Global Utilities

COP 21—Mind the Gap

Equities

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195 countries agree on 2°C warming objective; implies tougher targets

If legally ratified, the COP 21 agreement will likely lead to significantly stronger carbon reduction targets over time, as it is generally agreed that the currently announced targets will not limit warming to 2°C, and yet the signatories have agreed to hold the increase to "well below 2°C". Various studies have concluded that the current targets will result in an unacceptable level of warming that is between 2°C and 4°C.

It's more than a gap, it's a chasm

If warming is to be limited to 2°C, it implies an around 80% reduction in emissions on a global scale over the next 30 years. This would likely require most thermal generation to be replaced by low emission technology. Our forecasts have China growing from 9 GT CO_{2e} to 13 GT CO_{2e} by 2030, when in fact our calculations show that it needs to decline to 2GT CO_{2e} by 2030. The US's INDC calls for reductions from ~6.2 GT CO_{2e} in 2005 to ~4.7 GT CO_{2e} by 2025, but our calculations show that emissions would need to drop significantly to ~1.1 GT CO_{2e} by 2030 in the 2°C scenario. This highlights the extent of the challenge that the delegates have signed the world up for.

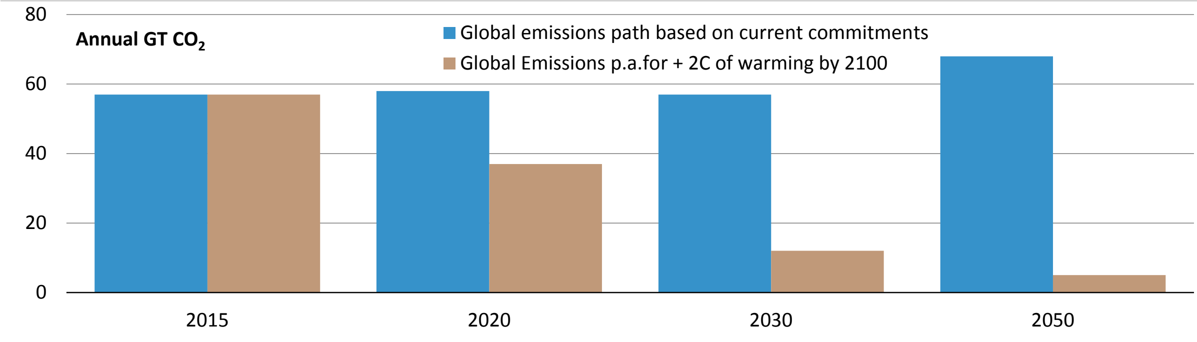
A significant threat to coal-fired power generation

To deliver the carbon reduction needed to come in at under 2°C of warming will require a shift away from thermal power generation. At the moment, the alternatives are hydro, nuclear, wind and photovoltaics (PV). In the future, carbon capture and storage (CCS) could play a role and keep some thermal power plants in the game, but CCS progress is slow. We are positively biased towards independent power producers (IPPs) and utilities that are overweight renewables. Oil is the second-largest source of carbon emissions globally, and a low carbon environment likely means many more electric vehicles will join the global fleet.

Who will benefit the most and least as we try to bridge the gap

We think the greatest potential negative impact will be on the Chinese IPPs, with their significant current and planned future exposures to coal-fired capacity. Investors will need to follow closely any shifts in policy that may come as the government decides if it needs to radically shift away from its current path. Our least preferred stock is Huaneng International Power. The significant beneficiaries should be the nuclear and renewable power producers, especially those implementing significantly large units that will replace coal units. We like CGN Power, Huadian Fuxin and Next Era Energy (NEE).

Figure 1: 2°C scenario path compared to current commitment path



Source: Climateinteractive.org, UBS estimates

Agreement and status summary

Conference of Parties 21 (COP 21) was attended by 40,000 delegates, and was held by the United Nations under the Framework Convention on Climate Change. The main outcome was an agreement to the key terms, which are summarised below (key extracts from the relevant Articles of the final agreement are shown in the appendix to this note).

Stabilising temperatures

The Paris Agreement commits 195 countries to work together to limit global warming to no more than 2°C above pre-industrial levels, with a stretch goal of keeping below 1.5°C of warming.

Each country has submitted an Intended Nationally Determined Contribution (INDC), stating what it will do to curb emissions, increase renewable energy, and/or reduce deforestation.

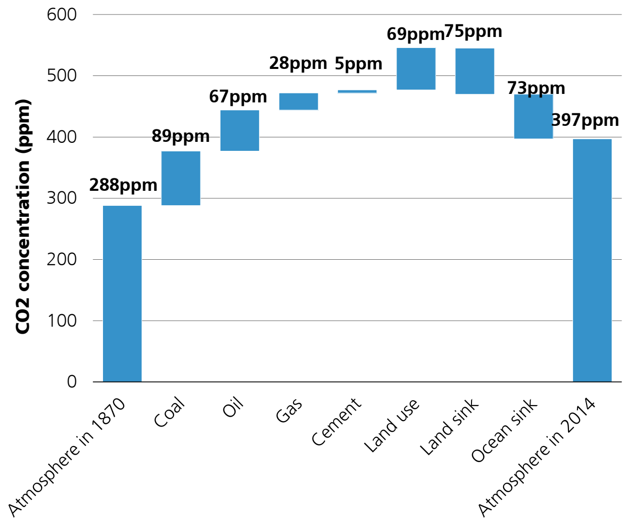
- INDCs are voluntary.
- The INDCs are insufficient to achieve the 2°C goal. Data produced by www.climatetracker.org (based on a model developed at MIT) implies that the INDCs if strictly observed would lead to around 4°C of warming by 2100. The global average surface temperature in the 20th century was 13.83°C.
- In 2018, countries are due to report on their INDC progress.
- By 2020, new INDCs have to be produced.
- The Paris Agreement is not a treaty and INDCs are not binding. This likely means that the US Senate will not be required to ratify the agreement from the US's perspective.
- Countries are bound to participate in a system for measuring progress on achieving goals.
- All 195 signatories have agreed to recognise that climate change represents an urgent and potentially irreversible threat to human societies.
- To enter into force, the Agreement will need to be ratified by at least 55 nations under the UN climate convention. These parties must also be responsible for at least 55% of total greenhouse gas emissions.

Emissions and sources of emissions

Research on climate change has a long history. As far back as 1988, NASA scientists were testifying before a US Senate Committee that they were 99% certain that global warming was underway. This was the year that the United Nations established the Intergovernmental Panel on Climate Change (IPCC). By 1992, they had published their first report and the Framework Convention on Climate Change (FCCC) was signed at the Rio Earth Summit.

