Energy Intelligence

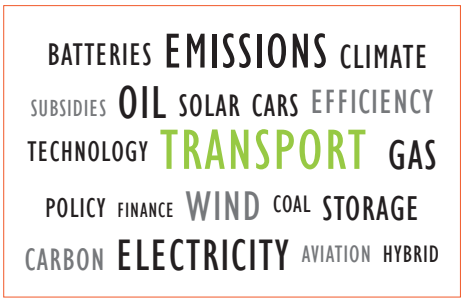
www.energyintel.com

EI NEW ENERGY

Vol. 5, No. 14

April 7, 2016

In This Issue



Tesla's New Model: The iPhone of Transport?

Automaker Tesla's unveiling of its Model 3 last week pushed fast-forward on the electric car race, although the auto business is still far from loosening oil's long-standing grip on transportation. The Model 3, which has already amassed a stunning 270,000 preorders globally, combines California-based Tesla's long driving range with a somewhat affordable $35,000 price tag. Many are comparing Tesla to iPhone maker Apple, both in its ingenuity and ability to spur competitors toward similar technologies. Despite recent progress, electric cars still have miles to go before they can truly compete with the internal combustion engine on convenience and affordability.

The Model 3 has made waves for several reasons. With a sticker price of $35,000 for the base model, it's far more affordable than Tesla's $70,000 Model S or its earlier $110,000 Roadster — proving that the luxury market can be used as a testing ground for more economical models. When coupled with a standout driving range of 250 miles and the company's fast-chargers, along with semiautonomous features such as advanced lane controls, the Model 3 makes several leaps forward for electric drive. Tesla is also working to improve the energy density of its batteries and is striving for economies of scale with its "gigafactory" in Nevada. The company hopes to cut battery costs to $200 per kilowatt hour in the next few years, down from an industry average of $350 now — already a 65% drop from 2010, when the trailblazing all-electric Nissan Leaf and plug-in hybrid Chevrolet Volt were rolled out.

Although $35,000 is easier to reach, it's still a stretch for many consumers. Six automakers are already offering more affordable electric vehicle (EV) models, according to data compiled by *EI New Energy*, although the driving distances are much shorter (see table). Efficient conventional cars are even more economical to buy. The gasoline-powered Honda Fit, for instance, can achieve 41 miles per gallon on the highway at a price of $16,000 up-front.

Today's oil price slump, depending on how long it persists, is another factor — prolonging or erasing the "payback period" in which the fuel savings of owning an electric car may offset the up-front cost. "These vehicles don't look as good when the price of gasoline is really low. At $4 or $4.50 a gallon, many people would be looking more closely at electric cars," said Virginia McConnell, a transportation expert with US think tank Resources for the Future. However, policies such as fuel economy standards and California's zero-emission vehicle standard will force automakers to move beyond gasoline

Renewable Energy Price Parity

	Gas ($/MMBtu)	CO_2 ($/ton)
Europe		
Market Price	3.77	5.95
Wind Onshore	10.34	121.61
Solar PV	7.86	85.13
US		
Market Price	1.95	0.00
Wind Onshore	7.77	102.31
Solar PV	5.81	74.57
Japan		
Market Price	7.85	0.00
Wind Onshore	18.34	184.46
Solar PV	19.54	226.06

Market prices Apr 5. Table indicates either gas or CO_2 price needed for new renewable energy to match profitability of new gas-fired power, without subsidies. High US carbon prices reflect low gas prices. Japan at parity so no carbon price needed. *Source: Energy Intelligence*

Chairman: Raja W. Sidawi. Vice Chairman: Marcel van Poecke. Chief Strategy Officer & Chairman Executive Committee: Lara Sidawi Moore. Editor-in-Chief: Thomas E. Wallin, Editorial Director: David Pike. Head Office: 5 East 37th St., NY 10016-2807. Tel.: (1 212) 532 1112. Fax: (1 212) 532 4479. Sales: sales@energyintel.com. Circulation: customerservice@energyintel.com. Bureaus: Dubai: Tel: (971) 364 2607. Houston: Tel.: (1 713) 222 9700. London: Tel.: (44 20) 7518 2200. Moscow: Tel.: (7 495) 721 1611/12/13. Singapore: Tel.: (65) 6538 0363. Washington, DC: Tel.: (1 202) 662 0700. Other publications: *Petroleum Intelligence Weekly, Oil Daily, International Oil Daily, EI Finance, Energy Compass, Energy Intelligence Briefing, Jet Fuel Intelligence, Natural Gas Week, Nefte Compass, Nuclear Intelligence Weekly, Oil Market Intelligence and World Gas Intelligence.*

