Conference on Sustainability in Engineering - CFES -2019

Report
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In Attendance:
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Overview

The Conference on Sustainability in Engineering for 2019 in University of Northern British Columbia in Prince George; BC’s Northern Capital, was held for the first time. Three delegates from Simon Fraser University Burnaby went to different sessions to cover all of the sessions. The conference focused on the theme of the “Triple Bottom Line”: Social, Economic and Environmental impacts. Not only did I gain knowledge on the sustainability and its current applications, but I also got to know the importance and the consequences especially if engineers don’t seek approaches that are sustainable. Taking the LEED course also gave me a more in-depth of the utilization of engineering and planning to achieve sustainable buildings. I will present the main points and the summary of different sessions.
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Opening keynotes

The conference took off with the keynotes from Guido Wimmers, Chair of the Master of Engineering Program. He presented a few actions they took to make this event sustainable, they planted 100 trees to offset the carbon footprint of this conference and they showed the engineering students optimistic outlook on the actions that have been taken to achieve sustainability such as using wood houses that reduce the energy consumption by 90% or buildings that used 85% less fossil fuel by switching to bio-energy. the content of the presentation focused on the education and the ethics of engineering, issues we are currently facing such as harsher climates and hence why we need the use of solar and other power productions. With many politicians and stakeholders that don’t fully believe in building a sustainable future, we aim to educate the youth to get into the community and politics the help our own future.

PG citizen, September 2, 2017: Referencing Dr. Rueben L. Gabriel, Ph.D., Instructor at CNC:

“Education is the means to building a progressive, peaceful and socioeconomically vibrant society. The end goal of education is nation building and global welfare.”

The opening keynotes also highlighted the importance of education for taking part in diversification, sustainability, positive change innovation and building a better society when there is leadership across the party lines.

Sustainability in Prince George

this session presented by Joshua Kelly opened with The Sustainable Development Goals (SDGs) and that it is challenging to show exactly what a sustainable project is. However, Prince George has taken many actions to build sustainability in their own community and more:

- Protecting sensitive slopes and wildfire control
- The first community to hit the mitigation roadmap
- Wastewater treatment
- Solar water heater
- The 20m² of solar pavement in front of City Hall and plans for powering electric cars
- Low carbon resilience
- Considering natural assets and green infrastructure
- Using Community Lifecycle Infrastructure Costing (CLIC) Tools
- Active transportation including sidewalks and transit
- Cleantech cluster
- Using waste to heat forestry operation

The presenter also explained that there are still actions for the youth to take such as:
Day two keynotes

The second-day Keynotes by Albert Koehler (P.Eng) exposed a few misconceptions about sustainability such as the way automotive companies would call their low emission cars or hybrid cars “green” when in fact it is not sustainable. The keynotes explained that the term sustainability is binary and there is not a “more sustainable” approach, there is only sustainable or not sustainable, even the Wood Innovation and Design Centre is not considered sustainable.

Furthermore, this keynotes provided a couple of points about constructing sustainable buildings

- energy Efficiency
- changes to the urban environment (such as transportation and heat island)
- materials used
- life cycle assessments

The keynotes also mentioned the benefits of building with wood, such as:

- faster building time, less light and noise pollution
- easier to recycle and used for other constructions
- long-lasting (no rusting)

Technical Tour/ UNBC Bioenergy

This tour showcased the transformation of energy usage from solely reliant on natural gas to using different biofuels in UNBC. The entire campus building was built to use natural gas when constructed in 1990. In the early 2000s, engineers were playing around with using bioenergy for energy such as heating, this project faced many challenges as to retrofit new boilers to the current existing building. Here are some key notes and ideas from that tour:

- One of the main users of the bioenergy heater is the greenhouse in UNBC, this greenhouse is not that well insulated, which required more energy to heat that building. Since biofuels are cheaper, the school has never considered taking any action to build a more efficient greenhouse.
- The boiler would take both wood pallets and hog fuel. dry pellets are mainly used overseas as it has a lower moisture content.
- The ash from the biowaste is currently going to landfill, but they are working with local farms to use the ash as soil amendments.
- The boiler building (UNBC Bioenergy Gasification Plant) is LEED certified (platinum)
Becoming Canada’s Green University

Other than just using biofuel, the students and the staff of this university has also started implementing ways to reduce waste, to start off, UNBC has an annual campus clean up for about an hour, with many students cleaning up the campus for both recycling and a better-looking campus. The students at UNBC has built their own dome greenhouse and uses lights from all angles to increase the temperature naturally from sunlight. UNBC did many other projects as listed below:

- Borrow A Mug (BAM) Program for students to save money and reduce paper cup usage on campus.
- Perhaps instead of reducing the charge of coffee if you bring your own mug, the cafe would instead charge more for a paper cup, using physiology to achieve sustainability.
- Changing into LED lights in classrooms for energy efficiency.
- Implementing timers and programs to monitor energy usage to reduce energy consumption by 15% on average which also saved the university $142000/year
- Using energy wise network to showcase with others of what went well in the project, what did not go well and places to improve on
- Started an all student course on global environmental changes
- Currently researching in wasted food and how to deal with that in our society.

