

LOL Engineers LTD | 5 Page Briefing Note

Title: SUPPORTING SPOTLIGHT SDGs WITH AN ENGINEERED OPTION

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Spotlight SDGs:

SDG 2 – Zero Hunger, SDG 6 – Clean water and sanitation

Sustainability Issue(s) Relevant to the Spotlight SDGs:

SDG 2 aims to end hunger and help communities achieve food security and adequate nutrition, through sustainable agricultural strategies. SDG 6 aims to provide safe drinking water, enable access to sanitation and hygiene facilities, and ensure stewardship of water resources.

These goals should be addressed first since food and water are fundamental human needs for survival. It is important we address these needs first, or people will be preoccupied with survival, rather than other goals we try to set.

Background on Spotlight SDGs:

Climate change is altering weather patterns around the world, leading to unreliable water and food supplies. For example, B.C. faced severe drought conditions in 2021 which led to water restrictions in parts of the province (Kulkarni, 2021). Similar conditions are also affecting the agricultural sector in Manitoba and Saskatchewan (MacIntosh & Pauls, 2021). Drought conditions lead to poorer crop yields and lower food production. Furthermore, B.C. has grown in population by 7.6% between 2016 and 2021, leading to increased food demands. As a result, food prices have been increasing, leading to fears of food insecurity (SDG2).

Agriculture is the largest user of freshwater, consuming 86% of the world's freshwater supply. By finding ways to reduce freshwater use in agriculture, we can ensure communities have access to clean water (Government of Canada, 2020). (SDG6)

The government is investing in projects to improve agricultural productivity (Agriculture and Agri-Food Canada, 2022), and seeking to expand the existing freshwater supply

(Metro Vancouver, 2019). The government is investing in ways to increase food and water production because of climate change. By investigating an engineering option, our company will be ready to bid on future lucrative government projects that increase agricultural yields while decreasing water consumption.

Current Global and National Status of Spotlight SDGs:

The targets of SDG 2 consist mainly of ending hunger, malnutrition, increasing agricultural productivity and incomes of food producers, ensuring sustainable food production and biodiversity.

At the global level, the world has largely moved backwards in achieving the targets for SDG 2. 811 million people in the world are suffering from hunger, which is 161 million more than 2019, moving further away from the goal of hunger elimination by 2030. 22% of the world's children suffer from stunting, which is far from the progress required to achieve 50% reduction in stunted children by 2025. Wasting still affects 45.4 million children (6.7%), far from the goal of eliminating it by 2025. Small scale food producers still make significantly less than large scale food producers, and the genetic diversity of farmed products is still small. COVID-19 and the war on Ukraine has increased countries with high food prices by 47% (United Nations Economic and Social Council, 2022).

Canada is on track to achieving SDG 2, with 14.7 million people suffering from malnourishment (1.2%), with an estimated 0.75% wasting rate and 2.5% stunting rate. However, Canada performance in the prevalence of obesity has increased from 20% to 30%. Challenges still remain in diversifying food species, nitrogen management, trophic levels, and hazardous pesticide exports (Sachs et al., 2022).

The targets of SDG 6 consist mainly of accessibility of drinking water, adequate sanitation, reducing water pollution, stewardship of water resources, and protecting water-related ecosystems.

At the global level, the world has made some progress in achieving the targets of SDG6. The population with access to clean water increased from 70 to 74%, access to managed sanitation facilities increased from 67% to 51%. However, there needs to be substantially more progress to achieve 100% by 2030. 60% of all water bodies have good quality. Water stress globally remains at 18.6%, though some parts of the world have stress levels above 100%. Only 32 countries have arrangements for water sources that cross their borders. 20% of water bodies are fluctuating in excess of water levels, and wetlands have decreased in size by 85% (United Nations Economic and Social Council, 2022).

Canada is on track or has achieved many of the targets of SDG 6. 99% of the population have access to clean water, though only 84% have access to managed

sanitation facilities. Access to sanitation needs to improve to meet SDG targets. Canada's water stress levels are at 3%, which is meeting the targets of SDG 6.

