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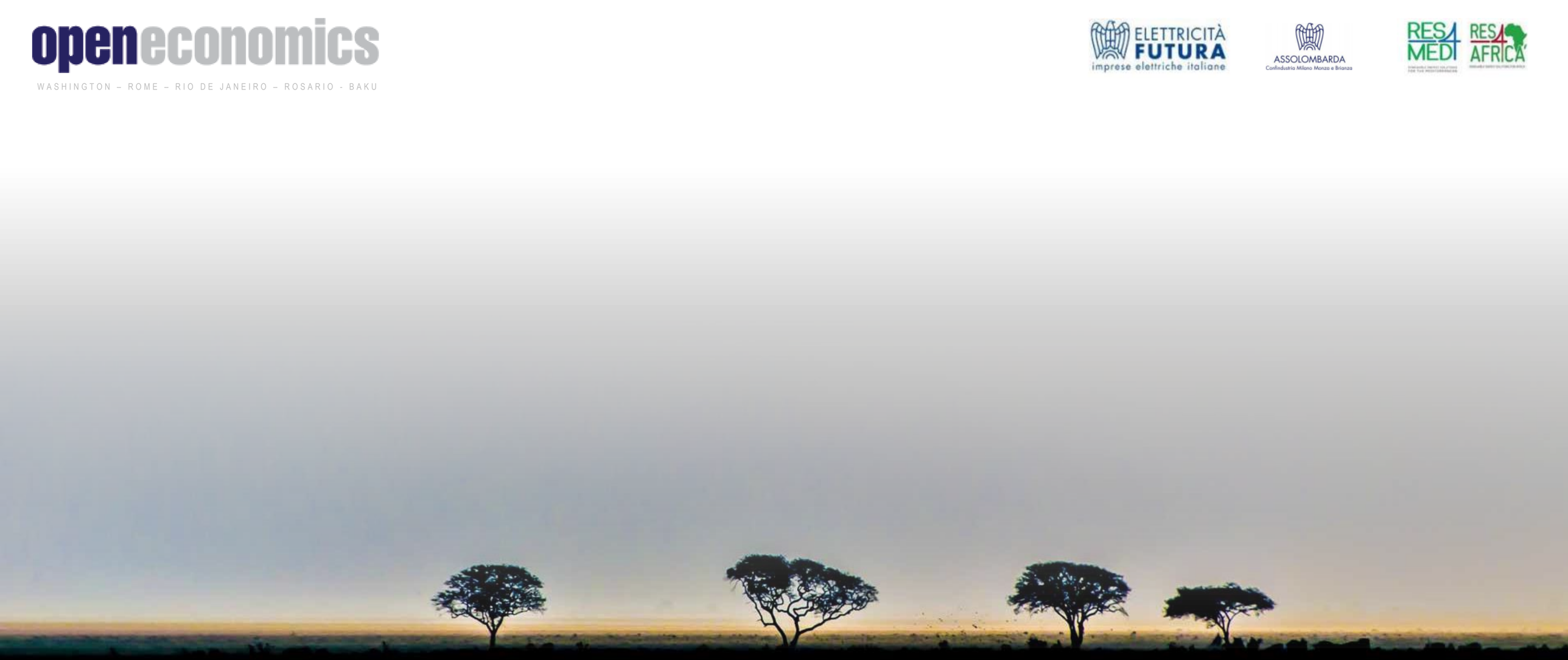

HOW TO MAXIMIZE CHANCES OF SECURING DEVELOPMENT FINANCE

ELETTRICITÀ FUTURA AND RES4MED | RENEWABLE ENERGY INVESTMENTS IN THE MEDITERRANEAN AND BEYOND | OCTOBER 30TH | MILAN

INDEX

ON THE DOCUMENT

SCOPE OF WORK

The purpose of the present document is to show a possible approach in estimating investment impact in developing regions in line with the best practices adopted for the assessment of investment projects and economic policies by the multilateral organizations, including the World Bank.

The analysis is related to two sample projects: a utility scale PV power plant in Algeria and an Offgrid solution for rural Sub Saharan Africa.

The outcome are indicative and have a pure demonstration purpose.

Among other indicators, the analysis will estimate the project impact on the local economy, social aspects and environment, and its contribution to supporting the Governments on a path towards sustainable economic growth for the country, characterized by a higher level of shared prosperity, social inclusion and employment.

Key indicators are provided as estimates of contribution to SGDs.

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LAST UPDATED

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ABOUT US

OE supports his clients in performing economic and financial valuations of investments and in building blended finance instruments

Cost-benefit and real option analysis of infrastructure investments

Project valuation and fairness opinions in energy, mining and other sectors

Political risk analysis, including macro-financial risks (FX Debts sustainability), sector policy frameworks, PPP and Public Procurement

Strategic advise on project & climate finance scouting, both upstream (country programming)

and downstream (Green Bonds sponsors, Blended Finance providers & Development Institutions supporting sustainable & resilient infrastructure in developing/emerging economies)

ABOUT

A spin-off of the Department of Economics at the University of Rome Tor Vergata, The founding group later joined an international group of professionals with a common experience with the World Bank and other multilateral organizations.

SERVICES

The company assists public administrations and private companies in evaluating investment policies, programs and projects, and structuring blended finance tools to support development and climate change related projects in emerging economies.

SKILLS

The company integrates scientific and economic skills with an in-depth knowledge of juridical frameworks and programming mechanisms of both local and multilateral financial institutions.

