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Towards a New Global Climate Agreement: Transition to a Low-Carbon Economy

November 23, 2014. World Bank: <u>World Is Locked into ~1.5°C Warming & Risks Are Rising,</u> <u>New Climate Report Finds</u>. "Turn Down the Heat: Confronting the New Climate Normal" report explores the risks worsening climate change poses to lives and livelihoods. It finds that globally, warming of close to 1.5°C above pre-industrial times – up from 0.8°C today – is already locked into Earth's atmospheric system by past and predicted greenhouse gas emissions. Everyone will feel the impact as weather extremes become more commons and risks to food, water, and energy security increase.



November 20, 2014. NOAA National Climatic Data Center, <u>State of the Climate: Global Analysis</u> <u>for October 2014</u>. The globally averaged temperature over land and ocean surfaces for October 2014 was the highest on record for the month since record keeping began in 1880. It also marked the 38th consecutive October with a global temperature above the 20th century average. The January–October combined global land and ocean average surface temperature was the warmest such period on record, surpassing the previous record set in 1998 and 2010.



November 1, 2014. Concluding instalment of the Fifth Assessment Report by the Intergovernmental Panel on Climate Change (IPCC): <u>Climate change threatens irreversible and dangerous</u>. <u>impacts, but options exist to limit its effects</u>. Human influence on the climate system is clear and growing, with impacts observed on all continents. If left unchecked, climate change will increase the likelihood of severe, pervasive and irreversible impacts for people and ecosystems. However, options are available to adapt to climate change and implementing stringent mitigations activities can ensure that the impacts of climate change remain within a manageable range, creating a brighter and more sustainable future. These are among the key findings of the Synthesis Report released by the Intergovernmental Panel on Climate Change (IPCC) on Sunday. The Synthesis Report distils and integrates the findings of the <u>IPCC Fifth Assessment Report</u> produced by over 800 scientists and released over the past 13 months – the most comprehensive assessment of climate change ever undertaken. "We have the means to limit climate change," said R. K. Pachauri, Chair of the IPCC. "The solutions are many and allow for continued economic and human development. All we need is the will to change, which we trust will be motivated by knowledge and an understanding of the science of climate change." The Synthesis Report confirms that climate



change is being registered around the world and warming of the climate system is

unequivocal. Since the 1950s many of the observed changes are unprecedented over decades to millennia. "Our assessment finds that the atmosphere and oceans have warmed, the amount of snow and ice has diminished, sea level has risen and **the concentration of carbon dioxide has increased to a level unprecedented in at least the last 800,000 years**," said Thomas Stocker, Co-Chair of IPCC Working Group I. There are multiple mitigation pathways to achieve the substantial emissions reductions over the next few decades necessary to limit, with a greater than 66% chance, the warming to 2oC – the goal set by governments. However, delaying additional mitigation to 2030 will substantially increase the technological, economic, social and institutional challenges associated with limiting the warming over the 21st century to below 2oC relative to pre-industrial levels, the report finds. **"It is technically feasible to transition to a low-carbon economy,"** said Youba Sokona, Co-Chair of IPCC Working Group III. "But what is lacking are appropriate policies and institutions. The longer we wait to take action, the more it will cost to adapt and mitigate

climate change." The Synthesis Report finds that mitigation cost estimates vary, but that global economic growth would not be strongly affected. In business-as-usual scenarios, consumption – a proxy for economic growth – grows by 1.6 to 3 percent per year over the 21st century. Ambitious mitigation would reduce this by about 0.06 percentage points. "Compared to the imminent risk of irreversible climate change impacts, the risks of mitigation are manageable" said Sokona. These economic estimates of mitigation costs do not account for the benefits of reduced climate change, nor do they account for the numerous co-benefits associated with human health, livelihoods, and development. Cutting Green House Gases emissions by 40-70% by 2050, and to near or below zero emissions in 2100, would likely keep warming <2°C