A Look to our Future

This session was presented by Emily Cheung, the Engineering Manager at DWB and an instructor at UNBC. Her talk focused on conservation and equality, Cheung expressed that sustainability has different meanings to different people(such as engineers, farmers or politicians) so in the end, it all comes down to what other people can see it as sustainable. Because we can see what other people are thinking and deciding is sustainable, we can better educate or tailor the future so people would be satisfied. To further prove this point, Cheung mentioned that even the usage of solar panels requires dangerous mining in harsh conditions and it has a negative impact on the environment as well. She suggests what the youth can do is to learn from the past and innovate for the future, avoid looking only in the current condition, collaboration with interdisciplinary and different generations to share ideas, mistakes to learn and contribute together, having consistency in what is right and wrong (ethics). Cheung also expressed that due to climate change, more frequent and extreme weather will mean that the old definition of a rare phenomenon is no longer in place and when innovation and constructing the future, engineers that into consideration. Lastly, Cheung suggests that engineers should go to their old projects and keep track of consequences, losses or wins in their career.
Engineering the Future of Food Production

This session was given by Andrew Adams, founder of the Hope Farm Organics, in this session, Adams gave a few facts about his experience in engineering farming and the future that he envisions:

- People can learn and use their knowledge in science to plant in harsh conditions
- There are many climatic issues coming up and it will affect the farmland, but because society does not value what they have until it’s gone, a certain awareness to the climate change is needed for society to take action before it is too late.
- We are expecting 20% more rain in 2050, but all those extra rain are expected to be focused in small time intervals (weeks, if not days), which will result in more frequent floods.
- Large scale mega farms have equipment that local farms often cannot afford but large scale farms do not care about the quality of their plants as much as local farmers.
- Local farms would modify and breed potatoes to have higher vitamin B content and does better in droughts, another step local farmers would take to ensure that their food is still full of nutrients and sustainable.
- Adams would build or fix small scale machines that would help with the heavy workload on a farm.
- Adams realized that automation is the key to the future of local farms and would encourage engineers to help local farms to achieve that goal.

Fossil Free - The Divestment Movement

This session was presented by Joey Broda, Biogas and Hydrogen Technical Specialist from McGill University. He starts off with a store of the floods and fires Canada faced in the past few years and how it cost a tremendous amount of money from the taxpayers. However, there hasn’t been much action taken in the preventions of such event, Broda explained that you can not treat a burn while there is still fire and we must remove ourselves away from this current situation before we can dive in and fix the issues of climate change. From statistics, our environment can only withstand a 2-degree change in average temperature before the earth reach irreversible damage, because it would take roughly 500 gigatons of CO₂ emission before we reach that temperature, and since there are 40 gigatons of CO₂ being emitted annually, there must be actions against the burning of fossil fuel.

While it may be true that major fossil fuel companies would public admit of its impact on climate, large corporations would rather supply for the growing demand for such products. Broda pointed out that there have been divestments in the 1990s against tobacco and he expressed that fossil fuel, much like tobacco, is killing the environment and us as well. Under the divestment Principles, investments in fossil fuel extraction are either at risk or becoming stranded assets.
and profitable, but at the cost of devastating climate change. Because large institutions have a big impact on the fossil fuel market, they should also have obligation to consider the wider social impact of their actions.

Broda brought up a few known organizations and individuals that are already involved in fossil fuel divestment such as World Bank, City of Sidney and Ban Ki-Moon. He felt the need to take actions against McGill university with petitions to the board of governors as well as protests and educations session on fossil fuels and their impact on the climate. However, it has been fruitless because it was too big of a scope and the board can not jump on board and move their assets altogether. Broda fought against this argument as there are many large index or mutual funds that divest, not unlike the already existing mutual funds and index funds.

Broda came up with an ambitious idea for the existing problems, he proposes to use the existing pipeline to transport and store methane gas from landfills to put in use as an alternative fuel for trucks. Lastly, Broda encourages system thinking as it will help us reveal and understand how the system over a long time will perform.

A Low Carbon Energy Future

This session was given by Steve Helle, UNBC Associate Professor. He expresses that there are many different ways that we can reduce our carbon footprint but there is still a long way to go. Here are his main ideas.

