Oral Submission to the Inspector of
An Board Pleanála
Made on the 22nd November 2017

10 year permission to facilitate further replacement of fossil fuel with alternative fuels and allow for introduction of alternative raw materials in the manufacturing of cement at: Platin Works Platin, Duleek, Co Meath

Dear Inspector
My name is Ollan Herr. I'm a director of Zero Waste Alliance Ireland. We are an advocacy group promoting ways to recycle materials and resources from waste so that they can be sustainably recycled – particularly for materials that are finite or are limited

I want to question the wisdom of burning materials at the Platin Cement Kiln that in particular contain phosphorus and nitrogen

I'm anxious to express my concern about any process that wastes or depletes the remaining finite resources of our planet. In particular I'm concerned that we recycle Phosphorus and Nitrogen as these elements are needed to grow food crops of our growing world population

"The six natural resources most drained by our 7 billion people" published in THE GUARDIAN Newspaper

https://www.theguardian.com/environment/blog/2011/oct/31/six-natural-resources-population

"Camila Ruz - Monday 31 October 2011
With 7 billion people on the planet – theoretically from today 2011– there will be an inevitable increase in the demand on the world's natural resources. Here are six already under severe pressure from current rates of consumption:

1. Water Comment: Water scarcity is not an issue for this oral hearing

2. Oil This is only enough "cheap" oil for the next 46.2 years, should global production remain at the current rate. Comment: Oil is still a major fuel for our modern mechanical methods of farming and the transport of fertilizer and for food transport around the world.

3. Natural gas A similar picture to oil exists for natural gas, with **enough gas in proven reserves** to meet 58.6 years of global production at the end of 2010. Comment: *Natural Gas is the most cost effective way to make Ammonia fertilizer to grow food crops using the industrial process known as the "Haber Bosch" method.*

4. Phosphorus -Without this element, plants cannot grow. Essential for fertiliser, phosphate rock is only found in a handful of countries, including the US, China and Morocco. With the need to feed 7 billion people, scientists from the Global Phosphorus Research Initiative predict we could run out of phosphorus in 50 to 100 years unless new reserves of the element are found.

5. Coal - This has the largest reserves left of all the fossil fuels, but as China and other developing countries continue to increase their appetite for coal, demand could finally outstrip supply. As it is, we have enough coal to meet 188 years of global production. *Comment: Coal is another fossil fuel that is used particularly in China to make ammonia fertilizer to grow food crops*

6. Rare earth elements - Scandium and terbium for mobile phones. *Comment: These elements are not of interest in this oral hearing "*

Nutrients in Waste

The waste categories listed below are proposed to be incinerated in the cement kiln. Initially almost all of these originally required the use of Natural Gas or Coal to make the ammonia fraction of fertilizer for their growth. By burning in a cement kiln, Phosphorus will be wasted and will not be recovered. This is the other essential element that is necessary for fertilizer to produce food.

Categories of waste that are proposed to be burned at Platin cement factory

02 01 02	animal-tissue waste
19 08 05	sludges from treatment of urban waste water
02 01 03	plant-tissue waste
02 01 06	animal faeces, urine and manure (including spoiled straw), effluent, collected separately and treated off-site
19 12 06	sludges from on-site effluent treatment other than those mentioned in 19 11 05
02 03 05	sludges from on-site effluent treatment
19 08 05	sludges from treatment of urban waste water
19 08 12	sludges from biological treatment of industrial waste water other than those mentioned in 19 08 11
19 08 14	sludges from other treatment of industrial waste water other than those mentioned in 19 08 13

Nitrogen should not be Burned for Cement – it should be recycled to grow food sustainably - without toxic metals

I want to argue to the Inspector that waste containing nitrogen should not be burned in a Cement Kiln. It should be recycled so that it can become a constituent of fertilizer for crops to grow food. Most of us don't stop to think about the link between Natural Gas or Coal and the food required to feed the 7 billion people in the world. I want to highlight this link. I want to highlight the problem of using or depending on natural gas and coal and most importantly I want to highlight the urgency to reduce greenhouse gas emissions.

I'm submitting additional information based on the following web sites.

