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# JUST ENERGY TRANSITIONS AND PARTNERSHIPS IN AFRICA: A SENEGAL CASE STUDY

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The aim of this project was to discuss a variety of views therefore each paper does only reflect the views of the author(s) and not the views of other participants in the project or the Ukama network as a whole.

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# Ukama

Solidarity for prosperity

The Ukama platform aims at building an informal dialogue process between a diversity of African and European experts bringing together perspectives of the Europe-Africa cooperation, including Climate, Sustainable Development, Economic transformation, International Cooperation, Finance and Trade to facilitate the emergence of such shared expectations. The main objective of the platform is to convene critical thinkers to help set out the themes and issues that are relevant for shared sense of prosperity for Africa and Europe.

# JUST ENERGY TRANSITIONS AND PARTNERSHIPS IN AFRICA: A SENEGAL CASE STUDY

## Socio-economic context of Senegal

Senegal is located in the extreme west of West Africa with 700 km of coastline bordering the Atlantic Ocean. The country covers an area of 196,722 km<sup>2</sup>.

Senegal is located in the sub-Saharan part of Africa, with a Sudanese-Sahelian type of climate. The South is made up of forests, while the North is made up of savannahs with some trees and it is a semi-desert zone. It is characterized by the alternation of a dry season from November to mid-June and a wet and hot season from mid-June to October, with an average annual rainfall following a decreasing gradient from 1200 mm in the South to 300 mm in the North of the country. Its economy is characterized by a dominance of the tertiary and primary sectors (4.6% and 4.5% of GDP in 2019). Its population is estimated at about 17.7 million (projected 2022), of which 50.22% are women. In Senegal, the poverty rate is 41.2% in 2017 with a target of 33% in 2023 (DGPPE, 2018).

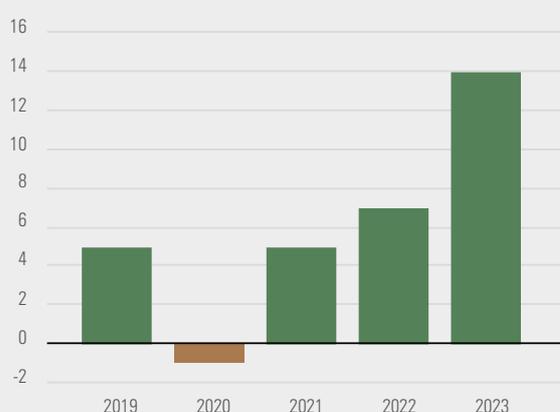
## Energy profile of the country

Senegal's energy situation is characterized by a predominance of petroleum products and biomass (EIS-Senegal 2019).

The country's **energy supplies** amounted to 4579 Ktoe in 2018 (compared to 4078 Ktoe in 2014, an increase of 12.29%), of which 53.48% were oil products and 35.27% biomass.

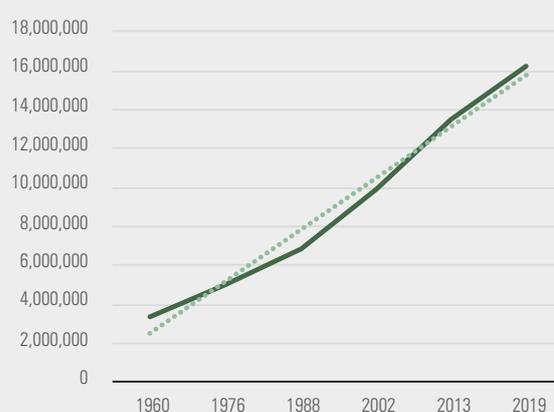
In terms of Senegal's energy supply, petroleum products represent up to 53%. To meet this primary energy demand, the bill for petroleum products is estimated at 805 billion CFA in 2018 compared to 184 billion CFA in 2000, increasing thereby its weight by 21% in the country's economy (SIE, 2019). In addition, universal access to electricity by 2025 remains a concern and a real socio-economic development issue in Senegal. The forthcoming exploitation of oil and gas in 2023 opens up new prospects and presents opportunities for lowering electricity production costs. The

**Figure 1.** Evolution of the GDP 2019 - 2023 ( % )



Source: National Agency for Statistics and Demography (Economic and social situation of Senegal, 2019)

