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Total Doubles Down on Gas, Renewables

French oil major Total is creating a new gas, renewables and power segment to "become the responsible energy major" — and it is even eyeing a top three slot in solar power, building off its stake in US solar panel maker SunPower. The move represents Total's deepening commitment to gas despite concerns about future gas demand and a global LNG glut, while underscoring Total's low-carbon ambitions despite low energy prices (NE Mar.10'16). It also highlights a shift emerging between oil majors — those who adapt to the climate challenge even if big changes are required, and those who stick to their core businesses (NE Feb.25'16). Specifically, Total said it will be combining its current midstream and downstream gas division, now part of the Upstream segment, and the New Energies division, now part of Marketing & Services.

Total intends "to deploy a proactive strategy in gas markets to meet demand and identify new outlets for our production," Chief Executive Patrick Pouyanne said. Gas currently accounts for 43% of the company's output and will soon pass 50%. Its gas division trades, markets and ships natural gas, LNG and liquefied petroleum gas, while also managing Total's power generation assets. Pouyanne has said fossil fuels are indispensable for the time being and "the right one" is gas because it is clean, abundant and the best companion of intermittent renewables (NE Jun.4'15). Despite the prospect of a global glut in LNG, Total's gas division president, Laurent Vivier, recently told *EI New Energy* sister publication *World Gas Intelligence* that this problem can be weathered by "big positions that can resist and absorb the ups and downs of one particular market" (WGI Apr.6'16).

More broadly, Total wants to take "a value chain approach to electricity," which Pouyanne called "the energy of the 21st century." That includes producing and selling from renewable sources, Pouyanne added — a sector where Total has "multiple ambitions" for the next two decades. Pouyanne has said that the plan is for renewables to amount to 10%-15% of Total's assets 15-20 years from now. The French major intends to "be in the top three in solar power, expand in electricity trading and energy storage, be a leader in biofuels, especially biojet fuel, and consider potential development opportunities in other renewable energies." This builds off its $1.5 billion acquisition of a 66% stake in US-based SunPower in 2011. Since that acquisition, Total's investment has gone through ups and downs in the solar market, but the French major insists it is taking the medium- to long-term view (NE May7'15). SunPower delivered 1.3 gigawatts of capacity last year and plans to triple its production capacity to 4 GW over the next five years.

Renewable Energy Break-Even Prices

Developing Asia	Coal	Gas
Market Price	2.85	6.99
Wind Onshore	4.68	6.02
Solar PV	6.72	4.69
Solar CSP	15.73	21.89
Mideast	**Oil**	**Gas**
Market Price	40.31	4.17
Wind Onshore	21.18	5.63
Solar PV	20.20	4.11
Solar CSP	72.32	18.94

Market prices Apr 19. Coal and Gas in $/MMBtu, Oil in $/bbl. Table indicates fuel price above which renewable energy is more profitable than new coal-, gas- or oil-fired power, without subsidies. *Source: Energy Intelligence*

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The new gas, renewables and power segment will also include a new innovation and energy efficiency division. It will oversee Total Energy Ventures, the company's corporate venture capital unit which has invested some $150 million so far, mostly in emerging businesses that are new to Total, notably in smart grids, energy storage and other segments of the electricity value chain. It will also comprise Awango, an energy access business focusing on solar kits for developing countries (NE Feb.4'16).

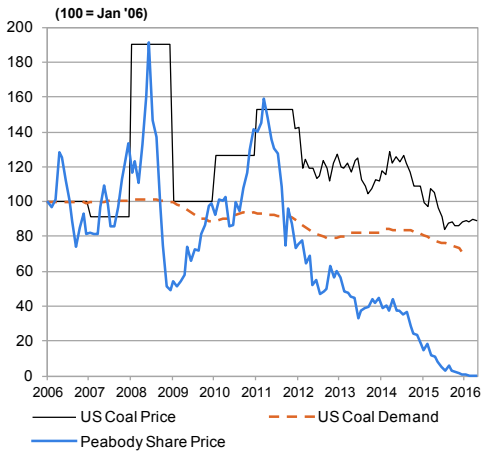
Total's bioenergy businesses, now part of the New Energies division, will move to a new biofuels unit within the refining and chemicals segment. The company is currently converting its La Mede refinery in southern France to biofuels and is engaged in a biojet joint venture with Amyris (NE Apr.23'15). Other notable initiatives announced this week include the creation within the central holding company of a new Civil Society Engagement division, which will manage all of Total's initiatives in this area, and a new Strategy and Climate division responsible for assuring the 2°C global warming scenario is incorporated into Total's strategy (NE Mar.31'16). As part of the major's cost reduction effort, another new segment, Total Global Services, will also pool central functions such as accounting, purchasing and human resources. Total aims to deploy the new gas, renewables and power segment by Sep. 1 and the global services segment by the beginning of next year.

