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Landing the Climate SDG into South Africa's Development Trajectory: Mitigation Policies, Strategies and Institutional Setup

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Abstract: Landing the Sustainable Development Goals (SDGs) into national development policies and development trajectories remain one of the desired outcomes to 2030. This paper teases out how South Africa landed the climate action SDG into its development trajectory, with a focus on mitigation policies, strategies and institutional setup. The study uses an online survey, key informant interviews, as well as policy documents and critical discourse analysis. The study concludes that South Africa has landed SDG 13 into its policies designed to respond to climate mitigation. However, there were several inherent challenges in the policies and strategies resulting in implementation inefficiencies, including the fact that the policy on climate change is driven more by international pressures and expectations rather than domestic awareness and activism. There are also challenges with institutional capacity to implement the policies at sub-national levels. Furthermore, reliance on a few experts makes the system vulnerable and fragile. The study also found that not enough is being done to support sustainable consumption and production (SDG 12) as there are energy intensive industries failing to comply with mitigation policies in place. Hence the paper recommends the need to fix the disjuncture between the energy policy and climate mitigation.

Keywords: SDGs; climate action; mitigation; institutions; stakeholders; 2030 agenda

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1. Introduction

Rosales [1], strongly cautions against dealing with the Sustainable Development Goals (SDGs) agenda separately from the climate action agenda. If this is not done, the author is of the view that the SDGs may not be implemented successfully, as it happened with the Millennium Development Goals (MDGs). The Agenda for Sustainable Development is unambiguous about the need to "Integrate climate change measures into national policies, strategies and planning" [2] (p. 23). Given the current arrangement where there is a specific climate SDG (SDG 13) addressed under the United Nations Framework Convention on Climate Change (UNFCCC), there are good grounds to believe that the necessary instrument for implementing interventions is in place through the Paris Agreement [3].

Although a lot of noise emerged from the United States of America (USA) on its desire to withdraw from the Paris Agreement, the Nationally Determined Contributions (NDCs), which outlines the countries' commitment to addressing climate change have put SDG 13 to life. These commitments have been widely received as the Paris Agreement came into effect on 4 November 2016 [4]. Despite this, on 4 November 2019, the USA followed through on its publicly stated intention to withdraw from the Paris Agreement by officially notifying the Secretary General of the United Nations in his capacity as depository that it was withdrawing from the Paris Agreement. The NDCs present intervention measures across a range of themes that are mainly centred on climate change mitigation.

There was also a period in which climate debate was dominated by denialism. Tucker [5], extensively documents climate change denialism that emanated from the USA. This denialism sought to create doubt about climate change science. This happened at the time when there was a growing consensus in the global community that saw climate change and sustainable development as two major challenges of the 21st century that required urgent collective action. The author further argues that humanity had to deal with a climate crisis that has never been seen before due to the failure to take effective actions to combat climate change in a timely manner. Rosales [1], acknowledges that climate change has inevitable effects on all global issues that are at the forefront of the United Nations agenda. Such issues include among others: poverty, economic development, population growth, sustainable development and resource management.

Given the foregone, this paper teases out how South Africa landed the climate action SDG into its development trajectory, with a focus on mitigation policies, strategies and institutional setup. It raises the research question: Which policies and institutions are dealing with climate change mitigation (including sustainable consumption and production) and what are the provisions of such policies? From this question, an objective is established to identify policies and institutions dealing with climate change mitigation (including sustainable consumption and production) and document the provisions of such policies in the context of SDG 13 domestication.

Although the SDGs emerged in 2015 following their adoption, they are increasingly gaining prominence among scholars and countries alike as actors try to better understand this transformative and yet ambitious developmental agenda from all angles. Similarly, countries across the world will continue to grapple with better ways to implement the SDGs in a manner that is inclusive. Furthermore, although a lot has been studied about climate change, there is no indication that studies have been done in South Africa that particularly look at the domestication of SDG 13 (climate action) within a policy and implementation framework. As such, this study, contributes to this body of knowledge.

2. Literature Review

It is acknowledged that climate change mitigation is one of the twin strategies most common in responding to climate change. The other being adaptation. The Intergovernmental Panel on Climate Change (IPCC) [6,7], defines mitigation as a human intervention to reduce the sources or enhance the sinks of greenhouse gases. Otto, Frame, Otto and Allen [8], have questioned the slow progress to mitigation, citing a combination of economic and political barriers to action caused by weak incentives to mitigate and strong incentives to benefit on the efforts of others. The authors contend that for any climate change mitigation policy to be successful, it should overcome these barriers and further be able to withstand and be flexible to other external pressures that may be caused by changes in the economy and political interests. The authors emphasize the need for climate change mitigation policies to be robust to withstand external pressures, and anti-fragile to be responsive to scientific uncertainty that allows trial and error with minimal societal costs. Linked to this is a precautionary approach to mitigation that allows development to continue while staying within the limits posed by the climate system. The authors warn that the precautionary approach can provide a legitimate justification to defer decisions until the uncertainties are resolved.

A perspective from Barbier [9], suggests that climate change mitigation policies tend to have regressive effects as they place higher financial strain on the poor, rather than those households that can afford. They also tend to be incompatible with efforts to expand modern energy services such as electricity generation. It seems though that this perspective does not consider that there are co-benefits that accrue to the poor such as improved air quality, clean energy, health and energy efficiency innovations. Lee [10], portrays that energy efficiency is perhaps one of the most crucial and cost-effective ways by which industries can reduce their greenhouse gas (GHG) emissions for sustainable development. It has been observed that other factors are forcing a growing number of industries to use

energy more efficiently. These factors include pressure from the markets, growing public awareness of environmental sustainability and increasing energy costs and volatility. These socio-economic pressures regarding cleaner production efforts and services are important change agents for the introduction of energy efficiency improvements. Renewable energy too, has been propelled by many entities, both private and public in order to address climate change mitigation. To this end, SDG 7 focuses on energy [2].

The economics of climate change is an essential issue in policy-making discourse at international and national levels [11]. For instance, the development of the carbon market has been found to be the most economically important endeavor related to climate change; that is cost-effective to achieve policy goals. Another issue in climate change policy is dealing with sustainable consumption and production.

According to Langhelle [12], and Stevens [13], sustainable production and consumption have become one of the key issues of sustainable development and is currently addressed through SDG 12 (sustainable consumption and production) [2]. Stevens [13], provides a detailed analysis on how sustainable production and consumption should be approached to achieve maximum benefit. The author further highlights the role of government in this regard through command-and-control instruments, providing enabling environments and incentives; as well as regulation and taxes. However, Stevens [13], cautions that these policy instruments can only influence consumers' behaviour only if the financial incentives are strong enough to influence their decision-making processes. Unfortunately, in many cases, taxes are not set high enough to have a deterrent and significant effects on consumption patterns due to lack of political will and industry lobbyists [13]; as well as the use of outdated and colonial times laws in many developing countries [14].