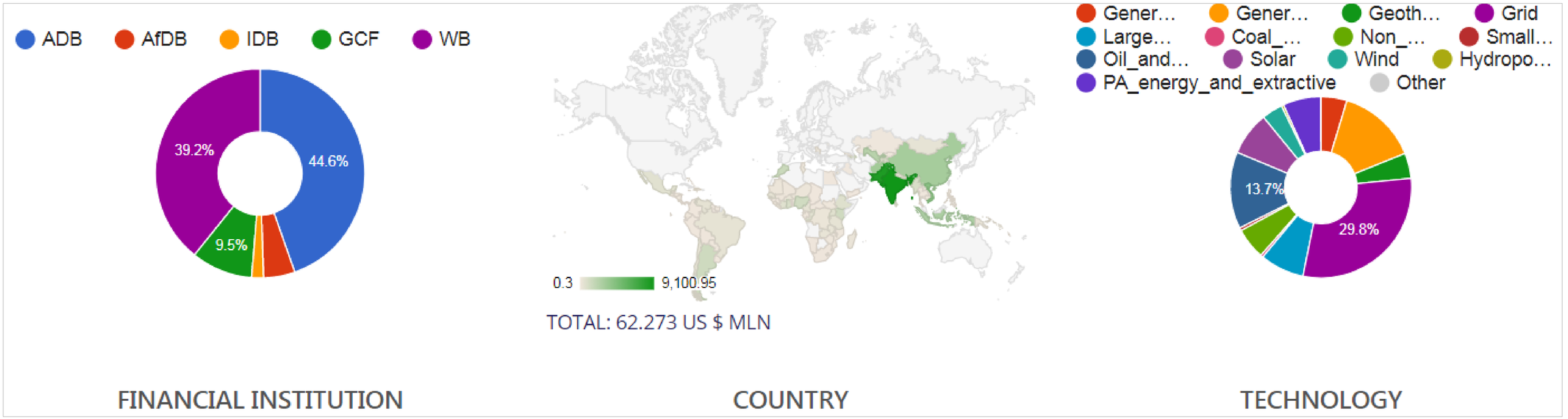
THE DEVELOPMENT FINANCE OPPORTUNITY

Energy transition presents unlimited opportunities to leverage technologies, competencies, DSGs targets and risk capital to foster innovation and investment in resilient infrastructure

Development finance solutions are key to reap these opportunities across borders in emerging and developing countries

The financial institutions for development and climate change are constantly searching for private business partners to pursue environmental and development goals through the implementation of projects with high economic and social impact

The achievement of SDG' targets (~4Trl$ x year) makes necessary to leverage the participation of private sector to cover the funding gap



DEVELOPMENT FINANCE FUNDING PROCESS

The process from the policy setting to the Corporate's investment is non linear and requires recursive adjustments

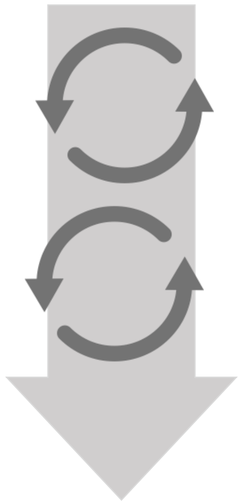
Programs and projects flow in the mainstream of political and financial relationships between Government and DFIs

No single avenues on transfers of funds but a constant alignment between targets and results

Approaching the decision makers since from the strategy stage increases the success rate

Public bodies and DFIs need robust and reliable analysis to evaluate the projects impact on the local economies and the environment

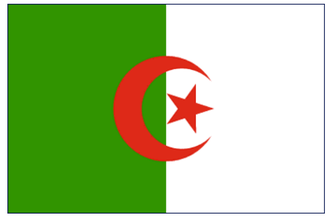
DFIs & GOVERNMENTS



POLICY SETTING	STAGE	TIMING	OWNER	OBJECT	FUNDS STATUS	FRAMEWORK
	STRATEGY	LONG TERM 3 - 5 Y	DFI	PROGRAMS	PLANNED	SKETCHY
	EXECUTION	MID TERM 2 - 3 Y	GOV + DFI	PROJECTS	APPROVED	DRAFT
	SPENDING	SHORT TERM < 2 Y	GOV	LOCAL FINANCIAL INSTITUTIONS	CONTRACTS CONCESSION PUBLIC/PRIVATE PARTNERSHIP INDIPENDENT POWER PROJECT	LOANS	ASSIGNED	FINAL
	FOREIGN EXCHANGE					OTHER FINANCIAL SOLUTIONS	SINGLE SOURCE	BLENDED

CORPORATE'S INVESTMENT

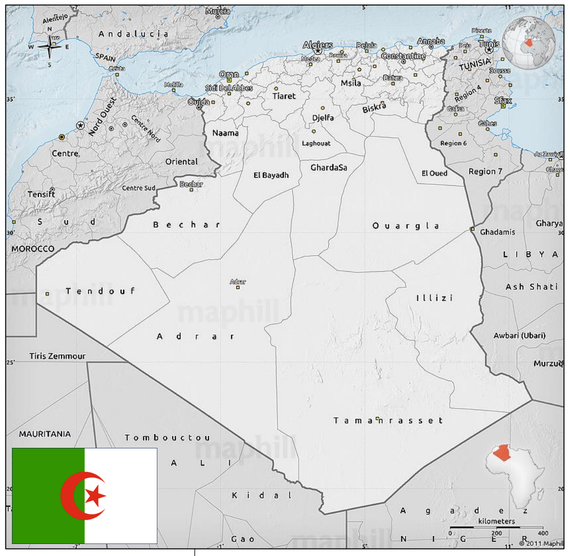
SAMPLE PROJECT 1
UTILITY SCALE PV POWER PLANT IN ALGERIA

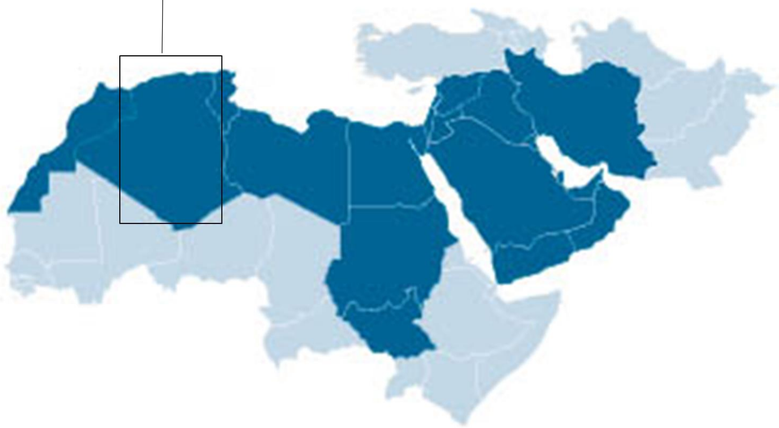


250
Mln USD

ALGERIA MARKET AND ELECTRICITY FRAMEWORK

IN 2011 ALGERIA'S ENERGY NEEDS WERE MET ALMOST EXCLUSIVELY BY HYDROCARBONS, MAINLY NATURAL GAS





Local Energy Policies

In 2011 Algeria adopted the Renewable Energy and Energy Efficiency Development Plan 2011-2030.

