A Brighter Bishops

Implementing sun exchange programme at Bishops

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Contents

Introduction:

We are Louie Hart, Storm Lanfear, James Du Preez and Thomas Mason - 4 boys at Bishops Diocesan College in Cape Town, South Africa. The big ideas course takes place in the second semester of your grade nine year and this year we were fortunate enough to take part.

Figure 1 The Group Members

The world is developing and therefore education must develop along with it and this is exactly what the big ideas course sets out to do. It focuses mainly on the Sustainable Development Goals, which focus on the development of the world in multiple facets in a future thinking and sustainable manner that the UN developed, and 193 countries signed in 2015.

What are the problems?

The problems with our SDG are that currently, around a billion people live without electricity. Close to three billion lack access to clean cooking solutions and are exposed to dangerous levels of air pollution, which results in millions of deaths each year, mostly among women and children.

https://sustainabledevelopment.un.org › ...

There is also the problem of global warming that is helped by the burning of coal and oil

What are the specific problems that we addressed?

Our first idea was looking at using faeces to create a very sustainable way of getting cooking gas solving that problem but then changed to solar power to take the school off the grid beginning to solve the problem of unclean energy.

Who do these problems affect?

These problems will ultimately affect everyone, because if we carry on with our current ways and continue to burn fossil fuels, there will continue to be global warming and people will continue to feel the affect and it will all come crashing down on us soon.

Who did we want to help?

We feel that there isn't just one specific group of people that we want to help, although it may benefit some people more than others. The problem that we have addressed will ultimately benefit the entire world as it will reduce the use of fossil fuels and ultimately save our planet from global warming along with many other factors and this will in turn help everyone.

Where did our project take place?

Our project is aimed to take place at our school, Bishops.

However, sun exchange is an idea scalable to the extent where it can be implemented on every rooftop across South Africa.

Why do we care and why do we want to address these problems?

The hard facts are, if we don't stop using non-renewable fossil fuels, there will soon be no planet left to save. The problem of renewable energy is one that affects every living human being on Earth, and we all need to do our part to help

Another asset that the big ideas course sets out to develop is the 4 C's:

Creativity

WHAT IS IT: Creativity is the use of one's imagination to come up with new and original ideas

WHY IS IT USEFUL: Creativity is one skill that cannot be accomplished by computers, so as AI becomes more and more prevalent in our society, we need to develop this uniquely human skill to remain ahead of the curve.

Communication

WHAT IS IT: Communication is transferring information from one person to another through the use of writing, speech or other methods

WHY IS IT USEFUL: No one person can hold all the information in the world, but if everyone learns a bit, the whole world can work as one.

Collaboration

WHAT IS IT: Collaboration is the act of working together with others to produce something

WHY IS IT USEFUL: Collaboration is useful to combine people's skills to make a group worth far more than the sum of its parts.

Critical Thinking

WHAT IS IT: Critical thinking is the ability of someone to see a problem in a completely objective way.

WHY IS IT USEFUL: Many of the issues the world faces today are extremely controversial, so being able to look at things without bias is crucial.

The reasoning behind the development of these qualities has to do with the future of education and the 4th industrial revolution - which we also had the privilege of learning about this to a great extent with Mr. Maree -

These 4 C's are traits that us as humans and citizens of the future should seek to develop as robots and CPU cannot imitate these qualities to the extent that the human brain can, it thus an advantage we have over robots, if developed properly.

The sustainable development goal that we are focusing on is

SDG 7 - Affordable and Clean Energy

Figure 2 SDG 7 Renewable Energy

But it relates to many of the other Sustainable goals such as

Figure 3 SDG 1 No Poverty

- Goal 1 - No poverty

We are going to be relating to no poverty, because in the process of solar panels, they need to be people who make, transport and install them. This requires companies to employ people who could be in poverty, lifting them out by providing them with a job. It will also make electricity cheaper for everyone, especially for those in poverty and they are then able to save money and possibly bring them out of major poverty. It not only helps the communities save money, but also helps the government. This will allow the government to spend more of the money on things such as housing, Police force etc to help people in poorer communities. (peterson, 2017)

The poverty numbers in South Africa are terrible. In 2014/2015 49.2% of adults were below the upper bound poverty line. (Department of statistics south africa, 2019)I think

this will make a small impact in helping reduce poverty and by doing so, working towards the SDG-1 goal: No poverty.

