PAGE PARTNERSHIP FOR ACTION ON GREEN ECONOMY

Green Jobs Assessment Model Sustainable Tourism in Burkina Faso

ONU programme pour l'environnement

Organisation internationale du Travail

PNUD

ONUDI ORGANISATION DES NATIONS UNIES POUR LE DÉVELOPPEMENT INDUSTRIEL

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Acronyms and abbreviations

B.F.A.	Burkina Faso
CH^4	Methane
CO^2	Carbon dioxide
CTS	Technical Monitoring Committee
DGEP	General Directorate of Economy and Planning
ETH	Tourist accommodation establishment
FCFA	Franc of the African Financial Community (Local Currency)
GFCF	Gross fixed capital formation
GAIN	Green Jobs Assessment Institutions Network
GHG	Greenhouse gas
$Gg.CO^2eq$	CO2 equivalent gigagram
GHG	Green House Gase
GJAM	Green Jobs Assessment Model
IAP	Automated forecasting instrument
I.O.	Input-Output
INSD	National Institute of Statistics and Demography
SAM	Social Accounting Matrix
MEEVCC	Ministry of Environment, Green Economy and Climate Change
MEFP	Ministry of Economy, Finance and Prospective
CGEM	Computable general equilibrium model
N^2O	Nitrous oxide
OBSTOUR	National Tourism Observatory
ILO	International Labor Organization
PAGE	Partnership for Action on Green Economy
GDP	Gross domestic product
UNEP	United Nations Environment Program
SINTEF	Norwegian Foundation for Industrial and Technical Research
SNPTD	National strategy for the promotion of sustainable tourism in Burkina Faso
SUT	Supply-and Use-Table
UNITAR	United Nations Institute for Training and Research
VA	Value Added

Executive summary

This report sets out to analyse the social and employment impacts of the national strategy for sustainable tourism in Burkina Faso. It also assesses the long-term impact of conflict on the economy, and, projecting a scenario of political stability, evaluates the potential of tourism to drive economic growth.

The Green Jobs Assessment Model (GJAM), based on data from the Social Accounting Matrix (SAM) and Supply-Use Tables (SUT) of the national economy for the year 2019, was used to analyse the effects of the national strategy on employment and greenhouse gas emissions. Thus, a baseline of past economic development was built, used to project economic development up to 2032, and then compared to two scenarios: "the sustainable tourism scenario" and the "international sustainable tourism scenario".

Both scenarios follow the national tourism strategy with increased investments in value chain services, luxury tourism and ecotourism; notably in the protection of natural and cultural heritage, the efficient management and recycling of water, the development of tourist infrastructure and research projects on sustainable tourism. These investments are expected to lead to long-term structural change in the tourism industry itself as well as across the entire economy. The two scenarios assume the share of sustainable tourism in total tourism to double from the current 15 per cent to 32 per cent in 2032. However, the two scenarios differ on important aspects: Compared to the "sustainable tourism scenario", for example, the "international sustainable tourism scenario" envisions more aggressive investment as it assumes an end to the conflict and the achievement of political stability. As a result, a strong influx of international tourism is expected in this scenario.

In order to finance investments in sustainable tourism, an energy tax on fossil fuels (CO_2 tax) is applied to industries with the highest GHG emissions, including electricity, gas production and petroleum refining. The tax is applied according to their weight in GHG emissions (approximately two thirds for "electricity and gas" and one third for "oil refining"). Importantly, this carbon tax, which is the opposite of a fossil fuel subsidy, is only applied to about 10 per cent of the richest part of the population. This is because a "flat" CO2 tax on all fossil fuels would impact all households through an increase of average overall prices: As energy is used in most industries and consumer products, a flat tax would drive up the cost of basic needs, notably food, housing, transport, cooking and energy. In fact, low-income households would be most impacted as they spend a larger share of their income on basic goods. Although high-income earners consume more total fossil fuel energy, and benefit most from energy subsidies, they spend a much smaller share of their total income on basic goods, and more on leisure and luxury goods. A flat fossil fuel energy tax would thereby further increase inequality.

In light of this, and to counteract the potential negative effects on low-income households – who constitute the majority of the general population – a subsidy may be given to poor households for food, education and health services. In fact, the subsidy is equal to the amount and paid for by the CO2 tax. Even though this is not its primary purpose, the CO2 tax has the potential to redistribute income from richer to poorer households in addition to reducing the wasteful consumption of fossil fuel energy, simultaneously reducing pollution and inequality.

In terms of results, compared to the business-as-usual baseline, the sustainable tourism scenario shows significant economy-wide changes in GHG emissions. Importantly, the reduction in CO2 levels comes with positive changes in value added and employment across the entire economy. This means that restructuring the tourism industry to be more sustainable has the potential to generate economy-wide growth while reducing GHG emissions and creating additional jobs.

The sustainable tourism scenario leads to a slight increase in added value of an average of 10 billion CFA francs each year. Similarly, some 3,000 jobs are created and GHG emissions are reduced by approximately 125 gigagrams (Gg) of CO2 equivalent. The restructuring results in a net gain of 5,000 jobs, as some 100,000 new jobs are created against about 95,000 job losses during the period of 2022–2032.

In the hypothetical scenario that there is an end to the conflict, international tourism receipts double from 2019 to 2032. That is an increase of 10 per cent annually for the years 2023–2032. All of the additional spending by international tourists is assumed to follow ecotourism principles of local and sustainable production.

Of the total amount spent by foreign tourists, 30 per cent is spent on sustainable accommodation; 30 per cent on sustainable catering and drinking establishment services; 5 per cent on sustainable booking agency and tour operator services; 5 per cent on creative artistic activities and shows; 10 per cent on souvenirs, such as textiles, clothes, leather and wood products; and 20 per cent on natural products, including produce (such as cashews and other nuts, sesame, other fruits and vegetables), fish and hunting products as well as artisan products (such as shea butter, coffee, chocolates and ice cream).

The employment effects are strong and positive across industries, highlighting the economic and social development potential of sustainable tourism. Agriculture, mainly cereal crop production, registers strong growth in production and generates the most jobs, followed by other major cultivation industries. In addition to job creation and economic development, there may be a positive secondary effect on food security and nutrition (not assessed by the model).

The sustainable international tourism scenario projects the creation of some 200,000 new and additional jobs by 2028. These employment gains, however, are dominated by contributing family workers and the self-employed. This highlights the structural labour market challenges of Burkina Faso's large informal and unskilled workforce and small segment of salaried employment. In order to increase decent work opportunities, additional employment policies are required, notably technical and vocational training and education.

The robust economic growth which would result from a strong and lasting increase in international tourism highlights the potential of an end to the conflict. Because of the significant supply chain links and integration of sustainable tourism industries in the country's economy, growth would pick up across other major industries. Notably, the hotel and tourism industry, accommodation, restaurants and catering services would drive economic growth across various sectors, pulling along supplying industries in agriculture and processing. Importantly, trade and service industries would grow significantly, contributing towards a structural change to more sustainable and service-led economic growth. However, due to the lack of a meaningful manufacturing base, employment in the secondary sector is only marginally implied. A dedicated industrial policy to manufacture basic metal and wood products, elementary machinery and durable consumer goods may change the picture and further stimulate the manufacturing sector and employment in implementing the sustainable tourism strategy.

But, the implementation of a CO2 tax may be perceived as "non-just" or not relevant for a country like Burkina Faso, which is not a major polluter on a global scale. Different resource mobilization options can then be explored through a benchmark of good practices in sustainable tourism financing, fiscal policies including sustainability-friendly fiscal reform, public-private partnership, new green finance instruments including in particular the establishment of green bonds and crowdfunding, favored by technological developments. In all cases, the option to adopt for financing sustainable tourism must take into account the structure of the national economy and the level of development of industries in the tourism value chain.

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1. Background

The tourism sector of Burkina Faso plays an important role in the socio-economic development of the country. Even though the contribution of tourism to the formation of gross domestic product (GDP) is relatively low at 2.1 per cent[1] in 2019 (DGEP/IAP[2], August 2022), the sector creates nearly 194,190 jobs (baseline study, August 2020). According to data from the National Tourism Observatory (OBSTOUR), tourism revenue amounted to nearly 70 billion CFA francs in 2019.

This dynamism of the sector is driven by an important tourist heritage. According to inventories carried out from 2012 to 2016, Burkina Faso has 1,080 sites and tourist attractions on, including 154 natural sites, 608 cultural sites and 318 mixed sites. This heritage is distributed among four tourist areas of the country with 413 sites and tourist attractions in the Center tourist area, 222 tourist sites and attractions in the Eastern tourist zone, 216 tourist sites and attractions in the Western tourist zone and 229 tourist sites and attractions in the Sahel tourist zone.

Given this heritage, the development of the tourism sector is a priority for the Government of Burkina Faso, which is making efforts to ensure its sustainable growth.

However, despite these efforts, the tourism sector faces many difficulties. These include ongoing social changes leading to the breakdown of the family unit, which has interrupted the transmission of important know-how, as well as shrinking community involvement in initiatives to promote and protect cultural and tourist heritage. Other difficulties include the illicit trafficking of goods, clandestine excavations and the looting of archaeological sites. In addition, the tourism sector faces enormous structural, organizational and financial obstacles which affect the quality of the tourist supply, the frequentation of the destination and the viability of the activity both for the economy and for sector actors.

All of these difficulties contribute to the disappearance of major natural and cultural heritage, the low level of development of tourist sites and the endangerment of certain sites due to human actions such as cultural practices, mining and urbanization.[3] This human action exerts direct pressure on fragile ecosystems by degrading the physical environment and disturbing wild flora and fauna. It also destabilizes traditional societies and reinforces competition for scarce resources, mainly land and water, making the sector a major source of local and global pollution. This reality is exacerbated by security and health challenges which constitute internal and external shocks leading to a decline in tourist activity in most major sites.

1 Weight of the value added of the "accommodation and catering" activity which represents the tourism industry in the statistical accounts, with regard to the non-availability of tourism satellite accounts.

2 DGEP is the General Directorate of the Economy and Planning of the Ministry of the Economy, Finance and Proospect, Burkina Faso. IAP is an Automated Forecasting Instrument.

3 National Strategy for the Promotion of Sustainable Tourism in Burkina Faso (2021–2025), September 2020.

The tourism sector today has a significant influence on natural resources and local populations, making the preservation and securing of natural tourist resources an emerging issue for Burkina Faso. In the long term, if this situation is badly managed, tourist activity could be a source of impoverishment, vulnerability and macroeconomic instability as it would be subjected to the mechanisms of the liberal market and to the local and international socio-political environment.

Since 2010, Burkina Faso has been transitioning the national economy towards a so-called green and inclusive economy. As part of this move toward sustainability, the tourism sector has been identified as one of the priority areas for the promotion of a green economy in Burkina Faso. It should allow the country to meet the major challenges of the 21st century, including the protection of environment, the vitality of the economy and the fair redistribution of the fruits of growth.

In order to ensure the sustainable and harmonious development of tourism, the Government and its partners are investing in sustainable solutions. It is in this context that the Partnership for Action on the Green Economy (PAGE) has initiated, at the request of the Government of Burkina Faso, a work plan for the post-COVID-19 green recovery of the tourism sector.[4]

One of the key activities of the PAGE work plan is to create a modelling study of the impact of public policies and incentive measures on greening and creating decent jobs in the tourism sector of Burkina Faso. Furthermore, in connection with the national security situation marked by the persistence of terrorist attacks since 2016, the completion of the study should contribute to the assessment of the impact of terrorist attacks on the activity of the sector.

To this end, the study was guided by the Ministry of Tourism, and entrusted by the Norwegian Foundation for Industrial and Technical Research (SINTEF), the ILO and a national consultant, to develop a Green Jobs Assessment Model (GJAM). The macro-economic, structural simulation model helps to better understand and quantify the employment risks from climate change as well as job opportunities and skills needs in green economy sectors, notably tourism and tourism-related supplying sectors.

Green jobs are defined by the ILO as decent jobs in any economic sector (agriculture, industry, services, administration, etc.) which have an "environmental goal", i.e. contributing to "reducing consumption of energy and raw materials, limit greenhouse gas emissions, minimize waste and pollution and protect and restore ecosystems". In Burkina Faso, according to the guide for the promotion of green jobs, the various consultations led to a consensual definition of green employment seen as employment "that contributes to generating income, preserving the environment, ensuring rational use of natural resources, to strengthen adaptation and resilience capacities in the face of the adverse effects of climate change or to reduce greenhouse gas emissions, in a dynamic of transition towards a green and inclusive economy". In this sense, Burkina Faso's tourism sector

4 PAGE is a multi-year inter-agency program, jointly implemented by the United Nations Environment Program (UNEP), the International Labor Organization (ILO), the United Nations Industrial Development Organization (UNIDO), the United Nations Institute for Training and Research (UNITAR) and the United Nations Development Program (UNDP). It supports countries willing to pursue green economy policies by helping them reframe economic policies and practices around sustainability in line with the 2030 Agenda, foster economic growth, create income and jobs, reduce poverty and inequality and strengthen the ecological foundations of their economies.

PAGE also builds national capacity in green economy, green industry, green entrepreneurship, sustainable agriculture, sustainable trade and green fiscal policies. Additionally, with the support of Switch Africa Green (SAG) and the tourism sector, the Ministry of Environment, Green Economy and Climate Change of Burkina Faso has developed the "National Strategy for the Promotion of Sustainable Tourism in Burkina Faso" (SNPTD), whose vision is to "Achieve a dynamic, competitive and sustainable tourism sector, creating decent jobs in green tourism in order to contribute to the structural transformation of the national economy and to the economic and social influence of Burkina Faso".

has been identified as one of the priority economic activity sectors with potential for creating green jobs, which constitute the base of Burkina Faso's transition to the a green and inclusive economy.

The macro-economic structural simulation model of green jobs used helps to better understand and quantify the risks of job losses linked to climate change as well as employment opportunities and skills needs in green economy sectors, notably tourism and tourism-related supply sectors.

The ultimate objective is to contribute to the development of national policies, programs, strategy documents and action plans to promote economic development and creation of green jobs, in particular for tourism, and for maximizing the creation decent jobs and reduce the risks of social disruption and loss of jobs and income.

The rest of this study report is built around the following axes: (i) a description of the current state of the economy, employment and Emissions; (ii) the method and data used; (iii) policy scenarios: assumptions and results ; and (iv) conclusion and policy implications.

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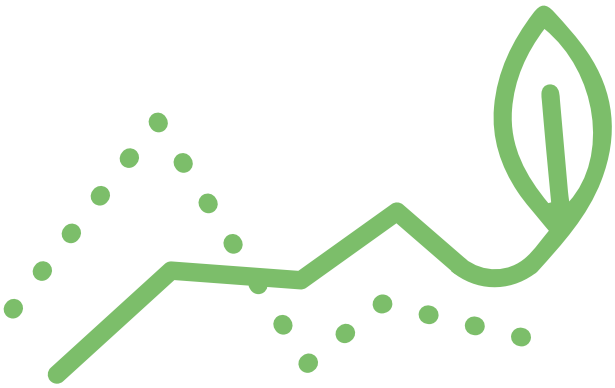
2. The current state of the economy, employment and emissions



From 2010 to 2021, the economy of Burkina Faso evolved in an international context marked by disruptions in economic activity linked to trade tensions between the USA and China, the unfavourable trend in the prices of exported raw materials such as gold and cotton and the occurrence of COVID-19. At the national level, economic activity was affected by the popular uprising of October 2014, social demands in the public sector, the effects of COVID-19 and the emergence of terrorist attacks leading to massive internal displacement of populations.

In 2022, the Russian–Ukrainian crisis, geostrategic tensions and the resurgence of new variants of COVID-19 have undermined the country's macroeconomic performance, in particular through strong inflationary pressures on the prices of imported products such as petroleum, fertilizer and wheat. Combined with the persistence of terrorist attacks, socio-political troubles and an unfavourable rain season in the agriculture sector, these factors are leading to a slowdown of economic growth.

2.1. Economic performance

The economic performance of Burkina Faso is described through some main indicators of GDP resources and uses over the period 2010–2021, with a particular focus on the years 2019, 2020 and 2021. Some national forecasts are also presented up to the year 2026 (DGEP/IAP, August 2022).

Main macroeconomic aggregates

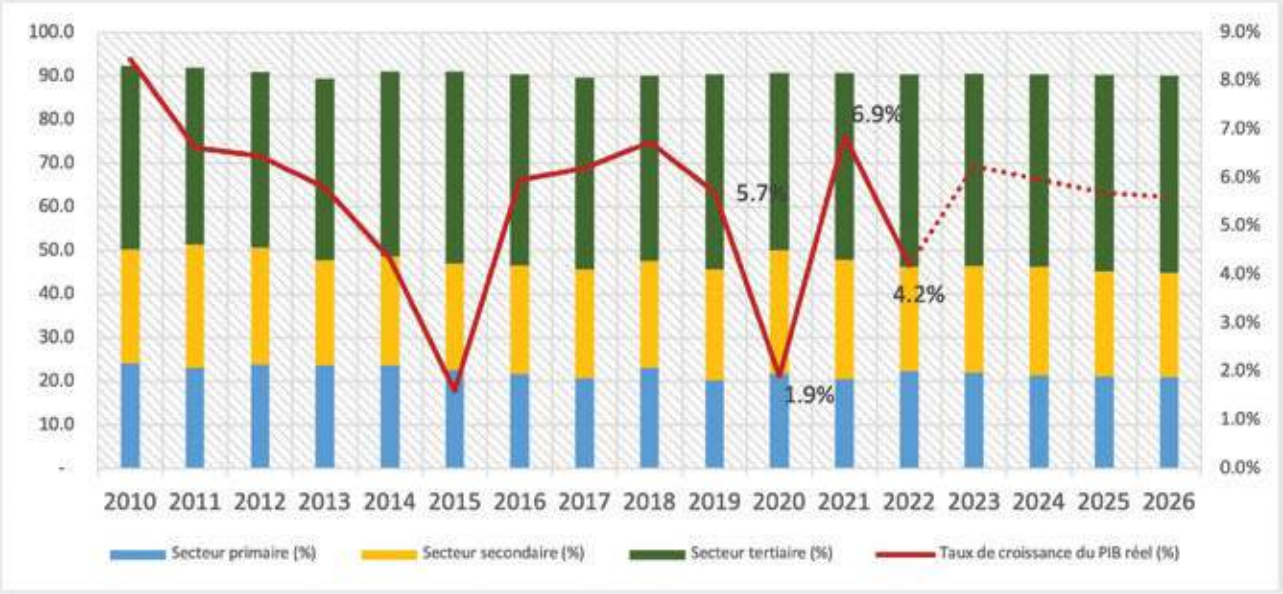
GDP resources

Overall, between 2010 and 2021, the national economy was relatively resilient to external and internal shocks. Indeed, real GDP increased from 4,820 billion FCFA in 2010 to 11,018.4 billion FCFA in 2021, representing an average economic growth of 5.6 per cent. Nevertheless, there were strong decelerations in growth in 2015 (+1.6 per cent) in connection with the effects of the socio-political crisis and in 2020 (+1.9 per cent), due to the COVID-19 pandemic.

Over the period, the structure of the economy is characterized by a preponderance of the tertiary sector (42.4 per cent of GDP on average), particularly "public administration services and other collective or personal services" which represents on average 16.9 per cent of nominal GDP. This industry recorded an average increase in its contribution of 5.4 per cent in line with the increase in salary and operating expenses of public administrations.

For the rest, the growth rate is estimated at 4.2 per cent in 2022 in relation to the drop in gold production and the surge in prices. It is projected at 6.2 per cent, 6.0 per cent, 5.7 per cent and 5.6 per cent respectively in 2023, 2024, 2025 and 2026.

Figure 1. Evolution of the growth rate and share of the sectors from 2010 to 2026 (percentage)



Source: DGEP/IAP, August 2022.

GDP uses

In terms of uses of GDP, the economy is essentially driven by final consumption, which represents on average 84 per cent of GDP. It rose from 4,337.9 billion FCFA in 2010 to 8,610.9 billion FCFA in 2021, representing an average annual growth of 6.5 per cent. It is dominated by final household consumption (64.6 per cent of GDP). Government consumption is about 16.3 per cent of real GDP.

The other components of the demand, investment (gross fixed capital formation) and net exports, represent on average 21.9 per cent and -5.4 per cent of GDP respectively. The negative contribution of net exports is due to imports being more important than exports. However, the trade deficit has been improving since 2020.

Figure 2. The evolution of uses of GDP from 2010 to 2026 (thousands of FCFA)

Source: DGEP/IAP, August 2022.

Inflation

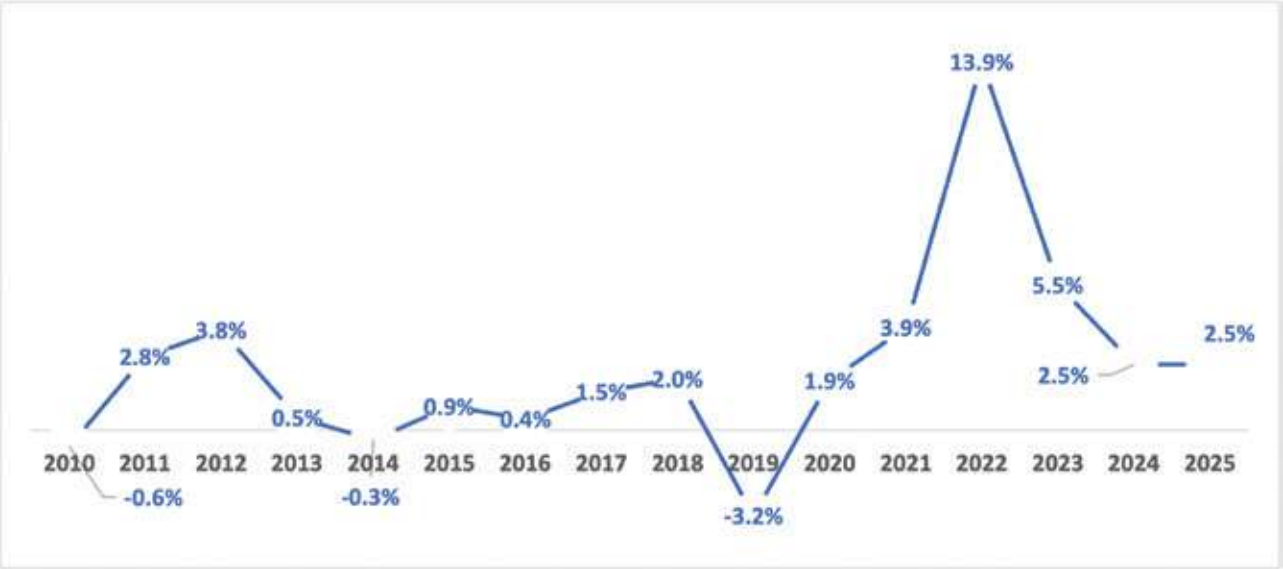
From 2010 to 2020, inflation was overall under control because inflation rates were below the West African community standard of a maximum of 3 per cent, except for in 2012 when the inflation rate was 3.8 per cent. In 2019 in particular, the economy recorded a negative inflation rate of 3.2 per cent.

In 2021, the inflation rate was 3.9 per cent, caused by the soaring prices of "food and non-alcoholic beverages", "alcoholic beverages, tobacco and narcotics", "housing, water and electricity, gas and other fuels" and "educational services".

In 2022, the inflation rate was estimated at 13.9 per cent because of the generalized surge in prices worldwide and the effects of the terrorist attacks, as well as the drop in cereal production during the 2021–2022 agricultural season.

From 2023 to 2025, inflation should gradually subside to below 3 per cent, assuming that there is a good agricultural season, an improvement in security, a continuation of government measures to fight against the high cost of living, an end to the Russian–Ukrainian crisis and an alleviation of geopolitical tensions.

Figure 3. The evolution of inflation from 2010 to 2025

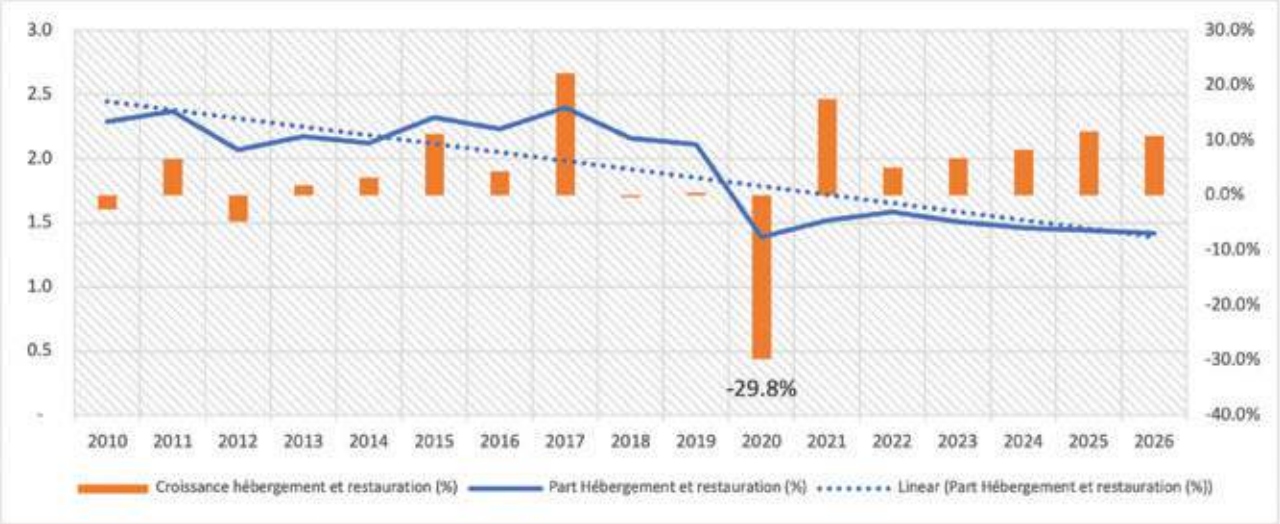


Source: DGEP/IAP, August 2022.

