# Portugal

IRENA
International Renewable Energy Agency

## 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 ▬
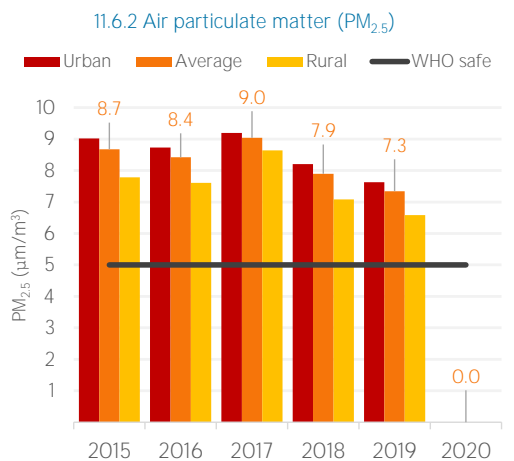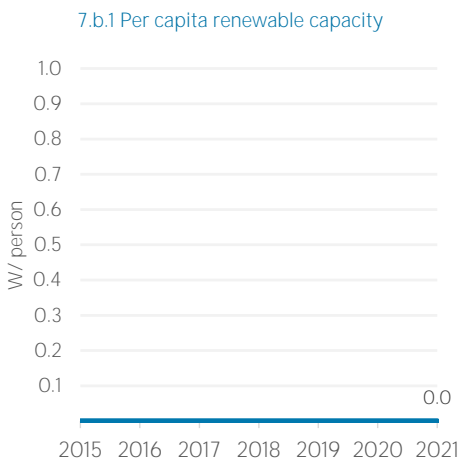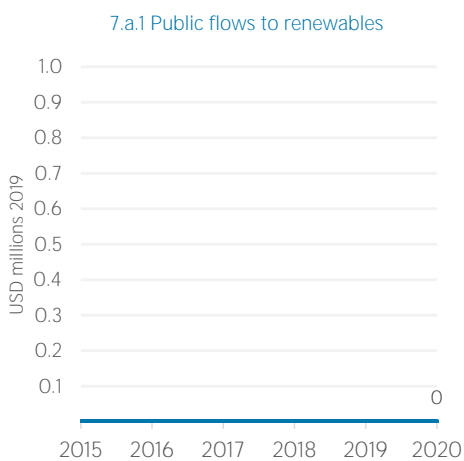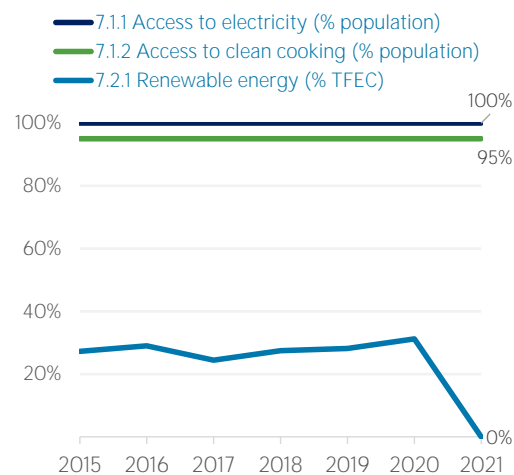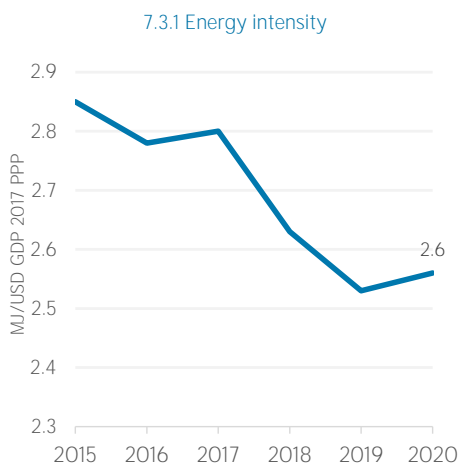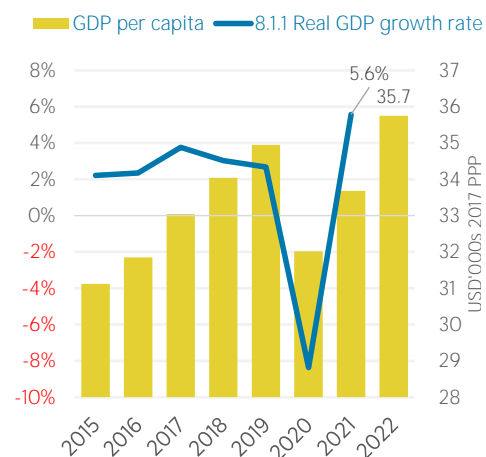


