



Competitiveness of corporate sourcing of renewable energy

Annex A.5 to Part 2 of the Study on the competitiveness of the renewable energy sector

Case study: Altair Chimica

*ENER/C2/2016-501
28 June 2019*

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1 Introduction

Representing an International leading producer, Altair Chimica, a Company of Essec Group, highly values the relationship between industrial activity and the environment and uses a new mercury-free chlorine and potassium plant relying on membrane cell technology, the most advanced in the world. Altair Chimica forms an interesting case study to understand why a company would decide to source or not to source renewable energy. Altair Chimica has less than 100 employees, therefore it faces challenges similar to those experienced by an SME. Since 2011, however, it belongs to a large group (Essec Group). The company is located in Italy, a country which already achieved its 2020 goals in terms of the share of renewable energy in the gross final energy consumption. Nevertheless, this is mainly due to support schemes rather than efforts from the corporate sector. Altair Chimica will start self-generating renewable energy through solar photovoltaic starting in 2019, therefore they still have their reasonings fresh in mind.

Figure 1. Plant at Altair Chimica



Source: Altair Chimica (2019)

2 Sector and Company

Chlorine is a common element in nature, which occurs as a greenish-yellow gas under standard conditions. However, chlorine is almost always bound to other elements due to its high reactivity. Chlorine production is an important sector in the global chemical industry. There are three main technologies for producing chlorine: i) the mercury cell process; ii) the diaphragm cell process; and iii) the membrane cell process. Although

these methods differ, they have in common that electricity is run through a brine solution, a technique referred to as electrolysis.¹

Chlorine is used as an input in many industries, and the chlorine value chain is characterized by a high level of vertical integration. Within the EU there is a chlorine production capacity of above 12 million tonnes per year. The largest share of chlorine is produced in Germany (42.5%), followed by France (11.6%), Belgium (8.5%), the Netherlands (6.9%), Spain (6.1%), UK (6.0%), and Italy (3.5%).²

Altair Chimica is a European chlorine producer, operating in a sector that is classified by NACE code C20.1.3 - Manufacturer of other inorganic basic chemicals. Altair produces chlorine and potassium in a mercury-free plant using membrane cell technology. Electrolysis is used to transform salt into potassium hydroxide, sodium hydroxide (starting from 2018), chlorine and hydrogen. These products are then used to make potassium and chlorine derivatives. Since last year Altair Chimica is able to sell caustic potassium not only in liquid but also in solid form. Altair Chimica is located near the beginning of the value chain. Chlorine is a basic product, and both chlorine and potassium derivatives are used as inputs to other production processes. The salt (potassium and sodium chloride) used as input to Altair Chimica's production process is bought from another company.

The market in which Altair Chimica operates is quite concentrated, barriers of entry consist of high start-up costs and economies of scale. In 2008, Altair Chimica was the first European company to produce mercury free, however European regulation has stipulated the phase-out of mercury for all European companies before 31 December 2017. In southern Europe Altair Chimica is a market leader, in northern Europe they are more of a niche player. Although Altair Chimica is the only producer of Potassium Hydroxide (KOH) in Italy, within Europe there are other companies that are industry rivals. The competitive strategy of Altair Chimica is to work on customer loyalty, product quality and price differentiation.

Main competitors within Europe are Evonik, INOVYN, Spolchemie, UNID, Vynova, Kem One, BASF, Covestro, AkzoNobel, Dow, Vinnolit.³

3 Country

Altair Chimica is based in Italy. In 2017 Italy had about 61 million inhabitants. Real GDP per capita stood at 26,400 euro in 2017, which was a 1.5% growth compared to 2016.⁴ The final energy consumption in Italy was 115.9 Mtoe in 2016. The largest share of the energy consumption was used for heating and cooling. The final energy consumption can be divided into conventional heating and cooling (51.7%), renewable heating and cooling (11.8%), conventional electricity (26.5%) and renewable electricity (10%). The renewable heating and cooling is sourced from bioenergy (63.4%), heat pumps (24.8%), renewable derived heat (8.8%), solar thermal (1.9%), and geothermal (1.2%). The renewable electricity is sourced from hydro (40.3%), solar (20.1%) biomass and renewable wastes (17.8%), wind (16.1%) and geothermal (5.7%). The services sector consumes most energy, followed by the iron and steel industry and the non-metallic minerals industry. These industries have a share of

¹ For further details, see: Egenhofer, C., Schrefler, L., Rizos, V., Infelise, F., Luchetta, G., Simonelli, F., Stoefts, W., Timini, J., and Colantoni L. (2014). Final report - For a study on composition and drivers of energy prices and costs in energy intensive industries: the case of the chemical industry – CHLORINE, Available from: <https://www.ceps.eu/system/files/Chlorine.pdf>

² Ibid.

