– Teacher guidelines for case study –
Green Olympics

Generic green skills

Cognitive competencies:

- Environmental awareness and a willingness to learn about sustainable development
- Innovation skills to identify opportunities and create new strategies to respond to green challenges

Interpersonal competencies:

- Communication and negotiation skills to discuss conflicting interests in complex contexts
- Marketing skills to promote greener products and services

Learning objective

Students are expected to:

1. Understand which green technologies were used during the Beijing Olympics.
2. Explain what sustainable development issues have been addressed by these technologies.
3. Suggest how to apply these green technologies to an industrial sector.
4. Advocate green solutions and promote green technologies through a campus activity.

Format

Group learning

Role of teacher

Facilitator, observer, companion

Resources needed

A3 paper, pen, colored pencil, student worksheet, case study

Time required

2 hours

Assessment

The assessment will be based on:

1. Students' participation in group discussions about sharing innovative ideas applied in greening the Beijing Olympics 2022 and their potential applications in industries.
2. Students' group presentations in class based on group discussion one (a table, mind map, graphs).
3. Students' posters on a selected topic related to green technologies and/or the Olympics.

Before the class:

1. Ask students to read the case study "Green Olympics 2022", and watch several videos and read reports (see Appendix 1 for the suggested list of videos and reports) that interest them.
2. Ask students to identify green technologies used during the Winter Olympics and list the sustainability issues that were addressed by these green technologies.

Teachers need to prepare following material before the class:

1. Videos or reading materials on the Beijing 2022 Winter Olympics (see the suggested list below), including topics on the green Olympic torch, green Olympic venues, green Olympic power supply, green Olympic transportation, the green Olympic village, green ice-making, green materials, green venues, 3D-printed snowflakes made of solid waste, outfits for the waste removal teams.
2. Search online for more information about green actions performed at previous Olympics.

During the class:

1. Group discussion 1 (20 mins)

    a. Put students into groups of four. Ask students to identify their roles in the group:
- *Leader* – overall facilitation of the group sharing, take the lead during discussion in terms of content and process, control the general framework of the discussion, and be able to move the discussion forward.
- *Timekeeper* – remind members to focus their discussion and thinking on the core issues that need to be addressed, and pay attention to the time constraints.
- *Recorder* – record key ideas from each group member and summarize those ideas.
- *Reporter* – possess good logical thinking and verbal skills, summarize group discussion and present the group output in the form of a presentation to the class.

    b. Facilitate students' group discussion on the two pre-class questions:
- What green technologies were used during the Beijing Winter Olympics 2022?
- What sustainability issues were addressed by the use of these green technologies?

    c. Guide students to use graphs, tables or mind maps to summarize their ideas. You could join one or two groups as an observer, pay close attention to the group discussions and respond to students' questions and different learning needs.

    Example: Guide students to use a table to organize their ideas

Green technology	What sustainability issues does it help to address?
e.g. Solar power	e.g. energy shortage, climate change, greenhouse effect

Example: Guide students to use a mind map to present ideas
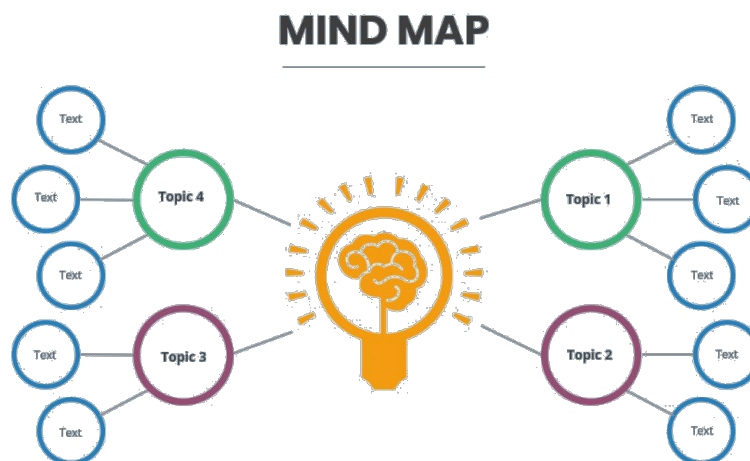
MIND MAP

d. Invite 1 or 2 groups to share their group findings to the whole class. It is suggested you use a mind map to summarize the ideas raised by all groups.

2. Group discussion 2 (30 mins)

a. Ask students to choose an industry sector that is relevant to their discipline/future field of work, and discuss how these green technologies (e.g, clean energy, green materials) can be applied in these sectors and which sustainability issues will be solved by these technologies Students need to be reminded that each of them should choose at least two green technologies from the case study and explore them in more detail in relation to their own education/work background.

b. Help students to think about other green technologies they think can be applied at the next Olympics, apart from those green technologies/measures mentioned in the case study. Suggest students do further research on this.

