

# RENEWABLE ENERGY COUNTRY PROFILES

## **AFRICA**



The [IRENA Renewable Energy Country Profiles](#) take stock of the latest development of renewable energy in two regions where renewable energy can make a significant contribution to combat climate change and bring modern energy services to everyone: Africa and the Pacific. These two regions are presented separately in this volume and its sister publication.”

The country profiles combine elements of IRENA analysis with the latest information available from a vast array of sources in order to give a brief yet comprehensive and up-to-date picture of the situation of renewable energy that includes energy supply, electrical capacity, energy access, policies, targets, investment climate, projects and endowment in renewable energy resources. Because of the different timelines of these sources, data presented here refer to years between 2008 and 2012. Data availability also differs from country to country, which makes comparison with a wider regional group possible only for the year for which figures are available for all the members of the group; while this may not be the most recent year, the differences between countries, regions and the world remain striking.

The current country profiles are just a starting point; they will be extended upon with new indicators to make them more informative, and maintained as a live product on the IRENA website as a key source of information on renewable energy. Your comments and feedback on both the format and the contents would be most appreciated at [statistics@irena.org](mailto:statistics@irena.org).



# ALGERIA



**35.4 million** Population (2010)

**159.4 billion USD** GDP (2010)

**4,501 USD** GDP per capita (2010)

FIGURE 1: GDP PER CAPITA FOR 2010

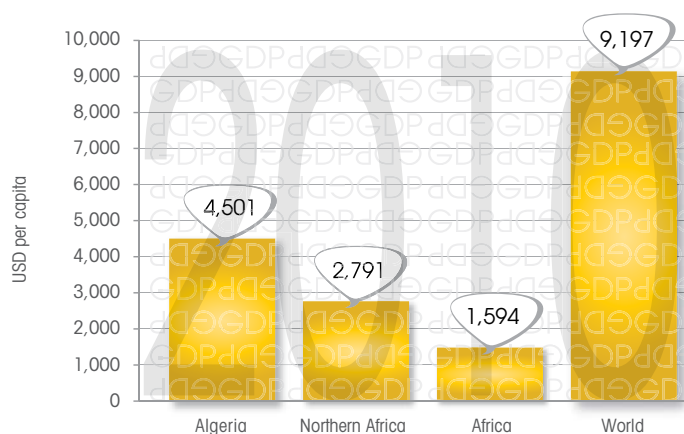
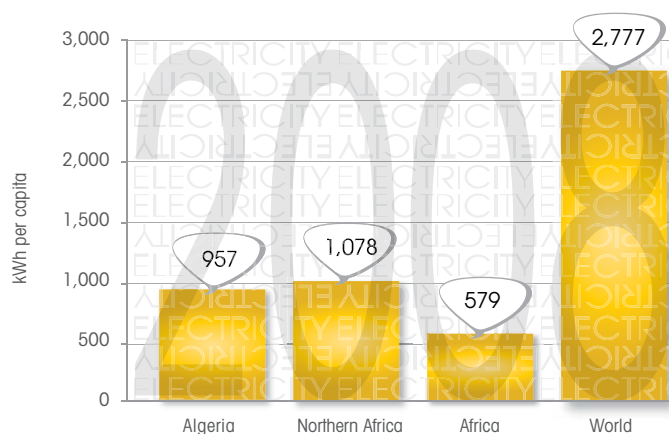


FIGURE 2: ELECTRICITY USE PER CAPITA FOR 2008



Northern Africa includes Algeria, Egypt, Libya, Morocco, Sudan and Tunisia.

## ENERGY NATIONAL PROFILE 2009

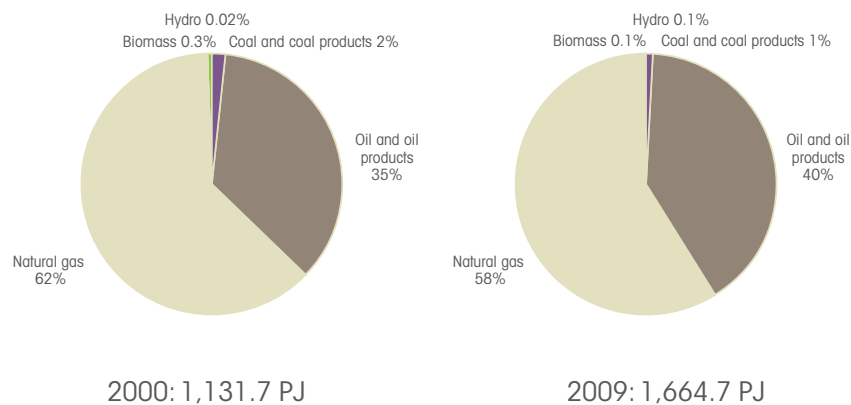
- Total Primary Energy Supply: 1,664.6 PJ - Of which renewables: 3.6 PJ (0.2 %)
- Energy self-sufficiency: 383.0%
- Fuel imports: 413 million USD (1.1 % of total imports)
- Electricity generation: 42.8 TWh - Of which renewables: 342.0 GWh (0.8 %)
- Electricity use per capita: 973 kWh
- Electrical capacity\*: 8.1 GW - Of which renewables: 280 MW (3.4 %)
- Electricity access rate: 99.3%
- Share of population using solid fuels: < 5%

\* 2008

### TARGETS:

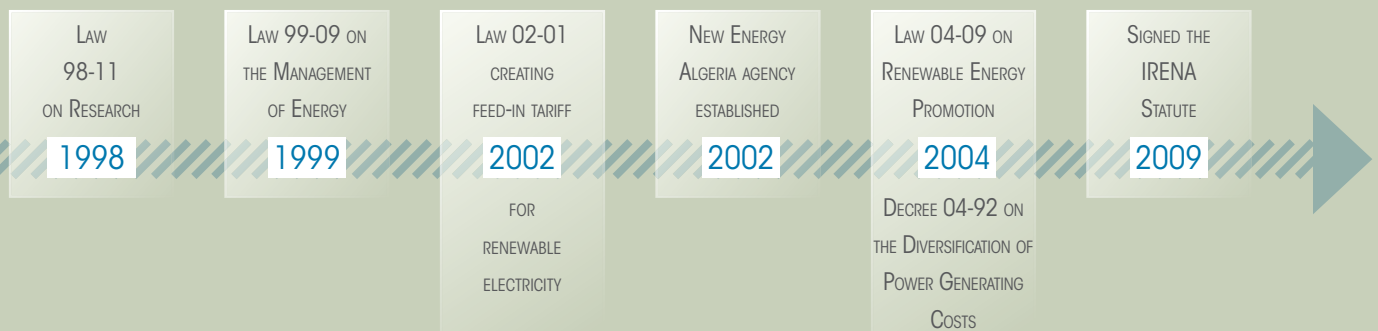
- 5% of electricity generation from renewables by 2017
- 20% of electricity generation from renewables by 2030
- 100 MW of wind capacity by 2015
- 170 MW of concentrating solar power by 2015
- 5.1 MW of solar photovoltaic capacity by 2015

FIGURE 3: TOTAL PRIMARY ENERGY SUPPLY\* IN 2000 AND 2009



\*excluding electricity trade

## POLICIES IN PLACE TO PROMOTE RENEWABLE ENERGY SINCE THE RIO CONFERENCE OF 1992



WORLD BANK EASE OF DOING BUSINESS INDEX FOR 2012: Ranked 148 out of 183

RENEWABLE ENERGY PROJECTS FROM THE GOVERNMENT AND PRIVATE SECTORS:

- 10 MW of wind capacity addition by mid-2012 (1 project)
- 150 MW of combined solar thermal/natural gas capacity addition announced (2 projects)

NUMBER OF REGISTERED CLEAN DEVELOPMENT MECHANISM PROJECTS FOCUSING ON RENEWABLE ENERGY: 0

RENEWABLE ENERGY RESOURCES: ● High ● Medium ● Low ● Unknown ✕ Not applicable

Wind ● Solar ● Hydro ● Biomass ● Geothermal ● Ocean ●

Note: The information on resources should be taken as an indication only. It refers to a general trend of available resources, and does not prejudice the feasibility of individual projects. The thresholds are indicative, and do not refer to any technological choice. The analysis is based on the literature.

Sources: Population and GDP: World Bank; Energy data: IEA, IRENA analysis based on UN data; Share of fuel imports in total imports: World Trade Organisation; Electrical capacity: IEA, EIA; Electricity access rate: World Energy Outlook 2010 database (IEA); Share of population using solid fuels: World Health Organisation; Targets: REN21, IRENA; Policy/legislation: IEA, Reegle, IRENA research; Ease of doing business index: World Bank; Renewable energy projects: Bloomberg New Energy Finance, IRENA research; Clean Development Mechanism projects: UNFCCC; Renewable energy resources: IRENA analysis.

Units: USD: United States dollar; kWh: kilowatt-hour; GWh: gigawatt-hour (1 GWh = 10<sup>6</sup> kWh); TWh: terawatt-hour (1 TWh=10<sup>3</sup> GWh); PJ: petajoule; MW: megawatt; GW: gigawatt (1 GW=10<sup>3</sup> MW).

# ANGOLA



**19.0 million** Population (2010)

**84.4 billion USD** GDP (2010)

**4,443 USD** GDP per capita (2010)

FIGURE 1: GDP PER CAPITA FOR 2010

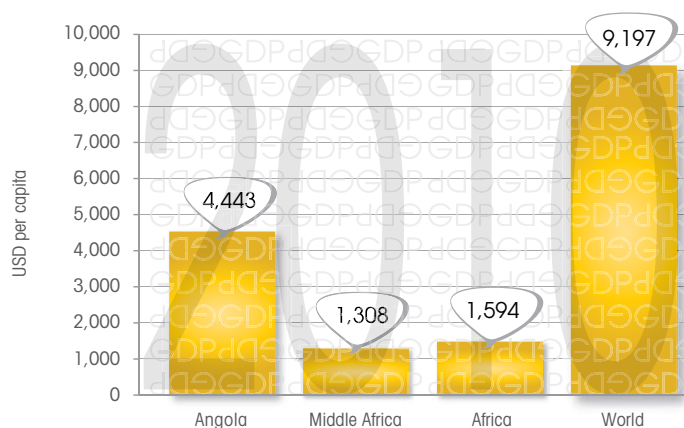
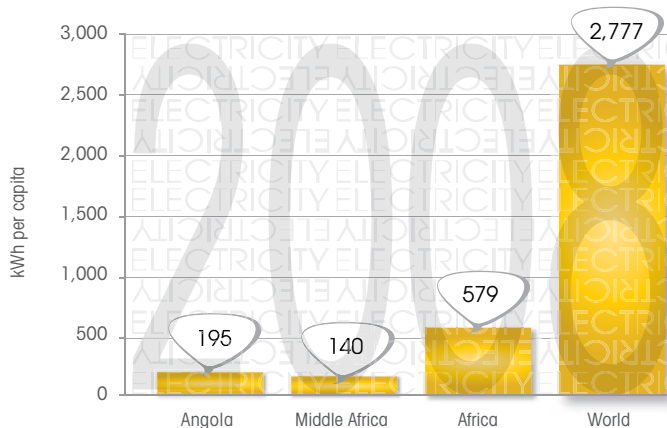


FIGURE 2: ELECTRICITY USE PER CAPITA FOR 2008



Middle Africa includes Angola, Cameroon, the Central African Republic, Chad, Congo, the Democratic Republic of Congo, Equatorial Guinea, Gabon and Sao Tome and Principe.

## ENERGY NATIONAL PROFILE 2009

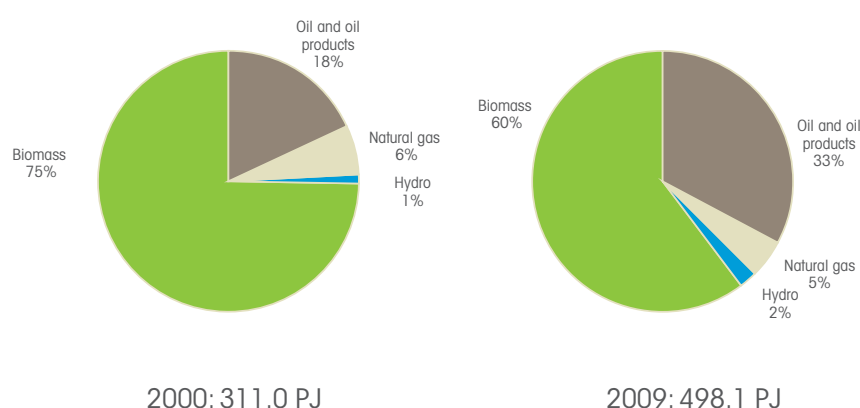
- Total Primary Energy Supply: 498.1 PJ - Of which renewables: 310.8 PJ (62.4 %)
- Energy self-sufficiency: 848.7%
- Fuel imports: Not available
- Electricity generation: 4,172 GWh - Of which renewables: 3,173 GWh (76.1 %)
- Electricity use per capita: 203 kWh
- Electrical capacity\*: 1,155 MW - Of which renewables: 498 MW (43.1 %)
- Electricity access rate: 30.0%
- Share of population using solid fuels: 48%

\* 2008

### TARGETS:

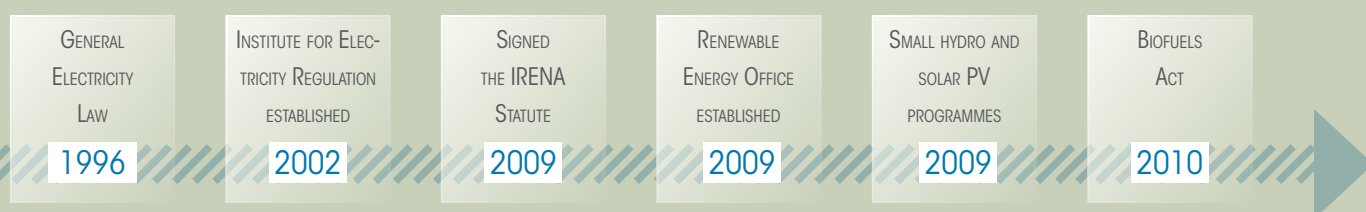
- No information available

FIGURE 3: TOTAL PRIMARY ENERGY SUPPLY\* IN 2000 AND 2009



\*excluding electricity trade

#### POLICIES IN PLACE TO PROMOTE RENEWABLE ENERGY SINCE THE RIO CONFERENCE OF 1992



WORLD BANK EASE OF DOING BUSINESS INDEX FOR 2012: Ranked 172 out of 183

RENEWABLE ENERGY PROJECTS FROM THE GOVERNMENT AND PRIVATE SECTORS:

- 190 MW of small hydro capacity addition announced (3 projects)
- 30 million litres of ethanol per year capacity addition announced (1 project)

NUMBER OF REGISTERED CLEAN DEVELOPMENT MECHANISM PROJECTS FOCUSING ON RENEWABLE ENERGY: 0

RENEWABLE ENERGY RESOURCES: ● High ● Medium ● Low ● Unknown ✕ Not applicable

Wind ● Solar ● Hydro ● Biomass ● Geothermal ● Ocean ●

Note: The information on resources should be taken as an indication only. It refers to a general trend of available resources, and does not prejudge the feasibility of individual projects. The thresholds are indicative, and do not refer to any technological choice. The analysis is based on the literature.

Sources: Population and GDP: World Bank; Energy data: IEA, IRENA analysis based on UN data; Share of fuel imports in total imports: World Trade Organisation; Electrical capacity: IEA, EIA; Electricity access rate: World Energy Outlook 2010 database (IEA); Share of population using solid fuels: World Health Organisation; Targets: REN21, IRENA; Policy/legislation: IEA, Reegle, IRENA research; Ease of doing business index: World Bank; Renewable energy projects: Bloomberg New Energy Finance, IRENA research; Clean Development Mechanism projects: UNFCCC; Renewable energy resources: IRENA analysis.

Units: USD: United States dollar; kWh: kilowatt-hour; GWh: gigawatt-hour (1 GWh = 10<sup>6</sup> kWh); TWh: terawatt-hour (1 TWh=10<sup>3</sup> GWh); PJ: petajoule; MW: megawatt; GW: gigawatt (1 GW=10<sup>3</sup> MW).

# BENIN



**9.2 million** Population (2010)

**6.6 billion USD** GDP (2010)

**720 USD** GDP per capita (2010)

FIGURE 1: GDP PER CAPITA FOR 2010

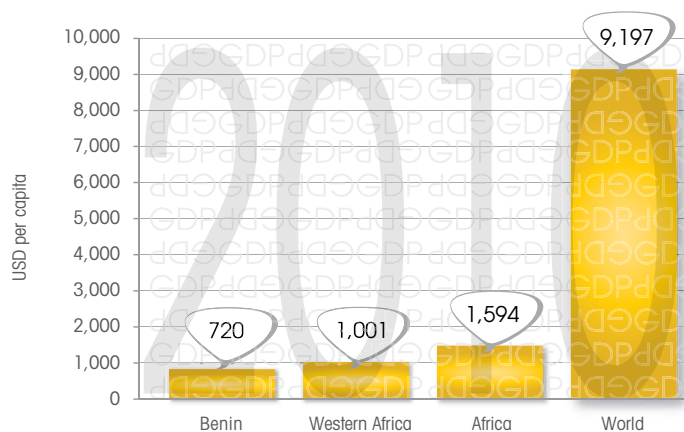
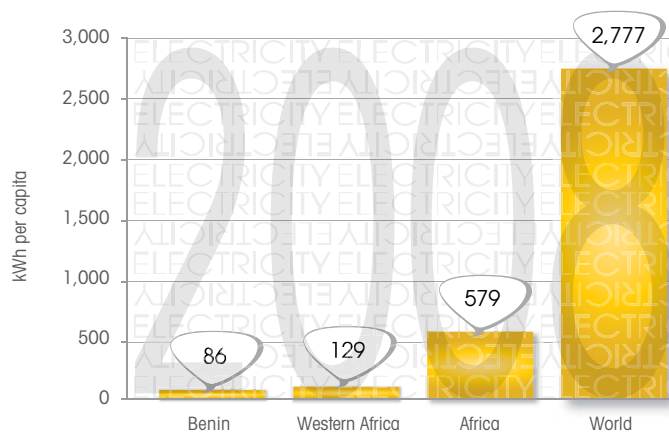


FIGURE 2: ELECTRICITY USE PER CAPITA FOR 2008



Western Africa includes Benin, Burkina Faso, Cape Verde, Côte d'Ivoire, Gambia, Ghana, Guinea, Guinea-Bissau, Liberia, Mali, Mauritania, Niger, Nigeria, Senegal, Sierra Leone and Togo.

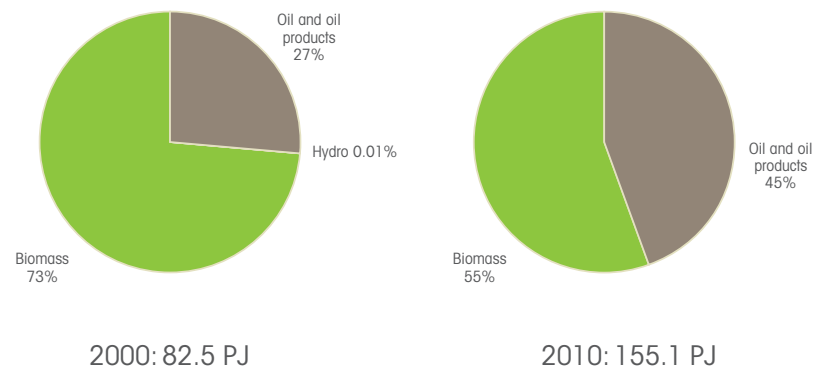
## ENERGY NATIONAL PROFILE 2010

- Total Primary Energy Supply: 156.8 PJ - Of which renewables: 86.0 PJ (54.9 %)
- Energy self-sufficiency: 54.9%
- Fuel imports: Not available
- Electricity generation: 113.6 GWh - Of which renewables: 0.0 GWh (0 %)
- Electricity use per capita: 92 kWh
- Electrical capacity: 92.3 MW - Of which renewables: 0.5 MW (0.5 %)
- Electricity access rate: 27.4%
- Share of population using solid fuels: 94%

### TARGETS:

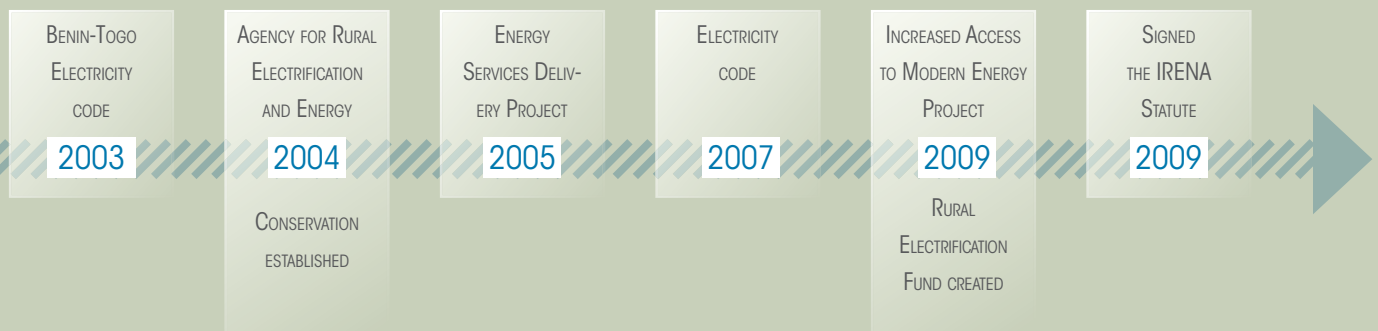
- 50% of rural electricity from renewables by 2025

FIGURE 3: TOTAL PRIMARY ENERGY SUPPLY\* IN 2000 AND 2010



\*excluding electricity trade

#### POLICIES IN PLACE TO PROMOTE RENEWABLE ENERGY SINCE THE RIO CONFERENCE OF 1992



WORLD BANK EASE OF DOING BUSINESS INDEX FOR 2012: Ranked 175 out of 183

#### RENEWABLE ENERGY PROJECTS FROM THE GOVERNMENT AND PRIVATE SECTORS:

- 6 MW of solar photovoltaic capacity addition announced (1 project)
- 50 million litres of ethanol per year capacity addition announced (1 project)

NUMBER OF REGISTERED CLEAN DEVELOPMENT MECHANISM PROJECTS FOCUSING ON RENEWABLE ENERGY: 0

RENEWABLE ENERGY RESOURCES: ● High ● Medium ● Low ● Unknown ✕ Not applicable

Wind ● Solar ● Hydro ● Biomass ● Geothermal ● Ocean ●

Note: The information on resources should be taken as an indication only. It refers to a general trend of available resources, and does not prejudice the feasibility of individual projects. The thresholds are indicative, and do not refer to any technological choice. The analysis is based on the literature.

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Units: USD: United States dollar; kWh: kilowatt-hour; GWh: gigawatt-hour (1 GWh = 10<sup>6</sup> kWh); TWh: terawatt-hour (1 TWh=10<sup>3</sup> GWh); PJ: petajoule; MW: megawatt; GW: gigawatt (1 GW=10<sup>3</sup> MW).



# BOTSWANA

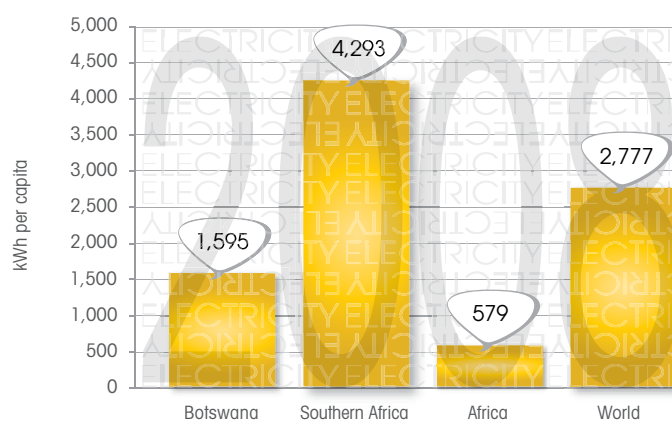
**2.0 million** Population (2010)  
**14.9 billion USD** GDP (2010)  
**7,513 USD** GDP per capita (2010)

FIGURE 1: GDP PER CAPITA FOR 2010



Southern Africa includes Botswana, Lesotho, Namibia, South Africa and Swaziland.

FIGURE 2: ELECTRICITY USE PER CAPITA FOR 2008



## ENERGY NATIONAL PROFILE 2009

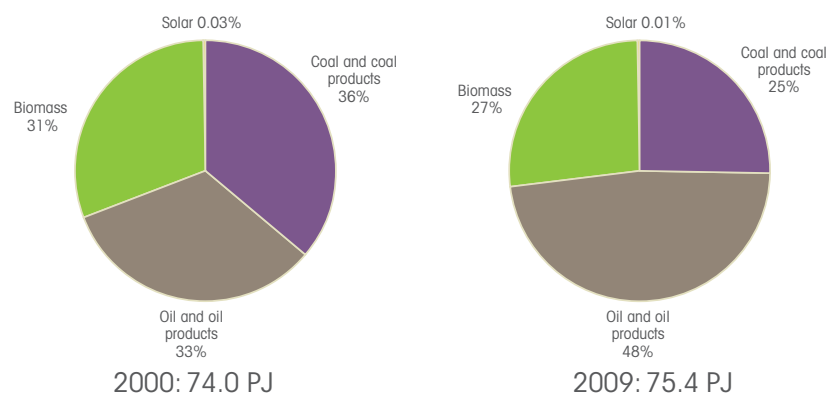
- Total Primary Energy Supply: 85.8 PJ - Of which renewables: 20.2 PJ (23.6 %)
- Energy self-sufficiency: 45.8%
- Fuel imports: 625 million USD (13.2 % of total imports)
- Electricity generation: 444.0 GWh (excludes emergency generation from diesel) - Of which renewables: 0.0 GWh (0 %)
- Electricity use per capita: 1,528 kWh
- Electrical capacity\*: 292 MW - Of which renewables: 0 MW (0 %)
- Electricity access rate: 45.4%
- Share of population using solid fuels: 40%

\* 2008

### TARGETS:

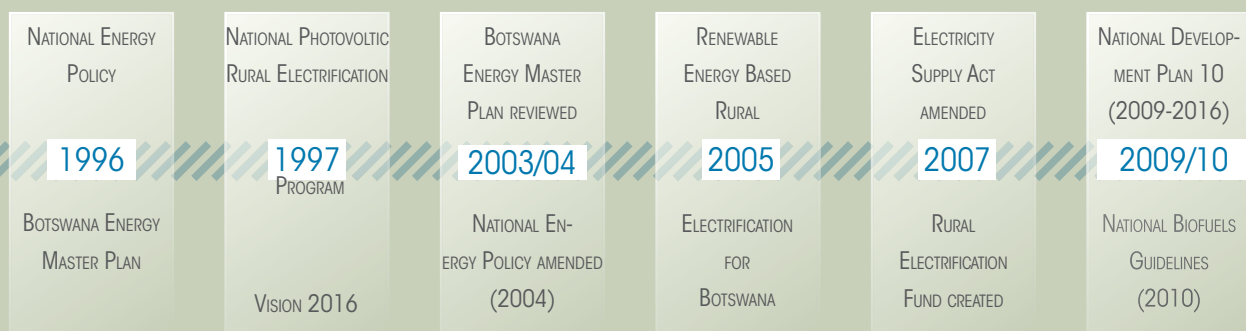
- All targets under review

FIGURE 3: TOTAL PRIMARY ENERGY SUPPLY\* IN 2000 AND 2009



\*excluding electricity trade

## POLICIES IN PLACE TO PROMOTE RENEWABLE ENERGY SINCE THE RIO CONFERENCE OF 1992



WORLD BANK EASE OF DOING BUSINESS INDEX FOR 2012: Ranked 54 out of 183

RENEWABLE ENERGY PROJECTS FROM THE GOVERNMENT AND PRIVATE SECTORS:

- 5 million litres of biodiesel per year capacity addition by 2012 (1 project)
- 1 MW of solar photovoltaic capacity addition by mid-2012 (1 project)

NUMBER OF REGISTERED CLEAN DEVELOPMENT MECHANISM PROJECTS FOCUSING ON RENEWABLE ENERGY: 0

RENEWABLE ENERGY RESOURCES: ● High ● Medium ● Low ● Unknown ✕ Not applicable

Wind ● Solar ● Hydro ● Biomass ● Geothermal ● Ocean ✕

Note: The information on resources should be taken as an indication only. It refers to a general trend of available resources, and does not prejudge the feasibility of individual projects. The thresholds are indicative, and do not refer to any technological choice. The analysis is based on the literature.

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Units: USD: United States dollar; kWh: kilowatt-hour; GWh: gigawatt-hour (1 GWh = 10<sup>6</sup> kWh); TWh: terawatt-hour (1 TWh=10<sup>3</sup> GWh); PJ: petajoule; MW: megawatt; GW: gigawatt (1 GW=10<sup>3</sup> MW).

# BURKINA FASO


**16.3 million** Population (2010)

**8.8 billion USD** GDP (2010)

**542 USD** GDP per capita (2010)

FIGURE 1: GDP PER CAPITA FOR 2010

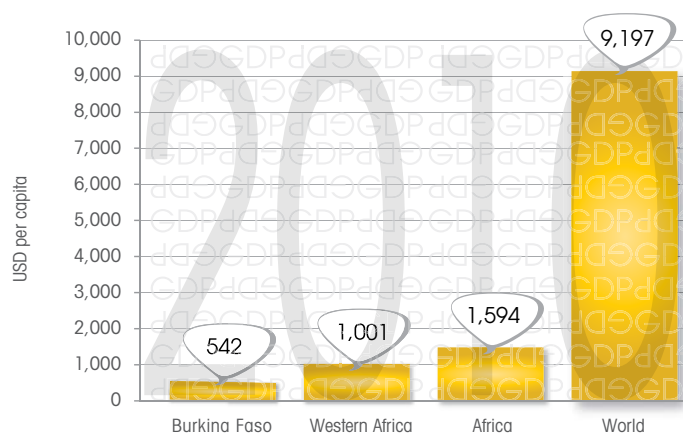
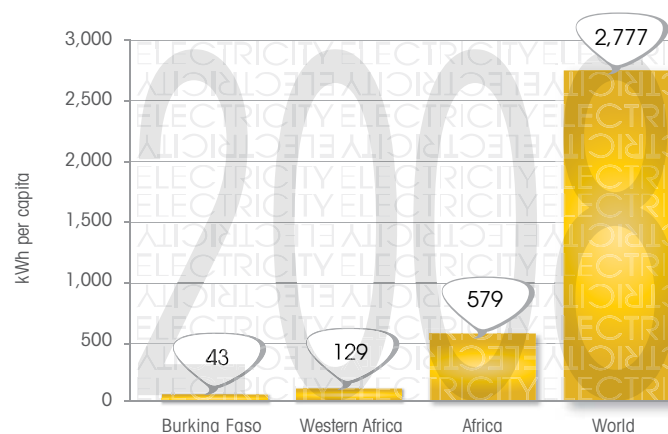


FIGURE 2: ELECTRICITY USE PER CAPITA FOR 2008



Western Africa includes Benin, Burkina Faso, Cape Verde, Côte d'Ivoire, Gambia, Ghana, Guinea, Guinea-Bissau, Liberia, Mali, Mauritania, Niger, Nigeria, Senegal, Sierra Leone and Togo.

## ENERGY NATIONAL PROFILE 2008

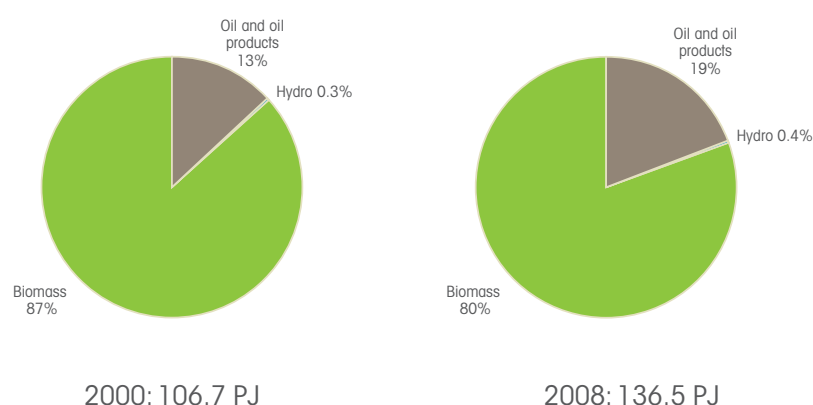
- Total Primary Energy Supply: 137.0 PJ - Of which renewables: 110.3 PJ (80.5 %)
- Energy self-sufficiency: 80.5%
- Fuel imports: Not available
- Electricity generation: 619.4 GWh - Of which renewables: 135.9 GWh (21.9 %)
- Electricity use per capita: 43 kWh
- Electrical capacity: 252 MW - Of which renewables: 32 MW (12.7 %)
- Electricity access rate\*: 14.6%
- Share of population using solid fuels: > 95%

\*2009

### TARGETS:

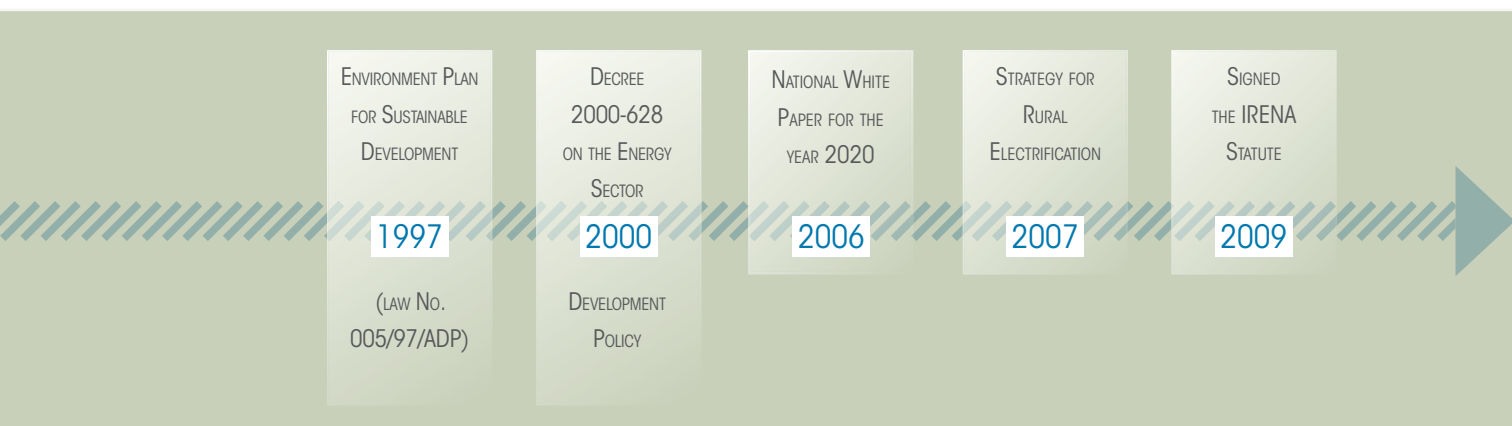
- No information available

FIGURE 3: TOTAL PRIMARY ENERGY SUPPLY\* IN 2000 AND 2008



\*excluding electricity trade

#### POLICIES IN PLACE TO PROMOTE RENEWABLE ENERGY SINCE THE RIO CONFERENCE OF 1992



WORLD BANK EASE OF DOING BUSINESS INDEX FOR 2012: Ranked 150 out of 183

RENEWABLE ENERGY PROJECTS FROM THE GOVERNMENT AND PRIVATE SECTORS:

- 20 MW of solar photovoltaic capacity addition announced (1 project)

NUMBER OF REGISTERED CLEAN DEVELOPMENT MECHANISM PROJECTS FOCUSING ON RENEWABLE ENERGY: 0

RENEWABLE ENERGY RESOURCES: ● High ● Medium ● Low ● Unknown ✕ Not applicable



Note: The information on resources should be taken as an indication only. It refers to a general trend of available resources, and does not prejudice the feasibility of individual projects. The thresholds are indicative, and do not refer to any technological choice. The analysis is based on the literature.

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Units: USD: United States dollar; kWh: kilowatt-hour; GWh: gigawatt-hour (1 GWh = 10<sup>6</sup> kWh); TWh: terawatt-hour (1 TWh=10<sup>3</sup> GWh); PJ: petajoule; MW: megawatt; GW: gigawatt (1 GW=10<sup>3</sup> MW).

# BURUNDI


**8.5 million** Population (2010)

**1.6 billion USD** GDP (2010)

**189 USD** GDP per capita (2010)

FIGURE 1: GDP PER CAPITA FOR 2010

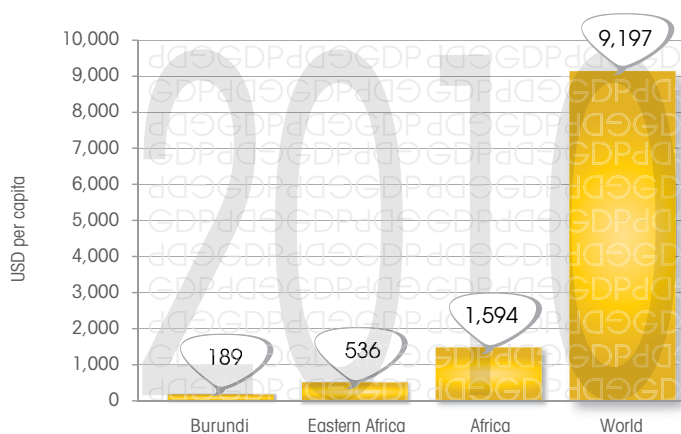
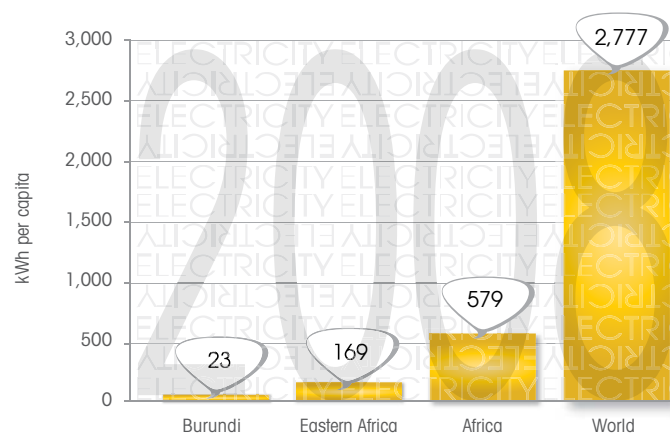


FIGURE 2: ELECTRICITY USE PER CAPITA FOR 2008



Eastern Africa includes Burundi, Comoros, Djibouti, Eritrea, Ethiopia, Kenya, Madagascar, Malawi, Mauritius, Mozambique, Rwanda, Seychelles, Somalia, the United Republic of Tanzania, Uganda, Zambia and Zimbabwe.

## ENERGY NATIONAL PROFILE 2009

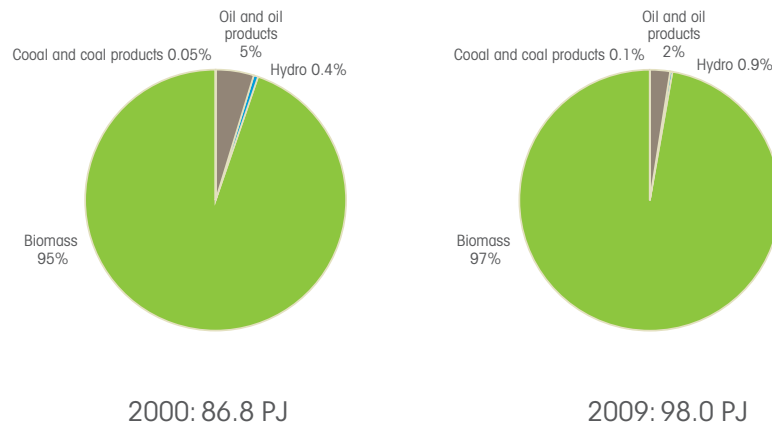
- Total Primary Energy Supply: 98.2 PJ - Of which renewables: 95.4 PJ (97.2%)
- Energy self-sufficiency: 97.3%
- Fuel imports: 10 million USD (2.6% of total imports)
- Electricity generation: 241.5 GWh - Of which renewables: 237.2 GWh (98.2%)
- Electricity use per capita: 23 kWh
- Electrical capacity\*: 32 MW - Of which renewables: 31.4 MW (98.1%)
- Electricity access rate: 2.7%
- Share of population using solid fuels: > 95%

\* 2008

### TARGETS:

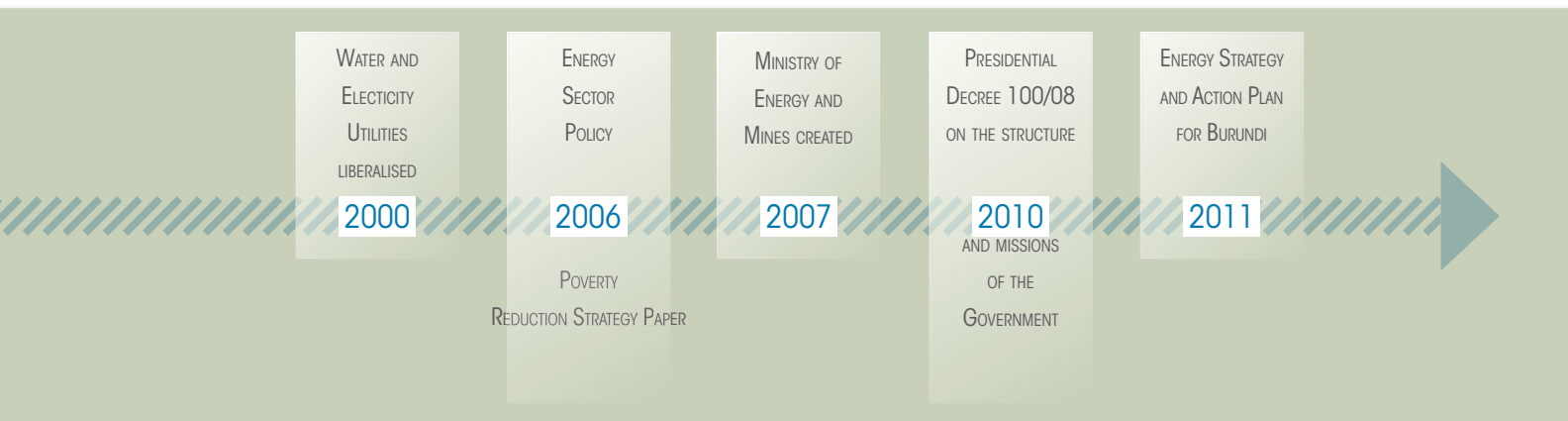
- 2.1% of final energy from renewables by 2020

FIGURE 3: TOTAL PRIMARY ENERGY SUPPLY\* IN 2000 AND 2009



\*excluding electricity trade

#### POLICIES IN PLACE TO PROMOTE RENEWABLE ENERGY SINCE THE RIO CONFERENCE OF 1992



WORLD BANK EASE OF DOING BUSINESS INDEX FOR 2012: Ranked 169 out of 183

#### RENEWABLE ENERGY PROJECTS FROM THE GOVERNMENT AND PRIVATE SECTORS:

- 30 MW of small hydro capacity addition announced (2 projects)

NUMBER OF REGISTERED CLEAN DEVELOPMENT MECHANISM PROJECTS FOCUSING ON RENEWABLE ENERGY: 0

RENEWABLE ENERGY RESOURCES: ● High ● Medium ● Low ● Unknown ✕ Not applicable

Wind ● Solar ● Hydro ● Biomass ● Geothermal ● Ocean ✕

Note: The information on resources should be taken as an indication only. It refers to a general trend of available resources, and does not prejudge the feasibility of individual projects. The thresholds are indicative, and do not refer to any technological choice. The analysis is based on the literature.

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Units: USD: United States dollar; kWh: kilowatt-hour; GWh: gigawatt-hour (1 GWh = 10<sup>6</sup> kWh); TWh: terawatt-hour (1 TWh=10<sup>3</sup> GWh); PJ: petajoule; MW: megawatt; GW: gigawatt (1 GW=10<sup>3</sup> MW).



# CAMEROON

**20.0 million** Population (2010)

**22.4 billion USD** GDP (2010)

**1,122 USD** GDP per capita (2010)

FIGURE 1: GDP PER CAPITA FOR 2010

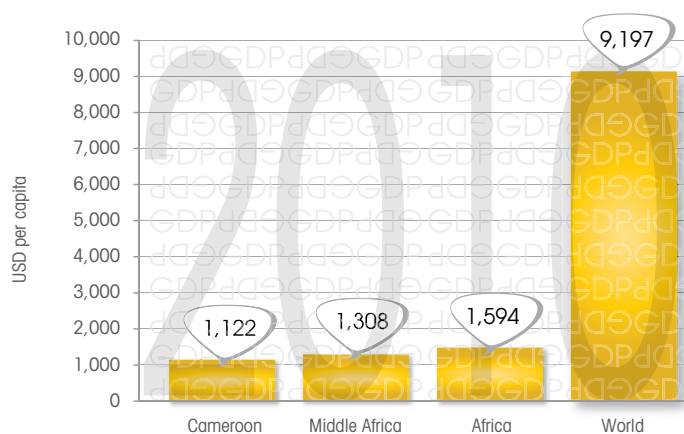
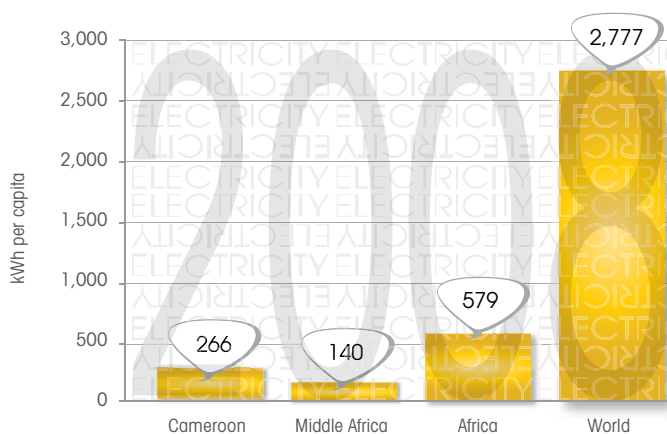


FIGURE 2: ELECTRICITY USE PER CAPITA FOR 2008



Middle Africa includes Angola, Cameroon, the Central African Republic, Chad, Congo, the Democratic Republic of Congo, Equatorial Guinea, Gabon and Sao Tome and Principe.