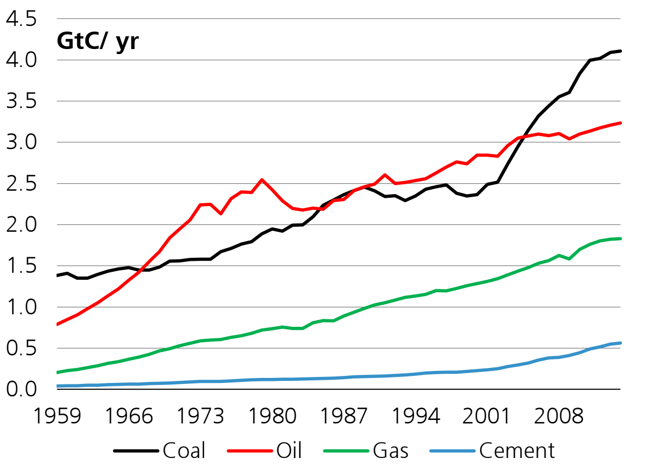
At the First Conference of the Parties (COP-1) of the FCCC in 1995, Parties recognised the inadequacy of the Convention's voluntary targets, and initiated the process of negotiating legally-binding targets of emission reduction or limitation for the so-called Annex I countries (i.e. developed countries and those with economies in transition). This convoluted process culminated at COP-3, giving birth to the Kyoto Protocol to the FCCC, a historic landmark in international environmental law. The Kyoto Protocol committed countries to reduce their overall greenhouse gas (GHG) emissions by at least five per cent below 1990 levels during the five-year commitment period of 2008-12.

Figure 2: Emissions by source



Source: Global Carbon Project

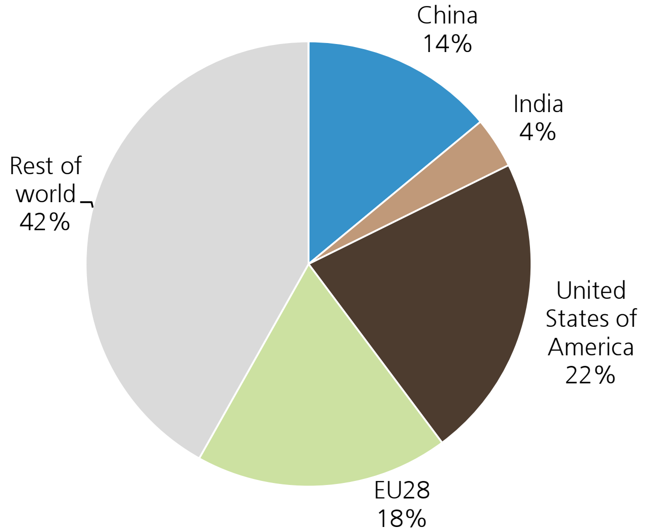
Figure 3: Historical emissions by fuel



Source: CDIAC

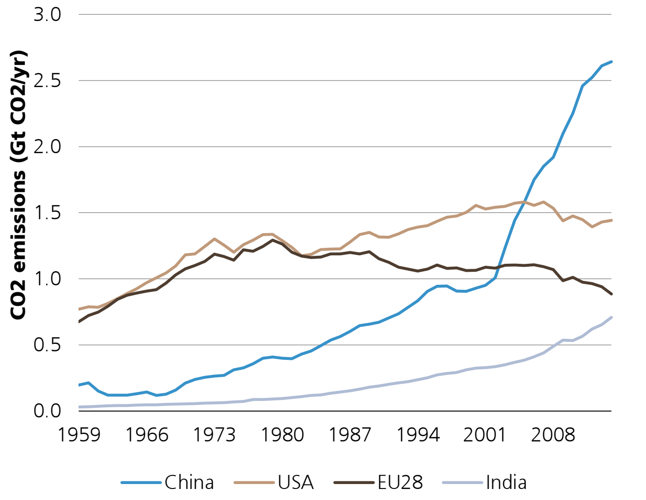
Post-Kyoto, the world has struggled to reach binding agreements. At the end of the Copenhagen meeting (COP 16), the most critical meeting after Kyoto, the consensus was that the meeting fell short of its aims. The so-called Copenhagen accord recognised the scientific case for keeping temperature rises to no more than 2°C, but did not contain legally-binding commitments to emission reductions to achieve that goal. This recent meeting in Paris (COP21) represents the most strongly worded agreement to target a warming of no more than 2°C and to set a stretch target to come in below this number. Specifically, Article 2 of the Paris agreement states that the parties plan on "holding the increase in the global average temperature to well below 2°C above pre-industrial levels, and to pursue efforts to limit the temperature increase to 1.5°C above pre-industrial levels, recognising that this would significantly reduce the risks and impacts of climate change".

Figure 4: Cumulative emissions by key geography



Source: CDIAC

Figure 5: Historical emissions by geography



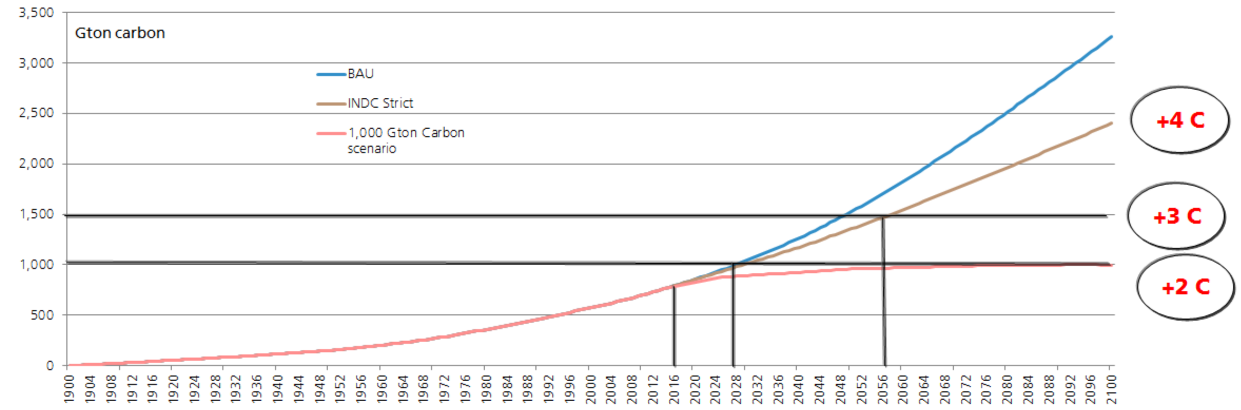
Source: CDIAC

Carbon budget and INDCs

The key contextual information and assumptions that underlie the INDC analysis are as follows.

- The climate sensitivity is 3. That is, a doubling of CO2 concentration would lead to a 3°C temperature change. This relationship is linear, and emissions stay in the atmosphere for thousands of years.
- The current concentration is 397 ppm of CO_2.
- To keep temperature change at 2°C relative to the 20th century average of just under 14°C, cumulative emissions need to peak at around 1000 GT of carbon. 1GT of carbon = 3.66 GT of CO_2.
- Cumulative carbon emissions at the end of 2015 are estimated at 775 GT, an increase of about 15.6 GT YoY.
- At the current rate, 1000 GT will be reached in 2030.
- The following chart shows the emission path under the current INDC as calculated by www.climateinteractive.org, and UBS's estimate of one of many potential paths that would get to 1000 GT of carbon by 2100.

Figure 6: Temperature impacts of announced INDCs relative to Paris commitment of 2°C



Source: Climate Interactive, UBS estimates

A summary of emissions under the estimated path way is as follows. The pathway is designed to be illustrative of the scale of change required after 2020 by new INDCs if the 2°C goal of COP21 is to be achieved by 2100.