Key Considerations:

To help countries facilitate progress in achieving the two SDGs described above, our engineered option should satisfy two key considerations within our context: Firstly, we must increase food production around the world to ensure food security; and to simultaneously improve water efficiency in food production.

We must ensure food security by increasing food production. By increasing food security, we can ensure that the population can develop in a healthy manner. A healthy population is essential for strong and sustainable economic growth, which further increases food security (Torero, 2014). Food security is a widespread problem in low-income countries (LIC), and climate change has exacerbated the problem, as LICs are unable to effectively mitigate or adapt to the changing climate (Patwardhan, 2016). Therefore, the solution should be low-cost and simple to implement to ensure that the engineered option can be implemented where it is needed most.

Much of the world's water is consumed by agriculture (Government of Canada, 2020). Food production should not exacerbate water security problems. The engineered option should be a water efficient solution. In the long term, this will preserve water resources for people and reduce the environmental impacts associated with treating and transporting the water, thereby achieving SDG 6 (United Nations, n.d.).

The engineered option should be environmentally sustainable, as environmental sustainability is a key target in both SDG 2 and 6. Firstly, the option should ensure sustainable and resilient agricultural practices, maintain ecosystems, strengthen adaptation to climate change and extreme events, while improve soil quality. Genetic diversity of plants and animals should be preserved, ensure equitable sharing of genetic resources. These targets will ensure that food production will be sustainable. The option should also protect water-based ecosystems and manage transboundary water resources (United Nations, n.d.), ensuring we have continued access to clean water far into the future. .

The improved food production and reduced water consumption will likely result in further development of the agricultural sector, as more farms attempt to mimic any successful strategy. This will lead to more clients that could be interested in our services or government investment in our products. Food security will bring economic benefits that will likely increase food demand, and hence, the number of farms / potential clients.

There are already many firms in the B.C. area that are focused on developing and providing irrigation installation services to farmers in the area. This shows that drip

irrigation could be a viable market in the local area. In fact, the B.C. irrigation management guide prepared by engineers in the B.C. Ministry of Agriculture, Food and Fisheries suggests drip irrigation as a potential irrigation method and provides information about drip systems to farmers in B.C. (Tam, Nyvall, & Brown, 2005). Moreover, the guide also provides a list of certified designers, where we can apply to be on the list, providing services to local farms.

Our firm should also consider the waste produced by our products at the end of their life cycle. By providing waste recovery services, our company not only generates goodwill with the local community and preserves our environment, but the recovery of waste for processing or recycling could potentially be profitable if we choose to process and sell the recovered material, while charging customers for the service.

Engineered Option:

Drip irrigation is a technology in agriculture that allows agriculture in arid areas by directly providing plant roots with water instead of spraying entire fields with water. Drip irrigation greatly reduces water consumption in agriculture, making it possible to grow food in arid areas. Drip irrigation works by using valves, pipes, tubes, and emitters to place water slowly and directly at the roots of plants, thereby reducing evaporation of water (Venot, Kuper, & Zwarteveen, 2017). In fact, drip irrigation is up to 90% efficient in water use, compared to sprinklers which are 65-75% efficient (McCann, 2022).

