

Diameter	5 m/s wind (lower limit)	15 m/s wind (upper limit)
222 m		
164 m		
127 m		
24 m		
3 m		
1.2 m		

In reality the upper limit output of these wind turbines is much less than calculated values. For example, the latest generation of turbine with 222 m diameter blades has a rated output of 15 MW. Suggest two reasons why this might be the case:



# Activity sheet 4

Use E=Pt and P=VI to calculate the answers to these scenarios.

Renewable energy

### Mobile phone

How long will it take to charge a mobile phone battery? Voltage = 3.7 V, Capacity = 3000 mAh Charger = 18 W

## **CNC** machine

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How much average current does this CNC process draw? Energy = 14.9 MJ, Time = 90 mins Voltage = 230 V

## Electric vehicle (EV)

How much energy can an EV battery store? Voltage = 400 V, Capacity = 90 kWh

#### Robot arm

How much energy does this robot arm use? Time = 16 hrs, Voltage = 230 V Average current draw = 10 A

When is this energy most likely to be needed during the day?

What implications does this have for a renewable energy supply?





# Activity sheet 5

Calculate the number of wind turbines and area of solar panels needed to deliver the following renewable generation by 2050:

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# 430 TWh offshore wind

One offshore wind turbine produces 8 MW.

Each **1 MW** wind produces about **500,000 kWh** per year.



## 85 TWh solar

1.6 m<sup>2</sup> solar panel provides 250 W.

1 kW solar produces about **850 kWh** per year.