Figure 4 SDG 8- Work and Economic Growth

- Goal 8 - Decent work and economic growth

Our project is really closely linked to goal 8, because if more people get involved in the project, sun exchange will employ more people to deal with the economic side of things, and the solar panel company will employ more people to build and maintain the solar panels. The companies that produce the raw materials will have to employ more people to cope with the increased demand, and last of all, the actual places where the program is implemented will save money on electricity costs, meaning they have more money to spend on expansion, and hiring more workers.

Figure 5 SDG 11- Sustanable cities and Communities

- Goal 11 - Sustainable cities and communities

Our project is related to this goal as we are looking to completely take Bishops off the grid and as a school it uses up a lot of electricity. This project also involves selling sustainable energy back into the grid resulting in more energy for SA. Hopefully through having this project at our school people will see its hopeful success and want to implement it in other places and due to the fact of the cells making your money back for you it will come at little to no cost therefore resulting in a sustainable economic and green energy environment.

Figure 6 SDG 12- Responsible production and Consumption

- Goal 12 - Responsible production and consumption

Currently, the vast majority (Roughly 90%) of South Africa's electricity is made from coal. Our coal in particular has a low heat value (doesn't make much electricity) and has a high ash content (bad for the environment) (Eskom, N.D)

Using solar power will make our consumption of electricity much less taxing on the environment, and our generation will be much more responsible in taking care of our planet.

Figure 7 SDG 13- Climate Action

- Goal 13 - Climate action

Our goal is closely linked to SDG13 as one of, if not the biggest problem with the current climate crisis has to do with our carbon emissions. 78% of global carbon emissions can be attributed to the burning and use of fossil fuels (scientists, 2016)

The main goal and target for our SDG is to rapidly decrease and strive to eradicate using these fossil fuels to produce energy. This means that by striving for affordable and clean energy for all (SDG7) we are also helping to solve the problem of climate change.

FIRST IDEA: Biodigester

-How we got the idea-

Our first idea that we had was very different to our current path and had to do with sustainable cooking fuels. Our idea came about as a result of a statistic we came across in which we learned that 3 Billion (40%) of the world's population still rely on polluting or unhealthy cooking fuels. ((UNDP, 2019)

Our idea was to implement a process called bio-digestion in rural farming areas in South Africa as this system runs off natural animal manure in which the natural methane is harnessed and burned for cooking. Cows are obviously a relatively abundant resource in such areas and thus it gave our idea merit and possibility.

-How it works-

Bio-digestion occurs when bacteria digest organic material in an anaerobic (without oxygen) environment. They produce two main products, biogas, a mixture of methane and carbon dioxide, and what is known as digestate, an organic slurry that is high in useful nutrients, free from pathogens and has little to no smell, making it an ideal fertilizer for industrial farming.

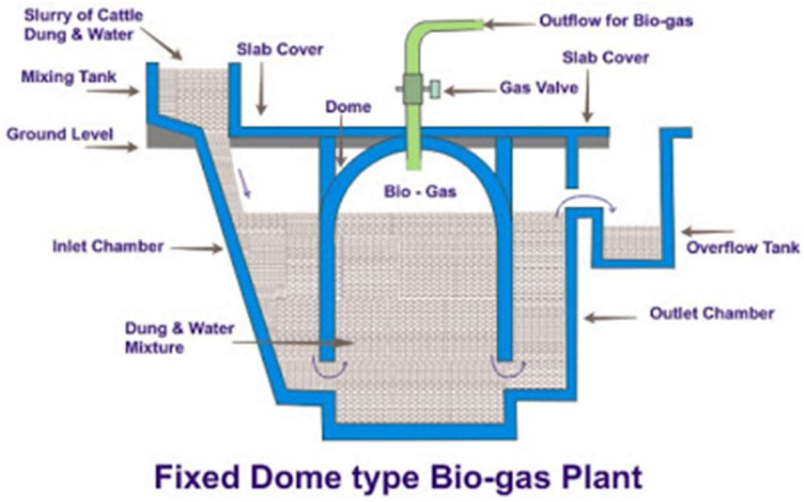


Figure 8 A Bio-gas Digester

(feedburner, 2016)

