Ref. Ares(2021)5795960 - 22/09/2021

# EGTOP - SALT MANDATE

## TERMS OF REFERENCE FOR SALT SUB-GROUP

**It seems necessary to state that there is currently no regulation existent at EU level for the production of salt for food and feed.**

Based on the analysis foreseen under points 1, 2 and 3[i], the salt sub-group is asked to suggest production rules applicable to organic production of salt and its final composition. The organic production rules should include a positive and a negative list of production techniques and the products and substances used.

In accordance with ***Regulation (EU) 2018/848***, the present document evaluates in particular the following elements:

## 1. Distinction between natural and non-natural production techniques

### 1.1. Definition of natural

*Reg. (EU) No 2018/848* reads:

*(10) Experience gained so far with the application of Regulation (EC) No 834/2007 shows the need to make clear to which products this Regulation applies. Primarily, it should cover products originating from agriculture, including aquaculture and beekeeping, as listed in Annex I to the Treaty on the Functioning of the European Union (TFEU). Moreover, it should cover processed agricultural products for use as food or feed because the placing of such products on the market as organic products provides a major outlet for agricultural products and ensures that the organic nature of the agricultural products from which they are processed is visible to the consumer. Likewise, this Regulation should cover certain other products which are linked to agricultural products in a similarly close way as processed agricultural products for use as food and feed because those other products either constitute a major outlet for agricultural products or form an integral part of the production process. **Finally, sea salt and other salts used for food and feed should be included in the scope of this Regulation because they may be produced by applying natural production techniques, and because their production contributes to the development of rural areas, and thus falls within the objectives of this Regulation.** For reasons of clarity, such other products not listed in Annex I to the TFEU should be listed in an Annex to this Regulation.*

An evaluation of the techniques used in salt production requires defining of what is “natural” in this context. There is, at present, no such definition available on EU level, although food authorities and the industry recognise the need for such definition[ii], following consumers’ demands[iii].

EU legislation defines the term ‘natural’ only for mineral waters *(Directive 2009/54/EC*[iv]*)* and flavourings *(Reg. (EU) 1334/2008*). Furthermore, only the use of the term “natural” in nutrition and health claims in food labelling is regulated on EU level *(Reg (EU) 1924/2006*).

Although some European countries such as Spain[v] and the UK provide legal guidance for food manufacturers on the use of the term “natural” ***(“natural food”*** means foods offered without no change in their initial composition in relation to how they occur in nature), very few countries worldwide have included a definition of it in their legislation. Australia, for instance, defines in its national organic standard[vi]: *“**natural:** means existing or formed by nature; not artificial.”*

***“Natural production techniques”*** in salt production are based on how salt has formed naturally (e.g., rock salt or natural crystallisation of sea water and natural brines) and respects nature’s systems, cycles and the environment. Salt production techniques always require a certain degree of energy and technology to be applied. Production techniques can be mapped to a gradation curve with regard to the degree of energy and technology required. The distinction between natural and non-natural production techniques corresponds to opposite ends of that curve and is assessed in the following points.

### 1.2. Natural and non-natural primary production techniques

Primary production techniques refer to the methods for salt extraction. Salt can basically be extracted from rock salt deposits or by concentration and crystallisation of salty waters through evaporation. (See *Salt Experts descriptive techniques*[vii]).

#### 1.2.1. Rock salt extraction

While the formation of rock salt is a naturally occurring process throughout the geological ages, this does not necessarily go for its extraction methods.

Rock salt can be obtained through classical underground mining techniques *(solid extraction)* or through the dissolution of the underground salt deposits *(solution mining)* followed by evaporation *(see point 1.2.3.).*

- *Solid extraction* can be carried out by cutting, drilling and blasting, techniques involving the use of explosives, or by continuous mining.
- *Solution minin*g includes drilling a borehole, injection of water into the deposit cavern and pumping out the saturated brine, followed by evaporation.

Neither *solid extraction of rock salt* nor *solution mining* would happen without changing the environment and natural resources. While solution mining and solid extraction techniques including **explosive** are clearly heavily non-natural, continuous mining techniques appears milder. However, the combination of mining technology including heavy machinery as well as impact on landscape and soil stability classifies this production method as non-natural.

***Solid rock salt extraction and solution mining can therefore not be considered natural production techniques as defined in point 1.1.***

#### 1.2.2. Extraction of natural brine

Brine may discharge naturally from rock salt deposits into underground caverns. These natural brine deposits can be exploited by pumping the brine to the surface. Brine extraction from underground brine deposits would not happen without changing the environment and natural resources, *i.e., drilling and pumping*. ***It cannot be considered a natural production technique in accordance with the definition in point 1.1.***

In natural salt springs, brine emerges naturally from its deposit to the surface. ***This naturally occurring process as well as obtaining the brine can be considered a natural production technique.***

The transformation processes, which turn brine into salt, are discussed in the next points.

#### 1.2.3. Solar evaporation techniques

The concentration and crystallisation of salty waters can be obtained by solar evaporation taking place in open-air ponds through the action of sun and wind. *(*See *Salt Experts descriptive techniques point 3.3.)*

***Following the definition in point 1.1., solar evaporation is a naturally occurring process and can thus be considered a natural production technique.***

This evaluation goes only for the process of evaporation and crystallisation itself. It does not refer to the natural or non-natural origin of the brine used for evaporation *(see point 1.2.2.).*

*Mixed evaporation techniques:* Thermal and solar evaporation are sometimes used in combination *(*See *Salt Experts descriptive techniques, point 3.3.3.).*

***As thermal evaporation would not happen without the active application of energy, mixed evaporation techniques are not in accordance with the definition for a natural production technique laid down in point 1.1.***

Harvesting of sea salt and solar-evaporated salt from natural brines by hand or by mechanical process is not a natural process in accordance with *point 1.1.*; however, ***the same goes for harvesting crops in organic agriculture.*** In fact, the salt production from seawater and natural brine is so similar to agriculture that the term ***"farmed salt"*** was coined to differentiate these salts obtained by techniques similar to agriculture from salts from mining extraction ***("mined salt")***. (*See also 6.2.)*.

The artisanal harvesting of solar salt, however, relaying on hand harvest and without further processing can be considered the most natural harvesting method.

### 1.2.4. Vacuum evaporation techniques

*Vacuum salt*[viii] (also: *evaporated salt, pure dried vacuum salt, PDV salt*) is obtained by evaporating chemically purified, saturated brine in closed vessels according to techniques described in *Salt Experts descriptive techniques, point 3.4*.

Although the underlying thermodynamic principles may certainly be deemed natural, their use in vacuum salt production is a technological one: vacuum salt heavily relies on non-natural techniques which require a lot of energy (see *point 8.2.3*.).

***Vacuum evaporation can therefore not be considered a natural production technique as defined in point 1.1.***

*Brine purification:* Before the brine is evaporated, it is generally softened and subject to a *purification process by chemical or mechanical means* (see *Salt Experts descriptive techniques point 3.4.a*) to remove undesired minerals such as calcium, magnesium, sulphates and carbonates.

These treatments of the brine require the use of ***processing aids*** such as *precipitation agents* (e.g., caustic Soda, soda ash, flue gas…) and *flocculants* to accelerate the sedimentation process. Further, in order to prevent the boiling brine from foaming, *anti-foaming agents* can be injected into the evaporator vessels.

***Brine purification by chemical or mechanical means and treatment would not happen without the active application of energy and chemicals and are therefore not natural production techniques as defined in point 1.1.***

### 1.2.5. Pan evaporation techniques

Salt pan techniques comprise what has been referred to in this text as *thermal* evaporation, i.e., evaporating the brine into salt crystals by heating it. The brine is heated in open pans, under normal atmospheric pressure.

Heating energy in the past came from wood or coal, firing large iron pans *(panhouse process)*, a process still in use in artisanal salt-making in Northern Europe[ix]. The modern *grainer* or *open-pan process* uses open, rectangular pans with heating devices, which usually are fired by waste steam or waste lumber to reduce the cost of energy. A variation is the *Alberger process*, in which flat circular pans with external heating flues are used to produce cup-shaped, pyramidal crystals of a low bulk density, similar to that of *Fleur de Sel*. In the advent of "gourmet salt", the process regained relevance[x].

***Applying the definition of point 1.1 to open-pan processes, neither would comply with a natural production technique, as heating of the brine requires the active application of energy.***

There are, obviously, graduations within the pan processes, with respect to the energy source used for heating (e.g., fossil resources (coal) vs. geothermal energy vs. electrical energy derived from fossil or solar resources), and with respect to the energy-efficiency of the individual process. These aspects are discussed in *point 8*.

### 1.2.6. Secondary processing steps

All secondary processes as described in *Salt Experts descriptive techniques, point 5 and 7,* are not natural and should be reduced to a minimum necessary.

Hence, when salts produced by different methods require different levels of secondary processing, preference should be given to the salt requiring the least secondary processing steps.

Also, in accordance with the article *7.b* and article *8.b of Reg. (EU) 848/2018* the use of f***ood and feed additives***, of ***non-organic ingredients***, of ***micronutrients*** and ***processing aids*** has to be used to a minimum extent.