## TOTAL ENERGY SUPPLY (TES)

| Total Energy Supply (TES) | 2015 | 2020 |
|---|---|---|
| Non-renewable (TJ) | 706 443 | 609 054 |
| Renewable (TJ) | 238 720 | 241 699 |
| Total (TJ) | 945 163 | 850 754 |
| Renewable share (%) | 25 | 28 |

| Growth in TES | 2015-20 | 2019-20 |
|---|---|---|
| Non-renewable (%) | -13.8 | -10.4 |
| Renewable (%) | +1.2 | +1.3 |
| Total (%) | -10.0 | -7.3 |

| Primary energy trade | 2015 | 2020 |
|---|---|---|
| Imports (TJ) | 1 100 599 | 865 905 |
| Exports (TJ) | 325 736 | 263 204 |
| Net trade (TJ) | - 774 863 | - 602 701 |
| | | |
| Imports (% of supply) | 116 | 102 |
| Exports (% of production) | 131 | 102 |
| Energy self-sufficiency (%) | 26 | 30 |

Total energy supply in 2020



■ Oil
■ Gas
■ Nuclear
■ Coal + others
■ Renewables
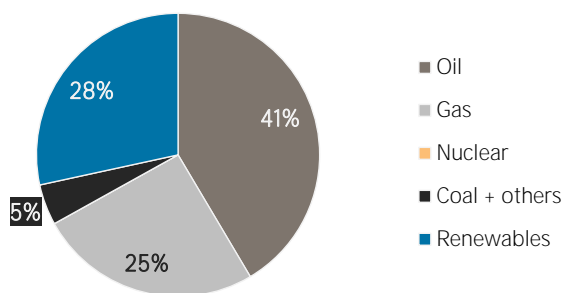
Renewable energy supply in 2020



■ Hydro/marine
■ Wind
■ Solar
■ Bioenergy
■ Geothermal

### Renewable TFEC trend

Electricity    Commercial heat    Bioenergy
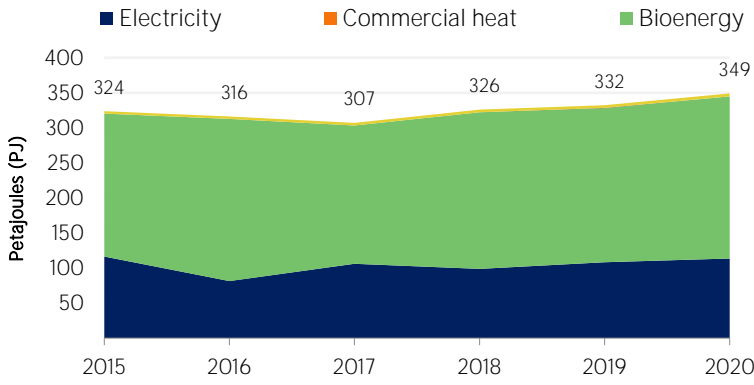


| Consumption by sector | 2015 | 2020 |
|---|---|---|
| Industry (TJ) | 79 912 | 82 845 |
| Transport (TJ) | 14 362 | 11 210 |
| Households (TJ) | 64 383 | 68 632 |
| Other (TJ) | 165 028 | 186 432 |

