

# OPPORTUNITIES FOR CLIMATE CHANGE MITIGATION IN THE WESTERN CAPE ENERGY LANDSCAPE

## OVERVIEW OF THE WESTERN CAPE CLIMATE CHANGE MITIGATION SCENARIOS FOR THE ENERGY SECTOR REPORT (2015)

The identified GHG emission reduction mitigation measures are aimed at contributing towards the national and international commitments to reduce greenhouse gas emissions and to direct both energy demand- and supply-side actions that are a priority for the Western Cape Government. This mitigation approach is aligned with the National Climate Change Response Policy (2011).



### PROVINCIAL PROFILE PROPORTION OF SOUTH AFRICA

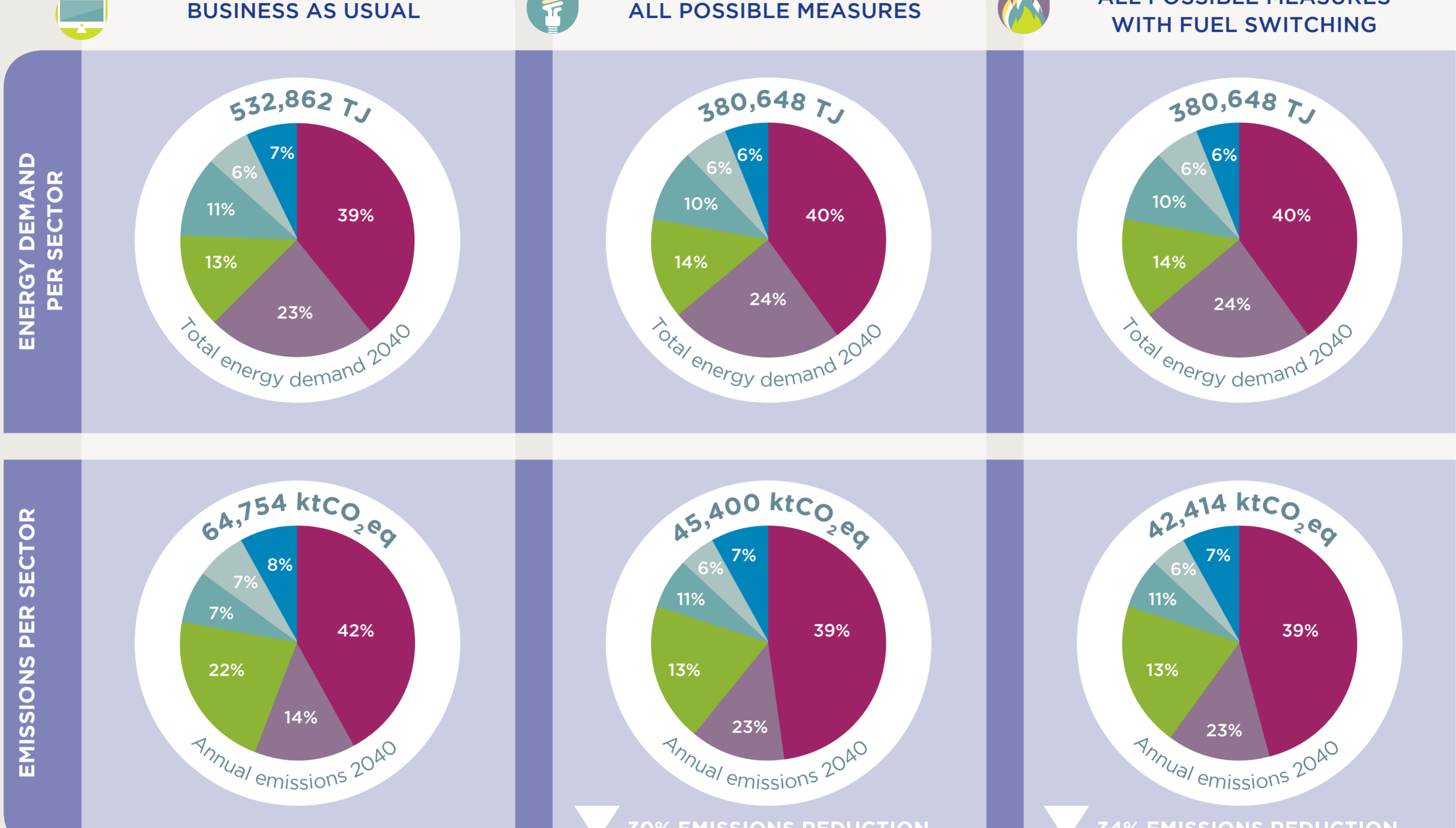
- AREA: 129,462km<sup>2</sup> (~10%)
- POPULATION: 6 million (~11.2%)
- CAPITAL: Cape Town GDP R438,7bn (~10%)
- ENERGY CONSUMPTION: 276,333,250 GJ (~13%)
- ENERGY RELATED GHG: 36,345,753 tCO<sub>2</sub>e (~11%)