The research we did also showed how effective this process is and how resource efficient it is - 1kg of cow manure produces enough methane to provide an hour of cooking gas and each cow produces 37kg of waste per day. (Fischer, 1998)

(Homan, 2012)

Biogas is already used in some areas of the world, particularly on large-scale dairy farms, but we wanted to scale down this technology and present it to the general public. (Agriculture, n.d.)

Unfortunately, whilst on our outing at the sustainability institute we discovered how large and difficult the infrastructure was to actually build, and how expensive these mechanisms were.

This reason for failure along with the help of our coach and a few brainstorming sessions led to our new idea.

SECOND IDEA: sun exchange

By this point we had been researching the biodigester for quite a while, and we were becoming quite disheartened, as we felt that we had hit a brick wall of sorts. We had looked at the theory for hours and watched countless videos, but still felt as if very few people had concrete instructions on how the digester could be made on a smaller scale and cheapy. It was then that our coach, Mr Vincent, introduced us to Sun Exchange, a collaborative program providing solar power to schools and businesses in Southern Africa. ((Exchange, 2019)) We felt strongly about this idea, as it seemed like a practical way to take a step towards a more sustainable Bishops.

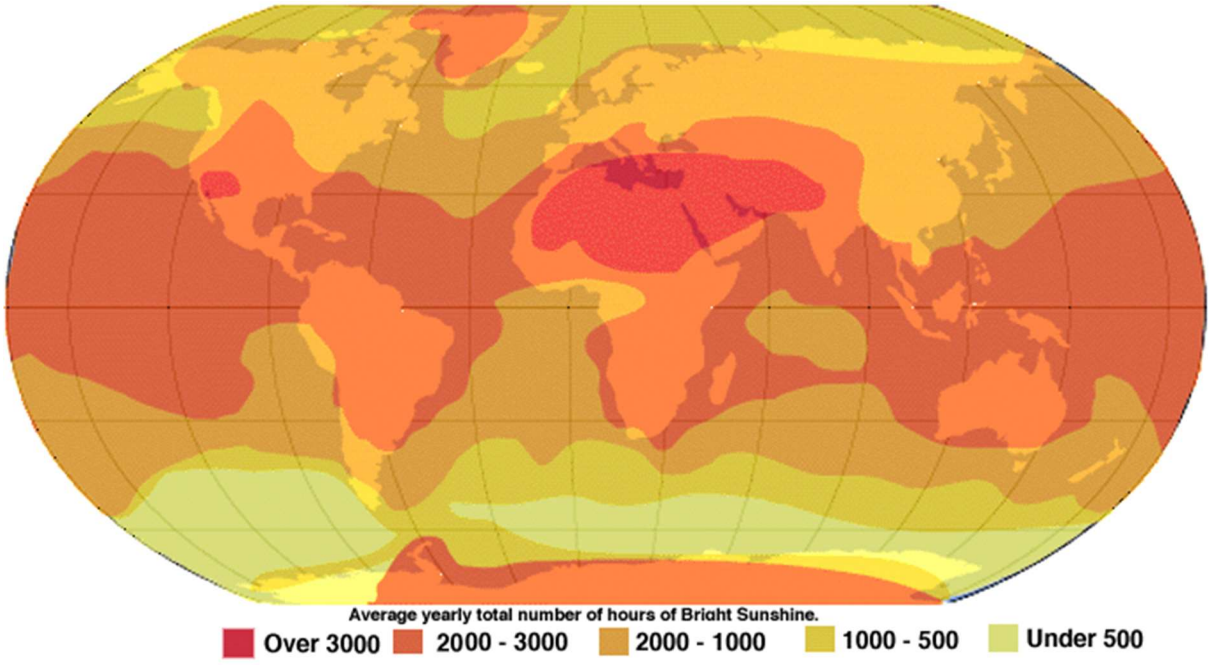


Figure 9 Bright Sunshine Hours

(Forum, 2019)