## 2. The contribution of salt production to the development of rural areas

### 2.1. Definition …

Reg. (EU) 2018/848 reads:

*(10) Experience gained so far with the application of Regulation (EC) No 834/2007 shows the need to make clear to which products this Regulation applies. Primarily, it should cover products originating from agriculture, including aquaculture and beekeeping, as listed in Annex I to the Treaty on the Functioning of the European Union (TFEU). Moreover, it should cover processed agricultural products for use as food or feed because the placing of such products on the market as organic products provides a major outlet for agricultural products and ensures that the organic nature of the agricultural products from which they are processed is visible to the consumer. Likewise, this Regulation should cover certain other products which are linked to agricultural products in a similarly close way as processed agricultural products for use as food and feed because those other products either constitute a major outlet for agricultural products or form an integral part of the production process.* ***Finally, sea salt and other salts used for food and feed should be included in the scope of this Regulation because they may be produced by applying natural production techniques, and because their production contributes to the development of rural areas, and thus falls within the objectives of this Regulation.*** *For reasons of clarity, such other products not listed in Annex I to the TFEU should be listed in an Annex to this Regulation.*

### 2.2. Evaluation

Hypersaline environments are important natural resources of considerable economic, ecological and cultural value. These ecosystems cover large areas throughout the world, not only in salt productions areas (saltworks), but also in natural lakes and tide pools[xi]. The biochemical processes that occur in these ecosystems hold considerable environmental, social and economic value[xii].

Sea salt production is a good example of how the same space can host several economic activities, which may even generate synergies that contribute to the development and sustainability of the areas where they are located.

The organisation of the value chain in the sea salt sector, and especially artisanal salt creates qualified jobs in coastal rural areas of otherwise poor employment rates except for beach tourism, strengthens the local economy and contributes to the protection of the coastline from touristic over-exploitation (hotel complexes, holiday resorts, marinas etc.).

In addition, sea saltworks provide opportunities for:

- ***sustainable tourism:*** services contributing to the preservation of the ecological and landscape values of the saltmarshes, such as sightseeing, birdwatching and salt-related activities.
- ***an important research site:*** due to its unique specificities a lot of research and monitoring is done at sea saltworks. There is a large bibliography on this subject (e.g., basic and applied research on halophilic microorganisms[xiii, xiv], *CRISPR-Cas9*[xv, xvi], *technology proteins studies*[xvii, xviii]).
- a source for ***several products*** linked to the ***bio-economy*** (e.g., natural brine as ”liquid salt”, bittern as a seasoning liquid similar to Japanese “Nigari”, salty clay and carotenoid pigments for cosmetic purposes, etc.)
- a site where as by-production to salt, also ***aquaculture*** (fish and *Artemia salina* as feedstock for seawater fish), ***algae cultivation*** and the ***farming of glasswort*** *(Salicornia spp.)* can be carried out.

**Sea salt extraction** is indisputably part of the cultural heritage of many regions and a remarkable example of **conciliation between economic progress and environmental conservation**, concurrently creating jobs and income and promoting biodiversity and wildlife preservation.

Also, some non-active salt mines and former salt production sites[xix] serve as tourist attractions in rural areas. Some of these sites are also part of the World Cultural Heritage (see *point 7*.)

## 3. The contribution to protection of the environment and climate - Article 4(a)

### 3.1. Definition

*Reg. (EU) 2018/848* reads:

*Article 4* ***Objectives:*** *Organic production shall pursue the following general objectives:* ***(a)*** *contributing to* ***protection of the environment and the climate****;*

This part of the mandate addresses two distinct objectives, *protection of the environment* and *protection of the climate*. However, both are so closely intertwined that with regard to salt production techniques, it seems appropriate to discuss the two objectives together.

While *article 4* of the regulation formulates an active contribution, *article 3*, in defining preventive measures, asks for avoiding negative effects on the environment. ***It may thus be concluded that the degree of negative effects a certain salt production technique has on the environment, provides a criterion for its contribution to environmental protection. The same goes for protection of the climate.***

Climate change and unsecured energy supply are topics with high importance in nowadays economy and society. Therefore, the efficient use of available energy resources is one of the key approaches in meeting the rising energy needs.

### 3.2. Evaluation

#### 3.2.1. Rock salt mining

The *cutting, drilling and blasting technique* requires the use of cutting and drilling machinery and the use of **explosives** (*ammonium nitrate, fuel oil mixtures*). Machinery accounts for the emission of exhaust gases (*hydrocarbons, carbon monoxide, nitrogen oxide, etc*.). These may also be caused, as reaction products, by the blasting process. Blasting further accounts for residues of wire and plastic. In order to stabilise the opened deposits, it can be necessary to inject cement, synthetic resins or other hardening substances through the borehole.

Emissions to air from extractive techniques can occur during all stages of the mining life cycle. Exhaust gases and gases from blasting pollute the environment and damage the climate. Plastic residues from blasting as well as cement and synthetic resins injected into soil strata may have toxic effects on soil-dwelling organisms and microbes.

The *continuous mining technique* uses machinery, which combines cutting and drilling by heavy roadheaders with haulage equipment excavating the salt. It avoids the blasting; nevertheless, the negative effect of polluting and climate-damaging exhaust gases persists.

In summary, mining of rock salt can contribute to climate change[xx] through:

- emission of GHGs;
- increasing solar radiation absorbed by the Earth due to change in land cover, emission of dust, vapour, etc.;
- lost $CO_2$ uptake by forests and vegetation that is cleared off;
- effects on local climate by changed morphology, vegetation, wind channels, etc.

***It can be concluded that mining of rock salt has negative effects on the environment and climate, which despite best practises cannot be avoided in the process.***

### 3.2.2. Solution mining

In order to inject water into an underground salt deposit, a borehole must be drilled and fixated with cement, and an appropriate tubular hanging must be constructed to accommodate for the water pipe, the brine reflux pipe and the pipe for the protective fluid *(blanket)*.

The environmental damage of this technique is not negligible, not only due to the use of large amounts of natural resources (*water*), but also because of the ***negative effects*** (erosion, leakage and seepage problems with saturated brine) of the area of the construction works already discussed in the previous paragraph. The blanket can be compressed air but also be made of diesel, other fuel or nitrogen. If one of the latter is used, ***resulting emissions add to the afore-mentioned pollution and thus, enhance the negative effect of the technique on environment and climate.*** Use of compressed air slightly lowers the negative impact.

Once in operation, *solution mining* leaches salt out of the deposit leaving behind empty caverns, with the ***associated risk of land subsidence, which would clearly be a negative effect on the environment***. This is, however, usually calculated in the exploitation plan and chambers are either kept filled with brine or, when emptied, backfilled with sludge and tailings from salt dressing or with residues from other industries and waste incinerators.

Increasingly in the past 60 years, solution-mined caverns are used for the long-term storage of gases and liquid hydrocarbons in large volumes, for instance, natural gas, oil and other petroleum products and hydrogen. This secondary use of the caverns is today considered as important as the production of salt[xxi]. More than 300 salt caverns in Germany are used today to store such energy carriers[xxii]. If this provides an environmental contribution, though, depends on the carrier's nature. It would apply to the storage of *green hydrogen*, i.e., made from renewable energies[xxiii].

Empty caverns also are considered as potential deposits for carbon dioxide, which involves capturing the $CO_2$ released from the use of fossil fuel and forcing it back into the ground, by means of a process called *carbon sequestration* or *carbon capture and storage (CCS)*[xxiv]. While this approach may help to acutely reduce the presence of climate-damaging $CO_2$ in the atmosphere, it ***only provides a short-term solution*** to the immanent problem of today's fossil and carbon dependent industry processes. ***It does not contribute to their substantial change and is not in line with EU decarbonisation strategies.***

### 3.2.3. Extraction of brine from natural underground brine deposits

Basically, the same opening and construction techniques (piping, etc.) as described for *solution mining* apply to extract brine from natural underground deposits, except that no water needs to be injected and normally, no blanket is needed. ***Consequently, the same negative effects are to be taken into account.***

### 3.2.4. Vacuum salt

Vacuum salt sector recognizes itself as an ***energy intensive subsector***. Air pollution and climate change influence each other through complex interactions in the atmosphere. $CO_2$ is the main gas contributing to climate change. See *points 5.2.2* and *8.2.3*.

### 3.2.5. Natural brine from salt springs

In natural salt springs, strong brine ***emerges naturally*** from its deposit to the surface. There is no need to drill a borehole, to insert a piping structure underground or use a protective blanket from fuel gas or similar. This ***reduces the environmental impact*** compared to solution mining and extraction from underground brine deposits.

No need to drill a well, insert a pipe structure underground, or use a protective blanket of combustible or similar gas. The pipe is built on surface level, which reduces environmentally harmful construction effects. It only serves the purpose of capturing and channelling the brine to solar evaporation ponds or thermal evaporation structures.

For channelling ***driven by gravity***, found in salt spring sites with solar evaporation ponds laid out in terraces (*Salt Experts descriptive techniques point 3.6.)*, no other energy source is necessary, and no emissions are associated, which is to be considered a ***contribution to protect environment and climate***. When the brine is channelled by pumps, usually to a panhouse or similar plant for thermal evaporation, this implies the use of fuel or electrical energy. *Fuel-driven pumps emit polluting and climate-damaging exhaust gases*. Electrical pumps avoid this imminent negative effect if driven by ***electricity from renewable resources whenever possible***.

