

Burning waste in cement kilns: the case of Salanit Anhovo

2015/12/02

July 2019

EKO KROG – Nature Conservation and Environmental Protection Society, Ravenska vas 3, 1410 Zagorje ob Savi, Slovenia, VAT No: 98997661, registration No.: 1050907000, tel.: +386 41 413 855, e-mail: eko.krog@gmail.com, www.ekokrog.org, FB/Twitter: @ekokrog

The case of the Salanit Anhovo cement plant

Burning waste in cement kilns is a widespread practice, but what impact does it have on citizens' health and the environment? The case of Salanit Anhovo, a cement plant co-incinerating waste in Western Slovenia, shows how harmful emissions from burning waste are affecting an already heavily impacted community. By releasing harmful and hazardous substances in the air and breaching the emissions limits set by national and European regulators, the plant was polluting the area and putting citizen's health at stake.

The environmental group EKO KROG lays out the case and formulates recommendations for more transparency and better regulation of waste co-incineration with the aim to let local populations living next to cement plants breathe.

Cement-asbestos past and new challenges

The lower Soča valley, located in Western Slovenia, is one of the most disadvantaged areas in the country when it comes to public health due to past asbestos production in Anhovo which began in 1921 and was finally banned in 1996.ⁱ In 1976 a new cement plant was built within the same Anhovo industrial area, today known as Salanit Anhovo.

Asbestos causes many diseases including mesothelioma, and lung cancer. The biggest exposure problem to asbestos in Slovenia is the wider area of Anhovo factory.ⁱⁱ Local clinics are recording 122 more cases of mesothelioma than the average Slovenian outpatient clinic.ⁱⁱⁱ In 2006 the Asbestos Law^{iv} was passed, providing compensations to the beneficiaries. The state covers 60% and employer 40% of compensation.

Local communities are now facing a different type of hazard. The Salanit Anhovo cement plant is located in the municipality of Kanal ob Soči (with a population of 6,000), in the Deskle settlement (itself with a population of 1,600). Today, Austrian Intercement is the majority owner of the plant, along with other stakeholders, such as the Italian company, Buzzi Unicem S.P.A.

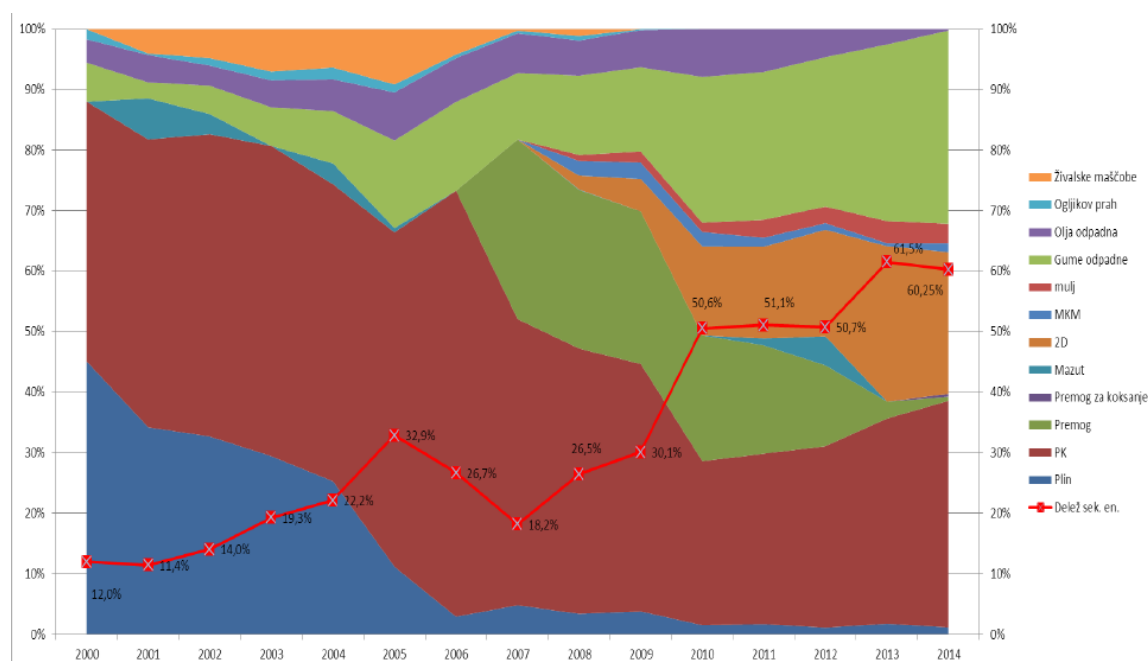
In 2007, Salanit Anhovo received its IPPC (Integrated Pollution Prevention and Control) permit to co-incinerate waste although in the framework of other permits, waste has already been incinerated for at least past 30 years. Data from the Slovenian Environment Agency (SEA) show a sharp rise in quantities of toxic substances emitted between 2007 and 2012.