## ENERGY NATIONAL PROFILE 2009

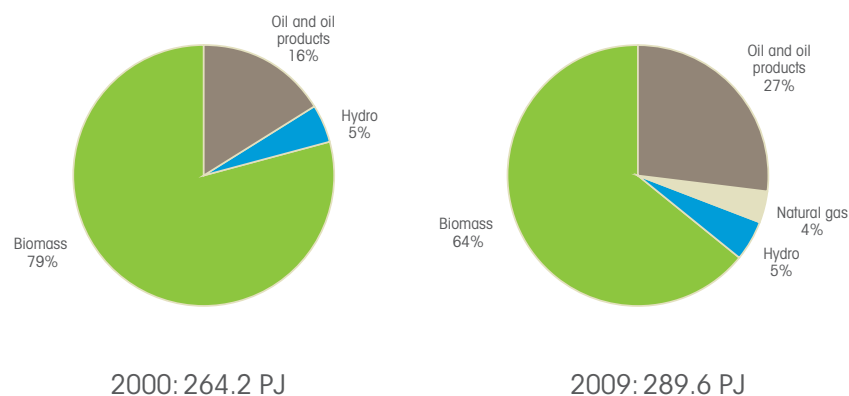
- Total Primary Energy Supply: 289.6 PJ - Of which renewables: 200.2 PJ (69.1 %)
- Energy self-sufficiency: 127.9%
- Fuel imports: 961 million USD (22.4 % of total imports)
- Electricity generation: 5.7 TWh - Of which renewables: 4,025 GWh (70.1 %)
- Electricity use per capita: 266 kWh
- Electrical capacity\*: 1,105 MW - Of which renewables: 805 MW (72.9 %)
- Electricity access rate: 48.7%
- Share of population using solid fuels: 81%

\* 2008

### TARGETS:

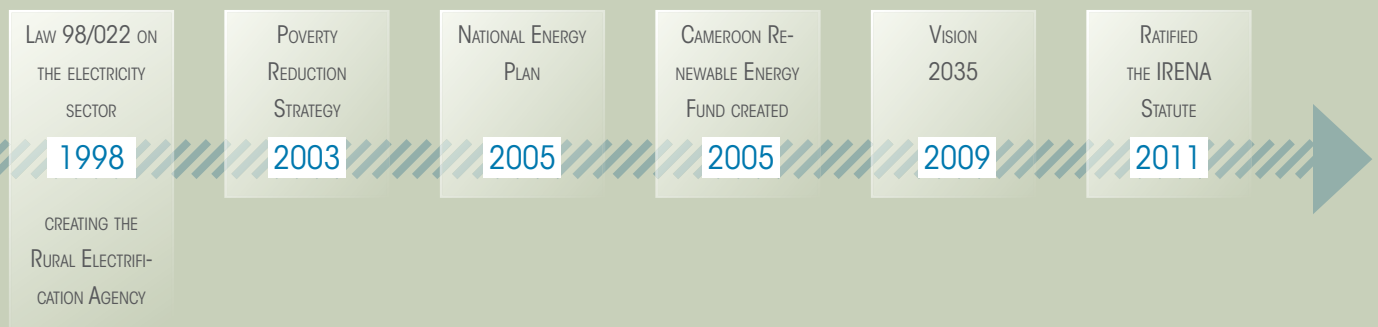
- No information available

FIGURE 3: TOTAL PRIMARY ENERGY SUPPLY\* IN 2000 AND 2009



\*excluding electricity trade

#### POLICIES IN PLACE TO PROMOTE RENEWABLE ENERGY SINCE THE RIO CONFERENCE OF 1992



WORLD BANK EASE OF DOING BUSINESS INDEX FOR 2012: Ranked 161 out of 183

RENEWABLE ENERGY PROJECTS FROM THE GOVERNMENT AND PRIVATE SECTORS:

- 19 MW of biomass-fired capacity addition announced (1 project)
- 12 MW of small hydro capacity addition announced (1 project)

NUMBER OF REGISTERED CLEAN DEVELOPMENT MECHANISM PROJECTS FOCUSING ON RENEWABLE ENERGY: 0

RENEWABLE ENERGY RESOURCES: ● High ● Medium ● Low ● Unknown ✕ Not applicable

Wind ● Solar ● Hydro ● Biomass ● Geothermal ● Ocean ●

Note: The information on resources should be taken as an indication only. It refers to a general trend of available resources, and does not prejudice the feasibility of individual projects. The thresholds are indicative, and do not refer to any technological choice. The analysis is based on the literature.

Sources: Population and GDP: World Bank; Energy data: IEA, IRENA analysis based on UN data; Share of fuel imports in total imports: World Trade Organisation; Electrical capacity: IEA, EIA; Electricity access rate: World Energy Outlook 2010 database (IEA); Share of population using solid fuels: World Health Organisation; Targets: REN21, IRENA; Policy/legislation: IEA, Reegle, IRENA research; Ease of doing business index: World Bank; Renewable energy projects: Bloomberg New Energy Finance, IRENA research; Clean Development Mechanism projects: UNFCCC; Renewable energy resources: IRENA analysis.

Units: USD: United States dollar; kWh: kilowatt-hour; GWh: gigawatt-hour (1 GWh = 10<sup>6</sup> kWh); TWh: terawatt-hour (1 TWh=10<sup>3</sup> GWh); PJ: petajoule; MW: megawatt; GW: gigawatt (1 GW=10<sup>3</sup> MW).

# CAPE VERDE



**513,000** Population (2010)  
**1.6 billion USD** GDP (2010)  
**3,215 USD** GDP per capita (2010)

FIGURE 1: GDP PER CAPITA FOR 2010

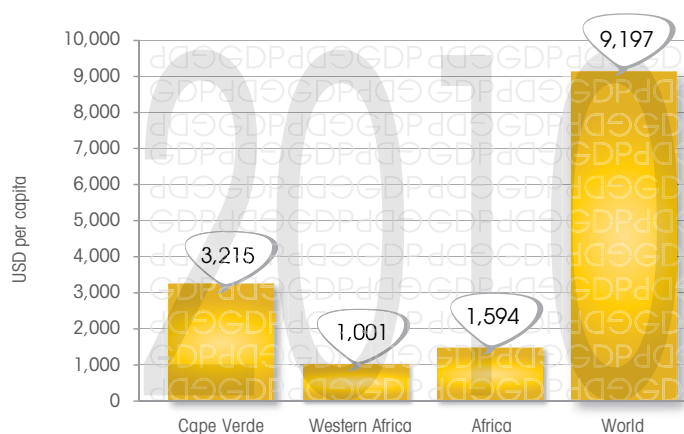
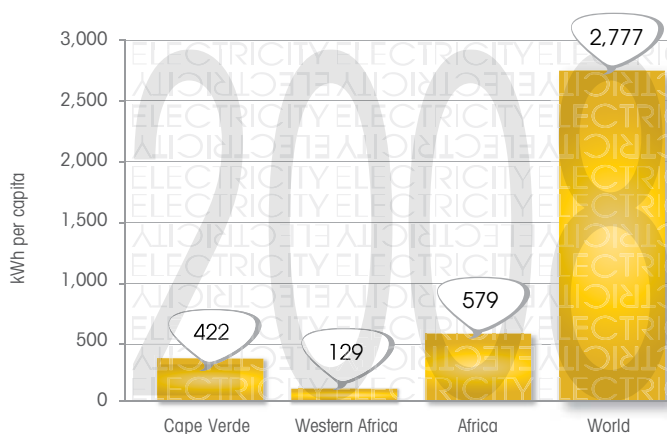


FIGURE 2: ELECTRICITY USE PER CAPITA FOR 2008



Western Africa includes Benin, Burkina Faso, Cape Verde, Côte d'Ivoire, Gambia, Ghana, Guinea, Guinea-Bissau, Liberia, Mali, Mauritania, Niger, Nigeria, Senegal, Sierra Leone and Togo.

## ENERGY NATIONAL PROFILE 2008

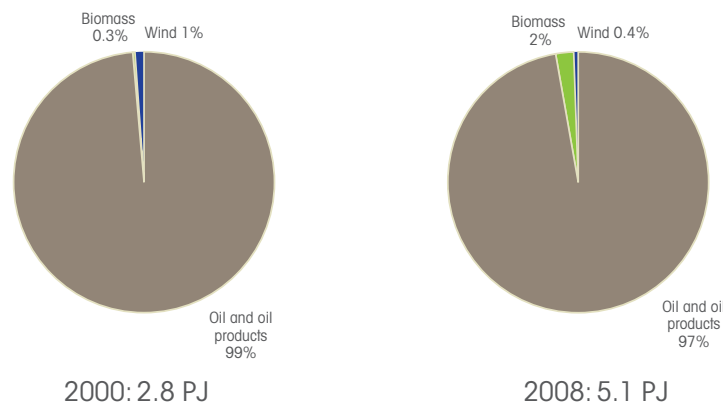
- Total Primary Energy Supply: 5.1 PJ - Of which renewables: 0.1 PJ (2.7 %)
- Energy self-sufficiency: 2.7%
- Fuel imports\*: 78 million USD (11 % of total imports)
- Electricity generation: 286.8 GWh - Of which renewables: 5.5 GWh (1.9 %)
- Electricity use per capita: 422 kWh
- Electrical capacity: 75 MW - Of which renewables: 3 MW (4 %)
- Electricity access rate\*: 87.0%
- Share of population using solid fuels: 36%

\*2009

### TARGETS:

- 50% of electricity generation from renewables by 2020

FIGURE 3: TOTAL PRIMARY ENERGY SUPPLY\* IN 2000 AND 2008



\*excluding electricity trade

## POLICIES IN PLACE TO PROMOTE RENEWABLE ENERGY SINCE THE RIO CONFERENCE OF 1992



WORLD BANK EASE OF DOING BUSINESS INDEX FOR 2012: Ranked 119 out of 183

RENEWABLE ENERGY PROJECTS FROM THE GOVERNMENT AND PRIVATE SECTORS:

- 7.5 MW of solar photovoltaic capacity addition announced (2 projects)
- 29 MW of wind capacity addition announced (6 projects)

NUMBER OF REGISTERED CLEAN DEVELOPMENT MECHANISM PROJECTS FOCUSING ON RENEWABLE ENERGY: 0

RENEWABLE ENERGY RESOURCES: ● High ● Medium ● Low ● Unknown ✕ Not applicable

Wind ● Solar ● Hydro ● Biomass ● Geothermal ● Ocean ●

Note: The information on resources should be taken as an indication only. It refers to a general trend of available resources, and does not prejudge the feasibility of individual projects. The thresholds are indicative, and do not refer to any technological choice. The analysis is based on the literature.

Sources: Population and GDP: World Bank; Energy data: IEA, IRENA analysis based on UN data; Share of fuel imports in total imports: World Trade Organisation; Electrical capacity: IEA, EIA; Electricity access rate: World Energy Outlook 2010 database (IEA); Share of population using solid fuels: World Health Organisation; Targets: REN21, IRENA; Policy/legislation: IEA, Reegle, IRENA research; Ease of doing business index: World Bank; Renewable energy projects: Bloomberg New Energy Finance, IRENA research; Clean Development Mechanism projects: UNFCCC; Renewable energy resources: IRENA analysis.

Units: USD: United States dollar; kWh: kilowatt-hour; GWh: gigawatt-hour (1 GWh = 10<sup>6</sup> kWh); TWh: terawatt-hour (1 TWh=10<sup>3</sup> GWh); PJ: petajoule; MW: megawatt; GW: gigawatt (1 GW=10<sup>3</sup> MW).

# CENTRAL AFRICAN REPUBLIC


**4.5 million** Population (2010)

**2.0 billion USD** GDP (2010)

**447 USD** GDP per capita (2010)

FIGURE 1: GDP PER CAPITA FOR 2010

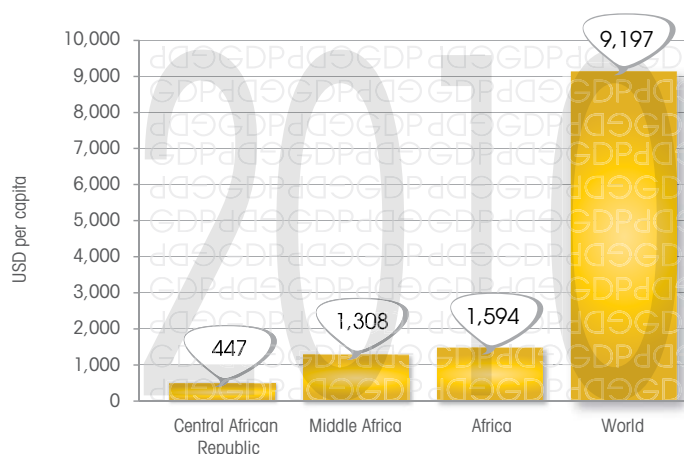
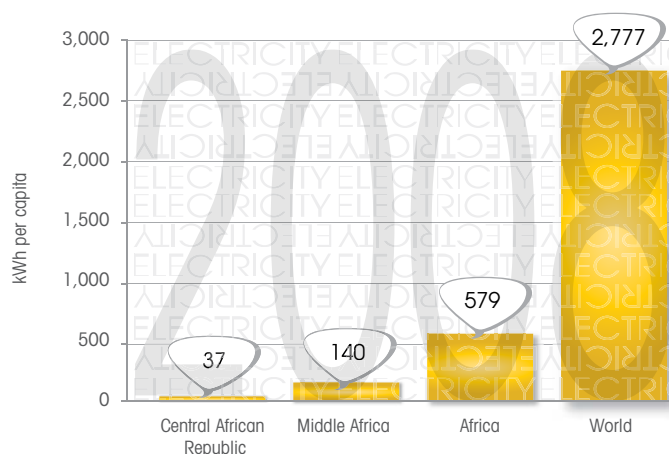


FIGURE 2: ELECTRICITY USE PER CAPITA FOR 2008



Middle Africa includes Angola, Cameroon, the Central African Republic, Chad, Congo, the Democratic Republic of Congo, Equatorial Guinea, Gabon and Sao Tome and Principe.

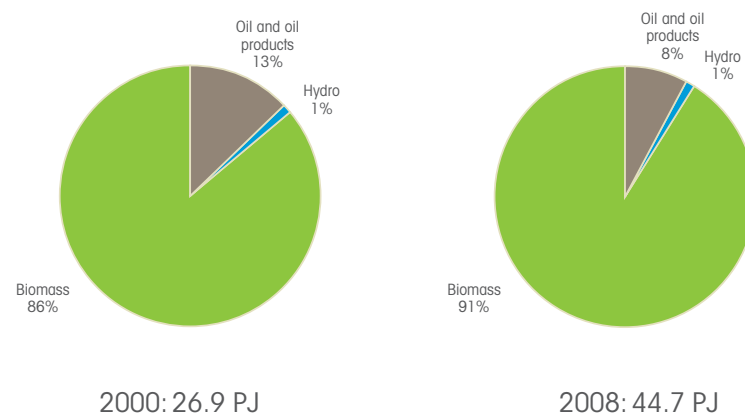
## ENERGY NATIONAL PROFILE 2008

- Total Primary Energy Supply: 44.7 PJ - Of which renewables: 41.0 PJ (91.6 %)
- Energy self-sufficiency: 91.6%
- Fuel imports: Not available
- Electricity generation: 162.0 GWh - Of which renewables: 132.0 GWh (81.5 %)
- Electricity use per capita: 37 kWh
- Electrical capacity: 46 MW - Of which renewables: 25 MW (54.3 %)
- Electricity access rate: Not available
- Share of population using solid fuels: > 95%

### TARGETS:

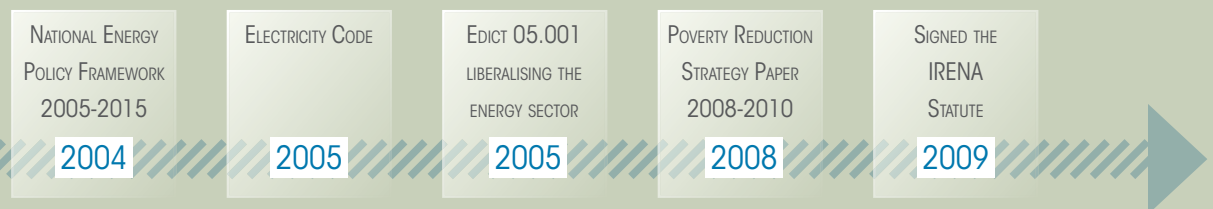
- No information available

FIGURE 3: TOTAL PRIMARY ENERGY SUPPLY\* IN 2000 AND 2008



\*excluding electricity trade

## POLICIES IN PLACE TO PROMOTE RENEWABLE ENERGY SINCE THE RIO CONFERENCE OF 1992



WORLD BANK EASE OF DOING BUSINESS INDEX FOR 2012: Ranked 182 out of 183

RENEWABLE ENERGY PROJECTS FROM THE GOVERNMENT AND PRIVATE SECTORS:

- No information available

NUMBER OF REGISTERED CLEAN DEVELOPMENT MECHANISM PROJECTS FOCUSING ON RENEWABLE ENERGY: 0

RENEWABLE ENERGY RESOURCES: ● High ● Medium ● Low ● Unknown ✕ Not applicable

Wind ● Solar ● Hydro ● Biomass ● Geothermal ● Ocean ✕

Note: The information on resources should be taken as an indication only. It refers to a general trend of available resources, and does not prejudice the feasibility of individual projects. The thresholds are indicative, and do not refer to any technological choice. The analysis is based on the literature.

Sources: Population and GDP: World Bank; Energy data: IEA, IRENA analysis based on UN data; Share of fuel imports in total imports: World Trade Organisation; Electrical capacity: IEA, EIA; Electricity access rate: World Energy Outlook 2010 database (IEA); Share of population using solid fuels: World Health Organisation; Targets: REN21, IRENA; Policy/legislation: IEA, Reegle, IRENA research; Ease of doing business index: World Bank; Renewable energy projects: Bloomberg New Energy Finance, IRENA research; Clean Development Mechanism projects: UNFCCC; Renewable energy resources: IRENA analysis.

Units: USD: United States dollar; kWh: kilowatt-hour; GWh: gigawatt-hour (1 GWh = 10<sup>6</sup> kWh); TWh: terawatt-hour (1 TWh=10<sup>3</sup> GWh); PJ: petajoule; MW: megawatt; GW: gigawatt (1 GW=10<sup>3</sup> MW).



# CHAD


**11.5 million** Population (2010)

**7.6 billion USD** GDP (2010)

**659 USD** GDP per capita (2010)

FIGURE 1: GDP PER CAPITA FOR 2010

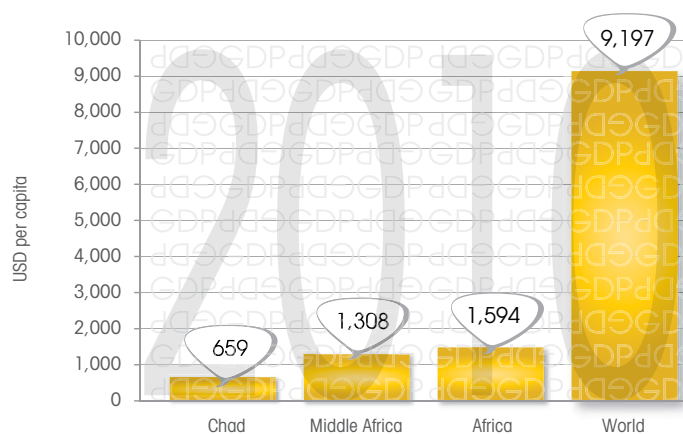
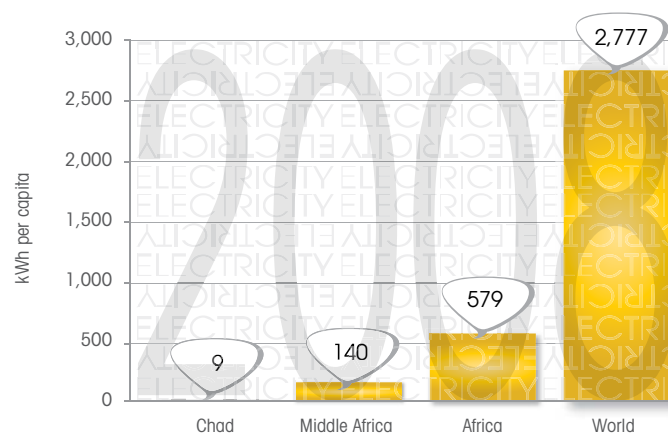


FIGURE 2: ELECTRICITY USE PER CAPITA FOR 2008



Middle Africa includes Angola, Cameroon, the Central African Republic, Chad, Congo, the Democratic Republic of Congo, Equatorial Guinea, Gabon and Sao Tome and Principe.

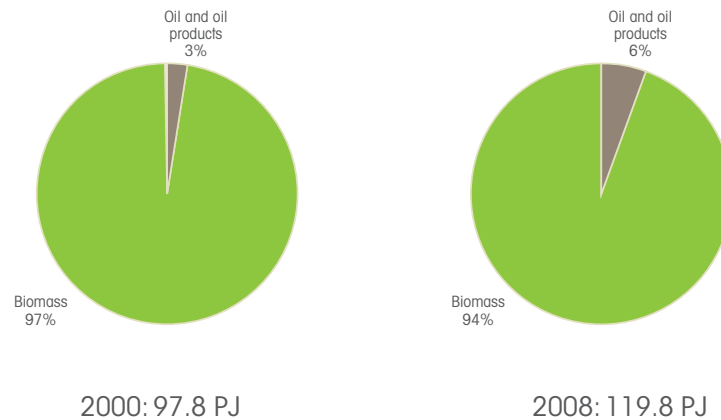
## ENERGY NATIONAL PROFILE 2008

- Total Primary Energy Supply: 119.8 PJ - Of which renewables: 112.8 PJ (94.2 %)
- Energy self-sufficiency: 317.0%
- Fuel imports: Not available
- Electricity generation: 103.0 GWh - Of which renewables: 0.0 GWh (0 %)
- Electricity use per capita: 9 kWh
- Electrical capacity: 32 MW - Of which renewables: 0 MW (0 %)
- Electricity access rate: Not available
- Share of population using solid fuels: 93%

### TARGETS:

- No information available

FIGURE 3: TOTAL PRIMARY ENERGY SUPPLY\* IN 2000 AND 2008



\*excluding electricity trade

#### POLICIES IN PLACE TO PROMOTE RENEWABLE ENERGY SINCE THE RIO CONFERENCE OF 1992



WORLD BANK EASE OF DOING BUSINESS INDEX FOR 2012: Ranked 183 out of 183

RENEWABLE ENERGY PROJECTS FROM THE GOVERNMENT AND PRIVATE SECTORS:

- No information available

NUMBER OF REGISTERED CLEAN DEVELOPMENT MECHANISM PROJECTS FOCUSING ON RENEWABLE ENERGY: 0

RENEWABLE ENERGY RESOURCES: ● High ● Medium ● Low ● Unknown ✕ Not applicable

Wind ● Solar ● Hydro ● Biomass ● Geothermal ● Ocean ✕

Note: The information on resources should be taken as an indication only. It refers to a general trend of available resources, and does not prejudge the feasibility of individual projects. The thresholds are indicative, and do not refer to any technological choice. The analysis is based on the literature.

Sources: Population and GDP: World Bank; Energy data: IEA, IRENA analysis based on UN data; Share of fuel imports in total imports: World Trade Organisation; Electrical capacity: IEA, EIA; Electricity access rate: World Energy Outlook 2010 database (IEA); Share of population using solid fuels: World Health Organisation; Targets: REN21, IRENA; Policy/legislation: IEA, Reegle, IRENA research; Ease of doing business index: World Bank; Renewable energy projects: Bloomberg New Energy Finance, IRENA research; Clean Development Mechanism projects: UNFCCC; Renewable energy resources: IRENA analysis.

Units: USD: United States dollar; kWh: kilowatt-hour; GWh: gigawatt-hour (1 GWh = 10<sup>6</sup> kWh); TWh: terawatt-hour (1 TWh=10<sup>3</sup> GWh); PJ: petajoule; MW: megawatt; GW: gigawatt (1 GW=10<sup>3</sup> MW).

# COMOROS

**675,000** Population (2010)

**541 million USD** GDP (2010)

**802 USD** GDP per capita (2010)

FIGURE 1: GDP PER CAPITA FOR 2010

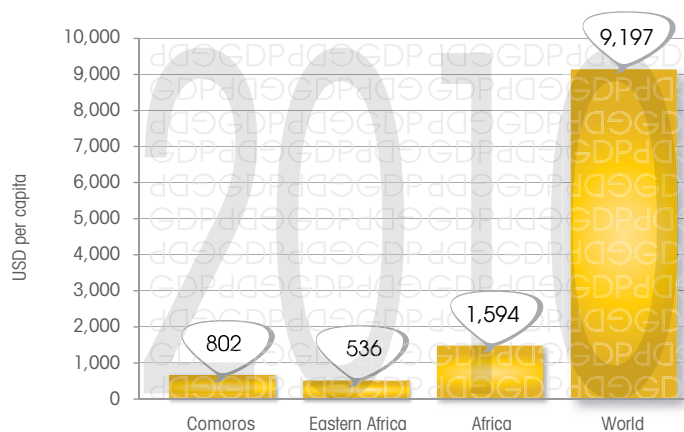
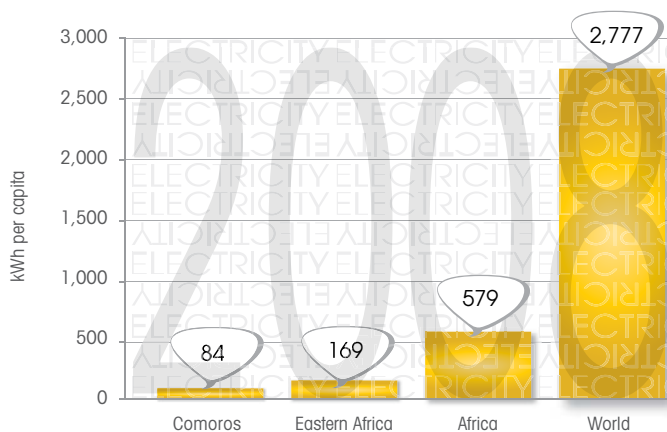


FIGURE 2: ELECTRICITY USE PER CAPITA FOR 2008



Eastern Africa includes Burundi, Comoros, Djibouti, Eritrea, Ethiopia, Kenya, Madagascar, Malawi, Mauritius, Mozambique, Rwanda, Seychelles, Somalia, the United Republic of Tanzania, Uganda, Zambia and Zimbabwe.

## ENERGY NATIONAL PROFILE 2008

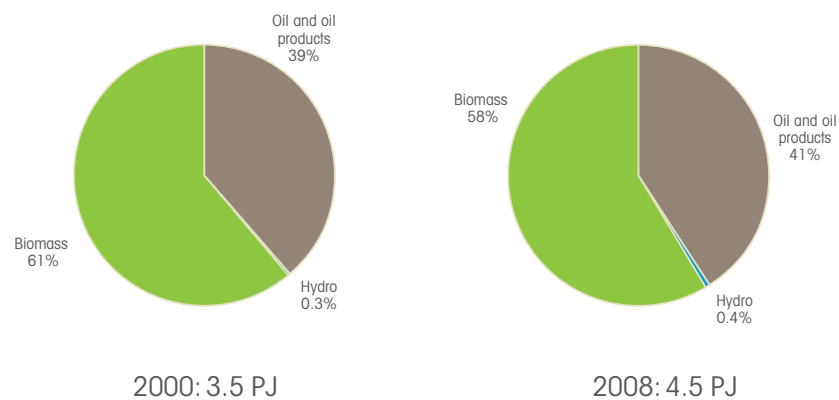
- Total Primary Energy Supply: 4.5 PJ - Of which renewables: 2.7 PJ (58.9 %)
- Energy self-sufficiency: 58.9%
- Fuel imports: Not available
- Electricity generation: 54.0 GWh - Of which renewables: 5.0 GWh (9.3 %)
- Electricity use per capita: 84 kWh
- Electrical capacity: 6 MW - Of which renewables: 1 MW (16.7 %)
- Electricity access rate\*: 46.0%
- Share of population using solid fuels: 76%

\* 2009

### TARGETS:

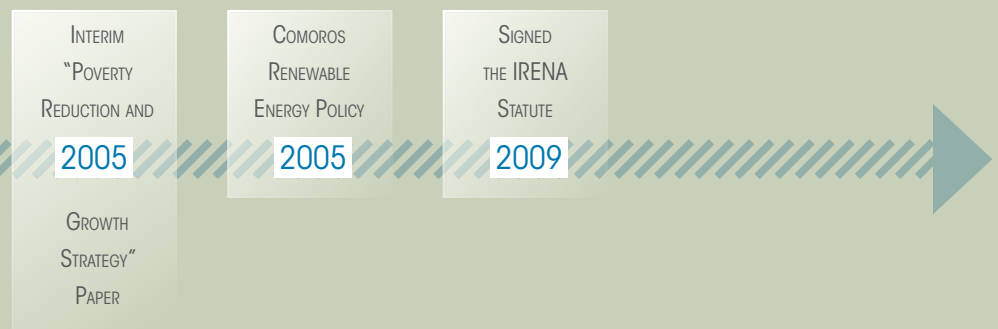
- No information available

FIGURE 3: TOTAL PRIMARY ENERGY SUPPLY\* IN 2000 AND 2008



\*excluding electricity trade

#### POLICIES IN PLACE TO PROMOTE RENEWABLE ENERGY SINCE THE RIO CONFERENCE OF 1992



WORLD BANK EASE OF DOING BUSINESS INDEX FOR 2012: Ranked 157 out of 183

RENEWABLE ENERGY PROJECTS FROM THE GOVERNMENT AND PRIVATE SECTORS:

- Electrification of six villages with solar photovoltaic micro-power station

NUMBER OF REGISTERED CLEAN DEVELOPMENT MECHANISM PROJECTS FOCUSING ON RENEWABLE ENERGY: 0

RENEWABLE ENERGY RESOURCES: ● High ● Medium ● Low ● Unknown ✕ Not applicable

Wind ● Solar ● Hydro ● Biomass ● Geothermal ● Ocean ●

Note: The information on resources should be taken as an indication only. It refers to a general trend of available resources, and does not prejudge the feasibility of individual projects. The thresholds are indicative, and do not refer to any technological choice. The analysis is based on the literature.

Sources: Population and GDP: World Bank; Energy data: IEA, IRENA analysis based on UN data; Share of fuel imports in total imports: World Trade Organisation; Electrical capacity: IEA, EIA; Electricity access rate: World Energy Outlook 2010 database (IEA); Share of population using solid fuels: World Health Organisation; Targets: REN21, IRENA; Policy/legislation: IEA, Reegle, IRENA research; Ease of doing business index: World Bank; Renewable energy projects: Bloomberg New Energy Finance, IRENA research; Clean Development Mechanism projects: UNFCCC; Renewable energy resources: IRENA analysis.

Units: USD: United States dollar; kWh: kilowatt-hour; GWh: gigawatt-hour (1 GWh = 10<sup>6</sup> kWh); TWh: terawatt-hour (1 TWh=10<sup>3</sup> GWh); PJ: petajoule; MW: megawatt; GW: gigawatt (1 GW=10<sup>3</sup> MW).

# CONGO


**3.8 million** Population (2010)

**11.9 billion USD** GDP (2010)

**3,165 USD** GDP per capita (2010)

FIGURE 1: GDP PER CAPITA FOR 2010

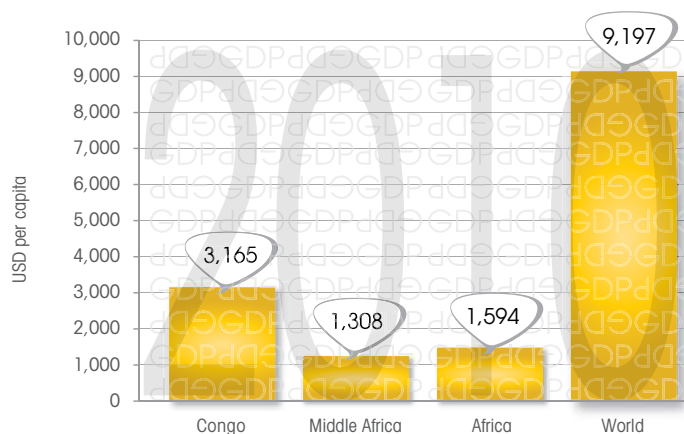
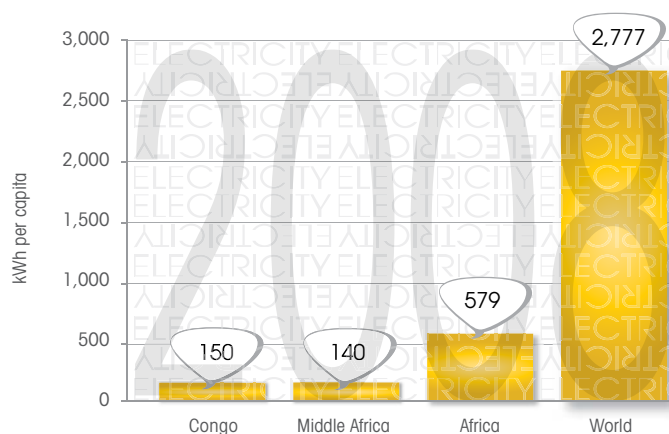


FIGURE 2: ELECTRICITY USE PER CAPITA FOR 2008



Middle Africa includes Angola, Cameroon, the Central African Republic, Chad, Congo, the Democratic Republic of Congo, Equatorial Guinea, Gabon and Sao Tome and Principe.

## ENERGY NATIONAL PROFILE 2009

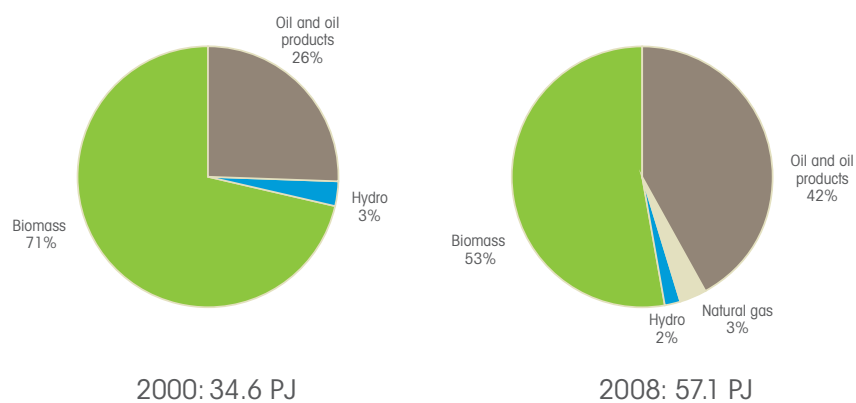
- Total Primary Energy Supply: 58.7 PJ - Of which renewables: 31.2 PJ (53.2 %)
- Energy self-sufficiency: 1,089.6%
- Fuel imports: Not available
- Electricity generation: 516.0 GWh - Of which renewables: 330.0 GWh (64 %)
- Electricity use per capita: 157 kWh
- Electrical capacity\*: 148 MW - Of which renewables: 119 MW (80.4 %)
- Electricity access rate: 37.1%
- Share of population using solid fuels: 84%

\* 2008

### TARGETS:

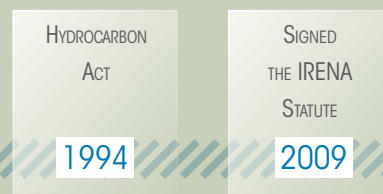
- No information available

FIGURE 3: TOTAL PRIMARY ENERGY SUPPLY\* IN 2000 AND 2009



\*excluding electricity trade

## POLICIES IN PLACE TO PROMOTE RENEWABLE ENERGY SINCE THE RIO CONFERENCE OF 1992



WORLD BANK EASE OF DOING BUSINESS INDEX FOR 2012: Ranked 181 out of 183

RENEWABLE ENERGY PROJECTS FROM THE GOVERNMENT AND PRIVATE SECTORS:

- No information available

NUMBER OF REGISTERED CLEAN DEVELOPMENT MECHANISM PROJECTS FOCUSING ON RENEWABLE ENERGY: 0

RENEWABLE ENERGY RESOURCES: ● High ● Medium ● Low ● Unknown ✕ Not applicable

**Wind** ● **Solar** ● **Hydro** ● **Biomass** ● **Geothermal** ● **Ocean** ●

Note: The information on resources should be taken as an indication only. It refers to a general trend of available resources, and does not prejudice the feasibility of individual projects. The thresholds are indicative, and do not refer to any technological choice. The analysis is based on the literature.

Sources: Population and GDP: World Bank; Energy data: IEA, IRENA analysis based on UN data; Share of fuel imports in total imports: World Trade Organisation; Electrical capacity: IEA, EIA; Electricity access rate: World Energy Outlook 2010 database (IEA); Share of population using solid fuels: World Health Organisation; Targets: REN21, IRENA; Policy/legislation: IEA, Reegle, IRENA research; Ease of doing business index: World Bank; Renewable energy projects: Bloomberg New Energy Finance, IRENA research; Clean Development Mechanism projects: UNFCCC; Renewable energy resources: IRENA analysis.

Units: USD: United States dollar; kWh: kilowatt-hour; GWh: gigawatt-hour (1 GWh = 10<sup>6</sup> kWh); TWh: terawatt-hour (1 TWh=10<sup>3</sup> GWh); PJ: petajoule; MW: megawatt; GW: gigawatt (1 GW=10<sup>3</sup> MW).



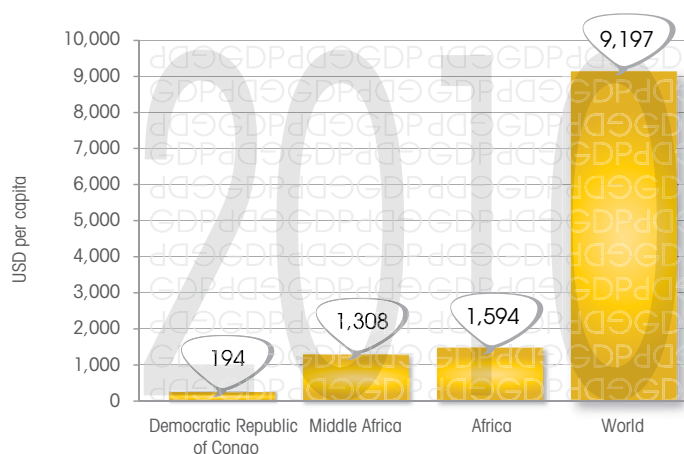
# DEMOCRATIC REPUBLIC OF CONGO

67.8 million Population (2010)

13.1 billion USD GDP (2010)

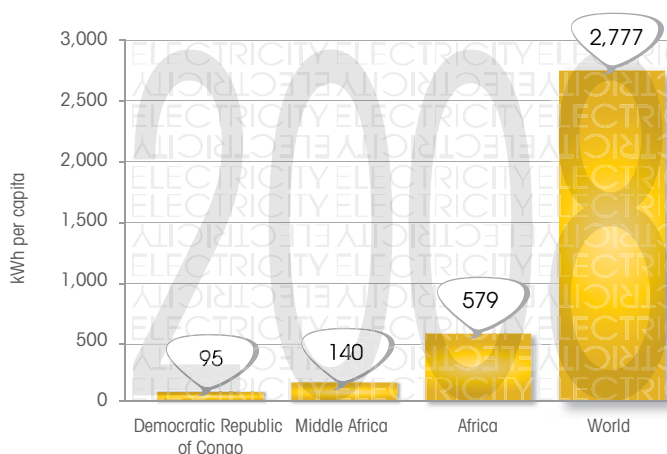
194 USD GDP per capita (2010)

FIGURE 1: GDP PER CAPITA FOR 2010



Middle Africa includes Angola, Cameroon, the Central African Republic, Chad, Congo, the Democratic Republic of Congo, Equatorial Guinea, Gabon and Sao Tome and Principe.

FIGURE 2: ELECTRICITY USE PER CAPITA FOR 2008



## ENERGY NATIONAL PROFILE 2009

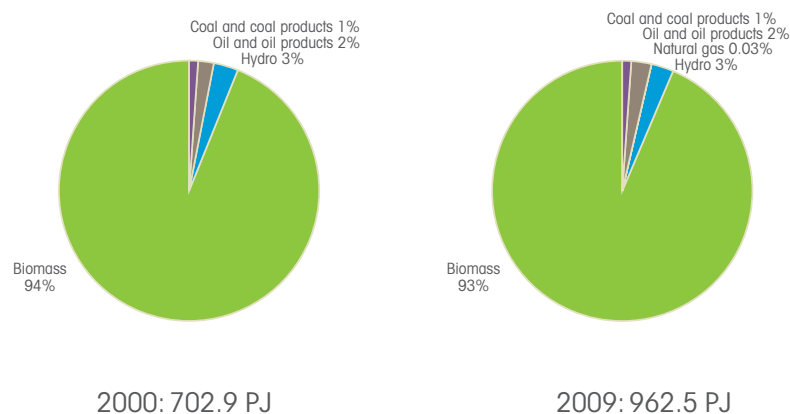
- Total Primary Energy Supply: 959.7 PJ - Of which renewables: 927.1 PJ (96.6 %)
- Energy self-sufficiency: 101.9%
- Fuel imports: Not available
- Electricity generation: 7.8 TWh - Of which renewables: 7.8 TWh (99.6 %)
- Electricity use per capita: 101 kWh
- Electrical capacity\*: 2,475 MW - Of which renewables: 2,442 MW (98.7 %)
- Electricity access rate: 11.1%
- Share of population using solid fuels: > 95%

\*2008

### TARGETS:

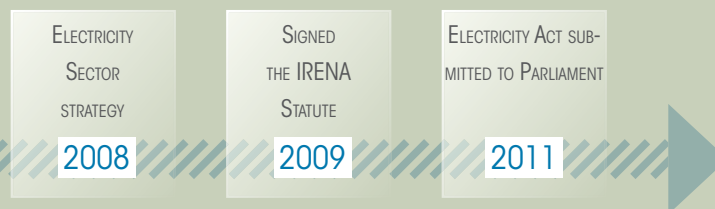
- No information available

FIGURE 3: TOTAL PRIMARY ENERGY SUPPLY\* IN 2000 AND 2009



\*excluding electricity trade

## POLICIES IN PLACE TO PROMOTE RENEWABLE ENERGY SINCE THE RIO CONFERENCE OF 1992



WORLD BANK EASE OF DOING BUSINESS INDEX FOR 2012: Ranked 178 out of 183

RENEWABLE ENERGY PROJECTS FROM THE GOVERNMENT AND PRIVATE SECTORS:

- 9 MW of small hydro capacity addition announced (1 project)

NUMBER OF REGISTERED CLEAN DEVELOPMENT MECHANISM PROJECTS FOCUSING ON RENEWABLE ENERGY: 0

RENEWABLE ENERGY RESOURCES: ● High ● Medium ● Low ● Unknown ✕ Not applicable

Wind ● Solar ● Hydro ● Biomass ● Geothermal ● Ocean ●

Note: The information on resources should be taken as an indication only. It refers to a general trend of available resources, and does not prejudice the feasibility of individual projects. The thresholds are indicative, and do not refer to any technological choice. The analysis is based on the literature.

Sources: Population and GDP: World Bank; Energy data: IEA, IRENA analysis based on UN data; Share of fuel imports in total imports: World Trade Organisation; Electrical capacity: IEA, EIA; Electricity access rate: World Energy Outlook 2010 database (IEA); Share of population using solid fuels: World Health Organisation; Targets: REN21, IRENA; Policy/legislation: IEA, Reegle, IRENA research; Ease of doing business index: World Bank; Renewable energy projects: Bloomberg New Energy Finance, IRENA research; Clean Development Mechanism projects: UNFCCC; Renewable energy resources: IRENA analysis.

Units: USD: United States dollar; kWh: kilowatt-hour; GWh: gigawatt-hour (1 GWh = 10<sup>6</sup> kWh); TWh: terawatt-hour (1 TWh=10<sup>3</sup> GWh); PJ: petajoule; MW: megawatt; GW: gigawatt (1 GW=10<sup>3</sup> MW).

# CÔTE D'IVOIRE



**21.6 million** Population (2010)  
**22.8 billion USD** GDP (2010)  
**1,056 USD** GDP per capita (2010)

FIGURE 1: GDP PER CAPITA FOR 2010

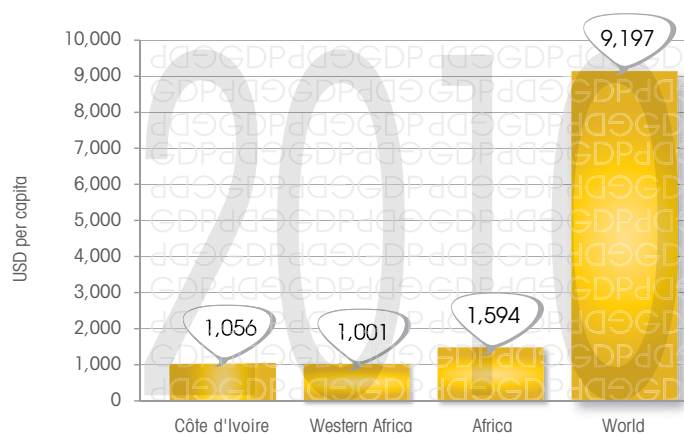
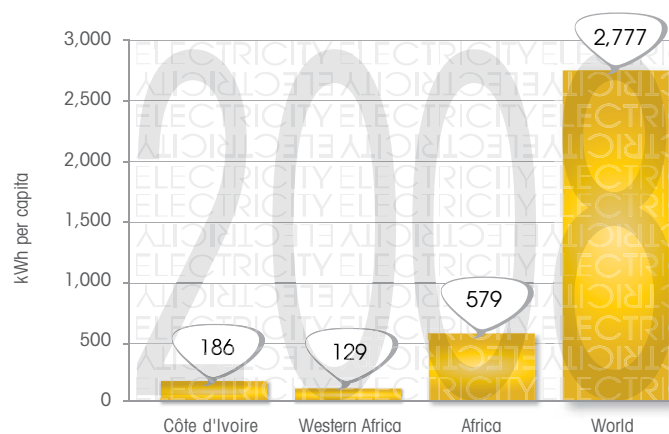


FIGURE 2: ELECTRICITY USE PER CAPITA FOR 2008



Western Africa includes Benin, Burkina Faso, Cape Verde, Côte d'Ivoire, Gambia, Ghana, Guinea, Guinea-Bissau, Liberia, Mali, Mauritania, Niger, Nigeria, Senegal, Sierra Leone and Togo.