### 3.2.6. Solar evaporation of seawater

Solar evaporation of seawater and gradual concentration of the resulting brine is driven ***only by sun and wind***, in large, shallow evaporating ponds covering a great part of the area. Brine close to saturation point is led into crystalliser ponds, where salt forms naturally through further evaporation. Water management is based on gravity where location in salt marshes and tidal range allow and is used exclusively in artisanal sea salt production. Many sea salt works use electrical or fossil-fuelled pumps, especially when levelled ground does not favour gravity-based brine flow *(see Salt Experts descriptive techniques point A.6)*.

The process of crystallisation by evaporation caused by sun and wind occurs with almost no energy consumption which implies no $CO_2$eq-emissions. **Solar salt production is, per se, a sustainable activity,** especially due to its efficiency and low fossil energy requirements in case of sea salt and natural brine salt. Gravity-driven circulation of water and brine is devoid of external energy application, with no emissions associated, which ***contributes to the protection of environment and climate***. Fuel-driven pumps emit polluting and climate-damaging exhaust gases. Electrical pumps avoid this; however, they can only be rated climate neutral if driven by ***electricity from renewable resource whenever possible***.

The bottom of the ponds is made of compacted earth, often argillaceous soils present in salt marshes, providing a natural basis first for the development of a beneficial bacterial mat and, later, for the formation of a layer of precipitated salt crystals. In conjunction with the absence of concrete structures and plastic liners, this preserves halophilic ecosystems *(see point 6)* and ***contributes to the protection of environment and climate.***

The ***Commission's Farm to Fork and Biodiversity Strategies*** include the target of reaching 25% of agricultural land under organic farming by 2030. Saltworks can represent an important capital in order to develop and improve biodiversity. They play an important role both as habitats for migratory waterbird species and as nodes of biotic connectivity networks.

Active saltworks have a positive impact on coastal flood mitigation. *The abandonment of saltworks is considered negative for local salt culture and sometimes for biodiversity and therefore accelerates further loss of cultural and natural heritage*[xxv]. This abandonment is having serious consequences for migratory bird populations and for the ecological role these play[xxvi].

### 3.2.7. Solar evaporation of mined brines

In suitable climate regions, solar evaporation is also applied to high-salinity brines from solution mining and underground brine deposits. The salt works are built in areas of level ground, large enough to accommodate the operation site and preferably near the coast. Due to sandy soils, ponds are usually made of cement or concrete, materials requiring large amounts of sand, water and energy to produce (see *point 8)*.

Cement and concrete crack and disintegrate over time through persisting contact with the strong brine and favour the growth of detrimental algae and fungi kept at base in earth ponds by the biological equilibrium. In order to prevent these undesired effects, ponds usually feature plastic liners, *which can be a source of pollution with microplastics*.

Natural clay acts as a hydraulic barrier in earth salt ponds, which is why clayey soils may provide an ***alternative to synthetic materials for use in solar pond liners***[xxvii]. This would also reduce cost of construction and the risk of contamination of subsoil and groundwater by high-salinity brines.

Water management in solar evaporation of mined brines normally relies on fossil-fuelled or electrical pumps, as the levelled ground does not allow for gravity-based brine flow. *Fuel-driven pumps emit polluting and climate-damaging exhaust gases*. Electrical pumps can only be rated climate neutral if driven by ***electricity from renewable resources whenever possible***.

## 4. The encouragement of short distribution channels and local production in the various areas of the Union - Article 4(f)

### 4.1. Definition

Reg. (EU) 2018/848 reads:

*Art. 4 - (f)* ***encouraging short distribution channels and local production*** *in the various areas of the Union;*

### 4.2. Evaluation

Salt is a natural resource that has been located in different areas of Europe (See *Salt Experts descriptive techniques point 1 and 2).* Salt extraction sites occur where the natural resource is located[xxviii].

This objective is compatible with the free trade of the organic salt provided *article 50 of Reg. 848/2018* (***non-prohibition and non-restriction of the marketing of organic and in-conversion products***). Short distribution should be assured whenever possible, provided hot climates favour the organic salt production.

Organic salt, like many other organic products, is produced where climatology and geographical conditions allow it, provided they accomplish the organic regulation requirements[xxix].

## 5. The contribution to a non-toxic environment - Article 4(d)

### 5.1. Definition

Regulation 2018/848 reads:

*Art. 4 - (d) substantially contributing to a* ***non-toxic environment;***

### 5.2. Evaluation

#### 5.2.1. Rock salt

The use of explosives, regardless of their emission power, does not contribute to a non-toxic environment.

Explosions and continuous mining or cut and blasting methods do not respect natural resources, such as water and air. In fact, they can cause reduced air quality resulting from the emanation of gases and can degrade and reduce water supplies.

The type of machinery used in underground mines exposes workers to an unhealthy environment. *Directive (EU) 2019/130*[xxx] lays down that ***there is sufficient evidence of the carcinogenicity of diesel engine exhaust emissions*** *arising from the combustion of diesel fuel in compression ignition engines. The ACSH agreed that traditional diesel engine exhaust emissions should be added to the carcinogenic substances, mixtures and processes listed in Annex I to Directive 2004/37/EC*[xxxi] *and has requested further investigations of the scientific and technical aspects of newer types of engines*. Diesel engine exhaust has been classified by the IARC as carcinogenic to humans (IARC category 1) and the IARC has specified that while the amount of particulates and chemicals are reduced in the newer types of diesel engines, it is not yet clear how the quantitative and qualitative changes will translate into altered health effects.

The *Directive (EU) 2019/130* has included works involving exposure to diesel engine exhaust emissions in *Annex I to Directive 2004/37/EC* and established in *Annex III* a limit value for diesel engine exhaust emissions calculated on elemental carbon (***0.05 mg/m³*** measured as elemental carbon).

### 5.2.2. Vacuum salt

Vacuum salt process is very different from solar salt process from the energetic point of view. *"Evaporated salt is manufactured by evaporating the water from brine, under vacuum. This entails the use of heat energy, with implications for $CO_2$ emissions*[xxxii]*.*

Although artificial evaporation techniques have been optimized and low $CO_2$-footprint energy sources (renewables) are being incorporated to some extent, vacuum salt has the **highest environmental impact**, as a large amount of water needs to be evaporated, for which it is very **energy intensive** and **large quantities of emissions** are produced.

As $CO_2$ levels rise, so do its effects on air pollution. $CO_2$ contributes to air pollution in its role in the greenhouse effect. $CO_2$ traps radiation at ground level, creating ground-level ozone. This atmospheric layer prevents the earth from cooling at night. One result is a warming of ocean waters. Oceans absorb carbon dioxide from the atmosphere. However, higher water temperatures compromise the oceans' ability to absorb carbon dioxide. Over time, the effects of carbon dioxide are accumulated. Another environmental effect of carbon dioxide on air pollution is climate change. The earth's surface temperature has risen over the last 100 years, according to studies done by the National Oceanic and Atmospheric Administration (NOAA). Scientists believe carbon dioxide pollution is the primary culprit[xxxiii].

Air pollution and climate change influence each other through complex interactions in the atmosphere. $CO_2$ is the main gas contributing to climate change.

### 5.2.3. Sea salt

Sea salt production is devoid of processing aids and relies on only natural crystallisation, contributing to a non-toxic environment.

Sea salt production needs large surfaces but **creates there an extremely delicate and precious equilibrium of a high environmental value**. The exploitation of salt marshes helps to maintain the ecological balance guaranteeing the very existence of these rare and the often-threatened biodiversity that they shelter.

According to the *Millennium Ecosystem Assessment*, environmental services fall into one of four categories: provisioning services (raw materials used by humans), supporting services (nutrient cycling, primary production, and oxygen production), regulating services (climate, water quality and risk mitigation), and cultural services (leisure, spirituality and knowledge generation). Saltworks provide diverse economic and ecological ecosystem services. Based on the literature review of various studies carried out throughout the world, we were able to identify a series of ecosystem services that saltworks offer, as per the four primary categories (provisioning, supporting, regulating, cultural)[xxxiv].

Seawater is affected by the pollution of the seas and oceans, from industrial sources and household litter, with the presence of microplastic being a considerable fact as a contaminant in sea salt. It needs to be stressed, however, that this is not to blame on the method of production but on the contamination of the source material (seawater). This situation is found in similar circumstances also in organic agriculture, which is not only subject to contamination with microplastic, but also to pollution by chemicals and GMO used in conventional agriculture, through soil, water and air.

## 6. The respect for nature's systems and cycles - Article 5(a)

### 6.1. Definition

*Reg. (EC) 2018/848* reads:

*Art. 5 - (a) respect for nature's systems and cycles and the sustainment and enhancement of the state of the soil, the water and the air, of the health of plants and animals, and of the balance between them;*

## 6.2. Evaluation

The solar evaporation of sea salt and salt from natural brine as defined in *point 1.1.* is, like farming, a production method dependent on the cycle of seasons throughout the year. Just as in agriculture, fields are ploughed and crops are seeded, grown and harvested, salt ponds are prepared in spring, flooded with seawater that turns into brine, followed by salt crystallisation and harvest.

The agricultural-like production of these *farmed salts* is strikingly different from the production of *mined salts* as described in *points 1 and 3*. In some countries, primary sea salt production is even considered an agricultural activity (e.g., in France).