While this is an important debate on climate change; Stevens [13], decries that the concept of sustainable consumption and production has not been fully effective because of its overemphasis on consumption and paying little attention to production. Of concern is that the role of the consumers does not appear to have taken center stage in the process, which can help drive sustainable production and achieve sustainable development. Accordingly, there have been calls for an integrated approach, which addresses both consumption and production at the same time because they tend to be mutually reinforcing, as opposed to a fragmented approach which is deemed inefficient.

While South Africa remains heavily dependent on coal for energy, the use of renewable energy sources has increased significantly [15]. Despite the rise in the generation of renewable energy, achieving substantial reductions in carbon emissions remains a challenge given the important role that coal plays in energy generation and the high energy intensity of production. From a domestication point of view, the Africa SDG Index Report of 2020 highlights that South Africa, like most countries in Africa has aligned the SDGs with its development plans. Particularly, the report singles out SDG 13 (climate action) and SDG 12 (responsible consumption and production) as SDGs that have progressed well in the continent [16]. With regard to SDG 13, an estimated 81% of the countries in Africa appear to be on track to meet this goal, with South Africa ranked 9th in the African Index [16] and 110 in the Global index [17] respectively.

Although progress has been recorded on SDG 13, the potential effect of climate change in South Africa is of growing concern and is expected to have greater impact on the crucial sectors such as water, agriculture and biodiversity that are also essential for economic development [18]. The impact is aggravated by the country's limited capacity to cope with the difficult conditions that are posed by climate change. Already it is suggested that the annual temperatures in South Africa have increased above global average over the past five decades [18]. South Africa has been flagged as one of the countries with high energy intensity by international standards [19]. As a result, the country was counted among the world's top 15 GHG emitters of carbon dioxide in 2004 [20]. The energy sector has been identified as the main driver of the country's total GHG emissions, contributing close to 80% in emissions; of which 50% are attributed to electricity generation and liquid fuels [21]. In this regard, approximately 38 gigawatts of installed capacity is generated from coal [21];

which van der Bank [18] characterize as "dirty energy". Coal constituted 92% of energy mix in South Africa in 2014, resulting in carbon dioxide contributing 83.7% of the net GHG emissions followed by methane at 4.9% [22].

From an economy development perspective, South Africa is an upper middle-income country, whose economy is not only relatively diversified, but also being regarded as advanced and industrialized; considering its technological, financial and physical infrastructure prowess; further bolstered by its representation in the Group of 20 countries [15]. The contribution of South Africa to global emissions is also fueled by the economic development trajectory that it has pursued that is underpinned by high energy demand primarily derived from cheap coal as has already been highlighted. Between 1994 and 2011, the economy grew significantly, reaching US$400 billion before it regressed to US$385 billion in 2019 as a result of prolonged sluggish growth following global economic downturn [15]. Winkler and Marquard [19], have cautioned that South Africa must guard against pursuing industrial development that could risk "locking in" the economy into energy intensive industries, and have suggested a need to progressively diversify the energy mix. Having said this, the government recognizes that even if the increase in the generation of renewable energy is a step in the right direction, achieving meaningful reductions in carbon emissions remains a challenge because of the important role that coal still plays in energy generation coupled with the high energy intensity of production [15].

3. Materials and Methods

An online survey (n = 103) was used as one of the key instruments to generate data. Respondents were asked a series of questions relating to the adequacy of climate change policies as advised by Leedy and Ormrod [23]. In this regard, the respondents were asked among others aspects; (i) if South Africa had policies in place designed to respond to climate change mitigation, and if those policies adequately address climate mitigation challenges faced by it, (ii) to explain what they thought were the intended policy outcomes for climate change mitigation policies, (iii) the sectors that must be prioritized, (iv) if it would be appropriate to impose tariffs on energy-intensive imports by other countries based on carbon content of domestic production, (v) if the government was doing enough to support sustainable consumption and production, (vi) if climate change management policies in South Africa had improved production methods by the energy-intensive industry, (vii) if the energy-intensive industry was complying with those climate change management policies, and (viii) if South Africa had sufficient tax instruments in place to support its response to climate change.

The quantitative approach enriched the study by introducing a linear research path that employed a reconstructed logic. As such, it put emphasis on reorganizing the data, standardizing and codifying research knowledge into explicit rules, formal procedures and techniques [24]. The qualitative approach made use of key informant interviews (n = 21) and policy documents analysis.

The questionnaire had open-ended questions to enable respondents to provide free response (unstructured), and close-ended questions (structured), in that the questions provided the respondents with multiple choices from which to choose. The closed questions were used where specific and explicit responses were required. Using these instruments, the respondents were asked to give perceptions regarding the extent to which they agreed or disagreed with a particular statement. To answer the question, the respondents were required to choose from two opposing extremes of strongly agree and strongly disagree as well as other common and acceptable Likert scale responses. This restricted and standardized the responses. Where relevant, follow up open-ended questions were asked to enable the respondents to explain in their own words why they agreed or disagreed. The respondents were requested to participate in the study prior to the interviews and the online survey being undertaken; also considering appropriate ethical considerations.

The identification of the respondents was undertaken at the same time before data collection commenced for both interviews and the online survey. Since policy on climate

change is the responsibility of national government departments, most respondents, particularly key informants were purposefully selected from them to provide insights and first-hand information, and thus complement the online survey. These included among others, the Department of Environmental Affairs, Department of Energy, Department of Planning, Monitoring and Evaluation, Department of Science and Technology, Department of Agriculture, Forestry and Fisheries and the Department of International Relations and Cooperation. Interviewing stopped when the saturation point was reached [25]—the point of redundancy of which continuing with data collection would not have yielded any new data, knowledge and or themes.

In addition to focusing on national government departments, the study also collected data using an online survey technique from State-Owned Entities (SOEs) that perform government mandate related to climate change and sustainable development, research organizations and non-governmental organizations. The online survey enabled respondents to provide responses based on multiple choices. Accordingly, the online survey provided quantitative data, while the interviews provided rich descriptions. Data collection commenced in December 2018 and was concluded in August 2019. A total of 103 respondents completed the QuestionPro online survey from about 700 respondents that the survey instrument was mailed to. Referral and opportunity sampling were also used to provide flexibility, improve the initial sampling plan and identify potential key informants that could contribute meaningfully to the study. Among others, respondents were requested to provide their perceptions and attitudes regarding climate change response and funding, institutional capacity and alignment, roles and responsibilities, South Africa's priorities in climate change response and the domestication of the climate change SDG. Of the respondents that took part in the online survey, 51% were male while 46% were female, while 3% chose not to disclose their gender. Further details are presented in Table 1.

Table 1. Age composition of respondents (n = 103).