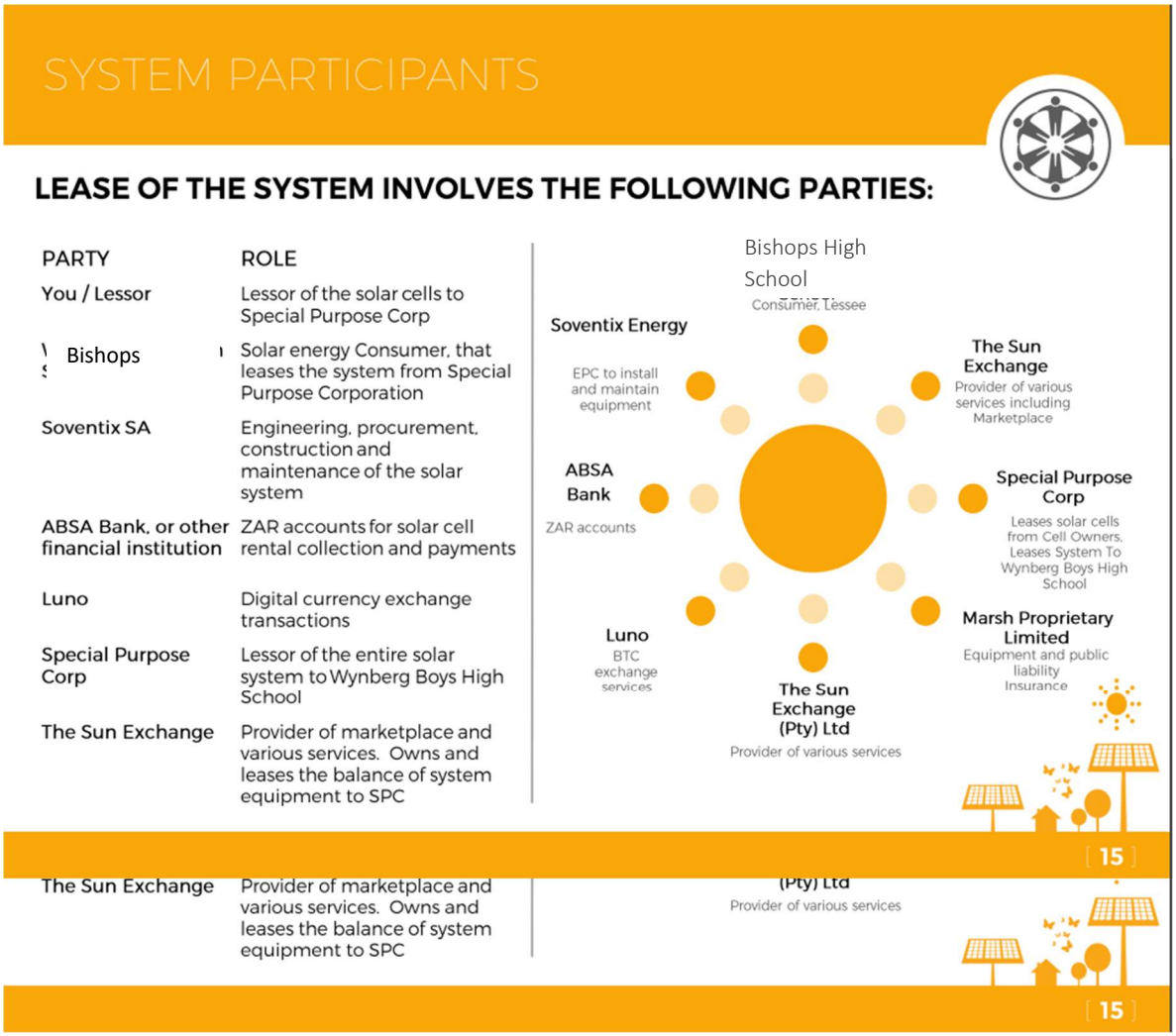
"I personally was really excited by this prospect, as I felt it was a new and interesting concept, because this was something we could actually do. The biogas digester was probably only ever going to be a theory project, along with maybe a small prototype, but Sun Exchange was a realistic way to make a difference, and if we did in fact go through with it, it would make a change we could personally see and feel."

