

Domestication and Prioritization of the Sustainable Development Goals and Agenda 2063 in Djibouti's National Development Plan with the iSDG Model Policy Scenario Analysis Report

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Millennium Institute (MI) is a nonprofit, non-governmental organization passionate about improving the welfare of individuals on every continent by working with stakeholders to meet the challenges of sustainable development.



Domestication and Prioritization of the Sustainable Development Goals and Agenda 2063 in Djibouti's National Development Plan with the iSDG Model

Policy Scenario Analysis Report

Millennium Institute

Executive Summary

The objective of this study is to support the Government of Djibouti to domesticate and prioritize the SDGs and Agenda 2063 through identification of cross-sectoral intervention policies and programs that are coherent, synergistic, and aligned with the SDGs and Agenda 2063. This was accomplished by customizing the iSDG model to represent the social-economic-environmental dynamics of Djibouti, building capacity to utilize the iSDG for policy analysis in the Government, and collaborating with the Government to test policy scenarios that enables progress towards the achievement of the NDP and Djibouti Vision 2035.

The analysis was conducted by developing three policy scenarios in cooperation with the Government of Djibouti: a business-as-usual scenario (BAU) where policy expenditure remains at 2019 levels into the future, a NDP scenario (NDP) based on the proposed national development plan for the period 2020-2024 (currently in development) where expenditure grows from 2020 levels based on estimates, and an optimistic scenario (OPT) where expenditure grows slightly faster in priority areas. The BAU was then used as a baseline to compare performance against.

Policy interventions were grouped in order to isolate their impacts to measure synergies across policies and the loss of attainment when interventions are left out. This enables quantifying the effect of interventions interacting to generate positive or negative contributions beyond their individual effects. Last, the return-on-investment of the net attainment of SDGs compared to the average cost of interventions is calculated.

These metrics are then used to identify SDG accelerators that act as leverage points where improvement in one area can trigger improved performance across multiple SDG indicators. This process informs developing effective policy suites that take advantage of potential synergies, ensure interventions receive support across sectors through supplementary interventions, and target SDGs where large gains can be made with, relatively speaking, fewer resources.

Key Findings

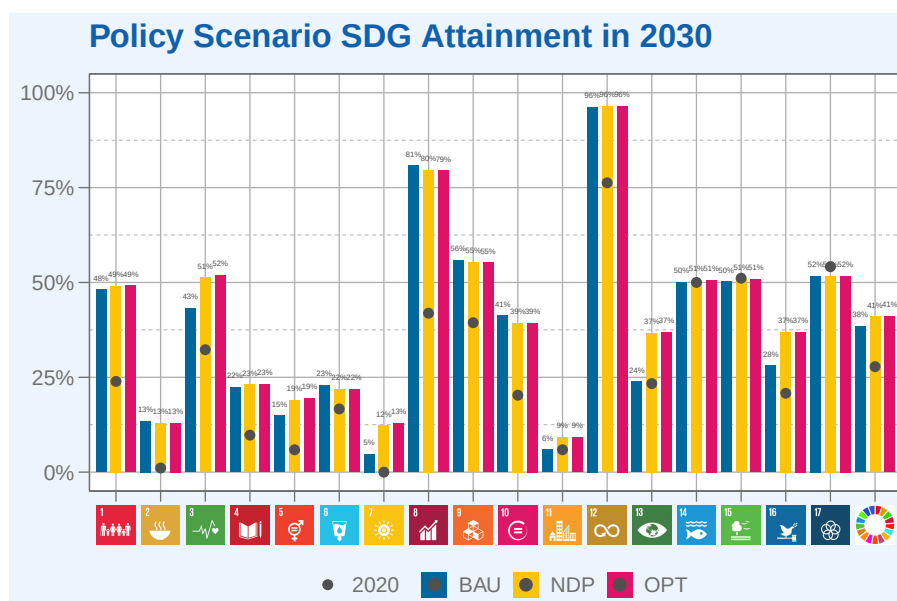


Figure 1: Scenario SDG Attainment in 2030 vs 2020 Levels

1. Proposed NDP investments improve total average SDG attainment in 2030 marginally; 3 percent over BAU investment. SDG 13, 16, 3, and 7 see the greatest improvement. The OPT scenario provides marginal increases in SDG 3 and 7, but the combined average increase in SDGs performance is the same as the NDP scenario due a decrease in SDG 8.
2. The analysis shows that targeted investments in SDG 1, 2, 3, 6, 8, 10, and 16 can lead to rapid improvement, either through the raw attainment that can be achieved or through synergies between interventions and supporting effects across interventions that lead to greater growth than the intervention alone could achieve.
3. Interventions for health, education, energy, and environment were identified as SDG accelerators. These interventions act as leverage points that improve goal achievement with fewer resources, contribute to synergies across SDGs for greater performance overall, and support implementation of other interventions to generate additional returns.
4. There are many trade-offs to be made between policies, and understanding these trade-offs and interactions between policy options is critical in effectively utilizing resources for attaining the SDGs, especially when there are competing objectives.
5. Targeting priority goals with budgetary allocation is necessary, but is alone not sufficient to improve performance on the SDGs. Rather, interventions that build on synergies and at adequate investment levels are required to ensure the highest SDG performance is achieved with available resources.
6. Djibouti's economic context provides an extraordinary opportunity for impactful policies, if the substantial future growth is utilized effectively. By harnessing growth and ensuring policies account for the dynamic interconnections of the development context, substantial progress can be attained beyond the scenarios estimates.

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1. Introduction

Global efforts until 2030 are focused on successfully implementing the Sustainable Development Goals (SDGs) adopted at the UN Summit in September 2015. At the African continental level, efforts are also focused on implementing the Africa Agenda 2063, the fifty-year strategic framework for socio-economic transformation of the continent adopted by the Heads of State and Government of the African Union in January 2015. The Government of Djibouti has endorsed both of these development agendas and is committed to implementing them.

The Republic of Djibouti has seen a rapid growth in economic and social indicators throughout the last decade. This due to strategic choices focused on transforming and developing the macroeconomic environment of the country. During the last two decades, continuous economic growth has resulted in a substantial reduction in poverty and created an enabling environment for significant progress towards SDGs.

The construction of new ports, rail connections, and cross-border roads have spurred the development of economic activities. The consensus is that these investments have supported sustained economic growth, which has helped to lower the incidence of poverty and improve other social indicators. Investments in infrastructure, health, and education have also significantly increased access to services, and many indicators in social areas have improved from the period between 2015 and 2019. Particularly, these investments show returns in increased school enrollment and decreased dropouts, especially for females, and rapidly increasing access to medical care.

Djibouti's long-term development goals are described in the Djibouti Vision 2035. Djibouti 2035 is based on five pillars: (i) "national peace and security," to strengthen unity, peace, and solidarity; (ii) "good governance," to reinforce good governance and democracy in order to support further growth and achievement; (iii) "diversified and competitive economy," with the private sector as the main driver of economic growth; (iv) "consolidation of human capital," through investments to build a hardworking, healthy, and educated workforce; and (v) "regional integration," to increase trade and commerce with regional partners further promoting development within the country investing and to support its achievement (Government of the Republic of Djibouti).

The Government of Djibouti is also currently developing the second National Development Plan (NDP), "Djibouti ICI," for the period 2020-2024 in order to implement Djibouti 2035. Djibouti ICI has two key strategic themes: macroeconomics and poverty, and five cross-cutting themes: (i) "digital by default," with a focus on expanding digital infrastructure and technology within the economy; (ii) "environment and climate change," to address the potential impacts in Djibouti; (iii) "competitiveness," to improve the global economic competitiveness of Djibouti; (iv) "stability and resilience," for furthering social, regional, economic, and institutional stability; and, (v) improving the Sustainable Development Goals attainment (Government of the Republic of Djibouti, 2021) (Government of the Republic of Djibouti, 2021).

Effective implementation of these development agendas, while ensuring alignment with international development frameworks, requires careful adaptation of the international frameworks to circumstances specific to Djibouti. This is accomplished through assessing the prioritization of objectives and sequencing of policies and interventions aimed at achieving development goals. Furthermore, integrating complex, interconnected social, economic, and environmental targets efficiently into national planning frameworks requires analytical tools and capacities necessary to evaluate the policy trade-offs associated with programming for sustainable development. Policymakers require these tools and capacity to design and apply integrated planning tools for evidence-based policy-making, progress monitoring, and impact evaluation in order to meet the objectives of multiple development agendas.

1.1. Study Objectives

The objective of this study is to identify cross-sectoral intervention policies and programs of the Djibouti ICI that are coherent, synergistic, and aligned with the SDGs and Agenda 2063, thereby supporting the Government of Djibouti to domesticate and prioritize the SDGs and Agenda 2063. This was accomplished by customizing the integrated Sustainable Development Goals model (iSDG) model to represent the social-economic-environmental dynamics of Djibouti, building capacity to utilize the iSDG for policy analysis, and working with the Government of Djibouti to test policy scenarios that enables progress towards the achievement of the Djibouti ICI and Vision 2035.

The study identifies which Djibouti ICI programs and associated interventions have the highest potential to be “SDG Accelerators” and enable progress towards the achievement of Djibouti ICI, Djibouti Vision 2035, and, ultimately, Vision 2040 goals. The analysis has been implemented with the intention of ensuring equitable economic growth, social development, and environmental protection.

The iSDG of the Millennium Institute (MI) is a dynamic simulation tool designed to support comprehensive and integrated long-term development planning. The model integrates social, economic, and environmental factors in its analysis and allows for the evaluation of different policy options towards the realization of the SDGs. The model provides a quantitative framework for analyzing policy trade-offs against desired goals. This enables the testing of scenarios describing the potential future consequences of a policy agendas.

1.2. Report Structure

This report details the study results from applying the iSDG to assess SDG synergies, accelerators, return-on-investment, and policy coherence under the framework of the Djibouti ICI. Following the introduction, the report consists of three main sections: Methodology, Scenario Analysis, and Key Findings. The iSDG-Djibouti model is described in the Methodology section. The description includes the history of its development, the purpose of the model, a discussion of the System Dynamics methodology on which the model is based, and an overview of the structure of the model, including its modules and interconnections.

This is followed by a description of how the model was adapted to represent Djibouti’s economic, societal and environmental context, including the validation and calibration of the model to Djibouti’s data set. The sources of data are provided, along with a brief description of the assumptions that have shaped the historical figures. Then, the method that the business-as-usual, NDP, and optimistic scenarios have been implemented as interventions in iSDG-Djibouti are described. The section concludes with a description of the analytical processes utilized to calculate SDG attainment, synergies, and accelerators to assess the scenarios.

The Scenario Analysis section presents the main analysis and results. First, the simulation results for overall SDG attainment and a discussion of NDP targets and performance are presented. The interventions are then grouped into intervention categories, and SDG performance analysis is provided by these categories. Then, the SDGs with the greatest synergistic potential are identified. The focus is shifted from partial analysis to drop-out analysis, whereby the synergistic effects of the investment categories are identified.

Finally, return on investment, in terms of SDG attainment compared to expenditure, is analyzed through assessing interventions individually. Last, interventions that act as leverage points to accelerate SDG attainment are discussed. In the Key Findings section a summary of SDG attainment, areas for improvement, and key interventions for designing scenarios is presented.

Throughout the report in the discussion of performance, it is important to note that the scaling used in all plots and tables refers to the International System of Units short scale abbreviation; e.g.: million (m) is 1,000,000 and billion (b) is 1,000,000,000.

2. Methodology

Policy design and planning for the SDGs presents a major challenge due in part to the interconnected and complex nature of the 17 goals. The analytical methodology used focuses on utilizing the iSDG model, calibrated to the Djibouti's context, to understand the complex, interconnected nature of policy impacts on development. This is done by assessing synergistic effects between interventions on goal attainment and through identifying interventions which accelerate goal attainment.

Synergies may have two effects, one in that actions geared towards the achievement of one SDG may lead to underachievement or failure in another. Similarly, successful initiatives for one SDG can create synergies between interventions targeting other SDGs, resulting in a greater increase in the SDG performance than if only one of the initiatives were implemented.

SDG Accelerators are leverage points where improvement in one area can trigger improved performance across multiple SDG indicators through synergistic effects. These leverage points can take the form of development priorities or areas that are lagging. Identifying accelerators requires a concurrent analysis of all 17 SDGs, the interactions between them, and the cascading and intersecting effects of the interventions across economic, social, and environmental systems.

2.1. iSDG-Djibouti

The *integrated Sustainable Development Goals* (iSDG) model is a System Dynamics based tool that has been designed to support national development planning. The model is structured to analyze medium-term and long-term development issues at the national level. The iSDG's sectors cover the key social, economic, and environmental development issues, and these sectors are dynamically linked such that the complex, interconnected relationships that drive sustainable development are represented.

The models comprehensiveness and level of aggregation make it an appropriate tool to support a detailed analysis of alternative government strategies (C Allen & Wiedmann, 2016; United Nations Environment Programme, 2014). The analysis itself is not intended to provide a forecast, rather to improve policy makers' understanding of the complex inter-sectoral connections that drive attainment of development goals in order to enable designing public policies with an integrated perspective.

The iSDG model evolved from the Millennium Institute's (MI) experience in developing and applying models for evaluating policy impact on sustainable development. Notably, the iSDG builds upon the Threshold 21 model, which focused on assessing policy impact on the Millennium Development Goals. These models have been developed over the past 35 years as tools to support policy development (Pedercini et al., 2018). The MI has applied these models in over 40 countries, and supported governments to use the tools to develop plans for national development, green economy, and sustainable agriculture¹.

¹View <https://www.millennium-institute.org/our-work>

The iSDG is built using the System Dynamics (SD) methodology, which excels at deconstructing and analyzing complex socio-economic environments and policy systems (Sterman, 2000). Using this method, the model is formulated as a system of ordinary differential equations, and includes approximately 3,000 variables organized in 30 sectors. This method of simulation aids in garnering insight into complex inter-relationships (Davis et al., 2007). SD has a long history of application for analyzing social, environmental, and economic issues, and these characteristics make SD a methodology well suited to exploring policies in the complex, interconnected system that is sustainable development of a country such as Djibouti.

The iSDG model focuses on representing the concepts that drive attainment of the Sustainable Development Goals (SDG), put forward by United Nations (UN) working committees around 2012 to follow up on the Millennium Development Goals (MDG) that were soon to be expiring (Griggs et al., 2013). With the MDGs more focused on alleviating poverty and promoting socioeconomic development, the SDGs brought in additional focus on environmental impacts in combination with social and economic development. These relationships have been adapted to the historical work of the MI with the Threshold 21 model with the iSDG model.

2.1.1. Model Sectors

The iSDG model structure includes all 17 SDGs and 78 SDG indicators.² The model includes 30 social, economic, and environmental modules (figure 2). Relationships are represented both within and between sectors in order to capture the inter-connected nature of development. The sectors of the iSDG are categorized into environmental (green), social (red) and economic (blue) modules.³

Each module operates as a sub-model, and includes the factors which influence SDGs within the sector. The arrows connecting the sectors in Figure 2 show how the model also integrates the sectors by modeling the cross-sectoral impacts. As the model simulates, the modules interact with each other based on the calculations done within the module. This interaction between modules enables the integration of cross-sectoral effects, which are a necessity when assessing policies for sustainable development.

Table 1: iSDG Sectors

Social Sectors	Economic Sectors	Environmental Sectors
1. Population	11. Agriculture	21. Land
2. Fertility	12. Industry	22. Soil
3. Mortality	13. Services	23. Water Demand
4. Education	14. Aggregate Production	24. Water Supply
5. Health	15. Investment	25. Electricity Demand
6. Transportation	16. Households	26. Electricity Generation
7. Other infrastructure	17. Government	27. Fossil Fuel Demand
8. Employment	18. Public Services	28. Fossil Fuel Production
9. Income distribution	19. Finance	29. Emissions and Waste
10. Poverty	20. Balance of Payments	30. Biodiversity

²View the model documentation for further details on the iSDG model

³Categorization has no impact on model functionality, but illustrates the breadth of the model.

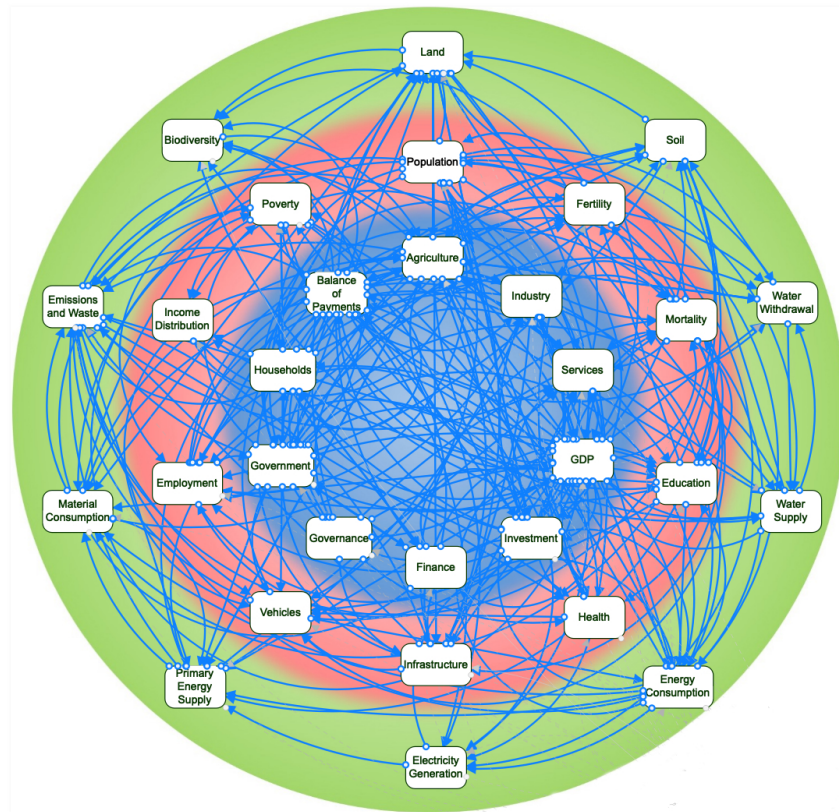


Figure 2: iSDG Model Sectors

2.1.2. SDG Indicators

The global framework of indicators adopted by the United Nations Statistical Commission brings together 169 indicators, which makes it possible to monitor the progress made by countries on an internationally comparable scale. However, the same indicators are not necessarily applicable to all national contexts, because of the characteristics specific to each country and the availability of the data required for their calculation.

