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Construction, operation, regulatory and bankability issues for utility scale renewable energy projects

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Introduction

Over the past 15 years, Australia's renewable energy market has continued to attract massive interest from Developers, Contractors, manufacturers, governments and local and international investors. This reflects global energy trends driven by factors such as a push for diversification of energy sources and asset classes, government incentives for clean energy technology developments and, importantly, the decreasing cost of electricity from renewable energy sources.

The renewable energy industry in Australia is well-established and mature for some technologies (eg wind, rooftop solar PV), developing in others (eg utility scale solar PV, solar thermal/CSP, hybrid solar and storage) and at commercialisation stage in others (eg geothermal, wave).

At this time of increasing market interest and development, it is relevant to consider key issues and market trends in the construction, operation and regulatory aspects of projects, and critical bankability considerations relating to each of these issues. While this paper focuses on issues that are of most interest to project sponsors and lenders, many of these considerations are equally relevant to contractors. This paper considers these issues in the context of utility scale solar and wind projects in Australia.

Overview of the current state of renewable energy in Australia

Renewable energy sources (comprised of solar PV, solar thermal, wind, hydro, wave, tidal and geothermal) contributed around 17% of Australia's electricity generation in the 2017 calendar year, down from 17.3% in 2016.[1] The Clean Energy Council hypothesizes that this fall in generation is attributed to a substantial fall in generation due to "reduced rainfall in catchment areas".[2] Of this amount, the largest contributions were from hydro (33.9%), wind (33.8%) and solar (22.6%).[3]

There was significant levels of investment in 2017, with investment in large-scale wind and solar projects reaching US$9 billion.[4] AU$1.81 billion was invested in wind and AU$451 million was invested in solar.[5] These investments led to the creation of 264MW of new generation capacity in 2016 and a further 4760MW of new generation capacity in 2017.[6] Large-scale solar capacity reached 450MW and large scale wind capacity reached 547MW.[7] This record increase in investment may be attributed to the Federal Government's continued commitment to the Renewable Energy Target and

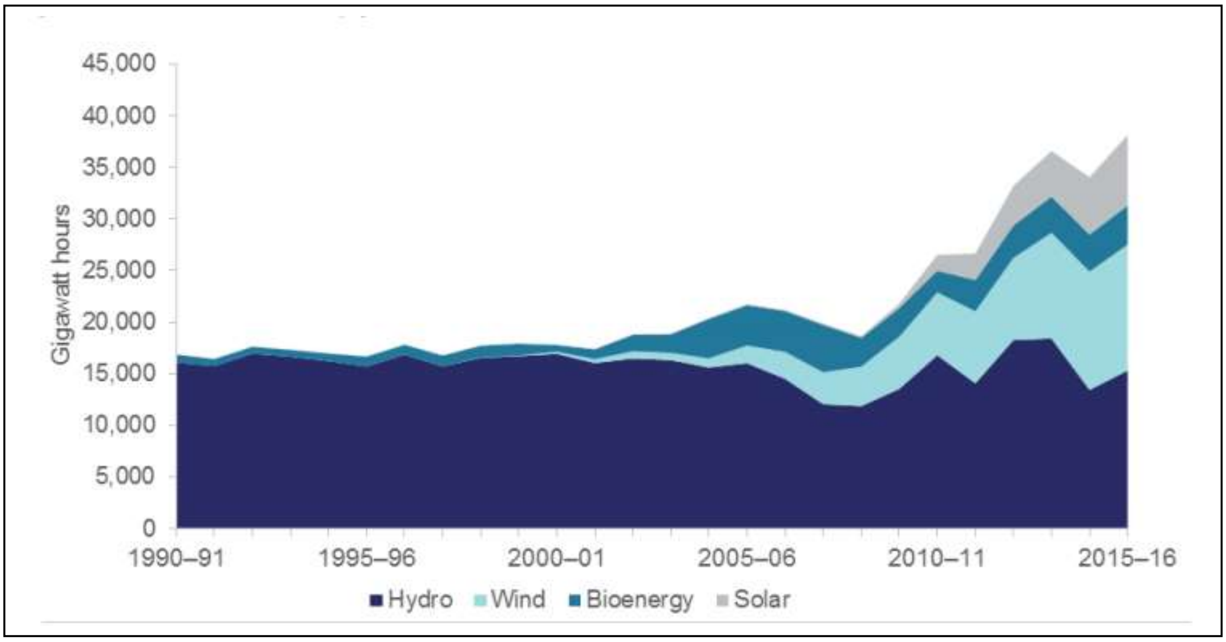
[1] Clean Energy Council, *Clean Energy Australia Report 2018,* https://www.cleanenergycouncil.org.au/policy-advocacy/reports/clean-energy-australia-report.html
[2] Clean Energy Council, *Clean Energy Australia Report 2018,* https://www.cleanenergycouncil.org.au/policy-advocacy/reports/clean-energy-australia-report.html
[3] Clean Energy Council, *Clean Energy Australia Report 2018,* https://www.cleanenergycouncil.org.au/policy-advocacy/reports/clean-energy-australia-report.html
[4] Clean Energy Council, *Clean Energy Australia Report 2018,* https://www.cleanenergycouncil.org.au/policy-advocacy/reports/clean-energy-australia-report.html
[5] Jonathan Gifford, 'Australian renewables investment bucks global trend to grow 49% in 2016' (17 January 2017) *Renew Economy* https://reneweconomy.com.au/australian-renewables-investment-bucks-global-trend-grow-49-2016/.
[6] Clean Energy Council, *Reflecting on a record year for renewables* (28 February 2018) https://www.cleanenergycouncil.org.au/news/2018/February/reflecting-record-year-renewables.html.
[7] Clean Energy Council, *Clean Energy Australia Report 2018,* https://www.cleanenergycouncil.org.au/policy-advocacy/reports/clean-energy-australia-report.html

sustained focus on renewable energy in the wake of the Independent Review into the Future Security of the National Electricity Market and resulting recommendations, available here.

There has also been a continued increase in the level of energy generated from renewable sources. A recent report by Green Energy Markets showed that for the period between December 2017 and February 2018 renewable energy in Australia generated 32% more electricity than brown coal, and 40% more electricity than gas.[8] An overview of energy generation from renewable sources is provided below.

A key issue for the energy industry overall in 2017 was the rising cost of electricity. Despite recent increases, the Australian Electricity Market Commission estimates that as the new wind and solar facilities begin generation, domestic prices will fall on average, by 6.2% over the next 2 years, providing relief for residential consumers.[9]

Australian energy generation from renewable sources[10]



Graph of Australian Electricity Generation from renewable sources between 1990 - 2016
Source: Australian Energy Update 2017 (Figure 4.5), Department of Environment and Energy

The Clean Energy Regulator reported that there was an increase of 114% in accredited generation capacity of new renewable energy power stations in 2016-2017 compared to 2015-2016 and 19.4 million MW of additional energy generated over the same period compared to 15.9 million in 2015-2016.[11] Overall, there was an estimated 17,500GW of renewable energy generated in 2016[12] and 6532MW of large-scale generation projects committed between 2016 and 2018.[13]

Overview by technology

Solar PV in Australia

Despite having some of the highest average solar radiation per square metre of any continent in the world and with world-leading capabilities in solar PV research and technology development, previously Australia has lagged in the development of utility scale solar PV facilities.

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[8] Ben Potter, 'Renewable energy out-generated brown coal and gas over summer' (26 March 2018) *Australian Financial Review* http://www.afr.com/news/renewable-energy-outgenerated-brown-coal-and-gas-over-summer-20180326-h0xyjh.
[9] Clean Energy Council, *Clean Energy Australia Report 2018,* https://www.cleanenergycouncil.org.au/policy-advocacy/reports/clean-energy-australia-report.html
[10] Department of the Environment and Energy, *Australian Energy Update 2017, https://www.energy.gov.au/sites/g/files/net3411/f/energy-update-report-2017.pdf*.
[11] Clean Energy Regulator, *2016-2017 Annual Report – Accelerating carbon abatement for Australia*, http://www.cleanenergyregulator.gov.au/DocumentAssets/Documents/Clean%20Energy%20Regulator%20Annual%20report%202016-17.pdf.
[12]Clean Energy Council, *Clean Energy Australia Report 2016,* https://www.cleanenergycouncil.org.au/policy-advocacy/reports/clean-energy-australia-report.html.
[13] Clean Energy Council, *Clean Energy Australia Report 2018,* https://www.cleanenergycouncil.org.au/policy-advocacy/reports/clean-energy-australia-report.html

In 2017, large scale solar PV accounted for 1.8% of renewable generation in Australia.[14] As at June 2018, the largest operating utility scale PV facilities in Australia are:

- 50MW Kidston Solar Project (Phase 1) (QLD) developed by Genex Power, which commenced generation in November 2017;[15]
- AGL Solar Projects Nyngan (102MW) and Broken Hill (53MW) (both in NSW) now sold into the Power Australian Renewables Fund both became operational ;[16]
- 56MW Moree Solar Farm (NSW) developed by Fotowatio Renewable Venture which commenced generation in March 2016;[17]
- 55MW Parks Solar Farm (NSW) which commenced operation in March 2018;
- 25MW Barcaldine Solar Farm (QLD) developed by Elecnor; and
- 20 MW Royalla solar farm developed by FRV (ACT), which began generation in September 2014.

Solar Choice is proceeding with plans for Australia's biggest solar farm after receiving approval from the Toowoomba Regional Council in 2015. The solar plant, which is located west of Toowoomba in Queensland, is expected to generate up to two gigawatts (2,000MW) once completed.[18]

Solar PV

The small-scale rooftop solar PV sector has undergone rapid development. 19% of Australian households have rooftop solar panels installed, the highest number of solar panels for household per capita globally. [19] In April 2018, there was 109 MW of rooftop solar installed, marking a record seven consecutive months of 100MW or more of new solar installation.[20] The price of small-scale solar installation has fallen by approximately 50% compared to 2012. A notable major development was the largest rooftop solar installation in Australia by Australia Post with 2.1MW generation capacity for the Sydney Parcel Facility.[21] The small-scale rooftop solar PV sector is highly competitive and disaggregated with a variety of suppliers and installers across the States and Territories and no clear market leaders. The Clean Energy Council accredits solar installers in accordance with the Solar Accreditation Scheme. In 2017, there was a 60% increase in the number of newly accredited installers per month compared to 2016.[22]

The rapid increase since 2008 has been primarily led by dramatic reductions in the relative costs of small-scale solar PV. This has been driven by a combination of supportive government policy environment and incentives, technological maturation, economies of scale (with rapid expansion in the global production of PV modules) and changes to the price of input costs, in particular, substantial decreases in the price of polysilicons.[23] The Clean Energy Australia Report produced by the CEC cites SunWiz's estimate that the small –scale solar growth will continue at "more than 1.2GW in 2018".[24]

The scale of household solar PV is understood to be playing an increasing role in relieving pressure on the networks, particularly in reducing peak energy demand. This was illustrated during the January 2014 heatwave across the southern states of Australia, where commentators estimate that rooftop solar PV contributed between 2.5-2.8% towards meeting peak demand, and caused the demand peak to be lower and later in the day than would otherwise have occurred.[25] Queensland has the largest aggregate total capacity of 1,977MW of rooftop solar installed in Australia and New South Wales is second with a total of 1,435MW. It should be considered whether increasing levels of rooftop solar

[14] Clean Energy Council, *Clean Energy Australia Report 2018,* https://www.cleanenergycouncil.org.au/policy-advocacy/reports/clean-energy-australia-report.html
[15] Genex Power, *50MW Kidston Solar Project (KS1),* http://www.genexpower.com.au/ks1-project-details.html.
[16] AGL, *AGL's Nyngan and Broken Hill solar plants officially opened* (20 January 2018) https://www.agl.com.au/about-agl/media-centre/asx-and-media-releases/2016/january/agl-nyngan-and-broken-hill-solar-plants-officially-opened.
[17] Australian Renewable Energy Agency, *Moree Solar Farm starts feeding into the grid* (01 March 2016) https://arena.gov.au/news/moree-solar-farm-starts-feeding-into-the-grid/
[18] Kristian Silva, 'Mega $1 billion Darling Downs solar farm approved', 11 February 2015, *The Sydney Morning Herald*, https://www.smh.com.au/national/queensland/mega-1-billion-darling-downs-solar-farm-approved-20150211-13c39r.html.
[19] Department of the Environment and Energy, *A better energy future for Australia,* https://www.energy.gov.au/government-priorities/better-energy-future-australia
[20] Cole Latimer, 'New rooftop solar adding equivalent of coal-fired power station every year', 8 May 2018, *The Canberra Times,* https://www.canberratimes.com.au/business/the-economy/new-rooftop-solar-adding-equivalent-of-coal-fired-power-station-every-year-20180508-p4ze0b.html.
[21] Clean Energy Council, *Reflecting on a record year for renewables* (28 February 2018) https://www.cleanenergycouncil.org.au/news/2018/February/reflecting-record-year-renewables.html
[22] Clean Energy Council, *Clean Energy Australia Report 2018,* https://www.cleanenergycouncil.org.au/policy-advocacy/reports/clean-energy-australia-report.html
[23] Australian Bureau of Resource and Energy Economics, *Energy in Australia*, 2013, http://www.bree.gov.au/documents/publications/energy-in-aust/bree- energyinaustralia-2013.pdf.
[24] Clean Energy Council, *Clean Energy Australia Report 2018,* https://www.cleanenergycouncil.org.au/policy-advocacy/reports/clean-energy-australia-report.html
[25] Giles Parkinson, 'Solar puts heat on big generators as demand peaks subside' *RenewEconomy*, 17 January 2014, http://reneweconomy.com.au/2014/solar- 23763.

may contribute to grid congestion. [26]

Solar thermal

While still in its infancy in Australia, a small number of solar thermal (also known as "concentrated solar power" or CSP) facilities have been, or are being, developed. In most cases, these are conversions of, or additions to, existing coal-fired power stations rather than stand-alone facilities. In addition to the 9.3Mw CSP station added to Liddell coal-fired power station in NSW and the 44MW plant in Kogan Creek, QLD, the South Australian government signed a Generation Project Agreement with American operator, Solar Reserve for a 150MW solar thermal power plant due for completion in 2020.[27] The generation capacity of the Aurora Solar Energy Project as proposed would be sufficient to power the State Government entirely[28] or the equivalent of 90,000 homes.[29]

There is a continued effort in the industry, particularly by bodies such as the Australian Renewable Energy Agency (**ARENA**), to conduct further feasibility studies and advance the potential for concentrated solar thermal technology opportunities. Most recently, ARENA accepted submissions on the topic of concentrated solar thermal technology from 31 global participations, specifically submissions to identify and discuss solar thermal opportunities in Australia. The result was a report produced by Australia in March 2018 which is available here. This is in addition to a roadmap funded by ARENA schedule for completion in 2018. ARENA's current estimate is that CSP may be commercially viable within the next 10 years.[30]

Wind

Wind currently remains the lowest cost form of renewable energy that can be rolled out on a large scale and, as such, continues to dominate the renewable energy marketplace.

Currently, the largest wind farm in Australia is the Macarthur Wind Farm with a generation capacity of 420 MW (developed by AGL and Meridian Energy with a current 50/50 ownership by H.R.L. Morrison & Co and Malakoff as a result of a sale by AGL in September 2015) which generated sufficient energy in the 2017 financial year to power 150,000 homes.[31] West Wind Energy however is planning to construct the Golden Plains Wind Farm in Victoria which will have a generation capacity of 35000 GW, far surpassing the capacity of Macarthur once operational. The estimates show that the Golden Plains Wind Farm will be able to meet the average annual power needs of 450,000 residences.[32] At the end of 2016 there were 2,106 wind turbines spread across 79 operating wind farms, supplying more than 5.3% of Australia's overall electricity consumption.[33]

Like solar, the large number of wind projects in development reflects factors such as the quality of wind resources in Australia, particularly along the southern coasts which are regarded as among the best in the world. The cost of wind generation technology has significantly reduced over recent years.[34]

Australia's wind generation capacity was valued in 2018 at 4816MW, meaning Australia ranked 17th globally in terms of wind energy generation.[35] By the end of 2017, there were a further 15 wind farms under construction or committed which will substantially increase this capacity estimate.[36]

A significant addition will be the Coopers Gap Wind farm which is due for completion in 2019 with a generation capacity of 453MW. Coopers Gap Wind Farm consists of 123 turbines and commenced

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[26] Clean Energy Council, *Clean Energy Australia Report 2018,* https://www.cleanenergycouncil.org.au/policy-advocacy/reports/clean-energy-australia-report.html
[27] Aurora Solar, *Port Augusta, South Australia,* https://aurorasolarthermal.com.au/project/.
[28] ABC News, *Solar thermal power plant announced for Port August 'biggest of its kind in the world'* (14 August 2017) http://www.abc.net.au/news/2017-08-14/solar-thermal-power-plant-announcement-for-port-augusta/8804628.
[29] Solar Reserve, *Aurora,* http://www.solarreserve.com/en/global-projects/csp/aurora.
[30] Australian Renewable Energy Agency, *Paving the way for concentrated solar thermal in Australia* (08 March 2016) https://arena.gov.au/news/paving-way-concentrated-solar-thermal-australia/.
[31] AGL, *2017 Sustainability Report - Renewable Energy,* http://agl2017.reportonline.com.au/sustainabilityreport/environment/renewable-energy.
[32] Adam Carey, 'Nation's biggest wind farm could be built between Geelong and Ballarat', 4 May 2018, *The Age*, https://www.theage.com.au/politics/victoria/nation-s-biggest-wind-farm-could-be-built-between-geelong-and-ballarat-20180504-p4zdgf.html.
[33] Clean Energy Council, *Clean Energy Australia Report 2016,* https://www.cleanenergycouncil.org.au/policy-advocacy/reports/clean-energy-australia-report.html.
[34] Australian Bureau of Resource and Energy Economics, *Energy in Australia*, 2013, http://www.bree.gov.au/documents/publications/energy-in-aust/bree-energyinaustralia-2013.pdf.
[35] Clean Energy Council, *Clean Energy Australia Report 2016,* https://www.cleanenergycouncil.org.au/policy-advocacy/reports/clean-energy-australia-report.html.
[36] National Wind Farm Commissioner, *2017 Annual Report,* https://www.nwfc.gov.au/publications/2017-annual-report.

construction in February 2018.[37]

The following notable wind farms became operational in 2017-2018:

- Ararat Wind Farm with a generation capacity of 240MW[38];
- White Rock Wind Farm Stage One (70 of 118 turbines) with generation capacity of 175MW[39]; and
- Hornsdale Wind Farm with a generation capacity of 315MW and Hornsdale Power Reserve of 100MW which includes the world's largest lithium ion battery[40] (also known as the 'Tesla big battery').

Renewable energy policy and legislative framework – Federal

The Energy Target (**RET**) is currently the main policy mechanism for renewable energy investment in Australia. The regulatory framework that establishes the RET is set out in the *Renewable Energy (Electricity) Act 2000* (Cth) (Act). When passed as legislation, the Act set a target for renewable energy generation from eligible renewable energy power stations in Australia of 41,000GWh by 2020. This represented a target of 20% of Australia's electricity being supplied by renewable sources by 2020 and maintained at this level until 2030. In June 2015, however, the Coalition Government passed legislation to cut this target to 33,000GWh. This figure reflects the recommendation in the Warburton Review of the RET. The rationale, in part, for this change was to reflect overall lower energy demand and represent a 'real 20%' figure. The Finkel Review recommendation that the RET was continued through to completion in 2030 but should not be extended.[41] The Clean Energy Regulator has stated that the RET will be achieved by 2020 based on the current projects under construction and record levels of investment in renewable energy in 2017.[42]

At the end of 2016, the generating capacity of large-scale renewable power stations was approximately 14,157GWh of eligible renewable energy (as defined under the Act) per year.[43] A study by consultancy firm SKM MMA[44] in 2012 found that the RET had delivered $18.5 billion of investment in renewable energy since 2001, and forecast that the RET would drive a further $18.7 million of investment between 2012 and 2020. The revised RET is still expected to unlock significant investment, of approximately $10 billion.[45]

The RET drives investment by creating a guaranteed market for additional renewable energy deployment using a mechanism of tradable Renewable Energy Certificates (**RECs**). RECs are market-based instruments generated by accredited renewable energy power stations and they can be traded and sold. Demand for RECs is created by a legal obligation that the Act places on liable entities (retailers and large users of electricity are known as 'liable entities') to purchase and surrender a certain amount of RECs each year.