Age Group	Percentage
20–29	10%
30–39	30%
40–49	31%
50–59	22%
60+	10%

Ninety-five percent of respondents were employed, the majority of whom (31%) held middle management positions, 26% in senior management and 11% in executive management. Similarly, 90% of the surveyed respondents possessed honours degree and above while 10% had a diploma and undergraduate qualifications. From the 103 respondents, 45% had up to 5 years of experience in climate change, 28% had between 6–10 years and 27% had 11 years and above.

These demographics herein depicts that the respondents were highly educated. They also depict that the respondents were highly experienced and familiar with the subject matter. Importantly, it shows that the majority of them were employed in middle and senior management positions that may have a lot of relevance in policy formulation and implementation.

4. Presentation and Discussion of Results

4.1. Climate Change Policies and Strategies for Mitigation

According to Arndt et al. [26], one way to reduce a country's exposure to climate change is to implement global policy that limits future GHG emissions. However, Marquardt [27], notes that in South Africa, the national government fails to execute comprehensive environmental policies due to competing interests. Given this proposition, the respondents were asked if South Africa has policies in place to respond to climate change. There was a high degree of agreement among respondents that South Africa has policies and strategies in place designed to respond to climate change mitigation. Eighty four percent of respondents surveyed felt that there are policies in place that are progressive

and development oriented. Table 2 lists some of the policies and strategies that were highlighted by the respondents.

Table 2. List of key climate change policies and strategies in South Africa.

Name of Policy or Strategy	Year
National Environmental Management Act (NEMA)	1998
National Environmental Management: Air Quality Act	2004
National Climate Change Strategy	2007
Long-term Mitigation Scenarios (LTMS)	2007
Ten Year Innovation Plan	2008
National Climate Change Response White Paper (NCCRWP)	2011
National Development Plan (NDP)	2012
Draft Climate Change Sector Plan for Agriculture, Forestry and Fisheries -Climate Smart Agriculture Strategic Framework	2013
The National Climate Change Response Monitoring and Evaluation	2015
Nationally Determined Contributions (NDCs)	2015
National Pollution Prevention Plan Regulations	2017
Low Emissions Development Strategy 2050 (LEDS)	2018
Green Transport Strategy	2018
Climate Change Bill	2018
Industrial Policy Action Plan X	2018
Carbon Tax Act	2019
Integrated Resource Plan (IRP)	2019
Reports mandated by UNFCCC Secretariat	ongoing

The respondents were then asked what they thought are the intended policy outcomes for climate change mitigation policies in South Africa. Three observations emerged out of this question. The first observation was that the respondents felt that the main intended outcome of South Africa's policy response to climate change is to minimize and stabilize the GHG emissions by ensuring that emissions remain within the trajectory range, and for South Africa to demonstrate its fair contribution to the global agenda. In pursuit of this intended outcome, it was indicated that South Africa has set itself a Peak, Plateau and Decline (PPD) development trajectory that will assist it in transitioning to a low carbon economy and move towards a temperature goal as set by the Paris Agreement and its commitments it made through the NDC. While this is noble, Northrop [28], argues that the fact that fossil fuel usage, carbon emissions and global Gross Domestic Product (GDP) are all growing is evidence enough to demonstrate the failure of Paris negotiations to obtain national pledges that sufficiently constrain emissions.

Nevertheless, the National Climate Change Response White Paper (NCCRWP) of 2011 envisages a scenario where emissions will peak in the period from 2020 to 2025, remain stable for around about 10 years, and decline thereafter in absolute terms (Department of Environmental Affairs (DEA) [29]. Respondent 15 suggested that the trajectory range may have to change given the changes that have taken place in technology evolution and the changes in prices over time that were not there when the policy was put in place. This sentiment is well recognized in the Integrated Resource Plan (IRP) of 2019, which acknowledges the fact that the IRP was developed at a time that was characterized by very fast changes in energy technologies, and uncertainty of the impact of those technological developments on the future energy system [21].

The second thing that emerged was that respondents saw the climate change policy within the context of the NDP objectives such as poverty eradication, job creation, improving the well-being of society, impacting on behavioral change, raising awareness, improving reporting, transitioning to sustainable consumption and production practices and promoting sustainable development.

Thirdly, Respondent 19 who previously led South Africa's negotiations under UNFCCC provided a different perspective. This was based on a perception that South African policy on climate change is driven more by international pressures and expectations rather

than domestic awareness and activism. From this observation, the respondent continues to indicate that climate change is not acted upon based on a clearly defined national interest. As a result, it was argued that climate change is just a consideration rather than a driver. Hence interventions do not appear to be embedded in the development trajectory decision making. With that in mind, the respondent asserted that climate change is seen as an add-on due to external pressures, hence it is not at the center of decision making. Given that, it was felt that its intended outcome is largely driven by the desire to be seen as a globally responsible citizen that is progressive and that make its fair contribution to the global agenda.

In reflecting on the policy, overall, the respondents echoed the generally held sentiments that South Africa is known for having good environmental policies. However, some respondents went as far as suggesting that its climate change policies are largely driven by a strong environmental bias. Respondent 15 suggested that this bias can be attributed to international pressures, donors and the consultants who shape the policy intents. Hence the ongoing debate about the heavy dependence on official development assistance and the implications of aid to developing countries.

It is perhaps for this reason that Llorah [30], has cautioned against over-reliance on international aid. The author argues that the donors tend to use their economic power to unduly influence the policies of recipient African governments in ways that are unfavorable for development. Importantly, the author goes as far as suggesting that relying on donor countries and organizations is synonymous to surrendering the country's authority to powerful international organizations that often interfere with the sovereignty of national governments and the autonomy of their domestic institutions.

Related to the questions that were posed to respondents was one on the issue of policy coherence. The respondents argued that the value of the policy is diminished by existing inconsistencies in the broader policy framework. Such inconsistencies were criticized for not being generally supportive of achieving the broader climate change objectives. In illustrating this challenge, Respondent 19, made an example of the climate change policy juxtaposed to the IRP. To this end, there was a perception that while the climate change policy may give a specific direction, the IRP would be pursuing objectives that are not complimentary to it. It was contended that the focus of the IRP would be more on energy security rather than reducing carbon emissions. Respondent 19 went further to suggest that the same trend could be observed in the industrial policy relative to climate change policy. It is not surprising that the IRP of 2019 that was released for implementation on 17 October 2019 is seen primarily as an electricity infrastructure development plan. This is because it is largely driven by least-cost electricity supply and demand balance considerations, taking into account the security of supply and the environmental considerations such as water and carbon emissions [21].

On the occasion of the release of the IRP, Van Der Poel and Felekis [31], highlight that the Minister of Mineral Resources and Energy stated that:

The IRP 2019 supports a diverse energy mix and sets out nine policy interventions to ensure the security of South Africa's electricity supply. (Independent Online, 22 October 2019) [31].