The iSDG tracks 64 unique SDG indicators, 78 if counting multiple times those that appear in multiple SDGs. The 78 indicators are a part of 51 targets. All SDGs are represented by at least one target. The complete list can be found in SDG Indicators in the iSDG Model Appendix. The targets included were selected based on the criteria of quantifiability and data availability.

2.2. Model Validation

The iSDG is structured to analyze medium to long-term development issues at the national level in order to provide practical policy insights. Specifically, the model provides policymakers and other users with means to analyze the consequences of planned and alternative policies. Such estimates are not to be taken as forecasts, as no model can accurately forecast long-term development trends, but as potential outcomes based on a set of clear and well-grounded assumptions.

The model's results inherently embed a high degree of uncertainty over the time horizon considered in the simulation. A variety of unforeseeable changes can take place during the period, and changes may take place in social, economic, or environmental systems. To address

the uncertainty inherent to modeling the complex interactions in sustainable development, the iSDG validation process focuses on strengthening the underlying assumptions based on currently available data and research. The goal of validation is improving the model's ability to provide insights in the key questions being addressed (Forrester, 1961).

Validation is embedded in the broader model implementation, and includes structural and behavioral validation tests (Barlas, 1996). Structural validation tests involve direct verification of the assumptions made in the model structure and parameters. Behavioral validation tests involve the assessment of the model's ability to replicate the historical behavior of the main indicators for the historical period of the simulation. Structural and behavioral validation techniques are discussed at a general level in the following section.

2.2.1. Structural validation

Testing the structural robustness of the model consists of five steps (Forrester & Senge, 1980; Richardson & Alexander L Pugh, 1981; Sterman, 2000). The key purpose of validating the model structure is to determine how suitable the model is for evaluating the questions asked in the analysis. This can be done by addressing the following questions:

1. *Is the model structure consistent with qualitative knowledge?*
2. *Are the model equations dimensionally consistent?*
3. *Are concepts for addressing the questions represented in the model?*
4. *Are parameters consistent with descriptive and numerical knowledge?*
5. *Does the simulation result make sense when inputs take on extreme values?*

These questions are addressed by MI during model development as well as throughout the implementation stages of the project. The iSDG model is maintained and updated based on leading research and modeling techniques. Throughout model development and project applications, equations are evaluated to ensure model consistency. Analytical direction is set based on the country's needs, and the model can be adjusted as a means to accurately address these questions.

During calibration of the model to the national context, parameter values are assessed both qualitatively and quantitatively to evaluate model fit. And, through calibration and BAU simulation, extreme conditions are tested to evaluate the robustness of the calibrated model. These considerations are necessary to verify that the model qualitatively and quantitatively represents the national context. The approach increases the rigor of the model application and ensures that the model will be useful for analyzing the policy impacts.

2.2.2. Behavioral validation

Behavior validation is a significant step in the model application. In the context of the model, behavior describes the simulation results of the variables in the model. The purpose of the iSDG model is to test policy impacts on the evolution of medium to long-term trends in sustainable development. The model calibration aims to accurately reflect medium-term to long-term behavior in historical data. This approach places less emphasis on short-term cycles.

Statistical summaries are used to validate the behavior of the model. The statistics used are standard econometric techniques for quantitatively assessing the degree to which the model replicates the trends and patterns in historical data. The calibration report evaluates the goodness-of-fit for the model application. This analysis guides further calibration towards the reduction of error in order to continually refine the behavioral validity of the model application.

2.2.3. Model Database

Data is collected from both international and national data sources. A comprehensive list of data sources for the inputs into the model and the data used to calibrate the model is reported in the Data Sources Appendix. When available, national data sources were prioritized, and international data filled gaps where national data was not available for model variables. If data was not available from national or international sources and if that data is necessary for calibration, interpolations and assumptions were made. Data was verified for internal consistency, and data has been confirmed with government officials.

2.2.4. Model Calibration

The model is calibrated to the historical data incrementally, module by module. The calibration process estimates parameters of the model in order to minimize residual error between the simulated variables and historical data. The partial-model testing method is used to minimize confounding effects between sectors and improve the robustness of calibration (Homer, 2012). In practice, the sectors of the model are separated into the smallest relevant structures and calibrated step by step. Then, the modules are integrated, and the final adjustments are made based on cross-sectoral effects. This process can be broken down into four steps: (1) isolate each partial-model, (2) estimate parameters, (3) integrate partial-models, and (4) assess and revise.

The calibration process has been designed considering best practices used for developing structural models like the iSDG. By following this process, the method adheres to the three heuristics for model testing (Oliva, 2003). That is, the method allows the calibration to (1) include all knowledge available about system parameters in calibration, to (2) apply calibration to the smallest possible problems, and (3) use calibration to test the model's ability to explain behavior. This approach reduces the risk of fitting the model to data, increases estimation efficiency, and concentrates the model error in the structure generating the behavior, thereby increasing robustness of the application.

2.3. Scenario Development

Three scenarios were developed in order to facilitate the analysis of policy impacts on SDG attainment. First the Business-as-Usual (BAU) scenario was developed based on historical policy expenditure. The BAU assumes that nominal expenditure remains the same until the end of the simulation from the 2020 levels. This approach enables the comparison of alternative scenarios to this baseline and isolate what the potential impact of changes of future policy expenditure can be.

Next, the NDP was coded to represent the budgeted policy expenditure as interventions within the iSDG. This was done in collaboration with the Government of Djibouti. An approximate total allocation was provided for the period from 2020-2024, and then an estimate of the percentage of total growth in expenditure from 2020 until 2030 was developed. This additional expenditure is then added to the BAU scenario to determine what the additional effect of policy expenditure is on the SDGs.

In some cases, data inconsistencies between historical policy data and future NDP policy data required transformations of the future policy expenditure to be consistent with historical data. This approach is necessary because the model has been calibrated to the historical data collected and validated by the Government of Djibouti, which creates complex relationships

between model structures and inputs. These relationships are sensitive to sudden changes in inputs or in order of magnitude. In these cases, the intervention data is then based on percent growth, rather than net expenditure in absolute terms.

The final scenario is an optimistic scenario (OPT) that is intended to be an opportunity to test additional expenditure above that planned in the NDP. The interventions chosen for additional expenditure represent areas of importance identified as priorities by the the Government of Djibouti to improve the attainment on the SDGs. By comparing the performance of the OPT scenario with the BAU and NDP, the OPT scenario provides insights into the drivers of attainment. Table 2 reports the estimated growth in expenditure over the nominal 2020 levels.

The ongoing COVID-19 pandemic also creates an important and necessary impact to represent throughout the scenarios. Throughout 2020 and 2021 the impacts of the COVID-19 pandemic have been felt worldwide, with all countries development paths substantially impacted. The impact of COVID-19 on Djibouti's economic development has been estimated by the Government of Djibouti and integrated into the model. The estimated impact is implemented in the model with simple assumptions, as the actual impact is still being determined. The impact is spread across all economic sectors represented in the model equally to reflect the aggregate percent GDP change year over year. The Government of Djibouti estimates that nominal GDP growth will be 6.6% in 2019, 1.2% in 2020, 7.0% in 2021, and 7.8% in 2022.

Table 2: Expenditure Growth from 2020-2030

Intervention	BAU	NDP	Optimistic
Climate Adaptation	0%	30%	35%
Family Planning	0%	0%	0%
Fertilizer Subsidies	0%	0%	0%
General Agriculture	0%	10%	11%
General Education	0%	30%	36%
General Health	0%	35%	42%
General Transfers	0%	45%	50%
Households Energy	0%	50%	55%
Industry Energy	0%	45%	48%
Land Protection	0%	40%	42%
Large Biomass	0%	35%	37%
Large Hydropower	0%	30%	33%
Large Photovoltaic	0%	40%	43%
Large Wind	0%	40%	43%
Marine Protection	0%	40%	42%
Paved Roads	0%	25%	27%
Railways	0%	30%	33%
Reforestation	0%	25%	27%
Sanitation Access	0%	15%	18%
Small Hydropower	0%	0%	0%
Small Photovoltaic	0%	30%	33%
Unpaved Roads	0%	25%	26%
Vehicles Efficiency	0%	0%	1%
Waste Management	0%	40%	43%
Water Access	0%	20%	23%
Water Efficiency	0%	40%	43%

In order to isolate interventions for assessing potential SDG accelerators, it is necessary to group the many interventions into intervention scenarios. These intervention scenario groups are based on combining interventions which have similar targets into a single group. By grouping interventions in this way, it is then possible to isolate and analyze the individual contribution of

interventions to the synergistic effects between interventions. This enables the identification of how interventions add to one another or detract from one another to impact SDG performance. Table 3 presents the groups of interventions used in the following analysis.

Table 3: Intervention Scenario Groups

Interventions	Agr	Eco	Inf	Was	Hlt	Edu	Env	Eng
Climate Adaptation							X	
Family Planning					X			
Fertilizer Subsidies	X							
General Agriculture	X							
General Education						X		
General Health					X			
General Transfers		X						
Households Energy								X
Industry Energy		X						
Land Protection							X	
Large Biomass								X
Large Hydropower								X
Large Photovoltaic								X
Large Wind								X
Marine Protection							X	
Paved Roads			X					
Railways			X					
Reforestation							X	
Sanitation Access				X				
Small Hydropower								X
Small Photovoltaic								X
Unpaved Roads			X					
Vehicles Efficiency								X
Waste Management							X	
Water Access				X				
Water Efficiency				X				

2.4. Analytical Process

Following developing the scenarios, the two policy scenarios can be compared against the business-as-usual scenario to determine the potential impacts future policy will have on SDG attainment. This analysis is completed in multiple steps. In the first step, SDG performance is measured for each scenario, then interventions are grouped and simulated individually to measure the single interventions impact. Next, the synergistic contribution of interventions is calculated to determine which interventions build upon others and which interventions negate the effect of others. Last, a drop out analysis is conducted to determine if removing particular interventions have substantial impacts on SDG attainment.

2.4.1. SDG Performance

The scenarios included in the calculation of performance are the BAU scenario, where no changes in the policy is made after 2019, and two policy scenarios, where the NDP implemented estimated policies from 2020 to 2030 and the optimistic scenario, where estimated expenditure is increased marginally in key areas. The performance of the interventions is defined in terms

of the progress towards achieving the SDGs linked to this intervention. Each SDG consists of indicators with a target value agreed by the international community.

$$Performance_{ij} = \frac{Value\ 2030_{ij} - Value\ 2015_j}{Target_j - Value\ 2015_j}$$

Where:

i = scenario

j = indicator

The model compares the value that each indicator has in 2030 in each scenario with the value in 2015. The model then calculates the ratio of this difference between the target values and the values in 2015. Using this equation, the impact of a policy is always evaluated based on the distance of the values of the indicators obtained from the corresponding target values. Using this approach enables the identification of the goals that have the greatest performance increase. It should be noted that the calculation of progress towards different SDGs is based on the average of available indicators within each SDG. Certain indicators more qualitative in nature or for which data was not available are not included, thus certain SDGs may have more indicators in the average.

The results presented in this report should be interpreted relative to each other, for instance, by comparing the values in 2020 to 2030 or between the Base scenario and other scenarios. This may differ from other methodologies that measure SDG attainment. Though all methodologies follow the SDG framework of goals, targets and indicators, the imputed attainment of methodologies may differ, as they use different methods of calculating the performance, and the indicators chosen may differ, depending on their scope and access to data sources.

For example, the SDG Index and Dashboards Report from the Sustainable Development Solutions Network (SDG Center for Africa & SDSN, 2020), though following the same Agenda 2030 framework as the iSDG, differs in four fundamental ways: (1) the selection of indicators, (2) the data sources, (3) target values in 2030, and (4) analysis of trends. On the selection of indicators, it may differ as the iSDG is limited by the scope of the model. Concerning the data sources, SDSN prioritizes sources that are internationally comparable, whereas the iSDG model development process includes consultation with national experts, policy stakeholders, and testing of internal consistency using the model. The analysis of trends differs as well as SDSN focuses solely on the past and present, whereas the iSDG includes a calibration based on historical data, keeping in mind internal consistency and dynamics between indicators, and uses this to project future attainment in different scenarios.

2.4.2. Intervention Synergy

Building on the calculation of SDG performance, the synergistic return of interventions can be assessed by combining the individual performance of each scenario and comparing the individual scenarios with the scenario that combines all of the interventions – the NDP scenario. This approach allows the interaction between the scenarios to be analyzed, and enables identifying effective strategies to improve SDG performance.

First, contributions are calculated from the performance of each scenario versus the performance of the NDP scenario. This value represents the relative performance of the scenario in question compared to the performance of the scenario that combines all interventions.

$$Contribution_{ij} = Scenario\ Performance_{ij} - BAU\ Performance_j$$

Where:

i = scenario

j = goal

The sum of the contributions across intervention scenarios is then removed from the net NDP performance. If positive, that is contributions sum to more than 1, this value represents a situation where the contribution to performance is stronger when all interventions are simulated together. If negative, or contributions sum to less than 1, then the value represents a redundancy where the performance of the individual scenarios is stronger than that of the combined scenario including all of the interventions.

This redundancy can arise for three possible reasons. First, the return on investment on that particular goal could fall as greater performance is achieved. Second, there could be negative effects between certain interventions. Finally, this redundancy can also occur if goals are fully achieved (e.g. reaching 100%).

$$Synergy_j = (NDP Performance_j - BAU Performance) - \sum_{i=1}^n Contribution_i$$

Where:

i = scenario

j = goal

n = number of scenarios

This approach enables the identification of which SDGs have the greatest synergistic return. By knowing which SDGs have greatest performance boosts through the interaction of the scenarios, interventions targeting those SDGs can be studied further.

2.4.3. Drop-out Effect

A second type of synergy analysis can be conducted to determine which interventions are most critical in supporting implementation of other interventions. Although interventions may not be important individually, they could be necessary in achieving SDG goals through the interactions they have with other interventions. In support of this question, a dropout analysis is conducted, which calculates what the effects would be if one scenario is excluded. This is done by removing performance of the dropout scenario from the combined scenario (NDP) in order to calculate the individual scenarios drop-out loss.

$$Dropout Loss_{ij} = NDP Performance_j - Dropout Performance_{-ij}$$

Where:

i = scenario

-i = inverse scenario

j = goal

Then, the net contribution of the intervention for each SDG is removed from the drop out loss to indicate the strength of the intervention in supporting other interventions in SDG attainment. This synergy is calculated for each intervention and goal. This calculation enables the assessment of which interventions are most vital in supporting other interventions for SDG achievement, and is an important step in determining which interventions can be targets to improve the overall effects of synergies across the scenario.

$$Dropout Effect_{ij} = Dropout Loss_{ij} - Intervention Contribution_{ij}$$

Where:

i = scenario

j = goal

2.4.4. Return on Investment

For the interventions which have policy expenditure associated with them in the model, the performance can be calculated relative to their cost. Some interventions are relatively less costly than others, and given their cost for implementation, could offer good returns for relatively lower investment levels. This can be true even if the total performance may not be as high as interventions. Additionally, the return on investment patterns can vary in case of diminishing returns due to a non-linear relationship between expenditure and goal attainment. For example, in the case of health coverage, it typically becomes more expensive to go from 95% to 100% coverage rather than 50% to 55% as marginal costs for health coverage will likely increase in rural areas.

The calculation of the return on investment is the performance relative to the base divided by the yearly average %GDP expenditure for the implementation of that scenario. By calculating the return on investment of policy expenditure to SDG performance, it is possible to identify which SDGs experience the greatest performance for the least cost to quicken the rate at which SDG goals are achieved.

$$Return\ on\ investment_{ij} = \frac{Performance_{i,j} - Performance_{BAU,j}}{Expenditure\ \% \ of\ GDP_i}$$

Where:

i = scenario

j = goal

2.4.5. Identification of Accelerators

By calculating the performance, synergies, drop-out effect, and the return on investment of interventions on SDG attainment, SDG accelerators can be identified. SDG accelerators are leverage points where improvement in one area triggers improved performance across multiple SDG indicators. These leverage points can take the form of development priorities or target areas that lag behind or show rapid improvement.