### Renewable energy consumption in 2020

Geothermal    Solar direct



Industry
Transport
Households
Other
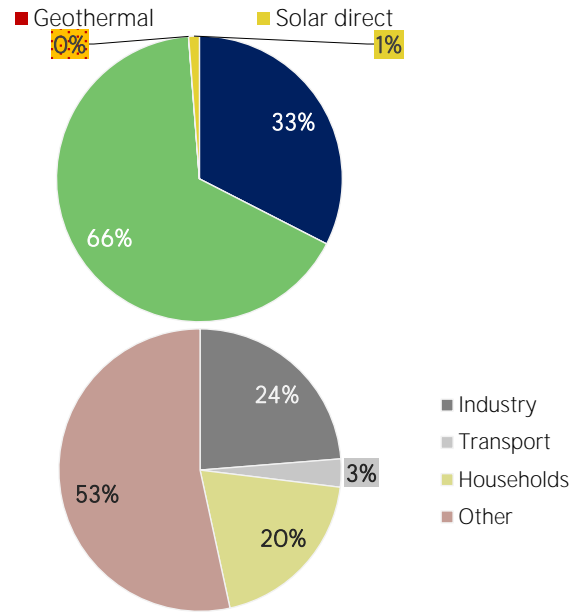
### Installed capacity trend

Fossil fuels    Nuclear    Other Non-RE
Hydro/marine    Wind    Solar
Bioenergy    Geothermal    Renewable share



### Net capacity change in 2022 (MW)

| Non-renewable | + 65 |
|---|---|

| Hydro and marine | + 337 |
|---|---|

| Solar | + 890 |
|---|---|

| Wind | + 28 |
|---|---|

| Bioenergy | 0 |
|---|---|

| Geothermal | 0 |
|---|---|
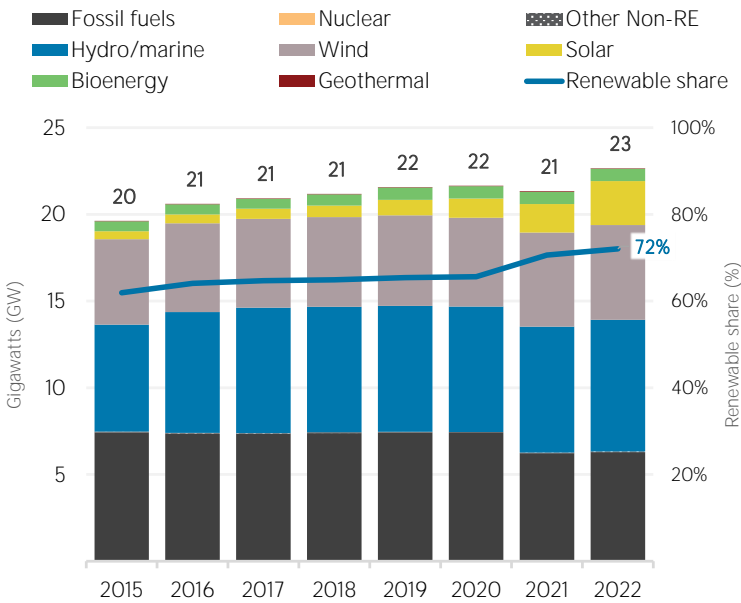
### Renewable capacity in 2022

Hydro/marine
Solar
Wind
Bioenergy
Geothermal
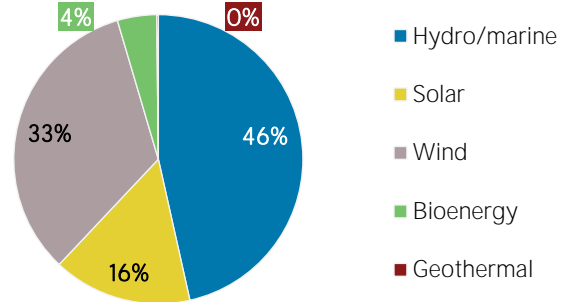