Updated in 2015, the program consists of:

22,000 MW of power generating capacity from RE sources

12,000 MW for domestic electricity demand

10,000 MW for export.

The review of the Plan puts greater focus on deployment of large-scale solar PV installations and onshore wind

The volume of natural gas saved by the 22 000 MW in renewable energy, will reach approximately 300 billion m3

The potential for biomass, geothermal and hydropower energies is comparatively very small

INDICATORS	ALGERIA	OECD
Energy use (kg of oil equivalent per capita)	1,321	4,145
Energy imports, net (% of energy use)	-177	21.0
Access to electricity (% of population)	100	100
Access to electricity, rural (% of rural pop.)	99.6	100
Access to electricity, urban (% of urban pop.)	100	100
CO2 emissions (kt) .000	145.4	12,138
CO2 emissions (tons per capita)	3.7	9.5
Electricity from renewables, no hydro (% of total)	0	9.1
Renewable output (% of total electricity)	0.4	22.0
Fossil fuel energy consumption (% of total)	100	80.2
Power consumption (kWh per capita)	1,356	7,995

SOURCE WORLD BANK DATABASE: ALGERIA 2014

SOLUTION AND SIMULATION SCENARIO FOR A PV POWER PLANT SOLUTION IN ALGERIA

UTILITY SCALE PV POWER PLANT IN ALGERIA

The project consists in developing a new pv power plant to help ensure reliable and clean energy supply both for the population (over 99% of which have access to electricity) and the productive sectors. Half of the production could be used for export according to National Energy Policy documents.

FRAMEWORK

Area	2.38 Mln Km2
Number of installations	1
People involved	40 Mln

SOLUTION AND PERFORMANCE

PV Installed	50 MW
DG Production	157 GWh/year

COST

Capex	250 Mln USD
Capex spent locally	20%

NOTE ON ASSUMPTION

Solutions are assumed to be realized in 5 years

50% used for national consumptions and 50% for export

SAMPLE PROJECT: UTILITY SCALE PV IN ALGERIA

IMPACT ON NATIONAL VARIABLES VS NO-PROJECT SCENARIO

The simulations developed suggest that the project impact is significant.
In particular, the model simulations suggest that the project would be an effective means to propel endogenous growth by increasing industrial productivity, and improving factor productivity.

Impact on value added shows a considerable increase (given the project size), generated by the increase of capital stock and higher productivity due to efficient electrification

AVERAGE ANNUAL INCREMENTAL VALUE ADDED / INVESTMENT

+ 0.25

The impact on production (direct and indirect) is driven by the increase of industry productivity (Through backward and forward linkages) and increase of energy exports

AVERAGE ANNUAL INCREMENTAL VALUE ADDED / INVESTMENT

+ 1.17

First consequence of the growth of capital stock is to enhance production for the domestic holders of capital

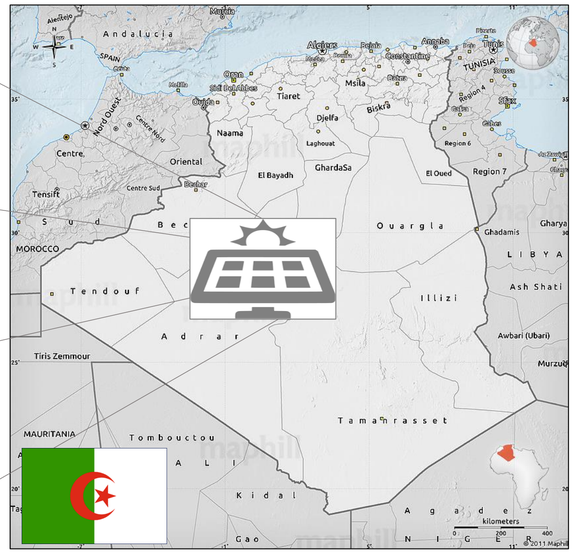
AVERAGE ANNUAL INCREMENTAL NOMINAL HOUSEHOLDS' INCOME / INVESTMENT

+ 0.45

Higher production and consumption boost annual local employment especially in industrial sectors and public services