In the NDP, policy expenditure is targeting potential leverage points identified by the Government of Djibouti. These programs have been implemented into the model scenarios in order to test their impact on SDG attainment. By using this series of approaches, it then becomes feasible to untangle the interconnected, complex nature of development planning by measuring just how much leverage do these interventions provide and what is required ensure improvement on the SDGs.

These methods of analysis are employed to identify key leverage points as SDG accelerators through their impact on SDG performance, and the underlying question each analytical step asks provides insight into determining what is an SDG accelerator. The four underlying questions to each step of analysis is summarized in Table 4. A combination of the results from these methods inform the selection are used to deduce which interventions are accelerators.

Table 4: Methods to identify accelerators

Question	Method	Role in identifying SDG Accelerators
1. Which SDGs have the greatest performance increase?	Individual Intervention Contribution	Simulating single interventions enables identifying interventions that have strong impact across many SDGs.
2. Which SDGs have the greatest synergistic return?	Synergies by SDG	Synergies across interventions can help identify combinations of interventions that work well together or create negative synergies.
3. Which interventions are necessary in supporting implementation of other interventions?	Drop-out Effect	Interventions may not have a strong effect individually, rather may be important in unlocking the full potential of other interventions.
4. Which SDGs have the greatest performance relative to the investment necessary?	Return on Investment	Interventions with a strong impact on SDG attainment relative to their cost identify where rapid improvement can be made.

3. Scenario Analysis

The following section details the results of the analysis, and there are multiple objectives. First, it is to report the SDG attainment for the key scenarios (BAU, NDP, OPT), and discuss the factors influencing SDG performance. Second, after reviewing the attainment of the main scenarios, each intervention is grouped in order to analyze potential SDG accelerators. Accelerators are policy leverage points where improvement in one area can trigger improved performance across multiple SDG indicators. This is done by assessing the contribution of intervention groups on SDG attainment, determining the effect when interventions are left out of the policy scenario, or the drop-out effect, and to analyze the return on investment of policy interventions.

3.1. SDG Attainment

Each scenario, the Business-as-usual (BAU), National Development Plan (NDP), and the Optimistic (OPT), is analyzed to determine their policy impact on the attainment of the SDGs. In each scenario policies begin to diverge in 2020, with the BAU scenario expenditure remaining flat to 2020 levels throughout the simulation, and the two policy scenarios growing linearly in accord with estimates provided by the Government of Djibouti. Thus, the value of attainment for each SDG in each scenario for 2020 remains the same and begins to diverge from 2021 onward. The policy scenarios are compared against the BAU scenario to assess how the NDP and OPT scenarios can improve SDG performance above what current expenditure levels would attain.

The overall SDG performance score is from 0 to 100 percent, where 100 percent indicates complete attainment of the SDG. The Scenario SDG Attainment Appendix contains tables that report the specific values of each SDG in each scenario from 2020, 2025, and 2030. Additionally, the difference between the levels of SDG attainment in 2030 and 2020 for each scenario can also be found in Appendix C.

In 2020, progress towards the SDGs is on average 27.81 percent. In the BAU scenario in 2030 the SDGs show varying levels of change, but the following SDGs show the greatest absolute attainment: SDGs 12 (96 percent), 8 (81 percent), 9 (56 percent), and 17, 15, 14 (52, 50, and

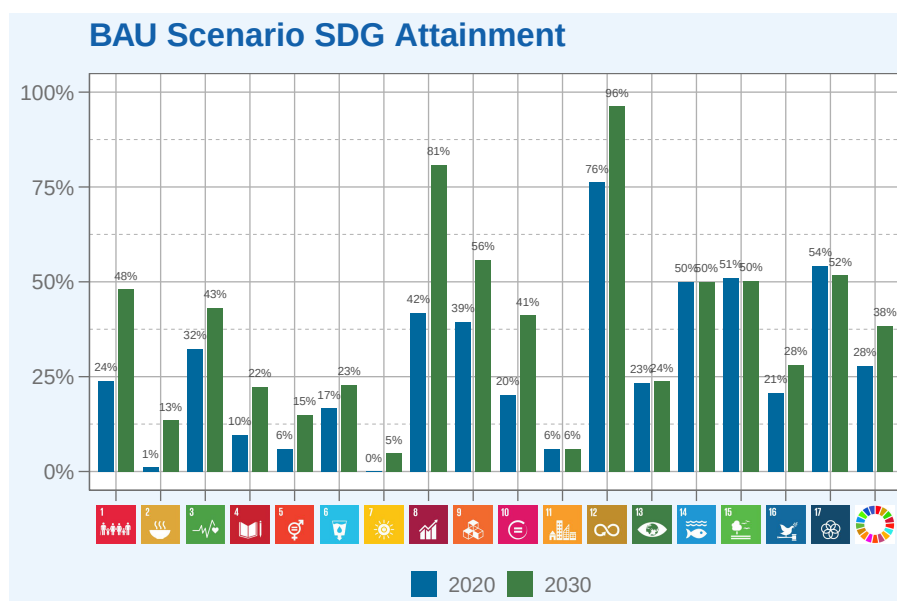


Figure 3: BAU SDG Attainment

50 percent, respectively). Comparatively, the lowest attainment for SDGs are seen in SDG 11 (6 percent), 7 (5 percent), 2 (13 percent), and 5 (15 percent). In the BAU scenario there is large progress on the total SDG attainment, however it remains well away from the goal of 100%. On average, there is an improvement in goal attainment of 10 percent between 2020 and 2030 in the BAU scenario; from 28 percent to 38 percent. The greatest net change is seen in SDGs 8 (39 percent), 1 (24 percent), 10 (21 percent), and 12, (20 percent).

Building on the BAU scenario, the NDP shows additional total average attainment of the SDGs increasing by 3 percent over BAU scenario levels in 2030 to 41 percent. In the policy scenarios, many of the SDGs see marginal to no impact above the BAU change, and few show a decrease compared to BAU levels. The NDP scenario shows the greatest gains over the BAU scenario in SDGs 13 (13 percent), 16 (9 percent), 3 (8 percent), and 7 (7 percent). Significantly, some SDGs experience a decrease in performance compared to the BAU scenario in 2030. Specifically, SDG 10 (-2 percent), 8 (-1 percent), and 6 (-1 percent) all show a drop in net performance. This is due to the interaction between interventions; in other words, the synergies strength, as interventions expenditure levels change in the scenarios after 2020.

Although there are marginal increases to individual SDGs in the optimistic scenario, the average increase remains steady at 41% with no substantial increase. Only SDGs 3 and 7 show an increase for 1 percent for each goal. However, SDG 8 shows a decline in attainment of an additional 1 percent on top of the 1 percent decline seen in the NDP compared to the BAU attainment. The decline seen in SDGs highlights an important aspect of policy-making; that is, there are many trade-offs to be made between potential policies. It is counter-intuitive that greater expenditure is necessary but not sufficient for improved SDG attainment.

A strategically designed policy suite may show greater effect on goal attainment than greater expenditure in a single area. These trade-offs become tangible through these analyses, as the model supports determining how interventions that improve performance of some SDGs may harm performance in others. For example, interventions that improve economic performance may harm other SDGs related to social or environmental issues. Of course, this relationship can also be seen vice versa, and, specifically, can be seen in the NDP and OPT as environmental interventions slow economic growth compared with the BAU.

None of the 17 SDGs are completely attained in 2030 in either the BAU, NDP, or OPT scenarios. However, in the BAU scenario SDGs 1, 2, 3, 4, 5, 8, 9, 10, and 12 show substantial growth over 2020 levels. Whereas, goals 11, 13, and 14 show marginal to no improvement in 2030; weighing average performance down. Due to competing economic and developmental objectives, SDGs 15 and 17 actually decrease from their 2020 values, which further offsets the average growth. The meaningful attainment seen in 2030 on many goals shows that NDP priorities will have a tangible impact, but it also shows where additional interventions can target in order to achieve more rapid improvement.

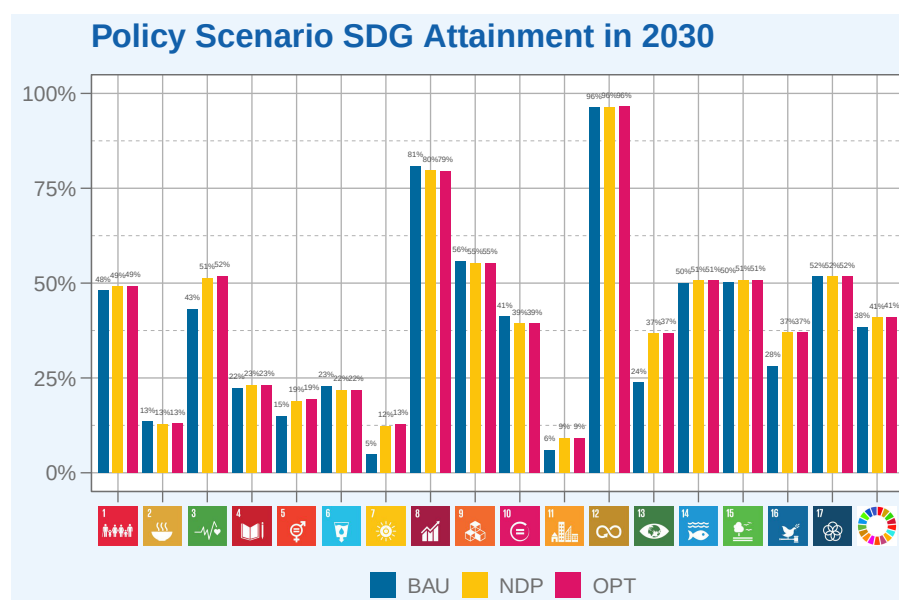


Figure 4: Scenario SDG Attainment in 2030

3.2. NDP Attainment

The NDP aims at strengthening the integration of the SDGs in all areas of development. 13 indicators present in the iSDG model have explicit targets within the NDP document. The NDP indicators track the economic, social, and environmental conditions in Djibouti. Review of the NDP achievements is based on the comparison of the simulations under the NDP and the BAU scenario.

Investing in the green economy is also key part of the NDP targets, this is specifically seen in the energy sector, with planned projects to increase capacity for renewable energy resources such as geothermal, solar, and wind. This is especially important to reduce production costs that remain high, decrease dependency on imported electricity, and to achieve the 100% renewable energy target.

In the NDP scenario, access to services such as water and sanitation and electricity show oscillations until 2030 with average levels above 2020 levels. This behavior is due to household income levels and fluctuations in poverty levels. The interventions in the BAU and additional NDP interventions that focus on energy, infrastructure, water and sanitation, and those interventions that support poverty alleviation contribute to the improvements in these indicators.

Total exports grow stably along with GDP in absolute terms, in the NDP scenario. While total exports as a share of the GDP remain stable from 2019, for both scenarios. As a result of the rapid economic growth, the population below the poverty line shows a declining trend under

both the BAU and NDP scenarios. This is due to policies directly targeting poverty alleviation such as general transfers, but also due to increasing employment in the industry, services, and agriculture sectors that result in growing household incomes in both scenarios.

The total enrollment rate and the proportion of women enrolled in education programs shows a steady increase over the period of the simulation, however there is no significant difference across scenarios. The improvement seen through the BAU scenario is the product of the previous decades of education policy, and the results of interventions in the NDP scenario on performance over the BAU will show as a slow compounding effect as education attainment accumulates in the population.

The Djibouti ICI indicates that improving environmental conditions is a priority, however no numerical indicators are provided. These activities include protecting natural resources, adapting to climate change, protecting biodiversity, and reducing waste generation. Reducing waste is focused on chemicals and hazardous waste in the NDP. In the NDP scenario, environmental interventions contribute to sustainably managing marine resources, protecting forest land, and adapting to the impacts of climate change.

3.3. Scenario Contribution

The combined performance of interventions reported above provides a comprehensive picture of the potential impact of policy scenarios. However, isolating the impact of interventions through the intervention group scenarios enables analyzing the contribution of single intervention groups and how these intervention groups interact. Determining the characteristics of the interaction between interventions is critical to understanding SDG attainment of the NDP or OPT scenarios. Additionally, comprehending how the interventions interact supports identifying policy suites that accelerate SDG attainment.

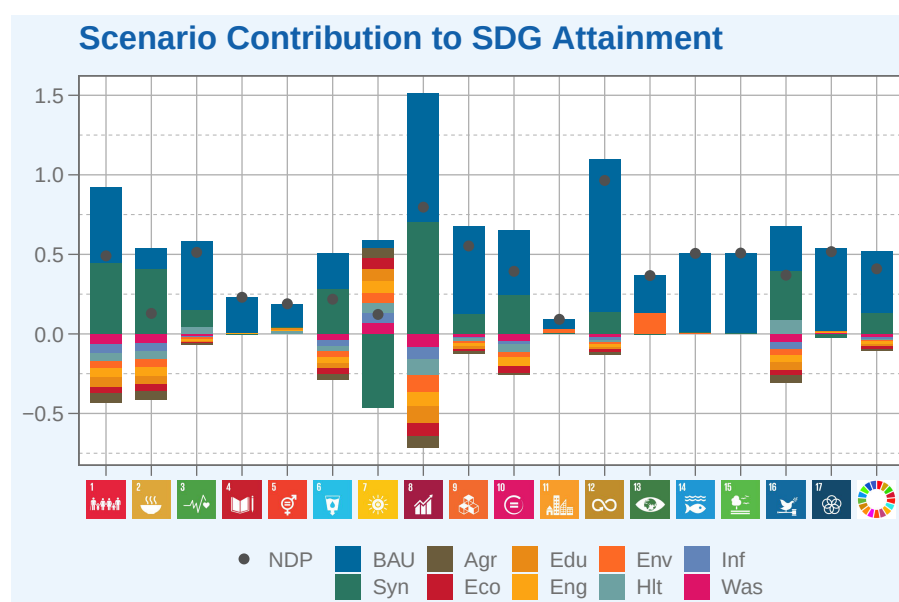


Figure 5: Scenario Contribution to SDG Attainment

The Intervention Synergy section describes the method used to calculate the contribution of each individual scenario to SDG attainment. The following eight intervention groups are analyzed: agriculture (agr), economy (eco), infrastructure (inf), water and sanitation (was),

health (hlt), education (edu), environment (env), and energy (eng). The description of which interventions are grouped by the scenarios can be found in Table 3.

Detailed values for the attainment and contribution of each intervention group is reported in the Intervention Group SDG Attainment Appendix. Figure 5 displays the stacked contributions of intervention groups, the BAU scenario contribution, the synergy impact across the interventions when simulated in the NDP, and the final SDG attainment in the NDP scenario.

The chart visualizes how the BAU in combination with the intervention groups contribution and the synergy effect will approximately equal the combined NDP scenario. It is important to note, that the sum of these components will not exactly equal the results of the NDP scenario. This is due to the dynamic effects of the model sectors interaction that differ as the policy inputs of simulation scenarios change. The analytical steps taken to decompose the combined attainment of the NDP scenario approximate quantifying the combined effect of the interventions, however the “whole is other than the sum of its parts.”

Figure 5 shows that the greatest contribution to each SDG is the combined simulation result of the policies of the BAU scenario. The individual interventions used in the NDP further build upon the gains seen in the BAU, however in many cases, the individual interventions scenarios or the synergistic impact of interventions counteracts SDG progress due to competing objectives between the policies. The impacts in the diagram describe the significance the interaction of the interventions, across sectors as effects flow through the system and across time as tangibles or intangibles accumulate, have in progressing on the SDGs.

3.3.1. SDGs 1-4

SDG 1 shows substantial gain over 2020 levels in the NDP scenario with the greatest contribution to progress coming from the combined simulation impact. Following the BAU contribution, the synergy effect between interventions generates the largest positive impact. In SDG 1, and many other interventions, the individual intervention scenarios generate a negative return compared to the BAU levels in the year 2030, however when simulated together, the return is over and above the BAU simulation. The agriculture, education, energy, infrastructure, and water and sanitation interventions contribute the largest negative impacts. The individual scenarios, due to the loss of indirect effects across sectors, result in poorer performance than the combined effects. In this case, it is logical that the loss of the economic growth due to investments in agriculture, energy, or infrastructure negatively impact poverty reduction.

When simulated together the economic intervention group contributes to the SDG progress, largely, through the continued growth seen in general transfers from the government directly alleviating poverty. However, the economic interventions are important to support other intervention groups which target poverty, specifically, the agriculture intervention contributes to the SDG attainment through increasing agricultural productivity, thus also contributing to reducing poverty. Further, the economic growth that is supported by infrastructure, health, and education interventions further stimulate poverty reduction through adding oil to the economic engine of growth (Figure 6 A). The total positive contribution is approximately 80 percent, however due to the individual negative contributions, the final attainment is 49 percent.