## CLIMATE CHANGE MITIGATION SCENARIO STUDY FOR THE PROVINCE'S ENERGY SECTOR

One of the goals of the Western Cape Government (WCG) is to enable a resilient, sustainable, quality and inclusive living environment.

The Western Cape Climate Change Response Strategy (2014) specifies the identification of desired sectoral mitigation contributions and the development and implementation of sustainable energy measures among key actions to pursue in this regard.

### EMISSIONS SCENARIOS FOR THE WESTERN CAPE 2012-2040



Industrial sector Passenger transport Residential sector Freight transport Agriculture Commercial sector

### EMISSIONS SCENARIO COMPARISON

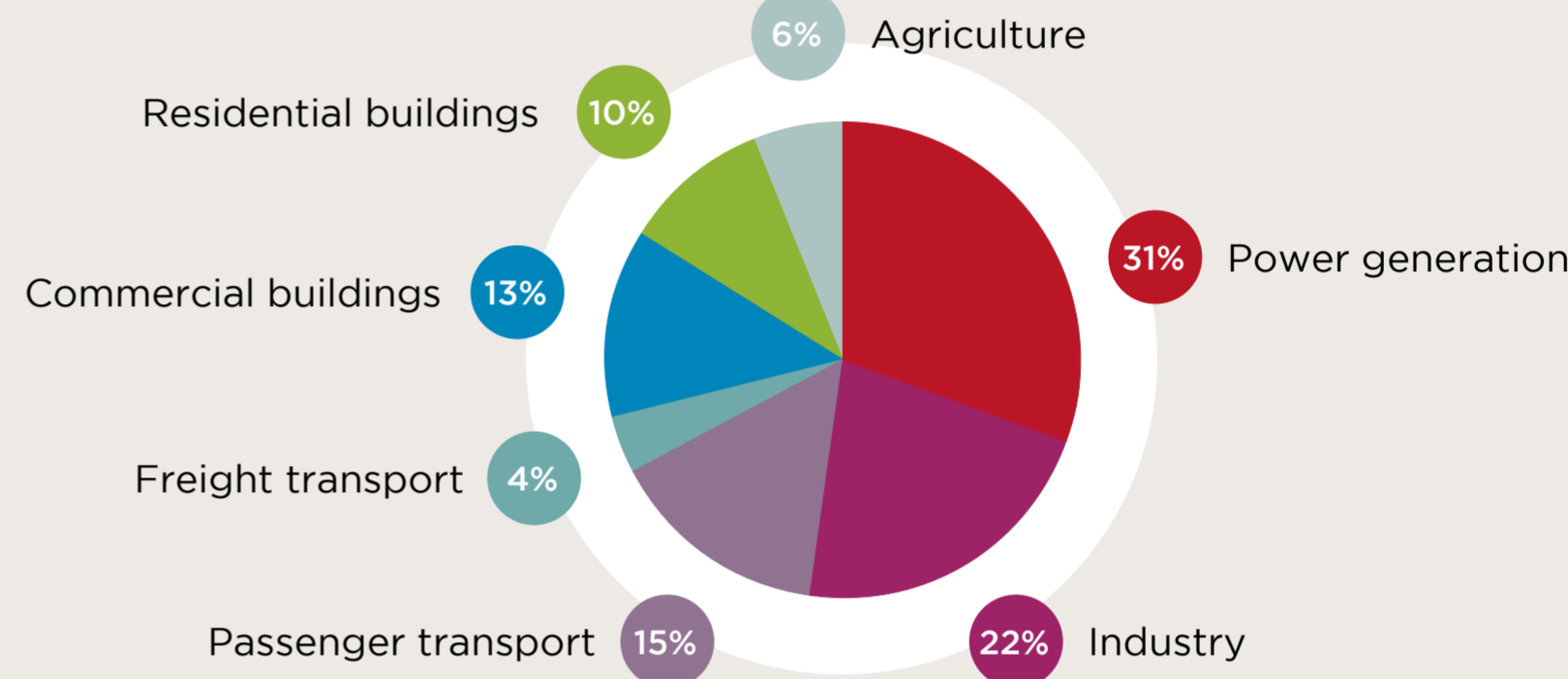


On comparison of the various scenarios, it shows that relative to the "business as usual" scenario, the application of the "all possible measures" scenario can result in a 30% decline in emissions over the period 2012-2040. If fuel switching is implemented, there is a 34% decline in emissions relative to the business as usual scenario.

## MITIGATION OPPORTUNITIES PER SECTOR

The 100 mitigation measures are summarised below according to the main type of mitigation measure for each sector. There is some duplication of measures across the sectors and sub-sectors (particularly in the industrial sector).

The graph on the right shows the relative contribution of each sector in terms of reduction. If all the measures in each sector are implemented this will realise the 34% reduction in emissions against the business as usual scenario.