-James du Preez

We decided to read up a bit more about Sun Exchange and discovered they are already doing great things within the community ((Exchange, 2019)). We also learned that solar panels are extremely well suited to the Southern African climate, as we receive nearly double the sunlight of many regions in Europe and the UK (GOV.ZA, N.D)

Sun Exchange starts when either Sun Exchange, or an independent individual, identifies a school or company that could use solar power. They then send in experts to evaluate the best area in which to put the panel array. They then start a crowdfunding project on their website, where anyone can pay a set amount to buy one solar cell, and see information based on the per year income of a cell. When the target is reached, construction begins, which usually takes around 4-6 weeks depending on how many cells you sell.

When this process begins so does the twenty-year lease on the cells. Then the excess electricity is sold back onto the grid, and you get money straight into any South African bank account.



"One aspect I really like about this idea is how the bishops community will be able to effectively own a part of the school in which we all love" **- Louie Hart**

Figure 10 SunExchange System Page

We then sat down and planned out how we were going to move forward. We had already planned an interview with Kelly Dow, who works with a company to fund renewable energy projects in South Africa for our biogas digester idea, but luckily her expertise still applied in our new situation.

Kelley Dow interview

Our first interview was with Kelly Dow, CEO of Kensani Capital - a company that funds and supports women in sustainable entrepreneurship, particularly regarding renewable energy projects.

It was an extremely interesting interview as she had a wealth of knowledge surrounding solar projects in southern Africa because she has funded and been involved with several solar projects in the past.

She has previously been involved in multi-billion-rand projects with some similar to ours in the way of crowdfunding the panels and these businesses have seemed to have done very well.

One of the things that we learned that was extremely surprising, was that the standard of renewable energy in South Africa is actually really good, and we have some of the biggest solar farms in the world (Murori, 2018)

She was very impressed and supportive of our idea on the whole which has left us very enthusiastic and motivated to continue pursuing this idea. She was particularly interested in the public-funded approach, rather than only private companies bidding on huge scale solar farms.

She did say though that the panels require lots of maintenance, space and free flowing water to keep them dust free. She also said that during cloudy days and bad weather the panels will be affected with regards to power produced.

"We felt this interview was very interesting and she really liked our idea, the only criticism she had was that the return on the projected break-even point was a bit longer than usual solar projects. She recommends we try drop the initial price and therefore drop the turnover point. She suggests we try drop to around 7 or 8 years rather than the 12 years that it is projected to make. This is not crucial though as it is an extremely low risk project and thus it makes the 12-year break-even point more viable." **- Louie Hart & Storm Lanfear**

We also planned an interview session with Mr Murray, the head of grounds at bishops. He also is one of the leaders in regard to implementing renewable energy at Bishops, and so has a wealth of knowledge of what works and what doesn't in a school context.

When dealing with our final idea we ran into a few problems. The first was getting the school energy consumption as we would need to go to the prep school to go find this out as the locations for where the panels where to be placed had changed. The second was getting our idea agreed on by multiple parties, including the two headmasters, Mr Brown and Mr Pearson.

Mr. Murray interview:

Our first interview with someone from bishops in a position to take this project forward with us was with Mr. Donovan Murray, head of estates at Bishops. We pitched our idea to him and in a very productive meeting we deduced the following points.