Philippe Roos, Strasbourg

Coal's Crash: A Warning for Oil?

The world's top private coal producer, Peabody Energy, filed for bankruptcy last week, following the US' No. 2 Arch Coal and other large players out the door (NE Apr.14'16). As a result, companies accounting for almost half the coal output in the world's second-largest coal-producing country have now collapsed. This downward spiral is said to have been several years in the making, as coal prices fell relative to natural gas, demand was overestimated, and investments shifted to alternatives. Climate policy and falling renewable energy costs heaped on more troubles. So where does coal go from here, and do its recent stumbles offer any lessons for the oil industry?

Experts tell *EI New Energy* that coal's downfall was the result of coal companies misjudging the market: They invested in new mines and relied on expectations that global coal demand would grow significantly. In actuality, Chinese coal demand didn't take off as expected and low-cost natural gas ate into coal's market share in the US. As a result, coal production trailed below marginal costs due to low coal prices (see graph). Despite these troubles, some say coal is far from dead. Although the US bankruptcies were a blow, "what that's really done is gotten rid of the least competitive ones," said James Stevenson, director of North American coal for IHS, who spoke about the sector as a whole. Low-cost natural gas was the main factor, but gas prices will eventually strengthen and coal will become competitive again, he predicted. "Where coal really loses is that it's much more expensive to build a new coal plant than to build a new gas plant — there will be an ongoing retirement of coal plants and steady building of natural gas and renewables," Stevenson said. "We expect coal demand to be about 55% of what it was in 2015. That's certainly lower, but certainly not zero."



Peabody share price compared with US coal price and demand since 2006, in index value (100 in January 2006). Monthly data except coal price over 2006-11, which is annual. Shows correlation between Peabody share price and coal price, with added impact of demand decline since 2009. *Source: Energy Intelligence*

Climate policy — either present regulations or future steps taken post-Paris — is also viewed as central to coal's fate, although its impact is hard to measure. Going forward, most US coal capacity is due for retirement at the end of this decade or the early 2020s. "We're going to have to replace that capacity at some point anyway, and as we think about how to do that, that's where the current directions of policy — particularly with concerns about climate change — begin to tilt the case away from coal. Then the coal market begins to evaporate as old plants retire," said Ken Medlock, head of the Center for Energy Studies at Rice University's Baker Institute. Environmentalists and divestment campaigners, for their part, believe coal companies set themselves up for failure by overlooking climate concerns. "We see Peabody's bankruptcy as the harbinger of the end of the fossil fuel era," said Lindsay Meiman, a spokeswoman for divestment advocacy 350.org. "The company was unwilling to change with the times, doubling down on fossil fuels as the world called for a shift to renewables."

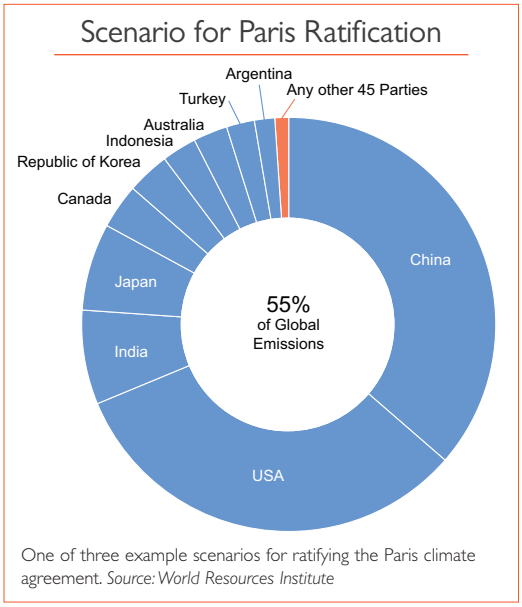
So are coal's troubles — regardless of how long-lasting — a warning siren for oil? "What's happened in the coal market should serve as a warning to all fossil fuel incumbents of how quickly things can change — if an alternative can supply the same product at the same cost," said Jason Sussams, senior researcher at London-based Carbon Tracker, a leading voice behind "stranded assets" warnings (NE Oct.29'15). For example, the rate at which US natural gas was substituted for coal was "incredible" and "the turn-around was rapid," he said. In the oil markets, electric vehicle costs are coming down, signaling that they could eventually compete with oil (NE Apr.7'16). "When electric vehicles do achieve cost parity, things can turn very, very quickly. Those in the oil industry should certainly be aware of what alternative demand futures hold for their business models," Sussams said (NE Nov.12'15). Another example is renewable power in Europe, where several large utilities admitted they didn't move quickly enough to adjust to the growing penetration of renewables in recent years. "Their business model was completely out of line with what demand was," Sussams said, "and they lost significant sums of money as a result."