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November 2, 2014. November 2, 2014. Briefing: What's new and interesting in the IPCC synthesis report by Roz Pidcock. For the first time in IPCC history, last year's report calculated the remaining amount of carbon humans can emit and still have a likely chance of limiting warming to less than two degrees above pre-industrial temperatures - the UNFCCC internationally accepted goal. The total budget is 2,900 billion tonnes of carbon dioxide. From the industrial revolution through to 2011, we'd emitted 1,900 billion, meaning two thirds of the budget was already spent. But while the international community considers two degrees as the threshold for dangerous warming, many low-lying and island nations that are already seeing the effects of sea level rise warn that for them, even 1.5 degrees of warming comes with unacceptably high risks. Another new feature of today's report is the calculation of a carbon allowance to stay below 1.5 degrees. The existing budget for two degrees already requires that about 80 per cent of known fossil fuel reserves stay in the ground, and keeping below 1.5 degrees is more ambitious still. Low or zero carbon energy sources will need to increase from the current share of 30 per cent to more than 80 per cent by 2050.

July 11, 2014. <u>UN: Pathways to Deep Decarbonization</u>. How to cut carbon emissions in order to prevent dangerous climate change. Biogas & Nanotechnology role.

June 2, 2014. <u>Will New Climate Regulations Destroy the Economy? (Hint: No.)</u> by Peter H. Gleick President, Pacific Institute. No. On the contrary, they might just save it by helping stimulate new technologies and industries and by reducing the risks of climate disruption. Claims that environmental laws will destroy the economy have been regularly made and are consistently false. The following graph shows U.S. GDP from 1929 to 2013 in real 2009 dollars (corrected for inflation) along with the years major environmental laws were passed. (Prepared by Peter Gleick, Pacific Institute. GDP data from the US Bureau of Economic Analysis.)



European Biogas Barometer

November 27, 2014. Released: EurObserv'ER Biogas Barometer. The expansion of biogas energy usage has continued across the European Union. According to EurObserv'ER, about 13.4 million tonnes oil equivalent (Mtoe) of biogas primary energy were produced during 2013, which is 1.2 Mtoe more than in 2012 representing a 10.2% growth. However, the biogas sector's momentum was more sluggish than in 2012 (16.9% between 2011 and 2012, giving an additional 1.8 Mtoe) and it is expected to lose some of its impetus in 2014 in a number of countries whose sector expansion controlling policy changes will limit the future use of energy crops. A European Biogas Association (EBA) report claims that in 2012 13.800 anaerobic digesters were in service in Europe (the European Union + Switzerland) with about 7.400 MW of electricity generating capacity. By the end of 2013, the 14.000 anaerobic digester threshold had been left far behind. Biomethane production is primarly gaining in popularity with the countries of the European Union, because it enables them to reduce their reliance on natural gas imports. The slump in the growth of the German and Italian markets that were up to now the European growth drivers for biogas has driven the European sector into a major restructuring exercise. In order to recover, the biogas sector requires fast decisions about the environmental requirement levels for biogas and biomethane production with regard to GHG emissions, so that they can be included in the European renewable energy target calculations. Thus the future development of the biogas sector is essentially a political issue. Accordingly, the best estimates for 2020 are those defined by each Member State in the national renewable energy action plans (NREAPs) for the EU of 28, which forecast that the biogas sector will contribute up to 4 456 ktoe of heat production and 64.2 TWh (5.423 ktoe) of electricity production, equating to combined final energy consumption of 9.879 ktoe.

