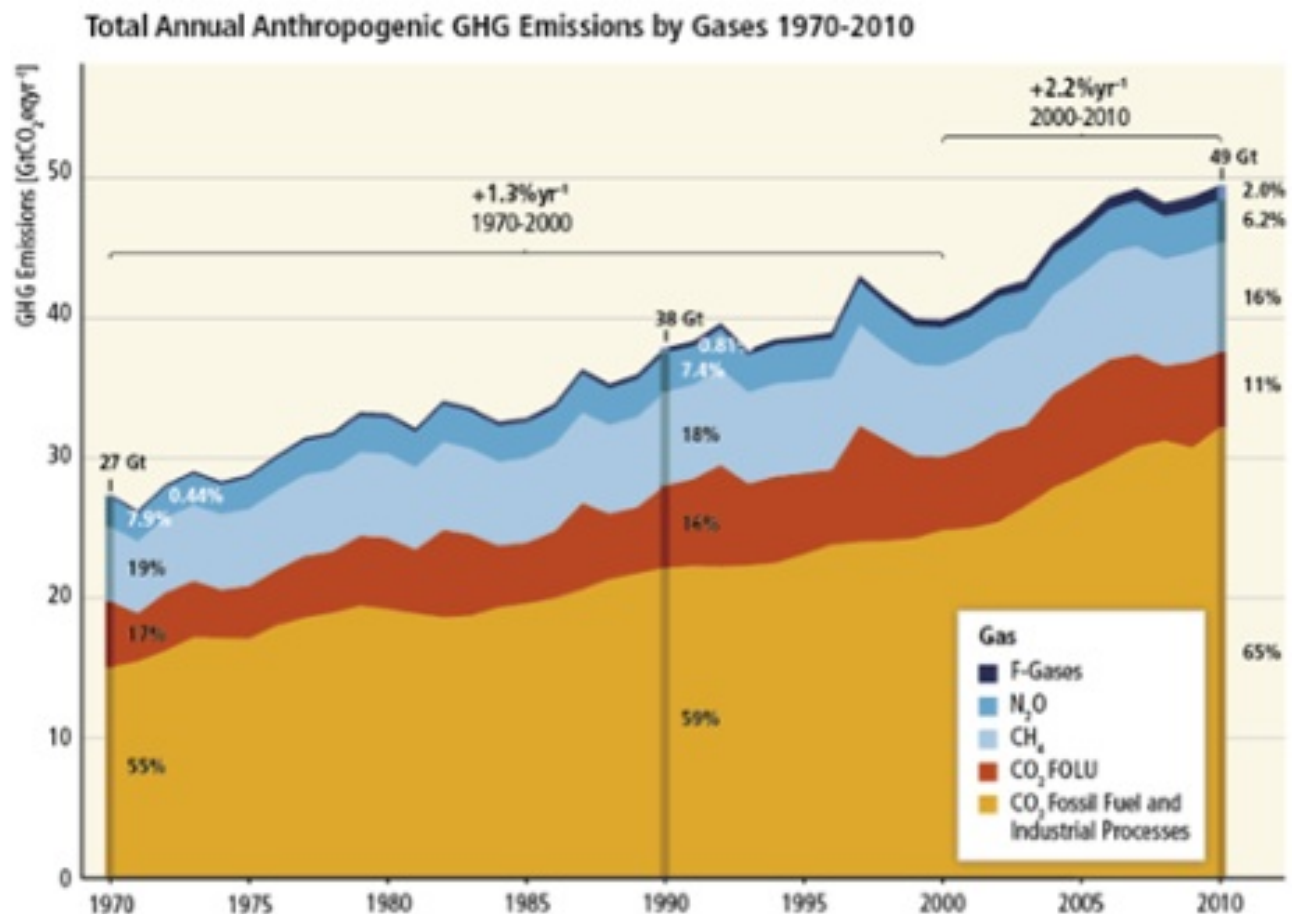




The Energy Transition in a Changing Climate

October 31, 2014. **IPCC report: six graphs that show how we're changing the world's climate.** We look at the data that underpins the **forthcoming IPCC climate science report detailing humanity's influence on the climate, global impacts and solutions.** On Sunday the world's top climate scientists are expected to reiterate their warning that **humanity's influence on the climate is unequivocal**, with wide-ranging impacts across the planet, from rising seas to melting ice. The UN's climate science panel, the Intergovernmental Panel on Climate Change (IPCC), is currently meeting in Copenhagen to thrash out the final wording of its so-called 'synthesis' report, the most comprehensive account of the state on climate science in seven years. But there is cause for hope if governments take action, it will suggest: **"Measures exist to achieve the substantial emissions reductions over the next few decades necessary to limit likely warming to 2C"**. A rise of 2C is the 'safe' level governments have agreed to hold temperatures to... We're spitting out more emissions that ever before, and it's getting worse. Over the past decade emissions grew at twice the rate of the previous 30 years.



October 28, 2014. **"Green Paper": Germany launches a complete renovation of the electricity market** 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.** The share of renewable energies in the electricity supply is growing rapidly, currently make solar, wind, biogas

and hydroelectric power plants around a quarter of Germany's electricity supply. Coal and gas power plants sell accordingly less and less power.

Absolute change in electricity production First nine months 2014 versus first nine months 2013

Change in electricity production: first nine months 2014 versus first nine months 2013



Graph: B. Burger, Fraunhofer ISE; data: Statistisches Bundesamt (2013), European Stock Exchange EEX (2014)

October 24, 2014. **EU2030 Climate Energy Policy Agreed: EU leaders agree to cut greenhouse gas emissions by 40% by 2030.** Climate commissioner hails ‘strong signal’ ahead of global Paris summit but key aspects of deal left vague or voluntary, raising questions as to how the aims would be realised... Poland, heavily dependent on coal-fired energy production, threatened to block the deal. Concessions granted to Poland will allow it to continue reaping hundreds of millions of euros in free allowances to modernise coal-fired power plants. A poll late last week found that 56% of Poles thought that EU financial support for energy should back clean energy rather than fossil fuels. “It’s scandalous,” said Julia Michalak, a spokeswoman for Climate Action Network Europe. “A continuation of free emission permits for Poland’s coal-reliant energy system would be a grave mistake. Leaders who came to Brussels to agree new historic climate goals, are actually discussing whether to hand out money to Europe’s dirtiest power plants.”

context=

October 28, 2014. **Policies put the EU on track to meet its 2020 climate and energy targets but bigger push needed for 2030.** European Union (EU) greenhouse gas emissions fell almost 2 % between 2012 and 2013, putting the EU very close to its 2020 reduction target, according to new analysis from the European Environment Agency (EEA). The EU is also on track to meet two other targets to boost renewable energy and energy efficiency by 2020.