Jump in burning secondary fuel and toxic emissions

Salanit Anhovo cement plant has a permit to co-incinerate 89 different types of waste, including hazardous waste (hydraulic oils, insulating and heat transmission oils, bilge oils, etc.). The use of waste as alternative fuel has risen significantly, standing at 60% in 2014, with petcoke accounting for the remaining 40%. Petcoke is a byproduct of the oil industry (petroleum refining residue) and is considered one of the dirtiest fossil fuels.^v

In 2007, Salanit Anhovo received its IPPC permit to co-incinerate waste, which was subsequently revised in 2013, 2014, 2018 and 2019.^{vi} The cement plant is allowed to burn 108,960 tonnes of waste per year, including 15,560 tonnes of hazardous waste (or close to 300 tonnes of waste daily, on average). The plant may produce 3,180 tonnes of clinker daily, and is allowed to substitute other fuels with waste up to 100%.^{vii}

Figure 1: Types and shares of fuels burned in Salonit Anhovo (source: Salonit Anhovo)



(Legend from top to bottom: animal fat; carbon dust; waste oils; waste tires; sludge; meat-and-bone meal; 2D (RDF); residual fuel oil; coking coal; coal; petcoke; gas; share of secondary fuels)

Data from the Slovenian Environment Agency show a sharp rise in the quantities of toxic substances emitted between 2007 and 2012.^{viii}

Table 1: Emissions from Salonit Anhovo 2007 and 2012 (source: SEA)

Pollutant	Official emissions data (2007)	Official emissions data (2012)
Benzene	1.5 t	2.88 t (+ 92%)
Ammonia (NH₃)	20 t	55.5 t (+ 178%)
Mercury (Hg) and compounds	9 kg	51.7 kg (+ 474%)
Nickel (Ni)	15 kg	21.4 kg (+ 43%)

According to the IPPC permit issued in 2018, Salonit Anhovo is allowed to emit 217 kg of mercury and its compounds per year (allowed 31 g/h and assuming 7000 h of operation per year).

NOx emissions: legislation and permits

NOx mainly impacts on respiratory conditions causing inflammation of the airways at high levels. Long term exposure can decrease lung function, increase the risk of respiratory conditions and increases the response to allergens.^{ix}

Similar to EU legislation, the national legislation sets higher emission limits for waste co-incineration in cement kilns than for dedicated incinerators. Allowing higher emissions for co-incineration puts local residents in the areas next to cement plants at a disadvantage when it comes to the protection of their health and environment.

Table 2: Comparing national and EU emission limit values for waste incinerators with Salonit Anhovo's IPPC permits (2007 and 2018)

mg/Nm ³	Dedicated waste incinerators (national and EU emissions limits)	Salonit Anhovo IPPC permit (2007)	Salonit Anhovo IPPC permit (2018)
Dust (PM ₁₀)	10	30 (× 3)	20 (× 2)
NOx	200	800 (× 4)	500 (× 2.5)
TOC	10	50 (× 5)	50 (× 5)
CO	50	Unlimited	Unlimited

Furthermore, Salonit Anhovo's IPPC permit sets only relative emission limit values expressed as mg/Nm³. Absolute emissions therefore depend on a maximum waste gas flow rate through their chimney. Largest gas flow rate for NOx as set in environmental permit (2018) for Salonit Anhovo is 310 kg/h (= maximum flue gas flow 620000 m³/h × concentration limit 500 mg/Nm³). Perhaps 310 kg/h does not seem a lot, but the difference becomes significant when the amount is calculated to assumed number of 7000 operating hours per year.