**Figure 2.** Evolution of the population in Senegal 1960 - 2019

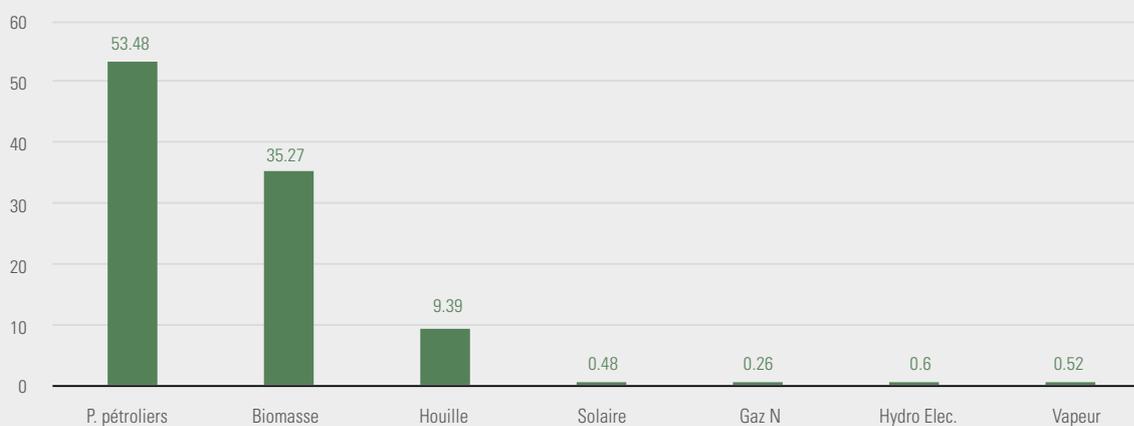


Source: National Agency for Statistics and Demography (Economic and social situation of Senegal, 2019)

**Table 1. Major indicators**

Indicators	Initial situation year	Value	Target 2023
GDP (in billion)	2018	13 407	22 218
GDP per capita (Constant S of 2011)	2017	2470	3341
HDI	2015	0.49	0.53
Infant mortality rate (per 1000)	2017	42	29.2
Maternal mortality ratio (per 100,000)	2017	236	178.4
Contraception prevalence rate	2017	28	34.1
Prevalence of severe malnutrition (% of children under 5 years)	2017	9	4.6
TBS in primary schools	2017	87.3	96.3
Average length of children in schools	2017	3.0	3.4
Gini index	2011	40.2	35.8
National poverty rate (%)	2017	41.2	33.0
International poverty rate (1.90 %)	2017	35.6	29.9
IADS	2013	2.85	1.8
Access to electricity (%)	2017	61.7	85.9
Access to electricity in rural areas (%)	2017	37.2	81.6
Renewable energies in the energy mix (%)	2017	17.23	29.2
Access to an improved water source (%)	2017	78.5	89.8
Access to an improved water source in rural area (%)	2017	67.6	81.3
Job creation per year (%)	2017	199 980	228 317
Proportion of the population that use Internet (%)	2017	25.66	46.41
Weight of industry in the GDP (%)	2017	20.6	25.0
Weight of agriculture in the GDP (%)	2017	15.4	16.22
Export per capita (FCFA)	2017	142 889	220 109

Source: Ministry of Economy, Planning and Cooperation (Cooperation Accelerated Priority Action Plan, 2021)

**Figure 3. Senegal's energy balance in 2019 (in %)**

Source: Ministry of Petroleum and Energy (Energy Information System, 2019)

transition expected through the “Gas to Power initiative” presents many prospects for carbon sobriety and resilience of populations. The expansion of the power generation fleet based on natural gas as outlined in the said strategy, mainly contributes to the achievement of the GHG emission reduction targets (NDC, 2020). With an average low emission level compared to fuel oil and coal, natural gas emits 12.3%eq CO<sub>2</sub> for the production of one kWh of energy. Thus, in Senegal's Nationally Determined Contribution, the penetration level of natural gas in the generation mix is estimated at 600 MW between 2025 and 2030 (CDN, 2020).

**Box 1: Gas to power strategy**

The «gas to power» strategy defines the basis for the development of electricity production from natural gas. The objective of this strategy is multiple and ambitious, in line with the commitments of the country's highest authorities:

- ▶ Gaining energy independence by securing SENELEC's fuel supply;
- ▶ To structurally abolish the tariff compensation paid by the State;
- ▶ Reduce considerably the cost of energy for the population and companies in Senegal;
- ▶ And finally, to achieve universal access to energy by 2025 as well as the objective of clean energy for all Senegal.

