Hong Kong Award for Environmental Excellence: Lessons from ISF Academy

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Application for the HKAEE Recommendations

Highlights of your Institution

- **Team of people**
- **Whole School Approach**
  - Facilities and Operations - What's your hardware? What support do you have from your administrators
  - Teaching and Learning - Look closely at your curriculum
  - Community Engagement - student clubs, parent involvement, faculty involvement, community days
  - External Partners
  - Highlight your successes in detail
  - Focus on Hong Kong and the region - what can your students do to help HK and the local environmental problems
  - Future plans - what are you doing next?
  - Where does sustainability fit into your strategic plan? Mission statement? Values?
  - Showcase your school - hopefully with an in-person tour

Introduction - Imperative for Schools

The ISF Academy

- In 2019, The ISF Academy won the Gold Award in the Education Sector of the HKAEE for both the Primary School and Secondary School
- We are located in Pokfulam at Cyberport
- ~ 2000 students on the Cyberport campus and ~ 300 in Kennedy Town
- Sustainability journey began in 2014
- Aligns with our values and mission statement
- Focussed on teaching and learning - innovative programs
- Infrastructure improvements

Remote Ceremony - Receiving the Awards

Example of a Sustainability Model

Whole School Initiatives

- Whole School Sustainability Council - includes parents, teachers, students, administrators - looking at policies and roadmap to net zero by 2030
- Dedicated full time Program Manager for Sustainability
- Whole School Sustainability Audit done in 2019 just before COVID
- TASS: The Alliance for Sustainable Schools - founding charter member
- Teacher Professional Development program: Sustainability Stewards
- Taught curriculum - both English and Chinese
- Partnerships with NGOs, Universities, Corporations

Sustainability Stewards

- Professional Development Program open to all teachers in the 3 divisions
- Bilingual emphasis to enhance the taught curriculum to include sustainability and the SDGs into all subjects at all grade levels
- This is a 1 or 2 year commitment on behalf of the teacher, monthly stipend
- Additional opportunities for faculty to take courses and attend conferences
- Active support by the Sustainability team - class tours, seminars, resources

Primary School

Cavat: Many of the Primary School programs we have adapted for our Pre-School in Kennedy Town: gardening, recycling, community events, teacher training, upcycling programs, old school uniform collection

- 1200 children in the Primary School
- Innovative programs include:
  - Food waste composting and rooftop gardens (over 500 students garden each year)
  - Traffic light system for energy consumption from the microgrid
  - Sustainability art projects
  - Sustainable Development Goals -----> makerspace--------> Project Day

Secondary School Highlights

- 5000 energy sensors on the campus for classroom monitoring on the campus
- Mobile App Development for individualized carbon footprint
- Student led research projects - present at international conferences
- Center for Renewable Energy Education - EE and IA course work
- Nanotechnology and Molecular Biology Laboratories
- Student led service projects
- Experiential Learning Opportunities
- Environmental Studies course at Grade 9/10
- Sustainability Student Voice committee

Swimming with Plastic

The Carbon Footprint of School Lunches at ISF Academy

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THE ISF ACADEMY

AGU 100 ADVANCING EARTH AND SPACE SCIENCE

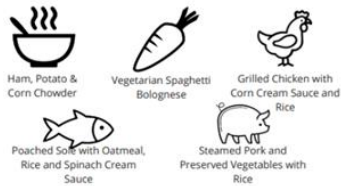
Introduction

Hong Kong is extremely dependent on imported goods. The city imports over 90% of its food from Brazil, the United States, Vietnam, Indonesia, the Philippines and China. Mainland China supplies 92% of fresh vegetables consumed in the city.

The ISF Academy is a private school in Hong Kong with a population of 2,000 students aged between 4 -18, all of whom have to eat lunch. The school's food service provider, Sodexo, serves around 400 lunches at ISF every day, the majority of which contain an animal protein.

The purpose of this research is to investigate the carbon emissions of school lunches at ISF and consider whether the school can improve the environmental impacts of each meal.

Lunches Analysed



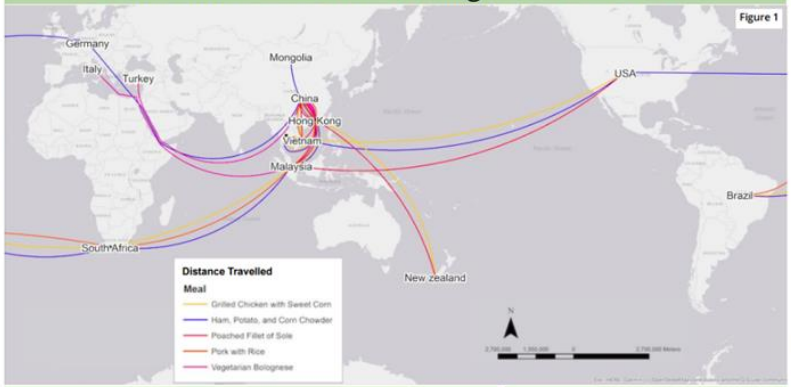
Assumptions & Limitations

A specific loading and unloading port is required to calculate the distance travelled by each ingredient. Sodexo provided each ingredient's country of origin, but did not always specify the city it came from. In those cases, the country's busiest port or capital city was used instead. While this assumption decreases the accuracy of the total distance travelled, it does give an adequate estimation of the total carbon emissions from transportation.

