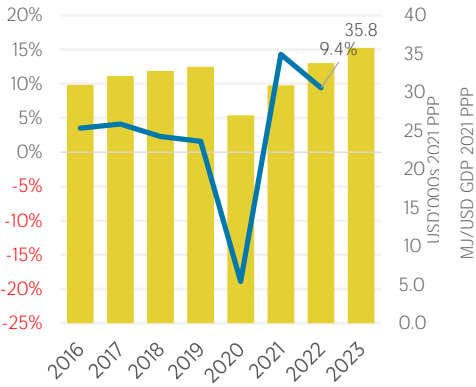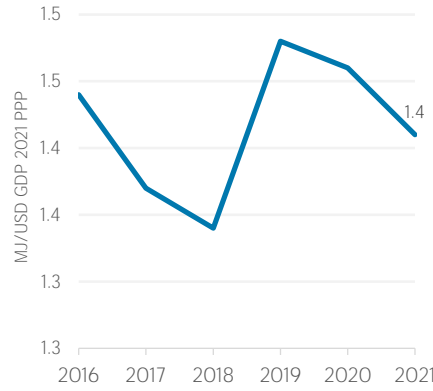# ENERGY PROFILE

Panama

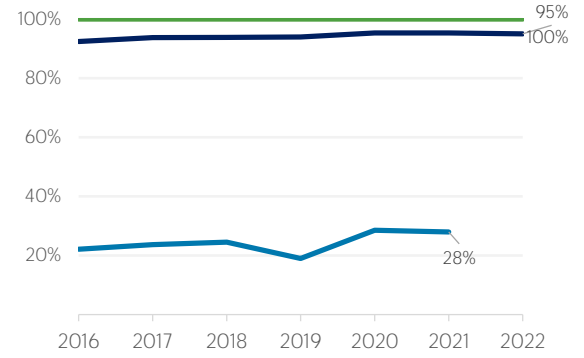## COUNTRY INDICATORS AND SDGS

GDP per capita ▬ **8.1.1 Real GDP growth rate**
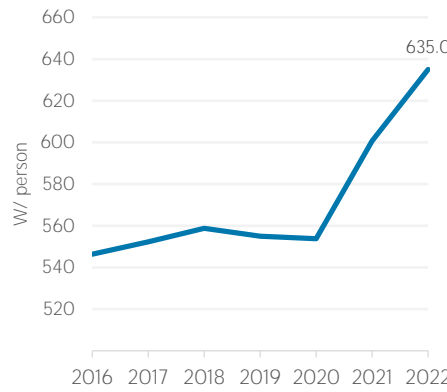

7.3.1 Energy intensity

7.1.1 Access to electricity (% population)
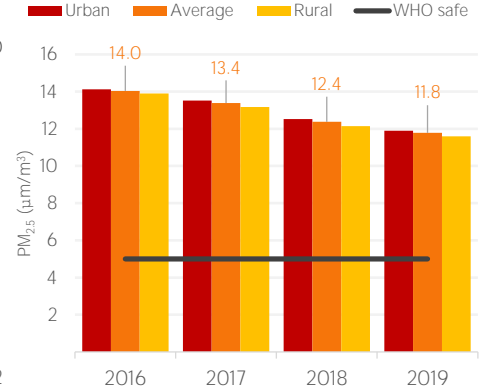7.1.2 Access to clean cooking (% population)
7.2.1 Renewable energy (% TFEC)

7.a.1 Public flows to renewables

7.b.1 Per capita renewable capacity
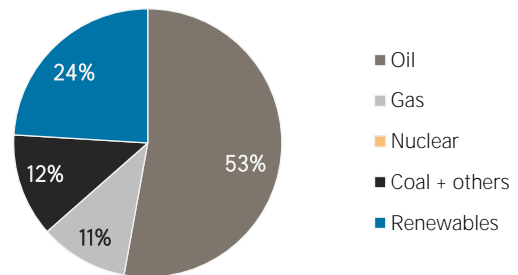

11.6.2 Air particulate matter (PM$_{2.5}$)

Urban ▪ Average ▪ Rural ▬ WHO safe

TOTAL ENERGY SUPPLY (TES)