BIOGAS BAROMETER 13.4 Mtoe *of blogas primary energy produced in 2023 in the European Union. Astudy carried out by EurObserv'ER.*

The sustainability requirements of biogas called into question: The biogas and biomethane production conditions are at the centre of heated negotiations at European Union level. On 28 July, the European Commission published a working document on the sustainability of solid and gaseous biomass used for electricity, heating and cooling. In the section on biogas, the report highlighted the environmental issues stemming from the use of energy crops and encouraged the use of a higher percentage of manure, slurry and other organic waste to improve the greenhouse gas emission performance of biogas installations. The report's main line is that the percentage reduction in greenhouse gas emissions from bioenergy such as biogas should be at least 70% less than fossil fuels, which is a higher target than 60% target actually defined by the Directive to come into effect from 1 January 2018 (for installations that start producing in January 2017). The sector feels that this percentage will be very hard to achieve, especially for biomethane production whose greenhouse gas emission performance levels would be measured in comparison with natural gas, applying the new European Commission-proposed method, and no longer against the mean European fossil energy mix excluding fuel that was previously used and more advantageous. However, a JRC (Joint Research Centre) report that accompanies the document, reckons that this target can be achieved provided certain production conditions apply with a 100% organic waste pathway or a co-digestion blend of 70% slurry to 30% maize. Negotiations between the stakeholders over the wording of a draft directive being prepared for presentation to the European Parliament and European Council are expected to be tough. The European Commission has already warned that no draft directive on these sustainability criteria would be expected before 2020.

Effects of the Biogas Policy Changes in Germany: Adaptation to New Requirements

November 27, 2014. <u>Revirement pour la filière biogaz allemande</u>. Editorial du Bioénergie International (novembre-décembre 2014) par François Bornschein, directeur de publication. Que se passe-t-il? Le contexte réglementaire évoluant, le modèle biogaz allemand en vigueur depuis les années 2000, perd sa rentabilité aux yeux des acteurs et investisseurs dont l'équation économique reposait sur des tarifs de rachats assortis de primes et bonus sur les intrants utilisés, l'épuration du biogaz, etc... **2015 sera donc l'ère des installations <75kW et de celles qui sauront jouer le jeu de la flexibilité**. En effet, l'Allemagne engagée depuis 2011 dans son tournant énergétique depuis son moratoire sur la sortie du nucléaire, confirme sa position, et **engage la filière biogaz à relever le défi de la flexibilité électrique pour palier les intermittences de son parc photovoltaïque et éolien**. La filière biogaz allemande, c'est tout de même 8000 installations en service à ce jour. Elle dispose là d'un formidable levier pour accroître la flexibilité de son système électrique. Car le gaz nous savons déjà le stocker!



June 27, 2011. <u>German Combined Power Plant Demonstrates Real-Time Integration of Renewables</u>. A pilot project showed how networking technology can create a 100-percent-uptime "virtual" power plant composed of widely-dispersed renewable energy sources

November 20, 2014. <u>Biogas on the edge</u>. Germany's biogas industry managed to add 41 MW of capacity before the amended Renewable Energy Act (EEG) took effect in 2014. In 2015 the industry expects to install less than 10 MW of capacity for the entire year. Ever since the amended Renewable Energy Act took effect, the industry has gone into a deep freeze. The poor economic development has hit planners and plant manufacturers hardest. Companies that established a strong plant services business or overseas businesses early on are now in better shape.

November 12, 2014. <u>Biogas industry operates flexibly</u>. German Biogas Association (Fachverband Biogas e.V.) presents the latest industry figures. **Mood for new installations, "very bad." Future electricity market design offers new perspectives**. With he entry into force of amended EEG, new installation of biogas plants in Germany has come to a virtual halt.

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November 25, 2014. La Grèce, nouvelle perspective de marché pour l'industrie allemande du biogaz. Les perspectives de marché pour Weltec, comme pour bien d'autres constructeurs d'outre-Rhin, se situent donc aujourd'hui principalement hors d'Allemagne, et le positionnement déjà ancien du constructeur résolument orienté à l'export, avec des références dans plus de 25 pays, le place aujourd'hui à l'abri de la forte baisse d'activité dans son pays d'origine.