The performance of the tourism sector: important effects of COVID-19 and insecurity

The "accommodation and catering" industry, which represents tourism activity, comprises an average of 2.1 per cent of GDP over the period of 2010 to 2021 (figure 4). This share was almost stable, at 2.2 per cent, until 2019, falling to 1.5 per cent on average from 2020. This decline in the sector's performance is linked to the harmful effects of the COVID-19 pandemic and terrorist attacks. Indeed, in 2020, the growth of the sector was negative by around 30 per cent in real terms (DGEP/IAP, August 2022).

Figure 4. Value added from tourism from 2010 to 2026 (percentage)

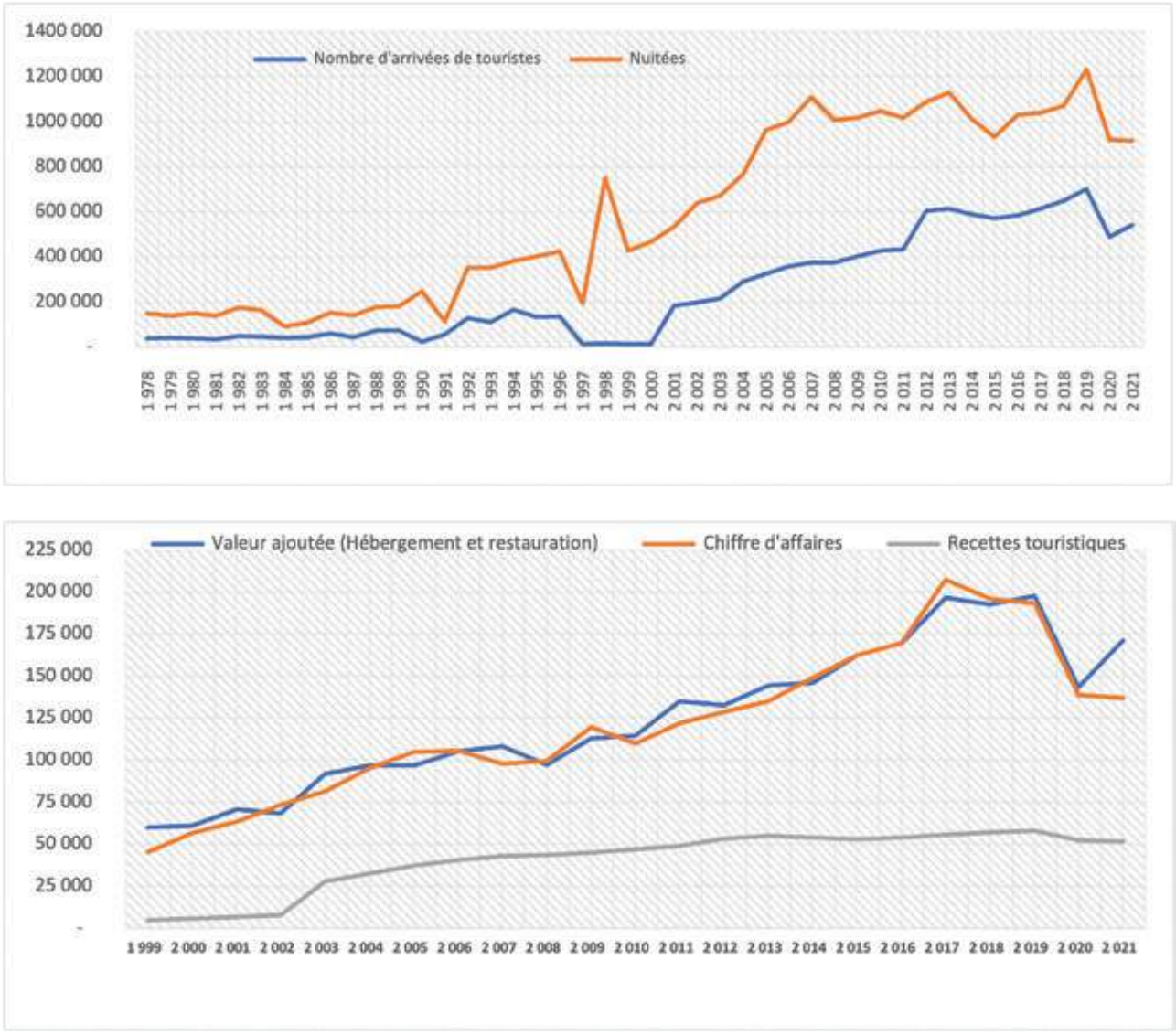


Source: DGEP/IAP, August 2022.

The series of "overnight stays" and "tourist arrivals" show erratic evolution with, however, mainly upward trends over the period (figure 5). Exceptional increases were recorded in 1998 for overnight stays. In particular, from the 2000s, there was a "boom" in tourist activity materialized by an acceleration in arrivals and overnight stays. After peaks observed in 2019, arrivals and overnight stays fell in 2020 by 30.4 per cent in arrivals and 25.4 per cent in overnight stays. These declines brought arrivals almost back to its level in 2011 and overnight stays to below its level in 2005.

The added value of tourist activity, turnover and tourist receipts have experienced regular upward trends, then started to decline from 2017. It is very likely that COVID-19 and terrorism strongly affected the activity of tourism in Burkina Faso.

Figure 5. Evolution of main indicators of the tourism sector



Source: DGEP, from OBSTOUR (National Tourism Observatory) data.

Assessment of the impact of COVID-19 on the tourism sector of Burkina Faso

According to an assessment of the socioeconomic impacts of COVID-19 in Burkina Faso by DGEP in March 2021, COVID-19 had a strong effect on the national tourism sector, which had already been affected by the security crisis facing the country since 2015. The health crisis has led to a slowdown in economic activity in almost all companies operating in the tourism sectors (hotels, restaurants, ticketing, travel, the organization of tourist circuits and more). Most establishments have closed and operated with as few staff as possible. The assessment observed the following:

- **A drop in tourist arrivals**

It is difficult to assess the number of companies which temporarily or permanently closed due to COVID-19. Overall, tourist arrivals in tourist accommodation establishments should experience a drop of 26.5 per cent in 2020 compared to 2019. This drop is more pronounced in the inbound tourism, which recorded a sharp drop (more than 55 per cent) in 2020 compared to 2019. As for internal tourism, it recorded a drop of 16.8 per cent in 2020 compared to 2019. This drop is attributable to insecurity as well as to COVID-19.

- **A loss of turnover**

In all, the national tourism industry recorded a drop in turnover of around 32.7 per cent in 2020. This drop is explained by the decline in overnight stays operated by tourist accommodation establishments in 2020, which was -41.1 per cent compared to 2019.

- **Job losses**

COVID-19 had a huge negative impact on jobs in the tourism sector. The decrease in the volume of activities of tourist companies led to the bankruptcy of several of these companies and, in turn, the dismissal of thousands of workers.

- In the hotel and restaurant sector, promoters had to reduce up to 50 per cent of the workforce, corresponding to a total of 3,987 workers declared to the National Social Security Fund (CNSS). In the informal sector, the loss of jobs is estimated at 119,838. Also, for the informal actors collaborating with this sector, an estimated 15,986 employees are affected by this crisis. In addition, the cessation of activities in this sub-sector has a collateral impact on activities and services related to the sub-sector, such as butchery, market gardening-culture, poultry farming and crafts. Furthermore, the social impact of the crisis could be broader. Based on the average household size in urban areas estimated at around six people by the INSD, nearly 23,822 people are likely to see their standard of living deteriorate.
- In the travel and tourist circuit sector, job losses have been estimated at least at 60 per cent of the overall workforce. With regard to tourist guides, the information communicated by the associations of tourist guides mentions 277 tourist guides working in Burkina Faso. For these actors, the absence of tourists due to the closure of borders and travel restrictions meant an end of their activities.

Assessment of the impact of insecurity on the tourism sector of Burkina Faso

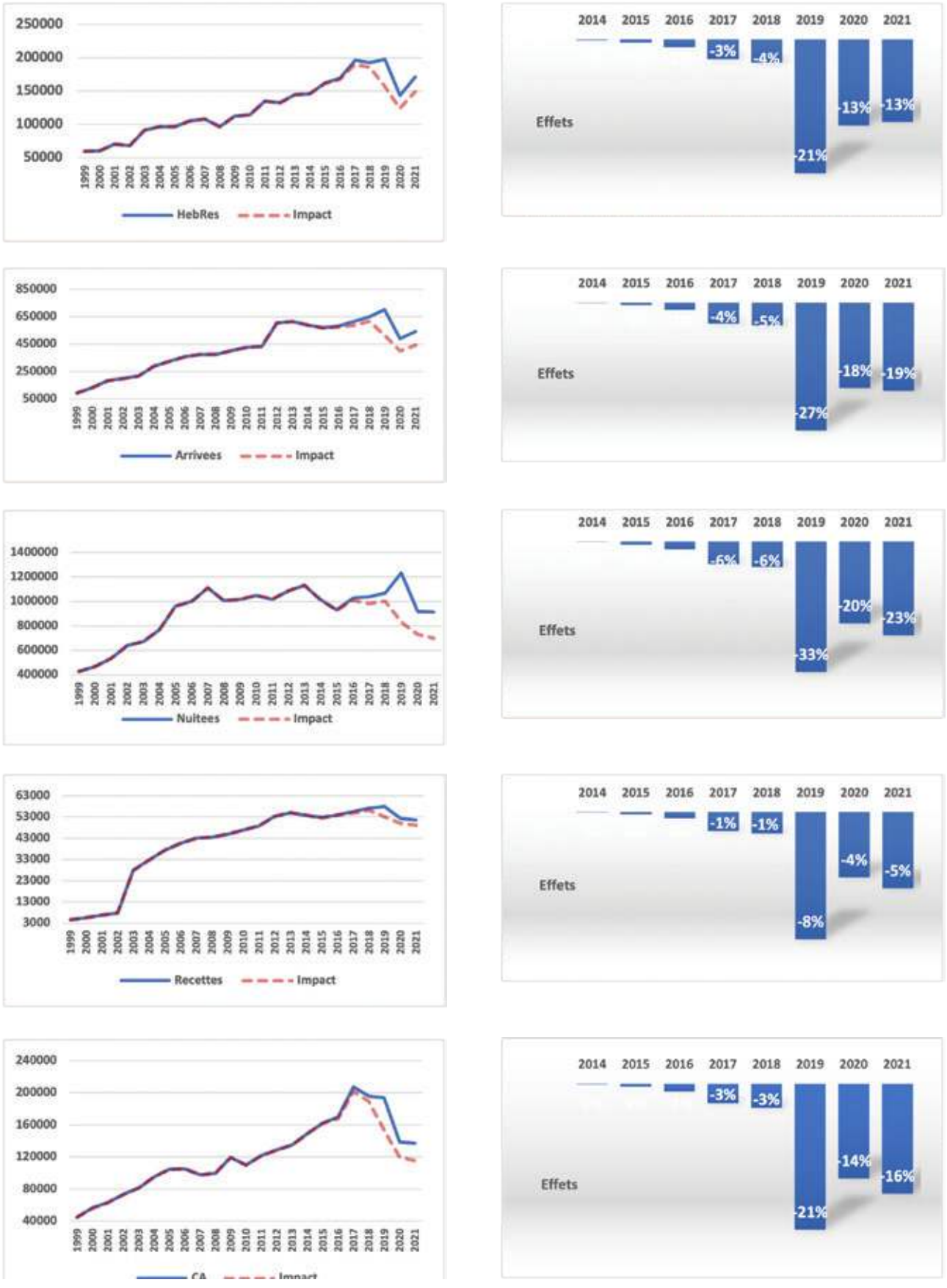
Insecurity has negatively impacted tourism demand. Specifically, terrorism has altered tourism demand patterns and had an enormous impact on the travel and tourism industry. This impact is all the greater when the activity of criminal organizations is long-term and explicitly targets a category of tourists. It also affects other sectors that are intertwined with tourism, such as airlines, hotels, restaurants and sales outlets, which cater to tourists.

The security crisis has had particularly negative effects on hunting tourism with the closure of forestry posts and hunting concessions in the Sahel and East regions. As these regions contain most of the national conservation areas, these closures have limited the country's efforts to preserve and protect natural resources. For example, forest police outings have been reduced, leaving most protected areas unchecked.

Moreover, an econometric assessment of the effects of insecurity was conducted in the tourism sector by DGEP in 2022. Regarding the empiric literature, this assessment used the "number of attacks" as insecurity variable and some main indicators of tourism sector such as "added value of accommodation and catering", "number of tourist arrivals", "overnight stays", "tourism receipts" and "turnover of tourist establishments".

The results (figure 6) shows that the occurrence of insecurity has an important impact on the tourism sector as indicated by the deviation of the dynamic of main indicators from 2016. Indeed, from 2016, indicators have strongly begun to decrease. The most important effects appear in 2019 for all variables: tourist arrivals and overnight stays respectively decrease by 27 per cent and 33 per cent, which leads to a shock on value added of the tourism sector (HebRes) of 21 per cent and an effect of 21 per cent on tourism turnover (CA) and tourism receipts of 8 per cent.

Figure 6. The effects of insecurity on the tourism sector, 2014–2021



Source: Estimates from DGEP, 2022.

2.2.
Employment by industry

The 2019 general census estimates the total population of Burkina Faso at 20,505,155 inhabitants and reports an annual growth rate of 2.94 per cent between 2006 and 2019 (INSD 2019). The population is composed of 51.7 per cent women and 48.3 per cent men, with 73.9 per cent living in rural areas and 26.1 per cent in urban areas. The age pyramid indicates that the population is mostly young, with 45.3 per cent of population under 15 years old and 77.9 per cent under 35 years old. The literacy rate of people aged 15 or over is 29.7 per cent (35.4 per cent for men and 24.7 per cent for women). In the economic activity, the unemployment rate as defined by the ILO is 7.1 per cent (8.8 per cent women and 5.6 per cent men), but the combined rate of unemployment and the potential labour force is 34.1 per cent (40.7 women and 27.7 per cent men).

According to estimates using the country's 2019 supply-and-use (SUT), the total population of workers is about 11.5 million people, which constitutes 56.1 per cent of the total population of Burkina Faso. These are respectively composed of 29.4 per cent of family workers, 21.0 per cent of self-employed workers and 5.7 per cent of salaried workers in the total population.

A brief description of industries of the economy

The composition of the supply-and-use table (SUT) 2019 for Burkina Faso shows three main sectors comprising various industries: the agro-forestry-pastoral sector, the industrial processing sector and the services sector.

The agro-forestry-pastoral sector is mainly composed of cereal crops production (such as maize, millet and sorghum), the forestry activities (vegetable crops and picking fruits,) and the livestock farming (cattle, sheep, goat and poultry breeding).

The industrial processing concern industries of mining (gold and zinc), food processing (meat, fish, fruits, leather, grain, coffee, beverage and other food products), the production of electricity and gas, the collection, treatment and distribution of water and waste management and the construction of buildings and public works.

The services sector of the economy is mainly represented by trade, transport, accommodation and restaurants, banking, insurance and financial institutions activities and public administration activities.

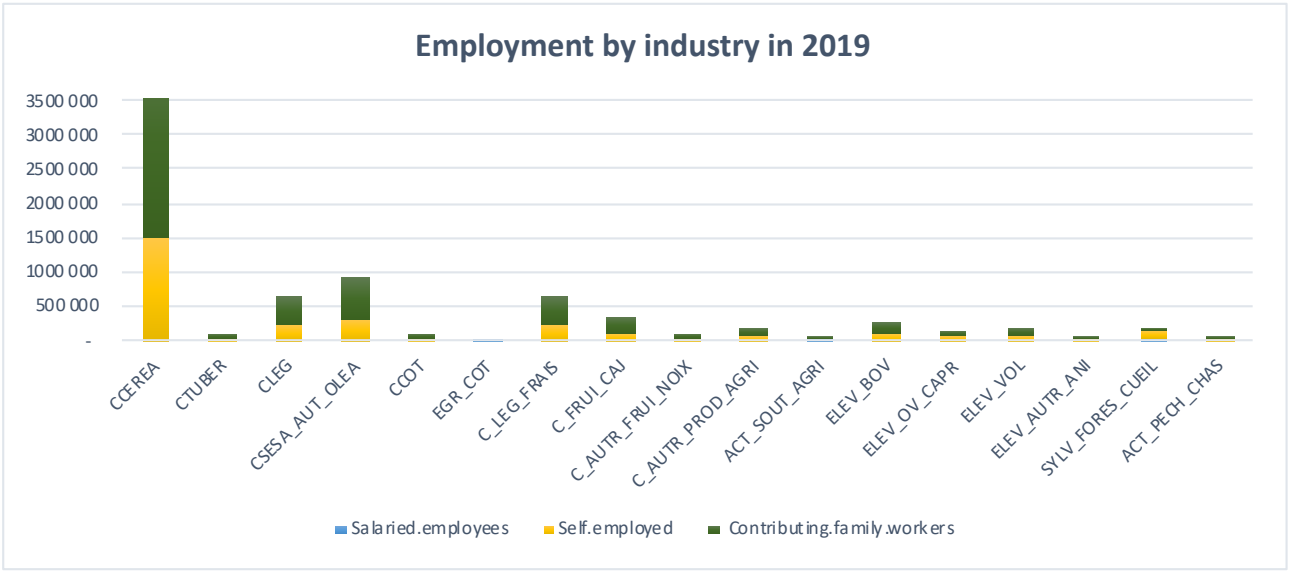
On the whole, Burkina Faso's population of workers comprises 6 million family workers (52.5 per cent), 4.3 million self-employed workers (37.4 per cent) and 1.2 million salaried workers (10.1 per cent). Family workers and self-employed workers are mainly found in cereal activities, corresponding to 39.27 per cent of all workers and 74.06 per cent of the total population. Salaried workers are concentrated in the activities of public administration (1.42 per cent), education (1.22 per cent), trade (1.20 per cent), mining (0.98 per cent) and other personal service activities (0.68 per cent).

Figure 7. Employment by industry, 2019

Source: Estimates from the 2019 SUT.

The agro-forestry-pastoral sector employs 8,608,326 workers (74.8 per cent of the population of workers), with 89,811 salaried workers, 2,974,812 self-employed workers and 5,543,703 contributing family workers (48.2 per cent). It employs 4,518,402 workers (39.2 per cent) in cereal crops (maize, millet, sorghum). The majority of salaried workers are found in agricultural support activities, forestry and cotton ginning.

Figure 8. Distribution of the working population in agro-forestry-pastoral industries, 2019

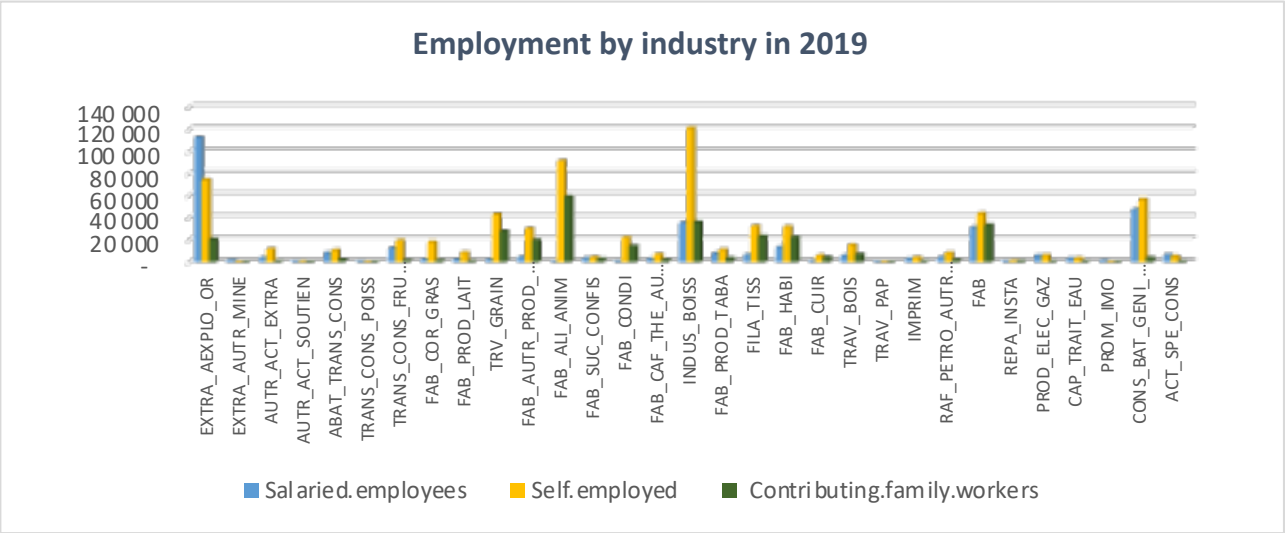


Source: Estimates from the 2019 SUT.

The processing industries employs 1,315,605 workers (11.4 per cent of the total population workers), with 330,567 salaried workers (2.9 per cent of total population workers), 696,343 self-employed workers (6.1 per cent) and 292,694 family workers (2.5 per cent).

The majority of salaried workers (112,946) are in gold mining (54.2 per cent), the beverage industry and the construction of buildings. Self-employed workers are also mainly in these industries as well as in the manufacturing of animal feed. The largest number of family workers are concentrated in the latter industry, followed by grain processing and gold mining.

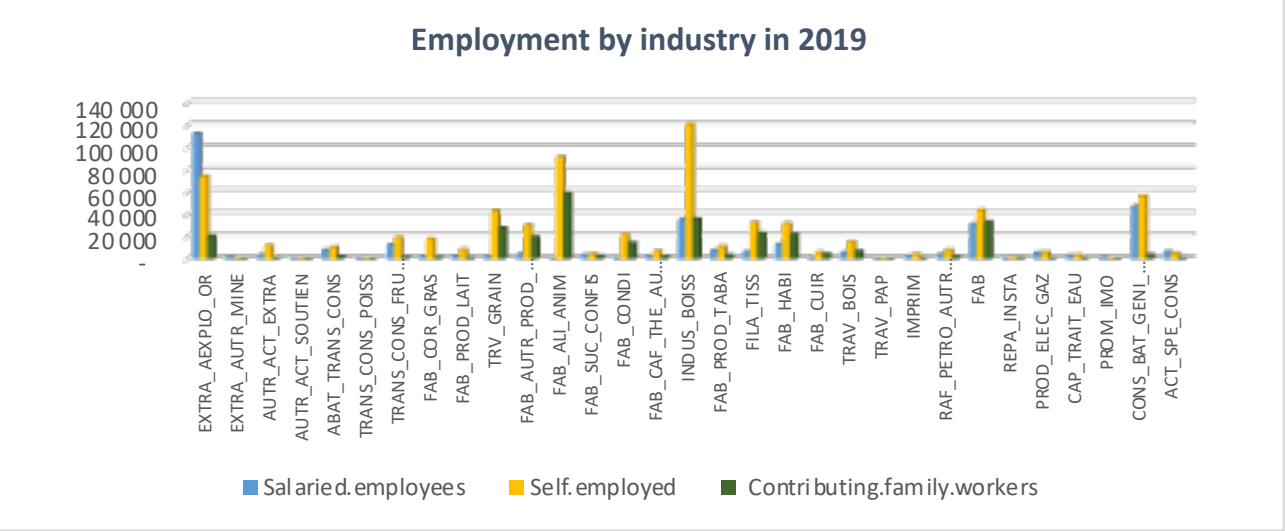
Figure 9. Distribution of the working population in processing industries, 2019



Source: Estimates from the 2019 SUT.

The service industries employ 1,577,702 total workers (13.4 per cent of total workers), with 745,049 salaried workers, 643,727 self-employed and 197,926 family workers. The trade industry is the most significant jobs provider with a total of 697,587 workers (44.2 per cent of service workers) and employs the majority of family workers in services.

Figure 10. Distribution of the working population in services, 2019



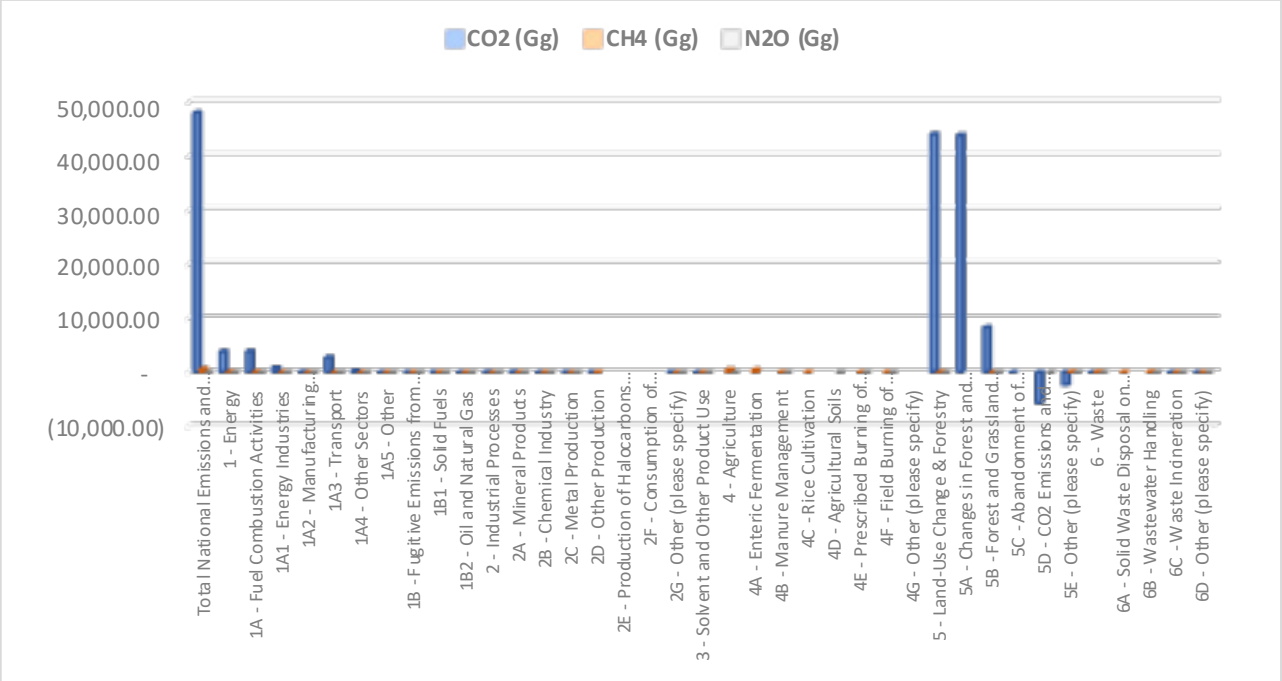
Source: Estimates from SUT 2019.