The convertible gas production capacity is estimated between 400 MW and 530 MW with an estimated investment need of 40.9 billion Francs. In addition, the construction of other power plants is planned with a total capacity of over 1000 MW.

**Total final energy consumption** is estimated at 2648 toe in 2018 (compared to 2715 ktoe in 2014, a decrease of 2.5%) with 39.26% for petroleum products and 38.6% for biomass. These consumptions are dominated by the household sector with 47.06% and the transport sector with 31.86%, followed by industry which absorbs the 14.96% (LPDSE, 2019).

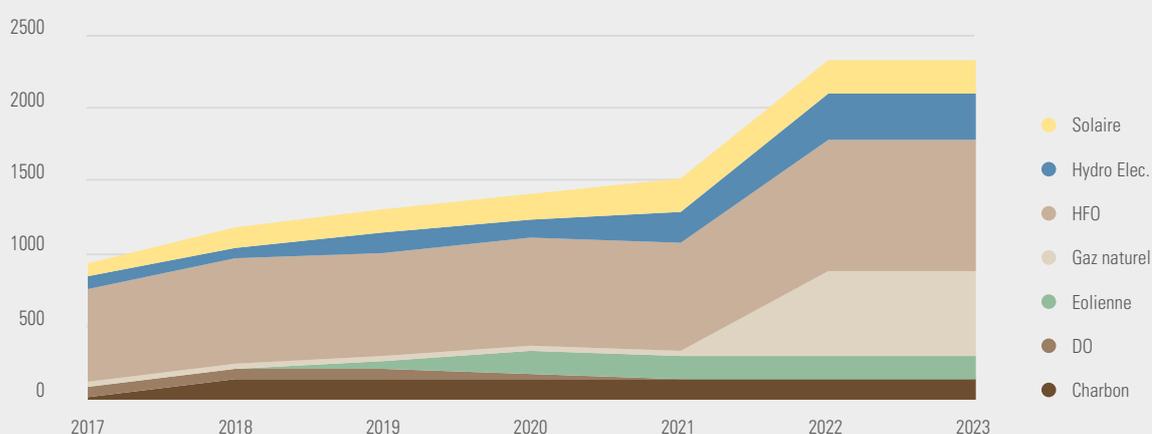
Within the majority sector, that of households, 82% of consumption is biomass (wood and charcoal), 10.93% of gas (LPG) and 7.2% of electricity (EIS, 2019).

In addition, it should also be noted that LPG constitutes nearly 7.6% of final energy consumption by product and that since 2010, butane gas is no longer fully subsidized. It remains only the removal of VAT.

**Access to electricity**

**The electricity generation fleet** has a total installed capacity of 1141 MW in 2018 (compared to 500 MW at the end of 2012) with an energy mix of 14% solar energy. Today, with the new solar power plants (Kaél (35 MW) in Diourbel and Kahone (25 MW) in Kaolack) and the 158.7 MW of the Taiba N'Diaye wind power plant, the penetration rate of renewable energy is around 30%, whereas in 2012 the share of renewable energy was around 7% (SENELEC).

**Figure 4. Evolution of the installed capacity in MW**



Source: Ministry of Petroleum and Energy (energy sector development policy letter 2019-2023, 2019)

**Table 2.** Evolution of the electrification rate in urban and rural areas

Description/Year	2012	2013	2014	2015	2016	2017	2018
Urban electrification rate	88	88	88	88,9	90,6	91,8	93,6
Rural electrification rate	27	29	29,5	30	32,2	39,9	42,3
National electrification rate	58	60,6	61,5	62	64	67,8	69,6

The rate of access to electricity: A strong disparity is noted in terms of access to electricity depending on the area of residence. In 2018 some 93.6% of urban households have access to electricity compared to only 42.3% in rural areas.

Senegal intends to achieve universal access to service in rural areas by 2025, one of the country's major energy challenges (ASER, 2020). With an estimated funding requirement of 660,353 million CFA, the five-year universal access plan will provide nearly three million people with access to electricity. This energy mix programme consists in a high penetration of renewable energies, particularly solar photovoltaic, interconnection to the sub-regional market and the use of natural gas in electricity production (LPDSE, 2019).