Hence, the IRP advocates that South Africa will continue to pursue a diversified energy mix that reduces reliance on a single or a few primary energy sources. Given that, it envisages that coal will continue to play a significant role in energy generation in the foreseeable future; also taking into account the abundance of coal resources in South Africa. This is despite the fact that coal has been branded as the dirtiest of all fuels and hence the world's leading source of GHGs [32]. However, the IRP envisages that new investments will be made in more efficient coal technologies.

It is perhaps for this reason that Respondent 15 suggested that a lot more could be achieved by merely liberalizing the energy sector and also deal with structural problems related to the energy grid and renewable energy. However, there was a recognition that this option does not seem to be a popular option politically (Respondent 15). As noted by

Ebinger et al. [33], political considerations may ultimately influence policy options that are pursued. Despite this criticism, 53% of the respondents surveyed felt that the climate change policies adequately address the climate change mitigation challenges that are faced by South Africa, while 36% disagreed with that assertion.

It came as no surprise that when the respondents were asked which sectors should be given priority in the policy, it was strongly advocated that a lot more emphasis is needed in the energy sector. Respondent 14 asserted that one way of achieving that would be to fix the disjuncture between the energy policy and climate change policy and ensure that they are aligned. If this were to be done, Respondent 13 felt that it could unleash the huge potential in the renewable energy sector. Furthermore, Respondent 13 argued that it could potentially stimulate manufacturing in the renewable energy sector which remains largely untapped. Ultimately, this would facilitate transition to low carbon-economy.

Other sectors that were highlighted that need attention include transport, agriculture, spatial planning, human settlements, carbon sequestration, technology and the land sector which has a potential to remove carbon. It was felt that clarity on targets per sector and more specificity on those targets were among the issues that needs further attention. The respondents, however. cautioned that irrespective of what options South Africa pursues, it must not shock the economy. Hence, Akram [34], acknowledges that environmental policy may have an impact on the economic growth depending on the level of development of the country. In emphasizing this sentiment, Respondent 9 indicated that climate change interventions must consider the ripple effects in the value chain and its related unintended consequences with a view to ensure a just and full transition.

The same sentiments were raised by the Minister of Mineral Resources and Energy who is reported to have argued that some towns could be wiped out if there was no proper consideration to just transition. Perhaps this thinking is informed by what Akram [34], calls a general perception that environmental regulations may impose constraints on production processes, resulting in harmful impacts on economic growth. Another important context in this discussion is that while the NCCRWP commits South Africa to deal with climate change, however, it is unambiguous in that as it builds climate resilience, it will be done, "in a manner that simultaneously addresses South Africa's over-riding national priorities for sustainable development, job creation, improved public and environmental health, poverty eradication, and social equality" [29] (p. 11).

Lenferna [35], wrote an opinion piece that was published by the Mail and Guardian on 16 October 2019, headlined: "Mantashe's dangerous energy agenda is from the Trump playbook"; Minister Mantashe is quoted to have indicated that:

Just ask the devastated coal workers and communities in Hendrina who have seen their livelihoods disappear with no plan to protect them as coal mines and power stations are shut down (*Mail & Guardian*, 2019, October 16).

According to the Minister's view, Hendrina provides a classical example of what could happen to the majority of towns in Mpumalanga province were coal to be phased out prematurely without considering the domino effects of such a move. The Minister further indicated that South Africa could not be expected to be held to the same standards that apply to developed countries as a developing country when it comes to emissions reductions as that would affect South Africa's economy and its industrial ambitions.

That being the case, it is not immediately clear whether the utterances by the Minister are in defense of energy security or continued use of coal. Having said that, Karimu and Mensah [36], acknowledge the role that energy play as a key component in human civilization as well as its importance in the modern economy. The authors further concur with reports that no country in the world has succeeded in shaking loose from the subsistence economy without access to the services that the modern economy provides.

Based on the diverse and somewhat confrontational reactions following the release of the IRP, it is clear that the contestation is not merely about issues related to just transition that are at play; but other considerations appear to be at stake given this highly contested document by stakeholders. In the midst of all this contestation, the Minister implied that

those that were opposed to the IRP were a lobby group for specific energy technologies disguised as concerned environmental organizations.

Another issue that emerged from the respondents was policy implementation inertia and poor implementation. According to Fischer-Smith [37], successful policy implementation is often viewed as an exception to the norm. This is because there are numerous obstacles that may hinder the implementation, such as unclear chain of command, multiple actors, and insufficient resources, can act as barrier points to effective implementation [37]. As already demonstrated earlier, multi-actor and multi-level implementation presents its set of challenges. In addition to this, effective implementation is attained when those that are responsible for implementing a policy execute it in a manner intended hence the authors have emphasized the link between policy design and implementation processes.

There was unanimity among respondents that climate change strategies are in place, but they are not supported by a strong implementation. The respondents felt that while the policies appear to say all the right things, actions are not always consistent with those policy intents. Failure to implement policies was in part attributed to the fact that climate change is not at the center of decision making and economic development trajectory but rather is seen as an add-on issue (Respondent 19). Clearly, poor implementation cannot be interrogated in isolation without addressing the question of institutional capacity. The respondents further expressed doubt whether the required institutional arrangements to implement the policies and strategies are in place. The same doubt was raised regarding the capacity to deliver on the expectations and the availability of knowledge or evidence base to deliver on those expectations. In addition to the institutional challenges to implement, the architecture of the policies was questioned by respondents. For instance, there was a perception that policies lack the "teeth", citing the Climate Change Mitigation System Framework (CCMSF) which includes Pollution Prevention Plans, Carbon Budgets and Desired Emissions Reduction Outcomes (DEROs) which are not mandatory.

While this criticism is noted, Respondent 18 highlighted that the criticism should be contextualized by equally acknowledging that the CCMSF has been implemented in a phased approach. It is expected that the non-mandatory dispensation which is part of the first phase which started in 2016 is envisaged to end in 2020. The second phase which will commence after 2020 is envisaged to become mandatory given that by that time, there will probably be a legal framework in place if the Climate Change Bill is approved. This phase will also see the introduction of Sectoral Emissions Targets for key economic sectors as well as Carbon Budgets which will allocate a certain amount of carbon emissions for individual companies.

Even though the policies were found to be good and ambitious, however Respondent 6 in particular disagreed and went as far as branding them as unimplementable. It was felt that implementation can only be effective if it is supported by resources. Hence, a need for a clear regulatory framework for climate change that is enforceable and can be monitored was found to be more compelling. Clearly, the reservation around the availability of capacity is something that is concerning and is reflected upon in the next section.

4.2. Institutional Capacity to Implement Different Climate Mitigation Measures

The institutional capacity to implement climate change policies was primarily broken down into three main categories. These include government departments, research institutions and institutions of higher learning such as universities. The following research institutions were identified: Council for Scientific and Industrial Research (CSIR), South African Weather Service (SAWS), Agricultural Research Council (ARC), Water Research Commission (WRC), and National Cleaner Production Centre (NCPC).