In June 2010, Federal Parliament passed legislation to split the RET into the Large-Scale Renewable Energy Target (**LRET**) with Large-Scale Generation Certificates (**LGCs**) and the Small-Scale Renewable Energy Scheme (**SRES**) with Small-Scale Technology Certificates (**STCs**). The LRET covers large scale renewable energy projects including wind farms, utility scale solar PV and solar thermal, hydro and geothermal, whereas the SRES covers small-scale technologies such as residential rooftop solar PV and solar hot water systems. The reforms are aimed to allow the market to set a LRET price to provide incentives for large-scale renewables. As the increasing obligation of liable entities to purchase LRECs to 2020 increases demand, LREC prices are expected to increase,

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[37] Elisa Iannunzio, 'Construction begins on Australia's largest wind farm', 13 February 2018, *Infrastructure Magazine*, https://infrastructuremagazine.com.au/2018/02/13/construction-begins-on-australias-largest-wind-farm/.
[38] Infrastructure Australia, *Ararat Wind Farm Fully Operational* (19 April 2017), https://www.infrastructureaustralia.com/utilities/ararat-wind-farm-fully-operational/.
[39] Goldwind Australia, *White Rock Wind Farm,* http://www.goldwindaustralia.com/projects/under-construction/white-rock-wind-farm/

[40] Hornsdale Wind Farm, *Hornsdale Wind Farm,* https://hornsdalewindfarm.com.au/
[41] Commonwealth of Australia, *Independent Review into the Future Security of the National Electricity Market – Blueprint for the Future* (June 2017), https://www.energy.gov.au/publications/independent-review-future-security-national-electricity-market-blueprint-future.
[42] Clean Energy Regulator, *Record year of investment means Australia's 2020 Renewable Energy Target will be met* (23 January 2018) http://www.cleanenergyregulator.gov.au/RET/Pages/News%20and%20updates/NewsItem.aspx?ListId=19b4efbb-6f5d-4637-94c4-121c1f96fcfe&ItemId=468.
[43] Clean Energy Regulator, *Tracking towards 2020: Encouraging renewable energy in Australia,* http://www.cleanenergyregulator.gov.au/About/Pages/Accountability%20and%20reporting/Administrative%20Reports/The%20Renewable%20Energy%20Target%202016%20Administrative%20Report/Increase-in-large-scale-renewable-energy-power-station-capacity-and-generation.aspx.
[44] SKM MMA, *Benefits of the Renewable Energy Target to Australia's Energy Markets and Economy*, 2012.
[45] 'New renewable energy target to unlock $10b worth of deals, GE says', *The Age*, 24 June 2015, http://www.theage.com.au/business/energy/australias-renewable-energy-target-to-unlock-10b-worth-of-deals-ge-says-20150624-ghwanx.html.

supporting the investment and expansion of large-scale renewable energy generation.

The RET scheme has been designed such that the majority of the RET will be delivered by large-scale renewable energy projects. The LRET includes legislative annual targets, starting at 10,000GWh in 2011 and increasing to 33,000GWh in 2020 and remaining at that level until 2030. Under the LRET, accredited renewable energy power stations are entitled to create one LGC for each MWh of electricity generated which can then be sold and transferred to liable entities using the REC Registry. Power stations using at least one of the more than 15 types of "eligible renewable energy sources" can become accredited.

Under the SRES, Owners of small-scale technology will receive one STC for each MWh generated by the small-scale system or displaced by the installation of a solar hot water heater or heat pump. In contrast to LGCs, STCs are available upfront on the installation of the system rather on an 'as generated' basis. The SRES is an uncapped scheme in that its annual targets are set based on the number of SRECs expected to be created in that year.

Liable entities are required to purchase an amount of both LGCs and STCs and surrender them on an annual basis (for LGCs) and a quarterly basis (for STCs). Liable entitles may purchase LGCs directly from renewable energy power stations or from agents dealing in LGCs. The market price of LGCs is dependent on supply and demand and has varied between $10 and $60.[46] Liable entities may purchase STCs through an agent who deals with STCs or through the STC clearing house. There is a government-guaranteed price of $40 for all STCs sold through the clearing house, but no price is set for STCs sold in the market. If a liable entity does not meet its obligations under the Act, it must pay a "shortfall charge", currently set at $65 per LGC or STC not surrendered.
The Act requires a review of the RET to be conducted every two years by the Climate Change Authority. The most recent review, released after the Warburton Review had concluded, was conducted in 2014 and the key recommendation was that an extension of the 2020 date should be considered.[47]

In 2016, the COAG Energy Council conducted the Independent Review into the Future Security of the National Electricity Market. On 9 June 2017, the final report, known as the Finkel Report was released. There were a number of recommendations in the final report, one of which was to introduce a Clean Energy Target (**CET**) which would be implemented alongside the RET until the RET's completion.[48] The CET, in its proposed form, was a policy mechanism modelled on the RET.[49] The mechanism would operate by setting a target for emissions generation annually, which would increase over time. Generators who produced electricity below a "low emissions threshold" would be entitled to certificates which they would be able to on-sell and which energy retailers would be obliged to purchase[50]. The intended effect was to burden energy retailers with a manageable but increasing obligation to purchase energy from clean energy retailers. This system was intended to incentivize new generators to enter the NEM and therefore assist with gradually and stably transitioning the NEM overall.

In late 2017, the Federal Government indicated however that it would not be proceeding with the CET, instead it would implement a different regime proposed by a body created by the COAG Energy Council following the Finkel Review, the Energy Security Board (**ESB**), known as the National Energy Guarantee (**NEG**). The NEG differs from the CET in a practical sense but it is similar in its objectives as well as also being technology neutral.

The NEG consists of a reliability guarantee followed by an emissions guarantee and operates by placing obligations on electricity retailers[51]. Specifically, the NEG would require retailers to:

1. own or contract a prescribed amount of 'dispatchable' generation to satisfy consumer and system demand as needed as a capacity mechanism to avoid blackouts and/or shortages; and
2. purchase or generate electricity below a prescribed emissions intensity threshold on an

[46] Clean Energy Regulator, *Increasing Australia's renewable electricity generation*, http://ret.cleanenergyregulator.gov.au/.
[47] Climate Change Authority, *2014 Renewable Energy Target Review Report*, http://climatechangeauthority.gov.au/reviews/2014-renewable-energy-target-review/report.
[48] Commonwealth of Australia, *Independent Review into the Future Security of the National Electricity Market – Blueprint for the Future* (June 2017), https://www.energy.gov.au/publications/independent-review-future-security-national-electricity-market-blueprint-future.
[49] Ben Potter, 'The very misunderstood Chief Scientist Alan Finkel', 17 November 2017, *The Age*, http://www.afr.com/news/afr-lunch-with-alan-finkel-20171112-gzjxz7.
[50] Clean Energy Council, *Clean Energy Target*, https://www.cleanenergycouncil.org.au/policy-advocacy/energy-transformation/clean-energy-target.html.
[51] David Blowers, 'How the National Energy Guarantee could work better than a clean energy target', 17 October 2017, *Grattan Institute*, https://grattan.edu.au/news/how-the-national-energy-guarantee-could-work-better-than-a-clean-energy-target/.

annual basis (this threshold will decrease over time) with the intention of forcing retailer's portfolios to contain an increasing number of clean energy options.[52]

The former may encourage greater use of energy storage systems such as battery energy storage systems and pumped hydro energy storage systems amongst other options. A controversial aspect of the NEG is that it allows retailers to use their discretion and best judgment as to the combination of generation and purchasing options to meet the reliability and emissions thresholds, arguably entrenching power in the big retailers.

On 20 April 2018, the ESB announced an 'initial design' of the proposed NEG. Although many questions as to how the NEG will operate in practice remain unchanged, the COAG Energy Council has approved the preliminary design and forecasts the final design of the NEG will be presented for approval in August 2018.[53]

The Clean Energy Regulator (**CER**) also reports to Parliament annually on the overall performance of the RET scheme. Among other functions, the CER administers the RET, the Emissions Reduction Fund and corporate services.[54] Earlier in 2018, the CER announced that based on the current number and capacity of renewable energy projects either committed or under construction, the RET will be met by 2020.[55]. Following a corresponding sharp drop in LGC prices as the RET is met, energy retailers have been reluctant to write long term PPAs which are required by financiers who have been disinclined to take merchant risk, though this may be changing. Read more on this in "Is merchant the new black?". Moreover, the price of LGCs being traded are near the penalty rate causing concern that this will disincentivise retailers from purchasing them and instead choose to pay the penalty and pass this cost onto consumers. The restoration of Australia amongst the top 10 most attractive countries to invest in renewable projects does demonstrate some industry confidence gained from the amended 2015 RET, policy certainty and renewable opportunities in Australia.[56]

The results of the recent election in South Australia should be heeded as Former Premier Jay Weatherill of the Labour party declared the state election a 'referendum on renewables' before losing to the Liberals. This may have implications for party policies in the forthcoming State and Federal elections where the conversation has again shifted back to whether to extend the life of coal plants or build new ones.[57]

Many industry bodies, including the Clean Energy Council, have advocated for the RET to be extended beyond the 2020 target to provide long term certainty for the sector and a stable growth pipeline.[58] The CER has also commented that financing has a large influence on the pace of future construction and financiers' confidence is impacted by the lack of long-term RET.[59]

Renewable energy policy and legislative framework – Commonwealth

Carbon Pricing Mechanism and the Clean Energy Plan

In July 2014, Parliament passed the *Clean Energy Legislation (Carbon Tax Repeal) Act 2014* (Cth), which repealed the Carbon Pricing Mechanism (**CPM**) that had been in place since July 2012. The CPM was originally introduced by the *Clean Energy Act 2011* (Cth) and the associated package of legislation comprising the former Labor Government's Clean Energy Plan.

Under the CPM, liable entities were required to purchase and surrender to the Federal Government a permit for every tonne of greenhouse gas emissions that it emits that is covered by the CPM. The price of permits was to be fixed for the first three years of the CPM. It was intended that, from 1 July 2015, the price of permits would be set by the market and the number of permits issued by the Federal

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[52] Energy Security Board, *National Energy Guarantee: High Level Design Document* http://www.coagenergycouncil.gov.au/sites/prod.energycouncil/files/publications/documents/High-level%20design%20National%20Energy%20Guarantee%2020%20April%202018%20Final.pdf..
[53] Ibid.
[54] Clean Energy Regulator, *Corporate Structure* (1 July 2015), http://www.cleanenergyregulator.gov.au/About/Who-we-are/Corporate-structure
[55] Clean Energy Council, *Clean Energy Australia Report 2018,* https://www.cleanenergycouncil.org.au/policy-advocacy/reports/clean-energy-australia-report.html
[56] Ernst & Young, 'Renewable energy country attractiveness index' (May 2016) Issue 47 *RECAI* 10.
[57] Mark Ludlow, *AEMO audit to explore extending life of coal-fired power stations* (9 April 2018) Australian Financial Review, http://www.afr.com/news/politics/aemo-audit-to-explore-extending-life-of-coalfired-power-stations-20180409-h0yiev.
[58] Clean Energy Council, *Power shift: A Blueprint for a 21st Century Energy System*, 17.
[59] Tristan Edis, 'Why the Renewable Energy Target won't be met in 2018', 11 February 2016, *Renew Economy,* http://reneweconomy.com.au/2016/why-the-renewable-energy- target-wont-be-met-in-2018-2018.

Government will be capped based on emissions data. It was proposed for the CPM to link with the EU emissions trading scheme from 2015. Although the CPM did not directly incentivise renewable energy development, putting a price on carbon was intended to provide an economic driver to incentivise investment in renewable energy in preference to emissions-intensive fossil fuel derived energy.

Other measures implemented by the previous federal government included the creation of the Clean Energy Finance Corporation (**CEFC**) and ARENA.

The CEFC was created to facilitate and coordinate up to $10 billion of investment in renewable energy, enabling technologies, energy efficiency and low-emissions technologies. The aim of the CEFC is to unlock significant new private sector investment by providing equity investments, commercial loans and loan guarantees, with equity to be reinvested in the CEFC.

Recently, in April, the CEFC and Palisade Investment Partners (**Palisade**) announced a new strategy valued at $1 billion to encourage institutional investment in renewable energy developments.[60] The CEFC will allocate up to $100 million of equity to the initial $1 billion investment strategy and Palisade will commit to up to $400 million of additional equity through a combination of managed funds and its Direct Investment Mandate clients (some of which currently include VicSuper, LGIAsuper and Qantas Super). The strategy is working up to a 500MW project pipeline and aims to attract investors at an earlier stage of project development to accelerate the construction of commercially viable projects and begin generating energy as soon as possible.

ARENA is an independent statutory body established with the aim of making renewable energy solutions more affordable and to increase the amount of renewable energy used in Australia. It was announced with an initial budget of $3.2 billion (later revised to $2.5 billion) in government funding to manage until the year 2022 to support a range of projects and technologies, with a particular focus on emerging and newly developed technologies and improvements, renewable energy in regional areas and knowledge sharing.

ARENA also has a range of funding programmes to support technologies and increase investor confidence in projects to improve their chances of success. ARENA's new Advancing Renewables Programme contributes to a wide range of projects and activities that have the potential to reduce the cost and increase the use of renewable energy technologies in Australia, in the long term. As part of this Programme, ARENA has allocated $100 million in funding to support large-scale solar PV projects selected through its competitive round. 22 high merit projects, located in all mainland states, were chosen to advance to the full application stage which closed in June 2016.
The conclusion of these projects will be critical in supporting cost reduction in large-scale solar PV technology, and closing the cost gap between the technology and other commercial alternatives to power generation. It is also a positive step towards developing the installed capacity of comparable international markets.

In September 2016, ARENA announced 12 large scale projects with 480MW of capacity, which were awarded $92 million in grants. French group Neoen won three projects which are located in NSW: Parkes Solar Farm, Griffith Solar Farm, and Dubbo Solar Farm. Canadian Solar won two grants for Oakey Solar Farm and Longreach Solar Farm which are both located in Queensland and have PPAs with the Queensland government. Four further projects located in Queensland received grants: Origin Energy's Darling Downs Solar Farm, Whitsunday Solar Farm, Genex Power's Kidston Solar Farm, and RATCH's Collinsville Solar Power Station. The remaining projects are located in New South Wales and Western Australia: Manildra Solar Farm, Goldwind's White Rock Solar Farm and APA Group's Emu Downs Solar Farm.

Following the 2013 Federal Government elections, the new Coalition Government introduced a package of 11 pieces of legislation into Federal Parliament that propose to abolish the CPM, the CEFC and the Climate Change Authority and to make further changes to a range of other measures associated with the previous Labor Government's clean energy plan. Whilst the CPM was repealed in July 2014 the majority of the Government's other measures were repeatedly blocked by the Senate, including the CEFC (Abolition) Bill 2014.

At the end of March 2016, the Government announced the retention of the CEFC and the introduction of a new $1 billion dollar Clean Energy Innovation Fund (**CEIF**), which will be jointly

[60] CEFC Media, Releases and announcements, *CEFC and Palisade draw major funds to support renewable energy projects valued at $1 billion*, 14 April 2016 http://www.cleanenergyfinancecorp.com.au/media/releases-and-announcements/files/cefc-and-palisade-draw-major-funds-to-support-renewable-energy- projects-valued-at-$1-billion.aspx.

managed by CEFC and ARENA. There were also proposals to defund ARENA as part of wider budget-saving measures and replace it with the CEIF.[61] The CEIF is set to provide both equity and debt finance for clean energy projects and will focus on companies, business and projects at early stages of development that are seeking capital to support their growth to the next level of development.[62] More broadly, the CEFC has continued with its investment function, in accordance with high level policy directions issued by the Government through Investment Mandates.[63] The CEFC Board has also established their 2018 Portfolio Vision which divides portfolio investment into a 50% renewable energy portion and a 50% energy efficiency and low emissions portion. Under the CEFC Act, the CEFC receives $2 billion each 1 July for these investments.

AGL has also announced that it will set up a new investment fund which it believes will generate up to $2-3 billion worth of investment in renewable energy projects. The Powering Australian Renewables Fund is expected to deliver about 1000 megawatts of new renewables which represents about 20% of the total generation required to meet the current 2020 RET target. AGL will contribute $200 million in equity and will seek investment partners for the new fund (such as super funds and banks).[64] This fund is expected to incentivise companies to participate in renewable energy projects by sharing the funding risk across a portfolio of projects, rather than a single project.

The Coalition's proposal in March 2016 to defund and replace ARENA with the CEIF was strongly opposed by state governments, various NGOs, researchers and the renewable energy industry, alike.[65] However, in late December 2016, a defunding compromise to reduce ARENA's funding by $500 million received bipartisan support. ARENA will continue its mandate with a budget of $800 million over the next five years until 2021.

Direct action plan

The Federal Coalition Government's policy framework for clean energy and carbon reduction measures consists of a range of measures comprising the Direct Action Plan.

The centrepiece of the Direct Action Plan is the Emissions Reduction Fund (**ERF**), which has the stated aim of providing incentives for abatement activities across the Australian economy. At present, the ERF has
been capped at $2.55 billion over 4 years. There are three components to the ERF:

- **Crediting emission reductions** – Participants are to be issued with one Australian Carbon Credit Unit (**ACCU**) for each tonne of carbon dioxide equivalent stored or avoided through registered projects. The ACCUs can be traded and sold. Eligible activities include (but are not limited to) landfill gas capture, energy efficiency and land sector projects.

- **Purchasing emissions reductions** – Participants with registered projects can:

  - apply to enter into a contract with the Clean Energy Regulator to sell ACCUs to the Clean Energy Regulator through an auction process;
  - sell their ACCUs in the secondary market; or
  - hold their ACCUs to offset emissions.

- **Safeguarding emissions reductions** – This component will be introduced on 1 July 2016 through a mechanism which aims to safeguard against the volume of emissions reductions being outweighed by significant emissions increases above business as usual levels.

In October 2014, the Parliament passed the *Carbon Farming Initiative Amendments Act 2014*, which amends the *Carbon Credits (Carbon Farming Initiative) Act 2011* (**Carbon Farming Act**) to give

[61] Michael Hopkin, 'Australian Renewable Energy Agency saved but with reduced funding – experts react', 13 September 2016, *The Conversation* *https://theconversation.com/australian-renewable-energy-agency-saved-but-with-reduced-funding-experts-react-65334*.
[62] CEFC Media, Releases and announcements, *CEFC welcomes creation of Clean Energy Innovation Fund,* 23 March 2016 http://www.cleanenergyfinancecorp.com.au/media/releases-and-announcements/files/cefc-welcomes-creation-of-clean- energy-innovation-fund.aspx.
[63] See e.g. the Ministerial Direction issued on 3 December 2015 https://www.legislation.gov.au/Details/F2015L02114.
[64] Clean Energy Council, *AGL tests the wind with new renewable energy fund*, 10 February 2016 https://www.cleanenergycouncil.org.au/news/2016/February/agl-new-powering-australian-renewable-energy-fund-wind-solar.html#sthash.IXeUdWTZ.dpuf.
[65] Sophie Vorrath & Giles Parkinson, 'Coalition, Labor agree to slash $500m from ARENA budget', (13 September 2016) *Renew Economy*, https://reneweconomy.com.au/coalition-labor-agree-to-slash-500m-from-arena-budget-83469/.

effect to the ERF. Existing Carbon Farming Initiative Projects have been transitioned to the ERF. To date, there have been 2 auctions of Australian Carbon Credits under the scheme.

In March 2018, the CER announced that a seventh Emission Reduction Fund auction will be held in June 2018. According to the Department of the Environment and Energy, there is at least $265 million available in the ERT for future use. The announcement of this auction followed the announcement of the new soil carbon method determined under the Carbon Farming Act which means that projects "increasing the inputs of carbon storage in soil" are valid participants for the upcoming ERF auction.

Renewable energy policy and legislative framework – State

Planning and environmental approvals

State-based planning systems and associated guidelines will also impact upon aspects of renewable energy development such as the siting and design of wind farms and solar PV farms.

For example, in Victoria, the *Policy and Planning Guidelines for Development of Wind Energy Facilities in Victoria* (January 2016)[66] (guidelines) provide guidance about suitable locations for wind energy facilities, a framework to ensure the thorough assessment of proposals for wind energy facilities and inform planning decisions in relation to a wind energy facility, including in relation to compliance with the Victorian Planning Provisions and the State Planning Policy Framework. Under the guidelines, wind turbines are excluded from (among other places) listed geographical areas (including the Yarra Valley, Dandenong Ranges, Bellarine and Mornington Peninsulas) and will not be permitted to be built within one kilometre of an existing dwelling without the written consent of the Owner of the dwelling. Similar legislation has been enacted in other jurisdictions including NSW.

All types of renewable energy, and wind energy in particular, have been the subject of debate generated by a small number of extremely vocal community groups. Recently, the Victorian Civil and Administrative Tribunal[67] directed the Mitchell Shire Council's decision to be set aside and a planning permit be granted to develop the Cherry Tree Wind Farm Pty Ltd near Seymour in Victoria, subject to the conditions set out in the decision. At paragraph 47 of its reasons, the Tribunal noted "[T]here is not sufficient evidence to establish that the proportion of the population residing in proximity to a wind farm which experiences adverse health effects is large enough to warrant refusal of a land use that is positively encouraged by planning policy." The Tribunal in that case referred to a number of studies, including publications from the Victorian Department of Health and others that expressly state that there is no scientific evidence to link wind turbines with adverse health effects.