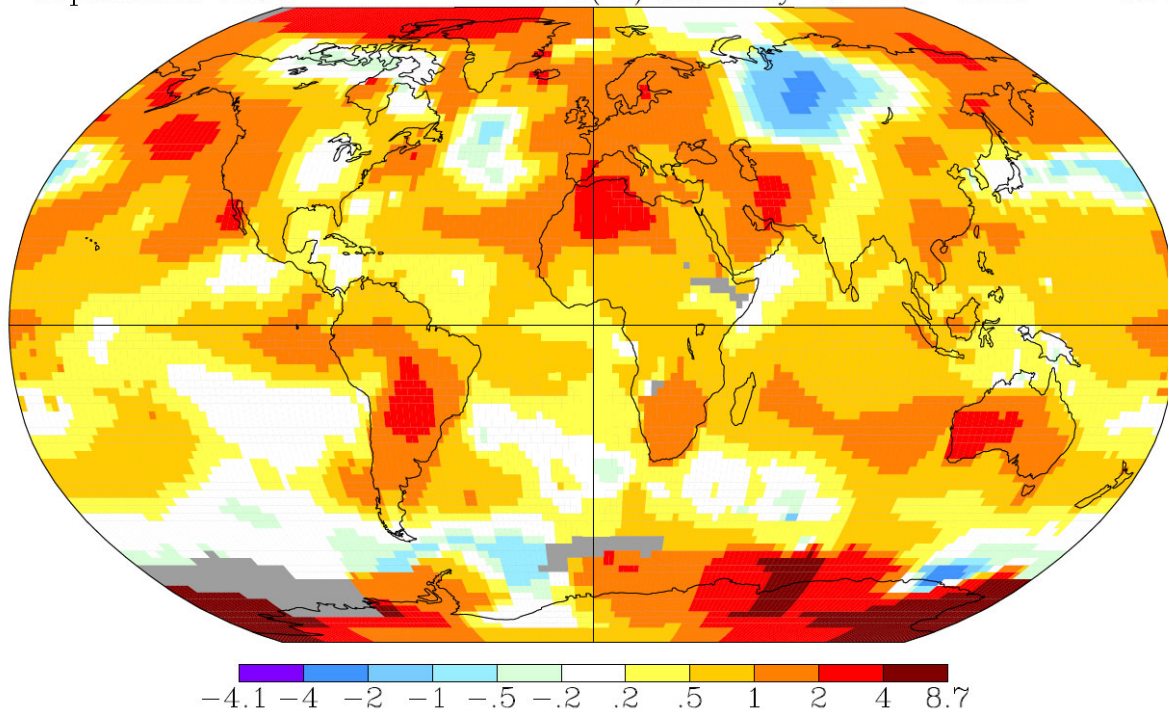
October 27, 2014. European Biogas Association (EBA): **Climate and energy targets 2030 – no binding RES requirements for the Members States is a threat.** At EU summit, the climate and energy package for 2030 was adopted including a 27% EU target for renewable energies in 2030. Inconsistency of this decision will deepen differences between the Members States... “The EU leaders seek the ways to reduce dependency on Russian gas, but they still don’t see potential from the local resources like biogas. Now the main task of the industry is to fight for a single European market to trade green gas over borders and to prove its value and potential,” stated EBA’s President Dr. Jan Stambasky.

October 24, 2014. **EU leaders out of touch with climate reality.** “The reality is that climate change already threatens people and nature. Yet the scale of ambition we need to tackle climate change is missing from the emission reduction, renewable energy and energy efficiency targets announced today by the EU Council. We are still waiting for targets that will fight climate pollution and drive rapid, just divestment out of fossil fuels and into the renewable, efficient economy of the future”

October 24, 2014. **L'UE pourrait diviser sa consommation de gaz par deux d'ici 2030.** Une moindre consommation de gaz permettrait de réduire les émissions de gaz à effet de serre, selon une étude publiée par Ecofys. **Au prix d'efforts considérables en matière d'efficacité énergétique.** La question de l'indépendance énergétique de l'Union est devenue prioritaire depuis le déclenchement de la crise ukrainienne. Alors que l'objectif de l'UE est de porter la part des énergies renouvelables à 27% d'ici 2030, l'analyse d'Ecofys avance que cette projection ne fait que suivre la tendance actuelle constatée du développement de la filière du renouvelable. Ce qui signifie qu'il existerait une **large marge de manœuvre pour un développement plus important des énergies renouvelables**, affirment les auteurs.

October 20, 2014. **After record warm September, 2014 is on track to warmest year, NOAA says. 2014 is turning into a superlative year for global temperature.** September was the warmest such month on record, according to the monthly [climate report by NOAA](#)'s National Climatic Data Center. This follows the warmest August on record, and the warmest summer on record, as well. NASA and the Japan Meteorological Agency agree on the warmth: both organizations also ranked September as the warmest on record.

September 2014 L-OTI(°C) Anomaly vs 1951–1980 0.78



October 14, 2014. **Transition énergétique : l'Assemblée nationale a adopté le projet de loi.** L'Assemblée nationale a adopté mardi 14 octobre 2014, en première lecture, le projet de loi relatif à la transition énergétique pour la croissance verte par 314 voix pour et 219 voix contre. **“Tout citoyen a deux patries, la sienne et la planète. En votant cette loi vous servez l'une et l'autre”** a conclu la ministre Ségolène Royal lors du vote en séance publique.

context=

October 29, 2014. Jean-Claude Girot, **Président de l'AFGNV, fait le point sur le gaz carburant dans la transition énergétique** dans un entretien publié par le Bulletin de l'Industrie Pétrolière. Le Président de l'AFGNV plaide pour un positionnement affirmé du GNV et du BioGNV dans la transition énergétique en France. **Il regrette que la France se positionne quasi-exclusivement sur la filière électrique au détriment des autres carburants alternatifs** qui présentent pourtant des atouts complémentaires. Il termine l'entretien par le rappel des avantages du GNV et l'intérêt aujourd'hui du monde des véhicules industriels pour ce carburant.

October 13, 2014. **Méthanisation : les produits agricoles alimentaires seront interdits.** Lors de l'examen du projet de loi sur la transition énergétique par l'Assemblée nationale, de nombreux amendements ont été déposés pour encadrer la méthanisation et lutter contre les **"fermes usines"**. L'un de ces amendements, présenté par les députés EELV, a été adopté avec l'avis favorable du gouvernement. Il vise à interdire les cultures dédiées, autrement dit les produits agricoles alimentaires. Ainsi, les installations de méthanisation ne pourront **"être alimentées par des matières autres que des déchets, des effluents d'élevages, des résidus de culture et des cultures intermédiaires, y compris les cultures intermédiaires à vocation énergétique"**. Cette interdiction vise à éviter la concurrence avec l'usage alimentaire. **"Il s'agit de tirer les enseignements de l'exemple des agro-carburants ou encore de la méthanisation en Allemagne, qui ont amené à une grande consommation de cultures dédiées et de terres agricoles, entraînant un effet de spéculation sur les matières premières agricoles"**, précise l'exposé des motifs.