INCREMENTAL STABLE JOB UNITS

+ 2,125

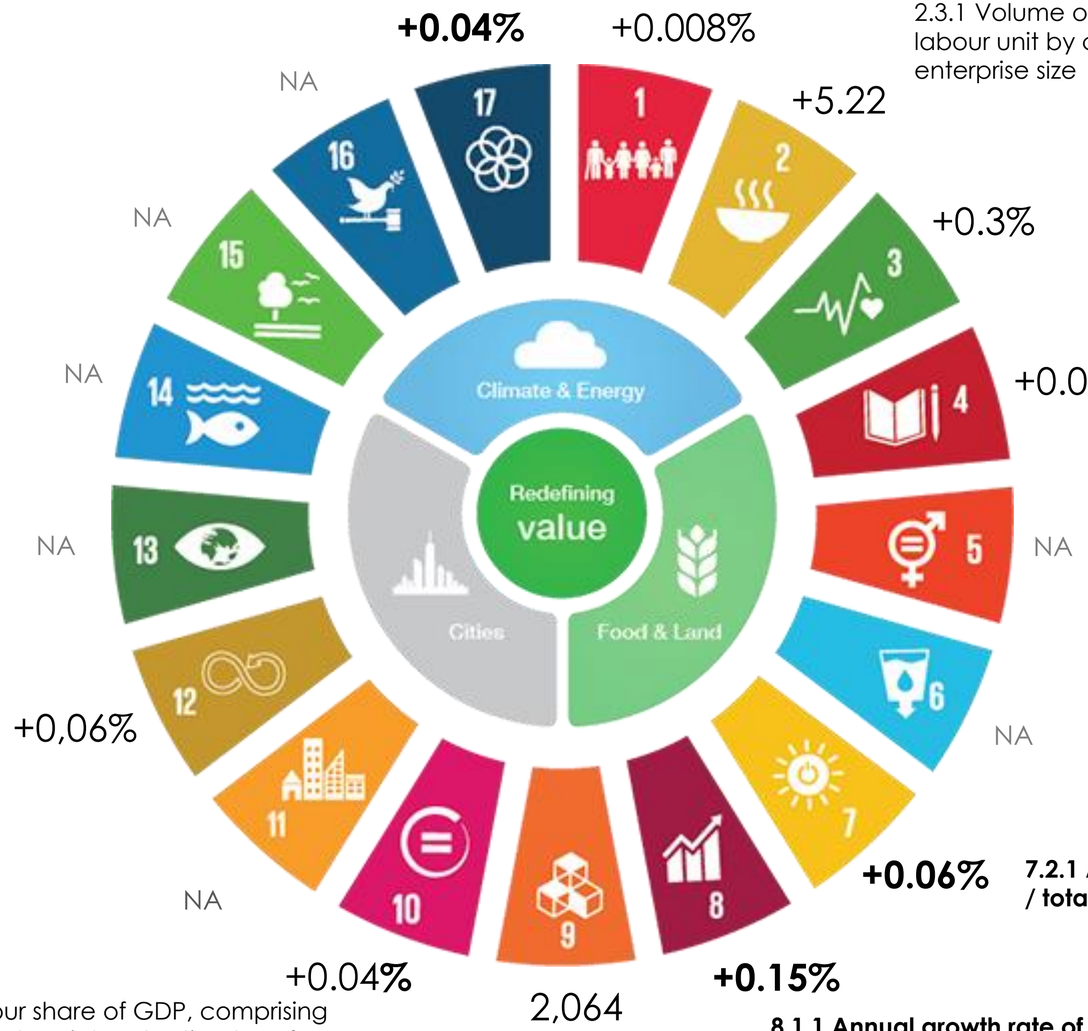


IMPACT ON SDGs

SDGs effects show the absolute project contribution in achieving global goals in the related area.

17.1.1 Total government revenue as a proportion of GDP

1.1.1 Population below the international poverty line, by sex, age, employment and location



2.3.1 Volume of annual production (Mln USD) per labour unit by classes of farming/pastoral/forestry enterprise size

3.8.2 Proportion of population with large household expenditures on health as a share of total household expenditure or income

4.1.1 Children and young: (a) in grades 2/3 (b) end of primary (c) end of lower secondary

12.2.2 Domestic material consumption, domestic material consumption per capita, and domestic material consumption per GDP

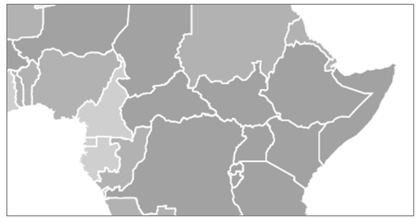
7.2.1 Annual renewable energy share (by the project) / total final energy consumption

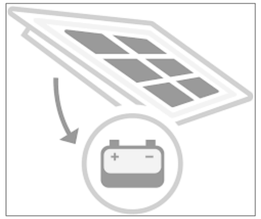
10.4.1 Labour share of GDP, comprising wages and social protection transfers