In February 2015, the National Health and Medical Research Council (NHMRC),[68] Australia's peak medical and scientific research body, released an information paper finding that no reliable evidence exists that wind farms directly cause health issues. The paper considered nearly 2000 published references and around 249 public submissions addressing noise, shadow flicker and electromagnetic radiation produced by wind farms.

Further discussion regarding the environmental impacts of the development of renewable energy projects is set out below.

State government policies to facilitate renewable energy investment

A large number of policies to facilitate the development of and investment in renewable energy, particularly for small-scale solar PV, have been implemented by various state governments across Australia.

The ACT Government has been among the most active of the State and Territory Governments in terms of driving investment in medium and large scale wind and solar PV projects. These policies are driven by the ACT's previous targets of 90% of energy from renewable sources by 2020, 40% reduction in greenhouse gases by 2020 and carbon neutrality by 2060. In 2016, the ACT government legislated a new renewable energy target of 100% renewables by 2020. During 2012, the ACT

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[66] Department of Environment, Land, Water and Planning, Policy and planning guidelines for development of wind energy facilities in Victoria http://www.dtpli.vic.gov.au/ data/assets/pdf_file/0011/231779/Policy-and-Planning-Guidelines-for-Development-of-Wind-Energy-Facilities-in- Victoria_January-2016.pdf.

[67] Cherry Tree Wind Farm Pty Ltd v Mitchell Shire Council P2910/2012, 26 November 2013, http://www.vcat.vic.gov.au/sites/default/files/cherry_tree_wind_farm_pty_ltd_v_mitchell_shire_council_decision.pdf.

[68] National Health and Medical Research Council, *Information Paper – Evidence on Wind Farms and Human Health*, February 2015 https://www.nhmrc.gov.au/_files_nhmrc/publications/attachments/eh57a_information_paper.pdf.

Government issued an RFP for a 'reverse auction' under which bids were submitted to enter into a 20 year feed-in tariff for up to 40 MW of large-scale solar PV projects. The scheme was heavily oversubscribed. The 20 MW Royalla Solar Farm developed by FRV was awarded the fast track stream in September 2012 and reached financial close in August 2013. In August 2013, two further projects – Zhenfa's 13 MW Mugga Lane Solar Farm and the 7 MW OneSun Capital Solar Farm – were also awarded feed-in tariffs. An independent review tabled by the ACT Environment Minister found that the reverse solar auction process was effective, generated strong competition, resulted in positive industry feedback and provided value for money for consumers.[69]

In March 2014, the ACT Government enacted legislation to expand the scope of the large-scale renewables feed- in tariff scheme to lift the current 210MW cap to 550MW and to expand its application to projects in the Australian Capital Region and beyond in certain circumstances. The ACT Government also announced that it would expand the scope of the large-scale feed-in tariff scheme to incorporate auctions for wind and waste-to- energy projects, as well as further solar PV projects. The ACT Government also has a medium-scale renewable energy feed-in tariff in place. The large-scale feed-in tariff scheme incorporated an auction process for 200 MW of wind powered generation facilities, which was closed in September 2014. The ACT Government received 18 submissions, with a combined generation capacity of more than 1,000 MW.[70] The winning bidders are expected to provide 24.0% of the ACT's electricity consumption. The three successful projects were:

- Coonooer Bridge Wind Farm, developed by Windlab
- Hornsdale Wind Farm, developed by Neoen and Megawatt Capital
- the Ararat Wind Farm, developed by RES.

In August 2015, the ACT Government invited interested parties to participate in its Second Wind Auction. Successful projects included Stage 2 of the 100MW wind farm proposed by Hornsdale Wind Farm and the 100MW Sapphire Wind Farm (Stage 1). The Hornsdale Wind Farm is located south-east of Port Augusta, South Australia, while the Sapphire Wind Farm which is currently under construction is located in northern New South Wales. The Sapphire Wind Farm is to be developed by CWP Renewables and is expected to commence construction in late 2016.[71] In August 2016, the ACT Government also awarded a 20 year feed-in tariff contract to 91MW Crookwell 2 Wind Farm which will be developed by Union Fenosa Wind Australian and located near Goulburn in New South Wales, and 109MW Hornsdale Wind Farm (Stage 3) developed by Neoen International SAS and Megawatt Capital.[72] This award forms part of the government's fourth reverse auction which supports the Next Generation Renewables Program. The output from these two wind farms is not only sufficient to secure the ACT's 100% renewable energy target by 2020,[73] but marks a record low benchmark price at $86.60/MWh and
$73/MWh, respectively. The fifth and final winner of the ACT Government's large-scale wind reverse auction was the 270MW Sapphire wind farm located near Glen Innes in New South Wales.

A number of other states and territories, including South Australia, Queensland, Victoria and the Northern Territory, have also implemented renewable energy targets to promote investment in the renewable energy sector. Queensland aims to achieve a renewable energy target of 50% by 2030. South Australia has also set a renewable energy target of 50% by 2025, after achieving its previous target of 33% renewable energy by 2020 in 2013-2014. In fact, in early 2018 South Australia was on track to reach and almost certainly exceed its 50% RET with approximately 48.9% of power being generated by renewable energy sources.[74] These developments form part of the broader South Australia Energy Plan, a four part procurement program to secure the generation and security of the State's energy supply which includes the Tesla big battery. For more details see Appendix 4.

In June 2016, the Victorian Labor Government committed to renewable energy targets of 25% by

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[69] ACT Government, Environment and Sustainable Development Directorate, *ACT Solar Auction Review*, October 2013 http://www.environment.act.gov.au/ data/assets/pdf_file/0004/581602/ACT_Solar_Auction_Review_-_Summary_Report.pdf.
[70] Environment and Planning Directorate, 'Strong bidding in wind auction good news for Canberra', 8 September 2014, http://www.cmd.act.gov.au/open_government/inform/act_government_media_releases/corbell/2014/strong-bidding-in-wind-auction-is-good-news-for-canberra.
[71] Department of Industry: Resources & Energy, *$200 million NSW wind farm helps Australia's capital meet Renewable Energy Target,* NSW Government, http://www.resourcesandenergy.nsw.gov.au/about-us/news/2016/$200-million-nsw-wind-farm-helps-australias-capital-meet-renewable-energy-target.
[72] Ibid.
[73] ACT Government, *Next Generation Energy Storage Grants,* http://www.environment.act.gov.au/energy/cleaner-energy/next-generation-renewables (last updates 7th November 2016).
[74] Nick Harmsen, 'SA election: 75pc renewables achievable with or without Weatherill's target, analyst says" 21 February 2018 ABC News http://www.abc.net.au/news/2018-02-21/sa-to-be-powered-by-75-per-cent-renewables-by-2025/9470408

2020 and 40% by 2025.[75] In December 2016, shortly after the Northern Territory Labor Government was elected in August, the government committed to adopting a target of 50% renewable energy by 2030.[76]

Following the success of the ACT Government's reverse auction schemes, Queensland and Victoria have sought to implement their own schemes. In late 2015, the newly elected Queensland Labor government increased its initial 40MW proposal for a large scale solar auction to 150MW under its new Solar 150 initiative.[77] Additionally, the Victorian Government plans to hold a number of staged auctions which will commence in 2017 and extend until 2025. These will include "solar-only" and technology neutral streams. The first round of auctions in 2017 are expected to generate 1800MW of new capacity and are intended to be built by 2020. In August 2016, the Victorian scheme was opened up to businesses and community for consultation on the design of major aspects including contractual arrangements, cost recovery mechanisms and auction evaluation principles.[78]

In early December 2016, the Victorian Labor government appointed former ACT Environment and Climate Change Minister Simon Corbell as Victorian Renewable Energy Advocate (**VREA**) to assist the State's RET of 40% renewable energy by 2025.[79] Corbell pioneered the ACT's large scale feed in tariff and reverse auction schemes which supported the large-scale renewable energy industry during times of ongoing RET uncertainty.

Moreover, certain local governments in New South Wales and Victoria are promoting Environmental Upgrade Funding, a method of financing that provides funding from $250,000 to $10 million plus for the retrofitting of commercial buildings with 'sustainable' features such as energy efficiency lighting and heating/cooling, in addition to small solar PV installations. A number of Lenders are offering special products for Environmental Upgrade Agreements in tandem with local governments with competitive interest rates compared with traditional lending.

Features of wind and solar facilities

Wind facilities

A wind farm typically comprises a series of wind turbines, a substation, cabling (to connect the wind turbines and substation to the electricity grid), wind monitoring equipment and temporary and permanent access tracks. The wind turbines used in commercial wind farms are large rotating, three bladed machines that typically produce between 1MW and 3MW of output. Each wind turbine is comprised of a rotor, nacelle, tower and footings. The height of a tower varies with the size of the generator but can be as high as 100m. The number of turbines depends on the location and capacity of turbines.

The amount of power a wind generator can produce is dependent on the availability and the speed of the wind. The term "capacity factor" is used to describe the actual output of a wind energy facility as the percentage of time it would be operating at maximum power output.

Wind farms need to be located on sites that have strong, steady winds throughout the year, good road access and proximity to the electricity grid. Australia has one of the world's best wind resources, especially along the southeast coast of the continent and in Tasmania.

Solar PV facilities

Solar PV facilities utilise PV cells which are assembled to form PV panels or modules that are then lined up into solar arrays, PV cells convert sunlight into electric current using the photoelectric effect. Most solar arrays use an inverter to convert the DC power produced by the PV panels into AC power. Solar PV plants can use either fixed-mount solar arrays or automated tracking systems that allow the solar arrays to follow the sun's daily path across the sky and optimise electricity production.

[75] Hon Daniel Andrews MP Media Release (15 June 2016), *Renewable Energy Targets to Create Thousands of Jobs*, Premier of Victoria http://www.premier.vic.gov.au/renewable-energy-targets-to-create-thousands-of-jobs/

[76] *NT Government's Renewable Energy Panel holds first meeting*, 16 December 2016, https://nt.gov.au/news/2016/december/nt-governments-renewable- energy-panel-holds-first-meeting.

[77] Giles Parkinson, 'Queensland lifts large scale solar auction target to 60MW', 9 September 2015, *Renew Economy* http://reneweconomy.com.au/2015/queensland-lifts-large-scale- solar-auction-target-to-60mw-67559.

[78] Media Release, 5th August 2016, 'Have your say on Victoria's renewable energy auctions, https://284532a540b00726ab7e-ff7c063c60e1f1cafc9413f00ac5293c.ssl.cf4.rackcdn.com/wp-content/uploads/2016/08/160805-Have-Your-Say-On-Victoria%E2%80%99s-Renewable-Energy-Auctions.pdf.

[79] Hon Daniel Andrews MP, *Simon Corbell Victoria's Renewable Energy Advocate*, 9th December 2016, http://www.premier.vic.gov.au/simon-corbell-victorias- renewable-energy-advocate/

A solar PV facility typically comprises a series of PV panel arrays and inverters, mounts, trackers (if used), cabling, monitoring equipment, substation and access tracks.

The amount of electricity generated by a PV facility will be dependent on a number of factors including the type and positioning of the panels and whether trackers are used.

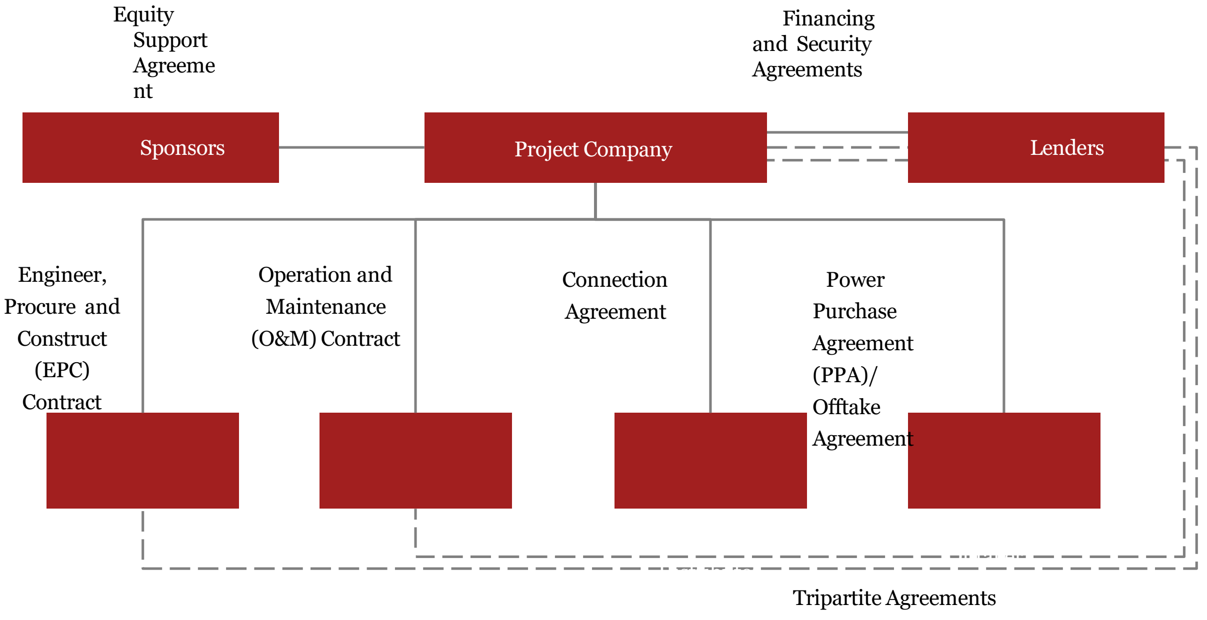
Solar thermal facilities

There are four primary technologies used in solar thermal facilities – Parabolic trough, solar tower, fresnel refractors and solar dish. Of these, the technology used in parabolic trough facilities is currently the most commercially mature, being used in 94% of solar thermal projects worldwide, followed by that used in solar tower facilities. The basic features of a solar thermal facility vary by technology but are essentially comprised of an array of mirrors used to concentrate sunlight and produce heat and steam to generate electricity using the conventional thermodynamic cycle. In parabolic trough projects, for example, curved mirrors concentrate the sun's rays on a focal line and synthetic oil, steam or molten salt is used to transfer the solar heat to a steam generator.

One of the main features driving the commercialisation of solar thermal technology is the ability to incorporate storage systems using synthetic oil or molten salt. Some solar thermal facilities with molten salt storage have storage capacities of 6-15 hours, which increase the capacity factors of the plants significantly.

Contractual structure

The diagram below illustrates the basic contractual structure of a typical project financed renewable energy project.



The detailed contractual structure will vary from project to project. For example, in some wind and hydro projects, the scope of work generally performed under an EPC Contract is split into a Turbine Supply Contract and a Balance of Plant (BOP) Contract, with the performance guarantees during the operating phase of the facility dealt with in a warranty operating and maintenance contract (WOM). However, for the purpose of this paper we have examined a project with the basic structure illustrated above.

As can be seen from the diagram, the Project Company[80] will usually enter into following agreements comprising the project documents:

- **Construction contract** – Governs various elements of the construction of the facility including the supply and assembly of equipment (such as turbines or PV panels) and construction of the balance of the plant comprising civil and electrical works. As outlined above, there are a range of contracting methods that may be used, from an EPC Contract (under which a Contractor is obliged to deliver a complete facility to a Developer who need only 'turn a key' to start operating the facility) to a split contracting structure (with the supply, design and construction of the facility all performed by separate parties, with or without a project manager). The choice of contracting approach will depend on a number of factors including the time available, Lender requirements, identity of the Contractor(s) and whether the Contractor is willing to 'wrap' or guarantee the performance of the components of the facility (eg panels, turbines). The major advantage of the EPC Contract over the other possible approaches is that it provides for a single point of responsibility. This is discussed in more detail below. In our experience most utility scale renewable energy projects use EPC Contracts.

  Interestingly, on large project financed projects the Contractor is increasingly becoming one of the Sponsors, (ie an equity participant in the Project Company). Contractors will ordinarily sell down their interest after financial close because, generally speaking, Contractors will not wish to tie up their capital in operating projects. In addition, once construction is complete the rationale for having the Contractor included in the Ownership consortium no longer exists. Similarly, once construction is complete a project will normally be reviewed as lower risk than a project in construction and therefore, all other things being equal, the Contractor should achieve a good return on its investment when selling down

- **Operation and maintenance contracts** – Are generally comprised of a long-term operating and maintenance contract (O&M contract) with an Operator, though the term will vary from project to project depending on factors such as the location, technology and PPA available. The Operator may be a Sponsor, particularly if one of the Sponsors is an independent power producer or utility company whose main business is operating wind or solar facilities. In some financing structures the Lenders will require the Project Company itself to operate the facility. In those circumstances the O&M contract will be replaced with a WOM contract with the manufacturer and supplier of the major equipment supplied, for example, in the case of a wind farm, the wind turbine generators.

- **PPA or offtake agreement** – Under which the Project Company will sell the electricity produced by the facility to a purchaser or 'offtaker.' In traditional project financed power projects there will be a power purchase agreement (**PPA**) between the Project Company and an offtaker such as an electricity retailer, large electricity consumer or government, under which the retailer or government undertakes to pay for a set amount of electricity for a specified amount of time, regardless of whether it actually takes that amount of electricity (referred to as a "take or pay" obligation). In turn, the Project Company will undertake to produce a minimum quantity of electricity. Sometimes a tolling agreement is used instead of a PPA, under which the power purchaser directs how the plant is to be operated and dispatched.

  Merchant power projects without a PPA in place do not have the same certainty of cash flow as they would if there was a PPA, and are generally considered higher risk than non-merchant projects. This risk can be mitigated by entering into synthetic PPAs or hedge agreements to provide some certainty of revenue.
  These agreements are financial hedges as opposed to physical sales contracts. These are discussed in further detail below.

- **Connection agreement** – For connection of the facility's generation equipment into the relevant grid or electricity distribution or transmission network between the Project Company and the Owner of the network (a transmission company, distribution company,

[80] Given this paper focuses on project financed infrastructure projects we refer to the Employer as the Project Company. Whilst project companies are usually limited liability companies incorporated in the same jurisdiction as the project is being developed in the actual structure of the Project Company will vary from project to project and jurisdiction to jurisdiction.

electricity utility or small grid Owner/Operator). The connection agreement will broadly cover the construction and installation of connection facilities and the terms and conditions under which electricity generated by the facility will be exported into the grid. A connection agreement will not be required where the facility is not connected to the grid, such as in the case of a 'captive' facility with a single offtaker.

- **Concession agreement** – In traditional power projects, a concession or project agreement is entered into between the Project Company and a government entity granting the Project Company a concession to build and operate the facility for a fixed period of time (usually between 15 and 25 years), after which it was handed back to the government. However, following the deregulation of electricity industries in many countries, merchant or independent power producer renewable energy projects are becoming increasingly prevalent. Merchant power projects do not normally require a concession agreement to be entered into – The Project Company will instead be required to obtain the necessary regulatory consents to construct and operate the project. The nature and extent of these approvals will vary from place to place, but will generally include planning, environmental and building approvals and approvals and licences to sell electricity into the market.

- **Financing and security agreements** – With the Lenders to finance the development of the project. It is critical that the above-listed suite of documents that govern the development, construction and long- term operation of a renewable energy facility are, where practical, tailored so as to be consistent and aligned from a risk allocation perspective with the requirements of the other project documents. Further, it is vital to properly manage the interfaces between the various types of agreements

Bankability

A bankable contract is a contract with a risk allocation between the Contractor and the Project Company that satisfies the Lenders. Lenders focus on the ability (or more particularly the lack thereof) of the Contractor to claim additional costs and/or extensions of time as well as the security provided by the Contractor for its performance. The less comfortable the Lenders are with these provisions, the greater amount of equity support the Sponsors will have to provide. In addition, Lenders will have to be satisfied as to the technical risk of the technology proposed and other project-specific features. Obviously price is also a consideration, but that is usually considered separately to the bankability of the contract because the contract price (or more accurately the capital cost of the facility) goes more directly to the bankability of the project as a whole.

Before examining the requirements for bankability, it is worth briefly considering the appropriate financing structures and lending institutions. The most common form of financing for infrastructure projects is project financing. Project financing is a generic term that refers to financing secured only by the assets of the project itself. Therefore, the revenue generated by the project must be sufficient to support the financing. Project financing is also often referred to as either "non-recourse" financing or "limited recourse" financing.