Electric Car Models in 2016

Battery-electrics	Range (miles)		Price
Tesla Model 3	250		$35,000
Nissan Leaf	107		$29,000
Kia Soul	90		$32,000
Fiat 500e	87		$32,000
Mercedes B-Class	85		$42,000
BMW i3	83		$42,000
VW E-Golf	83		$29,000
Chevrolet Spark	82		$25,000
Honda Fit EV	82		$37,000
Ford Focus	76		$29,000
Plug-in hybrids	**Electric**	**Gasoline**	**Price**
Chevrolet Volt	53	367	$33,000
Hyundai Sonata	27	573	$35,000
Ford C-Max	21	599	$32,000
Toyota Prius	11	529	$30,000

Select model year 2016 vehicles with all-electric ranges, in maximum miles and thousands of dollars (starting prices, rounded to nearest thousand). Excludes two-seaters and some luxury models.
Source: Energy Intelligence, US Department of Energy.

cars regardless of pump prices, she said. Tesla also has a few things to prove before its Model 3 can be deemed a success. "There's a lot of interest, with 270,000 preorders, but 15 million cars are sold every year in the US," McConnell said. Also, the Model 3 isn't going to be placed into the hands of its customers until next year — requiring Tesla to show it can deliver, after overestimating its production capabilities in the past.

Other automakers are joining Tesla in devoting manpower and financial muscle toward longer-range, cheaper EVs — much like the iPhone led to a smartphone race that brought in competitive Android and Windows models. Chevrolet, for example, plans to unveil its all-electric Bolt with a 200-mile driving range next year at $38,000. "Tesla Motors is the standard by which all other all electric vehicles will be judged from today and into the future," says Dan Lippe of Petral Consulting in Houston. "The only unanswered question I have is, what will [Tesla Chief Executive] Elon Musk do when BMW, Volkswagen or GM make a multibillion-dollar buyout offer for Tesla?"

Lauren Craft, Washington

Oil Majors Struggle to Cut Carbon

After the Paris talks resulted in a strong agreement, European majors seemed to have placed a winning bet on gas. They've pushed gas to the forefront of their upstream portfolios, hoping their call for a "global price on carbon" will leave them in a healthy financial position as the world aims to keep temperature rises well below 2°C. European majors, which have published sustainability reports for years, may be much more transparent on carbon issues than their US counterparts — with Exxon Mobil and Chevron under particular scrutiny for not stress testing their operations under possible climate policy. Yet the European majors' efforts to rein in carbon intensity and reduce greenhouse gas emissions, in particular carbon dioxide, are a mixed bag despite the stronger emphasis on gas (NE Mar.31'16). Sustainability reports show many climate positives — such as improvements in energy efficiency and, for some, flaring reduction — but increased oil and gas production volumes, often from maturing or technically challenging fields, have led to higher overall emission volumes in many cases.

UK major BP expects gas, which made up 55% of its upstream output last year, to account for 26% of a much bigger world energy pie in 2035, up from approximately 24% in 2015 (WGI Jun.10'15). It says gas is potentially the cleanest fossil fuel if methane emissions are kept below 3%, with the industry average now roughly 1.5%-1.7%. BP's 2035 outlook suggests gas will wrest dominance of the energy sector from oil and coal within two decades — or at least reach parity in percentage terms.

BP, which bowed to shareholder pressure in 2015 by agreeing to outline how it will prepare for a low-carbon future, warned in its latest sustainability report that despite increasing gas' share in its upstream portfolio, its global greenhouse gas emissions jumped 3.7% last year (IOD Feb.9'15). "The increased GHG intensity reflects our divestment of lower-intensity assets, increasing intensity in new areas that are more technically challenging, and late-life operations. Although there may be annual fluctuations, it is likely that the carbon intensity of our upstream operations will continue to increase for these reasons." While BP's overall GHG emissions climbed last year, its CO_2 emissions dropped slightly to 21.2 million tons of CO_2 last year, from 21.6 million tons in 2014, due to higher methane and indirect CO_2 emissions.

Norway's Statoil is also betting on the resilience and adaptability of gas. Because of increased oil and gas production volumes in 2015 — output increased to 1,073 million boe last year, up from 997 million boe in 2014 — total CO_2 emissions rose slightly from 15.3 million tons in 2014 to 15.4 million tons in 2015. Statoil's E&P operations are becoming less-GHG intensive, mainly due to reduced flaring and lower methane emissions, yet due to the ramp-up in production volumes, overall CO_2 emissions still rose year-on-year. The overall CO_2 increase in 2015 was offset by reduced flaring from the US Bakken tight oil field and improved energy efficiency, mainly on Norwegian Continental Shelf fields, which saved more than 1.4 million tons of CO_2 emissions last year, according to Statoil's sustainability report published last month.