- Electrification is the first step that we can take to achieve lower carbon energy
- We have been using more clean energy
- Huge improvement for solar panels, both in cost, effectiveness and emission for production
- There is still the rebound effect or Jevons paradox, things are too costly to use. But though it can be more efficient, more people use it and more resource is lost
- Passive house use about ¼ of the energy of that regular house
- We have internationally agreed to limit it to above 2 degrees max from industrial levels
- It took 50 years for coal to become the primary energy source
- Another 50 years for oil to become the primary energy source
- Shell projects that we will mainly use solar and wind energy
- We can even have a negative CO\textsubscript{2} impact if we have enough vegetation
- in the equity Statistics, we found that the main user of energy is from the first world to support their lifestyles such as driving or lighting
- With that being said, people in the lower class should also deserve a higher quality of life
- From primary energy to useful service, we go down to about 3% used for actual work, much like the bioenergy lost when energy is moved up the food chain
- Though our impact might be small, every bit counts
Investing in Sustainability

This session was given by David Claus, Director of Facilities Management and Capital Planning for UNBC. He strongly encouraged actions from the youth and what we can do to invest our time and money into sustainability:

- UNBC sponsored by BC Hydro and they wanna save money
- It is important to measure the usage of energy and compare it with how well a project is doing based on their own statistics
- Energy projects often generate payback and saving for the end user
- But many sustainable initiatives are actually worse than not investing in them at all! such as using paper bags (cost more than plastic bags to produce)
- And because of that, many places will not recycle when they have the area for putting trash in landfills
- Most importantly, for us to raise awareness of the importance of investing in sustainability, we must get staffs and people from the university on board.
- Make sure to tell the story and have an audience
- For us to have a proper impact on the audience we need to be-
  - Specific
  - Measurable
  - Assignable
  - Relevant
  - Time-based
- Organizations like to be safe so they want to build anything for that reason
- Another good reason for organizations to invest in sustainability is for (immediate) safety reasons or publicity

Leed Certification Course

LEED (Leadership in Energy and Environmental Design) Certification is a point (credit) based evaluation and it can be reported online to be qualified. There are many prerequisites to be met even before it could be ranked for the LEED Certification. There are many aspects to this certification, ranging from electricity used to energy consumption. The points are given in different categories:

- Integrative Process
- Location and Transportation
- Sustainable sites
- Water Efficiency
- Energy & Atmosphere
- Materials and Resources
- Indoor Environmental Quality
Innovation in Design
Regional Priority

This course helps the student to pass the LEED Green Associate Exam and once the exam is passed, the individual then is granted the title of Green Associate and must have 15 hours of Continuing Education every 2 years.

Case study presentation

The case study presentation assigned a few students to each group and were all given the same issue to deal with, which is “how to feed the 10 billion expected population in 2050”. Each group had a few hours to come up with a solution and present their ideas. The main ideas from each group as follows:

- Having an app linked to the home fridge and notify the user when an item is going to be expired to reduce wasted food.
- Phasing out cattle farms via government legislature and implement multiple floor condominium style aquaponic systems across Canada. Reducing the area used for farmland
- Using fish to provide nutrients for the plants, more sustainable, which will cost less than importing goods and reducing GHG emissions from cattle farms

personal takeback and feedback

The organizers definitely paid a lot of attention to details in this conference and everything went as planned. I would like to see ESSS events to be held with this much collaboration and involvement. These conference sessions would also bring the students to different venues and explore what the city has to offer, I would like this conference to continue and see what the University of Waterloo can bring for the next sustainability conference in the future.

The most important takeaway from this conference is that although there are many steps that we have already taken, there is still a long way to go before engineers can call quits. In fact, the idea of sustainability is ongoing and it requires constant attention from mindful engineers for the environment to stay healthy. I also got to learn about the tools that engineers use for assessing the sustainability of buildings and cities such as life cycle analysis, passive house.

A huge aspect of this conference was to connect with other students, from conversations, I learnt that many other universities also have sustainable engineering undergard programs and many universities in Europe is already divesting in their funding. That information will invaluable in the future in my education and professional development.

I also had the chance to talk to a student from Ryerson University and learned about their engineering society’s own publication. They organized a group of passionate writers in the program and publish both satirical publications and actual advancement and news in the engineering sphere of things. I
realized that this is the unity that SFU-B is lacking and haven’t been able to be achieved for a long time. In the near future, I would like to start publications in ESSS and get sponsors and advertisers for them as well.

Lastly, I would like to thank ESSS for giving me this opportunity to be involved in such an event and warn anyone travelling to Prince George in the future that they should pack warm.