

# Direct air capture

with Evangeline Leong, Maksis Darzins and Dr Aaron Guo

## Talking points

### Knowledge

1. What is direct air capture (DAC)?
2. What is an adsorbent?

### Comprehension

3. What are two ways in which the team's DAC system differs from most other DAC projects?
4. What are some major challenges of DAC?

### Application

5. Do you think the DAC2BIO approach is best described as having a negative or neutral carbon footprint? Why?
6. Research and industry tend to work on different timescales, there are differences in how technical terms are used, and systems have to be established for sharing intellectual property. How do you think the team resolves these challenges? Give hypothetical examples.

### Analysis

7. Do you think the microbes that the team uses within their bioreactor are natural or genetically engineered? Justify your answer.
8. "Throughout the design process of the pilot system, the team has consulted with every branch of engineering, including chemical, mechanical, aerospace, electrical and civil," says Maksis. How do you think each of these branches of engineering is relevant to the DAC2BIO project?

### Evaluation

9. To what extent do you think that DAC will play a significant role in addressing climate change at the global scale? Explain your answer.
10. What do you think a fully circular carbon economy could look like in the future? Give examples of how it might change society.

## Activity

You can do this activity individually or in a small team.

Imagine you are a DAC specialist. You want to convince your nation's political leaders to establish a large-scale DAC facility in your country. In particular, the leaders are interested in getting answers to the following questions:

- What is DAC, and how does it work?
- Why is DAC important?
- Why should our country invest in this technology?

Using Evangeline, Maksis and Aaron's article and your own research, create a short presentation that answers the above questions. Consider the following while building your presentation:

- What level of prior knowledge are politicians likely to have?
- How can you get your main points across quickly and effectively?
- How much detail should you go into?
- How can images, graphics and other types of media help you?
- How can you speak to national interests?
- How can you address any likely concerns or doubts that these politicians might have?

Present your pitch to your class, who will pretend to be your nation's political leaders. Answer any questions that they have to the best of your abilities.

Afterwards, take some time to reflect on your presentation. Did your political leaders seem convinced? Did they understand what you had to say? To what extent did you address their concerns or doubts effectively? Think about how you would use this experience to improve your presentation if you were to give it again.

## More resources

- The team collaborates with colleagues at the RECARB Hub that are focusing on cultivating gas-eating microbes in bioreactors. Their work is covered in another Futurum article: [futurumcareers.com/tackling-climate-change-with-gas-guzzling-microbes](https://futurumcareers.com/tackling-climate-change-with-gas-guzzling-microbes)
- Climeworks is an industry leader in the field of DAC. They explain how the technology works in a playlist of short videos: [youtu.be/xEwY9b2XzLk?si=VB7TH-NnfoMs4zn0](https://youtu.be/xEwY9b2XzLk?si=VB7TH-NnfoMs4zn0)
- To learn more about the rapidly-advancing field of DAC, the team recommends seeking the latest reports from the International Energy Agency. Find one here: [iea.blob.core.windows.net/assets/78633715-15c0-44e1-81df-41123c556d57/DirectAirCapture\\_Akeytechnologyfornetzero.pdf](https://iea.blob.core.windows.net/assets/78633715-15c0-44e1-81df-41123c556d57/DirectAirCapture_Akeytechnologyfornetzero.pdf)