The terms "non-recourse" and "limited recourse" are often used interchangeably, however they mean different things. "Non-recourse" means there is no recourse to the project Sponsors at all and "limited recourse" means, as the name suggests, there is limited recourse to the Sponsors. The recourse is limited both in terms of when it can occur and how much the Sponsors are forced to contribute. In practice, true non-recourse financing is rare. In most projects the Sponsors will be obliged to contribute additional equity in certain defined situations.

Traditionally project financing was provided by commercial Lenders. However, as projects became more complex and financial markets more sophisticated, project finance also developed. The size of the debt required to develop a complex project means that in many cases the debt will be syndicated across multiple commercial Lenders. Additional mezzanine and other subordinated forms of debt may also be used.

Whilst commercial Lenders still provide finance, governments now also provide financing either through export credit agencies[81] or trans or multinational organisations like the World Bank, the Asian Development Bank and European Bank for Reconstruction and Development. Sponsors are also using more sophisticated products like credit wrapped bonds, securitisation of future cash flows

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[81] Export credit agencies are bodies that provide finance on the condition that the funds are used to purchase equipment manufactured in the country of the export credit agency.

and political risk insurance to provide a portion of the necessary finance. For example, in 2013 a ZAR 1,000,000,000 (approximately than AU$100 million) solar financing bond was issued by an affiliate of Soitec Solar to finance the construction of a 44 MW utility-scale concentrator photovoltaic (CPV) solar power plant in Touwsrivier, South Africa.[82]

In assessing bankability, Lenders will look at a range of factors and assess a contract as a whole. Therefore, in isolation it is difficult to state whether one approach is or is not bankable. Generally speaking the Lenders will require the following elements to be included for a contract to be considered to be 'bankable':

- A fixed completion date
- A fixed completion price
- No or limited technology risk
- Output guarantees
- Liquidated damages for both delay and performance
- Security from the Contractor and/or its parent
- Large caps on liability (ideally, there would be no caps on liability, however, given the nature of EPC Contracting and the risks to the Contractors involved there are almost always caps on liability)
- Restrictions on the ability of the Contractor to claim extensions of time and additional costs.

An EPC Contract delivers all of the requirements listed above in one integrated package. This is one of the major reasons why they are the predominant form of construction contract used on large-scale project financed infrastructure projects. Lenders have become comfortable with the interface risk arising in a split EPC structure and will focus on the remedies for underperformance in the WOM.

Sponsor support

In certain cases, it may be necessary to provide Sponsor support to strengthen the capacity of the Project Company to satisfy its obligations to the banks and to have a "bankable" project. Forms of Sponsor support may include equity subscription agreements (base and standby equity), completion guarantees of whole or part of the debt until the project commences commercial operation, bank guarantees to support the completion guarantee and cost overrun guarantees/facility. Completion guarantees, for example, ensure that the Lenders will be paid back a set amount if the facility does not reach completion or the repayment of scheduled debt service, of Principal plus interest, if completion is delayed. Other forms of support may be incorporated where the Sponsor is a party to a key project contract (such as a construction contract, O&M agreement or offtake agreement) by requiring the Sponsor to provide additional guarantee letters of credit or corporate support to underpin the project.

Merchant PPA

As noted above, to ensure certainty of revenue project Sponsors will generally prefer to enter into a long-term PPA in respect of the energy produced by a renewable energy facility. Where this is not available or not available on terms satisfactory to the Sponsors, the Sponsors will be required to enter into merchant arrangements and sell directly into the electricity spot market. For a fully merchant project (FMP), versus a fully or partly contracted project, from the Sponsor perspective the expected IRR will obviously need to
increase to account for the significantly increased risk in returns the project will experiencing due to exposure to spot prices.

Some FMPs may seek to implement an electricity hedge programme to reduce pricing risk in an otherwise merchant transaction. Beyond the amount of generation hedged and beyond the term of the implemented hedge, spot market pricing risk will remain. If the project and the Lenders required

[82] Sun & Wind Energy, 'Soitec: 44MW CPV power plant in South Africa is taking shape', http://www.sunwindenergy.com/news/soitec-44-mw-cpv-power-plant-south-africa-taking-shape.

these hedges, their renewal on expiry (ie rolling hedges) would most likely need to be documented to involve the Lenders, or otherwise meet pre-agreed minimum criteria.

Any Lender requirement for long term foundation hedges will come down to being able to model an acceptable return for the Sponsor and Lenders. Lenders will also look to the credibility and financial strength of any offtake swap providers. In some cases, the Lenders' own internal energy trading desk may be involved, provided there is a certain level of certainty regarding expected generation from the facility.

It can generally be anticipated that both the gearing and ratios for a FMP will be higher than for projects with full or partial PPAs in place.

Gearing could be expected to be around 45-50% for an FMP, as opposed to 60-75% for a project which had hedged/set prices for whatever it was able to generate. Our understanding is that the gearing for a recent Australian merchant wind project was 50%, but since then merchant prices have declined along with price forecasts, which could push gearing even lower.

From a Lenders' perspective, with a long term PPA in place with known price for an accepted generation profile contracted, Debt Service Cover Ratios could be expected to be around 1.40x. If the price for the entire generation profile is not known however, given the spot price risk a DSCR of around 2.0x may be required (on a conservative forward price assumption). The higher DSCR is required on the basis that it is anticipated that far greater revenue will need to be achieved for the scheduled debt service costs.

We understand that some Lenders are contemplating the possibility of using a blended DSCR in modelling the bankability of renewable energy projects. For example, if 30% of anticipated generation is the subject of a hedge, that portion of the project may have a DSCR of 1.4x. The remainder of anticipated generation (including the tail end of the contracted portion, which a financier would assume reverts to spot price risk) would need to achieve a higher DSCR, say around 2.0x.

With PPAs very scarce in the market and currently high wholesale and LGC prices, more developers are looking at 'going merchant' as an alternative. Please see our paper for a closer look at the risk-rewards of such a strategy here.

Basic features of an EPC Contract

The key clauses in any construction contract are those that impact on time, cost and quality.

The same is true of EPC Contracts. However, EPC Contracts tend to deal with issues with greater sophistication than other types of construction contracts. This is because, as mentioned above, an EPC Contract is designed to satisfy the Lenders' requirements for bankability.

EPC Contracts provide for:

- **A single point of responsibility**. The Contractor is responsible for all design, engineering, procurement, construction, commissioning and testing activities. Therefore, if any problems occur the Project Company need only look to one party – The Contractor – To both fix the problem and provide compensation. As a result, if the Contractor is a consortium comprising several entities, the EPC Contract must state that those entities are jointly and severally liable to the Project Company

- **A fixed contract price**. Risk of cost overruns and the benefit of any cost savings are to the Contractor's account. The Contractor usually has a limited ability to claim additional money, which is limited to circumstances where the Project Company has delayed the Contractor or has ordered variations to the works

- **A fixed completion date**. EPC Contracts include a guaranteed completion date that is either a fixed date or a fixed period after the commencement of the EPC Contract. If this date is not met the Contractor is liable for Delay Liquidated Damages (DLDs). DLDs are designed to compensate the Project Company for loss and damage suffered as a result of late completion of the facility. To be enforceable in common law jurisdictions, DLDs must be a genuine pre-estimate of the loss or damage that the Project Company will suffer if the facility is not completed by the target completion date. The genuine pre-estimate is determined by reference to the time the contract was entered into.

  DLDs are usually expressed as a rate per day, which represents the estimated extra costs incurred (such as extra insurance, supervision fees and financing charges) and losses suffered (revenue forgone) for each day of delay.

  In addition, the EPC Contract must provide for the Contractor to be granted an extension of time when it is delayed by the acts or omissions of the Project Company. The extension of time mechanism and reasons why it must be included are discussed below.

  Performance guarantees. The Project Company's revenue will be earned by operating the facility. Therefore, it is vital that the wind farm or solar farm performs as required in terms of output and reliability. As such EPC Contracts contain performance guarantees backed by compensation measures such as Performance Liquidated Damages (PLDs), payable by the Contractor if it fails to meet the performance guarantees. These mechanisms are described in further detail below.

  PLDs must be a genuine pre-estimate of the loss and damage that the Project Company will suffer over the life of the project if the wind farm does not achieve the specified performance guarantees. As with DLDs, the genuine pre-estimate is determined by reference to the time the contract was signed. PLDs usually represent a net present value (NPV) (less expenses) calculation of the revenue forgone over the life of the project if the relevant performance guarantees are not met.

  PLDs and the performance guarantee regime and its interface with DLDs and the delay regime is discussed in more detail below.

  Caps on liability. As mentioned above, most EPC Contractors will not, as a matter of company policy, enter into contracts with unlimited liability. Therefore, EPC Contracts for power projects cap the Contractor's liability at a percentage of the contract price. This varies from project to project; however, an overall liability cap of 100% of the contract price is common. In addition, there are normally sub-caps on the Contractor's liquidated damages liability. For example, DLDs and PLDs might each be capped at 15% of the contract price, with an overall cap on both types of liquidated damages of 25% of the contract price.

  There will also generally be an exclusion of consequential or indirect loss. Put simply, consequential damages are those damages that do not flow directly from a breach of contract, but which were in the reasonable contemplation of the parties at the time the contract was entered into. This used to mean heads of damage like loss of profit. However, loss of profit is now usually recognised as a direct loss on project financed projects and, therefore, would be recoverable under a contract containing a standard exclusion of consequential loss clause.

Given the unclear position under Australian law, parties must ensure that an exclusion of liability clause is carefully drafted. Importantly, the clause should set out clearly and exhaustively expressed in detail those losses which are intended to be categorised as consequential. Where presented with a clause excluding liability for consequential loss, project companies must expressly state the categories of loss for which the Contractor will be liable. This essentially means that project companies will need to include a definition of Direct Loss which would identify losses that are within the contemplation of the parties, (eg in a project financing of a power or process plant project a Direct Loss should include loss of revenue under a corresponding PPA). Clearly this may be difficult to negotiate, but this should nevertheless be the starting position.

Nonetheless, care should be taken to state explicitly that liquidated damages can include elements of consequential damages. Given the rate of liquidated damages is pre-agreed, most Contractors will not object to this exception to the exclusion on consequential loss.

In relation to both caps on liability and exclusion of liability, it is common for there to be some exceptions. The exceptions may apply to either or both the cap on liability and the prohibition on claiming consequential losses. The exceptions themselves are often project specific; however, some common examples include fraud or wilful misconduct, death or personal injury and breaches of intellectual property warranties.

Security. It is standard for the Contractor to provide performance security to protect the Project Company if the Contractor does not comply with its obligations under the EPC Contract. The security takes a number of forms including:

- A bank guarantee for a percentage, normally in the range of 5–15%, of the contract price. The actual percentage will depend on a number of factors including the other security available to the Project Company, the payment schedule (the greater the percentage of the contract price remaining unpaid by the Project Company at the time it is likely to draw on security to satisfy DLD and PLD obligations, the smaller the bank guarantee can be), the identity of the Contractor and the risk of it not properly performing its obligations, the price of the bank guarantee and the extent of the technology risk associated with the facility. the Project Company and the Lenders will generally require minimum standards in respect of the entity providing the guarantee, such as a minimum Standard & Poor's rating, and may also require the ability to approve the specific provider of the guarantee

- Retention, ie withholding a percentage (usually 5%–10%) of each payment. Provision may be made to replace retention monies with a bank guarantee (sometimes referred to as a retention guarantee or retention bond). However, cash retention and retention guarantees/bonds are less prevalent in the current market as both project companies and Lenders prefer this to be incorporated into the bank guarantee

- Advance payment guarantee, if an advance payment is made. This is generally in the form of a bank guarantee to the value of the advance payment

- Parent company guarantee, from the ultimate parent (or other suitable related entity) of the Contractor, which provides that it will perform the Contractor's obligations if, for whatever reason, the Contractor does not perform.

Variations. The Project Company has the right to order variations and agree to variations suggested by the Contractor. If the Project Company wants the right to either omit works in their entirety or to be able to engage a different Contractor, this must be stated specifically. In addition, a properly drafted variations clause should make provision for how the price of a variation is to be determined. In the event the parties do not reach agreement on the price of a variation, the Project Company or its representative should be able to determine the price. This determination is subject to the dispute resolution provisions. In addition, the variations clause should detail how the impact, if any, on the performance guarantees is to be treated. For some larger variations the Project Company may also wish to receive additional security. If so, this must also be specified within the variations clause.

Defects liability. The Contractor is usually obliged to repair defects that occur in the 12 to 24 months following completion of performance testing. Defects liability clauses can be tiered, ie the clause can provide for one period for the entire facility and a second, extended period for more critical items (eg wind turbines or PV panels). In such cases, the Project Company will usually seek to ensure that it is protected by manufacturer's warranties (discussed in further detail below).

Intellectual property. The Contractor warrants that it has rights to all intellectual property used in the execution of the works and indemnifies the Project Company if any third parties' intellectual property rights are infringed.

Force majeure. The parties are excused from performing their obligations if a *force majeure* event occurs. This is discussed in more detail below

Suspension. The Project Company usually has the right to suspend the works.

Termination. This sets out the contractual termination rights of both parties. The Contractor usually has very limited contractual termination rights. These rights are limited to the right to terminate for non-payment or for prolonged suspension or prolonged *force majeure* and will be further limited by the tripartite agreement between the Project Company, the Lenders and the Contractor. The Project Company will have more extensive contractual termination rights. They will usually include the ability to terminate immediately for certain major breaches or if the Contractor becomes insolvent and the right to terminate after a cure period for other breaches. In addition, the Project Company may have a right to terminate for convenience. It is likely the Project Company's ability to exercise its termination rights will also be limited by the terms of the financing agreements.

Performance specification. Unlike a traditional construction contract, an EPC Contract usually contains a performance specification. The performance specification details the performance criteria that the Contractor must meet. However, it does not dictate how such criteria must be met. This is left to the Contractor to determine. A delicate balance must be maintained. The specification must be detailed enough to ensure the Project Company knows what it is contracting to receive but not so detailed that if problems arise the Contractor can argue that the issues are not its responsibility.

Potential drawbacks of using an EPC Contract

Whilst there are, as described above, numerous advantages to using an EPC Contract, there are some disadvantages. These include the fact that an EPC Contract may command a higher contract price than alternative contractual structures. One factor is the allocation of almost all the construction risk to the Contractor. This has a number of consequences, one of which is that the Contractor will have to factor into its price the cost of absorbing those risks. This will result in the Contractor building contingencies into the contract price for events that are unforeseeable and/or unlikely to occur. If those contingencies were not included, the contract price would be lower. However, the Project Company would bear more of the risk of those unlikely or unforeseeable events, which may not be acceptable to the Lenders. Sponsors have to determine, in the context of their particular project, whether the strict risk allocation is warranted in the face of the increased price.

As a result, Sponsors and their advisors must critically examine the risk allocation on every project. Risk allocation should not be an automatic process. Instead, the Project Company should allocate risk in a sophisticated way that delivers the most efficient result. For example, if a project is being undertaken in an area with unknown geology and without the time to undertake a proper geotechnical survey, the Project Company may be best served by bearing the site condition risk itself as it will mean the Contractor does not have to price a contingency it has no way of quantifying. This approach can lower the risk premium paid by the Project Company. Alternatively, the opposite may be true. The Project Company may wish to pay for the contingency in return for passing off the risk which quantifies and caps its exposure. This type of analysis must be undertaken on all major risks prior to going out to tender.

Another consequence of this strict approach to risk allocation is the fact that there are relatively few construction companies that can and are willing to enter into EPC Contracts, which can also result in relatively high contract prices.

Another major disadvantage of an EPC Contract becomes evident when problems occur during construction. In return for receiving a guaranteed price and a guaranteed completion date, the Project Company cedes most of the day-to-day control over the construction. Therefore, project companies have limited ability to intervene when problems occur during construction. The more a Project Company interferes, the greater the likelihood of the Contractor claiming additional time and costs. In addition, interference by the Project Company will make it substantially easier for Contractors to defeat claims for liquidated damages and defective works.

Obviously, ensuring the project is completed satisfactorily is usually more important than protecting the integrity of the contractual structure. However, if a Project Company interferes with the execution of the works, in most circumstances it will have the worst of both worlds – A contract that exposes it to liability for time and costs incurred as a result of its interference without any corresponding ability to hold the Contractor liable for delays in completion or defective performance. The same problems occur even where the EPC Contract is drafted to give the Project Company the ability to intervene. In many circumstances, regardless of the actual drafting, if the Project Company becomes involved in determining how the Contractor executes the works, then the Contractor will be able to argue that it is not liable for either delayed or defective performance.

It is critical that great care is taken in selecting a Contractor that has sufficient knowledge and expertise to execute the works. Given the significant monetary value of EPC Contracts, and the potential adverse consequences if problems occur during construction, the lowest price should not be the only factor.

Split EPC Contracts

One common variation on the basic EPC structure illustrated above is a split EPC Contract. In the case of wind and hydro projects, the split is commonly between the turbine supplier, responsible for supplying, installing and commissioning the turbines, and the civils Contractor responsible for performing the balance of the plant (BOP). Lower prices may be achieved using this form of split by avoiding the Contractor applying a risk premium for having to wrap or guarantee either equipment that it has not sourced or manufactured or works that it has not performed.

Another common split structure involves splitting an EPC Contract into an onshore construction contract and an offshore supply contract.[83] The main reason for using this form of split contract is because it can result in a lower contract price as it allows (in an onshore/offshore split) the Contractor to make savings in relation to onshore taxes; in particular on indirect and corporate taxes in the onshore jurisdiction.[84]

In multi-jurisdiction projects, a split structure may also be used to reduce the cost of complying with local licensing regulations by having certain portions of the works, particularly the design works, undertaken in other offshore jurisdictions.

In a split arrangement, unlike a standard EPC Contract, the Project Company cannot look only to a single Contractor to satisfy all the contractual obligations (in particular, design, construction and performance). In such cases a third agreement, a wrap-around guarantee or coordination and interface agreement, may be used to deliver a single point of responsibility despite the split. Under a wrap-around guarantee, an entity, usually either the offshore supplier or the parent company of the contracting entities, guarantees the obligations of both Contractors. This delivers a single point of responsibility to the Project Company and the Lenders.

However, a wrap-around guarantee will not be relevant where the manufacturer of the turbines or panels and the balance of plant Contractor are separate entities and neither company will take the single point of responsibility under the wrap-around guarantee. Accordingly, the Lenders will want to be satisfied that the interface issues are dealt with in the absence of a single point of responsibility.

Key renewable energy specific clauses in EPC Contracts

Manufacturers' warranties

Ensuring that the EPC Contract allows for recourse by the Project Company to the manufacturers' warranties for equipment such as (in the case of solar PV) inverters, modules, trackers and other key components, is paramount to meeting bankability requirements. It is critical that the technology used for a facility is efficient, reliable, safe and serviceable.

The solar PV manufacturing landscape in particular has seen many manufacturers face a zero or negative profit margins and file for bankruptcy due to the rapid growth of the market leading to an oversupply which has depressed prices. With most solar PV facilities expected to have a lifetime of

[83] For a more detailed discussion on split EPC Contracts refer to the PwC *International Best Practice in Project and Construction Agreements* guide http://www.pwc.com.au/legal/investing-infrastructure.html
[84] This is common to projects in Asia; however, detailed tax advice is required to ascertain whether this is appropriate for any specific project.

20+ years, the Owner needs to ensure that the manufacturer behind the inverters, modules and other warranted equipment it uses can honour the warranty for the life of the project. To avoid potential issues arising, we recommend that parties are stringent in conducting their due diligence regarding the selection of manufacturers. This includes looking for (among other things) common financial metrics to indicate the relative stability of those manufacturers (eg cash flow per share, debt to capital ratio).

Key matters for consideration in reviewing any warranty offered by a manufacturer include:

- **Term of the warranty** – Although the required term will vary depending on the equipment that the warranty applies to, the term must be sufficient to cover the likely period in which issues are likely to arise and (if possible) the life of the facility. For example, in the case of PV modules, these warranties should subsist for 5 to 10 years after the commercial operation date for product guarantees or defects, and up to 25 years in respect of output guarantees and degradation

- **What is covered by the warranty** – Which piece of equipment and which level of performance? Are there any exclusions or exemptions? For example, if there is an over-sizing of the panel arrays in proportion to the inverters, will this void or otherwise affect the warranties provided in respect of the inverters

- **Choice of law** – Manufacturers will generally select the law of the country in which their operations are based. However, inconsistencies may arise where this is different to the law applying to the other project documents. Manufacturer's warranties may also be difficult to enforce in certain jurisdictions such as the People's Republic of China

- **Dispute resolution** – The warranty documents should set out the process to be followed in the event that a dispute arises. International manufacturers generally tend to prefer arbitration over litigation.

The warranties obtained by the Contractor must be fully transferrable and contain provisions to be assigned to the Project Company on project completion or in the event of the Contractor's default or insolvency. Further protections for the Project Company and the Lenders include the side agreements and Lenders' ability to take security over the warranties and to exercise the right of step-in under a tripartite agreement.