Figure 7: Global emissions path milestones to limit warming to 2°C

	GT carbon emissions	Reduction relative to 2015 levels
2015	15.6	
2020	10	-36%
2030	3.3	-79%
2040	1.3	-92%

Source: UBS estimates

Utilities—significant cuts needed to limit a 2°C rise

We assume that utilities will in some way, shape or be responsible for their share of emission reductions. There are two major ways that utilities can reduce carbon emissions. 1) Substitute lower emission generation for higher emission generation. 2) Employ energy efficiency measures to see lower total demand for electricity. Essentially, a 2°C target requires largely carbon-free output from about 2030 onwards. The benefits and opportunities that could emerge are as follows.

- The replacement of most fossil-fuelled power generation with carbon-light generation, most likely wind, PV and nuclear.
- Alternatively, carbon capture and storage (CCS) could become more significant. Relative to the progress made by renewables over the past decade, progress in making CCS more economic and even technically proven has been insignificant.
- An increasingly large opportunity for storage.
- Likely considerable grid reinforcement.
- Investment in energy efficiency measures (i.e. residential time of use meters, energy-efficient motors, LED lightbulbs).

As transport (measured by oil consumption) is the second-largest source of CO_2 emissions, it is likely that a 2°C target would require substantial substitution by

renewable electricity for oil. We estimate this could add over 40% to current global electricity demand.

On the negative side:

- Renewable generation presently needs to be forced into a market with little or no consumption growth. That makes the economics more difficult.

- In some countries with renewable support/subsidies but without explicit carbon costs, the impact of new renewables is to force low-emission fossil fuel generation out of the merit order—i.e. renewables would end up substituting for gas rather than coal.

- The technical ability of the "grid" to cope with large swings in supply associated with very high levels of intermittent generation (above 50%) is unproven and will almost certainly require storage. Electricity storage still does not have much of a track record at the utility level.

Individual country targets and implications for utilities

In this section, we detail the Intended Nationally Determined Contributions (INDCs) proposed by various countries, bearing in mind that China and the US alone are the source of around 45% of annual emissions. Making the additional assumption that each country is responsible for contributing proportionately to tighter INDCs post-2020 in order to achieve the goal of limiting warming to 2°C, we then show the CO_2 reduction from each country relative to 2015 to achieve 2°C growth.

Figure 8: Selected targets offered ahead of COP21 (INDCs)

Country	Base Level	Reduction Target	Target Year	Use of international markets?
China	2005	Emissions peaking 60-65 % (carbon intensity)	2030 (or before)	Not Specified
United States	2005	26-28 %	2025	No
EU	1990	0.4	2030	No
India	2005	33-35 %(carbon intensity)	2030	Not mentioned
Russia	1990	25-30 percent	2030	No
Japan	2005 2013	25.4% 26%	2030	The amount of emission reductions and removals acquired by Japan under the Joint Crediting Mechanism (JCM) will be appropriately counted as Japan's reduction.
Korea	BAU	37 percent	2030	Will use market mechanisms partly, in accordance with relevant rules and standards.
Vietnam	BAU	8 % Unconditional 25% conditional	2030	Not mentioned
Philippines	BAU	70 percent	2030	Not specified
Singapore	2005	36 % (emissions intensity)	2030	Intends to achieve INDC through domestic efforts, but will continue to study the potential of international market mechanisms.
Australia	2005	26-28 percent	2030	Not mentioned
Thailand	BAU	20 % (unconditional) 25% conditional	2030	Continue to explore the potential of bilateral, regional and international market mechanisms

Source: Country INDCs

Figure 9: Selected country emissions based on announced INDCs

MT CO_2	2005	2010	2015	2020	2030
Australia			541	533	453
China	6,326		8,472	9,836	13,000
India	1,500			3,600	5,500
USA	6,200	6,000	5,700	5,200	*4,700
Electricity share MT (based on share 2015 emissions)					
Australia			186	172	146
China	2,047		3,873	4,497	8,914
USA	1,922	1,860	1,767	1,612	1,457

*2025 target for the US.
Source: Government policy announcements, UBS estimates

Figure 10: 2°C scenario path compared to INDC path

Annual GT CO_2	2015	2020	2030	2050
Global emissions INDC path	57	58	57	68
Global Emissions for 2°C by 2100	57	37	12	5
Reduction GT of CO_2 for 2°C relative to INDC			-45	-63
Reduction %			-79%	-93%
Emissions by country 2°C scenario, assuming constant global share				
Australia	0.5	0.3	0.1	0.0
China	8.5	5.4	1.8	0.7
India	2.6	1.7	0.5	0.2
USA	5.3	3.4	1.1	0.4

Source: Climateinteractive.org, UBS estimates

Figure 11: 2030 INDC path compared to the 2°C scenario

2030 emission reduction from 2015 @ 2°C target MT CO_2	2030	2050
Australia	-427	-489
China	-6,680	-9,016
India	-2,046	-3,300
USA	-4,200	-4,900

Source: UBS estimates

Australia

Australia's 2020 emission reduction target

Australia has committed to reducing emissions by 5% below 2000 levels by 2020 (equivalent to a 13% reduction on 2005 levels). As of August 2015, the government is on track to meet its 2020 target.

Australia has committed to a 2030 target of reducing emissions by 26-28% below 2005 levels. In per capita terms, Australia's target represents cuts of 50-52% by 2030 and 64-65% per unit of GDP.

The below policies are currently in use to meet the 2020 target. The Australian government will undertake consultation in 2017-18 to determine further post-2020 emission reduction policies.

Figure 12: Australia's NDIC policy instruments

Policy	Description
Emissions Reduction Fund	This voluntary scheme aims to provide incentives for organisations and individuals to earn Australian carbon credit units (ACCUs). One ACCU is earned for each tonne of carbon dioxide equivalent negated or avoided by a project. The government has provided A$2.55bn to establish the fund.
Renewable Energy Target (RET)	The RET scheme operates in two parts—the small-scale target (SRES) and the large-scale target (LRET). The LRET provides financial incentives for the establishment of renewable energy sources. One LGC is created for each MWh of green electricity generated. It can then be sold to retailers who surrender them to the Clean Energy Regulator to show their compliance to the RET. The current scheme calls for large-scale generation of 33,000 GWh by 2020.
National Energy Productivity Target	To improve Australia's energy productivity by up to 40% over 2015-30. This involves creating efficient incentives, educating/empowering consumers, helping businesses transition to energy-efficient practices, and promoting innovation.

Source: Government websites

Implications for Australian utilities

Under the currently announced INDCs, there will only be small implications for Australian utilities in the next few years. This is because Australia is already close to meeting its announced target. We estimate that on a proportionate basis, electricity emissions need to fall just 16 mt by 2020 and 40 mt by 2030.

Even under a 2°C path, stationary emissions need to fall by just 30% by 2030 from 2015 levels, but they then need to keep falling to zero a few years later.

We expect some level of consumption growth between now and 2030. Before allowing for electric vehicles, we think 0.5% per year of consumption growth is a reasonable estimate.

For further analysis of the impact of a higher percentage of renewables in Australia, please refer to Energiewende: Aussie style.

Carbon tax likely to return to the agenda

On the assumption that Australia will put in place policies to achieve the 2°C target it has signed up for in Paris, although not yet ratified, we think it is more likely that some form of carbon tax will be imposed. We think it is generally

accepted that polices that incentivise renewables are insufficient to create the necessary adjustments to carbon output.

