

1.0 General Learnings

Overall this course brings to light the complexities that towards making renewable energy a greater mix of the electricity grid. It highlights how the needs of peak demand and base demand need to be balanced to ensure the security and stability of the power supply. A critical part of the learnings have centered on the challenges with where renewable resources are available and the requirements needed for each resource. These have ranged from the land requirement for solar energy sources and wind sources to the intermittent nature of these resources. The following sections outlines the need to consider environmental footprint, lifetime cost analysis and technical limitations that have an impact on the adoption of renewables.

2.0 Environmental Footprint

One key focus of this course has been to highlight the environmental impact of the renewable sources of electricity. While considering each resource it is important to also analyze the impact of each resource on the environment. While solar resources like solar thermal have considerable potential, one must consider the amount of land required to make the production feasible. Similar considerations need to be made when looking at wind or batteries. Though it is often assumed that renewable sources are better for the environment, it is important to consider the impact and limitations of these resources when analyzing their potential. The land needed for solar thermal may be feasible for places like the US or Canada where land is abundant and large areas are uninhabited, however in populated geographies it is important to consider how many people will need to be displaced or the impact that renewables can have on existing economies. Only through a holistic consideration of all the variables can successful policies be made for the adoption of renewables.

3.0 Cost Analysis

When considering the options for electricity investments, lifetime cost analysis need to be carried out to understand the true value of each resource to the economy. While resources like geothermal may have a high initial investment cost when compared to coal, their lifetime cost are lower and not subject to market price variability for fuel costs. Similar

considerations need to be made when considering investments in solar energy and wind which may have a high capital investment cost but low lifetime cost. A lifetime analysis of these resources is critical as renewables may not be economical if analyzed on 5 year investment cycles but may be more economical when looking at the lifetime of the operating life of the facility.

4.0 Technical Limitation

It is also critical to note that not all renewable sources are comparable or ideal for certain electricity applications. Key considerations need to be made about how base power and peak power are supplied and the role of intermittent renewable resources in reliably supplying reliable, uninterrupted power. It is critical to consider the role of energy storage and policies around conservation to supplement the role of renewable energy and also to reduce overall consumption.

5.0 Conclusion

It is important to consider the impact of renewables on existing infrastructure and behaviour to develop policies that can ensure their adoption in the grid. Considering the FIT policies in Ontario, it is noted that while wind energy is a larger share of the overall energy mix, wind energy is not effectively incorporated into the grid as it is produced when demand is low. Policy makers need to recognize that renewable technologies cannot be viewed in isolation and are dependant of many technical facts that need to be considered in concert with production. Investments in wind energy should be complimented with investments in energy storage and reduced investment in fossil fuel based plant. By considering renewables in isolation from the overall grid and without investments in infrastructure to address technical limitations, policy makers will not realize the full benefit of the investments made.