Total Energy Supply (TES)	2016	2021
Non-renewable (TJ)	131 973	139 472
Renewable (TJ)	40 540	44 138
Total (TJ)	172 512	183 611
Renewable share (%)	23	24

Growth in TES	2016-21	2020-21
Non-renewable (%)	+5.7	+4.1
Renewable (%)	+8.9	+0.5
Total (%)	+6.4	+3.2

Primary energy trade	2016	2021
Imports (TJ)	299 124	147 589
Exports (TJ)	1 446	2 030
Net trade (TJ)	- 297 678	- 145 559
Imports (% of supply)	173	80
Exports (% of production)	3	4
Energy self-sufficiency (%)	24	25

Total energy supply in 2021

■ Oil
■ Gas
■ Nuclear
■ Coal + others
■ Renewables

Renewable energy supply in 2021

■ Hydro/marine
■ Wind
■ Solar
■ Bioenergy
■ Geothermal
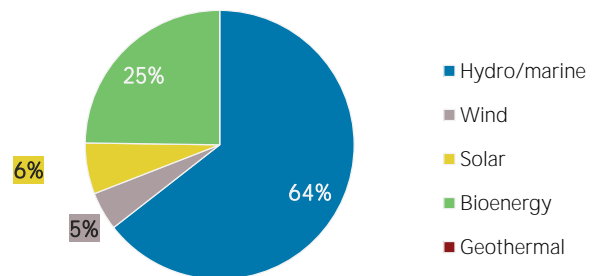
RENEWABLE ENERGY CONSUMPTION (TFEC)

Renewable TFEC trend

Legend: Electricity ■ (dark blue), Commercial heat ■ (orange), Bioenergy ■ (green)

Petajoules (PJ)

Year	Value
2016	68
2017	66
2018	67
2019	64
2020	76
2021	82
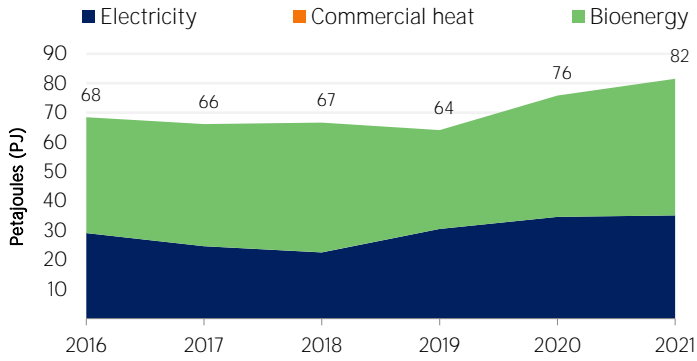
Consumption by sector	2016	2021
Industry (TJ)	5 833	4 618
Transport (TJ)	121	230
Households (TJ)	14 971	15 218
Other (TJ)	47 514	61 439

Renewable energy consumption in 2021

Legend: Geothermal ■ (red), Solar direct ■ (yellow)

Top pie:
- 43% (Electricity, dark blue)
- 57% (Bioenergy, green)
- 0%

Bottom pie:
- Industry 6%
- Transport 0%
- Households 19%
- Other 75%
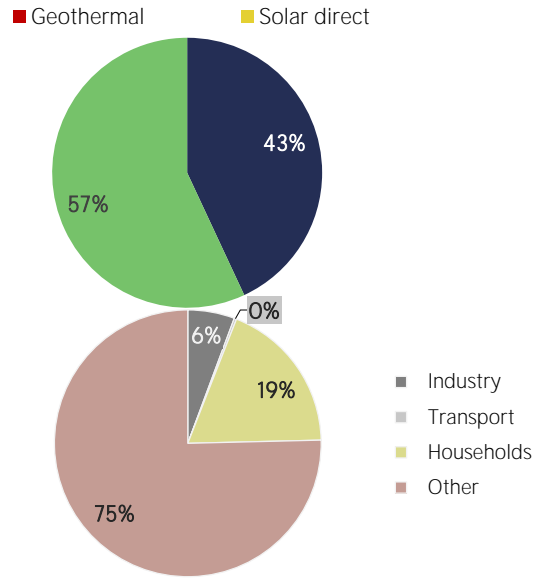
ELECTRICITY CAPACITY