2.3.
GHG emissions by industry

Emissions from the inventory of GHG in 2017 (see Annex A.2.2) indicate that the total emissions of the three main gases (CO^2, CH4 and N20) of Burkina Faso amounts at 48,789.44 Gg of CO2 equivalents. GHG emissions are mainly caused by CO2 (98.6 per cent); methane (1.3 per cent) and nitrous oxide (0.1 per cent) emissions are almost negligible in the country.

The emissions of GHG are provided essentially by "land-use change and forestry" (44 123.42 Gg) in relation to "changes in forest and other woody biomass stocks" (43 909.94 Gg). There are some slight emissions from "forest and grassland conversion" (8,317.51 Gg). The use of energy causes some 3,896.09 Gg of CO2 (8.1 per cent) due to transport (2,754.90 Gg). The relatively low methane emissions (647.43 Gg) are due to agriculture (465.64 Gg) because of enteric fermentation (441.81 Gg).

Figure 11. Split of GHG emissions in the original inventory of 2017



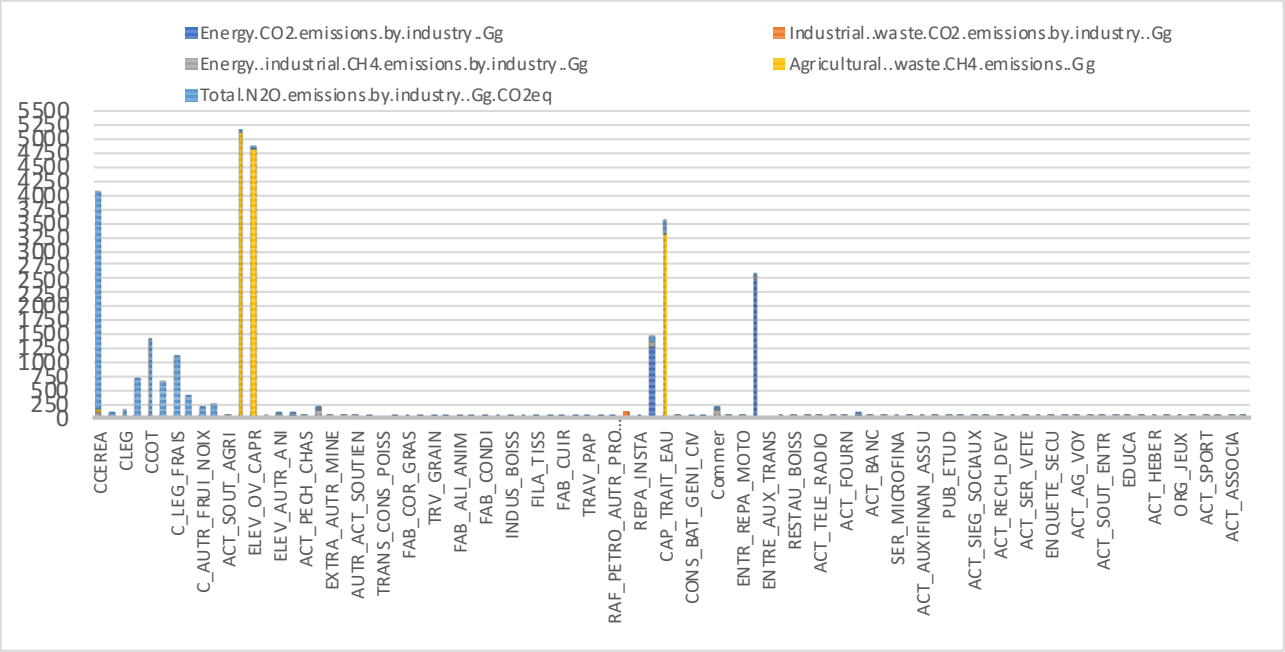
Source: Estimates from the 2019 SUT.

Estimates of emissions from the 2017 inventory show that the total quantity of gas emitted by industries in 2019 amounts to 27,590.74 Gg, which corresponds to 98.3 per cent of the country's total emissions. In order of importance, the quantities emitted by industry are:

- CH^4 emissions come from "cattle farming" (18.3 per cent), "sheep and goat farming" (17.2 per cent) and "collection, treatment and distribution of water sanitation, waste management and depollution" (11.8 per cent);
- ^{N}20 emissions emanating from agricultural soils are concentrated primarily in the industries of subsistence and cash crop agriculture (cereals crops, tubers, fruits and vegetables, cotton and so on) at 31.9 per cent of total GHG emissions, then in "collection, treatment and distribution of water sanitation, waste management and depollution" (0.9 per cent), in "production and distribution of electricity and gas" (0.4 per cent); and traces of N20 emissions in "trade" (0.1 per cent) and "gold mining" (0.05 per cent);

- CO2 emissions are found in "transport" (9.0 per cent) and "production and distribution of electricity and gas" (4.5 per cent) industries. "Cereal cultivation" (0.1 per cent), "mineral extraction" (0.1 per cent), "other processing activities" (0.4 per cent), "building construction" (0.1 per cent) and "commerce" (0.1 per cent) emit less.

Figure 12. Split of GHG emissions by industry, 2019

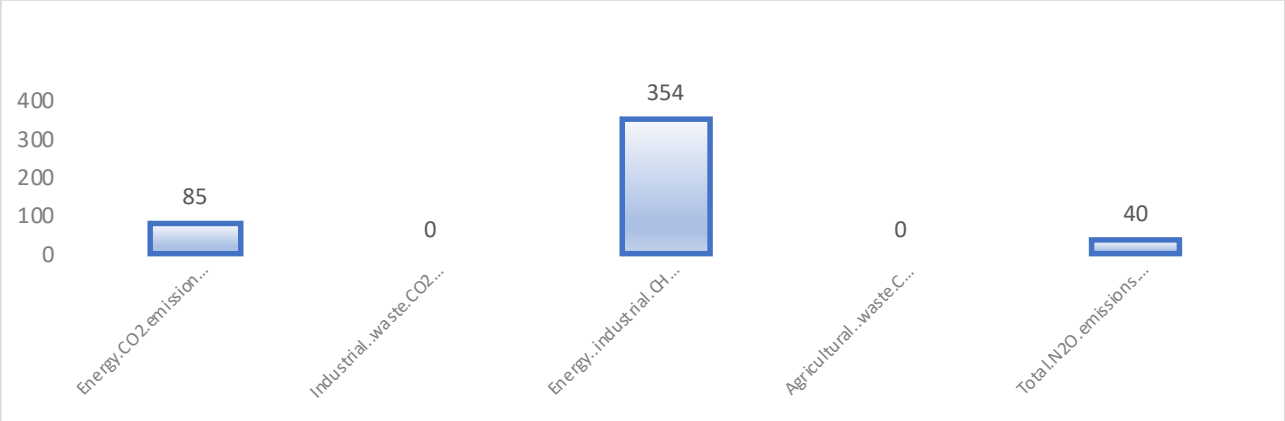


Source: Estimates from the 2019 SUT.

Estimates of direct household CO_2 emissions in 2019

Direct household GHG emissions total 479 Gg, corresponding to 1.7 per cent of national total emissions estimated for 2019. CH4 emissions are the largest (74 per cent), followed by CO2 emissions (17.7 per cent) and N20 (8.3 per cent).

Figure 13. Direct GHG emissions by household consumption, 2019



Source: Estimates from the 2019 SUT.

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3. Method and data of green jobs modelling

The methodology used in this study is based on the Green Jobs Assessment Model, which is based on data from the Social Accounting Matrix (SAM) and the supply-and-use tables (SUT) of the economy of Burkina Faso for the year 2019. The SUT was extended by an estimate of jobs and greenhouse emissions in the industries of the economy.

3.1. Overview of the theoretical foundations of green jobs modelling

This methodology takes its theoretical foundations from the economic modelling of input-output (ES), namely with the Economic Table developed by François Quesnay in the 18th century (1758) and which presented the first analytical description of the economy (O'Hara 1999).

In the 1870s, Léon Walras developed a general equilibrium model based on the idea that total inputs must equal total outputs (Silva 2001). Wassily Leontief, later inspired by these writings, developed the formal theoretical framework for ES analysis in the late 1930s (Bjerkholt and Kurz 2006; Miller and Blair 2009).

Wassily Leontief perfected the input-output accounting framework in his 1941 and 1953 works on the structure of the economy of the United States of America. This work culminated in the ES model, first published in 1965. Today, most macroeconomic analyses use Leontief's concepts, and ES analysis remains a widely used method in economics.

3.2.Existing economic scenario models in Burkina Faso

A non-exhaustive literature search on economic models used for policy analysis in Burkina Faso yielded the existence of several computable general equilibrium (CGE) models. Most of these have been used to do analysis of agricultural or food policies. Regarding the economic effects of climate policies, a multitude of approaches is used, including a lot of qualitative methods with a specific focus on gender aspects (Cohen et al. 2016; Ashley 2020; Lau et al. 2021). Zidouemba (2017) uses a CGE model to assess economy-wide implications of climate change. He stresses the importance of using multi-sectoral models for this kind of analysis. These models are usually based on a social-accounting matrix, input-output table (IOT) or supply-and-use table (SUT), and are able to identify indirect effects, that is, effects of changes or shocks in one industry that penetrate throughout the entire economic system, affecting several industries that are part of the value chains. In addition, the inclusion of the production–income–household expenditure circle is important to be able to consider induced effects.

CGE models are very similar in their nature to the GJAM models from the GAIN (ILO 2017) network, but with some fundamental differences, notably in terms of the assumption in CGE models that the economy functions at the most efficient level and that markets are cleared. As such, any structural change will constitute a loss of efficiency, at least in the short and medium term, making CGS less suited to model market imbalances and structural changes, such as from a transition to greener economic growth. However, there are also similarities: the supply-use table database used by the GJAM Burkina Faso is derived from the disaggregated CGE Social Accounting Matrix for the year 2019, which is used by the Ministry of Economy, Finance and Development of Burkina Faso. The biggest difference is that the GJAM models do not have multi-period optimization function, that is, they assume myopic foresight of economic agents (in contrast to perfect foresight). In addition, the GJAM models are demand driven and do not have supply constraints, and their results need to be interpreted accordingly. More on that in Appendix A.1.

In addition to the CGE that is used, Burkina Faso is trying to implement the system dynamics model (Threshold 21 model) for policy simulations. This model was developed by the Millennium Institute in Washington and is implemented within the Ministry of Economy, Finance and Development. This model is different from CGE and GJAM because it is not an economic model based on standard economic theory and works with various databases collected over long series over time in all planning sectors, namely the sectors of the economy, social sectors (education, health and so on) and environmental sectors. It has been used somewhat to make simulations of climate change mitigation and adaptation policies in the agricultural sector. However, it is not fully operational due to software constraints and is ill-suited for detailed budget and economic planning.

3.3.
Using supply-and-use tables for policy analysis

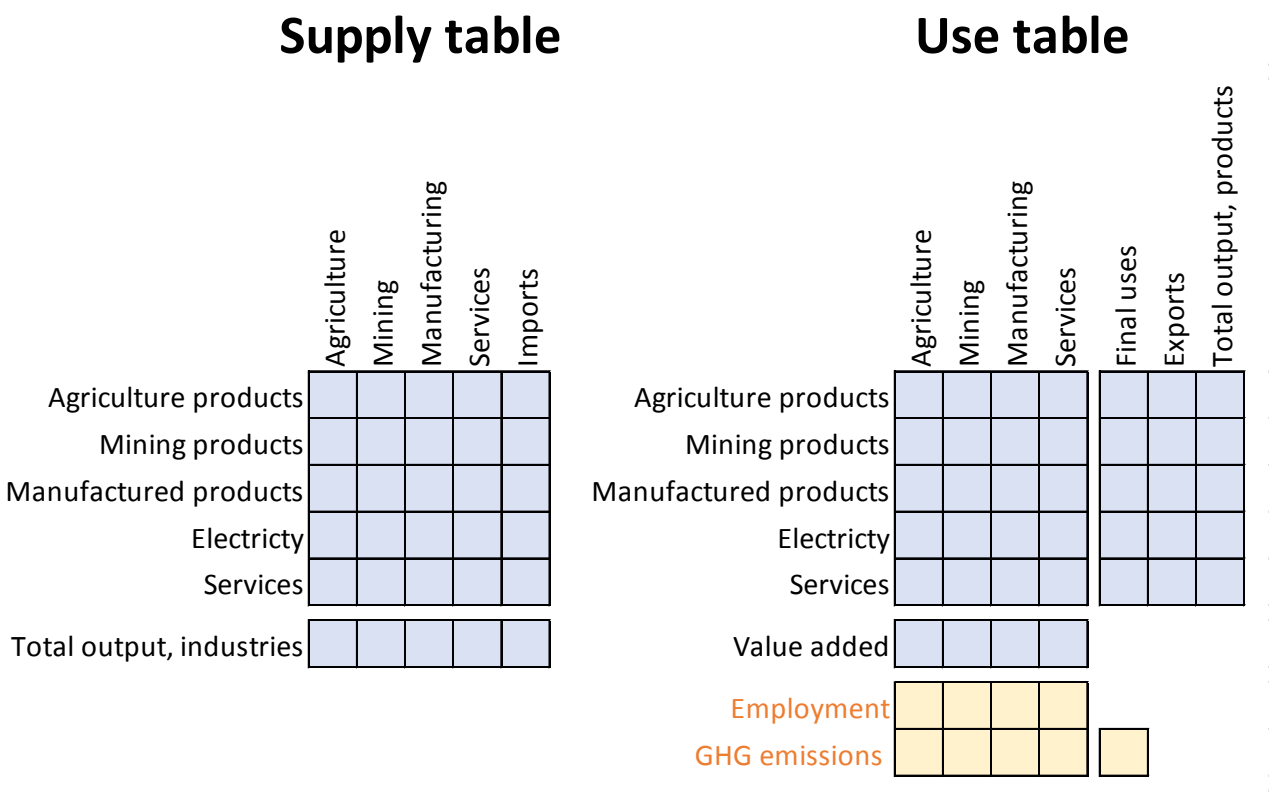
Transforming the tourism sector to become sustainable affects not only the tourism industry itself, but also the industries providing inputs such as goods and services, causing ripple effects throughout the entire economy.[5] Sustainable tourism practices, for example, encourage tourists to stay local in small-scale accommodations in rural areas, while conventional tourism practices aggregate all tourists to a few large hotels, likely owned by international hotel chains, relatively near to the airport and attractions. Notably, local accommodations buy coffee and food locally, while the internationally owned hotel imports most things in order to serve its customers the same things they get at home. Local accommodation employs local people, while the big internationally owned hotel only employs locals for the low-paid jobs and gives the higher-paid jobs, such as those in management and tourist entertainment, to people from the same countries the tourists are coming from. Hilton, for example, employs international people, thus channelling earnings abroad. Therefore, local accommodation better fosters the growth of local value chains. The direct effects of local accommodation will result in indirect economic effects on different industries along their value chains – which will also impact their suppliers, and the suppliers of their suppliers, and so on.

The increase or decrease of economic activity will impact jobs. With any policy, there will be industries which will increase their economic output and therefore increase the demand for workers, but there will also be industries that may decrease their economic output, leading to job losses. Assessing the positive and negative impacts of policies is, therefore, necessary to maximize the potential benefits and minimize potential negative economic, social and environmental implications.

GJAMs are built to quantify these ripple effects of climate policies and green structural change. GJAMs are macro-economic models based on IOTs or SUTs that integrate economic data with data on jobs and GHG emissions. The starting point are the economic SUTs, compiled by statistical offices. These tables give a picture of the total supply and the total use of goods and services in the economy, quantifying the transactions in products between industries, purchases by final consumers and to and from international trade. Supply tables describe what industries produce and how much of each product is imported. It also includes the trade and transport margins and taxes fewer subsidies on products, which represent the difference between the production (basic) prices and the final consumer (purchase) prices. Use tables describe all products used by industries in the country, products purchased by final consumers and exported and gross value added (VA) generated by industries.

Figure 14. Simplified illustration of a supply table and use table extended with employment and GHG emissions data per industry

5 This section is partly based on the GJAM report for Turkey.



Models based on SUT can simulate the direct, indirect and induced effects of different policies on the economic output of the different industries. Not only that, but supply-and-use and input-output tables can be linked with social and environmental indicators (called extensions) that describe the direct impacts of each industry on workers and on the environment. A simplified supply-and-use table is illustrated in figure 14. Note that we do not model inflation. The only price changes that can be modelled are those due to changing technology of production in the scenarios, which are reported in constant prices.

Green Jobs Assessment Models (GJAMs) quantify the impacts of policies on:

- The economy. Gross value added corresponds to the GDP by industry, giving insights on the effects of climate policies to national GDP growth, and on the growth or decrease of each industry's economic activity.
- Greenhouse gas emissions. Besides direct changes due to, for example, the decrease of coal electricity, it also considers the net changes in emissions including increased emissions from infrastructure investments, and from increased or decreased economic activities in other industries.
- Employment. The model gives insight into the potential increase or decrease of the demand for workers in different industries. By including information on the structure of workers in each industry – per gender, skill level and formality status – it can measure how the demand for skills will change in the economy, and how it can affect workers in disadvantaged groups.
- It is important to note that GJAMs are not economic forecasting models. Rather, these models are a tool to inform "what if" scenarios on emissions and labour demand by industries, given that the remaining structure of the economy remains as is. The results show how changes in individual economic activities influence the economic structure and reflect on direct, indirect and induced effects. A technical description of the model is available in section A.1 in the appendix.

How do Green Jobs Assessment Models work?

Green Jobs Assessment Models are built to answer one main question: How do climate and other green policies affect social and employment outcomes?

Here is how it works:

First, policy questions are translated into scenarios, describing these policies in values such as:

- Which industries are directly affected? For example, electricity generation industries when shifting from coal to solar and wind electricity or agriculture when shifting from low-input to climate-smart agriculture.
- How fast and by how much do green industries grow? For example, how does the electricity mix change year by year, by increasing green electricity and decreasing in coal shares?
- What investments are needed for this transition? Investments include, for example, goods, services, research and training.

Next, these scenarios are implemented in the model:

- A baseline scenario for economic growth is built using macro-econometric parameters for economic and population growth.
- New green industries, those that the Government plans to grow, are added to the supply-and-use table.
- Annual changes in the market shares of green and traditional industries are implemented, which supply products according to green industries' growth.
- Annual investments in green industries are distributed in products as additional investments to the economy or replace investments in traditional (such as coal) industries.
- Finally, the model quantifies direct impacts on the industries affected, and how these changes affect the demand for goods and services from other industries (and how increase or decrease of economic output from these other industries affects the demand from other industries, and so on).
- The results of the GJAM model, then, comprise all (direct, indirect and induced) impacts of the modelled policies on the economic output of every industry in the national economy, and how these affect employment, GDP and greenhouse gas emissions in each industry.

3.4.
Data used for the Green Jobs Assessment Model

This section describes the data sources needed to develop the GJAM:

- **Supply-and-use table for a recent year**
- **Macro-economic time series**
- **Labour data**
- **Greenhouse gas emissions**
- **Data for splitting the tourism industries**

Supply-and-use table (SUT) for a recent year

In this report, we use an SUT constructed from the Social Accounting Matrix (SAM) from 2019 (General Direction of Economy and Planning, DGEP). The SAM was built using the official SUT for 2019 (National Institute of Statistics and Demography, INSD) with 34 industries and 42 products. The estimated SUT we utilize describes the economy in 2019 for 96 products and 90 industries (see table 4 and table 5 in the appendix for the full industry and product detail). There is an SUT available for 2020, but it is a lot more aggregated and is heavily influenced by COVID-19, while the 2019 SUT displays the inter-industry relations as they were prior to the pandemic. Neither the 2019 nor the 2020 SUT are likely to be good indications of how the economic structure will be after the COVID-19 crises, but we assume that the inter-industry relations are better reflected in the more detailed 2019 table. In this report, all economic growth is estimated based on estimating constant prices. The method and data used for estimating the SUT are detailed in section A.2 in the appendix.

Macro-economic time series

The model considers the past and current state of the economy as described by data from the UN System of National Accounts (UNSD 2022), that is, the macro-economic values for final household and government consumption expenditure, gross fixed capital formation, imports and exports, as well as value added with as much industry and component data (such as net taxes on production, compensation of employees and net operating surplus) as possible. The SUT should adhere to these macro-economic key indicator values.

For the econometric estimations (see section A.1 for a detailed description), we use a historical time series of data from the UN System of National Accounts. These data are reported to the UN Statistics Division by the National Statistical Office in Burkina Faso and made available in an easily accessible format for analysis. The estimated parameters together with exogenous information on the development of exports from the IMF (2022) as well as general global economic (Guillemette and Turner 2018) and population (UN 2019) growth, are the main parameters defining the baseline scenario pathway.

Labour data

The labour data is based on the data for 34 industries available in the official SUT for 2019 of INSD. Please see section A.2.1 for the process of how labour was disaggregated from 34 to 90 industries. The employment indicators available are:

- **Salaried employees (Salariés):** Workers with formal contracts, earning salaries (compensation of employees / Rémunération des salariés)
- **Self-employed (Patrons):** Workers without formal contacts or formal employment link. These are employers (owners of businesses who employ other people), entrepreneurs, consultants, artisans, subsistence workers, sellers of wood and charcoal and workers in the informal economy.
- **Contributing family workers (Aides familiaux):** Workers whose main occupation is the business of their family (such as family farms, family businesses and caregivers). Family workers can be paid or unpaid.

Greenhouse gas emissions

The GHG emissions data used are the official Greenhouse Gas Inventory for 2017.[6] The GHG inventory provides information on CO_2, CH_4 and N_{20} emissions according to 15 individual activities. (Hydrofluorocarbons, HFCs, are not included in this analysis.) Because this sector classification does not match the SUT classification, a disaggregation of emissions to the SUT industries is necessary. Please see section A.2.2 for more information.

3.5. Modelling of sustainable tourism in the supply-and-use table

Modelling of sustainable tourism in the supply-and-use system is twofold: First, we model investments into sustainable tourism infrastructure. To this end, the gross fixed capital formation (GFCF) vector in the model is changed according to the investment products needed for building infrastructure for sustainable tourism. Second, we model the structural change related to sustainable tourism, that is, more sustainable accommodation, catering and drinking establishment, as well as booking agency and tour operator services. Here, the most important difference is a choice of accommodation, more vegetarian and less meat-based food, lower use of energy (electricity, gas and petroleum products) and waste services. Section A.2.2 contains more details on the structure of the sustainable tourism industries.

6 Burkina Faso Ministry of Environment, Green Economy and Climate Change and Permanent Secretariat of the National Council for Sustainable Development, Third National Communication under the UN Framework Convention on Climate Change, April 2022.

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4. Policy scenarios: assumptions and results

4.1. Baseline development: business-as-usual scenario

The purpose of having this reference scenario is to establish a level of economic development which can serve as a baseline to which the development in the sustainable tourism scenario can be compared.[7] Here, we assume that the economy grows (as specified in the following paragraphs), but that the structure of the economy does not change (Zidouemba 2017). That is, industries are continuing to produce with the same production technology, and the import shares of products remains stable.

In the reference scenario, the only exogenous drivers of the model are exports and population. These are specified to follow the IMF medium term forecast (2022) up to 2027, combined with the OECD's Long View (Guillemette and Turner 2017) from 2028 and UN DESA's population prospects (UN 2019), respectively. Values are displayed in table 1.

Table 1. Values for exogenous variables from 2020 (percentage)

GROWTH RATES	2020	2021	2022	2023	2024	2025	2026	2027–2030	2031–2035
Population, medium fertility forecast	2.86	2.73	2.67	2.62	2.58	2.54	2.51	2.40	2.25
Volume of exports of goods and services[1]	-2.71	2.59	4.68	9.26	5.86	5.06	5.02	5.55	6.10

1 Note that we use the IMF forecast up to and including 2027. From 2027, we use the development of global GDP as described in the OECD Long View but correct for the difference in 2027.

The remaining macro-economic demand side components are modelled as follows:

- **Government consumption grows (exogenous to the model) as a function of population (econometrically estimated).**
- **Gross fixed capital formation (exogenous to the model for the current year) grows with the average GDP growth rate of the previous four years.**
- **Changes in inventories (exogenous to the model) decrease by 1 per cent annually.**

7 It is based on the description of the baseline scenario used for GJAM Turkey but adapted to the model for Burkina Faso.

The product shares for these variables in the total are constant.

Household consumption is endogenous to the model, as is GDP (the sum over all industries' value added). The household consumption model utilizes income elasticities from the USDA international food comparison programme (Muhammad et al. 2015; Meade et al. 2014) for nine consumption categories (see table 2). The change in household income for the consumption model is approximated by the change in GDP.