### Access to energy for cooking

The main fuels used for cooking are wood (45.2%, of which 32.8% is collected wood and 12.4% is purchased wood), gas (34.0%) and charcoal (18.7%) (ANSD, 2019).

In urban areas, charcoal remains the domestic fuel most used by households (41%) ahead of butane gas (39%) and wood (20%). However, in rural areas, firewood is the most used fuel (51%) then charcoal (25%) and gas (22%) follow, (Strengthening Access to Improved Stoves RFA, SEMIS 2021). There is a strong elasticity between income level and fuel type use. When household income increases, the use of firewood decreases in favor of butane gas and charcoal.

In order to minimize this heavy dependence on traditional fuels, which currently provide 88% of household energy needs (RFA, SMIS 2021), and to reduce deforestation, the Senegalese government, through its Nationally Determined Contribution

(NDC, 2020), plans to distribute approximately 800,000 improved stoves per year until 2030. At the same time, more than 2,000 biodigesters are installed in rural areas as part of the National Biogas Programme (PNB, 2022), with a view to installing 27,000 biodigesters by 2030.

In light of this profile, there is a real political will to promote renewable energies in order to accelerate access to electricity for some 2.5 million people in Senegal that do not have electricity. As part of the Universal Access to Electricity programme in 2025, 39% of localities will be electrified through mini-photovoltaic grid and autonomous solar photovoltaic power plants. According to the strategy, the SHS (Solar Home System) and other solar kits will be a powerful lever for universal access to energy with a view to reach households living in hamlets and often far from the grid. Indeed, out of the 4356 localities that will be electrified by autonomous PV systems, 3524 (81%) are listed as hamlets.

Senegal has just discovered oil and gas. This is seen as an opportunity to reduce energy access gaps and achieve universal access to energy services. Cumulative deep offshore gas resources in Saint Louis, Cayar and Sangomar are estimated at over 40 Tcf (Trillion Cubic Feet). With a production capacity of 2.5 million tons, the first phase of the Grande Tortue Ahmeyim field is estimated at 4810 million dollars (USD). For the Teranga and Yakaar fields intended for the domestic market with a capacity of 150 mmscfd. Their initial investment is estimated at 2000 million dollars (USD) (Petrosen).

The fundamental question is how, in the context of a country producing oil and gas that has signed the Paris Agreement, it can proceed with a partnership for a just energy transition? A partnership likely to meet both the requirements **of socio-economic progress and low carbon footprint.**

Therefore, a partnership for a just energy transition must address the following issues:

- i. **Sovereignty** to reduce the energy bill, the structural imbalance of the trade balance and the risks of inflation.
- ii. **Universal access to sustainable energy services**, available (in quantity/quality) and at lower cost to restore territorial and gender injustice in a perspective of industrialization and job and wealth creation for the empowerment of youth and women.
- iii. **Low carbon footprint and resilience** for the fulfillment of political commitments through the NDC under the Paris Agreement on climate change.
- iv. **Technology transfer** in a win-win partnership with the world, especially with the European Union.

## Stakeholder Dialogue on the Partnership for a Just Energy Transition

The recent oil and gas discovery in the country have repositioned the issue of transition. Just energy transition and partnership is understood by national stakeholders (see consultation process below) in terms of equity and inclusion in access to the country's fossil fuel and renewable energy opportunities. And this, in accordance with the Senegalese Constitution which states that **"natural resources belong to the Senegalese people"**.

Thus, the multi-stakeholder policy dialogue held in September 2022, under the initiative of ENDA-ENERGIE, places energy transition in a process of dynamic transformation of Senegal's energy system. This consists, on the part of the public authorities, in progressively reinforcing the use of sustainable energies in substitution to fossil energies in order to respond to the concerns of resilience of the populations and low carbon footprint. This constant search to promote conviviality between society and nature requires a choice of optimal energy trajectory. Stakeholders agree on the perception that energy transition refers to **"the gradual shift from fossil fuels to cleaner and decarbonized energy in the energy system"**,

For a just and equitable transition, the actors have designed a framework on the basis of priority issues which involve: social, economic, environmental, partnership, and governance dimensions.