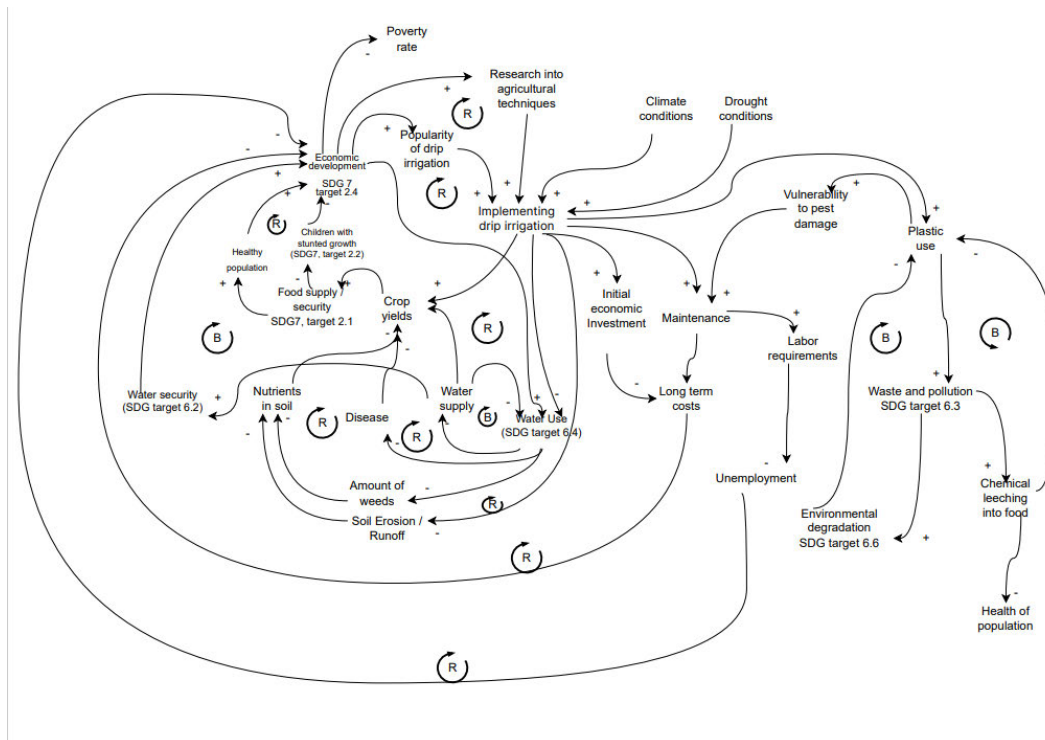
There are also many other benefits to drip irrigation, such as preventing the spread of disease in food crops, efficient use of fertilizer, reduced soil erosion, reduced weed growth, reduced labor costs, and reduced energy usage. (Ayars, Lamm, & Nakayama, 2006) These benefits often increase crop yields in agriculture as well.

Drip irrigation addresses SDG 6 and key considerations associated with it, since drip irrigation provides a substantial increase in water efficiency compared to spray irrigation and other conventional techniques. This preserves water resources for other purposes, such as for human consumption and for industry. Drip irrigation also protects water ecosystems and reduces water pollution. The reasons include: Reduced fertilizer use results in less harmful runoff that can affect water resources downstream; and reduced herbicide use since drip irrigation reduces weed growth, which also reducing harmful runoff.

Drip irrigation also addresses SDG 2 and its associated targets, since it opens areas typically considered unsuitable for farming due to an arid climate. Developing agriculture in arid areas can improve food security and facilitate development for the population living in arid areas by improving food supply. Moreover, drip irrigation, while has a slightly higher capital and maintenance cost, is still relatively low cost and simple to maintain as systems comprise mostly of tubes, pipes, and pumps.

A Systems View:

Recommendation and Conclusion:



A drip irrigation system is an effective method to achieve the sustainability issues we have set out to address: namely addressing the sustainable development goals of clean water and sanitation; and zero hunger. A drip irrigation system not only increases food yields and food security in places that previously could not support agriculture, but also preserves freshwater resources for other uses. It is a low-cost and relatively simple solution.

The drip irrigation is also an appropriate system given the current context of climate change and unstable weather patterns that lead to droughts. Drip irrigation uses much less water, therefore is less susceptible to unstable weather patterns compared to conventional methods.

Government investment from the municipal to the federal levels provide strong economic support for projects that improve agricultural efficiency and resiliency to climate-related events. Investigating drip irrigation as an engineered option will certainly open opportunities for our company to bid on lucrative government contracts.

For these reasons, I believe that our company should investigate drip irrigation systems as an engineered option.

APPENDIX 1: References

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