

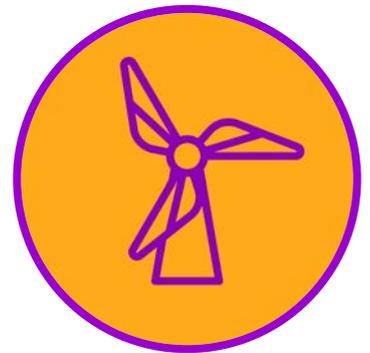
# Theme 4 Living Greener

It is becoming increasingly important to transform our cities and societies, to reduce our negative impacts on the environment.

How can we use AI to make our buildings, homes and communities more environmentally friendly?

In this pack you will find:

- An overview of the theme and how it links to the Industrial Strategy's Grand Challenges
- Examples of the opportunities and challenges within this theme
- Probing questions and sub-themes to help you think about how AI can be used within this theme
- Case studies of real examples of how AI is helping issues within this theme



## The Grand Challenges

The Grand Challenges form part of the Industrial Strategy.

They aim to improve people's lives, and transform the UK's industries for the better. The four Grand Challenges are linked to the themes of the Longitude Explorer Prize:

## Theme 4 Living Greener

**Clean Growth Grand Challenge** is aimed at halving the energy use of new buildings by 2030. By making our buildings smarter and more efficient we can cut household energy bills and meet carbon reduction targets.



Theme 1 Living Longer  
(Ageing Society Grand  
Challenge )



Theme 2 Living Better  
( Artificial Intelligence & Data  
Grand Challenge)



Theme 3 Living Together  
(Future of Mobility Grand  
Challenge)





## Creating Greener Societies

One of the defining global challenges of our age is how to reduce our ecological footprint.

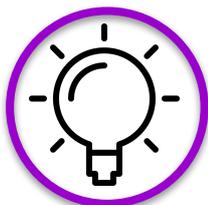
Advances in technology and artificial intelligence can play a key role in helping us to transform our cities and towns.

Below are key mini-themes, challenges, and prompting questions to get you thinking about how AI can be applied to creating greener societies.

### How can AI help?

- How could AI be used to help us use **less energy** in our homes and buildings?
- Could AI **monitor** and **analyse** data in a way that would help us use energy more efficiently?
- What **information** would help you use energy better? Can AI help get this data to you?

### Energy Consumption



The energy we use to light and heat our homes, drive our cars, and keep our cities and towns moving, all have an impact on the climate.

Even though the UK is increasing its amount of clean energy production, reaching 50% low carbon sources in 2018, the amount of energy used that year increased due to changes in climate<sup>1</sup>

### Challenges

### How can AI help?

- How can we use AI's ability to **monitor, analyse**, and **learn** to reduce air pollution in our towns and cities?
- What **information** would help you understand pollution levels? Can AI help get this information to you?
- Could AI be used to **predict** air pollution levels?

### Air Pollution



Poor air quality is one of the largest environmental risks to public health in the UK, as long-term exposure to air pollution can cause chronic conditions such as cardiovascular and respiratory diseases as well as lung cancer, leading to reduced life expectancy.

### Challenges



## How can AI help?

- How can we use AI's ability to learn to help us recycle more plastic?
- What information would help you recycle more plastic? Can you use AI to get that information to people?

## Plastic Pollution



Plastic is everywhere. Useful and convenient, it's also a massive pollution problem, especially in our oceans. Turtles and seabirds become ensnared in discarded plastics. Around 5,000 items of marine plastic pollution have been found per mile of beach in the UK

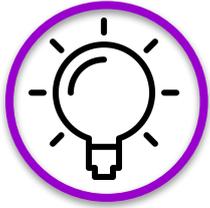
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## Challenges





## Use Case 1



### Energy Consumption

## Watt Time - AI and cleaner power



Watch the story of Dr Setareh Sdjadi and how she uses AI to forecast solar energy production: [video](#) (3.53 min)

Watt time uses machine learning algorithms and data to make energy use more efficient.

A good example would be a refrigerator, which only consumes power in short bursts every half hour or so. But within this short time frame the type of power on the grid can actually change, from cleaner solar or wind generated energy to a dirty power plant generated energy. Watt time can synch the refrigerators power use with the cleaner power on the grid.

Using smart devices Watt time gives people the opportunity to see and decide how their electricity is made.

Visit <https://www.watttime.org/> for more information

What are the challenges cleaner power are trying to solve?	How is AI being used to help?	What data is used?
Synching energy use with cleaner energy from the grid, and avoid dirtier power sources	<p><b>Machine Learning</b></p> <p>AI algorithms are able to use data from different power plants and calculate when the lowest emission rates will be.</p> <p>The software then communicates with smart devices (e.g. vending machines) and lets them know when to use power.</p>	<p>Data from <b>different power plants</b> and renewable energy production sites</p> <p>Data from the <b>power grid</b></p>

## What are the risks?

### Cyber Security

Increasing the use of AI algorithms in the management of a city or country's power grid, increases the risk of cyber attacks. How can we make sure that these systems are protected?





## Use Case 2

### Plastic Pollution



## Gringgo - Easier plastic recycling



Watch this video about Gringgo, how the company was started and what it's trying to do - [video](#) (1.40 min)

Gringgo is developing an AI smartphone tool that will use image recognition to identify recyclable materials and quantify their value.

By being able to identify what can be recycled, and how much you can earn from recycling it, waste workers in Indonesia will be able to maximise their earnings while increasing how much waste gets recycled.

You can read more about this [here](#)

What are the challenges Easier plastic recycling are trying to solve?	How is AI being used to help?	What data is used?
<p><b>Making recycling easier and more profitable</b></p>	<p><b>Computer Vision / Machine Learning</b></p> <p>The machine learning algorithms will need to be given many examples of recyclable materials as images (training data). It will then develop the ability to recognize what should or should not be recycled, and calculate the cost of the materials so that they can be sold.</p> <p>Using a smartphone camera you will then be able to determine what can or can't be recycled, simply by taking a photo of it or scanning it with your phone.</p>	<p><b>Images of various types of products</b> that end up in the trash and can be recycled</p> <p><b>Data on the costs of recyclable materials</b> (how much they can be bought and sold for)</p>





## Some other examples you can check out:

- **The Edge** - The world's smartest building?
  - [Video](#)
  - [Website](#)
- **IBM's Green Horizon** - predicting and monitoring air pollution
  - [Video](#)
  - [Website](#)

## References

1. <https://eandt.theiet.org/content/articles/2019/07/low-carbon-electricity-production-reaches-record-high-in-the-uk/>
2. <https://www.sas.org.uk/our-work/plastic-pollution/plastic-pollution-facts-figures/>