The cyclic way of sea salt production is best illustrated by the season's cycle in artisanal saltworks: In spring, the ponds, dikes, locks and gates are repaired by hand and undergo a sound cleaning. In May, at spring tide, clean seawater is let into the evaporation system for the first time. From June to September, sun and wind concentrate seawater gradually into a strong brine, in serial evaporation ponds. Driven by gravity, concentrated brine moves into small, shallow crystalliser ponds, where it evaporates further. Salt crystals form in the saturated brine and precipitate until the brine is used up and the salt ready for harvesting. When the salt has been gathered, new brine is led into the crystallisers to restart the cycle. The seawater reservoir is filled up if necessary. The cycle of concentration, crystallisation and harvesting is repeated several times during the summer months. Salt season ends with the first autumn rains, usually in late September. Residual brine remains in the ponds, which are flooded by rainwaters. During wintertime, the flooded ponds provide food and habitat for many species of waterbirds (e.g., egrets, flamingos, ibises, spoonbills).

Biological management of sea saltworks in general aims at creating a biological equilibrium of the ponds, in order to enhance salt yields and quality[xxxv]. Measures include development of the bacterial mat, turbidity control with plankton eating macro-zooplankton[xxxvi] or favouring the production of unicellular algae (e.g., *Dunaliella salina*) and autotrophic bacteria (e.g., *Halobacterium*), species responsible for the red colour of the water in the most concentrated salt ponds. The presence of all these species has proven to contribute to evaporation and salt crystallisation, which is why their symbiosis is essential for the salt production activity. Bacterial bio-precipitation of salt even allows for early salt crystallisation in under-saturated saline waters[xxxvii].

Most organic components present in sea water do not survive the concentration process. Instead, halophile populations develop: hypersaline bacteria and algae, unicellular organisms and aquatic invertebrates. They are fundamental elements of the food chain for aquatic species including fish, cephalopods, bivalves and other invertebrates and a wide range of water birds including threatened species. Vegetation is characterised by site-specific plant communities with halophilic biota and including many endemic species. The distribution of all these species varies according to the physical and chemical characteristics of water and substrate (especially salinity).

**Salt marshes favour the development of microorganisms which constitute the first link of the food chain.** These marsh areas are also perfect for the growth of many bird species that find abundant food and protection against predators. Productive maintenance of the saltmarshes represents insurance to preserve and conserve environmental and natural values. The drying up of uncultivated salt marshes results in a biological impoverishment of the environment and a downgrading of the landscape.

*Mined salts*, in contrast, as well as *mined brines*, derive from extraction techniques of the mining industry, which is not dependent on the seasons of the year or on local weather and climate conditions.

## 7. The preservation of natural landscape elements, such as natural heritage sites - Article 5(b)

### 7.1. Definition

*Regulation (EU) No 2018/84*8 reads:

*Art. 5 - (b) the **preservation of natural landscape** elements, such as **natural heritage site**s;*

### 7.2. Evaluation

Sea saltworks in the European Union countries are situated in saltmarshes, salt meadows and salt steppes protected as Special Areas of Conservation under *Directive 92/43/EEC*[xxxviii] and as Special Protection Areas under the *Directive 09/147/EU*[xxxix]. EU members countries contracted to the international Ramsar Convention for the protection of wetlands, and almost all their sea saltworks are protected by the rules implementing this Convention at the local level. Furthermore, in several countries, saltworks are legally protected either as Natural Reserves or Natural Regional Parks.

The solar production technique, developed over more than 2000 years in the salt marshes, has undoubtedly contributed to preserve a specific fauna and flora. Salt marshes have long been recognised as playing a major role in the conservation of water birds for both breeding and staging and, as a result, most of them are classified as Natura 2000, Nature Reserve or Ramsar sites.

They are protected areas of importance for wildlife, flora, fauna or features of geological or other special interest, which are reserved and managed for conservation and to provide special opportunities for study or research. These protected spaces play a decisive role in ecosystem conservation and species surviving for the ecologic processes and ecosystem maintenance. They are essential tools for in situ biodiversity conservation. At EU level, nature and biodiversity are protected by several laws.

Natural heritage sites are regulated on international level by the *Unesco World Heritage Centre*[xl]. To date, no active salt production sites are inscribed to the list of natural heritage sites. However, the natural heritage site *Wadden Sea* (since 2009, extended 2014), affecting Denmark, Germany and the Netherlands, is actually threatened/at risk through offshore rock salt extraction[xli]; despite the protection status, new mining projects were/are granted (2014[xlii] to 2019[xliii]). Another example is the heritage site Doñana National Park in Spain (since 1994), situated between the saltworks of Huelva and Sanlúcar de Barrameda, which is threatened by a governmental project to inject and store gas in the underground cavities around the park[xliv].

It should be noted in this context that famous sites with relation to salt, such as the former salt mining region *Hallstatt-Dachstein / Salzkammergut* in Austria, the former *saltworks of Salins-les-Bains and Arc-et-Senans* in France (underground brine) and the *Wieliczka and Bochnia Royal Salt Mines* in Poland, are recognised as Unesco ***cultural*** world heritage sites, not natural ones.

## 8. The responsible use of energy and natural resources, such as water, soil, organic matter and air - Article 5(c)

### 8.1. Definition

Regulation 2018/848 reads:

*Art. 5 - (c)* the ***responsible use*** of energy and natural resources, such as water, soil, organic matter and air;

### 8.2. Evaluation

#### 8.2.1. Rock salt

Rock salt deposits are limited, non-renewable resources. With regard to the use of energy in primary production, rock salt ranks after sea salt, consuming 93 MJ per ton of salt (2,6 times more than sea salt). Mining activity involving heavy machinery leads to 4 times more $CO_2$ emission than sea salt (12 kg per ton of salt[xlv]).

The uppermost fertile layer of land, the topsoil is the first environmental compartment that is impacted by any extractive project already from construction[xlvi].

The major drawback of industrial mining is the damage mining operations cause to the environment. Rock salt mining methods lead to the occurrence of workings of specific dimensions and shapes. Operation of gravitation forces causes that caverns are subjected to convergence effects whose appearance on land surface is a question of time. Such effects are demonstrated by the change of shape and of hydrogeological relationships etc. Consequently, the natural environment can be affected (e.g., in visible replacement of vegetation species) and land use may also dramatically change, owing to mining menace[xlvii].

The physical stability of the surface and subsurface is of paramount importance at mining projects, both at the design scenario (vibration by transport or blasting, man-induced earthquakes, minor land subsidence due to undermining) and in case of accidents (sinkholes above underground mines, tailing dams, waste heaps and quarry slope failures). Many catastrophes have occurred due to salt mine collapses and very important landscape changes, regardless the extraction method used[xlviii, xlix, l, li, lii, liii, liv].

Removal of large areas of topsoil can destroy habitats, and the chemicals used in mining operations can leach into the groundwater and pollute the area.

In summary, the possible consequences of the rock salt mining processes (**classical salt mines** and extraction by **solution mining**) include *reduction of air quality*, *loss of potable water supplies* and a *short- and long-term land subsidence*[lv]*"*.

### 8.2.2. Artificial brines: solution mining

This technique consumes **large amounts of water to dissolve the salt** creating a cavern in the salt layer.

The environmental damage of this technique is not negligible, not only because the use of large amounts of natural resources (water), but also by the erosion of the area.

During the dissolution process, interaction between the mechanical effect and dissolving characteristics of rock salt on wall rock of rock salt cavern exists[lvi].

Although in the last years, knowledge in rock mechanics has made great progress in the field of the rheological behaviour of rocks and in the techniques of in situ measurement of stresses, it is often still impossible to know the value of all parameters which have an influence on the stability of an underground structure[lvii] .

The environmental risks of underground cavern creation—*catastrophic ground collapse, surface subsidence and degradation of groundwater quality and quantity*—are the same for solution salt mining as for conventional rock salt mining.

The subrosion intensity associated with brine extraction at the wet rock head can be far more serious than any natural subrosion process. ***Changes to the subrosion regime caused by human impact are irreversible.*** The regeneration of naturally controlled subrosion following eventual shutdown of brine extraction activity can be expected to be an extremely slow process the most significant phases of which are predicted to require periods of time measured in centuries rather than years[lviii].

### 8.2.3. Vacuum salt

Over 65% of salt production goes to chemical industry applications of which the production of Chlorine and Soda Ash are the largest applications, and road de-icing[lix]. Growing demand for highly purified salt for industrial uses led to the development of purification processes resulting in salts over 99% NaCl.

The chemical industry is the largest salt consumer of salt of the total production. Growing demand for highly purified salt for industrial uses led to the development of purification processes resulting in salts over 99% NaCl. Vacuum salt is the purest salt used in chlor-alkali plants; however, its production requires considerable amounts of energy[lx].

*"The EU States have developed different energy and climate policies in the framework of Kyoto Protocol. The EU Emissions Trading System (EU ETS) for $CO_2$, is a cornerstone of the European Union's policy to combat climate change and a cost-effective tool for reducing greenhouse gas emissions. The ETS Directive states that the industries considered to be exposed to a significant risk of "carbon leakage", receive special treatment to support their competitiveness. This term refers to the sectors likely to relocate their installations to other more-flexible countries in terms of climate policies"*[lxi].