September 30, 2014. **Transition énergétique, la bataille de l'emploi.** Les députés entament mercredi 1er octobre l'examen du projet de loi visant réduire la dépendance de la France aux énergies fossiles. Les gains et pertes d'emplois tiendront une large place dans les débats. La bataille des chiffres a commencé. La ministre de l'écologie, Ségolène Royal, promet la création de 100 000 emplois en trois ans grâce à la transition énergétique. Les modèles de l'Ademe pronostiquent, eux, un solde net de 300 000 emplois d'ici à 2030. Les partisans de l'atome, nombreux parmi les députés de l'opposition, évoquent un bilan négatif à cause des emplois détruits dans le nucléaire.

October 8, 2014. [Anaerobic Digestion and Gasification can replace gas imports](#). “Biomethane is a mature technology that can significantly reduce Europe’s dependency on natural gas” was the **main message of the 2nd Conference of the European Biogas Association** in the Netherlands. DGs for Energy, Transport and Agriculture confirm that in the next decades there is no way to achieve renewable energy targets without biogas. According to Antonio Tricas-Aizpun from DG MOVE, **in the decades to come the objective is to move away from natural gas towards biomethane supplies**. As an important trigger he named agreement of the standard M/475 and adoption on the Directive Clean Power for Transport, which should enable achieving the 5% share of natural gas and biomethane vehicles market in 2020. **“Biogas can be an important pillar of the European energy policy in terms of safety and decarbonisation”**, told Dr. Jan Stambasky, EBA’s President. “A combined effort of anaerobic digestion and gasification can deliver sufficient biomethane to replace natural gas imports from Russia. Both technologies produce biomethane, share the same regulatory framework and the same technical infrastructure, therefore a cooperation between the industries will be crucial in the coming years.” In total 240 participants from 30 countries attended the three day joint event on biogas and gasification in the Dutch region of Alkmaar. The next Conference of the European Biogas Association is scheduled for 2016. Stambasky summarized: “The high number of participants from outside Europe confirms that we **have the best know-how to share and that the industry has an enormous potential to grow in the EU and beyond. This is the route that we want to continue in the coming years.**”

Spain: The agro-industrial biogas refuses to die

Octubre, 2014. [La situación del biogás agroindustrial en España, ¿a donde vamos?](#) Francisco Repullo, presidente de la Asociación española de Biogás ([AEBIG](#)). **Reformas nefastas, impuestos sin sentido, inseguridad jurídica..., resultado: Alemania 9.945 plantas – España 32 plantas. Gravar la generación de energía con biogás con un impuesto de hidrocarburos es un absoluto contrasentido, el biogás es una fuente de energía verde.** Mirando al futuro del sector, si no conseguimos que mejoren las normativas recién anunciadas, **nuestras previsiones son pesimistas.**

context=

October 21, 2014. [Cierra la planta de biogás de Ros Roca Group por los recortes a la cogeneración](#) por Gonzalo Baratech, Economiadigital. Ros Roca Group ha echado el **cierre definitivo a la planta de cogeneración y depuración de purines** que tiene en el municipio soriano de Langa de Duero. La sociedad que lo explota, Langa de Duero Enercorr XXI, ha presentado concurso de acreedores ante los juzgados mercantiles de Lleida e irá a la liquidación. La instalación se levantó hace 13 años. Incluye una planta de cogeneración eléctrica, que transforma los purines en biogás. La firma venía depurando 300.000 metros cúbicos procedentes de granjas de Soria, Segovia, Burgos y Aranda de Duero. Langa de Duero Enercorr XXI **dio resultados positivos desde su nacimiento, hasta 2013**. Este último año facturó 18,3 millones, con un beneficio de 1,8 millones. **Pero los cambios normativos introducidos por el Gobierno han recortado drásticamente las primas a la cogeneración y, además, con efectos retroactivos.** El corolario es que la planta ha dejado de ser rentable. De hecho, con la nueva regulación, **el negocio resulta ruinoso. Es el mismo final que han sufrido las 30 plantas existentes en España.** Todas ellas han cerrado o han suspendido pagos. “El Gobierno ha desatado un problema muy grave, porque los purines ya no se pueden tratar y depurar --explican fuentes de la empresa--. Su alto poder contaminante supone un peligro para la salud”.

October 19, 2014. [La reforma eléctrica aboca al cierre a la planta de biogás de Ultzama](#). La gestión de la **planta de biogás con base de purines** inaugurada en diciembre de 2010 en el polígono Elordi de, Iraizotz (Ultzama), fue declarada en septiembre en proceso de liquidación por la deuda acumulada en el último año, que ronda los 2,2 millones de euros. El cierre es consecuencia del impacto en sus ingresos de la reforma emprendida en la concesión de primas a las energías renovables.

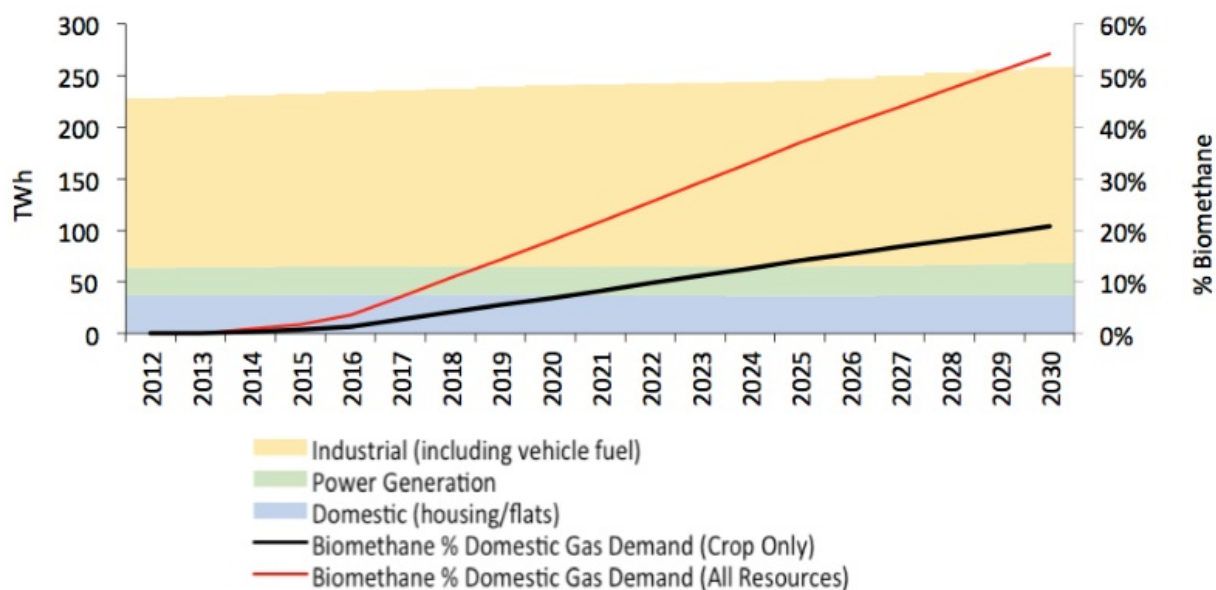
October 15, 2014. Éxitos de mujeres empresarias: [Tessai, a la vanguardia en las plantas de biogás](#). La empresa murciana diseña, electrifica y automatiza **la nueva planta de biogás de Kernel en Los Alcázares (Murcia), la primera planta de biogás en España a base de restos de ensaladas, verduras y melones.** Las empresas murcianas se dan la mano, y lo hacen estableciendo acuerdos de colaboración entre sí para beneficiarse de la experiencia y profesionalización que destacan en diversos sectores. Este es el caso de Tessai, Tecnología Eléctrica de Servicios del Sureste, la firma que bajo la dirección de Antonia Griñán (premio Empresaria del Año 2013) está conquistando importantes avances en el sector de la electricidad y automatización dentro y fuera de España. Uno de los más recientes proyectos en que ha colaborado esta firma consiste en la electrificación y automatización de la planta de biogás de 370