Statoil, a leader among its peers in disclosing carbon intensity across fuel types, says it aims to reduce upstream production CO_2 emissions from 10 kilograms of CO_2 per barrel of oil equivalent

Statoil's CO_2 Emission Intensity Per Production Segment*

	2020 Target	Share of Production	2015	2014	2013	2012
Conventional	11	89%	9	9	9	8
Heavy Oil	17	2	17	15	14	17
Extra Heavy Oil	NA	1	66	67	70	56
LNG	24	4	22	24	27	26
Shale Gas	6	2	6	8	NA	NA
Tight Oil	18	2	21	36	46	44
Overall	9	100%	10	11	11	10

*kg CO_2/barrel of oil equivalent (boe) for upstream exploration and production activities. *Source: Statoil*

in 2015 (see table). That achievement is 60% less than the 2014 industry average of 18 kgCO_2/boe according to lobby group the International Association of Oil and Gas Producers (IOGP) — which is expected to go down to 9 kgCO_2/boe by 2020. For LNG, Statoil is aiming for 24 kgCO_2/boe in 2020, up from 22 kgCO2/boe in 2015, but still below a four-year high of 27 kgCO_2/boe in 2013.

Royal Dutch Shell, due to release its latest sustainability report this month, noted in its 2014 report that overall GHG emissions increased by 4.1% to 76 million tons of CO_2 in 2014, despite improved energy efficiency. The rise in GHG emissions was mainly due to increased gas flaring — 13 million tons of CO_2 in 2014 (the highest level since 2006) compared to 7.4 million tons CO_2 in 2013 — at operations in Iraq, Qatar, Nigeria and Malaysia.

Italy's Eni says it has reduced CO_2 emissions by 27% over the period 2010-2014, from 59 million tons CO_2 in 2010 to 43 Mt/CO_2 in 2014. Eni said in its *2016-2019 Strategic Plan*, published in March, that for every ton of oil equivalent produced there were 0.2 tons of CO_2 emissions. By 2025, Eni plans to reduce this figure by 43% to just over 0.1 tons of CO_2 per ton of oil equivalent.

French Total, another major weighting towards gas, is struggling to reduce overall GHG emissions from operated and equity-stake assets, despite an impressive cutback on gas flaring of 33% over 2013-15. In 2015, emissions were 50 million tons of CO_2 equivalent, down from 54 Mt in 2014 but only slightly lower than 51 Mt reported for 2013. Total is doing better from operated activities, where it achieved its target for reducing emissions by 15% over 2008-2015.

Jay Eden, London

China's Stunning EV Sales Hit Reality Check

Following a year of stunning growth in 2015, the electric vehicle (EV) industry in China now faces a real threat of being unable to sustain last year's explosive momentum as cracks start to show in the subsidy-driven strategy. The January to February sales figures for "new-energy" vehicles — including pure EVs that made up nearly 70% of the total, with the remainder split between plug-in hybrids and fuel-cell models — are showing tamer year-on-year growth rates, and even a plunge in absolute monthly sales when compared with December data. The slippage is said to result from the uncertain fate of subsidies following revelations of subsidy abuses. New-energy vehicles got off to a bad start in 2016 when media exposed that some automakers faked sales to their affiliates to claim generous government subsidies — putting a question mark around the authenticity of 2015 sales. An investigation ensued in January by four government departments, including the finance ministry, with the conclusions not yet released. Some Chinese cities also held back on announcing the 2016 subsidy rates, prompting speculation that both central and local governments are mulling hefty cuts.

China's central government had already announced it would gradually scale back on new-energy vehicle subsidies, aiming for a complete phaseout after 2020, but a substantial cutback is not due until 2017. Any decision to bring forward the timetable, or make sharper cuts than the planned 20%-40% reductions over 2017-20, would be a blow to China's transition away from oil-powered vehicles. Latest Chinese official figures showed new-energy vehicle sales for the two-month period of January to February at just over 35,700 — a 170% year-on-year increase, but a plunge from 37,000 in December alone. The 2016 sales have bucked the general trend of strong monthly growth in China last year that amounted to a staggering 331,000 in 2015, toppling the US as the largest market globally (NE Feb.25'16).

The recent decline has been partly attributed to delays by some cities, like Shanghai, in finalizing its subsidies after the previous schemes expired at end-2015. Shanghai finally made known its new subsidy scheme last week, announcing steep reductions of 25%-80% for many models except fuel-cell vehicles, while others that fail to meet a stricter range criteria of at least 100 kilometers were struck off the subsidy list. Shanghai also introduced a mechanism that lowers subsidy payments as sales get higher. Interestingly, Shanghai also promised additional payouts for plug-in hybrids that meet stricter petroleum fuel economy standards and have a smaller oil tank, hoping to address concerns that many hybrid car owners are mostly topping up on oil instead of recharging.