8.1.1 Annual growth rate of real GDP per capita

9.4.1 CO2 emission (T) per unit of value added

SAMPLE PROJECT 2
OFFGRID SOLUTION FOR RURAL SUB SAHARAN AFRICA





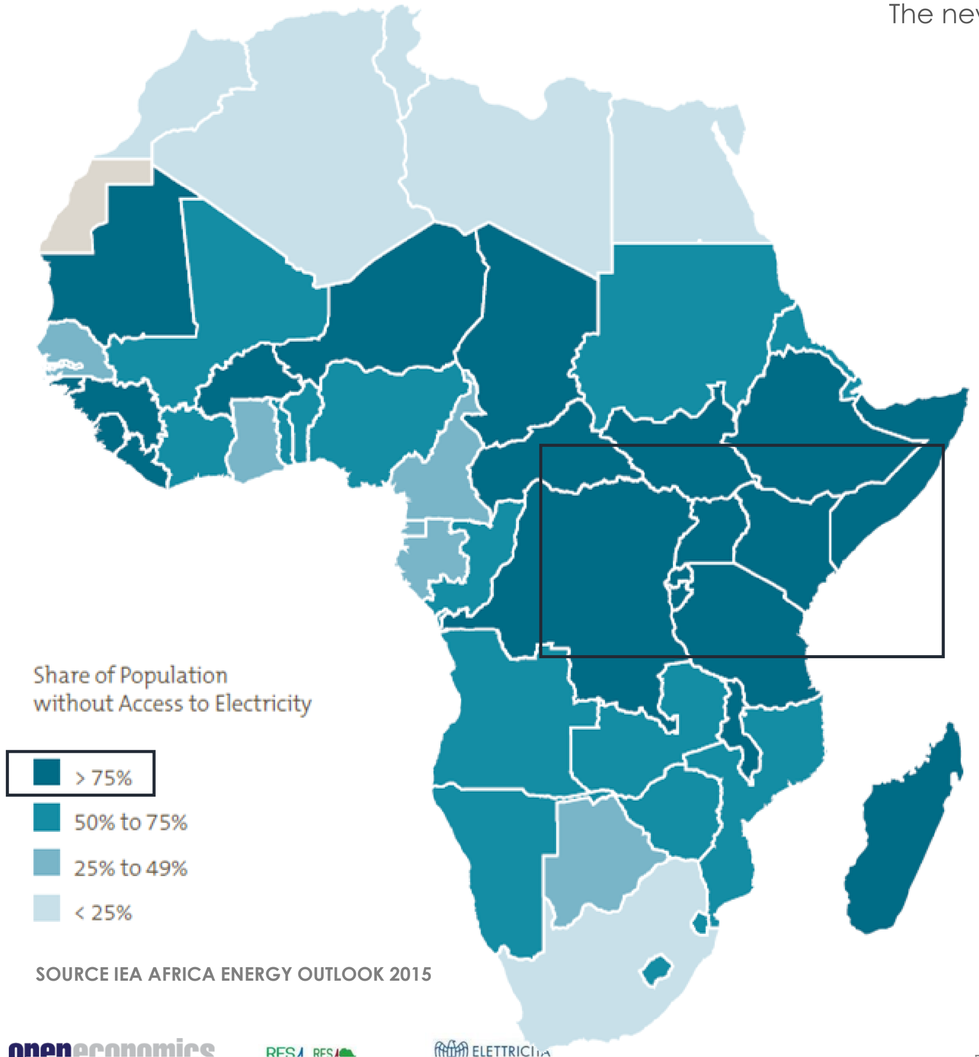
65
Mln USD

SAMPLE PROJECT: OFFGRID SOLUTION IN RURAL SS AFRICA

RURAL DISTRICT FRAMEWORK IN SUB SAHARAN AFRICA

2014 ANNUAL ELECTRICITY CONSUMPTION PER CAPITA WAS 40 KWH WHICH IS BELOW MINIMUM ACCEPTABLE GLOBAL AVERAGE PER CAPITA OF 500 KWH

OVER 620 MILLION PEOPLE LACK ACCESS TO ELECTRICITY



SOURCE IEA AFRICA ENERGY OUTLOOK 2015

Local Energy Policies

The new policies in the Sub Saharan region aim to attract private investments and local participation in the Energy Sector.

They focus on increasing access to modern energy and the share of renewables in electricity mix.

Energy resources are abundant but still heavily underexploited

To bring about private investments and technology transfers, the Governments recognize the role of :

PPP agreements (1)

fair returns on investment through cost-reflective energy pricing (2)

implementation of lifeline tariffs for customers with less ability to pay (3)

INDICATORS	RURAL DISTRICT	SUB S.AFRICA	OECD
Energy use (kg of oil equivalent per capita)	546	683	4,145
Energy imports, net (% of energy use)	N.A.	-48.8	21.0
Access to electricity (% of population)	1.7	37.4	100
Access to electricity, rural (% of rural pop.)	N.A.	17.8	100
Access to electricity, urban (% of urban pop.)	N.A.	68.9	100
CO2 emissions (kt) .000	0.4	883	12,138
CO2 emissions (tons per capita)	0.2	0.8	9.5
Electricity from renewables, no hydro (% of total)	N.A.	1.7	9.1
Renewable output (% of total electricity)	N.A.	26.4	22.0
Fossil fuel energy consumption (% of total)	N.A.	39.8	80.2
Power consumption (kWh per capita)	38.4	480.6	7,995

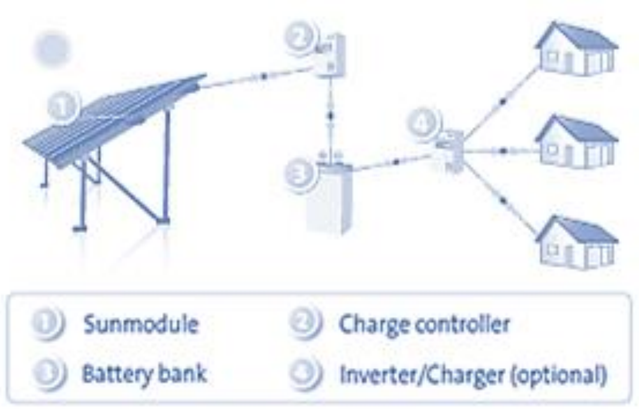
SOLUTION AND SIMULATION SCENARIO FOR A SAMPLE PROJECT

OFFGRID SOLUTION RURAL DISTRICTS SUB S. AFRICA

The villages involved are likely to be connected to the national grid in more than 15 years and probably 20.

The project aims to create "electrical islands" of higher productivity that spread their benefits on the surrounding areas through backward and forward linkages.

To this aim a Minigrid solution has been engineered based on commercial solution (PV + ESS).



NOTE ON ASSUMPTION

Solutions are assumed to be realized in 4 years in 125 villages in rural districts.

In the first year only the pilot project is developed.

10 projects are expected to be implemented the second year, 10 in the third year, and the remaining 4 in the fourth and last year.

FRAMEWORK

Area	125 villages
Number of installations	25
People involved	112,500
Industrial customers	3,000
Commercial customers	250

SOLUTION

PV Installed	22,500 kWp
BESS Capacity	37,200 kWh
DG	9,125 kVA
PCS	8,010 kW

PERFORMANCE

Daily Load	73,250 kWh/day
Renewable Fraction	86%
DG Production	3,046,000 kWh/year

COST

Capex	64,933,950 USD

SAMPLE PROJECT: OFFGRID SOLUTION IN RURAL SS AFRICA

IMPACT ON LOCAL VARIABLES VS NO-PROJECT SCENARIO

The simulations developed suggest that the project impact is significant. In particular, the model simulations suggest that the project would be an effective means to propel endogenous growth by increasing the quality and quantity of the capital stock in the rural areas, and improving factor productivity.