There are many people that need to back and approve this idea before it is implemented.

He believes that our idea is good, but he is unsure when exactly the new sports centre is going to be built, if at all

He thus suggested that we implement this at the new staff housing at bishop's prep as they are looking to go green there

He said that in theory he loves our idea and believes it is very viable

We also started delegating tasks to members of the group regarding the final research for, and the actual writing of the narrative. This helped us to not only complete these tasks, but also to feel more prepared for the task that lay ahead, by splitting it up into manageable 'mini-tasks'

We also planned perhaps the most important part of the project, were we actually going to implement this at Bishops? We threw ideas back and forth, and we were left with two options: raise money through a Bishops fundraiser or go as Sun Exchange intended and let anyone put money towards buying their own solar cells. We in the end decided to go for the second option, as it benefited us in a few key ways.

First of all, anyone, from any country, can contribute to the project.

second of all, if you buy a solar cell, you actually receive a return on your investment when extra power is sold back onto the grid. This provides an incentive for even complete strangers to invest and help Bishops become more sustainable. So, in its essence, this project will provide Bishops with FREE solar panels.

We then set about writing our narrative, drawing on our previous knowledge and also our recent new research regarding solar panels. Trying to hunt down Mr Murray was certainly an interesting experience, as he is involved in so many areas at the school, that there was no concrete place to find him.

***"Our meeting with Mr Murray really just cleared up the fact that our idea was do-able and visible for the near future. He also helped answer a few unanswered questions such as who to talk to and where we can set this project up. This talk was very helpful and would make our project a bit easier since we had someone who knew what was going on with the ins and outs of the school, but it also showed us that we have a big task ahead of us*"-Thomas Mason**

"**Our group worked really well together, and we made progress on our narrative quickly, while still maintaining a positive work environment. Our research period served us extremely well, as a lot of the information concerning the biodigester idea also applied to our new plan." -James du Preez**

"I feel like our group has really gelled together and have become one rather than four individuals. We are all dedicated to our work and this is shown through the effort that each of us have put in. When the workload is split and each of us need to do a section of the work, it is done and done well. I think we work well together, because we all have the same goal, and all want to have achieved it by the time we leave at the end of the 2019 Big Ideas course." - Storm Lanfear

We then started branching out of the Bishops community, and contacted Mr. Van Schalkwyk, the deputy principal at Wynberg, who have already implemented the Sun Exchange program successfully. We were hoping that he could answer some questions for us or point us towards someone who could.

Mr. Van Schalkwyk was quite possibly the most informative and useful person we spoke to throughout the course of our project. He gave us a really unique view from the customer side and gave us a very clear idea of what to expect going forward. He provided a lot of useful tips and information.

For one, he mentioned that most of the investors are from overseas, as they can then earn carbon credits. Carbon credits are an extremely useful system whereby companies are allocated credits based on how many tonnes of carbon dioxide (and similar gasses) they are allowed to release in a certain amount of time. Extra credits can be sold to other companies for a large profit. (wikipedia, 2019)
We also learned that Bishops will actually have to buy the electricity from Sun Exchange at a massively reduced rate, and this is how Sun Exchange generates the capital to pay investors their dividends.

Another thing that he suggested we work on independently from Sun Exchange is a battery system of some sort, so the solar energy can also be utilized at night and saved up during school holidays for later use. He finally gave us the contact of the owner of Sun Exchange, as he talked to the Wynberg boys about the project beforehand.

“Talking to Mr. Van Schalkwyk really helped to rekindle my excitement for the project, as we could now physically see our goal drawing closer every day.” - James du Preez

“Seeing how the program has worked at Wynberg has really given me confidence in our idea and it outlines and shows us what can happen if the idea gets off the ground.”
Storm Lanfear

Mr. King Interview

In our last week of big ideas we had a brilliant meeting with Mr. Sean King, the finance director at bishops and he had some really positive input. Mr King has clearly been looking into solar power at Bishops, as he had a lot of information on where the best area would be to place a panel array. He suggested the Stephan Couts-Trotter cricket centre, as it not only faces north, but it has a central position in the school near large users of electricity, it also has a near perfect roof slope of 35 degrees.