### Net capacity change (GW)

Fossil fuels    Renewable
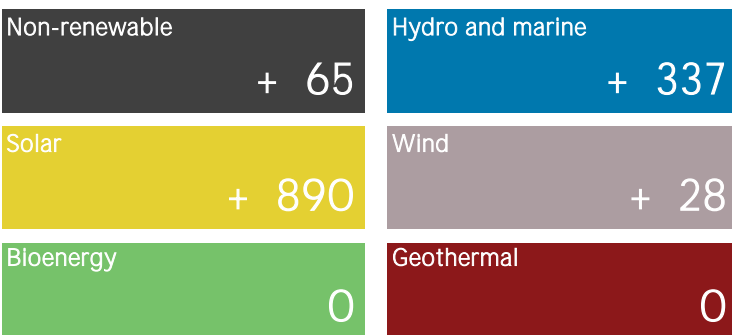


### Capacity utilisation in 2021 (%)



| | |
|---|---|
| Fossil fuels | 29% |
| Nuclear | |
| Hydro/Marine | 19% |
| Solar | 19% |
| Wind | 29% |
| Bioenergy | 64% |
| Geothermal | 70% |
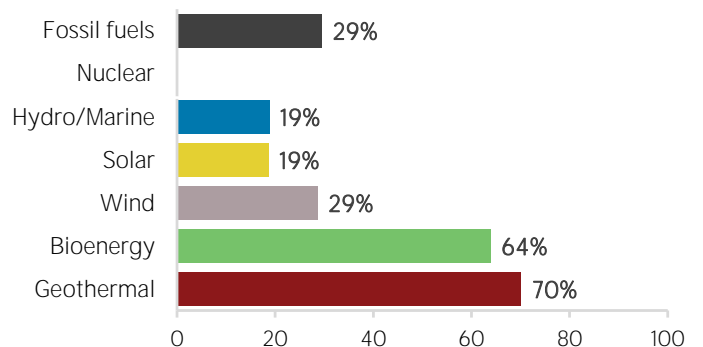
# ELECTRICITY GENERATION

## Generation in 2021

| Generation in 2021 | GWh | % |
|---|---|---|
| Non-renewable | 19 438 | 38 |
| Renewable | 31 541 | 62 |
| Hydro and marine | 11 908 | 23 |
| Solar | 2 237 | 4 |
| Wind | 13 216 | 26 |
| Bioenergy | 4 003 | 8 |
| Geothermal | 179 | 0 |
| Total | 50 980 | 100 |

### Per capita electricity generation (kWh)
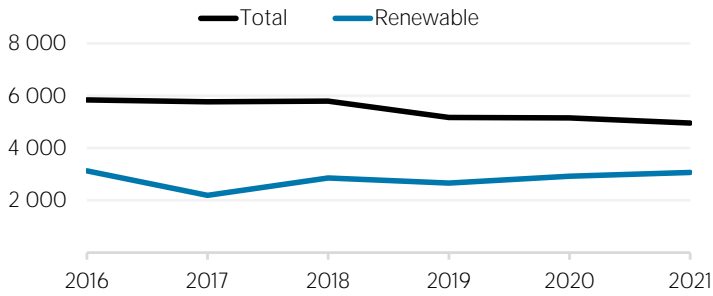


### Electricity generation trend



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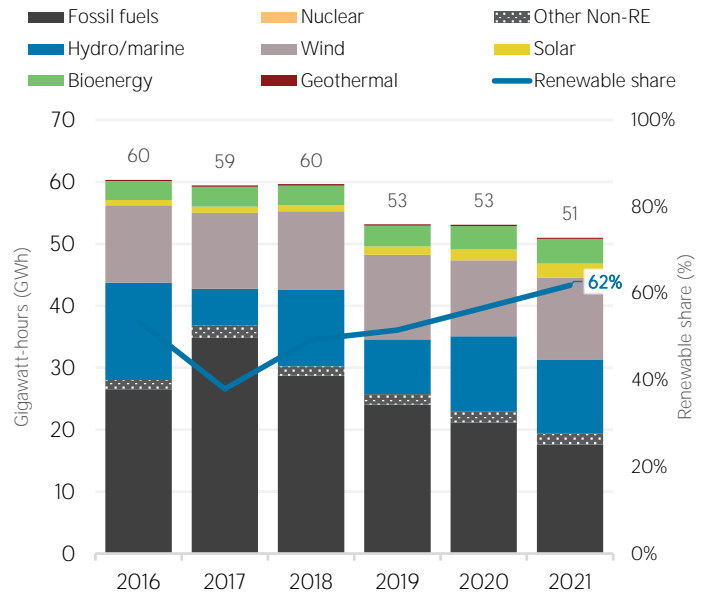
# LATEST POLICIES, PROGRAMMES AND LEGISLATION

