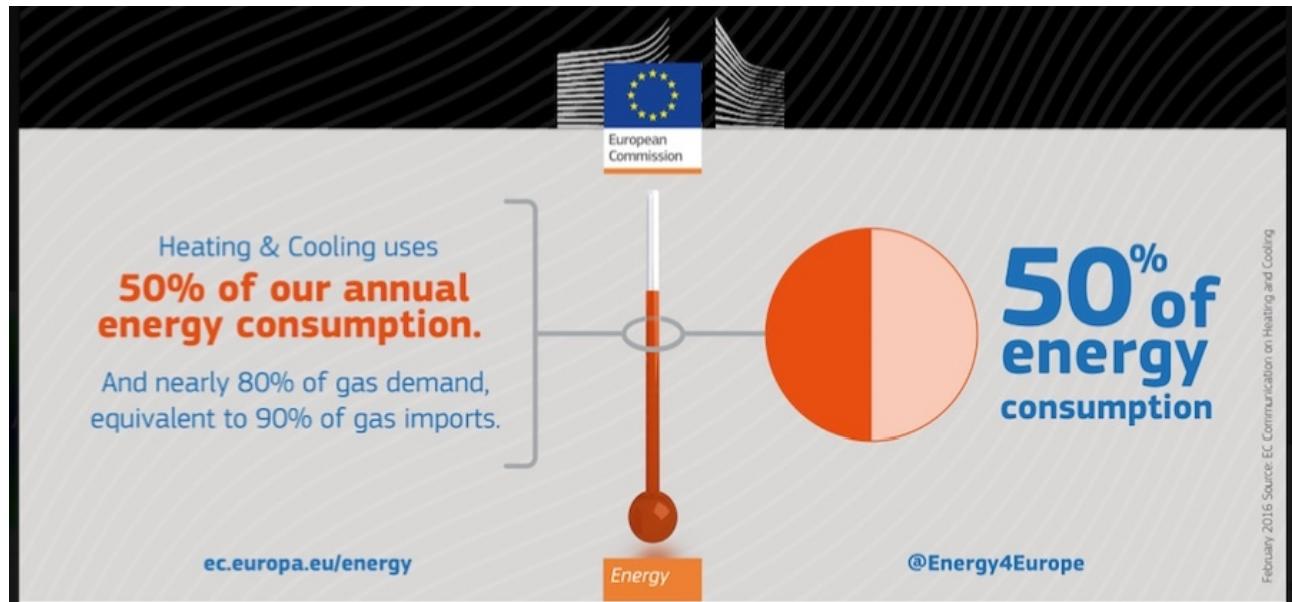




“Warming homes, not the planet.” Heating with Biogas and Biomethane



Heating & cooling = half of the EU's energy consumption

February 16, 2016. **Commission proposes new rules on gas and a heating and cooling strategy.** “The European Commission has released new proposals for a raft of measures which will shore-up prevention of gas crises and ensure better coordination and support between EU countries in any gas supply disruption. The proposals will also tighten-up so-called intergovernmental agreements in the energy field between EU and non-EU countries and set out a strategy for boosting energy security through access to LNG and gas storage. Furthermore, addressing the potential for improving energy efficiency and the use of renewable energy in the sector with the first ever dedicated strategy, the Commission presents the way forward to move towards a smart, efficient and sustainable heating and cooling system. These proposals are **part of the Commission's Energy Union strategy** and will give a strong push to improving the EU's energy security and solidarity. **They are also in line with the EU's commitments to fighting climate change** taken at the Paris climate summit towards the end of last year.” February 16, 2016. **Towards a smart, efficient and sustainable heating and cooling sector.** “European Commission presents today the **first strategy to optimise buildings' and industries' heating and cooling**, a sector accounting for 50% of the EU's annual energy consumption.”

January, 2016. **EBA position on EU's heating & cooling policy.** “The European Biogas Association (EBA) strongly supports the European Commission's plans to establish a common EU strategy for the heating and cooling sector (...) In order to **decarbonise heating and cooling in a cost-effective manner – by maintaining the existing infrastructure** – the EU should promote further production and use of **biomethane, which is the only renewable alternative to natural gas known so far**. Also other renewable energy sources, including raw biogas fed into CHP units, could significantly contribute to an increased share of renewables in this heavily fossil dependent sector. EBA is convinced while applying conservative estimates that by 2030 the overall potential