Impact on value added shows a large increase, generated by the increase of capital stock and higher productivity due to efficient electrification

AVERAGE ANNUAL INCREMENTAL VALUE ADDED

+ 31 %

Impact on production (direct and indirect) is driven by the transformation of agriculture thanks to the expansion of irrigation and machinery created by the electricity grid

AVERAGE ANNUAL INCREMENTAL PRODUCTION

+ 32 %

First consequence of the growth of capital stock is to enhance production for the households who are the main holders of land capital in rural areas

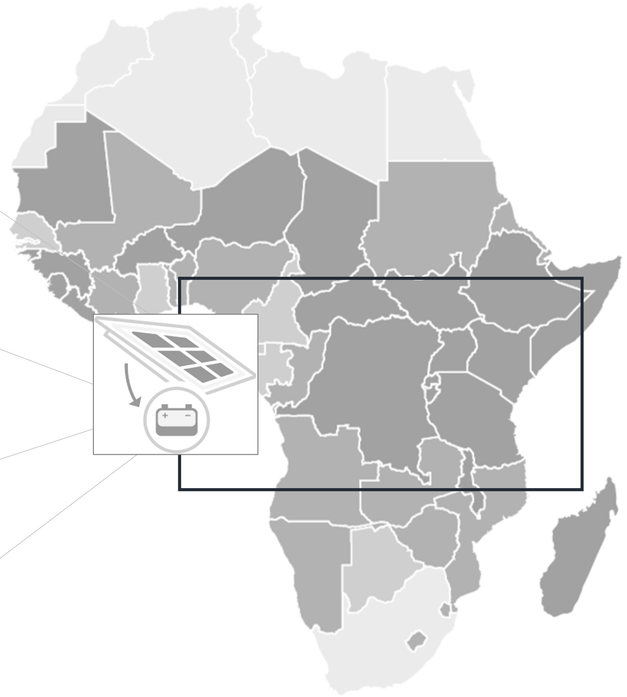
AVERAGE ANNUAL INCREMENTAL HOUSEHOLDS' INCOME

+ 31 %

Higher production and consumption boost local employment especially in agriculture and services

INCREMENTAL STABLE JOB UNITS

+ 49 %



IMPACT ON **UN** SDGs

SDGs effects show the absolute project contribution in achieving global goals in the related area.

17.3.2 Volume of remittances (in United States dollars) as a proportion of total GDP

1.1.1 Population below the international poverty line, by sex, age, employment and location

+43% +50%

NA +443

2.3.1 Volume of production per labour unit by classes of farming/pastoral/forestry enterprise size

NA +3.8%

3.8.2 Proportion of population with large household expenditures on health as a share of total household expenditure or income

NA +41%

4.1.1 Proportion of children in grades 2/3

13 CO2 reduction VS traditional power plant 319,694

NA

12.2.2 Domestic material consumption, domestic material consumption per capita, and domestic material consumption per GDP +17%

11.3.1 Ratio of land consumption rate to population growth rate +10.12%

+50%

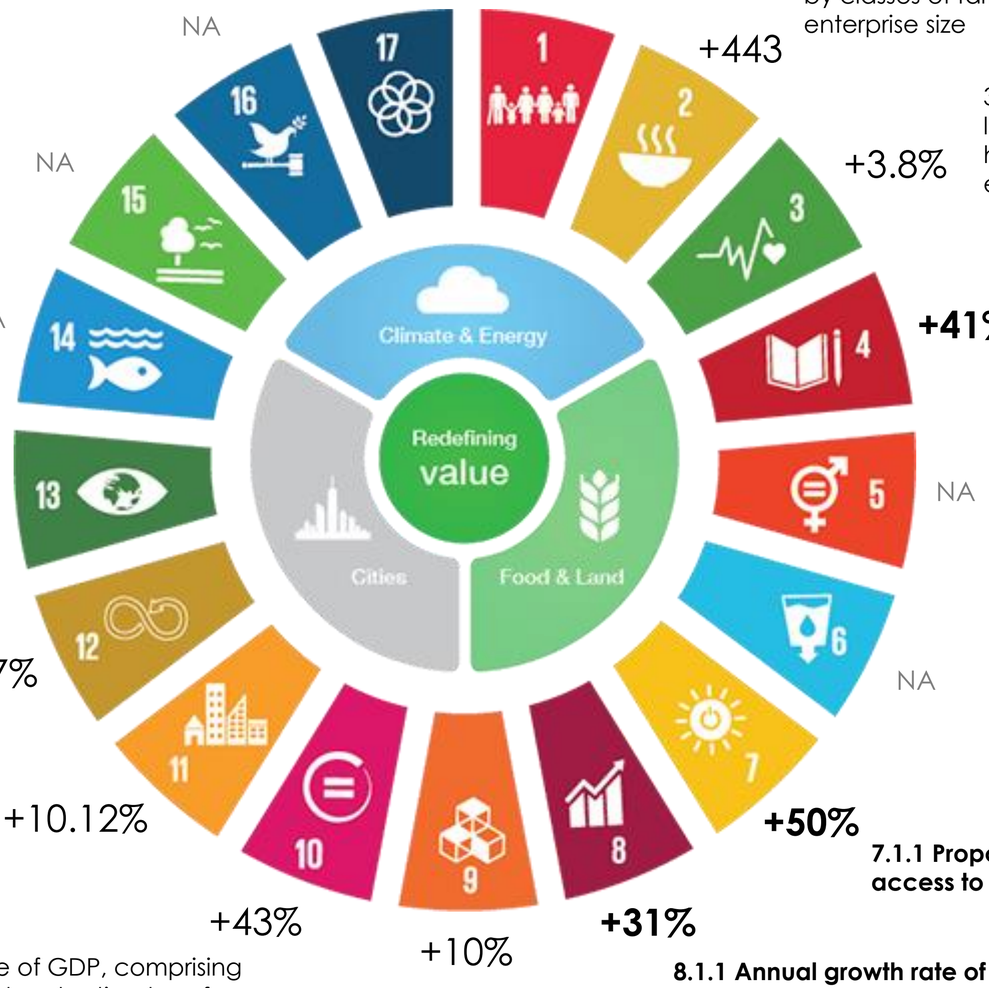
7.1.1 Proportion of population with access to electricity