Shanghai New-Energy Vehicle Subsidies (yuan)

	2016-17	2014-15
All-electric passenger cars	10,000-30,000	40,000
Plug-in hybrid passenger cars	10,000	30,000
All-electric buses	120,000-250,000	150,000-500,000
Plug-in hybrid buses	50,000	250,000
Fuel cell vehicles	300,000-600,000	200,000-500,000

2016-17 figures based on minimum driving range of 100 km for all-electric passenger cars, 150 km for all-electric buses; no range requirements for 2014-15.
Source: Shanghai municipal government.

If Shanghai's example is anything to go by, other cities and even the central government are likely to follow suit in cutting subsidies and tightening criteria to force improvements in vehicle performance or close loopholes. While this may consolidate the industry and weed out the poorer performers in the long run, the near-term concern is an immediate impact on sales, which could derail efforts to meet an ambitious government goal of 5 million cumulative all-electric and plug-in hybrid sales by 2020. Despite the uncertainties, however, reputable Chinese EV manufacturers like Beijing Automotive Industry Group and Shenzhen-based BYD have voiced hopes of doubling or tripling their new-energy vehicle sales this year from the already high 2015 starting point — confident in continued policy strength given the push to address China's severe air pollution issues. On top of outright cash subsidies, some local governments have dangled other aggressive incentives that are especially alluring in areas where driving and vehicle ownership is restricted — such as better odds in obtaining license plates, exemptions from rush-hour driving curbs and promises to expand recharging and parking infrastructure (NE Aug.13'15).

Early imperfections in China's push to promote new-energy vehicles don't erase the overall progress, even if explosive growth doesn't recur this year, says Liping Kang with the nonprofit Innovation Center for Energy and Transportation, which is launching an EV ranking this year aimed at speeding up Chinese consumers' decision-making. Chinese automakers have now largely overcome consumers' "range anxiety" by extending the EV driving range to well over 200 kilometers (124 miles), while recharging infrastructure has improved vastly, Kang tells *EI New Energy* (p1). In the next few years, however, the success of China's EV industry will hinge on further technological and cost breakthroughs to win mass market acceptance, even as government subsidies and public sector purchases fade away, she adds.

Kimfeng Wong, Singapore

Storage: Master Key to the Energy Transition

The ambitious climate goals agreed in Paris in December will require the eventual decarbonization of energy systems globally, implying a massive push for renewables, not just in power production but also transport and heating (NE Dec.17'15). But for variable renewables, such as solar and wind, to reach their full potential, more energy storage will needed (NE Mar.10'16). "If you are talking about a true transition to renewables, going beyond 50%-60% of variable renewables in your electricity system, then energy storage is going to be crucial," Ruud Kempener, technology road map analyst at the International Renewable Energy Agency (Irena), told *EI New Energy*. Historically, the energy storage market has been dominated by pumped hydro — which currently accounts for around 98% of all energy storage worldwide — although battery storage has recently begun to make inroads (see table). But while growth in utility scale battery storage has been "absolutely impressive in terms of gigawatts especially in the last year, it's still a very low base," Kempener added.

Uptake is being helped partly by policy support — in places such as Germany, Japan and California — but also more significantly by falling battery costs (NE Feb.25'16). This is largely being driven by developments in the electric vehicle (EV) sector, with manufacturers who are currently expanding production looking to find another outlet for their batteries as a hedge against any lower-than-expected uptake of EVs (NE Feb.25'16). "It doesn't matter" whether it's in a car, the home, office or a container in a field next to a substation, "they are just desperate to get those sales [of batteries] out to drive transport," said Logan Goldie-Scot of Bloomberg New Energy Finance (BNEF). Uptake could then "almost become self re-enforcing" as when you add new capacity it's easier and cheaper to add yet more (NE Feb.25'16). "In the next few years you could begin to see this materialize," he added.

At utility-scale, batteries may have limited applications, improving rather than completely overhauling the system — for frequency regulation, for example, they have shown they can offer a better service for a lower overall price to the network. But for larger-scale, longer-term storage, other solutions, such as conversion of power to natural gas, will be needed. Although currently hampered by efficiency issues and high investment costs, power-to-gas offers enormous seasonal storage potential, according to Matthias Muller-Mienack from GridLab in Germany. This could also give renewables inroads in home heating, potentially proving disruptive for natural gas suppliers.