A rapid downfall for oil would look quite different, requiring a societal shift among individual consumers, not large-scale choices by utilities. Consumers won't switch away from oil unless the cost of alternative vehicles comes down significantly, and even then, consumers' choices swing with the oil market's ups and downs. When oil prices crushed previous records in summer 2008, the Toyota Prius hybrid went on back order, but now that oil prices have sunk, automakers have announced record sales of SUVs, Medlock noted. In any case, Dan Lippe of Petral Consulting believes oil will indeed lose its monopoly on transport, and is currently expecting the next crude oil peak to occur in the 2018-20 window followed by a trough in 2022-24. "Eventually, as crude oil loses its monopoly on transportation fuels markets, crude oil demand will move into an era of slow but inexorable decline and the duration of weak prices will once again extend for 8-10 years," Lippe said. Strategic decisions, of course, are what could make or break any individual energy company. "The most highly leveraged companies will be first in line at the court house doors," Lippe said.

Lauren Craft, Washington, with Philippe Roos, Strasbourg

Full Steam Ahead for Paris Deal

The Paris climate agreement reached in December defied expectations, with all 195 countries there agreeing to an ambitious long-term goal (NE Dec.17'15). But rather than dissipating after the talks, that diplomatic determination to tackle climate change seems to be undiminished as efforts focus now on ratifying the deal — turning it into a functioning, international agreement. This strong momentum will be evident at a signing event at the UN headquarters in New York this week, which 60 heads of state are expected to attend. The UN reckons 155 will sign on Friday — a record for the opening day for signing of an international agreement. Others will have a year to sign the deal, but official ratification could take longer.



One of three example scenarios for ratifying the Paris climate agreement. *Source: World Resources Institute*

When 55 countries accounting for 55% of emissions have done this, the Paris agreement can come into legal force. This is the same benchmark that was applied to the earlier Kyoto Protocol, but a big difference is that this agreement covers all greenhouse gas emissions from every country, not just the developed industrial countries' carbon dioxide (CO_2) emissions. This means the bar is set much lower, and consequently some suggest it could be reached by 2018 or earlier (NE Apr.14'16). "This agreement is going to take effect quicker than cautious people or pessimists thought," said Climate Strategies' Henry Derwent, a top UK government climate change official.

This all marks a sea change from previous climate deals. The 1997 Kyoto Protocol only came into effect in 2005. After the US walked away from the deal, the UN struggled to amass the required 55%. The protocol only came into effect after Russia signed up — having won key trade concessions. This time around, crucially, the US and China are fully engaged and driving the process forward — their presidents recently pledged to ratify Paris this year and will be signing the agreement this week (NE Apr.7'16). Together, they represent 38% of global greenhouse gas emissions, more than half what's required to bring the Paris Agreement into force. Even without the EU on board for now — its slow policymaking process means it's not expected to be able to ratify Paris for a few

years — the US and China, together with a few other countries, could easily reach the implementation threshold (see graph). "The US-China announcement was a big step forward," said Eliza Northrop from the World Resources Institute. "We're also hearing other countries, such as India and Canada, are supportive of joining early. So early entry into force, or certainly earlier than 2020, is definitely on the cards." This would sidestep the need to rely on Russia, the world's fourth-largest emitter of CO_2, whose support for the Paris Agreement is questionable (NE Apr.14'16).

If Paris goes into effect early, it would only have a limited impact in concrete terms, as most provisions of the deal only apply from 2020. However, crucially, signing up early could give those countries a greater say in how the climate agreement is implemented — in areas such as carbon trading, for instance (NE Nov.26'15). "If you get enough countries over the line and reach the 55% milestone, it has a snowball effect, because countries that haven't ratified it cannot participate in the process of developing all the details that will need to sit behind the Paris Agreement," said Damian Ryan from the Climate Group. "That's a pretty strong inventive to get a move on with ratification."