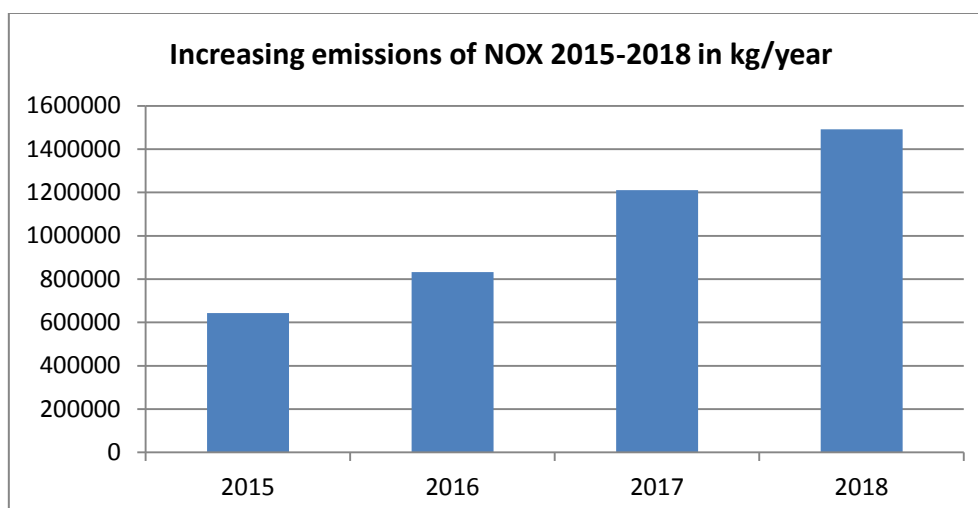
Using the above calculation method, Table 3 compares maximum allowed absolute emissions of NOx for three different scenarios: theoretical case if ceiling for Salonit Anhovo would be the same as for incinerators and cases when Salonit Anhovo was permitted the ceiling of 800 mg/Nm³ and 500 mg/Nm³ respectively.

Table 3: Comparison of absolute NOx emissions for three scenarios (emission limit value in mg/Nm³ × maximum flue gas flow 620000 m³/h × 7000 operating hours)

NOx	Dedicated waste incinerators (national and EU emissions limits)	Salonit Anhovo IPPC permit (2007)	Salonit Anhovo IPPC permit (2018)
mg/Nm ³	200	800	500
kg/h	124	496	310
kg/day	2,976	11,904	7,440
kg/year	868,000	3,472,000	2,170,000

Salonit Anhovo reported 1,211 tons of NOx annual emission into the air for 2017 which is well below the emission limit values as set in their environment permit. On the other hand it exceeds for 40% the scenario in case NOx emission would be as low as for dedicated waste incinerators.

Figure 2: Increasing NOx annual emissions as reported by Salonit Anhovo 2015-2018 in kg/year^x



Snail slow legislation harmonization

In 2016 amendments to Decree on waste incineration and co-incineration plants^{xi} were passed, setting the total allowable emissions of NO_x at 500 mg/Nm^3 for waste co-incineration in cement plants, and specifying that the Ministry of Environment should harmonise IPPC permits within six months of the effective date of the legislation. Cement plants would then be required to bring their operations in line with these limits within the subsequent six months. The Decree came into force on 20 February 2016. The deadline for Salanit Anhovo to comply with new NO_x emissions limit passed on 20 February 2017.

As evident in Table 4 and Table 5, according to Salanit Anhovo web page, the 24-hour average emission concentrations of NO_x were still above 500 mg/Nm^3 ceiling with the company stating on their web page that emission limit value for NO_x was 800 mg/Nm^3 .

Table 4: 24-hour average emissions concentrations (mg/Nm^3) for Salanit Anhovo on 21 March 2017 (Source: Salanit Anhovo webpage, updated: 21 March 2017 at 08:59)

(mg/Nm^3)	24-hour average	Emissions limits (IPPC permit for Salanit Anhovo)
TOC	24.3	50
Dust (PM_{10})	3.0	30
SO_2	31.3	50
NO_x	627	800
CO	308	N/A

Table 5: Examples of 24-hour average emissions concentrations (mg/Nm^3) for Salanit Anhovo (Source: Salanit Anhovo webpage, 23 September 2017 and 29 December 2017)

mg/Nm^3	23 September 2017	29 December 2017
TOC	22.1	23.3
Dust (PM_{10})	2.7	2.6
SO_2	0.1	5.1
NO_x	730	712
CO	256	247

Only *16 months after the deadline* set out in the national legislation, in July 2018, the Slovenian Environment Agency harmonised the IPPC permit for Salanit Anhovo, setting their NO_x emission limit values at 500 mg/Nm^3 .