## ENERGY NATIONAL PROFILE 2009

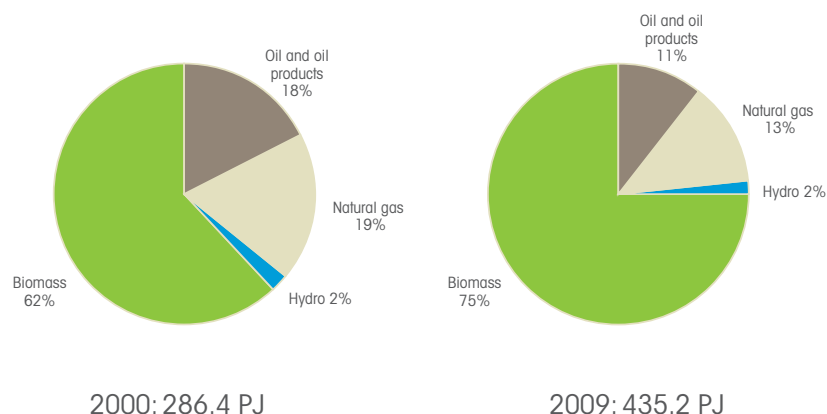
- Total Primary Energy Supply: 433.5 PJ - Of which renewables: 333.4 PJ (76.9 %)
- Energy self-sufficiency: 114.9%
- Fuel imports: 1.5 billion USD (21.4 % of total imports)
- Electricity generation: 5.9 TWh - Of which renewables: 2,238 GWh (38 %)
- Electricity use per capita: 187 kWh
- Electrical capacity\*: 1,218 MW - Of which renewables: 606 MW (49.8 %)
- Electricity access rate: 47.3%
- Share of population using solid fuels: 79%

\* 2008

### TARGETS:

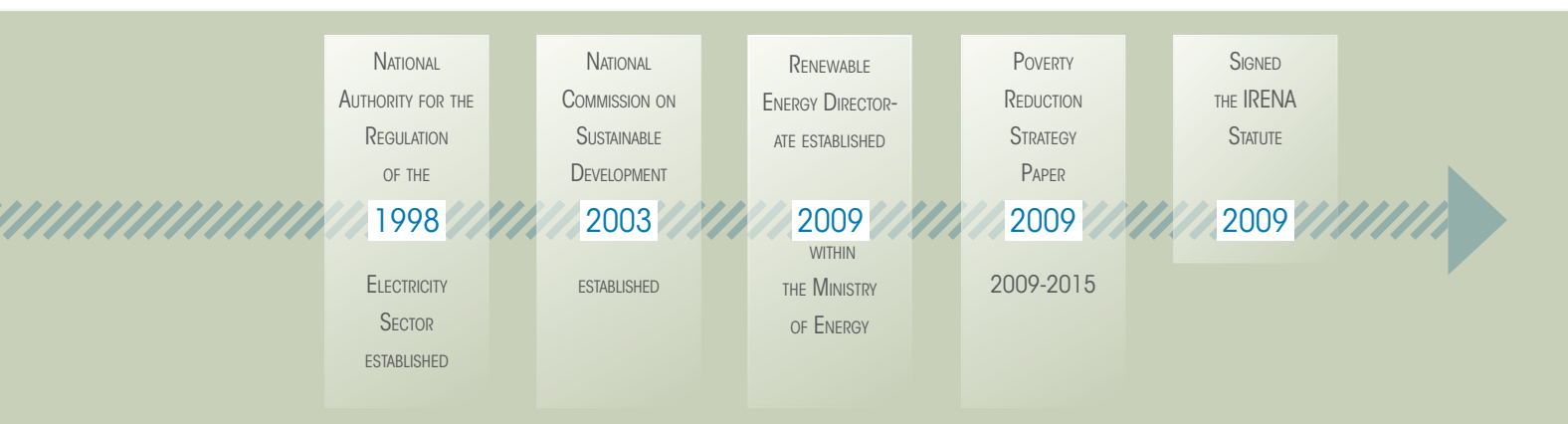
- 3% of primary energy from renewables (excluding biomass) by 2013
- 5% of primary energy from renewables (excluding biomass) by 2015

FIGURE 3: TOTAL PRIMARY ENERGY SUPPLY\* IN 2000 AND 2009



\*excluding electricity trade

## POLICIES IN PLACE TO PROMOTE RENEWABLE ENERGY SINCE THE RIO CONFERENCE OF 1992



WORLD BANK EASE OF DOING BUSINESS INDEX FOR 2012: Ranked 167 out of 183

## RENEWABLE ENERGY PROJECTS FROM THE GOVERNMENT AND PRIVATE SECTORS:

- 60 MW of biomass-fired capacity addition by 2013 (1 project)
- 33 MW of biogas-fired capacity addition announced (2 projects)

NUMBER OF REGISTERED CLEAN DEVELOPMENT MECHANISM PROJECTS FOCUSING ON RENEWABLE ENERGY: 3

RENEWABLE ENERGY RESOURCES: High Medium Low Unknown

Wind Solar Hydro Biomass Geothermal Ocean

Note: The information on resources should be taken as an indication only. It refers to a general trend of available resources, and does not prejudice the feasibility of individual projects. The thresholds are indicative, and do not refer to any technological choice. The analysis is based on the literature.

Sources: Population and GDP: World Bank; Energy data: IEA, IRENA analysis based on UN data; Share of fuel imports in total imports: World Trade Organisation; Electrical capacity: IEA, EIA; Electricity access rate: World Energy Outlook 2010 database (IEA); Share of population using solid fuels: World Health Organisation; Targets: REN21, IRENA; Policy/legislation: IEA, Reegle, IRENA research; Ease of doing business index: World Bank; Renewable energy projects: Bloomberg New Energy Finance, IRENA research; Clean Development Mechanism projects: UNFCCC; Renewable energy resources: IRENA analysis.

Units: USD: United States dollar; kWh: kilowatt-hour; GWh: gigawatt-hour (1 GWh = 10<sup>6</sup> kWh); TWh: terawatt-hour (1 TWh=10<sup>3</sup> GWh); PJ: petajoule; MW: megawatt; GW: gigawatt (1 GW=10<sup>3</sup> MW).

# DJIBOUTI

**879,000** Population (2010)

**Not available** GDP (2010)

**Not available** GDP per capita (2010)

FIGURE 1: GDP PER CAPITA FOR 2010

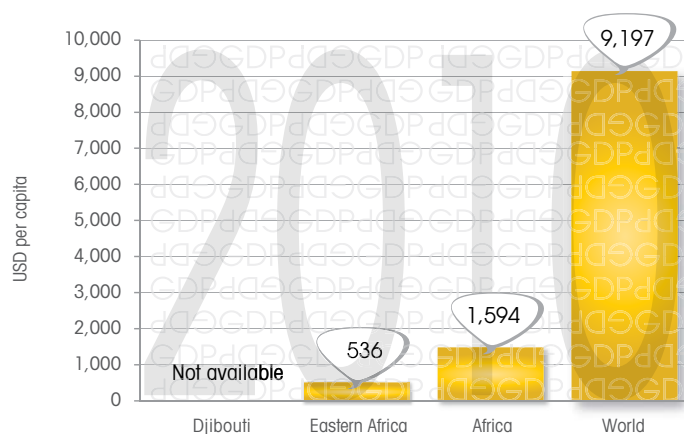
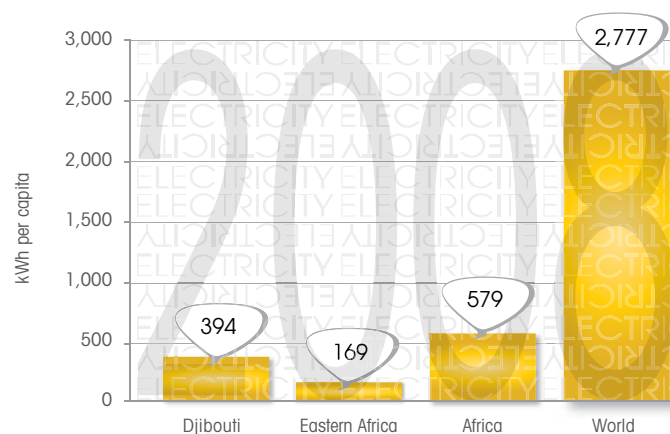


FIGURE 2: ELECTRICITY USE PER CAPITA FOR 2008



Eastern Africa includes Burundi, Comoros, Djibouti, Eritrea, Ethiopia, Kenya, Madagascar, Malawi, Mauritius, Mozambique, Rwanda, Seychelles, Somalia, the United Republic of Tanzania, Uganda, Zambia and Zimbabwe.

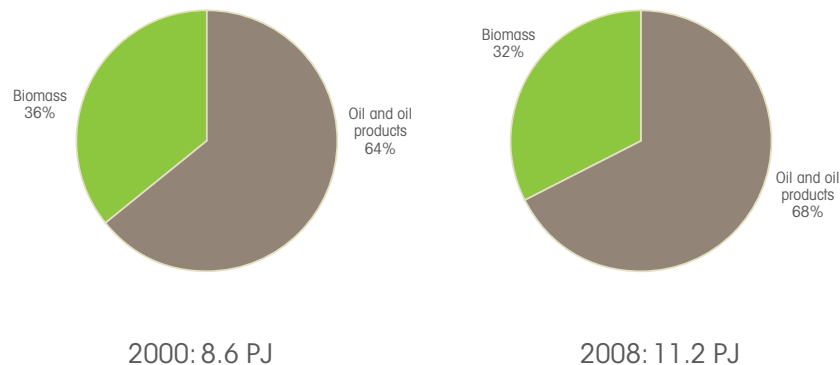
## ENERGY NATIONAL PROFILE 2009

- Total Primary Energy Supply: 11.2 PJ - Of which renewables: 3.6 PJ (32.3 %)
- Energy self-sufficiency: 32.3%
- Fuel imports: Not available
- Electricity generation: 335.0 GWh - Of which renewables: 0.0 GWh (0 %)
- Electricity use per capita: 394 kWh
- Electrical capacity: 118 MW - Of which renewables: 0 MW (0 %)
- Electricity access rate: Not available
- Share of population using solid fuels: 16%

### TARGETS:

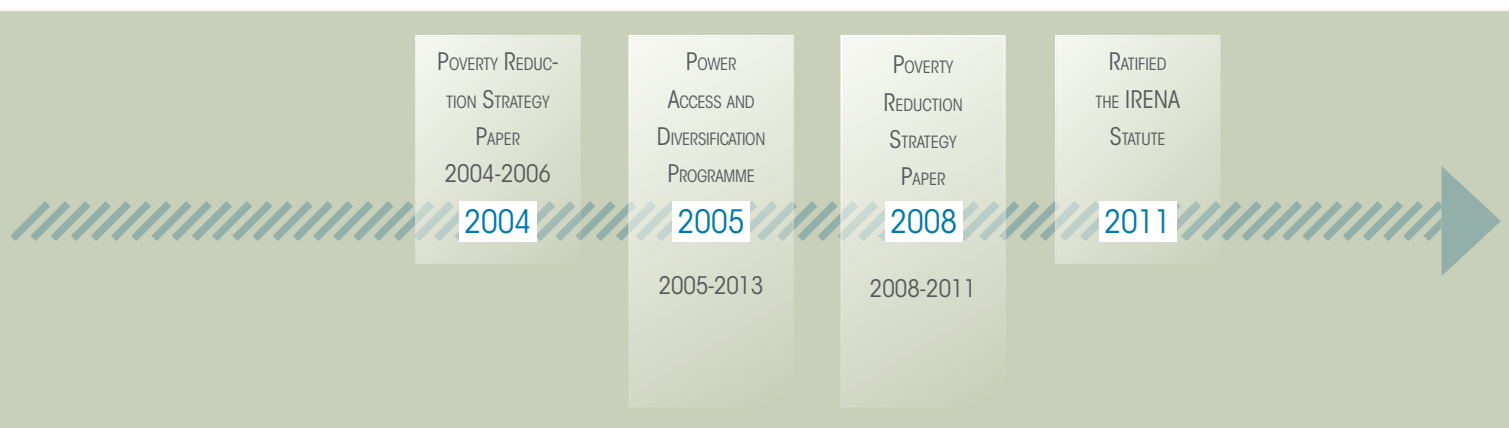
- 30% of rural electrification to come from solar photovoltaic by 2017

FIGURE 3: TOTAL PRIMARY ENERGY SUPPLY\* IN 2000 AND 2008



\*excluding electricity trade

#### POLICIES IN PLACE TO PROMOTE RENEWABLE ENERGY SINCE THE RIO CONFERENCE OF 1992



WORLD BANK EASE OF DOING BUSINESS INDEX FOR 2012: Ranked 170 out of 183

RENEWABLE ENERGY PROJECTS FROM THE GOVERNMENT AND PRIVATE SECTORS:

- 50 MW of geothermal capacity addition announced (1 project)

NUMBER OF REGISTERED CLEAN DEVELOPMENT MECHANISM PROJECTS FOCUSING ON RENEWABLE ENERGY: 0

RENEWABLE ENERGY RESOURCES: ● High ● Medium ● Low ● Unknown ✕ Not applicable

Wind ● Solar ● Hydro ● Biomass ● Geothermal ● Ocean ●

Note: The information on resources should be taken as an indication only. It refers to a general trend of available resources, and does not prejudge the feasibility of individual projects. The thresholds are indicative, and do not refer to any technological choice. The analysis is based on the literature.

Sources: Population and GDP: World Bank; Energy data: IEA, IRENA analysis based on UN data; Share of fuel imports in total imports: World Trade Organisation; Electrical capacity: IEA, EIA; Electricity access rate: World Energy Outlook 2010 database (IEA); Share of population using solid fuels: World Health Organisation; Targets: REN21, IRENA; Policy/legislation: IEA, Reegle, IRENA research; Ease of doing business index: World Bank; Renewable energy projects: Bloomberg New Energy Finance, IRENA research; Clean Development Mechanism projects: UNFCCC; Renewable energy resources: IRENA analysis.

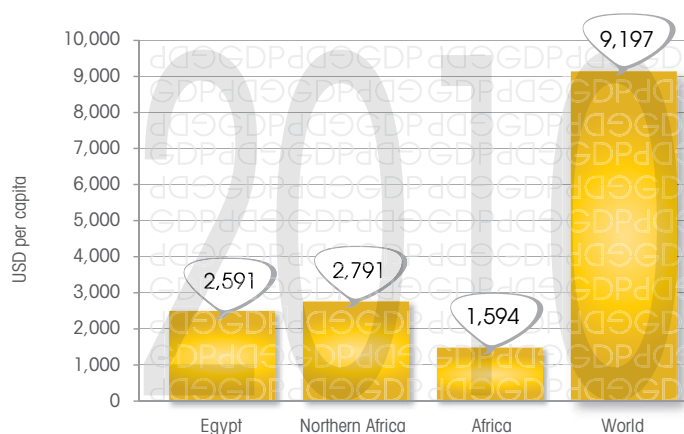
Units: USD: United States dollar; kWh: kilowatt-hour; GWh: gigawatt-hour (1 GWh = 10<sup>6</sup> kWh); TWh: terawatt-hour (1 TWh=10<sup>3</sup> GWh); PJ: petajoule; MW: megawatt; GW: gigawatt (1 GW=10<sup>3</sup> MW).

# EGYPT



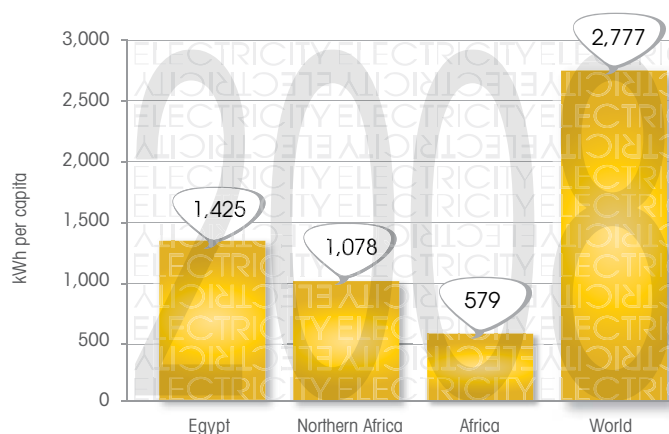
**84.5 million** Population (2010)  
**218.9 billion USD** GDP (2010)  
**2,591 USD** GDP per capita (2010)

FIGURE 1: GDP PER CAPITA FOR 2010



Northern Africa includes Algeria, Egypt, Libya, Morocco, Sudan and Tunisia.

FIGURE 2: ELECTRICITY USE PER CAPITA FOR 2008



## ENERGY NATIONAL PROFILE 2009

- Total Primary Energy Supply: 3,015.1 PJ - Of which renewables: 115.1 PJ (3.8 %)
- Energy self-sufficiency: 122.5%
- Fuel imports: 4.4 billion USD (9.9 % of total imports)
- Electricity generation: 139.0 TWh - Of which renewables: 14.0 TWh (10.1 %)
- Electricity use per capita: 1,487 kWh
- Electrical capacity\*: 23.4 GW - Of which renewables: 3,147 MW (13.4 %)
- Electricity access rate: 99.6%
- Share of population using solid fuels: < 5%

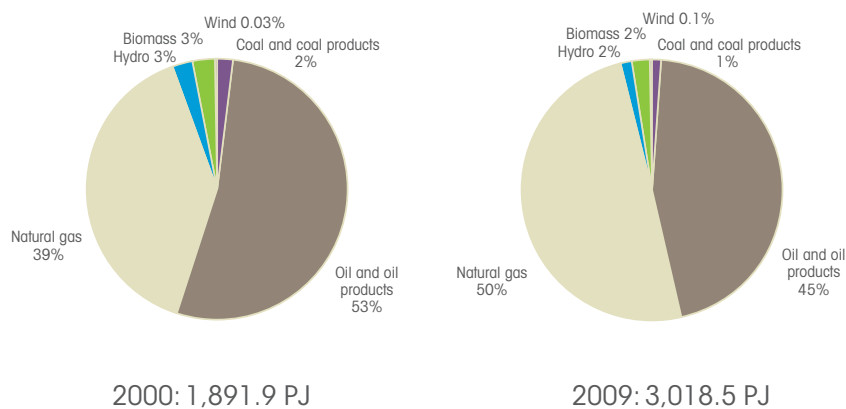
\* 2008

### TARGETS:

- 14% of primary energy from renewables by 2020
- 20% of electricity generation from renewables by 2020: 12% from wind (equivalent to more than 7,200 MW installed), 6% from hydro and 2% from other renewables



FIGURE 3: TOTAL PRIMARY ENERGY SUPPLY\* IN 2000 AND 2009



\*excluding electricity trade

## POLICIES IN PLACE TO PROMOTE RENEWABLE ENERGY SINCE THE RIO CONFERENCE OF 1992



WORLD BANK EASE OF DOING BUSINESS INDEX FOR 2012: Ranked 110 out of 183

### RENEWABLE ENERGY PROJECTS FROM THE GOVERNMENT AND PRIVATE SECTORS:

- 250 MW of wind capacity addition by 2014 (1 project)
- 100 MW of solar thermal capacity addition by 2015 (1 project)
- 540 MW of wind capacity addition announced (3 projects)
- Up to 100 MW of small hydro capacity addition announced (2 projects)

NUMBER OF REGISTERED CLEAN DEVELOPMENT MECHANISM PROJECTS FOCUSING ON RENEWABLE ENERGY: 4

RENEWABLE ENERGY RESOURCES: ● High ● Medium ● Low ● Unknown ✕ Not applicable

Wind ● Solar ● Hydro ● Biomass ● Geothermal ● Ocean ●

Note: The information on resources should be taken as an indication only. It refers to a general trend of available resources, and does not prejudice the feasibility of individual projects. The thresholds are indicative, and do not refer to any technological choice. The analysis is based on the literature.

Sources: Population and GDP: World Bank; Energy data: IEA, IRENA analysis based on UN data; Share of fuel imports in total imports: World Trade Organisation; Electrical capacity: IEA, EIA; Electricity access rate: World Energy Outlook 2010 database (IEA); Share of population using solid fuels: World Health Organisation; Targets: REN21, IRENA; Policy/Legislation: IEA, Reegle, IRENA research; Ease of doing business index: World Bank; Renewable energy projects: Bloomberg New Energy Finance, IRENA research; Clean Development Mechanism projects: UNFCCC; Renewable energy resources: IRENA analysis.

Units: USD: United States dollar; kWh: kilowatt-hour; GWh: gigawatt-hour (1 GWh = 10<sup>6</sup> kWh); TWh: terawatt-hour (1 TWh=10<sup>3</sup> GWh); PJ: petajoule; MW: megawatt; GW: gigawatt (1 GW=10<sup>3</sup> MW).

# EQUATORIAL GUINEA

**693,000** Population (2010)  
**14.0 billion USD** GDP (2010)  
**20,200 USD** GDP per capita (2010)

FIGURE 1: GDP PER CAPITA FOR 2010

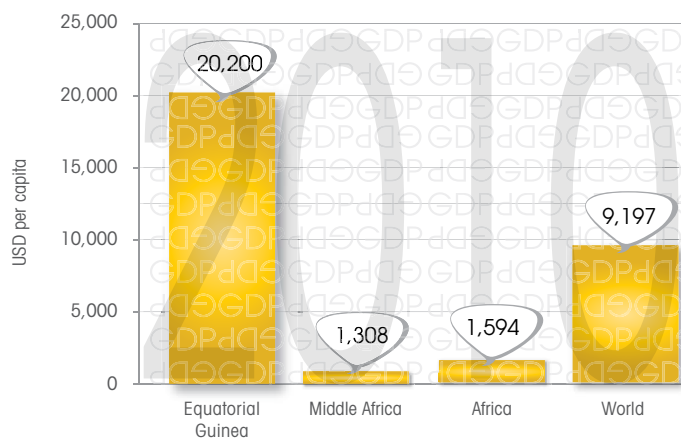
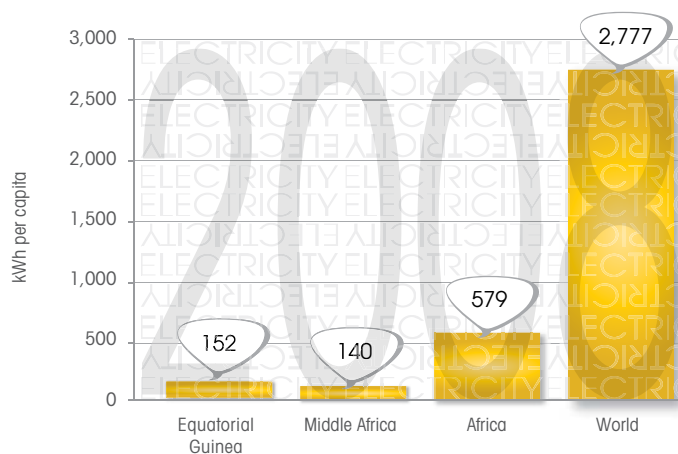


FIGURE 2: ELECTRICITY USE PER CAPITA FOR 2008



Middle Africa includes Angola, Cameroon, the Central African Republic, Chad, Congo, the Democratic Republic of Congo, Equatorial Guinea, Gabon and Sao Tome and Principe.

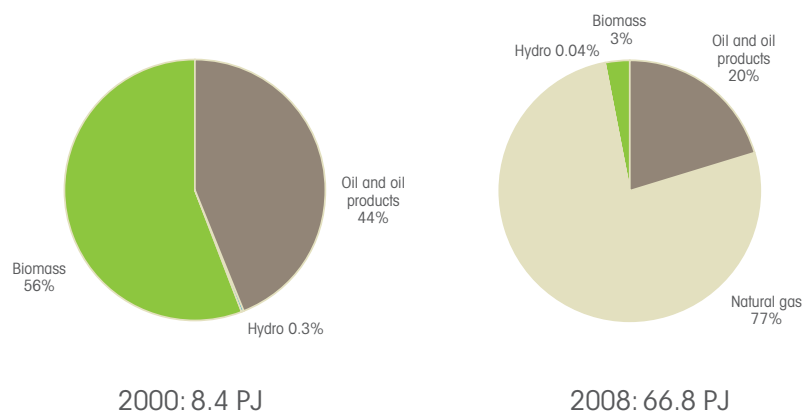
## ENERGY NATIONAL PROFILE 2008

- Total Primary Energy Supply: 66.8 PJ - Of which renewables: 2.0 PJ (3.0 %)
- Energy self-sufficiency: 1,443.4%
- Fuel imports: Not available
- Electricity generation: 100.0 GWh - Of which renewables: 7.0 GWh (7 %)
- Electricity use per capita: 152 kWh
- Electrical capacity: 31 MW - Of which renewables: 1 MW (3.2 %)
- Electricity access rate: Not available
- Share of population using solid fuels: Not available

### TARGETS:

- No information available

FIGURE 3: TOTAL PRIMARY ENERGY SUPPLY\* IN 2000 AND 2009



\*excluding electricity trade

## POLICIES IN PLACE TO PROMOTE RENEWABLE ENERGY SINCE THE RIO CONFERENCE OF 1992



WORLD BANK EASE OF DOING BUSINESS INDEX FOR 2012: Ranked 155 out of 183

RENEWABLE ENERGY PROJECTS FROM THE GOVERNMENT AND PRIVATE SECTORS:

- No information available

NUMBER OF REGISTERED CLEAN DEVELOPMENT MECHANISM PROJECTS FOCUSING ON RENEWABLE ENERGY: 0

RENEWABLE ENERGY RESOURCES: ● High ● Medium ● Low ● Unknown ✕ Not applicable

**Wind** ● **Solar** ● **Hydro** ● **Biomass** ● **Geothermal** ● **Ocean** ●

Note: The information on resources should be taken as an indication only. It refers to a general trend of available resources, and does not prejudice the feasibility of individual projects. The thresholds are indicative, and do not refer to any technological choice. The analysis is based on the literature.

Sources: Population and GDP: World Bank; Energy data: IEA, IRENA analysis based on UN data; Share of fuel imports in total imports: World Trade Organisation; Electrical capacity: IEA, EIA; Electricity access rate: World Energy Outlook 2010 database (IEA); Share of population using solid fuels: World Health Organisation; Targets: REN21, IRENA; Policy/legislation: IEA, Reegle, IRENA research; Ease of doing business index: World Bank; Renewable energy projects: Bloomberg New Energy Finance, IRENA research; Clean Development Mechanism projects: UNFCCC; Renewable energy resources: IRENA analysis.

Units: USD: United States dollar; kWh: kilowatt-hour; GWh: gigawatt-hour (1 GWh = 10<sup>6</sup> kWh); TWh: terawatt-hour (1 TWh=10<sup>3</sup> GWh); PJ: petajoule; MW: megawatt; GW: gigawatt (1 GW=10<sup>3</sup> MW).

# ERITREA



**5.2 million** Population (2010)

**2.1 billion USD** GDP (2010)

**405 USD** GDP per capita (2010)

FIGURE 1: GDP PER CAPITA FOR 2010

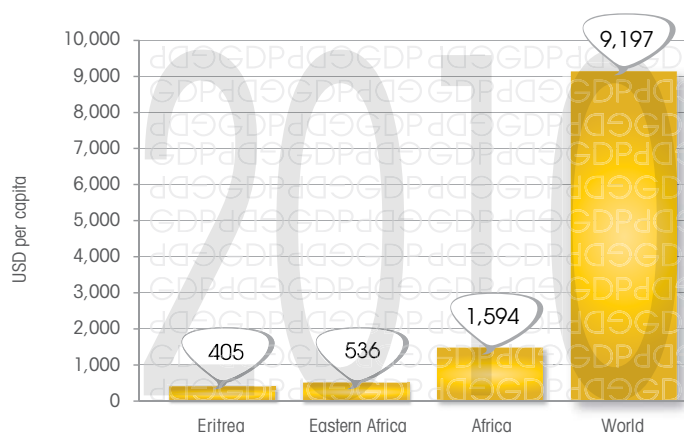
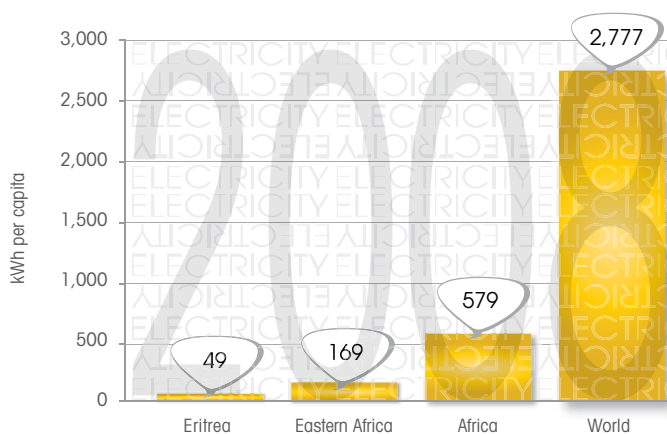


FIGURE 2: ELECTRICITY USE PER CAPITA FOR 2008



Eastern Africa includes Burundi, Comoros, Djibouti, Eritrea, Ethiopia, Kenya, Madagascar, Malawi, Mauritius, Mozambique, Rwanda, Seychelles, Somalia, the United Republic of Tanzania, Uganda, Zambia and Zimbabwe.

## ENERGY NATIONAL PROFILE 2009

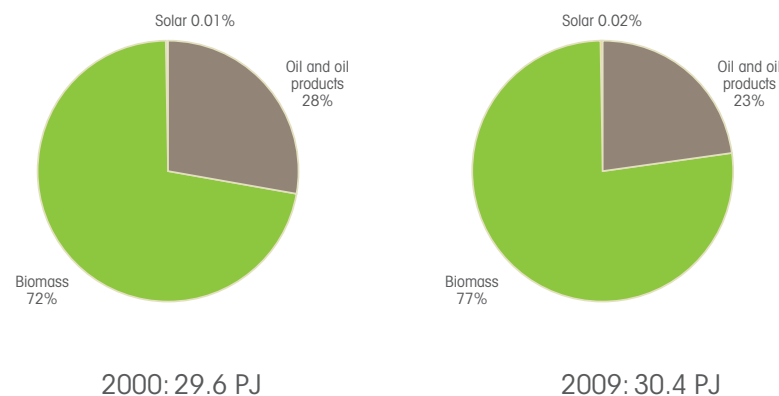
- Total Primary Energy Supply: 30.4 PJ - Of which renewables: 23.5 PJ (77.4 %)
- Energy self-sufficiency: 77.4%
- Fuel imports: Not available
- Electricity generation: 295.0 GWh - Of which renewables: 2.0 GWh (0.7 %)
- Electricity use per capita: 51 kWh
- Electrical capacity\*: 167 MW - Of which renewables: 1 MW (0.6 %)
- Electricity access rate: 32.0%
- Share of population using solid fuels: 63%

\* 2008

### TARGETS:

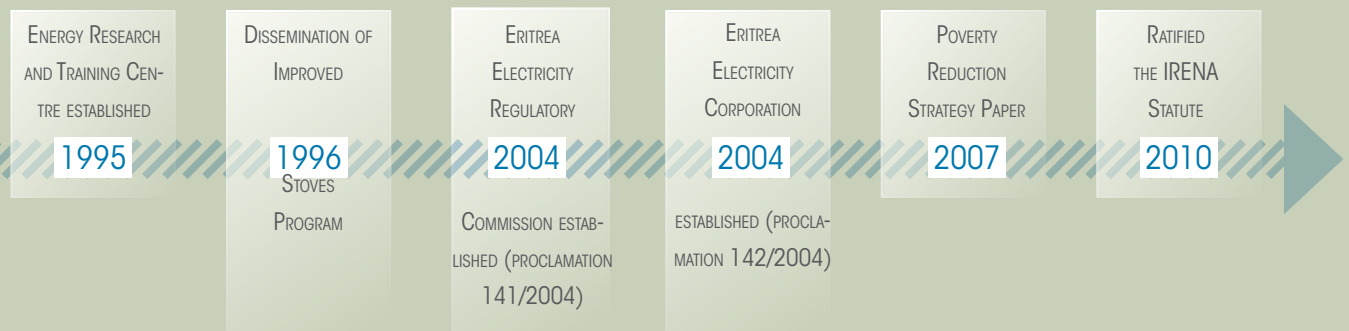
- 50% of electricity generation from wind

FIGURE 3: TOTAL PRIMARY ENERGY SUPPLY\* IN 2000 AND 2009



\*excluding electricity trade

#### POLICIES IN PLACE TO PROMOTE RENEWABLE ENERGY SINCE THE RIO CONFERENCE OF 1992



WORLD BANK EASE OF DOING BUSINESS INDEX FOR 2012: Ranked 180 out of 183

RENEWABLE ENERGY PROJECTS FROM THE GOVERNMENT AND PRIVATE SECTORS:

- No information available

NUMBER OF REGISTERED CLEAN DEVELOPMENT MECHANISM PROJECTS FOCUSING ON RENEWABLE ENERGY: 0

RENEWABLE ENERGY RESOURCES: ● High ● Medium ● Low ● Unknown ✕ Not applicable

Wind ● Solar ● Hydro ● Biomass ● Geothermal ● Ocean ●

Note: The information on resources should be taken as an indication only. It refers to a general trend of available resources, and does not prejudice the feasibility of individual projects. The thresholds are indicative, and do not refer to any technological choice. The analysis is based on the literature.

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Units: USD: United States dollar; kWh: kilowatt-hour; GWh: gigawatt-hour (1 GWh = 10<sup>6</sup> kWh); TWh: terawatt-hour (1 TWh=10<sup>3</sup> GWh); PJ: petajoule; MW: megawatt; GW: gigawatt (1 GW=10<sup>3</sup> MW).

# ETHIOPIA


**85.0 million** Population (2010)

**29.7 billion USD** GDP (2010)

**350 USD** GDP per capita (2010)

FIGURE 1: GDP PER CAPITA FOR 2010

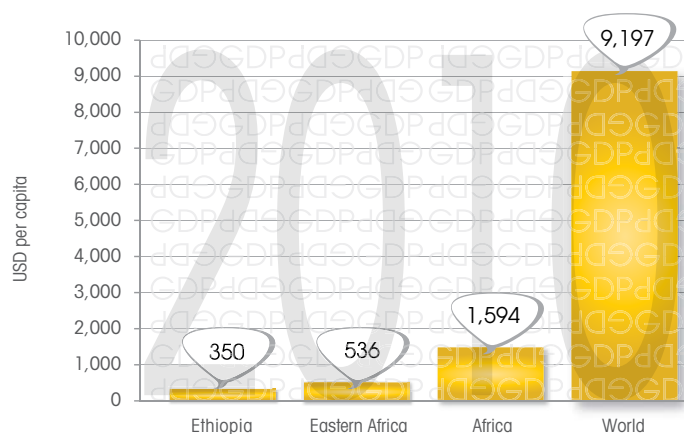
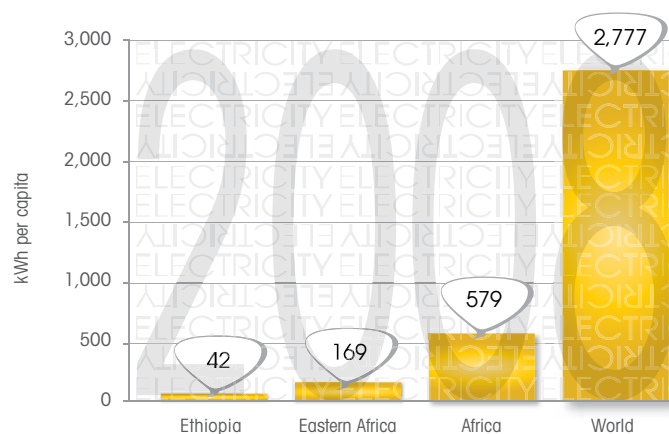


FIGURE 2: ELECTRICITY USE PER CAPITA FOR 2008



Eastern Africa includes Burundi, Comoros, Djibouti, Eritrea, Ethiopia, Kenya, Madagascar, Malawi, Mauritius, Mozambique, Rwanda, Seychelles, Somalia, the United Republic of Tanzania, Uganda, Zambia and Zimbabwe.

## ENERGY NATIONAL PROFILE 2009

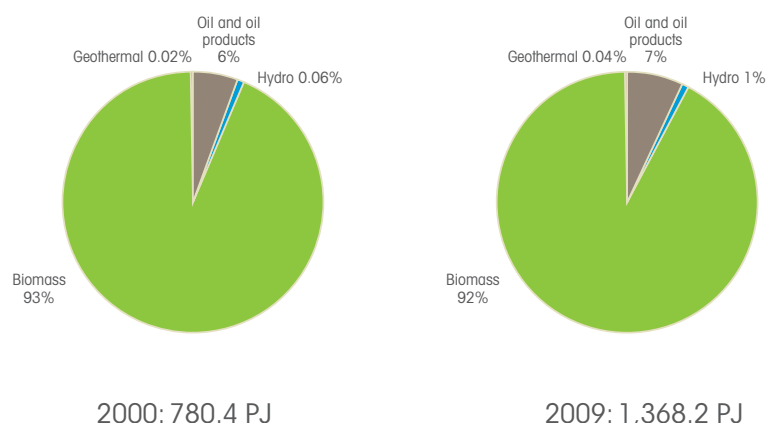
- Total Primary Energy Supply: 1,368.2 PJ - Of which renewables: 1,271.7 PJ (92.9 %)
- Energy self-sufficiency: 92.9%
- Fuel imports: 1.3 billion USD (16.4 % of total imports)
- Electricity generation: 4,106 GWh - Of which renewables: 3,598 GWh (87.6 %)
- Electricity use per capita: 45 kWh
- Electrical capacity\*: 929 MW - Of which renewables: 791 MW (85.1 %)
- Electricity access rate: 17.0%
- Share of population using solid fuels: > 95%

\*2008

### TARGETS:

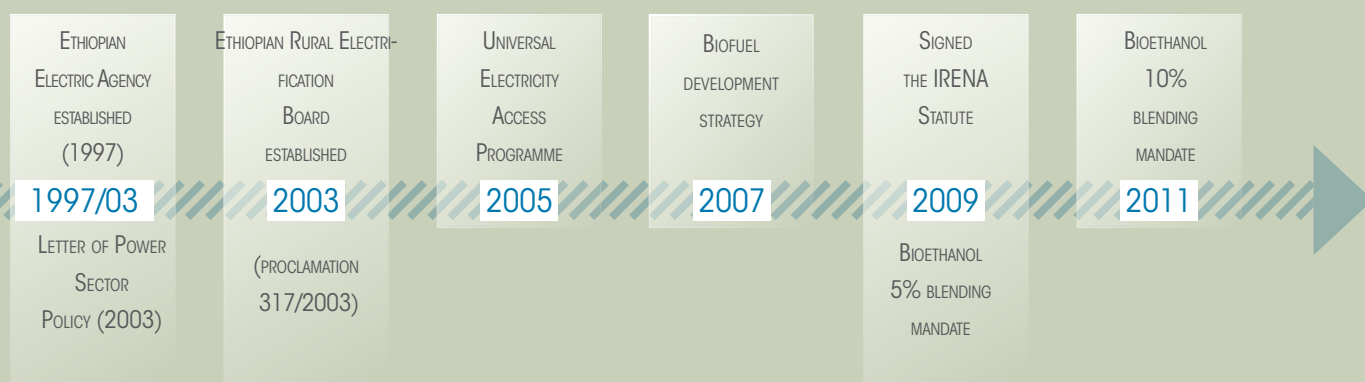
- 760 MW of wind capacity addition by 2013
- 5,600 MW of hydro capacity addition by 2013
- 450 MW of geothermal capacity addition by 2013

FIGURE 3: TOTAL PRIMARY ENERGY SUPPLY\* IN 2000 AND 2009



\*excluding electricity trade

#### POLICIES IN PLACE TO PROMOTE RENEWABLE ENERGY SINCE THE RIO CONFERENCE OF 1992



WORLD BANK EASE OF DOING BUSINESS INDEX FOR 2012: Ranked 111 out of 183

#### RENEWABLE ENERGY PROJECTS FROM THE GOVERNMENT AND PRIVATE SECTORS:

- 120 MW of wind capacity addition by 2012 (1 project)
- 50 MW of geothermal capacity addition announced (2 projects)
- 149 million litres of biofuel per year capacity addition announced (2 projects)

NUMBER OF REGISTERED CLEAN DEVELOPMENT MECHANISM PROJECTS FOCUSING ON RENEWABLE ENERGY: 0

RENEWABLE ENERGY RESOURCES: ● High ● Medium ● Low ● Unknown ✕ Not applicable

Wind ● Solar ● Hydro ● Biomass ● Geothermal ● Ocean ✕

Note: The information on resources should be taken as an indication only. It refers to a general trend of available resources, and does not prejudge the feasibility of individual projects. The thresholds are indicative, and do not refer to any technological choice. The analysis is based on the literature.

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Units: USD: United States dollar; kWh: kilowatt-hour; GWh: gigawatt-hour (1 GWh = 10<sup>6</sup> kWh); TWh: terawatt-hour (1 TWh=10<sup>3</sup> GWh); PJ: petajoule; MW: megawatt; GW: gigawatt (1 GW=10<sup>3</sup> MW).



# GABON


**1.5 million** Population (2010)

**13.0 billion USD** GDP (2010)

**8,667 USD** GDP per capita (2010)

FIGURE 1: GDP PER CAPITA FOR 2010

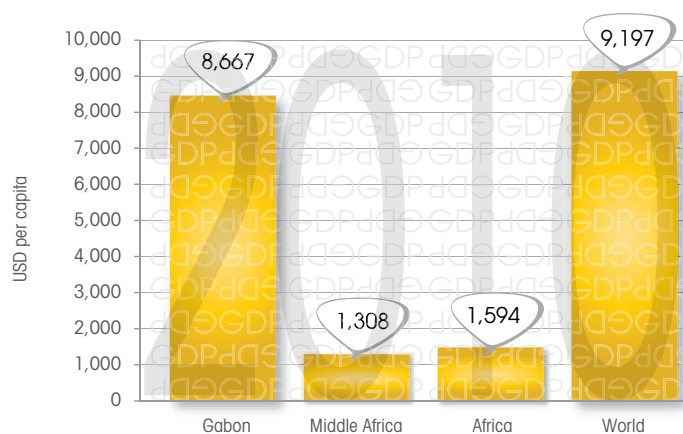
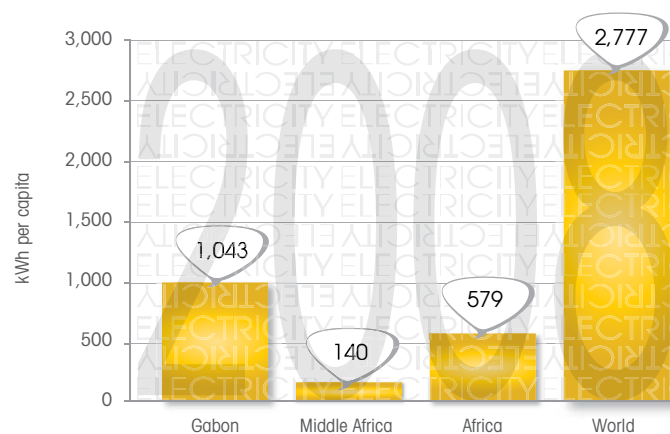


FIGURE 2: ELECTRICITY USE PER CAPITA FOR 2008



Middle Africa includes Angola, Cameroon, the Central African Republic, Chad, Congo, the Democratic Republic of Congo, Equatorial Guinea, Gabon and Sao Tome and Principe.

## ENERGY NATIONAL PROFILE 2009

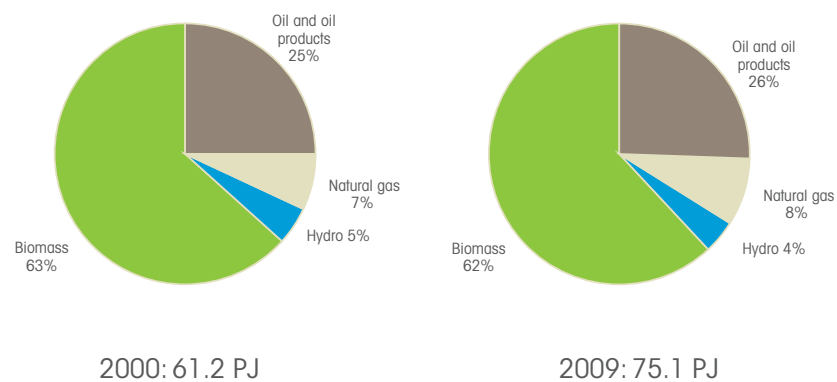
- Total Primary Energy Supply: 75.1 PJ - Of which renewables: 49.6 PJ (66.0 %)
- Energy self-sufficiency: 757.4%
- Fuel imports: Not available
- Electricity generation: 1,666 GWh - Of which renewables: 893.0 GWh (53.6 %)
- Electricity use per capita: 924 kWh
- Electrical capacity\*: 415 MW - Of which renewables: 170 MW (41 %)
- Electricity access rate: 36.7%
- Share of population using solid fuels: 27%

\* 2008

### TARGETS:

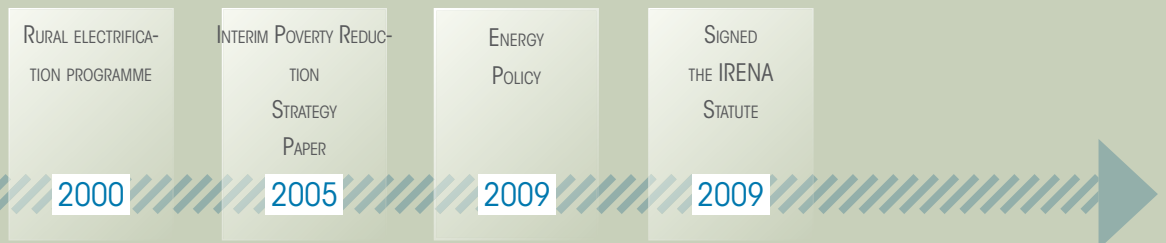
- More than 70% of electricity generation from renewables by 2016
- 80% of final energy from renewables by 2020

FIGURE 3: TOTAL PRIMARY ENERGY SUPPLY\* IN 2000 AND 2009



\*excluding electricity trade

## POLICIES IN PLACE TO PROMOTE RENEWABLE ENERGY SINCE THE RIO CONFERENCE OF 1992



WORLD BANK EASE OF DOING BUSINESS INDEX FOR 2012: Ranked 156 out of 183

RENEWABLE ENERGY PROJECTS FROM THE GOVERNMENT AND PRIVATE SECTORS:

- 78 MW of small hydro capacity addition announced (2 projects)

NUMBER OF REGISTERED CLEAN DEVELOPMENT MECHANISM PROJECTS FOCUSING ON RENEWABLE ENERGY: 0

RENEWABLE ENERGY RESOURCES: ● High ● Medium ● Low ● Unknown ✕ Not applicable

Wind ● Solar ● Hydro ● Biomass ● Geothermal ● Ocean ●

Note: The information on resources should be taken as an indication only. It refers to a general trend of available resources, and does not prejudge the feasibility of individual projects. The thresholds are indicative, and do not refer to any technological choice. The analysis is based on the literature.