Even though these institutions were identified, when asked if South Africa has institutional mechanisms in place to implement climate change mitigation policies, the respondents expressed mixed reactions. Forty-six percent of the respondents (Figure 1) felt that there is inadequate institutional capacity to implement mitigation measures. It is worth noting that 19% of the 46% strongly felt that there is a lack of institutional capacity.

On the other hand, 42% of respondents felt that South Africa does indeed have institutional mechanisms (capacity) to implement climate change mitigation measures, of which 15% strongly agreed.

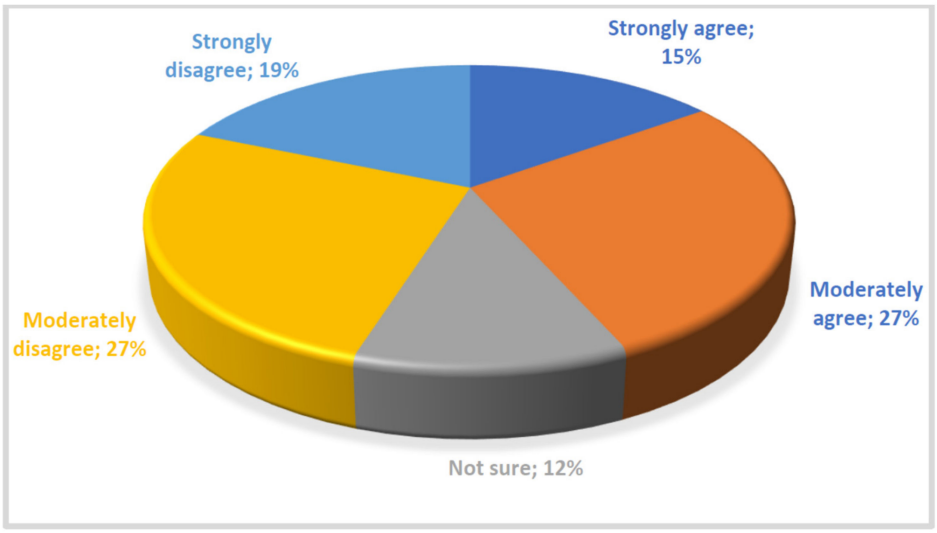

Figure 1. Institutional mechanism to implement mitigation measures.

At a government level, the respondents indicated that capacity appears to be concentrated at the national level (in national departments) (Respondent 21). Marquardt [27], however cautions that it does not matter how powerful a national ministry might be, due to dependence to some degree on sub-national authorities for implementation. Even though this may be the case that technical capacity is there at the national level but the ability to implement appears to be hindered by limited resources and funding challenges. The respondents highlighted that to facilitate coordination, the government has set up coordination mechanisms such as an Intergovernmental Committee on Climate Change (IGCCC) and the Inter-Ministerial Committee. The IGCCC is overseen by a department responsible for Environmental Affairs. However, Respondent 16 felt that the cross-cutting nature of climate change warrants that climate change should not be purely categorized as an environmental issue left to that department alone to champion it. The respondents advocated that other sector departments must mainstream climate change in the implementation of their own sector programs.

Although that appears to be an ideal situation, Respondent 18 felt that this is not always possible because sector departments tend to be first and foremost more interested in implementing their core mandates. This means that mainstreaming climate change becomes secondary to them. This is supported by Galvani [38], who claims that local implementing staff will be more willing to implement policies which they believe make a meaningful contribution to their stakeholders. It was felt that what would matter most to them is the delivery of the service that they are mandated to deliver and the satisfaction of its clients on the services rendered. The respondents suggested that most likely, the satisfaction with the service would not be judged on whether the climate change considerations were taken into account or not.

Given the perceived concentration of capacity at the national level, coupled with technical expertise that is limited to a few experts elsewhere, Respondent 1 described the system as "fragile" because it is heavily dependent on few experts. Galvani [38], posits that implementation becomes challenging in an environment where there is multi-actor and multi-level implementation especially where it is compounded by uneven capacity and resources.

It was noteworthy to observe Respondent 19 use the analogy of the structure of the Paris Agreement as a framework through which the capacity of government can be

assessed. The Paris Agreement is broadly structured in a manner that requires countries to set goals, implement actions and then report on progress made regarding the contribution to the global effort. Respondent 19 suggested that, that is where the fragility of the system becomes an issue of concern because it was contended that South Africa does not appear to have strong institutional arrangements to undertake all three functions as envisaged in the Paris Agreement.

Furthermore, Respondent 19 found it odd and concerning that the target setting component in South Africa is largely driven by very few individuals (three guys) in a single department of a university. It was argued that such a small team does not appear to have multidisciplinary expertise to center target setting on economic development imperatives. As a result, target setting appears to be more anchored from a technical and technology driven perspective rather than being wholly inclusive of other relevant factors. Moreover, the fact that prioritization and target setting is driven by consultants rather than the government was found to be problematic on its own because determining national interest remains the sole preserve of government which it must define itself (Respondent 19). In this regard, it was inferred that South Africa lacks strong institutions and the capacity to perform that function. With regard to implementing the action, even though the respondents recognized the existence of multiple players, but the challenge lies with the center that is not holding and that fails to drive the vision.

As a result, there was a feeling that the implementation appears to be haphazard and not coordinated. On reporting, there was an acknowledgement that there seems to be systems in place to understand the impact of the policies that have been put forward as well as the data streams that are necessary to do that. The inference that Respondent 15 made highlighted that the capacity constraints are as a result of the lack of intellectual capacity and leadership rather than the warm bodies that are needed to implement the policies; but also, in a manner that is responsive to economic challenges that prevail. The next section deliberates on the robustness of the climate change policies to support economic growth in detail.

4.3. Robustness of Policies to Support Economic Development

Northrop [28], argues that the effects of climate change on economic development are no longer a mystery but are rapidly becoming a stark reality. As much as economic development drives climate change in a way, climate change policies must take into account their implications on the economy. There was a mixed reaction from respondents when asked if climate change mitigation policies are adequate to promote economic growth (Figure 2). The respondents felt that climate change interventions must not be seen to be stifling economic development in order to ensure broader buy-in and acceptance from all stakeholders, including business. Forty-six percent of the respondents surveyed indicated that climate change mitigation policies are sufficient to promote economic development. However, almost a similar number of respondents were not convinced that climate change policies are supportive of economic growth.

The respondents that agreed that climate change policies are complimentary to economic growth emphasized that South Africa's negotiating stance at a global level is more about economic growth. Hence, it has welcomed a broad flexible deal in the Paris Agreement. Furthermore, they argued that the fact that the climate change policy deals with issues such as inequality, poverty eradication and other socio-economic issues shows that economic growth considerations are included in the policy. In addition, they also indicated that South Africa's climate change policy can contribute to economic growth provided there is innovative implementation. Such innovative measures would also explore new growth opportunities and industries emerging out of policy implementation.