+43% +10% +31%

10.4.1 Labour share of GDP, comprising wages and social protection transfers

9.2.1 Manufacturing value added as a proportion of GDP and per capita

8.1.1 Annual growth rate of real GDP per capita



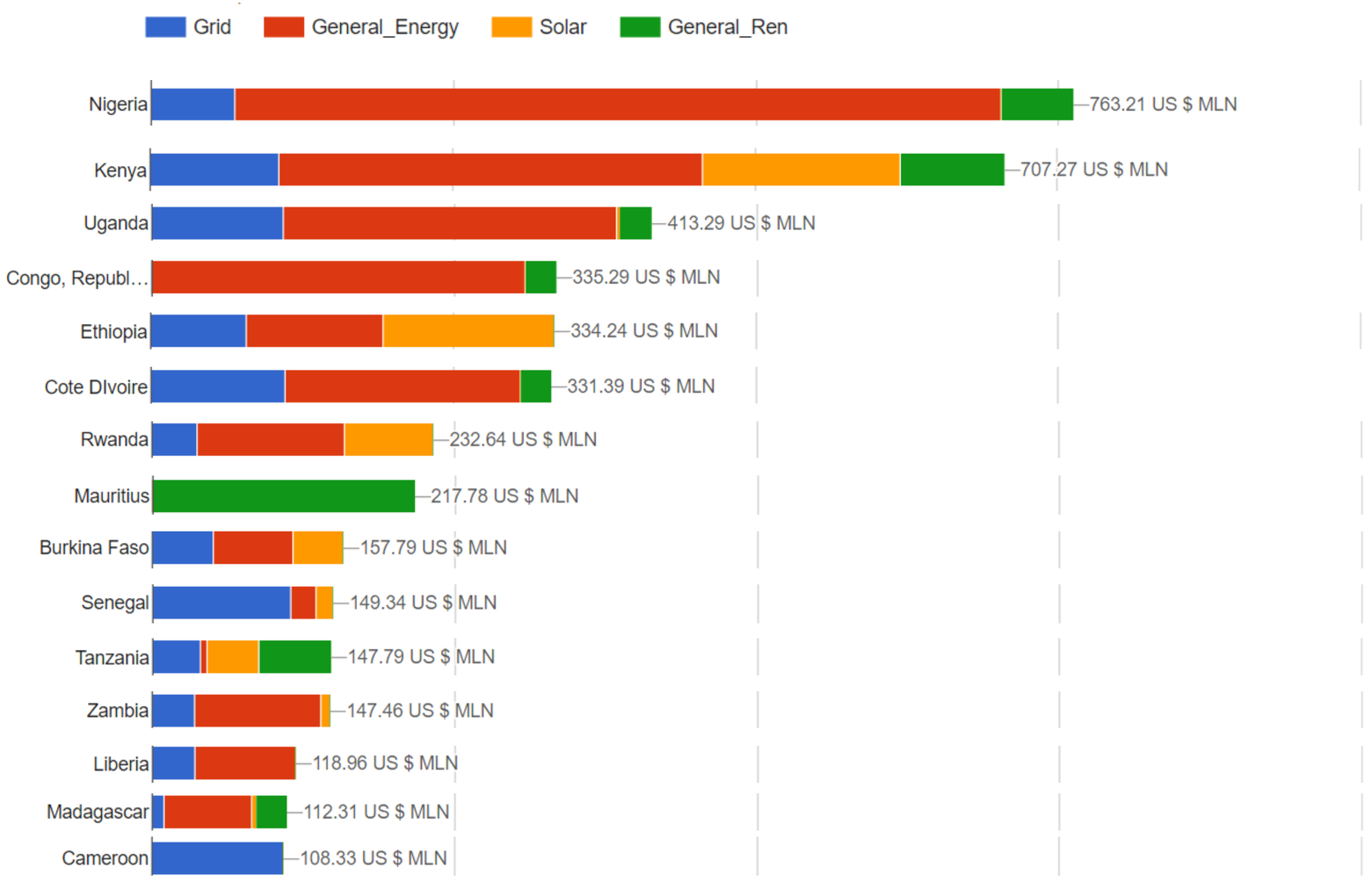
SAMPLE PROJECT: OFFGRID SOLUTION IN RURAL SS AFRICA

DEVELOPMENT FUNDS AVAILABLE IN SUB SAHARAN AFRICA

- More than **5,2 BILLION USD** funds available
- 164 Active funding projects
- WB the major supporter (3.9 BLN USD)
- Focus on Rural electrification

DEVELOPMENT FINANCE MONITOR

DFI: ADB, AfDB, IDB, GCF, WB,
COUNTRY: Kenya, Ethiopia, Guinea, Sierra Leone, Liberia, Cote DIvoire, Congo, Republic of, Tanzania, Rwanda, Burundi, Mozambique, Ghana, Mali, Zimbabwe, Zambia, Guinea-Bissau, Uganda, Burkina Faso, Lesotho, Madagascar, South Sudan, Benin, Namibia, Nigeria, South Africa, Mauritius, Comoros, Equatorial Guinea, Togo, Senegal, Malawi, Congo, Democratic Republic of, Mauritania, Cameroon, Cabo Verde, Central African Republic, Djibouti, Niger, Gambia, The, Gabon, Chad, Sao Tome and Principe,
TECH: Grid, General_Energy, Solar, General_Ren,