November 21, 2014. **Biogas at Home: A Renewable No-Brainer** by Warren Weisman (founder and CEO of Hestia Home Biogas an invented the company's 2M3 home biogas digester). Germany is the leading producer of biogas in the developed world, with 8,700 biogas plants with 3,400 MW of installed electric generation capacity. The United States lags far behind with less than 450 plants with 175 MW of capacity... But if we were to do what has never been done before and include individual household and farm scale biogas plants that are not grid-tied, **China easily eclipses the rest of the world combined**. Although China does have a growing number of large, modern biogas plants, **today nearly all of China's biogas plants are residential scale biodigesters** of around 10 cubic meters underground pit-type digesters made from brick and traditional Chinese "triple concrete" at a cost around \$85 USD. These plants provide home cooking energy and are often used in conjunction with 60 cu.m. village scale plants providing electricity. As it has done in China, home scale biogas could potentially play a major role in America's energy future by helping meet the energy and waste recycling needs of individual families one household at a time.



November 2, 2014. About-face for biogas policy in Germany. The new renewable energy law (EEG 2014) came into force in Germany on 1 August 2014 and marks a turnaround for biogas. Future production will be much less geared to using energy crops. One of the new law's aims is to reduce the financial cost of energy transition by slowing the growth of the most expensive electricity- generating sectors. Solid biomass and biogas find themselves in the line of fire. One of the main measures of the new law affecting biogas is the withdrawal of the premium for using energy crops (NawaRo-Bonus), to encourage the use of organic and farming waste. Another major upset is that to limit the remuneration of biogas installations, biogas plants with capacity in excess of 100 kW will henceforth only be eligible for financial support of up to 50% of their nominal installation capacity. The new payment system is still more generous to small installations that transform agricultural waste. The setting of the 100-MW ceiling on new biogas installations will result in a sharp drop in their number from 2015 onwards... Setback for the Italian biogas market: The Ministerial Decree of 6 July 2012 on new incentive systems for renewable electricity production that applied from 1 January 2013 has completely shifted Italian policy on biogas. Along with the UK, France is no doubt the most promising country for biogas development. (From EurObserv'ER Biogas Barometer)

October 28, 2014. <u>"Green Paper": Germany launches a complete renovation of the electricity market</u> After the reform of the law on the development of renewable energies (EEG), the federal government now takes a much more important project: the reconstruction of the entire German power plants and the market in which these power plants sell their electricity.

August 21, 2014. <u>Renewable energy patents boom in Germany</u> As a first mover in the transition to renewables, Germany aims to position itself as a provider of equipment for the production of renewable energy across the world. And according to recent data, these plans have started to pay off in recent years.

July 22, 2014. <u>Germany: Biomethane industry barometer published for the first half of 2014</u> This edition focuses on the effects of the reform of the Renewable Energy Sources Act (EEG) and future market developments. The reform of the German Renewable Energy Sources Act (EEG) will eliminate the substance remuneration classes for certain raw materials and the gas generation bonus for biomethane. That **will reduce the EEG remuneration for generation of electricity from biomethane by up to 40 percent**. As a result, calculating, implementing and refinancing biogas feedin projects via the EEG market will become far more difficult. The largest sales market for biomethane remains use for electricity generation in combined heat and power plants. However, as the EEG reform will result in less favourable conditions for this, plant builders, planners, biomethane generators and traders are **increasing their sales activities in the heat and fuel markets, as well as overseas**. Biomethane export marketing increased considerably. The fact that **overseas sales are now the third-largest use option for biomethane highlights the industry's efforts to overcome the sales problems on the German market and enter new markets**.

July 4, 2014. Press release: <u>New German Renewable Energy Act (EEG) shoots biogas in Germany</u>. "European Biogas Association (EBA) strongly criticises the amended Renewable Energy Act (EEG), approved by the German Parliament on June 27. This U-turn in German biogas policies will nearly stop the already weakening growth in Germany, losing its chance to reduce dependence on imported natural gas."