Ronan Kavanagh, London

India Fast-Tracks Actions to Wean Off Oil

India is moving quickly on steps to curb its rising transport emissions, including lofty targets for electric and natural gas vehicles and heavy diesel taxes. Choking air in cities like the capital New Delhi is pushing the country's leaders toward urgent action, and India's desire to cut oil imports and fulfill the Paris climate agreement are adding to its motivations (NE Jan.7'16). Growing affluence and the fast-expanding economy have been stoking India's vehicle sales and transport fuel consumption: In the financial year ended Mar. 31, total vehicle sales rose roughly 3.8% on year to 20.5 million units. This was supported by a 7.8% jump in car sales, their fastest pace of growth in the last five years, to just over 2 million units. In line with this, diesel consumption rose 7.5% to nearly 75 million tons and gasoline was up 14.5% at 22 million tons.

The World Health Organization (WHO) says 13 of the 20 dirtiest cities globally are in India, with New Delhi topping the charts. On Tuesday, the American embassy's Air Quality Index showed New Delhi's air as "unhealthy" and advised people with heart or lung disease and children to avoid exertion. It showed concentrations of fine particulate matter — tiny particles that cause respiratory troubles — above 130 micrograms per cubic meter against WHO's recommended level of no more than 10 micrograms.

Alarmed, New Delhi has restricted the use of private vehicles on roads for the second half of April — the second time it has taken such a drastic measure. In addition, the Supreme Court of India has banned sales of luxury diesel cars in New Delhi and adjoining areas since December, which will last through the end of this month. It has also directed taxi operators in New Delhi to shift their fleet to natural gas from diesel by Apr. 30. This has led to a flurry of action, with Oil Minister Dharmendra Pradhan opening as many as 36 new retail fuel outlets in a single day on Apr. 7, in and around New Delhi, for dispensing compressed natural gas to vehicles. Analysts say the Supreme Court is also contemplating new taxes on diesel cars to curb fuel use. Pradhan's ministry had already announced in January that India will leapfrog to Euro VI tailpipe emissions standards by April 2020 — up from the current Euro IV requirements, skipping the Euro V stage entirely (NE Jan.21'16).

Over the years, India's government has encouraged the use of diesel in the economy by keeping diesel taxes — and, by extension, prices — lower than gasoline, said Anumita Roychowdhury, executive director at New Delhi-based advocacy group Centre for Science and Environment. While gasoline currently sells for 61 rupees (92¢) per liter in New Delhi, diesel sells at 48 rupees (72¢). India has done this because diesel is used in public transport and also by farmers for irrigation equipment. Now, pressure is increasing for the government to check diesel use and promote vehicles that run on alternative fuels (NE Dec.3'15).

Given the strong case for alternatives, India's government is considering some innovative — and in some cases, surprising — solutions. A group of four ministers is evaluating an incredibly ambitious plan for all of India's cars to be switched to electric drive by 2030: "India

can become the first country in world of this size that runs 100% on electric vehicles," said India's Federal Power Minister Piyush Goyal. The group is even considering special financial arrangements to help consumers swallow the high upfront price of EVs, he said last month (NE Apr.7'16).

But shifting away from diesel and gasoline won't be easy. For EVs, India is starting from square one in building out charging infrastructure. Also, two-thirds of electricity produced in India is produced by coal, raising doubts about the life-cycle benefits of EVs. Roychowdhury points out that EVs have limited driving ranges, requiring other solutions for heavy-duty vehicles or long-haul car trips (NE Aug.27'15). With natural gas vehicles, energy security is the main hurdle. India is already an importer of gas, so increasing gas consumption with vehicles would only increase this dependency. And, as with EVs, infrastructure is also an obstacle for NGVs: only a handful of cities, like Delhi, have retail stations that sell gas as a vehicle fuel. Also, India has only a 16,000-kilometer gas pipeline network, a fraction of what the US has. With farmers not allowing pipelines across farmlands, gas infrastructure would be limited to select cities.

Rakesh Sharma, New Delhi

China: Electric Cars a Lifeline for Fuel Economy

China's strict new fuel economy standards kicked in this year, compelling automakers to progressively lower the average consumption of cars they sell to no more than 5 liters per 100 kilometers in 2020 (NE Apr.14'16). Under this new, fourth-phase standard — applicable to passenger cars — an annual average reduction of 6.2% is required over 2016-20 from the 2015 limit of 6.9 liters (see table). For automakers, this represents a daunting task considering they only achieved a fuel consumption cut of under 2% over the past few years. Besides the cost and technological challenges, Chinese automakers must also contend with consumers' preferences for larger, more fuel-intensive models like SUVs, which are undermining fuel economy ambitions. To ensure the 2020 fuel economy standard is met, "new-energy" vehicles (NEVs) — defined as pure electric vehicles (EVs), plug-in hybrids and fuel-cell models — will play a crucial role, alongside advanced energy-saving technologies and a proposed trading mechanism for fuel economy credits, according to the nonprofit Innovation Center for Energy and Transportation (iCET).