DFI AND ACTIVE PROJECTS IN SUB SAHARAN AFRICA

World Bank
Size: 427.000.000

Africa Development Bank
Size: 27.000.000

USAID
Size: 190.000.000

Sweden International Development Agency
Size: 8.900.000.000

European Investment Bank
Size: 189.652.000

Green Climate Fund
Size: 174.000.000

Japan International Cooperation Agency
Size: 174.000.000

DEVELOPMENT FINANCE MONITOR

DFI: ADB, AfDB, IDB, GCF, WB,
COUNTRY: Kenya, Ethiopia, Guinea, Sierra Leone, Liberia, Cote DIvoire, Congo, Republic of, Tanzania, Rwanda, Burundi, Mozambique, Ghana, Mali, Zimbabwe, Zambia, Guinea-Bissau, Uganda, Burkina Faso, Lesotho, Madagascar, South Sudan, Benin, Namibia, Nigeria, South Africa, Mauritius, Comoros, Equatorial Guinea, Togo, Senegal, Malawi, Congo, Democratic Republic of, Mauritania, Cameroon, Cabo Verde, Central African Republic, Djibouti, Niger, Gambia, The, Gabon, Chad, Sao Tome and Principe,
TECH: Grid, General_Energy, Solar, General_Ren,

TITLE	COUNTRY	DFI	AVAILABILITY	TOTAL	STATUS	APPROVAL
Nigeria Power Sector Guarantees Project	Nigeria	WB	395.00	395.00	Active	01/05/2014
Nigeria Electricity and Gas Improvement Project (NEGIP)	Nigeria	WB	200.00	400.00	Active	16/06/2009
Accelerating the Transformational Shift to a Low-Carbon Economy in the Republic of Mauritius	Mauritius	GCF	191.40	191.40	Active	01/12/2016
C?te d?Ivoire - Power Transmission and Distribution Networks Reinforcement	Cote DIvoire	AfDB	181.60	181.60	Approved	01/11/2016
LAST MILE CONNECTIVITY PROJECT II	Kenya	AfDB	129.23	129.23	Approved	01/04/2015
Multinational - ETHIOPIA-KENYA ELECTRICITY HIGHWAY	Kenya	AfDB	122.92	122.92	Active	01/09/2012
Multinational -ETHIOPIA-KENYA ELECTRICITY HIGHWAY	Ethiopia	AfDB	112.28	112.28	Approved	01/09/2012
POWER SECTOR IMPROVEMENT ANDGOVERNANCE SUPPORT PROJECT	Congo, Republic of	AfDB	109.31	109.31	Approved	01/12/2016
Cote d'Ivoire - Electricity Transmission and Access Project	Cote dIvoire	WB	108.33	325.00	Active	30/03/2017
Electricity Transmission and Reform Project	Cameroon	WB	108.33	325.00	Active	07/12/2016

ANNEXES
METHODOLOGY AND BIBLIOGRAPHY

NOTES ON THE METHODOLOGY

Based on DFIs best practice and data sources

GENERAL

The analysis has been performed from the point of view of all the local stakeholders.

In line with the best practices adopted for the assessment of investment projects and economic policies by the multilateral organizations, including the World Bank, a Dynamic Computable General Equilibrium (CGE) Model was constructed to simulate the workings of the local economy based on the estimate of a detailed Social Accounting Matrix (SAM). The model included both representation of the local and the district economy.

The impact values are presented as a set of indicators related to standard UN SDGs.
Following, is possible to find an essential bibliography about some of the methodology used.

SDG SOCIAL ACCOUNTING MATRIX (SAM)

The SAM estimated for the regions aim to represent a coherent, integrated and structured framework that takes account the different components of economic development, in terms of infrastructure and production, of the oil industry and other renewable and non renewable resources.

The SAMs have been estimated using an international data base, the national accounts and several pre-existing relevant parameter estimates based on multilateral statistical sources (World Bank, IFPRI, UN). Critical activities accounted for are: agriculture, fishery, forestry, crude oil, other non renewable resource extraction, refinery, manufactures, private and government services.

The SAMs accounts include production activities, commodities and for factor payments (capital, land and labor) to household, according to their regional distribution and an aggregate institutions (government, enterprises, finance and rest of the world).

DINAMIC COMPUTABLE GENERAL EQUILIBRIUM MODEL [CGE]

The model follows the SAM disaggregation of factors, activities, and institutions and is calibrated for the year 2016.

All values are expressed in real terms at constant prices and expressed in US$ 2016. Model results are either reported on a yearly base or as present values (PV), calculated using a social rate of discount of 10%.

The CGE model is based on estimation techniques and applications similar to the models recently developed for the World Bank for several countries, including Mexico, Brazil, Peru, Kenya and Nigeria.

The dynamic version is based on a time recursive structure, in which the solution of one period depends only on current and past variables, with endogenous total capital accumulation.

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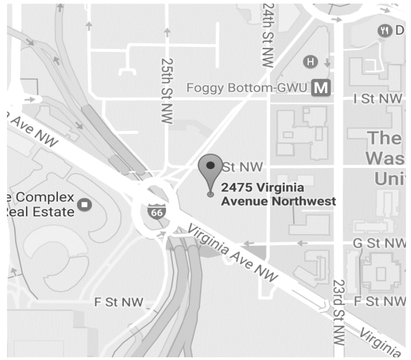

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OpenEconomics is a spin-off of the University of Rome Tor Vergata.
The company assists public administrations and private companies
in the evaluation of policies, programs and investment projects
through the application of advanced economic methodologies.
OpenEconomics integrates scientific-economic skills
with an in-depth knowledge of institutions, low frameworks,
regulations and public debate process.
The scientific team, led by Professor Pasquale Lucio Scandizzo,
Con count on an extensive experience in managing complex projects
matured as advisor to World Bank, FAO, UNIDO, IFAD,
National Governments and multinational companies.

OpenEconomics is certified by Accredia as compliant to UNIEN ISO 9001: 2008
for the activities and processes of research, development, and application
of economic, mathematical, environmental models
for economic evaluations.
Certificate No. QMS17170041-35.0080 issued on 16.03.2017 by Accerta Spa.