Installed capacity trend

Legend: Fossil fuels ■ (black), Nuclear ■ (orange), Other Non-RE ▦ (grey), Hydro/marine ■ (blue), Wind ■ (grey), Solar ■ (yellow), Bioenergy ■ (green), Geothermal ■ (red), Renewable share — (line)

Gigawatts (GW) / Renewable share (%)

Year	Total
2016	3.3
2017	3.4
2018	3.9
2019	3.9
2020	4.2
2021	4.1
2022	4.1
2023	4.4

Renewable share 2023: 67%

Net capacity change in 2023 (MW)

Non-renewable **+ 132**	Hydro and marine **+ 3**
Solar **+ 117**	Wind **0**
Bioenergy **+ 32**	Geothermal **0**

Renewable capacity in 2023

Legend: Hydro/marine ■ (blue), Solar ■ (yellow), Wind ■ (grey), Bioenergy ■ (green), Geothermal ■ (red)

- Hydro/marine 63%
- Solar 22%
- Wind 11%
- Bioenergy 4%

Net capacity change (GW)

Legend: Fossil fuels ■ (black), Renewable ■ (blue)

Year	Fossil fuels	Renewable
2018	0.3	0.2
2019	0.0	0.0
2020	0.3	0.0
2021	-0.4	0.3
2022	-0.1	0.1
2023	0.1	0.2

Capacity utilisation in 2022 (%)

Source	Value
Fossil fuels	20%
Nuclear	
Hydro/Marine	51%
Solar	17%
Wind	22%
Bioenergy	42%
Geothermal	
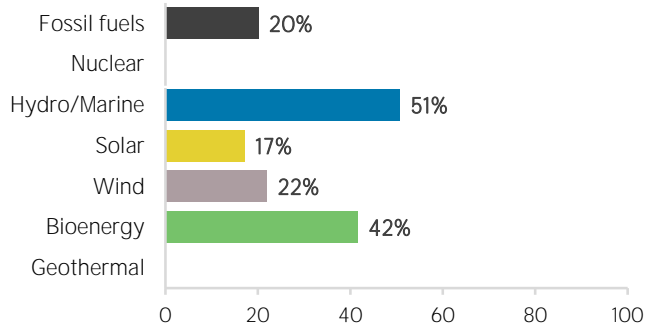
ELECTRICITY GENERATION

Generation in 2022	GWh	%
Non-renewable	2 424	20
Renewable	9 747	80
Hydro and marine	8 134	67
Solar	775	6
Wind	584	5
Bioenergy	254	2
Geothermal	0	0
Total	12 171	100

Per capita electricity generation (kWh)
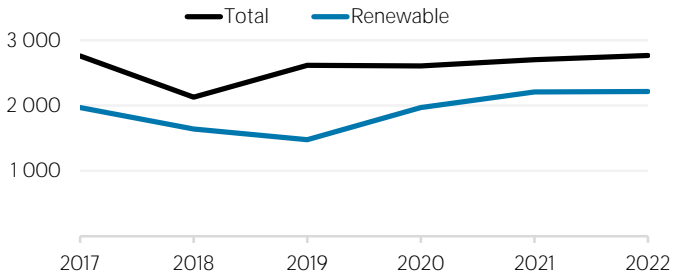
Electricity generation trend
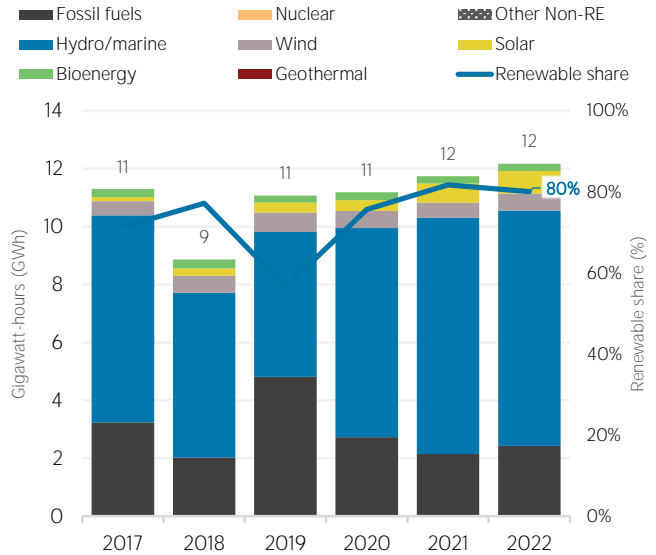
# LATEST POLICIES, PROGRAMMES AND LEGISLATION