### *Social resilience dimension for a just energy transition*

**People must be at the heart of a just energy transition:** The energy transition must first respond to **the requirement of universal access to modern energy services** at an affordable cost for the most vulnerable populations and businesses (small economic units in the informal sector and small and medium-sized enterprises and industries (SME/SMI)). The transition process must accelerate access to electricity for 2.5 million people in Senegal for both social and productive uses and for millions of households to clean cooking energy for a sound environment and public health.

Also, the energy transition will certainly create new jobs for young people, but also job losses in some sectors. For it to be just, it must provide a framework and ensure the reconversion of citizens who will be impacted, for example, fishing communities on the coast.

With the Energy-Water-Agriculture nexus approach, the TEJ can play a major role in strengthening inclusive food systems for food sovereignty.

### *The economic dimension of the energy transition*

Energy transition also contains the issue of the country's energy sovereignty. The country's energy independence, one of the major focuses of the "Gas-to-power" programme, guarantees the security of energy supplies in this increasingly complex geopolitical context with its multiple negative externalities. The example of the impact of the war in Ukraine on economies in terms of inflation and its implications on the cost of living for citizens is quite illustrative. Moreover, the reduction in the cost of electricity induced by the switch from heavy fuel oil to natural gas in the production of electricity can initiate a new industrialization at the national level and thus strengthen the creation of added value.

### *The technological and investment dimension*

Energy transition is taking place in the diversification of the energy mix both for electricity production and

for access to clean cooking energy. Thus, the deployment of renewable energy technologies (solar, wind, biofuels, etc.) with injection into the grid is an irreversible trend. However, local governments are ringing alarm bells to make this new dynamic more just and equitable. Many communities are giving authorization for land occupation to solar investors who produce and sell electricity through the interconnected grid without any guarantee of access for the local population. This social injustice must be lifted by, among other things, the supervision of communities through the erection of a local content of solar power plants with injection to the grid.

The rapid urbanization with the demographic growth of metropolises and the problems of congestion (mobility) also places the transport sector in a transition towards the use of solar electric vehicles to reduce the carbon footprint of cities.

**Box 2.** For example, according to the results of the city wide GHG inventory, Dakar is responsible for the total emission of 2,626,843 tons of carbon dioxide equivalent (tCO<sub>2</sub>eq) in 2016. In Dakar, average emissions per capita are estimated at 2.1 tCO<sub>2</sub>eq. Thus, compared to the national average (0.6 tCO<sub>2</sub>eq/inhabitant), an inhabitant of the city of Dakar emits 3.5 times more than an inhabitant of remote parts of Senegal.

Source: City of Dakar GHG Emissions Inventory Report, 2019, PCET Dakar

In addition, the switch from heavy fuel oil to natural gas for the power plants of the national electricity company (SENELEC), the “Gas to Power” programme, will be carried out to ensure the company’s security of supply in terms of low-carbon fuel. The convertible gas production capacity is estimated at between 400 MW and 530 MW with an estimated investment requirement of 40.9 billion francs.

In the framework of clean cooking energy, a major programme to disseminate some 2 million improved stoves is underway in Senegal, financed by the Green Climate Fund (GCF) and the BMZ.

### *The low-carbon footprint dimension for a just energy transition*

The country’s commitment requirements through the NDC under the Paris Agreement must reposition energy transition on a trajectory of low carbon optimization and resilience of the energy system itself.

Even if the stakeholders in the dialogue agreed on gas as a transition energy, they pleaded that the use of natural gas should not trap the development of renewable energies and that the resources from gas exploitation should progressively finance the transition to clean energy. This is especially important because energy transition is one of the four systemic transformation clusters selected in the initiative to co-construct a long-term low-carbon and climate change resilience strategy for Senegal. This initiative is part of the DDP (Deep Decarbonization Pathways) through the partnership between the Sustainable Development and International Relations Institute, IDDRI and ENDA ENERGIE with the financial support of the French Agency for Development (AFD).

The five (5) multi-sectoral groups of the said initiative are organizing consultations on the issues of the co-construction approach through high-level policy dialogues, conducting technical sessions on the low-carbon and climate change resilient trajectories.