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Units: USD: United States dollar; kWh: kilowatt-hour; GWh: gigawatt-hour (1 GWh = 10<sup>6</sup> kWh); TWh: terawatt-hour (1 TWh=10<sup>3</sup> GWh); PJ: petajoule; MW: megawatt; GW: gigawatt (1 GW=10<sup>3</sup> MW).

# GAMBIA


**1.8 million** Population (2010)

**807 million USD** GDP (2010)

**461 USD** GDP per capita (2010)

FIGURE 1: GDP PER CAPITA FOR 2010

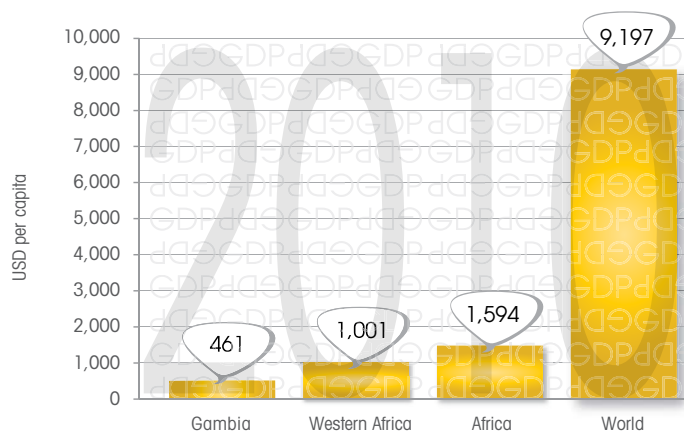
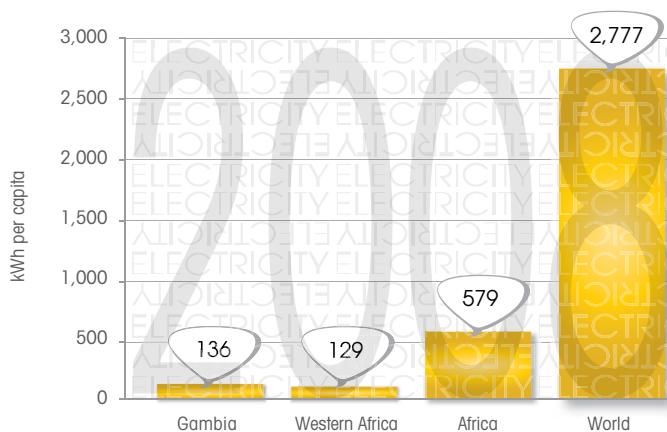


FIGURE 2: ELECTRICITY USE PER CAPITA FOR 2008



Western Africa includes Benin, Burkina Faso, Cape Verde, Côte d'Ivoire, Gambia, Ghana, Guinea, Guinea-Bissau, Liberia, Mali, Mauritania, Niger, Nigeria, Senegal, Sierra Leone and Togo.

## ENERGY NATIONAL PROFILE 2008

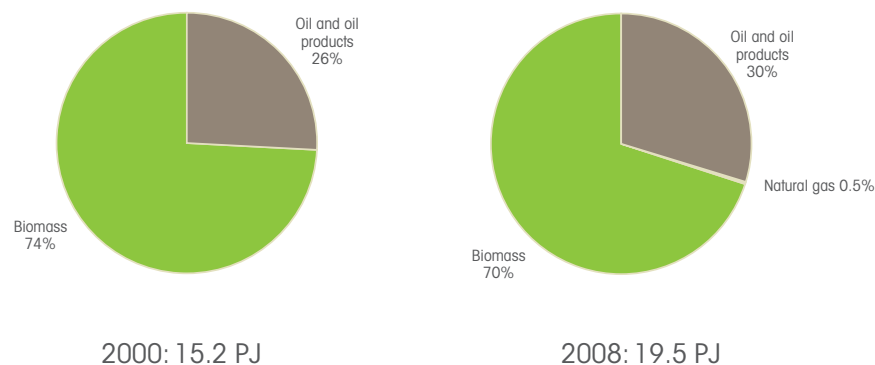
- Total Primary Energy Supply: 19.5 PJ - Of which renewables: 13.6 PJ (69.8 %)
- Energy self-sufficiency: 69.8%
- Fuel imports\*: 47 million USD (15.5 % of total imports)
- Electricity generation: 242.0 GWh - Of which renewables: 0.0 GWh (0 %)
- Electricity use per capita: 136 kWh
- Electrical capacity: 53 MW - Of which renewables: 0 MW (0 %)
- Electricity access rate: Not available
- Share of population using solid fuels: 95%

\* 2009

### TARGETS:

- No information available

FIGURE 3: TOTAL PRIMARY ENERGY SUPPLY\* IN 2000 AND 2008



\*excluding electricity trade

#### POLICIES IN PLACE TO PROMOTE RENEWABLE ENERGY SINCE THE RIO CONFERENCE OF 1992



WORLD BANK EASE OF DOING BUSINESS INDEX FOR 2012: Ranked 149 out of 183

RENEWABLE ENERGY PROJECTS FROM THE GOVERNMENT AND PRIVATE SECTORS:

- 14 MW of waste-to-energy capacity addition announced (1 project)

NUMBER OF REGISTERED CLEAN DEVELOPMENT MECHANISM PROJECTS FOCUSING ON RENEWABLE ENERGY: 0

RENEWABLE ENERGY RESOURCES: ● High ● Medium ● Low ● Unknown ✕ Not applicable

**Wind** ● **Solar** ● **Hydro** ● **Biomass** ● **Geothermal** ● **Ocean** ●

Note: The information on resources should be taken as an indication only. It refers to a general trend of available resources, and does not prejudice the feasibility of individual projects. The thresholds are indicative, and do not refer to any technological choice. The analysis is based on the literature.

Sources: Population and GDP: World Bank; Energy data: IEA, IRENA analysis based on UN data; Share of fuel imports in total imports: World Trade Organisation; Electrical capacity: IEA, EIA; Electricity access rate: World Energy Outlook 2010 database (IEA); Share of population using solid fuels: World Health Organisation; Targets: REN21, IRENA; Policy/legislation: IEA, Reegle, IRENA research; Ease of doing business index: World Bank; Renewable energy projects: Bloomberg New Energy Finance, IRENA research; Clean Development Mechanism projects: UNFCCC; Renewable energy resources: IRENA analysis.

Units: USD: United States dollar; kWh: kilowatt-hour; GWh: gigawatt-hour (1 GWh = 10<sup>6</sup> kWh); TWh: terawatt-hour (1 TWh=10<sup>3</sup> GWh); PJ: petajoule; MW: megawatt; GW: gigawatt (1 GW=10<sup>3</sup> MW).

# GHANA



**24.3 million** Population (2010)  
**31.3 billion USD** GDP (2010)  
**1,287 USD** GDP per capita (2010)

FIGURE 1: GDP PER CAPITA FOR 2010

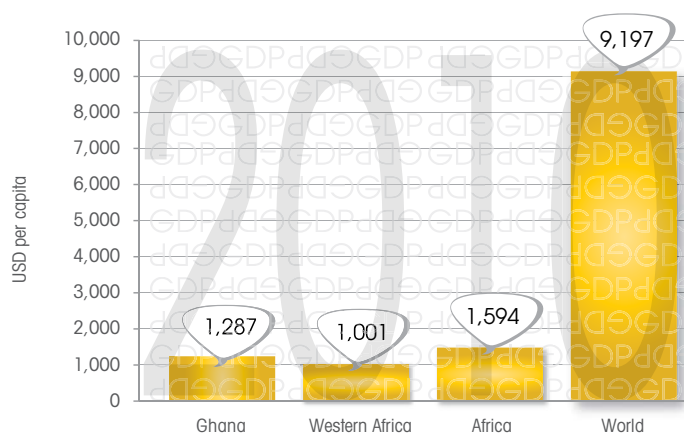
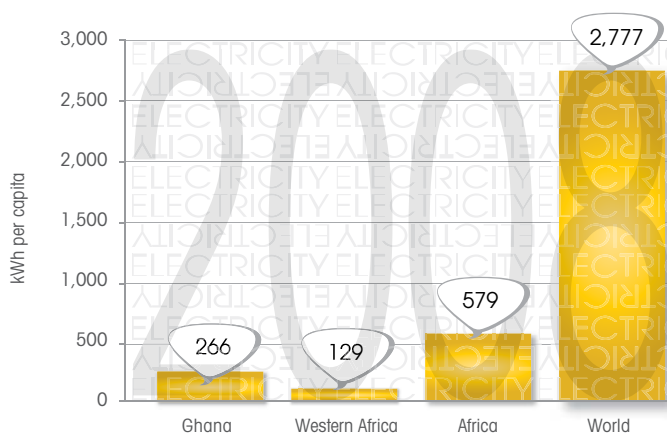


FIGURE 2: ELECTRICITY USE PER CAPITA FOR 2008



Western Africa includes Benin, Burkina Faso, Cape Verde, Côte d'Ivoire, Gambia, Ghana, Guinea, Guinea-Bissau, Liberia, Mali, Mauritania, Niger, Nigeria, Senegal, Sierra Leone and Togo.

## ENERGY NATIONAL PROFILE 2009

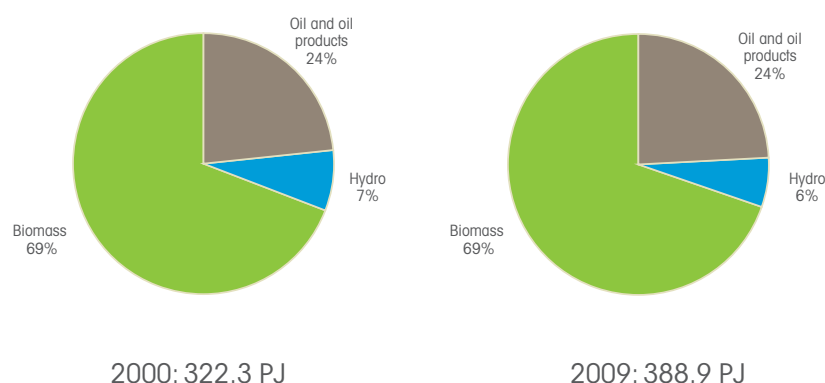
- Total Primary Energy Supply: 386.9 PJ - Of which renewables: 295.0 PJ (76.2 %)
- Energy self-sufficiency: 76.3%
- Fuel imports: 1.1 billion USD (14 % of total imports)
- Electricity generation: 9.0 TWh - Of which renewables: 6.9 TWh (76.8 %)
- Electricity use per capita: 265 kWh
- Electrical capacity\*: 2,111 MW - Of which renewables: 1,280 MW (60.6 %)
- Electricity access rate: 60.5%
- Share of population using solid fuels: 86%

\* 2008

### TARGETS:

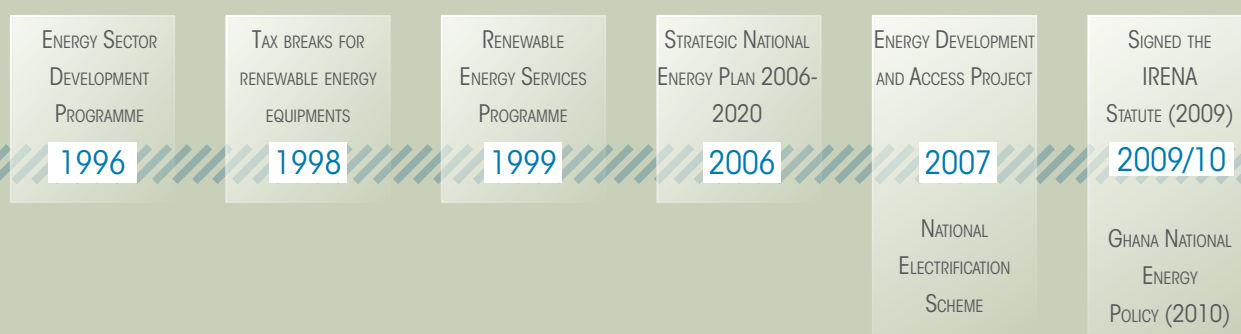
- 10% of electricity generation from renewables by 2020

FIGURE 3: TOTAL PRIMARY ENERGY SUPPLY\* IN 2000 AND 2009



\*excluding electricity trade

## POLICIES IN PLACE TO PROMOTE RENEWABLE ENERGY SINCE THE RIO CONFERENCE OF 1992



WORLD BANK EASE OF DOING BUSINESS INDEX FOR 2012: Ranked 67 out of 183

## RENEWABLE ENERGY PROJECTS FROM THE GOVERNMENT AND PRIVATE SECTORS:

- 50 MW of waste-to-energy capacity addition announced (1 project)
- 2 MW of biomass-fired capacity addition announced (1 project)
- 150 million litres of biofuel per year capacity addition announced (1 project)

NUMBER OF REGISTERED CLEAN DEVELOPMENT MECHANISM PROJECTS FOCUSING ON RENEWABLE ENERGY: 0

RENEWABLE ENERGY RESOURCES: ● High ● Medium ● Low ● Unknown ✕ Not applicable

**Wind** ● **Solar** ● **Hydro** ● **Biomass** ● **Geothermal** ● **Ocean** ●

Note: The information on resources should be taken as an indication only. It refers to a general trend of available resources, and does not prejudice the feasibility of individual projects. The thresholds are indicative, and do not refer to any technological choice. The analysis is based on the literature.

Sources: Population and GDP: World Bank; Energy data: IEA, IRENA analysis based on UN data; Share of fuel imports in total imports: World Trade Organisation; Electrical capacity: IEA, EIA; Electricity access rate: World Energy Outlook 2010 database (IEA); Share of population using solid fuels: World Health Organisation; Targets: REN21, IRENA; Policy/Legislation: IEA, Reegle, IRENA research; Ease of doing business index: World Bank; Renewable energy projects: Bloomberg New Energy Finance, IRENA research; Clean Development Mechanism projects: UNFCCC; Renewable energy resources: IRENA analysis.

Units: USD: United States dollar; kWh: kilowatt-hour; GWh: gigawatt-hour (1 GWh = 10<sup>6</sup> kWh); TWh: terawatt-hour (1 TWh=10<sup>3</sup> GWh); PJ: petajoule; MW: megawatt; GW: gigawatt (1 GW=10<sup>3</sup> MW).

# GUINEA


**10.3 million** Population (2010)

**4.5 billion USD** GDP (2010)

**437 USD** GDP per capita (2010)

FIGURE 1: GDP PER CAPITA FOR 2010

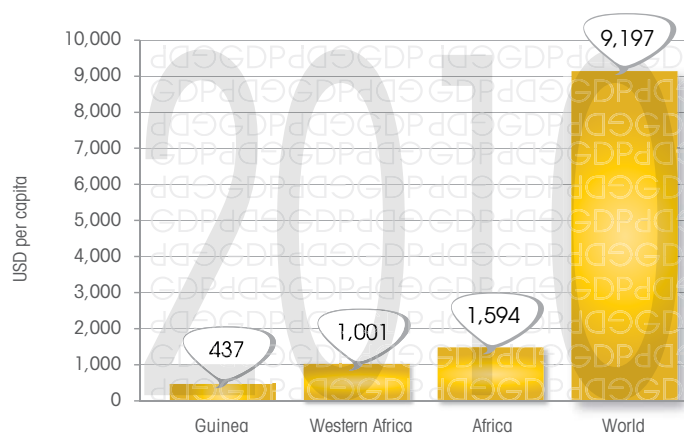
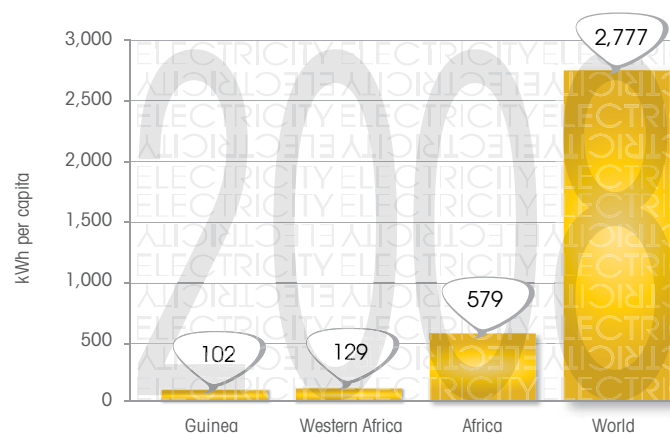


FIGURE 2: ELECTRICITY USE PER CAPITA FOR 2008



Western Africa includes Benin, Burkina Faso, Cape Verde, Côte d'Ivoire, Gambia, Ghana, Guinea, Guinea-Bissau, Liberia, Mali, Mauritania, Niger, Nigeria, Senegal, Sierra Leone and Togo.

## ENERGY NATIONAL PROFILE 2008

- Total Primary Energy Supply: 179.0 PJ - Of which renewables: 161.4 PJ (90.2 %)
- Energy self-sufficiency: 90.2%
- Fuel imports\*: 385 million USD (36.3 % of total imports)
- Electricity generation: 1,000 GWh - Of which renewables: 528.8 GWh (52.9 %)
- Electricity use per capita: 102 kWh
- Electrical capacity: 331 MW - Of which renewables: 123 MW (37.2 %)
- Electricity access rate: Not available
- Share of population using solid fuels: > 95%

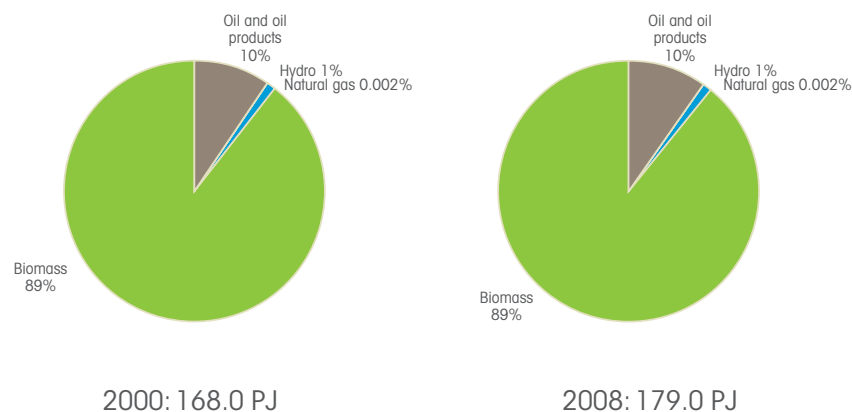
\* 2009

### TARGETS:

- No information available



FIGURE 3: TOTAL PRIMARY ENERGY SUPPLY\* IN 2000 AND 2008



\*excluding electricity trade

#### POLICIES IN PLACE TO PROMOTE RENEWABLE ENERGY SINCE THE RIO CONFERENCE OF 1992



WORLD BANK EASE OF DOING BUSINESS INDEX FOR 2012: Ranked 179 out of 183

RENEWABLE ENERGY PROJECTS FROM THE GOVERNMENT AND PRIVATE SECTORS:

- No information available

NUMBER OF REGISTERED CLEAN DEVELOPMENT MECHANISM PROJECTS FOCUSING ON RENEWABLE ENERGY: 0

RENEWABLE ENERGY RESOURCES: ● High ● Medium ● Low ● Unknown ✕ Not applicable

Wind ● Solar ● Hydro ● Biomass ● Geothermal ● Ocean ●

Note: The information on resources should be taken as an indication only. It refers to a general trend of available resources, and does not prejudge the feasibility of individual projects. The thresholds are indicative, and do not refer to any technological choice. The analysis is based on the literature.

Sources: Population and GDP: World Bank; Energy data: IEA, IRENA analysis based on UN data; Share of fuel imports in total imports: World Trade Organisation; Electrical capacity: IEA, EIA; Electricity access rate: World Energy Outlook 2010 database (IEA); Share of population using solid fuels: World Health Organisation; Targets: REN21, IRENA; Policy/legislation: IEA, Reegle, IRENA research; Ease of doing business index: World Bank; Renewable energy projects: Bloomberg New Energy Finance, IRENA research; Clean Development Mechanism projects: UNFCCC; Renewable energy resources: IRENA analysis.

Units: USD: United States dollar; kWh: kilowatt-hour; GWh: gigawatt-hour (1 GWh = 10<sup>6</sup> kWh); TWh: terawatt-hour (1 TWh=10<sup>3</sup> GWh); PJ: petajoule; MW: megawatt; GW: gigawatt (1 GW=10<sup>3</sup> MW).

# GUINEA-BISSAU



**1.6 million** Population (2010)  
**879 million USD** GDP (2010)  
**533 USD** GDP (2010)

FIGURE 1: GDP PER CAPITA FOR 2010

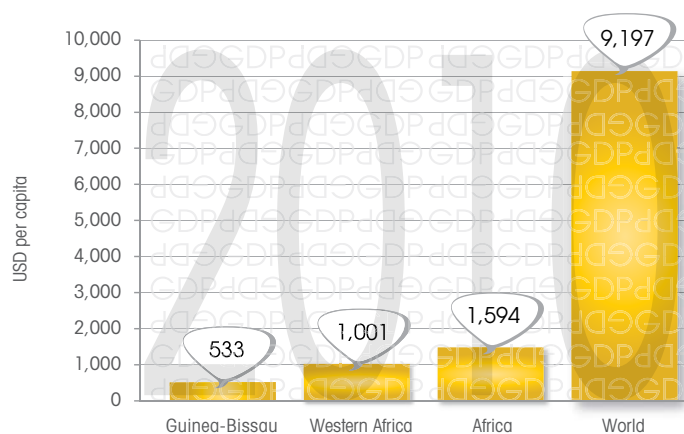
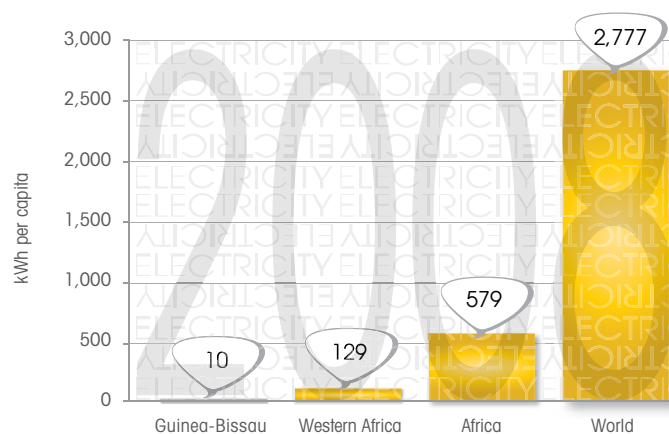


FIGURE 2: ELECTRICITY USE PER CAPITA FOR 2008



Western Africa includes Benin, Burkina Faso, Cape Verde, Côte d'Ivoire, Gambia, Ghana, Guinea, Guinea-Bissau, Liberia, Mali, Mauritania, Niger, Nigeria, Senegal, Sierra Leone and Togo.

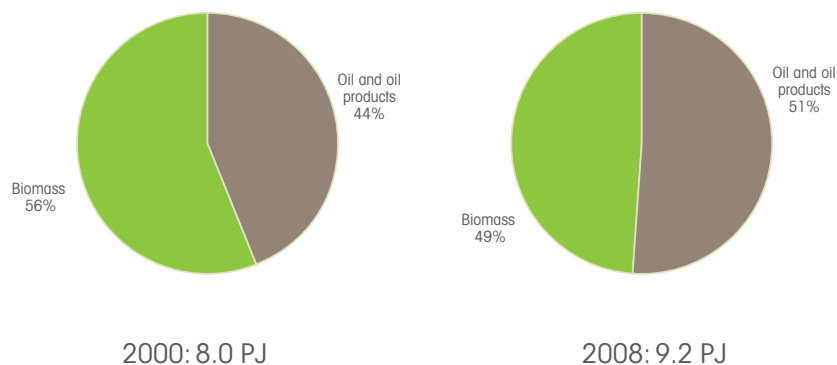
## ENERGY NATIONAL PROFILE 2008

- Total Primary Energy Supply: 9.2 PJ - Of which renewables: 4.5 PJ (48.7 %)
- Energy self-sufficiency: 48.7%
- Fuel imports: Not available
- Electricity generation: 15.0 GWh - Of which renewables: 0.0 GWh (0 %)
- Electricity use per capita: 10 kWh
- Electrical capacity: 15 MW - Of which renewables: 0 MW (0 %)
- Electricity access rate: 10.0%
- Share of population using solid fuels: > 95%

### TARGETS:

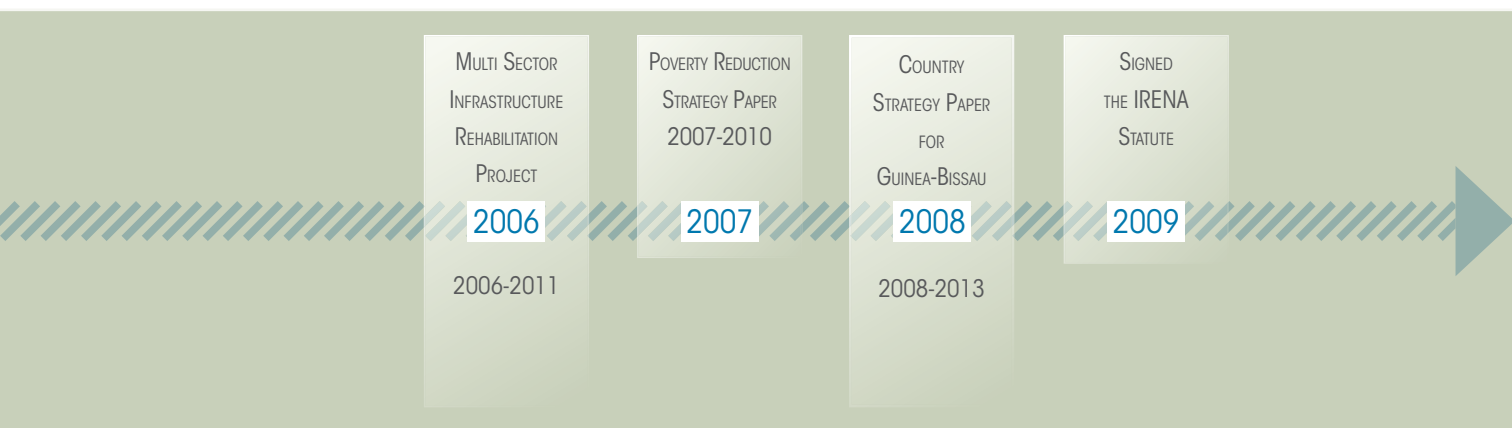
- 2% of primary energy from solar photovoltaic by 2015

FIGURE 3: TOTAL PRIMARY ENERGY SUPPLY\* IN 2000 AND 2008



\*excluding electricity trade

#### POLICIES IN PLACE TO PROMOTE RENEWABLE ENERGY SINCE THE RIO CONFERENCE OF 1992



WORLD BANK EASE OF DOING BUSINESS INDEX FOR 2012: Ranked 176 out of 183

RENEWABLE ENERGY PROJECTS FROM THE GOVERNMENT AND PRIVATE SECTORS:

- Diffusion of solar home systems in rural areas

NUMBER OF REGISTERED CLEAN DEVELOPMENT MECHANISM PROJECTS FOCUSING ON RENEWABLE ENERGY: 0

RENEWABLE ENERGY RESOURCES: ● High ● Medium ● Low ● Unknown ✕ Not applicable

Wind ● Solar ● Hydro ● Biomass ● Geothermal ● Ocean ●

Note: The information on resources should be taken as an indication only. It refers to a general trend of available resources, and does not prejudge the feasibility of individual projects. The thresholds are indicative, and do not refer to any technological choice. The analysis is based on the literature.

Sources: Population and GDP: World Bank; Energy data: IEA, IRENA analysis based on UN data; Share of fuel imports in total imports: World Trade Organisation; Electrical capacity: IEA, EIA; Electricity access rate: World Energy Outlook 2010 database (IEA); Share of population using solid fuels: World Health Organisation; Targets: REN21, IRENA; Policy/legislation: IEA, Reegle, IRENA research; Ease of doing business index: World Bank; Renewable energy projects: Bloomberg New Energy Finance, IRENA research; Clean Development Mechanism projects: UNFCCC; Renewable energy resources: IRENA analysis.

Units: USD: United States dollar; kWh: kilowatt-hour; GWh: gigawatt-hour (1 GWh = 10<sup>6</sup> kWh); TWh: terawatt-hour (1 TWh=10<sup>3</sup> GWh); PJ: petajoule; MW: megawatt; GW: gigawatt (1 GW=10<sup>3</sup> MW).

# KENYA



**40.9 million** Population (2010)

**31.4 billion USD** GDP (2010)

**769 USD** GDP per capita (2010)

FIGURE 1: GDP PER CAPITA FOR 2010

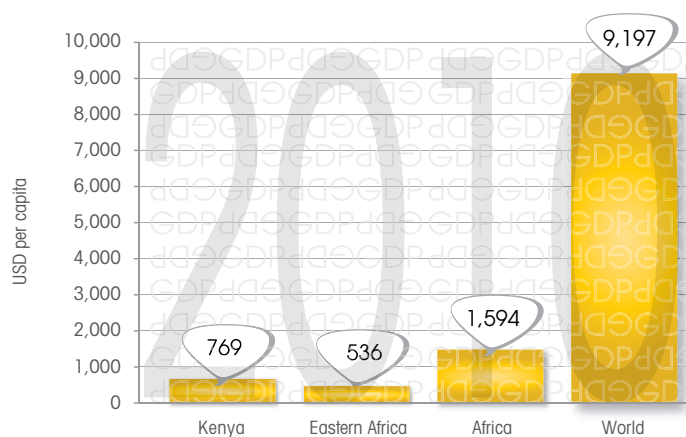
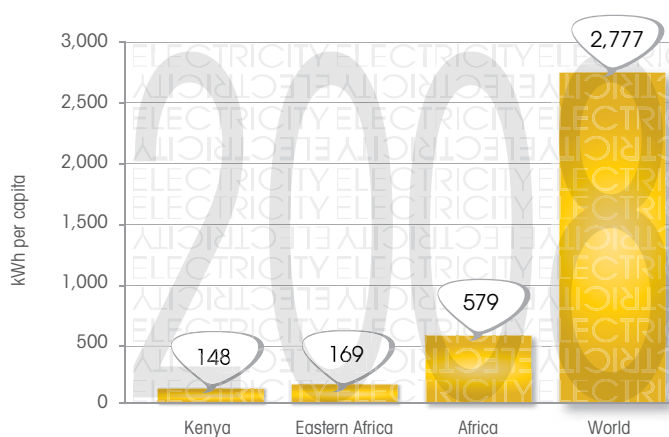


FIGURE 2: ELECTRICITY USE PER CAPITA FOR 2008



Eastern Africa includes Burundi, Comoros, Djibouti, Eritrea, Ethiopia, Kenya, Madagascar, Malawi, Mauritius, Mozambique, Rwanda, Seychelles, Somalia, the United Republic of Tanzania, Uganda, Zambia and Zimbabwe.

## ENERGY NATIONAL PROFILE 2009

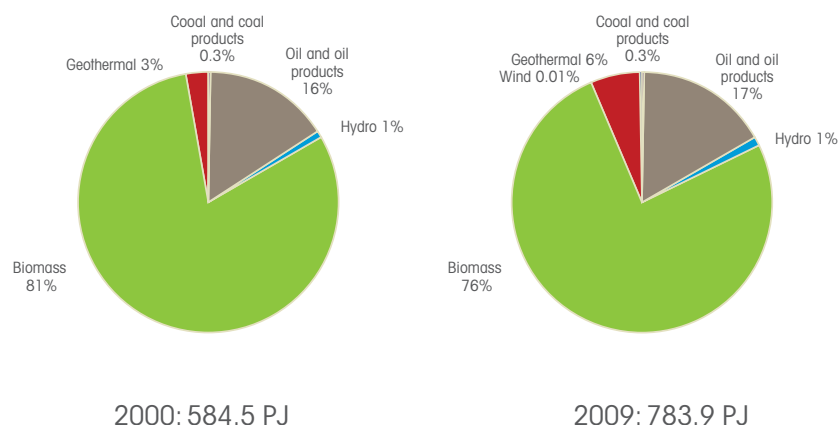
- Total Primary Energy Supply: 783.9 PJ - Of which renewables: 652.0 PJ (83.2%)
- Energy self-sufficiency: 83.2%
- Fuel imports: 2.1 billion USD (20.8% of total imports)
- Electricity generation: 6.9 TWh - Of which renewables: 3,846 GWh (55.9%)
- Electricity use per capita: 146 kWh
- Electrical capacity\*: 1,286 MW - Of which renewables: 862 MW (67%)
- Electricity access rate: 16.1%
- Share of population using solid fuels: 75%

\* 2008

### TARGETS:

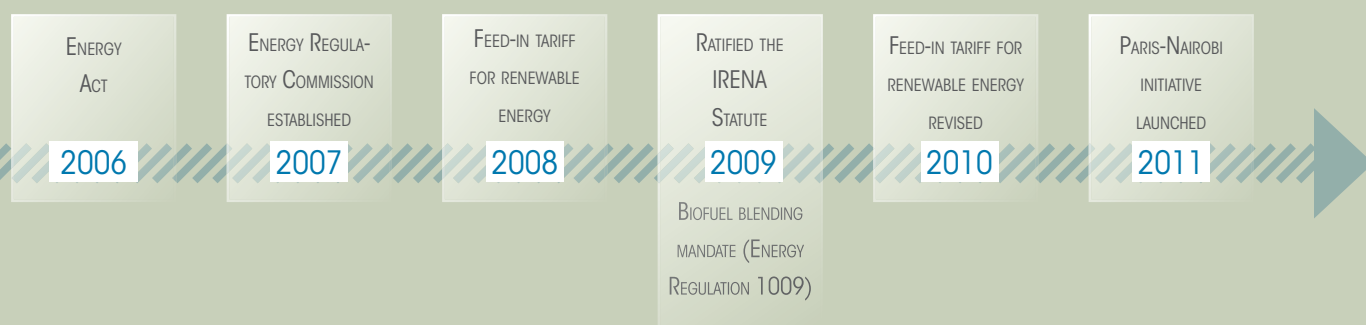
- Double installed renewable capacity by 2012
- 5,000 MW of geothermal capacity by 2030

FIGURE 3: TOTAL PRIMARY ENERGY SUPPLY\* IN 2000 AND 2009



\*excluding electricity trade

## POLICIES IN PLACE TO PROMOTE RENEWABLE ENERGY SINCE THE RIO CONFERENCE OF 1992



WORLD BANK EASE OF DOING BUSINESS INDEX FOR 2012: Ranked 109 out of 183

## RENEWABLE ENERGY PROJECTS FROM THE GOVERNMENT AND PRIVATE SECTORS:

- 32 million litres of ethanol capacity addition by 2012 (2 projects)
- Up to 600 MW of geothermal capacity addition by 2017 (5 projects)
- More than 550 MW of wind capacity addition by 2013 (3 projects)
- 100 MW of biomass-fired capacity addition announced (4 projects)
- 45 MW of small hydro capacity addition announced (13 projects)

NUMBER OF REGISTERED CLEAN DEVELOPMENT MECHANISM PROJECTS FOCUSING ON RENEWABLE ENERGY: 4

RENEWABLE ENERGY RESOURCES: ● High ● Medium ● Low ● Unknown



Note: The information on resources should be taken as an indication only. It refers to a general trend of available resources, and does not prejudge the feasibility of individual projects. The thresholds are indicative, and do not refer to any technological choice. The analysis is based on the literature.

Sources: Population and GDP: World Bank; Energy data: IEA, IRENA analysis based on UN data; Share of fuel imports in total imports: World Trade Organisation; Electrical capacity: IEA, EIA; Electricity access rate: World Energy Outlook 2010 database (IEA); Share of population using solid fuels: World Health Organisation; Targets: REN21, IRENA; Policy/legislation: IEA, Reegle, IRENA research; Ease of doing business index: World Bank; Renewable energy projects: Bloomberg New Energy Finance, IRENA research; Clean Development Mechanism projects: UNFCCC; Renewable energy resources: IRENA analysis.

Units: USD: United States dollar; kWh: kilowatt-hour; GWh: gigawatt-hour (1 GWh = 10<sup>6</sup> kWh); TWh: terawatt-hour (1 TWh=10<sup>3</sup> GWh); PJ: petajoule; MW: megawatt; GW: gigawatt (1 GW=10<sup>3</sup> MW).

# LESOTHO



**2.1 million** Population (2010)

**2.1 billion USD** GDP (2010)

**1,023 USD** GDP per capita (2010)

FIGURE 1: GDP PER CAPITA FOR 2010

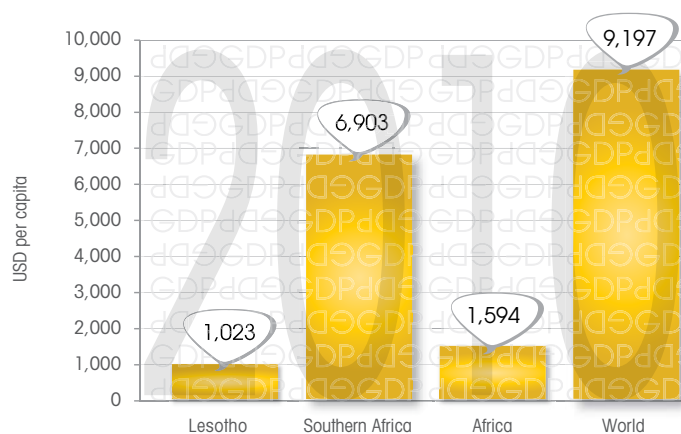
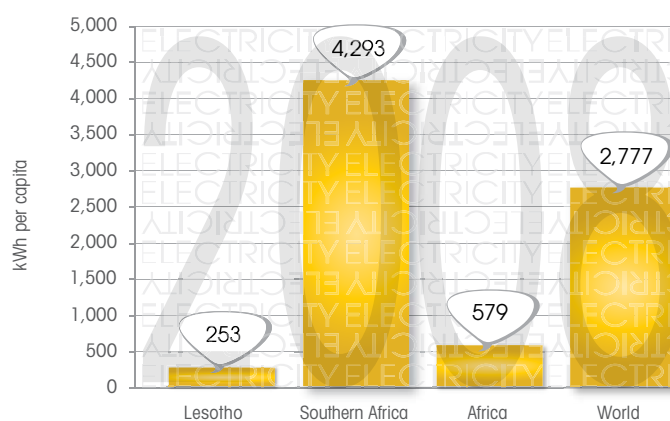


FIGURE 2: ELECTRICITY USE PER CAPITA FOR 2008



Southern Africa includes Botswana, Lesotho, Namibia, South Africa and Swaziland.

## ENERGY NATIONAL PROFILE 2008

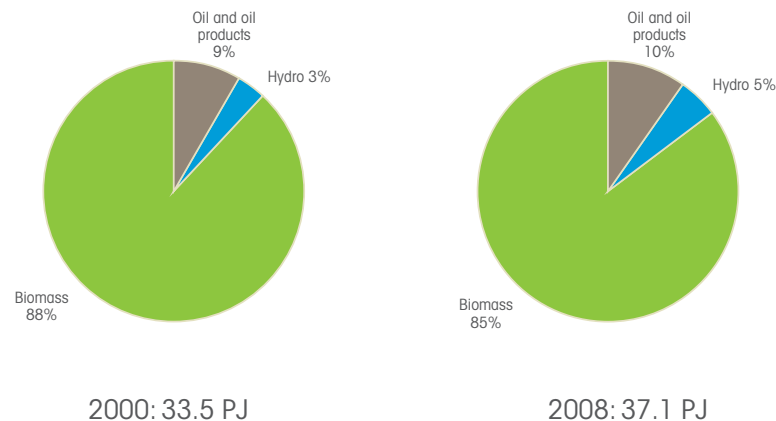
- Total Primary Energy Supply: 37.2 PJ -Of which renewables: 33.4 PJ (89.7 %)
- Energy self-sufficiency: 89.7%
- Fuel imports\*: 125 million USD (6.4 % of total imports)
- Electricity generation: 522.3 GWh - Of which renewables: 519.8 GWh (99.5 %)
- Electricity use per capita: 253 kWh
- Electrical capacity: 76 MW - Of which renewables: 76 MW (100 %)
- Electricity access rate\*: 16.0%
- Share of population using solid fuels: 71%

\* 2009

### TARGETS:

- 35% of rural electrification to come from renewables by 2020

FIGURE 3: TOTAL PRIMARY ENERGY SUPPLY\* IN 2000 AND 2008



\*excluding electricity trade

#### POLICIES IN PLACE TO PROMOTE RENEWABLE ENERGY SINCE THE RIO CONFERENCE OF 1992



WORLD BANK EASE OF DOING BUSINESS INDEX FOR 2012: Ranked 143 out of 183

RENEWABLE ENERGY PROJECTS FROM THE GOVERNMENT AND PRIVATE SECTORS:

- 25 MW of wind capacity addition announced (1 project)

NUMBER OF REGISTERED CLEAN DEVELOPMENT MECHANISM PROJECTS FOCUSING ON RENEWABLE ENERGY: 0

RENEWABLE ENERGY RESOURCES: ● High ● Medium ● Low ● Unknown ✕ Not applicable

Wind ● Solar ● Hydro ● Biomass ● Geothermal ● Ocean ✕

Note: The information on resources should be taken as an indication only. It refers to a general trend of available resources, and does not prejudge the feasibility of individual projects. The thresholds are indicative, and do not refer to any technological choice. The analysis is based on the literature.

Sources: Population and GDP: World Bank; Energy data: IEA, IRENA analysis based on UN data; Share of fuel imports in total imports: World Trade Organisation; Electrical capacity: IEA, EIA; Electricity access rate: World Energy Outlook 2010 database (IEA); Share of population using solid fuels: World Health Organisation; Targets: REN21, IRENA; Policy/legislation: IEA, Reegle, IRENA research; Ease of doing business index: World Bank; Renewable energy projects: Bloomberg New Energy Finance, IRENA research; Clean Development Mechanism projects: UNFCCC; Renewable energy resources: IRENA analysis.

Units: USD: United States dollar; kWh: kilowatt-hour; GWh: gigawatt-hour (1 GWh = 10<sup>6</sup> kWh); TWh: terawatt-hour (1 TWh=10<sup>3</sup> GWh); PJ: petajoule; MW: megawatt; GW: gigawatt (1 GW=10<sup>3</sup> MW).



# LIBERIA



**4.1 million** Population (2010)

**986 million USD** GDP (2010)

**240 USD** GDP per capita (2010)

FIGURE 1: GDP PER CAPITA FOR 2010

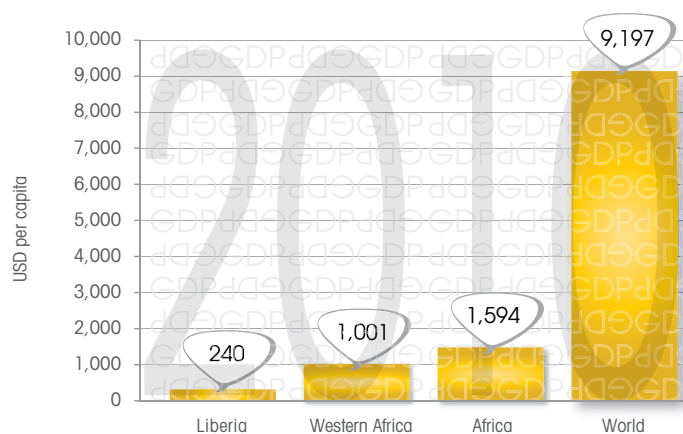
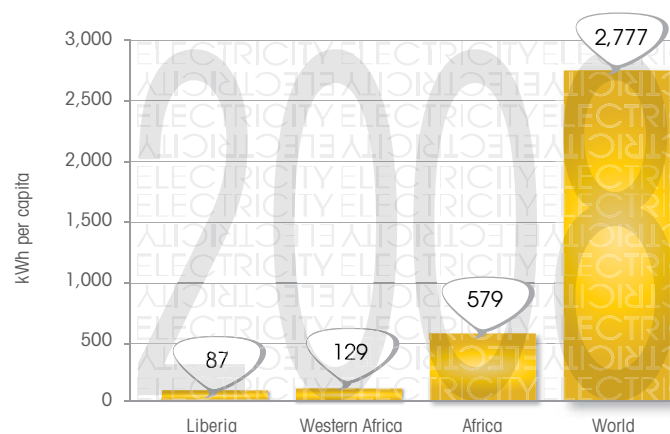


FIGURE 2: ELECTRICITY USE PER CAPITA FOR 2008



Western Africa includes Benin, Burkina Faso, Cape Verde, Côte d'Ivoire, Gambia, Ghana, Guinea, Guinea-Bissau, Liberia, Mali, Mauritania, Niger, Nigeria, Senegal, Sierra Leone and Togo.