Table 2. Income elasticities for broad consumption categories for Burkina Faso

FOOD, BEVERAGES & TOBACCO	CLOTHING & FOOTWEAR	HOUSING	HOUSE FURNISHING	MEDICAL & HEALTH	TRANSPORT & COMMUNICATION	RECREATION	EDUCATION	OTHER
0.808	0.968	1.077	1.056	1.987	1.234	4.987	0.933	2.021

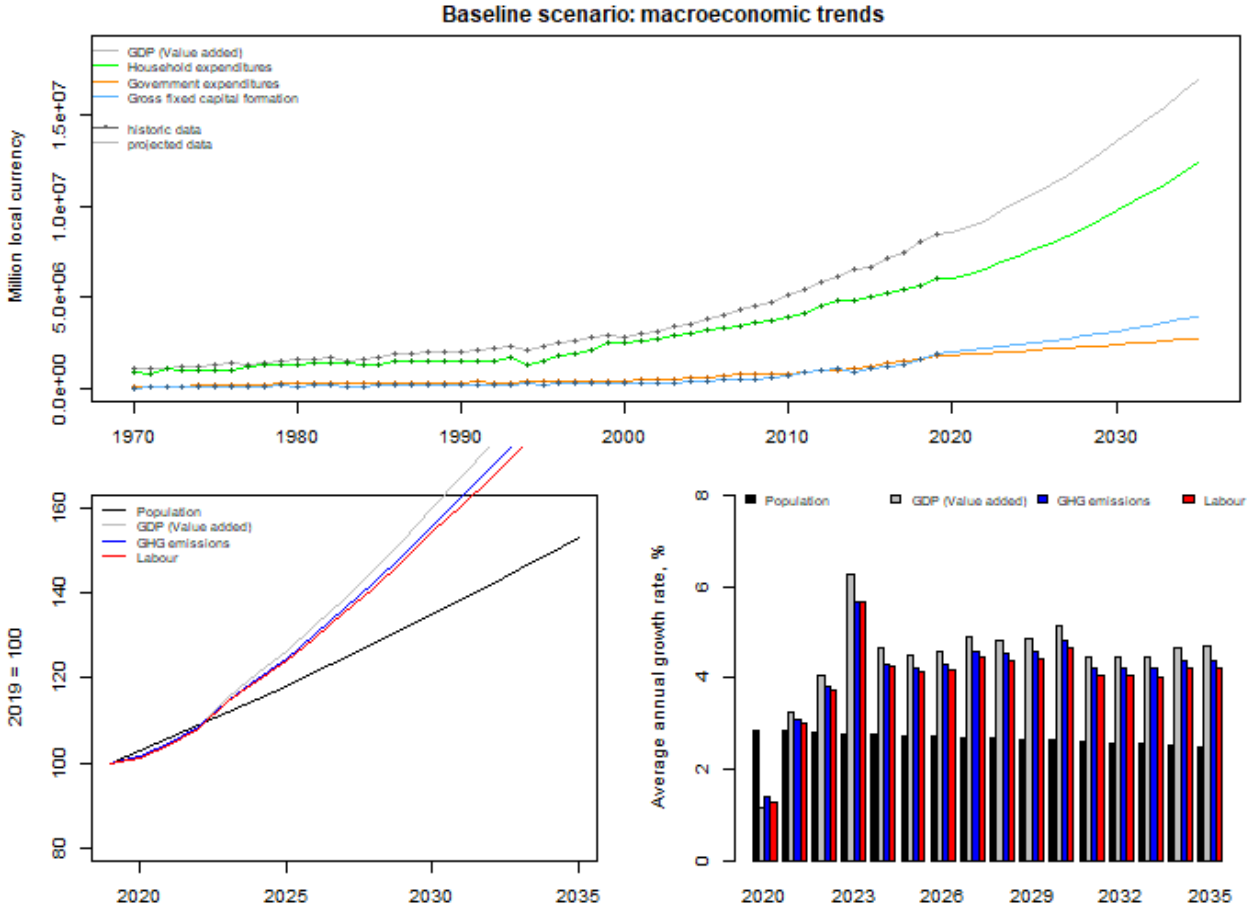
Source: The USDA international food comparison programme (Muhammad et al. 2015; Meade et al. 2014).

The economic structure (described by the market share matrix *D*, calculated from the 2019 supply table) and the technology coefficient matrix *B* (calculated from the 2019 use table) are kept constant for the years 2020–2035. This entails that the economy is assumed to have a static Leontief production function without technological change or any economies of scale or price effects. Import shares per product are constant. As there is no technological change or changes in the structure of primary inputs (value-added components), prices are constant.

Production by industry *g* is calculated using the industry-by-commodity commodity-demand-driven SUT model (Miller and Blair 2009) $g = D (I - BD)^{-1} y$. In this demand-driven model, this results in, for example, electricity production growing with electricity demand. The unit is in monetary terms.

Since the technology coefficient matrix *B* is constant, the share of value added in total industry output is also constant. Value added per industry is then determined endogenously, by multiplying the value added in output shares with output per industry. Total GDP equals the sum over all industries' value added and is then used to determine the development of household consumption expenditures. Since both total value added/GDP and household consumption expenditures are endogenous to the model, they are not equal to any existing economic forecasts. In the GJAM Burkina Faso baseline scenario, economic growth is between 4 per cent and 6 per cent per year during the projection period 2020–2035, as shown in figure 6. Overall, the real growth rate of the economy is 4.4 per cent on average over this period. This is relatively conservative compared to national but also IMF forecasts but ensures model stability. In addition, the model does not consider GDP fluctuations that are bound to happen because of variations in rainfall. The baseline is meant to be a base for comparison for the sustainable tourism scenario, where we change individual components such as investment and the structure of industries that are part of the tourism sector.

Figure 15. Macroeconomic trends for the baseline scenario



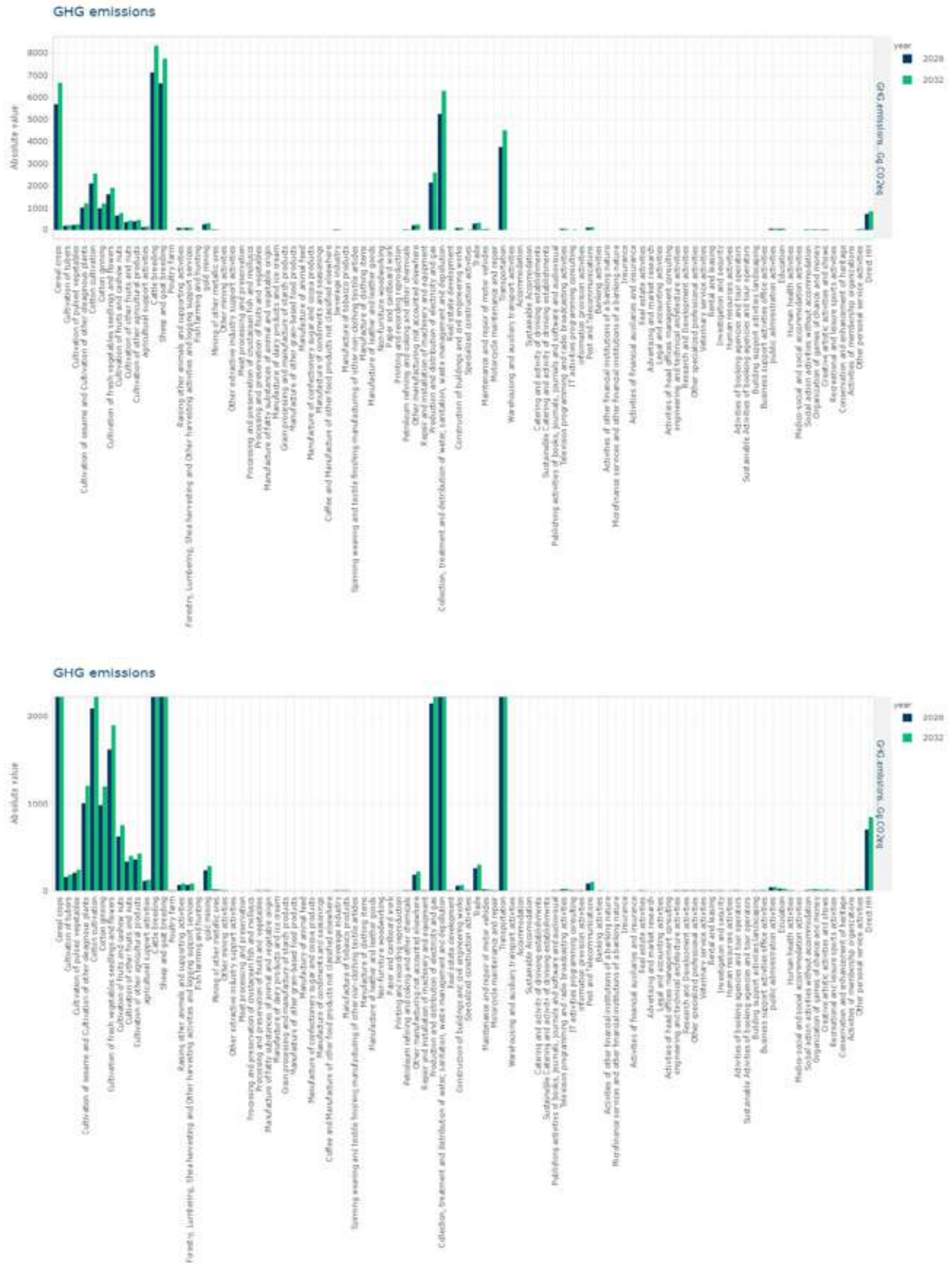
Source: Baseline scenario from GJAM Burkina Faso.

In this baseline scenario we assume constant labour productivity (persons employed per unit industry output). To estimate the employment requirements, we thus multiply the (constant) number of persons employed per unit of industry output with the projected output by industry in monetary terms. The same procedure is used for GHG emissions. Note that the model, akin to other macro-economic models (Rosendahl 2021), does not include land use, land use change and forestry (LULUCF) emissions. This is a drawback because deforestation caused by firewood and charcoal production as well as extensive agriculture is the main source of emissions. It is also a major driver of desertification and the loss of agricultural productivity.

In all, in this basic structure, energy-based GHG emissions are assumed to increase by an average of 4.2 per cent per year and the employment created by an average of 4.1 per cent over the 2020–2035 period of projection.

Figure 16 shows that GHG emissions will increase significantly after 2019, especially in agricultural industries (cattle breeding, sheep and goat breeding, cereals crops, cultivation of sesame, oleaginous plants and fresh vegetables and cotton cultivation and ginning). They will also increase in processing industries such as the production and distribution of electricity and gas, collection, treatment and distribution of water, and slightly in petroleum refining and other manufacturing. In the service industries, only emissions in transportation will increase significantly, with trade providing only a few quantities of GHG. These increases will reach at least about 3.4 per cent on average in the period 2020–2035, in a range of 0.6 per cent in 2020 to 4 per cent in 2032. Direct household emissions will have the most significant increase from 0.2 per cent in 2020 to 6.1 per cent in 2028 and 2032.

Figure 16. GHG trends by industry for the baseline scenario, projections for 2028 and 2032

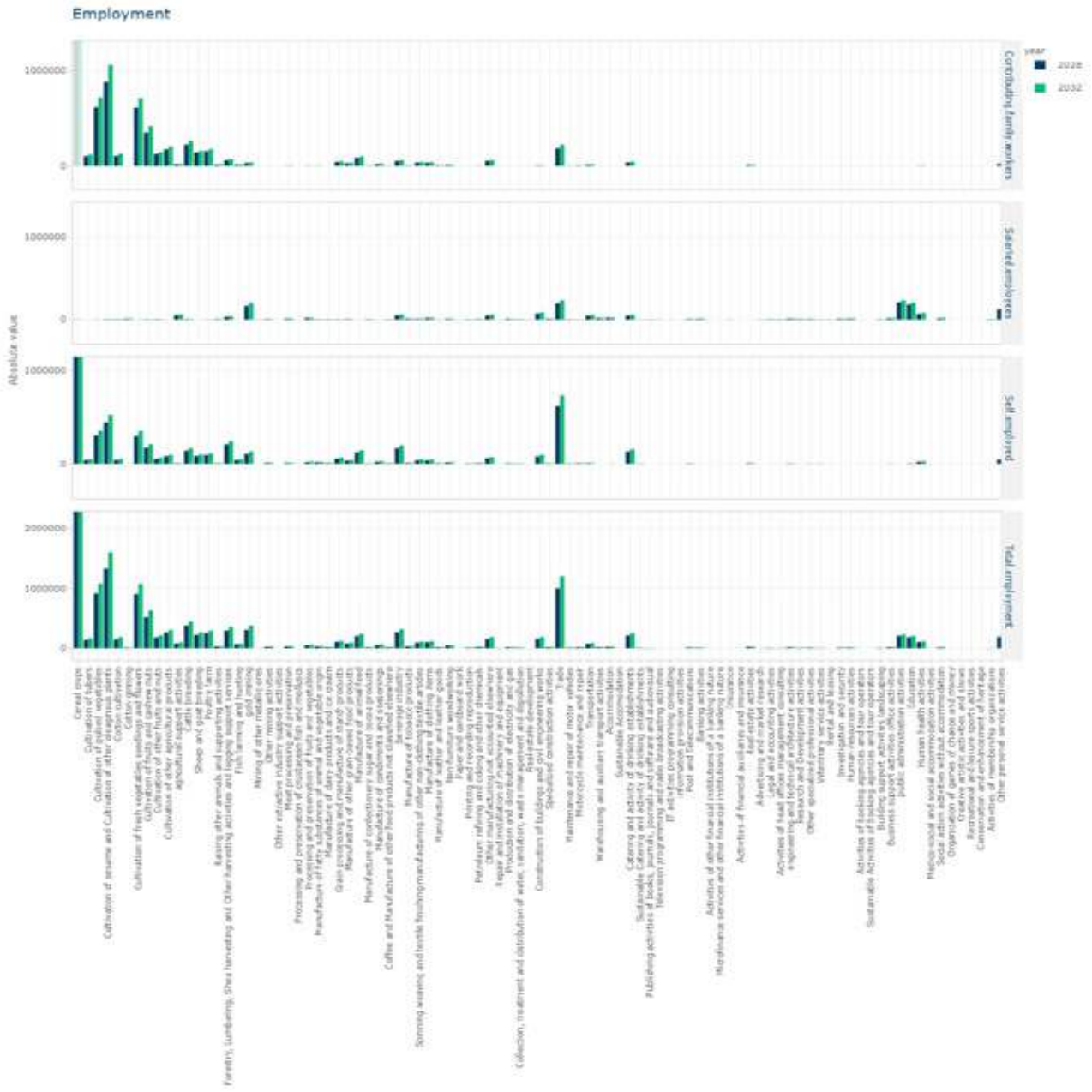


Source: Baseline scenario.

The creation of jobs should most positively affect almost all agricultural industries, but mainly cereal crops at about 3.5 per cent on average between 2020 and 2032, cultivation of vegetables and sesame and other oleaginous plants. Processing industries should register some job creation. In the service industries, trade could provide of 3.8 per cent increase of employment (figure 17).

In terms of the distribution of workers, job creation is dominated by self-employed and contributing workers, mainly in agricultural and processing industries. Service industries will be the weakest in job creation out of all categories of workers, except for trade, which should gain new jobs (more self-employed). Salaried employees should be distributed across all industries of the economy, but will appear more in public administration, education and human health activities and less in agricultural industries (figure 17).

Figure 17. Employment trends by industry for the baseline scenario, projections for 2028 and 2032



Source: Baseline scenario.

4.2. Assumptions for the sustainable tourism scenario

4.2.1.Summary of the National Sustainable Tourism Strategy: relevant aspects for modelling sustainable tourism in the GJAM

The draft national strategy for sustainable tourism identifies tourism practices according to three categories:

- **Value-chain management of tourism activities**
  - Products and services which tourists consume such as food, hotels, transport, recreation and a range of potential highly valued export products such as coffee, honey, cotton and fabrics should be promoted domestically, produced and marketed for increased consumption by tourists and integrated into national value chains.
  - The objective is to increase economic activity around tourism and increase length of stay.
- **Luxury tourism**
  - Congress tourism, conferences and seminars.
  - High-end customers who are very demanding but economically more profitable.
  - Business tourism, but could extend to safaris.
- **Ecotourism**
  - Combines tourism and heritage protection, whether natural, cultural or derived, in rural or urban areas.
  - Aims to advocate the positive impacts of tourism on the host destination.
  - However, ecotourism requires supervision and technical and financial support for the actors by the tourist administration.

The strategy further suggests a greening of tourist activities following the challenges identified by the World Trade Organization, which are: energy and greenhouse gases, water consumption, waste management, loss of biodiversity, effective management of built and cultural heritage, planning and governance. In the context of tourism in Burkina Faso, the following five elements were identified as important:

- **Transition to clean energies**
  - Travel, transport, accommodation and other tourist activities make tourism a major contributor to greenhouse gas emissions and a factor in climate change as well as local pollution.
  - Public transport, cycling, trekking and other means of transport that consume less fossil fuel.
  - Efficient management of water in tourist accommodation establishments (ETH), tourist sites and leisure areas.
- **Promotion of the circular economy**
  - Abandoning the overconsumption of goods and applying the 3R principle (reduce, reuse and recycle) in the management of solid and liquid waste at tourist sites.

- Advocating local production in the choice of their inputs.

- **Protection of natural and cultural heritage**

  - Maintenance of essential ecological processes and the preservation of biodiversity.
  - The preservation of built heritage, cultural heritage and traditional values.

- **Socio-economic inclusion of stakeholders**

  - Stimulate the development of infrastructure and public services.
  - The supply of products and services from local suppliers in order to boost the local economy and create jobs.
  - Social responsibility.

- **"Eco-labels" for the benefit of tourism businesses**

  - Field of hosting, certification can allow ETH to be efficient and consequently reduce their production costs through the adoption of new technologies, new practices and the implementation of environmental management.
  - High-end local products such as cashew and other nuts, coffee, cocoa, cotton and fabrics, dried fruits, honey and other national specialties valued by tourists would further increase revenues from tourists and fetch a premium price when eco-labelled. Investment into the production of highly valued products for purchase by tourists and export such as coffee, sesame, shea butter, cocoa, cotton and fabrics, dried mangoes and fruits and other national specialties (which is modelled in the hypothetical sustainable tourism scenario in section 4).

4.2.2.Definition of sustainable tourism practices for modelling in the GJAM

According to the National Green Economy Strategy, adopted by Order No. 2019-278 /MEEVCC/CAB, of July 8, 2019, taken up by the guide for the promotion of green jobs in Burkina Faso (Ministry in charge of the environment and economy) [8], eleven (11) priority economic activity sectors are listed as constituting the pillars of Burkina Faso's transition to a green and inclusive economy. These are: agriculture, livestock, forestry, fishing, energy, mining, water, transport, tourism and sanitation (Annex A.4). To these should be added the industrial sector which is a transversal sector. In particular, for the tourism sector, green jobs are found in the following activities:

8 Draft version, November 2020

Table 3 . Areas of green employment in the tourism sector of Burkina Faso

SECTOR	GREEN JOBS OPPORTUNITIES
Tourism	Heritage enhancement ecotourism
	Animation in ecotourism
	Facilitator in rural tourism and outdoor activities
	Design and construction of green leisure activities
	Naturalist / ecotourist guide
	Management of wildlife protection areas, for ecotourism purposes
	Site management ecotourism

Source: Authors, from the guide to promoting green jobs in Burkina Faso

However, it should be noted that the green jobs proposals in this report remain indicative and not exhaustive.

Furthermore, in the National Strategy for the Promotion of Sustainable Tourism, the following sustainable tourism practices are also defined as "green tourism activities" and implemented in the GJAM model:

1. Value chains

- Accommodation and restaurants value chain (this relates specifically to "*Socio-economic inclusion of stakeholders*")
    - Local food producers: more direct purchases from farmers,
    - Local employment: savings from energy and waste efficiency are used to increase salaries and employ more people to offer better services,
    - Efficient water and waste management chain (this relates specifically to "*Promotion of circular economy*").
- Operations of tour operators value chain
    - Lower use of car transport services (this relates specifically to "*Transition to clean energies*"),
    - Higher use of specialized professional services and landscaping building support services (this relates specifically to "*Socio-economic inclusion of stakeholders*" and "*Protection of natural and cultural heritage*").

2. Ecotourism aspects

- Investment in protection of cultural heritage sites: Heritage conservation and enhancement services (this relates specifically to "*Protection of natural and cultural heritage*"),
- Efficient water management in local accommodation and restaurants requires investment in civil engineering works and construction works (this relates specifically to "*efficient management of water in ETH, tourist sites and leisure areas*"),
- Investment into the production of highly valued products for purchase of tourists and export such as cashew and nuts, sesame, shea butter, coffee, cocoa, cotton and fabrics, dried mangoes and fruits and other national specialities (which is modelled in the hypothetical sustainable tourism scenario in section 4).

As both the increasing deployment of renewable energy and the shift to more sustainable modes of transport are part of the general green transition, and neither are confined to tourism, they will not be modelled at this point. Studies from other countries clearly show that both have positive implications for local employment and a significant contribution to mitigating GHG emission.

4.2.3.Modelling sustainable tourism in the GJAM

There are two main aspects to model: the planned investments into sustainable tourism and the expected structural change in the tourism industry. Table 3 summarizes the current plans following the National Sustainable Tourism Strategy on the share of sustainable tourism in total tourism (increasing from the current 15 per cent in 2022 to 32 per cent in 2032) as well as expected investments into the different aspects of the sustainable tourism infrastructure:

- Protection of natural and cultural heritage (SUT product for modelling: Heritage conservation and enhancement services)
- Efficient management and recycling of water (SUT product for modelling: Civil engineering works and construction works)
- Development of reception and waiting areas, play areas, areas for children and other tourist infrastructure (SUT product for modelling: Architectural, engineering and technical services and Specialized construction services)
- Research projects on sustainable tourism (SUT product for modelling: Research-Development Services)

In order to finance investments into sustainable tourism and fossil fuel energy, the model simulates a CO^2 tax on "Production and distribution of electricity and gas" and "Petroleum refining and coking and other chemicals". The tax is applied as per their share in GHG emissions (approximately two thirds electricity and gas and one third petroleum refining).

Importantly, without any complementary measures, the low-income households would be most impacted because they spend a large share of their income on basic needs such as food, housing, cooking and transport, for which energy is a major cost component. Although high-income earners consume more fossil fuel energy, thereby contributing much more to emissions and pollution, as a share of their income, they spend much less on basic, energy-related goods. As they are less impacted by the tax than the poorer households, a fossil fuel energy or CO2 tax would further increase inequality.

To counteract the negative effects of price increases on low-income households – who constitute the majority of the general population – a price subsidy is implemented alongside the tax for food products, education and health services. In fact, the subsidy is paid for by the CO2 tax. Thus, in addition to reducing the wasteful consumption of fossil fuel energy, the tax has the potential to redistribute income from richer to poorer households, reducing inequality and pollution simultaneously.

In terms of structural change, there is a decrease in refinery products and chemicals as well as water and electricity from the use of fossil fuels. In terms of international tourism, there is an increase in consumption and sales of processed agricultural produce such as cashew nuts and dried mango due to the value-chain policy to increase supply and production.

Table 4. Share of sustainable tourism and investments in total tourism

DESCRIPTION	UNIT	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Share of sustainable tourism in total tourism	Percent	15.49	18.06	23.22	22.43	23.55	24.73	25.97	27.26	28.63	30.06	31.56
Expected investment in "protection of natural and cultural heritage"	Millions, local currency	250		580	1180	1239	1300	1365	1433	1504	1579	1658
Expected investment in the "efficient management and recycling of water"	Millions, local currency	27	27	27	27							
Expected investment in "efficient management and recycling of waste"	Millions, local currency	262	262		262							

Expected investment in "the development of reception and waiting areas, play areas, areas for children" and other tourist infrastructure	Millions, local currency	430	606	200	200	210	220	232	250	275	316	363
Expected spending on "research projects for sustainable tourism"	Millions, local currency	6	220	220		220						

Source: Draft of National Sustainable Tourism Strategy, Burkina Faso Ministry of Culture, Arts and Tourism, December 2022.

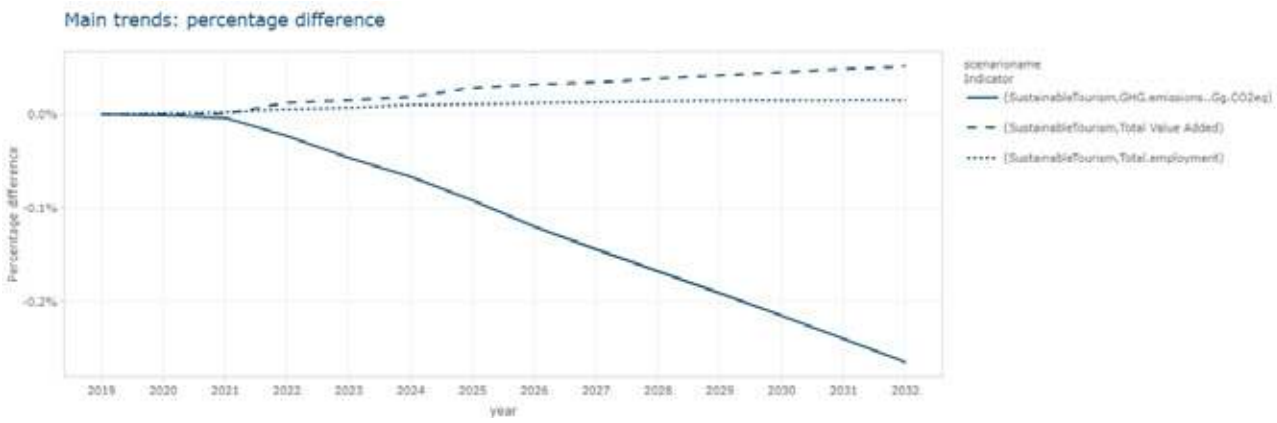
Water and waste service usage is reduced by 11 per cent annually following the investments in "Efficient management and recycling of water and waste", the industries "Sustainable accommodation", "Sustainable catering and activity of drinking establishments" and "Sustainable activities of booking agencies and tour operators". In addition, it is assumed that through information and education campaigns following research projects on sustainable development, all three sustainable tourism industries reduce their consumption of electricity, gas, refinery products and other chemicals by 5 per cent annually until 2028.