Where manufacturer's warranties are not available, or where they are available but may be inadequate or impractical to enforce, Lenders and Sponsors may need to consider other options. One option we are seeing in the market to address the risk of under-performance are specialist insurance products that guarantee the output of the system. The cost of the long-term usage of such insurance products is something that would have to be weighed against other options and, if selected, incorporated into the project financial model.

Another option to avoid over-reliance on manufacturer's warranties is to implement stringent quality assurance practices for key components. This will generally involve a multi-stage process, including factory audits and field inspections, on-site inspections of purchased equipment before it leaves the plant and field inspections following installation. To maintain stringency, it is preferable that an independent QA is used rather than relying on any QA conducted by the manufacturer.

Serial defects

Where a facility incorporates a large number of the same components that are critical to performance (such as wind turbines for wind facilities or modules or inverters for solar PV facilities), it is important that the Sponsors are protected in the instance that a fault or defect emerges in a batch or other consignment of that component with the same root cause (known as a 'serial defect'). Although Sponsors should also be protected by the manufacturer's warranties applying to those components (as noted above), it is beneficial for bankability purposes to ensure that the Contractor also has obligations to address serial defects.

Serial defects provisions are triggered where defects with the same root cause arise in respect a specified percentage of a batch or consignment of a component. Although the required percentage will vary depending on factors such as the technology used, we have seen ranges between 2-20% of a specific component. The term of the Contractor's serial defects obligations will generally be the same length as the defects liability period.

If a serial defect is identified, the Contractor will generally be required to test all other components from the same batch or consignment to determine whether the serial defect is present. An independent party or laboratory may be nominated in the EPC Contract to perform the tests if required. As a minimum, the Contractor will be required to report to the Sponsors on the result of the tests and to replace the components in which the serial defect is identified (at the cost of the Contractor, including shipping costs). Generally the Contractor will be required to replace all components within that batch or component (even those in which a serial defect was not identified in testing) to ensure that the serial defect does not arise elsewhere. A requirement may also be included to notify the Project Company in the event that serial defects are identified in other batches of the same product worldwide, in which case the Project Company may require additional monitoring to be implemented.

Grid access

Clearly, EPC Contracts will not provide for the handover of the wind farm or solar PV facility to the Project Company and the PPA will not become effective until all commissioning and reliability trialling has been successfully completed. This raises the important issue of the need for the EPC Contract to clearly define the obligations of the Project Company in providing grid access to the Contractor.

Lenders need to be able to avoid the situation where the Project Company's obligation to ensure grid access is uncertain, as this could result in protracted disputes concerning the Contractor's ability to place load onto the grid system and to obtain extensions of time where delay has been caused as a result of the failure of the Project Company to provide grid access.

Grid access issues arise at two differing levels, namely:

- the obligation to ensure that the infrastructure is in place
- the obligation to ensure that the Contractor is permitted to export power.

With respect to the first obligation, the Project Company is the most appropriate party to bear this risk *vis-à-vis* the Contractor, since the Project Company usually either builds the infrastructure itself or has it provided through the relevant concession agreement. Issues that must be considered include:

- What are the facilities that are to be constructed (eg substations, transmission lines) and how will these facilities interface with the Contractor's works? Is the construction of these facilities covered by the PPA, connection agreement, concession agreement or any other construction agreement? If so, are the rights and obligations of the Project Company dealt with in a consistent manner?
- What is the timing for completion of the infrastructure – Will it fit in with the timing under the EPC contract?

With respect to the Contractor's ability to export power, the EPC Contract must adequately deal with this risk and satisfactorily answer the following questions to ensure the smooth testing, commissioning and entering of commercial operation:

- What is the extent of the grid access obligation? Is it merely an obligation to ensure that the infrastructure necessary for the export of power is in place or does it involve a guarantee that the grid will take all power which the Contractor wishes to produce?
- What is the timing for the commencement of this obligation? Does the obligation cease at the relevant target date of completion? If not, does its nature change after the date has passed?
- What is the obligation of the Project Company to provide grid access in cases where the Contractor's commissioning/plant is unreliable – Is it merely a reasonableness obligation?
- Is the relevant grid robust enough to allow for full testing by the Contractor – For example, the performance of full load rejection testing?
- What is the impact of relevant national grid codes or legislation and their interaction with both the EPC Contract and the PPA?

Many EPC Contracts are silent on these matters or raise far more questions than they actually answer. It is advisable to back to back the Project Company's obligations under the EPC Contract (usually to provide an extension of time and/or costs) with any restrictions under the PPA. This approach will not eliminate the risk associated with grid access issues but will make it more manageable.

A variety of projects we have worked on have incurred significant amounts of time and costs in determining the grid access obligations under the EPC Contract, indicating that it is a matter which must be resolved at the contract formation stage. Therefore, we recommend inserting the clauses in Appendix 1, as modified to align with the relevant regulatory/grid access regime.

Development and environmental considerations

The responsibility for environmental obligations relating to the construction and operation of a wind or solar facility must be set out clearly in the EPC Contract. In particular, wind farms have a range of environmental impacts which need to be considered and managed properly and the Sponsor or Project Company will have to investigate if any aspects of the project are likely to be subject to scrutiny under the *Environmental Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act)[85] or other environment or planning legislation such as the relevant state planning scheme provisions.

Certain factors relating to the location of the facility or its effect on particular environmental features may limit development or trigger the need for reports or assessments to be conducted and approvals obtained before construction can proceed. For example, as outlined above, if wind turbines are located close to dwellings, written consent may be required from the Owners before development is allowed. Depending on the relevant state legislative framework, if the facility will require the clearance of native vegetation, a native vegetation offset management plan may need to be prepared, and if flora and fauna will be affected, surveys and assessments may be required. In the case of solar PV, issues may arise in respect of visual amenity and glint issues. In a recent decision Civil Aviation Safety Authority (CASA) rejected claims that potential glare from a proposed solar farm at Mt Majura in the ACT could pose a danger for aircraft using nearby Canberra Airport.86

Environmental and development impacts of solar and wind energy facilities include:

- Concern regarding visual impact, as well as the effect of shadow flicker and blade glint (for wind) or reflective glare (solar), which must be avoided or mitigated by design and siting

- Visual impacts may also pose an issue in terms of effects on particular locations of high amenity or tourist value, which may restrict or prevent development

- In the case of wind, noise from the swishing of the blades and mechanical noise associated with noise from the generator, along with requirements to comply with prescribed noise standards and guidelines

- Impacts on listed threatened species that inhabit the nearby area, whose habitat or surrounding ecological community may be impacted by the development, or on migratory species that may fly or move through the wind farm area, even if they do not inhabit the area. This is a particular issue in the case of migratory birds whose migration path crosses an established or proposed wind energy facility. In addition, effects on areas of high conservation and landscape values, such as national and state parks, Ramsar Wetlands, World Heritage properties and National Heritage Places, may also limit or prevent development

- Effects caused by the clearance of native vegetation during construction and continued clearing requirements during the operation of the facility to, in the case of solar, avoid shading or shadowing

- Potential electromagnetic interference with microwave, television and radio signals

[85] The EPBC Act prescribes the Commonwealth's involvement in environmental matters where an action has or will have a significant impact on "matters of national environmental significance". Detailed administrative guidelines are found at www.environment.gov.au/epbc

[86] Energy Business News, 'Solar Glare Claims for Canberra Solar Rejected: CASA', 15 November 2013 http://www.energybusinessnews.com.au/energy/solar/solar- glare-claims-for-canberra-solar-rejected-casa/

- Construction issues such as the impact of construction traffic and the construction of access road and lay-down areas.

- Archaeological and heritage issues including the impact on cultural heritage values and sites of significance to Indigenous peoples.

Many of these issues will be most relevant at the stage of seeking development approval and will be the responsibility of the Sponsor or Project Company. The list of permits, approvals and licences that must be obtained by the Project Company should be clearly identified in the EPC Contract, with the balance of construction consents and approvals being the responsibility of the Contractor. However, responsibility for adherence to the conditions attached to the development approvals, permits and the risks identified in the environmental impact assessment, must be passed on to the Contractor. For instance, planning approvals for wind farms are generally subject to permit conditions about noise limits. The Contractor must adhere to the required noise specifications and provide warranties that the wind farm will comply with the noise curves required by the specifications. If the environmental assessment has identified areas of ecological or archaeological importance, then these pre-construction site conditions must be documented in the EPC Contract and accepted by the Contractor.

The Contractor must also develop an environmental management plan to identify risks, mitigation and monitoring processes during construction. This should take into account factors such as erosion, dust and sediment control, storage of hazardous materials, weed control and waste management.

Consistency of commissioning and testing regimes

It is also important to ensure the commissioning and testing regimes in the EPC Contract mirror the requirements for commercial operation under the PPA. Mismatches only result in delays, lost revenue and liability for damages under the PPA, all of which have the potential to cause disputes.

Testing/trialling requirements under both contracts must provide the necessary Project Company satisfaction under the EPC Contract and system Operator/offtaker satisfaction under the PPA or connection agreement. Relevant testing issues which must be considered include:

- Are differing tests/trialling required under the EPC Contract and the PPA/connection agreement? If so, are the differences manageable for the Project Company or likely to cause significant disruption?

- Is there consistency between obtaining handover from the Contractor under the EPC Contract and commercial operation? It is imperative to prescribe back-to-back testing under the relevant PPA and the EPC Contract, which will result in a smoother progress of the testing and commissioning and better facilitate all necessary supervision and certification. Various certifications will also be required at the Lender level, and the Lenders will not want the process to be held up by their own requirements for certification. To avoid delays and disruption it is important that the Lenders' engineer is acquainted with the details of the project and, in particular, any potential difficulties with the testing regime. Therefore, any potential problems can be identified early and resolved without impacting on the commercial operation of the facility

- Is the basis of the testing to be undertaken mirrored under both the EPC Contract and the PPA? For example, what noise tests are to be performed?

- What measurement methodology is being used? Are there references to international standards or guidelines to a particular edition or version?

- Are all tests necessary for the Contractor to complete under the EPC Contract able to be performed as a matter of practice?

Significantly, if the relevant specifications are linked to guidelines such as the relevant International Electrotechnical Commission (IEC) standard, consideration must be given to changes which may occur in these guidelines. The EPC Contract reflects a snapshot of the standards existing at a time when that contract was signed, meaning that mismatches may occur if the relevant standards guidelines have changed. It is important that there is certainty as to which standard applies for both the PPA and the EPC Contract – The standard at the time of entering the EPC Contract or the standard which applies at the time of testing?

Consideration must be given to the appropriate mechanism to deal with potential mismatches between the ongoing obligation of complying with laws, and the Contractor's obligation to build to a specification agreed at a previous time. One solution is to require satisfaction of guidelines "as amended from time to time". The breadth of any change of law provision will be at the forefront of any review.

The above issues raise the importance of the testing schedules to the EPC Contract and the PPA. The size and importance of the various projects to be undertaken must mean that the days where schedules are attached at the last minute without being subject to review are gone. Discrepancies between the relevant testing and commissioning requirements will only serve to delay and distract all parties from the successful completion of testing and reliability trials.

In addition, there is a need to ensure that the interface arrangements in relation to testing and commissioning are appropriately and clearly spelled out between the EPC Contractor and the Operator under the EPC Contract, the O&M contract and any other relevant interface agreements to avoid any subsequent interface disputes.

These are all areas where lawyers can add value to the successful completion of projects by being alert to and dealing with such issues at the contract formation stage.

Interface issues between the offtaker and the EPC Contractor

It is imperative that the appropriate party corresponds with the relevant offtaker/system Operator during construction on issues such as the provision of transmission facilities/testing requirements and timing.

The Project Company must ensure the EPC Contract states clearly that it is the appropriate party to correspond with the offtaker and the system Operator. Any uncertainty in the EPC Contract may unfortunately see the EPC Contractor dealing with the offtaker and/or the system Operator, possibly risking the relationship of the Project Company with its customer. It is the Project Company which must develop and nurture an ongoing and long term relationship with the offtaker, whereas the Contractor's prime objective is generally to complete the project on time or earlier at a cost which provides it with significant profit. The clash of these conflicting objectives in many cases does not allow for such a smooth process. Again, the resolution of these issues at the EPC Contract formation stage is imperative.

Interface issues on site access

Access to land involves negotiations with the landowner or the appropriate state-based land authority. In the case of wind energy in particular, the Project Company will generally enter into access agreements with the landowners, and may be required to do so under legislation. The more common arrangements will be land leases providing possession and site access for the duration of the construction and operation of the wind farm. While the leasing of land to wind energy companies provides long-term income that complements farming income, the substance of the land lease agreements with landowners is the subject of much discussion and negotiation, principally to ensure that the environmental and development impact of the wind farm development is considered and managed properly. Securing land rights for good development sites may be difficult if there is community opposition to these developments, particularly given controversy in recent years relating to aspects of wind farm development such as noise and "flicker" issues from wind turbines. However, there is also a large body of community support for wind farms demonstrated by pro-wind rallies and the increasing development of community wind farms such as Hepburn Wind.[87]

Principal responsibility for obtaining access to the site and negotiating the terms of the lease agreements will lie with the Project Company. However, in order for the Project Company to comply with the terms of the land lease or other access agreements, the Project Company will have to ensure that the Contractor under the EPC Contract complies with all the terms and conditions of the land lease agreements. The Contractor must also accept some degree of responsibility for the ongoing liaison and coordination with landowners during the construction and operation of the facility. Given that considerations and concerns will often differ between landowners, the specific requirements of the landowners should be taken into account at an early stage in the negotiation of the terms of the EPC Contract for any facility. Such concerns will vary from prohibitions on the depth of excavation to allow farming activity, to controlling the spread of pests and weeds.

The Project Company should only be required to provide possession and access as permitted under

[87] Hepburn Wind is a 4.1 MW community owned wind energy facility, located at Leonards Hills in Victoria and reached commercial operation in July 2011: http://hepburnwind.com.au/the-project/.

the negotiated land lease or site agreements, and the obligations of the Project Company under the land lease or site agreements should be flowed down into the EPC Contract. The Contractor should be appraised of the specific conditions and requirements of the landowners to ensure that the Contractor is aware of the limits on access to the site on which the facility is to be constructed and operated. The Contractor must formally acknowledge the Project Company's obligation to comply with the terms of the land lease or site agreements and must accept responsibility for compliance with the terms of the land lease or site agreements which are affected by the Contractor's design and construction obligations under the EPC Contract.

Wind turbine certification

In the case of wind farms, the provision of design certificates or a statement of compliance from an independent certifying body is essential for the Project Company to ensure that the wind turbines provided by the Contractor have been designed in accordance with industry standards and will fulfil the required design parameters.

Certification of wind turbines has a history of more than 25 years and different standards apply in Denmark, Germany and the Netherlands (which pioneered the development and application of certification rules). In recent years, other countries, as well as Lenders, have realised the necessity of a thorough evaluation and certification of wind turbines and their proposed installation. The certifications are commonly divided into type certification and wind turbine certification. The certification is usually required to be carried out by an independent certifying body such as Germanischer Lloyd Industrial Services GmbH (GL Renewables) (an international operating certification body for renewable energy equipment, including wind turbines), and is performed in accordance with that body's rules – In the case of GL Renewables in accordance with the *Regulations for the Certification of Wind Energy Conversion Systems, 1999 edition and the Guideline for the Certification of Wind Turbines, 2010 edition.*[88] Under these regulations, type certification comprises design assessment, evaluation of quality management and prototype testing and is preferably obtained by the Project Company prior to shipment of components to site. Where possible, the certification should encompass confirmation on the design life of the wind turbines.

Wind turbine certification involves a complete third party assessment and certification of specific wind turbines from design assessment to commissioning, witnessing, site assessment and periodic monitoring. Wind turbine certification can only be carried out for type certified wind turbines and on locations for which the necessary data is available.

The Project Company may also require a site certification to be provided by an independent certifying body confirming that real site conditions of the wind farm as a whole (including factors such a wind, climate, topography and turbine layout) complies with the design parameters of the relevant international standard. The real climatic conditions of the relevant site will be provided to the certifying body for assessment of factors such as the wind conditions prevalent at the site as compared with standard wind conditions and the calculation of loads for the site conditions compared with the design basis.

Staged completion

As each wind turbine generator or solar PV array is usually constructed sequentially, they may be taken over by the Project Company as they each pass the required tests on completion. While the taking over of each wind turbine generator or solar PV array and associated equipment as and when it is installed and commissioned is not unusual, it is important to ensure that the issue of a taking over certificate for each individual wind turbine does not affect the Contractor's obligations under the EPC Contract. Issues such as the management of staggered defects liability periods, the method of calculation of the availability guarantees and the point at which performance security held by the Project Company should be released are among the important issues that must be considered carefully by the Project Company when contemplating staged taking over.

Despite taking over individual wind turbine generators or solar PV arrays, the performance security held by the Project Company should only be reduced or released when the facility has passed all tests required for commercial operation of the entire facility. Factors such as the time period between taking over of each wind turbine generator or solar PV array and the generation of electricity by the wind turbine generators or solar PV arrays taken over by the Project Company, will influence the point at which it is reasonable to reduce the performance security held by the Project Company. If the

[88] Other certifications include certification according to the Dutch prestandard NVN 11400-0, Wind Turbines – Part 0: Criteria for type certification-technical criteria", Issue April 1999 and certification according to the Danish Technical Criteria.

operation and maintenance obligations of an Operator of the facility commences on the taking over each wind turbine generator or solar PV array, the performance security to be provided by the Operator can be increased in accordance with the number of wind turbine generators or solar PV arrays taken over.

The issue of a taking over certificate for individual wind turbine generators or solar PV arrays will also trigger commencement of the defects liability period for that particular wind turbine generator or solar PV array. If a facility has, in the case of a wind farm, between 20 and 25 wind turbines, this could mean that the Project Company will have to administer defects liability periods equivalent to the number of wind turbines on the wind farm. If there is a substantial gap between taking over of the first wind turbine and the last wind turbine, this could also result in the defects liability period for the first wind turbine expiring substantially earlier than the last wind turbine taken over and could affect the Contractor's defects rectification or warranty obligations for defects affecting the entire wind farm. The ideal position would be to require the defects liability period to commence on taking over of each wind turbine generator but to expire only from a set time from taking over of the entire wind farm. If this proves too onerous for the Contractor, the wind turbine generators could be divided into circuits, each comprising a separable portion. A taking over certificate will therefore only be issued in relation to each circuit, making it easier to administer the defects liability periods or to manage other issues such as the reduction of security.

Another important consideration is to ensure that the delay liquidated damages imposed for failure to complete the entire facility by the required date for practical completion takes into account any revenue that may be generated by the Project Company from individual wind turbine generators or solar PV arrays that are taken over and operated prior to commercial operation of the entire facility. This is to ensure that the delay liquidated damages represent a genuine pre-estimate of the Project Company's loss.

Key performance clauses in renewable energy EPC Contracts

Liquidated damages

Almost every construction contract will impose liquidated damages for delay and standards in relation to the quality of construction. Most, however, do not impose PLDs. EPC Contracts impose PLDs because the achievement of the performance guarantees has a significant impact on the ultimate success of a project.
Similarly, it is important that the wind farm or solar PV facility commences operation on time because of the impact on the success of the project and because of the liability the Project Company will have under other agreements (eg under a PPA or financing agreements). This is why DLDs are imposed. DLDs and PLDs are both "sticks" used to motivate the Contractor to fulfil its contractual obligations.

The law of liquidated damages

As discussed above, liquidated damages must be a genuine pre-estimate of the Project Company's loss. If liquidated damages are more than a genuine pre-estimate they will be deemed to be a penalty and unenforceable. There is no legal sanction for setting a liquidated damages rate below that of a genuine pre- estimate, however, there are the obvious financial consequences.

In addition to being unenforceable as a penalty, liquidated damages can also be void for uncertainty or unenforceable because they breach the Prevention Principle. 'Void for uncertainty' means, as the term suggests, that it is not possible to determine how the liquidated damages provisions work. In those circumstances, a court will void the liquidated damages provisions.

The Prevention Principle was developed by the courts to prevent Employers, ie project companies, from delaying Contractors and then claiming DLDs. It is discussed in more detail below in the context of extensions of time.

Prior to discussing the correct drafting of liquidated damages clauses to ensure they are not void or unenforceable it is worth considering the consequences of an invalid liquidated damages regime. If the EPC Contract contains an exclusive remedies clause the result is simple – The Contractor will have escaped liability unless the contract contains a 'fail safe' clause with an explicit right to claim damages at law if the liquidated damages regime fails.

If, however, the EPC Contract does not contain an exclusive remedies clause the non-challenging party should be able to claim at law for damages they have suffered as a result of the challenging party's non or defective performance. What then is the impact of the caps in the now invalidated liquidated damages clauses?