A distinction was also made on the impact of the policies in the economy on the short-term and long-term respectively. This was to clarify that while in the short-term the economic growth may be affected as a result of the policies, in the long-term, such policies would be beneficial to the economy (Respondent 16). Arndt et al. [26], indicates

that the need to cope with short-term shocks in order to proceed on a positive long-term development path should often be a central consideration. This is an important point to caution against short-termism and lose sight of the long-term benefits of policies. The argument that environmentally friendly technologies may assist industries to continue sustainably was welcomed with skepticism because that would also depend on how the industry and other players react to those measures. In highlighting this point, Respondent 6 felt that there is a point where the industry sees measures as a burden to them. For example, the respondent indicated that the Carbon Tax Act has been viewed as increasing the cost of doing business in the country.

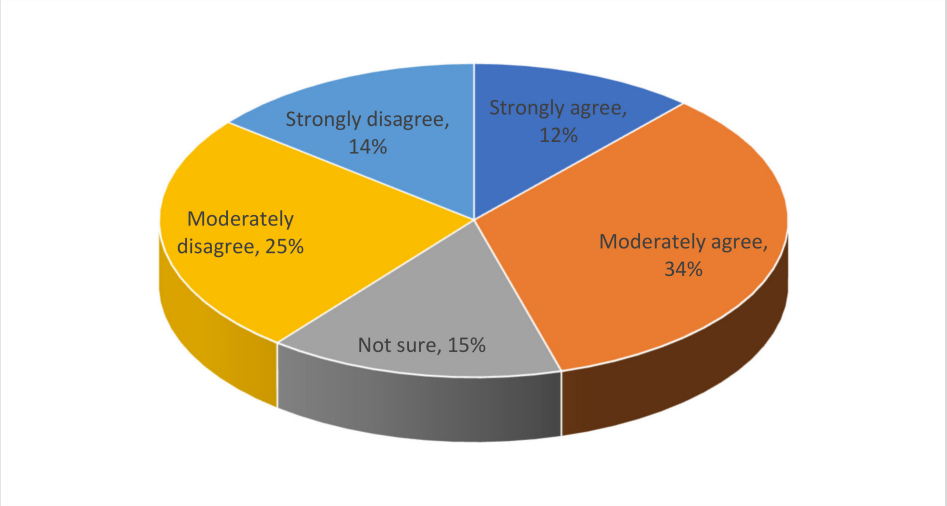

Figure 2. Promotion of economic development by climate change policies.

The issue of green technologies, particularly renewable energy was also a recurring feature. However, some respondents cautioned that renewable energy should not be perceived as a panacea to South Africa's climate change problems. Northrop [28], seems to share the sentiment based on the fact that despite the widespread faith in technological innovation, there is still no empirical basis that a technological fix can be developed and disseminated in time to make current and near-term global economic growth safe for the climate. It was asserted that the renewable energy will not provide the baseload that the country needs at any given point. Respondent 19 argued that the incoherence is yet another signal that the center does not hold and therefore measures are haphazard. For example, renewable energy was cited as one area, which has a huge potential for economic growth but that has not been fully exploited.

According to the IRP of 2019, a total of 6,422 megawatts under the Renewable Energy Independent Power Producers Program (REIPPP) has been procured. Of this, at least 3876 megawatts are operational and connected to the national grid [21]. Even though South Africa has rolled out renewable energy in the past, the respondents felt that very few if any of those technologies are South African. Furthermore, there was also a feeling that the components used in those technologies do not appear to have been manufactured in South Africa.

That being the case, Respondent 19 indicated that the REIPPP may have deprived the country of enormous opportunity to increase its manufacturing capacity and create green jobs. Related to this would be the spill-over effects on the value chain and the ability to minimize the negative impact on the balance of payment as South Africa invest on these technologies because there is no value add that is undertaken in South Africa other than the construction phase. It is for this reason that Respondent 19 implied that the REIPPP program missed an opportunity to revolutionize the manufacturing sector in green economy, something that could have been used to boost the economy rather than merely address the emissions reductions. This happened despite the tools that the

Department of Trade, Industry and Competition (DTIC) has put in place such as minimum content requirements and Black Economic Empowerment policy. Hence the respondents questioned the extent to which these tools are implemented and complied with. Once again, this symbolizes weaknesses in policy implementation and monitoring across government.

What seemed to be the emerging sentiment from the respondents is that South Africa must unlock the renewable energy sector potential. Furthermore, the respondents suggested that South Africa must define and clarify for itself the nature and form of the future economy so that it can transform and be geared to that eventuality. Unfortunately, it was the respondent's view that such a vision of the future economy seems to be lacking and things seems to continue as business as usual. It was asserted that this is a serious issue that must not be taken for granted, otherwise, South Africa risks its economic trajectory being dictated by other countries through response measures on trade that may be imposed to it.

Respondent 1 felt that international trade policy measures aligned to climate mitigation are dominated by developed countries, with response measures generally including border tax adjustments, tariffs, labelling and others. In concurring, Respondent 19 cautioned that South Africa is not able to deal with those types of response measures. This is primarily because South Africa's policies are not nested on the national interest. Issues related to response measures it seems may not be divorced from competitiveness, trade barriers and other unintended consequences that may deprive countries to trade freely and fairly. Hence, Respondent 18 indicated that the developing countries have argued that it creates uneven playing field when it comes to international trade. These concerns appear to confirm what Barbier [9], cautioned against; that over emphasizing on reducing the burning of fossil fuel by developed countries, then they may be forced to respond accordingly, including by taking trade actions that may foster their international competitiveness.

Respondent 6 felt that even domestically, South Africa has to meet the trade union demands who have not fully bought to the energy mix trajectory that South Africa has set itself for fear of job losses. Similarly, it was felt that the business sector decries the increasing cost of doing business attributed to some of the measures. While at a government level, the respondents found it worrying that the different departments dealing with trade, economic policies and environment appear not to be singing from the same script (Respondent 4). Hence, Marquarrdt [27], cautions that lack of coordination across levels and sectors may affect implementation.

Interestingly, when respondents were asked explicitly if it is an appropriate response to impose tariffs on energy-intensive imports based on the carbon content of domestic production, a somewhat interesting picture emerged. Overwhelmingly, 70% of the respondents surveyed felt that imposing tariffs would be a necessary measure. Figure 3 illustrates this point. Out of the 70% that agreed that imposing tariffs on energy-intensive products would be a necessary response, 41% of those strongly agreed. This is despite the mixed reaction of respondents on the question of response measures. Those that agreed with the imposition of tariffs on energy intensive products indicated that if South Africa is serious about mitigating emissions and the only measure that it has at its disposal is to impose tariffs, then it must be done.