A carbon tax sends an economy a wide price signal, rather than being specific to utilities. As far as utilities go, renewable energy tends to push out carbon light, thermal generation, first gas, and then black coal. High carbon emitting brown coal is the last power generation fuel to be pushed out by renewables.

On the other hand, a carbon tax increases the costs of high carbon emitting generation.

As the 2°C target, if it is to be achieved, requires a relatively fast adjustment, we think it is the obvious tool to turn to for faster adjustment. We believe if other countries such as China and the US were to move in that direction, the chances of a carbon tax in Australia would increase.

Stock implications

Figure 13: Implications for Australian utilities (INDC)

	Reuters Code	Rating	Share Price (A$)	Price Target (A$)	Price Upside	Mkt Cap(A$bn)	Impact of current Country target	Impact of potential policy to meet 2 degree warming
AGL	AGL.AX	Neutral	16.49	16.50	0.1%	8.9	Minor negative	Strong negative
APA	APA.AX	Buy	8.29	9.25	11%	5.4	Largely irrelevant	Would benefit from carbon tax
DUE	DUE.AX	Neutral	2.31	2.41	4%	2.7	Very minor	Would benefit from carbon tax
EPW	EPW.AX	Neutral	1.48	2.00	36%	0.6	Very minor	Neutral
IFN	IFN.AX	n.a	0.46	n.a.	n.a.	0.2	Benefits from renewables policy	Strong winner from carbon tax and renewables policy
ORG	ORG.AX	Buy	4.35	6.57	51%	16.0	Very minor	Mixed
SKI	SKI.AX	Neutral	1.87	2.02	8%	2.4	Very minor	Could benefit from investment in distributed generation
SPN	AST.AX	Buy	1.42	1.53°	8%	4.4	Very minor	Benefits from transmission and distributed generation

Note: Above data as of 15 December 2015.
Source: Company data, UBS estimates

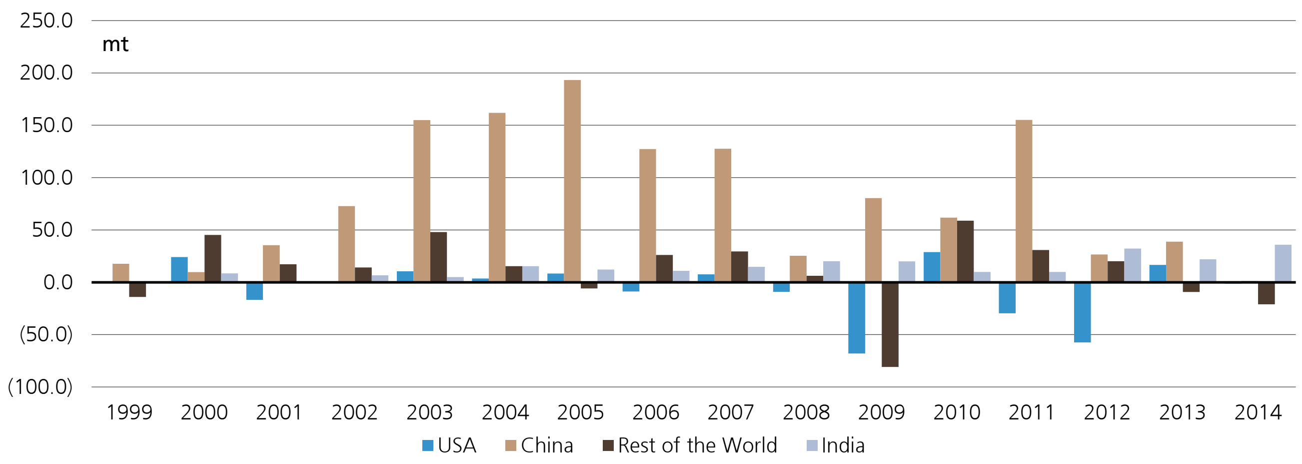
China

The relentless increase in China's combustion of coal has been potentially the single biggest cause of surging global warming emissions over the past 25 years. Almost 10 years ago, China surged past the US to become the world's biggest carbon emitter. We forecast that China's annual CO_2 emissions could reach twice that of the US and will likely account for nearly 30% of all annual global emissions of CO_2. While China has not overtaken the US in cumulative emissions, it is on course to surpass the US on that historic metric in just a few more decades.

In late 2014, an announcement of a joint US-China agreement to curb emissions was a surprise and a milestone ending to what many felt was an ongoing delay by which both nations used each other's inaction as a pretext to postpone action on climate change. In the announcement, President Obama revealed a new US target to cut net greenhouse gas emissions 26-28% below 2005 levels by 2025. At the same time, President Xi Jinping of China announced targets to peak CO_2 emissions by 2030, and to increase the non-fossil fuel share of all energy to around 20% by 2030.

What was not clear from the November 2014 announcement was how China would actually reduce its burning of carbon fuel, especially coal, which has been the mainstay of China's energy economy, not only in power generation, but industrial production and even the provision of heat. Its coal use has tripled in just 15 years, and is now half that of the entire world, and more than 60% of China's primary energy needs.

Figure 14: YoY change in coal consumption



Source: BP Statistical Review of World Energy 2015, UBS

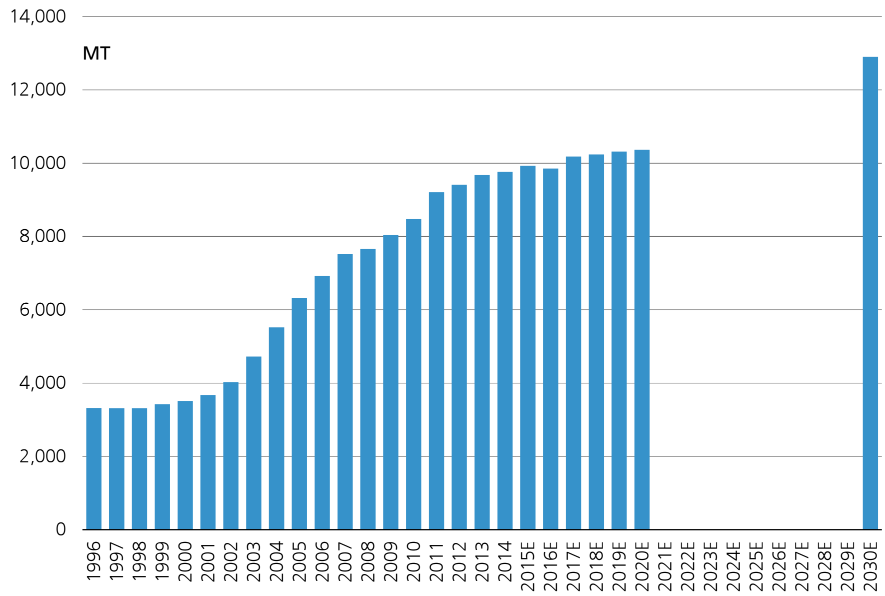
However, no sooner was the pact announced that China's coal consumption appeared to plateau and decline. In fact, we believe coal consumption in the year since that 11 November 2014 announcement has declined more than 10%. We think this is more to do with a slowing economy than government action, with the most likely cause the slowdown in industrial output, the addition of major hydro-electric capacity, further displacement of coal-fired generation by gas, wind and solar, and increased energy efficiency.

