# Life cycle assessments of extruded AC and DC power cable systems

Dominik **HÄRING**, Gero **SCHRÖDER,** Christoph **SAAM,** Andreas **WEINLEIN**, Axel **BOSSMANN;**
Südkabel GmbH, (Germany)
dominik.haering@suedkabel.com, gero.schroeder@suedkabel.com, christoph.saam@suedkabel.com,
andreas.weinlein@suedkabel.com, axel.bossmann@suedkabel.com

## ABSTRACT

*Growing industrialization requires an increased responsibility by industry and manufacturers in their impact on the environment. Electric power cables take on a fundamental role in the distribution and transmission of electrical energy as a reliable energy source for the future. Higher power ratings require higher system operation voltages and currents. Power cables with weights up to approx. 60 kg/m are necessary to meet these requirements in terms of an increasing energy demand. This shows, that the question of sustainable manufactured products, such as power cables, is appropriate. However, because of a complex production process, the analysis of the environmental impact of a cable manufacturing process requires a detailed investigation of the materials and processes used.*

*The following paper describes the life cycle assessment of an extruded power cable system production process.*

## KEYWORDS

life cycle assessment, environment, carbon dioxide emission, HVDC, HVAC, cable, cable accessory, XLPE cables

## INTRODUCTION

The increasing power demand worldwide requires the transmission of electrical energy over long distances. Extruded high voltage cable systems have been developed successfully in the past decades and, therefore, many years of operating experience are available as mentioned in references [1] and [2].

Based on growing public attention regarding environmental impact of industrial projects, the manufacture of components take on an important role concerning the responsibility of the environmental impact of the products and components. With the establishment of the energy management system according to ISO 50001, a general understanding with regard to total energy and water consumption, emission of greenhouse gases or generated waste is available. General terms of environmental aspects of cables are defined in technical report IEC/TR 62125 [3].

However, the development of new and advanced high voltage cable systems focuses on the technical aspects in terms of thermal, mechanical and electric stress on the components. So far no product specific consideration of environmental impact during the development process of cable system components has been done so far. Consideration of a specific product is necessary to meet public demands when putting sustainable manufactured components into use. The actuality of this topic can be seen in the newly established CIGRE working group WG B1.36 [4].

To understand the environmental impact of a specific product, a life cycle assessment method has been developed and implemented in the manufacturing process of high voltage power cables and their accessories. This model enables the product to be understood from an environmental perspective from the onset of its life. The following paper addresses the LCA model that has been developed and extracts a portion of the research results from the perspective of a cable system manufacturer.

## LIFE CYCLE ASSESMENT

As mentioned above, the increased attention to protecting the environment leads to a growing interest in understanding how a product impacts on the environment. Carbon dioxide emissions and energy consumption are of special interest. A life cycle assessment (LCA) is a technique used to evaluate the environmental impact of a product. Every stage of a product will be assessed from an environmental perspective throughout the entire life cycle as shown in figure 1 of the LCA.

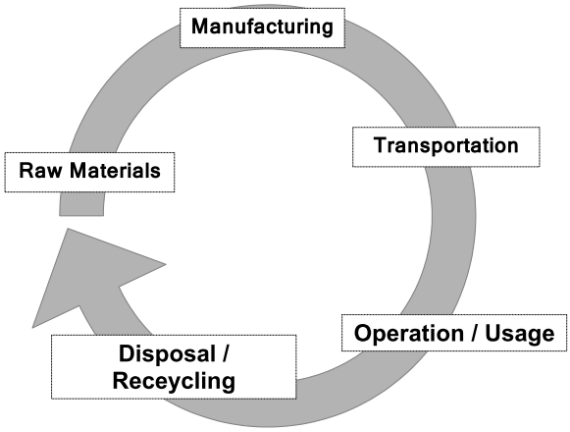


**Fig. 1: Principle sketch of a product life cycle**

The principle aim of an LCA is to compare the environmental impact of products by investigating the flow of related materials and understanding how the flow impacts the environment. The results of the investigation and the information from the LCA can be optimized in terms of sustainable and environmentally improved processes. The fundamental principles and framework of a life cycle assessment is addressed in ISO 14040 in [5]. According to [4] an LCA consists of four phases:

- definition of goal and scope
- inventory analysis
- impact assessment
- interpretation of results