for biogas production from anaerobic digestion is at least 30 billion m³ / year. Taken together with biomass gasification, an estimate for the total production of biomethane is 50 billion m³ per year. By 2030, the industry could produce renewable energy equivalent to approximately 10% of the EU's current natural gas consumption, for electricity generation, heating/cooling and as a transportation fuel (...) Other benefits of the use of biomethane/biogas as a heating fuel include **improved gas security of supply**: the renewable gases are domestically sourced fuels that can be produced anywhere in Europe, thus avoiding gas imports from third countries and politically unstable regions (...) In addition, **biomethane can make full use of the existing natural gas infrastructure and equipment**: the gas grid, CHP units and domestic gas boilers. Biomethane is also, as natural gas, a flexible and storable energy source. Finally, in urban areas, biogas fed into CHPs can easily contribute to powering district heating. In order to realise the potential of biomethane and biogas as well as all their benefits, the **EU needs to impose an ambitious policy framework and legislation to increase the amount of all renewables in the heating and cooling sector** (...) More specifically in the biogas sector, the **Commission should encourage Member States to maximise the full efficiency of their biogas plants** through optimal support for heat recovery. The easiest way to valorise heat from CHP installations at biogas plants is to use it directly at the biogas plant and in surrounding buildings or to feed it into district heating systems. In general, **any support schemes should as well acknowledge the important role that biomethane plays in decarbonising the European energy sector**: current national support schemes, set up for renewable energies, tend to be limited to green electricity while green gas is often left outside these systems. Furthermore, in order to effectively substitute a part of the natural gas supplies, **biomethane needs a common European market**, i.e. a possibility to be traded across the EU's internal borders. At the moment such trade is impossible due to the European mass-balancing requirements that do not take the specific requirements of the gaseous biofuel into account. In order to enable proper administration for mass balancing of injected biomethane, it is necessary that the European Commission defines the natural gas network operated on the territory of the European Union as a single, integrated unit."

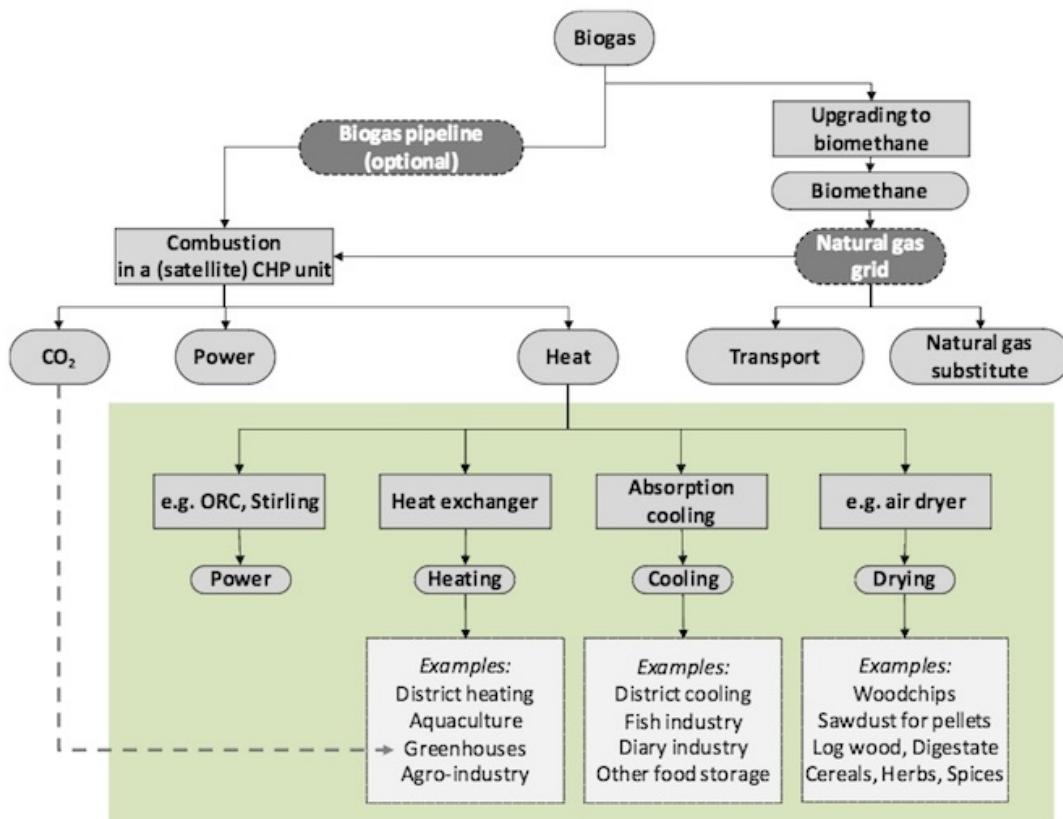
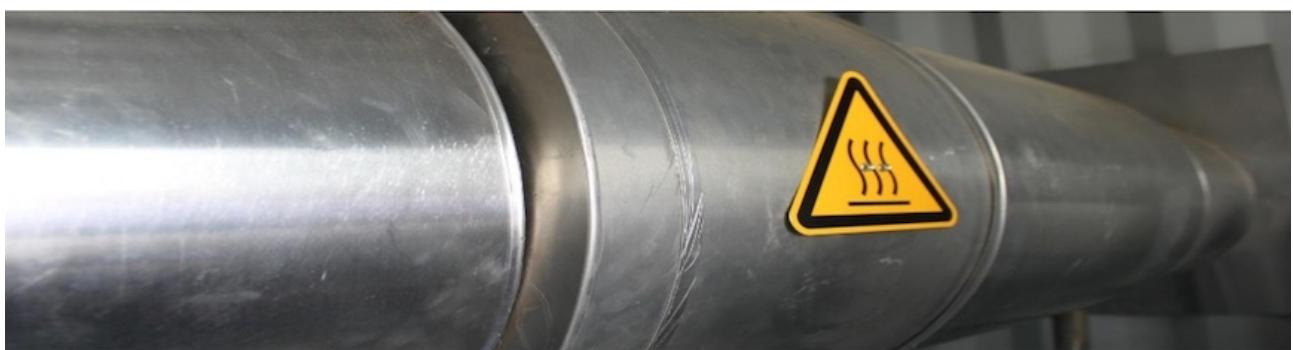