Six months later in June 2015, China submitted its Intended Nationally Determined Contribution (INDC) with the target to lower the carbon intensity of GDP by 60% to 65% below 2005 levels by 2030, increase the share of non-fossil fuel energy

carriers of the total primary energy supply to around 20% by that time, and increase its forest stock volume by 4.5bn cubic metres, compared to 2005 levels.

The 65% reduction in carbon intensity per unit of GDP means that even with modest growth in the economy, absolute levels of CO_2 are still set to rise by 2030. We assume that despite flat power demand currently that it returns to a 3% YoY growth level and that the economy grows at a modest 4% per year from 2020 to 2030. Our forecasts suggest that China can easily meet and exceed its target of 65% reduction in carbon intensity—the bigger question is when can it reach peak CO_2 production?

Figure 15: China's CO_2 emissions



Source: BP Statistical Review of World Energy 2015, UBS estimates

Implications for Chinese power utilities

We believe that China's current INDC is not consistent with limiting global warming to below 2°C, and as a result, a more aggressive target is likely to be announced in 2016-17. Given the current dependence on coal in the power sector, we expect a number of key trends to continue.

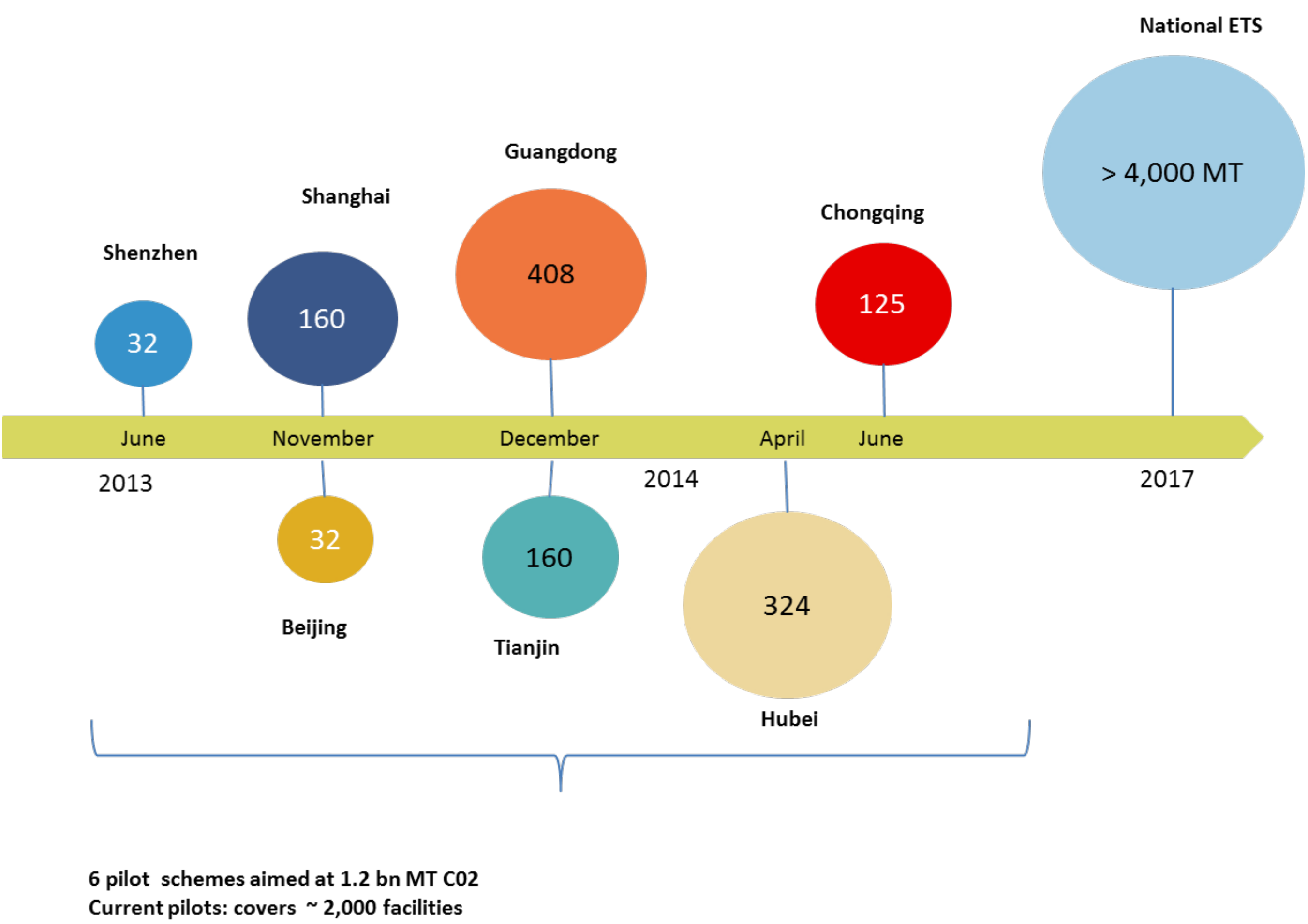
1) Shift from high (450+) grams of coal per KWh usage towards lower (less than 300) grams of coal per KWh usage
2) Further build-out of the nuclear programme
3) More renewables projects in coastal areas
4) Ultra-high voltage transmission projects to bring power from west to east coast
5) A continued decline in utilisation hours for east coast coal-powered units

Will China implement a carbon tax?

There have been rumours that China would implement a carbon tax, but none have materialised so far. Seven pilot carbon cap-and-trade programmes have operated in the Guangdong, Shanghai Chongqing, Beijing, Tianjin, Hubei, and Shenzhen provinces, and these paved the way for the September 2015 announcement by President Xi Jinping at the White House that China intends to

inaugurate a nationwide cap-and-trade system in 2017. This news of a cap-and-trade system for greenhouse gas emissions by 2017 signalled that the world's largest emitter may be starting to tackle climate change as well as the conventional air pollution that has been grabbing international headlines recently.

Figure 16: China's 7 emissions trading schemes and the journey to a national scheme



Note: Size of circle represent the amount of CO_2 being traded per year.
Source: Roger Raufer, UBS

The bigger question is whether China can implement and enforce such a complex opaque system. More than a decade in, the European Union's Emissions Trading Scheme (ETS) has been only mildly effective. The EU has struggled to remedy numerous design and implementation flaws including a too-loose cap that has failed to induce a significant, persistent and rising carbon price, as well as international offsets that hold down carbon prices and whose environmental benefits remain maddeningly difficult to monitor and verify. An opaque permit-based trading system may be well-suited to China's management by committee approach, and this could be the possible motivation for China's choice of cap-and-trade over a transparent and easier-to-administer carbon tax, combined with its history of profiting from questionable carbon offsets.

China's 2017 targets for things other than CO_2

Back in 2013, the State Council unveiled an Action Plan on Prevention and Control of Air Pollution. The plan proposed to improve overall air quality across the nation

over five years, reduce heavy pollution by a large margin, and make obvious improvements in air quality in the Beijing-Tianjin-Hebei Province, the Yangtze River Delta and the Pearl River Delta.

Specifically by 2017, the level of inhalable particulate matter in cities in the stated areas would drop by at least 10% against the 2012 level.