1. **Harber Bosch Process** – Reference from Wikipedia – The **Haber process**, also called the **Haber–Bosch process**, is an artificial nitrogen fixation process and is the main industrial procedure for the production of ammonia today. It is named after its inventors, the German chemists Fritz Haber and Carl Bosch, who developed it in the first half of the 20th century. The process converts atmospheric nitrogen (N_2) to ammonia (NH_3) by a reaction with hydrogen (H_2) using a metal catalyst under high temperatures and pressures. The major source of hydrogen is methane from natural gas. The conversion, steam reforming, is conducted with steam in a high temperature and pressure tube inside a reformer with a nickel catalyst, separating the carbon and hydrogen atoms in the natural gas. The Haber process now produces 450 million tonnes of nitrogen fertilizer per year, mostly in the form of anhydrous ammonia, ammonium nitrate, and urea. Three to five percent of the world's natural gas production is consumed in the Haber process (around 1–2% of the world's annual energy supply).[15][16][17][18] In combination with pesticides, these fertilizers have quadrupled the productivity of agricultural land:

With average crop yields remaining at the 1900 level the crop harvest in the year 2000 would have required nearly four times more land and the cultivated area would have claimed nearly half of all ice-free continents, rather than under 15% of the total land area that is required today.[19]

Due to its dramatic impact on the human ability to grow food, the Haber process served as the "detonator of the population explosion", enabling the global population to increase from 1.6 billion in 1900 to today's 7 billion.[20] Nearly 80% of the nitrogen found in human tissues originated from the Haber-Bosch process.[21]

2. "**Energy Budget of nitrogen use in the United States**" by Mr Nathan Kelischek.
http://pimlico.phys.appstate.edu/JSRESA/kelischek.1-1.pdf Producing ammonia is an extremely energy intensive process. In this study it is stated that the USA is importing ammonia, 73% is derived from natural gas and that 27% is derived from coal. Because these are fossil fuels the production of ammonia for the fertility of farms in the USA generates Greenhouse Gases.

3. Reserves of Natural Gas – BP British Petroleum.
https://www.bp.com/en/global/corporate/energy-economics/statistical-review-of-world-energy/natural-gas/natural-gas-reserves.html

Ignoring the potential of shale oil there "is sufficient natural gas to meet more than 50 years of current production (52.5 years)."

4. UN urges food sector to reduce fossil fuel use and shift to energy smart agriculture

http://www.un.org/climatechange/blog/2011/11/un-urges-food-sector-to-reduce-fossil-fuel-use-and-shift-to-energy-smart-agriculture/

The United Nations Food and Agriculture Organization (FAO) has urged the global food industry to reduce its dependence on fossil fuels, saying that excessive reliance on that form of energy is likely to undermine efforts to produce enough food for the world's growing population.

"There is justifiable concern that the current dependence of the food sector on fossil fuels may limit the sector's ability to meet global food demands," said a FAO study circulated yesterday at the ongoing UN Conference on Climate Change in Durban, South Africa.

The food sector, including input manufacturing, production, processing, transportation, marketing and consumption, accounts for approximately 30 per cent of global energy consumption, and produces over 20 per cent of global greenhouse gas emissions.

"The global food sector needs to learn how to use energy more wisely. At each stage of the food supply chain, current practices can be adapted to become less energy intensive," said Alexander Mueller, the FAO Assistant Director-General for Environment and Natural Resources.

"Using local renewable energy resources along the entire food chain can help improve energy access, diversify farm and food processing revenues, avoid disposal of waste products, reduce dependence on fossil fuels and greenhouse gas emissions, and help achieve sustainable development goals,"

"New technologies reduce greenhouse gas emissions from nitrogenous fertilizer in China"

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3666697/

ABSTRACT

The Haber–Bosch process is one of the greatest inventions in modern human history. It enables industrial-scale production of ammonia from atmospheric N_2 using energy. From ammonia, various synthetic nitrogen (N) fertilizers are manufactured, without which nearly half of the world's population would not be alive today (1). However, synthetic N fertilizer has become "too much of a good thing" because much of the N applied to cropland escapes the agricultural system and becomes a pollutant, which disrupts terrestrial and aquatic ecosystem functions and contributes to global climate change.

The environmental cost is considerable, between €70 billion and €320 billion per year just for the European Union according to a recent 5-y European nitrogen assessment (2). This 200-member expert panel considered N emission reductions a central environmental challenge in the 21st century and called for a global inter- convention

N protocol to address the issue. Indeed, coordinated global efforts are particularly critical when dealing with N-related greenhouse gas (GHG) emissions, because such emissions and their impacts recognize no borders.

China is central to the issue. This is not only because China is the largest emitter of fossil-fuel CO_2 into the atmosphere (3) but because China has become a dominating force in the international N fertilizer market. In the past 2 decades (1990–2009), 61% of the world's increase in N fertilizer production and 52% of the increased N consumption occurred in China (4). In 2010, China produced 37.1 terrogram (Tg) of N. This accounted for >30% of world's total and exceeded the combined N fertilizer use in North America (11.1 Tg N) and the European Union (10.9 Tg N) in 2009 (4). Furthermore, China's N fertilizer production and utilization have distinct characteristics. N fertilizer relies heavily on coal as the main source of energy in its production. Coal has a greater carbon footprint than other forms of energy, such as natural gas.