While utility-scale battery storage may only have a niche role to play, "where there's a lot of room for greater disruption is behind the meter," if consumers really do start buying energy stor-

Electricity Storage Costs by Technology

	Grid Support			Distribution	Retail Level	
($/MWh)	Large-Scale Storage	PV Integration	Frequency Regulation	Support	Industrial & Commercial	Residential
Zinc Battery	290	300	—	360	380	—
Lithium Ion Battery	520	520	240	590	590	1,320
Flow Battery	590	660	—	610	720	1,190
Sodium Battery	700	670	—	780	770	—
Lead-Acid Battery	890	740	—	1,100	1,020	1,670
Pumped Hydro	230	—	—	—	—	—
Flywheel	—	—	630	—	—	—
Compressed Air	190	—	—	—	—	—
Gas Turbine	190	190	190	190	190	—
Diesel Engine	250	250	—	—	250	—

Average cost of storage by technology and application compared with conventional alternatives to storage (gas turbine and diesel engine), in $ per megawatt hour. US data. *Source: Lazard*

age, said BNEF's Goldie Scot. And combined with domestic rooftop solar this could be particularly transformative. "Then you can start thinking about a real change, because then your electricity system is moving from a centralized power system to something where distributed power is going to be big," said Irena's Kempener. This would be incredibly disruptive for an electricity system traditionally based on a vertically integrated, centralized power production and distribution model — which in Europe is already being rocked by increasing renewables penetration.

Managing issues such as how electric vehicle batteries are charged and discharged and how they interact with the power network could also lead to the emergence of a much more dynamic power system. You would move from a relatively "dumb" energy system to an energy system with technological enhancements that's a lot "smarter," said Andrew Lever, director of innovation at the UK's Carbon Trust. This could also dovetail well with the emerging "internet of things," which will see an increasing number of household appliances becoming network-connected. This would allow innovative new demand side power management tools to emerge, helping to further reduce energy costs and boost energy security — meeting two other parts of what's sometimes referred to as the "energy trilemma" alongside cutting carbon emissions, Lever noted.

Ronan Kavanagh, London

'Energy Democracy' Builds Ranks in US

Demonstrators donning aprons emblazoned with the catchphrase "Pancakes Not Pipelines" were arrested outside the downtown Washington office of the Federal Energy Regulatory Commission last week. A handful of activists urged commissioners to join them for "the last dregs of syrup" from a family farm in Pennsylvania, recently stripped of its maple trees to clear a path for a pipeline carrying Marcellus Shale gas. While many observers laughed off the pancake protest as a media stunt, greens have realized the value of these grassroots events as recruiting tools. Often, they go viral on social media. Small clutches of protesters popping up nationwide, whether they are landowners challenging a pipeline in court or activists preventing the federal government from executing oil and gas lease sales, are empowered by adding their voices to a larger, louder chorus — "Keep It in the Ground" (NE Dec.10'15). It's the overarching strategy behind the push for a faster energy transition, and involves tactics as varied as forcing the federal government to be more responsible with the country's natural resources or making shareholders rethink investments in fossil fuels (NE Mar.24'16).

Oil and gas trade organizations tend to dismiss all environmentalists as extremists, although greens in the climate movement are far from monolithic. Yet harmony is more the norm these days as both the little greens and big greens jointly work to tame what they label a climate emergency. It's not a hatred of fossil fuels that unites them, either. Instead, they say, it's science and logic: Keep adding to the infrastructure that supports drilling and the transport of gas or oil and the US will neither meet its Paris accord goals nor prevent the severe consequences of a warmed planet laid out by climate scientists.

"The movement is really growing and really maturing under the banner of 'Keep It in the Ground,'" Greenpeace USA researcher Jesse Coleman tells *EI New Energy*. He describes it as an intersection of the environmental and social justice movements. Momentum has inspired Greenpeace to launch a democracy campaign on the heels of the November rejection of the Keystone XL pipeline. "That showed a lot of people that if you're willing to stand up, something can happen. There's a real recognition among everyday people that there's a systemic problem. People are hungry for change."

One unifying theme among the diverse mix of those involved in the "energy democracy" is the argument that 80% of the known fossil fuels must remain in the ground to keep greenhouse gas

emissions under control, says Janet Redman, climate policy program director at the progressive Institute for Policy Studies. "While we're dialing down on fossil fuels, we have to be dialing up the energy efficiency and the renewable energy piece," she says. "That is the critical next step" and it's tricky and scary territory. While natural gas has been anointed as coal's successor, it's not a magical bridge to renewables. Hydraulic fracturing has become a lightning rod for multiple reasons and eventually power plants burning gas must be equipped with expensive carbon capture. "The old idea that the [fossil fuel industry] rules the country, so we have to do things that are not palatable, is not OK anymore," Redman says. "There's a growing sentiment that we need to take back our economy and build one that is low-emitting and also good for people's health, pocketbooks and well-being."

Coleman cites a Department of Energy study saying the US needs to invest $700 billion in renewables by 2050 to ensure a full transition to sun and wind power (NE Mar.31'16). But Congress won't approve sensible legislation to combat climate change as long as fossil fuel money funds so many elections, he says. Neither should citizens count on Bill Gates and other Breakthrough Energy Coalition philanthropists as the sole link to a carbon-free future. "We need a democracy that represents people instead of a cadre of wealthy donors," he says. "We can't sit around and wait for the billionaires to save us."