4.3. Expected economic, employment and emission impacts of the sustainable tourism scenario

4.3.1.GHG impacts of the sustainable tourism scenario

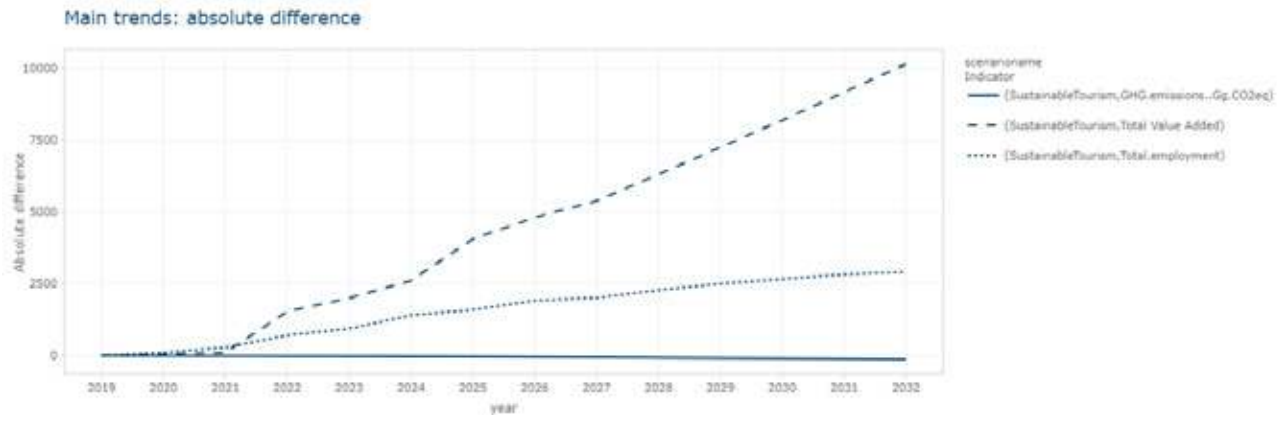
Compared to the business-as-usual baseline, economy-wide changes in GHG emissions are significant in a scenario with more sustainable tourism. This is despite the relatively small size of the tourism industry. The sustainable tourism scenario predicts about a 0.3 per cent decrease in total economy-wide GHG emissions by 2032. Even if this seems to be slight, this decrease nevertheless makes an important contribution to halting the initial increase of GHG in the entire economy.

Figure 18. Relative difference in value added, employment and emissions between the sustainable tourism and business-as-usual scenarios



Importantly, the reduction in CO_2 comes with positive changes in value added and employment. This means that a switch from the current structure to a more sustainable tourism industry has the potential to generate growth while reducing GHG emissions and creating a few thousands of additional jobs.

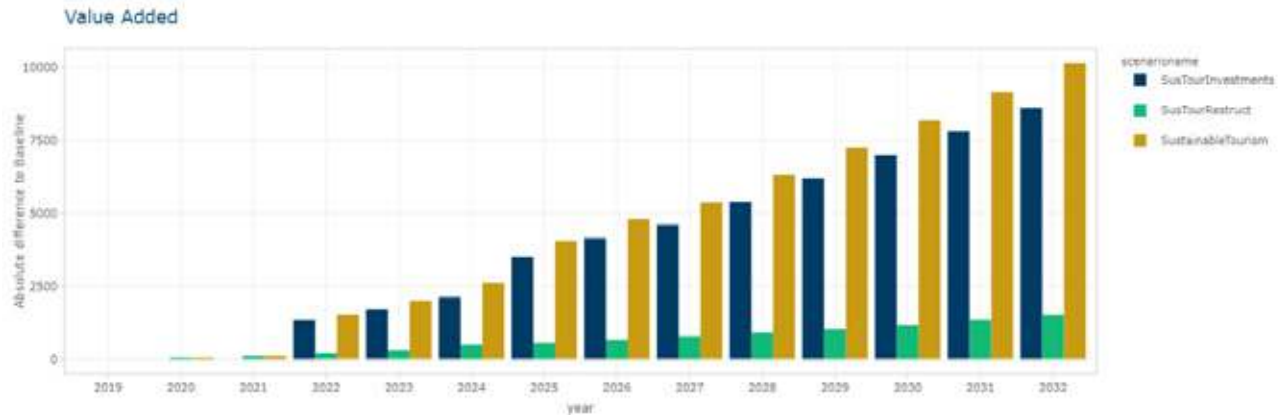
Figure 19. Absolute difference in value added, employment and emissions between sustainable tourism and business-as-usual scenarios



The sustainable tourism scenario leads to a slight increase in added value of an average of 10 billion CFA francs each year. Similarly, some 3,000 jobs are created and GHG emissions are reduced by approximately 125 Gg of CO_2 equivalent.

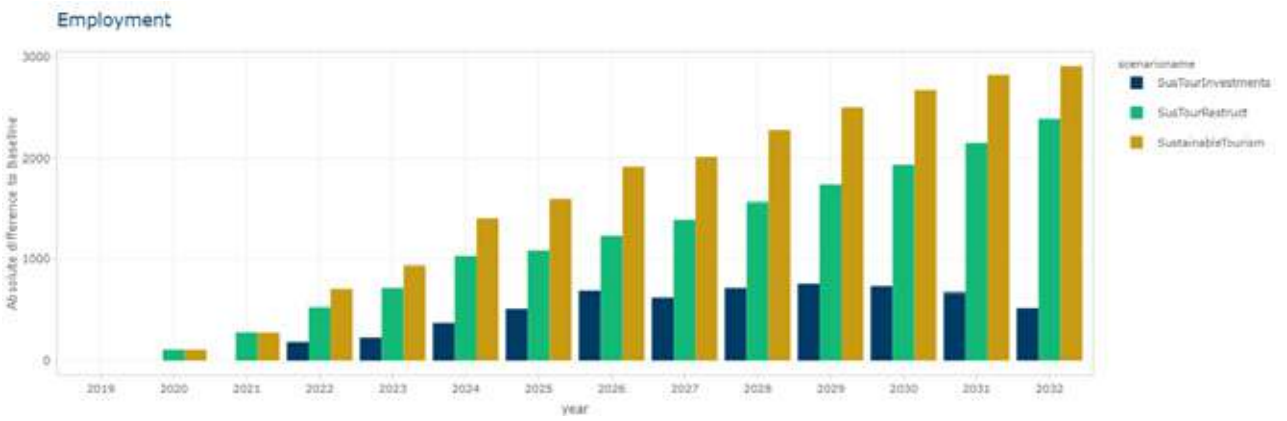
Figures 21 and 22 show the difference between the contributions of the structural change and the investments into sustainable tourism infrastructure. While for value added the investment effect is stronger, for employment the structural change effect is stronger and more long term. For GHG emissions, the structural change effect dominates so as to achieve a total reduction in GHG emissions. The increases in emissions due to the investments are negligible.

Figure 20. Absolute difference in value added between sustainable tourism and business-as-usual scenarios: total, structural change and investment effects



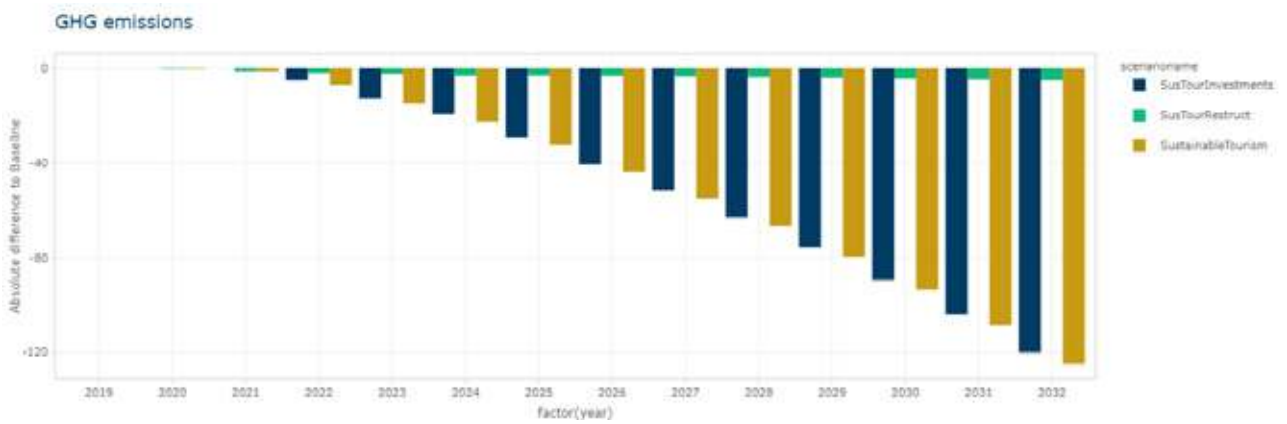
The share of investments in the increase in added value is gradually increasing to reach around 85 per cent in 2032, with the restructuring contributing 15 per cent of the growth. By the end of the period, the effect of investments on the value added slows down, when structural change affects more of the economy.

Figure 21. Absolute difference in employment between sustainable tourism and business-as-usual scenarios: total, structural change and investment effects



As for employment, the share of the change in structure is estimated to account for 82 per cent in 2032 while the investments contribute some 18 per cent.

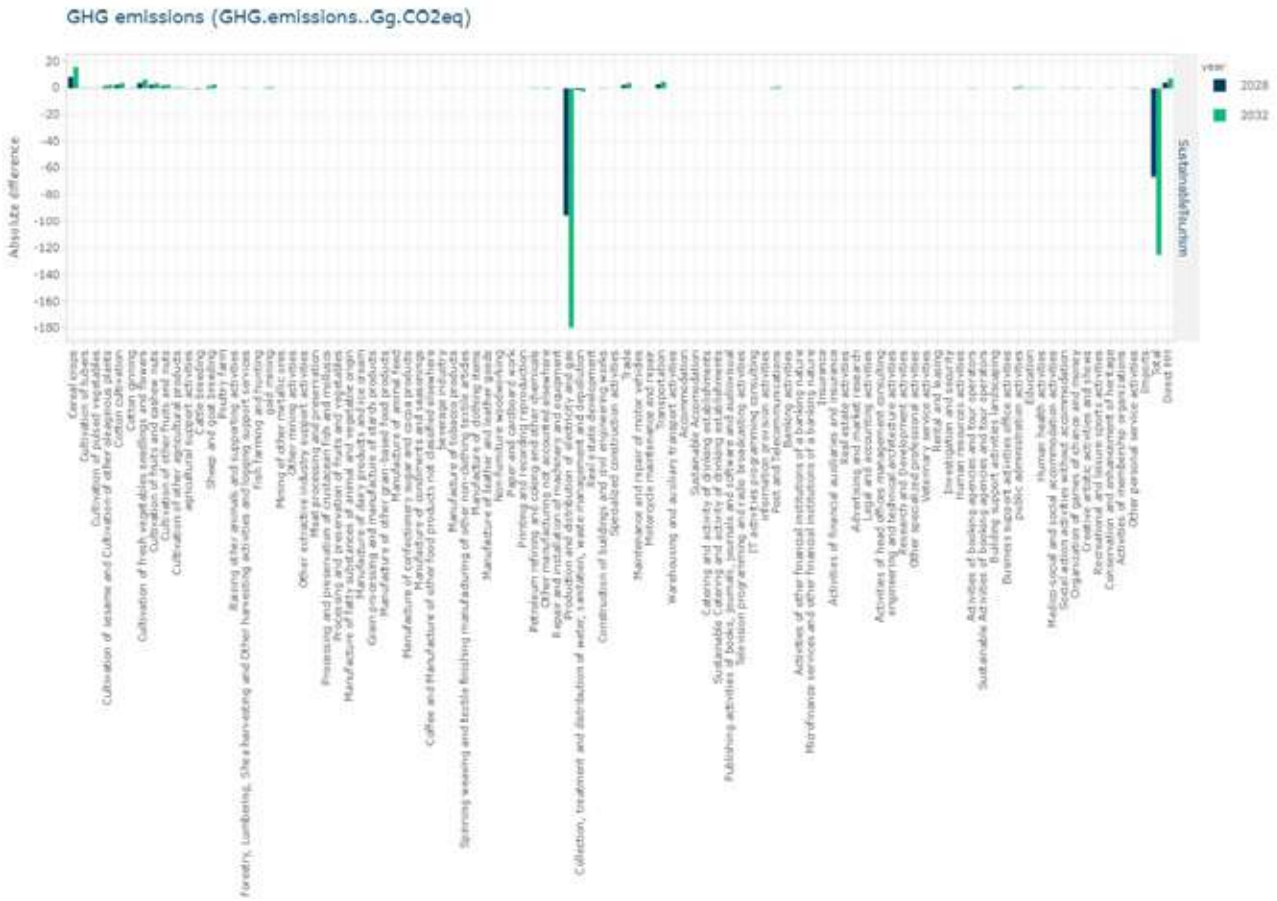
Figure 22. Absolute difference in emissions between sustainable tourism and business-as-usual scenarios: total, structural change and investment effects



In terms of GHG emissions, almost all of the gas reduction is driven by the structural change. Due to the financing through the CO_2 tax, there is lower demand for CO2 intense products, thus resulting in a decrease in GHG emissions. The decrease is very small, but it should be noted that the economy is growing strongly, meaning a decoupling is achieved.

4.3.2.Impacts by industry of sustainable tourism scenario

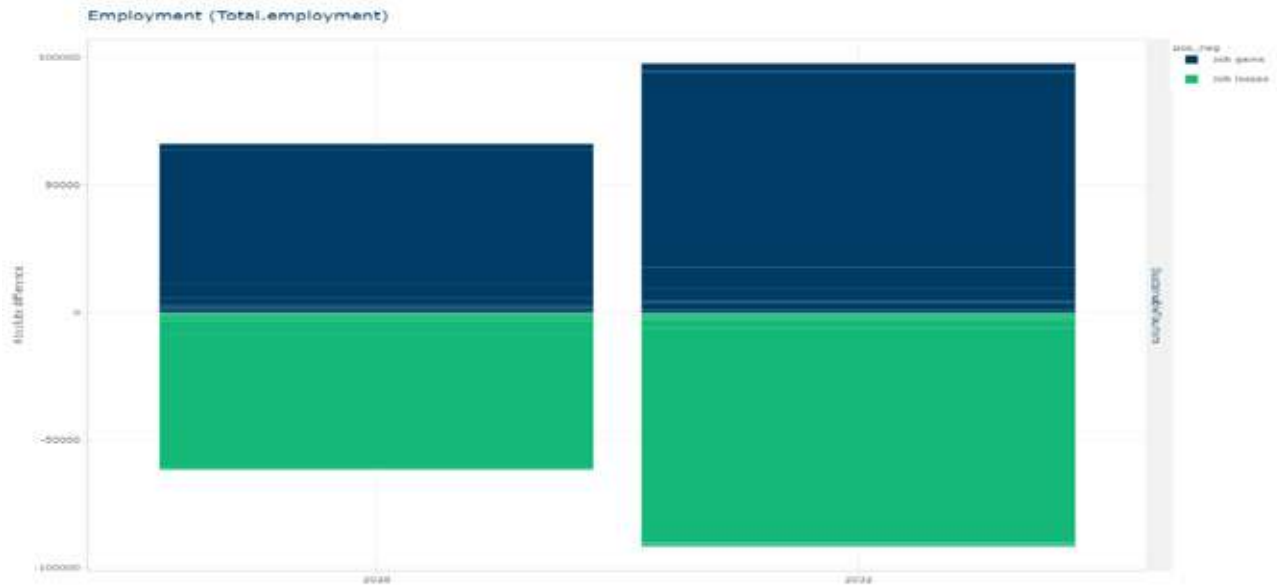
The reduction of GHG emissions in the sustainable tourism scenario is mainly observed in "production and distribution of electricity and gas", the industry subject to the CO_2 tax. There are more emissions from the agricultural industries, in particular, those where a price subsidy is given, and for those, demand in the sustainable tourism sectors increases. Figure 23. Difference in total GHG emissions by industry



Employment gains and losses

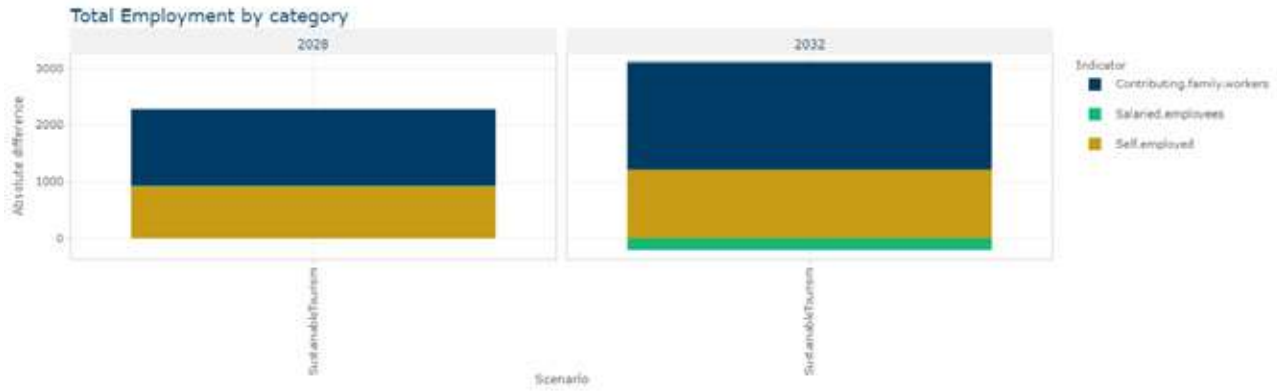
The sustainable tourism scenario leads to job losses and gains in the economy from 2022 to 2032. In the middle of the period in 2028, the total job creation is about 2,300. This is the difference between an increase of slightly more than 70,000 new jobs and a slightly smaller number of job losses. The same dynamics are observed by the end of 2032, where the gain in nearly 100,000 new jobs is offset by about 95,000 losses, leading to an absolute net total of 2,900 jobs created. On average, the rate of job creation is higher than job losses.

Figure 24. Employment gains and losses in middle and end of period, 2028 and 2032



In this sustainable tourism scenario, the job creation mostly affects self-employed and contributing family workers in the agricultural industries. Job growth among salaried employees in the service industries is basically flat, and it can be concluded that without any additional employment policies, that there would be no significant increase in the number of salaried employees.

Figure 25. Categories of workers affected by job creations and losses, 2028 and 2032

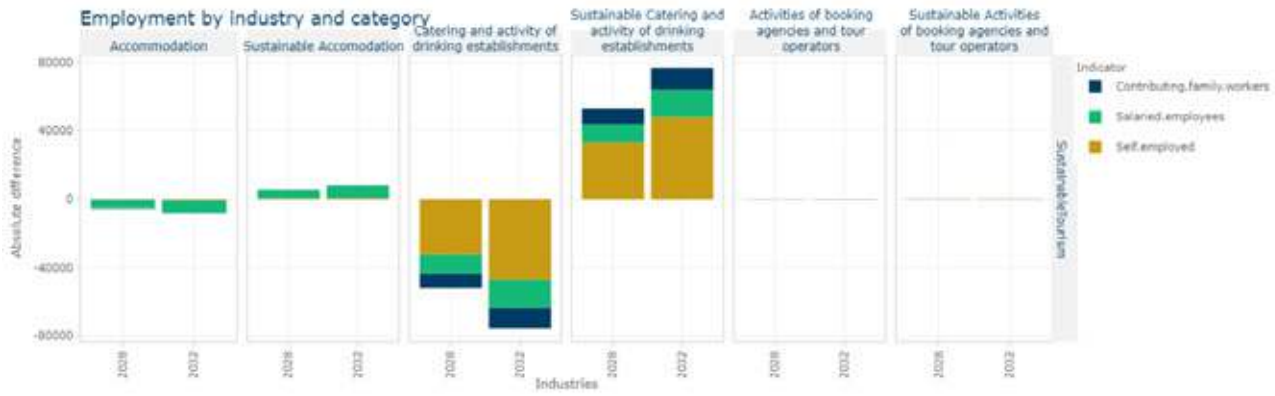


Job creations and losses are spread across the economy. Over the 90 industries, 46 of them create new jobs, and 44 of them lose jobs.

More specifically, the sustainable tourism industries that are built in the scenario create the most jobs. The most significant job creation is achieved by making "catering and activity of drinking establishments" more sustainable.

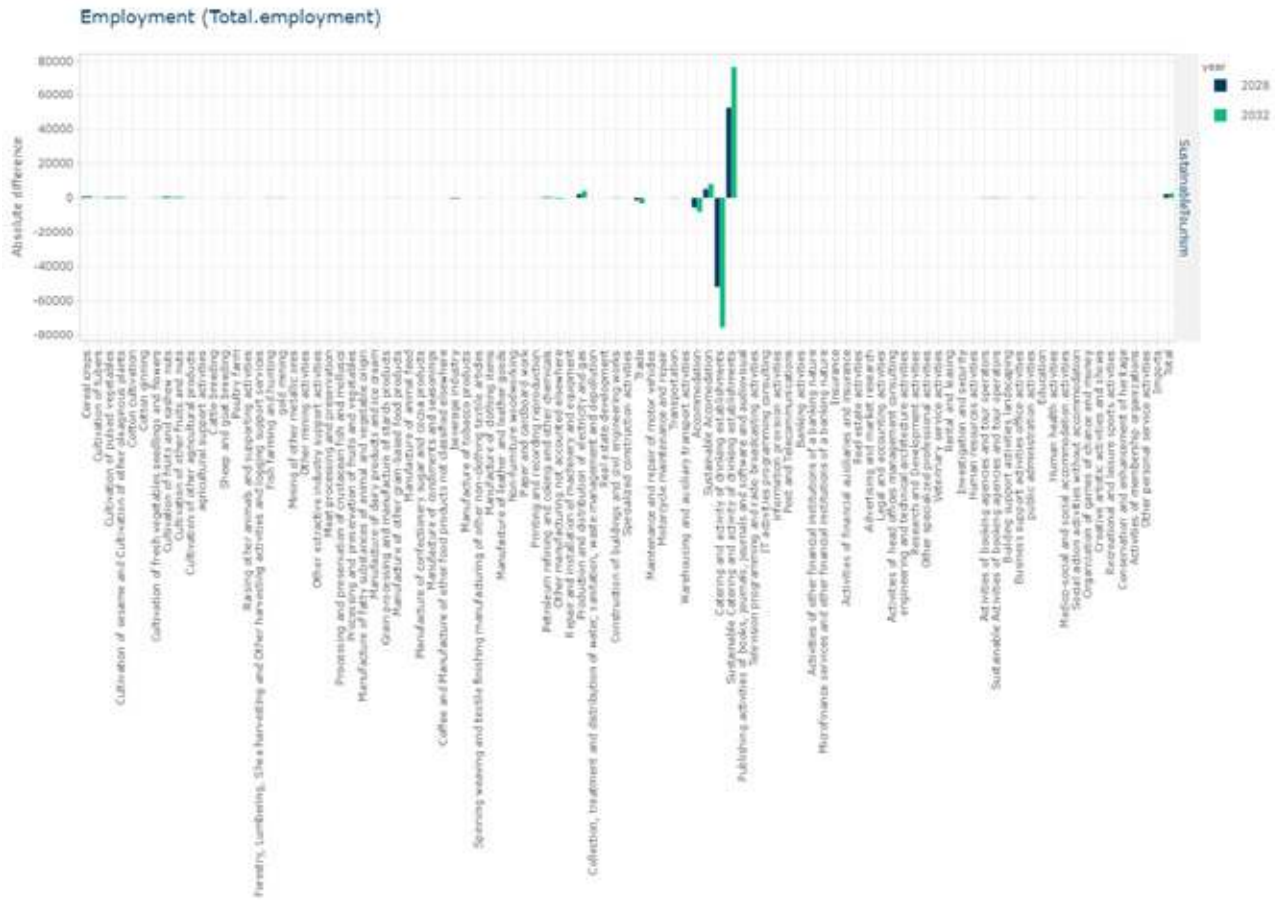
It creates 63,900 jobs in 2028 and 93,295 jobs in 2032. Sustainable accommodation creates 5,501 jobs in 2028 and 8,222 in 2032. Sustainable "activities of booking agencies and tour operators" creates fewer jobs.

Figure 26. Categories of workers affected by job creation and loss in the tourism industries, 2028 and 2032



Employment in agriculture increases slightly and remains basically flat in services and manufacturing, again highlighting structural challenges in the economy in creating formal employment. Additional policies in education and technical and vocational training may be required to translate the positive growth effect into more formal work in the service sector.

Figure 27. Difference in total labour by industry, 2028 and 2032



4.4. Expected impact from the strong influx of foreign tourists: A doubling of international tourism receipts by 2030 and an end to the conflict

According to the World Bank's World Development Indicators[9] "international tourism, receipts" for Burkina Faso were USD173 million or 101,362 million CFA,[10] which corresponds to about 4 per cent of total exports in the SUT for 2019.

In the hypothetical scenario of increasing the number of foreign tourists, we assume a major cessation of conflict activities and the doubling of international tourism receipts from the 2019 level to 2032. That is an annual increase of 10 per cent over the 2019 amount for the years 2023–2032. All of the additional spending by international tourists is assumed to follow ecotourism principles of local and sustainable production.

Of the total amount spent by foreign tourists, 30 per cent is spent on "sustainable accommodation", 30 per cent on "sustainable catering and drinking establishment services", 5 per cent on "sustainable booking agency and tour operator services", 5 per cent on creative artistic activities and shows, 10 per cent on souvenirs such as textiles, clothes, leather and wood products and 20 per cent on natural products including produce (cashew and other nuts, sesame, other fruits and vegetables), fish and hunting products, as well as artisan products such as shea butter, coffee, chocolates and ice cream.

4.4.1. Economic, employment and GHG impacts

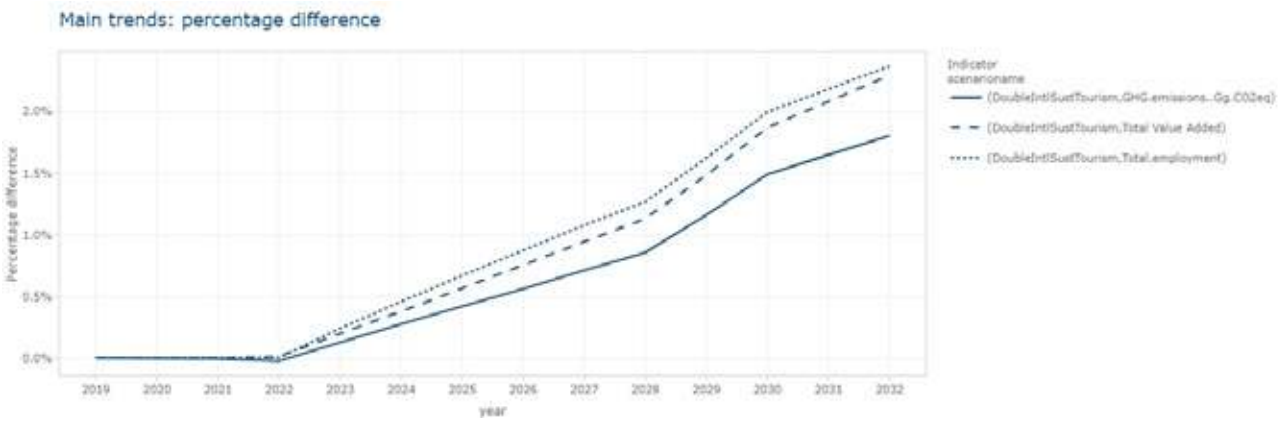
Compared to the business-as-usual scenario, changes in value added and in employment grows dynamically during the period of 2022–2035. They gradually increase by an additional 2.8 per cent by 2032 and slow to an additional 1 per cent by 2035.