SDG 2 progresses rapidly during the NDP policy period showing a net gain of 12 percent, however absolute attainment remains low. The BAU scenario contributes to progress made, however the synergy between interventions shows the greatest contribution to attainment. Similar to SDG 1, the individual scenarios show a negative contribution compared with the BAU at time 2030. Again, this effect indicates the importance of implementing interventions

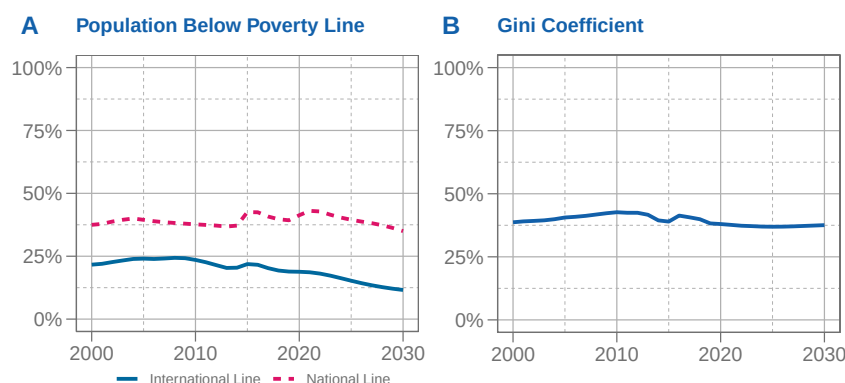


Figure 6: Income and Poverty Variables in NDP Scenario

together in order to obtain greater SDG achievement. The greatest negative effects come from the agriculture, education, energy, and water and sanitation interventions.

It is clear that without the economic growth and improvement on social indicators supported by these interventions, then the total potential of the interventions can not be unlocked. In the model, this goal is primarily driven by poverty levels and agricultural production. Given the limited agriculture potential, growing population, and high Gini coefficient, and despite economic growth, further targeting of poverty and wealth distribution will help to improve food security (Figure 6 B).

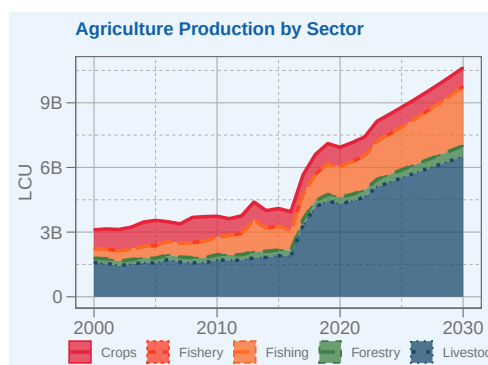


Figure 7: Agriculture Production in NDP Scenario

In the NDP scenario, SDG 3 shows marked improvement. The BAU scenario shows the greatest contribution, but the interactions between the interventions and the impact on attainment are also important in this SDG. Again, many intervention groups show a negative effect, however the synergy between interventions contributes positively to total attainment. The health intervention groups specifically show positive contribution to attainment of SDG 3.

Health outcomes represented in the model are a significant driver of Good Health and Well-being performance, and the health intervention improves the performance of these indicators directly. Through the combined effect infrastructure, and water and sanitation expenditures contribute further through indirect impacts. However, when interventions are simulated alone, the population and economic growth coupled with poverty level leads to negative impacts within interventions; inversely impacting health outcomes.

Without the combined impacts of interventions building upon one another, the 12 percent net gain in SDG 3 would be strongly dampened. However, these relationships also indicate an opportunity to improve attainment by focusing further on health interventions and interventions

which support good health outcomes through direct investment or through poverty alleviation, education, and infrastructure development. In particular, greater health gains can be made in childhood health for malnutrition, undernourishment, and stunting. Overall mortality drops in the NDP scenario, increasing average life expectancy, however only marginal gains are made in these critical health concerns that have long lasting impacts (Figure 8).

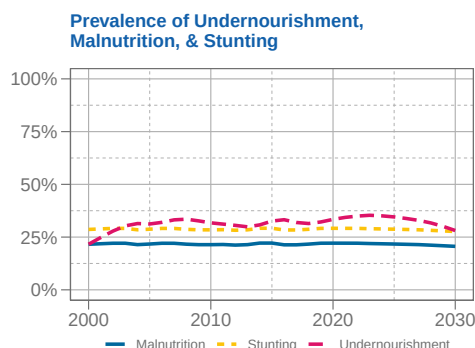


Figure 8: Food Insecurity in NDP Scenario

SDG 4 also shows improvement in the NDP scenario, and the BAU again shows strong contribution in this SDG. However, a marginal contribution to attainment from intervention groups beyond the BAU scenario is also seen. Importantly, there are limited to no negative contributions from individual scenarios due to interacting effects. Performance of this goal is influenced by a important dynamic that has significant impact on changes in attainment. There is a substantial delay within the education system due to education taking up to or more than a decade to be completed. This leads to the effects on productivity, health, and other areas being delayed, as policy expenditure in education takes this time to impact outcomes. A positive change in this goal would mean compounding benefits in many areas 20, 30 and 40 years later as generational cohorts reach greater educational attainment. The improvement seen in attainment is largely due to expenditure from the past that has led to greater enrollment rates slowly driving up average years of school and literacy throughout the simulation, especially for females (Figure 9).

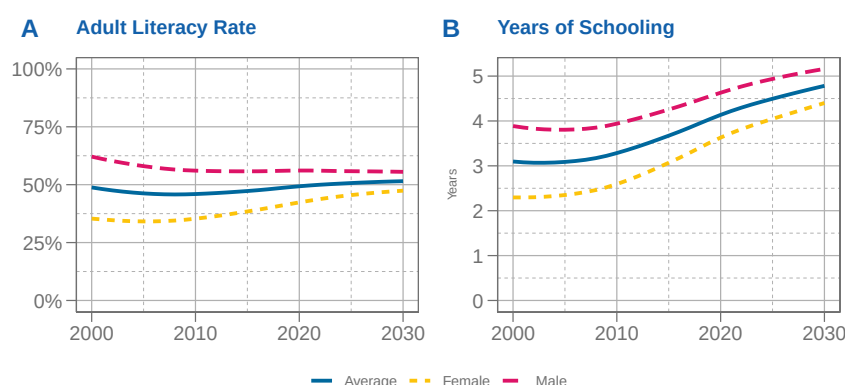


Figure 9: Education Variables in NDP Scenario

This structure driving education and the indicators of SDG 4 generates a high amount of inertia, which makes improving performance a difficult and slow process. This inertia is caused by the delay as cohorts of generations move through the education system. Concretely, it can be seen as previous generational cohorts that had low access to educational services weight the performance experienced today, especially as life expectancy increases. The growing expenditure seen in the policy scenarios will contribute to a quickening attainment of this goal,

however attainment will benefit from a strong push in the short to medium-term. Further gains can be achieved through additional interventions to decrease drop-out rate in secondary and tertiary education, especially for females to improve the gender gap, and to increasing the average literacy rate.

3.3.2. SDGs 5-8

SDG 5 shows the a net total of 13 percent growth in attainment of the SDGs over 2020 levels. Similar to other SDGs, the total effect of interventions in the BAU makes up the greatest contribution, while each intervention group also contributes marginally to attainment. One of the greatest contributors to attainment is the education intervention group. Gender equality benefits greatly from the continued education investment, which leads to greater enrollment and lower dropout levels of women in primary, secondary, and tertiary education. Economic growth further provides employment opportunity and is spurred by energy, infrastructure, health, and water and sanitation interventions. However, women are disproportionately poorer, and economic inequality due to gender inequality dampens attainment. Although gains are seen in secondary and tertiary education, improved targeting of women at these education levels can further support progress on gender equality. Improvement in this area will lead to a greater number of women in the workforce with a higher educational attainment, which will further stimulate economic productivity and growth in Djibouti.

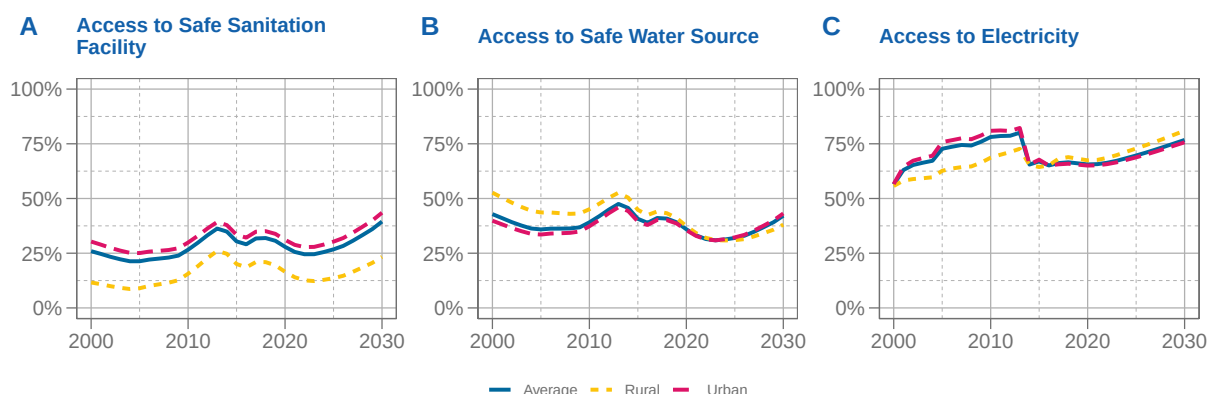


Figure 10: Water, Sanitation, Electricity Access in NDP Scenario

Clean Water and Sanitation, SDG 6, shows progress in the BAU scenario of 6 percent and 5 percent in the NDP. As seen on SDG 1 and 2, each intervention group contributes negative to the overall attainment compared to the BAU due to the lack of interacting effects in the individual intervention scenarios. Synergy between interventions lead to a strong positive impact. The low absolute attainment is a function of the relationship of poverty and income levels, which fluctuate substantially between 2010 and 2020 and the amount of water and sanitation infrastructure on access to adequate water and sanitation between rural and urban environments. Despite growing expenditure, economic, population and infrastructure growth lead to further water and sanitation demands, which counteract the individual effects of the interventions as they cascade throughout the model (Figure 10 A & B). Poverty reduction and greater targeting of water infrastructure for urban and rural areas are necessary for further improvement on SDG 6.

Historically, primary energy has been supplied through imported oil, gas, and electricity. In the NDP scenario this remains true, however budget allocation to renewable energy generation capacity, such as solar, wind, and hydro do lead to domestic energy production (Figure 11 A & B). Despite the investment in renewable energy sources, SDG 7 shows a strong negative

synergy during the simulation period from 2020 to 2030. This outcome is counter-intuitive to the assumed impact of the budget allocation and overall growth seen in Djibouti.

This change is due to the substantial growth in energy demand and thus consumption seen from 2020 until 2030 (Figure 11 C). This demand is a direct result of a growing population, expanded infrastructure providing wider access to electricity, greatly increasing transportation, and, significantly, a rapidly growing economy that requires greater amounts of energy to create goods and services. The increased demand is, in the end, satisfied by additional oil, gas, and electricity imports, rather than by domestic energy generation, thus resulting in the low absolute performance of Affordable and Clean Energy.

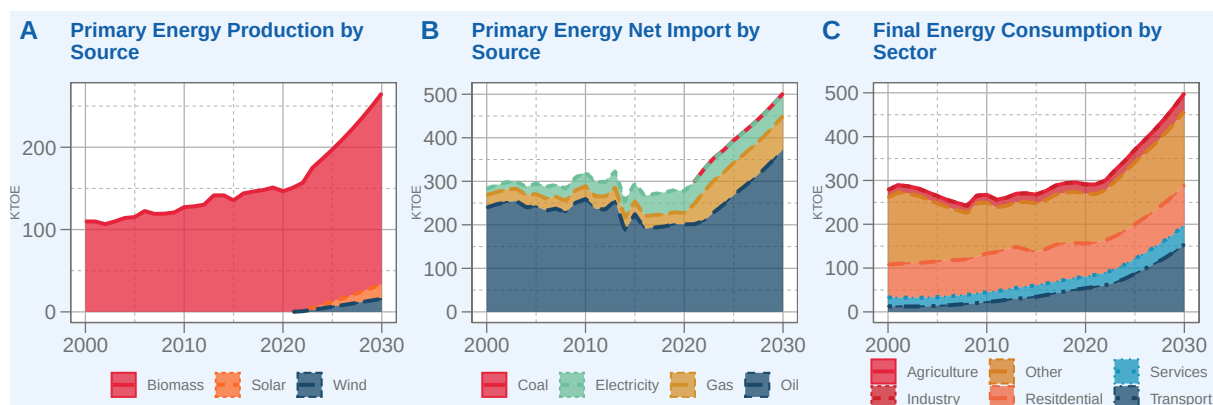


Figure 11: Energy Supply and Consumption in NDP Scenario

Goal 8 experiences the greatest net gain in performance of 38 percent in the NDP scenario. This growth is dampened by the impacts of the COVID-19 pandemic. The economic impact of COVID-19 leads to first a decline in attainment of Decent Work and Economic Growth throughout the period of the effect (2020-2022), but also leads to lasting impact on the rate of change of the SDG. The impact of COVID-19 dampens the interaction between factors driving the goal in the short-term, but the NDP scenario shows a strong growth rate following the effect of COVID-19 that pushes economic performance back towards anticipated levels (Figure 12).

SDG 8 is driven by improvements in economic production, material consumption and waste, and employment levels. Efficiency increases lead to improvement in production, consumption, and waste generation, however, ceteris paribus, also lead to decreasing levels of employment. Despite this damper, the rapid economic growth outpaces any negative effects that may be experienced on employment due to efficiency increases.

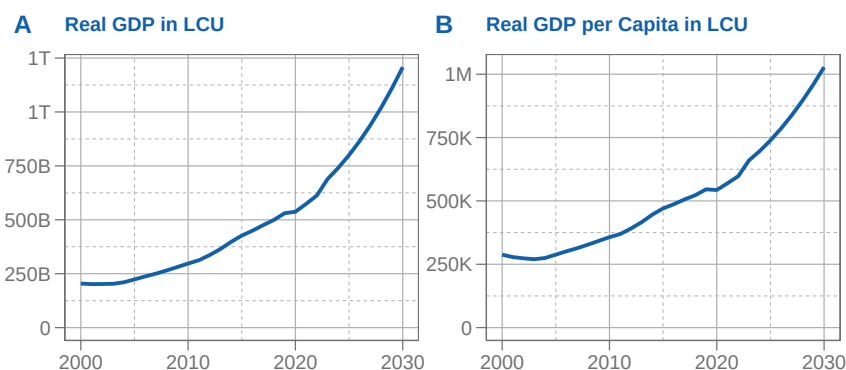


Figure 12: GDP and GDP per capita in NDP Scenario

Individual interventions show a negative contribution, however synergistic effects more than make up for the impact. SDG 8 requires that interventions are implemented together in order to improve performance. Without interventions targeting infrastructure, education, agriculture, and health outcomes, growth would show substantial decline. The strong synergistic effects that are intrinsic to this SDG pinpoint that creating a suite of interventions that are designed to take advantage of synergies can promote sustained, inclusive and sustainable economic growth.

3.3.3. SDGs 9-12

SDG9, Industry, Innovation and Infrastructure, shows substantial improvement in the NDP scenario over 2020 levels. Out of the scenarios, the combined policies of the BAU scenario and the synergies of policy intervention have the greatest contribution. Individual intervention groups lack the interaction effect between interventions that lead to greater attainment. Additional investment in industrial energy efficiency in the NDP scenario and the rapid economic growth; industry production grows while the energy intensity and emissions per unit of value added decreases rapidly until 2030 as scale economies grow (Figure 13).

Additionally, the proportion of industrial employment compared to other employment sectors marginally increases due to this increased efficiency. All the while, additional infrastructure that has been accumulating from the substantial investment in preceding decades has led to greater rural accessibility. These factors and other factors that contribute to total factor productivity combine in synergy to achieve the gain in performance.

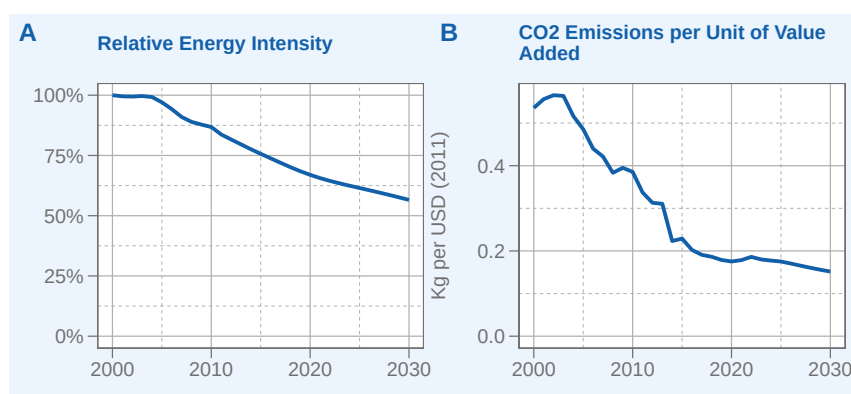


Figure 13: Economic Efficiency in NDP Scenario

Similar to Goal 8, the COVID-19 pandemic also dampens the internal dynamics driving the Reducing Inequalities goal (10). Historical households financial data contains a great deal of noise, which impacts the simulations, yet general conclusions based off of the relationships between components of the model can be drawn from the performance. Economic growth through 2020 to 2022 is blunted while future growth is slowed due to COVID-19. This decline in economic activity most dramatically impacts the bottom 40th percentile of income earners, as the rapid decrease in poverty slows sharply. The previous trend of accelerating decreases in poverty does not return until after the anticipated impact of COVID-19 in 2023.

Despite the impact of COVID-19 in the short-term, SDG 10 sees a substantial increase in attainment from 20 percent in 2020 to 39 percent in 2030 in the NDP scenario. The increase is due to the effect that interventions have on decreasing inequality. Intervention groups interact to create a greater effect than when implemented alone. The synergy between interventions contributes a substantial amount to total attainment. However, attainment decreases by 2 percent from the BAU to the NDP. This is due to income percentile changes and labor share.