In the revised Salanit Anhovo permit (23 July 2018) the Slovenian Environment Agency stated: »... due to the actual occasional exceedance of NO_x emissions it is necessary to specify the request from BAT 19 to install SNCR technology to reduce the emissions of nitrogen oxides, and obligation to ensure continued monitoring of NH_3 from BAT 20.« In the same document it is said that Salanit Anhovo will be able to install SNCR by the end of September 2018, and continued NH_3 monitoring by the end of 2018. According to the environment inspectorate, Salanit Anhovo »completed the installation of SNCR technology at the end of August 2018 and carried out a test run«. Which is *18 months after statutory deadline*. Until July 2019 we did not receive an reply from SEA to our inquiry about when the SNCR device was put into use.

Notwithstanding, Salanit Anhovo occasionally exceeds permitted ceiling for some other pollutants, example is in a table below.

Table 6: 24-hour average emissions concentration (mg/Nm³) for Salanit Anhovo on 10 January 2018, exceeding the TOC emissions limits set in the IPPC permit (Source: Salanit Anhovo webpage, updated: 10 January 2018 at 15:30)

mg/Nm ³	24-hour average	Emissions limits (IPPC permit for Salanit Anhovo)
TOC	60.9	50
Dust (PM₁₀)	2.2	30
SO₂	0.4	50
NOx	502	800
CO	485	N/A

The emissions measured within permanent monitoring are published on the Salanit Anhovo webpage as 24-hour averages, screening higher individual overruns.

A burden for the local population



For the local population, legislative harmonisation is much more than a mere administrative formality. The area is already heavily impacted by asbestos-related diseases such as mesothelioma cancer. All medical recommendations state that patients with asbestosis should avoid any further lung burden and live in a clean and healthy environment. Despite this, the local population is now experiencing new environmental and health impacts as a result of co-incineration of large quantities of waste in the cement plant. Salanit Anhovo can hardly present itself as a modern, socially and environmentally responsible cement plant if it continues to emit quantities of pollutants that exceed legislation. That the state and its institutions allow such breaches is deeply worrying.

“The state should no longer allow activities that could endanger health in the Soča Valley. The limit values of pollutants are only a political consensus. None are designed to make you healthy”, Dr. Metoda Dodič-Fikfak, MD.

In her doctoral thesis, Dr Tanja Ljubič Mlakar researched mercury in cement clinker production and emissions controls, carrying out several measurements of air quality in the vicinity of the cement factory in 2005 and 2006: »Elemental gaseous mercury concentrations emitted from the cement production plant were spread over a relatively large range (1–103 ng m⁻³) but were, in most cases, below 10 ng m⁻³. The only exception was the elemental gaseous Hg mean concentration of about 80 ng m⁻³ measured on May 2005 at the Morsko site, which was significantly higher. During the measurement, the wind was blowing in a SSW direction from the main cement plant chimneys of height 75 m. *We can assume that this measurement showed the influence of the cement clinker production process.* Two other series of measurements were performed under conditions with weak or no wind, and they showed a more uniform mercury distribution in the cement plant surroundings«. ^{xii} For comparison, the SEA carried out measurements of gaseous mercury in ambient air at the Iskrba measuring station at Kocevška Reka in the years 2014 and 2016. The highest measured value in May 2014 was 1.7 ng m⁻³. The Iskrba station is located at a measuring point where there is no industry influence.

In 2015, the Agricultural Institute of Slovenia carried out an analysis of soil and vegetables from two fields in the Kanal ob Soči municipality. ^{xiii} The aim of the study was to assess actual level of soil contamination in the area where the municipality planned an irrigation system. They wanted to assess the suitability of the conditions for the cultivation of vegetables, fruits and crops due to the proximity of Salonit Anhovo.

Legislation defines the level of soil contamination with heavy metals with three levels: limit values, alert thresholds and critical levels. At the limit values, the effects on human health or the environment are still acceptable. Alert threshold for certain types of land use means the likelihood of adverse effects on human or environmental health. Due to adverse effects on humans and the environment, contaminated soils at critical levels are not suitable for the production of plants intended for human or animal consumption, and for retaining or filtering water.

In both locations, the soil results showed nickel content (78.9 mg/kg DM and 79.7 mg/kg DM) exceeding the alert threshold set out in the national legislation (70 mg/kg DM). For certain soil use, this implies likely adverse effects on human health or the environment.

Samples of carrots growing at one of the locations approached the regulatory limit values (0.1 mg/kg FM) for cadmium (0.087 mg/kg FM). When considering the measurement uncertainty (+/- 20% relative) and the precautionary principle, those carrots should not be placed on the market.