Figure 4: General technical solutions for using heat of biogas plants described in the Handbook

April, 2015. **BiogasHeat: Development of sustainable heat markets for biogas plants in Europe.** [BiogasHeat Final Publishable Report](#). “Biogas production increasingly contributes to meeting energy demands in the European market. It opens new opportunities for farmers, industry and the environment as well as offering sustainable solutions to a variety of challenges we face today in the agricultural, transport and energy sectors. Energy efficiency targets are one of the major priorities and challenges on the European energy policy agenda. The EU set a goal to reach 20% reduction in Europe’s primary energy consumption by 2020, meaning that also the biogas sector is faced with a challenge of reaching higher energy efficiency levels in biogas plants. Even though in many European countries production and use of biogas is increasingly recognised as a sustainable option to meet 2020 targets, the main focus remains on the optimisation of the electricity production. Most biogas plants produce electricity in CHP biogas plants, providing an opportunity to implement different heat utilisation concepts next to a biogas plant. However, **the utilisation of heat from CHP is often not taken into account and is wasted. One of the main reasons for wasting heat from CHP plants is the lacking recognition of renewable heat as valuable source of energy by consumers and energy policy makers in most EU Member States.** This leads to slow market development of renewable heating and cooling technologies, including heat recovery from CHP biogas plants (...) From the biogas plant operators’ point of view, **heat utilisation is a complex business as heat is easy to produce but hard to sell. Heat is cheap but technical features of heat are sophisticated sometimes.** Nevertheless, biogas plant operators have to increase the overall energy efficiency of their plants, which mainly can be done by utilising heat that, otherwise, would be wasted. Several examples in Europe show that it makes sense to spend time and other resources in developing heat use solutions, but an adequate strategy is necessary to develop a successful business case. All heat use options depend on certain technical, social, economic and legal framework conditions that have to be fulfilled. As a general rule it can be said that there is no general solution that is appropriate for all plants. Viable options for heat utilisation vary among Europe depending on factors like climatic conditions and development of district heating grids. Especially existing plants, very often in remote locations, need an individual heat use solution.”



2015. **Sustainable Heat Use of Biogas Plants. A Handbook** by Dominik Rutz, Rita Mergner, Rainer Janssen (BiogasHeat).

December 2015. **Biomethane & Biogas Report 2015.** Annual statistical report of the European Biogas Association on the European anaerobic digestion industry and markets. “Along with electricity from biogas, heat is produced and can be sold to the district heating network. Many biogas plants, whether stand-alone plants or within existing industrial facilities, use the heat produced for their own processes and this amount of heat is rarely accounted for in national statistical data, as it is not reported to energy regulatory offices. Still, according to data reported by the national biogas associations and information provided by EurObserv'ER, **nearly 30 TWh of heat was produced in 2014.** Electricity and heat in Europe were mainly produced in CHP plants and a smaller amount in electricity and thermal only plants: 61% of electricity and nearly 85% of

