**Abstract**

The need for sustainable renewable energy has been increasing due to the negative impact of non-renewable energy sources. With the unstable and sporadic nature of sustainable renewable energy, flow batteries show immense potential in mitigating these issues. Traditional vanadium and zinc-based flow batteries, as well as new flow battery systems, are now being researched extensively. Vanadium and zinc-based flow batteries are nearing commercialization, but their low power and energy densities keep them from being used in more businesses and industries.

This thesis will examine the effect of flow batteries on fire safety, since battery storage systems have become more popular as a form of energy storage. A literature review is undertaken using the key terms listed below to locate current articles, journals, and research papers that give the most comprehensive answers to flow battery-related concerns. The first section of the thesis discusses the necessity for energy storage systems and how flow batteries may be incorporated into them. The second section discusses the operating principle and idea of a flow battery. The thesis's second half discusses the safety and fire issues connected with flow batteries, including gas development, thermal runaway, and deterioration. These risks are contrasted to those associated with lithium-ion batteries to demonstrate how each storage solutions might contribute to fire safety.

**Keywords**

Flow battery, Flow battery types, Flow battery risks, Firefighting, Fire risk analysis, Safety hazards in flow batteries, Fire risks in lithium-ion battery, Safety hazard in lithium-ion battery, Application of battery storage systems, Safety reports.