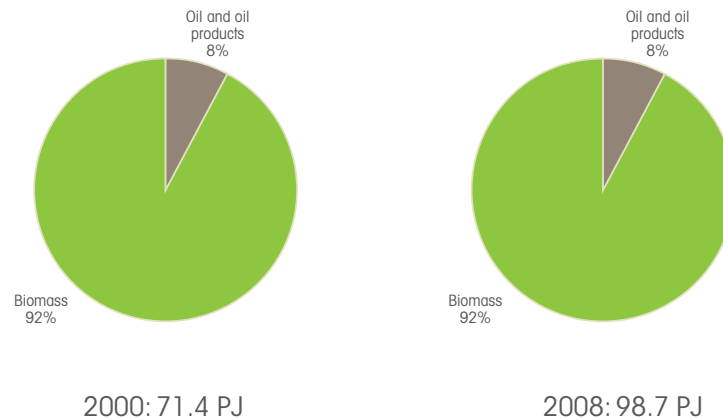
## ENERGY NATIONAL PROFILE 2008

- Total Primary Energy Supply: 98.7 PJ - Of which renewables: 91.0 PJ (92.2 %)
- Energy self-sufficiency: 92.2%
- Fuel imports: Not available
- Electricity generation: 353.0 GWh - Of which renewables: 0.0 GWh (0 %)
- Electricity use per capita: 87 kWh
- Electrical capacity: 198 MW - Of which renewables: 0 MW (0 %)
- Electricity access rate: Not available
- Share of population using solid fuels: > 95%

### TARGETS:

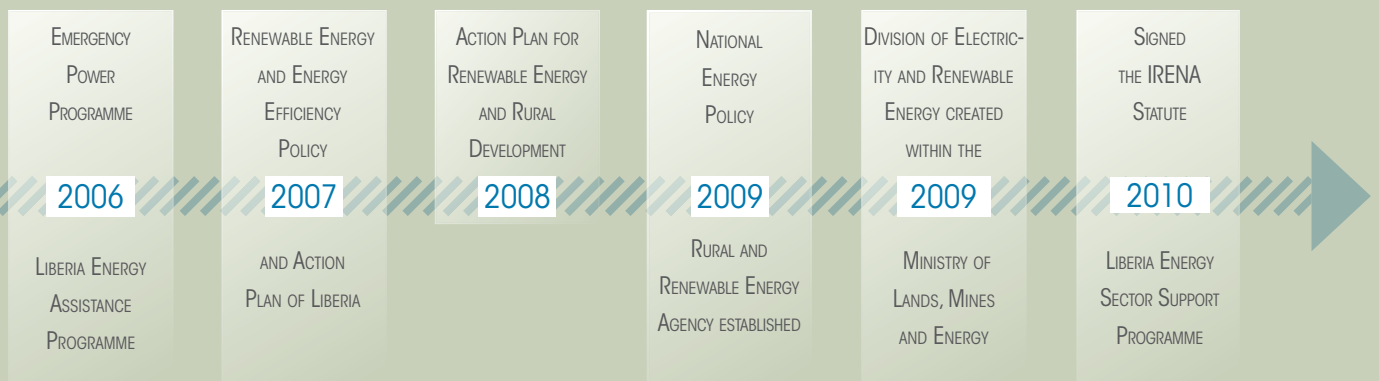
- No information available

FIGURE 3: TOTAL PRIMARY ENERGY SUPPLY\* IN 2000 AND 2008



\*excluding electricity trade

#### POLICIES IN PLACE TO PROMOTE RENEWABLE ENERGY SINCE THE RIO CONFERENCE OF 1992



WORLD BANK EASE OF DOING BUSINESS INDEX FOR 2012: Ranked 151 out of 183

RENEWABLE ENERGY PROJECTS FROM THE GOVERNMENT AND PRIVATE SECTORS:

- 7 MW of biomass-fired capacity addition announced (2 projects)

NUMBER OF REGISTERED CLEAN DEVELOPMENT MECHANISM PROJECTS FOCUSING ON RENEWABLE ENERGY: 1

RENEWABLE ENERGY RESOURCES: ● High ● Medium ● Low ● Unknown ✕ Not applicable

Wind ● Solar ● Hydro ● Biomass ● Geothermal ● Ocean ●

Note: The information on resources should be taken as an indication only. It refers to a general trend of available resources, and does not prejudge the feasibility of individual projects. The thresholds are indicative, and do not refer to any technological choice. The analysis is based on the literature.

Sources: Population and GDP: World Bank; Energy data: IEA, IRENA analysis based on UN data; Share of fuel imports in total imports: World Trade Organisation; Electrical capacity: IEA, EIA; Electricity access rate: World Energy Outlook 2010 database (IEA); Share of population using solid fuels: World Health Organisation; Targets: REN21, IRENA; Policy/legislation: IEA, Reegle, IRENA research; Ease of doing business index: World Bank; Renewable energy projects: Bloomberg New Energy Finance, IRENA research; Clean Development Mechanism projects: UNFCCC; Renewable energy resources: IRENA analysis.

Units: USD: United States dollar; kWh: kilowatt-hour; GWh: gigawatt-hour (1 GWh = 10<sup>6</sup> kWh); TWh: terawatt-hour (1 TWh=10<sup>3</sup> GWh); PJ: petajoule; MW: megawatt; GW: gigawatt (1 GW=10<sup>3</sup> MW).

# LIBYA



**6.5 million** Population (2010)

**Not available** GDP (2010)

**Not available** GDP per capita (2010)

FIGURE 1: GDP PER CAPITA FOR 2010

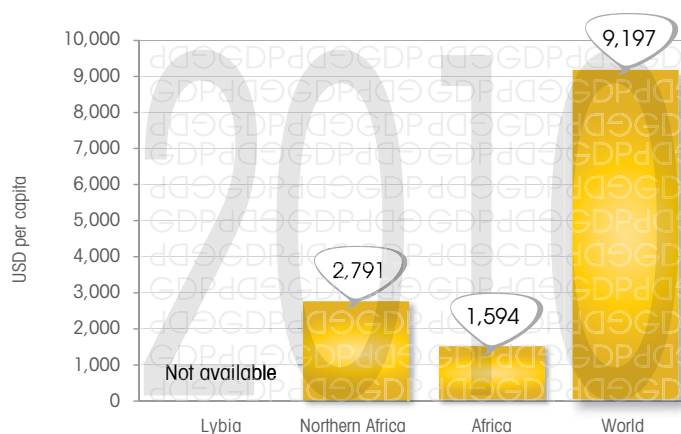
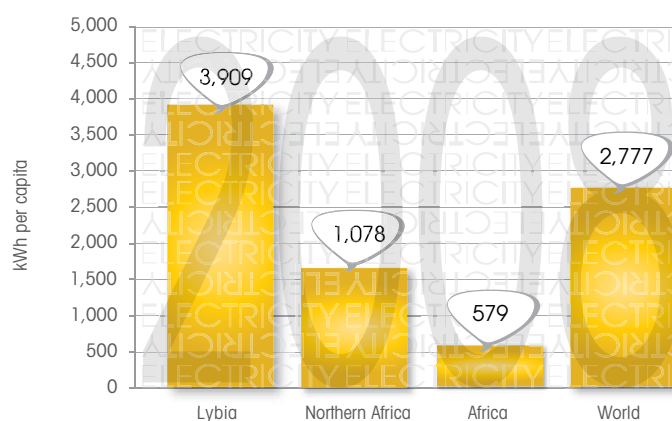


FIGURE 2: ELECTRICITY USE PER CAPITA FOR 2008



Northern Africa includes Algeria, Egypt, Libya, Morocco, Sudan and Tunisia.

## ENERGY NATIONAL PROFILE 2009

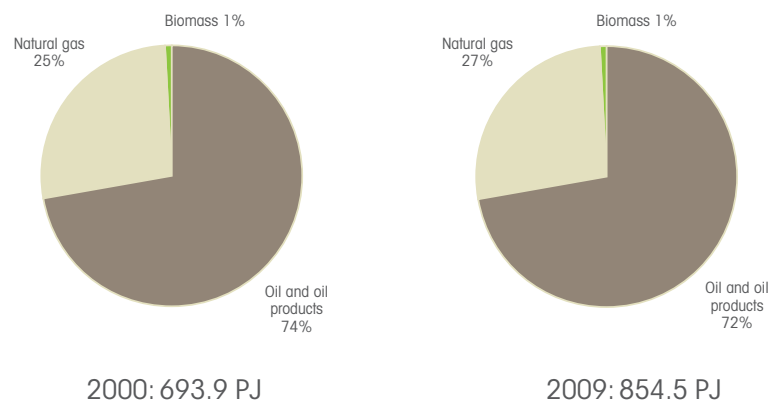
- Total Primary Energy Supply: 854.3 PJ - Of which renewables: 7.0 PJ (0.8 %)
- Energy self-sufficiency: 427.0%
- Fuel imports: 99.8%
- Electricity generation: 30.4 TWh - Of which renewables: 0.0 GWh (0 %)
- Electricity use per capita: 4,068 kWh
- Electrical capacity\*: 6.3 GW - Of which renewables: 0 MW (0 %)
- Electricity access rate: 99.8%
- Share of population using solid fuels: < 5%

\* 2008

### TARGETS:

- 10% of primary energy from renewables by 2020
- 10% of electricity generation from renewables by 2020
- 30% of electricity generation from renewables by 2030
- 1,000 MW of wind capacity by 2015

FIGURE 3: TOTAL PRIMARY ENERGY SUPPLY\* IN 2000 AND 2009



\*excluding electricity trade

## POLICIES IN PLACE TO PROMOTE RENEWABLE ENERGY SINCE THE RIO CONFERENCE OF 1992

RENEWABLE ENERGY  
AUTHORITY OF LIBYA  
ESTABLISHED  
2007

SIGNED  
THE IRENA  
STATUTE  
2009

## WORLD BANK EASE OF DOING BUSINESS INDEX FOR 2012: Not ranked

## RENEWABLE ENERGY PROJECTS FROM THE GOVERNMENT AND PRIVATE SECTORS:

- More than 600 MW of wind capacity addition announced (5 projects)

## NUMBER OF REGISTERED CLEAN DEVELOPMENT MECHANISM PROJECTS FOCUSING ON RENEWABLE ENERGY: 0

## RENEWABLE ENERGY RESOURCES: ● High ● Medium ● Low ● Unknown ✕ Not applicable



Note: The information on resources should be taken as an indication only. It refers to a general trend of available resources, and does not prejudge the feasibility of individual projects. The thresholds are indicative, and do not refer to any technological choice. The analysis is based on the literature.

Sources: Population and GDP: World Bank; Energy data: IEA, IRENA analysis based on UN data; Share of fuel imports in total imports: World Trade Organisation; Electrical capacity: IEA, EIA; Electricity access rate: World Energy Outlook 2010 database (IEA); Share of population using solid fuels: World Health Organisation; Targets: REN21, IRENA; Policy/legislation: IEA, Reegle, IRENA research; Ease of doing business index: World Bank; Renewable energy projects: Bloomberg New Energy Finance, IRENA research; Clean Development Mechanism projects: UNFCCC; Renewable energy resources: IRENA analysis.

Units: USD: United States dollar; kWh: kilowatt-hour; GWh: gigawatt-hour (1 GWh = 10<sup>6</sup> kWh); TWh: terawatt-hour (1 TWh=10<sup>3</sup> GWh); PJ: petajoule; MW: megawatt; GW: gigawatt (1 GW=10<sup>3</sup> MW).

# MADAGASCAR

**20.1 million** Population (2010)

**8.7 billion USD** GDP (2010)

**433 USD** GDP per capita (2010)

FIGURE 1: GDP PER CAPITA FOR 2010

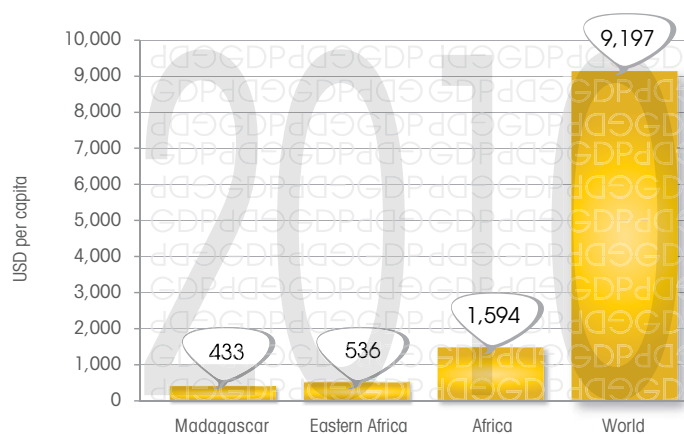
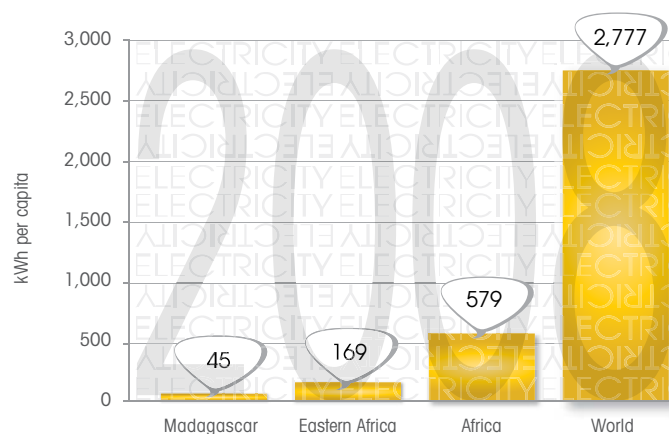


FIGURE 2: ELECTRICITY USE PER CAPITA FOR 2008



Eastern Africa includes Burundi, Comoros, Djibouti, Eritrea, Ethiopia, Kenya, Madagascar, Malawi, Mauritius, Mozambique, Rwanda, Seychelles, Somalia, the United Republic of Tanzania, Uganda, Zambia and Zimbabwe.

## ENERGY NATIONAL PROFILE 2008

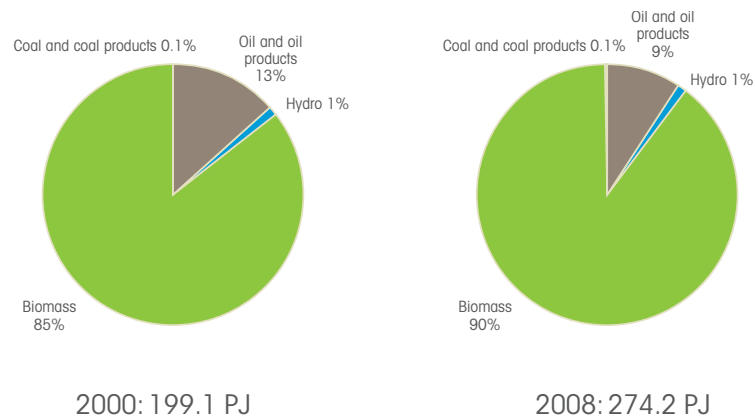
- Total Primary Energy Supply: 274.2 PJ - Of which renewables: 248.5 PJ (90.6 %)
- Energy self-sufficiency: 90.6%
- Fuel imports\*: 327 million USD (10.2 % of total imports)
- Electricity generation: 1,104 GWh - Of which renewables: 699.7 GWh (63.4 %)
- Electricity use per capita: 45 kWh
- Electrical capacity: 246 MW - Of which renewables: 124 MW (50.4 %)
- Electricity access rate\*: 19.0%
- Share of population using solid fuels: > 95%

\* 2009

### TARGETS:

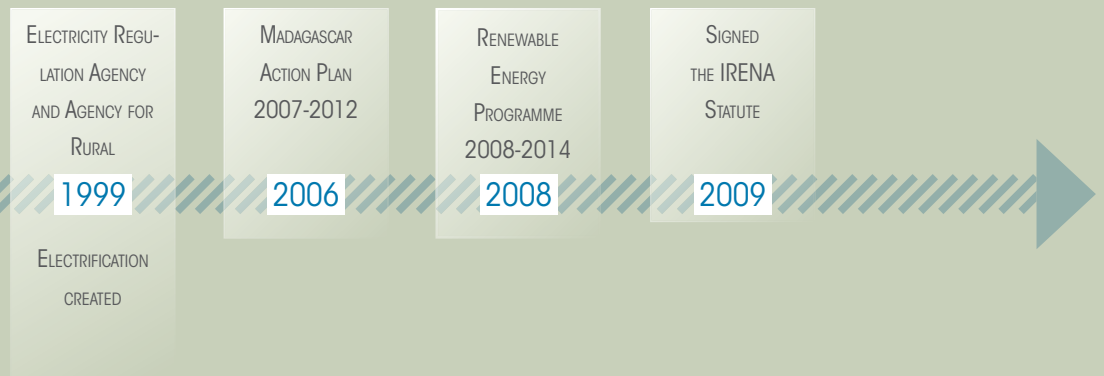
- 54% of final energy from renewables by 2020
- 75% of electricity generation from renewables by 2020

FIGURE 3: TOTAL PRIMARY ENERGY SUPPLY\* IN 2000 AND 2008



\*excluding electricity trade

## POLICIES IN PLACE TO PROMOTE RENEWABLE ENERGY SINCE THE RIO CONFERENCE OF 1992



WORLD BANK EASE OF DOING BUSINESS INDEX FOR 2012: Ranked 137 out of 183

RENEWABLE ENERGY PROJECTS FROM THE GOVERNMENT AND PRIVATE SECTORS:

- 19 MW of small hydro capacity addition announced (2 projects)

NUMBER OF REGISTERED CLEAN DEVELOPMENT MECHANISM PROJECTS FOCUSING ON RENEWABLE ENERGY: 1

RENEWABLE ENERGY RESOURCES: ● High ● Medium ● Low ● Unknown ✕ Not applicable

Wind ● Solar ● Hydro ● Biomass ● Geothermal ● Ocean ●

Note: The information on resources should be taken as an indication only. It refers to a general trend of available resources, and does not prejudge the feasibility of individual projects. The thresholds are indicative, and do not refer to any technological choice. The analysis is based on the literature.

Sources: Population and GDP: World Bank; Energy data: IEA, IRENA analysis based on UN data; Share of fuel imports in total imports: World Trade Organisation; Electrical capacity: IEA, EIA; Electricity access rate: World Energy Outlook 2010 database (IEA); Share of population using solid fuels: World Health Organisation; Targets: REN21, IRENA; Policy/legislation: IEA, Reegle, IRENA research; Ease of doing business index: World Bank; Renewable energy projects: Bloomberg New Energy Finance, IRENA research; Clean Development Mechanism projects: UNFCCC; Renewable energy resources: IRENA analysis.

Units: USD: United States dollar; kWh: kilowatt-hour; GWh: gigawatt-hour (1 GWh = 10<sup>6</sup> kWh); TWh: terawatt-hour (1 TWh=10<sup>3</sup> GWh); PJ: petajoule; MW: megawatt; GW: gigawatt (1 GW=10<sup>3</sup> MW).

# MALAWI


**14.9 million** Population (2010)

**5.1 billion USD** GDP (2010)

**343 USD** GDP per capita (2010)

FIGURE 1: GDP PER CAPITA FOR 2010

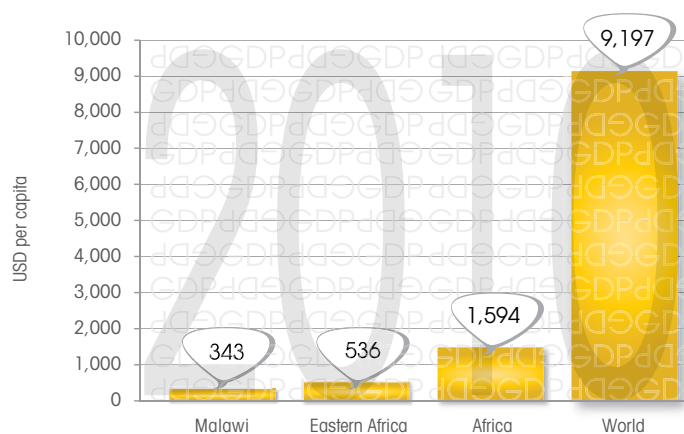
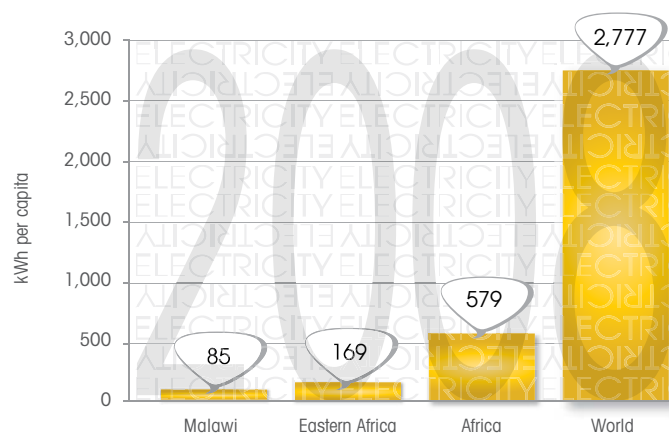


FIGURE 2: ELECTRICITY USE PER CAPITA FOR 2008



Eastern Africa includes Burundi, Comoros, Djibouti, Eritrea, Ethiopia, Kenya, Madagascar, Malawi, Mauritius, Mozambique, Rwanda, Seychelles, Somalia, the United Republic of Tanzania, Uganda, Zambia and Zimbabwe.

## ENERGY NATIONAL PROFILE 2008

- Total Primary Energy Supply: 134.0 PJ - Of which renewables: 118.0 PJ (88.1 %)
- Energy self-sufficiency: 89.1%
- Fuel imports\*: 211 million USD (11.7 % of total imports)
- Electricity generation: 1,801 GWh - Of which renewables: 1,544 GWh (85.7 %)
- Electricity use per capita: 85 kWh
- Electrical capacity: 315 MW - Of which renewables: 290 MW (92.1 %)
- Electricity access rate\*: 9.0%
- Share of population using solid fuels: > 95%

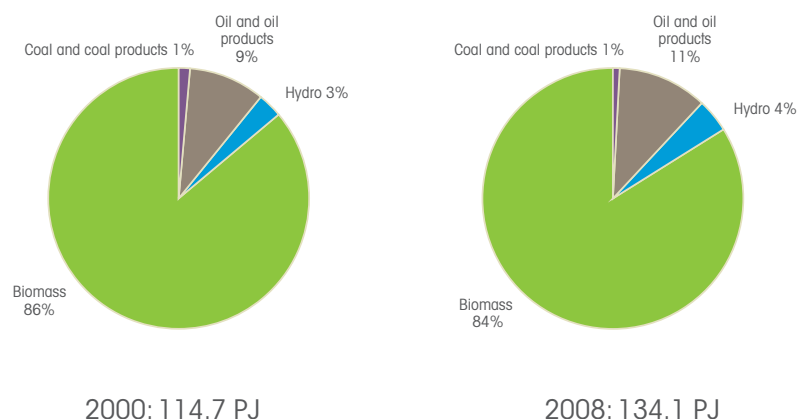
\* 2009

### TARGETS:

- 7% of primary energy from renewables by 2020



FIGURE 3: TOTAL PRIMARY ENERGY SUPPLY\* IN 2000 AND 2008



\*excluding electricity trade

## POLICIES IN PLACE TO PROMOTE RENEWABLE ENERGY SINCE THE RIO CONFERENCE OF 1992



WORLD BANK EASE OF DOING BUSINESS INDEX FOR 2012: Ranked 145 out of 183

## RENEWABLE ENERGY PROJECTS FROM THE GOVERNMENT AND PRIVATE SECTORS:

- 75 KW micro hydropower project with mini-grid in final stages of completion
- Plan to construct isolated wind farms with total installed capacity of 120 MW starting in year 2012
- 450 KW grid-connected Solar Power Project underway
- 10MW small hydropower project about to start

NUMBER OF REGISTERED CLEAN DEVELOPMENT MECHANISM PROJECTS FOCUSING ON RENEWABLE ENERGY: 0

RENEWABLE ENERGY RESOURCES: ● High ● Medium ● Low ● Unknown ✕ Not applicable

Wind ● Solar ● Hydro ● Biomass ● Geothermal ● Ocean ✕

Note: The information on resources should be taken as an indication only. It refers to a general trend of available resources, and does not prejudice the feasibility of individual projects. The thresholds are indicative, and do not refer to any technological choice. The analysis is based on the literature.

Sources: Population and GDP: World Bank; Energy data: IEA, IRENA analysis based on UN data; Share of fuel imports in total imports: World Trade Organisation; Electrical capacity: IEA, EIA; Electricity access rate: World Energy Outlook 2010 database (IEA); Share of population using solid fuels: World Health Organisation; Targets: REN21, IRENA; Policy/legislation: IEA, Reegle, IRENA research; Ease of doing business index: World Bank; Renewable energy projects: Bloomberg New Energy Finance, IRENA research; Clean Development Mechanism projects: UNFCCC; Renewable energy resources: IRENA analysis.

Units: USD: United States dollar; kWh: kilowatt-hour; GWh: gigawatt-hour (1 GWh = 10<sup>6</sup> kWh); TWh: terawatt-hour (1 TWh=10<sup>3</sup> GWh); PJ: petajoule; MW: megawatt; GW: gigawatt (1 GW=10<sup>3</sup> MW).

# MALI


**15.4 million** Population (2010)

**9.3 billion USD** GDP (2010)

**602 USD** GDP per capita (2010)

FIGURE 1: GDP PER CAPITA FOR 2010

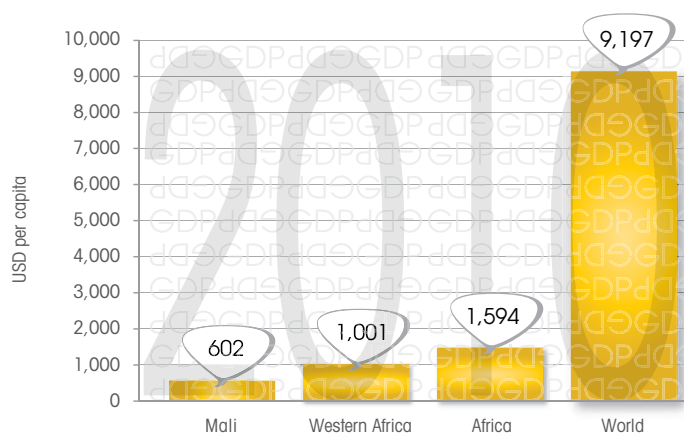
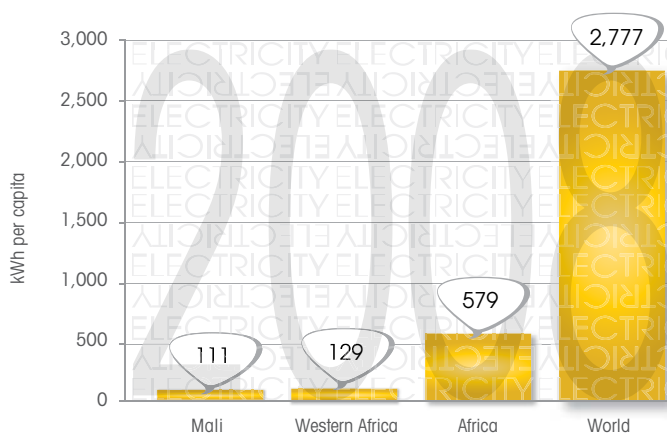


FIGURE 2: ELECTRICITY USE PER CAPITA FOR 2008



Western Africa includes Benin, Burkina Faso, Cape Verde, Côte d'Ivoire, Gambia, Ghana, Guinea, Guinea-Bissau, Liberia, Mali, Mauritania, Niger, Nigeria, Senegal, Sierra Leone and Togo.

## ENERGY NATIONAL PROFILE 2008

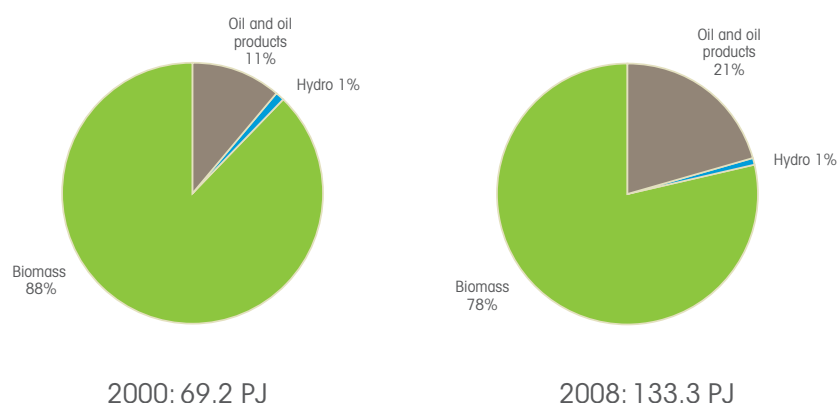
- Total Primary Energy Supply: 135.0 PJ - Of which renewables: 105.8 PJ (78.4 %)
- Energy self-sufficiency: 78.4%
- Fuel imports\*: 265 million USD (10 % of total imports)
- Electricity generation: 977.0 GWh - Of which renewables: 279.0 GWh (28.6 %)
- Electricity use per capita: 111 kWh
- Electrical capacity: 280 MW - Of which renewables: 155 MW (55.4 %)
- Electricity access rate: Not available
- Share of population using solid fuels: > 95%

\* 2009

### TARGETS:

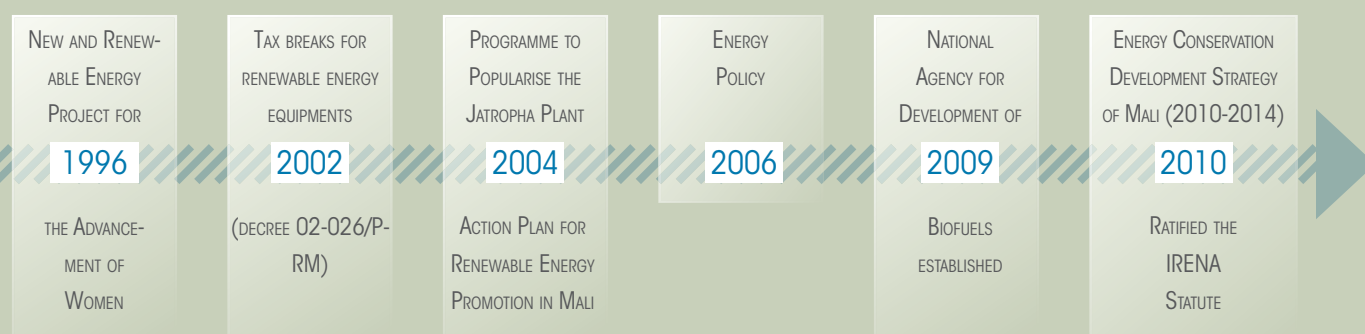
- 15% of primary energy from renewables (excluding biomass) by 2020
- 25% of electricity generation from renewables by 2020

FIGURE 3: TOTAL PRIMARY ENERGY SUPPLY\* IN 2000 AND 2008



\*excluding electricity trade

#### POLICIES IN PLACE TO PROMOTE RENEWABLE ENERGY SINCE THE RIO CONFERENCE OF 1992



WORLD BANK EASE OF DOING BUSINESS INDEX FOR 2012: Ranked 146 out of 183

#### RENEWABLE ENERGY PROJECTS FROM THE GOVERNMENT AND PRIVATE SECTORS:

- 80 MW of small and mini hydro capacity addition announced (2 projects)
- 20 MW of waste-to-energy capacity addition announced (1 project)
- 15 million liters of ethanol per year capacity addition announced (1 project)

NUMBER OF REGISTERED CLEAN DEVELOPMENT MECHANISM PROJECTS FOCUSING ON RENEWABLE ENERGY: 1

RENEWABLE ENERGY RESOURCES: ● High ● Medium ● Low ● Unknown ✕ Not applicable

Wind ● Solar ● Hydro ● Biomass ● Geothermal ● Ocean ✕

Note: The information on resources should be taken as an indication only. It refers to a general trend of available resources, and does not prejudge the feasibility of individual projects. The thresholds are indicative, and do not refer to any technological choice. The analysis is based on the literature.

Sources: Population and GDP: World Bank; Energy data: IEA, IRENA analysis based on UN data; Share of fuel imports in total imports: World Trade Organisation; Electrical capacity: IEA, EIA; Electricity access rate: World Energy Outlook 2010 database (IEA); Share of population using solid fuels: World Health Organisation; Targets: REN21, IRENA; Policy/Legislation: IEA, Reegle, IRENA research; Ease of doing business index: World Bank; Renewable energy projects: Bloomberg New Energy Finance, IRENA research; Clean Development Mechanism projects: UNFCCC; Renewable energy resources: IRENA analysis.

Units: USD: United States dollar; kWh: kilowatt-hour; GWh: gigawatt-hour (1 GWh = 10<sup>6</sup> kWh); TWh: terawatt-hour (1 TWh=10<sup>3</sup> GWh); PJ: petajoule; MW: megawatt; GW: gigawatt (1 GW=10<sup>3</sup> MW).

# MAURITANIA

**3.4 million** Population (2010)

**3.6 billion USD** GDP (2010)

**1,080 USD** GDP per capita (2010)

FIGURE 1: GDP PER CAPITA FOR 2010

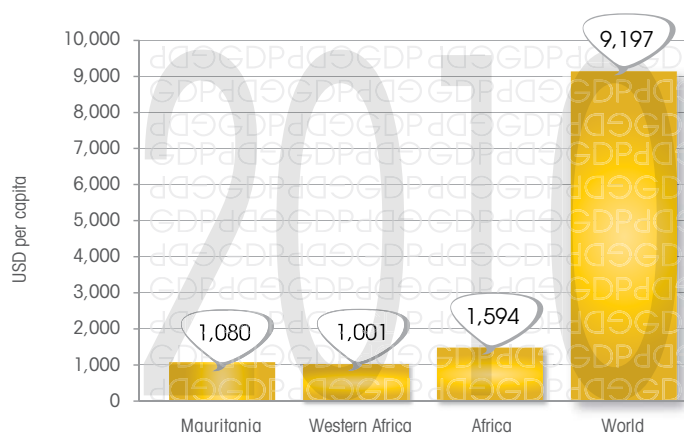
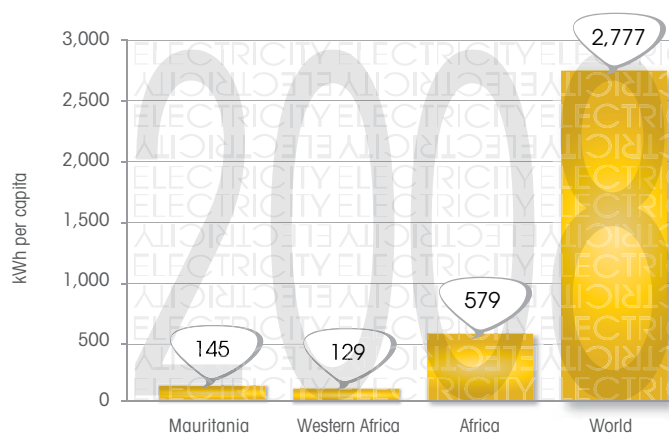


FIGURE 2: ELECTRICITY USE PER CAPITA FOR 2008



Western Africa includes Benin, Burkina Faso, Cape Verde, Côte d'Ivoire, Gambia, Ghana, Guinea, Guinea-Bissau, Liberia, Mali, Mauritania, Niger, Nigeria, Senegal, Sierra Leone and Togo.

## ENERGY NATIONAL PROFILE 2008

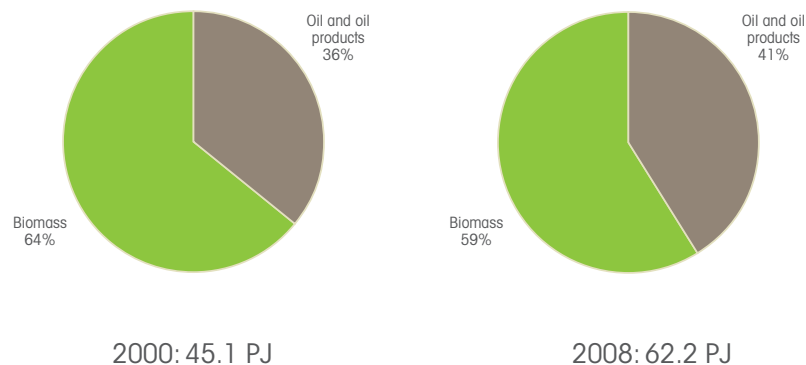
- Total Primary Energy Supply: 62.6 PJ - Of which renewables: 36.6 PJ (58.5 %)
- Energy self-sufficiency: 99.1%
- Fuel imports\*: 436 million USD (30.5 % of total imports)
- Electricity generation: 486.9 GWh - Of which renewables: 0.0 GWh (0 %)
- Electricity use per capita: 145 kWh
- Electrical capacity: 253 MW - Of which renewables: 97 MW (38.3 %)
- Electricity access rate: Not available
- Share of population using solid fuels: 60%

\* 2009

### TARGETS:

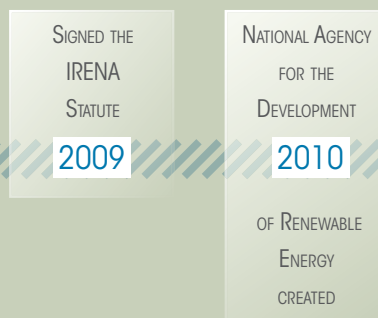
- 15% of primary energy from renewables (excluding biomass) by 2015
- 20% of primary energy from renewables (excluding biomass) by 2020

FIGURE 3: TOTAL PRIMARY ENERGY SUPPLY\* IN 2000 AND 2008



\*excluding electricity trade

## POLICIES IN PLACE TO PROMOTE RENEWABLE ENERGY SINCE THE RIO CONFERENCE OF 1992



WORLD BANK EASE OF DOING BUSINESS INDEX FOR 2012: Ranked 159 out of 183

RENEWABLE ENERGY PROJECTS FROM THE GOVERNMENT AND PRIVATE SECTORS:

- 83 to 150 MW of wind capacity addition announced (4 projects)

NUMBER OF REGISTERED CLEAN DEVELOPMENT MECHANISM PROJECTS FOCUSING ON RENEWABLE ENERGY: 0

RENEWABLE ENERGY RESOURCES: ● High ● Medium ● Low ● Unknown ✕ Not applicable



Note: The information on resources should be taken as an indication only. It refers to a general trend of available resources, and does not prejudice the feasibility of individual projects. The thresholds are indicative, and do not refer to any technological choice. The analysis is based on the literature.

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Units: USD: United States dollar; kWh: kilowatt-hour; GWh: gigawatt-hour (1 GWh = 10<sup>6</sup> kWh); TWh: terawatt-hour (1 TWh=10<sup>3</sup> GWh); PJ: petajoule; MW: megawatt; GW: gigawatt (1 GW=10<sup>3</sup> MW).

# MAURITIUS

**1.3 million** Population (2010)

**9.7 billion USD** GDP (2010)

**7,589 USD** GDP per capita (2010)

FIGURE 1: GDP PER CAPITA FOR 2010

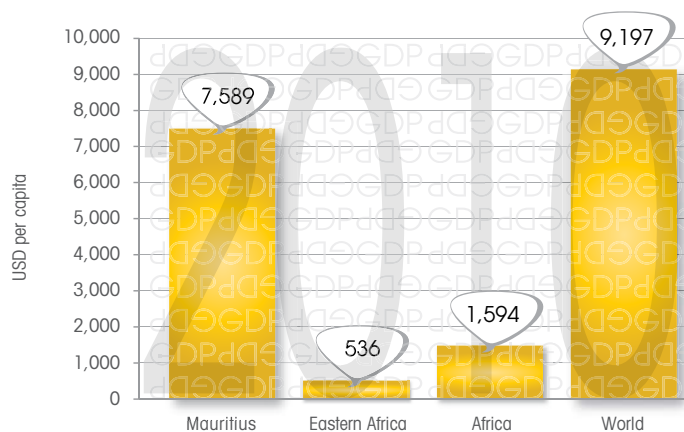
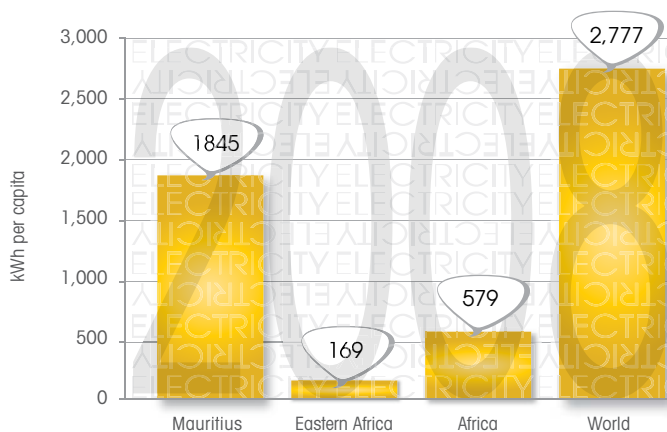


FIGURE 2: ELECTRICITY USE PER CAPITA FOR 2008



Eastern Africa includes Burundi, Comoros, Djibouti, Eritrea, Ethiopia, Kenya, Madagascar, Malawi, Mauritius, Mozambique, Rwanda, Seychelles, Somalia, the United Republic of Tanzania, Uganda, Zambia and Zimbabwe.

## ENERGY NATIONAL PROFILE 2010

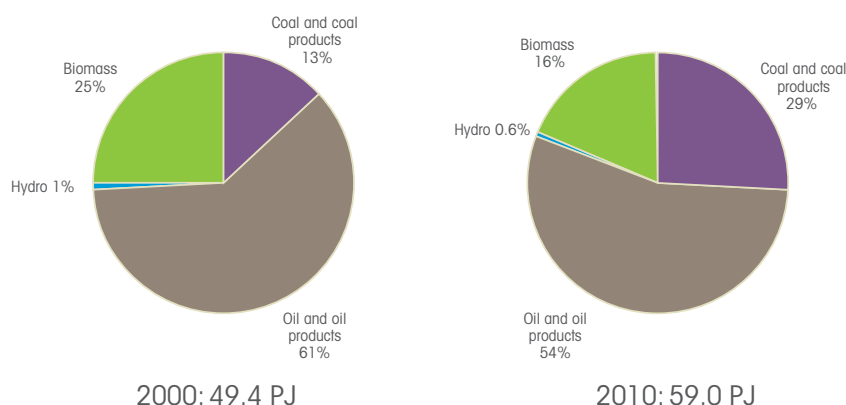
- Total Primary Energy Supply: 59.0 PJ - Of which renewables: 11.3 PJ (19.1%)
- Energy self-sufficiency: 19.1%
- Fuel imports\*: 561 million USD (15% of total imports)
- Electricity generation: 2,577 GWh - Of which renewables: 608.9 GWh (23.6%)
- Electricity use per capita: 1,870 kWh
- Electrical capacity: 739 MW - Of which renewables: 59 MW (8%)
- Electricity access rate: 99.4%
- Share of population using solid fuels: < 2%

\*2009

### TARGETS:

- 35% of electricity generation from renewables by 2025

FIGURE 3: TOTAL PRIMARY ENERGY SUPPLY\* IN 2000 AND 2010



\*excluding electricity trade

## POLICIES IN PLACE TO PROMOTE RENEWABLE ENERGY SINCE THE RIO CONFERENCE OF 1992



WORLD BANK EASE OF DOING BUSINESS INDEX FOR 2012: Ranked 23 out of 183

## RENEWABLE ENERGY PROJECTS FROM THE GOVERNMENT AND PRIVATE SECTORS:

- 12 MW of solar photovoltaic capacity addition by the end of 2013 (2 projects)
- 38 MW of wind capacity addition by the end of 2014 (2 projects)
- 3 MW of landfill gas to energy capacity by the end of 2011 (1 project)

NUMBER OF REGISTERED CLEAN DEVELOPMENT MECHANISM PROJECTS FOCUSING ON RENEWABLE ENERGY: 0

RENEWABLE ENERGY RESOURCES: ● High ● Medium ● Low ● Unknown ✕ Not applicable

Wind ● Solar ● Hydro ● Biomass ● Geothermal ● Ocean ●

Note: The information on resources should be taken as an indication only. It refers to a general trend of available resources, and does not prejudge the feasibility of individual projects. The thresholds are indicative, and do not refer to any technological choice. The analysis is based on the literature.

Sources: Population and GDP: World Bank; Energy data: IEA, IRENA analysis based on UN data; Share of fuel imports in total imports: World Trade Organisation; Electrical capacity: IEA, EIA; Electricity access rate: World Energy Outlook 2010 database (IEA); Share of population using solid fuels: World Health Organisation; Targets: REN21, IRENA; Policy/Legislation: IEA, Reegle, IRENA research; Ease of doing business index: World Bank; Renewable energy projects: Bloomberg New Energy Finance, IRENA research; Clean Development Mechanism projects: UNFCCC; Renewable energy resources: IRENA analysis.

Units: USD: United States dollar; kWh: kilowatt-hour; GWh: gigawatt-hour (1GWh = 10<sup>6</sup> kWh); TWh: terawatt-hour (1 TWh=10<sup>3</sup> GWh); PJ: petajoule; MW: megawatt; GW: gigawatt (1 GW=10<sup>3</sup> MW).