Respondent 16 suggested that the revenue generated from those tariffs could be reinvested back in the economy and the cleaner technologies that are less energy-intensive. Furthermore, Respondent 18 implied that South Africa does not have many options as the trends globally are towards transitioning to a low carbon economy and South Africa has to follow suit before such measures are forced on to it. If South Africa did not decarbonize its economy, Respondent 18 argued that there is also a danger that South Africa could be used as a dumping ground for high carbon technologies and processes. However, the dissenting view from Respondents 7 and 8 was that imposing tariffs would be inappropriate for a developing and emerging country like South Africa that is still strongly reliant on coal. It was felt that South Africa remains a big exporter of fossil fuels and the majority of its exports still remain largely energy-intensive while its capacity to low carbon economy is still fledgling. With this in mind, it was implied that it is almost given that South Africa's

products will continue to have high carbon footprint and measures to impose tariffs would not only be untimely but would also erode its competitiveness and be devastating for the economy. As argued in the literature review, imposing tariffs on developing countries would be damaging because their manufacturing exports would be affected negatively.

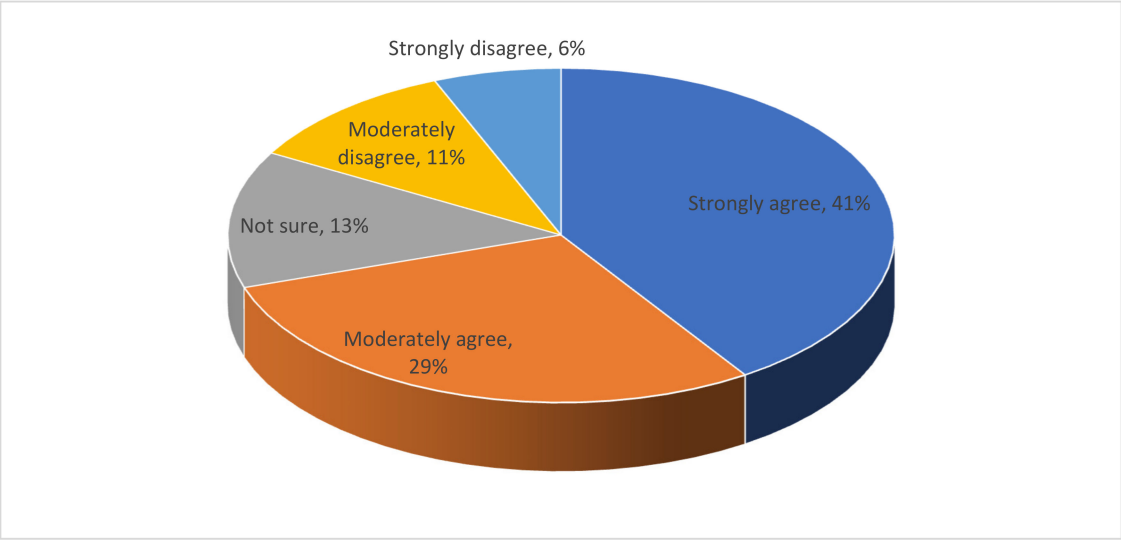

Figure 3. Appropriateness of imposing tariffs on energy intensive products.

Another perspective from Respondent 14 was that it would not be fair to have a one size fits all approach when it comes to response measures. This perspective advocated for a differentiated approach between developed and developing countries. The issue of differentiation can be traced back to the UNFCCC and the Kyoto Protocol. There was an insinuation that some developed countries feel that the Kyoto Protocol was unfair to them as it imposed obligations that came at a tremendous cost to them and the pricing of their products. Even though the Kyoto Protocol may have had that effect, it was contended that it helped them to become greener in their production processes. Now those developed countries, it was argued that they are introducing these measures in order to try and recoup the costs that they incurred from the countries that were not obligated under the Kyoto Protocol. While this seems largely speculative and a far-fetched conspiracy, it cannot simply be dismissed as such.

4.4. Industry Focused Measures

The respondents were asked if government is doing enough to support sustainable consumption and production (SDG 12). Most respondents were of the view that South Africa is not ready for such a dispensation. Among the responses that were provided, it was indicated that South Africa's level of development does not even allow the country to entertain sustainable consumption because it is still grappling with peoples' basic needs and services. Therefore, it was contended that initiatives to influence consumption patterns and altering them would be appropriate for affluent nations where people have choices (Respondent 19). It was argued that the situation in South Africa is completely different because most of the population does not have choices. However, it was posited that there are opportunities that can be pursued in terms of reducing carbon footprint through public infrastructure system such as transport. Such interventions would indirectly change the pattern of consumption by the broader public. Accordingly, of the respondents felt that government was not doing enough to support sustainable consumption and production as shown in Figure 4. About 70% of the respondents were of the view that not enough is being done to support sustainable consumption and production. Respondent 4 attributed this to lack of strong policies to encourage it resulting in huge opportunity loss in this area.

Furthermore, the respondents felt that its energy sector is not only energy intensive, but also expensive.

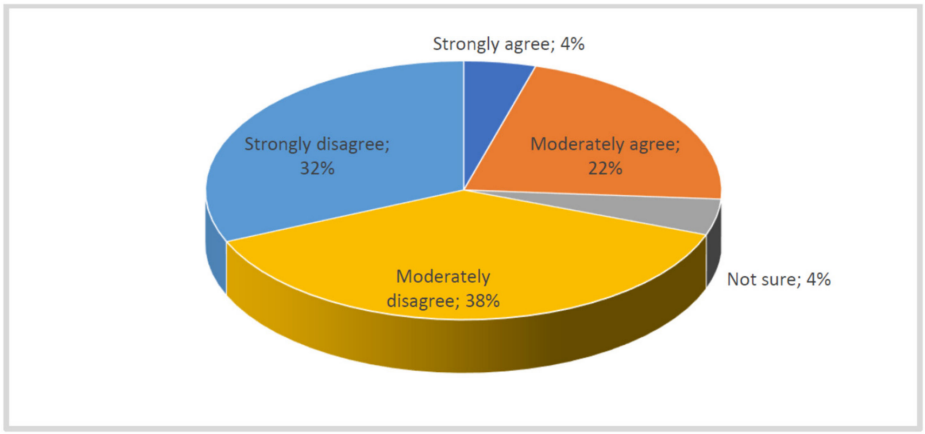

Figure 4. Government has measures to support sustainable consumption and production.

The business sector was not sparred of the criticisms by the respondents. They felt that the other challenge lay with the business sector itself that tend to be highly resistant to changes and policy intents that are introduced. It was suggested that the government must endeavor to demonstrate to industry that sustainable production makes a good business sense and could save industry sector resources (Respondent 18). However, despite the criticism of government, it was acknowledged that there are measures that are in place such as appliance labelling, energy efficiency and building code standards, even though it would seem that there is limited awareness about these measures. Furthermore, it was recognized that government has introduced initiatives such as plastic bags recycling, strategy on tire recycling, building lighting and in the waste management sector, however, these measures are seen as pet projects rather than mainstream interventions (Respondent 15). Important to note though was that it was indicated that these interventions were as a result of external funding rather than being fully conceptualized in South Africa. However, the introduction of the carbon tax and other environment related incentives were the beginning endeavor to address this issue.

