

## 'Tastes like water': how a US facility is recycling sewage to drink

### Level 3: Advanced

#### 1 Warmer

##### a. Discuss the following questions in pairs.

- In your opinion, what are the biggest challenges cities face when it comes to providing clean, reliable water to residents?
- Would you be willing to drink recycled wastewater if it had been purified to a high standard? Why or why not?
- Are there any sustainable methods in your country or region for conserving or producing drinking water?

#### 2 Key words

##### a. Find the words from the wordpool in the article. Then use the words to complete the definitions using the correct form.

aquifers	conserve	leftovers	replenish	vats
bacteria	cost-effective	membranes	scarcity	whirr
blasted	discharge	plant	sewage	
blueprint	disinfect	portfolio	undergo	

- \_\_\_\_\_ : large containers used for storing or processing liquids
- \_\_\_\_\_ : things that remain after a meal or a process
- \_\_\_\_\_ : thin layers that separate or filter substances, especially in biology or industrial systems
- \_\_\_\_\_ : a large industrial building where goods are manufactured or processed
- \_\_\_\_\_ : to clean something carefully in order to kill harmful bacteria or viruses
- \_\_\_\_\_ : to refill or restore something to its original level
- \_\_\_\_\_ : a situation where something is not easy to find or obtain
- \_\_\_\_\_ : to release a substance, especially a liquid or gas, into the environment
- \_\_\_\_\_ : achieving good results without costing too much money

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10. \_\_\_\_\_ : a continuous low sound made by something that is moving quickly, such as a machine
11. \_\_\_\_\_ : a detailed plan that outlines how something will be built or achieved
12. \_\_\_\_\_ : to protect natural resources from harm or destruction
13. \_\_\_\_\_ : small single-celled organisms, some of which can cause disease
14. \_\_\_\_\_ : to experience something, especially a change or process
15. \_\_\_\_\_ : a collection of work, business investments or responsibilities
16. \_\_\_\_\_ : destroyed or broken by a sudden force, especially using explosives
17. \_\_\_\_\_ : wastewater and waste material that is carried away from homes through pipes
18. \_\_\_\_\_ : underground layers of rock or soil that hold water and allow it to flow

#### b. Complete the sentences with words from the previous activity in the correct form.

1. In order to filter out any impurities, wastewater is passed through special \_\_\_\_\_.
2. The surgery equipment is \_\_\_\_\_ every day to maintain sterile conditions.
3. Water \_\_\_\_\_ is becoming a major issue in many hotter regions due in part to climate change.
4. In the cheese-making process, milk is heated in large \_\_\_\_\_ before the curds, or solid parts, are removed.
5. We could hear the \_\_\_\_\_ of drones as they hovered in the air.
6. \_\_\_\_\_, including broken bricks and scraps of metal were cleared away from the construction site before rebuilding could begin.
7. Many remote communities depend on \_\_\_\_\_ for their drinking water supply.
8. An effective water treatment \_\_\_\_\_ will process millions of litres of water each day.

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9. A lengthy period of wet weather is needed to \_\_\_\_\_ the reservoirs after a dry summer.
10. Engineers had to \_\_\_\_\_ through layers of mountain rock during the construction of the railway tunnel.
11. Factories can be fined for illegally \_\_\_\_\_ waste into rivers and seas.
12. Solar panels are becoming a common and \_\_\_\_\_ source of energy.
13. A team of architects will present their \_\_\_\_\_ for a new hospital complex in the coming months.
14. It's vital that households try to \_\_\_\_\_ water during times of drought, and that is why the government have issued a ban on using hosepipes.
15. The \_\_\_\_\_ in yoghurt and other fermented milk drinks can help maintain a healthy digestive system.
16. When the material \_\_\_\_\_ advanced heating, a chemical reaction occurs.
17. It's a good idea to take a(n) \_\_\_\_\_ of your work with you when you go for interview.
18. \_\_\_\_\_ needs to be treated and purified before it is released into the ocean.

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*A California project can turn sewage into drinking water in less than an hour and could be a blueprint for other water-scarce regions*