Some Milestones in Biogas Use

November 25, 2014. Process converts human waste into rocket fuel. Buck Rogers surely couldn't have seen this one coming, but at NASA's request, University of Florida researchers have figured out how to turn human waste -- yes, that kind -- into rocket fuel. Adolescent jokes aside, the process finally makes useful something that until now has been collected to burn up on re-entry. What's more, like so many other things developed for the space program, the process could well turn up on Earth, said Pratap Pullammanappallil. In 2006, NASA began making plans to build an inhabited facility on the moon's surface between 2019 and 2024. As part of NASA's moon-base goal, the agency wanted to reduce the weight of spacecraft leaving Earth. Historically, waste generated during spaceflight would not be used further. NASA stores it in containers until it's loaded into space cargo vehicles that burn as they pass back through the Earth's atmosphere. For future long-term missions, though, it would be impractical to bring all the stored waste back to Earth. Dumping it on the moon's surface is not an option, so the space agency entered into an agreement with UF to develop test ideas. "We were trying to find out how much methane can be produced from uneaten food, food packaging and human waste. The idea was to see whether we

could make enough fuel to launch rockets and not carry all the fuel and its weight from Earth for the return journey. **Methane can be used to fuel the rockets. Enough methane can be produced to come back from the moon**." They found the process could produce 290 liters of methane per crew per day, all produced in a week. **Their results led to the creation of an anaerobic digester process, which kills pathogens from human waste, and produces biogas** -- a mixture of methane and carbon dioxide by breaking down organic matter in waste. In earth-bound applications, that fuel could be used for heating, electricity generation or transportation. The digestion process also would produce about 200 gallons of non-potable water annually from all the waste. That is water held within the organic matter, which is released as organic matter decomposes. Through electrolysis, the water can then be split into hydrogen and oxygen, and the astronauts can breathe oxygen as a back-up system. The exhaled carbon dioxide and hydrogen can be converted to methane and water in the process.



November 20, 2014. Britain's first 'poo bus' - running on human waste. The 40-seater "Bio-Bus" is fuelled by biomethane gas generated by the treatment of sewage and food waste at a processing plant. A single tank of the gas, which is produced using the typical annual waste of five people, is enough to power the vehicle for 190 miles. Bosses said the ground-breaking vehicle will improve air quality and proves there is value in human poo. The maiden voyage will see the first passengers travel on the route from Bristol Airport to the historical city of Bath, Somerset. "Gas powered vehicles have an important role to play in improving air quality in UK cities. But the Bio-Bus goes further than that and is actually powered by people living in the local area, including quite possibly those on the bus itself."

November 19, 2014. **First fish farm heated using household waste**. <u>Little fish turn into big fish</u> <u>thanks to energy from waste</u>. In Woodlawn, Australia, a fish farm is producing 2500 tons of fish per year. Its main source of energy? Mountains of waste. In Woodlawn, waste is a valuable resource. The methane it generates is used to produce clean electricity - thereby also avoiding emitting greenhouse gases into the atmosphere - and the heat generated by the operation provides warmth for a fish farm which raises fish that can then be found on Australian plates, the remains of which end up in the garbage! In a country where fish consumption is very high, it is what could well be called the perfect example of a successful circular economy.

November 19, 2014. <u>Waterless toilets turn human waste into energy and fertiliser</u>. UK-based <u>Loowatt</u> has developed a hygienic waterless toilet system; this one also generates energy. The odourless Loowatt toilet uses a sealing mechanism to wrap human waste in a biodegradable liner which is pulled through the sealer when the toilet is flushed. The "cartridge" is then emptied periodically into an anaerobic digester, where the waste and biodegradable liners are converted into biogas and fertiliser.

November 11, 2014. <u>German village Feldheim the country's first community to become energy</u> <u>self-sufficient</u>. The rural village of Feldheim, 80 kilometres south of Berlin, is at the vanguard of Germany's energy revolution, boasting a wind farm, solar plant, biogas and biomass facilities. Germany is undergoing an energy transformation called Energiewende, which aims to reduce carbon emissions, increase the use of renewable energy, and stop all nuclear power. The village now attracts thousands of ecotourists every year and has set up an educational group to spread the word.