### *Political and partnership dimensions for a just energy transition*

The adoption of a just energy transition strategy, its ownership and successful implementation depends on concerted cooperation between decision makers including local governments, the private sector, civil society organisations, technical and financial partners. This requires:

- First, strong political support from decision-makers for an open, responsible, inclusive and supportive governance of the energy sector. It is the decision-makers who have the legitimacy to make technical optimization choices and development trajectory models. The reinforcement of renewable energy penetration ambitions from 31% (solar, wind and hydro energies) in 2022 to 50% in 2030 is possible given the country’s natural endowments (for solar: 5.5 KWh/m<sup>2</sup>/day on the ground (ANER); for wind: less than 260 W/m<sup>2</sup> and for biomass: 1.5 tC/h/year (IRENA)). However, as mentioned above, oil and gas rents should gradually finance the strengthening of the transition to renewable energy. This reinforces the strong idea defended by ENDA ENERGIE during the dialogue on oil chaired by the President of the Republic (ENDA’s Contribution on the management of revenues

generated by the exploitation of oil and gas in Senegal- 12 June 2018).

- Then, the mobilization of investments to operate the technological choices through technical and financial partners, especially with the European Union;
- And finally, the involvement of the private sector and civil society organisations for social engineering to accompany the transition but also the development of decentralized technology markets through the deployment of renewable energy.

risks of social instability place the Africa-Europe partnership in a perspective of future energy supplies to these countries. Through the REPowerEU plan, Europe intends to reduce or even stop its gas imports from Russia (40% of European consumption) by 2027. Even if biogas and hydrogen could contribute to this reduction of about 30 billion cubic meters by 2030. There will still be a significant gap of 130 billion cubic meters (Enerdata, 2022). This gap will be filled by diversifying supplies from a number of countries, of which Senegal offers great LPG potential. Reserves intended for the local market and for import from which the EU could benefit in order to secure its gas supplies through JETP.

## Key players in the partnership for a just energy transition

The energy insecurity caused by the war in Ukraine and its negative impacts in terms of inflation and

**Table 3. Key actors in the transition**

Key actors in the transition	Positions and interests
<b>State</b> MEP COS Petrogaz ANER (National Agency for Renewable Energies) ASER (Agence Sénégalaise d'Électrification Rurale)	<ul style="list-style-type: none"> <li>• Energy sovereignty of the country for socio-economic development and security of energy supply</li> <li>• Optimization of the mix through modeling</li> <li>• Universal access to modern energy services for territorial and gender equity to reduce energy inequalities and injustices</li> <li>• More financial flows for oil and gas investments</li> <li>• Employability of youth and women</li> <li>• Partnership</li> </ul>
<b>Local governments</b>	<ul style="list-style-type: none"> <li>• Territorial equity in access to modern energy services with a territorialization approach to boost the local economy.</li> <li>• Promotion of decentralized energy for more specialized local enterprises</li> <li>• Need to transfer energy as a competence of local authorities in the framework of the decentralization process</li> <li>• Reduction of energy costs</li> </ul>
<b>CSOs (Civil Society Organizations)</b>	<ul style="list-style-type: none"> <li>• Universal access to modern energy services for households, businesses, schools and health facilities.</li> <li>• Strengthening the local content of the energy transition (TEJP)</li> <li>• The TEJP must accompany the deconstruction of the energy partnership with the European Union</li> <li>• Support for technology transfer at all levels</li> <li>• Designing demand-side energy models</li> <li>• Strengthening the dialogue between stakeholders</li> </ul>
<b>Private sector</b>	<ul style="list-style-type: none"> <li>• Promotion of the national and local private sector through winning a percentage of public contracts</li> <li>• Win-win partnership with foreign companies</li> </ul>

**Table 4. Technical and financial partners**

Partners	Initiative/programmes
<b>AFD, France</b>	Initiative for the co-construction of a long-term energy sobriety and resilience strategy for Senegal, in the framework of the DDP (Ministry of Environment and Sustainable Development, Ministry of Oil and Energy)
<b>GIZ PED II</b>	Programme for the Promotion of Sustainable Energy in Senegal (PED II) with a component on the energy mix scenario
<b>Platform1 2050 / BMZ, Germany</b>	Support for the definition of a long-term vision of low carbon and resilience (Ministry of Economy and Finance, Ministry of Environment and Sustainable Development, Ministry of Oil and Energy).
<b>World Bank</b>	«Gas to Power» programme »
<b>UNDP</b>	Accompanying the just energy transition and partnership through the development of economic models of decentralized solar electrification.