Unfortunately, the position is unclear in common law jurisdictions, and a definitive answer cannot be provided based upon the current state of authority. It appears the answer varies depending upon whether the clause is invalidated due to its character as a penalty, or because of uncertainty or unenforceability. Our view of the current position is set out below. We note that whilst the legal position is not settled the position presented below does appear logical.

- **Clause invalidated as a penalty** – When liquidated damages are invalidated because they are a penalty (ie they do not represent a genuine pre-estimate of loss), the liquidated damages or its cap will not act as a cap on damages claims at general law. We note that it is rare for a court to find liquidated damages are penalties in contracts between two sophisticated, well-advised parties

- **Clause invalidated due to acts of prevention by the Principal** – If a liquidated damage clause is invalidated as a result of the Contractor not being entitled to an extension of time for an act of prevention by the Principal, the amount of liquidated damages or the cap on liquidated damages specified in the EPC Contract will not act as a cap or limit in respect of general damage claims at law

- **Clause void for uncertainty** – A liquidated damages clause that is unworkable or too uncertain to ascertain what the parties intended is severed from the EPC Contract in its entirety, and will not act as a cap on the damages recoverable by the Principal from the Contractor at law. Upon severance, the clause is, for the purposes of contractual interpretation, ignored. However, it should be noted that the threshold test for rendering a clause void for uncertainty is high, and courts are reluctant to hold that the terms of a contract, in particular a commercial contract where performance is well advanced, are uncertain.

Drafting of liquidated damages clauses

Given the role liquidated damages play in ensuring EPC Contracts are bankable, and the consequences detailed above of the regime not being effective, it is vital to ensure they are properly drafted to ensure Contractors cannot avoid their liquidated damages liability on a legal technicality.

Therefore, it is important, from a legal perspective, to ensure DLDs and PLDs are dealt with separately. If a combined liquidated damages amount is levied for late completion of the works, it risks being struck out as a penalty because it will overcompensate the Project Company. However, a combined liquidated damages amount levied for underperformance may under compensate the Project Company.

Our experience shows that there is a greater likelihood of delayed completion than there is of permanent underperformance. One of the reasons why projects are not completed on time is Contractors are often faced with remedying performance problems. This means, from a legal perspective, if there is a combination of DLDs and PLDs, the liquidated damages rate should include more of the characteristics of DLDs to protect against the risk of the liquidated damages being found to be a penalty.

If a combined liquidated damages amount includes a NPV or performance element, the Contractor will be able to argue that the liquidated damages are not a genuine pre-estimate of loss when liquidated damages are levied for late completion only. However, if the combined liquidated damages calculation takes on more of the characteristics of DLDs the Project Company will not be properly compensated if there is permanent underperformance.

It is also important to differentiate between the different types of PLDs to protect the Project Company against arguments by the Contractor that the PLDs constitute a penalty. For example, if a single PLDs rate is only focused on availability and not efficiency, problems and uncertainties will arise if the availability guarantee is met but one or more of the efficiency guarantees are not. In these circumstances, the Contractor will argue that the PLDs constitute a penalty because the loss the Project Company suffers if the efficiency guarantees are not met are usually smaller than if the availability guarantees are not met.

Drafting of the testing, performance guarantee and compensation regime

A properly drafted performance testing and guarantee regime is critical because the success or failure of the project depends, all other things being equal, on the performance of (ie revenue generated by) the wind farm or solar farm.

The major elements of the performance regime are:

- Testing
- Performance Guarantees
- Performance Liquidated Damages or other compensation measures. These are discussed in turn below.

Testing

Performance tests may cover a range of areas. Three of the most common are:

Functional tests – These test the functionality of certain parts or components of the facility, rather than the facility as a whole. For example, in the case of wind farms, tests may be in relation to SCADA systems, power collection systems and meteorological masts, etc. Performance liquidated damages and other compensation measures do not normally attach to these tests; they are absolute obligations that must be achieved in order to reach the next stage of completion.

Various components of the wind turbine generators themselves (including blades, hubs and nacelles) will also be subject to functional tests. In the case of solar PV, key components to be tested are panels, inverters, trackers (if used) and transformers.

Performance guarantee tests – These test the ability of the facility to meet the performance guarantees for the facility specified in the contract.

Performance tests and corresponding performance guarantees vary between technologies. Common across most renewable energy technologies is a two stage performance testing framework. The first round of performance tests is generally performed in order to achieve commercial operation and a second round (and potentially further subsequent rounds) is performed after the facility has been operating for a period of time.

For wind farms, tests on commercial operation will generally be comprised of a commissioning test with a reliability run of around 240 hours (though this may vary by project). A capacity or output test and corresponding guarantee may be provided, depending on (among other factors) the requirements of the PPA or other concession arrangements. Tests after commercial operation generally include a range of acoustic tests and power curve tests. Power curve tests are generally performed 12-18 months after commercial operation; however, the time and expense of the performing the power curve test means that it will generally only be performed if the facility is experiencing performance issues.

For solar PV farms, performance tests on commercial operation may include both capacity and performance ratio tests. Capacity tests may be in respect of installed capacity (measuring the aggregate nameplate DC capacity of all panels installed) and/or output or achieved capacity (measuring the aggregate DC capacity of the panels based on peak hourly conditions and net of auto-consumption and other system losses applicable under these conditions). Performance ratio tests (measuring the efficiency of the facility) will also generally be performed on commercial operation after an evaluation period of around 60 days. Tests after commercial operation are usually performance ratio tests and are generally completed over multiple 12 month evaluation periods corresponding with the duration of the defects liability period.

In respect of the pre-commercial operation performance tests, the Contractor will continue to be liable for DLDs until either the facility achieves the guaranteed level or the Contractor pays compensation (such as PLDs) where the facility does not operate at the guaranteed level. Obviously, DLDs will be capped (usually at 15% of the contract price), therefore the EPC Contract should give the Project Company the right to call for the payment of the compensation and accept the facility.

It is common for the Contractor to be given an opportunity to modify the facility if it does not meet the performance guarantees on the first attempt. This is because the compensation amounts are normally very large and most Contractors would prefer to spend the time and the money necessary to remedy performance instead of paying compensation. Not giving Contractors this opportunity will likely lead to an increased contract price both because Contractors will build a contingency for paying compensation into the contract price. Also, in most circumstances the Project Company will prefer to receive a facility that achieves the required performance guarantees.

If the Contractor is to be given an opportunity to modify and retest, the EPC Contract must deal with who bears the costs required to undertake the retesting. The cost of the performance of a power curve test in particular can be significant and should generally be to the Contractor's account because the retesting only occurs if the performance guarantees are not met at the first attempt.

For each performance test, a corresponding performance guarantee will be set. This may be an absolute level (eg due to a corresponding regulatory requirement) or a percentage of the performance level to be reached. If the minimum performance guarantees are not met the Project Company will generally (subject to the requirements of any tripartite arrangements) have the right to terminate and may have the right to reject the facility and require the Contractor to dismantle the facility and return the site to a greenfield state.

The level at which performance guarantees (including minimum performance guarantees) are set will depend on a variety of factors such as technical and project-specific considerations. The performance guarantees should be set at a level of performance at which it is economic to accept the facility. Lender's input will be vital in determining what this level is. However, it must be remembered that Lenders have different interests to the Sponsors. Lenders will, generally speaking, be prepared to accept a facility that provides sufficient income to service the debt. However, in addition to covering the debt service obligations, Sponsors will also want to receive a return on their equity investment. If that will not be provided via the sale of electricity because the Contractor has not met the performance guarantees, the Sponsors will have to rely on the compensation mechanisms to earn their return.

If the Contractor fails to achieve any of the required performance guarantees, the facility may not be able to generate energy at the rate included in the financial model and, as such, there will be a revenue shortfall. To ensure that the required ratios and covenants are met under the financing agreements, as well as to provide an equity return to the Sponsors, an EPC Contract will generally provide compensation mechanisms such as performance liquidated damages or a reduction in the contract price. A lump sum reduction in the contract price or 'buy down' is commonly used where the facility does not meet its capacity guarantees, and will be set at a level to reflect the NPV of the Project Company's losses over the life of the facility due to lost production. Further commentary in respect of PLDs is set out above.

If performance guarantees on commercial operation are not met and a reduction in the contract price and/or PLDs are paid by the Contractor, there will be an adjustment made to the level of post-commercial operation performance guarantees and compensation measures to ensure that the Project Company does not 'double recover' for the same loss.

A diagram setting out a sample performance testing and performance guarantee framework for solar PV is set out at Appendix 2.

Technical issues

Ideally, the technical testing procedures should be set out in the EPC Contract. However, for a number of reasons, including the fact that it is often not possible to fully scope the testing program until the detailed design is complete, the testing procedures may be left to be agreed during construction by the Contractor, the Project Company's representative or engineer and, if relevant, the Lenders' engineer. However, a properly drafted EPC Contract should include the guidelines for testing.

The complete testing procedures must, as a minimum, set out details of:

- **Testing methodology** – Reference is often made to standard methodologies, for example, the IEC 61-400 methodology[89]

[89] The IEC (http://www.iec.ch/home-e.htm) is a global organisation that prepares and publishes international standards for all

- **Testing equipment** – Who is to provide it, where it is to be located, how sensitive must it be
- **Tolerances** – What is the margin of error? For instance excluding wind or solar irradiance in excess of specified speeds or levels
- **Ambient conditions** – What atmospheric conditions are assumed to be the base case? (Testing results will need to be adjusted to take into account any variance from these ambient conditions).

Key general clauses in EPC Contracts

Delay and extensions of time

(a) The Prevention Principle

As noted previously, one of the advantages of an EPC Contract is that it provides the Project Company with a fixed completion date. If the Contractor fails to complete the works by the required date they are liable to pay DLDs. However, in some circumstances the Contractor is entitled to an extension of the date for completion. Failure to grant an extension of time for a Project Company caused delay can void the liquidated damages regime and "set time at large". This means the Contractor is only obliged to complete the works within a reasonable time.

This is the situation under common law governed contracts due to the Prevention Principle. The Prevention Principle was developed by the courts to prevent Employers (ie project companies) from delaying Contractors and then claiming DLDs.

The legal basis of the Prevention Principle is unclear and it is uncertain whether you can contract out of the Prevention Principle. Logically, given most commentators believe that given the Prevention Principle is an equitable principle, explicit words in a contract should be able to override the principle. However, the courts have tended to apply the Prevention Principle even in circumstances where it would not, on the face of it, appear to apply. Therefore, there is a certain amount of risk involved in trying to contract out of the Prevention Principle. The more prudent and common approach is to accept the existence of the Prevention Principle and provide for it the EPC Contract.

The Contractor's entitlement to an extension of time is not absolute. It is possible to limit the Contractor's rights and impose pre-conditions on the ability of the Contractor to claim an extension of time. A relatively standard Extension of Time (EOT) clause would entitle the Contractor to an EOT for any of the following events:

- An act, omission, breach or default of the Project Company
- Suspension of the works by the Project Company (except where the suspension is due to an act or omission of the Contractor)
- A variation (except where the variation is due to an act or omission of the Contractor)

Force majeure

Which cause a delay to an activity on the critical path and about which the Contractor has given notice within the period specified in the contract. It is permissible (and advisable) from the Project Company's perspective to make both the necessity for the delay to impact the critical path and the obligation to give notice of a claim for an extension of time conditions precedent to the Contractor's entitlement to receive an EOT. In addition, it is usually good practice to include a general right for the Project Company to grant an EOT at any time. However, this type of provision must be carefully drafted because some judges have held (especially when the Project Company's representative is an independent third party) then the inclusion of this clause imposes a mandatory obligation on the Project Company to grant an extension of time whenever it is fair and reasonable to do so, regardless of the strict contractual requirements. Accordingly, from the Project Company's perspective it must be made clear that the Project Company has complete and absolute discretion to grant an EOT, and

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electrical, electronic and related technologies. The main technical committee for wind turbine systems is TC88 which publishes standards for the wind turbine industry.

that it is not required to exercise its discretion for the benefit of the Contractor.

Similarly, following some recent common law decisions, the Contractor should warrant that it will comply with the notice provisions that are conditions precedent to its right to be granted an EOT.

We recommend using the clause in Appendix 1.

(b) Concurrent delay

You will note that in the suggested EOT clause, one of the subclauses refers to concurrent delays. This is relatively unusual because most EPC Contracts are silent on this issue. For the reasons explained below we do not agree with that approach.

A concurrent delay occurs when two or more causes of delay overlap. It is important to note that it is the overlapping of the causes of the delays, not the overlapping of the delays themselves that leads to concurrent delay. In our experience, this distinction is often not made. This leads to confusion and sometimes disputes. More problematic is when the contract is silent on the issue of concurrent delay and the parties assume the silence operates to their benefit. As a result of conflicting case law it is difficult to determine who, in a particular factual scenario, is correct. This can also lead to protracted disputes and outcomes contrary to
the intention of the parties.

There are a number of different causes of delay which may overlap with delay caused by the Contractor. The most obvious causes are the acts or omissions of a Project Company.

A Project Company often has obligations to provide certain materials or infrastructure to enable the Contractor to complete the works. The timing for the provision of that material or infrastructure (and the consequences for failing to provide it) can be affected by a concurrent delay. For example, the Project Company is usually obliged, as between the Project Company and the Contractor, to provide a transmission line to connect to the wind farm by the time the Contractor is ready to commission the wind farm. Given the construction of the transmission line can be expensive, the Project Company is likely to want to incur that expense as close as possible to the date commissioning is due to commence. For this reason, if the Contractor is in delay the Project Company is likely to further delay incurring the expense of building the transmission line. In the absence of a concurrent delay clause, this action by the Project Company, in response to the Contractor's delay, could entitle the Contractor to an extension of time.

Concurrent delay is dealt with differently in the various international standard forms of contract. Accordingly, it is not possible to argue that one approach is definitely right and one is definitely wrong. In fact, the 'right' approach will depend on which side of the table you are sitting.

In general, there are three main approaches for dealing with the issue of concurrent delay. These are:

- **Option One** – The Contractor has no entitlement to an extension of time if a concurrent delay occurs

- **Option Two** – The Contractor has an entitlement to an extension of time if a concurrent delay occurs

- **Option Three** – The causes of delay are apportioned between the parties and the Contractor receives an extension of time equal to the apportionment. For example, if the causes of a 10-day-delay are apportioned 60:40 Project Company: Contractor, the Contractor would receive a six-day extension of time.

Each of these approaches is discussed in more detail below.

(i) *Option One: Contractor not entitled to an extension of time for concurrent delays.*

A common, Project Company friendly, concurrent delay clause for this option one is:

*"If **more than one event** causes concurrent delays and the cause of at least one of those events, but not all of them, is a cause of delay which would not entitle the Contractor to an extension of time under [EOT Clause], then **to the extent of the concurrency**, the Contractor will not be entitled to an extension of time."*

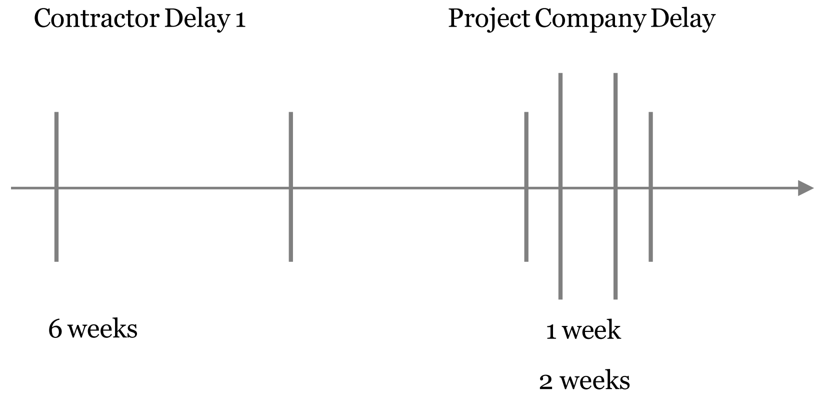
The most relevant words are bolded.

Nothing in the clause prevents the Contractor from claiming an extension of time under the general extension of time clause. What the clause does do is to remove the Contractor's entitlement to an extension of time when there are two or more causes of delay and at least one of those causes would not entitle the Contractor to an extension of time under the general extension of time clause.

For example, if the Contractor's personnel were on strike and during that strike the Project Company failed to approve drawings, in accordance with the contractual procedures, the Contractor would not be entitled to an extension of time for the delay caused by the Project Company's failure to approve the drawings.

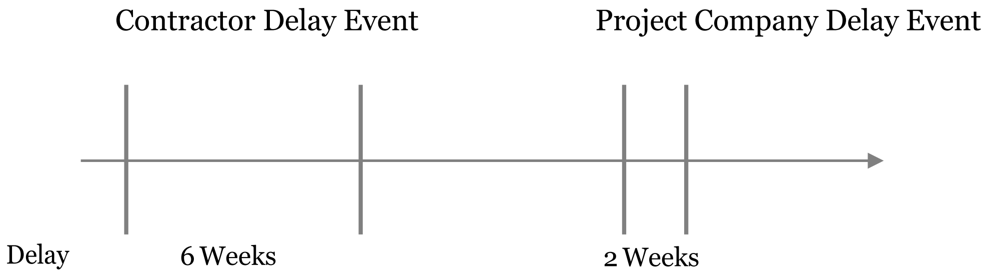
The operation of this clause is best illustrated diagrammatically.

Example 1: Contractor not entitled to an extension of time for Project Company caused delay



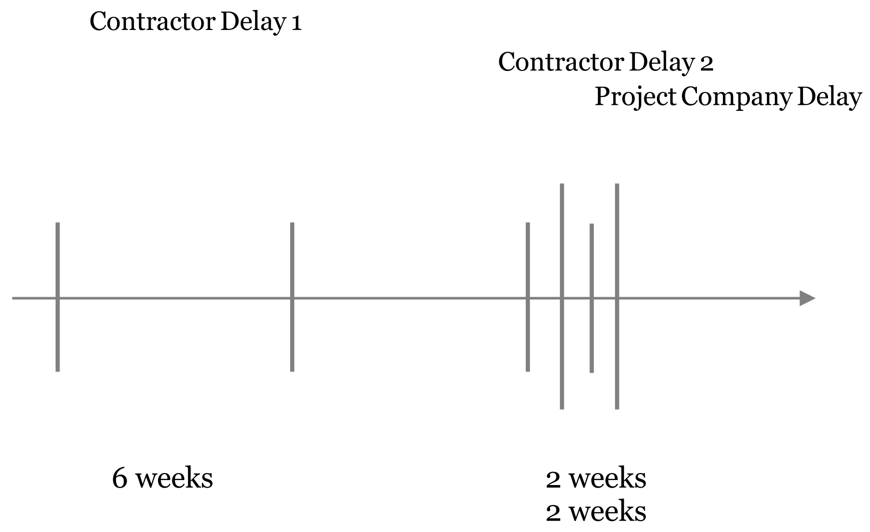
In this example, the Contractor would not be entitled to any extension of time because the Contractor Delay 2 overlap entirely the Project Company Delay. Therefore, using the example clause above, the Contractor is not entitled to an extension of time to the extent of the concurrency. As a result, at the end of the Contractor Delay 2 the Contractor would be in eight-week delay (assuming the Contractor has not, at its own cost and expense accelerated the works).

Example 2: Contractor entitled to an extension of time for Project Company-caused delay



In this example, there is no overlap between the Contractor and Project Company delay events and the Contractor would be entitled to a two-week extension of time for the Project Company delay. Therefore, at the end of the Project Company delay the Contractor will remain in six weeks delay, assuming no acceleration.

Example 3: Contractor entitled to an extension of time for a portion of the Project Company caused delay



In this example, the Contractor would be entitled to a one week extension of time because the delays overlap for one week. Therefore, the Contractor is entitled to an extension of time for the period when they do not overlap (ie when the extent of the concurrency is zero). As a result, after receiving the one-week extension of time, the Contractor would be in seven weeks delay, assuming no acceleration.

From a Project Company's perspective, we believe, this option is both logical and fair. For example, if, in example 2 the Project Company delay was a delay in the approval of drawings and the Contractor delay was the entire workforce being on strike, what logic is there in the Contractor receiving an extension of time? The delay in approving drawings does not actually delay the works because the Contractor could not have used the drawings given its workforce was on strike. In this example, the Contractor would suffer no detriment from not receiving an extension of time. However, if the Contractor did receive an extension of time it would effectively receive a windfall gain.

The greater number of obligations the Project Company has the more reluctant the Contractor will likely be to accept option one. Therefore, it may not be appropriate for all projects.

(ii) Option Two: Contractor entitled to an extension of time for concurrent delays

Option two is the opposite of option one and is the position in many of the Contractor friendly standard forms of contract. These contracts also commonly include extension of time provisions to the effect that the Contractor is entitled to an extension of time for any cause beyond its reasonable control which, in effect, means there is no need for a concurrent delay clause.