³ For further details, see: Eurochlor (2016). Chlorine production sites in Europe, available from: <http://www.eurochlor.org/media/83054/09-chlorineplantseurope.pdf>

⁴ For further details, see: Eurostat (2018). Population change - Demographic balance and crude rates at national level, available from: http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=demo_gind&lang=en

renewable energy of 15%, 9% and 7% respectively. The industries with the highest share of renewable energy are wood and wood products, and transport equipment.

4 Energy use

Producing chlorine and potassium /sodium hydroxide and derivatives is an energy intensive process. The electricity intensity in this sector lies around 3 MWh per tonne but can vary significantly between plants in the same region. In general, electricity forms by far the largest share of the energy costs in the chlorine industry. Furthermore, electricity costs are often responsible for more than a third of the total production costs. The electricity prices paid by chlorine producers in southern Europe have gone up over time.⁵

The main share of the electricity used by Altair Chimica is used in its central process, the electrolysis. A much smaller share is used for general business operations, to move fluid, to produce compressed air and to produce nitrogen. Altair Chimica's yearly electricity consumption is around 150 GWh. About two thirds of this electricity is purchased from the grid and the remaining third is produced by Altair Chimica in a high efficiency cogeneration plant fed with natural gas (non-renewable production). This combustion plant generates both electricity and thermal heat. The expectation is that Altair Chimica will expand its chlorine and potassium production every year and will thereby also expand its energy consumption. Since the process at Altair Chimica is so energy intensive, the energy costs (including natural gas) form a high share of total costs (about 30%).

5 RE procurement method and technology

Although Altair Chimica does not source renewable energy yet, there are planning to rely on solar photovoltaic from January 2019 onwards. The solar panels are currently being constructed and placed on the roof of one of their plants. At first, the company will start with 1,000 m² solar panels. The expectation is that in the next three years around 0.5% of electricity will be from solar. This is small in relative numbers, but in absolute numbers (about 150 MWh) the amount of renewable energy is more substantial. If this first trial with solar photovoltaic is successful, Altair Chimica might choose to increase the renewable energy production in the future and expand up to 700 MWh.

The investment made by Altair Chimica is quite large, although the overall amount cannot be disclosed for confidentiality reasons. Furthermore, the time it will take to earn back the initial investment is quite long, around eight years. There were no government funds available for this investment, therefore the company had to bear the full cost. However, there is some support from the government in the form of a tax discount, up to 3% of the investment. Another benefit is that the high Italian taxes on electricity from the grid (network costs, renewable energy support, etc.) do not have to be paid on self-consumed renewable energy.

6 Benefits

For Altair Chimica the most important benefits for sourcing renewable energy are lower electricity costs and an increase in sustainability.

⁵ For further details, see: Drabik, Eleonor; Koper, Michèle; Egenhofer, Christian; Rizos, Vasileios; Afanador, Angelica; Simonelli, Felice; Hähl, Thomas; Renda, Andrea; Zarra, Antonella; Faure, Aurélie; Bons, Marian; Schmitt, William (2018). Final report - For a study on composition and drivers of energy prices and costs in energy intensive industries. Case studies in selected energy intensive industries. Available from: <https://publications.europa.eu/en/publication-detail/-/publication/0f9c440f-ec78-11e8-b690-01aa75ed71a1/language-en>

The sustainability aspect played a role in Altair Chimica's decision to source renewable energy. Altair Chimica believes everyone should try to be more sustainable, and this is their way of doing so. Another reason for improving their sustainability was the positive effect this has on their corporate social responsibility strategy. They hope that their customers will be more confident in choosing for Altair Chimica if the company produces in a more sustainable way. The investment in solar photovoltaic distinguishes them from the competition, and the fact that they are using renewable energy will be stressed in their communication with customers.

The cost aspect is very important as well. Altair Chimica expects that the decision to source renewable energy will reduce the company's operating costs. In relative terms this decrease will be small and is hard to estimate. But, in a competitive sector like the chlorine industry, even small savings matter. The costs savings will be due to a decrease in both energy taxes and the energy component of the electricity costs. As mentioned, no taxes have to be paid over the renewable energy that they self-consume, in contrast with energy from the grid. With respect to the energy generation costs, Altair Chimica states that the electricity produced through solar photovoltaic is free once the investment is paid off. As mentioned, it will take them 8-9 years to earn their investment back, but the solar panels will last much longer than that. The company estimates the solar panels will continue generate electricity over a 25-year period, before they have to be replaced.

Related to the cost aspect is the security that Altair Chimica will gain. By producing their own energy Altair Chimica is guaranteed a stable energy production, but more importantly stable energy prices. Since electricity is a central input in the production process Altair Chimica is vulnerable to large variability in the electricity price. This price variability might be due to changes in the market price of energy but might also be due to policies such as the EU ETS system, whose costs are passed on to electricity users by generators. At the moment, Altair Chimica is not in the EU ETS system, but they are indirectly affected through the electricity prices.

