

- Teacher guidelines for case study - Sludge treatment in T. Park



Generic green skills

Cognitive competencies:

- Innovation skills to identify opportunities and create new strategies to respond to green challenges
- Understanding the complexity and interconnectedness of sustainable development issues and challenges

Intrapersonal competencies:

- Adaptability and transferable skills that help workers learn and apply the new technologies and processes required to green their jobs

Technological Competencies:

- Management systems (waste, energy, water)



Learning objective

Students are expected to:

1. Understand the principle of 'waste-to-usableness' in the closed-loop economy.
2. Identify what changes can be made in a selected industry sector to move towards a closed-loop model.



Format

Individual learning and field trip



Role of teacher

Facilitator



Resources needed

A4 paper, student worksheet, case study



Time required

45 mins in class; a half-day field trip



Assessment

The assessment will be based on:

Students' field trip report up to 1,500 words.

Suggested teaching and learning sequences

Before the class:

Ask students to

1. Read the T. Park case study to understand the process of sludge treatment.
 2. Refer to the closed-loop economy concept (see the concept information sheet) and examine why T. Park can be called a closed-loop enterprise.
 3. Have a look at the T. Park website and identify what activities will be on there soon:
<https://www.tpark.hk/en/story/>
 4. Plan and book a field trip in small groups to T. Park.
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During the class:

1. Divide students into groups of 5–6, either according to their major or at random.
 2. Facilitate students' discussion on the question of how T. Park is a closed-loop enterprise.
 3. Invite students to share their thoughts with the class.
 4. Help students to make a group plan for a field trip to T. Park:
 - a. Ask them to identify activities or workshops coming up at T. Park in the near future (e.g. make a concrete amplifier class).
 - b. Ask students to schedule a time slot to visit the different facilities in T. Park such as the T. Cafe, T. theatre and T. roof, in addition to the activity the group will attend. Suggest they have a 30-minute discussion at the end of the visit to share observations and ideas.
 5. Explain the requirements for the field trip:
 - a. Students should take photos of things that impressed them and make brief notes in their notebook.
 - b. Students should identify at least two ideas, or good designs, related to '**waste-to-energy**' or '**waste-to-usableness**' that they think could be applied in the industry sector of their choice.
 6. Explain the assessment criteria for the field report.
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After the class:

Students are each required to submit a field trip report, which includes

1. A description of activities they attended and their reflections on them: What did they learn? What did they find interesting?
2. A description of the facilities they looked at and their reflections on what aspects of the closed-loop model they are related to (see the concept information sheet).
3. The results of a group discussion about how ideas identified during this visit could be applied to the industry sector of their choice, in order to illustrate what kind of changes can be made in order to **transfer waste into something useable to close a loop**.

Suggested answers/examples for the activities

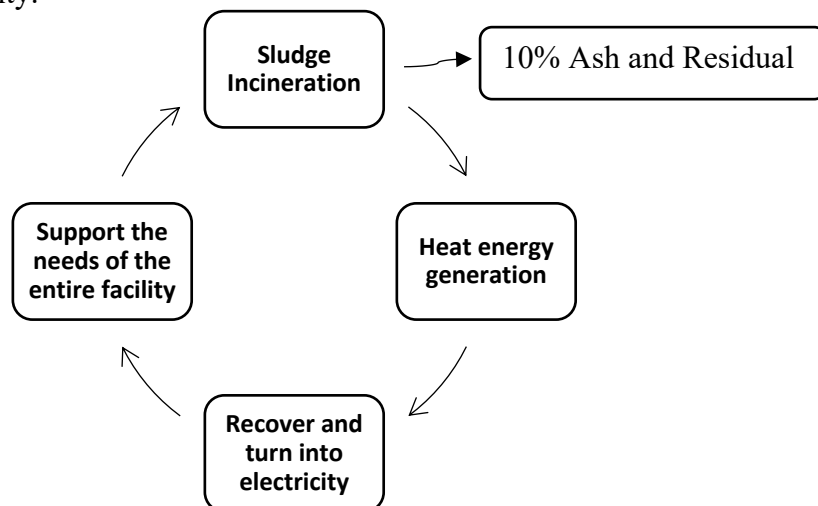
Why is T. Park a closed-loop enterprise?

T. Park is an almost perfect example of a closed-loop enterprise. All facilities and technologies there are trying to use waste to produce energy. Specifically,

1. Sewage sludge is used as fuel there, through burning; the facility turns the sludge into energy.
2. After incineration, sludge is converted into ash and residue – **a total reduction of 90% of the original sludge volume**. This dramatically cuts down the quantity of waste that needs to be disposed of in landfills and, as a result, reduces the emission of greenhouse gases by up to 237,000 tonnes a year.
3. All the heat energy generated from the incineration process is **recovered and turned into electricity that can support the needs of the entire facility**. When running at full capacity, it can also produce up to 2 megawatts (MW) of **surplus electricity** for the public power grid or for up to 4,000 homes.

Use of water for cooling is also a closed loop. Students can look at the diagram on the website: <https://www.tpark.hk/en/process/>

This is a simplified closed-loop version of T. Park that was created based on the sludge treatment process, which turns sludge into electricity.



Suggested assessment criteria for the student field-trip report

1. The report demonstrates students' understanding about why T. Park can be called a closed-loop enterprise through the explanation of some examples.
2. The report demonstrates appropriate reflections about activities they have and they answer the questions: 'What did you learn?', and 'What did you find interesting?'
3. The report includes a description (including photos) of facilities they have visited, as well as students' reflections about which aspects of the closed-loop model relate to the facilities they discuss.
4. The report illustrates how ideas identified during this visit could be applied to students' chosen industry sector, and in particular the kinds of changes that could be made in order to **transfer waste into usability to close a loop**.

Reference:

Story | T · PARK. Retrieved from <https://www.tpark.hk/en/story/>