3. Poster design and presentation

a. Ask students to design a poster to promote green technologies on campus.

b. Facilitate students to discuss ideas for their poster, which should be focused on the Beijing Olympics, greening of industries, the next Olympics.

c. Guide students to agree on the approach, and discuss the main ideas they want to present.

d. Ask students to start making the poster and continue with it as their group homework.

After the class:

1. Ask students to finalize their posters. Suggest students do additional research if needed.

2. Identify a place on campus where students can put up their posters. Select the time and announce the campus event when students will be presenting their posters.

3. Ask students to put the poster in the dedicated place on campus for promotion of green technologies/Green Olympics. Ask the students to promote their poster for students and teachers during the campus event.

You can use the suggested criteria in Appendix 2 to evaluate students' participation and presentations.

During group discussions, you may refer to the following examples to guide students' discussion in a group:

Group discussion 1

- What green technologies were used during the Beijing Winter Olympics 2022?
- What sustainability issues were addressed by the use of these green technologies?

Green technology	What sustainability issues does it help to address?
The application of new energy, such as solar, wind and thermal power	e.g. energy shortage, climate change, greenhouse effect
Reutilization of Olympic venues	e.g. recycling, green buildings
Green transportation technology	e.g. energy conservation and efficiency, global warming
Green garments for staff and athletes	e.g. waste management, carbon cycle

Group discussion 2

1. Choose an industry sector that is relevant to your discipline/future field of work, and discuss how these green technologies (e.g, clean energy, green materials) can be applied in those sectors and what sustainability issues can be solved by these technologies? You should choose at least two green technologies identified from the case study and explore them further to discuss in more details according to your own education/work background.

Examples of green technologies:

a. 3D printing could be used for landscape projects. For example, Shenzhen International Convention and Exhibition Center used 3D-printed concrete to create a landscape plaza with a total area of 5523.3 square meters. 3D-printed concrete was used to build the pedestrian walkway, sculptures, seats, tree ponds, flowerbeds and retaining walls. 3D-technology greatly reduced the cost of materials, molds and labor.

b. Used containers were transformed into environmentally friendly housing, sales offices or container industrial zones. Those end-of-life international standard containers were stacked layer upon layer and reinforced with welding to create different offices. Those offices were then connected by stairs and an outdoor platform made from wooden panels and an iron frame. This was how used containers were transformed into detached or joined offices.

You can also guide students to discuss:

a. Solar power application in residential communities and parks.

b. The applications of all kinds of green technologies and green materials in different sectors, such as the construction sector, new energy, vehicle manufacturing.

2. Apart from green technologies/measures presented in the case study, identify additional green technologies that could be applied at the next Olympics? Students can do further research on this.

   You may direct students to think about the following points and guide students to do online research using keywords, such as "green technology in 2022".

   a. AI technologies for addressing different sustainability issues, such as waste management and electricity monitoring.

   b. Green materials used for building different facilities for the Olympics.

   c. Green technology that helps to generate energy from waste, such as producing electrical energy via steam-powered turbines, or helping to turn waste to something useful, such as plant-based packaging.

   d. Self-sufficient buildings and low carbon construction.

Reference:

生态中国网. 2022 北京冬奥会如何做到绿色环保？[How did the 2022 Beijing become a green Winter Olympics?] www.eco.gov.cn

北京冬奥会有何绿色看点？解密"绿色冬奥"中的"黑科技" [What are the green futures of the Beijing Winter Olympics? The "Black Technology" in the "Green Winter Olympics".] https://m.thepaper.cn/baijiahao_16580518

冬奥会场馆：绿色、科技、智慧、可持续[Winter Olympics venues: green, technological, smart and sustainable] https://www.doc88.com/p-13373981128131.html

List of videos and reports to watch before class:

1. 绿 色 冬 奥 低 碳 北 京 ｜ [Beijing to embrace green, sustainable Winter Olympics] https://m.ximalaya.com/selfshare/sound/472556879

2. 2022 年 冬 奥 会 让 科 技 、绿 色 飞 跃 [2022 Winter Games to make tech, green leap] https://www.aisoutu.com/a/1070286

3. 北京冬奥会开幕式细节彰显绿色理念【双语】[Opening ceremony of Beijing 2022 mirrors vision of green Olympics] http://xby.52hrtt.com/cn/n/w/info/G1644285313649

4. 北 京 冬 奥 会 将 是 一 场 绿 色 冬 奥 会 [Beijing aims to hold a green Winter Olympics] http://www.enread.com/news/sports/109852.html

5. 绿色冬奥，来了！[Green Winter Olympics Coming] https://www.bilibili.com/video/av421344427

6. 绿色冬奥来了！英文解读首届零碳冬奥会长什么样？[What does the first zero-carbon Olympics look like?] https://3g.163.com/v/video/VFMO5VP7K.html