Elizabeth McGowan, Washington

US Tightens Crackdown on Methane Emissions

US federal regulators are redoubling efforts to reduce methane emissions in the oil and gas sector by launching a new voluntary partnership program. The 41 founding oil and gas companies of what's called the Natural Gas Star Methane Challenge Program were introduced last week by US Environmental Protection Agency (EPA) Administrator Gina McCarthy. "We know there are still many more opportunities for methane reduction," McCarthy said, adding that the program is just one piece of the EPA's overarching strategy. Methane, the principal component of natural gas, may not linger as long as carbon dioxide, the most prevalent greenhouse gas, but studies show it is as least 25 times more potent (see graph). In December, as part of the Paris climate change agreement, President Barack Obama pledged to reduce US emissions of all heat-trapping gases 26% to 28% below 2005 levels by 2025. The Obama administration has also vowed to reduce methane emissions 40% to 45% below 2012 levels by 2025 (OD Mar.11'16).

The Methane Challenge tasks partners with acting on emission reductions within the next five years, according to the EPA. Each company has outlined specific, self-directed goals it is intent on accomplishing. The founding companies are predominantly natural gas pipeline and gas distribution companies, rather than producers. They include Dominion, Duke, MidAmerican, Pacific Gas & Electric, Questar and Southern California Gas. McCarthy had previously alluded to the latest Methane Challenge as a flexible, cost-effective and transparent way for oil and gas companies to reduce methane emissions. She lauded participants as being on "the leading edge."

Environmental groups have long criticized the EPA's previous One Future program, a voluntary company-led effort to control methane emissions, as not being strict enough and they fear that the Methane Challenge also will be less than effective. Industry groups have defended One Future as a model program. However, of the 8,000 or so US producers, only eight — all large independents and majors — have been actively participating in One Future. On Wednesday McCarthy said that expanding the EPA's voluntary efforts provides a "platform for companies to transparently report actions to reduce methane emissions and to be publicly recognized as leaders in reducing methane emissions."

However, controlling methane emissions is clearly not just a voluntary effort (OD Jan.25'16). This spring, the EPA will release the final version of its regulations aimed at curbing methane emissions from new oil and gas infrastructure, McCarthy said. And earlier this month the Obama administration announced that it will begin cracking down on methane emissions from existing oil and gas facilities. The first step for regulations directed at existing facilities is an information collection request, which McCarthy has said will be rolled out in April. On Wednesday, she said the request requires EPA officials to figure out where the existing sources of methane are in the oil and gas sector, what technology is available to reduce or halt emissions and how much those technologies cost. "While it may seem boring, it is the linchpin of how we can move forward on methane," McCarthy said.

Elizabeth McGowan, Washington

IN BRIEF

Top Emitters to Ratify Paris Deal

In a development that greatly increases its chances of entering into force, China and the US last week pledged to ratify the Paris climate agreement at a UN ceremony in New York on Apr. 22 (NE Jan.7'16). This then prompted India's Environment Minister Prakash Javadekar to make a similar promise. The Paris Agreement sets out an action plan based on self-imposed targets by individual countries to limit global warming to well below 2°C, but will need formal ratification by 55 countries that account for at least 55% of global emissions before it can enter into force.

Banks Send $8B for Climate

A group of large financial institutions announced Wednesday that they are directing $8 billion in sustainable investments designed to propel the low-carbon transition. The investments were made under the umbrella of the Catalytic Finance Initiative, launched by Bank of America (BoA) in 2014. Aside from BoA, the $8 billion is also coming from HSBC, Credit Agricole, European Investment Bank, AllianceBernstein, Babson Capital Management, Mirova, and the International Finance Corp. The initiative aims to blend public and private finance and its priorities include clean energy infrastructure, green bonds, project finance, green asset-backed securities, emerging markets investments and advisory assistance.

SunEdison on Verge of Bankruptcy

There is a "substantial risk" that troubled US solar and wind company SunEdison will soon seek bankruptcy protection, its listed subsidiary TerraForm Global said in a regulatory filing last week. SunEdison, which advertises itself as "the largest global renewable energy development company," recently went into an acquisition frenzy, causing its debt to reach an unbearable $12 billion. Originally a pure solar player, it entered the wind business last year by purchasing First Wind, a large US developer. Lenders are expected to take control of the bankrupt company and its huge portfolio of projects.