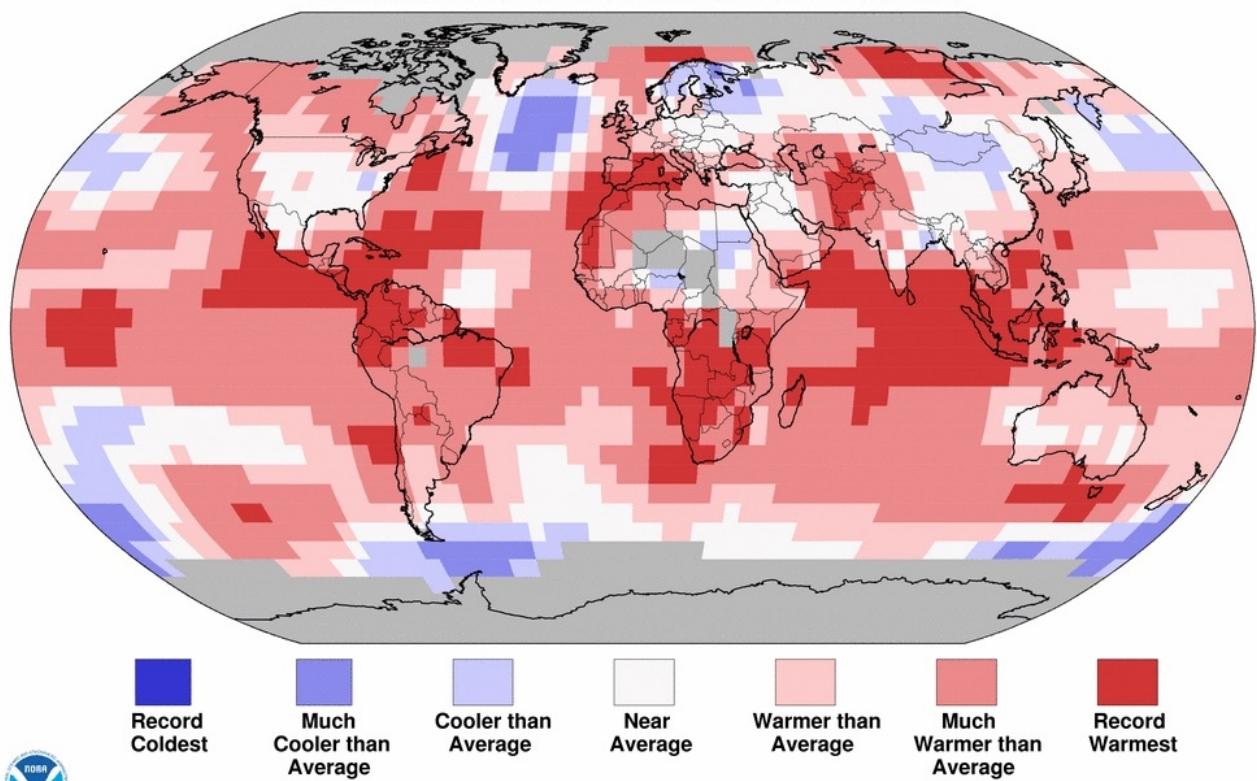
heat (...) 2014 also saw a launch of a new incentive - the Renewable Heat Incentive that promotes production of heat from renewable sources.”

November 2014. **Biogas Barometer 2014 by EurObservER.** “EU are also under obligation to organize recovery circuits for the various types of organic waste and set up sorting systems to collect them, through European waste regulations (Directive 2008/98/EC). The application of this directive, and discussions are currently going on to strengthen its criteria (a draft directive has been filed along these lines), will contribute new fermentable waste to the sector that should make up in part for the decreased use of energy crops. 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”**