GHG emissions in an accelerated international sustainable tourism scenario change in a different way as compared to the modest sustainable tourism scenario. The accelerated scenario contributes to reducing emissions for only the first four years. GHG emissions increase up to 1.5 per cent from 2027 to 2032 due to the strong positive effect on economic growth and employment. In fact, as a developing economy whose baseline is very low, Burkina Faso is expected to prioritize economic growth and job creation while relatively, and not absolutely, decoupling from GHG emissions.

9 World Bank, World Development Indicators Data Bank (Series ST.INT.RCPT.CD).

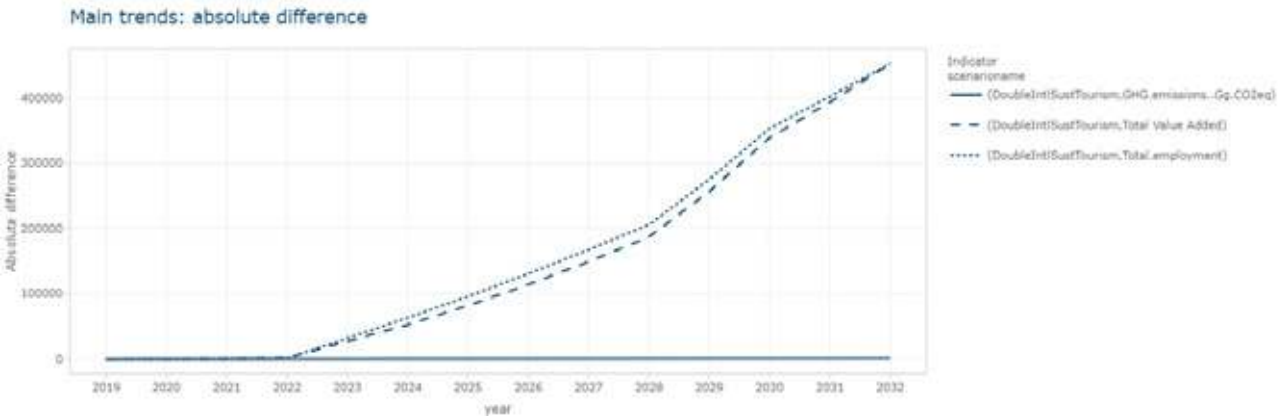
10 Using the World Bank's "Official exchange rate (LCU per USD, period average)" of 585.

Figure 28. Relative difference in value added, employment and emissions between sustainable international tourism and business-as-usual scenarios



While the absolute difference in value added and employment is important compared to the baseline, a relative decoupling in GHG emissions is achieved.

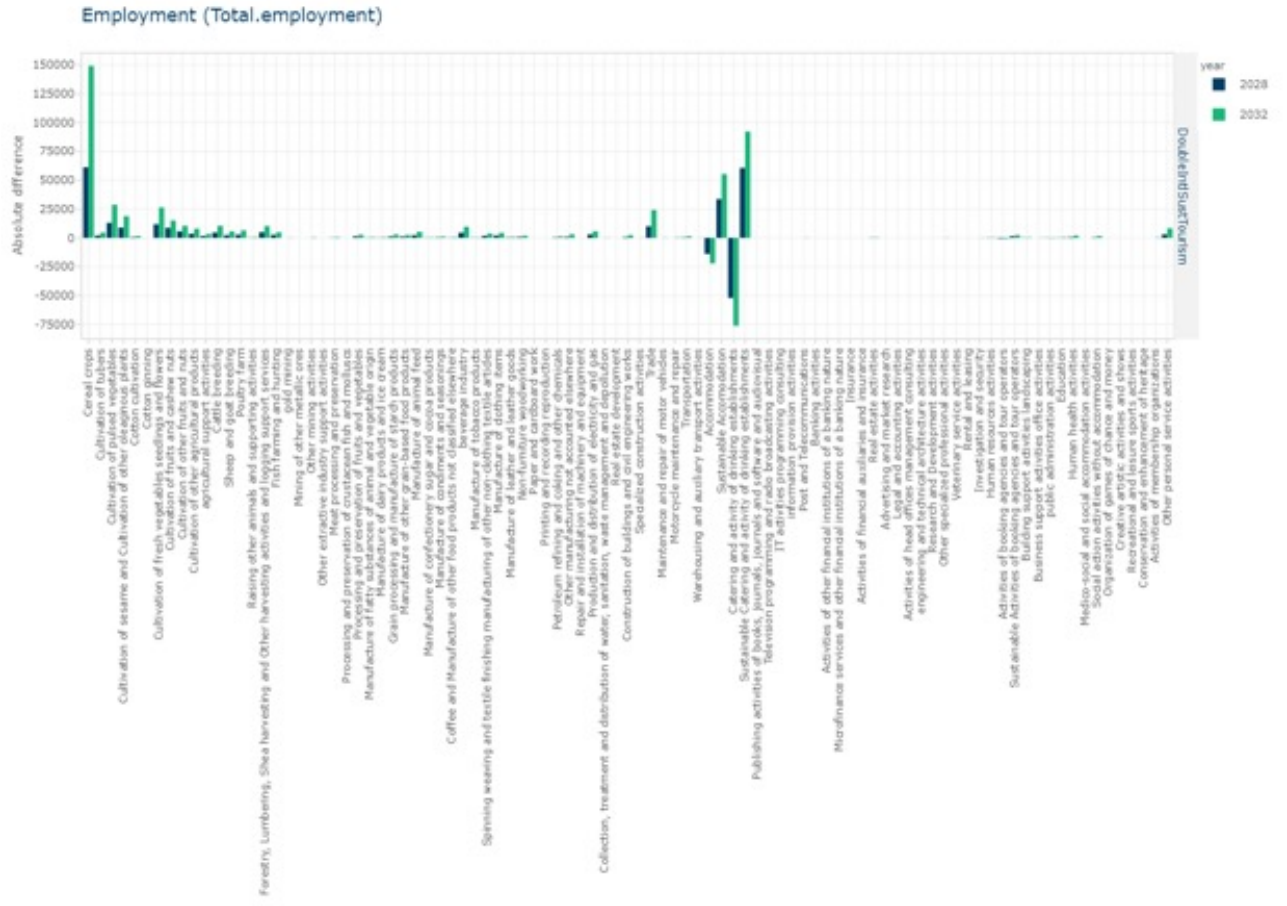
Figure 29. Absolute difference in value added, employment and emissions between sustainable international tourism and business-as-usual scenarios



4.4.2.Economic, employment and GHG impacts by industry

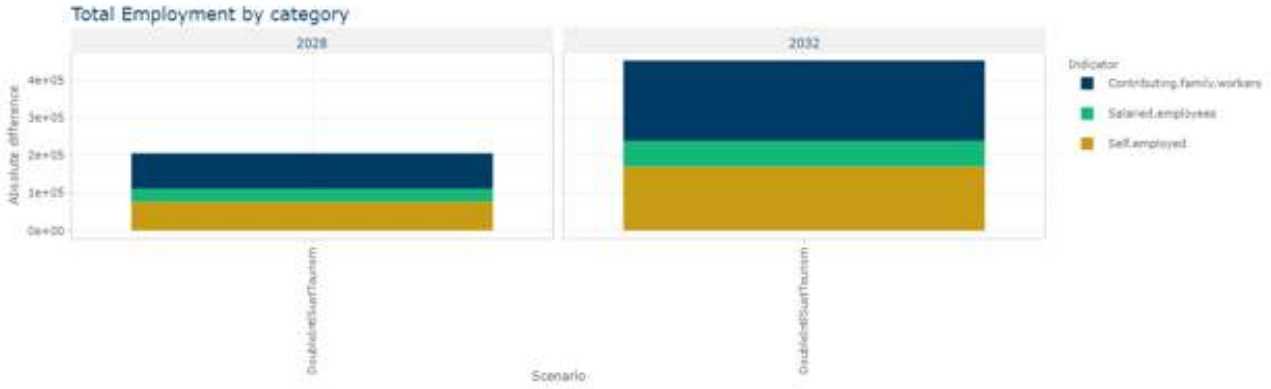
The employment effects are positive across industries, highlighting the economic and social development potential of sustainable tourism. Agriculture, mainly cereal crops, receive the most important generation of jobs in 2028 and 2032, followed by the other major cultivation industries. A positive secondary effect on food security and nutrition may result.

Figure 30. Difference in total labour by industry, 2028 and 2032



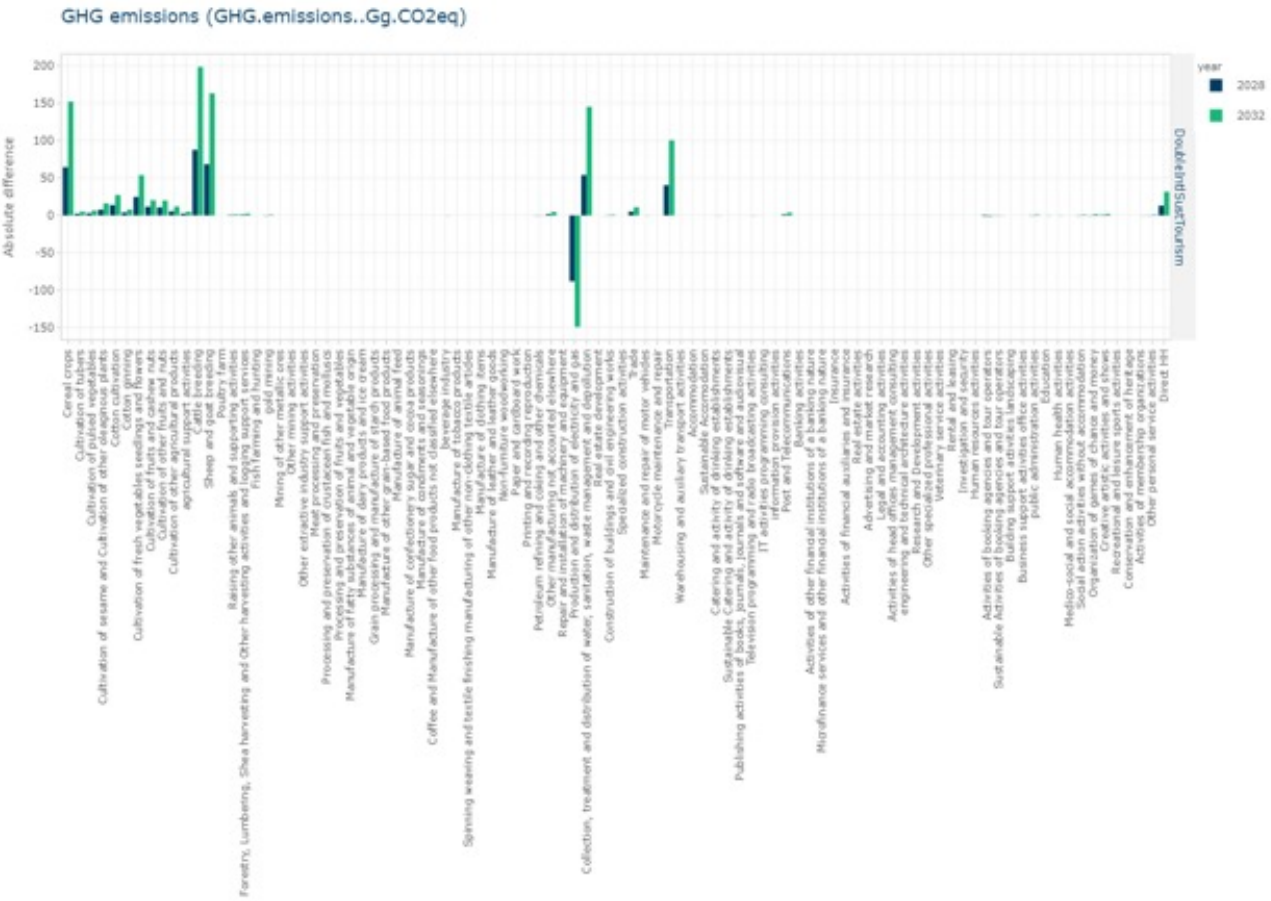
The sustainable international tourism scenario creates some 200,000 jobs in 2028. These jobs are dominated by contributing family workers and self-employed workers and comprise fewer salaried jobs. Additional employment policies, notably, technical and vocational training and education, may further increase the share of salaried and formal employment.

Figure 31. Difference in total labour by category, 2028 and 2032



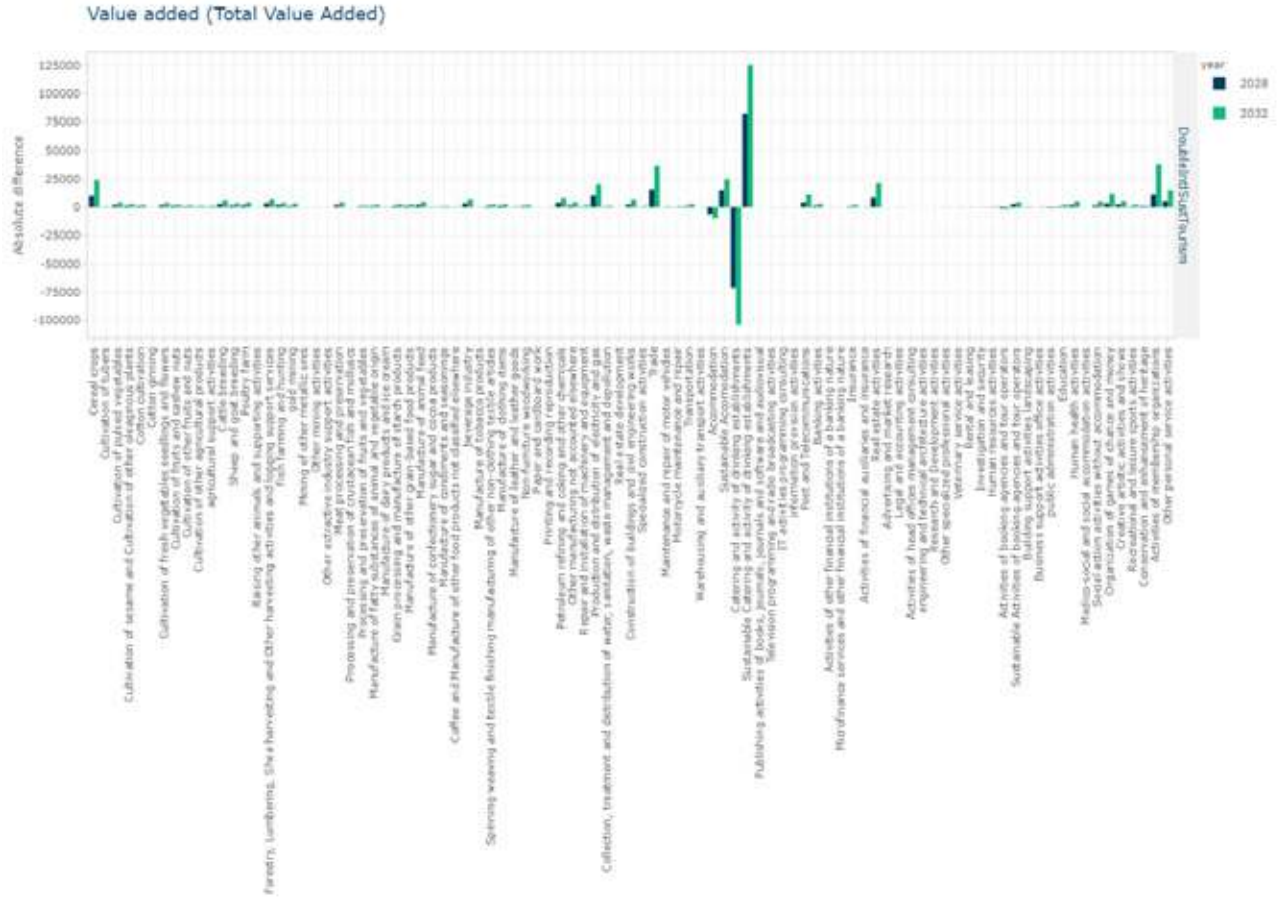
By industries, the figure shows that the scenario creates significant increases of GHG in agricultural industries (mainly in cereal crops), corresponding to half of total GHG in 2028 and 42.5 per cent of total GHG in 2032. This reflects strong economic growth in the sector, which is positive for food production and self-sufficiency. Moreover, due to the strong economic growth effects, GHG emissions are significant in the middle and the end period for "production and distribution of electricity and gas", "collection, treatment and distribution of water, sanitation, waste management and depollution" and in transportation.

Figure 32. Difference in total GHG emissions by industry



The robust economic growth which would result from a strong influx and durable increase in international tourism, highlights the potential of an end to the conflict and the achievement of political stability. Economic growth would pick up across major industries in the Burkina economy. Most importantly, the hotel and tourism industry, with accommodation, restaurants and catering services, would drive economic growth, pulling agriculture and processing industries along a strong growth path. Importantly, trade and service industries will grow significantly, contributing towards a structural change to more sustainable and service-led economic growth.

Figure 33. Difference in total value added by industry, 2028 and 2032



5. Conclusion: Policy implications and analysis

The main objective of this study was to model the impact of public policies and incentive measures on greening and the creation of decent jobs in the tourism sector of Burkina Faso, in the post-COVID-19 context. To achieve this objective, the methodology used is an application of the Green Jobs Assessment Model to the issues of the tourism sector in Burkina Faso. The GJAM is a macroeconomic model that assesses the direct, indirect and induced effects of climate change and other green policies on the economic output of each industry of the national economy, and how these affect workers and greenhouse gas emissions effect in each industry.

The Burkina Faso Model was built with data from the 2019 SUT and three main scenarios were built including a baseline scenario, a sustainable tourism scenario and a scenario in which a large influx of international tourists occurs based on the the hypothesis of an end to terrorist attacks and political stability. The model was based on the structure of tourism sector accounts and the data available within the national statistical system.

The baseline scenario was constructed with projections of the evolution of the macroeconomic components in the final demand of the national economy and the evolution of the population, these being specified to follow the medium-term forecasts of the IMF until 2027, combined with the OECD long-term outlook from 2028 and the UN DESA demographic outlook. In this scenario, the economy grows following past trends without any major structural changes. This scenario allows an economic growth rate of between 4% and 6%, with an annual average of 4.4% during the 2020-2035. Similarly, in this basic structure, energy-related GHG emissions are assumed to increase by an average of 4.2% per year and jobs created by an average of 4.1% over the 2020-2035 projection period.

The sustainable tourism scenario is based on the national strategy for promoting sustainable tourism following the ecotourism principles of local and sustainable production. The accelerated international tourism scenario also assumes the implementation of the national policy to promote sustainable tourism, but predicts a doubling of international tourist arrivals by 2035, based on the assumption of political stability and an end of terrorist attacks.

As such, the final two policy scenarios highlight the potential negative impact on tourism as well as the potential economic and employment benefits of international and sustainable tourism.

Compared to the baseline scenario, the sustainable and international tourism scenarios show favorable results at the macroeconomic level with the potential to revive economic growth and job creation. The increase in value added is mainly driven by investment while long-term structural change leads to employment growth and the stabilization of GHG emissions.

By industry, compared to baseline scenario, the sustainable tourism scenario leads to a significant decrease in GHG emissions in the "production and distribution of electricity and gas, the collection, treatmen" and "distribution of water" and in "transportation". An absolute decoupling of economic growth and GHG emissions is achieved.

However, in the accelerated international tourism scenario, due to very strong economic growth and job creation, total emissions increase but less than in the baseline scenario. A relative decoupling is observed.

On the jobs side, job gains and losses spread through the economy. Of the 90 industries, 46 create new jobs compared to 44 which lose them. In particular, the sustainable tourism industries built in the scenario create the most important jobs.

Agricultural industries are those experiencing significant employment gains, particularly in grain and other field crops due to the supply chain effects of increased consumption of agricultural products. local origin. In the international tourism scenario, employment in the tourism sector, including hotels, accommodation, catering, stimulates indirect job creation in commerce and related services.

For their part, manufacturing industries are not significantly affected by employment changes reflecting the service nature of tourism industries.

In terms of labor market composition, employment gains are mainly observed in self-employment and family workers, highlighting the challenge of creating formal and salaried jobs. Additional employment policies, particularly in the area of technical and vocational training and education, are needed to bring about structural improvement towards formal and skilled employment

The three new green industries of sustainable tourism, namely "sustainable catering and drinking establishments", "sustainable accommodation" and "sustainable activities of booking agencies and tour operators" contribute significantly to structural and to job creation in the emerging green tourism sector. "Sustainable catering and drinking places" creates 63,900 jobs in 2028 and 93,295 jobs in 2032, the largest job creation, and "Sustainable Accommodation" creates 5,501 jobs in 2028 and 8,222 jobs in 2032. The "sustainable activities of booking agencies and tour operators" create the least number of jobs.

Sustainable international tourism built as a doubling of the influx of foreign tourists and based on the assumption of political stability and peace, leads to a strong overall increase in added value and employment, in the short and medium term. Positive effects on employment are recorded across the economy, driven by agriculture and services. These increases concern all groups of workers in the economy, mainly family workers and self-employed workers and some salaried workers. With regard to GHG emissions, the positive effect on the decrease is only for the short term, with emissions increasing due to the strong prospects for economic growth. The results of the study show positive effects on economic growth and jobs, however with mixed effects on emissions. The growth in added value of the economy is accompanied by a significant creation of 200,000 jobs; the reduction in GHG emissions is short-term, followed by an increase in these which reaches approximately 1.7% in 2032. Job creation affects almost all sectors, but even more agricultural industries, presaging positive effects as food security. However, the dynamism of the agricultural sector (increase in VA and jobs) leads to an increase in GHGs in this sector and in other sectors (energy, water and transport).

In view of these results, the model and the analysis of the scenarios show that the tourism sector has a strong integration into the national economy through an important value chain of hotel, accommodation and catering activities which stimulate growth in the supply industries of increased consumption of locally sourced agricultural products and processing. The study also reveals a strong link between the agro-pastoral sector and the national economy which are the most sensitive to variation induced by investment and structural change.

This also reflects the weak influence of manufacturing industries in the economy, due to the lack of a solid productive base.

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It is therefore important to anticipate the needs for complementary employment and just transition policies, particularly in terms of technical and vocational training and education in agriculture and related industries, as well as in the hotel and tourism industries, in order to translate the positive effects on employment into formal and salaried jobs. It is important to note that financial investments and industrial policies are needed to supply industries including agriculture and agro-industry with high-value export goods such as coffee, textiles, nuts and dried fruits. Such investments would enable the high-quality production of valued export goods and would further attract international tourists.

When designing strategies, just transition policies are needed not only to lay the foundation for GDP growth and job creation, but also to mitigate the negative effects of job losses. The key to successful restructuring is the early identification of job opportunities for the economic transition, particularly for affected jobs in industries that rely heavily on fossil fuels.

While the accommodation, hotel and restaurant industries create more jobs in a sustainable tourism scenario, they are dominated by informal workers. An important issue not assessed here is the formalization and professionalization of the tourism sector. The implementation of education and professional training policies for the benefit of professionalization will help to strengthen the assets of sustainable tourism sector. This requires imagining suitable programs to strengthen the capacities of catering stakeholders and give them the opportunities to move from the informal to the formal sector. In addition, booking agencies and tour operators provide few jobs due to their weak representation in the market and the weak development of air transport. Thus, public policies must pay particular attention to the development of transport infrastructure and facilitate the attraction of foreign direct investment specifically in air transport, given its sensitivity to the reduction of GHG emissions.

Across the economy, the skills of the national labor force must be developed through a bold plan to reform the education system that gives pride of place to vocational training, so that they are employed in all industrial processing activities. The government should also take appropriate measures to ensure virtuous governance of local industries to foster local growth.

The manufacturing sector is less affected by sustainable tourism scenarios. This is evidenced by the low participation of this sector in job creation. Adequate infrastructure for the sector practically does not exist, despite several years of political proclamation. An industrial policy dedicated to the manufacture of basic metal and wood products, elementary machinery and consumer goods in their own right can be a game-changer and further boost manufacturing and employment in the implementation of the national strategy of sustainable tourism.

This study thus provides very interesting results which make it possible to capture the potential effects of the objectives of promoting sustainable tourism in the different industries of the economy of Burkina Faso. The results can be used for the implementation of public policies in the tourism sector. However, in view of the data from the national accounts system which may seem limiting for the sector, the development of tourism satellite accounts should be accelerated to be operational, in order to provide data corresponding to a more detailed picture of the different sectors of the tourism sector in Burkina Faso.

At last, the implementation of a CO_2 tax suggested in this study may be perceived as "non-just" or not relevant for a country like Burkina Faso, which is not a major polluter on a global scale. Different resource mobilization options can then be explored through a benchmark of good practices in sustainable tourism financing, fiscal policies including sustainability-friendly fiscal reform, public-private partnership, new green finance instruments including in particular the establishment of green bonds and crowdfunding, favored by technological developments. In all cases, the option to adopt for financing sustainable tourism must take into account the structure of the national economy and the level of development of industries in the tourism value chain.

