civil society organisations. This qualitative assessment can take account of spatial variation within the FUA highlighting the need for, or inevitability of, more contribution from one policy area and less in another (e.g. more avoid and less improve in dense urban areas of the FUA and vice versa in more rural areas).

The intention of this assessment is to flag where particular strategies are likely to have an overall negative impact on any other objective. Where this is the case, then within the policy assessment workshop, cities need to consider how the negative impacts can be mitigated or avoided through regulatory or fiscal interventions (e.g., protections or subsidies for particular groups that are adversely affected). If this mitigation is not possible, then the policy strategy mix selected in Worksheet 1 of the Carbon Reduction Strategy Support Tool should be reviewed and where possible adjusted to remove or at least reduce the scale of choices that are likely to cause intractable negative impacts on another objective.



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The Carbon Reduction Strategy Support Tool

Configuration Settings Worksheet

The configuration settings worksheet allows users to adjust the default values for a number of parameters used in the tool.

This allows more locally relevant values to be defined. If the user enters a local value for any of the parameters in the configuration settings sheet, then this overrides the defaults applied by the tool.

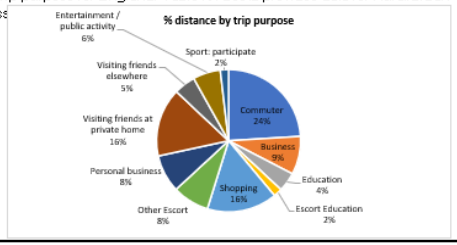
Setting locally relevant parameter values

This file allows users to adjust the default values for a number of parameters used in the tool. This allows more locally relevant values to be defined.

User should define a local value if they do not wish to use the default value.

If you want to use the default value, make sure the local value cell is empty (delete any values previously entered to the relevant

			Local Value	Default Value	Units	Comment / Source
Base-case CO2 emissions from ICE cars on the road		All areas		138	gCO2/km	The fuel efficiency of the average car on the road in 2020 in the UK was approx. 138 gCO2/km. The average age of cars on the road was 8.5 years. The average fuel efficiency of new conventional cars in 2020 was 122gCO2/km (Department for Transport https://www.nimblefins.co.uk/average-co2-emissions-car-uk#nogo). Carbon dioxide emissions per car steadily declined every year between 2001 and 2018, decreasing by around 2.7 g/km each year.
Commuting trip distance as % of total trip distance (within particular area type)		Urban		24%		Default values derived from Nationl Travel Survey data analysis on trip distance by trip purpose for England. Table NTS9912 provides data for Rural/Urban class
		Peri-urban		26%		
		Rural		28%		
Personal business trip distance as % of total trip distance (within particular area type)		Urban		7%		
		Peri-urban		8%		
		Rural		10%		
Shopping trip distance as % of total trip distance (within particular area type)		Urban		15%		
		Peri-urban		16%		
		Rural		18%		
Shopping, leisure, education, and personal business trip distance as % of total trip distance (within particular area type)		Urban		50%		
		Peri-urban		45%		
		Rural		40%		
% of trips within 1km of home that are walked, cycled or use public transport		All areas		90%		Default value derived from NTS0308 - Average number of trips by trip length and main mode: England 2019
% of all trips by distance band (within particular area type)	<3km	Urban		46%		Default values are derived from Table NTS9911 - Average number of trips (trip rates) by trip length, region and Rural-Urban Classification: England, 2018/2019 (Department for Statistics, Nation Travel Survey).
	3 - 8 km			26%		
	> 8 km			28%		
	<3km	Peri-urban		37%		
	3 - 8 km			20%		
	> 8 km			43%		
	<3km	Rural		24%		
	3 - 8 km			26%		
	> 8 km			50%		
Average carbon intensity of renewable electricty generation (wind, solar, hydro,		All areas		10	gCO2e/kWh	Carbon intensity of electricity varies greatly depending on fuel source. As a rough guide coal has a carbon intensity of about 1,000g CO2/kWh, oil is 800g CO2/kWh, natural gas is around 500g CO2/kWh, while nuclear, hydro, wind and solar are all less than 50 g CO2/kWh. The carbon intensity of grid electricity is determined by the fuel mix used in generation. e.g. More coal and less use of gas in the grid
Average carbon intensity of fossil fuel electricty generation (coal, lignite, oil, gas)		All areas		690	gCO2e/kWh	electricity mix will result in higher carbon intensity of fossil fuel generation.



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The Carbon Reduction Strategy Support Tool

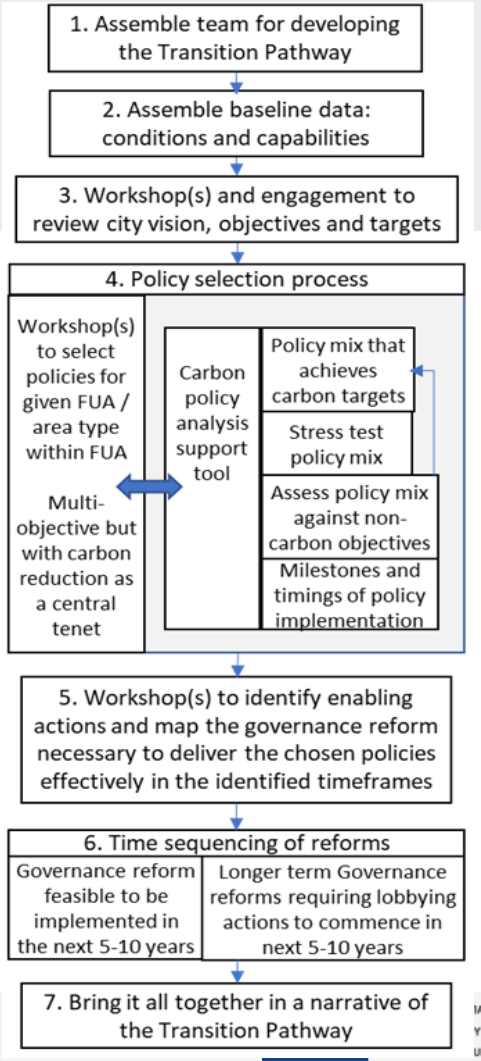
The final output from the use of the Carbon Reduction Strategy Support Tool is a preferred policy strategy mix for achieving long-term and intermediate carbon reduction targets up to and including 2050. This preferred strategy mix includes defined levels of uptake/improvement and timings for implementation of the avoid, shift, improve strategies within this mix.

These outputs are useful for cities to inform workshop discussions and decision making with stakeholders, including policy makers and politicians, when developing their long-term policy strategies and defining transition pathways to net-zero carbon.

The next step of the Transition Pathway process is to then assess the preferred policy strategy mix to ensure that the strategy selections are realistic and realisable in the context of the existing governance capacities and the achievable governance reforms that would be required to deliver the new policy.

Refer to the:

- Lesson on *TP methodology* and the
- Lesson on *Governance capacity building to support the creation of cities' 'transition pathways'*



The Carbon Reduction Policy Support Tool

The Carbon Reduction Strategy Support Tool has been developed in Excel and is available free to use by any city.

- The tool is available on the CityConsult Agency via this link: Link to be provided
- A more detailed description of the tool and user guide is available via the above link.
- In addition, an assignment has been set where users are tasked with collecting data for their city and to then experiment with input options for the different Avoid Shift Improve policy strategies – to obtain likely impacts of these options on carbon reduction up to 2050: Link to be provided
- Further queries relating to the Carbon Reduction Strategy Support Tool can be directed to steve.wright@vectos.eu

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