kw que la hortofructícola Kernel ha construido junto a su industria, en Los Alcázares. **El proyecto persigue la gestión de los residuos del procesado de las frutas y hortalizas, a la vez que generar energía para el autoconsumo de la instalación y más de 4.000 toneladas de fertilizantes orgánicos.** Mediante una inversión de más de dos millones de euros, Kernel ha logrado evitar la emisión de más de 10.000 toneladas anuales de dióxido de carbono equivalente y ha comenzado a producir unos 3.000 megavatios anuales de energía renovable, dando así solución a más de 15.000 toneladas anuales de residuos.

September 28, 2014. [La reforma energética obliga a Coren a cerrar la única planta de purines de Galicia.](#)

April 29, 2013. [Autoconsumo y venta de fertilizantes, la respiración asistida del biogás industrial](#) por Javier Rico, Energías Renovables. **El biogás agroindustrial se niega a morir.** Mientras sus principales promotores no se cansan de llamar a las puertas de ministerios solicitando unas tarifas apropiadas para hacer viables los proyectos, **salen adelante instalaciones confiando en los beneficios que aportan el tratamiento de residuos, el autoconsumo y la producción de fertilizantes orgánicos.** Es el caso de [Ludan](#), que cerró recientemente un acuerdo con la industria agroalimentaria Kernel Export para construir una planta de biogás de 370 kW en Los Alcázares (Murcia). Kernel Export es una empresa agroalimentaria con una amplia variedad de productos hortofructícolas puestos en el mercado, entre los que destacan ensaladas envasadas. **“La planta se construirá sin primas –añade Puchades–, y sus objetivos principales serán cubrir parte del consumo eléctrico de la industria, gestionar los subproductos hortícolas generados en la propia industria de procesado y en el campo y producir fertilizantes orgánicos de elevado valor a partir de los digestatos, reduciendo las necesidades de compra de nutrientes externos y fomentando un modelo más ecológico y sostenible”.**

2014. [Biomethane Potential Market Matrix](#) by GreenGasGrids. **Biomethane potential in Spain is currently considered low due to lack of operational biomethane plants, and a lack of any government incentives as of yet.** However, Gas demand in Spain is expected to increase slightly over the next 20 years, and the knock on effect on required gas volumes derived from renewable sources, may positively impact the market. Assessing the resource availability of Spain indicates that crop based biomethane could produce as much as 20% of domestic gas demand by 2030. **Assuming all resources are converted to biomethane 55% of domestic gas demand could be displaced by biomethane.**



Biomethane potential in Spain

Digestate

October 25, 2014. [Digestate as bio-fuel in domestic furnaces.](#) 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 .**

October 24, 2014. Presentato il libro di Bezzi e Ragazzoni: [DIGESTATO: opportunità e vantaggi negli impieghi in agricoltura.](#)

October 17, 2014. [Apply food-based digestate in spring for best results](#). A JOINT project between Waste and Resources Action Programme (WRAP) and Defra [has revealed](#) food-based digestate should be applied to crops in spring in order to obtain the full benefits. The four-year project, the DC-Agri (digestate and compost in agriculture) project, looked into how farmers could use quality anaerobic digestate more efficiently and improve production. Speaking at NextGen WRAP project manager Will McManus said: **“The importance of digestate is it has particularly high ammonium levels.** The readily available nitrogen is much higher in food-based digestate than in pig or cattle slurry.” At Wensum where food-based digestate was applied in autumn at the typical application rate only 20 per cent of the total nitrogen applied was taken up by the crop, whereas a spring application saw an uptake of 80 per cent. In comparison with standard fertilisers, yield increases of about 10-11 per cent were seen after applications of food-based digestate, compared to yield benefits of 12 per cent from green food compost and cattle slurry. The project also looked into the fate of nitrogen if it were not taken up by the crop. Some was lost as ammonia and around 60-80 per cent of ammonia losses were to the atmosphere. **The research results could help anaerobic digester (AD) operators maximise their returns,** said Mr McManus. **“A quarter of AD operators are charging for their digestate but the rest have to pay farmers to take it away”**

October 15, 2014. [European Biogas Association Workshop on Digestate](#) (Report). Goals of this event are to discuss anaerobic digestion’s contribution to sustainable EU agriculture, demonstrate possibilities of digestate as a valuable bio-fertiliser, promote the End-of-Waste status for digestate and deliver arguments why biogas digestate shall not fail under the REACH regulation .

October 13, 2014. [Digestat et agriculture biologique](#). L'épandage de digestat issu de la méthanisation de sous-produits animaux codigérés avec des matières d'origine végétale ou animales est maintenant officiellement autorisé en agriculture biologique. Les sous-produits animaux concernés doivent cependant relever de la catégorie 3 ou du contenu du tube digestif relevant de la catégorie 2 ne provenant pas d'élevages industriels. Cette autorisation d'épandre du digestat sur des parcelles conduites en agriculture biologique fait suite à une modification du règlement UE 889/2008 portant sur l'agriculture biologique par [le règlement d'exécution 354/2014](#).