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ANNEX

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A.2. List of people and structures consulted and data collection

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Dr Larba Issa KOBYAGDA	General Director of Economy and Planning	Planning documents and policies Communication on the tourism sector
Monique OUEDRAOGO born ILBOUDO	General Director of Tourism / Ministry of Communication, Culture, Arts and Tourism	Data questionnaire sheet for the sustainable tourism scenario
Mr BALBONE Bassirou	OBSTOUR/DGA tourism	Time series on tourism indicators
		Policy documents, strategies, action plans
		Tourism dashboards
GANGO Jean Paul Zakaria	General Director of Green Economy / Ministry of Environment, Water and Sanitation	Guide to promoting green jobs in Burkina Faso
Mr BOMBIRI	DSS/DGESS Environment	Directories and Reports
Mr KABORE Eric	DGESS Environment	Directories and reports
Mr Ye	Tourism	Budget data
		Sustainable tourism data
Mr OUARMA Boukary	DGEVCC	Statistical yearbooks 201 2020 and survey report, REBB
Mr ROUAMBA Boudassida	SP/CNDD	GHG emissions inventory/3rd communication
Mr NIANGAO Issaka	INSD	SAM/SUT, ENESI phase 1 and phase 2 investigator manual
Mr KERE Brahim	DGEP/DPAM	SUT/IAP

Mr SAWADOGO Pingdebamba	**DGEP/DPSS**	**Draft National Sustainable Tourism Strategy**

A.3 The Green Jobs Assessment Model (general description)

The GJAM we developed for Burkina Faso applies the same philosophy and modelling approach that was taken for MEIO Norway (Aponte et al. 2018; Wiebe at al. 2022), GJAM Nigeria (ILO and UNDP 2021a), GJAM Zimbabwe (ILO and UNDP 2021b) and GJAM Turkey (ILO 2022). It is based on the model suggested in the ILO's GAIN Training Guidebook (ILO 2017), adapted for the use of supply-and-use tables. We have further introduced endogeneity with some macro-economic key variables to capture dynamic development paths over time. To this end, we follow ideas put forward by the Interindustry Forecasting Project at the University of Maryland (Clopper 2012). We embed the supply-use-model into a set of linear macro-economic equations (see figure A1). Population and exports are exogenous drivers of the model, while investments (gross capital formation), household demand and GDP (and value added) are endogenous. The model is dynamic-recursive and can be classified as a simple macro-econometric input-output (MEIO) model (West 1995; Lewney et al. 2019). While similar to computable general equilibrium (CGE) models, the most important differences are that MEIO models are more empirically based (estimation of behavioural parameters), assume myopic foresight of all agents and have a Leontief production function (Pollitt et al. 2019) as opposed to, for example, a constant elasticity of substitution (CES) production function. Although some price effects are considered in the GJAM model family, these models are to date simpler than other MEIO models such as E3MG (Mercure et al. 2018) and related models or models from the INFORUM family, such as INFORGE (Mönnig et al. 2009; Maier et al. 2015) for Germany.

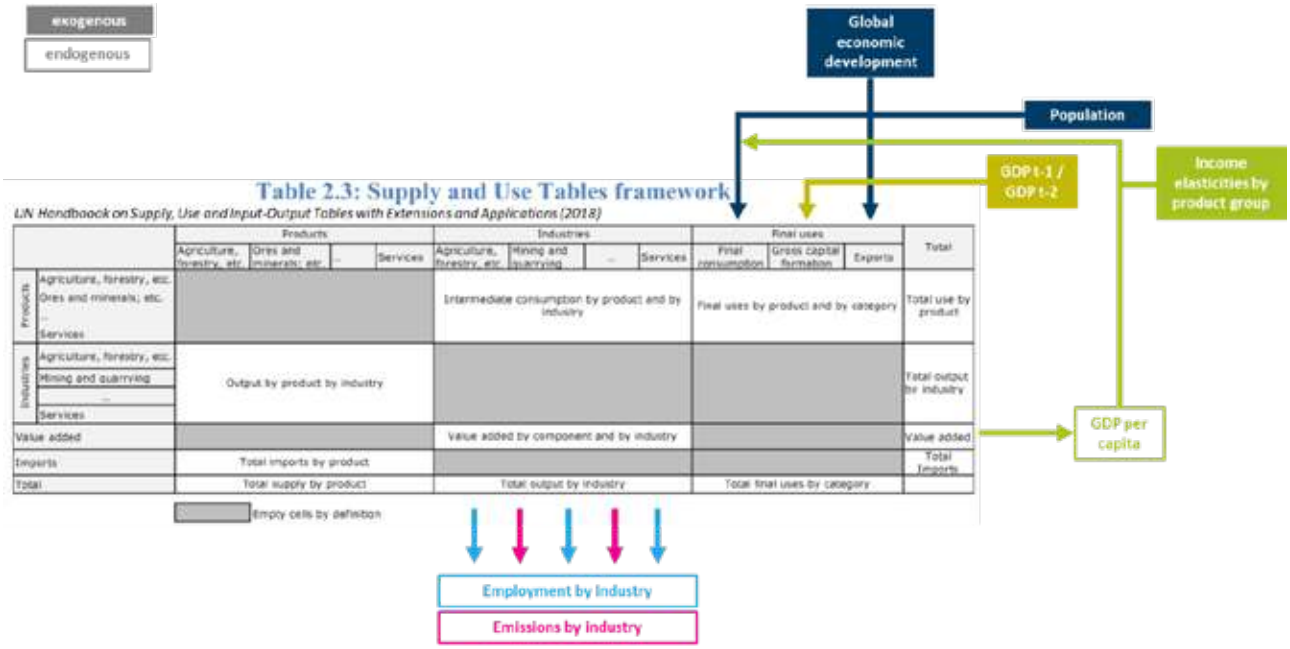

Figure A1. Schematic representation of the supply-and-use table based model

The Green Jobs Assessment Model (GJAM) for Burkina Faso is a dynamic-recursive model combining macro-economic equations with a supply-and-use table system. The model is set up in constant 2019 prices. The macro-economic equations are:

- Exports, which grow with an exogenously assumed global GDP growth rate.
- Gross capital formation (investments), which grows with the previous year's growth rate. This stabilizes the model by exogenizing investments when finding the solution for the current year, while still allowing for different growth paths across scenarios.
- Government consumption, which depends on population growth and lagged GDP, and is estimated econometrically based on time series data from the system of national accounts.
- Population is assumed to follow the medium fertility scenario from UN DESA's world population prospects (UN 2019).

We assume that the share of each product in total exports, total investments and total government consumption remains constant in the reference scenario, while these can be exogenously changed in the green transition scenarios.

Household consumption expenditures are modelled using a demand system where household consumption by product (*prod)* depends on total income (GDP) and income *(eI),* own-price *(eop)* and cross-price *(ecp)* elasticities, with *gr*X denoting the growth (in per cent) in variable X:

$$HHEprod_t = HHEprod_{t-1} + (eI \times grGDP) + (eop \times grOwnPrice) + (ecp \times grOtherPrices)$$

Here, income, own-price and cross-price elasticities are taken from the USDA international food comparison programme, [18,19] but can be estimated econometrically if time series with a sufficient number of observations are available. Product price changes are determined in the input-output core, using the Leontief price model. Note that we do not model inflation. The only price changes that can be modelled are those due to changing production technology in the scenarios. Prices in the reference and the current green scenario are constant.

Figure A1 shows the circular flow between final demand by product and value added by industry, which, considering taxes and other flows, determines GDP per capita, which is used to model final demand. In mathematical terms, the use matrix is denoted U and the supply matrix is the transpose of the make matrix, V^T.

- *The industry-by-commodity commodity-demand-driven SUT model (Miller and Blair 2009) is:* $g = D (I - BD)^{-1} y$
- *Where y is the final demand by product (obtained by summing the individual final demand vectors), and B is the use coefficient matrix:* $B = U \, diag \, (g)^{-1}$
- *where g is the vector of industry output. D is the market share matrix:* $D = V \, diag \, (q)^{-1}$
- *where q is the vector of product output.*

The model iterates in every year until the change in final household demand from one iteration to the next is below a given threshold. The next year is then initialized with endogenous variables being set to the current year solution and exogenous variables as well as scenario inputs taking the next year's value.

For the scenarios it is possible to model:

- additional investment by product
- changes in the structure of household and government demand
- changes in the use coefficient matrix such as the technology with which an industry produces
- changes in the market share matrix, for example, which industries produce which share of a product
- changes in the import shares by products
- changes in emission intensities of industries

Production and value added are always endogenous. From this we can estimate changes in employment by using a constant labour intensity (that is, a fixed number of workers by skill and gender per unit of value added by industry) multiplied with the new value added by industry.

General limitations and strengths of the modelling approach

Excerpt from general documentation of the software for the economic core model (SUT_core)

SUT based macro-econom(etr)ic IO models / GAIN type Green Jobs Assessment Models are **not** economic forecasting models. Rather, these models are a tool to inform about possible effects of "what if" scenarios on emissions and labour demand by industries, given that the remaining structure of the economy remains as is.

The results should be assessed relative to the reference scenario. They indicate the direction and possible size of the effects but should be taken as indicative estimates.

The results show how changes in individual economic activities influence the economic structure. Direct, indirect and induced effects of technological change and changes in household, government and investment structure are reflected.

An (imperfect) list of limitations to the modelling approach:

- The model is based upon the historical relationship between economic activity, income and consumption and the production structure of the base year (currently, the last year available at TurkStat is 2012), which in turn might be estimated based on older supply-and-use tables. For some countries, the most recent available SUT might be from 2010 or 2012, while other countries might have tables as recent as 2019. Extrapolating data over the next decade based on such data will not necessarily give a complete picture, but it constitutes a valuable starting point for assessing effects of climate change mitigation and adaptation and other sustainability policies through "what if" analyses.
- While the option for price changes is given, there is no adjustment of production structure or investments based on price changes. Household demand for different product groups, however, is modelled using own- and cross-price elasticities.
- Investments grow with the previous year's growth rate, and the structure of the investment remains the same, with one exception: the exogenously given investment for individual

scenarios, which comes in addition to the general investments. This entails that the additional investments in the scenarios are not crowding out other investments but come as an additional economic stimulus.

- The results show which industries are likely to have an increased demand for labour, and which industries might contract. The actual labour market outcomes also depend on other factors as well as dynamic labour market adjustments such as wage adjustments, labour availability, labour productivity changes and more, that are not considered here.
- The current modelling of international trade is very simplified. Import shares by product are based on the supply table from the base year. Exports grow with global GDP projections from the IMF or OECD.

Once these limitations are well understood, they contribute to the **main strength of the model: simplicity and transparency.** These are reinforced by the other strengths:

- The model depends on very few types of data, which can be combined into one consistent framework with few equations.
- The model is data-driven and reflects country-specific characteristics very well.
- Scenarios are implemented using one Excel sheet and the model runs in only a few seconds, which allows us to calculate a large number of scenarios and thereby assess the validity of different scenario assumptions.
- For every single result, we can find an explanation that is in the data or one of the very few assumptions underlying the model.

A.4 Burkina Faso's supply-and-use table

Table 5. List of SUT 90 industries

INDUSTRY	INDUSTRY NAME	
CCEREA	Culture de céréales	Cereal crops
CTUBER	Culture de tubercules	Cultivation of tubers
CLEG	Culture de légumes à cosse secs	Cultivation of pulsed vegetables
CSESA_AUT_OLEA	Culture de sésame et Culture d'autres plantes oléagineuses	Cultivation of sesame and Cultivation of other oleaginous plants
CCOT	Culture du coton	Cotton cultivation
EGR_COT	Égrenage de coton	Cotton ginning
C_LEG_FRAIS	Culture de légumes frais plants semences et fleurs	Cultivation of fresh vegetables seedlings and flowers
C_FRUI_CAJ	Culture de fruits et de noix de cajou	Cultivation of fruits and cashew nuts
C_AUTR_FRUI_NOIX	Culture d'autres fruits et noix	Cultivation of other fruits and nuts
C_AUTR_PROD_AGRI	Culture d'autres produits agricoles	Cultivation of other agricultural products
ACT_SOUT_AGRI	Activités de soutien à l'agriculture	Agricultural support activities
ELEV_BOV	Élevage de bovins	Cattle breeding
ELEV_OV_CAPR	Élevage d'ovins et de caprins	Sheep and goat breeding
ELEV_VOL	Élevage de volailles	Poultry farm
ELEV_AUTR_ANI	Élevage d'autres animaux et activités de soutien à l'élévage	Raising other animals and supporting activities

SYLV_FORES_CUEIL	Sylviculture-exploitation forestière-cueillette	Forestry-lumbering-harvesting
ACT_PECH_CHAS	Pêche pisciculture et chasse	Fish farming and hunting
EXTRA_AEXPLO_OR	Extraction de minerais d'or	Gold mining
EXTRA_AUTR_MINE	Extractions d'autres minerais métalliques	Mining of other metallic ores
AUTR_ACT_EXTRA	Autres activités d'extractions	Other mining activities
AUTR_ACT_SOUTIEN	Autres activités de soutien aux industries extractives	Other extractive industry support activities
ABAT_TRANS_CONS	Abattage transformation et conservation des viandes	Meat processing and preservation
TRANS_CONS_POISS	Transformation et conservation des poissons crustacés et mollusques	Processing and preservation of crustacean fish and molluscs
TRANS_CONS_FRUI_LEG	Transformation et conservation des fruits et légumes	Processing and preservation of fruits and vegetables
FAB_COR_GRAS	Fabrication de corps gras d'origine animale et végétale	Manufacture of fatty substances of animal and vegetable origin
FAB_PROD_LAIT	Fabrication de produits laitiers et crèmes glacées	Manufacture of dairy products and ice cream
TRV_GRAIN	Travail des grains et fabrication de produits amylacés	Grain processing and manufacture of starch products
FAB_AUTR_PROD_BASECERA	Fabrication d'autres produits alimentaires à base de céréales	Manufacture of other grain-based food products
FAB_ALI_ANIM	Fabrication d'aliments pour animaux	Manufacture of animal feed
FAB_SUC_CONFIS	Fabrication de sucre de confiseries et de produits à base de cacao	Manufacture of confectionery sugar and cocoa products
FAB_CONDI	Fabrication de condiments et d'assaisonnements	Manufacture of condiments and seasonings

FAB_CAF_THE_AUT_PROD_ALI	Café et Fabrication d'autres produits alimentaires non classés ailleurs	Coffee and Manufacture of other food products not classified elsewhere
INDUS_BOISS	Industrie de boissons	Beverage industry
FAB_PROD_TABA	Fabrication de produits à base de tabac	Manufacture of tobacco products
FILA_TISS	Filature tissage et ennoblissement textile fabrication d'autres articles textiles non vestimentaires	Spinning weaving and textile finishing manufacturing of other non-clothing textile articles
FAB_HABI	Fabrication d'articles d'habillement	Manufacture of clothing items
FAB_CUIR	Fabrication de cuir et d'articles de cuir	Manufacture of leather and leather goods
TRAV_BOIS	Travail du bois hors meubles	Non-furniture woodworking
TRAV_PAP	Travail du papier et du carton	Paper and cardboard work
IMPRIM	Imprimerie et reproduction d'enregistrement	Printing and recording reproduction
RAF_PETRO_AUTR_ PROD_CHIM	Raffinage pétrolier et cokéfaction et autres produits chimiques	Petroleum refining and coking and other chemicals
FAB	Autres activités de fabrication non comptabilisées ailleurs	Other manufacturing not accounted elsewhere
REPA_INSTA	Réparation et installation de machines et de matériel	Repair and installation of machinery and equipment
PROD_ELEC_GAZ	Production et distribution d'électricité et de gaz	Production and distribution of electricity and gas
CAP_TRAIT_EAU	Captage traitement et distribution d'eau assainissement gestion des déchets et dépollution	Collection, treatment and distribution of water, sanitation, waste management and depollution
PROM_IMO	Promotion immobilière	Real estate development
CONS_BAT_GENI_CIV	Construction de bâtiments et des travaux de Génie civil	Construction of buildings and Civil engineering works

ACT_SPE_CONS	Activités spécialisés de construction	Specialized construction activities
Commer	Commerce	Trade
ENTR_REPA_VEHI	Entretien et réparation de véhicules automobiles	Maintenance and repair of motor vehicles
ENTR_REPA_MOTO	Entretien et réparation de motocycles	Motorcycle maintenance and repair
TRANSP	Transport	Transportation
ENTRE_AUX_TRANS	Entreposage et activités auxiliaires de transport	Warehousing and auxiliary transport activities
HEBERG	Hébergement	Accommodation
RESTAU_BOISS	Restauration et activité des débits de boisson	Catering and activity of drinking establishments
ACT_PRESS	Activités d'édition de livres, journaux, revues et logiciels et audiovisuel	Publishing activities of books, journals, magazines and software and audiovisual
ACT_TELE_RADIO	Activités de programmation télévisuelle et de radiodiffusion	Television programming and radio broadcasting activities
ACT_INFOR	Activités informatiques conseil programmation	IT activities programming consulting
ACT_FOURN	Activités de fourniture d'information	information provision activities
Post_Telecom	Poste et Télécommunications	Post and Telecommunications
ACT_BANC	Activités bancaires	Banking activities
ACT_ETA_FINAN	Activités des autres établissements financiers à caractère bancaire	Activities of other financial institutions of a banking nature
SER_MICROFINA	Services de microfinance et des autres établissements financiers à caractère bancaire	Microfinance services and other financial institutions of a banking nature
ASSURA	Assurances	Insurance

ACT_AUXIFINAN_ASSU	Activités d'auxiliaires financiers et d'assurance	Activities of financial auxiliaries and insurance
ACT_IMMOB	Activités immobilières	Real estate activities
PUB_ETUD	Publicité et études de marché	Advertising and market research
ACT_JURI_COMPTA	Activités juridiques et comptables	Legal and accounting activities
ACT_SIEG_SOCIAUX	Activités des sièges sociaux conseil en gestion	Activities of head offices management consulting
ACT_ARCHITEC	Activités d'architecture d'ingénierie et techniques	engineering and technical architecture activities
ACT_RECH_DEV	Activités de Recherche et Développement	Research and Development activities
AUTR_ACT_PROF	Autres activités professionnelles spécialisés	Other specialized professional activities
ACT_SER_VETE	Activités de services vétérinaires	Veterinary service activities
LOCAT	Location et location bail	Rental and leasing
ENQUETE_SECU	Enquête et sécurité	Investigation and security
ACT_RH	Activités liées aux ressources humaines	Human resources activities
ACT_AG_VOY	Activités des agences de réservation et voyagistes	Activities of booking agencies and tour operators
ACT_SOUT_BAT	Activités de soutien aux bâtiments aménagement paysager	Building support activities landscaping
ACT_SOUT_ENTR	Activités de soutien aux entreprises activités de bureau	Business support activities office activities
ACT_AD_PUB	Activités d'administration publique	public administration activities
EDUCA	Éducation	Education
ACT_SANT_HUM	Activités de santé humaine	Human health activities

ACT_HEBER	Activités d'hébergement médicosocial et social	Medico-social and social accommodation activities
ACT_AC_SOCIA	Activités d'action sociale sans hébergement	Social action activities without accommodation
ORG_JEUX	Organisation des jeux de hasard et d'argent	Organization of games of chance and money
ACT_CREA	Activités créatives artistiques et de spectacles	Creative artistic activities and shows
ACT_SPORT	Activités sportives récréatives et de loisir	Recreational and leisure sports activities
CONS_VAL_PATRI	Conservation et valorisation du patrimoine	Conservation and enhancement of heritage
ACT_ASSOCIA	Activités des organisations associatives	Activities of membership organizations
ACT_SER_PERSO_AUTR	Autres activités de services personnels	Other personal service activities

Table 6. List of SUT 96 products

PRODUCTS	PRODUCTS NAME	
CEREA	Céréales	Cereals
TUBER	Tubercules	Tubers
LEGU	Légumes à cosses secs	Dried leguminous vegetables
SESAM_PRO_AUT_OLEA	Sésame et autres produits oloégineux	Sesame and other oilseed products
COTON	Coton	Cotton
PROD_EGR_COT	Produits égrenage coton	Cotton ginning products
LEGU_FRAIS	Légume frais plants semences et fleurs	Fresh vegetable plants seeds and flowers
FRUI_NOI_CAJ	Fruits et noix de cajou	Cashew fruits and nuts
AUTR_FRUIT	Autres fruits et noix	Other fruits and nuts

AUTR_PROD_AGRI	Autres produits agricoles	Other agricultural products
SERV_SOUT_AGRI	Produits de soutien à l'agriculture	Agricultural support products
BOVIN	Bovins	Cattle
OVIN_CAPR	Ovins et caprins	Sheep and goats
VOLAI	Volailles	Poultry
AUTR_ANIM	Autres animaux	Other animals
PROD_SYL	Produits de sylviculture	Forestry products
PROD_EXP_FOREST	Produits d'exploitation forestière	Logging products
KARITE	Karité	Shea
AUTR_PROD_CUEIL	Autres produits de cueillette	Other harvested products
PROD_PEC_PISC	Produits de pêche et pisciculture	Fishing and fish farming products
PROD_CHASS	Produits de chasse	Hunting products
OR_SERV_EXPLO	Produits or	Gold products
AUTR_MINE_META	Autres minerais métallurgiques	Other metallurgical ores
AUTR_PROD_EXTRACT	Autres produits d'extraction	Other extraction products
AUTR_SERV_SOUT	Autres services de soutien	Other support services
PROD_ABBAT	Produits des abbâts	Offal products
POISSON_PEC	Poisson crustacés et mollusques transformés	Processed fish crustaceans and molluscs

PROD_TRANS	Produits transformation et conservation des fruits et légumes	Fruit and vegetable processing and preservation products
CORPS_GRAS	Corps gras d'origine animale et végétale	Fats of animal and vegetable origin
PROD_LAIT	Produits laitiers et crèmes glacées	Dairy products and ice cream
PROD_TRAV_GRAIN	Produits des travaux de grains et fabrication de produits amylacés	Products of grain processing and manufacture of starch products
AUTR_PROD_BASECERA	Autres produits à base de céréales	Other cereal products
ALI_ANIMAUX	Aliments pour animaux	Food for animals
SUCR_CONFIS	Sucre et confitures	Sugar and jams
CONDIM	Condiments	Condiments
CAFE_THE_AUTR_PROD_ALI	Café et autres produits alimentaires	Coffee and other food products
BOISSON	Boisson	Beverage
TABA	Tabac	Tobacco
FILS_TIS_TEX	Fils tissus et textile	Fabric and textile yarns
ART_HABI	Articles d'habillement	Clothing items
CUIR	Produits de Fabrication de cuir et d'articles de cuir	Leather and Leather Goods Manufacturing Products
PROD_TRAV_BOI	Produits du bois hors meubles	Non-furniture wood products
PROD_TRAV_PAP	Produits papiers et du carton	Paper and cardboard products
TRAV_IMPRE	Produits imprimerie	Printing products
PROD_RAFI_AUT_PROD_CHIM	Produits raffinerie et chimiques	Refinery and chemical products

PROD_FAB	Produits de fabrication	Manufacturing products
SERV_REPA	Services de réparation	Repair services
ELEC_GAZ	Produits électricité et gaz	Electricity and gas products
EAU_ASSAIN	Produits eau et assainissement	Water and sanitation products
BATIM	Produits bâtiments	Building products
PROD_CONS_BATI	Produits de Construction de bâtiments et des travaux de Genie civils	Construction products for buildings and civil engineering works
OUVRA_TRAV_CONS	Produits des ouvrages travaux et construction	Income from works and construction
SERV_CONS	Services spécialisés de construction	Specialized construction services
SERV_ENTR_AUTO	Services Entretien et réparation de véhicules automobiles	Motor vehicle maintenance and repair services
SERV_ENTR_MOTO	Services Entretien et réparation de motocycles	Services Maintenance and repair of motorcycles
SERV_TRANS_FEROV	Services transport ferroviaire	Rail transport services
SERV_TRANS_ROUT	Services transport routier	Road transport services
SERV_TRANS_AER	Services transport aérien	Air transport services
SERV_ENTREP	Services Entreposage et activités auxiliaires de transport	Services Warehousing and auxiliary transport activities
SERV_POST_COUR	Services des postes et courriers	Post and courier services
SERV_HEBER	Services hébergements	Accommodation services
SERV_RESTAU	Services Restauration et activité des débits de boisson	Services Catering and activity of drinking establishments

PROD_CINEMA	Produits de cinéma	Cinema products
SERV_TELE_RADIO	Services de programmation télévisuelle et de radiodiffusion	Television programming and radio broadcasting services
SERV_DES_INF_INFOS	Services informatiques conseil programmation	IT services consulting programming
SERV_TELEC	Services télécommunications	Telecommunications services
SERV_BANC	Services bancaires	Banking services
SERV_AUTR_ETAFIN	Services autres établissements financiers à caractère bancaire	Services of other financial establishments of a banking nature
SERV_MICROFIN	Services de de microfinance et des autres établissements financiers à caractère bancaire	Microfinance services and other financial institutions of a banking nature
SERV_ASSURA	Services assurance	Insurance Services
SERV_AUXFINAN	Services d'auxiliaires financiers et d'assurance	Financial auxiliaries and insurance services
SERV_IMMO	Services immobiliers	Real estate services
SERV_PUB	Services Publicité et études de marché	Advertising and market research services
SERV_JURID	Services juridiques et comptables	Legal and accounting services
SERV_SIEGES	Services des sièges sociaux conseil en gestion	Management consulting head office services
SERV_ARCHI	Services d'architecture d'ingénierie et techniques	Engineering and Technical Architecture Services
SERV_RD	Services de Recherche-Développement	Research and Development Services
AUTR_SERVPROF	Autres services professionnels spécialisés	Other specialized professional services
SERV_VETER	Services vétérinaires	Veterinary services

SERV_LOCA	Services location bail	Leasing services
ENQ_SECU	Enquête sécuritaire	Security investigation
SERV_RHU	Services ressources humaines	Human resources services
SERV_VOYAGES	Services des agences de réservation et voyagistes	Services of booking agencies and tour operators
SERV_SOUTBAT	Services de soutien bâtiments aménagement paysager	Landscaping building support services
SERV_SOUTENTR	Services de soutien aux entreprises activités de bureau	Business support services office activities
SERV_ADPUB	Services Administration publique	Services Public administration
EDUCA	Éducation	Education
SERV_SANTE	Services de santé humaine	Human health services
SERV_HEBER_MEDICO	Services d'hébergement médicosocial et social	Medico-social and social accommodation services
SERV_ACTSOCIA	Services d'action sociale sans hébergement	Social action services without accommodation
JEUX	Jeux de hasard et d'argent	Games of chance and money
ACT_CREATIVES	Produits activités créatives	Creative activity products
SERV_SPORTIV	Services sportifs récréatifs et de loisir	Recreational and leisure sports services
SERV_CONSERV	Services de conservation	Preservation services
SERV_ASSOCI	Services organisations associatives	Services for associative organizations
SER_PERSO_AUTR	Autres services professionnels	Other professional services

A.2.1 Converting the social accounting matrix for 2019 to a supply-and-use table for 2019

The conversion from a social accounting matrix to a supply-use table was necessary in order to have a sufficient disaggregated economic framework for better simulation results. Starting from a 2019 SAM of 96 products and 90 branches, it was possible to reconstruct on the one hand the table of resources and on the other hand the table of uses, both necessary for the constitution of the disaggregated SUT 2019.