| | | |
|---|---|---|
| 1 | 2023 Energy affordability support package for businesses | 2023 |
| 2 | 2023 incentives for decentralised renewable electricity production | 2023 |
| 3 | 2023 Incentives for low-carbon company vehicle fleets | 2023 |
| 4 | Freezing of urban travel pass prices for 2023 | 2023 |
| 5 | Natural gas subsidy for consumers outside the regulated tariff system | 2023 |

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# ENERGY AND EMISSIONS

### Energy-related $CO_2$ emissions by sector
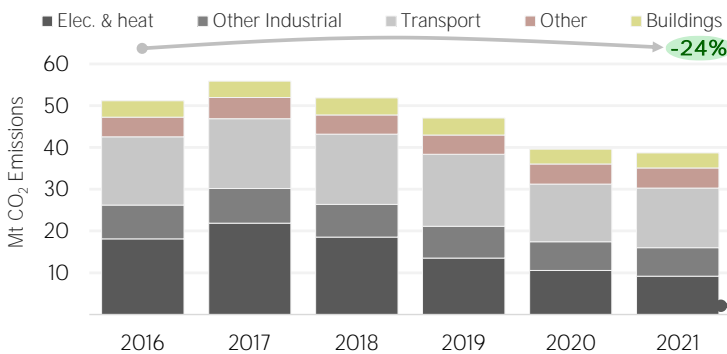


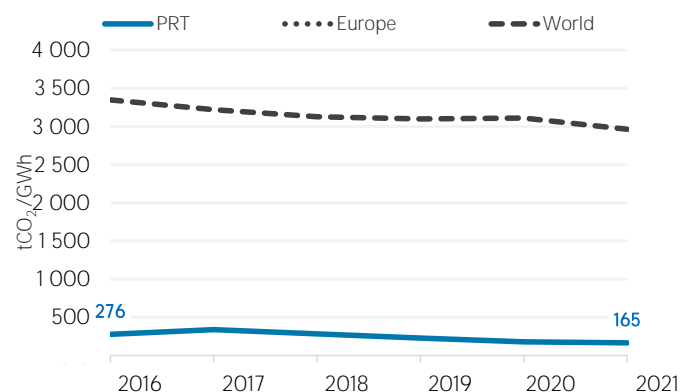### Elec. & heat generation $CO_2$ emissions in
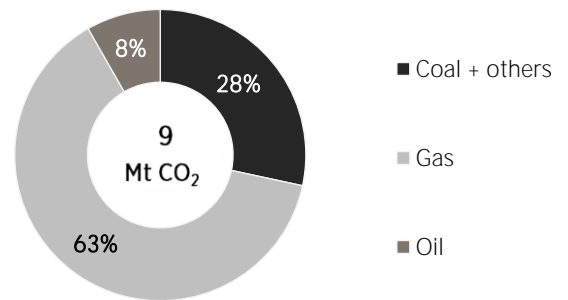