Additionally, due to accumulation of factors driving Total Factor Productivity, the average labor share remains steady throughout the majority of the NDP scenario and only begins to increase towards the simulation. This highlights that targeting the distribution of future economic growth to decrease inequality can further improve performance of SDG 8.

Goal 11 sees little to no change in the BAU scenario, however increases by 3 percent in the NDP. After the BAU the environmental intervention scenario contributes the greatest positive impact to There are little to no contributions from other interventions and synergies between interventions are not seen. This effect is due to negligible impact that planned interventions have on the indicators driving SDG 11. Specifically, the rapid economic growth leads to increasing material use and waste that outpace waste management investment. Further, emissions increase over 2020 levels due to greater industrial production and transportation. These effects are offset by the additional infrastructure and climate change adaptation expenditure that leads to lower impacts of natural disasters and generates the slight improvement seen in the NDP and OPT scenarios. These factors lead to stagnating performance, but also highlight potential targets for improving performance.

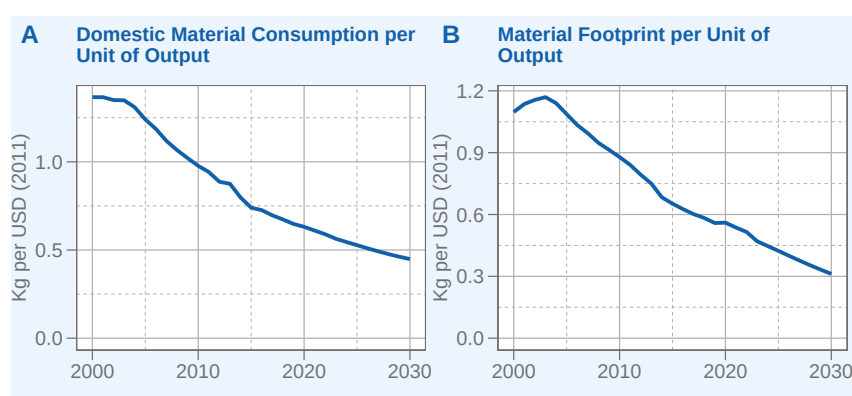


Figure 14: Economic Efficiency in NDP Scenario

SDG 12 sees sustained growth until 2030 in the NDP scenario and results in the greatest total attainment at 96 percent with a net attainment of 20 percent. The substantial attainment is largely contributed by the combined BAU intervention allocations, however the additional intervention allocation from the NDP add a non-negligible contribution to overall attainment through synergy effects. Progress on goal 12 is driven by increased efficiency of the economy, which can be seen as the domestic material consumption and material footprint per unit of output decreases steadily (Figure 14). This relative progress offsets the real increases seen in material consumption and material footprint.

3.3.4. SDGs 13-17

Goals 13, 14, and 15 see little to no change from the 2020 to 2030 levels in the BAU. The performance of SDG 13 is driven by the proportion of the population affected by natural disasters and mortality related to climate events. In the NDP, attainment increases dramatically from 24 percent in the BAU to 37 percent in the NDP. This growth is due to interventions in climate change adaptation and infrastructure that contribute to attainment on this goal. Climate change adaptation expenditure was not included in BAU historical data, and thus the NDP shows rapid improvement.

The achievement for Goal 14, the Life Under Water goal, is driven primarily by the protection of marine areas and careful exploitation of fish stocks to ensure sustainability in harvest. Histori-

cally, exploitation of fish stocks has been managed through sustainable methods, according to data, and this continues, however protection of marine areas is minimal. This can be targeted to improve conservation and sustainable use of marine resources. SDG 15 also shows little change over the BAU scenario, and results in the same levels as seen in 2020. The increase in protected land areas driving the marginal improvement in the NDP over the BAU scenario. Key drivers of goal 15 that can be targeted to improve performance are protecting or expanding land and forest area and biodiversity.

SDG 16 sees improvement in the simulation scenarios with the largest contributions coming from the synergies, the BAU scenario, and the health intervention, respectively. In the model, the goal for Peace, Justice and Strong Institutions is primarily driven by improvement on governance indicators and reduction in violent crime rates. In the BAU, NDP, and OPT scenarios there are no specific interventions targeting governance and institutional quality. The 16 percent improvement that is seen is a result of reduced crime and violence rates that improve due to poverty alleviation, increased education access, and improved food security.

In SDG 17, Partnership for the Goals, the model considers a diverse revenue base for achievement in this goal in order to fund government activities from taxes, to grants, as well as interest payment to export ratio. No direct intervention in this area is proposed, and due to growing exports while interest payment remain the same, achievement drops marginally. Raising domestic revenue by expanding the tax base or increasing international cooperation could help with achievement of SDG 17.

3.4. Drop-out Effect

The next method to identify SDG accelerators is to assess the drop-out effect between different categories of interventions. The drop-out effect is used to assess the impact that interventions have on goal attainment between other interventions. That is to say, are there dependencies for interventions to maintain the goal attainment level achieved when implemented together, or are there negative effects between interventions when groups are implemented together.

This is done first by calculating the attainment loss when removing one of the intervention groups. The drop-out loss indicates how negatively will the joint scenario attainment be impacted without the intervention group. These values are reported in Table 15 of the Intervention Group Drop Out Effect Appendix. Next, the drop-out effect is calculated, which measures the strength of interdependence between intervention groups when simulated in combination with one another. Specifically, this percentage indicates the gain or loss due to indirect contributions across interventions when groups are simulated together. The drop-out effect is reported in Table 16 of Appendix F.

By determining the drop-out effect, it is possible to further untangle the impact policy options have on the complex, interconnected nature of development processes. Table 15, which reports the drop-out loss, indicates the value if the intervention group was removed while retaining all other intervention groups. Whereas Table 16, which reports the drop-out effect, indicates the impact when an intervention group is run in conjunction with other interventions.

For the agriculture scenario group, many SDGs show a substantial effect when the intervention is run in conjunction with others. In particular SDG 1, 2, 6, 8, and 16 show the largest supporting effect to attainment with SDG 1, 2, and 8 being greater than 5 percent. Agricultural interventions lead to the accumulation of capital in the agriculture sector, which increases employment and, along with employment growth overall, is one factor that leads to decreased poverty levels by 2030 (Figure 15). SDG 7 shows a strong negative relationship, indicating that the agriculture scenario detracts from attainment. This is largely due to an increase in the accessibility of

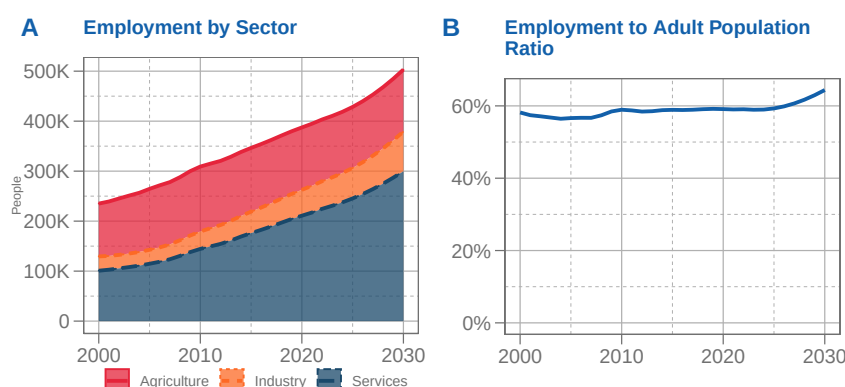


Figure 15: Employment Variables Behavior

biomass as a form of energy generation as agriculture yield and thus biomass availability increases.

The economic scenario group shows the second highest supporting effect with a total of impact 2.18 percent. This intervention group supports interventions targeting SDGs 1, 2, 6, 8, and 16, but also contributes largely to SDG 10. The causes for this scenario groups contribution to attainment of SDGs 1, 2, 6, 8, and 16 similarly build on the agriculture scenario group by further directly increasing industrial economic activity and decreasing inequality and poverty.

This is achieved through transfers, which also lead to indirect effects increasing employment in the industrial sector, improving food security, water and sanitation access. However, this growth also increases energy demand substantially, which, despite increasing renewable energy capacity, is largely satisfied by growing consumption of non-renewable primary energy supplies. This leads to SDG 7 also having a negative contribution.

The infrastructure and water and sanitation scenario groups also contribute similarly to SDGs 1, 2, 6, 8, 10, and 16. The indirect impact of these scenarios through investing in road, rail, and water and sanitation infrastructure supports economic development that increases employment, and improves poverty levels and health outcomes. Again, similarly to previously discussed scenarios, the development generated through these interventions leads to greater demand of energy, which is satisfied by non-renewable primary sources of energy.

The health scenario group shows the greatest average attainment across all SDGs at 2.24%. As with other scenarios, improved health services leads to substantial attainment on SDGs 1, 2, 6, 8, and 10. Specifically, this greater level of attainment is seen on SDGs 3, 8, and 10. The investment in health services interventions directly lead to greater attainment on SDG 3 through decreasing mortality rates and increasing life expectancy due to improved access and quality of health care. Yet, this intervention group further supports interventions by building attainment for SDG 8 through improved health outcomes leading to greater employment levels and thus productivity. Building on these gains further, improved health outcomes promote greater economic equality, which supports SDG 10 attainment.

The education intervention group also contributes to supporting the attainment of SDGs 1, 2, 6, 8, and 16. Education interventions show a particularly strong contribution to interventions targeting SDG 8, as higher education attainment increases the potential productivity leading to greater economic output. This increased economic activity further enables the education intervention group to support interventions targeting SDG 1 and 2.

This increased economic activity and higher educational attainment leads to greater employment levels that lower poverty and food insecurity. It is important to note that this intervention group,

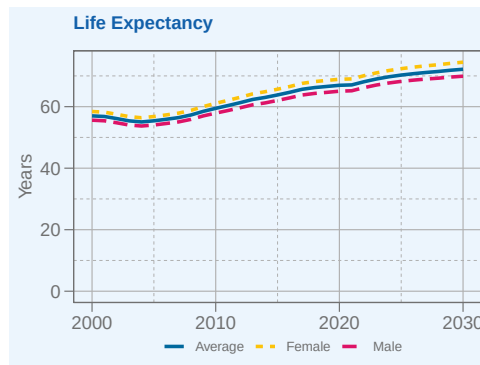


Figure 16: Life Expectancy in NDP Scenario

along with all other intervention groups, shows little to no impact on SDG 4. This is due to the substantial inertia that influences education indicators. Due to the delay the BAU expenditure contributes the greatest extent to the net change seen in SDG 4, and the impact of policies implemented in the next 10 years will be delayed.

The environmental intervention group scores just above the average across interventions with an average supporting effect of 2.06 percent. In general, this intervention group sees similar contribution effects of other groups with benefits seen for SDG 1, 2, 3, 6, 8, 9, 10, 12, and 16. However, the greatest supporting effect is seen for SDG 8 at 13.67 percent.

The climate adaptation intervention is the greatest factor that drives this relationship. This is because expenditure in adaptation leads to offsetting potential negative economic impacts due to climate change. This effect on maintaining the potential productivity of economic sectors can be seen throughout all three sectors represented in the model: agriculture, industry, and services. By maintaining a higher potential productivity, employment levels are also increased, which contributes to sustained, inclusive, and sustainable economic growth.

The final, energy oriented intervention group is the third most effective in terms of supporting other interventions implementation and shows an average effect of 2.17 percent. SDGs 1, 2, 3, 6, 8, 9, 10, 12, and 16 all see marked impacts when other interventions are implemented with the energy interventions. Similar to other intervention groups, the energy interventions contribute to greater economic activity and employment, decreased poverty levels, and greater access to electricity at the end of the simulation period.

Significantly, this intervention group does not improve performance of SDG 7, despite the expenditure directed towards renewable energy production capacity. This unexpected outcome is due to the result of the rapid economic growth experienced during the simulation period. This growth leads to rapidly increasing energy demand, which, despite the investment in renewable energy capacity, can only be satisfied by growing consumption of non-renewable primary energy supplies.

3.5. Return on Investment

Using the results from the group scenario contribution analysis in combination with the average additional investment necessary to realize these returns, it is possible to calculate the relative return on investment for each group of interventions over the contribution of the BAU scenario. The calculation is done by dividing the attainment of the NDP minus the attainment of the BAU at time 2030 by the average additional investment required, expressed as a percentage of GDP.

This value describes the returns for the additional expenditure seen in the NDP over the BAU. A comprehensive table of ROI by scenario for each SDG is reported in the Appendix G.

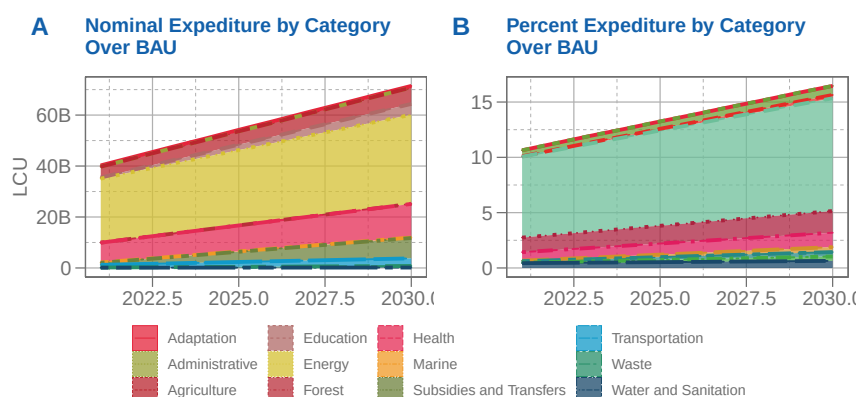


Figure 17: NDP Compared to BAU Expenditure

Total expenditure levels for each intervention required to obtain the SDG performance described here are included in Appendix H. Figure 17 visualizes the annual nominal expenditure required from 2021 until 2030 additional to the BAU expenditure to achieve the results of the NDP. Expenditure levels increase from 40 billion LCU to approximately 70 billion LCU in 2030. This growth in expenditure comes to an increase from 10 percent over BAU expenditure in 2021 to approximately 17 percent in 2030.

The NDP returns the greatest average attainment across all SDGs out of the intervention scenarios, with all other intervention groups returning a negative average. This negative effect is due to the loss of the interacting effect between the scenarios that generate synergies. The NDP generates an average of 5.33 percentage points of return for each expenditure as a percentage of GDP (Figure 18). With the exception of SDGs 2, 6, 8, 9, and 10 all SDGs return a positive ROI. This negative result is caused by the attainment of each SDG in the NDP scenario being lower than the attainment in the BAU scenario. This is due to conflicting objectives within the intervention categories and the dynamics that determine how sectors interrelate.

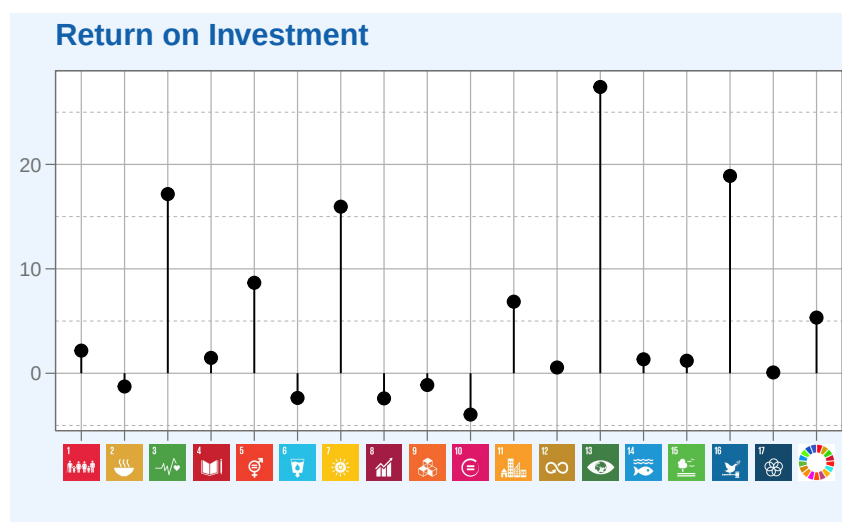


Figure 18: Return on Investment in NDP Scenario

For SDGs 12 and 17 the ROI is nearly zero, as there is little to no performance increase in these SDGs in the NDP compared to the BAU. It is important to note that despite the large change seen in SDG 12, the additional NDP expenditure results in little to no additional performance. In

the NDP scenario, eleven SDGs are below the average value, which skews the mean of the SDGs, while some of the SDGs show superior returns on investment, such as SDG 3, 7, 13, and 16; 17, 16, 27, and 19 percent, respectively. The performance of these SDGs indicates a substantial amount of improvement for each percent of expenditure as a share of GDP in the NDP scenario. Additionally, SDGs 1, 5, and 11 show a return of greater than double the investment for the NDP contribution.

Many intervention group scenarios show a negative result for the majority of the SDGs. This is due to the lower SDG attainment seen in these interventions compared to the BAU attainment in 2030. In some cases, interventions show a large ROI in one or several SDGs, while most remain negative. This is due to the interventions direct or immediate effects that can be seen in the NDP simulation period from 2020 to 2030.

For example the health scenario shows 11 percent ROI for SDG 3, 15.6 percent for SDG 7, and 21 percent for SDG 16, while all other SDGs are zero or negative. This result is similar across individual intervention groups, and shows that the interactions between interventions are critical for ensuring improvement across the SDGs rather than in only one sector. This shows the importance that interventions impacts are considered as part of a larger strategy that accounts for the synergies between them.