Vestas Regains Top Wind Spot

Denmark's Vestas regained its top spot in consultancy Make's global ranking of wind turbine manufacturers in 2015, up from third place in 2014. Germany's Siemens, which was last year's No. 1 thanks to exceptional growth in the offshore market, dropped to No. 4 in 2015. Last year's second, General Electric, is now third — ahead of Siemens, thanks to its acquisition of Alstom's wind business, which helped the US conglomerate in Latin America and Europe. While China's record wind expansion last year pushed Goldwind from fourth to second position, only four Chinese firms ended up in the top 10, down from five last year, as foreign markets remain difficult for them. Next year's ranking is likely to show the impact of announced mergers between Germany's Nordex and Spain's Acciona Windpower, and between the wind businesses of Siemens and Spain's Gamesa (NE Feb.4'16).

Asia Super Grid Push Boosted

The push for an Asia Super Grid of power interconnections — which could unlock the abundant wind and solar energy potential of remote regions like Mongolia for export to other Asian countries — has gotten a boost from a memorandum of understanding signed by Japan, Russia, South Korea and China (NE Nov.1'12). The deal on research and planning to promote an interconnected grid spanning Northeast Asia was inked on Mar. 30 by Japan's telecommunications giant and renewable energy advocate Softbank, China's State Grid, state-owned Korea Electric Power Corp. and Russian grid operator Rosseti. The four influential companies agreed to conduct business evaluation studies and lobby for support from their respective governments.

Renewables Second in UK Power Mix

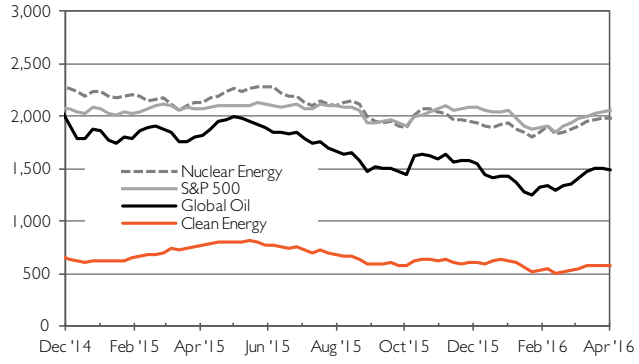
Renewables became the second largest provider of electricity in the UK, behind gas, accounting for 24.7% of the power mix in 2015. A surge in wind and biomass-generated output pushed renewables up from 19.1% in 2014. Gas now dominates the UK electricity mix at 29.5%, yet despite an increase in the UK's domestic carbon floor price from April, actual gas generation dropped 1.2% to 99.8 TWh. Coal fared much worse, dropping 24.3% year-on-year, while renewables surged by 28.8% to 83.3 TWh. The figures released last week by the Department of Energy and Climate Change show onshore and offshore wind, alongside biomass in co-firing units, increasing output by more than 23% year-on-year. Solar photovoltaic output surged from a relatively low base, up 86.6% to 7.6 TWh.

Biojet Advances in Europe, US

Dutch airline KLM began a five to six week test program last week of 80 commercial biofuel flights between Oslo and Amsterdam. The biofuel will be supplied by Air BP and SkyNRG. Oslo airport became the first airport in the world to supply biofuel directly from its hydrant system in January. Meanwhile, in the US, renewable fuels firm Gevo says that the process for obtaining approval for commercial use of jet fuel made from isobutanol is nearing completion, paving the way for Alaska Airlines to make the first-ever commercial test flight using Gevo's alcohol-to-jet fuel (ATJ) (NE Sep.3'15).