China's Next Fuel Economy Targets

Year	Fuel Economy Limit (liters/100 km)	Annual Reduction (liters/100 km)	Annual Reduction (%)
2014	7.12	0.21	-2.8%
2015	6.90	0.22	-3.1
2016	6.70	0.20	-2.9
2017	6.40	0.30	-4.5
2018	6.00	0.40	-6.3
2019	5.50	0.50	-8.3
2020	5.00	0.50	-9.1
Annual Average Gain % 2016-20			**-6.2%**

2014 is actual, 2015-20 data based on national targets. *Source: Innovation Center for Energy and Transportation*

Vehicle emissions are a major contributor to the choking smog plaguing many congested Chinese cities, so the country has little choice but to push hard at auto-fuel efficiency. Successful implementation of the latest standard would cut carbon dioxide emissions by a cumulative 113 million tons by the end of 2020 and conserve 35 million tons in oil consumption, according to estimates by the Ministry of Industry and Information Technology. China currently lags Europe and Japan in vehicle fuel economy, but is making great strides in setting standards that will allow it to catch up by 2020, iCET's Beijing-based Liping Kang tells *EI New Energy* (see table). However, to meet the fuel economy limits in 2020, or even 2015, Chinese car makers will need to rely heavily on the sales of NEVs, which count toward the regulation as having zero fuel consumption and are also weighted two to five times more heavily than traditional cars toward compliance over 2016-20.

International Fuel Economy Standards

	Targets (liters/100 km)			
Year	China	EU	US	Japan
2015	6.90	5.20	6.70	5.90
2020	5.00	3.80	6.00	4.90
2025	4.00	3.00	4.80	NA

Source: China's Ministry of Industry and Information Technology

Chinese officials have yet to announce the fuel consumption figure achieved in 2015, but iCET estimates suggest China was able to meet the fuel economy requirement for last year, provided NEVs are included in the calculations, says Kang. The 2014 national average was 7.22 liters — without counting NEVs, which would have lowered the value to 7.12 liters. The impact of NEVs on fuel economy is growing fast: NEV sales posted a stunning 340% year-on-year expansion to 331,000 last year, accounting for 1.3% of total automobile sales, up from just 0.3% in 2014 (NE Apr.7'16). The central government is aiming to boost cumulative NEV sales to 5 million in 2020, and has strong policy incentives in place such as generous cash subsidies and exemptions from stringent license plate quotas and driving restrictions. Beijing is also mulling a zero-emission vehicle mandate that imposes numerical EV targets akin to a Californian scheme already in place, China Finance Minister Lou Jiwei told an EV forum early this year (NE Sep.5'13).

If the NEV sales target is met, China's fleet is expected to squeeze out an additional 0.5 liters/100 km in 2020, according to iCET's 2015 annual report on passenger vehicle fuel consumption. China's industry ministry also allows for a deduction of up to 0.5 liters if car makers incorporate energy-saving technologies like high-efficiency air conditioning, engine stop-start systems and gear-shift indicators (NE Jul.10'14). With the combined 1 liter savings from these two incentives, the actual fuel consumption improvement needed in traditional cars over 2016-20 (from 6.9 liters to 5 liters/100 km) becomes much more attainable at just 0.9 liters instead of 1.9 liters, the iCET notes. Another important policy tool to encourage quicker fuel economy compliance is the proposed trading mechanism: Car makers able to over-deliver on their yearly targets will accumulate credits, which can be transferred for a price to those lagging behind. This can help offset the costs of fuel economy technological upgrades, estimated at 7,000 yuan-15,000 yuan ($1,100-$2,300) per car. Implementation details for this scheme are likely to be announced later this year, says Kang. "China's fuel economy management system also needs fine-tuning, one aspect being the lack of financial penalty and other effective punitive measures, resulting in fewer drivers and less pressure on automakers to upgrade technology to meet standards, dragging down the rate of improvement in the past years," she added.

Kimfeng Wong, Singapore

Why Investors Aren't Crossing the Natural Gas 'Bridge'

With both oil and natural gas markets likely to stay in a slump in the near term, it's worth asking where investors see better opportunities. In the long run, the move toward lower-carbon energy is expected to boost gas, as investor concerns mount over the volumes of high-cost, high-carbon oil assets in energy companies' portfolios. This is likely to tip the scales in gassier companies' favor. For the time being, however, stock market valuations suggest the opposite. Indeed, most big investors with shorter investment horizons — players aiming to outperform the broader market on a quarterly or annual basis — are betting much more aggressively on oilier firms. "In general, investors have gotten more constructive on crude and there is a desire to increase exposure. Undoubtedly some of this move is reflective of higher crude prices, but we also believe this trade could have some more legs," says Wells Fargo analyst David Tameron. He says energy investors are looking for "more beta" — a measure of volatility — focusing on oilier names in the exploration and production sector with decent balance sheets.