Land & Ocean Temperature Percentiles Jan 2016

NOAA's National Centers for Environmental Information

Data Source: GHCN-M version 3.3.0 & ERSST version 4.0.0



Fri Feb 12 06:41:00 EST 2016

January 2016 warmest on record for the globe

Clean-energy Transition is transforming the Global Economy

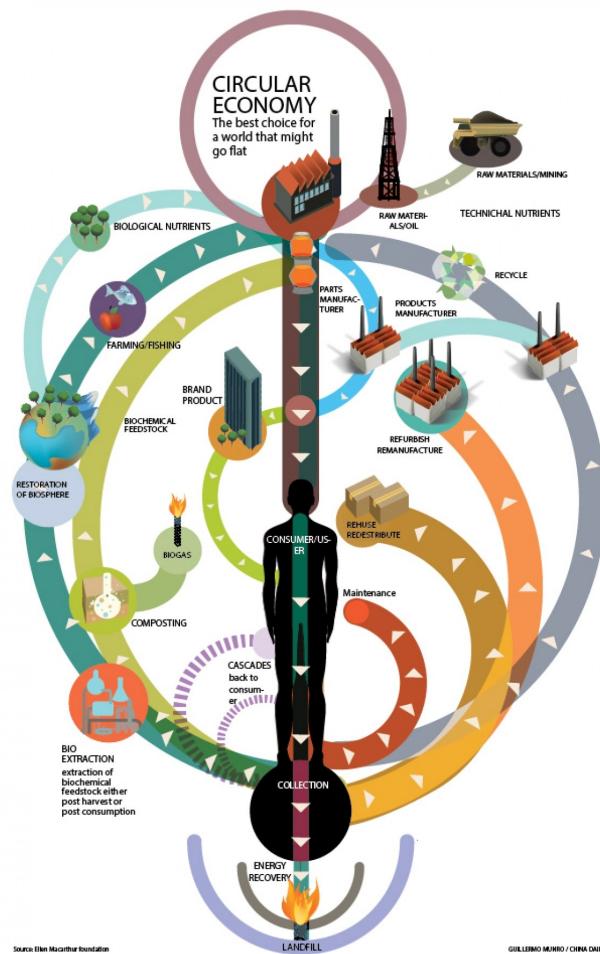
February 24, 2016. **The Climate Summit of Money** By Katy Lederer, The New Yorker. “The seventh Investor Summit on Climate Risk, co-sponsored by the U.N. Foundation and the nonprofit sustainability group Ceres, on the heels of the historic Paris Climate Summit. Five hundred investors representing twenty-two trillion dollars in assets convened at the U.N.’s iconic East Side headquarters, where they heard from some of the negotiations’ highest-profile players, including Christiana Figueres, the U.N. climate chief; Ségolène Royal, France’s minister of ecology, sustainable development, and energy; and Michael Bloomberg, who currently serves as the U.N. special envoy for climate change and cities. The event was, in essence, the Climate Summit of Money, and the question being posed was **how to finance the clean-energy transition that Paris promised**—a transition that scientists and economists agree must happen quickly if the world is to avert the worst economic impacts of climate change—with the strictures of fiduciary duty. “The tools that you design, the financial structures that you develop, the blends that you are able to put together,” Figueres said, setting the agenda for the day in her address. “All of that, in the next five years, will decide the quality of certainly the energy and certainly the quality of the global economy for the next thirty-five years, and hence the quality of life for everyone else for hundreds of years.” The International Energy Agency has estimated that it will cost sixteen and a half trillion dollars for the world to meet its collective Paris goals, and the presenters at the conference sliced and diced this ambitious mandate from a variety of angles (...) The often dramatic projections of market dislocation from, on the one hand, sudden shifts in the energy markets to, on the other, the shocks of climate change itself are based on the concept of “the carbon bubble,” (...) **In 2015, investments in clean energy totalled three hundred and eighty billion dollars, which was a record for the industry, but still far short of the trillion in annual investments that Ceres says is required for the world to stay—both literally and financially—above water.”**



February 23, 2016. **Fossil fuel industries can fail quickly.** Demand for coal evaporated faster than anyone thought possible by Chris Tomlinson, Houston Chronicle. “The four largest coal companies in the United States were worth \$34 billion in 2011. This year they are worth \$150 million, and two are in bankruptcy. **King Coal collapsed in five short years.** A decade ago, experts declared that coal’s widespread use and low cost guaranteed the mining companies had a bright future. Not anymore. Coal’s demise came about from a drop in demand, increased environmental regulation and product substitution. **Executives in the oil industry would do well to pay attention** (...) Oil may not collapse as quickly as coal did, but to think that it can’t is to ignore history.”

February 17, 2016. **Nicholas Stern: “Mitigar el cambio climático impulsa la economía”** por Andy Robinson, La Vanguardia. “Esta es una oportunidad para impulsar el crecimiento. Habrá una gran inversión en nuevas infraestructuras, y eso es bueno para el crecimiento. Además, es un buen momento para hacer esta inversión, los tipos de interés están por los suelos en la actualidad.

Tenemos recursos desempleados en la economía europea. El acuerdo de París va a impulsar grandes inversiones en investigación y desarrollo de energías renovables y eficiencia energética. Europa perdió una oportunidad durante la recesión. Debemos aprovecharla para realizar fuertes inversiones en energía limpia y así crear empleo. Pero no es tarde. Los tipos de interés todavía están extraordinariamente bajos.”