The level of fine particulate matter in the Beijing-Tianjin-Hebei Province, the Yangtze River Delta and the Pearl River Delta will be cut by 25%, 20% and 15%, respectively, and the annual concentration of fine particulate matter in Beijing will be kept at 60μg /m3.

To achieve the above objectives, the Action Plan defined 10 measures.

1) **Enhanced treatment of multiple pollutants** by accelerating the construction of desulphurisation, denitration and dust removal projects in key sectors. Promote public transport, new energy vehicles and upgrade the quality of fuel oil.

2) **Monitor the addition of new industrial capacity** and end illegal projects under construction in industries with serious overcapacity.

3) **Speed up reform of state-owned enterprises (SOEs) and stimulate the environmental industry.** Promote innovative development and industrialisation of major environmental equipment and products.

4) **Speed up steps to adjust China's energy structure** and increase the supply of clean energy. By 2017, the consumption of coal will fall to below 65% in terms of total energy consumption. The Beijing-Tianjin-Hebei Province, the Yangtze River Delta and the Pearl River Delta will try to achieve negative growth in their total coal consumption.

5) **Raise the environmental threshold for projects.**

6) **Allow market mechanisms to assist in improving air quality**—this includes pricing and mechanisms as well as encouraging private equity to participate in air pollution control.

7) **Strengthen legal systems** and ensuring strict supervision and management by law.

8) **Establish regional coordination mechanisms** and set/monitor regional targets.

9) **Establish effective monitoring**, early warning and emergency response systems.

10) **Encourage public participation.**

Stock implications

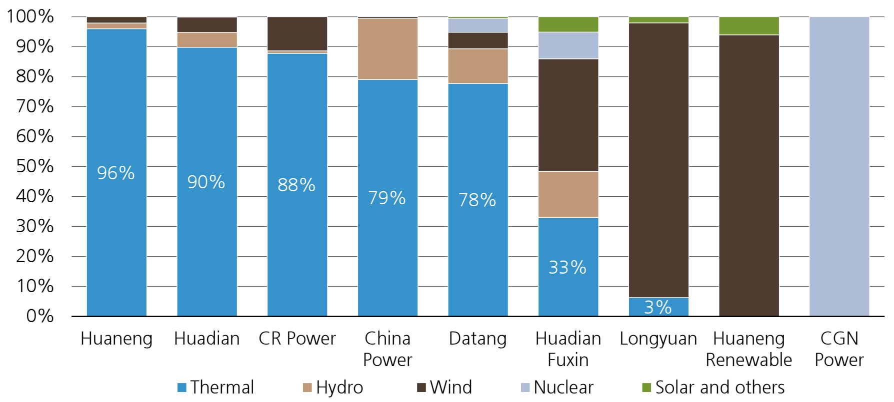
Many of China's listed power generators have significant exposure to coal, and their capex plans include the continued construction of coal units. Despite the recent shift to more efficient units that burn less coal per KWh than older units, we believe a significant change in policy to limit warming by 2°C could have very negative impact on longer-term earnings.

Figure 17: Implications for Chinese IPPs

	Reuters code	Rating	Share price	Price target	Price Upside	Market Cap US$bn	Impact of current target	Impact of potential policy to meet 2 degree warming
Nuclear IPP								
CGN	1816.HK	Buy	HK$2.68	HK$4.60	72%	11.78	Positive	Strong positive
Traditional IPPs (Primarily coal based)								
Datang - H	0991.HK	Buy	HK$2.31	HK$4.60	104%	7.00	Minor negative	Strong negative
Huaneng - H	0902.HK	Neutral	HK$6.61	HK$7.20	13%	13.77	Minor negative	Strong negative
CR Power	0836.HK	Neutral	HK$14.58	HK$15.50	9%	6.81	Minor negative	Strong negative
China Power Int'l	2380.HK	Neutral	HK$4.05	HK$5.00	24%	2.70	Minor negative	Strong negative but much more renewables and possible hydro/nuclear injection
Wind farm operators / Diversified IPPs								
Huaneng Renewable	0958.HK	Buy	HK$2.16	HK$3.80	83%	1.88	Positive	Very strong positive
Huadian Fuxin	0816.HK	Buy	HK$2.10	HK$3.90	95%	1.68	Positive	Strong positive

Note: Above data as of 15 December 2015.
Source: Company data, UBS estimates

Figure 18: Attributable capacity breakdown of IPPs by fuel mix (as of end-2014)



Source: Company data

India

India's total emissions have been growing steadily since 1990. Population is one of the main drivers of India's projected GHG emissions. Over 2010-30, the UN projects that India's population will increase by 24%, reaching 1.53bn people by 2030. Over the same period, we project per capita emissions could increase by around 90% to 3.6 tCO_{2e} per capita by 2030, but still far below the 2010 world average of 6.7 tCO_{2e} per capita.

The power sector accounted for 32% of India's total emissions in 2010. Given that the fuel mix is dominated by coal-fired generation (approximately 70% in 2012), the emission intensity of electricity supply in India is relatively high (almost 1Kg CO_2/kWh). Per capita electricity demand in India is very low at around 700 kWh/capita, but growing fast, and in 2014, the government announced a commitment to achieving 24x7 electricity supply for all by 2019. Population growth, increased access to electricity and economic development are expected to result in strong growth of electricity demand in India. We estimate power demand growth could continue to run at 4-6% pa.

India submitted its Intended Nationally Determined Contribution (INDC) in October 2015, which specified the targets to reduce its emissions intensity of GDP by between 33% to 35% by 2030 compared to 2005 levels, to increase the share of non-fossil fuel based power generation capacity to 40% of installed electric power capacity by 2030 (equivalent to 26-30% of generation in 2030), and to create an additional (cumulative) carbon sink of 2.5-3 $GtCO_{2e}$ through additional forest and tree cover by 2030. This move was a further reduction from its earlier pledge to reduce the emissions intensity of GDP by 20% to 25% by 2020 compared to 2005 levels.