Sodexo stated that trucks were used for all road transportation, but did not share the specific truck size. For this investigation, it was assumed that all the trucks were 40 tonne heavy duty trucks, which still provides a general depiction of transportation emissions, despite the fact that every truck size has different levels of fuel efficiency.

The carbon emissions from livestock and agricultural production were calculated using data from Poore and Nemecek's article "Reducing food's environmental impacts through producers and consumers." However, their data did not include all ingredients used in the analysed lunches, so production emissions of the most similar food was used instead. For example, milk was used in place of culinary cream and wheat was used in place of pasta.

Visualisation of the Distance Ingredients Travelled



Refrigerated Ingredients

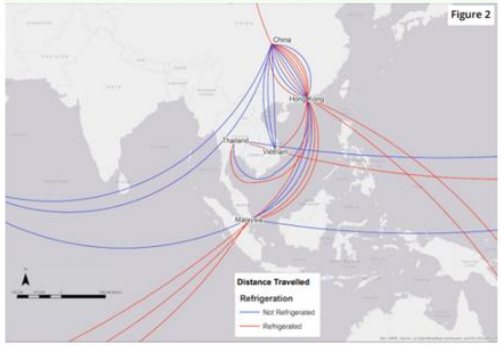


Figure 2 above identifies which shipments were refrigerated and which were not. Ingredients that were refrigerated during transport emitted more CO2e per kilometre than items that did not require refrigeration. For example, non-refrigerated trucks produce 1.03 kg of carbon dioxide per kilometer, whereas refrigerated trucks emit 5% more CO2 per kilometer, at 1.086 kg.

Transport Emissions

It was assumed that all the ingredients travelled to ISF on 40 tonne heavy-duty trucks or cargo ships. These trucks emit 51-91 grammes of carbon per tonne kilometer and cargo ships emit 10-15 grammes of carbon per tonne kilometer from fuel combustion.

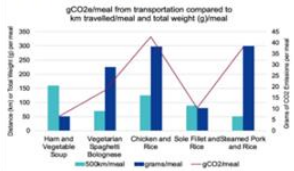


Figure 3

The CO2 emissions from transportation is mostly influenced by the total weight of the meal, rather than total kilometers the ingredients travelled. The chicken meal has the highest transportation emissions and its total weight is relatively heavy, while the soup has the lowest emissions and is relatively lightweight.

Shipping emissions are currently responsible for 3.1% of the total global greenhouse gas emissions, but the IMO estimates that by 2050, shipping emissions will account for 10% of total global emissions. Despite this rapid increase, shipping emissions are not included in the Paris Climate Agreement.

Total CO2e Emissions per Meal

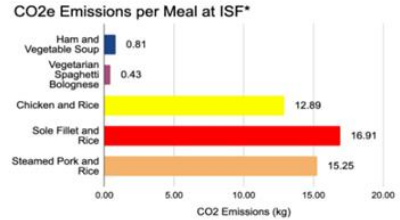


Figure 4

* The data used in figure 4 is from Poore and Nemecek's article on the average global carbon emissions from food, which included emissions from land use change, crop production, livestock and aquaculture, processing and packaging.

Animal protein based meals have significantly higher CO2e emissions than the plant protein based meal, but each animal emits different levels of carbon. Per 100g of protein, pork emits 7.6 kg, chicken emits 6.7 kg and fish emits 6.0 kg of CO2e. In addition to meat type, the portion of animal protein affects the total CO2e emissions. Of the meals analysed, the largest portion of animal protein was sole, which was consequently the highest CO2e emitter, as seen in figure 4.

Conclusion

The results of this analysis go against the logical assumption that the further an ingredient travels, the higher its emissions. In fact, greenhouse gas emissions from transportation per meal are relative to the weight of each ingredient shipped. Transportation emissions of each ingredient were calculated by finding the percent of space it occupied on the truck or ship and since ships have greater storage capacities than trucks, the same weight of ingredients emit more CO2 in a truck than on a ship.

This analysis also demonstrates that meals with animal protein release more CO2 than meals with vegetable proteins. This is because animal protein emissions include the greenhouse gases from producing livestock feed, the land-use change required to create space for the animals and the greenhouse gases livestock manure and flatulence create. Producing feed for livestock tends to emit more CO2e emissions than growing vegetable proteins, on top of the added transportation that is required to bring the food to the animals. Additionally, the growing of livestock feed is the leading cause for deforestation for agriculture on top of the loss of natural habitats and biodiversity.

The ISF Academy could reduce its carbon footprint by serving more vegetarian meals in place of animal protein meals. ISF could also display the total emissions of each meal on the daily menu so students and staff can consider the carbon emissions of meal options when deciding what to eat.

Areas for future exploration within this topic include calculating the carbon dioxide equivalent emissions from food processing and manufacturing that are specific to the ingredients served at ISF.

This topic could be further expanded by considering the carbon emissions from food when it is wasted, so that the ingredients' entire lifecycle is accounted for.

Scan here for works cited & acknowledgments