In particular, the agriculture, economy, education, health, and infrastructure intervention groups will interact with other intervention scenarios to produce greater SDG attainment across many of the SDGs. These interventions are especially important in alleviating poverty and the impacts of poverty, as they increase economic activity, providing jobs, and increasing the rate of economic growth by modifying Total Factor Productivity. Furthermore, the individual ROIs of interventions by SDG can indicate where the main contribution of effects is due.

For instance, much of the return seen in the NDP for SDG 3 is due to the health interventions, while the returns of SDG 5 are contributed from the health and education interventions. SDG7 sees a large contribution from each intervention group, but this is due to the rapid growth in GDP for outpacing energy demand that decreases energy intensity throughout the scenarios. Despite a multiplying effect of each intervention for GDP, much of the increase is due to the internal dynamics of the engine of growth. Additionally, SDG 13's largest contributor can be seen in the 33.5 percent ROI seen in the environmental intervention, while SDG 16 is heavily impacted by the health intervention.

Despite the high ROI for few SDGs and negative returns for others, this does not indicate that interventions are inefficient or ineffective, per se. Many interventions require long-term investment that leads to accumulation of the factors necessary to support SDG attainment. For instance, policies to impact the distribution of wealth are likely to take many years to impact access to health-care, electricity, water and sanitation, or education, and the later indirect effects of improved health outcomes or increased productivity will be further delayed.

This is because the accumulation of wealth once policies are implemented is delayed as effects flow between sectors. Land and marine protection also require continuous investment, as limited investment now would make it more difficult to protect or rehabilitate degraded areas in the future. Not investing in these areas today could bring negative consequences to environmental, economic, or social indicators that increase the cost of improvement in the future due to gaps in key developmental indicators negatively impacting other areas.

3.6. SDG Accelerators

SDG accelerators are leverage points where improvement in one area can trigger improved performance across multiple SDG indicators. Identifying accelerators can inform developing effective policy suites that take advantage of potential synergies, ensure interventions receive support across sectors through additional interventions, and target SDGs that large gains can be made in with, relatively speaking, fewer resources.

The first question to review in the identification of accelerators is, “which SDGs have the greatest performance increase?” Through reviewing the contributions of each scenario, it is apparent that SDGs 1, 3, 8, 9, 10, 12, and 16 all show net performance well above the average of 13 percent in the NDP. Further, the health, education, and environment intervention groups show multiple SDGs with attainment above their respective average performance. Additionally, the synergistic return of SDGs 1, 2, 6, 8, 10, and 16 are also above the average synergistic return seen in the NDP.

Furthermore, the economic, health, environment, and energy interventions show strong supporting effects across multiple SDGs above their relative average; setting these interventions apart from the attainment in other interventions showing few SDGs above the average or narrowing distributed around the average. Additionally, attainment for SDG 1, 2, 6, 8, 10, and 16 shows contributing effects from many interventions or substantial contributions from few interventions.

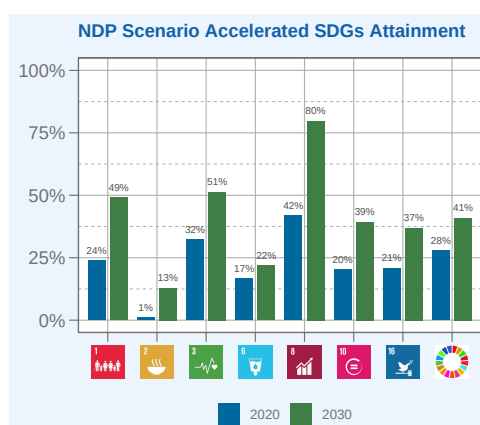


Figure 19: BAU SDG Attainment

Last, the SDGs that have the greatest performance relative to the investment required for achievement are SDG 3, 5, 7, 11, 13, and 16. The performance on these goals in the NDP scenario indicate that large improvement can be made with fewer resources. In general, the NDP shows a high average return on investment, with six SDGs showing greater than average returns. The interventions targeting health, education, and environment also show returns well above average in particular SDGs.

Through the accelerator identification methodology, it is clear that targeting SDGs 1, 2, 3, 6, 8, 10, and 16 can lead to rapid improvement, either through the raw attainment that can be achieved or through synergies and supporting effects across interventions (Figure 19). The attainment of these SDGs can be strongly impacted by the interventions for health, education, energy, and environment.

These interventions can accelerate SDG attainment by acting as leverage points that improve goal achievement with fewer resources, contribute to synergies across SDGs for greater performance overall, and support implementation of other interventions to generate additional

returns. This makes these interventions viable targets for testing policy in order create additional leverage to improve performance on the SDGs.

In the NDP and OPT scenarios, marginal improvement over the BAU or even marginal decline in attainment compared to the BAU is experienced. This is because synergies and drop-out effects across interventions lead to unanticipated consequences in indirectly related sectors. These consequences have feedback effects throughout the development context, and result in delayed or counter-intuitive results.

This illustrates that targeting priority goals with budgetary allocation is necessary, but is alone not sufficient to improve performance on the SDGs. Rather, further analysis and development of interventions is necessary to design policy options that build on synergies and put in place supporting interventions at adequate levels in order to ensure the highest SDG performance is achieved with the planned resources.

4. Key Findings

Djibouti sees great gains in the SDGs with a total average attainment of 41 percent in 2030 for the NDP scenario compared to 28 percent in 2020. The gains experienced are not spread evenly over the SDGs, with some SDG increasing by nearly 40% and others decreasing marginally. Assessment of the drivers for attainment of the SDGs indicate that there are areas where attainment can be increased with, compared to total resource allocation, fewer resources, and other areas that require a greater priority to make progress. Specifically, inequality, food security, education, gender equality, renewable energy generation, urban environments, and the natural environment are areas that can lead to greater attainment with further interventions.

The combination of rapid economic growth and targeted economic, energy, and water and sanitation interventions in the NDP scenario lead to greater employment levels that decrease poverty and result in improved access to water and sanitation, electricity, health services, and food security. However, the impressive economic growth carries with it social and environmental repercussions regarding economic sustainability, equality, and clean energy. Despite this, the distribution of the accumulated wealth up to 2030 detracts from performance on the SDGs. The Gini coefficient in 2030 for the NDP simulation is 37.7, which is a marginal improvement over 2020 levels estimated at 37.9.

The distribution of wealth has long-term and far reaching effects for development goal attainment. By implementing policies that enable the economic growth experienced over the next 10 years to be distributed more equitably, then returns on many goals will compound; paying greater and greater dividends in the future. Decreasing inequality will directly decrease poverty levels, which will further improve education access, water and sanitation access, electricity access, and food security over time. These factors will accumulate as the poverty rate decreases, and citizens are able to contribute more productively to society due to higher educational attainment and longer, healthier lives.

From an economic perspective, investing early in decreasing inequality can lead to increasing productivity growth rates though improving the human capital component of total factor productivity. However, to increase the effect of this additional growth factor, it is necessary to improve social indicators that will drive this behavior and lead to inclusive and sustainable economic growth.

The indicators that drive SDG 4, inclusive and equitable, quality education, are subject to a high amount of inertia, which makes improving performance a difficult and slow process.

Cohorts of generations that previously had low access to educational services weight average levels, especially as life expectancy increases, creating a long delay until results of policies are experienced. This factor is critical in creating a developmental strategy, and highlights the significance of implementing interventions targeting SDG 4 early. Specifically, decreasing drop-out rate in secondary and tertiary education, especially for females improve gender equality, increasing secondary and tertiary enrollment, and increasing the average literacy rate are necessary to make greater progress on SDG 4.

Growth in the industrial and service sectors directly increases demand for energy from 2020 to 2030 and shows little sign of slowing. Additionally, decreasing poverty leads to increasing access to electricity, which also contributes to growing energy demand. Although capacity of renewable sources of energy are increasing, this capacity only adds a marginal supply relative to the change in demand. Due to this, additional demand is satisfied by non-renewable sources such as oil and gas. Greater investment in renewable energy is required to offset the rapid economic growth in Djibouti. Further investment in the short-term to medium-term in renewable sources can offset a substantial amount of emissions and improve the performance of SDG 7 by 2030.

Beyond the interventions explored in the scenarios, sufficient governance and institutional quality is necessary for the effective implementation of public expenditure and the facilitation of private investment. Improvements in governance can contribute to increased overall productivity and improvement on multiple SDGs. The key SDGs that can be impacted by governance are SDGs 8, 9, 16, and 17, however the effects transcend individual goals and create synergies across goals. This is due to governance improving the effectiveness of interventions and creating a multiplier effect on the overall improvements seen throughout the scenarios. However, the earlier governance improvements are experience, the greater the dividends will be in the long run as the effect compounds over time.

Beyond the specific dynamics of areas that can benefit from targeted interventions, SDGs 1, 2, 3, 6, 8, 10, and 16 can lead to rapid improvement, either through the raw attainment that can be achieved or through synergies and supporting effects across interventions. The attainment of these SDGs is strongly impacted by the interventions for health, education, energy, and environment. Although, these interventions also interact widely with the SDGs to improve attainment. These interventions accelerate SDG attainment by acting as leverage points that improve goal achievement with fewer resources, contribute to synergies across SDGs for greater performance overall, and support implementation of other interventions to generate additional returns.

Interventions targeting these accelerators are necessary to improve the overall performance of the SDGs, however it is not sufficient to ensure generating additional gains in attainment. Implemented alone, these interventions would most probably fall well short of the attainment seen in the NDP scenario. These interventions require the support of supplementary interventions in order to build upon each other. These interventions may be viable targets for adjusting policy to create additional leverage and improve performance on the SDGs.

Overall, SDG attainment sees progress in many areas in the NDP scenario, however, many SDGs show low absolute performance, despite seeing meaningful growth by 2030, and many SDGs see marginal or negative change. Understanding the trade-offs and interactions between policies options is critical in effectively utilizing resources for optimal results, especially when there are competing objectives. The economic context in Djibouti provides a strong foundation for developing and implementing policy options that will take advantage of the growth anticipated over the next ten years. By effectively harnessing this growth and ensuring policies account for the dynamic, interconnections of the development context, substantial progress can be attained beyond what is estimated in the NDP scenario.

A. Data Sources

Table 5: iSDG Database Sources

Module	Sources
Population	INS 1998-2014; UNPOP 1990-1997, 2015-2020;
Fertility	Births from MSLS; Fertility Rate from UNPOP; Contraceptive Prevalence Rate from WDI
Mortality	UNPOP 2012-2017
Education	Barro Lee; WDI
Health	WDI
Road and Rail Infrastructure	Road data from AGEROUTE; Rail data from WDI; Disasters data from EMDAT; Rural Access Index from World Bank
Vehicles	Vehicles, Passenger and Goods Transported data from WDI; Fatalities data from INS
Employment	Employment data by sector from INS; Gender and Employment-to-Population ratios from WDI
Income distribution	WDI
Poverty	UNDP; WDI
Agriculture	Livestock data from FAO; Production by hectare from FAO and MINAGRI; Disaggregated production value pre-2014 from INS; Disaggregated production value 2015-2018 from WDI
Industry	INS
Services	INS
Aggregate Production	GDP and Investment from INS; Deflator from WDI
Investment	INS
Households	WDI
Government	? IMF
Governance	WDI; WGI
Finance	? Financing and debt from Ministère de l'Économie et des Finances; Reserves and interest on foreign debt from WDI
Balance of Payments	Balance of Payments from INS; Transfers and income from IMF; Exchange rates from WDI
Land	FAO; REDD+
Soil	FAO
Water Demand	Aquastat (FAO)
Water Supply	Aquastat (FAO); WDI
Energy Demand	EIA; Proportion of Population with Access to Electricity from WDI
Electricity Generation	EIA; WDI
Fossil Fuel Demand	EIA
Material Consumption	EIA
Emissions and Waste	Carbon Dioxide Emissions from EIA and WDI; Agricultural emissions from FAO; Marine protection data from WDI; Territorial Waters data from World Resources Institute
Biodiversity	Sea Around Us; WDI

B. SDG Indicators in the iSDG Model

Table 6: SDG Indicators in the iSDG

Indicator	Description
SDG 1	End poverty in all its forms everywhere
1.1.1	Proportion of population below the international poverty line, by sex, age, employment status and geographical location (urban/rural)
1.2.1	Proportion of population living below the national poverty line, by sex and age
1.4.1	Proportion of population living in households with access to basic services
1.5.1	Number of deaths, missing and persons affected by disaster per 100,000 people
1.5.2	Direct disaster economic loss in relation to global GDP
SDG 2	End hunger, achieve food security and improved nutrition and promote sustainable agriculture
2.1.1	Prevalence of undernourishment
2.2.1	Prevalence of stunting among children under 5 years of age
2.2.2	Prevalence of malnutrition among children under 5 years of age, by type (wasting and overweight)
2.3.1	Volume of production per labor unit by classes of farming/pastoral/forestry enterprise size
2.4.1	Proportion of agricultural area under productive and sustainable agriculture
SDG 3	Ensure healthy lives and promote well-being for all at all ages
3.1.1	Maternal mortality ratio
3.1.2	Proportion of births attended by skilled health personnel
3.2.1	Under-five mortality rate
3.2.2	Neonatal mortality rate
3.4.1	Mortality rate attributed to cardiovascular disease, cancer, diabetes or chronic respiratory disease
3.6.1	Death rate due to road traffic injuries
3.7.1	Proportion of women of reproductive age who have their need for family planning satisfied with modern methods
3.7.2	Adolescent birth rate per 1,000 women in that age group
3.8.1	Coverage of essential health services
SDG 4	Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all
4.1.1	Proportion of children and young people achieving at least a minimum proficiency in reading and mathematics, by sex
4.3.1	Participation rate of youth and adults in formal and non-formal education and training in the previous 12 months, by sex
4.5.1	Parity indices (female/male, rural/urban, bottom/top wealth quintile and others such as disability status, indigenous peoples and conflict affected as data become available)
4.6.1	Percentage of population in a given age group achieving at least a fixed level of proficiency in functional (a) literacy and (b) numeracy skills, by sex
SDG 5	Achieve gender equality and empower all women and girls
5.5.1	Proportion of seats held by women in national parliaments and local governments
5.6.1	Proportion of women aged 15-49 years who make their own informed decisions regarding sexual relations, contraceptive use and reproductive health care
SDG 6	Ensure availability and sustainable management of water and sanitation for all
6.1.1	Proportion of population using safely managed drinking water services
6.2.1	Proportion of population using safely managed sanitation services, including a handwashing facility with soap and water
6.4.1	Change in water use efficiency over time
6.4.2	Level of water stress: freshwater withdrawal as a proportion of available freshwater resources
SDG 7	Ensure access to affordable, reliable, sustainable and modern energy for all
7.1.1	Proportion of population with access to electricity
7.2.1	Renewable energy share in the total final energy consumption
7.3.1	Energy intensity measured in terms of primary energy and gross domestic product

Table 6: SDG Indicators in the iSDG (continued)

Indicator	Description
SDG 8	Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all
8.1.1	Annual growth rate of real GDP per capita
8.2.1	Annual growth rate of real GDP per employed person
8.4.1	Material footprint (MF) and MF per capita, per GDP
8.4.2	Domestic material consumption (DMC) and DMC per capita, per GDP
8.5.2	Unemployment rate, by sex, age and persons with disabilities
8.6.1	Proportion of youth (aged 15-24) not in education, employment or training
SDG 9	Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation
9.1.1	Proportion of the rural population who live within 2 km of an all-season road
9.2.1	Manufacturing value added as a proportion of GDP and per capita
9.2.2	Manufacturing employment as a proportion of total employment
9.4.1	CO2 emission per unit of value added
SDG 10	Reduce inequality within and among countries
10.1.1	Growth rates of household expenditure or income per capita among the bottom 40 per cent of the population and the total population
10.2.1	Proportion of people living below 50 per cent of median income, by age, sex and persons with disabilities
10.4.1	Labor share of GDP, comprising wages and social protection transfers
SDG 11	Make cities and human settlements inclusive, safe, resilient and sustainable
11.5.1	Number of deaths, missing and persons affected by disaster per 100,000 people
11.5.2	Direct disaster economic loss in relation to global GDP, including disaster damage to critical infrastructure and disruption of basic services
11.6.1	Percentage of urban solid waste regularly collected and with adequate final discharge with regard to the total waste generated by the city
11.6.2	Annual mean levels of fine particulate matter (e.g. PM2.5 and PM10) in cities (population weighted)
SDG 12	Ensure sustainable consumption and production patterns
12.2.1	Material footprint (MF) and MF per capita, per GDP
12.2.2	Domestic material consumption (DMC) and DMC per capita, per GDP
SDG 13	Take urgent action to combat climate change and its impacts
13.1.2	Number of deaths, missing and persons affected by disaster per 100,000 people
SDG 14	Conserve and sustainably use the oceans, seas and marine resources for sustainable development
14.4.1	Proportion of fish stocks within biologically sustainable levels
14.5.1	Coverage of protected areas in relation to marine areas
SDG 15	Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss
15.1.1	Forest area as a proportion of total land area
15.1.2	Proportion of important sites for terrestrial and freshwater biodiversity that are covered by protected areas, by ecosystem type
15.5.1	Red List Index
SDG 16	Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels
16.1.1	Number of victims of intentional homicide per 100,000 population, by sex and age
16.5.2	Proportion of businesses who had at least one contact with a public official and who paid a bribe to a public official, or were asked for a bribe by these public officials, during the previous 12 months
16.6.2	Proportion of the population satisfied with their last experience of public services
SDG 17	Strengthen the means of implementation and revitalize the Global Partnership for Sustainable Development
17.1.1	Total government revenue as a proportion of GDP, by source
17.1.2	Proportion of domestic budget funded by domestic taxes