**Vacuum salt sector recognises itself as an energy intensive subsector**; however, few references to public data are available about energy consumption in salt production for reasons of confidentiality of industry details. Eurostat figures aggregate the whole sector (sea, rock, vacuum, etc.) energy consumption and it is no possible to identify the energy intensive and carbon leakage exposed subsector of vacuum salt (subsector is not recognized at NACE-code level). Nevertheless, some evidence can be found about this energy intensiveness[lxii, lxiii, lxiv]. With more than 800 MJ/t of salt and a $CO_2$ emission of 93 kg/t of salt vacuum salt exceeds sea salt by a factor 23 and 30, respectively[lxv].

For example, *the publicly available Executive Summary of the Qualitative Assessment for the European Salt Industry* NACE 08.93 presented by EUsalt states that ***the vacuum salt sub-sector has on average about four times the total emissions intensity per unit of GVA than the average for the salt sector on NACE level as published by the COM in its preliminary assessment***[lxvi].

The need of these climate policies is evidence that **high energy consumption enterprises** and **environmental pollution are linked,** which is obviously **not compatible** with the inclusion of these enterprises in organic labelling regulation.

### 8.2.4. Sea salt

**Sea salt is a renewable resource.** The process of crystallisation by evaporation caused by sun and wind occurs with almost no energy consumption which implies no $CO_2$eq-emmissions. A lot of evidence about this fact can be found in literature. This goes, even more so, for artisanal sea salt production, with no machinery involved in maintenance and harvesting.

Solar salt production from seawater and natural brines as defined in *point 1.1.* is, per se, a sustainable activity, *especially due to its efficiency*[lxvii] *and low fossil energy requirements*[lxviii].

*"Solar salt is the least energy intensive of the three principal methods of recovery. Pollution abatement costs are minimal"*[lxix].

*"Obviously, less fossil energy is needed for the production of solar salt than for the extraction of rock salt and the production of evaporated salt. Most of the energy required extracting sodium chloride from seawater or brine is free. Seawater is evaporated by the power of the sun and wind."*[lxx].

Production of sea salt does not bind scarce freshwater resources and the seawater used is applied efficiently by cycling through the salt ponds when turning into brine. The efficient use of seawater is enhanced even more, if the salt is washed in its original brine and if this, as in artisanal sea salt production, is done prior to harvesting.

Salt-deterioration of soils is a serious environmental problem; however, it is found to be most closely related to irrigation in dry continental climate regions, combined with inefficient water distribution and faulty on-farm water management[lxxi], than to the activity of sea saltworks. Although environmental damage through saltworks, e.g., by seepage-induced salinisation of freshwater and soil or cutting of mangroves and other costal vegetation, is an undeniable risk, sea salt-producing countries are well aware of it and counteract worldwide, with regard to new exploration and expansion projects, through regulations[lxxii], environmental impact assessment[lxxiii] and authority controls[lxxiv].

In Europe, on the other hand, sea saltworks are either situated in naturally salty wetlands such as salt marshes and natural estuaries with already existing salt-adapted flora and fauna, or in man-made wetlands built centuries ago (e.g., *Aigues-Mortes* salt marsh, *Midi,* France), with subsequently adapted species and representing nowadays important habitats (Natura 2000). A good example for proactive guidelines in this respect is the "MC-Salt" Project aiming at environmental management and conservation in Mediterranean Saltworks and Coastal Lagoons[lxxv].

#### 8.2.5. Salt from natural brine from salt springs and salt lakes

Although not from renewable resources, the salts obtained from brines from salt springs and salt lakes are similar to sea salt with regard to their low energy requirements when produced only by solar evaporation, and, due to their high-salinity brines, even more efficiently produced.

## 9. The production of a wide variety of high-quality products that respond to consumers' demand for good that are produced by the use of processes that do not harm the environment and human health - Article 5(d).

### 9.1. Definition

*Regulation (EU) No 2018/848* reads:

*Art. 5 - (d) the production of a wide variety of high-quality food and other agricultural and aquaculture products that* ***respond to consumers' demand*** *for goods that are produced by the use of processes that do not harm the environment, human health, plant health or animal health and welfare;*

With the organic food sector growing substantially over the past decades, scientists have been analysing consumers' expectations of organic food and assessing the criteria, on which these expectations are based:

Food safety, health aspects and environmental concern, along with positive sensory attributes such as freshness, smell, taste, and texture, influence consumer preferences for organic food[lxxvi]. Several studies have shown that consumers associate organic food with a natural process, care for the environment and animal welfare, expecting organic food to be free from additives such as chemical pesticides and mineral fertilisers[lxxvii]. In summary, consumers' expectations are ruled by the "naturalness" of the organic food product and sustainability aspects such as increasing biodiversity and saving natural resources.

A recent study in Spain showed that, despite a general positive attitude towards organic food, consumers tend to confuse it with locally produced and homemade food, demonstrating at the same time consumers' receptivity for using local breeds, which contribute to biodiversity and add value to organic farming through ecotourism and educational activities[lxxviii].

With regard to feed, even consumers of organic food show low awareness of feed origin and supply chains and little knowledge of feed production, as a study in Germany revealed[lxxix]. Researchers therefore reasoned that *"the current situation with regard to feed production is not in line with consumers' ideas of sustainable organic agriculture"*[(idem)].

### 9.2. Evaluation

Salt is one of the most abundant minerals on the planet and an incredibly important substance whose number of uses is estimated to more than 14,000. Organic regulation only concerns the uses for food and feed. It does not concern salt for chemical or pharmaceutical uses or de-icing.

Organic salt for food and feed shall accomplish with the requirements established in the Codex Alimentarius as a general rule. However, other regulations of the MS shall be taken into account in relation to the content of NaCl to include salts with lower levels of sodium chloride (e.g., *Fleur de sel, sal marina virgen, sel gris, sal marinho tradicional…*).

In EU countries[lxxx] around **3,7 Mt** (8%[lxxxi] of 46[lxxxii] Mt) **are needed for food** and **feed consumption**. The quantity necessary for food grade salt could be covered entirely by salt obtained only by solar evaporation of natural sources (*sea water, natural brines from salt springs* and *salt lake water*). Moreover, in accordance with *Regulation (EU) No 2018/848*, organic salt **is currently not a mandatory ingredient for organic food production,** which leaves a production capacity of organic salt far greater than the quantity needed for direct human consumption.

Consequently, organic salt for feed by direct consumption (lick stones, or loose crystals as a supplement) can still be covered by solar evaporation of natural sources as defined above (See *Annex Salt Production of Salt Experts descriptive techniques*) .

Organic production implies good environmental practices. The source of the salt does not suffice to determine its organic nature. Also, salt production techniques must comply with the requirements of this regulation.

Sea water, natural brines from salt springs and salt lake water provide organic salt as far as they undergo solar evaporation. On the contrary, salt provided by the same sources but obtained by thermal evaporation processes (heating), with high energy consumption, are obviously not compliant with organic production rules (see *point 1*).

For the sake of consistency, salt types resulting from production processes not in line with the aim of the Regulation due to their environmental impact shall be excluded from being considered as organic. This helps to strengthen the position of organic salt, whereas **trying to integrate all types of salt would weaken if not undermine the ones that undoubtedly fit the basis of the regulation.** This is not judging which salts are "good" or "bad" but merely assesses compliance with the mandate and production rules. Salts not fitting the organic regulation principles have their appliances in other industries like the chemical and pharmaceutical ones.

## 10. The adaptation of the production process to take account of the regional differences in the ecological balance, climatic and local conditions

While this point **does not refer directly to Reg. (EU) 848/2018**, it may be understood as how different salt production processes reflect climatic and local conditions and how they have been adapted to them. A reference of this point is laid down in *Council Regulation (EC) No 834/2007*[lxxxiii]:

*Whereas (21) It is appropriate to provide for flexibility as regards the application of production rules, so as to make it possible to adapt organic standards and requirements to local climatic or geographic conditions, specific husbandry practices and stages of development. This should allow for the application of exceptional rules, but only within the limits of specific conditions laid down in Community legislation;*

*Article 5 (d) taking account of the local or regional ecological balance when taking production decisions;*

The *USDA* defines organic agriculture as *"a production system that is managed to respond to site-specific conditions by integrating cultural, biological and mechanical practices that foster cycling of resources, promote ecological balance, and conserve biodiversity."*

When this adaptation is assessed with regard to the ecological balance specific for a production site in a given geographical location, sea salt production shows a greater variety in techniques specifically adapted to local and climate conditions than other salts. Taking into account the differences in landscape, coastal structure, soil types, temperature, sun and wind intensity, rainfalls and humidity, sea saltworks have adjusted their operations, for many centuries, by using smaller or larger evaporation and crystalliser areas, shallower or deeper ponds and varying arrangements of the ponds within the saltern as well as harvesting time among other production steps.

Specifically, this adaptation can be seen in production of artisanal sea salt to local specificities is illustrated by the harvest of coarse salt in regard of the weather risk:

- In Guérande (France), with frequent rains even in summer, the producer harvests daily the crystallisers to secure the salt.
- In Ile de Ré (France), weather is drier, and the rain risk is lower; the producer harvests the coarse salt each 2 days.
- In Algarve, Portugal, with little rain risk, the producer harvests every 1 or 2 weeks.