While oil companies have largely accepted a "lower-for-longer" or "medium-for-longer" price outlook, many investors still regard the sector with much promise. They point to big investment cuts over the past two years that they believe will ultimately spur a sharp oil-price rebound they don't want to miss. This sentiment also applies to the majors, although the correlation is less pronounced due to their diverse, integrated portfolios, with share prices of oil-heavy Chevron and Exxon Mobil doing better than those of Royal Dutch Shell, fresh off its gas-focused acquisition of BG. Right or wrong, many investors believe oil prices will recover from current levels of around $40 per barrel over the next two or three years. Some of the US upstream's biggest underperformers over the past year have been companies with gas-dominated production portfolios. The SIG Exploration & Production Index in the US, which most analysts use as a benchmark, shows a 44% loss over the past 12 months.

Financial concerns — plus overcapacity in global gas and LNG markets — means major oil companies with more robust gas portfolios such as Shell aren't being rewarded for making the clean energy "transition" (NE Apr.16'15). Ken Medlock, head of the Center for Energy Studies at Rice University's Baker Institute, suggests the situation may not change any time soon. He says majors can cover operating costs with cash flow from the slew of LNG projects coming on stream, but sees "no growth opportunity in LNG for the next decade" (WGI Mar.9'16). Despite a bigger push toward gas over the past decade, the production profile of six leading majors — Exxon, Shell, Chevron, BP, Total and Eni — remains on average geared 57% towards liquids, which account for 9.7 million barrels of oil equivalent per day of total combined output of 17.1 million boe/d. Andrew Logan, head of the oil and gas program at Ceres, a US-based coalition of investors representing $1.9 trillion in assets under management, says it's difficult for long-term investors — even more socially responsible ones — to reward majors for holding substantial gas reserves when "more than half their assets are oil and could be at great risk of being stranded" by future climate policies.

Paul Merolli, Washington

IN BRIEF

Exxon Fights Climate Probe

Exxon Mobil has started to fight back against investigations launched by prosecutors in several US jurisdictions to determine whether the company misled investors and the public about the risks of climate change. The company filed a petition in its home state of Texas last week, asking a court to strike down a subpoena issued by Attorney General Claude Earl Walker of the US Virgin Islands. The subpoena seeks documents going back almost 40 years as part of the territory's probe of whether Exxon deliberately withheld information about the link between fossil fuels and global warming (NE Dec.10'15). Exxon has denied the allegations, which are also being investigated by the state attorneys general of New York, California and Massachusetts. So far, Exxon appears only to have launched a legal challenge against the Virgin Islands probe. In its petition, the company accuses Walker of conducting an "abusive fishing expedition," and contends that the move violates the company's rights under the US and Texas constitutions.

Norway Fund Excludes Coal Firms

Norway's oil fund, the world's biggest sovereign wealth fund, has excluded 52 coal-dependent companies from its portfolio in a further sign of the financial community's stricter criteria for investments in fossil fuels. Norway's finance ministry had announced plans last year to impose stricter investment criteria on coal assets. It followed a call from a key parliamentary committee to divest from companies that generated more than 30% of their output or revenue from coal, either mining or using coal as a fuel for electricity generation (IOD Jun.1'15). Norges Bank said the exclusions from the $860 billion Government Pension Fund Global were based on Norges Bank Investment Management's analysis of a first tranche of companies that could be affected. The fund's list of excluded companies includes the world's largest coal producer, Coal India, along with Chinese mining giants China Coal Energy and China Shenhua Energy. The world's largest privately owned coal producer, Peabody Energy, which filed for bankruptcy last week, was also listed (p2).

Wind Installations Break Record

Annual wind installations crossed the 60 GW mark for the first time in 2015 at 63 GW, up from 52 GW in 2014, the Global Wind Energy Council (GWEC) found in its annual report. China accounted for almost half of this growth, with an "astonishing" 31 GW of new projects. China is now surpassing the EU's total installed capacity, at 145 GW versus 142 GW, or one third of the world's 433 GW. Both Europe and the US performed better than expected last year, at 14 GW and 9 GW, respectively, with Europe's offshore sector setting a new record at just over 3 GW. GWEC projects that global wind capacity will nearly double in the next five years to 790 GW in 2020, led by China but with major contributions from Europe and the US.

