

# Biruk Tadesse Woldearegay

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## **Personal information:**

Educational Background: European Masters in Industrial Ecology (Chalmers University of Technology and University of Graz), Masters of Science in Environmental and Energy Management with Energy Management track (University of Twente, the Netherlands), B.Sc. degree in Mechanical Engineering (Jimma University, Ethiopia), Diploma in Manufacturing Technology (Nazareth Technical College, currently Adama Science and Technology University, Ethiopia), Diploma in General Mechanics (Adama Technical School, Ehtiopia).

Goal: I am particularly interested cleaner production aspect of sustainability and my professional goal in the future is to combine all my previous technical knowledge with the knowledge that I got from this master's degree study (Industrial Ecology) and excel in the areas of Design for Environment (DfE), Cleaner Production and Sustainable Manufacturing.

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## **Title of thesis: Study of Supply Risk Factors of Critical Materials for Electromobility**

### **Abstract:**

The transportation sector is responsible for 20% of world primary energy use and 25% of energy related CO<sub>2</sub> emissions. It is argued that there is a high potential to reduce energy related CO<sub>2</sub> emissions from this sector by 30% from the 2012 level by 2050. Electric vehicles are considered to be the best option to decarbonize the transportation sector. The purpose of this thesis is to provide a better understanding of the supply risk factors of critical materials for electro-mobility.

Essential critical materials for electro-mobility have been selected and the relevant supply risk factors have been identified. The impacts of the identified supply risk factors on the availability of the selected critical materials have been evaluated.

Eleven critical materials and six supply risk factors have studied in this thesis. The majority of the materials have been found to be extracted as by-product materials and their availability could depend on the demand and extraction rate of the carrier metal. With regard to geographical concentration of ores and production, PGMs and REEs may face possibly high supply risk. Assessment of the environmental impacts has been limited by lack of data.

The impact of supply risk factors of critical materials on electro-mobility could better be understood if all the supply risk factors identified in this thesis and the shortcomings of this thesis identified under each supply risk factors are addressed.