November 6, 2014. **First zero carbon, waste-to-energy data center**. Nation's first bio gas and fuel cell powered data center Microsoft builds first zero carbon, waste-to-energy data center together with Siemens and FuelCell Energy, in Cheyenne, WY. The project uses biogas methane produced by common waste byproducts at the nearby Dry Creek wastewater facility to power the fuel cell system. The fuel cell system then converts the biogas into electricity to power the Microsoft data center.



November 1, 2014. **Renewable Energy for Ethiopian Refugee Camps**. In an exciting new project, Norwegian Refugee Council (NRC) Ethiopia has introduced biogas as an alternative fuel in Bambasi Refugee Camp in Ethiopia. Human and animal waste is used to generate as that can burn safely and effectively in people's homes. The pilot phase in Bambasi refugee camp, which houses mainly Sudanese refugees, has proven successful and has inspired new plans to apply the innovation to other refugee camps in Ethiopia. The use of biogas has led to a significant reduction in dependence on firewood for cooking, and women are able to save more time to attend to income generating activities instead of going in search of firewood.

Digestate

November 27, 2014. Digestato: ministeri agricoltura-ambiente, approvato decreto in conferenza Stato-Regioni. Approvato lo schema di decreto sulla revisione delle norme relative alla gestione degli effluenti di allevamento e sull'utilizzazione agronomica del digestato, prodotto dagli impianti di digestione anaerobica. Nel merito il provvedimento prevede: bipartizione del digestato in agrozootecnico ed agroindustriale; condizioni di parificazione ai concimi di origine chimica, attraverso un'esecuzione di analisi chimiche al digestato in uscita dagli impianti ed il calcolo dell'azoto tramite l'effettivo fabbisogno delle colture, così da garantire il rispetto dell'ambiente; divieto di utilizzazione agronomica del digestato in caso di immissione negli impianti di colture che provengano dai siti di bonifica; flessibilità della collocazione temporale del periodo obbligatorio di 60 giorni di divieto di spandimento degli effluenti; introduzione di una graduale limitazione all'uso di colture no food alternative all'utilizzazione agricola dei terreni coltivati.

November 16, 2014. Digestato al posto di fertilizzanti di sintesi. Il digestato, ovvero lo scarto del processo di fermentazione, può essere utilizzato come fertilizzante, in sostituzione dei prodotti di sintesi. L'azoto contenuto nel materiale organico di partenza viene così riutilizzato in agricoltura. Se ne sta occupando il Gruppo Ricicla dell'Università degli Studi di Milano, che ha proposto dei criteri tecnici per sostituire completamente l'azoto di sintesi con l'azoto contenuto nel digestato. Si verrebbe così a creare un ciclo chiuso e integrato in grado di riutilizzare i reflui zootecnici per la produzione di energia e fertilizzanti rinnovabili. Lorella Rossi del Centro Ricerche Produzioni Animali CRPA di Reggio Emilia, ha risposto all'altra questione mossa dai critici, ovvero il problema Clostridium e alla domanda se un uso agronomico dei digestati contribuisca ad un aumento della contaminazione ambientale da parte di questi batteri. Dopo aver presentato casi reali, realizzati durante il progetto "Biogas e Parmigiano Reggiano", ha riportato la dichiarazione dell'EFSA (European Food Security Agency): "Secondo le pubblicazioni scientifiche, i batteri patogeni non aumentano di numero durante il trattamento mesofilo del letame, nella fase finale della lavorazione. Pertanto, l'applicazione dell'effluente trattato con processi mesofili su terreni non aumenta i rischi biologici rispetto all'applicazione di effluente grezzo". Da qui l'intervento di Fabrizio Annibali del Dipartimento di Sanità Pubblica Veterinaria e Sicurezza Alimentare dell'Istituto Superiore di Sanità che conclude che: "In Italia non è mai stata dimostrata la correlazione fra casi di botulismo nei bovini e l'uso di digestati provenienti dalla digestione anaerobia", definendola una "leggenda metropolitana. Il botulismo è un fenomeno da sempre collegato a effetti collaterali dell'attività zootecnica". E conclude: "Sarebbe estremamente utile promuovere una serena discussione tra i favorevoli e i contrari, soprattutto per fornire alla popolazione la possibilità di formulare un'opinione scevra da ogni preconcetto e pregiudizio".