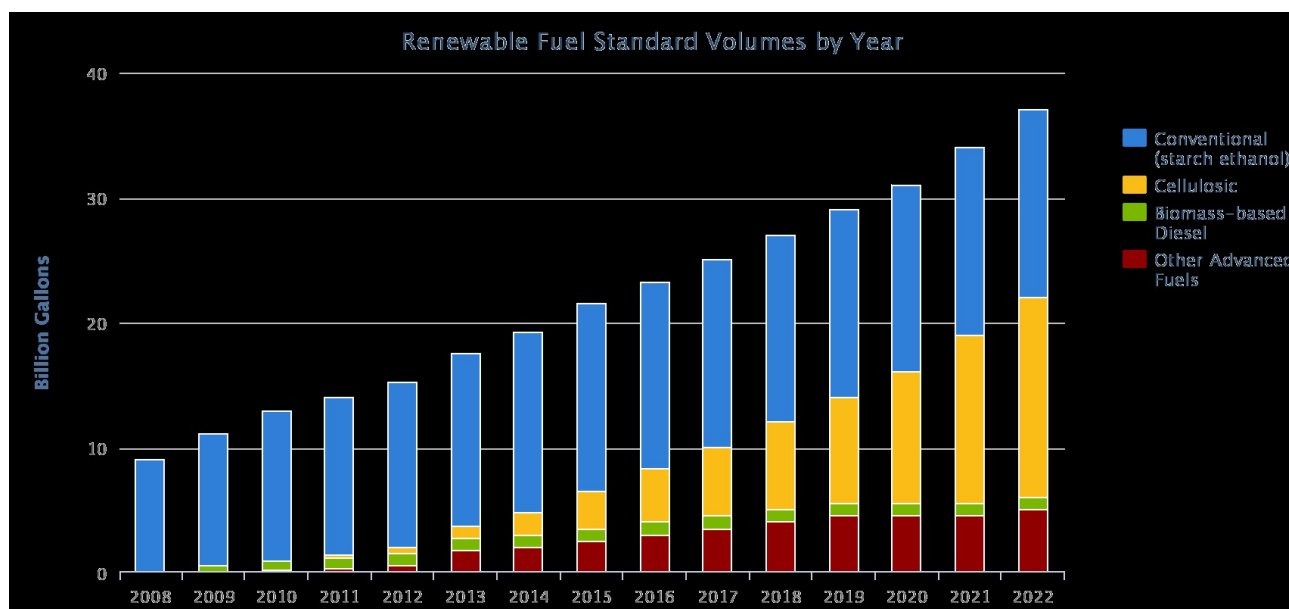
October 9, 2014. [A Waste-to-Energy Company is establishing a manure based biogas plant in Karachi](#). The plant will produce significant amount of digested manure (digestate) which can be used as an organic fertilizer. **This will be Pakistan’s first industrial scale biogas plant paving the way for further industrial scale biogas plants in the country.** Since the project produces a significant amount of digestate, an organic soil enrichment product which can be further manufactured into crop specific value added products, the Company is looking to enter into a long term agreement with interested parties to **off take the digestate in bulk from the plant location.**

EXPRESSION OF INTEREST - ORGANIC FERTILIZER	
A Waste-to-Energy Company is establishing a manure based biogas plant in Karachi. The plant will produce significant amount of digested manure (digestate) which can be used as an organic fertilizer. This will be Pakistan's first industrial scale biogas plant paving the way for further industrial scale biogas plants in the country. Since the project produces a significant amount of digestate, an organic soil enrichment product which can be further manufactured into crop specific value added products, the Company is looking to enter into a long term agreement with interested parties to off take the digestate in bulk from the plant location.	
Properties of the Digestate	
Organic Matter	60 kg/ton of digestate
Water	940 liters/ton of digestate
Total Nitrogen	3.7 kg/ton of digestate
Total Phosphorus	1.96 kg/ton of digestate
Total Potassium	0.85 kg/ton of digestate
Carbon: Nitrogen Ratio	1:20
Sulphur	0.4 kg/ton of digestate
Benefits of Digestate	
- Odorless & Pathogen free	- Nutrients are in more plant available form
- Balanced NPK	- High Organic content
- Homogenous product	- High water content
- Can be applied as a soil conditioner in as-is form	- Input to further value added products
Location for Availability of Digestate	
Landhi, Karachi	
Interested parties are requested to submit an Expression of Interest (EOI) document disclosing the following information:	
1) Profile of Organization and Ownership	
2) Nature of Business	
3) Quantity of digestate required per annum	
Documents can be sent through email at digestate.eoi@gmail.com by 24th October, 2014. Only those parties who have submitted EOI and those with good financial and reputational credentials will be selected to meet the management and subsequently participate in the bidding process.	

Second-generation biofuels: Biogas, Advanced Biofuel

Second generation biofuels, also known as advanced biofuels, are fuels that can be manufactured from various types of biomass. Biomass is a wide-ranging term meaning any source of organic carbon that is renewed rapidly as part of the carbon cycle. Biomass is derived from plant materials but can also include animal materials. First generation biofuels are made from the sugars and vegetable oils found in arable crops, which can be easily extracted using conventional technology. In comparison, **second generation biofuels are made from lignocellulosic biomass or woody crops, agricultural residues or waste, which makes it harder to extract the required fuel.** **Second generation biofuel technologies have been developed because first generation biofuels manufacture has important limitations** First generation biofuel processes are useful but limited in most cases: there is a threshold above which they cannot produce enough biofuel without threatening food supplies and biodiversity. Many first generation biofuels depend on subsidies and are not cost competitive with existing fossil fuels such as oil, and some of them produce only limited greenhouse gas emissions savings. When taking emissions from production and transport into account, life-cycle assessment from first generation biofuels frequently approach those of traditional fossil fuels. Second generation biofuels can help solve these problems and can supply a larger proportion of global fuel supply sustainably, affordably, and with greater environmental benefits.

October 15, 2014. **Biogas producers finding opportunity in advanced biofuel markets** by Katie Fletcher, Biomass Magazine. “Now that we have the EPA approving more biogas pathways for the **renewable fuel standard (RFS)**, certainly there is a lot more opportunity for people to get involved and actually make money,” said Todd Taylor, attorney and co-chair of the Clean Technology Group with Fedrikson and Byron. During the **2014 National Advanced Biofuel Conference** held in Minneapolis on Oct. 13-14, Taylor and other professionals in the biogas space reviewed the continued momentum and implications **biogas** producers are experiencing in advanced biofuel markets with the expansion of the new RFS pathway for biogas.