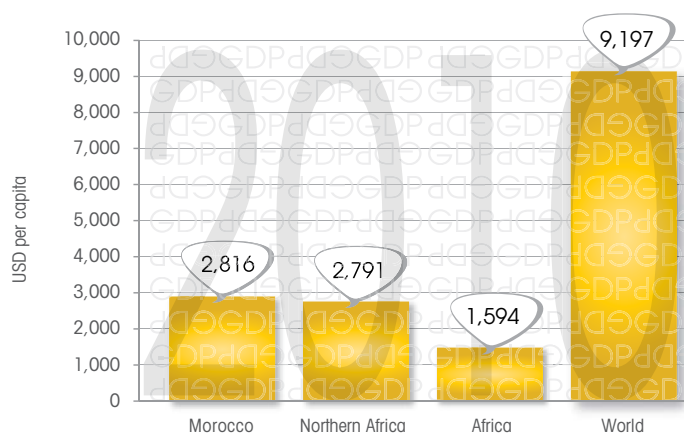
# MOROCCO

**32.4 million** Population (2010)

**91.2 billion USD** GDP (2010)

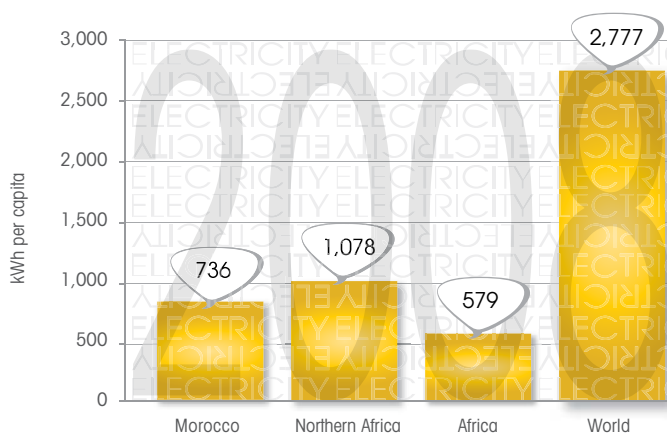
**2,816 USD** GDP per capita (2010)

FIGURE 1: GDP PER CAPITA FOR 2010



Northern Africa includes Algeria, Egypt, Libya, Morocco, Sudan and Tunisia.

FIGURE 2: ELECTRICITY USE PER CAPITA FOR 2008



## ENERGY NATIONAL PROFILE 2009

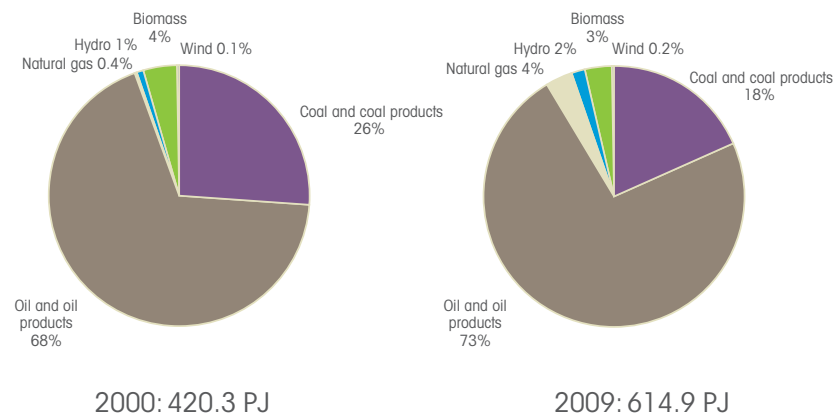
- Total Primary Energy Supply: 631.5 PJ - Of which renewables: 30.9 PJ (4.9 %)
- Energy self-sufficiency: 5.2%
- Fuel imports: 6.7 billion USD (20.5 % of total imports)
- Electricity generation: 21.4 TWh - Of which renewables: 2,989 GWh (14 %)
- Electricity use per capita: 747 kWh
- Electrical capacity\*: 6.0 GW - Of which renewables: 1,514 MW (25.2 %)
- Electricity access rate: 97.0%
- Share of population using solid fuels: 7%

\*2008

### TARGETS:

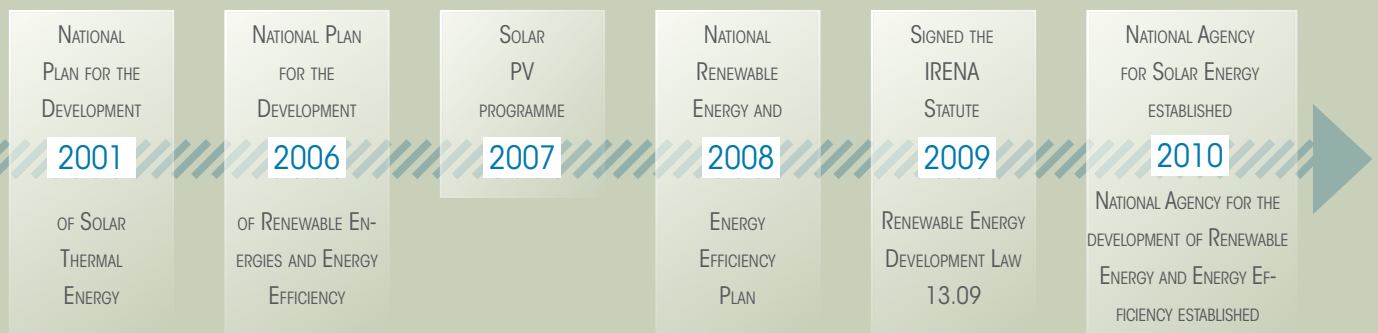
- 8% of primary energy and 10% of final energy from renewables by 2012
- 20% of electricity generation from renewables by 2012 and 42% by 2020
- 400 MW of small hydro capacity by 2015
- 2,000 MW of solar capacity by 2020
- 1,440 MW of wind capacity by 2015, increased to 2,000 MW by 2020
- 400,000 m<sup>2</sup> of solar hot water capacity by 2012, increased to 1.7 million m<sup>2</sup> by 2020

FIGURE 3: TOTAL PRIMARY ENERGY SUPPLY\* IN 2000 AND 2009



\*excluding electricity trade

## POLICIES IN PLACE TO PROMOTE RENEWABLE ENERGY SINCE THE RIO CONFERENCE OF 1992



WORLD BANK EASE OF DOING BUSINESS INDEX FOR 2012: Ranked 94 out of 183

## RENEWABLE ENERGY PROJECTS FROM THE GOVERNMENT AND PRIVATE SECTORS:

- 450 MW of wind capacity addition by 2014 (3 projects)
- Up to 1,100 MW of wind capacity addition announced (10 projects)
- 130 MW of solar thermal capacity addition announced (2 projects)
- 9 MW of solar photovoltaic capacity addition announced (2 projects)

NUMBER OF REGISTERED CLEAN DEVELOPMENT MECHANISM PROJECTS FOCUSING ON RENEWABLE ENERGY: 4

RENEWABLE ENERGY RESOURCES: ● High ● Medium ● Low ● Unknown ✕ Not applicable

Wind ● Solar ● Hydro ● Biomass ● Geothermal ● Ocean ●

Note: The information on resources should be taken as an indication only. It refers to a general trend of available resources, and does not prejudice the feasibility of individual projects. The thresholds are indicative, and do not refer to any technological choice. The analysis is based on the literature.

Sources: Population and GDP: World Bank; Energy data: IEA, IRENA analysis based on UN data; Share of fuel imports in total imports: World Trade Organisation; Electrical capacity: IEA, EIA; Electricity access rate: World Energy Outlook 2010 database (IEA); Share of population using solid fuels: World Health Organisation; Targets: REN21, IRENA; Policy/Legislation: IEA, Reegle, IRENA research; Ease of doing business index: World Bank; Renewable energy projects: Bloomberg New Energy Finance, IRENA research; Clean Development Mechanism projects: UNFCCC; Renewable energy resources: IRENA analysis.

Units: USD: United States dollar; kWh: kilowatt-hour; GWh: gigawatt-hour (1 GWh = 10<sup>6</sup> kWh); TWh: terawatt-hour (1 TWh = 10<sup>3</sup> GWh); PJ: petajoule; MW: megawatt; GW: gigawatt (1 GW = 10<sup>3</sup> MW).

# MOZAMBIQUE

**23.4 million** Population (2010)

**9.6 billion USD** GDP (2010)

**410 USD** GDP per capita (2010)

FIGURE 1: GDP PER CAPITA FOR 2010

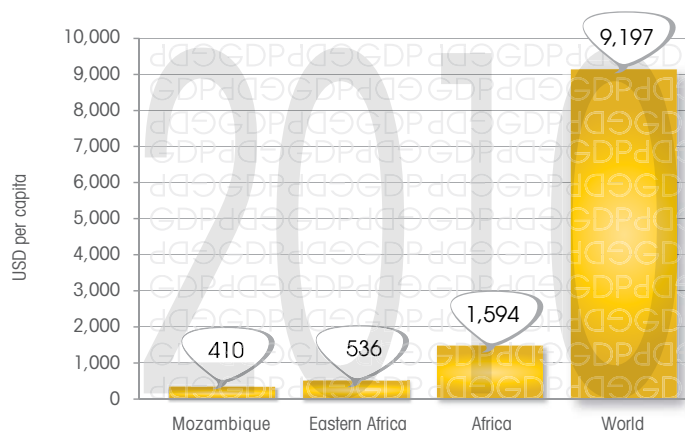
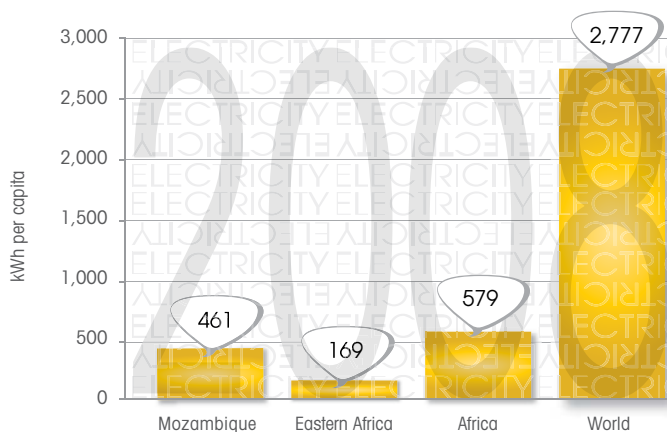


FIGURE 2: ELECTRICITY USE PER CAPITA FOR 2008



Eastern Africa includes Burundi, Comoros, Djibouti, Eritrea, Ethiopia, Kenya, Madagascar, Malawi, Mauritius, Mozambique, Rwanda, Seychelles, Somalia, the United Republic of Tanzania, Uganda, Zambia and Zimbabwe.

## ENERGY NATIONAL PROFILE 2009

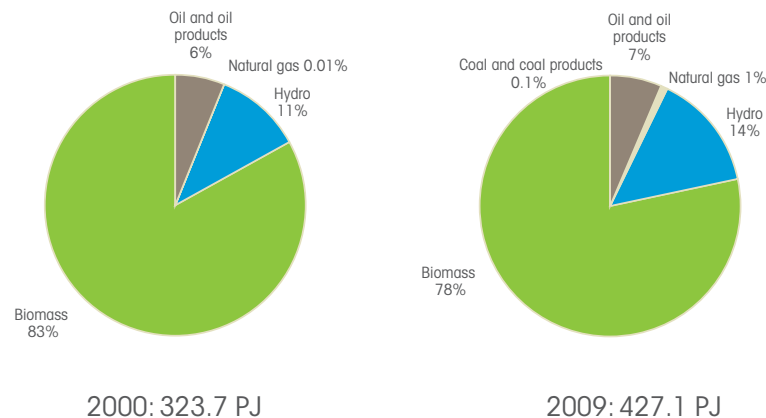
- Total Primary Energy Supply: 408.9 PJ - Of which renewables: 395.5 PJ (96.7 %)
- Energy self-sufficiency: 122.0%
- Fuel imports: 581 million USD (15.4 % of total imports)
- Electricity generation: 17.0 TWh - Of which renewables: 17.0 TWh (99.9 %)
- Electricity use per capita: 453 kWh
- Electrical capacity\*: 2,428 MW - Of which renewables: 2,179 MW (89.7 %)
- Electricity access rate: 11.7%
- Share of population using solid fuels: > 95%

\* 2008

### TARGETS:

- 6,000 MW of wind, solar and hydro capacity (2,000 MW each)
- Installation of 82,000 solar photovoltaic systems, 1,000 biodigesters, 3,000 wind pumping systems, 5,000 renewable-energy-based productive systems and 100,000 solar heater in rural areas

FIGURE 3: TOTAL PRIMARY ENERGY SUPPLY\* IN 2000 AND 2009



\*excluding electricity trade

## POLICIES IN PLACE TO PROMOTE RENEWABLE ENERGY SINCE THE RIO CONFERENCE OF 1992

ENERGY REFORM AND  
ACCESS PROJECT  
(2003-2011)

2003

RATIFIED  
THE IRENA  
STATUTE

2011

WORLD BANK EASE OF DOING BUSINESS INDEX FOR 2012: Ranked 139 out of 183

RENEWABLE ENERGY PROJECTS FROM THE GOVERNMENT AND PRIVATE SECTORS:

- 420 million litres of ethanol per year capacity addition announced (3 projects)
- 100 million litres of biodiesel per year capacity addition announced (1 project)
- 32 MW of biofuel-fired capacity addition announced (1 project)
- 120 MW of wind capacity addition announced (2 projects)

NUMBER OF REGISTERED CLEAN DEVELOPMENT MECHANISM PROJECTS FOCUSING ON RENEWABLE ENERGY: 0

RENEWABLE ENERGY RESOURCES: ● High ● Medium ● Low ● Unknown ✕ Not applicable



Note: The information on resources should be taken as an indication only. It refers to a general trend of available resources, and does not prejudice the feasibility of individual projects. The thresholds are indicative, and do not refer to any technological choice. The analysis is based on the literature.

Sources: Population and GDP: World Bank; Energy data: IEA, IRENA analysis based on UN data; Share of fuel imports in total imports: World Trade Organisation; Electrical capacity: IEA, EIA; Electricity access rate: World Energy Outlook 2010 database (IEA); Share of population using solid fuels: World Health Organisation; Targets: REN21, IRENA; Policy/Legislation: IEA, Reegle, IRENA research; Ease of doing business index: World Bank; Renewable energy projects: Bloomberg New Energy Finance, IRENA research; Clean Development Mechanism projects: UNFCCC; Renewable energy resources: IRENA analysis.

Units: USD: United States dollar; kWh: kilowatt-hour; GWh: gigawatt-hour (1 GWh = 10<sup>6</sup> kWh); TWh: terawatt-hour (1 TWh = 10<sup>3</sup> GWh); PJ: petajoule; MW: megawatt; GW: gigawatt (1 GW = 10<sup>3</sup> MW).

# NAMIBIA



**2.2 million** Population (2010)

**12.2 billion USD** GDP (2010)

**5,502 USD** GDP per capita (2010)

FIGURE 1: GDP PER CAPITA FOR 2010

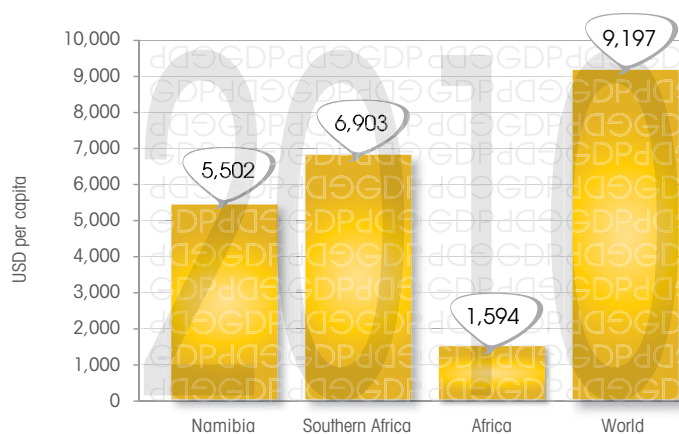
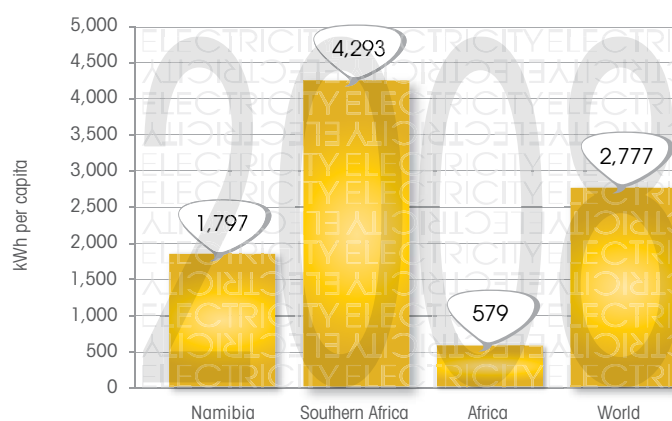


FIGURE 2: ELECTRICITY USE PER CAPITA FOR 2008



Southern Africa includes Botswana, Lesotho, Namibia, South Africa and Swaziland.

## ENERGY NATIONAL PROFILE 2009

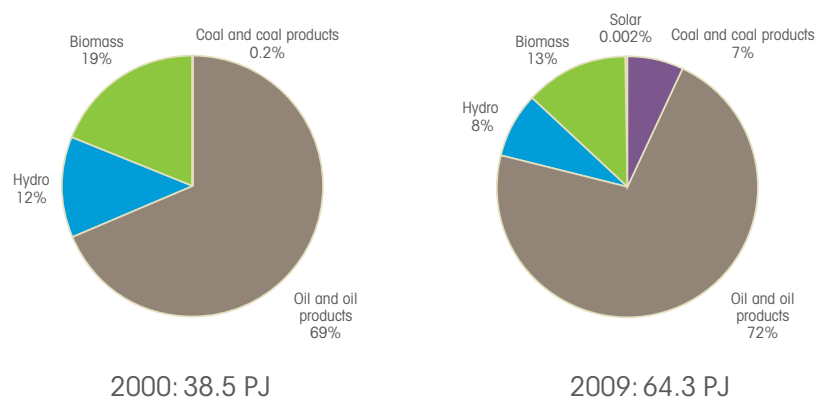
- Total Primary Energy Supply: 71.7 PJ - Of which renewables: 13.8 PJ (19.2 %)
- Energy self-sufficiency: 19.2%
- Fuel imports: 374 million USD (7.5 % of total imports)
- Electricity generation: 1,742 GWh - Of which renewables: 1,429 GWh (82 %)
- Electricity use per capita: 1,628 kWh
- Electrical capacity\*: 264 MW - Of which renewables: 249 MW (94.3 %)
- Electricity access rate: 34.0%
- Share of population using solid fuels: 57%

\* 2008

### TARGETS:

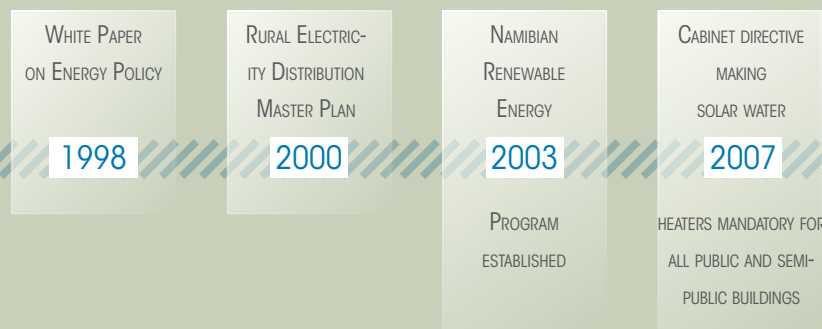
- 40 MW of renewable capacity (excluding hydro) by 2011

FIGURE 3: TOTAL PRIMARY ENERGY SUPPLY\* IN 2000 AND 2009



\*excluding electricity trade

## POLICIES IN PLACE TO PROMOTE RENEWABLE ENERGY SINCE THE RIO CONFERENCE OF 1992



WORLD BANK EASE OF DOING BUSINESS INDEX FOR 2012: Ranked 78 out of 183

## RENEWABLE ENERGY PROJECTS FROM THE GOVERNMENT AND PRIVATE SECTORS:

- Up to 450 MW of wind capacity addition announced (5 projects)
- 26 MW of small hydro capacity addition announced (3 projects)
- 400 MW of solar thermal capacity addition announced (1 project)

NUMBER OF REGISTERED CLEAN DEVELOPMENT MECHANISM PROJECTS FOCUSING ON RENEWABLE ENERGY: 0

RENEWABLE ENERGY RESOURCES: ● High ● Medium ● Low ● Unknown ✕ Not applicable

Wind ● Solar ● Hydro ● Biomass ● Geothermal ● Ocean ●

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Units: USD: United States dollar; kWh: kilowatt-hour; GWh: gigawatt-hour (1 GWh = 10<sup>6</sup> kWh); TWh: terawatt-hour (1 TWh = 10<sup>3</sup> GWh); PJ: petajoule; MW: megawatt; GW: gigawatt (1 GW = 10<sup>3</sup> MW).



# NIGER


**15.9 million** Population (2010)

**5.5 billion USD** GDP (2010)

**349 USD** GDP per capita (2010)

FIGURE 1: GDP PER CAPITA FOR 2010

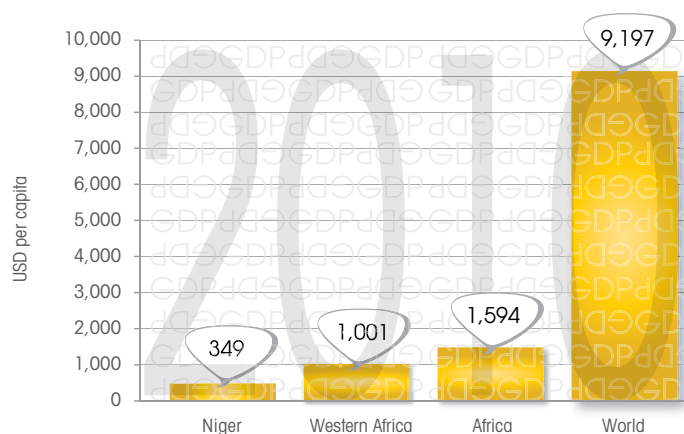
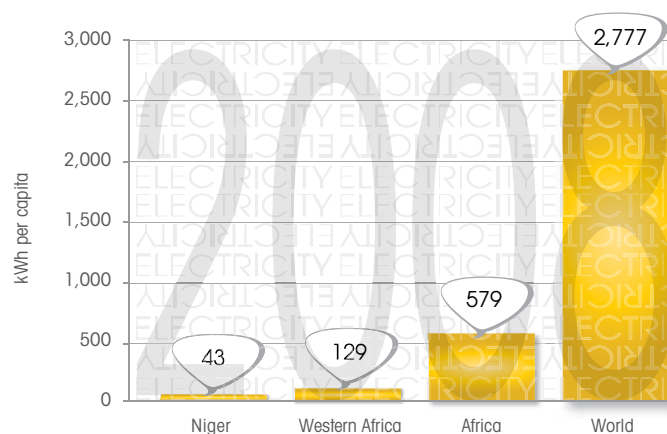


FIGURE 2: ELECTRICITY USE PER CAPITA FOR 2008



Western Africa includes Benin, Burkina Faso, Cape Verde, Côte d'Ivoire, Gambia, Ghana, Guinea, Guinea-Bissau, Liberia, Mali, Mauritania, Niger, Nigeria, Senegal, Sierra Leone and Togo.

## ENERGY NATIONAL PROFILE 2009

- Total Primary Energy Supply\*: 169.6 PJ - Of which renewables: 156.8 PJ (92.5 %)
- Energy self-sufficiency\*: 95.3%
- Fuel imports: 212 million USD (11.2 % of total imports)
- Electricity generation: 242.3 GWh - Of which renewables: 0.0 GWh (0 %)
- Electricity use per capita: 40 kWh
- Electrical capacity\* \*: 230 MW - Of which renewables: 1 MW (0 %)
- Electricity access rate: 8.6%
- Share of population using solid fuels: > 95%

\* 2008

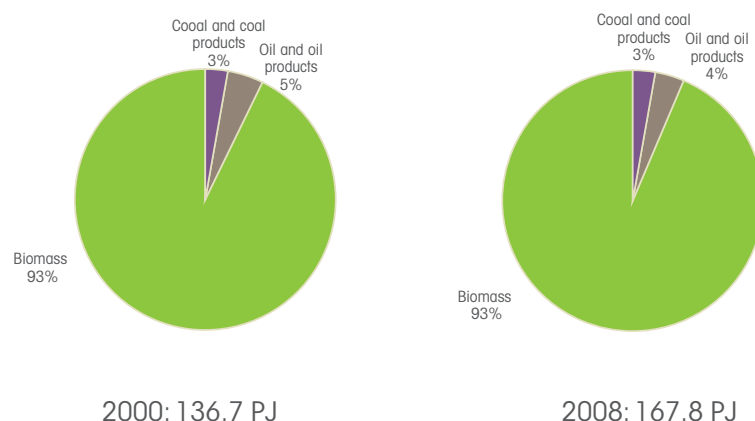
\*\* 2011

### TARGETS:

- 10% of primary energy from renewables by 2020

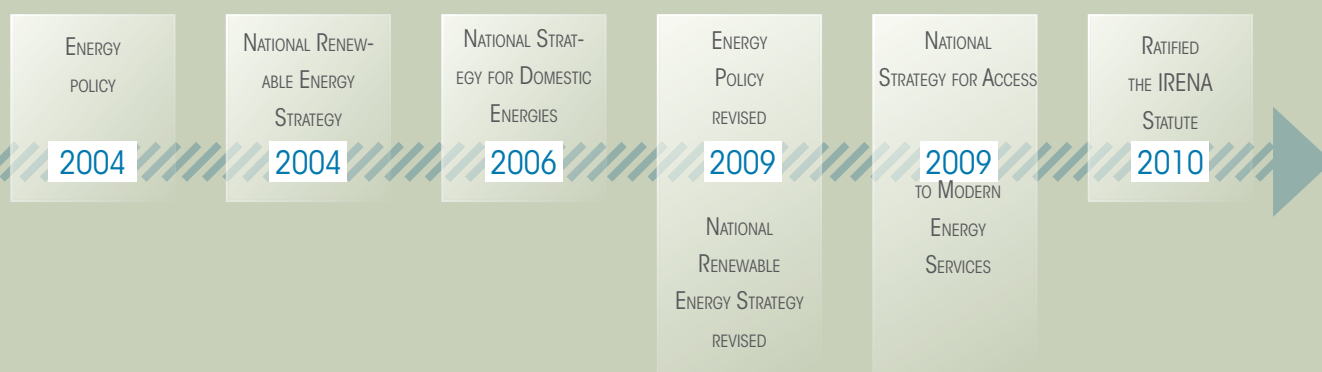


FIGURE 3: TOTAL PRIMARY ENERGY SUPPLY\* IN 2000 AND 2008



\*excluding electricity trade

#### POLICIES IN PLACE TO PROMOTE RENEWABLE ENERGY SINCE THE RIO CONFERENCE OF 1992



WORLD BANK EASE OF DOING BUSINESS INDEX FOR 2012: Ranked 173 out of 183

RENEWABLE ENERGY PROJECTS FROM THE GOVERNMENT AND PRIVATE SECTORS:

- No information available

NUMBER OF REGISTERED CLEAN DEVELOPMENT MECHANISM PROJECTS FOCUSING ON RENEWABLE ENERGY: 0

RENEWABLE ENERGY RESOURCES: ● High ● Medium ● Low ● Unknown ✕ Not applicable

Wind ● Solar ● Hydro ● Biomass ● Geothermal ● Ocean ✕

Note: The information on resources should be taken as an indication only. It refers to a general trend of available resources, and does not prejudice the feasibility of individual projects. The thresholds are indicative, and do not refer to any technological choice. The analysis is based on the literature.

Sources: Population and GDP: World Bank; Energy data: IEA, IRENA analysis based on UN data; Share of fuel imports in total imports: World Trade Organisation; Electrical capacity: IEA, EIA; Electricity access rate: World Energy Outlook 2010 database (IEA); Share of population using solid fuels: World Health Organisation; Targets: REN21, IRENA; Policy/legislation: IEA, Reegle, IRENA research; Ease of doing business index: World Bank; Renewable energy projects: Bloomberg New Energy Finance, IRENA research; Clean Development Mechanism projects: UNFCCC; Renewable energy resources: IRENA analysis.

Units: USD: United States dollar; kWh: kilowatt-hour; GWh: gigawatt-hour (1 GWh = 10<sup>6</sup> kWh); TWh: terawatt-hour (1 TWh=10<sup>3</sup> GWh); PJ: petajoule; MW: megawatt; GW: gigawatt (1 GW=10<sup>3</sup> MW).

# NIGERIA


**158.3 million** Population (2010)

**193.7 billion USD** GDP (2010)

**1,224 USD** GDP per capita (2010)

FIGURE 1: GDP PER CAPITA FOR 2010

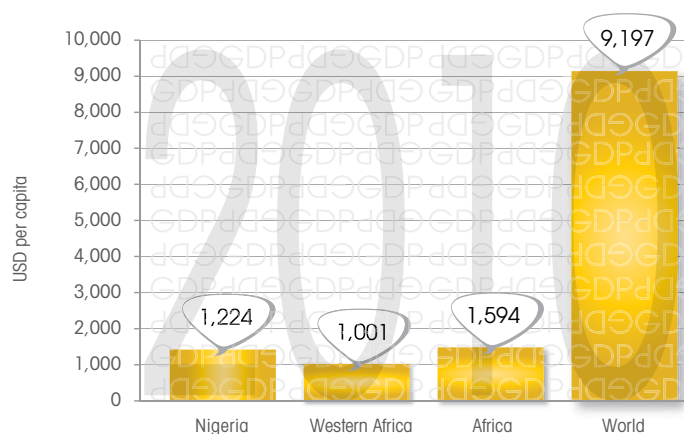
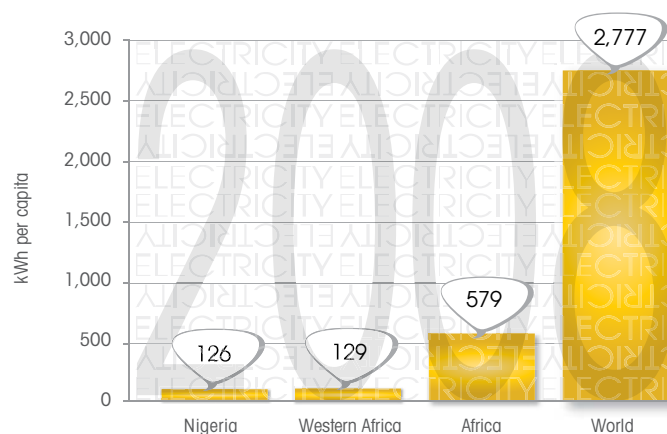


FIGURE 2: ELECTRICITY USE PER CAPITA FOR 2008



Western Africa includes Benin, Burkina Faso, Cape Verde, Côte d'Ivoire, Gambia, Ghana, Guinea, Guinea-Bissau, Liberia, Mali, Mauritania, Niger, Nigeria, Senegal, Sierra Leone and Togo.

## ENERGY NATIONAL PROFILE 2009

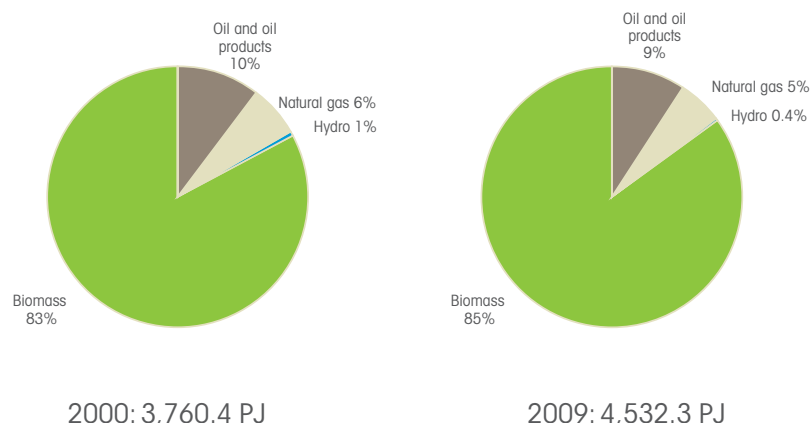
- Total Primary Energy Supply: 4,532.3 PJ - Of which renewables: 3,864.3 PJ (85.3 %)
- Energy self-sufficiency: 211.3%
- Fuel imports: 335 million USD (1 % of total imports)
- Grid electricity generation: 19.8 TWh - Of which renewables: 4,529 GWh (22.9 %)
- Grid electricity use per capita: 120 kWh
- Grid electrical capacity\*: 5.9 GW - Of which renewables: 1,938 MW (32.9 %)
- Grid electricity access rate: 50.6%
- Share of population using solid fuels: 79%

\*2008

### TARGETS:

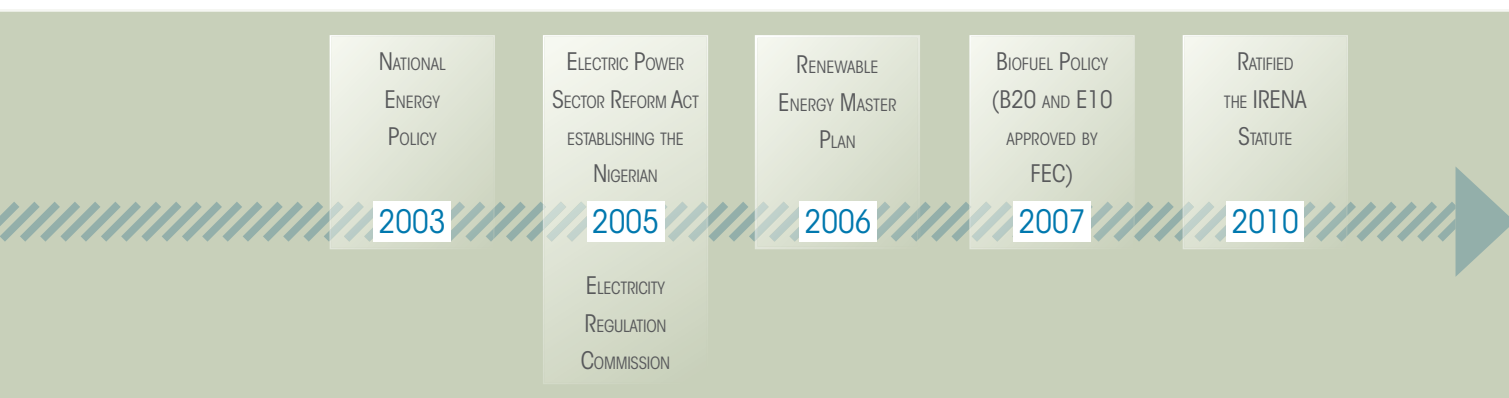
- 18% of electricity from renewables by 2025
- 20% of electricity from renewables by 2030
- 100 MW of small hydro capacity by 2015 and 760 MW by 2025
- 300 MW of solar photovoltaic capacity by 2015 and 4,000 MW in 2025
- 40 MW of wind capacity by 2025
- 5 MW of biomass-fired capacity by 2015 and 30 MW by 2025

FIGURE 3: TOTAL PRIMARY ENERGY SUPPLY\* IN 2000 AND 2009



\*excluding electricity trade

#### POLICIES IN PLACE TO PROMOTE RENEWABLE ENERGY SINCE THE RIO CONFERENCE OF 1992



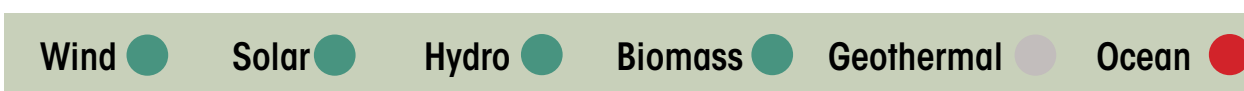
WORLD BANK EASE OF DOING BUSINESS INDEX FOR 2012: Ranked 133 out of 183

#### RENEWABLE ENERGY PROJECTS FROM THE GOVERNMENT AND PRIVATE SECTORS:

- 10 MW of wind capacity addition by 2012 (1 project)
- 2,930 MW of hydropower capacity addition announced (3 projects)
- 80 million litres of biodiesel per year capacity addition announced (1 project)
- 225 million litres of ethanol per year capacity addition announced (4 projects)
- 5 MW of biomass-fired capacity addition announced (1 project)
- 10 MW of dispersed solar photovoltaic projects (for water pumping, street lights and mini-grids)

NUMBER OF REGISTERED CLEAN DEVELOPMENT MECHANISM PROJECTS FOCUSING ON RENEWABLE ENERGY: 1

RENEWABLE ENERGY RESOURCES: ● High ● Medium ● Low ● Unknown ✕ Not applicable



Note: The information on resources should be taken as an indication only. It refers to a general trend of available resources, and does not prejudge the feasibility of individual projects. The thresholds are indicative, and do not refer to any technological choice. The analysis is based on the literature.

Sources: Population and GDP: World Bank; Energy data: IEA, IRENA analysis based on UN data; Share of fuel imports in total imports: World Trade Organisation; Electrical capacity: IEA, EIA; Electricity access rate: World Energy Outlook 2010 database (IEA); Share of population using solid fuels: World Health Organisation; Targets: REN21, IRENA, Energy Commission of Nigeria; Policy/legislation: IEA, Reegle, IRENA research; Ease of doing business index: World Bank; Renewable energy projects: Bloomberg New Energy Finance, IRENA research, Energy Commission of Nigeria; Clean Development Mechanism projects: UNFCCC; Renewable energy resources: IRENA analysis.

Units: USD: United States dollar; kWh: kilowatt-hour; GWh: gigawatt-hour (1 GWh = 10<sup>6</sup> kWh); TWh: terawatt-hour (1 TWh=10<sup>3</sup> GWh); PJ: petajoule; MW: megawatt; GW: gigawatt (1 GW=10<sup>3</sup> MW).

# RWANDA


**10.3 million** Population (2010)

**5.6 billion USD** GDP (2010)

**548 USD** GDP per capita (2010)

FIGURE 1: GDP PER CAPITA FOR 2010

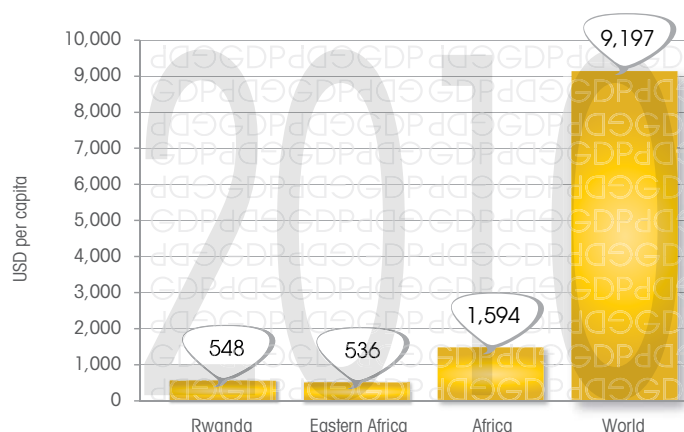
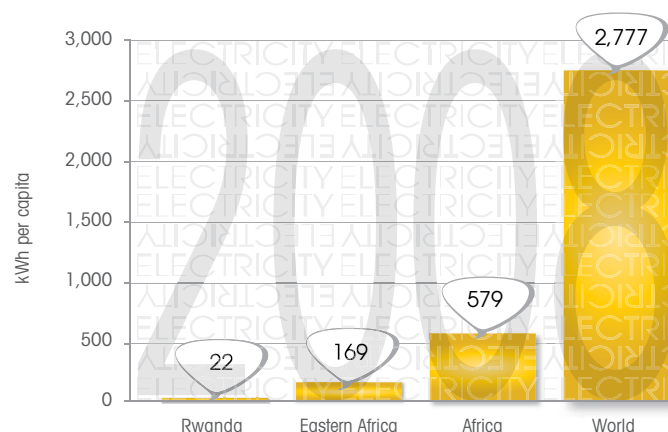


FIGURE 2: ELECTRICITY USE PER CAPITA FOR 2008



Eastern Africa includes Burundi, Comoros, Djibouti, Eritrea, Ethiopia, Kenya, Madagascar, Malawi, Mauritius, Mozambique, Rwanda, Seychelles, Somalia, the United Republic of Tanzania, Uganda, Zambia and Zimbabwe.

## ENERGY NATIONAL PROFILE 2008

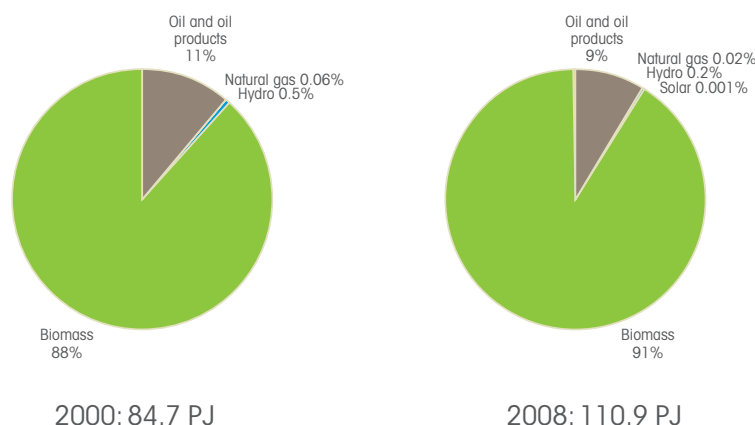
- Total Primary Energy Supply: 111.2 PJ - Of which renewables: 101.2 PJ (91.0 %)
- Energy self-sufficiency: 91.1%
- Fuel imports\*: 28 million USD (2.3 % of total imports)
- Electricity generation: 196.8 GWh - Of which renewables: 71.5 GWh (36.3 %)
- Electricity use per capita: 22 kWh
- Electrical capacity: 67 MW - Of which renewables: 37 MW (55.2 %)
- Electricity access rate: Not available
- Share of population using solid fuels: > 95%

\* 2009

### TARGETS:

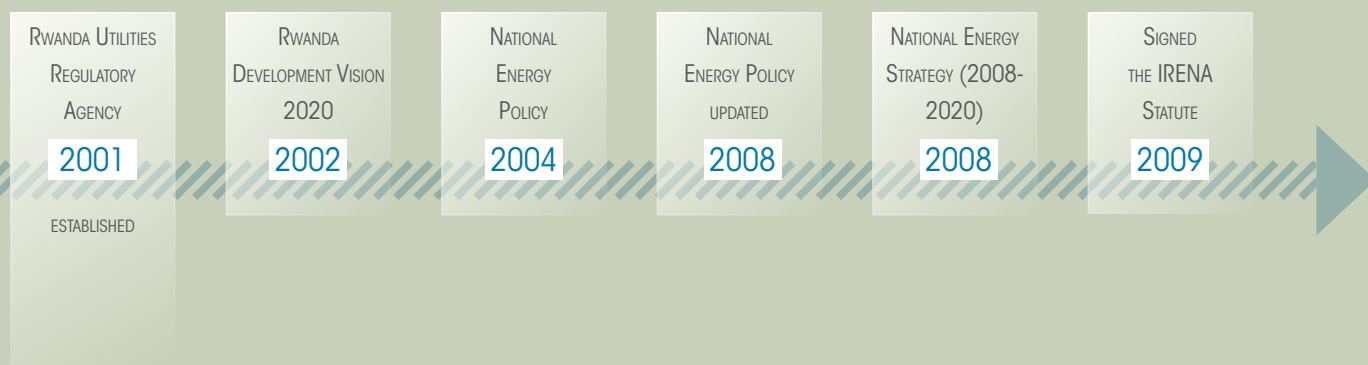
- 90% of electricity generation from renewables by 2012
- 42 MW of small hydro capacity by 2015

FIGURE 3: TOTAL PRIMARY ENERGY SUPPLY\* IN 2000 AND 2008



\*excluding electricity trade

## POLICIES IN PLACE TO PROMOTE RENEWABLE ENERGY SINCE THE RIO CONFERENCE OF 1992



WORLD BANK EASE OF DOING BUSINESS INDEX FOR 2012: Ranked 45 out of 183

### RENEWABLE ENERGY PROJECTS FROM THE GOVERNMENT AND PRIVATE SECTORS:

- 28 MW of small capacity addition by end 2012 (1 project)
- 5 MW of small capacity addition announced (1 project)
- 16 million litres of biodiesel per year capacity addition announced (1 project)
- 1 MW of biogas-fired capacity addition announced (1 project)

NUMBER OF REGISTERED CLEAN DEVELOPMENT MECHANISM PROJECTS FOCUSING ON RENEWABLE ENERGY: 3

RENEWABLE ENERGY RESOURCES: ● High ● Medium ● Low ● Unknown ✕ Not applicable

Wind ● Solar ● Hydro ● Biomass ● Geothermal ● Ocean ✕

Note: The information on resources should be taken as an indication only. It refers to a general trend of available resources, and does not prejudge the feasibility of individual projects. The thresholds are indicative, and do not refer to any technological choice. The analysis is based on the literature.

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Units: USD: United States dollar; kWh: kilowatt-hour; GWh: gigawatt-hour (1 GWh = 10<sup>6</sup> kWh); TWh: terawatt-hour (1 TWh=10<sup>3</sup> GWh); PJ: petajoule; MW: megawatt; GW: gigawatt (1 GW=10<sup>3</sup> MW).

# SAO TOME AND PRINCIPE

**165,000** Population (2010)  
**197 million USD** GDP (2010)  
**1,190 USD** GDP per capita (2010)

FIGURE 1: GDP PER CAPITA FOR 2010

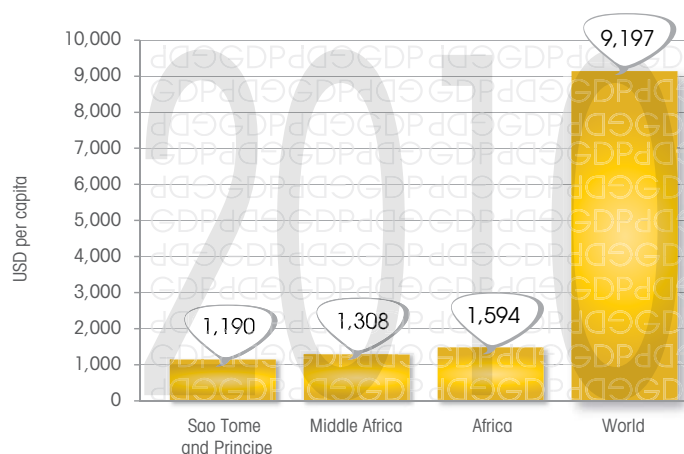
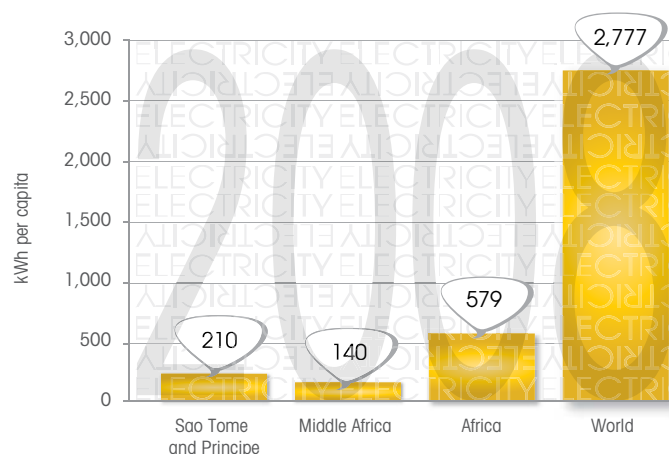


FIGURE 2: ELECTRICITY USE PER CAPITA FOR 2008



Middle Africa includes Angola, Cameroon, the Central African Republic, Chad, Congo, the Democratic Republic of Congo, Equatorial Guinea, Gabon and Sao Tome and Principe.