The main artisanal sea salt production sites were thoroughly studied and described during the Interreg SAL in 2004-2007. Each production site's specificity was precisely described: pond's layout, pond's ratio, water management, works, harvest, tools, work agenda, etc.[lxxxiv]

The salt sub-group will also provide their views in particular on:

- **The possibility to split into clearly and effectively separated production units and the resulting requirement/s - Article 9(2) and (7)**

The whole production process and most of the processing stages of solar salt coming from sea water and natural brines accomplish the organic requirements laid down in *Reg. (EU) 848/2018* until harvest.

The first non-organic practice may happen during the secondary processing (heavy washing, additives, etc). Therefore, separation in place or time will be enough to ensure differentiation among organic, conversion and non-organic processes and products, making it illogical to duplicate installations if physical separation is imposed.

Besides, the biggest market share of most of salt producers is not the food sector but other uses: feed, water treatment, chemical industry, de-icing, etc. In order to not put at risk the supply of organic salt, organic and non-organic production units may be present in the same plant, provided they are separated in place and/or time. Similar practices as established for HACCP rules (e.g., allergens management) should be defined in these cases.

Chemicals analyses and processing registers shall be required to verify no food additives, processing aids and any other products and substances and ingredients not authorized for production of organic salt have been used.

- **The necessity and condition to comply with a conversion period - Article 10**

The conversion period should be *at least three years* before the first harvest of organic salt in case of having previously used non-natural brines, understood as brines whose origin is different from sea, spring or salt lakes, or brines which have undergone any non-organic practice such us chemical purification, etc. This conversion period will ensure that artificial brines from solution mining or brines that were subject to chemical treatment are completely renewed by natural ones.

In case of primary salt production units where no artificial brine was used, there is no need a conversion period, because organic and non-organic production imply the same practices during the crystallisation production process, with the only difference that non-organic processing practices (*e.g., addition of anticaking, processing aids…*) are avoided.

If the salt's origin (sea, spring, salt lake) is organic and its crystallisation (evaporation only by action of sun and wind) is organic, no change is expected during the conversion period until any non-organic processing practice, such us the addition of additives, is carried out.

*Rock salt* should be excluded from the scope of this Regulation due to environmental reasons as well as due to not meeting the principles and objectives of organic production. For this reason, a conversion period for this type of salt does not apply.

- **The specific requirements for collection, packaging, transport and storage of products - Annex III**

Salt producers shall ensure that organic salt and in-conversion salt are collected, packaged, transported and stored in accordance with the rules set out in Annex III[lxxxv] and *Codex Stan 150-1985* in case *iodine salts* have been added, such as:

- **Collection of products and transport to preparation units**

  Organic salt operators may carry out the simultaneous collection of organic, in-conversion and non-organic salts only where appropriate measures *in place or time* have been taken to prevent any possible mixture or exchange between organic, in-conversion and non-organic products and to ensure the identification of the organic and in-conversion salts.

  Salt producers shall keep the information relating to collection days, hours, the circuit and date and time of the reception of the organic salt available to the control authority or control body.

- **Packaging and transport of products to other operators or units**

Organic salt operators shall ensure that organic and in-conversion salts are transported to other operators or units, including wholesalers and retailers, only in appropriate packaging, containers or vehicles closed in such a manner that substitution of the content cannot be achieved without manipulation or damage of the seal and provided with a label stating, without prejudice to any other indications required by Union law:

(a) the name and address of the organic salt producer and, where different, of the owner or seller of the product;

(b) the name of the product or a description of the compound feedstuff accompanied by a reference to organic production;

(c) the name or the code number of the control authority or control body to which the organic salt operator is subject; and

(d) where relevant, the lot identification mark in accordance with a marking system either approved at national level or agreed with the control authority or control body and which permits the linking of the lot with the records referred to in *Article 34(5) of Reg. (EU) 848/2018*.

The information referred to in *points (a) to (d)* may also be presented on an accompanying document, if such a document can be undeniably linked with the packaging, container or vehicular transport of the product. This accompanying document shall include information on the supplier or the transporter.

The closing of packaging, containers or vehicles shall not be required where:

(a) the transport takes place directly between two operators, both of which are subject to the organic control system;

(b) the transport includes only organic or only in-conversion products;

(c) the products are accompanied by a document giving the information required under *points (a) to (d);* and

(d) both the expediting and the receiving operators keep documentary records of such transport operations available for the control authority or control body

- **Reception of products from other operators of units**

On receipt of an organic or in-conversion salt, the organic salt operators shall check the closing of the packaging, container or vehicle where it is required, and the presence of the indications provided for in *points (a) to (d)*.

The organic salt operator shall cross-check the information on the label referred to in *points (a) to (d)* with the information on the accompanying documents. The result of those verifications shall be explicitly mentioned in the records referred to in *Article 34(5) of Reg. (EU) 848/2018*.

- **Special rules for the reception of products from a third country**

Where organic or in-conversion salts are imported from a third country, they shall be transported in appropriate packaging or containers, closed in a manner that prevents the substitution of the content and bearing the identification of the exporter and any other marks and numbers that serve to identify the lot, and shall be accompanied by the certificate of control for import from third countries where appropriate.

On receipt of an organic or in-conversion salts imported from a third country, the natural or legal person to whom the imported consignment is delivered and who receives it for further preparation or marketing shall check the closing of the packaging or container and, in the case of products imported in accordance with *point (b)(iii) of Article 45(1) of Reg. (EU) 848/2018*, shall check that the certificate of inspection referred to in that Article covers the type of product contained in the consignment. The result of this verification shall be explicitly mentioned in the records referred to in *Article 34(5) of Reg. 848/2018*.

- **Storage of products**

Areas for the storage of products shall be managed in such a way as to ensure identification of lots and to avoid any mixing or contamination with products or substances not in compliance with the organic salt production rules. Organic and in-conversion salts shall be clearly identifiable at all times.

No input products or substances other than those authorised pursuant organic salt production rules for use in organic salt shall be stored in organic or in-conversion salt production units.

Where organic salt operators handle organic, or in-conversion or non-organic salts in any combination and the organic or in-conversion salts are stored in storage facilities in which also other salts are stored:

(a) the organic or in-conversion salts shall be kept separate from the other salts;

(b) every measure shall be taken to ensure identification of consignments and to avoid mixtures or exchanges between organic, in-conversion and non-organic salts;

(c) suitable cleaning measures, the effectiveness of which has been checked, shall have been carried out before the storage of organic or in-conversion salts and the salt operators shall keep records of those operations.

Only the products for cleaning and disinfection authorised pursuant to organic salt production rules for use in salt organic production shall be used in storage facilities for that purpose.

**In setting organic salt production rules, a particular attention will be done on water**

The production of salt is considered as organic production provided that the seawater and salty waters quality corresponds to ***clean seawater***[lxxxvi] or ***clean water***[lxxxvii] according to *Article 2(1)(h) and (i) of Regulation (EC) 852/2004*[lxxxviii].

**Contaminant control measures established in agreed regulations** (*Alimentarius Codex*[lxxxix], *General Standard for contaminants and toxins in food and feed*[xc], etc.) will assure both the quality of the organic salt and the quality of its natural source.

*Sea water quality levels shall be adequate to ensure the development and survival of characteristic biocenosis of saltmarshe*s, which are intrinsically necessary for sea salt production. Specific regulation enforcement[xci] shall protect and guarantee symbiosis between the ecosystem and the activity and objectives of the saltworks.

Sea Saltworks are water bodies normally situated along the coast and whose object is the production of salt through evaporation of seawater. They are composed of a system of shallow ponds with a high range of salinities all exceeding that of seawater. Their location and manner of exploitation, together with the salinity of the ponds (particularly those situated at the end of the circuit), set the standard for the development of environmental conditions. Their characteristics are different among the different ponds belonging to the same water body and their elevated saline concentrations lead these systems to present particular environmental conditions to which some specialized organisms have been able to adapt. Besides, characteristics undergo seasonal variation.

The *Water Framework Directive (WFD)* requires Member States to distinguish between ***"natural"*** and ***"heavily modified waterbodies"*** *(Article 4(3))*. The latter are designated as having an acceptably lower ecological status as the result of hydromorphological pressures, which cannot be removed because of the high social or economic cost. In some MS, within the scope of the WFD, the sea saltworks belong to the transitional waters group and have been designated as Transitional Waters (TW) and Heavily Modified Water Bodies (HMWB) (e.g., Spanish Water Planning Instruction[xcii]).

Regarding *HMWB*, *WFD* establishes as obligatory the determination of their ***ecological potential***, and not their ***ecological status*** *(Article 2 (23) and Annex II Point 1.3 (ii))*. This supposes the assumption of certain exceptional conditions and among them a lower ecological status, maintaining at the same level the goals of protection and quality improvement. Because of this, the quality targets for *HMWB* are *"good chemical status"* (compliant to natural water bodies) and *"good ecological potential"*, pragmatically defined as the ecological quality expected under the conditions of the implementation of all possible measures[xciii].