The suitability of this option will obviously depend on which side of the table you are sitting. This option is less common than option one but is nonetheless sometimes adopted. It is especially common when the Contractor has a superior bargaining position.

(iii) Option Three: Responsibility for concurrent delays is apportioned between the parties

Option three is a middle ground position that has been adopted in some of the standard form contracts. For example, the Australian Standards construction contract AS4000 adopts the apportionment approach. The AS4000 clause states:

"34.4 Assessment

When both non qualifying and qualifying causes of delay overlap, the Superintendent shall apportion the resulting delay to WUC according to the respective causes' contribution.

In assessing each EOT the Superintendent shall disregard questions of whether:

a) WUC can nevertheless reach practical completion without an EOT; or *b) the Contractor can accelerate, but shall have regard to what prevention and mitigation of the delay has not been effected by the Contractor."*

We appreciate the intention behind the clause and the desire for both parties to share responsibility for the delays they cause. However, we have some concerns about this clause and the practicality of the apportionment approach in general. It is easiest to demonstrate our concerns with an extreme example. For example, what if the qualifying cause of delay was the Project Company's inability to provide access to the site and the non- qualifying cause of delay was the Contractor's inability to commence the works because it had been black banned by the unions. How should the causes be apportioned? In this example, the two causes are both 100% responsible for the delay.

In our view, an example like the above where both parties are at fault has two possible outcomes. Either:

- The delay is split down the middle and the Contractor receives 50% of the delay as an extension of time

- The delay is apportioned 100% to the Project Company and therefore the Contractor receives 100% of the time claimed. The delay is unlikely to be apportioned 100% to the Contractor because a judge or arbitrator will likely feel that that is "unfair", especially if there is a potential for significant liquidated damages liability. We appreciate the above is not particularly rigorous legal reasoning, however, the clause does not lend itself to rigorous analysis.

In addition, option three is only likely to be suitable if the party undertaking the apportionment is independent from both the Project Company and the Contractor.

Exclusive remedies and fail safe clauses

It is common for Contractors to request the inclusion of an exclusive remedies clause in an EPC Contract.
However, from the perspective of a Project Company, the danger of an exclusive remedies clause is that it prevents the Project Company from recovering any type of damages not specifically provided for in the EPC Contract.

An EPC Contract is conclusive evidence of the agreement between the parties to that contract. If a party clearly and unambiguously agrees that their only remedies are those within the EPC Contract, they will be bound by those terms. However, the courts have been reluctant to come to this conclusion without clear evidence of an intention of the parties to the EPC Contract to contract out of their legal rights. This means if the common law right to sue for breach of EPC Contract is to be contractually removed, it must be done by very clear words.

(a) Contractor's perspective

The main reason for a Contractor insisting on a Project Company being subject to an exclusive remedies clause is to have certainty about its potential liabilities. The preferred position for a Contractor will be to confine its liabilities to what is specified in the EPC Contract. For example, an agreed rate of liquidated damages for delay and, where relevant, underperformance of the wind farm. A Contractor will also generally require the amount of liquidated damages to be subject to a cap and for the EPC Contract to include an overall cap on its liability.

(b) Project company's perspective

The preferred position for a Project Company is for it not to be subject to an exclusive remedies clause. An exclusive remedies clause limits the Project Company's right to recover for any failure of the Contractor to fulfil its contractual obligations to those remedies specified in the EPC Contract. For this reason, an exclusive remedies clause is an illogical clause to include in an EPC Contract from the perspective of a Project Company because it means that the Project Company has to draft a remedy or exception for each obligation – This represents an absurd drafting position. For example, take the situation where the EPC Contract does not have any provision for the recovery of damages other than liquidated damages. In this case, if the Contractor has either paid the maximum amount of liquidated damages or delivered the wind farm in a manner that does not require the payment of liquidated damages (ie it is delivered on time and performs to specification) but subsequent to that delivery the Project Company is found to have a claim, say for defective design which manifests itself after completion, the Project Company will have no entitlement to recover any form of damages as any remedy for latent defects has been excluded.

The problem is exacerbated because most claims made by a Project Company will in some way relate to performance of the facility and PLDs were expressed to be the exclusive remedy for any failure of the facility to perform in the required manner. For example, any determination as to whether the facility is fit for purpose will necessarily depend on the level and standard of the performance of the facility. In addition to claims relating to fitness for purpose, a Project Company may also wish to make claims for, amongst other things, breach of contract, breach of warranty or negligence. The most significant risk for a Project Company in an EPC Contract is where there is an exclusive remedies clause and the only remedies for delay and underperformance are liquidated damages. If, for whatever reason, the liquidated damages regimes are held to be invalid, the Project Company would have no recourse against the Contractor as it would be prevented from recovering general damages at law, and the Contractor would escape liability for late delivery and underperformance of the facility.

(c) Fail safe clauses

In contracts containing an exclusive remedies clause, the Project Company must ensure all necessary exceptions are expressly included in the EPC Contract. In addition, drafting must be included to allow the Project Company to recover general damages at law for delay and underperformance if the liquidated damages regimes in the EPC Contract are held to be invalid. To protect the position of a Project Company (if liquidated damages are found for any reason to be unenforceable and there is an exclusive remedies clause), we recommend the following clauses be included in the EPC Contract:

"[ ].1 If clause [delay liquidated damages] is found for any reason to be void, invalid or otherwise inoperative so as to disentitle the Project company from claiming Delay Liquidated Damages, the Project company is entitled to claim against the Contractor damages at law for the Contractor's failure to complete the Works by the Date for Practical Completion.

[ ].2 If [ ].1 applies, the damages claimed by the Project company must not exceed the amount specified in Item [ ] of Appendix [ ] for any one day of delay and in aggregate must not exceed the percentage of the EPC Contract Price specified in Item [ ] of Appendix [ ]."

These clauses (which would also apply to PLDs) mean that if liquidated damages are held to be unenforceable for any reason the Project Company will not be prevented from recovering general damages at law. However, the amount of damages recoverable at law may be limited to the amount of liquidated damages that would have been recoverable by the Project Company under the EPC Contract if the liquidated damages regime had not been held to be invalid (see discussion above). For this reason, the suggested drafting should be commercially acceptable to a Contractor as its liability for delay and underperformance will be the same as originally contemplated by the parties at the time of entering into the EPC Contract.

In addition, if the EPC Contract excludes the parties' rights to claim their consequential or indirect losses, these clauses should be an exception to that exclusion. The rationale being that the rates of liquidated damages are likely to include an element of consequential or indirect losses.

Force Majeure

(a) What is *force majeure*?

Force majeure clauses are almost always included in EPC Contracts. However, they are rarely given much thought unless and until one or more parties seek to rely on them. Generally, the assumption appears to be that "the risk will not affect us" or "the *force majeure* clause is a legal necessity and does not impact on our risk allocation under the contract". Both of these assumptions are inherently dangerous, and, particularly in the second case, incorrect. Therefore, especially in the current global environment, it is appropriate to examine their application.

Force majeure is a civil law concept that has no real meaning under the common law. However, *force majeure* clauses are used in contracts because the only similar common law concept – The doctrine of frustration – Is of limited application. For that doctrine to apply the performance of a contract must be radically different from what was intended by the parties. In addition, even if the doctrine does apply, the consequences are unlikely to be those contemplated by the parties. An example of how difficult it is to show frustration is that many of the leading cases relate to the abdication of King Edward VIII before his coronation and the impact that had on contracts entered into in anticipation of the coronation ceremony.

Given *force majeure* clauses are creatures of contract their interpretation will be governed by the normal rules of contractual construction. *Force majeure* provisions will be construed strictly and in the event of any ambiguity the *contra proferentem* rule will apply. *Contra proferentem* literally means "against the party putting forward". In this context, it means that the clause will be interpreted against the interests of the party that drafted and is seeking to rely on it. The parties may contract out of this rule.

The rule of *ejusdem generis*, which literally means "of the same class", may also be relevant. In other words, when general wording follows a specific list of events, the general wording will be interpreted in light of the specific list of events. In this context it means that when a broad "catch-all" phrase, (such as "anything beyond the reasonable control of the parties") follows a list of more specific *force majeure* events the catch all phrase will be limited to events analogous to the listed events. Importantly, parties cannot invoke a *force majeure* clause if they are relying on their own acts or omissions.

The underlying test in relation to most *force majeure* provisions is whether a particular event was within the contemplation of the parties when they made the contract. The event must also have been outside the control of the contracting party. There are generally three essential elements to *force majeure*:

- It can occur with or without human intervention
- It cannot have reasonably been foreseen by the parties
- It was completely beyond the parties' control and they could not have prevented its consequences.

Given the relative uncertainty surrounding the meaning of *force majeure* we favour explicitly defining what the parties mean. This takes the matter out of the hands of the courts and gives control back to the parties.
Therefore, it is appropriate to consider how *force majeure risk* should be allocated.

(b) Drafting *force majeure* clauses

The appropriate allocation of risk in project agreements is fundamental to negotiations between the Project Company and its Contractors. Risks generally fall into the following categories:

- Risks within the control of the Project Company
- Risks within the control of the Contractor
- Risks outside the control of both parties.

The negotiation of the allocation of many of the risks beyond the control of the parties, for example, latent site conditions and change of law, is usually very detailed so that it is clear which risks are borne by the Contractor. The same approach should be adopted in relation to the risks arising from events of *force majeure*.

There are two aspects to the operation of *force majeure* clauses:

- The definition of *force majeure* events
- The operative clause that sets out the effect on the parties' rights and obligations if a *force majeure* event occurs.

The events which trigger the operative clause must be clearly defined. As noted above, it is in the interests of both parties to ensure that the term *force majeure* is clearly defined.

The preferred approach for a Project Company is to define *force majeure* events as being any of the events in an exhaustive list set out in the contract. In this manner, both parties are aware of which events are
force majeure events and which are not. Clearly, defining *force majeure* events makes the administration of the contract and, in particular, the mechanism within the contract for dealing with *force majeure* events simpler and more effective.

An example exhaustive definition is:

"An Event of Force Majeure is an event or circumstance which is beyond the control and without the fault or negligence of the party affected and which by the exercise of reasonable diligence the party affected was unable to prevent provided that event or circumstance is limited to the following:

a) *riot, war, invasion, act of foreign enemies, hostilities (whether war be declared or not) acts of terrorism, civil war, rebellion, revolution, insurrection of military or usurped power, requisition or compulsory acquisition by any governmental or competent authority;*

b) *ionising radiation or contamination, radio activity from any nuclear fuel or from any nuclear waste from the combustion of nuclear fuel, radioactive toxic explosive or other hazardous properties of any explosive assembly or nuclear component;*

c) *pressure waves caused by aircraft or other aerial devices travelling at sonic or supersonic speeds;*

d) *earthquakes, flood, fire or other physical natural disaster, but excluding weather conditions regardless of severity; and*

e) *strikes at national level or industrial disputes at a national level, or strike or industrial disputes by labour not employed by the affected party, its subContractors or its suppliers and which affect an essential portion of the Works but excluding any industrial dispute which is specific to the performance of the Works or this Contract."*

An operative clause will act as a shield for the party affected by the event of *force majeure* so that a party can rely on that clause as a defence to a claim that it has failed to fulfil its obligations under the contract.

An operative clause should also specifically deal with the rights and obligations of the parties if a *force majeure* event occurs and affects the project. This means the parties must consider each of the events it intends to include in the definition of *force majeure* events and then deal with what the parties will do if one of those events occurs.

An example of an operative clause is:

"[ ].1 Neither party is responsible for any failure to perform its obligations under this Contract, if it is prevented or delayed in performing those obligations by an Event of Force Majeure.

[ ].2 Where there is an Event of Force Majeure, the party prevented from or delayed in performing its obligations under this Contract must immediately notify the other party giving full particulars of the Event of Force Majeure and the reasons for the Event of Force Majeure preventing that party from, or delaying that party in performing its obligations under this Contract and that party must use its reasonable efforts to mitigate the effect of the Event of Force Majeure upon its or their performance of the Contract and to fulfil its or their obligations under the Contract.

[ ].3 Upon completion of the Event of Force Majeure the party affected must as soon as reasonably practicable recommence the performance of its obligations under this Contract. Where the party affected is the Contractor, the Contractor must provide a revised Program rescheduling the Works to minimise the effects of the prevention or delay caused by the Event of Force Majeure

[ ].4 An Event of Force Majeure does not relieve a party from liability for an obligation which arose before the occurrence of that event, nor does that event affect the obligation to pay money in a timely manner which matured prior to the occurrence of that event.

[ ].5 The Contractor has no entitlement and the Project Company has no liability for:

(a) any costs, losses, expenses, damages or the payment of any part of the Contract Price during an Event of Force Majeure; and

(b) any delay costs in any way incurred by the Contractor due to an Event of Force Majeure."

In addition to the above clause, it is important to appropriately deal with other issues that will arise if a *force majeure* event occurs. For example, as noted above, it is common practice for a Contractor to be entitled to an extension of time if a *force majeure* event impacts on its ability to perform the works. Contractors also often request costs if a *force majeure* event occurs. In our view, this should be resisted. *Force majeure* is a neutral risk in that it cannot be controlled by either party. Therefore, the parties should bear their own costs.

Another key clause that relates to *force majeure* type events is the Contractor's responsibility for care of the works and the obligation to reinstate any damage to the works prior to completion. A common example clause is:

"[ ].1 The Contractor is responsible for the care of the Site and the Works from when the Project Company makes the Site available to the Contractor until 5.00 pm on the Date of Commercial Operation.

[ ].2 The Contractor must promptly make good loss from, or damage to, any part of the Site and the Works while it is responsible for their care.

[ ].3 If the loss or damage is caused by an Event of Force Majeure, the Project Company may direct the Contractor to reinstate the Works or change the Works. The cost of the reinstatement work or any change to the Works arising from a direction by the Project Company under this clause will be dealt with as a Variation except to the extent that the loss or damage has been caused or exacerbated by the failure of the Contractor to fulfil its obligations under this Contract.

[ ].4 Except as contemplated in clause [ ].3, the cost of all reinstatement Works will be borne by the Contractor."

This clause is useful because it enables the Project Company to, at its option, have the damaged section of the project rebuilt as a variation to the existing EPC Contract. This will usually be cheaper than recontracting for construction of the damaged sections of the works.

Operation and maintenance

(a) Operating and maintenance manuals

The Contractor is usually required to prepare a detailed operating and maintenance manual (O&M manual). The EPC Contract should require the Contractor to prepare a draft of the O&M manual within a reasonable time to enable the Project Company, the Operator and possibly the Lenders to provide comments which can be incorporated into a final draft at least six months before the start of commissioning.

The draft should include all information that may be required for start-up, all modes of operation during normal and emergency conditions and maintenance of all systems of the facility.

(b) Operating and maintenance personnel

It is standard for the Contractor to be obliged to train the operations and maintenance staff supplied by the Project Company. The cost of this training will be built into the contract price. It is important to ensure the training is sufficient to enable such staff to be able to efficiently, prudently, safely and professionally operate the facility upon commercial operation. Therefore, the framework for the training should be described in the Appendix dealing with the scope of work (in as much detail as possible). This should include the standards of training and the timing for training.

The Project Company's personnel trained by the Contractor will also usually assist in the commissioning and testing of the facility. They will do this under the direction and supervision of the Contractor. Therefore, absent specific drafting to the contrary, if problems arise during commissioning and/or testing the Contractor can argue they are entitled to an extension of time etc. We recommend inserting the following clause:

"[ ].1 The Project Company must provide a sufficient number of competent and qualified operating and maintenance personnel to assist the Contractor to properly carry out Commissioning and the Commercial Operation Performance Tests.

[ ].2 Prior to the Date of Commercial Operation, any act or omission of any personnel

provided by the Project Company pursuant to GC [ ].1 is, provided those personnel are acting in accordance with the Contractor's instructions, directions, procedures or manuals, deemed to be an act or omission of the Contractor and the Contractor is not relieved of its obligations under this Contract or have any claim against the Project Company by reason of any act or omission."

Spare parts

The Contractor is usually required to provide, as part of its scope of works, a full complement of spare parts (usually specified in the appendices (the scope of work or the specification) to be available as at the commencement of commercial operation.

Further, the Contractor should be required to replace any spare parts used in rectifying defects during the defects liability period, at its sole cost. There should also be a time limit imposed on when these spare parts must be back in the store. It is normally unreasonable to require the spare parts to have been replaced by the expiry of the defects liability period because that may, for some long lead time items, lead to an extension of the defects liability period.

The Project Company also may wish to have the option to purchase spares parts from the Contractor on favourable terms and conditions (including price) during the remainder of the concession period. In that case it would be prudent to include a term which deals with the situation where the Contractor is unable to continue to manufacture or procure the necessary spare parts. This provision should cover the following points:

- Written notification from the Contractor to the Project Company of the relevant facts, with sufficient time to enable the Project Company to order a final batch of spare parts from the Contractor

- The Contractor should deliver to, or procure for the Project Company (at no charge to the Project Company), all drawings, patterns and other technical information relating to the spare parts

- The Contractor must sell to the Project Company (at the Project Company's request) at cost price (less a reasonable allowance for depreciation) all tools, equipment and moulds used in manufacturing the spare parts, to extent they are available to the Contractor provided it has used its reasonable endeavours to procure them.

The Contractor should warrant that the spare parts are fit for their intended purpose, and that they are of merchantable quality. As a minimum, this warranty should expire on the later of:

- The manufacturer's warranty period on the applicable spare part

- The expiry of the defects liability period.

The Project Company should be aware that the Contractor may be purchasing the spare parts from the Original Equipment Manufacturer (OEM). The OEM will have typically imposed non-negotiable warranties on the spare parts that the Contractor will try to pass-through to the Project Company. This should be resisted
on the part of the Project Company. However, the Project Company should be prepared to pay higher prices for those spare parts to reflect the greater risk the Contractor will be accepting in place of the pass-through of the OEM warranties.

Interface issues

In some circumstances, a split contract structure may be used to achieve a lower overall contract price than would be achieved under an EPC Contract. For example, a structure with a BOP contract and an equipment supply contract may be used. However, if a split structure is used, it is critical that a single point of responsibility is provided. If not, the Project Company will be left with interface risk which will impact on bankability.

Matters that are critical to providing a single point of responsibility are:

- Providing that no claim is available by the Contractor against the Project Company arising out of an act or omission of any other Contractor

- Preventing split Contractors from having the ability to make a claim on the Project Company due to the default of one of the other contracting entities (eg equipment supply Contractor claiming against the Project Company for a default caused by the balance of plant Contractor).

If a split contract structure is used, we recommend inserting the following clauses:

No relief

[ ] Neither Contractor 1 nor Contractor 2 will be entitled to payment of any sum from the Project Company or to relief from any obligation to make payment of any sum to the Project Company or be entitled to relief from or reduction of any other liability, obligation or duty arising out of or in connection with the contracts including (without limitation):

[ ].1 any extension of time;

[ ].2 any relief from liability for liquidated damages;

[ ].3 any relief from liability for any other damages;

[ ].4 any relief for deductions from payments;

[ ].5 any relief from liability to rectify defects;

[ ].6 any increase in the contract sum under the contracts; or

[ ].7 payment of any costs incurred, which arises out of or in connection with any act or omission of

the other, whether pursuant to or in connection with any of the contracts or otherwise.

Horizontal defences

[ ] Contractor 1 and Contractor 2 each waive any and all rights, under contract, tort or otherwise at law, to assert any and all defences which either of Contractor 1 or Contractor 2 may have to a claim by the Project Company for the non-performance, inadequate performance or delay in performance under their respective Contract due to any non-performance or inadequate performance or delay in performance by the other party under its Contract."

Dispute resolution

Dispute resolution provisions for EPC Contracts could fill another entire paper. There are numerous approaches that can be adopted depending on the nature and location of the project and the particular preferences of the parties involved.

However, there are some general principles which should be adopted. They include:

- Ensuring that the dispute resolution process is aligned with that under the PPA
- Having a staged dispute resolution process that provides for internal discussions and meetings aimed at resolving the dispute prior to commencing action (either litigation or arbitration)
- Obliging the Contractor to continue to execute the works pending resolution of the dispute
- Not permitting commencement of litigation or arbitration, as the case may be, until after commercial operation of the facility. This provision must make exception for the parties to seek urgent interlocutory relief
- Providing for consolidation of any dispute with other disputes which arise out of or in relation to the construction of the facility. The power to consolidate should be at the Project Company's discretion.

Key project experience

For examples of projects which relate to the content explored in this paper as well as an overview of the PwC integrated multi-disciplinary approach to renewable projects, see Appendix 3.