Table 6: SDG Indicators in the iSDG (continued)

Indicator	Description
17.3.1	Foreign direct investments (FDI), official development assistance and South-South Cooperation as a proportion of total domestic budget
17.4.1	Debt service as a proportion of exports of goods and services

C. Scenario SDG Attainment

Table 7: BAU Scenario SDG Attainment by Year

Variable	2020	2025	2030
Total	27.81%	34.84%	38.43%
SDG 1	23.91%	35.41%	48.05%
SDG 2	1.08%	6.23%	13.48%
SDG 3	32.27%	39.37%	43.20%
SDG 4	9.75%	18.04%	22.34%
SDG 5	5.89%	11.00%	14.87%
SDG 6	16.67%	16.67%	22.92%
SDG 7	0.00%	1.66%	4.76%
SDG 8	41.89%	74.25%	80.80%
SDG 9	39.39%	49.31%	55.80%
SDG 10	20.28%	45.90%	41.20%
SDG 11	5.90%	5.54%	5.95%
SDG 12	76.26%	88.52%	96.22%
SDG 13	23.34%	22.18%	23.80%
SDG 14	50.00%	50.00%	50.00%
SDG 15	51.11%	50.63%	50.25%
SDG 16	20.79%	24.67%	28.06%
SDG 17	54.15%	52.90%	51.67%

Table 8: NDP Scenario SDG Attainment by Year

Variable	2020	2025	2030
Total	27.81%	34.96%	40.94%
SDG 1	23.91%	36.15%	49.07%
SDG 2	1.08%	6.27%	12.89%
SDG 3	32.27%	45.34%	51.26%
SDG 4	9.75%	18.09%	23.03%
SDG 5	5.89%	12.19%	18.94%
SDG 6	16.67%	16.67%	21.81%
SDG 7	0.00%	4.00%	12.25%
SDG 8	41.89%	44.90%	79.67%
SDG 9	39.39%	47.93%	55.27%
SDG 10	20.28%	54.99%	39.34%
SDG 11	5.90%	6.43%	9.17%
SDG 12	76.26%	87.94%	96.47%
SDG 13	23.34%	25.71%	36.67%
SDG 14	50.00%	50.61%	50.63%
SDG 15	51.11%	50.92%	50.81%
SDG 16	20.79%	33.15%	36.93%
SDG 17	54.15%	52.98%	51.70%

Table 9: OPT Scenario SDG Attainment by Year

Variable	2020	2025	2030
Total	27.81%	34.93%	41.06%
SDG 1	23.91%	36.21%	49.18%
SDG 2	1.08%	6.27%	12.96%
SDG 3	32.27%	45.57%	51.87%
SDG 4	9.75%	18.10%	23.19%

Table 9: OPT Scenario SDG Attainment by Year (continued)

Variable	2020	2025	2030
SDG 5	5.89%	12.26%	19.47%
SDG 6	16.67%	16.67%	21.83%
SDG 7	0.00%	4.13%	12.89%
SDG 8	41.89%	43.56%	79.49%
SDG 9	39.39%	47.87%	55.24%
SDG 10	20.28%	55.09%	39.30%
SDG 11	5.90%	6.43%	9.21%
SDG 12	76.26%	87.92%	96.49%
SDG 13	23.34%	25.74%	36.85%
SDG 14	50.00%	50.62%	50.64%
SDG 15	51.11%	50.93%	50.84%
SDG 16	20.79%	33.39%	36.93%
SDG 17	54.15%	52.99%	51.71%

Table 10: Policy Scenario SDG Attainment Difference from 2020 to 2030

Variable	BAU	NDP	OPT
Total	10.63%	13.13%	13.26%
SDG 1	24.14%	25.16%	25.27%
SDG 2	12.40%	11.81%	11.88%
SDG 3	10.93%	18.99%	19.60%
SDG 4	12.59%	13.28%	13.43%
SDG 5	8.97%	13.04%	13.57%
SDG 6	6.25%	5.14%	5.17%
SDG 7	4.76%	12.25%	12.89%
SDG 8	38.91%	37.79%	37.60%
SDG 9	16.41%	15.88%	15.84%
SDG 10	20.92%	19.06%	19.02%
SDG 11	0.05%	3.26%	3.31%
SDG 12	19.95%	20.21%	20.23%
SDG 13	0.46%	13.33%	13.51%
SDG 14	0.00%	0.63%	0.64%
SDG 15	-0.86%	-0.30%	-0.27%
SDG 16	7.27%	16.14%	16.14%
SDG 17	-2.48%	-2.45%	-2.45%

D. Intervention Group SDG Attainment

Table 11: Intervention Group SDG Attainment in 2030

Variable	Agr	Eco	Inf	Was	Hlt	Edu	Env	Eng
Total	36.84%	36.95%	36.81%	36.69%	37.86%	37.05%	37.82%	36.76%
SDG 1	41.77%	44.18%	41.88%	41.99%	43.09%	41.98%	43.77%	42.59%
SDG 2	8.11%	9.04%	8.08%	8.07%	8.45%	8.28%	8.42%	8.31%
SDG 3	42.00%	42.29%	42.07%	42.05%	47.81%	42.69%	42.13%	42.18%
SDG 4	22.36%	22.35%	22.36%	22.36%	22.23%	23.16%	22.36%	22.36%
SDG 5	14.89%	14.88%	14.92%	14.89%	16.90%	16.75%	14.88%	14.88%
SDG 6	19.10%	19.57%	19.14%	19.21%	19.54%	19.21%	19.27%	19.45%
SDG 7	11.39%	11.34%	11.32%	11.36%	11.10%	11.98%	11.31%	12.20%
SDG 8	73.35%	72.35%	72.73%	73.14%	70.52%	70.69%	69.97%	72.22%
SDG 9	54.09%	54.26%	54.56%	54.15%	54.28%	54.09%	54.14%	54.34%
SDG 10	39.84%	36.68%	39.11%	36.81%	35.75%	41.16%	38.61%	35.81%
SDG 11	5.95%	5.95%	5.95%	5.95%	5.95%	5.95%	9.25%	5.95%
SDG 12	94.16%	94.81%	94.25%	94.33%	95.09%	94.50%	94.70%	94.75%
SDG 13	23.80%	23.80%	23.80%	23.80%	23.80%	23.80%	37.01%	23.80%
SDG 14	50.00%	50.00%	50.00%	50.00%	50.00%	50.00%	50.63%	50.00%
SDG 15	50.25%	50.25%	50.25%	50.25%	50.25%	50.25%	50.81%	50.25%
SDG 16	23.30%	24.46%	23.38%	23.49%	36.93%	23.43%	23.72%	23.94%
SDG 17	51.96%	51.91%	51.96%	51.95%	51.88%	51.95%	51.92%	51.91%

Table 12: Intervention Group SDG Attainment Difference with BAU in 2030

Variable	Agr	Eco	Inf	Was	Hlt	Edu	Env	Eng
Total	-1.59%	-1.49%	-1.62%	-1.74%	-0.58%	-1.38%	-0.62%	-1.67%
SDG 1	-6.28%	-3.87%	-6.17%	-6.06%	-4.96%	-6.07%	-4.28%	-5.46%
SDG 2	-5.38%	-4.44%	-5.40%	-5.41%	-5.03%	-5.20%	-5.06%	-5.17%
SDG 3	-1.20%	-0.91%	-1.13%	-1.15%	4.60%	-0.51%	-1.07%	-1.02%
SDG 4	0.02%	0.01%	0.03%	0.02%	-0.11%	0.83%	0.02%	0.02%
SDG 5	0.02%	0.01%	0.05%	0.02%	2.03%	1.89%	0.02%	0.02%
SDG 6	-3.82%	-3.35%	-3.78%	-3.71%	-3.38%	-3.71%	-3.65%	-3.47%
SDG 7	6.62%	6.57%	6.56%	6.59%	6.33%	7.21%	6.55%	7.44%
SDG 8	-7.45%	-8.46%	-8.07%	-7.66%	-10.29%	-10.11%	-10.83%	-8.59%
SDG 9	-1.72%	-1.55%	-1.24%	-1.65%	-1.52%	-1.71%	-1.66%	-1.47%
SDG 10	-1.36%	-4.52%	-2.09%	-4.39%	-5.45%	-0.04%	-2.59%	-5.39%
SDG 11	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	3.30%	0.00%
SDG 12	-2.06%	-1.40%	-1.97%	-1.89%	-1.13%	-1.71%	-1.52%	-1.46%
SDG 13	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	13.21%	0.00%
SDG 14	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.63%	0.00%
SDG 15	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.56%	0.00%
SDG 16	-4.75%	-3.59%	-4.68%	-4.57%	8.87%	-4.63%	-4.34%	-4.12%
SDG 17	0.30%	0.24%	0.29%	0.28%	0.21%	0.28%	0.26%	0.24%

E. Intervention Group SDG Synergy

Table 13: SDG Synergy Calculation

Variable	NDP Performance Difference	Intervention Performance Difference	Synergy
Total	2.50%	-10.69%	13.19%
SDG 1	1.02%	-43.15%	44.17%
SDG 2	-0.59%	-41.09%	40.50%
SDG 3	8.06%	-2.39%	10.45%
SDG 4	0.69%	0.84%	-0.15%
SDG 5	4.07%	4.05%	0.02%
SDG 6	-1.11%	-28.87%	27.76%
SDG 7	7.49%	53.88%	-46.39%
SDG 8	-1.13%	-71.46%	70.33%
SDG 9	-0.53%	-12.51%	11.99%
SDG 10	-1.86%	-25.83%	23.97%
SDG 11	3.22%	3.30%	-0.09%
SDG 12	0.26%	-13.14%	13.39%
SDG 13	12.87%	13.21%	-0.34%
SDG 14	0.63%	0.63%	0.00%
SDG 15	0.56%	0.56%	0.00%
SDG 16	8.87%	-21.80%	30.68%
SDG 17	0.04%	2.09%	-2.06%

F. Intervention Group Drop Out Effect

Table 14: Inverse Intervention Group SDG Attainment in 2030

Variable	NoAgr	NoEco	NoInf	NoWas	NoHlt	NoEdu	NoEnv	NoEng
Total	40.92%	40.25%	40.83%	40.81%	39.27%	40.54%	39.49%	40.44%
SDG 1	49.05%	46.76%	48.94%	48.80%	47.83%	48.87%	47.04%	48.20%
SDG 2	12.80%	11.14%	12.74%	12.62%	11.84%	12.42%	11.97%	11.98%
SDG 3	51.23%	50.08%	51.15%	51.06%	43.45%	50.47%	50.81%	50.56%
SDG 4	23.03%	23.03%	23.02%	23.03%	23.16%	22.22%	23.03%	23.03%
SDG 5	18.94%	18.94%	18.90%	18.93%	16.77%	16.92%	18.94%	18.93%
SDG 6	21.78%	20.33%	21.64%	21.47%	20.41%	21.38%	21.11%	20.70%
SDG 7	12.25%	12.31%	12.31%	12.28%	12.54%	11.67%	12.32%	11.50%
SDG 8	79.59%	76.53%	78.94%	78.91%	76.29%	78.08%	76.84%	76.70%
SDG 9	55.27%	55.12%	54.80%	55.21%	55.09%	55.27%	55.22%	55.04%
SDG 10	39.33%	37.56%	39.29%	39.01%	38.54%	39.54%	39.11%	38.42%
SDG 11	9.17%	9.19%	9.17%	9.17%	9.20%	9.17%	5.95%	9.19%
SDG 12	96.48%	96.33%	96.46%	96.44%	96.22%	96.38%	96.30%	96.36%
SDG 13	36.67%	36.75%	36.68%	36.69%	36.80%	36.68%	23.80%	36.75%
SDG 14	50.63%	50.63%	50.63%	50.63%	50.63%	50.63%	50.00%	50.63%
SDG 15	50.81%	50.81%	50.81%	50.81%	50.81%	50.81%	50.25%	50.81%
SDG 16	36.93%	36.93%	36.93%	36.93%	26.25%	36.93%	36.93%	36.93%
SDG 17	51.71%	51.75%	51.71%	51.72%	51.78%	51.72%	51.74%	51.75%

Table 15: Intervention Group Drop-out Loss on SDG Attainment in 2030

Variable	NoAgr	NoEco	NoInf	NoWas	NoHlt	NoEdu	NoEnv	NoEng
Total	0.02%	0.69%	0.11%	0.13%	1.67%	0.40%	1.44%	0.50%
SDG 1	0.02%	2.31%	0.13%	0.27%	1.24%	0.20%	2.02%	0.87%
SDG 2	0.09%	1.75%	0.14%	0.27%	1.05%	0.47%	0.92%	0.91%
SDG 3	0.03%	1.17%	0.10%	0.19%	7.80%	0.78%	0.45%	0.70%
SDG 4	0.00%	0.00%	0.01%	0.00%	-0.13%	0.81%	0.00%	0.00%
SDG 5	0.00%	0.00%	0.04%	0.00%	2.17%	2.01%	0.00%	0.00%
SDG 6	0.03%	1.48%	0.17%	0.34%	1.40%	0.43%	0.70%	1.11%
SDG 7	0.00%	-0.06%	-0.06%	-0.03%	-0.29%	0.58%	-0.07%	0.75%
SDG 8	0.09%	3.14%	0.73%	0.77%	3.38%	1.59%	2.84%	2.97%
SDG 9	0.00%	0.16%	0.48%	0.06%	0.19%	0.00%	0.05%	0.23%
SDG 10	0.02%	1.78%	0.05%	0.33%	0.81%	-0.19%	0.24%	0.93%
SDG 11	0.00%	-0.02%	0.00%	-0.01%	-0.03%	0.00%	3.22%	-0.02%
SDG 12	-0.01%	0.15%	0.02%	0.03%	0.25%	0.10%	0.17%	0.11%
SDG 13	0.00%	-0.08%	-0.01%	-0.02%	-0.13%	-0.01%	12.87%	-0.08%
SDG 14	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.63%	0.00%
SDG 15	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.56%	0.00%
SDG 16	0.00%	0.00%	0.00%	0.00%	10.68%	0.00%	0.00%	0.00%
SDG 17	0.00%	-0.05%	-0.01%	-0.01%	-0.08%	-0.01%	-0.03%	-0.04%

Table 16: Intervention Group Drop-out Effect on SDG Attainment in 2030

Variable	NoAgr	NoEco	NoInf	NoWas	NoHlt	NoEdu	NoEnv	NoEng
Total	1.61%	2.18%	1.73%	1.87%	2.24%	1.78%	2.06%	2.17%
SDG 1	6.30%	6.19%	6.30%	6.33%	6.21%	6.27%	6.31%	6.33%
SDG 2	5.46%	6.19%	5.54%	5.68%	6.08%	5.67%	5.98%	6.08%
SDG 3	1.23%	2.08%	1.24%	1.34%	3.20%	1.29%	1.52%	1.72%

Table 16: Intervention Group Drop-out Effect on SDG Attainment in 2030 (continued)

Variable	NoAgr	NoEco	NoInf	NoWas	NoHlt	NoEdu	NoEnv	NoEng
SDG 4	-0.02%	-0.02%	-0.02%	-0.02%	-0.02%	-0.02%	-0.02%	-0.02%
SDG 5	-0.02%	-0.01%	-0.02%	-0.02%	0.14%	0.13%	-0.02%	-0.01%
SDG 6	3.85%	4.83%	3.96%	4.06%	4.78%	4.14%	4.35%	4.58%
SDG 7	-6.62%	-6.63%	-6.62%	-6.62%	-6.62%	-6.63%	-6.62%	-6.69%
SDG 8	7.54%	11.60%	8.80%	8.43%	13.67%	11.70%	13.67%	11.56%
SDG 9	1.72%	1.70%	1.71%	1.71%	1.71%	1.72%	1.72%	1.70%
SDG 10	1.38%	6.30%	2.14%	4.72%	6.26%	-0.15%	2.82%	6.32%
SDG 11	0.00%	-0.02%	0.00%	-0.01%	-0.03%	0.00%	-0.09%	-0.02%
SDG 12	2.05%	1.55%	1.98%	1.92%	1.38%	1.81%	1.69%	1.58%
SDG 13	0.00%	-0.08%	-0.01%	-0.02%	-0.13%	-0.01%	-0.34%	-0.08%
SDG 14	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
SDG 15	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
SDG 16	4.75%	3.59%	4.68%	4.57%	1.81%	4.63%	4.34%	4.12%
SDG 17	-0.30%	-0.29%	-0.30%	-0.29%	-0.28%	-0.29%	-0.29%	-0.29%