Prior to establishing the ecological potential for each characterised surface water body type, type-specific *hydromorphological and physicochemical conditions shall be established representing the values of the hydromorphological and physicochemical quality elements* and an intercalibration exercise of the different proposed methodologies must first be conducted by the various MS. Although there is a large literature on the study of marine and estuarine nutrient and biogeochemical cycles in aquatic systems, this kind of studies in saltern systems is proportionally much lower[xciv].

To date, little progress has yet been made regarding the indicators' definition and the intercalibration exercise for *HMWB*[xcv]*[Annex II. Point 1.3]*.

The Commission Decision of 17 august 2005[xcvi] sets out the register of sites to form the intercalibration network referred to in *Section 1.4.1(vii) of Annex V to Directive 2000/60/EC*, but ***not all the HMWB have been classified***.

The problem is that the intercalibration procedures developed for the types of natural water bodies cannot be extrapolated to hypersaline HMWB (*salinity > 40 psu*) due to their very different conditions. There are several data sets, but experts decided not to include the *HMWB* in the *3rd Intercalibration Phas*e. Consequently, intercalibration exercise is not possible for this typology[xcvii]. This, together with the wide variety of anthropogenic uses, makes it even more difficult for *HMWB* to establish common criteria for the indexes, methods and limits among the MS. Further, in several national legislations, such as Spanish legislation, no indicator and intercalibration procedure has been set out for most of the saltmarshes, to establish the ecological potential[xcviii].

In summary, **Sea Saltworks are very different from rivers and coastal waters** and due to their particularities, their regulation is not completely covered in the *WFD* and related legislation. In most of the countries with sea Saltworks, river basin plans make a qualitative ecological potential assessment based of their best knowledge but **lacking reference values and properly validated indicators for sea Saltworks**. Besides, there are differences in their implementation by the different regional and Member Government Authorities.

Appropriate indicators for sea Saltworks, due to their particular characteristics (salinity > 40psu and depending on the type of pond and season), are still pending, reference values remain outstanding and intercalibration among the different MS must be done to assure a coherent and fair ecological classification. There is still a lot of work to be done since no specific reference values are found in these regulations for sea Saltworks (*e.g. Habitats and Birds Directive in the Natura 2000 framework and Water Framework Directive*) that could help define their status rigorously.

Current **monitoring processes of saltmarshes have not been established** with the same methods as for other water bodies; they haven't been through the same authorisation levels. Consequently, ***we believe there is no justification to link the organic salt production*** to the *Directive 2000/60* EC as it is not fully developed with appropriate indicators, reference and comparable values and good procedures to avoid an unfair play of field among the different types of salt. And even more, when there are precedents for other organic products which are not required to comply with *Directive 2000/60* EC (*e.g., organic rice and other types of organic salt*).

*Aldeguer, Lidia*
*Merlin, Louis*
*Siebert, Andrea*

March 1st, 2021

## REFERENCES

[i] Description of different salt origins, salt production methods, composition and contaminants - EGTOP Salt Sub-Group, January 18th, 2021

[ii] https://www.safefoodadvocacy.eu/natural-campaign/

[iii] Román, S., et al.: The importance of food naturalness for consumers: Results of a systematic review, Trends in Food Science & Technology, Vol 67, 2017

[iv] Directive 2009/54/EC of the European Parliament and of the Council of 18 June 2009 on the exploitation and marketing of natural mineral waters

[v] Libro blanco de atributos diferenciados de producto. Versión 1 Julio 2019. AECOC

[vi] Australian National Standard for Organic and Bio- Dynamic Produce, Edition 3.7, September 2016

[vii] Salt EGTOP Description salt origin methods, composition and contaminants techniques 18th January 2021 – point 3

[viii] While vacuum techniques are mostly applied in large-scale industrial operations, they have been adopted, since the 1990s, by producers of flake salt in Iceland, using brine from geothermal wells in the sea bottom, to which they apply vacuum evaporation using geothermal energy: "... the geothermal well is the source of both salt-brine and process steam."

[ix] E.g., Læsø Salt: Sustainable wood with a footprint neutral energy source provided that the wood comes from sustainable forestry securing that only surplus of wood from the forestry is used.

[x] E.g., https://www.cargill.com/salt-in-perspective/alberger-salts-unique-production-process, https://www.falksalt.com

[xi] Javor, B., 1989. Hypersaline Environments: Microbiology and Biogeochemistry. Brock/ Springer series in contemporary bioscience, USA.

[xii] Shadrin, N.V., 2009. The Crimean hypersaline lake peculiarities 99011. The Crimean Hypersaline Lakes: Towards Development of Scientific Basis of Integrated Sustainable Management, vol. 3. pp. 1–5.

[xiii] The existence of non-pigmented moderately halophilic eubacteria in solar saltworks was proven by microbiologists António Ventosa (Seville) and Aharon Oren (Jerusalem): Ventosa, A et al.: Biology of moderately halophilic aerobic bacteria. Microbiology and molecular biology reviews, vol. 62,2 (1998)

[xiv] Oren, A: Industrial and environmental applications of halophilic microorganisms, Environmental Technology, 31:8-9, 2010

[xv] CRISPR technology is a recent genome-editing tool that acts as molecular scissors capable of specifically cutting any sequence of DNA from the genome and allowing the insertion of changes in it. Its origin is in a microorganism that inhabits the marshes of Santa Pola (Alicante), in whose genome the biologist Francis Mojica, in 1992 found the bases that would give rise to the CRISPR technique. This genetic editing tool, the most powerful ever discovered, is applicable to fields such as Agriculture, Livestock, Biotechnology and Medicine.

[xvi] Documentary Human nature - Rotten Tomatoes- Science & Nature Docs, NETFLIX 2019

[xvii] Diversity of bacteriorhodopsins in different hypersaline waters from a single Spanish saltern, R.T. Papke, C.J. Douady, W. Ford Doolittle, F. Rodríguez- Valera - Sept 2003.

[xviii] Retinal-binding proteins mirror prokaryotic dynamics in multipond solar salterns, M. Gomariz, M. Martínez-García, F. Santos, M. Constantino, I. Meseguer, J. Antón – February 2015.

[xix] The "Wieliczka" Salt Mine in Poland and in Germany e.g. the former salt mines in Bad Friedrichshall

[xx] Background Study on the environmental impact assessment of non-energy minerals extraction projects with regard to European Union Community requirements – JRC Technical Report, August 2020

[xxi] Fiedelman and Voigt, 1993; Ratigan 1995; Reidy 2010

[xxii] Donadei, S., Schneider G.-S.: Compressed Air Energy Storage in Underground Formations, in: Storing Energy, pp. 113-133, Elsevier 2016

[xxiii] Bünger, U., Michalski, J., et al.: Large-scale underground storage of hydrogen for the grid integration of renewable energy and other applications, in: Compendium of Hydrogen Energy, pp. 133-163, Woodhead Publishing 2016

[xxiv] Paidoussis, M.P.: Pipes Conveying Fluid: Linear Dynamics II, in: Fluid-Structure Interactions (2nd ed.), pp. 235-332, Academic Press 2014

[xxv] Petanidou & Dalaka, 2009.

[xxvi] Selection of ecological indicators for the conservation, management and monitoring of Mediterranean coastal Salinas – E. López · P.A. Aguilera · M. F. Schmitz · Hermelindo Castro · F. D. Pineda - Environ Monit Assess (2010) 166:241–256
DOI 10.1007/s10661-009-0998-2

[xxvii] Silva, G., Almanza, R.: Use of clays as liners in solar ponds, Solar Energy no. 83 (2009) pp 905-919

[xxviii] Salt-producing southern European countries provide a good deal of the fruits and vegetables consumed in Central and Northern Europe, conventional and organic, whereas industrial and technological products take the opposite direction from North to South. As the flow of goods within Europe is bigger from North to South, sometimes, trucks and other means of transport go back empty or with their capacity underused. With supply routes and logistics being established, it seems reasonable that organic salt would be included, along with other exported foods, which may help to optimise loads and reduce the carbon footprint of food transportation. It should be remarked that salt can even be transported with foodstuffs that need refrigeration or freezing, which broadens the options for by-transport.