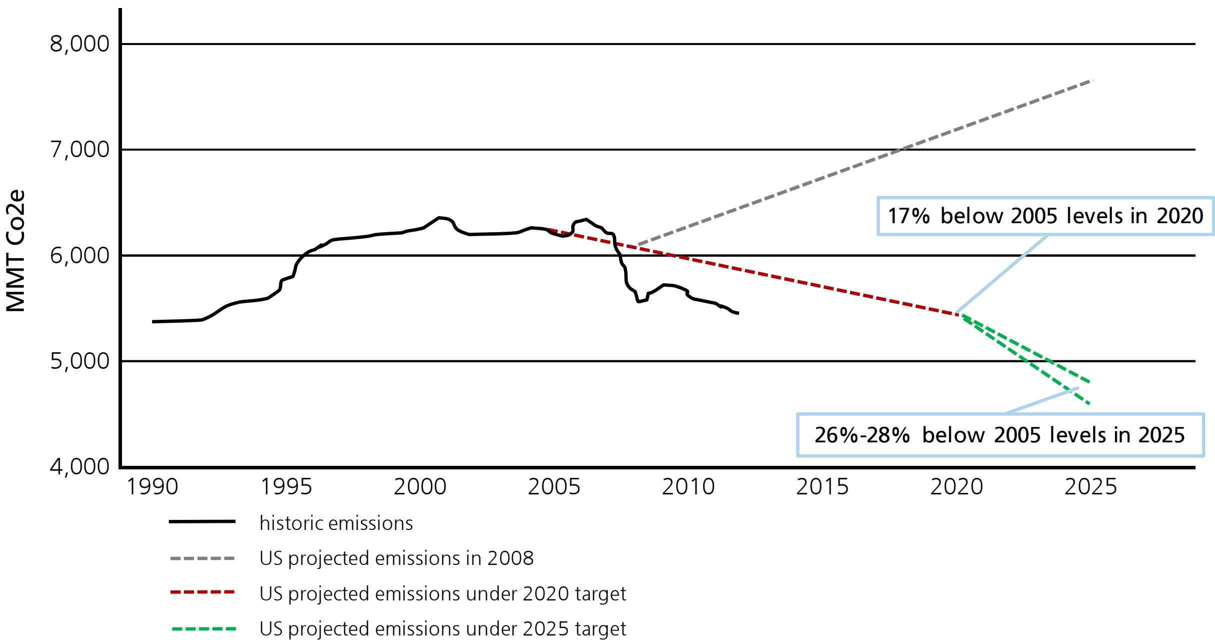
With the current policies, including the target for 175 GW of renewable energy capacity by 2022, it is possible for the share of non-fossil fuel power generation capacity to reach 30%+ by 2030.

The 2022 renewable energy targets represent a big increase in renewable energy generation, but they may not keep up with growth in national electricity demand. Under the current policies, we estimate growth for solar and wind power capacity at 12% per year on average will exceed growth for coal-powered electricity capacity at 4-5% pa between 2013 and 2030. However, the absolute growth in coal-powered electric-generating capacity will be larger than the absolute increase in renewable/non-fossil fuel generation capacity over the same period. Ultimately, this would lead to continued increases in CO_2 produced until 2030.

USA

The US has pledged to cut its emissions by 26-28% in 2025 against a 2005 baseline (~6,200 Gg CO_2) in its intended nationally determined contribution (INDC)—this is against a backdrop of a 32% cut by 2030 already committed via the legally binding Clean Power Plan (CPP). Although the Republican Senate majority leader Mitch McConnell is leading efforts to stop the Paris efforts from clearing the Senate, US law allows Presidential approval of some international agreements without the Senate.

Figure 19: US emissions under the 2020 and 2025 targets



Source: US INDC, UBS estimates

CPP sets the standard for the US INDC

While we certainly see the Paris data points as constructive for global and wind solar developers, the real impact for the US comes primarily in the sense of pushing the country (under any future administration) to 'stay the course' on its current implementation of the Clean Power Plan (CPP). In line with that, we view the potential for tax credit extensions as a key tool to drive renewable asset development in accordance with the CPP requirements.

How does the upcoming presidential election impact the CPP?

Following the adoption of the CPP, there has been a great deal of discussion on the potential for the decision to be reversed if a Republican President is elected in 2016. It remains unclear how a future administration would derail the programme, but we suspect 'leakage' and weakened/delayed implementation of individual state programmes via pending state implementation plans (SIPs) would be the primary manner. Given the timeline for many of the more controversial states to see their SIP filings (or lack thereof) rejected by the EPA in the next administration, the upcoming election has a disproportionate impact on the fate of the sector (and particularly for the states that are straggling).

But will the global agreement act as a deterrent for CPP reversal?

The timing of the EPA's finalisation of the CPP ahead of the summit in Paris was a clear indication that the US wanted other countries to follow suit, and additionally set the precedent that the US is acting as a leader in setting emission standards. Prior to the Paris summit, the CPP received heavy pushback domestically, but the global agreement helps to add credibility to the US's standards. It has been noted that the CPP in isolation will not have a serious impact on global emissions, and thus the global agreement has helped to solidify the CPP, and reduces the domestic pressure by evening the global playing field.

Tax credits in the near term are more pertinent for execution

The investment tax credit (ITC-solar) and production tax credit (PTC-wind) are currently being considered by tax writing committees in the US House and Senate as part of a large bucket of tax credits that have or are set to expire (tax extenders bill). According to Bloomberg, lobbyists have stated that a gradual step-down in the ITC over a five-year period is being advocated for, which would include "commence construction" language, similar to the rules already in effect for the PTC (projects started rather than finished within the window would receive the credit). "Commence construction" would effectively add two years to the qualifying window for principally large-scale solar projects, equalising the treatment across wind and solar projects. For the PTC, a two-year extension through 2018 or 2019 is being considered as well, with the credit phasing out over that time period. One of the more outspoken proponents of the renewable energy credit extensions has been Congressman Brian Higgins from New York, who submitted a letter to Ways and Means Chairman, Kevin Brady for the extension (plus commence construction language), which was signed by a coalition of over 90 congress members. Contacts close to the situation have cited about a 33% probability that five-year extensions will be passed as part of the package (with adding two years through "commence construction" language as an alternative). It has also been noted often that the price for passing ITC and PTC extensions (desired by Democrats) may be legislation to lift the crude oil export ban (desired by the Republicans). Overall, we see the most concrete outcome of the Paris summit and the CPP in the form of tax credit extensions.

Transportation sector targeted as well, especially in California

With emissions generated from the transportation sector making up 27% of total emissions in the US in 2013, compared to 31% from electricity generation, significant efforts are being taken to reduce transportation emissions as well. The main policy in place is the Zero Emission Vehicle (ZEV) mandate in California, which imposes significant fines on automakers if ZEV quotas are not met. Generally speaking, the mandate states that an automaker that sells vehicles in California must have 15.4% of the sales be ZEVs by model year 2025 (1.4Mn ZEVs in CA by 2025). ZEV standards are expected to be adopted in Connecticut, Washington DC, Maryland, Massachusetts, New Jersey, New York, Oregon, Rhode Island, and Vermont. The penalty is US$5k per ZEV vehicle not produced.

Who are the winners?

We see the main winners being the renewable energy operators, but specifically the utility-scale developers, given the need to replace coal generation units with solar or wind power plants. To that end, we expect First Solar (FSLR) and NEE to be the main beneficiaries, FSLR on the solar side, and NEE primarily on the wind side. From a fundamental level, Sun Edison (SUNE) would be set to benefit as well, but

that depends on the company's ability to emerge from its current corporate governance issues regarding its yieldco[1] TerraForm Power (TERP) and a heavy debt load. Additionally, we see residential solar energy operators, such as SolarCity (SCTY) being helped more by potential tax credit extensions. Lastly, given the yieldco downturn, we expect a significant opportunity for the yield vehicles (NRG Yield [NYLD], 8 Point 3 Energy [CAFD], TERP, Next Era Energy LP [NEP]) to sell-down assets to third-parties, given the expected high demand for projects under tax-incentive policies. Please see the following table of stocks and the corresponding implications.