G. Intervention Scenario Return on Investment

Table 17: Intervention Scenario SDG Return on Investment

Variable	NDP	Agr	Eco	Inf	Was	Hlt	Edu	Env	Eng
Total	5.331	-4.046	-3.558	-4.106	-4.344	-1.419	-3.491	-1.564	-3.992
SDG 1	2.168	-15.960	-9.281	-15.592	-15.129	-12.203	-15.329	-10.874	-13.034
SDG 2	-1.266	-13.668	-10.641	-13.651	-13.507	-12.359	-13.146	-12.858	-12.343
SDG 3	17.161	-3.046	-2.182	-2.867	-2.869	11.318	-1.288	-2.729	-2.438
SDG 4	1.472	0.057	0.035	0.069	0.053	-0.267	2.087	0.049	0.044
SDG 5	8.665	0.051	0.024	0.128	0.046	4.988	4.762	0.040	0.039
SDG 6	-2.364	-9.719	-8.015	-9.566	-9.275	-8.297	-9.370	-9.271	-8.272
SDG 7	15.953	16.833	15.749	16.586	16.468	15.569	18.222	16.625	17.753
SDG 8	-2.406	-18.944	-20.256	-20.416	-19.143	-25.281	-25.541	-27.504	-20.494
SDG 9	-1.126	-4.361	-3.706	-3.132	-4.118	-3.740	-4.331	-4.225	-3.499
SDG 10	-3.957	-3.463	-10.826	-5.283	-10.959	-13.396	-0.106	-6.572	-12.871
SDG 11	6.854	0.000	0.000	0.000	0.000	0.000	0.000	8.386	0.000
SDG 12	0.551	-5.228	-3.364	-4.976	-4.712	-2.773	-4.325	-3.852	-3.493
SDG 13	27.417	0.000	0.000	0.000	0.000	0.000	0.000	33.545	0.000
SDG 14	1.336	0.000	0.000	0.000	0.000	0.000	0.000	1.592	0.000
SDG 15	1.200	0.000	0.000	0.000	0.000	0.001	-0.001	1.430	0.000
SDG 16	18.899	-12.086	-8.602	-11.833	-11.412	21.803	-11.684	-11.014	-9.832
SDG 17	0.078	0.753	0.575	0.727	0.703	0.512	0.707	0.650	0.580

H. Scenario Expenditure by Main Category

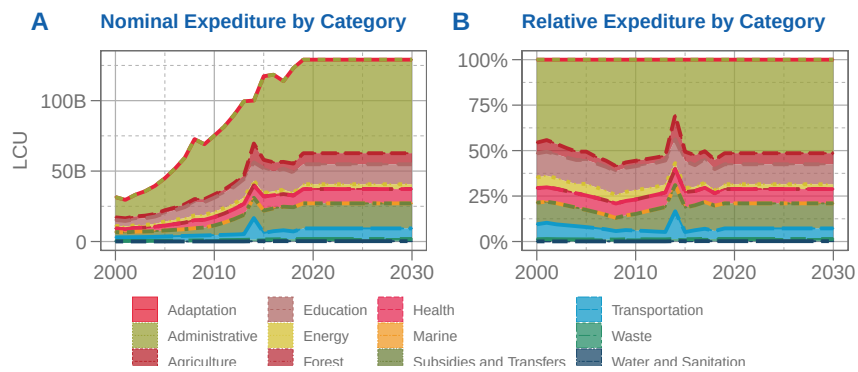


Figure 20: BAU Expenditure

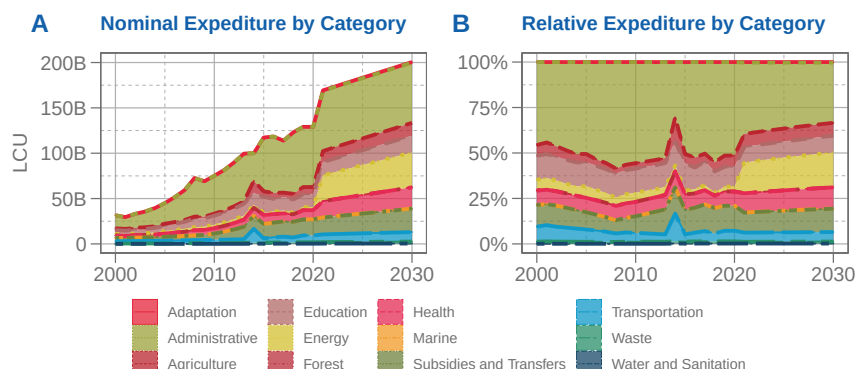


Figure 21: NDP Expenditure

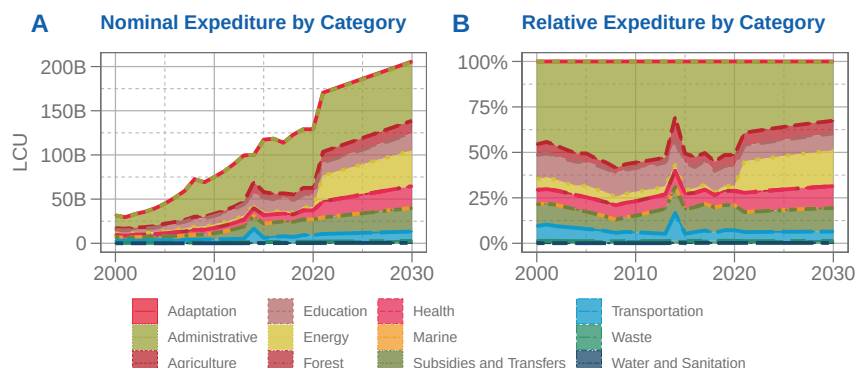


Figure 22: NDP Expenditure

Table 18: BAU Scenario Expenditure by Main Category in Billion LCU

Year	Subsidies and Transfers	Administrative	Health	Education	Transportation	Energy	Agriculture	Water and Sanitation	Forest	Marine	Adaptation	Waste
2000	3.75	14.40	2.51	4.18	2.60	1.84	1.87	0.02	0.01	0.01	0	0.37
2001	3.42	13.08	2.34	3.90	2.64	1.89	1.89	0.02	0.01	0.01	0	0.39
2002	3.85	15.37	2.61	4.36	2.70	1.94	1.89	0.02	0.01	0.01	0	0.40
2003	3.89	17.35	2.82	4.69	2.75	1.89	1.86	0.02	0.01	0.01	0	0.41
2004	4.02	19.99	3.12	5.20	2.86	2.03	1.83	0.03	0.01	0.01	0	0.45
2005	4.25	22.74	3.55	5.92	3.05	2.87	2.06	0.03	0.01	0.01	0	0.49
2006	4.50	27.59	4.07	6.79	3.18	2.99	1.85	0.04	0.01	0.01	0	0.59
2007	4.74	32.95	4.68	7.80	3.29	3.17	2.00	0.04	0.01	0.01	0	0.64
2008	5.27	42.56	5.73	9.55	3.38	3.33	2.05	0.05	0.02	0.01	0	0.74
2009	5.57	39.01	5.47	9.12	3.51	3.46	2.05	0.05	0.02	0.01	0	0.80
2010	6.86	41.77	5.97	9.94	3.64	3.81	2.26	0.05	0.02	0.01	0	0.83
2011	8.69	44.63	6.46	10.76	3.72	3.87	2.32	0.06	0.02	0.01	0	0.96
2012	10.97	48.38	7.11	11.84	3.87	3.96	2.63	0.06	0.02	0.01	0	1.01
2013	13.69	52.59	7.86	13.10	4.02	4.46	2.63	0.07	0.02	0.01	0	1.12
2014	14.40	30.46	8.81	13.07	15.24	3.26	13.37	0.20	0.02	0.01	0	1.22
2015	15.81	59.39	9.97	17.47	4.61	2.57	5.99	0.20	0.02	0.01	0	1.30
2016	16.23	62.19	9.29	14.00	5.78	2.77	6.55	0.22	0.02	0.01	0	1.36
2017	16.72	57.29	8.94	14.92	6.31	3.11	4.82	0.24	0.02	0.01	0	1.43
2018	17.17	67.81	8.33	14.42	5.44	1.91	6.28	0.23	0.02	0.01	0	1.47
2019	17.78	66.40	10.15	14.16	7.50	3.43	7.85	0.24	0.02	0.00	0	1.56
2020	17.78	66.40	10.15	14.16	7.50	3.43	7.85	0.24	0.02	0.00	0	1.56
2021	17.78	66.40	10.15	14.16	7.50	3.43	7.85	0.24	0.02	0.00	0	1.56
2022	17.78	66.40	10.15	14.16	7.50	3.43	7.85	0.24	0.02	0.00	0	1.56
2023	17.78	66.40	10.15	14.16	7.50	3.43	7.85	0.24	0.02	0.00	0	1.56
2024	17.78	66.40	10.15	14.16	7.50	3.43	7.85	0.24	0.02	0.00	0	1.56
2025	17.78	66.40	10.15	14.16	7.50	3.43	7.85	0.24	0.02	0.00	0	1.56
2026	17.78	66.40	10.15	14.16	7.50	3.43	7.85	0.24	0.02	0.00	0	1.56
2027	17.78	66.40	10.15	14.16	7.50	3.43	7.85	0.24	0.02	0.00	0	1.56
2028	17.78	66.40	10.15	14.16	7.50	3.43	7.85	0.24	0.02	0.00	0	1.56
2029	17.78	66.40	10.15	14.16	7.50	3.43	7.85	0.24	0.02	0.00	0	1.56
2030	17.78	66.40	10.15	14.16	7.50	3.43	7.85	0.24	0.02	0.00	0	1.56

Table 19: NDP Scenario Expenditure by Main Category in Billion LCU

Year	Subsidies and Transfers	Administrative	Health	Education	Transportation	Energy	Agriculture	Water and Sanitation	Forest	Marine	Adaptation	Waste
2000	3.75	14.40	2.51	4.18	2.60	1.84	1.87	0.02	0.01	0.01	0.00	0.37
2001	3.42	13.08	2.34	3.90	2.64	1.89	1.89	0.02	0.01	0.01	0.00	0.39
2002	3.85	15.37	2.61	4.36	2.70	1.94	1.89	0.02	0.01	0.01	0.00	0.40
2003	3.89	17.35	2.82	4.69	2.75	1.89	1.86	0.02	0.01	0.01	0.00	0.41
2004	4.02	19.99	3.12	5.20	2.86	2.03	1.83	0.03	0.01	0.01	0.00	0.45
2005	4.25	22.74	3.55	5.92	3.05	2.87	2.06	0.03	0.01	0.01	0.00	0.49
2006	4.50	27.59	4.07	6.79	3.18	2.99	1.85	0.04	0.01	0.01	0.00	0.59
2007	4.74	32.95	4.68	7.80	3.29	3.17	2.00	0.04	0.01	0.01	0.00	0.64
2008	5.27	42.56	5.73	9.55	3.38	3.33	2.05	0.05	0.02	0.01	0.00	0.74
2009	5.57	39.01	5.47	9.12	3.51	3.46	2.05	0.05	0.02	0.01	0.00	0.80
2010	6.86	41.77	5.97	9.94	3.64	3.81	2.26	0.05	0.02	0.01	0.00	0.83
2011	8.69	44.63	6.46	10.76	3.72	3.87	2.32	0.06	0.02	0.01	0.00	0.96
2012	10.97	48.38	7.11	11.84	3.87	3.96	2.63	0.06	0.02	0.01	0.00	1.01
2013	13.69	52.59	7.86	13.10	4.02	4.46	2.63	0.07	0.02	0.01	0.00	1.12
2014	14.40	30.46	8.81	13.07	15.24	3.26	13.37	0.20	0.02	0.01	0.00	1.22
2015	15.81	59.39	9.97	17.47	4.61	2.57	5.99	0.20	0.02	0.01	0.00	1.30
2016	16.23	62.19	9.29	14.00	5.78	2.77	6.55	0.22	0.02	0.01	0.00	1.36
2017	16.72	57.29	8.94	14.92	6.31	3.11	4.82	0.24	0.02	0.01	0.00	1.43
2018	17.17	67.81	8.33	14.42	5.44	1.91	6.28	0.23	0.02	0.01	0.00	1.47
2019	17.78	66.40	10.15	14.16	7.50	3.43	7.85	0.24	0.02	0.00	0.00	1.56
2020	17.78	66.40	10.15	14.16	7.50	3.43	7.85	0.24	0.02	0.00	0.00	1.56
2021	18.58	66.40	17.91	14.58	8.55	28.53	12.11	0.35	0.05	0.13	0.51	1.62
2022	19.38	66.40	18.52	15.01	8.77	29.66	12.35	0.35	0.05	0.14	0.53	1.69
2023	20.18	66.40	19.12	15.43	8.98	30.80	12.59	0.36	0.05	0.14	0.54	1.75
2024	20.98	66.40	19.72	15.86	9.19	31.84	12.83	0.36	0.05	0.15	0.56	1.81
2025	21.78	66.40	20.33	16.28	9.41	32.98	13.07	0.37	0.05	0.16	0.57	1.87
2026	22.58	66.40	20.93	16.71	9.62	34.02	13.31	0.38	0.05	0.16	0.59	1.94
2027	23.38	66.40	21.54	17.13	9.83	35.16	13.55	0.38	0.06	0.17	0.60	2.00
2028	24.18	66.40	22.14	17.56	10.05	36.20	13.79	0.39	0.06	0.17	0.62	2.06
2029	24.98	66.40	22.74	17.98	10.26	37.34	14.03	0.39	0.06	0.18	0.63	2.12
2030	25.78	66.40	23.35	18.41	10.48	38.38	14.27	0.40	0.06	0.18	0.65	2.19

Table 20: OPT Scenario Expenditure by Main Category in Billion LCU

Year	Subsidies and Transfers	Administrative	Health	Education	Transportation	Energy	Agriculture	Water and Sanitation	Forest	Marine	Adaptation	Waste
2000	3.75	14.40	2.51	4.18	2.60	1.84	1.87	0.02	0.01	0.01	0.00	0.37
2001	3.42	13.08	2.34	3.90	2.64	1.89	1.89	0.02	0.01	0.01	0.00	0.39
2002	3.85	15.37	2.61	4.36	2.70	1.94	1.89	0.02	0.01	0.01	0.00	0.40
2003	3.89	17.35	2.82	4.69	2.75	1.89	1.86	0.02	0.01	0.01	0.00	0.41
2004	4.02	19.99	3.12	5.20	2.86	2.03	1.83	0.03	0.01	0.01	0.00	0.45
2005	4.25	22.74	3.55	5.92	3.05	2.87	2.06	0.03	0.01	0.01	0.00	0.49
2006	4.50	27.59	4.07	6.79	3.18	2.99	1.85	0.04	0.01	0.01	0.00	0.59
2007	4.74	32.95	4.68	7.80	3.29	3.17	2.00	0.04	0.01	0.01	0.00	0.64
2008	5.27	42.56	5.73	9.55	3.38	3.33	2.05	0.05	0.02	0.01	0.00	0.74
2009	5.57	39.01	5.47	9.12	3.51	3.46	2.05	0.05	0.02	0.01	0.00	0.80
2010	6.86	41.77	5.97	9.94	3.64	3.81	2.26	0.05	0.02	0.01	0.00	0.83
2011	8.69	44.63	6.46	10.76	3.72	3.87	2.32	0.06	0.02	0.01	0.00	0.96
2012	10.97	48.38	7.11	11.84	3.87	3.96	2.63	0.06	0.02	0.01	0.00	1.01
2013	13.69	52.59	7.86	13.10	4.02	4.46	2.63	0.07	0.02	0.01	0.00	1.12
2014	14.40	30.46	8.81	13.07	15.24	3.26	13.37	0.20	0.02	0.01	0.00	1.22
2015	15.81	59.39	9.97	17.47	4.61	2.57	5.99	0.20	0.02	0.01	0.00	1.30
2016	16.23	62.19	9.29	14.00	5.78	2.77	6.55	0.22	0.02	0.01	0.00	1.36
2017	16.72	57.29	8.94	14.92	6.31	3.11	4.82	0.24	0.02	0.01	0.00	1.43
2018	17.17	67.81	8.33	14.42	5.44	1.91	6.28	0.23	0.02	0.01	0.00	1.47
2019	17.78	66.40	10.15	14.16	7.50	3.43	7.85	0.24	0.02	0.00	0.00	1.56
2020	17.78	66.40	10.15	14.16	7.50	3.43	7.85	0.24	0.02	0.00	0.00	1.56
2021	18.67	66.40	18.03	14.67	8.57	29.36	12.13	0.35	0.05	0.13	0.52	1.63
2022	19.56	66.40	18.76	15.18	8.80	30.57	12.39	0.36	0.05	0.14	0.53	1.70
2023	20.45	66.40	19.48	15.69	9.03	31.78	12.65	0.36	0.05	0.15	0.55	1.76
2024	21.34	66.40	20.21	16.20	9.26	32.99	12.91	0.37	0.05	0.15	0.57	1.83
2025	22.23	66.40	20.93	16.71	9.49	34.20	13.17	0.38	0.05	0.16	0.59	1.90
2026	23.11	66.40	21.66	17.22	9.72	35.41	13.43	0.38	0.05	0.16	0.60	1.96
2027	24.00	66.40	22.38	17.73	9.95	36.62	13.69	0.39	0.06	0.17	0.62	2.03
2028	24.89	66.40	23.11	18.24	10.18	37.83	13.95	0.40	0.06	0.17	0.64	2.10
2029	25.78	66.40	23.83	18.75	10.41	39.04	14.21	0.40	0.06	0.18	0.66	2.17
2030	26.67	66.40	24.56	19.26	10.64	40.25	14.47	0.41	0.06	0.18	0.67	2.23

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