The high pollution level, including noise and odour pollution, affect the quality of life of citizens in the region. Equally, the contamination of soil impacts the cultivation of fruit and vegetables. In socioeconomic terms, local residents face depreciation of their real estate, and an elevated emigration rate. ^{xiv}

Transparency

In 2001, the Kanal ob Soči municipality carried out an advisory referendum on the co-incineration of waste at the Salonit Anhovo plant. Local residents voted overwhelmingly against burning waste in the cement kiln, with 78% voicing their clear opposition.

According to the environment impact assessment (EIA) commissioned by Salonit Anhovo as part of its IPPC permit application, the impact area is limited by the fence around the plant property. National legislation enables industrial installations to limit the impact area considered in the EIA and thus to

exclude third-party participants from the process of obtaining permits and approvals. During the public consultation local NGO Eko Anhovo unsuccessfully lodged several appeals.

Transparency of cement plants is regulated by legislation which prescribes parameters and conditions for continuous and occasional monitoring. Monitoring results are then processed and sent to SEA. Transparency of cement plants is an essential tool for building confidence in such operations by local residents, especially when they have past experiences with devastating consequences to human health. Transparency, of course, is not only established at the declarative level within the company's policies. Trust requires continuous public access to all monitoring data on impacts on human health and environment, and consultation with local residents when they voice their concerns.

Salonit Anhovo publishes informative 24 hour average concentrations of measured parameters from continuous monitoring: PM₁₀, NO_x, TOC, SO₂, CO and from the end of 2018 also NH₃. Within continuous monitoring, the flue gas flow rate is measured too, but this information is not published despite the fact that it is essential for calculating the emitted quantity of pollutants in kg/h. Monthly reports on continuous emissions measurements are published on the company's website, but with a delay of several months. Access to the page of July 2019 showed last reports for November 2018.

On the same page the company publishes monthly reports on the quality of ambient air. Those reports are delayed for several months as well. Ambient air quality is measured by two stations. Reports include only measurements of PM₁₀ particles, which are shown as average monthly concentration in µg/m³ without meteorological data such as air temperature, humidity, wind speed. Both stations are owned and operated by Salonit Anhovo which means they actually monitor themselves.

Conclusions and recommendations

EKO KROG proposes some recommendations to improve the transparency of large polluters such as cement plants, as well as recommendations to improve national and EU legislation to better protect human health and environment.

In less than a decade, Salonit Anhovo significantly increased the share of waste as alternative fuel and has a permit to do so up to 100%. In 2019 SEA issued a permit to a significant increase in the exploitation of marl and limestone in local quarries suggesting the future increase of clinker production with more waste co-incineration.

Current national and EU legislation allows higher emissions ceilings for cement plants burning waste than for dedicated waste incinerators. This makes little sense from an environmental protection and human health perspective, as the total impact of hazardous substances, odour, noise and dust emissions is not in any way mitigated by the pollution source. Allowing higher emissions for co-incineration puts local residents in those areas at a disadvantage when it comes to the protection of their health and environment.

Recommendation 1: Cement plants burning waste should respect the same total emissions levels as dedicated waste incinerators.

The Salonit Anhovo cement plant has co-incinerated waste at least for the past 30 years. Its first IPPC permit was issued in 2007 and revised in 2013, 2014, 2018 and 2019. The EIA carried out to obtain the permit confined the impact area to that owned by the company, thus excluding all potential third-party participants from participating in the permitting procedure. Current national legislation allows

industrial emitters to freely select from among accredited institutions to carry out the EIA. Given that this service is paid for by the industrial emitter, it is likely that the impact assessment is designed in favour of the contracting authority.

Recommendation 2: Some years ago, environmental NGOs proposed a change to the EIA procedure. The change would require a company needing such an assessment to pay a state tax, at which point one of national institutions would independently hire an accredited organisation (verifier for monitoring services). Although the Slovenian Environment Agency supports the idea, the legislation has not been changed.

Transparent operation of the company builds the trust of local residents. State institutions would have to show greater attention to local residents. It is unacceptable for these institutions to harmonize legislation with a significant delay and do not require the adjustment of the polluter within the deadlines.

Slovenia ratified the Aarhus Convention in 2004. However, the lack of transposition and implementation of the Aarhus Convention into national legislation has impacted all three pillars, particularly access to environmental information. Although Saloniit Anhovo publishes its daily average emissions on its webpage, these average values hide the peaks and overruns during which the majority of hazardous substances are emitted.