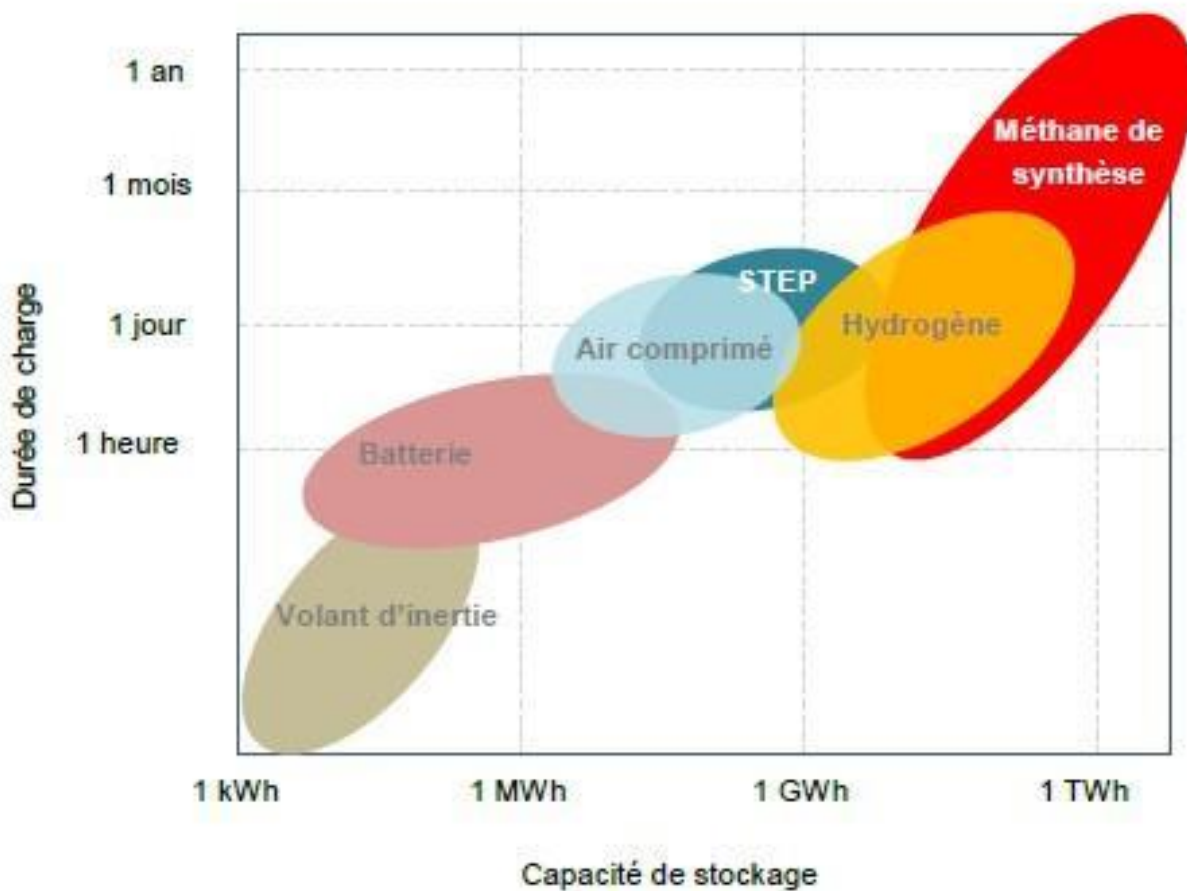
Credit: DOE, Alternative Fuels Data Center

October 2, 2014. **EPA Expands Biofuels Definition To Inflate Production Numbers**. Cellulosic biofuel production has been virtually non-existent, despite rosy government predictions. To rectify that, the Environmental Protection Agency recently expanded the definition of what constitutes a cellulosic biofuel, which critics say is a political move to artificially boost production numbers. The EPA **has expanded the definition** of cellulosic and advanced biofuels to

include liquefied and compressed natural gas produced from biogas and landfills. “Biogas and gas captured from landfills that six months ago didn’t count as cellulosic biofuel now qualify under EPA’s expanded definition,” Bob Greco, downstream director at the American Petroleum Institute, told reporters on a press call... **Cellulosic production in July — before the EPA’s rule change — was only 4,156 gallons. After the EPA announced its rule change in early August, production jumped to 3,492,106 — [virtually all of the increase coming from natural gas biofuels.](#)**

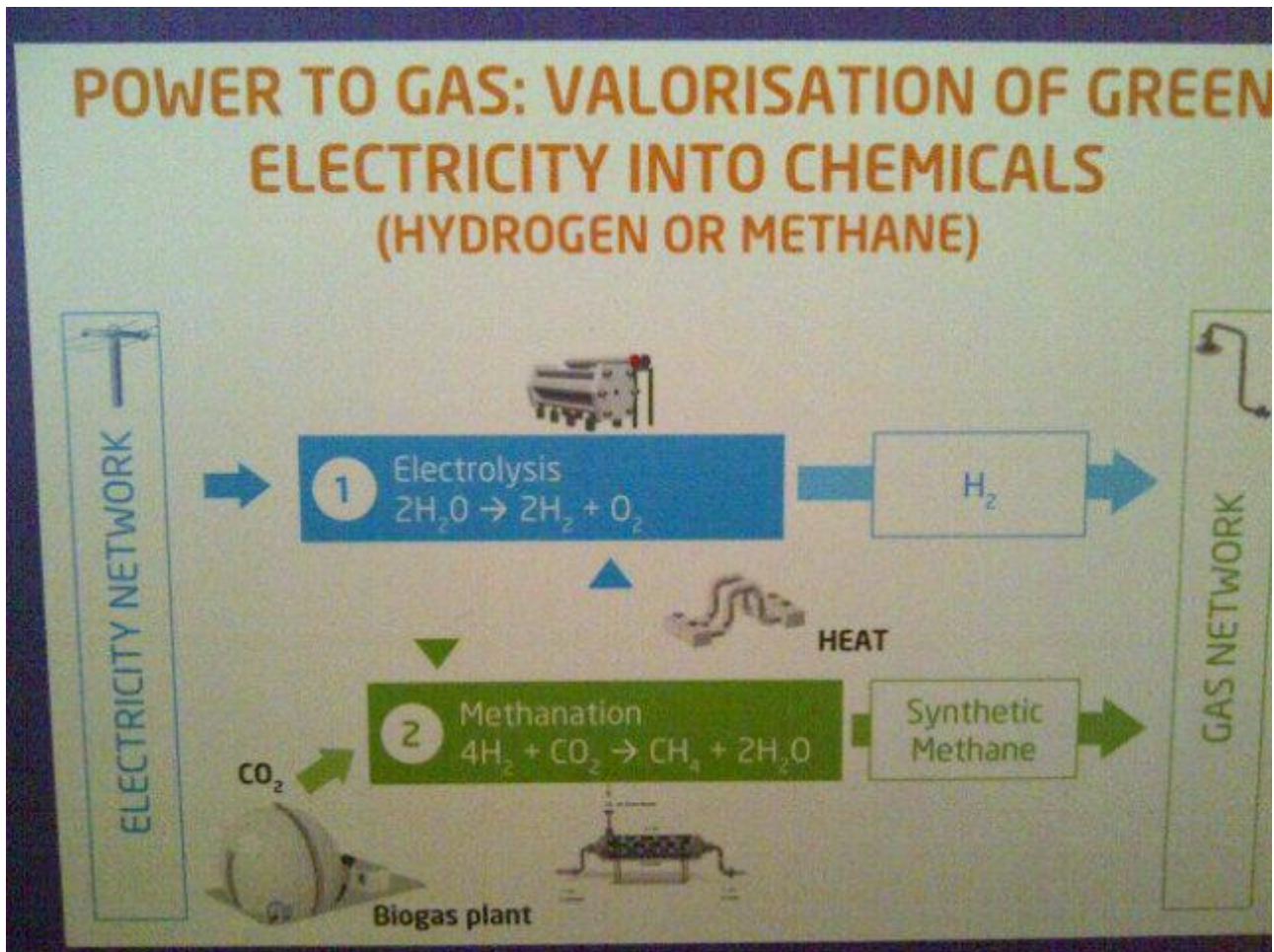
Power to Gas

Figure 9 – Capacités et durées de stockage de l’électricité par différents moyens