Similar sentiments were expressed when the respondents were asked if the climate change management policies have improved the production methods by the energy-intensive industries. Forty-one percent of respondents disagreed with the statement, 38% agreeing, while 21% of respondents were not sure. Once more, there was criticism of the energy sector that is energy intensive. The government was criticized for lack of legislation and lack of monitoring mechanisms. Fundamentally, there was also criticism that most measures are voluntary in nature. This was in reference to measures such as carbon budgets and pollution prevention plans that have not been fully implemented yet. Accordingly, even where progress had been made, it was felt that such progress could not be attributed to climate change policies which had only begun to be implemented (Respondent 19). It was implied that the Air Quality Act was to be credited for such progress.

The government was commended for the introduction of section 12L of the Income Tax Act (1962) which may have helped companies to be energy efficient (Respondent 12). From this instrument, companies must prove that their production is efficient through audits. The Carbon Tax Act that came into force in June 2019 was acknowledged in that it will further use tax instruments to promote cleaner production methods. It was indicated that the fuel levy has grown over the past years and may have forced logistics companies to rethink their operations and include efficiencies in their processes. As cautioned earlier in the literature review, policy instruments on incentives can only influence behavior only if the financial incentives are strong enough to influence decision-making processes. For

instance, tax instruments are generally known to be less effective if they are not set high enough to have a deterrent effect.

The respondents also felt that the industry itself is not as responsive as it should be due to the size of investment that it has to make to improve production methods and processes. It came as no surprise that when asked if the energy intensive industry was complying with climate change mitigation policies (Figure 5); 61% of the respondents felt that the energy intensive industry is not complying with those policies.

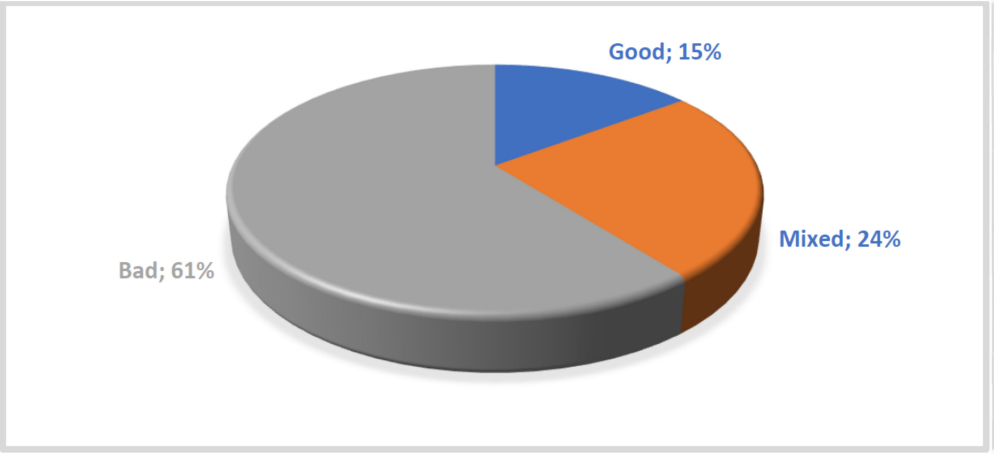

Figure 5. Energy intensive industry complying with climate mitigation policies.

The respondents felt that the big companies have continued to emit unabated due to lack of capacity to enforce emissions quotas. In emphasizing this point, Respondent 19 highlighted that this was a real problem because it would be naïve to ignore the fact that the industry is a very strong lobby group. Fischer-Smith [37], notes that such powerful interest groups intervening in policy creation may at times prevent coordinated policy action. As such, it can influence policy to the level where it is able to comply with. That way, the objectives are set in a bar that is within reach for them, low enough to be achieved (Respondent 19).

The respondents indicated that such a scenario then creates a false impression that the industry is complying. The respondents suggested that in some cases, the industry can push for the deferment of the implementation of the policy. This reduces the likelihood of them having compliance issues. It was suggested that the problem is that while the industry recognizes that they have to comply with policy provisions, but they do not see them as something beneficial to their bottom line (Respondent 18). Hence the issue of incentives becomes relevant in policy development. It was also implied that government is complicit in that its own energy producer has also failed to comply with policies and measures such as Minimum Emissions Standards and has been found wanting on many occasions (Respondent 15). Furthermore, government was criticized for the perception that good quality coal appears to be reserved for an export market while poor quality coal is used in the country (Respondent 6). It was argued that only an enforceable regulatory framework would remedy the situation that is largely voluntary.

The respondents were asked if South Africa has mechanisms to provide for incentives to encourage industry to adopt cleaner production practices. There was a mixed reaction from respondents with 46% feeling that there are incentives in place to encourage industry to adopt clear production practices. However, 40% of respondents disagreed while 15% were not sure. As indicated earlier, incentives must be designed in a manner that induces behavior change. Among the tax incentives, are the two incentives that were introduced in the Income Tax Act of 1962. The first one relates to section 11D of the Income Tax Act. This was introduced in 2006 by government in order to promote private sector Research and Development (R&D) investment to boost innovation in the private sector, develop and

improve products and processes. The second one is Section 12L of the Income Tax Act. This incentive provides an allowance for businesses to implement energy efficiency savings. The savings allow for tax deduction of 95c per kilowatt hour saved on energy consumption. However, it has been criticized for giving very little money back to companies. This is in light of the technology investments that must be made vis-à-vis the amount of rebates provided, this may need to be reviewed to make it more effective.

5. Conclusions

The purpose of this paper was to present the findings regarding policies and institutions that deal with climate change mitigation (including sustainable consumption and production). The study revealed that South Africa has put in place good policies and strategies to respond to climate change mitigation. However, some interventions were found to be ineffective because they are voluntary. There was also a lack of concrete actions to implement them, as well as inconsistencies in the broader policy framework. Related to this, the study revealed that there is a lack of adequate institutions to implement the policies and the strategies that it has put in place. The institutional capacity was found to be concentrated at national level and the system was found to be fragile due to dependence to few experts. The paper concludes that not enough is being done to support sustainable consumption and production (SDG 12) that is closely linked to SDG 13. Hence it also concluded that policies have not improved production methods by the industry and the energy intensive industry is not complying with the policies. The study recommends continued refinement of the climate mitigation policy for industry compliance, the promotion of renewable energy, energy efficiency and a low carbon development trajectory for South Africa.

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Informed Consent Statement: Informed consent was obtained from all participants involved in the study as respondents.

Data Availability Statement: The data presented in this study may be provided on request from the corresponding author. The data are not publicly available due to privacy and confidentiality requirements in line with the ethics approval protocols.

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