1 SDG7 Academy in Panama — **2021**

2 Technical transformation to promote the energy transition in Panama — **2021**

3 Panama's Energy Transition Council — **2020**

4 Resolution N° 114/2017 approved Technical Regulation DGNTI-COPANIT 104:2017 — **2017**

5 Resolution n° 115/2017 adopting Technical Regulation DGNTI-COPANIT 103:2017 — **2017**
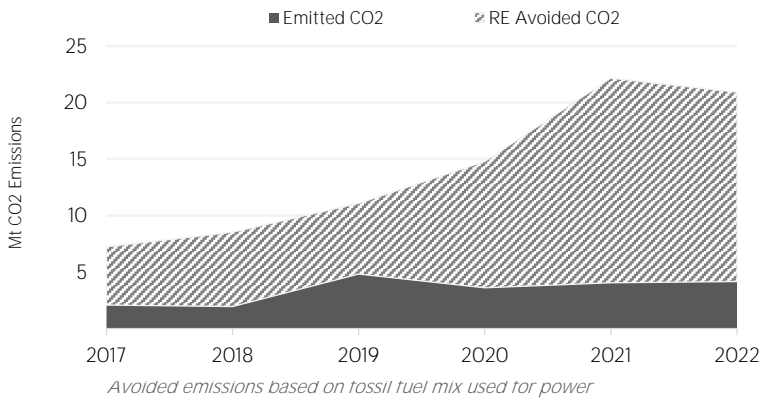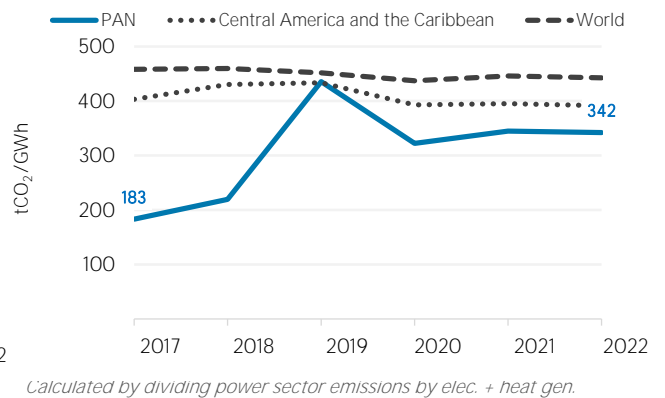
ENERGY AND EMISSIONS

CO_2 emissions by sector
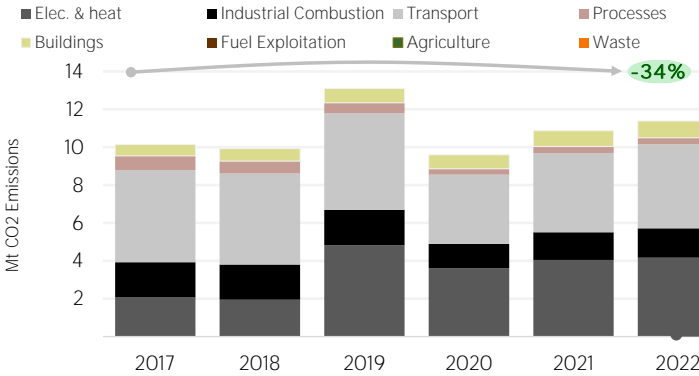
Elec. & heat generation CO_2 emissions in
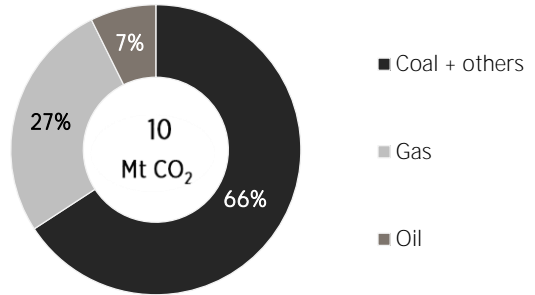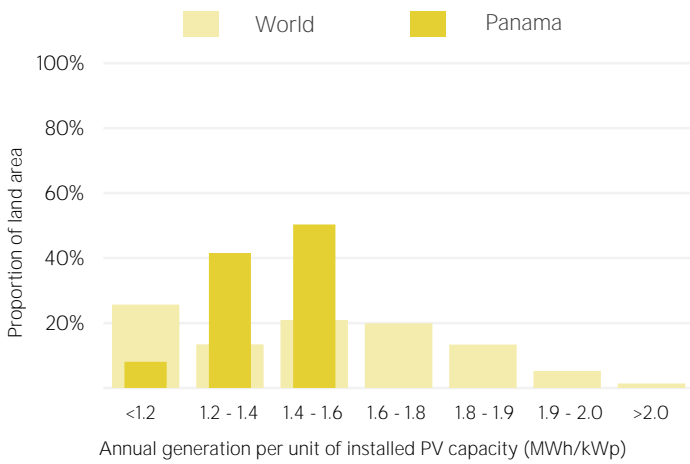