Figure 20: Implications for US stocks

Company	Reuters Code	Rating	Current Price (US$)	Price Target (US$)	Price upside	Market cap (US$bn)	Impact of current Country target	Impact of potential policy to achieve 2C
FSLR	FSLR.O	Neutral	$59.83	$58.00	-3%	6.07	highly positive	highly positive
SCTY	SCTY.O	Neutral	$40.05	$33.00	-18%	3.87	highly positive	highly positive
SUNE	SUNE.N	Sell	$4.95	$2.00	-60%	1.35	highly positive	highly positive
TERP	TERP.O	Sell	$12.39	$6.00	-52%	0.67	highly positive	highly positive
NEP	NEP.N	Neutral	$26.75	$25.00	-7%	0.43	highly positive	highly positive
NYLD	NYLDa.N	Neutral	$12.43	$16.00	29%	2.14	highly positive	highly positive
CAFD	CAFD.O	Neutral	$13.63	$11.00	-19%	1.36	highly positive	highly positive
NEE	NEE.N	Buy	$98.72	$112.00	13%	45.02	positive	positive
ITC	ITC.N	Neutral	$37.62	$37.00	-2%	5.85	positive	positive
ES	ES.N	Neutral	$49.72	$52.00	5%	15.77	positive	positive

Note: Above data as of 15 December 2015.
Source: Factset, UBS estimates

[1] Yieldco = a publicly-traded firm created by its parent company to own operating assets that generate predictable cash flow

Brazil

- Brazil's INDC released in September 2015 for COP21: http://www.itamaraty.gov.br/images/ed_desenvsust/BRAZIL-iNDC-english.pdf
- Brasil's CO_2 emission evolution from 1990 to 2012 (page 18), in Tg using GWP: http://www.mct.gov.br/upd_blob/0235/235580.pdf

Brazil has committed to reduce its emissions by 37% below the 2005 levels by 2025 (i.e. to 1.3 $GtCO_{2e}$ from 2.1) and by 43% versus 2005 levels by 2030 (to 1.2 $GtCO_{2e}$).

Figure 21: Brazil's commitments and historical emissions

GtCO2e (GWP-100; IPCC										
1990	1995	2000	2005	2011	2012	2025e	2030e	2005-2012	2005-2025e	2005-2030e
1.4	2.6	2.1	2	1.3	1.2	1.3	1.2	-41%	-37%	-43%

Source: INDC

Brazil has already reduced its emissions by 41% compared to 2005 levels. This was mostly explained by an 82% reduction in the deforestation rate of the Amazon region between 2004 and 2014.

Brazil has a low carbon economy that is supported by a successful biofuel programme (ethanol and biodiesel) and a clean energy matrix (75% of the power plants are hydro or renewables).

In order to comply with the 2°C target, Brazil plans to: 1) expand its sustainable biofuel programme to 18% of the energy mix in 2030; 2) eliminate illegal deforestation in the Amazon by 2030; 3) increase the share of renewable sources for electricity generation to at least 23% (ex-hydro sources) by 2030; and 4) reach a 10% level of energy efficiency in the power sector by 2030.

Impact on Brazilian utilities

The listed stocks we cover are mostly hydro/renewable operators, with between 75% (Tractebel) and 100% (Tiete, CPFL, Energias, Light) of the assets being hydro power plants.

Most companies have already indicated over the past few years that they would invest in wind power and solar projects. Brazil should continue to foster more thermoelectricity generation (mostly gas-based) in its energy matrix as a means to mitigate hydrology risks and increase currently low reserve margins—Brazil has faced two years of drought in the main SE region/four years in the NE region, leading to not only a surge in power prices, but also some supply constraints and brownouts across the country.

Our top pick within the theme is AES Tiete (Tiete), which is 100% hydro-based generation, but has plans to expand into wind power and solar. Tiete is a quality name with a clean and unlevered balance sheet, increased revenue visibility and inflation-adjusted prices/tariffs, lower drought-related costs as the weather reverses to mean, lean opex/low capex, a stronger growth outlook (higher returns for both greenfield and brownfield assets in Brazil), and yet double-digit dividend yields.

Tiete (similarly to Tractebel, Energias do Brasil, Cemig, Copel) also has paper projects for gas-fired thermoelectricity plants, but these new projects should be small compared with its existing asset bases.

Statement of Risk

Utilities are driven by commodities, power prices, M&A, regulatory intervention, and interest rates.

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Neutral	FSR is between -6% and 6% of the MRA.	40%	26%
Sell	FSR is > 6% below the MRA.	12%	18%
Short-Term Rating	**Definition**	**Coverage[3]**	**IB Services[4]**
Buy	Stock price expected to rise within three months from the time the rating was assigned because of a specific catalyst or event.	less than 1%	less than 1%
Sell	Stock price expected to fall within three months from the time the rating was assigned because of a specific catalyst or event.	less than 1%	less than 1%

Source: UBS. Rating allocations are as of 30 September 2015.
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AES TIETE (ON)	GETI3.SA	Buy	N/A	R$13.62	15 Dec 2015
AGL Energy Limited	AGL.AX	Neutral	N/A	A$16.49	15 Dec 2015
APA Group	APA.AX	Buy	N/A	A$8.29	15 Dec 2015
AusNet Services[4, 5a, 7]	AST.AX	Buy	N/A	A$1.42	15 Dec 2015
CGN Power[16a]	1816.HK	Buy	N/A	HK$2.68	15 Dec 2015
China Power International Development	2380.HK	Neutral	N/A	HK$4.05	15 Dec 2015
China Resources Power	0836.HK	Neutral	N/A	HK$14.58	15 Dec 2015
Datang International Power	0991.HK	Buy	N/A	HK$2.31	15 Dec 2015
Diversified Utility & Energy Trusts[2, 4]	DUE.AX	Neutral	N/A	A$2.31	15 Dec 2015
ERM Power Limited[13]	EPW.AX	Neutral	N/A	A$1.48	15 Dec 2015
Eversource Energy[16b]	ES.N	Neutral	N/A	US$49.72	15 Dec 2015
First Solar Inc[16b]	FSLR.O	Neutral	N/A	US$59.83	15 Dec 2015
Huadian Fuxin Energy Corporation[4, 5b]	0816.HK	Buy	N/A	HK$2.10	15 Dec 2015
Huaneng Power International[16b]	0902.HK	Neutral	N/A	HK$6.61	15 Dec 2015
Huaneng Renewable Corporation	0958.HK	Buy	N/A	HK$2.16	15 Dec 2015
ITC Holdings Corp[16b]	ITC.N	Neutral	N/A	US$37.62	15 Dec 2015
NextEra Energy[4, 5b, 6a, 6b, 7, 16b]	NEE.N	Buy	N/A	US$98.72	15 Dec 2015
NextEra Energy Partners LP[2, 4, 5b, 6a, 16b]	NEP.N	Neutral	N/A	US$26.75	15 Dec 2015
NRG Yield[16b]	NYLDa.N	Neutral	N/A	US$11.70	15 Dec 2015
Origin Energy[4, 5a, 7]	ORG.AX	Buy	N/A	A$4.35	15 Dec 2015
SolarCity Corp[16b]	SCTY.O	Neutral	N/A	US$40.05	15 Dec 2015
Spark Infrastructure Group[3]	SKI.AX	Neutral	N/A	A$1.87	15 Dec 2015
SunEdison Inc.[13, 16b]	SUNE.N	Sell	N/A	US$4.95	15 Dec 2015
TerraForm Power, Inc.[2, 4, 5b, 6a, 16b]	TERP.O	Sell	N/A	US$12.39	15 Dec 2015

Source: UBS. All prices as of local market close.
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