October 30, 2014. **«Power-to-Gas», une solution d’avenir pour stocker l’électricité d’origine renouvelable** Une étude commune de l’ADEME, GRTgaz et GrDF. **La transformation de l’électricité en gaz injecté ensuite dans les réseaux permettrait de valoriser des excédents d’électricité produite par des sources renouvelables comme l’éolien ou le photovoltaïque.** Ce principe de conversion, baptisé « Power-to-Gas » est actuellement à l’étude dans plusieurs pays européens. A partir de leurs scénarios de prospective énergétique pour 2030 et 2050, l’ADEME et GrDF se sont associés à GRTgaz pour réaliser un état des lieux international des avancées et perspectives du « Power to Gas ». L’étude considère que cette technologie devrait être pleinement opérationnelle en France à l’horizon 2030. Avec un taux de pénétration des énergies renouvelables électriques supérieur à 50% en 2050, le « Power to Gas » permettrait de produire entre 20 et 30 TWh/an de gaz renouvelable injectable dans les réseaux existants, **s’imposant comme une solution de stockage des excédents de longue durée.** S’appuyant sur l’importante capacité de stockage des infrastructures de gaz (stock en conduite et stockages souterrains), la conversion de l’électricité en gaz fait l’objet de recherches dans plusieurs pays européens comme l’Allemagne ou le Danemark.

Le « Power to Gas » consiste à transformer l'électricité renouvelable en hydrogène par électrolyse de l'eau, hydrogène qui peut ensuite être injecté dans le réseau de gaz naturel en l'état, ou après une étape de méthanisation, qui consiste à l'associer à du CO₂ pour le convertir en méthane. Le développement des énergies renouvelables électriques intermittentes comme l'éolien et le photovoltaïque nécessite de trouver des solutions pour optimiser leur insertion dans les réseaux d'énergie. En effet, en cas de production trop faible, il faut disposer de capacités de production modulables en appui ; à l'inverse, une production supérieure à la demande requiert le développement de capacités de stockage et/ou de conversion des excédents. Pour en savoir plus, consultez l'étude et la synthèse de l'étude sur le site de l'ADEME: <http://www.ademe.fr/etude-portant-lhydrogene-methanation-comme-procede-valorisation-lelectricite-excedentaire>



Synthesized chemicals from biogas -muconic, succinic, lactic acids...-

December 31, 2014. [Castor plant for biodiesel, biogas, and ethanol production with a biorefinery processing perspective](#). Whole parts of castor plant, as a non-edible energy crop, were used for multiple biofuels production. Extracted castor oil was used for biodiesel production by transesterification, whereas the castor plant residues, i.e., stem, seed cake, and leaves, were employed for ethanol and biogas production. Effects of operating conditions, including methanol to oil ratio, temperature, and reaction time on biodiesel production yield were investigated. The optimum biodiesel yield was 88.2%, obtained at 0.4:1 methanol to oil mass ratio at 40 °C for 90 min. This yield corresponded to 155 g biodiesel per kg castor plant. In addition, pretreatment using 8% w/v NaOH at 0 and 100 °C for 30 and 60 min was applied to improve ethanol and biogas yields. The best results for both enzymatic hydrolysis and ethanol production by simultaneous

saccharification and fermentation (SSF) were obtained after alkali pretreatment at 100 °C for 60 min for all plant residues. The highest ethanol production yield achieved from pretreated castor stem was as high as 82.2%, corresponding to 63 g ethanol per kg castor plant. In the case of biogas production, alkali pretreatment enhanced the methane production yield from castor stem; however, it could not improve the production yield of castor seed cake and leaves. Furthermore, untreated castor seed cake had the highest methane production yield of 252.1 ml/g VS, equal to 68.2 L per kg of castor plant.

October 30, 2014. [DOE Awards \\$2.5 Million to NatureWorks to Transform Biogas into the Lactic Acid Building Block for Ingeo](#). The DOE grant supports a NatureWorks and Calysta multi-year program aimed at Ingeo™ feedstock diversification. The U.S. Energy Department's Office of Energy Efficiency and Renewable Energy, Bioenergy Technologies Office announced a grant of up to \$2.5 million to **NatureWorks, one of the world's leading suppliers of bioplastics**, in support of an ongoing program that aims to sequester and use methane, a potent greenhouse gas, as a feedstock for the company's Ingeo™ biopolymers and intermediates. This June, a year after the joint development program was announced, **Calysta demonstrated [lab-scale production of lactic acid from methane](#), a major milestone in the project. Fundamental R&D should be completed in the next two to three years, enabling pilot production in three to five years.** A greenhouse gas 20 times more harmful than carbon dioxide, methane is generated by the natural decomposition of plant materials and is a component of natural gas. Biomethane refers specifically to renewably sourced methane produced from such activities as waste-water treatment, decomposition within landfills, farm wastes, and anaerobic digestion. **If successful, the technology could directly produce lactic acid from any of these methane sources...** [Calysta, Inc.](#) Menlo Park, CA, is an innovator in industrial products from sustainable sources. Calysta Energy **is developing new Biological Gas-to-Liquids® and Biological Gas-to-Chemicals® technologies using methane as a new feedstock for high value chemicals and transportation fuels** with cost and performance advantages over current processes. Calysta Nutrition develops and commercializes **[fish and livestock nutritional products based on gas fermentation of methane](#)**. Calysta Nutrition has operations in Stavanger, Norway.

October 25, 2014. [Bioelectrochemical removal of carbon dioxide \(CO₂\): An innovative method for biogas upgrading](#). Bioelectrochemical removal of CO₂ for biogas upgrading showed great potential. The in-situ biogas upgrading system was more effective than the ex-situ one. Species from the genus Methanobacterium were dominant on all the biocathodes. Alkali production and CO₂ absorption might also contribute to biogas upgrading.