## ENERGY NATIONAL PROFILE 2008

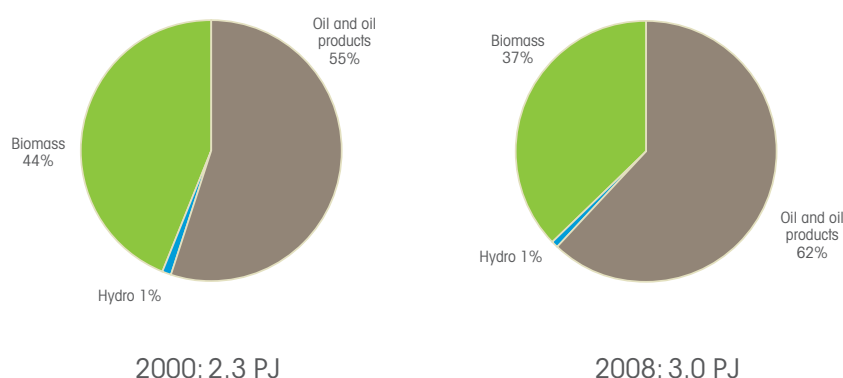
- Total Primary Energy Supply: 3.0 PJ - Of which renewables: 1.1 PJ (38.5 %)
- Energy self-sufficiency: 38.5%
- Fuel imports\*: 16 million USD (15.4 % of total imports)
- Electricity generation: 33.7 GWh - Of which renewables: 12.0 GWh (35.6 %)
- Electricity use per capita: 210 kWh
- Electrical capacity: 14 MW - Of which renewables: 6 MW (42.9 %)
- Electricity access rate: Not available
- Share of population using solid fuels: Not available

\* 2009

### TARGETS:

- No information available

FIGURE 3: TOTAL PRIMARY ENERGY SUPPLY\* IN 2000 AND 2008



\*excluding electricity trade

## POLICIES IN PLACE TO PROMOTE RENEWABLE ENERGY SINCE THE RIO CONFERENCE OF 1992

POVERTY REDUCTION  
STRATEGY PAPER  
2002-2015

2002

NATIONAL ADAPTA-  
TION PROGRAMME  
OF ACTION

2007

SIGNED  
THE IRENA  
STATUTE

2009

WORLD BANK EASE OF DOING BUSINESS INDEX FOR 2012: Ranked 163 out of 183

RENEWABLE ENERGY PROJECTS FROM THE GOVERNMENT AND PRIVATE SECTORS:

- No information available

NUMBER OF REGISTERED CLEAN DEVELOPMENT MECHANISM PROJECTS FOCUSING ON RENEWABLE ENERGY: 0

RENEWABLE ENERGY RESOURCES: ● High ● Medium ● Low ● Unknown ✕ Not applicable

Wind ●

Solar ●

Hydro ●

Biomass ●

Geothermal ●

Ocean ●

Note: The information on resources should be taken as an indication only. It refers to a general trend of available resources, and does not prejudge the feasibility of individual projects. The thresholds are indicative, and do not refer to any technological choice. The analysis is based on the literature.

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Units: USD: United States dollar; kWh: kilowatt-hour; GWh: gigawatt-hour (1 GWh = 10<sup>6</sup> kWh); TWh: terawatt-hour (1 TWh=10<sup>3</sup> GWh); PJ: petajoule; MW: megawatt; GW: gigawatt (1 GW=10<sup>3</sup> MW).



# SENEGAL



**12.9 million** Population (2010)

**13.0 billion USD** GDP (2010)

**1,007 USD** GDP per capita (2010)

FIGURE 1: GDP PER CAPITA FOR 2010

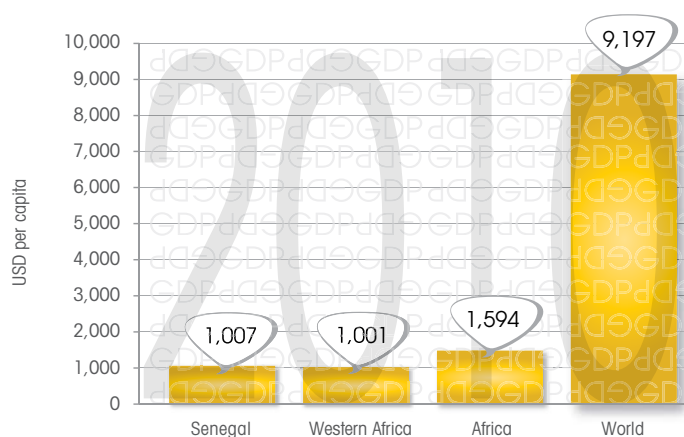
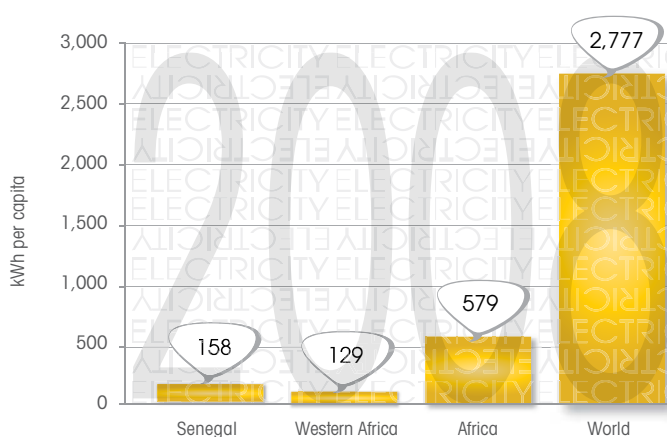


FIGURE 2: ELECTRICITY USE PER CAPITA FOR 2008



Western Africa includes Benin, Burkina Faso, Cape Verde, Côte d'Ivoire, Gambia, Ghana, Guinea, Guinea-Bissau, Liberia, Mali, Mauritania, Niger, Nigeria, Senegal, Sierra Leone and Togo.

## ENERGY NATIONAL PROFILE 2009

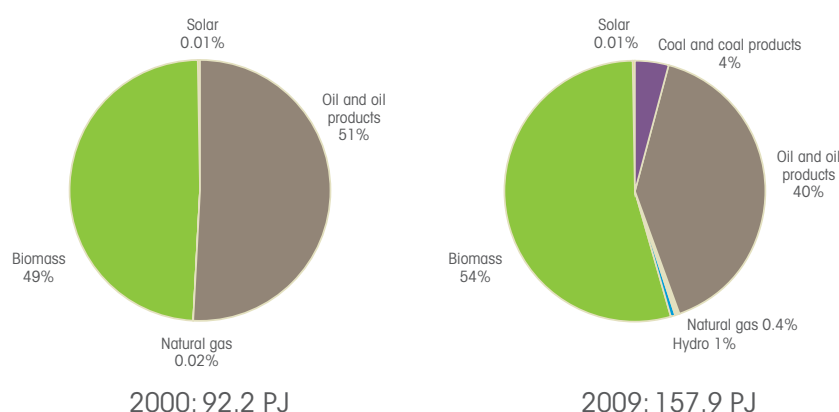
- Total Primary Energy Supply: 158.4 PJ - Of which renewables: 86.8 PJ (54.8 %)
- Energy self-sufficiency: 55.5%
- Fuel imports: 1.1 billion USD (23.2 % of total imports)
- Electricity generation: 2,858 GWh - Of which renewables: 292.0 GWh (10.2 %)
- Electricity use per capita: 189 kWh
- Electrical capacity\*: 548 MW - Of which renewables: 2 MW (0.4 %)
- Electricity access rate: 42.0%
- Share of population using solid fuels: 51%

\* 2008

### TARGETS:

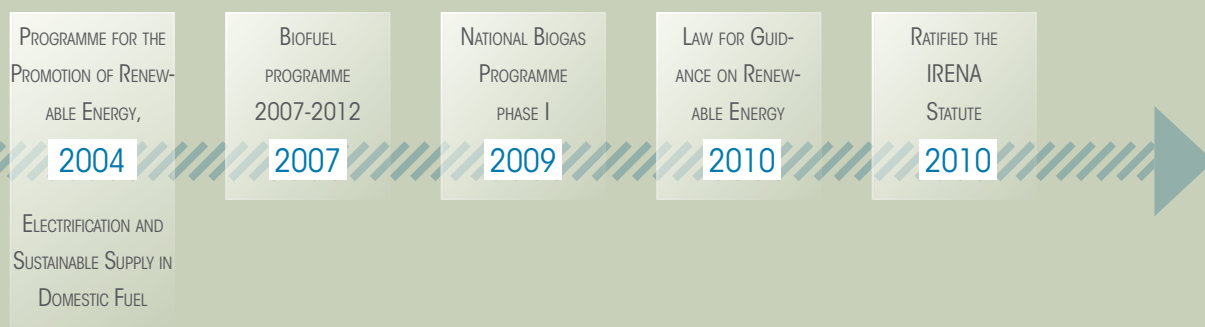
- 15% of primary energy from renewables by 2025

FIGURE 3: TOTAL PRIMARY ENERGY SUPPLY\* IN 2000 AND 2009



\*excluding electricity trade

## POLICIES IN PLACE TO PROMOTE RENEWABLE ENERGY SINCE THE RIO CONFERENCE OF 1992



WORLD BANK EASE OF DOING BUSINESS INDEX FOR 2012: Ranked 154 out of 183

RENEWABLE ENERGY PROJECTS FROM THE GOVERNMENT AND PRIVATE SECTORS:

- 125 MW of wind capacity addition by the end of 2011 (1 project)
- 25 MW of biomass-fired capacity addition announced (1 project)

NUMBER OF REGISTERED CLEAN DEVELOPMENT MECHANISM PROJECTS FOCUSING ON RENEWABLE ENERGY: 1

RENEWABLE ENERGY RESOURCES: ● High ● Medium ● Low ● Unknown



Note: The information on resources should be taken as an indication only. It refers to a general trend of available resources, and does not prejudice the feasibility of individual projects. The thresholds are indicative, and do not refer to any technological choice. The analysis is based on the literature.

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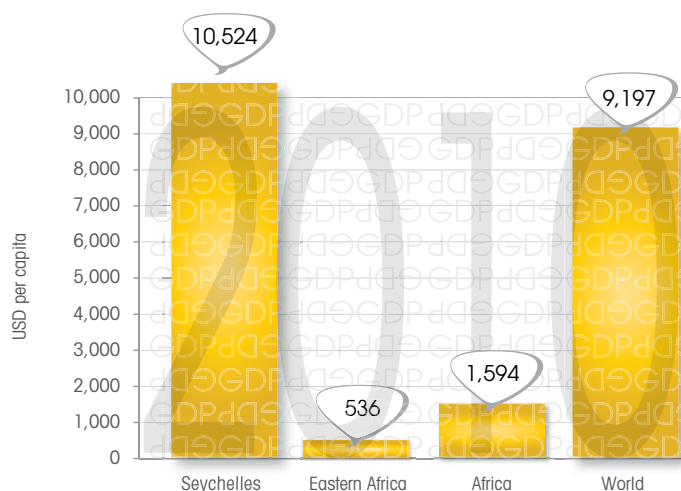
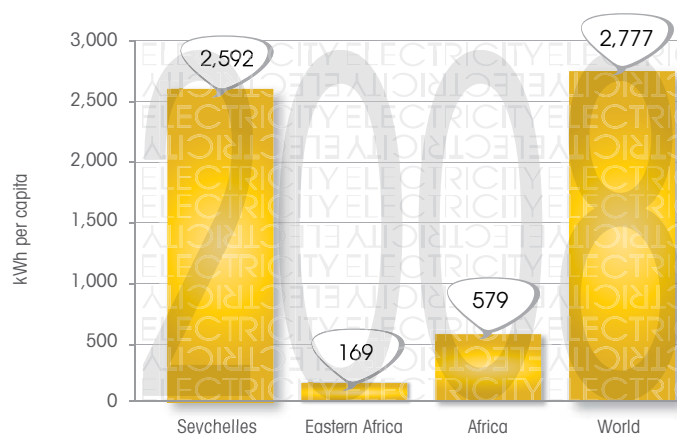
Units: USD: United States dollar; kWh: kilowatt-hour; GWh: gigawatt-hour (1 GWh = 10<sup>6</sup> kWh); TWh: terawatt-hour (1 TWh=10<sup>3</sup> GWh); PJ: petajoule; MW: megawatt; GW: gigawatt (1 GW=10<sup>3</sup> MW).

# SEYCHELLES

**89,000** Population (2010)

**937 million USD** GDP (2010)

**10,524 USD** GDP per capita (2010)

**FIGURE 1: GDP PER CAPITA FOR 2010**

**FIGURE 2: ELECTRICITY USE PER CAPITA FOR 2008**


Eastern Africa includes Burundi, Comoros, Djibouti, Eritrea, Ethiopia, Kenya, Madagascar, Malawi, Mauritius, Mozambique, Rwanda, Seychelles, Somalia, the United Republic of Tanzania, Uganda, Zambia and Zimbabwe.

## ENERGY NATIONAL PROFILE 2009

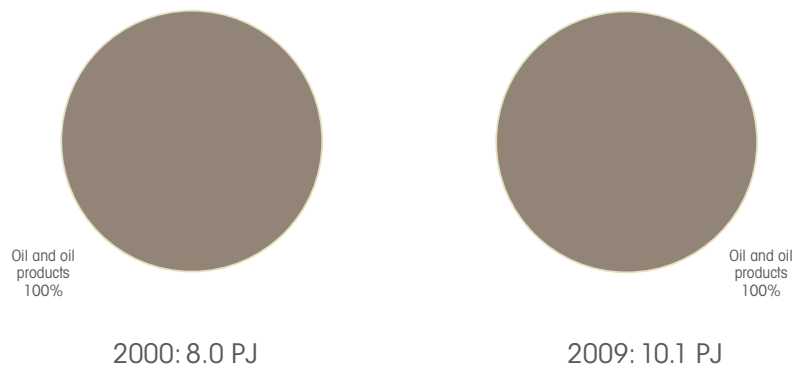
- Total Primary Energy Supply: 10.1 PJ - Of which renewables: 0.0 PJ (0.0 %)
- Energy self-sufficiency: 0.0%
- Fuel imports: 205 million USD (25.4 % of total imports)
- Electricity generation: 275.7 GWh - Of which renewables: 0.0 GWh (0 %)
- Electricity use per capita: 2,660 kWh
- Electrical capacity\*: 95 MW - Of which renewables: 0 MW (0 %)
- Electricity access rate: 96.0%
- Share of population using solid fuels: < 5%

\* 2008

### TARGETS:

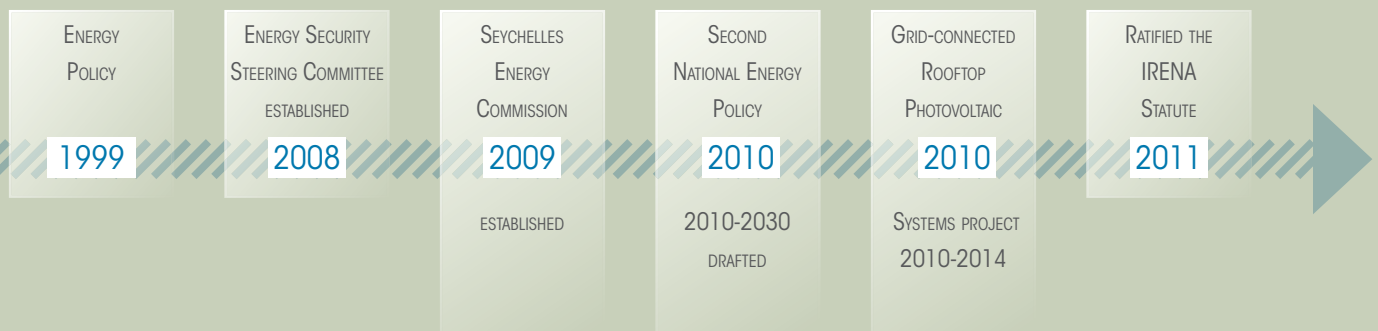
- 5% of electricity generation from renewables by 2020
- 15% of electricity generation from renewables by 2030

FIGURE 3: TOTAL PRIMARY ENERGY SUPPLY\* IN 2000 AND 2009



\*excluding electricity trade

#### POLICIES IN PLACE TO PROMOTE RENEWABLE ENERGY SINCE THE RIO CONFERENCE OF 1992



WORLD BANK EASE OF DOING BUSINESS INDEX FOR 2012: Ranked 103 out of 183

RENEWABLE ENERGY PROJECTS FROM THE GOVERNMENT AND PRIVATE SECTORS:

- 18 MW of wind capacity addition announced (1 project)

NUMBER OF REGISTERED CLEAN DEVELOPMENT MECHANISM PROJECTS FOCUSING ON RENEWABLE ENERGY: 0

RENEWABLE ENERGY RESOURCES: ● High ● Medium ● Low ● Unknown ✕ Not applicable

Wind ● Solar ● Hydro ● Biomass ● Geothermal ● Ocean ●

Note: The information on resources should be taken as an indication only. It refers to a general trend of available resources, and does not prejudice the feasibility of individual projects. The thresholds are indicative, and do not refer to any technological choice. The analysis is based on the literature.

Sources: Population and GDP: World Bank; Energy data: IEA, IRENA analysis based on UN data; Share of fuel imports in total imports: World Trade Organisation; Electrical capacity: IEA, EIA; Electricity access rate: World Energy Outlook 2010 database (IEA); Share of population using solid fuels: World Health Organisation; Targets: REN21, IRENA; Policy/legislation: IEA, Reegle, IRENA research; Ease of doing business index: World Bank; Renewable energy projects: Bloomberg New Energy Finance, IRENA research; Clean Development Mechanism projects: UNFCCC; Renewable energy resources: IRENA analysis.

Units: USD: United States dollar; kWh: kilowatt-hour; GWh: gigawatt-hour (1 GWh = 10<sup>6</sup> kWh); TWh: terawatt-hour (1 TWh=10<sup>3</sup> GWh); PJ: petajoule; MW: megawatt; GW: gigawatt (1 GW=10<sup>3</sup> MW).

# SIERRA LEONE


**5.8 million** Population (2010)

**1.9 billion USD** GDP (2010)

**326 USD** GDP per capita (2010)

FIGURE 1: GDP PER CAPITA FOR 2010

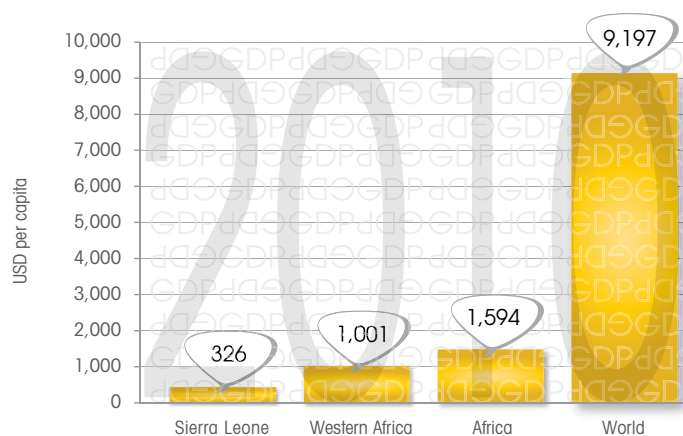
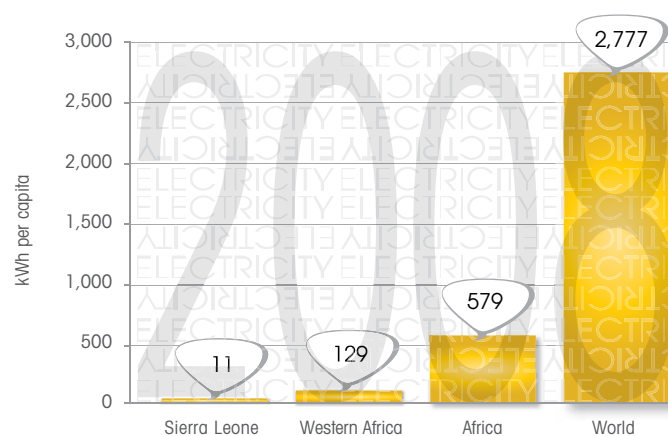


FIGURE 2: ELECTRICITY USE PER CAPITA FOR 2008



Western Africa includes Benin, Burkina Faso, Cape Verde, Côte d'Ivoire, Gambia, Ghana, Guinea, Guinea-Bissau, Liberia, Mali, Mauritania, Niger, Nigeria, Senegal, Sierra Leone and Togo.

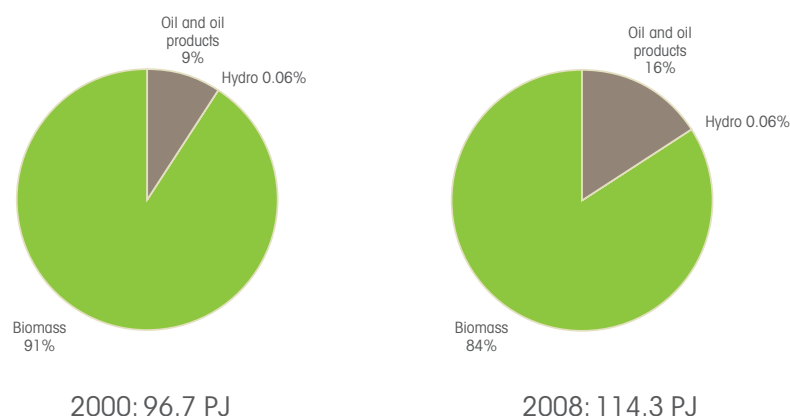
## ENERGY NATIONAL PROFILE 2008

- Total Primary Energy Supply: 114.3 PJ - Of which renewables: 96.2 PJ (84.1 %)
- Energy self-sufficiency: 84.1%
- Fuel imports: Not available
- Electricity generation: 63.0 GWh - Of which renewables: 20.0 GWh (31.7 %)
- Electricity use per capita: 11 kWh
- Electrical capacity: 52 MW - Of which renewables: 4 MW (7.7 %)
- Electricity access rate: Not available
- Share of population using solid fuels: > 95%

### TARGETS:

- No information available

FIGURE 3: TOTAL PRIMARY ENERGY SUPPLY\* IN 2000 AND 2008



\*excluding electricity trade

#### POLICIES IN PLACE TO PROMOTE RENEWABLE ENERGY SINCE THE RIO CONFERENCE OF 1992



WORLD BANK EASE OF DOING BUSINESS INDEX FOR 2012: Ranked 141 out of 183

#### RENEWABLE ENERGY PROJECTS FROM THE GOVERNMENT AND PRIVATE SECTORS:

- 90 million litres of ethanol per year capacity addition announced (1 project)
- 32 MW of biomass-fired capacity addition announced (1 project)
- 50 MW of small hydro capacity addition announced (1 project)

NUMBER OF REGISTERED CLEAN DEVELOPMENT MECHANISM PROJECTS FOCUSING ON RENEWABLE ENERGY: 0

RENEWABLE ENERGY RESOURCES: ● High ● Medium ● Low ● Unknown ✕ Not applicable



Note: The information on resources should be taken as an indication only. It refers to a general trend of available resources, and does not prejudice the feasibility of individual projects. The thresholds are indicative, and do not refer to any technological choice. The analysis is based on the literature.

Sources: Population and GDP: World Bank; Energy data: IEA, IRENA analysis based on UN data; Share of fuel imports in total imports: World Trade Organisation; Electrical capacity: IEA, EIA; Electricity access rate: World Energy Outlook 2010 database (IEA); Share of population using solid fuels: World Health Organisation; Targets: REN21, IRENA; Policy/legislation: IEA, Reegle, IRENA research; Ease of doing business index: World Bank; Renewable energy projects: Bloomberg New Energy Finance, IRENA research; Clean Development Mechanism projects: UNFCCC; Renewable energy resources: IRENA analysis.

Units: USD: United States dollar; kWh: kilowatt-hour; GWh: gigawatt-hour (1 GWh = 10<sup>6</sup> kWh); TWh: terawatt-hour (1 TWh=10<sup>3</sup> GWh); PJ: petajoule; MW: megawatt; GW: gigawatt (1 GW=10<sup>3</sup> MW).

# SOMALIA



**9.4 million** Population (2010)

**Not available** GDP (2010)

**Not available** GDP per capita (2010)

FIGURE 1: GDP PER CAPITA FOR 2010

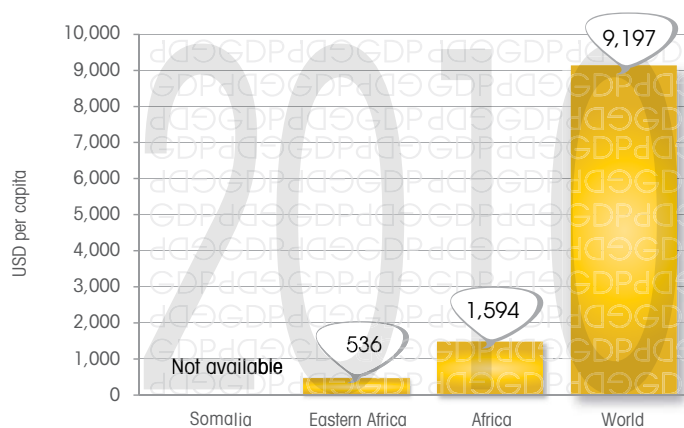
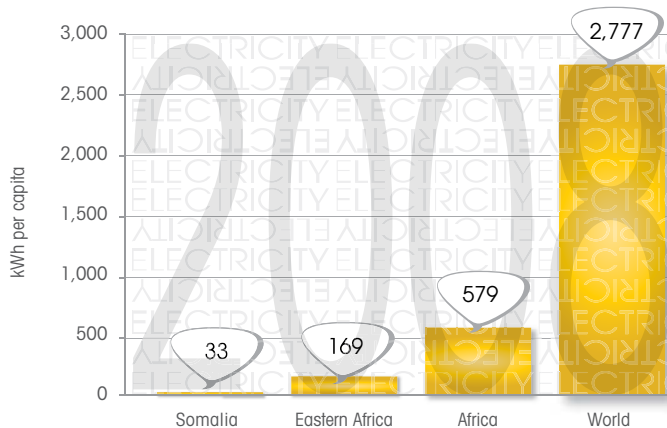


FIGURE 2: ELECTRICITY USE PER CAPITA FOR 2008



Eastern Africa includes Burundi, Comoros, Djibouti, Eritrea, Ethiopia, Kenya, Madagascar, Malawi, Mauritius, Mozambique, Rwanda, Seychelles, Somalia, the United Republic of Tanzania, Uganda, Zambia and Zimbabwe.

## ENERGY NATIONAL PROFILE 2008

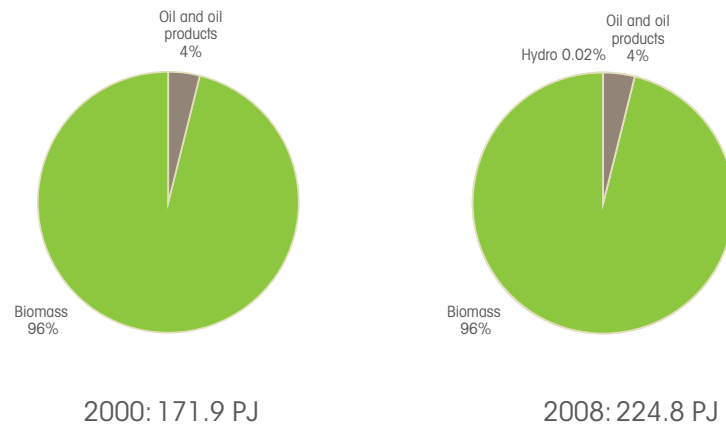
- Total Primary Energy Supply: 224.8 PJ - Of which renewables: 216.0 PJ (96.1 %)
- Energy self-sufficiency: 97.3%
- Fuel imports: Not available
- Electricity generation: 326.0 GWh - Of which renewables: 15.0 GWh (4.6 %)
- Electricity use per capita: 33 kWh
- Electrical capacity: 65 MW - Of which renewables: 5 MW (7.7 %)
- Electricity access rate: Not available
- Share of population using solid fuels: > 95%

### TARGETS:

- No information available



FIGURE 3: TOTAL PRIMARY ENERGY SUPPLY\* IN 2000 AND 2009



\*excluding electricity trade

## POLICIES IN PLACE TO PROMOTE RENEWABLE ENERGY SINCE THE RIO CONFERENCE OF 1992



## WORLD BANK EASE OF DOING BUSINESS INDEX FOR 2012: Not ranked

## RENEWABLE ENERGY PROJECTS FROM THE GOVERNMENT AND PRIVATE SECTORS:

- No information available

## NUMBER OF REGISTERED CLEAN DEVELOPMENT MECHANISM PROJECTS FOCUSING ON RENEWABLE ENERGY: 0

## RENEWABLE ENERGY RESOURCES: ● High ● Medium ● Low ● Unknown ✕ Not applicable

**Wind** ● **Solar** ● **Hydro** ● **Biomass** ● **Geothermal** ● **Ocean** ●

Note: The information on resources should be taken as an indication only. It refers to a general trend of available resources, and does not prejudge the feasibility of individual projects. The thresholds are indicative, and do not refer to any technological choice. The analysis is based on the literature.

Sources: Population and GDP: World Bank; Energy data: IEA, IRENA analysis based on UN data; Share of fuel imports in total imports: World Trade Organisation; Electrical capacity: IEA, EIA; Electricity access rate: World Energy Outlook 2010 database (IEA); Share of population using solid fuels: World Health Organisation; Targets: REN21, IRENA; Policy/legislation: IEA, Reegle, IRENA research; Ease of doing business index: World Bank; Renewable energy projects: Bloomberg New Energy Finance, IRENA research; Clean Development Mechanism projects: UNFCCC; Renewable energy resources: IRENA analysis.

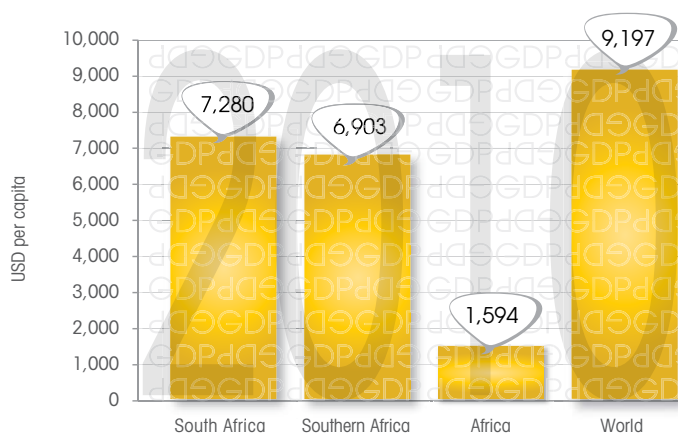
Units: USD: United States dollar; kWh: kilowatt-hour; GWh: gigawatt-hour (1 GWh = 10<sup>6</sup> kWh); TWh: terawatt-hour (1 TWh = 10<sup>3</sup> GWh); PJ: petajoule; MW: megawatt; GW: gigawatt (1 GW = 10<sup>3</sup> MW).

# SOUTH AFRICA



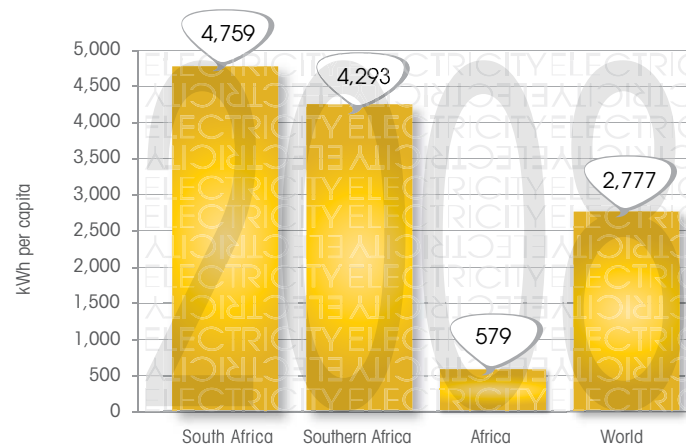
**50.0 million** Population (2010)  
**363.7 billion USD** GDP (2010)  
**7,280 USD** GDP per capita (2010)

FIGURE 1: GDP PER CAPITA FOR 2010



Southern Africa includes Botswana, Lesotho, Namibia, South Africa and Swaziland.

FIGURE 2: ELECTRICITY USE PER CAPITA FOR 2008



## ENERGY NATIONAL PROFILE 2009

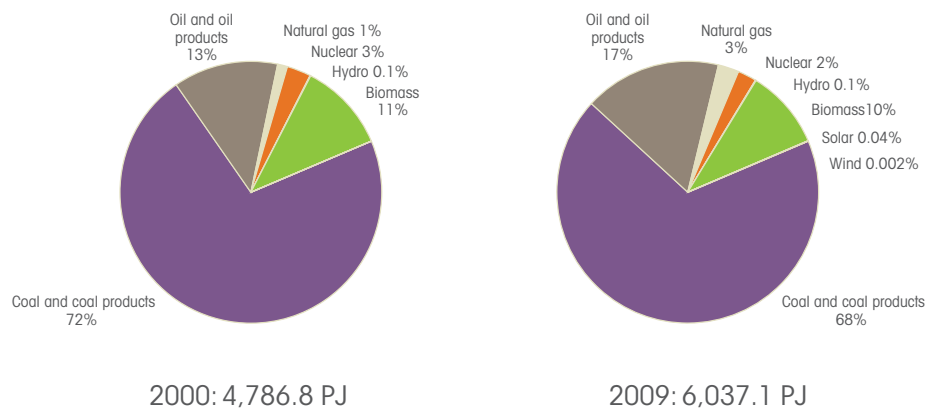
- Total Primary Energy Supply: 6,030.7 PJ - Of which renewables: 600.8 PJ (10.0%)
- Energy self-sufficiency: 111.5%
- Fuel imports: 13.7 billion USD (18.7 % of total imports)
- Electricity generation: 246.8 TWh - Of which renewables: 1,764 GWh (0.7%)
- Electricity use per capita: 4,532 kWh
- Electrical capacity\*: 44.1 GW - Of which renewables: 675 MW (1.5%)
- Electricity access rate: 75.0%
- Share of population using solid fuels: 17%

\* 2008

### TARGETS:

- 10,000 GWh of renewables produced by 2013
- 3,100 MW of renewable capacity by 2013, including 500 MW of wind and 50 MW of concentrating solar power
- 4% of electricity generation from renewables by 2013
- 13% of electricity generation from renewables by 2020

FIGURE 3: TOTAL PRIMARY ENERGY SUPPLY\* IN 2000 AND 2009



\*excluding electricity trade

## POLICIES IN PLACE TO PROMOTE RENEWABLE ENERGY SINCE THE RIO CONFERENCE OF 1992



WORLD BANK EASE OF DOING BUSINESS INDEX FOR 2012: Ranked 35 out of 183

## RENEWABLE ENERGY PROJECTS FROM THE GOVERNMENT AND PRIVATE SECTORS:

- 12 MW of biogas-fired capacity addition by 2012 (2 projects)
- 100 MW of solar photovoltaic capacity addition by 2013 (2 projects)
- More than 400 MW of wind capacity addition by 2014 (5 projects)

NUMBER OF REGISTERED CLEAN DEVELOPMENT MECHANISM PROJECTS FOCUSING ON RENEWABLE ENERGY: 10

RENEWABLE ENERGY RESOURCES: ● High ● Medium ● Low ● Unknown ✕ Not applicable

Wind ● Solar ● Hydro ● Biomass ● Geothermal ● Ocean ●

Note: The information on resources should be taken as an indication only. It refers to a general trend of available resources, and does not prejudge the feasibility of individual projects. The thresholds are indicative, and do not refer to any technological choice. The analysis is based on the literature.

Sources: Population and GDP: World Bank; Energy data: IEA, IRENA analysis based on UN data; Share of fuel imports in total imports: World Trade Organisation; Electrical capacity: IEA, EIA; Electricity access rate: World Energy Outlook 2010 database (IEA); Share of population using solid fuels: World Health Organisation; Targets: REN21, IRENA; Policy/legislation: IEA, Reegle, IRENA research; Ease of doing business index: World Bank; Renewable energy projects: Bloomberg New Energy Finance, IRENA research; Clean Development Mechanism projects: UNFCCC; Renewable energy resources: IRENA analysis.

Units: USD: United States dollar; kWh: kilowatt-hour; GWh: gigawatt-hour (1 GWh = 10<sup>6</sup> kWh); TWh: terawatt-hour (1 TWh=10<sup>3</sup> GWh); PJ: petajoule; MW: megawatt; GW: gigawatt (1 GW=10<sup>3</sup> MW).

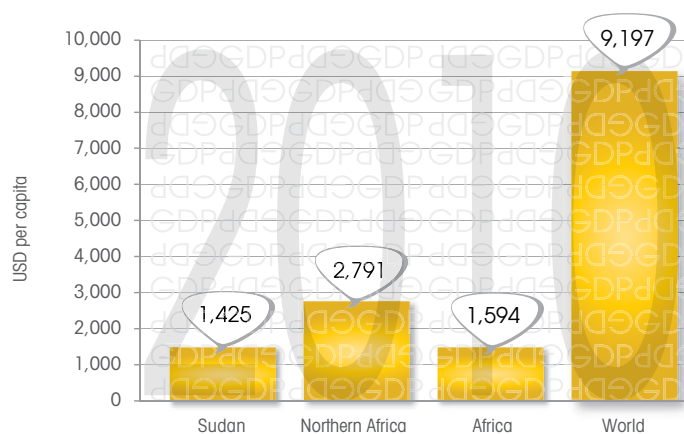
# SUDAN

Note: This country profile and map relate to Sudan and its borders prior to the independence of the Republic of South Sudan and its subsequent admission to the United Nations as a new Member State in July 2011.



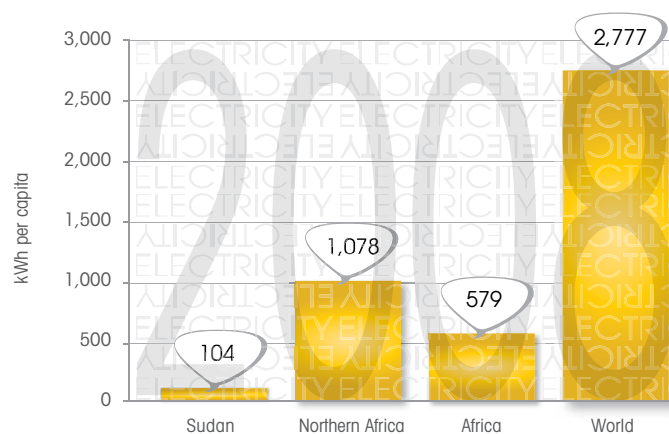
**43.6 million** Population (2010)  
**62.0 billion USD** GDP (2010)  
**1,425 USD** GDP per capita (2010)

FIGURE 1: GDP PER CAPITA FOR 2010



Northern Africa includes Algeria, Egypt, Libya, Morocco, Sudan and Tunisia.

FIGURE 2: ELECTRICITY USE PER CAPITA FOR 2008



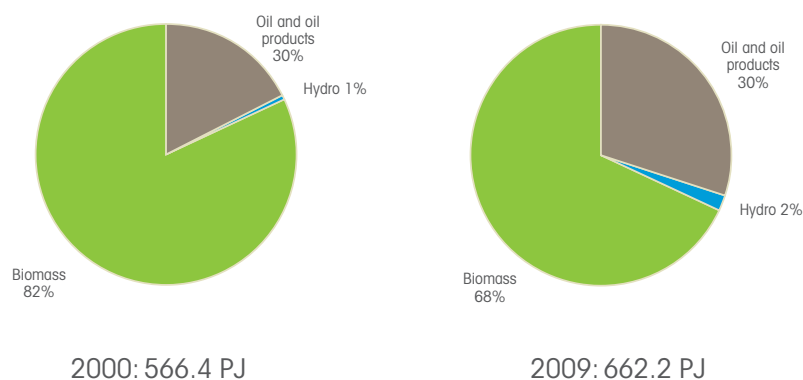
## ENERGY NATIONAL PROFILE 2009

- Total Primary Energy Supply: 662.2 PJ - Of which renewables: 461.9 PJ (69.8 %)
- Energy self-sufficiency: 222.6%
- Fuel imports: Not available
- Electricity generation: 6.8 TWh - Of which renewables: 3,228 GWh (47.8 %)
- Electricity use per capita: 115 kWh
- Electrical capacity: 2,300 MW - Of which renewables: 1,550 MW (67.4 %)
- Electricity access rate: 30.0%
- Share of population using solid fuels: 80%

### TARGETS:

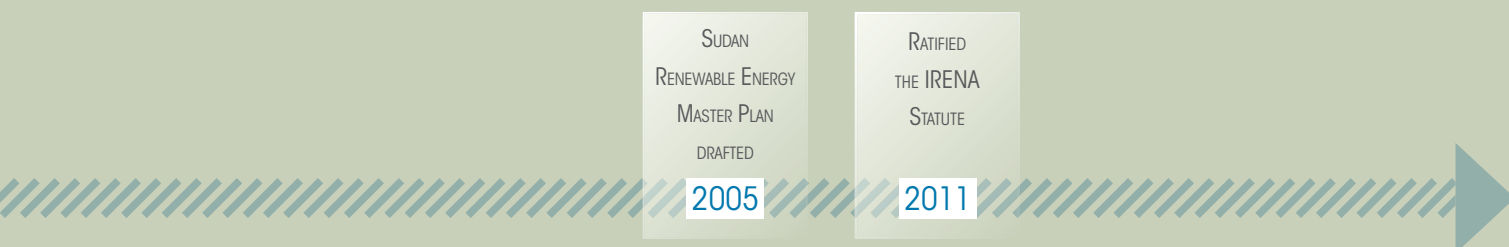
- No information available

FIGURE 3: TOTAL PRIMARY ENERGY SUPPLY\* IN 2000 AND 2009



\*excluding electricity trade

## POLICIES IN PLACE TO PROMOTE RENEWABLE ENERGY SINCE THE RIO CONFERENCE OF 1992



WORLD BANK EASE OF DOING BUSINESS INDEX FOR 2010: Ranked 154 out of 183

RENEWABLE ENERGY PROJECTS FROM THE GOVERNMENT AND PRIVATE SECTORS:

- 60 million litres of ethanol per year capacity addition announced (1 project)
- 50 million litres of biodiesel per year capacity addition announced (1 project)

NUMBER OF REGISTERED CLEAN DEVELOPMENT MECHANISM PROJECTS FOCUSING ON RENEWABLE ENERGY: 0

RENEWABLE ENERGY RESOURCES: ● High ● Medium ● Low ● Unknown ✕ Not applicable

Wind ● Solar ● Hydro ● Biomass ● Geothermal ● Ocean ●

Note: The information on resources should be taken as an indication only. It refers to a general trend of available resources, and does not prejudge the feasibility of individual projects. The thresholds are indicative, and do not refer to any technological choice. The analysis is based on the literature.

Sources: Population and GDP: World Bank; Energy data: IEA, IRENA analysis based on UN data; Share of fuel imports in total imports: World Trade Organisation; Electrical capacity: IEA, EIA; Electricity access rate: World Energy Outlook 2010 database (IEA); Share of population using solid fuels: World Health Organisation; Targets: REN21, IRENA; Policy/legislation: IEA, Reegle, IRENA research; Ease of doing business index: World Bank; Renewable energy projects: Bloomberg New Energy Finance, IRENA research; Clean Development Mechanism projects: UNFCCC; Renewable energy resources: IRENA analysis.

Units: USD: United States dollar; kWh: kilowatt-hour; GWh: gigawatt-hour (1 GWh = 10<sup>6</sup> kWh); TWh: terawatt-hour (1 TWh=10<sup>3</sup> GWh); PJ: petajoule; MW: megawatt; GW: gigawatt (1 GW=10<sup>3</sup> MW).

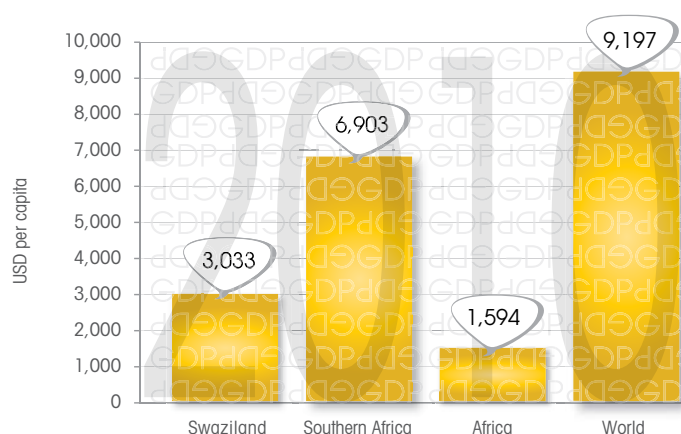
# SWAZILAND

**1.2 million** Population (2010)

**3.6 billion USD** GDP (2010)

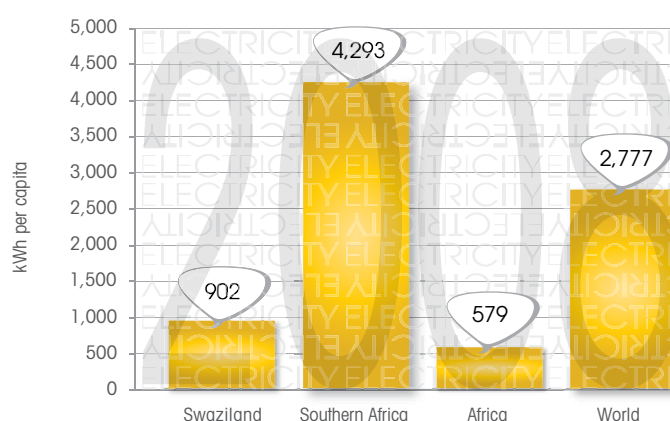
**3,033 USD** GDP per capita (2010)

FIGURE 1: GDP PER CAPITA FOR 2010



Southern Africa includes Botswana, Lesotho, Namibia, South Africa and Swaziland.