February 4, 2016. **Propuesta de la UE de modificación del marco jurídico del fin de la condición de residuo** por Christian Morron Lingl, abogado Terraquí derecho ambiental. “El 2 de diciembre de 2015, la Comisión presentó el paquete de nuevas medidas sobre la economía circular que abarcan la totalidad del ciclo de vida: de la producción y el consumo a la gestión de residuos y el mercado de materias primas secundarias, este último mediante la modificación de la legislación de residuos, proponiendo una mayor armonización y simplificación del marco jurídico del fin de la condición de residuo. Entre las acciones propuestas en la Comunicación de la Comisión al Parlamento Europeo, al Consejo, al Comité Económico y Social Europeo y al Comité de las Regiones “**Cerrar el círculo: un plan de acción de la UE para la economía circular**”, tendentes al apoyo de la economía circular en cada etapa de la cadena de valor, destaca la del impulso del mercado de las denominadas “materias primas secundarias”, expresión usada para referirse al producto resultante de un proceso de fin de residuo, es decir, de un proceso por el cual un material que era residuo abandona tal condición mediante una operación de valorización del mismo.”

February 3, 2016. **Denmark: Biogas production can be optimized for the benefit of climate and economy** by Bodill Harder, Energistyrelsen (Danish Energy Agency). “Is the conclusion of the project "Development and efficiency of biogas production in Denmark" completed by the Biogas Task Force of Energy Agency that, in collaboration with 16 biogas plants, Aarhus University, Plan Energy and Agro Tech, investigated for 2 years the production of biogas and looked for optimization opportunities (...) The reports provide an updated overview of the "state of the art" for Danish biogas production and points the way **toward a future biogas production based on residues with a healthy economy and an optimal climate records.”**



An aerial view toward lower Manhattan of one of PRESENT Architecture's proposed "Green Loop" hybrid composting centers and waterfront public parks.

February 2, 2016. Leave the trashy lifestyle behind. **Trash tubes, compost islands, and the future of waste in America's biggest city** by Cole Rosengren, Fusion. “Since the city’s last landfill closed in 2001, trash now travels hundreds of miles away at an increasingly high cost. New York Mayor Bill de Blasio has proposed an ambitious plan to send “zero waste” to landfills by 2030, but some experts doubt that this growing city of more than 8.4 million people can solve its trash dilemma without **rethinking the system entirely**. The success of New York’s zero waste plans will have big implications for how other urban areas handle their trash in coming years (...) Developing new systems to collect trash more efficiently and process it within city limits would be a good first step. “**We want to bring stuff as close to the neighborhoods as possible**,” said Ben Miller, a former sanitation policy director for the city. “As decentralized and small-scale as possible.” Miller is working with his partners at the planning firm Closed Loops, with funding from state grants, to bring pneumatic tubes to New York’s High Line (...) The technology can take more than 10 years to pay off, but for high-end developments or busy neighborhoods, the absence of trucks and garbage bags can be well worth it. Miller noted that another benefit is minimizing the distance that waste has to travel before it leaves the city. Ideally there would be a way to process it within city limits and close the loop entirely. “It’s not rocket science,” he said. “These things can be built like Legos. Plug and play.” Cities in Sweden, France, the United Kingdom and elsewhere reflect this model. **Trash in certain neighborhoods travels via pneumatic tubes or trucks to local waste stations**

for processing (...) The technology exists to turn this food waste into energy locally. Anaerobic digestion—a process in which bacteria break down the organic material and biogas is created that can heat homes—has already been tested at Brooklyn’s Newtown Creek Wastewater Treatment Plant. Yet many residents don’t want these facilities in their neighborhoods. Evan Erlebacher, co-founder of Present Architecture, has an idea to change that. He said it comes down to emphasizing design and community benefits. “Traditionally, waste facilities are these horrible boxes that you put as far away from people as possible,” he said. “Does this have to be a horrible thing?” In 2014, Present Architecture proposed the “Green Loop,” an offshore facility that would receive food waste from trucks or barges, compost it on site and use the material for a 12-acre park on the roof. These facilities could be built throughout the five boroughs and serve as community hubs. Though the idea may not be economically possible at the moment, it received a lot of attention and contributed to the ongoing conversation about incorporating waste into city life.”



GesiShamba by SimGas. Modular rural biogas system for households

January 29, 2016. **Bringing better biodigesters and clean energy to Africa** by Juha Seppala, World Bank. “Sub-Saharan Africa continues to suffer from a major energy deficit, with hundreds of millions of people lacking access to electricity and clean cooking fuels. There is a great need for innovative mechanisms that can help families access clean and affordable energy. **The Carbon Initiative for Development (Ci-Dev)** is one such mechanism. A \$125 million fund with a pipeline of 14 pilot projects in Africa, Ci-Dev will help improve living standards and sustainable energy through results-based finance. Along the way, it will generate valuable lessons in how reducing greenhouse gas emissions can generate tangible development benefits for local communities, like cleaner air, improved safety, and financial and time savings. These lessons can help in the **delivery and scale up of innovative climate finance business models**. Today, we signed Ci-Dev’s first emission reductions purchase agreement for a project in East Africa that produces low-carbon, cutting-edge biodigesters. The purchase agreement is with SimGas, a Dutch private company that manufactures plastic-molded biodigesters at a state-of-the-art facility in Tanzania, for sale to rural households in Kenya and elsewhere in the region (...) Because the project helps lower greenhouse gasses – specifically carbon dioxide emissions from burning fuel wood – **the project will generate emission reductions that will then be sold to Ci-Dev, creating a revenue stream for the project. These results-based payments for carbon will subsidize the retail price of the biodigesters**, making them more affordable to poor households, and offer an extended five-year warranty to improve consumer confidence. Hopefully, this will boost early sales of this brand-new technology and help scale up the effort – making these biodigesters available to more people.”