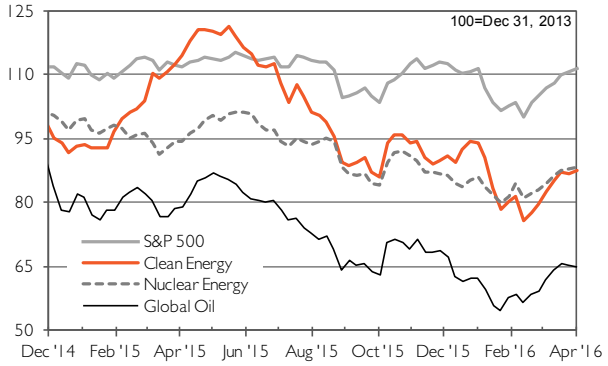
CLEAN ENERGY EQUITY MARKETS

Energy Equity Index Values



Source: Standard & Poor's

Energy Equity Class Performance



Source: Standard & Poor's

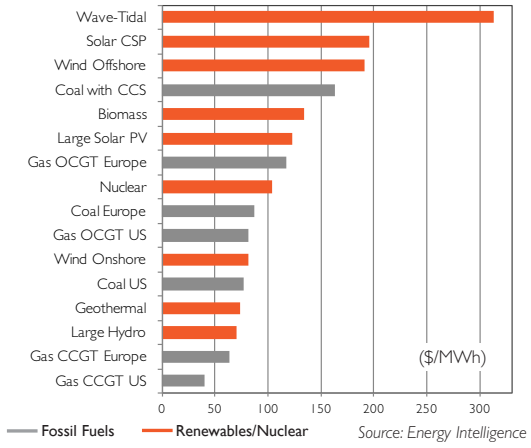
EI NEW ENERGY DATA

Energy Futures: Reference Prices

Carbon (€/ton)	Apr 5	Mar 29	Chg.
ECX EUA	5.23	4.77	+0.46
ECX CER	0.42	0.40	+0.02
Crude oil ($/bbl)			
Nymex light, sweet	35.89	38.28	-2.39
ICE Brent	37.87	39.14	-1.27
Natural gas ($/MMBtu)			
Nymex Henry Hub	1.95	1.98	-0.03
ICE UK NBP	3.77	4.18	-0.41
Coal ($/ton)			
Nymex Capp*	43.63	43.62	+0.01
ICE Rotterdam	44.70	44.45	+0.25

All prices are front month. EUA = EU Allowances; CER = Certified Emission Reductions under UN CDM. ICE UK gas converted from p/therm. *Short tons. *Source: Exchanges*

Newbuild Power Generation Costs



Source: Energy Intelligence

DATA: The complete set of *EI New Energy* data is available to web subscribers, including full levelized cost of energy (LCOE) calculations, fuel switching thresholds, electricity production by sector; ethanol and biodiesel fundamentals, carbon prices, methodologies and reader's guides. Historical data is available as a premium Data Source product.

Global Carbon Prices

Europe (€/ton)	Apr 5	Mar 29	Chg.
EUA Dec '16	5.24	4.79	+0.45
US ($/ton)			
CCA (Calif.) Dec '16	12.61	12.69	-0.08
RGGI (Northeast) Dec '16*	5.65	5.25	+0.40
New Zealand (NZ$/ton)			
NZU (spot)	11.85	11.05	+0.80
Asia ($/ton)	Apr 1	Mar 25	Chg.
China-Guangdong	2.21	2.50	-0.29
South Korea	16.05	16.05	0.00

Benchmark months. *Short tons; all others metric tons. *Source: ICE, OMF*

EU Carbon Futures Prices

ECX front-month futures. *Source: ICE*

Global Electricity Prices

Europe ($/MWh)	Apr 5	Mar 29	Chg.
Germany (EEX)	25.76	30.69	-4.93
France (Powernext)	30.56	33.69	-3.13
Scandinavia (Nordpool)	23.93	24.63	-0.70
UK (APX)	48.13	48.53	-0.40
Italy (GME)	36.28	36.98	-0.70
Spain (Omel)	31.66	34.80	-3.14
North America			
New England	45.25	24.75	+20.50
Texas (Ercot)	12.98	13.73	-0.75
US Mid-Atlantic (PJM West)	29.38	29.78	-0.40
US Southwest (Palo Verde)	19.88	18.25	+1.63
Canada (Ontario)	6.95	1.12	+5.83
Other			
Australia (NSW)	72.51	44.21	+28.30
Brazil (SE-CW)	12.36	11.84	+0.51
India (IEX)	46.63	42.81	+3.82
Japan (JPEX)	72.96	60.00	+12.96
Russia (ATS)	17.61	18.77	-1.16
Singapore (USEP)	29.81	37.33	-7.52

Wholesale prices. *Source: Exchanges*

Key Biofuel Prices

US ($/gallon)	Apr 5	Mar 29	Chg.
Futures			
CBOT Ethanol	1.4680	1.4520	+0.0160
RBOB Gasoline	1.3778	1.4538	-0.0760
Spot market			
Ethanol Midcont.	1.43	1.37	+0.06
Ethanol NY Harbor	1.51	1.46	+0.05
Ethanol US Gulf	1.51	1.46	+0.05
Europe ($/ton)			
Futures			
ICE Gasoil	314.50	341.50	-27.00
Spot market			
Gasoline	452.00	471.50	-19.50
Diesel	311.00	344.25	-33.25
Biodiesel			
Fame 0	795.00	795.00	0.00
RME	780.00	780.00	0.00
SME	805.00	805.00	0.00
PME	795.00	775.00	+20.00

Source: Thomson Reuters, Exchanges

EDITOR: Lauren Craft (lcraft@energyintel.com). DEPUTY EDITOR: Ronan Kavanagh. EDITORIAL: US: Jason Fargo, Emily Meredith, Barbara Shook, Anthony Venezia. LONDON: Jason Eden. STRASBOURG: Philippe Roos. SINGAPORE: Kimfeng Wong. DUBAI: Amena Bakr, Oliver Klaus, Iain Packham. INDIA: Rakesh Sharma. DATA: Jason Lipton. PRODUCTION: Michael Win. Published weekly.