The supply table was constructed by calculating the components of the supply (resources) of the economy from the production by industry, adding to this the imports by industry, which gives the total supply by industry of the economy and also adding the taxes on the corresponding products. The matrix thus obtained measures the outputs by industry, the total sum of which provides the overall output of the economy.

The table of uses was obtained by calculating the intermediate consumptions of the different industries, which made it possible to obtain the total of the intermediate consumptions used for each product. The other components of the demand are also calculated (Final consumption of households, final public consumption plus that of NPISHs, Gross Fixed Capital Formation plus changes in inventory and finally exports). This leads to the final demand for each product of the economy on row. The matrix thus constituted constitutes the matrix of uses in the economy, the total sum of which provides the total demand of the national economy.

However, as the two tables are to be considered at basic prices, it was necessary to calculate and subtract the taxes on the products in the matrix of uses. So, for the conversion from the uses table at purchaser's prices to a table at basic prices, we used the product taxes from the supply table to calculate the percentage of taxes on the product of total supply (domestic production + imports + product taxes) for each product in row. This percentage is then subtracted from all entries in the corresponding row in the use table. The calculations ultimately lead to two supply and use tables perfectly balanced at basic prices.

The total value added (GDP) obtained for the whole economy is ultimately consistent with the total value of production of the original SAM and otherwise all major accounting identities are equal in the three calculation options of production (uses, supply and revenue).

Total production + Imports + Taxes on products = Total intermediate consumption + total final demand for products

GDP = Final consumption + Investment + Exports – Imports = Total added value of the industries + Taxes on products + Intermediate demand = Compensation of employees + Net taxes on production (including subsidies) + Net operating surplus

A.2.2 Split of sustainable tourism industries

The national statistics classify "Hosting services" and "Restaurant services and drinking establishment services" as tourism expenditures. In addition, we classify spending on "Services of booking agencies and tour operators". The corresponding industries that provide the largest share of these services are "Accommodation", "Catering and activity of drinking establishments" and "Activities of booking agencies and tour operators". For GJAM Burkina Faso, we follow the usual procedure as described in the GAIN Training Guidebook to split the sustainable industries from the conventional industries. Here, we assume that sustainable activities have a share of 2.5 per cent in 2019. As a default, the sustainable industry therefore uses 2.5 per cent of the inputs, while the conventional industry uses 97.5 per cent of the inputs. Those are the entries in green font colour in table 6 below. The main differences between the production patterns of sustainable and conventional industries are that the sustainable industries have:

- Double the share of vegetarian inputs (blue),
- A 20 per cent share of use of meat-based products (red),
- A 20 per cent share of use of energy products (petroleum, electricity, gas), manufactured products and waste and water services (red),
- A 20 per cent share of the use/no use of motor vehicles maintenance and repair services as well as road and air transport services (red),
- Double the share of landscape building support services (nature conservation) (blue),
- The product "Drinks" has been used to balance the product use, and thus was manually altered by a few percentages to get the 2.5 per cent / 97.5 per cent share correct (dark green), and
- For Activities of booking agencies and tour operators, some products are only used by the conventional industry, such as road and air transport (black). Sustainable tourism is assumed to use less carbon intense modes of traveling such as walking tours or bicycles.

These qualitative assumptions (more vegetarian-based food, less meat-based food, lower energy and waste use, lower manufacturing inputs and a higher share of spending on landscape conservation in the proximity of the establishments) are based on a review of the literature on sustainable tourism industries and the understanding of sustainable tourism in the Draft National Sustainable Tourism Industry. However, the exact quantification (double the share and a 20 per cent share) was done by the authors of this report, based on the various and partly conflicting numbers found in the literature.

Table 7. Split of sustainable tourism industries

	Accommodation	Sustainable Accomodation	Catering and activity of drinking establishments	Sustainable Catering and activity of drinking establishments	Activities of booking agencies and tour operators	Sustainable Activities of booking agencies and tour operators
Cereals	0.0	0.0	5154.5	271.3	0.0	0.0
Tubers	61.6	3.2	2364.5	156.0	0.0	0.0
Dried leguminous vegetables	42.1	2.2	1766.2	93.0	0.0	0.0
Sesame and other oilseeds	18.4	1.0	757.6	39.9	0.0	0.0
Cotton	0.0	0.0	0.0	0.0	0.0	0.0
Cotton ginning products	0.0	0.0	0.0	0.0	0.0	0.0
Fresh vegetable plants seeds and flowers	2.3	0.1	107.2	5.6	0.0	0.0
Cashew fruits and nuts	271.5	14.3	2813.9	148.1	0.0	0.0
Other cultivated fruits and nuts	0.0	0.0	0.0	0.0	0.0	0.0
Other agricultural products	0.0	0.0	132.3	10.1	0.0	0.0
Agricultural support services	0.0	0.0	0.0	0.0	0.0	0.0
Cattle	25.9	0.1	50915.4	255.9	0.0	0.0
Sheep and goats	124.5	0.6	17777.1	89.3	0.0	0.0
Poultry	237.0	1.2	9630.4	48.7	0.0	0.0
Other Animals and Livestock Support Activities	26.7	0.1	296.5	1.5	0.0	0.0
Forestry products	0.0	0.0	0.0	0.0	0.0	0.0
Logging products	0.0	0.0	140.2	3.6	0.0	0.0
Shea	0.0	0.0	0.0	0.0	0.0	0.0
Other harvested products and forestry support services	0.0	0.0	0.0	0.0	0.0	0.0
Fishery and fish farming products	0.0	0.0	28683.2	735.5	0.0	0.0
Hunting products and related activities	0.0	0.0	540.1	2.7	0.0	0.0
Gold	0.0	0.0	0.0	0.0	0.0	0.0
Other metallic ores	0.0	0.0	0.0	0.0	0.0	0.0
Other extraction products	0.0	0.0	0.0	0.0	0.0	0.0
Mineral exploration and prospecting services	0.0	0.0	0.0	0.0	0.0	0.0
Products of slaughter, processing and preservation of meat	343.9	1.7	22265.6	111.9	0.0	0.0
Prepared fish and fish products	0.0	0.0	0.0	0.0	0.0	0.0
Production Processing Storage Vegetables	347.4	24.3	3921.8	254.4	0.0	0.0
Fats of animal and vegetable origin	104.0	2.7	1826.2	46.8	0.0	0.0
Dairy products and ice cream	0.0	0.0	0.0	0.0	0.0	0.0
Worked grain products and starch products	134.3	5.0	2166.6	55.6	0.0	0.0
Other grain-based food products not elsewhere accounted for	401.1	10.3	11010.6	282.3	0.0	0.0
Food for animals	0.0	0.0	0.0	0.0	0.0	0.0
Sugar confectionery chocolates and other cocoa-based products	123.0	3.2	624.6	16.0	0.0	0.0
Condiments and seasonings	0.0	0.0	29.4	0.8	0.0	0.0
Coffee and tea and other food products	103.5	2.7	1071.8	27.5	0.0	0.0
Drinks	3943.8	110.4	54636.9	1028.6	0.0	0.0
Tobacco	0.0	0.0	0.0	0.0	0.0	0.0
Yarn fabrics textile other non-clothing textile articles	7.2	0.2	24.9	0.6	0.0	0.0
Clothing items	11.8	0.3	34.5	0.9	0.0	0.0
Worked leather and travel items	0.0	0.0	0.0	0.0	0.0	0.0
Woodworking products excluding furniture	0.0	0.0	0.0	0.0	0.0	0.0
Paper and board products	6.4	0.2	4.0	0.1	5.1	0.1
Print jobs and recording reproduction	0.0	0.0	0.0	0.0	0.0	0.0
Refinery products and other chemicals	27.1	0.1	135.8	0.7	432.2	2.5
Products of manufacturing activities	54.9	0.3	174.6	0.9	5.4	0.1
Repair and installation of machinery and equipment	21.1	0.5	10.5	0.3	0.0	0.0
Electricity gas	115.7	0.6	126.3	0.6	11.9	0.3
Distributed water products from sanitation waste management and recovery	4.6	0.0	26.2	0.1	0.0	0.0
Complete buildings	0.0	0.0	0.0	0.0	0.0	0.0
Building construction products	0.0	0.0	0.0	0.0	0.0	0.0
Civil engineering works and construction works	0.0	0.0	0.0	0.0	0.0	0.0
Specialized construction services	0.0	0.0	0.0	0.0	2.2	0.1
Motor vehicle maintenance and repair services	3.1	0.0	4.9	0.0	11.2	0.0
Motorcycle maintenance and repair services	0.0	0.0	0.0	0.0	0.0	0.0
Rail transport services	0.0	0.0	2.3	0.0	0.0	0.0
Road transport services	2.4	0.0	14.6	0.1	55.9	0.3
Air transport services	0.0	0.0	0.0	0.0	204.8	1.0
Warehousing services and transport auxiliaries	0.0	0.0	72.6	1.3	0.0	0.0
Post and courier services	0.0	0.0	0.0	0.0	0.0	0.0
Hosting services	0.0	0.0	0.0	0.0	0.0	0.0
Restaurant services and drinking establishment services	0.0	0.0	0.0	0.0	0.0	0.0
Revenue from film and television programming activities	0.0	0.0	0.0	0.0	0.0	0.0
Broadcast television programming services	0.0	0.0	0.0	0.0	0.0	0.0
Information and computer services consulting programming	1.4	0.0	0.0	0.0	0.0	0.0
Telecommunications services	47.2	1.2	64.9	1.7	15.0	0.4
Banking services	26.6	0.7	58.0	1.5	18.5	0.5
Services of other financial institutions of a banking nature	0.0	0.0	0.0	0.0	0.0	0.0
Microfinance services and other financial institutions of a banking nature	0.0	0.0	2.1	0.1	0.0	0.0
Insurance Services	1.1	0.0	5.4	0.1	12.0	0.3
Financial auxiliaries and insurance services	0.0	0.0	0.0	0.0	0.0	0.0
Real estate services	0.0	0.0	0.0	0.0	110.6	18.5
Advertising and market research service	3.1	0.1	0.0	0.0	0.0	0.0
Legal and accounting services	0.0	0.0	0.0	0.0	1.3	0.0
Management consulting head office services	0.0	0.0	0.0	0.0	0.0	0.0
Architectural, engineering and technical services	0.0	0.0	0.0	0.0	0.0	0.0
Research-Development Services	0.0	0.0	0.0	0.0	0.0	0.0
Other specialized professional services	0.0	0.0	2.3	0.1	3.4	0.2
Veterinary services	0.0	0.0	0.0	0.0	0.0	0.0
Rental and leasing services	0.0	0.0	0.0	0.0	70.9	1.8

Continue Table 7. Split of sustainable tourism industries

	Accommodation	Sustainable Accomodation	Catering and activity of drinking establishments	Sustainable Catering and activity of drinking establishments	Activities of booking agencies and tour operators	Sustainable Activities of booking agencies and tour operators
Investigations and Security	0.0	0.0	0.0	0.0	0.0	0.0
Human Resources Services	247.6	6.3	0.0	0.0	0.0	0.0
Services of booking agencies and tour operators	0.0	0.0	0.0	0.0	0.0	0.0
Landscaping building support services	7.2	0.4	2.3	0.1	1.2	0.1
Business support services office activities	1.2	0.0	0.0	0.0	0.0	0.0
Public administration services	0.0	0.0	0.0	0.0	0.0	0.0
Education Services	0.0	0.0	0.0	0.0	0.0	0.0
Services for human health	0.0	0.0	0.0	0.0	0.0	0.0
Medico-social and social accommodation services	0.0	0.0	0.0	0.0	0.0	0.0
Social action services without accommodation	0.0	0.0	0.0	0.0	0.0	0.0
Games of chance and money	0.0	0.0	0.0	0.0	0.0	0.0
Services Creative artistic activities and shows	0.0	0.0	0.0	0.0	0.0	0.0
Recreational and leisure sports services	0.0	0.0	0.0	0.0	0.0	0.0
Heritage conservation and enhancement services	0.0	0.0	0.0	0.0	0.0	0.0
Services of membership organizations	0.0	0.0	0.0	0.0	0.0	0.0
Services from other personal service activities	0.0	0.0	0.0	0.0	0.0	0.0
TAXES ON PRODUCTS	352.7	9.0	4605.2	118.1	38.5	1.0
Net taxes on production (incl subsidies)	269.7	6.9	15652.5	401.3	20.1	0.5
Compensation of employees	4607.6	118.1	10490.7	269.0	202.8	5.2
Net operating surplus	2264.0	58.1	185306.1	4751.4	808.8	20.7
Total value added	**7141.3**	**183.1**	**211449.3**	**5421.8**	**1031.7**	**26.5**
Total industry output	15060.5	386.2	442173.2	9234.6	2031.8	53.6

A.2.3 Split of sustainable tourism products

The model does not differentiate between sustainable and unsustainable tourism products ("Hosting services", "Restaurant services and drinking establishment services", "Services of booking agencies and tour operators"). In the scenarios, these products are increasingly offered by the sustainable industries (Sustainable Accommodation, Sustainable Catering and activity of drinking establishments, Sustainable Activities of booking agencies and tour operators), that is, the market shares of the sustainable industries increase, while those of the corresponding conventional industries decrease.

A.5 Measuring impacts

A.3.1 Labour extensions

The data in Excel format (labour.xlsx) is available upon request. Original data from the 2019 SUT, in 34 industries (sheet: labour_filled):

data from SUT 2019 (34 industries, 42 products)				
Effectifs employés par branche	Agriculture vivrière	Agriculture de rente	Egrenage coton	Elevag activ annex l'élev
➢ Salariés	27 680	22 625	5 978	
➢ Patrons	2 385 844	160 115	-	2
➢ Aides familiaux	4 777 695	327 790	-	3

Categories available:

- **Salaried employees (Salariés):** Workers with formal contracts, earning salaries (compensation of employees / Rémunération des salaries).
- **Self-employed (Patrons):** Workers without formal contacts or formal employment link. These are employers (owners of businesses who employ other people), entrepreneurs, consultants, artisans, subsistence workers, sellers of wood and charcoal as well as workers in the informal economy.
- **Contributing family workers (Aides familiaux):** Workers whose main occupation is the business of their family (such as family farms, family businesses and caregivers). Family workers can be paid or unpaid.

We used the following steps:

1. Build a concordance matrix between disaggregated and aggregated industries (sheet: bridge_SUT_agg2detailed).
2. Estimate the share of compensation of employees (Rémunération des salaries) and other net operating surplus / mixed income (Excédent brut d'exploitation / revenu mixte) to disaggregate each detailed industry into the aggregated industries (sheet: share_COE and share_ONOS). Example:

- The livestock industries (in aggregated SUT: Élevage et activités annexes à l'élevage) correspond to 4 industries in the 90 classification (Elevage de bovins, Elevage d'ovins et de caprins, Elevage de volailles, Elevage d'autres animaux et activités de soutien à l'élévage). The distribution of total compensation of employees and mixed income of these industries are:

	ELEV_BOV	ELEV_OV_CAPR	ELEV_VOL	
Salaries	**1693**	**76**	**405**	**1589**
Share of salaries	**45.0%**	**2.0%**	**10.8%**	**42.2%**
Mixed income	**163991**	**101773**	**111984**	**10373**
Share of mixed income	**42.3%**	**26.2%**	**28.9%**	**2.7%**

3. These shares are used to distribute the workers from each aggregated industry into all disaggregated industries, considering the following assumptions:

- Salaried employees are distributed based on salaries (compensation of employees, the *Share of salaries* in the table above) and
- Self-employed and contributing family workers are distributed based on other net operation surplus and mixed income (the *Share of mixed income* in the table above).

4. Allocated extensions in the available categories, in the correct format for input into the model, is in the sheet: labour.
5. **If there are more indicators,** they can be applied to the existing employment indicators. For example, if there is information that 55 per cent of the workers in agriculture are women, we multiply the employment in every disaggregated industry corresponding to "agriculture" by the share of female employment, to arrive at a new indicator, "Female employment".

A.3.2 GHG extensions

The data in Excel format (GHG.xlsx) is available upon request. Original data from the 2017 GHG inventory, in 15 individual activities (sheet: GHG_original):

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	NET CO2 (GG)	CH4 (GG)	N2O (GG)
Total National Emissions and Removals	48 109.92	647.43	32.09
1 - Energy	3 896.08	39.27	0.85
1A - Fuel Combustion Activities	3 896.08	39.27	0.85
1A1 - Energy Industries	814.38	1.89	0.25
1A2 - Manufacturing Industries and Construction (ISIC)	65.62	0	0
1A3 - Transport	2 754.90	0.62	0.15
1A4 - Other Sectors	261.19	36.75	0.45
1A5 - Other	0	0	0
1B - Fugitive Emissions from Fuels	0	0	0
1B1 - Solid Fuels	0	0	0
1B2 - Oil and Natural Gas	0	0	0
2 - Industrial Processes	87.22	0	0
2A - Mineral Products	66.27	0	0
2B - Chemical Industry	0	0	0
2C - Metal Production	1.49	0	0
2D - Other Production	0	0	
2E - Production of Halocarbons and Sulphur Hexafluoride			
2F - Consumption of Halocarbons and Sulphur Hexafluoride			
2G - Other (please specify)	19.45	0	0
3 - Solvent and Other Product Use	0	0	0
4 - Agriculture		465.88	25.39
4A - Enteric Fermentation		441.81	
4B - Manure Management		22.53	0
4C - Rice Cultivation		1.3	

4D - Agricultural Soils			25.36
4E - Prescribed Burning of Savannas		0	0
4F - Field Burning of Agricultural Residues		0	0
4G - Other (please specify)			
5 - Land-Use Change & Forestry	44 126.41	64.38	5.29
5A - Changes in Forest and Other Woody Biomass Stocks	43 909.94		
5B - Forest and Grassland Conversion	8 317.51	0.03	0
5C - Abandonment of Managed Lands	0		
5D - CO2 Emissions and Removals from Soil	-5 739.87		0
5E - Other (please specify)	-2 361.16	64.35	5.28
6 - Waste	0.2	78.15	0.59
6A - Solid Waste Disposal on Land		30.69	
6B - Wastewater Handling		47.02	0.57
6C - Waste Incineration	0	0	0
6D - Other (please specify)	0.2	0.44	0.02

GHG emissions are available in three gasses: CO_2, CH_4 and N_2O. Hydrofluorocarbons (HFCs) are not included in this analysis. The gases are described, in the model, in the unit of Gg of CO2-equivalents, by applying GWP-100 metric from the 6th Assessment Report from the IPCC:

	GWP-100
CO_2	**1**
CH_4, fossil	**29.8**
CH_4, non-fossil	**27**
N_2O	**273**

The GHG emissions and economic data correspond to two different years (2017 for emissions and 2019 for the SUT used in the GJAM model). Because we need emissions for 2019, we start by estimating emissions growth in the period. **This only works if the two years are close,** otherwise inflation can lead to an overestimate of emissions growth.

We used the following steps for the allocation:

For this, we do the following (sheet: GHG_allocation_aggSUT2017):

1. Identify which of the emission categories need to be allocated (the columns in red correspond to empty values or to values that summarize detailed activities and should not be counted).
2. Using the 2017 SUT (34 industries), we identify which activities apply to each industry. For example, emissions from energy industries correspond to energy conversion (production of electricity) while emissions from agricultural soils happens in all agricultural industries. These correspond to the concordance matrix in range C3:AU37.
3. Identify the indicator to distribute activities to industry, using the following assumptions:

    - Consumption of fossil fuels (Produits de raffinage et Cokéfaction) by industry and final demand, from the use table: used for distributing energy emissions (Activities 1 – Energy, 1A1 to 1A5).
    - Total value added per industry, from the use table: used for distributing the rest of the emissions (that is, the non-energy emissions, activities 2 – Industrial Processes, 4 – Agriculture and 6 – Waste).
    - Emissions from land-use change and forestry are not considered in the GJAM model, since they cannot be allocated to industries nor be linked to direct growth of industrial activity over time.
4. We estimate emissions growth between 2017 and 2019 based on the growth of energy use and value added in the relevant industries (rows 52 to 59).
5. GHG emissions are scaled up to 2019 (rows 61 to 67). Total GHG emissions are 5 per cent lower than in 2017, due to the decrease of CH_4 emissions from energy from other sectors (agriculture, commercial and residential).
6. Estimated emissions for 2019 are then allocated to the 90 SUT industries based on use of energy products and value added from the detailed SUT (sheet: GHG_allocation).
7. The final allocated emissions, in the format for inputs to the GJAM model, are available in the sheets "ghg" (emissions from industries) and "ghghh" (emissions from households). The final emissions categories are the following:

    - Energy CO_2 emissions
    - Industrial and waste CO_2 emissions
    - Energy and industrial CH_4 emissions
    - Agricultural and waste CH_4 emissions
    - Total N_2O emissions

LULUCF emissions

While agricultural emissions can be easily related to economic activity, emissions from Land Use, Land-Use Change and Forestry (LULUCF) cannot be allocated to the GJAM. This emissions category describes carbon emissions and sinks per land type and per change of use in land type between years. These include, for example, changes in forest and other woody biomass stocks; forest and grasslands conversions: abandonment of croplands, pastures, or other managed lands; changes in the carbon content of soil; or natural disturbances such as forest fires in managed or unmanaged lands when those disturbances are followed by land-use changes.

The emissions and sinks associated to land use and land-use change do not depend directly on economic activity, but on many different factors. The GJAM assumes a direct relationship between economic output and emissions. While this relationship can be assumed for the emission categories accounted in the model (for example, a higher output from animal husbandry would lead to higher emissions from manure management and enteric fermentation), the relationship between economic output and land-use change is not direct. Increased agricultural output comes, often, from increased productivity, and not necessarily from increased land use. For this reason, a direct correlation cannot be established between increased economic activity of different industries to changes in carbon emissions or sinks in the LULUCF accounts.

An approximation for reflecting emissions from land degradation and/or deforestation can be made by accounting for emissions from the burning of firewood and charcoal for cooking and heating. In countries with a large consumption of traditional biomass in households and economic activities, and where there are established links between collection of fuel wood and deforestation or land degradation, these emissions can be used as a proxy for covering parts of LULUCF emissions. The main assumption, in this case, is that the fuel wood was sourced from unmanaged lands and contributed to reduced carbon stock in forests, since managed forestry is not considered to represent net emissions.

A. 6 Areas of green jobs by priority sector in Burkina Faso

SECTOR	GREEN JOBS OPPORTUNITIES BY SECTOR
Agriculture	Production of organic manure (compost)
	Manufacturing fertilizer organic
	Design, manufacture and maintenance of low-carbon agricultural technologies (agricultural equipment)
	manufacture of biodegradable bags for bagging seeds and crops (rice, millet, corn, etc.)
Breeding	Forage production and use
	Manufacture and use of agro-industrial by-products
Forestry	wood production _ work
	plant production (nurseries, etc.)
	practice of the profession of ecotourist guide
	gardener job _
Fishing and aquaculture	Fish production (creation of fish farms);
	Production of other fish products such as the cultivation of spirulina.

Energy	Sectors for the production of energy technologies from renewable sources (biofuel, solar, wind, geothermal, etc.): these are jobs for: ¨technicians; ¨engineers; 32 ¨biofuel researchers and specialists
	sector (photovoltaic solar, Concentrated photovoltaic solar, thermodynamic solar or thermal solar for domestic use). These are specific jobs such as: ¨electricians, ¨repairers of photovoltaic panels, ¨cablers, etc.
	sectors /implementation of intelligent electricity networks or smart grids : these are essentially jobs linked to research and development activity
	sector for recycling and recovering waste into energy: jobs for: ¨technicians, ¨waste collectors; ¨unit processors/welders (crusher, etc.);
	sector : (production of biofuels (briquettes, coal) from agricultural waste: these are jobs for technicians and specialists in gasification, pyrolysis and torrefaction of biomass
Mining	Monitoring the implementation of Environmental and Social Management Plans and environmental inspections on mining sites;
	Capacity building and awareness-raising activities for the greening of mining sites;
	Control of the sale, purchase, transport and use of chemicals and equipment in mines;
	Manufacturing and marketing of approved equipment
Transportation	Production and distribution of low-carbon motorized intra-urban and inter-urban means of transport (electric motorcycles, electric individual vehicles, electric buses, etc.)
	Putting into circulation of intra - urban and inter - urban means of public transport (taxis, minibuses, buses, etc.);
	Production, distribution and maintenance of non-motorized transport;
	Activities of scrapping companies, processing of user vehicles; the recovery of materials and the treatment of residues (oil, scrap metal, plastics, used batteries, tires, etc.)

Water	Development of smart networks (“water grids ”);
	Design, marketing and maintenance of equipment suitable for water management;
	Monitoring and control of sustainable water resources management systems;
	Development of efficient techniques for sustainable management of water resources
	water font
Tourism	Heritage enhancement ecotourism
	Animation in ecotourism
	Facilitator in rural tourism and outdoor activities
	Design and construction of green leisure activities
	Naturalist / ecotourist guide
	Management of wildlife protection areas, for ecotourism purposes
	Site management ecotourism
Sanitation waste management _	Collection, transport and recovery of household waste
	Collection, transport and recycling of plastic waste
	Waste recovery electronic
	Sustainable management channels for faecal sludge, used oils, metals

Industry	Recycling and reduction of solid waste (plastic, cardboard, etc.)
	Recycling of liquid waste (wastewater, used oils, etc.)
	Rational water management _
	Promoting efficiency energy
	Use of energies renewable
	pollution prevention _
	Supply Green
	Green distribution
	Implementation of Corporate Social Responsibility

PAGE PARTNERSHIP FOR ACTION ON GREEN ECONOMY

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