

Re-designing the value and supply chains of salt: the case of the chloralkali sector in the Netherlands

D. XEVENOS^{1,2}

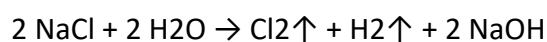
¹SEALEAU B.V., Delft, The Netherlands,

²Applied Sciences faculty, Delft University of Technology (TU Delft), The Netherlands

Introduction

Even though more than 110 countries produce salt at a global scale, the world production is concentrated in only a few countries. In Europe, the total salt production is estimated at 69 million tons in 2013, with Germany being the largest producer (16.5 Mt or 23.9% of total), followed by Russia (12.3%), and The Netherlands (9.6%) [1].

Salt has more than 14,000 known uses [2]. According to Roskill [1], chloralkali production accounts for 21 million tons of salt consumption per year or 31% of total global consumption. Salt comprises the basic raw material for the chlorine production process, which is described as follows:



Chlorine is used in more than 55 % of overall chemical production and more than 85 % of all pharmaceuticals. Today, much of the chlorine is used as a raw material in the production of polyvinyl chloride (PVC), a plastic used in fabricating flooring, pipe, wallpaper, clothing, furniture, and a wide range of household products. Various complex drugs and spray crops with insecticides, herbicides, and fungicides contain chlorine as part of their basic structure. Chlorinated chemicals are used to refrigerate and freeze food, cool homes, offices and cars, and even insulate buildings from the heat and cold. Finally, its disinfecting properties remain vital to public health as chlorine is used extensively in water purification systems.

According to the European Pollutant Transfer and Register (E-PRTR) there are 587 industrial facilities in Europe, generating approx. 18.4 million tons of Chlorides (Cl-) per year (2017) [3]. The chemical sector is generating most of the releases (9,955,120 tons or 54% of total). Within the chemical sector, the production of basic inorganic chemicals is the dominant industrial activity generating 86% (or 8,561,970 tons) of the total releases. Germany accounts for 33.4%, followed by Italy (25%), France (13.6%), Poland (12.8%), UK (4.2%) and The Netherlands (3.8%). If we look into the chloralkali sector, Germany is Europe's largest chloralkali producer, accounting for 45% of regional output in 2012, followed by Belgium / Netherlands (15.6%), and France (10%) [1].

Methods

This work presents the case of the chloralkali sector in The Netherlands, with the view to assess the possibilities for a circular economy approach for the recovery of salt from chlorine users. The research methodology involved the following steps:

- 1) Identification and mapping of chlorine production facilities and chlorine consumption plants at a national level.

2) Discussion with relevant stakeholders of the chlorine supply chain, chlorine sector to investigate interest in shifting towards circular economy business models/solutions.

3) Investigation of relevant framework to introduce circular economy solutions.