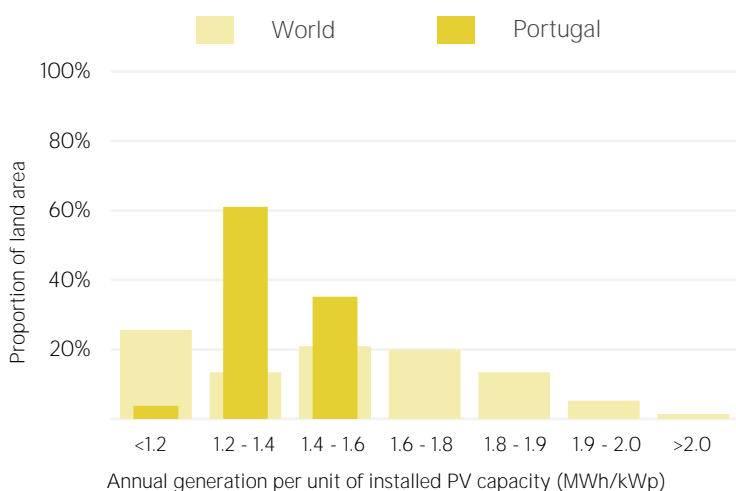### Avoided emissions from renewable elec. & heat
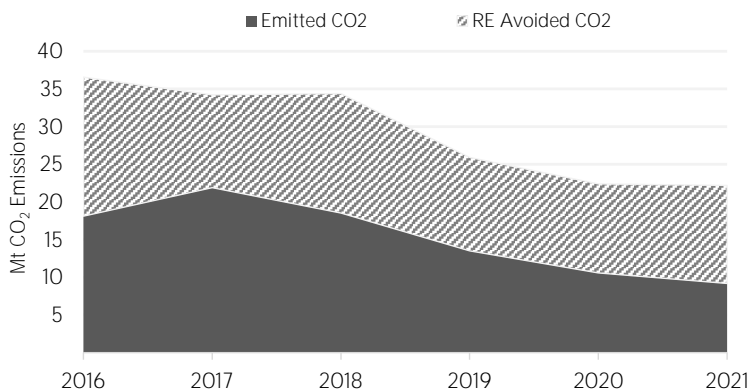


*Avoided emissions based on fossil fuel mix used for power*
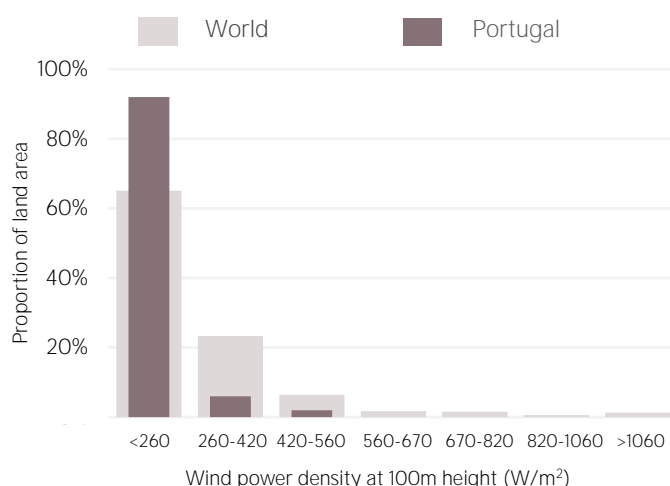
### $CO_2$ emission factor for elec. & heat generation



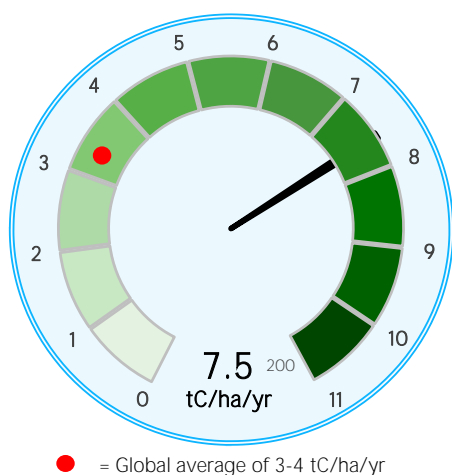*Calculated by dividing power sector emissions by elec. + heat gen.*

## Distribution of solar potential

Legend: World (light yellow) | Portugal (dark yellow)

Y-axis: Proportion of land area (0% to 100%)

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

Legend: World (light grey) | Portugal (dark brown)

Y-axis: Proportion of land area (0% to 100%)

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

7.5
tC/ha/yr
200

● = 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