January 29, 2016. **Copenhagen set to divest from fossil fuels** by Arthur Nelsen, The Guardian. The mayor of Denmark's capital launches a push to withdraw the city's £700m investment fund out of coal, oil and gas holdings (...) Copenhagen is at the forefront of world cities in the green transition, and we are working hard **to become the world's first CO2 neutral capital in 2025** (...) Last year, Oslo became the first capital city to divest from fossil fuels, when it ditched \$7m of coal investments, to join a growing movement of cities that have pledged to combat climate change (...) Around 80% of the world's known coal, 50% of its oil and 30% of its gas reserves will have to stay in the ground if dangerous global warming is to be avoided, climate scientists say.”

January 27, 2016. **UN chief wants clean energy investments doubled by 2020**. Increase in clean energy investment an important part of Paris summit. Ban Ki-moon told over 500 global investors at the UN investor summit on climate risk that increasing investment in clean energy is critical in following up on the landmark Paris agreement. “**The world now counts on you to act at the speed and scale needed to transform the global economy**. To keep global temperature rise well below 2 degrees, and even 1.5 degrees, we must begin the shift away from fossil fuels immediately. **We need a massive scaling up of investments in clean energy and energy efficiency**,” he said Ban laid out five steps for the investor action.

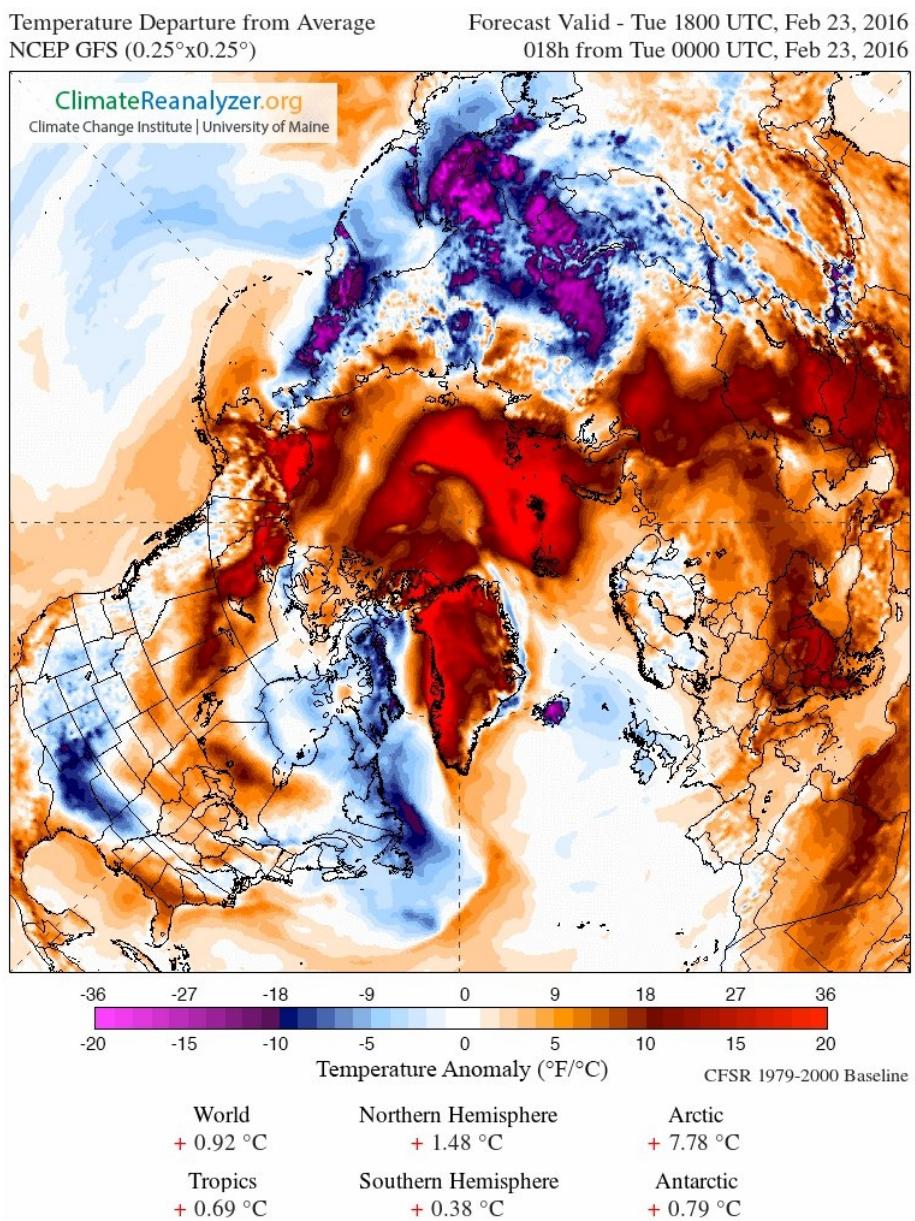
- National climate plans of developing countries must be financed, with institutional investors particularly well placed to provide the significant amounts of capital needed.
- Pension funds must use their influence as investors and shareholders to accelerate the rapid de-carbonization of the economy.
- The banking sector must continue scaling up the green bond market while changing its lending practices to support green investments, reflecting the growing risk in the brown economy.
- The insurance industry must strengthen climate resilience and disaster risk reduction efforts, especially in the most vulnerable countries.
- Investors need to know how the impacts of climate change can affect specific companies, sectors and financial markets as a whole, with clearer disclosure.