Avoided emissions from renewable elec. & heat

Avoided emissions based on fossil fuel mix used for power

CO_2 emission factor for elec. & heat generation

Calculated by dividing power sector emissions by elec. + heat gen.

Distribution of solar potential

World   Panama

Proportion of land area

X-axis: Annual generation per unit of installed PV capacity (MWh/kWp)
Categories: <1.2, 1.2 - 1.4, 1.4 - 1.6, 1.6 - 1.8, 1.8 - 1.9, 1.9 - 2.0, >2.0

Distribution of wind potential

World   Panama

Proportion of land area

X-axis: Wind power density at 100m height (W/m^2)
Categories: <260, 260-420, 420-560, 560-670, 670-820, 820-1060, >1060
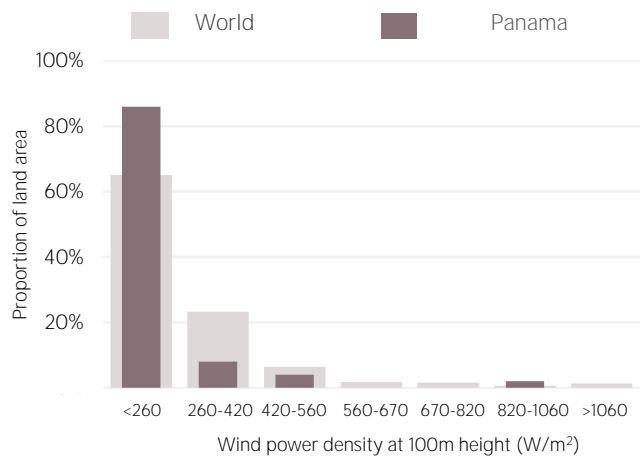
Biomass potential: net primary production

8.5 tC/ha/yr

● = Global average of 3-4 tC/ha/yr
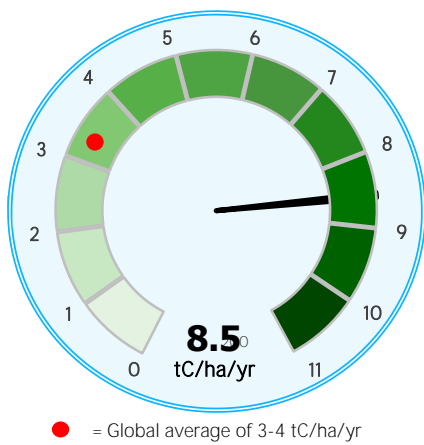
Indicators of renewable resource potential

Solar PV: Solar resource potential has been divided into seven classes, each representing a range of annual PV output per unit of capacity (kWh/kWp/yr). The bar chart shows the proportion of a country's land area in each of these classes and the global distribution of land area across the classes (for comparison).

Onshore wind: Potential wind power density (W/m^2) is shown in the seven classes used by NREL, measured at a height of 100m. The bar chart shows the distribution of the country's land area in each of these classes compared to the global distribution of wind resources. Areas in the third class or above are considered to be a good wind resource.

Biomass: Net primary production (NPP) is the amount of carbon fixed by plants and accumulated as biomass each year. It is a basic measure of biomass productivity. The chart shows the average NPP in the country (tC/ha/yr), compared to the global average NPP of 3-4 tonnes of carbon

IRENA
International Renewable Energy Agency