Emission Factors along the N Fertilizer Chain.

For every ton of N produced and used on cropland in China, an average of 13.5 t of CO_2-equivalent (eq) (t CO_2-eq) is emitted. The largest emission along the chain comes from ammonia synthesis. This is partly due to the energy-intensive nature of the chemical engineering process that requires high temperature and pressure and partly due to the low energy efficiency of coal as the main energy source. Coal-based facilities have an emission factor of >5 t CO_2-eq t NH_3-N^{-1} compared with <3 t CO_2-eq t NH_3-N^{-1} for natural gas-based plants.

For the same energy source, large-scale facilities emit slightly less GHGs per unit of N than medium- or small-scale facilities. The next phase involves converting ammonia into various N fertilizer products; the processes have a weighted emission factor of 0.9 t CO_2-eq t N^{-1} but a wide range from 0.3 to 5.7 t CO_2-eq t N^{-1} . Thereafter, transport and distribution of the N products have an emission factor averaging 0.1 t CO_2-eq t N^{-1}.

"IMPLICATIONS OF FOSSIL FUEL DEPENDENCE FOR THE FOOD SYSTEM"

By Jay Tomczak, originally published by Tompkins Country Relocalization Project June 11, 2006

http://www.resilience.org/stories/2006-06-11/implications-fossil-fuel-dependence-food-system/

Abstract: Our current industrialized food system is not sustainable due to it's over dependence on non-renewable fossil fuel energy and it's degradation of the natural systems on which it depends for its existence. If action to change these aspects of the food system are not taken, convening resource depletion and degradation will cause the food system to collapse. Our food system is the result of the "green revolution" which created greatly increased crop yields by using large amounts of fossil fuel energy in the form of synthetic nitrogen fertilizers, petroleum based agrochemicals,

diesel powered machinery, refrigeration, irrigation and an oil dependent distribution system. This system destroys biodiversity, contributes to global climate change and degrades soil and water quality.

The availability of decades of cheap fossil fuel energy has allowed the food system to become dependent on finite resources that are rapidly being depleted. Due to the constraints of the first and second laws of thermodynamics this system can not be maintained in its current form. Essential components of the current system such as synthetic nitrogen fertilizers which require natural gas as a feedstock and oil dependent distribution exemplify the fragile nature of the food system. A wide scale conversion to low energy, ecologically sustainable agriculture must be implemented to avoid food system collapse and future food supply shortages.

It is the therefore the submission of Zero Waste Alliance Ireland that we should not waste or put beyond the possibility of reuse, the nitrogen in the form of ammonia that took so much fossil fuel energy to recover from the atmosphere in the first place. The burning of organic nitrogenous material contained in sewage sludge, plant or tissue waste should not be burned by this cement kiln. The failure by our society and economy and our current waste water treatment systems to recycle this nitrogenous resource to grow crops is a failure to be responsible for the food security of our grand children.

Phosphorus should not be Burned for Cement – it should be Recycled for Food

European Union Phosphorus Platform

This organization was set up to explain the importance of reducing the wasting of phosphorus and the need to recycle phosphorus sustainably from waste food and from waste water such as separated urine – please look at all 4 of the short YouTube videos.

http://phosphorusplatform.eu/links-and-resources/p-facts

Phosphorus is essential for worldwide food security

This irreplaceable natural resource is being used up increasingly fast. The demand for phosphorus is growing and virtually all phosphorus rock is mined in countries outside of Europe.

In Europe, phosphorus is not being treated sustainably. It disappears from the food chain as animal manure, human excreta and organic waste. However, solutions are available. We invite you to our Phosphorus Platform to participate, collaborate and innovate.

Hardly any raw phosphorus is available in Europe

Raw phosphorus is obtained from mining phosphate rock. These mines are for the largest part located in Morocco, the US and China. In Europe hardly any raw phosphorus is available, except for a very small quantity in Finland.

Therefore, virtually all phosphorus in Europe has to come from outside Europe. Due to increasing welfare in Africa, Latin America and Asia and an ever increasing world population, the demand for phosphorus is growing.

The dependency of Europe on raw phosphorus from outside Europe endangers our access and threatens our future food security.

Wasting phosphorus impacts the environment

In Europe, phosphorus is being treated in an unsustainable way. Through fertilizers, sewage and animal manure, large amounts of phosphorus and other nutrients end up in ground water and water bodies.