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- 1 As the pumps whirr around us, Denis Bilodeau motions to the liquid in the vats below. It looks like iced tea, but in fact it's secondary treated sewage, cleaned of any solids by the plant next door. In less than an hour, and after three steps of processing, we will be drinking it – as pure water.
- 2 The Groundwater Replenishment System facility in Orange County, California, houses the pipes, filters and pumps to move up to 130 million gallons each day – enough for 1 million people – processing it from dark to clear. The facility, which opened in 2008, is part of broader moves to help conserve water.
- 3 Bilodeau, the president of the water district, says: "This is going to be a blueprint for any community that's facing water scarcity, or wants to have more locally controlled water."
- 4 The idea is to take the water from the sanitation district next door and to push it through a three-step process – microfiltration, reverse osmosis and ultraviolet light purification – to make clean water. The facility provides 45 per cent of central Orange County's water and helps manage storm water inflows and reduce reliance on imported water.
- 5 In general, once sewage has been treated, the water is returned to our rivers, but extreme droughts and climate breakdown are pushing cities to consider using recycled sewage for drinking water. It is already done in Israel, Singapore and Kuwait, but Orange County has been a US pioneer in this area, hoping to reduce dependence on water piped from faraway rivers or pumped from aquifers under the ground.
- 6 When the liquid reaches the plant it has already been through some treatment and is clean enough to discharge into the oceans, but nowhere near clean enough to drink. The first step is to pump the water through polypropylene fibres – which look like tiny plastic straws – to remove bacteria and other unwanted elements.
- 7 Pipes then carry the filtered water to a building to undergo reverse osmosis, where it is pushed through membranes that squeeze out the salts, organic chemicals and any leftovers.
- 8 Finally, the water is blasted with high-intensity ultraviolet light and hydrogen peroxide to disinfect anything that might remain. "It's concentrated sunlight," Bilodeau says. Except this would injure your eyes, because it is so strong.
- 9 After walking around all three buildings, we reach a sink with running, clear water. I drink a cup of the stuff, expecting a smell of what it used to be – but no, it's super clean, with almost a flat taste. That's because it no longer contains any salts or minerals – they have been blasted out by the cleaning process. On the cup is a motto, "Tastes like water ... because it is water", chosen because it is the number one comment, says Mehul Patel, the executive director of operations at the Orange County Water District, who oversees the facility.
- 10 Even though we are drinking the super-clean water out of the facility, the liquid will actually head back underground. Some of it will travel in pipes to the coastline of the Pacific Ocean where it will keep the salty water out of the coastal aquifer. Most will zoom 15 miles in pipelines to the city of Anaheim, where it will create lakes to replenish the water that people drink in the county.
- 11 The big drawback to this system is that making water – instead of sucking it from the ground – takes a huge amount of energy and labour. The system consumes 17 megawatts of electricity and has a monthly electricity bill of \$2.5 million (£1.85 million), while to run the place takes 26 operators.
- 12 But the technology also offers some control over an increasingly climate-changed future: Bilodeau says the team estimates several years ahead in terms of what they think their water needs will be and what the water sources will be. "That's one of the main reasons why we developed this," he adds. "Because we wanted to sort of diversify our supply portfolio."
- 13 Some places are looking to the oceans for drinking water, but wastewater is more cost-effective as a source of water, Bilodeau says, because there are fewer salts in wastewater than sea water. That makes the energy costs of cleaning the water about half of what it would be to remove the salt.
- 14 The model is increasingly being used in other water-scarce regions in the US. Los Angeles County is building a water recycling project in the San Fernando Valley to produce 20 million gallons a day. Instead of sending treated wastewater out to sea, it will be cleaned for drinking water, just like in Orange County. There are also projects starting in Utah, Texas and Colorado.

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- 15 The Orange County model has won awards, including a Guinness World Records title for the most wastewater recycled to drinking water in 24 hours on 16 February 2018. But the best praise is the public support for the water, says Bilodeau – and the economic argument behind it. "It's now cheaper to make our own water than to buy imported water, or to clean sea water," he says.

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#### 3 Comprehension check

a. Are these sentences True (T) or False (F) or Not Mentioned (NM)?

- |  |            |
|--|------------|
| 1. The treated sewage water at the beginning of the process is already safe to drink.                  | T / F / NM |
| 2. The Orange County facility uses three stages of purification to clean the water.                    | T / F / NM |
| 3. Orange County began its water recycling project in direct response to a water contamination crisis. | T / F / NM |
| 4. Israel and Singapore also recycle wastewater for drinking purposes.                                 | T / F / NM |
| 5. The facility's ultraviolet purification system uses natural sunlight to clean the water.            | T / F / NM |
| 6. Mehul Patel believes the recycled water tastes strange to most people.                              | T / F / NM |
| 7. Most of the purified water is stored underground rather than sent directly to taps.                 | T / F / NM |
| 8. The energy costs of purifying sewage water are higher than those for desalinating seawater.         | T / F / NM |
| 9. The Orange County model is being copied in other US states facing water shortages.                  | T / F / NM |
| 10. The public has been slow to support the idea of drinking recycled sewage water.                    | T / F / NM |

#### 4 Key language

a. Put these steps in the correct order (1-4) according to the article.

Step: \_\_\_\_\_

They use UV light and chemicals to clean the water.

Step: \_\_\_\_\_

Pipes carry the water to a different building.

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Step: \_\_\_\_\_

People can safely drink the water.

Step: \_\_\_\_\_

They push the water through fibres to remove bacteria.

b. Look at the example sentences. Choose the correct option a, b or c in each sentence.

**Active Voice:** *People drink tap water in most European countries.*

**Passive voice:** *Tap water is drunk in most European countries.*

1. When we change a *present simple* sentence to *simple present passive*, we use the ...
  - a. present form of the verb.
  - b. past participle form of the verb.
  - c. *-ing* form of the verb.
2. In the *present simple passive*, we use ...
  - a. *have / has* + past participle.
  - b. *will* + base verb.
  - c. *am / is / are* + past participle.
3. In the *present simple passive* with *can*, we use ...
  - a. *can* + *be* + past participle.
  - b. *can* + *is* + past participle.
  - c. *can* + past participle + *have*.

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c. Rewrite the steps in task a using the present simple passive and in the correct order.

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_
4. \_\_\_\_\_

### 5 Discussion

a. Discuss these questions.

- According to the text, why is wastewater considered more cost-effective to treat than seawater?
- Would you feel comfortable drinking water that has been recycled from sewage if it had gone through this process? Why or why not?
- The facility uses a large amount of electricity to treat the water. Do you think this system is sustainable in the long term, especially in the context of climate change? Why or why not?

### 6 In your own words

- a. The article describes the process by which wastewater is turned into drinking water. Summarise the information by selecting and reporting the main features and making comparisons where relevant. You can use the steps in Activity 4 to help you. Write at least 150 words.
- b. Share your summaries with the class.