Ban says that about \$330 billion was invested in clean energy last year, but that is far from what he calls the “**clean trillion**” needed per year in the decades to come.”

January 25, 2016. **El incalculable coste de frenar la transición energética** por Javier García Breva. “Los informes de la Agencia Internacional de la Energía (AIE) de 2014 y 2015 insisten en que para 2040 la demanda eléctrica mundial crecerá un 70% y que más del 60% de la inversión en nueva potencia se destinará a las renovables, que para 2030 superarán al carbón como primera fuente de energía. Es la mejor descripción de **la transición energética que está en marcha en el mundo y que no se debe solamente a razones ambientales sino también económicas** (...) El éxito de la Cumbre de París no es el acuerdo de la COP 21, porque al no existir compromisos nacionales es un fracaso disfrazado. El éxito, frente al avance del cambio climático, va a venir de la imparable inversión en energías renovables, por ser sus costes inferiores al de los combustibles fósiles y la energía nuclear. **La inversión renovable garantiza la reducción de costes energéticos a empresas y hogares a través de la generación distribuida y el autoconsumo** (...) **La transición energética es viable por razones tecnológicas y por razones económicas**. Según el Informe sobre perspectivas tecnológicas de la AIE de 2014, por cada dólar que se invierta en esta transición se ahorrarán tres dólares por el menor consumo de combustibles fósiles. Es el mismo dato que confirma el Foro de Energía Sostenible para todos (SE4ALL) de la ONU (...) Si al coste de los impactos por el cambio climático se suma el coste de las importaciones de combustibles fósiles, parece claro que **frenar la transición energética en España tendrá un coste del 7% del PIB**, inasumible para la sociedad.”

December 9, 2016. **Wastewater: a virtuous source of energy** by Veolia. “**As China ramps up development of the Silk Road Economic Belt**, the “beautiful pastures” of Urumqi are under

intense ecological pressure. An advanced biogas recovery project gives some angular momentum to the circular economy in the remote Xinjiang province (...) Urumqi Hedong Veolia Water Co. Ltd, a wastewater joint venture which houses **one of the most advanced biogas recovery projects in China, possibly in Asia. The project is a landmark in ecological conservation and the deployment of the circular economy in this unique part of the world** (...) Yet for its remoteness and mystery, Xinjiang is no wilderness. Urumqi itself has been a vibrant Silk Road trade center for thousands of years and will be a vital hub of China's new One Belt, One Road development initiative, a modern day Silk Road which connects much of central Asia through trade agreements and China's newly formed Asian Infrastructure Investment Bank (AIIB). **The challenge for Urumqi's growth is therefore neither location nor economic prospects but environment** (...) The challenge for Urumqi's growth is therefore neither location nor economic prospects but environment (...) If necessity is the mother of invention, then scarcity is the father of the circular economy. Driven by a need to run wastewater operations at maximum efficiency, Veolia and partner Urumqi KUNLUN Environment Protection Group Co Limited worked to implement an advanced biogas production system for the Hedong wastewater treatment plant, not only reducing sludge stress on the water cycle downstream but also extracting biogas from a resource previously regarded as waste."



Winter 2016: Massive 'heat wave' in Arctic