Indonesia Cuts Biodiesel Buying

Indonesia has committed to buy up to 1.6 billion liters (10.6 million bbl) of biodiesel from local producers over the period from May to October, down from the 1.87 billion liters purchased in the previous tender for November 2015 to April 2016, Reuters reported this week. The decline, which came despite an increase this year in the mandated bio-blending ratio from 15% to 20%, has been attributed to reduced demand from transport. Jakarta wants to boost the consumption of domestically produced biodiesel as a means of cutting its diesel import bill and also propping up prices of palm oil for export, but the widening price gap between biodiesel and regular diesel is threatening full implementation of the bio-blending mandate (NE Nov.19'15).

Africa Could Export Renewables

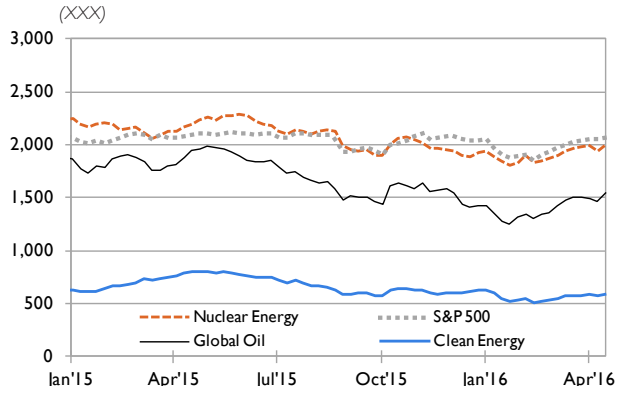
North Africa has the potential to not only produce all its electricity from renewables, but also to export "considerable" amounts to Europe, Germany's Fraunhofer Institute found in a new report on a future "supergrid." Intermittent solar photovoltaic (PV) and wind would need to be complemented by concentrated solar power with thermal storage, which can generate at any time and in a controllable manner, the report emphasizes. PV should be mainly used locally, it adds, as the advantage of higher sunshine levels in arid areas away from the coasts is "overcompensated by high transmission costs." The integration of European and North African grids in a cross-Mediterranean system would lead to lower total costs, Fraunhofer found.

Vattenfall Sells Off Lignite

Swedish state-owned Vattenfall has taken a $3.3 billion hit (up to SEK 27 billion) on selling unwanted lignite power stations and mines in Germany. The sale to Czech Republic energy company EPH — which owns German generator Mibrag — and investment group PPF Investments, despite costing billions, was a cheaper alternative to keeping the assets, Vattenfall said. Post-sale, Vattenfall will increase its share of climate neutral generation to more than 75%, compared with 50% now, with annual CO_2 emissions dropping from 80 million tons per year to 25 mt/year, notes chief executive Magnus Hall. Vattenfall, like peers E.On and Engie, plans to concentrate on renewables and regulated grids (NE Jul.16'15).