November 14, 2014. <u>AD fertiliser 'safe' to use on crops in Scotland</u>. Digestate and compost products produced by AD facilities have been classified as safe to use on arable land in Scotland, assurance scheme Quality Meat Scotland announced yesterday. But, NFU Scotland warned that farmers should be 'aware of risks' when using biofertiliser from anaerobic digestion plants on their

crops, which could potentially 'cut them off' from certain buyers and markets compared with other soil conditioners. **Concerns had previously been raised that the process could also actively cultivate the Clostridium botulinum organism** – a bacterium which is known to be hazardous to both humans and livestock. However, three research projects have now been completed, the most recent in July 2014, confirming no 'significant growth' of the organism in anaerobic digestion and risks similarly low to those associated with livestock slurries. Welcoming the standards revision, Iain Gulland, chief executive of Zero Waste Scotland, said: "This decision by Quality Meat Scotland to permit the use of compost and fertiliser products derived from food waste **is a breakthrough for a circular economy in Scotland**. "Food and other organic wastes contain nutrients which are important to plant growth, so it's appropriate they are returned to the soil when it's safe and right to do so."

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November 11, 2014. Biogas and botulism: **Is it true that the digestate resulting from biogas production can contain botulinus?** (video) Mr Anniballi of the Italian Hub Centre for Botulism, ISS, who is studying the phenomenon, discusses his theory, according to which the formation of botulinus is not directly attributable to biogas production.

November 6, 2014. <u>Significance of Phosphorus in Anaerobic Digestion Residuals Recovery</u>. Gas production and energy potential typically dominate the spotlight in the anaerobic digestion (AD) technology world, while **benefits of residues and nutrient management from AD are overshadowed**. However, utilizing AD residues and considering the value of properly managing nutrients, such as phosphorus, may make-or-break projects considered uneconomical based on energy production value alone. Nutrient management benefits from digestion should be considered to help keep residuals on the positive side of the balance sheet. For example, agricultural waste management is typically not considered a profit center. Monetizing the benefits in terms of removal and clean-up cost or value as fertilizer is vital, but can be challenging.

October 24, 2014. <u>Digestate as bio-fuel in domestic furnaces</u>. This study investigates the use of the biogas power plants byproduct (digestate) as biofuel in an ordinary domestic air furnace. The **digestate**, disposed by a 1 MW biogas plant located in Italy, **was dried out and pelletized** in order to be used as fuel in a wood pellet furnace



Responsible Research and Innovation



November 21, 2014. <u>Rome Declaration on Responsible Research and Innovation in Europe</u>. "We, the participants and organisers of the conference (Science, Innovation and Society: achieving Responsible Research and Innovation" held in Rome on 19-21 November 2014 under the auspices of the Italian Presidency, consider it as our collective duty to further promote Responsible Research and Innovation in an integrated way.

We call on European Institutions, EU Member States and their R&I Funding and Performing Organisations, business and civil society to **make Responsible Research and Innovation a central objective across all relevant policies and activities**, incluiding in shaping the European Research Area and the Innovation Union.

The present declaration builds on the 2009 Lund Declaration, which called for an emphasis on societal challenges, and on the 2013 Vilnius Declaration, which underlined that a resilient partnership with all relevant actors is required if research is to serve society. We believe the conditions are now right for responsible research and innovation to underpin European research and innovation endeavour and therefore call on all stakeholders to work together for inclusive and sustainable solutions to our societal challenges."