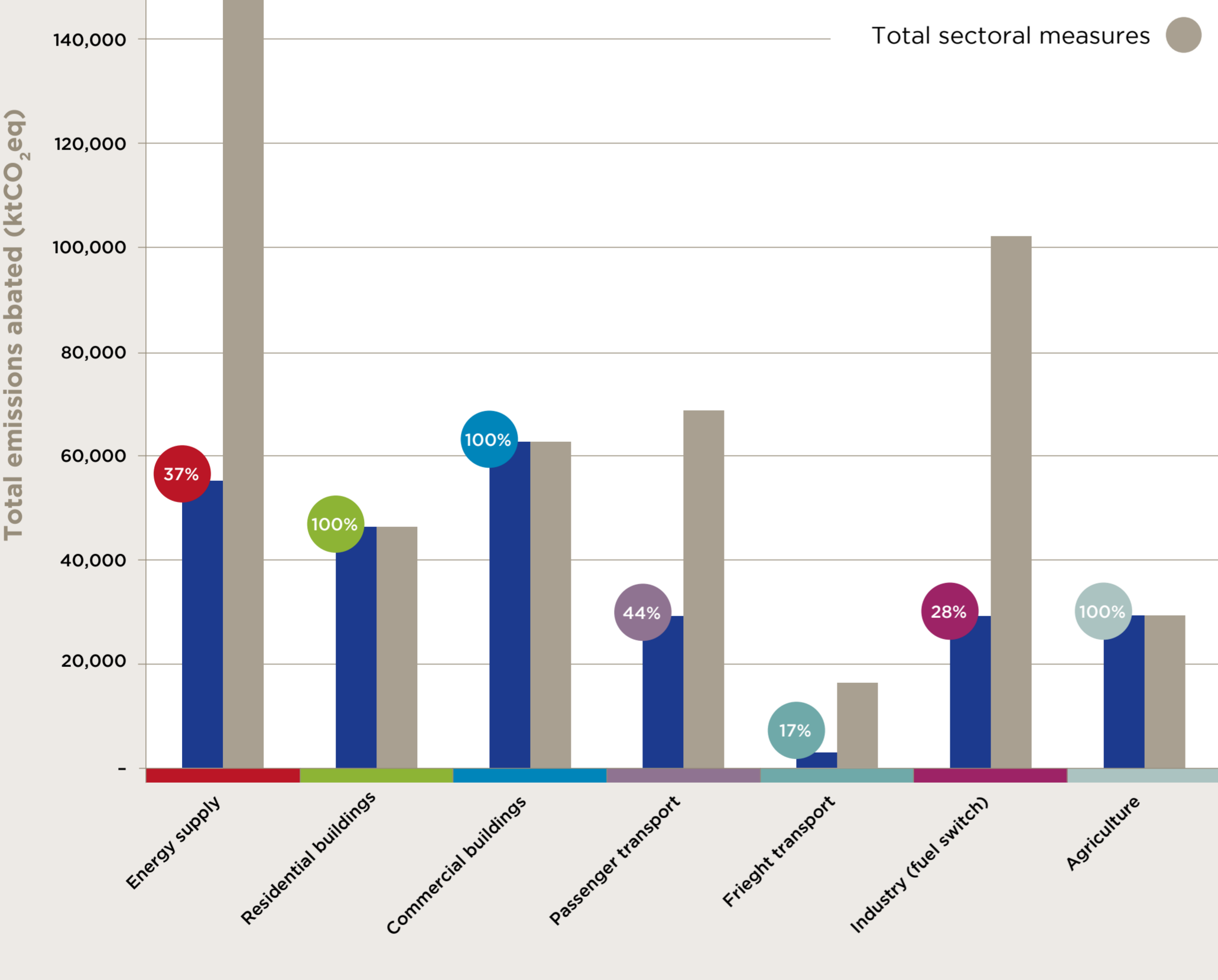


- | AGRICULTURE   | COMMERCIAL AND RESIDENTIAL BUILDINGS  |
|---|---|
| <ul style="list-style-type: none"> <li>Conservation agriculture</li> <li>Reduced tillage</li> <li>Higher efficiency irrigation management</li> <li>Reduced water use</li> <li>Energy efficiency; variable speed drives on irrigation pumps and variable speed motors</li> </ul> | <ul style="list-style-type: none"> <li>Solar water heater</li> <li>Efficient lighting</li> <li>Embedded generation; PV</li> <li>Energy efficient appliances</li> <li>Passive building/improved thermal design</li> </ul>          |
| PASSENGER TRANSPORT   | FREIGHT TRANSPORT   |
| <ul style="list-style-type: none"> <li>Maximum shift from private to public transport</li> <li>Improved or alternative road and rail vehicle engines (more efficient ICE, hybrid electric, plug-in electric hybrid, electric, fuel cell, and CNG powered vehicles)</li> </ul>   | <ul style="list-style-type: none"> <li>Improved engine technology both for road and rail vehicles</li> <li>Shift from road to rail (mitigation increase with cleaner electricity)</li> </ul>                                      |
| POWER GENERATION  | INDUSTRY ENERGY EFFICIENCY AND PROCESS IMPROVEMENTS   |
| <ul style="list-style-type: none"> <li>Onshore wind power</li> <li>Natural gas with closed cycle gas turbines</li> <li>Solar photovoltaics</li> <li>Concentrated solar power</li> </ul>   | <ul style="list-style-type: none"> <li>Improved motor control</li> <li>Variable speed drivers</li> <li>Energy efficient boiler systems and kilns</li> <li>Energy switch from coal and heavy furnace oil to natural gas</li> </ul> |

## APPROACHES TO PRIORITIZING MITIGATION MEASURES

An extensive list of mitigation measures were identified as part of the initial stakeholder consultation, but there was a need to tighten this list to a set of feasible and appropriate mitigation measures for the Western Cape. A number of methods were used to prioritise mitigation measures and these are discussed below.