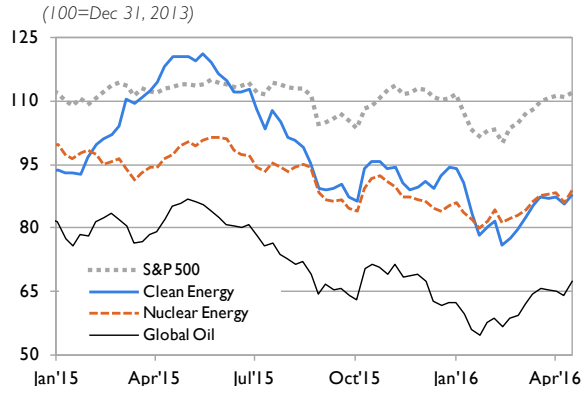
CLEAN ENERGY EQUITY MARKETS

Energy Equity Index Values



Source: Standard & Poor's

Energy Equity Class Performance



Source: Standard & Poor's

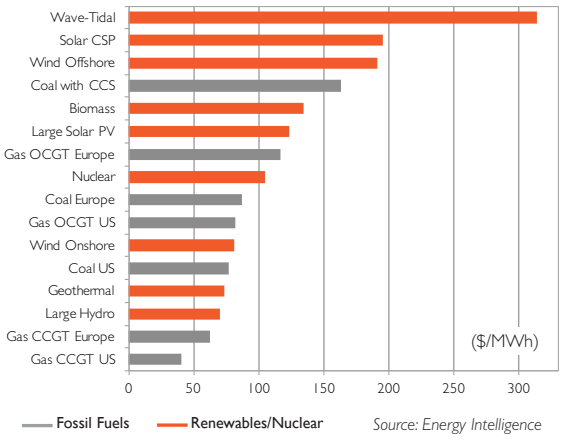
EI NEW ENERGY DATA

Energy Futures: Reference Prices

Carbon (€/ton)	Apr 19	Apr 12	Chg.
ECX EUA	5.56	5.58	-0.02
ECX CER	0.40	0.43	-0.03
Crude oil ($/bbl)			
Nymex light, sweet	41.08	42.17	-1.09
ICE Brent	44.03	44.69	-0.66
Natural gas ($/MMBtu)			
Nymex Henry Hub	2.09	2.00	+0.08
ICE UK NBP	3.96	3.81	+0.16
Coal ($/ton)			
Nymex Capp*	43.63	43.63	0.00
ICE Rotterdam	46.05	44.85	+1.20

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

Global Electricity Prices

Europe ($/MWh)	Apr 19	Apr 12	Chg.
Germany (EEX)	27.05	32.49	-5.44
France (Powernext)	28.06	31.81	-3.75
Scandinavia (Nordpool)	24.45	27.74	-3.29
UK (APX)	52.38	50.53	+1.86
Italy (GME)	33.00	37.60	-4.59
Spain (Omel)	32.85	25.44	+7.41
North America			
New England	29.63	40.50	-10.88
Texas (Ercot)	20.95	17.37	+3.58
US Mid-Atlantic (PJM West)	30.77	32.28	-1.52
US Southwest (Palo Verde)	21.75	18.25	+3.50
Canada (Ontario)	4.01	4.17	-0.16
Other			
Australia (NSW)	86.91	89.09	-2.18
Brazil (SE-CW)	15.40	14.31	+1.09
India (IEX)	37.07	47.50	-10.43
Japan (JPEX)	71.32	66.07	+5.25
Russia (ATS)	17.04	15.66	+1.37
Singapore (USEP)	33.84	33.51	+0.33

Wholesale prices. *Source: Exchanges*

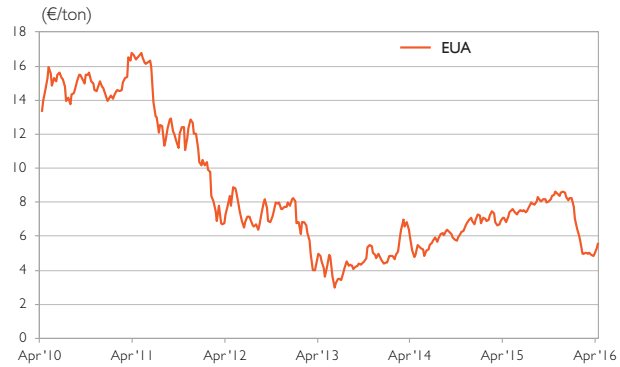
DATA: The complete set of *EI New Energy* data is available to web subscribers, including full levelized cost of energy (LCOE) calculations, fuel switching thresholds, electricity production by sector; ethanol and biodiesel fundamentals, carbon prices, methodologies and reader's guides. Historical data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

Global Carbon Prices

Europe (€/ton)	Apr 19	Apr 12	Chg.
EUA Dec '16	5.57	5.59	-0.02
US ($/ton)			
CCA (Calif.) Dec '16	12.33	12.56	-0.23
RGGI (Northeast) Dec '16*	5.17	5.44	-0.27
New Zealand (NZ$/ton)			
NZU (spot)	13.10	13.10	0.00
Asia ($/ton)	**Apr 15**	**Apr 8**	**Chg.**
China-Guangdong	2.50	2.20	+0.30
South Korea	16.04	16.15	-0.11

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

EU Carbon Futures Prices



ECX front-month futures. *Source: ICE*

Key Biofuel Prices

US ($/gallon)	Apr 19	Apr 12	Chg.
Futures			
CBOT Ethanol	1.5630	1.5190	+0.0440
RBOB Gasoline	1.4799	1.5343	-0.0544
Spot market			
Ethanol Midcont.	1.53	1.51	+0.02
Ethanol NY Harbor	1.60	1.57	+0.03
Ethanol US Gulf	1.60	1.57	+0.03
Europe ($/ton)			
Futures			
ICE Gasoil	378.50	376.00	+2.50
Spot market			
Gasoline	480.00	496.00	-16.00
Diesel	376.25	375.00	+1.25
Biodiesel			
Fame 0	835.00	795.00	+40.00
RME	800.00	790.00	+10.00
SME	840.00	805.00	+35.00
PME	815.00	785.00	+30.00

Source: Thomson Reuters, ICAP, Exchanges

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