Finally, if their first experience with solar photovoltaic is successful they might extend to other roofs. As mentioned, if all Altair Chimica's roofs would be covered by solar panels then the company could produce 700 MWh per year.

7 Costs

The most important obstacle that Altair Chimica had to overcome to source renewable energy was the high initial investment. Another barrier was the fact that this large investment is only earned back over a time frame of 8 years. This requires long-term planning. The costs will have to be paid when constructing the solar panels, but once the investment is paid off the rest of the energy is for free.

It is still a challenge for Altair Chimica to get the solar photovoltaic construction approved by the authorities. There is a large number of authorities that has to be contacted, as well as a lot of procedures that have to be followed. Authorities involved are transmission system operator (to adapt the grid interconnection), the municipality (for building permits), the customs agency (Agenzia delle Dogane to amend the company's operating license) and the firefighting department (for fire hazards/risks). It is difficult to make sure all procedures are followed correctly, and it is hard to estimate how long it will take to obtain all necessary approvals. Any mistakes will result in extra delays. Therefore, the administrative part of self-generating renewable energy forms another hurdle for Altair Chimica to overcome. To a more limited extent the policy uncertainty formed a barrier to self-generate renewable energy. In fact, new incentives to produce in a sustainable way might be introduced by the government, if and when these incentives will become is uncertain.

8 Policy recommendations

The main barriers that Altair Chimica experienced in their decision to self-generate renewable energy were the high up-front investment and the effort it takes to get their construction authorized. Here lie some opportunities for governments that aim to simulate the self-generation of renewable energy. Providing credit schemes or subsidies to companies that want to invest in generating renewable energy might boost the uptake of self-generation of renewable energy and shorten the pay-back period of such investment. On the other hand, once companies decide to self-generate renewable energy, offering help in the authorization process or streamlining the authorization process might improve the companies' experience. If companies have a positive experience, this might encourage other companies to invest in the self-generation of renewable energy as well. Potentially this could create a positive feedback effect.

STUDY ON THE COMPETITIVENESS OF THE RENEWABLE ENERGY SECTOR

Case study: Altair Chimica



Source: Altair Chimica, 2019

Introduction



○ Company

- Altair Chimica is a European chlorine producer, operating in a sector that is classified by NACE code C20.1.3 - Manufacture of other inorganic basic chemicals.
- Altair Chimica has less than 100 employees, therefore it faces challenges similar to those experienced by an SME. Since 2011, however, it belongs to a large group (Esseco Group).
- Although Altair Chimica does not source renewable energy yet, there are planning to partially rely on solar photovoltaic from January 2019 onwards.

○ Sector

- Chlorine production is an important sector in the global chemical industry. There are three main technologies for producing chlorine: i) the mercury cell process; ii), the diaphragm cell process; and iii) the membrane cell process.
- Chlorine is used as an input in many industries, and the chlorine value chain is characterized by a high level of vertical integration. Within the EU there is a chlorine production capacity of about above 12.2 million tonnes per year.
- The market in which Altair Chimica operates is quite concentrated, barriers of entry consist of high start-up costs and economies of scale.

○ Country

- Altair Chimica is based in Italy. Italy is a southern European country, bordering France, Switzerland, Austria and Slovenia. In 2017 Italy had about 60.661 million inhabitants. Real GDP per capita stood at 26,400 euro in 2017, which was a 1.5% growth compared to 2016.
- The final energy consumption in Italy was 115.9 Mtoe in 2016. The largest share of the energy consumption was used for heating and cooling.
- The services sector consumes most energy, followed by the iron and steel industry and the non-metallic minerals industry

Energy use, procurement, costs and benefits



○ Energy use

- Producing chlorine and potassium /sodium hydroxide and derivatives is an energy intensive process.
- Altair Chimica's yearly electricity consumption is around 150 GWh. About two thirds of this electricity is purchased from the grid and the remaining third is produced by Altair Chimica in a high efficiency cogeneration plant fed with natural gas (non-renewable production).
- The main share of the electricity used by Altair Chimica is used in its central process, the electrolysis

○ Energy procurement

- Although Altair Chimica does not source renewable energy yet, there are planning to apply rely on solar photovoltaic from January 2019 onwards.
- At first, the company will start with 1,000 m2 solar panels. If this first trial with solar photovoltaic is successful, they Altair Chimica might choose to increase their renewable energy production in the future and expand up to 700 MWh.

○ Benefits

- For Altair Chimica the most important benefits for sourcing renewable energy are lower electricity costs and an increase in sustainability.

○ Costs

- The most important obstacle that Altair Chimica had to overcome to source renewable energy was the high initial investment.