### A) PROVINCIAL INFLUENCE ON SECTORAL MITIGATION MEASURES



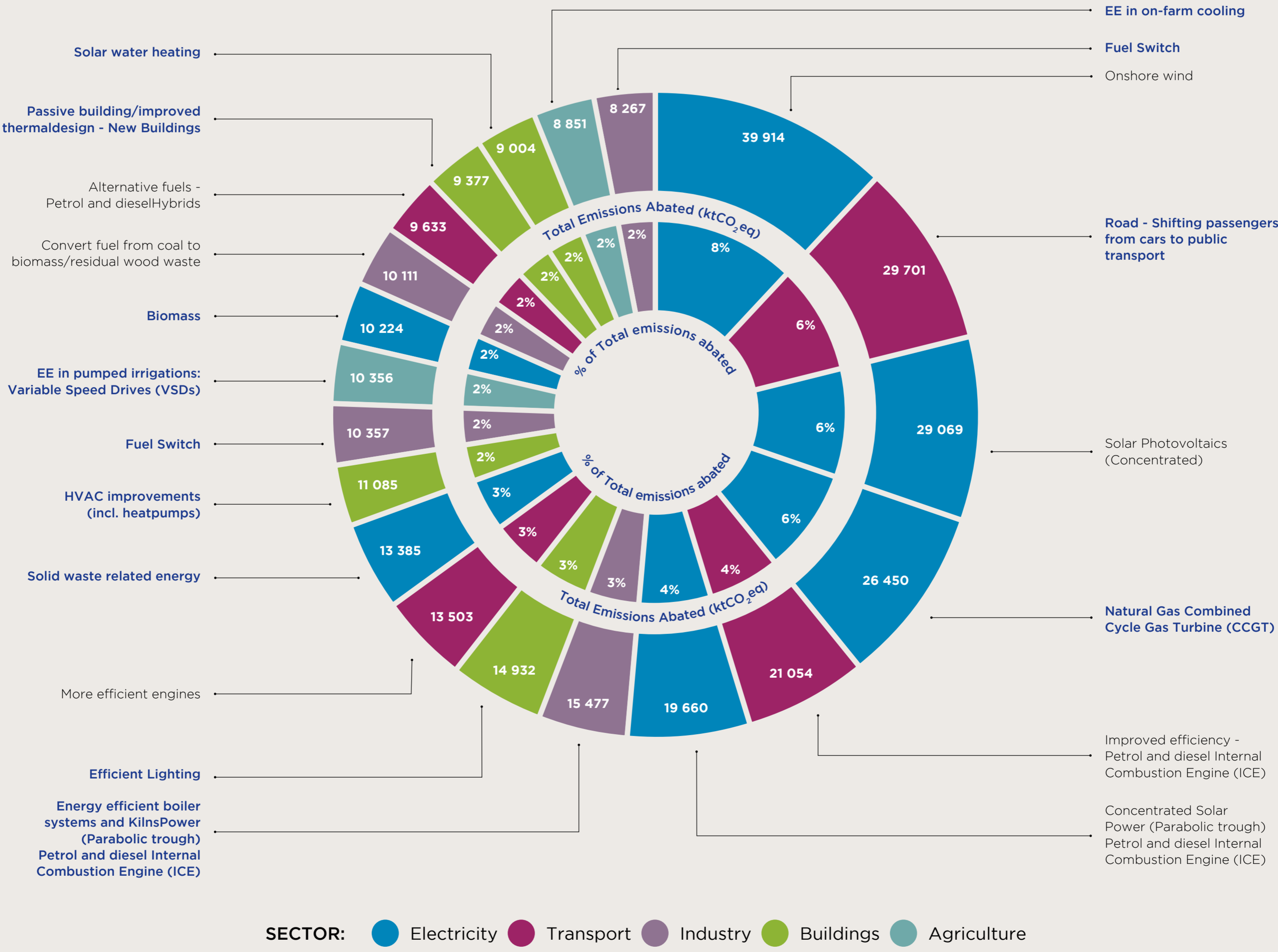
While effort should be made to pursue those measures which present the greatest abatement potential, there is equal motivation to pursue those which the province has the greatest ability to influence or implement. The percentages highlight the proportion of government influence on the sectors. The level and type of influence will vary across the sector. This influence can range from being the key driver for a specific measure or providing support to other bodies to drive action.

### B) MULTI-CRITERIA ANALYSIS (MCA)

A multi-criteria analysis was used to assess the mitigation between abatement potential, cost and benefits (benefits refers to economic-, social-, and non-greenhouse gas environmental impacts).

### C) ABATEMENT

The chart below shows the top 20 mitigation measures on authority abatement potential. The WCG and local authorities have some control over the implementation of the mitigation measures which are highlighted in blue.



Although the model and the report have been finalised, there is now a need to take this analysis forward and develop the necessary implementation plans to support the rollout of the mitigation measures and to support national climate change mitigation targets and programmes.

<p><b>BUSINESS AS USUAL</b> Showing a future where there are no changes to energy consumption and emissions in terms of technology advances or reduction of consumption.</p>	<p><b>ALL POSSIBLE MEASURES</b> The implementation of the most feasible set of mitigation measures in the energy sector. This is not all measures possible, but the most feasible set of measures that have been identified as part of the model.</p>	<p><b>ALL POSSIBLE MEASURES WITH FUEL SWITCHING</b> The implementation of the most feasible set of mitigation measures as well as the transition away from coal-generated electricity to natural gas (where technology will allow a shift in fuel).</p>
GJ gigajoules (unit of energy measurement)	TJ terajoule	CO <sub>2</sub> eq tonnes CO <sub>2</sub> equivalent. It is a measure used to compare the emissions from the various greenhouse gas emissions based upon their global warming potential.