[xxix] Official statistics of Eurostat are available in the European Commission webpage : Database - Eurostat (europa.eu)

[xxx] Directive (EU) 2019/130 of the European Parliament of the Council of 16 January 2019 amending Directive 2004/37/EC on the protection of workers from the risks related to exposure to carcinogens or mutagens at work

[xxxi] Directive 2004/37/EC of the European Parliament and of the Council of 29 April 2004 on the protection of workers from the risks related to exposure to carcinogens or mutagens at work

[xxxii] Energy use - https://www.saltassociation.co.uk/salt-the-facts/environmental-impact/

[xxxiii] The Effects of Carbon Dioxide on Air Pollution, Chris Dinesen Rogers

[xxxiv] Identification and analysis of ecosystem services associated with biodiversity of saltworks - Ocean and Coastal Management 163 (2018) 278–284

[xxxv] Solar Salt works & the economic value of, European Salt Producers Association (EuSalt), Proceedings of the International Conference on Solar Salt Works & The Economic Value of Biodiversity, 4th June 2014

[xxxvi] Biogeochemical Models of Solar Salterns – Javor B.J., 2000

[xxxvii] The role of Extreme Halophilic Bacteria in Precipitation of Salt – Perthuisot J-P., Castanier S., 8th World Salt Symposium, 2000

[xxxviii] Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora

[xxxix] Directive 2009/147/EC of the European Parliament and of the Council of 30 November 2009 on the conservation of wild birds

[xl] https://whc.unesco.org/

[xli] Ens, B., de Groot, A. V., et al.: (2015). Gas and salt extraction: The effects of subsidence. Regiecollege Waddengebied

[xlii] https://www.dutchnews.nl/news/2014/02/salt_mining_under_the_wadden_s/

[xliii] https://roskill.com/news/salt-ks-plans-new-dutch-off-shore-brine-field-by-drilling-a-new-cavern/

[xliv] European Parliament Committee on Petitions: Draft Mission Report on inspection visit at Doñana National Park (2019)

[xlv] D. Vidovic. 2018 . CO2 Footprint: Comparison between Rock Salt, Sea Salt and Vacuum Salt. K+S Group Company

[xlvi] Background Study on the environmental impact assessment of non-energy minerals extraction projects with regard to European Union Community requirements – JRC Technical Report, August 2020

[xlvii] Effect of salt mining on land surface

[xlviii] Catastrophic Failures of Underground Evaporite Mines

[xlix] L'effondrement de 1873 à la mine de Varangéville

[l] Mine de sel de Varangéville Évaluation des aléas mouvements de terrain associés aux quartiers anciens Catastrophique

[li] Failures of Underground Evaporite Mines,

[lii] Environmental Consequences of the Retsof Salt Mine Roof Collapse

[liii] Effects of the 1994 Retsof Salt Mine Collapse in the Genesee Valley, New York,

[liv] Widespread subsidence occurred after a mine collapse in the Genesee Valley, New York,

[lv] Widespread subsidence occurred after a mine collapse in the Genesee Valley, New York,

[lvi] Analysis on difference between rock salt dissolving model with and without mechanical effect.

[lvii] Stability of caverns created in rock salt by solution mining

[lviii] Overall model of a flooded mine in Rock salt and its consequences at surface.

[lix] Influence Technological Revolutions on salt production, Moreno Sergio A., Asociación Mexicana de la Industria Salinera, World Salt Symposium 2018

[lx] Best Available Techniques (BAT) Reference Document for the Production of Chlor-alkali – JRC Science and Policy Reports 2014

[lxi] Measuring the Vulnerability of an Energy Intensive Sector to the EU ETS under a Life Cycle Approach: The Case of the Chlor-Alkali Industry Isabel Garcia-Herrero *, Maria Margallo, Jara Laso, Raquel Onandía, Angel Irabien and Ruben Aldaco, Sustainability, 2017, 9, 837.

[lxii] 10th Word Salt Symposium 2018. Denis Vidovic. CO2 Footprint: Comparison between Rock Salt, Sea Salt and Vacuum Salt. K+S Group Company

lxiii Environmental balance of salt production speaks in favour of solar saltworks Global NEST Journal , Vol 11, No 1, pp 41-48, 2009. Presented at the 1st International conference on the Ecological Importance of Solar Saltworks, Santorini Island, Greece, 20-22 October 2006.

lxiv 9th International Symposium on salt. Recrystallization process for the upgrading of rock-and solar salt. Götzfried (Südsalz GmbH), Eörs Kondorosy (EVATHERM Ltd).

lxv Energy balance of salt production speaks in favour of solar saltworks - Vladimir M. Sedivy, 2015

lxvi Publishable Executive Summary. Qualitative Assessment for the European Salt Industry NACE 08.93 Represented by EUsalt as part of the assessment of carbon leakage risks in phase iv of the EU ETS.

lxvii Sustainability Assessment of Traditional Solar Salt - A. Marques, March 2009

lxviii Environmental Balance of salt production speaks in favour of solar saltworks – V. Sedivy, 2009

lxix J. Leydon, 1973. Environmental Science in the Salt Industry, , 413-420

lxx A. Marques, R. Teixeira, A. Lorena, V. del Pino, Y. del Valle-Inclan, J. Navalho, T. Domingos: ‘‘Sustainability Assessment of Traditional Solar Salt’’, 2nd International Conference on the Ecological Importance of Solar Saltworks (CEISSA 2009), Merida, Yucatan, Mexico, 26–29 March 2009, pp. 88 – 97.

lxxi Qadir, M., et al.: Economics of salt-induced land degradation and restoration, Natural Resources Forum 38, 2014

lxxii Thys, A.: Sustainability and Impact Aspects of Exploitation of Marine Salt, Magnesium and Bromine, Journal of Coastal Research, Vol. 19, No. 4, 2003

lxxiii Rahman, A.: Environmental Impact Assessment - solar salt works a case study. 10.13140/RG.2.1.4490.5681, 2015

lxxiv Wolchok, L.: Impacts of Salt Production on Pemba, Tanzania (2006). Independent Study Project (ISP) Collection. 329.

lxxv Massimiliano Costa, Fabrizio Borghesi, Lino Casini, Zsuzsa Fidlóczky, Francesca Migani, 2016. Guidelines for the environmental management of the Mediterranean and Black sea saltworks (management model) in the Natura 2000 network. LIFE10 NAT/IT/000256.

lxxvi Shafie F. A., Rennie, D.: Consumer Perceptions Towards Organic Food, Procedia - Social and Behavioral Sciences, Vol. 49, 2012, pp. 360-367

lxxvii von Meyer-Höfer, M., Nitzko, S., Spiller, A.: Consumers’ expectations towards organic: An exploratory survey in mature and emerging European organic food markets, British Food Journal, Vol. 117 No. 5, 2015, pp. 1527-1546

lxxviii Rodríguez- Bermúdez, R., Miranda, M., et al.: Consumers' perception of and attitudes towards organic food in Galicia (Northern Spain). Int J Consum Stud. 2020; 44: 206– 219

lxxix Wägeli, S., Hamm, U.: Consumers’ perception and expectations of local organic food supply chains, Organic Agriculture 6 (3), 2015

lxxx EU[27] 2020

lxxxi Roskill - Review of the socio-economic impact of salt production in Europe - July 2017

lxxxii World-Mining-Data, C. Reichl, M. Schatz, G. Zsak, Volume: 31, Minerals Production, Vienna 2016 - Euromines

lxxxiii Council Regulation (EC) No 834/2007 of 28 June 2007 on organic production and labelling of organic products and repealing Regulation (EEC) No 2092/91

lxxxiv Geneviève DELBOS, Programme Interreg III B Sal/Sel de l'Atlantique 2004-2007 Revalorisation de l'identité des marais salants de l'Atlantique. Récupération et promotion des potentiels biologique, économique et culturel des zones côtières humides.

lxxxv Regulation 848/2018

lxxxvi "clean seawater" means natural, artificial or purified seawater or brackish water that does not contain micro-organisms, harmful substances or toxic marine plankton in quantities capable of directly or indirectly affecting the health quality of food;

lxxxvii "clean water" means clean seawater and fresh water of a similar quality;

lxxxviii Reg (EC) No 852/2004 of the European Parliament of the Council of 29 April 2004 of the hygiene of foodstuffs.

lxxxix Codex Alimentarius, Standard for Food Grade Salt. Codex Stand Number 150-1985,

xc Codex Alimentarius, Standard for contaminants and toxins in food and feed. Codex Stand Number 193-1995,

xci Birds and Habitats Directives – Directive 2009/147/EC of the European Parliament and of the Council of 30 November 2009 on the conservation of wild birds - Council Directive 92/43 EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora.

xcii Orden ARM/2656/2008, de 10 de septiembre, por la que se aprueba la instrucción de planificación hidrológica

xciii Hering, D., Borja, A., Carstensen, J., Carvalho, L., Elliott, M., Feld, C.K., Hesikanen, A., Johnson, R.K., Moe, J., Pont, D., Solheim, A.L., van de Bund, W., 2010. The European water framework directive at the age of 10: a critical review of the achievements with recommendations for the future. Sci. Total Environ. 408, 4007–4019.

xciv Soares, R.H.R.M., Assunção, C.A., Fernandes, F.O., Marinho-Soriano, E., 2018. Identification and analysis of ecosystem services associated with biodiversity of saltworks. Ocean Coastal Manage 163 (1), 278–284.

xcv Commission Decision (EU) 2018/229 of 12 February 2018 establishing, pursuant to Directive 2000/60/EC of the European Parliament and of the Council, the values of the Member State monitoring system classifications as a result of the intercalibration exercise and repealing Commission Decision 2013/480/EU

xcvi Commission Decision of 17 August 2005 on the establishment of a register of sites to form the intercalibration network in accordance with Directive 2000/60/EC of the European Parliament and of the Council

[xcvii] Ponis, E., Giovanardi, F., Facca, C., Buchet, R., Derolez, V., Bernardi Aubry, F., Pagou, K., Garcia, E., Ninevic, Z., Costas, N., Pardo, I., Salas Herrero, F., 2018. Transitional waters Mediterranean geographic Intercalibration group. Phytoplankton Ecological Assessment Methods, EUR 29607 EN. Publications Office of the European Union, Luxembourg. ISBN: 978-92-79-98683-3 - JRC114726.

[xcviii] Real Decreto 817/2015, de 11 de septiembre, por el que se establecen los criterios de seguimiento y evaluación del estado de las aguas superficiales y las normas de calidad ambiental.