7. 最后的 500 天:北京冬奥会的"绿色"成绩单 [500-day countdown: Progress in hosting a green 2022 Olympics] https://h5.weishi.qq.com/weishi/feed/73T4TIxbe1KkAXTxi

8. 可持续向未来[Sustainable for the Future]

   https://haokan.baidu.com/v?pd=wisenatural&vid=5360513138097658509

9. 老外讲故事·看冬奥⑬｜沙睿杰:最触动我的是关乎我们共同命运的绿色奥运理念! [Shanghai through our eyes: Beijing 2022 ｜ Rajnish Shama: What impressed the most is the shared future of ours—Green Olympics] https://video.sina.cn/finance/2022-02-19/detail-ikyakumy6782461.d.html?tn=sjllqjp

10. 街头采访|2022 年冬奥会及绿色奥运知多少？[R-Cells Interview ｜ what do you know about 2022 Beijing Winter Olympics and Green Olympics] https://www.bilibili.com/video/BV1qK4y1W7Zi/

11. 科技冬奥之「将"低碳"进行到底」冬奥绿科技打造多个世界之最！[The Winter Olympics Technologies: Top Green Technologies of "Low-carbon" Olympics] https://haokan.baidu.com/v?pd=wisenatural&vid=5690477415242209897

12. 双语|"飞扬"！北京冬奥会、冬残奥会火炬发布 [Torches of Beijing Winter Olympic Games and Winter Paralympic Games Released] https://www.163.com/edu/article/G27TUBU100297VGM.html

13. 双语｜北京冬奥会将设三个冬奥村，食堂是亮点[Dining halls will be a highlight of three villages of Beijing Winter Olympic Games] https://xw.qq.com/cmsid/20211222A01OV000

14. [北京 2022]绿色冬奥 氢燃料车助力张家口赛区 [[Beijing 2022] Green Olympics: Hydrogen-fueled vehicles powers Zhangjiakou venues] https://tv.cctv.com/2021/10/18/VIDE2DVbLBU1xzKZ4l9A6CGo211018.shtml

15. 揭秘！冬奥会绿色"用雪自由"背后的科技"护航舰" [Reveal: Technologies behind the "Snow Freedom" of Green Olympics] https://www.360kuai.com/pc/974452bfa2253f174?cota=3&kuai_so=1&sign=360_57c3bbd1&refer_scene=so_1

16. #北京 2022 年冬奥会 #冬奥气象 100 问 为什么冬奥会的雪是"绿色"的？30 秒 get！#北京冬奥会 [#Beijing Winter Olympics 2022 #100 Questions: 30 seconds on why the snow of Winter Olympics is "green"?] https://tv.360kan.com/player?id=039c4a7d47723228cbfb69018e8d742d&q=%E5%86%AC%E5%A5%A5%E4%BC%9A%E7%BB%BF%E8%89%B2&src=mohe-short_video-new&srcg=mohe-short_video-new

The evaluation criteria for your participation and presentations

	Excellent	Good	Fair	Poor
Engagement	All members actively engaged in group discussion	At least 3/4 of students actively engaged in group discussion	At least 1/2 of students actively engaged in group discussion	At least 1/4 of students actively engaged in group discussion
Task assignment	Tasks were assigned to every group member	Tasks were assigned to most group members	Tasks were assigned to only 1/2 of the group members	Tasks were taken up by only 1 group member
Quality of group discussion	Group members showed excellent listening skills and shared ideas through discussion	Group members showed a certain level of communication and interaction skills when discussing core ideas	Group members only engaged in simple discussion and had little interaction	Some group members were not interested in interaction
Roles of group members	Each group member clearly identified and effectively performed his or her role	Group members were assigned roles but were not clear about the role definition	Group members were assigned roles but did not play their roles	No roles were assigned in the group
What green technologies were used in the Beijing Winter Olympics 2022	Over 4 technologies	3 technologies	2 technologies	1 technology
What sustainability issues were addressed by these green technologies	Over 4 technologies	3 technologies	2 technologies	1 technology
What additional green technologies can be used in the next Olympics/ greening of industries	Over 4 technologies	3 technologies	2 technologies	1 technology
Quality of the poster	Ideas were presented in a very clear and interesting way in the poster. The poster was artistically designed.	Ideas were presented in a relatively clear and interesting way in the poster. The poster was designed with some artistic elements.	Ideas were not presented clearly and interestingly enough in the poster. The poster was designed with a few artistic elements.	Ideas were not presented clearly in the poster. The poster lacked artistic design.
Quality of promotional talk about the poster	Described ideas very clearly about how green technologies help solve sustainability issues. Provided strong evidence to support arguments.	Described ideas relatively clearly about how green technologies help solve sustainability issues. Provide relatively strong evidence to support your arguments.	Less clearly described the ideas about how green technologies help solve sustainability issues. Less evidence was provided to support arguments.	Unclearly described the ideas about how green technologies help solve sustainability issues. Insufficient evidence was provided to support arguments.