Recommendation 3: Official off-site measurement data, source emissions data of continuous and periodic monitoring should be available to local communities and civil society. Non-disclosure of such data increases the uncertainty about the health and environmental impact on the local population.

Prior to 2016, the Environment Protection Act required large emitters to obtain an environmental permit every 10 years. In 2016, however, the Slovenian government made two amendments to the Act, lowering the standards of environmental protection and limiting public participation in decision-making:

- Higher emissions levels than those required by legislation may be approved based on a self-assessed cost-benefit analysis by the emitter.
- An IPPC permit may be granted to an emitter for an unspecified length of time.^{xv} The government stated that it introduced both of these changes in order to eliminate administrative economic barriers.

Recommendation 4: Environmental protection should not be regarded as an administrative obstacle for industry. Rather, when certain industries impact environmental and human health, all stakeholders should have an equal opportunity to participate in the decision-making process. IPPC permits should not be granted for unspecified timeframes, nor should higher emissions levels be allowed based solely on self-assessed cost-benefit analyses by industry, without consultation with other stakeholders.

EKO KROG is an environmental non-profit organization based in Zasavje. The region is one of the most environmentally degraded areas in Slovenia, a legacy of two centuries of heavy industry. In 2002, the Lafarge group bought the cement plant and changed its fuel from coal to petcoke, and in 2009 received permission to co-incinerate waste. EKO KROG entered a lengthy legal battle with the Lafarge multinational. In 2015 national authorities finally ordered Lafarge to halt production. EKO KROG and its chairman Uroš Macerl won 2017 Goldman Environmental Prize for Europe. EKO KROG believes that defending natural resources and the future of our children is the duty of our generation. They are creating an environmental center, where they pass their knowledge to fellow activists and youth.

Sources:

ⁱ Klemenitna Jezeršek, Problem azbesta kot nevarnega proizvoda, Diplomsko delo, Ekonomska fakulteta, Univerza v Ljubljani, 20002

ⁱⁱ Marko Vudrag, *Problematika azbesta je še vedno nedokončana zgodba*, 2015, <http://www.nijz.si/sl/problematika-azbesta-je-se-vedno-nedokoncana-zgodba>

ⁱⁱⁱ Mlinar Nevenka, MD, *Stanje zdravja v naši občini*, 2017

^{iv} Remedying Consequences of Work with Asbestos Act (Zakon o odpravljanju posledic dela z azbestom) (Ur.L.RS, št. 38/06)

^v Oil Change International, *Petroleum Coke: The Coal Hiding in The Tar Sands*, 2013

^{vi} Agencija RS za okolje (SEA): <http://okolje.arso.gov.si/ippc/tabela/15/regld/82/page/11>

^{vii} ARSO (SEA), Odločba o spremembi okoljevarstvenega dovoljenja Salonit Anhovo, 13.3.2014

^{viii} ARSO (SEA): http://okolje.arso.gov.si/onesnazevanje_zraka/devices

^{ix} BMI Icopal, <http://www.icopal-noxite.co.uk/nox-problem/nox-pollution.aspx>

^x years 2015-2017: SEA; year 2018: Nacionalni laboratorij za zdravje, okolje in hrano: Letno poročilo o trajnih meritvah emisije snovi v zrak na izpustu CS1 iz peči za klinker na lokaciji skale v podjetju SA d.d. za leto 2018

^{xi} Uredba o sežigalnicah in napravah za sosežig odpadkov (Uradni list RS, št. 8/2016)

^{xii} Mlakar Ljubič, T., 2011, *Živo srebro v proizvodnji cementnega klinkerja in nadzor emisij*, doktorska disertacija; Ljubljana.

^{xiii} Karo Bešter P. and Vrščaj, B., 2015, *Vsebnost težkih kovin v tleh in vrtninah, ki so pridelane na izbranem območju Občine Kanal ob Soči*, Slovenija, Kmetijski inštitut Slovenije, Oddelek za kmetijsko ekologijo in naravne vire, Center za tla in okolje, Ljubljana.

^{xiv} Statistical Office of Republic Slovenia, <https://www.stat.si/obcine/sl/2016/Municip/Index/61>

^{xv} Uradni list RS, št. 30/2016: 1264. Zakon o spremembah in dopolnitvah Zakona o varstvu okolja (ZVO-11), stran 4233.