This is a direct threat for our aquatic ecosystems due to the process of eutrophication: increased levels of nutrients resulting in oxygen depletion. The impact on biodiversity is critical, since certain fish and other aquatic animal populations do not survive or invasive new species are introduced.

A phosphorus crisis affects us all

Developing countries are already facing the negative effects of the phosphorus challenge. As prices of raw phosphorus rise, access to fertilizers becomes increasingly difficult and eventually causes soil degradation. The developing world is the first victim of shortage and will be hit hardest.

For European countries, several factors already pose a serious threat for the access to raw phosphorus. Political unrest and climate change in phosphorus mining countries exert pressure on price and export security in any scenario. In the end, exhaustion of phosphorus and consequently the shortage of food will lead to political turmoil, from strikes and demonstrations to migration and war.

Page 5 - "**8 reasons why we need to rethink the management of phosphorus resources in the global food system**" Dr Dana Cordell "Institute for Sustainable Futures"
http://phosphorusfutures.net/wp-content/uploads/2015/02/1_P_DCordell.pdf

Page 6- "Identification and Evaluation of Phosphorus recovery technologies in an Irish Context" University of Limerick **- EPA STRIVE Report 189 (2014-W-DS-22)**
http://www.epa.ie/researchandeducation/research/researchpublications/researchreports/research189.html

Phosphorus (P) is essential for all life. Manufactured phosphorus fertilisers, produced from mined phosphate rock, are vital for food security. Of the approximately 22 million tonnes of phosphorus added to the world economy annually from mined fossil phosphate resources, approximately 80–90% is used as fertiliser in agriculture, 5–7% for animal feed additives and the remainder in various other applications. Phosphate rock is a limited non-renewable resource concentrated in a few countries and the supply is vulnerable to future scarcity, volatile pricing and geopolitical tensions. The economic importance and high supply risk of phosphate rock led to its inclusion in the European Union list of Critical Raw Materials in 2014. Phosphorus cannot be produced synthetically and has no substitute in food production. Owing to the dependence of food security on phosphorus availability and its potential to contribute to eutrophication in the receiving environment, there is a global need to promote more efficient use of phosphorus, as well as its recovery and reuse. Phosphorus recycling is supported by the Circular Economy Package published by the European Commission in 2015, which proposes measures to contribute to closing the loop of product lifecycles through increased recycling and reuse, with benefits for the environment and the economy. Almost all of the 3 million tonnes of phosphorus consumed in food per year by the global population enters the wastewater sector. It has been estimated that in 2009 the phosphorus available from urine and faeces could account for 22% of the total global phosphorus demand. Municipal wastewaters, therefore, represent a major point source from which to recover phosphorus and re-establish a circular economy. This project focused on identifying and evaluating current and developing phosphorus recovery technologies and assessing their viability in an Irish context.

Phosphorus recovery technologies were identified that can be applied in the wastewater treatment process to recover phosphorus from the liquid phase.

Outputs from the project include a table of phosphorus recovery technologies summarising the details of 28 phosphorus recovery technologies identified in terms of the phosphorus source targeted, the phosphorus product produced, percentage phosphorus recovery, operational scale, technology readiness level, details of the supplying/ developing company, and patent information, where relevant. Important considerations in identifying the most appropriate technology for implementation include quantity and phosphorus concentration of the waste stream, energy and chemical requirements, capital and operational costs, risk of "technological lock-in" and compatibility with the existing wastewater treatment plant infrastructure that can be applied in the wastewater treatment process to recover phosphorus from the liquid phase.

Page 7 - **Thames Water - Ostara – Phosphorus recovery from Municipal Sewage Treatment** http://ostara.com/nutrient-management-solutions/

You know the problem. You remove phosphorus to meet your effluent limits and protect local waterways from nutrient pollution, but now you've got a new problem: struvite. You could use chemicals, but they're expensive and increase sludge production.

THERE IS A BETTER WAY:

OSTARA'S PEARL® AND WASSTRIP® PROCESS

Ostara's technology suite helps communities around the world manage valuable phosphorus resources while meeting increasingly strict phosphorus limits. Our nutrient recovery system helps save on chemical costs, reduce sludge loads, and create a new revenue stream through the sale of high value recovered fertilizer. Plus, it reduces your carbon footprint – that's not just good operational practice, that's good stewardship.

Page 8 – “**European Commission – Circular Economy: New Regulations to boost the use of organic and waste based fertilizers”**

Page 9 - “**Nitrogen and Phosphorus Recovery from Human Urine by Struvite Precipitation and Air Stripping in Vietnam”** As a viable alternative to burning and wasting nitrogen and phosphorus in the Irish Cement Kiln at Platin the following domestic system was presented to the Inspector as an alternative that should be implemented.