The centre is near the heart of the school and is therefore able to feed electricity to many of the larger electricity consumers around that area easily.

The problem with the sun exchange program is that it does not include batteries. Mr King prefers this, but it does come with is disadvantages. It cannot hold electricity and therefore cannot provide at night. This is a problem for the Boarding houses, if we were to try implement this for those purposes. He said that we should possible, in the future look at maybe implementing batteries.

"I feel that our group started to lose its excitement toward the project, but our meeting with Mr King really sparked us, and got us enthusiastic about the project again. He was very open to our idea and was loving the fact that we were taking part in the big ideas course. The fact that Mr King loves the big ideas course and what is does, is very encouraging, because he has such a high status in the school and is seeing the benefits of the course."

– Storm Lanfear

Conclusion

Half of the world has no access to clean cooking fuels, and upwards of a billion people have no access to electricity, which has become almost as essential as the air we breathe in this new developing world. We found looking into this problem to be a very jarring experience, as we never quite realised how bad the problem was. Most of the problems stem from the interconnected nature of this problem. Providing clean cooking fuels would likely not solve the problem, as many of the afflicted live in poverty. This links back to SDG 1 (No Poverty) and obviously SDG 7 (Renewable Energy). If our solution is successful, it will influence a number of SDGs, most notably SDG 8 (Decent Work and Economic Growth).

By its very nature our project is geared towards sustainability, so there are no foreseeable problems for the future. Sun Exchange is a company oriented towards

future thinking and solutions, so as solar technology continues to evolve and grow to become more efficient, so will our solution.

The project can easily be passed on to future generations of Bishops men, and spread throughout the Cape Town community, and onwards further, as far as the idea can carry itself.

(Anon., n.d.)

FINAL REFLECTION

Our group started out with a certain idea that stared out looking good but in towards the end of it we started to find problems and holes in it but I believe the fact that we were able to make the decision to change was good instead of sticking with our failing idea, showing the way that we went from a to c in the cloud. After that we worked hard and did what we set out in front of us but once we came to the end of that we just sat around a bit and didn't really continue the project but as of recently we have started making big progress and I don't think it's too late to go far with the idea- Thomas Mason

“I personally feel like our group has really embraced and put effort into the big ideas 2019 course. We had many moments of uncertainty and a whole lot of sitting in the cloud however I feel really pleased and grateful to have worked with this group. Being a new boy, it was also really great to get the opportunity to interact and get to know 3 other boys I didn’t know so well beforehand.

Although sometimes it was hard and frustrating working with the same people every period it was really nice to get to know each of them as people and not just as a project partner. All in all I am so pleased I signed up for big ideas as it was truly refreshing to have a different spin and process of education and learning”- Louie Hart

“I think that the big ideas course as a whole has really benefited the way I look at problems and the way I see solutions. The group that we started as at the beginning of our project stages has turned into each of us becoming a dedicated and devoted boy.

We have really come together as one and have been with each other through the tough times and hard hours of work. At times there was doubt, but it all worked out in the end and have evolved. I feel that every boy has done their bit during the narrative process and we will continue to push on to finish strong with our presentation.

The whole big ideas course for me has really taught me a lot of life lessons that I wouldn’t have learnt if I had stayed with the regular curriculum. You learn a lot when you are not being pushed constantly by a teacher. You learn self-discipline and you learn to set up meeting and social skills and the ways in which to go about those meeting and I feel that the traits that I have learnt will stand me in good stead.” – Storm Lanfear

I feel that the Big Ideas course has been a really unique and interesting way of learning. We have looked deeper into a lot of issues that normal school does address, but barely scratches the surface. I think our group has done really well with allocating work fairly. I think the skills we have learned in regards to researching, thesis writing and interview and presentation will be very useful not only in school, but in life in general.

-James du Preez

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