## The opportunities of a possible JETP agreement

The objective of a JETP agreement for a just energy transition in Senegal would be to ensure energy sovereignty that guarantees first and foremost universal access to low-cost, low-carbon energy services and the economic empowerment of citizens and the competitiveness of industry.

More specifically, it will involve mobilizing financing for appropriate investments, developing the external market for energy products, and ensuring technology transfer. Different opportunities for a possible JETP agreement in Senegal mentioned during the stakeholder consultation:

- ▶ The development of a culture of multi-stakeholder dialogue and the ease of creating spaces for policy dialogue around the JETP issue.
- ▶ A clear political vision of the possibilities for achieving energy independence in Senegal and securing fuel supplies for SENELEC.
- ▶ The need to reduce subsidies related to electricity tariff compensation and fuel bills.
- ▶ The requirements of employability of young people through the development of service companies, specialized in gas and oil and the expansion of the base of trades with the industry of processing of gas and oil at the national level;
- ▶ The potential for external investment to finance gas and renewable energy projects in Senegal.

## What should Europe do to improve JETP?

To improve the JETP in Senegal, Europe should:

- ▶ Help develop a long-term strategy and a just energy transition action plan.
- ▶ Promote a diplomacy focused on the **requirement of universal access to energy services to reduce energy poverty while moving towards the transformation of local value chains and the professionalization of local entrepreneurs.**
- ▶ Facilitate the mobilization of funding for the deployment of decentralized renewable energy systems, particularly solar.

- ▶ Supporting research and development within the framework of a development and technology transfer programme focused on improving the national innovation system.

## What should the case study country do on its own to improve a JETP?

Senegal needs to define a consensual vision that goes beyond the timeframe of the Energy Sector Development Policy Letter, which has a 5-year horizon. In this perspective, the exploration and development of low-carbon and climate-resilient trajectories will be of considerable help to policy-makers in defining and implementing the necessary regulatory, technical and financial frameworks. Indeed, the planning and modeling exercise of the energy transition to 2035 or even 2050 will allow to make appropriate strategic and technological choices to guarantee universal and modern access to energy services and to contribute to the climate change mitigation policy.

Moreover, Senegal would benefit from developing and implementing a more appropriate communication on the issue of oil and gas exploitation in order to better inform the Senegalese citizen who continues to have very high expectations.

## Actions require joint action - between Europe

- ▶ Financing in Senegal for energy and transport infrastructure, including discussing gas infrastructure;
- ▶ Energy technology transfer: joint implementation in Senegal of projects with high potential for transferring clean energy technologies;
- ▶ **Training and capacity building:** training and capacity building of Senegalese engineers through the Institut National of Oil and du Gaz (INPG), for the conduct of a just energy transition. Indeed, the existence of proven technical expertise through the partnership combined with the availability of

- investments for infrastructure will help promote access to energy services but also the development and implementation of territorial climate-energy plans to improve the carbon footprint of territories;
- Development of a communication strategy between the European Union and Senegal.
- Within the framework of decentralization and as part of territorial equity, support the territories to promote economic models of off-grid electrification with solar technologies;
- Supporting negatively impacted populations, particularly fisheries actors.
- Supporting research and development on the use of renewable energy in oil platforms to reduce the carbon footprint of oil companies.

## Barriers to a successful JETP and some measures to overcome these barriers

### Barriers to a successful JETP include

- Inadequate communication and lack of awareness raising
- The weakness of prospective exercises and/or analyses on the energy transition
- Lack of social dialogue and diplomacy could clash with the European Union's prioritization of clean energy for a just transition
- The propensity of Europe to want to privilege its own energy security first to the detriment of the producer country
- The weakness of the legal, regulatory and institutional framework for a partnership dedicated to a just energy transition.

### Recommendations

- Ensure the interrelation with the other transformational pillars (Agriculture, Transport, Industry, etc.) to implement mitigation measures and achieve sustainable development objectives through win-win partnership.
- Support the development of a framework for coordination and development of synergies between technical and financial partners of the energy transition.
- Strengthen the technical mechanism for prospective analysis of the different low-carbon and climate change resilient development trajectories
- Strengthen the social dialogue of all stakeholders to raise awareness of the mass on the issues of the just energy transition and partnership for more ownership of the processes underway;
- Strengthening information collection systems and access to quality data to improve planning and ensure performance and impact monitoring.

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