October 17, 2014. [Microbes Enrich Biogas And Synthesize Valuable Chemical](#) by Erika Gebel Berg, C&EN, Chemical&Engineering News. **Researchers enlist bacteria to turn the carbon dioxide in raw biogas into succinic acid, leaving behind energy-rich methane.** [Irini Angelidaki's](#) team at the [Technical University of Denmark](#) wanted to develop a simple biological method that could transform carbon dioxide of biogas into something useful instead of releasing it into the atmosphere. To do so, the researchers enlisted other anaerobic bacteria for help. Several species of **these microbes convert carbon dioxide into succinic acid, a four-carbon molecule with multiple industrial applications, including as a precursor for polymers, a food additive, and a replacement for petroleum-based chemicals.** Using these bacteria, the scientists could turn raw biogas into pure methane and succinic acid. For a proof-of-principle experiment, the researchers selected *Actinobacillus succinogenes*, a carbon-fixing bacterium that tolerates high concentrations of sugar and succinic acid. They constructed a closed fermentation vessel that allowed them to pump a simulated biogas consisting of 60% methane and 40% carbon dioxide over a culture of *A. succinogenes*. The team increased pressure in the vessel to 140 kPa to increase the solubility of the carbon dioxide in the culture. At this pressure, a 24-hour fermentation produced 14.39 g of succinic acid per liter of culture and a biogas composed of 95.4% methane, which is good enough for most

applications. The purity achieved is exciting, says Caixia (Ellen) Wan of the University of Missouri, Columbia. However, she says, real biogas may require additional purification steps because of impurities, such as hydrogen sulfide, that could potentially harm bacterial cultures. Also, given the amount of carbon dioxide present in the simulated biogas, the team's yield of succinic acid is low, Wan says. Gunnarsson thinks they should be able to increase yields by optimizing the bacterial strain and fermentation conditions.

October 9, 2014. [Energy Department Announces \\$13.4 Million to Develop Advanced Biofuels and Bioproducts](#). This will help drive down the cost of producing gasoline, diesel, and jet fuel from biomass. These products not only will help reduce carbon emissions, but also advance the department's work to enable the production of clean, renewable and cost-competitive drop-in biofuel at \$3 per gallon by 2022. Two of these selections will **address research efforts on the efficient conversion of biogas (a mixture of gases generated from the biological breakdown of organic material) to valuable products other than power:**

- The National Renewable Energy Laboratory of Golden, Colorado will receive up to \$2.5 million to develop a conversion process demonstrating the **production of muconic acid from biogas**. This acid can be converted into an array of bioproducts, including fuel, plasticizers, and lubricants.
- Natureworks, LLC of Minnetonka, Minnesota will receive up to \$2.5 million to develop a **fermentation process, using biogas and bacteria, for the production of lactic acid**. This process could be used for the commercialization of biomethane to fuels.

The Energy Department's Office of Energy Efficiency and Renewable Energy accelerates the development and deployment of energy efficiency and renewable energy technologies and market-based solutions that strengthen U.S. energy security, environmental quality, and economic vitality.

October 2, 2014. [Utilization of CO₂ Fixating Bacterium Actinobacillus succinogenes 130Z for Simultaneous Biogas Upgrading and Biosuccinic Acid Production](#). Biogas is an attractive renewable energy carrier. However, it contains CO₂ which limits its use for certain applications. **Here we report a novel approach for removing CO₂ from biogas and capturing it as a biochemical through a biological process.** This approach entails converting CO₂ into biosuccinic acid using the bacterial strain Actinobacillus succinogenes 130Z, and simultaneously producing high-purity CH₄ (> 95%). This work represents the first successful attempt to develop a system capable of upgrading biogas to vehicle fuel/gas grid quality and simultaneously produce biosuccinic acid, a valuable building block with large market potential in the near term.

Applied Nanoparticles to Biogas Production

October 21, 2014. [Nanoparticle technology triples the production of biogas](#). Researchers of the Catalan Institute of Nanoscience and Nanotechnology (ICN2), a Severo Ochoa Centre of Excellence, and the Universitat Autònoma de Barcelona (UAB) have developed the new BiogàsPlus, a technology which allows increasing the production of biogas by 200% with a controlled introduction of iron oxide nanoparticles to the process of organic waste treatment. The development of BiogàsPlus was carried out by the ICN2's Inorganic Nanoparticle group, led by ICREA researcher Víctor Puntès, and by the Group of Organic Solid Waste Composting of the UAB School of Engineering, directed by Antoni Sánchez.

The system is based on the use of iron oxide nanoparticles as an additive which "feeds" the bacteria in charge of breaking down organic matter. This additive substantially increases the production of biogas and at the same time transforms the iron nanoparticles into innocuous salt. "We believe we are offering a totally innovative approach to the improvement of biogas production and organic waste treatment, since this is the first nanoparticle application developed with this in mind. In addition, it offers a significant improvement in the decomposition of organic waste when compared to existing technologies", explains Antoni Sánchez.

According to researchers, today's biogas production is not very efficient - only 30 to 40 per cent of organic matter is converted into biogas - when compared to other energy sources. "The first tests conducted with BiogàsPlus demonstrated that product increases up to 200% the production of this combustible gas. This translates into a profitable and sustainable solution to the processing of organic waste, thus favouring the use of this renewable source of energy", affirms Eudald Casals, ICN2 researcher participating in the project. At the moment, BiogàsPlus has been successfully applied in cellulose and mud found in urban treatment plants, but it also can be used in different anaerobic digestions, such as agricultural, industrial or urban waste treatments. "Now the challenge lies in extrapolating the technology to digesters with capacity for hundreds of cubic metres. This would allow using it in large-scale anaerobic digestion processes around the world, thereby greatly increasing the production of biogas, a renewable energy which is growing steadily and is accessible to everyone", Antoni Sánchez explains.

Applied Nanoparticles, a Gateway to the Market

"Our idea is the result of many projects: you study one thing and discover another", Casals explains. "We were studying the toxicity of iron oxide nanoparticles in the waste treatment of anaerobic biological processes when we discovered that not only were they not toxic, they actually stimulated the production of biogas", he adds.

Researchers saw this discovery as the opportunity to begin a business project and make its application possible. With that in mind, they created Applied Nanoparticles, gestated at the ICN2 and currently in the process of signing a knowledge transfer agreement with the UAB. "Our business concept focuses on the design of processes with low energy, low toxicity, minimisation of waste and reduction of contaminating emissions", Víctor Puntès affirms. "In addition, the composition of the additive can be optimised according to the waste which must be treated, in order to offer a maximum efficiency to the process."

Acknowledged Project

The now patented BiogàsPlus technology received in 2011 a 100,000 dollar grant from the Bill & Melinda Gates Foundation. The grant money went towards testing the capacity of iron oxide nanoparticles, which helped to verify the efficacy of its application in a pilot 100 litre digester. This year BiogàsPlus was one of the finalists in the third edition of the Repsol Entrepreneurs Fund. "Our product was born in an academic setting and we decided to send the proposal to the Repsol Foundation, so they could help us further develop the product and get it onto the market", all three researchers comment. BiogàsPlus was presented on Tuesday 21 October at the Eureka Building of the Bellaterra campus as part of an event organised by the UAB Research Park and the Repsol Entrepreneurs Fund.