How source separated human urine from single houses or communities can be treated to recover the 98% of the phosphorus and 90% of the nitrogen.
http://onlinelibrary.wiley.com/doi/10.1002/clen.201100036/abstract

Abstract

A “No Mix” urine separating sanitation system was installed in a dormitory at the University of CanTho in South Vietnam, with the objective of recycling nutrients from source separated wastewater streams. This paper presents the “Yellow Water” treatment plant and its efficiency in recovering phosphorus and nitrogen from human urine. The pilot plant achieved phosphorus removal efficiencies of 98% with both diluted and undiluted urine. Phosphorus was recovered in the form of struvite, a solid mineral fertilizer with heavy metal concentrations being below the German Fertilizer Regulation's threshold limits. About 110 g of struvite could be generated after one treatment cycle, during which 50 L of urine were processed. Nitrogen removal by air stripping showed best results when circulating the urine for 3 h through the stripping column at a high flow rate (80 L/h). With these settings, more than 90% of the nitrogen could be removed from the urine, and virtually 100% of this nitrogen could be recovered in the form of liquid ammonium sulphate. In the future, treatment costs could be further reduced by making use of the solar energy that is available during daytime in South Vietnam.

Page 10 - **Herr Ltd** – A family friendly method of growing plants by a hydroponic method to recover N, P and K from separated human urine. Because human urine has no toxic levels of metals, the harvested leaves of the plants can be used directly in the vegetable garden. In addition the leaves can be composted along with kitchen vegetable waste over a period of 2 or 3 years to make compost. This will allow for an extended period of time for any ingested pharmaceuticals in the urine to break down. In this way Nitrogen, Phosphorus and Potassium from human urine can be safely used in kitchen gardens without any toxic metals, hormones or ingested pharmaceuticals. It’s ironic to think that a natural system using sunlight and composting, rather than fossil fuel or high tek engineering can recycle nutrients so safely and be operated at home by a family gardener.

Conclusion - We are the last generation that will be ignorant of “World Resource Depletion”. It is the view of Zero Waste Alliance Ireland that Sewage Sludge or any of the other similar categories listed by “Irish Cement” that contain Nitrogen and Phosphorus should not be burned in the cement kiln for the following reasons:

The Fossil Fuels (Natural Gas and Coal) that are used to make ammonia gas for fertilizer are finite and will eventually be depleted. We must reduce significantly the greenhouse gas emissions associated with the making of ammonia fertilizer. Any finite material must instead be recycled.

The Burning of Nitrogen (Ammonia) and its loss to the atmosphere results in this resource being no longer available to farmers as part of the fertilizer to grow food

The emission of NOx will cause ozone in sunlight conditions. At ground levels ozone will cause ambient air pollution and should therefore be avoided.

The energy of the Nitrogen (Ammonia) recovered in the Cement Kiln will not replace or be equal to the total energy required for its original manufacture, its processing as an NPK fertilizer, its transport around the world or the energy for its application on farms. Because the nitrogen is not being recycled locally to grow food it forces the continuation of this very wasteful energy intensive Harber & Bosch method that is depleting the remaining finite resources of natural gas. This failure to recycle nitrogenous waste as a fertilizer is not sustainable.

The Green House gases that are generated by the manufacturing of Ammonia using the Haber & Bosch process contribute to climate change and must be reduced and eventually avoided.

Phosphorus fertilizer is likely to become expensive in Europe, India and other parts of the world over the coming 20 to 40 years as the resources of the USA and China, two of the three remaining countries with phosphorus rock begin to protect their own national supplies. When "peak phosphorus" is upon us and world demand is greater than the supply then no nation will have cheap phosphorus to sell to Ireland. Unless we recycle nutrients of nitrogen and phosphorus, food prices in supermarkets that are based on fossil fuel and mined phosphorus fertilizer will become volatile, then more expensive, then unaffordable and eventually will not be for sale at all.

Phosphorus is a finite resource that can be replaced by no other element. If burned in cement kilns this strategically important resource will be lost and wasted forever.

We must therefore recycle Nitrogen and Phosphorus. We must avoid the possibility of a world population collapse. I am asking An Board Pleanála to prioritize the long term public interest and but this above the private short term interests of a private business. It is not in the public interest that we should ignore the need for future food security. We must not allow food to become unaffordable or risk food shortages. We must not allow the poor in society to go hungry.

Regards Ollan Herr - Zero Waste Alliance Ireland –

http://zerowasteireland.com/

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