FIGURE 2: ELECTRICITY USE PER CAPITA FOR 2008



## ENERGY NATIONAL PROFILE 2009

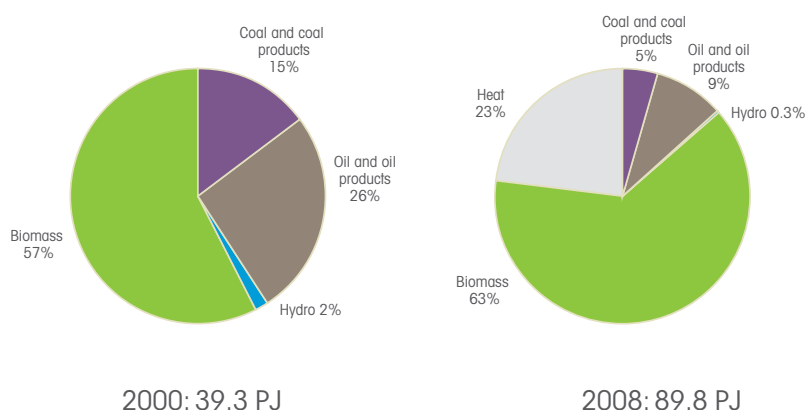
- Total Primary Energy Supply\*: 94.0 PJ – Of which renewables: 57.1 PJ (60.8%)
- Energy self-sufficiency\*: 88.3%
- Fuel imports: 225 million USD (14.1 % of total imports)
- Electricity generation: 733.4 GWh - Of which renewables: 650 GWh (88.6 %)
- Electricity use per capita: 943 kWh
- Electrical capacity: 130 MW - Of which renewables: 120 MW (92.3 %)
- Electricity access rate: 45.0%
- Share of population using solid fuels: 58%

\*2008

### TARGETS:

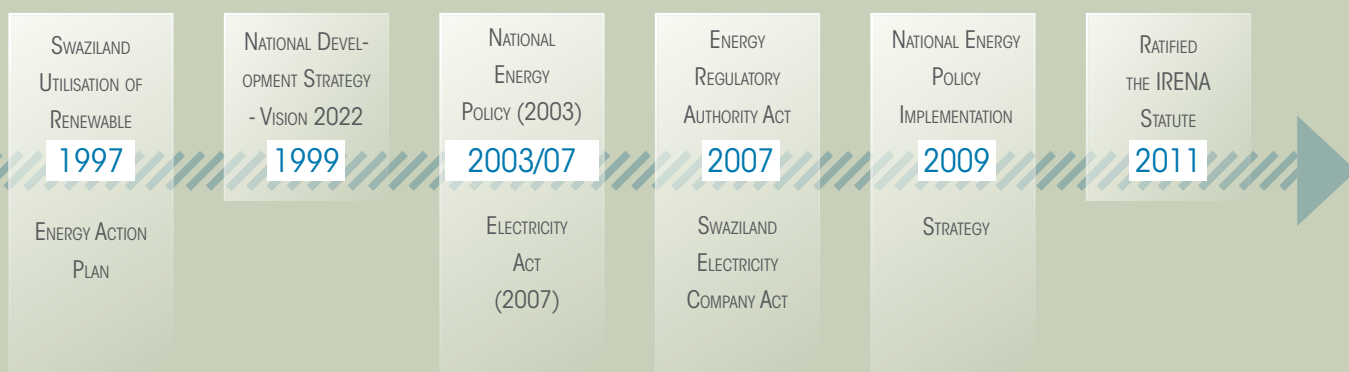
- 20% of all public buildings installed with solar water heaters by 2014
- Develop Solar water heater standards by 2012
- Establish fiscal incentives to promote renewable energy by 2013
- Establish a demonstration centre for renewable energy technologies by 2015

FIGURE 3: TOTAL PRIMARY ENERGY SUPPLY\* IN 2000 AND 2008



\*excluding electricity trade

## POLICIES IN PLACE TO PROMOTE RENEWABLE ENERGY SINCE THE RIO CONFERENCE OF 1992



WORLD BANK EASE OF DOING BUSINESS INDEX FOR 2012: Ranked 118 out of 183  
RENEWABLE ENERGY PROJECTS FROM THE GOVERNMENT AND PRIVATE SECTORS:

- Installation of solar water heaters in public buildings
- Cogeneration in sugar mills using sugar cane waste (70 MW, proposed 30MW)
- Installation and promotion of efficient wood stoves
- Distribution of solar and LED lighting units for rural schools
- Bioethanol blending with petroleum

NUMBER OF REGISTERED CLEAN DEVELOPMENT MECHANISM PROJECTS FOCUSING ON RENEWABLE ENERGY: 0

RENEWABLE ENERGY RESOURCES: ● High ● Medium ● Low ● Unknown ✕ Not applicable

Wind ● Solar ● Hydro ● Biomass ● Geothermal ● Ocean ✕

Note: The information on resources should be taken as an indication only. It refers to a general trend of available resources, and does not prejudice the feasibility of individual projects. The thresholds are indicative, and do not refer to any technological choice. The analysis is based on the literature.

Sources: Population and GDP: World Bank; Energy data: IEA, IRENA analysis based on UN data; Share of fuel imports in total imports: World Trade Organisation; Electrical capacity: IEA, EIA; Electricity access rate: World Energy Outlook 2010 database (IEA); Share of population using solid fuels: World Health Organisation; Targets: REN21, IRENA; Policy/legislation: IEA, Reegle, IRENA research; Ease of doing business index: World Bank; Renewable energy projects: Bloomberg New Energy Finance, IRENA research; Clean Development Mechanism projects: UNFCCC; Renewable energy resources: IRENA analysis.

Units: USD: United States dollar; kWh: kilowatt-hour; GWh: gigawatt-hour (1 GWh = 10<sup>6</sup> kWh); TWh: terawatt-hour (1 TWh=10<sup>3</sup> GWh); PJ: petajoule; MW: megawatt; GW: gigawatt (1 GW=10<sup>3</sup> MW).



# UNITED REPUBLIC OF TANZANIA


**45.0 million** Population (2010)

**23.1 billion USD** GDP (2010)

**512 USD** GDP per capita (2010)

FIGURE 1: GDP PER CAPITA FOR 2010

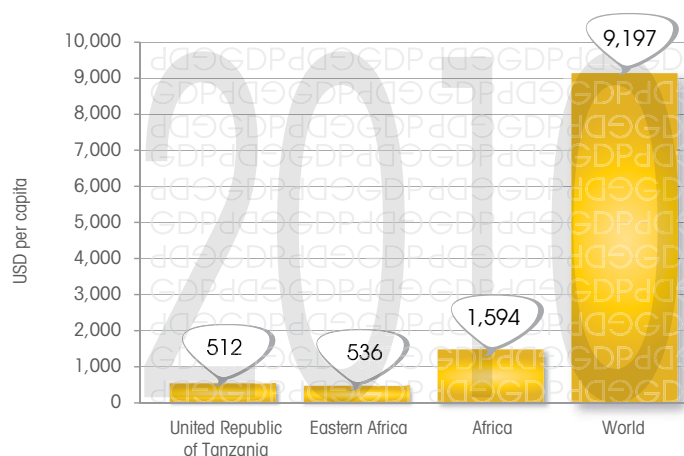
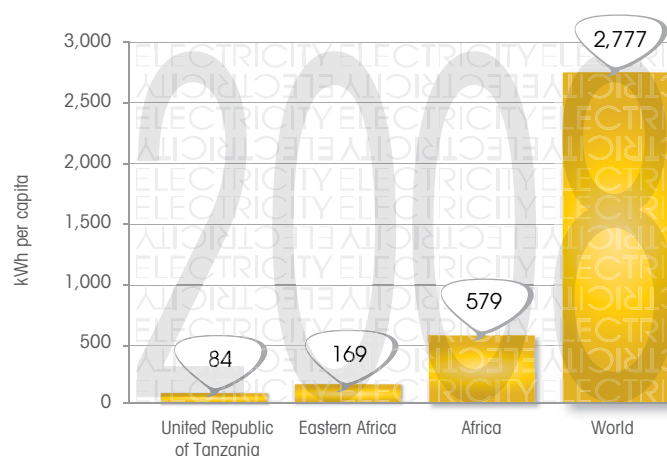


FIGURE 2: ELECTRICITY USE PER CAPITA FOR 2008



Eastern Africa includes Burundi, Comoros, Djibouti, Eritrea, Ethiopia, Kenya, Madagascar, Malawi, Mauritius, Mozambique, Rwanda, Seychelles, Somalia, the United Republic of Tanzania, Uganda, Zambia and Zimbabwe.

## ENERGY NATIONAL PROFILE 2009

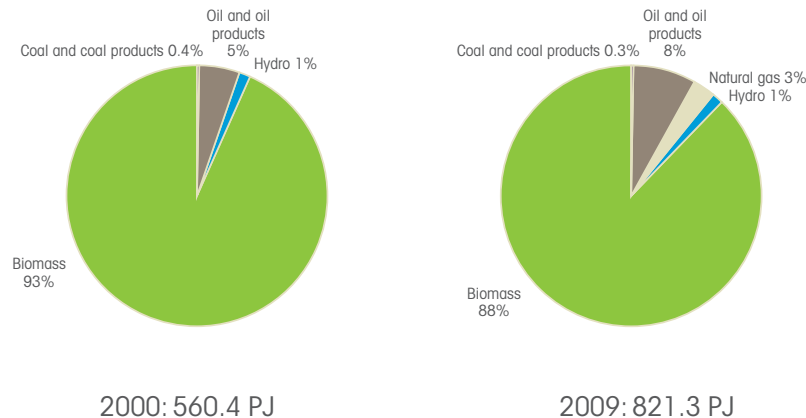
- Total Primary Energy Supply: 821.3 PJ - Of which renewables: 730.3 PJ (88.9 %)
- Energy self-sufficiency: 92.0%
- Fuel imports: 1.5 billion USD (23.1 % of total imports)
- Electricity generation: 4,628 GWh - Of which renewables: 2,784 GWh (60.2 %)
- Electricity use per capita: 85 kWh
- Electrical capacity\*: 1006 MW - Of which renewables: 579 MW (57.6 %)
- Electricity access rate: 13.9%
- Share of population using solid fuels: 90%

\* 2008

### TARGETS:

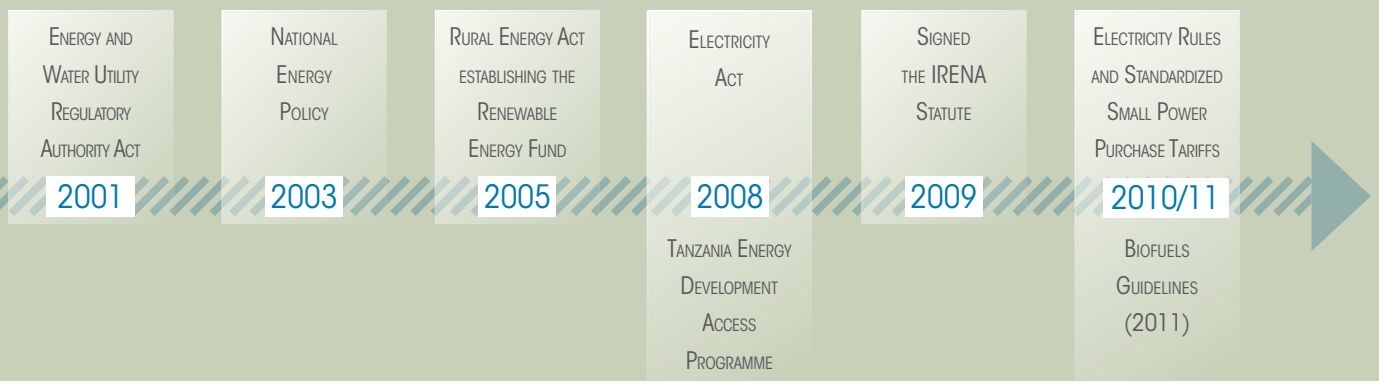
- No information available

FIGURE 3: TOTAL PRIMARY ENERGY SUPPLY\* IN 2000 AND 2009



\*excluding electricity trade

#### POLICIES IN PLACE TO PROMOTE RENEWABLE ENERGY SINCE THE RIO CONFERENCE OF 1992



WORLD BANK EASE OF DOING BUSINESS INDEX FOR 2012: Ranked 127 out of 183

RENEWABLE ENERGY PROJECTS FROM THE GOVERNMENT AND PRIVATE SECTORS:

- 100 million litres of ethanol capacity addition by the end of 2011 (1 project)

NUMBER OF REGISTERED CLEAN DEVELOPMENT MECHANISM PROJECTS FOCUSING ON RENEWABLE ENERGY: 0

RENEWABLE ENERGY RESOURCES: ● High ● Medium ● Low ● Unknown ✕ Not applicable

Wind ● Solar ● Hydro ● Biomass ● Geothermal ● Ocean ●

Note: The information on resources should be taken as an indication only. It refers to a general trend of available resources, and does not prejudge the feasibility of individual projects. The thresholds are indicative, and do not refer to any technological choice. The analysis is based on the literature.

Sources: Population and GDP: World Bank; Energy data: IEA, IRENA analysis based on UN data; Share of fuel imports in total imports: World Trade Organisation; Electrical capacity: IEA, EIA; Electricity access rate: World Energy Outlook 2010 database (IEA); Share of population using solid fuels: World Health Organisation; Targets: REN21, IRENA; Policy/legislation: IEA, Reegle, IRENA research; Ease of doing business index: World Bank; Renewable energy projects: Bloomberg New Energy Finance, IRENA research; Clean Development Mechanism projects: UNFCCC; Renewable energy resources: IRENA analysis.

Units: USD: United States dollar; kWh: kilowatt-hour; GWh: gigawatt-hour (1 GWh = 10<sup>6</sup> kWh); TWh: terawatt-hour (1 TWh=10<sup>3</sup> GWh); PJ: petajoule; MW: megawatt; GW: gigawatt (1 GW=10<sup>3</sup> MW).

# TOGO



**6.8 million** Population (2010)

**3.2 billion USD** GDP (2010)

**465 USD** GDP per capita (2010)

FIGURE 1: GDP PER CAPITA FOR 2010

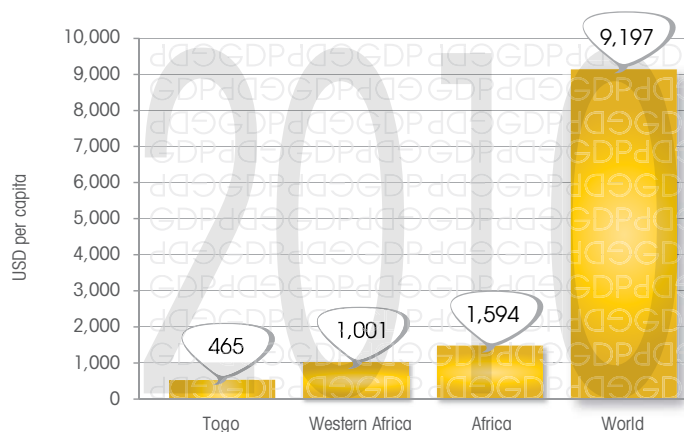
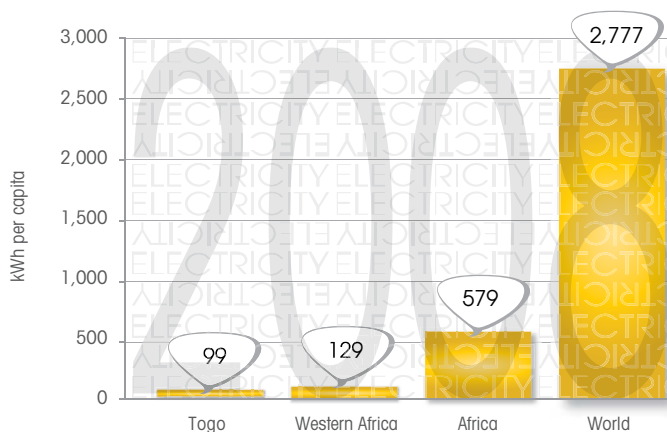


FIGURE 2: ELECTRICITY USE PER CAPITA FOR 2008



Western Africa includes Benin, Burkina Faso, Cape Verde, Côte d'Ivoire, Gambia, Ghana, Guinea, Guinea-Bissau, Liberia, Mali, Mauritania, Niger, Nigeria, Senegal, Sierra Leone and Togo.

## ENERGY NATIONAL PROFILE 2009

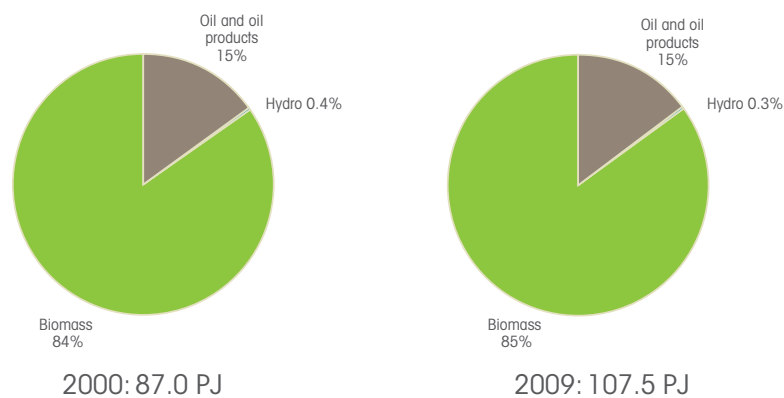
- Total Primary Energy Supply: 110.0 PJ - Of which renewables: 91.7 PJ (83.4 %)
- Energy self-sufficiency: 83.4%
- Fuel imports: 228 million USD (16.3 % of total imports)
- Electricity generation: 126.0 GWh - Of which renewables: 95.0 GWh (75.4 %)
- Electricity use per capita: 99 kWh
- Electrical capacity\*: 85 MW - Of which renewables: 67 MW (78.8 %)
- Electricity access rate: 20.0%
- Share of population using solid fuels: > 95%

\* 2008

### TARGETS:

- No information available

FIGURE 3: TOTAL PRIMARY ENERGY SUPPLY\* IN 2000 AND 2009



\*excluding electricity trade

#### POLICIES IN PLACE TO PROMOTE RENEWABLE ENERGY SINCE THE RIO CONFERENCE OF 1992



WORLD BANK EASE OF DOING BUSINESS INDEX FOR 2012: Ranked 162 out of 183

RENEWABLE ENERGY PROJECTS FROM THE GOVERNMENT AND PRIVATE SECTORS:

- No information available

NUMBER OF REGISTERED CLEAN DEVELOPMENT MECHANISM PROJECTS FOCUSING ON RENEWABLE ENERGY: 0

RENEWABLE ENERGY RESOURCES: ● High ● Medium ● Low ● Unknown ✕ Not applicable

**Wind** ● **Solar** ● **Hydro** ● **Biomass** ● **Geothermal** ● **Ocean** ●

Note: The information on resources should be taken as an indication only. It refers to a general trend of available resources, and does not prejudge the feasibility of individual projects. The thresholds are indicative, and do not refer to any technological choice. The analysis is based on the literature.

Sources: Population and GDP: World Bank; Energy data: IEA, IRENA analysis based on UN data; Share of fuel imports in total imports: World Trade Organisation; Electrical capacity: IEA, EIA; Electricity access rate: World Energy Outlook 2010 database (IEA); Share of population using solid fuels: World Health Organisation; Targets: REN21, IRENA; Policy/legislation: IEA, Reegle, IRENA research; Ease of doing business index: World Bank; Renewable energy projects: Bloomberg New Energy Finance, IRENA research; Clean Development Mechanism projects: UNFCCC; Renewable energy resources: IRENA analysis.

Units: USD: United States dollar; kWh: kilowatt-hour; GWh: gigawatt-hour (1 GWh = 10<sup>6</sup> kWh); TWh: terawatt-hour (1 TWh=10<sup>3</sup> GWh); PJ: petajoule; MW: megawatt; GW: gigawatt (1 GW=10<sup>3</sup> MW).

# TUNISIA



**10.5 million** Population (2010)

**44.3 billion USD** GDP (2010)

**4,204 USD** GDP per capita (2010)

FIGURE 1: GDP PER CAPITA FOR 2010

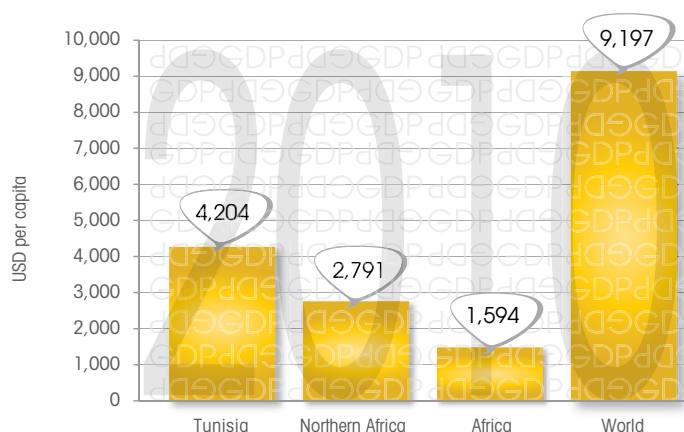
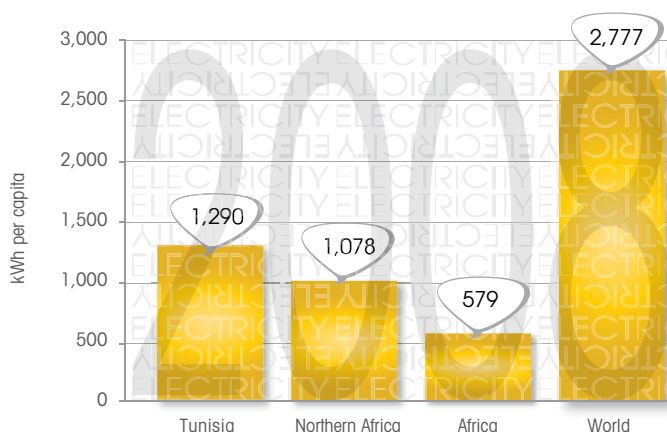


FIGURE 2: ELECTRICITY USE PER CAPITA FOR 2008



Northern Africa includes Algeria, Egypt, Libya, Morocco, Sudan and Tunisia.

## ENERGY NATIONAL PROFILE 2009

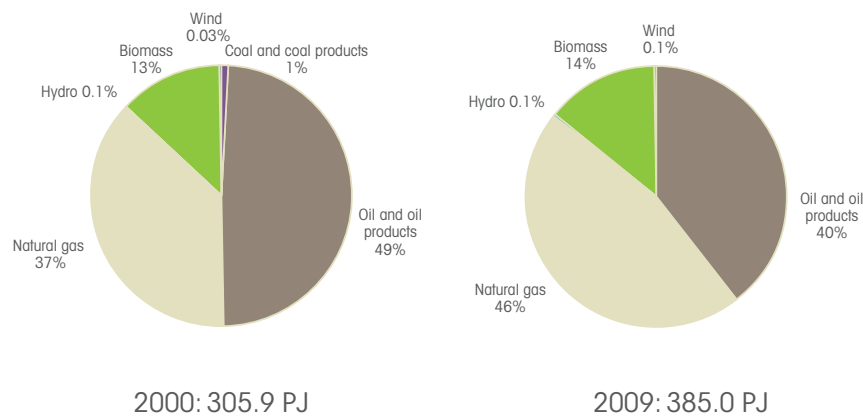
- Total Primary Energy Supply: 385.2 PJ - Of which renewables: 54.8 PJ (14.2 %)
- Energy self-sufficiency: 84.9%
- Fuel imports: 2.2 billion USD (11.4 % of total imports)
- Electricity generation: 15.7 TWh - Of which renewables: 176.0 GWh (1.1 %)
- Electricity use per capita: 1,312 kWh
- Electrical capacity\*: 3,496 MW - Of which renewables: 82 MW (2.3 %)
- Electricity access rate: 99.5%
- Share of population using solid fuels: < 5%

\* 2008

### TARGETS:

- 4% of electricity generation from renewables by 2011
- 11% of electricity generation from renewables by 2016
- 25% of electricity generation from renewables by 2030
- 330 MW of wind capacity, 15 MW of solar photovoltaic capacity and 750,000 m<sup>2</sup> (500 MW<sub>th</sub>) of solar hot water capacity by 2011
- 1,000 MW of renewable capacity by 2016
- 4,700 MW of renewable capacity by 2030

FIGURE 3: TOTAL PRIMARY ENERGY SUPPLY\* IN 2000 AND 2009



\*excluding electricity trade

## POLICIES IN PLACE TO PROMOTE RENEWABLE ENERGY SINCE THE RIO CONFERENCE OF 1992



WORLD BANK EASE OF DOING BUSINESS INDEX FOR 2012: Ranked 46 out of 183

## RENEWABLE ENERGY PROJECTS FROM THE GOVERNMENT AND PRIVATE SECTORS:

- More than 250 MW of wind capacity addition announced (3 projects)
- 5 MW of solar combined cycle power capacity addition announced (1 project)

NUMBER OF REGISTERED CLEAN DEVELOPMENT MECHANISM PROJECTS FOCUSING ON RENEWABLE ENERGY: 0

RENEWABLE ENERGY RESOURCES: ● High ● Medium ● Low ● Unknown ✕ Not applicable

Wind ● Solar ● Hydro ● Biomass ● Geothermal ● Ocean ●

Note: The information on resources should be taken as an indication only. It refers to a general trend of available resources, and does not prejudge the feasibility of individual projects. The thresholds are indicative, and do not refer to any technological choice. The analysis is based on the literature.

Sources: Population and GDP: World Bank; Energy data: IEA, IRENA analysis based on UN data; Share of fuel imports in total imports: World Trade Organisation; Electrical capacity: IEA, EIA; Electricity access rate: World Energy Outlook 2010 database (IEA); Share of population using solid fuels: World Health Organisation; Targets: REN21, IRENA; Policy/legislation: IEA, Reegle, IRENA research; Ease of doing business index: World Bank; Renewable energy projects: Bloomberg New Energy Finance, IRENA research; Clean Development Mechanism projects: UNFCCC; Renewable energy resources: IRENA analysis.

Units: USD: United States dollar; kWh: kilowatt-hour; GWh: gigawatt-hour (1 GWh = 10<sup>6</sup> kWh); TWh: terawatt-hour (1 TWh=10<sup>3</sup> GWh); PJ: petajoule; MW: megawatt; GW: gigawatt (1 GW=10<sup>3</sup> MW).



# UGANDA


**33.8 million** Population (2010)

**17.0 billion USD** GDP (2010)

**503 USD** GDP per capita (2010)

FIGURE 1: GDP PER CAPITA FOR 2010

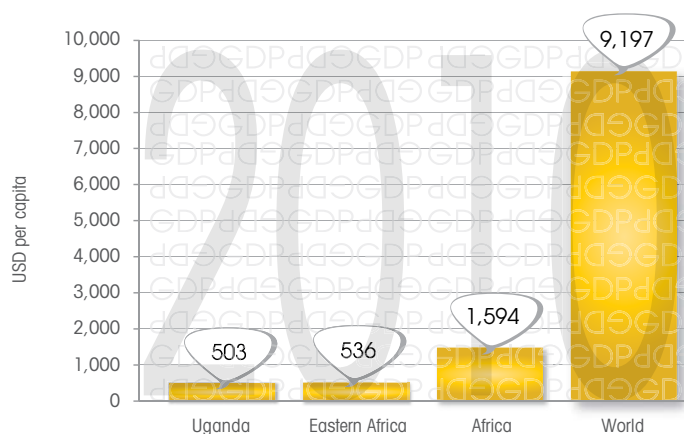
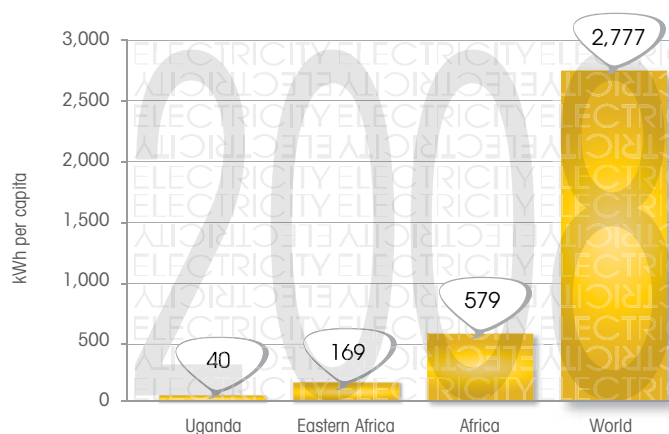


FIGURE 2: ELECTRICITY USE PER CAPITA FOR 2008



Eastern Africa includes Burundi, Comoros, Djibouti, Eritrea, Ethiopia, Kenya, Madagascar, Malawi, Mauritius, Mozambique, Rwanda, Seychelles, Somalia, the United Republic of Tanzania, Uganda, Zambia and Zimbabwe.

## ENERGY NATIONAL PROFILE 2008

- Total Primary Energy Supply: 659.6 PJ - Of which renewables: 620.5 PJ (94.1 %)
- Energy self-sufficiency: 94.1%
- Fuel imports\*: 125 million USD (2.9 % of total imports)
- Electricity generation: 2,058 GWh - Of which renewables: 1,467 GWh (71.3 %)
- Electricity use per capita: 40 kWh
- Electrical capacity: 515 MW - Of which renewables: 315 MW (61.2 %)
- Electricity access rate\*: 9.0%
- Share of population using solid fuels: > 95%

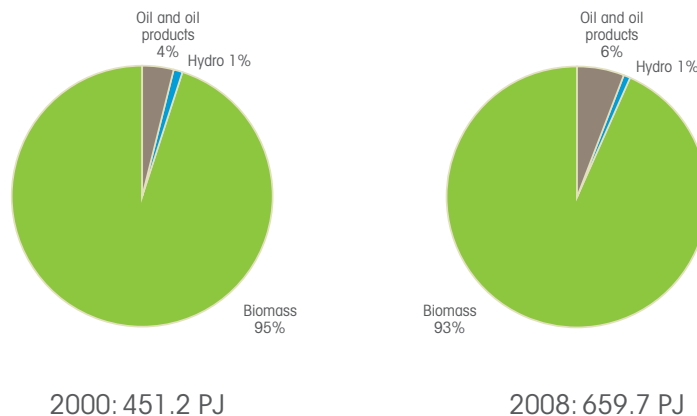
\* 2009

### TARGETS:

- 61% of electricity generation from renewables by 2017
- 188 MW of small hydro, biomass and geothermal capacity by 2017
- 30,000 solar water heaters by 2017
- 100,000 biogas digesters by 2017



FIGURE 3: TOTAL PRIMARY ENERGY SUPPLY\* IN 2000 AND 2009



\*excluding electricity trade

## POLICIES IN PLACE TO PROMOTE RENEWABLE ENERGY SINCE THE RIO CONFERENCE OF 1992



WORLD BANK EASE OF DOING BUSINESS INDEX FOR 2012: Ranked 123 out of 183

RENEWABLE ENERGY PROJECTS FROM THE GOVERNMENT AND PRIVATE SECTORS:

- 40 MW of waste-to-energy capacity addition announced (1 project)
- 60 MW of small hydro capacity addition announced (7 projects)

NUMBER OF REGISTERED CLEAN DEVELOPMENT MECHANISM PROJECTS FOCUSING ON RENEWABLE ENERGY: 2

RENEWABLE ENERGY RESOURCES: ● High ● Medium ● Low ● Unknown ✕ Not applicable

Wind ● Solar ● Hydro ● Biomass ● Geothermal ● Ocean ✕

Note: The information on resources should be taken as an indication only. It refers to a general trend of available resources, and does not prejudge the feasibility of individual projects. The thresholds are indicative, and do not refer to any technological choice. The analysis is based on the literature.

Sources: Population and GDP: World Bank; Energy data: IEA, IRENA analysis based on UN data; Share of fuel imports in total imports: World Trade Organisation; Electrical capacity: IEA, EIA; Electricity access rate: World Energy Outlook 2010 database (IEA); Share of population using solid fuels: World Health Organisation; Targets: REN21, IRENA; Policy/legislation: IEA, Reegle, IRENA research; Ease of doing business index: World Bank; Renewable energy projects: Bloomberg New Energy Finance, IRENA research; Clean Development Mechanism projects: UNFCCC; Renewable energy resources: IRENA analysis.

Units: USD: United States dollar; kWh: kilowatt-hour; GWh: gigawatt-hour (1 GWh = 10<sup>6</sup> kWh); TWh: terawatt-hour (1 TWh=10<sup>3</sup> GWh); PJ: petajoule; MW: megawatt; GW: gigawatt (1 GW=10<sup>3</sup> MW).

# ZAMBIA



**12.9 million** Population (2010)

**16.2 billion USD** GDP (2010)

**1,253 USD** GDP per capita (2010)

FIGURE 1: GDP PER CAPITA FOR 2010

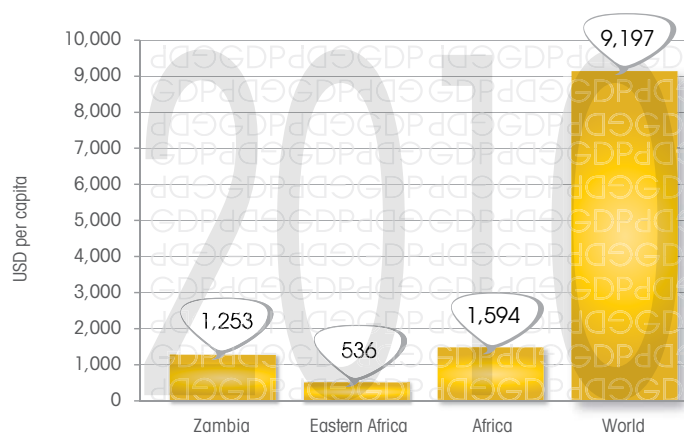
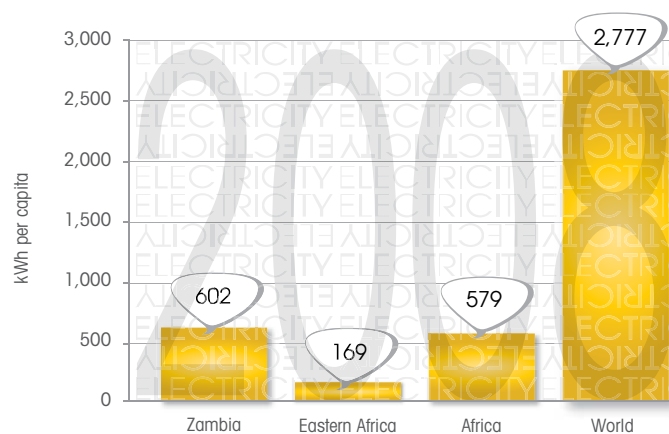


FIGURE 2: ELECTRICITY USE PER CAPITA FOR 2008



Eastern Africa includes Burundi, Comoros, Djibouti, Eritrea, Ethiopia, Kenya, Madagascar, Malawi, Mauritius, Mozambique, Rwanda, Seychelles, Somalia, the United Republic of Tanzania, Uganda, Zambia and Zimbabwe.

## ENERGY NATIONAL PROFILE 2009

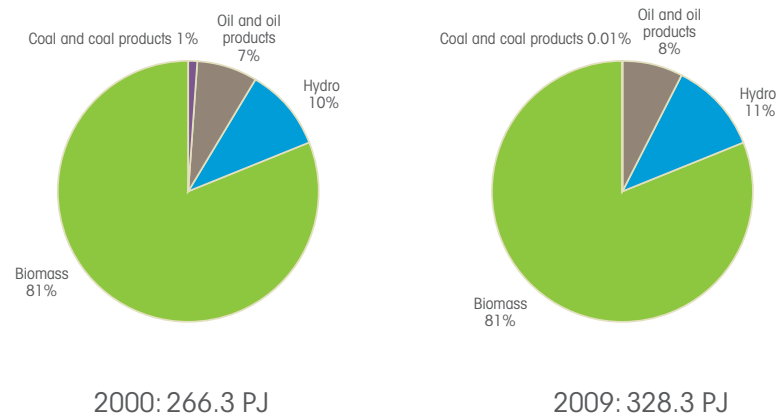
- Total Primary Energy Supply: 328.9 PJ - Of which renewables: 303.2 PJ (92.2 %)
- Energy self-sufficiency: 92.2%
- Fuel imports: 529 million USD (13.9 % of total imports)
- Electricity generation: 10.3 TWh - Of which renewables: 10.3 TWh (99.7 %)
- Electricity use per capita: 625 kWh
- Electrical capacity\*: 1,680 MW - Of which renewables: 1,672 MW (99.5 %)
- Electricity access rate: 18.8%
- Share of population using solid fuels: 86%

\* 2008

### TARGETS:

- No information available

FIGURE 3: TOTAL PRIMARY ENERGY SUPPLY\* IN 2000 AND 2009



\*excluding electricity trade

#### POLICIES IN PLACE TO PROMOTE RENEWABLE ENERGY SINCE THE RIO CONFERENCE OF 1992



WORLD BANK EASE OF DOING BUSINESS INDEX FOR 2012: Ranked 84 out of 183

RENEWABLE ENERGY PROJECTS FROM THE GOVERNMENT AND PRIVATE SECTORS:

- 8 MW of small hydro capacity addition announced (3 projects)

NUMBER OF REGISTERED CLEAN DEVELOPMENT MECHANISM PROJECTS FOCUSING ON RENEWABLE ENERGY: 0

RENEWABLE ENERGY RESOURCES: ● High ● Medium ● Low ● Unknown ✕ Not applicable

Wind ● Solar ● Hydro ● Biomass ● Geothermal ● Ocean ✕

Note: The information on resources should be taken as an indication only. It refers to a general trend of available resources, and does not prejudge the feasibility of individual projects. The thresholds are indicative, and do not refer to any technological choice. The analysis is based on the literature.

Sources: Population and GDP: World Bank; Energy data: IEA, IRENA analysis based on UN data; Share of fuel imports in total imports: World Trade Organisation; Electrical capacity: IEA, EIA; Electricity access rate: World Energy Outlook 2010 database (IEA); Share of population using solid fuels: World Health Organisation; Targets: REN21, IRENA; Policy/legislation: IEA, Reegle, IRENA research; Ease of doing business index: World Bank; Renewable energy projects: Bloomberg New Energy Finance, IRENA research; Clean Development Mechanism projects: UNFCCC; Renewable energy resources: IRENA analysis.

Units: USD: United States dollar; kWh: kilowatt-hour; GWh: gigawatt-hour (1 GWh = 10<sup>6</sup> kWh); TWh: terawatt-hour (1 TWh=10<sup>3</sup> GWh); PJ: petajoule; MW: megawatt; GW: gigawatt (1 GW=10<sup>3</sup> MW).

# ZIMBABWE

**12.6 million** Population (2010)

**7.5 billion USD** GDP (2010)

**591 USD** GDP per capita (2010)

FIGURE 1: GDP PER CAPITA FOR 2010

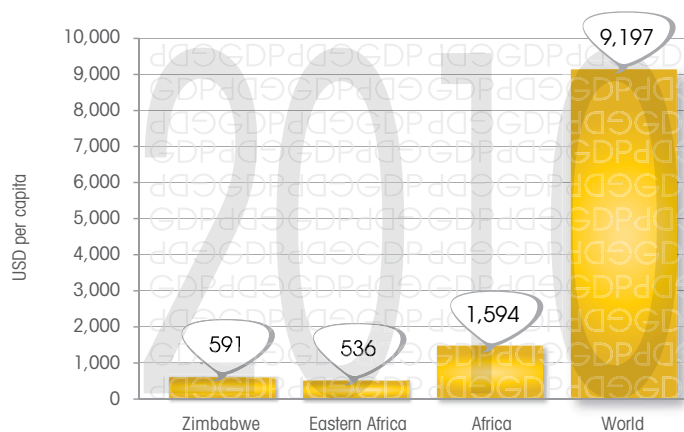
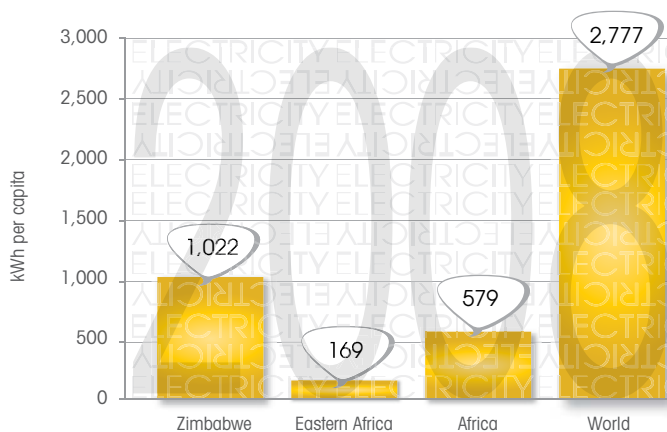


FIGURE 2: ELECTRICITY USE PER CAPITA FOR 2008



Eastern Africa includes Burundi, Comoros, Djibouti, Eritrea, Ethiopia, Kenya, Madagascar, Malawi, Mauritius, Mozambique, Rwanda, Seychelles, Somalia, the United Republic of Tanzania, Uganda, Zambia and Zimbabwe.

## ENERGY NATIONAL PROFILE 2009

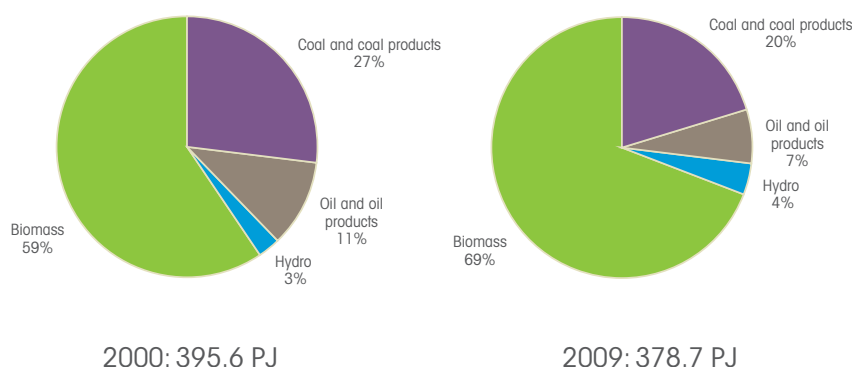
- Total Primary Energy Supply: 398.3 PJ - Of which renewables: 276.2 PJ (69.4 %)
- Energy self-sufficiency: 89.7%
- Fuel imports: 454 million USD (15.7 % of total imports)
- Electricity generation: 7.9 TWh - Of which renewables: 4,202 GWh (53.3 %)
- Electricity use per capita: 1,022 kWh
- Electrical capacity\*: 2,099 MW - Of which renewables: 754 MW (35.9 %)
- Electricity access rate: 41.5%
- Share of population using solid fuels: 71%

\* 2008

### TARGETS:

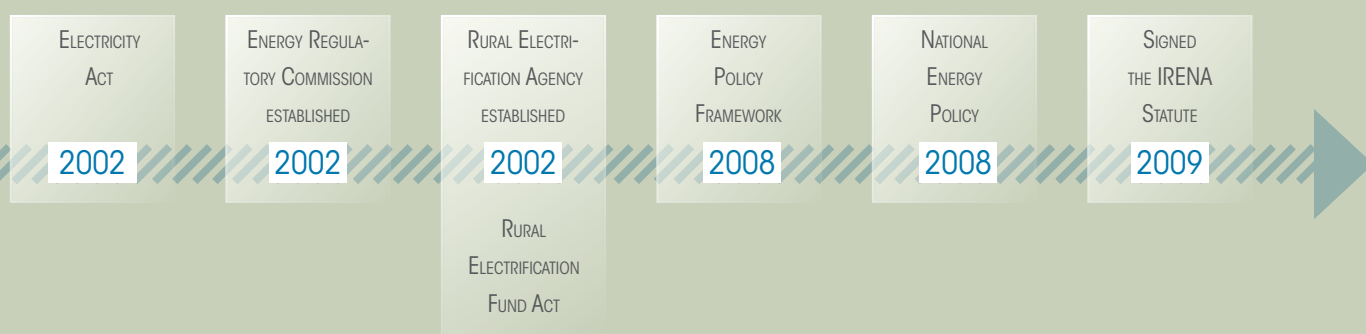
- 10% share of biofuels in liquid fuels by 2015

FIGURE 3: TOTAL PRIMARY ENERGY SUPPLY\* IN 2000 AND 2009



\*excluding electricity trade

## POLICIES IN PLACE TO PROMOTE RENEWABLE ENERGY SINCE THE RIO CONFERENCE OF 1992



WORLD BANK EASE OF DOING BUSINESS INDEX FOR 2012: Ranked 171 out of 183

RENEWABLE ENERGY PROJECTS FROM THE GOVERNMENT AND PRIVATE SECTORS:

- 5 MW of small hydro capacity addition announced (1 project)

NUMBER OF REGISTERED CLEAN DEVELOPMENT MECHANISM PROJECTS FOCUSING ON RENEWABLE ENERGY: 0

RENEWABLE ENERGY RESOURCES: ● High ● Medium ● Low ● Unknown ✕ Not applicable

Wind ● Solar ● Hydro ● Biomass ● Geothermal ● Ocean ✕

Note: The information on resources should be taken as an indication only. It refers to a general trend of available resources, and does not prejudge the feasibility of individual projects. The thresholds are indicative, and do not refer to any technological choice. The analysis is based on the literature.

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Units: USD: United States dollar; kWh: kilowatt-hour; GWh: gigawatt-hour (1 GWh = 10<sup>6</sup> kWh); TWh: terawatt-hour (1 TWh=10<sup>3</sup> GWh); PJ: petajoule; MW: megawatt; GW: gigawatt (1 GW=10<sup>3</sup> MW).



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