Appendix 1 Example clauses

Part I – Extension of time regime

[ ].1 The Contractor must immediately give notice to the Project Company of all incidents and/or events of whatsoever nature affecting or likely to affect the progress of the Works.

[ ].2 Within 15 days after an event has first arisen the Contractor must give a further notice to the Project Company which must include:

(a) the material circumstances of the event including the cause or causes

(b) the nature and extent of any delay

(c) the corrective action already undertaken or to be undertaken

(d) the effect on the critical path noted on the Program

(e) the period, if any, by which in its opinion the Date for Commercial Operation should be extended

(f) a statement that it is a notice pursuant to this GC [ ].2.

[ ].3 Where an event has a continuing effect or where the Contractor is unable to determine whether the effect of an event will actually cause delay to the progress of the Works so that it is not practicable for the Contractor to give notice in accordance with GC [ ].2, a statement to that effect with reasons together with interim written particulars (including details of the likely consequences of the event on progress of the Works and an estimate of the likelihood or likely extent of the delay) must be submitted in place of the notice required under GC [ ].2. The Contractor must then submit to the Project Company, at intervals of 30 days, further interim written particulars until the actual delay caused (if any) is ascertainable, whereupon the Contractor must as soon as practicable but in any event within 30 days give a final notice to the Project Company including the particulars set out in GC [ ].2.

[ ].4 The Project Company must, within 30 days of receipt of the notice in GC [ ].2 or the final notice in GC [].3 (as the case may be), issue a notice notifying the Contractor's Representative of its determination as to the period, if any, by which the Date for Commercial Operation is to be extended.

[ ].5 Subject to the provisions of this GC [ ], the Contractor is entitled to an extension of time to the Date for Commercial Operation as the Project Company assesses, where a delay to the progress of the Works is caused by any of the following events, whether occurring before, on or after the Date for Commercial Operation:

(a) any act, omission, breach or default by the Project Company, the Project Company's Representative and their agents, employees and Contractors

(b) a Variation, except where that Variation is caused by an act, omission or default of the Contractor or its SubContractors, agents or employees

(c) a suspension of the Works pursuant to GC [ ], except where that suspension is caused by an act, omission or default of the Contractor or its SubContractors, agents or employees

(d) an Event of *Force Majeure*

(e) a Change of Law.

[ ].6 Despite any other provisions of this GC [ ], and notwithstanding that the Contractor is not entitled to or has not claimed an extension of time to the Date for Commercial Operation, the Owner may, in its absolute sole and unfettered discretion, at any time grant an extension of the Date for Commercial Operation. The Owner has no obligation to grant, or to consider whether it should grant, an extension of time and is not required to exercise this discretion for the benefit of the Contractor.

[ ].7 The Contractor must constantly use its best endeavours to avoid delay in the progress of the works.

[ ].8 If the Contractor fails to submit the notices required under GCs [ ].1, [ ].2 and [ ].3 within the times required then:

(a) the Contractor has no entitlement to an extension of time

(b) the Contractor must comply with the requirements to perform the Works by the Date for Commercial Operation

(c) any principle of law or equity (including those which might otherwise entitle the Contractor to relief and the "Prevention Principle") which might otherwise render the Date for Commercial Operation immeasurable and liquidated damages unenforceable, will not apply.

[ ].9 It is a further condition precedent of the Contractor's entitlement to an extension of time that the critical path noted on the Program is affected in a manner which might reasonably be expected to result in a delay to the Works reaching Commercial Operation by the Date for Commercial Operation.

[ ].10 If there are two or more concurrent causes of delay and at least one of those delays would not entitle the Contractor to an extension of time under this GC [ ] then, to the extent of that concurrency, the Contractor is not entitled to an extension of time.

[ ].11 The Project Company may direct the Contractor's Representative to accelerate the Works for any reason including as an alternative to granting an extension of time to the Date for Commercial Operation.

[ ].12 The Contractor will be entitled to all extra costs necessarily incurred, by the Contractor in complying with an acceleration direction under GC [ ].11, except where the direction was issued as a consequence of the failure of the Contractor to fulfil its obligations under this Contract. The Project Company must assess and decide as soon as reasonably practical, the extra costs necessarily incurred by the Contractor.

Part II – Grid access regime

[ ].1 The Contractor must co-ordinate the connection of the Facility to the Transmission Line and provide, in a timely manner, suitable termination facilities in accordance with Appendix 1. The Contractor must liaise with the Network Service Provider, Government Authorities and other parties to avoid delays in connecting the Facility to the Transmission Line.

[ ].2 On the Date for First Synchronisation the Project Company must ensure that there is in place a Transmission Network which is capable of receiving the generated output the Facility is physically capable of producing at any given time.

[ ].3 The Project Company's obligation to ensure that the Transmission Network is in place is subject to the Contractor being able (physically and legally) to connect the Facility to the Transmission Line and import and/or export power to the Transmission Network.

[ ].4 If the Contractor notifies the Project Company that First Synchronisation is likely to take place before the Date for First Synchronisation, the Project Company must endeavour, but is under no obligation to ensure that the Transmission Network is in place, to enable First Synchronisation to take place in accordance with the Contractor's revised estimate

of First Synchronisation.

[ ].5 At the time of and following First Synchronisation the Project Company will ensure that the Contractor is permitted to export to the Transmission Network power which the Facility is physically capable of exporting, provided that:

(a) it is necessary for the Contractor to export that amount of power if the Contractor is to obtain Commercial Operation

(b) the Contractor has complied in all respects with its obligations under GC [ ].7

(c) in the reasonable opinion of the Project Company and/or the Network Service Provider the export of power by the Facility will not pose a threat to the safety of persons and/or property (including the Transmission Network).

[ ].6 For the avoidance of doubt, the Project Company will not be in breach of any obligation under this Contract by reason only of the Contractor being denied permission to export power to the Transmission Network in accordance with the Grid Code.

[ ].7 The Contractor must carry out the testing of the Works, in particular in relation to the connection of the Facility to the Transmission Network so as to ensure that the Project Company and the Contractor as a Participant (as defined in the Electricity Code) comply with their obligations under the Electricity Code in respect of the Testing of the Works,

[ ].8 The Contractor must carry out the Testing of the Works, in particular in relation to the connection of the Facility to the Transmission Network, so as to ensure that:

(a) any interference to the Transmission Network is minimised

(b) damage to the Transmission Network is avoided.

[ ].9 The Contractor must promptly report to the Project Company's Representative any interference with and damage to the Transmission Network which connects with the Facility.

[ ].10 Without derogating from the Contractor's obligations under this Contract, in carrying out any test which requires the Contractor to supply electricity to the Transmission Network, the Contractor must:

(a) issue a notice to the Project Company's Representative at least 24 hours prior to the time at which it wishes to so supply, detailing the testing or commissioning and including the Contractor's best estimate of the total period and quantity (in MWh per half-hour) of that supply

(b) promptly notify the Project Company's Representative if there is any change in the information contained in such notice

(c) do all things necessary to assist the Project Company (including but not limited to cooperating with the Network Service Provider and complying with its obligations under GC 20.15), so that the Project Company can comply with its obligations under the National Electricity Code.

Part III – Performance testing and guarantee regime

1 Testing

Tests and inspections

1.1 The Contractor must, at its own expense, carry out at the place of manufacture and/or on the Site all tests and/or inspections of the Equipment and any part of the Works as specified in this Contract or as required by any applicable Laws, and as necessary to ensure the Facility operates safely and reliably under the conditions specified in the Schedule of Scope of Work and the Schedule of Tests.

[Note: Schedule of Tests should specify all the categories of tests other than the Tests (example: test at manufacturers plant, test on site, functional test etc.)]

1.2 The Contractor must also comply with any other requirements of the Owner in relation to testing and inspection.

1.3 The Owner and the Lenders' Representative are entitled to attend any test and/or inspection by its appointed duly authorised and designated inspector.

1.4 Whenever the Contractor is ready to carry out any test and/or inspection, the Contractor must give a reasonable advance notice to the Owner of the test and/or inspection and of the place and time.
The Contractor must obtain from any relevant third party or manufacturer any necessary permission or consent to enable the Owner's inspector and the Lenders' Representative to attend the test and/or inspection.

1.5 The Contractor must provide the Owner's Representative with a certified report of the results of any test and/or inspection within 5 days of the completion of that test or inspection.

1.6 If the Owner or the Lenders' Representative fails to attend the test and/or inspection, or if it is agreed between the parties that the Owner or the Lenders' Representative will not attend, then the Contractor may proceed with the test and/or inspection in the absence of the Owner's inspector and provide the Owner and the Lenders' Representative with a certified report of the results.

1.7 The Owner may require the Contractor to carry out any test and/or inspection not described in this Contract. The Contractor's extra costs necessarily incurred, which do not include head office or corporate overheads, profit or loss of profit, in the carrying out of the test and/or inspection will be added to the Contract Price only if the test shows that the relevant Works conform with the requirements of the Contract, but otherwise all costs will be borne by the Contractor.

1.8 If any Equipment or any part of the Works fails to pass any test and/or inspection, the Contractor must either rectify to the Owner's satisfaction or replace such Equipment or part of the Works and must repeat the test and/or inspection upon giving a notice under GC 1.4.

1.9 The Contractor must afford the Owner and the Lenders' Representative access at any time to any place where the Equipment is being manufactured or the Works are being performed in order to inspect the progress and the manner of manufacture or construction, provided that the Owner gives the Contractor reasonable prior notice.

1.10 The Contractor agrees that neither the execution of a test and/or inspection of Equipment or any part of the Works, nor the attendance by either or both the Owner and the Lenders' Representative nor the issue of any test report pursuant to GC 1.5 releases the Contractor from any other responsibilities under this Contract.

1.11 No part of the Works are to be covered up on the Site without carrying out any test and/or inspection required under this Contract and the Contractor must give reasonable notice to the Owner whenever any part of the Works are ready or about to be ready for test and/or inspection.

1.12 The Contractor must uncover any part of the Works or make openings in or through the same as the Owner may from time to time require at the Site and must reinstate and make good that part.

1.13 If any part of the Works have been covered up at the Site after compliance with the requirement of GC 1.12 and are found to be performed in accordance with the Contract, the Contractor's extra costs, which do not include head office or corporate overheads, profit or loss of profit, necessarily incurred in uncovering, making openings in or through, reinstating and making good the same will be added to the Contract Price.

Performance tests procedures and guidelines

1.14 The relevant Performance Tests must be conducted by the Contractor after Commissioning to ascertain whether the Facility can achieve Completion and after Completion to ascertain whether the Facility can meet the Performance Guarantees.

1.15 All Performance Tests must be conducted in a professional, timely, safe and environmentally responsible manner and in accordance with the Schedule of Scope of Work and the Schedule of Tests, all other terms and conditions of this Contract, applicable standards, Laws, Government Approvals and must be accomplished at no additional cost or expense to the Owner.

1.16 The Facility must not be operated during any Performance Test in excess of:

(a) the limits allowed by any manufacturer to maintain its warranty

(b) the limits imposed by the Law and Government Approvals applicable standards

(c) the limits stated in the Schedule of Tests.

1.17 The Contractor agrees that the Owner and the Lenders' Representative will monitor the conduct of the Performance Testing to ensure compliance with the terms and conditions of this Contract.

1.18 The Contractor agrees that an inspection pursuant to GC 1.17 by the Owner and/or the Lenders' Representative does not release the Contractor from any other responsibilities under this Contract, including meeting the Performance Guarantees.

1.19 If a Performance Test is interrupted or terminated, for any reason, that Performance Test must be re- started from the beginning, unless otherwise approved by the Owner or the Lenders' Representative.

1.20 The Owner or the Contractor is entitled to order the cessation of any Performance Test if:

(a) damage to the Works, the Facility or other property or personal injury

(b) breach of the conditions specified in the relevant environmental Laws or Government Approvals, is likely to result from continuation.

1.21 If the Contractor fails to pass a Performance Test (or any repetition in the event of prior failure) or if a Performance Test is stopped before its completion, that Performance Test must, subject to 24 hours prior notice having been given by the Contractor to the Owner and the Lenders' Representative, be repeated as soon as practicable. All appropriate adjustments and modifications are to be made by the Contractor with all reasonable speed and at its own expense before the repetition of any Performance Test.

1.22 The results of the Performance Tests must be presented in a written report, produced by the Contractor and delivered to the Owner and the Lenders' Representative within 5 days of the completion of the Tests. Those results will be evaluated by the Owner and the Lenders' Representative. In evaluation of the results, no additional allowance will be made for measurement tolerances over and above those specified in the applicable ISO test standard.

Sale of electricity during the performance tests

1.23 The Contractor acknowledges and agrees that:

(a) the Owner is entitled to all energy, revenues and other benefits, including all Renewable Energy Certificates under the REC Act, carbon credits and all other "green" renewable energy credits, that may be generated or derived from the Facility during the Performance Tests or otherwise

(b) nothing in this Contract imposes any restrictions on the Owner from selling any electricity generated during the Performance Tests.

2 Precommissioning, commissioning and tests on completion

Precommissioning

2.1 The Contractor must perform the Precommissioning of the Facility in accordance with the Owner's requirements and procedures in relation to Precommissioning as set out in the Schedule of Scope of Work.

2.2 As soon as all works in respect of Precommissioning are completed and, in the opinion of the Contractor, the Facility is ready for Commissioning, the Contractor must give notice to that effect to the Owner. As soon as reasonably practicable after receipt of that notice, the Owner must issue a notice to the Contractor specifying the date for commencement of Commissioning.

Commissioning

2.3 On the date specific in the notice issued by the Owner under clause 2.3, the Contractor must commence Commissioning of the Facility in accordance with the requirements and procedures in relation to Commissioning as set out in the Schedule of Scope of Work.

Performance tests

2.5

(a) After the completion of Commissioning the Contractor must give the Owner at least 10 Days prior written notice that the Equipment, Works and Facility (or any component part of the Works and Facility) are ready for the Commercial Operation Performance Tests.

(b) The Owner must, as soon as reasonably practicable, after receipt of a notice under GC 2.5(a), issue a notice to the Contractor specifying the date for commencement of the Commercial Operation Performance Tests if such a date is not already identified in the Program and the Schedule of Tests.

3 Commercial operation, post-commercial operation and final completion

Completion

3.1

(a) The Contractor must notify the Owner at least [70] Days before the whole of the Works will, in the opinion of the Contractor reach the stage of Commercial Operation and be suitable for the issue of the Facility Completion Form by the Independent Engineer.

(b) As soon as the whole of the Works have, in the opinion of the Contractor, satisfied each of the preconditions for achieving Commercial Operation, including that the Facility Completion Form has been issued to the Owner by the Independent Engineer, the Contractor must give a notice to that effect to the Owner.

(c) The Owner's Representative must, promptly, and no later than 10 days after receipt of the Contractor's notice under GC 3.1(b), either issue a Certificate of Commercial Operation stating that the Facility has achieved Commercial Operation or notify the Contractor that the Facility has not achieved Commercial Operation and indicate any defects and/or deficiencies.

(d) Despite any other provision of this Contract, no payment and no partial or entire use or occupancy of the Site, the Works or the Facility by the Owner in any way constitutes an acknowledgment by the Owner that Commercial Operation has occurred, nor does it operate to release the Contractor from or otherwise affect any of the Contractor's warranties, obligations or liabilities under or in connection with this Contract.

(e) If the Owner's Representative notifies the Contractor of any defects and/or deficiencies, the Contractor must then correct those defects and/or deficiencies and the procedures described in this GCs 3.1 must be repeated until the Owner issues a Certificate of Commercial Operation.

(f) Upon the issue of the Certificate of Commercial Operation, the Contractor must handover care, custody and control of the Facility to the Owner.

Post-commercial operation performance tests

3.2

(a) The Contractor must give the Owner prior written notice of when it intends to carry any of the Post Commercial Operation Performance Tests at the times and in accordance with the requirements set out in the Schedule of Tests.

(b) As soon as reasonably practicable after receipt of a notice under GC 3.2(a), the Owner must issue a notice to the Contractor specifying the date for commencement of the Post Commercial Operation Performance Tests at the times and in accordance with the Schedule of Tests.

Final completion

3.3

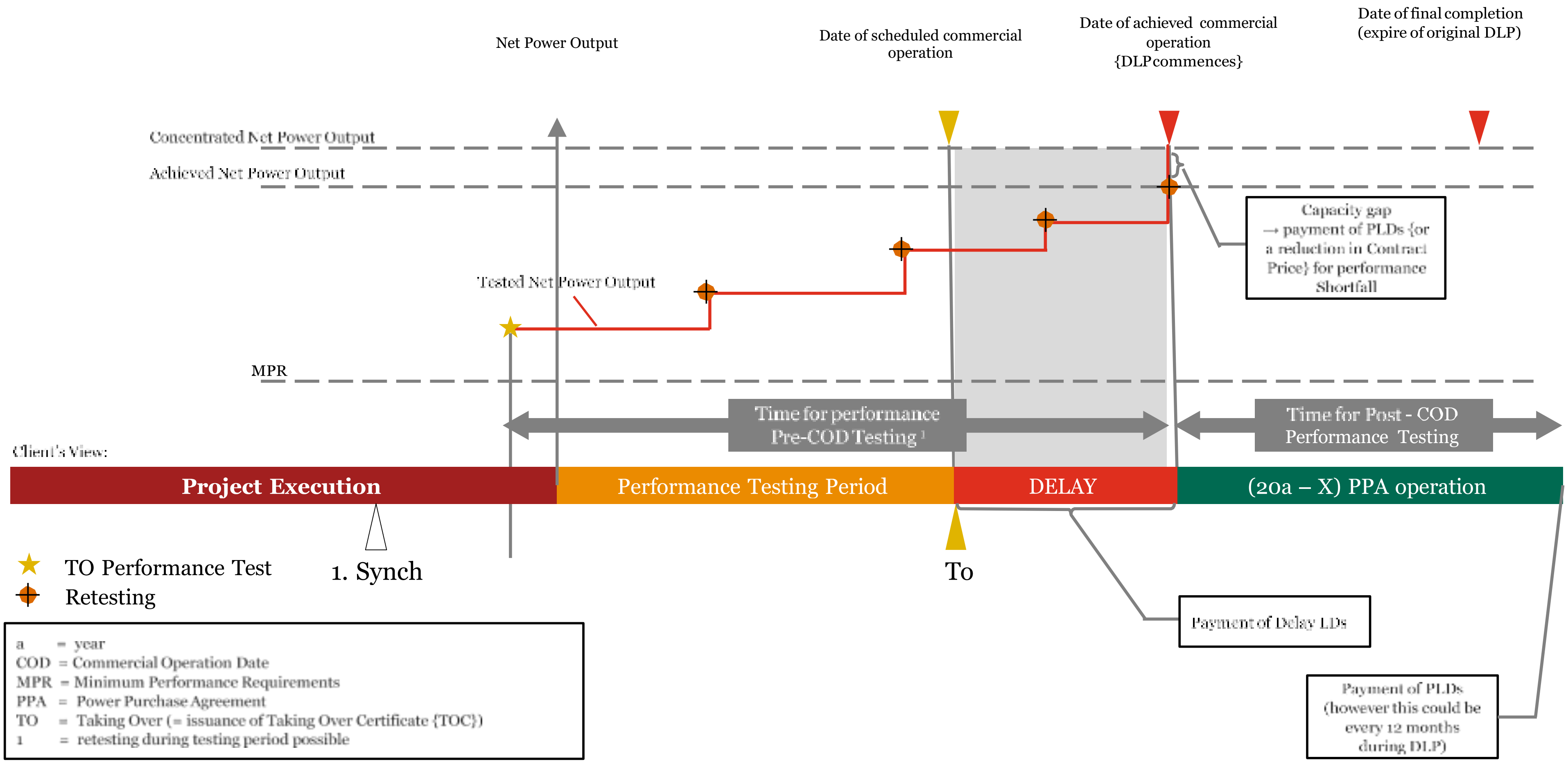
(a) As soon as the Facility, in the opinion of the Contractor, reaches the stage of Final Completion the Contractor must give a notice to the Owner.

(b) The Owner's Representative must, promptly, and no later than 10 days after receipt of the Contractor's notice under GC 3.6(a), either issue a Certificate of Final Completion stating that the Facility has reached Final Completion or notify the Contractor of any defects and/or deficiencies.

(c) If the Owner's Representative notifies the Contractor of any defects and/or deficiencies, the Contractor must then correct those defects and/or deficiencies and the procedures described in GCs 3.6(a) and (b) must be repeated until the Owner issues a Certificate of Final Completion.

(d) Despite any other provision of this Contract, no partial or entire use or occupancy of the Site, the Works or the Facility by the Owner, whether during the Tests after Completion or otherwise, in any way constitutes an acknowledgment by the Owner that Final Completion has occurred, nor does it operate to release the Contractor from any of its warranties, obligations or liabilities under this Contract including the satisfactory performance of its obligations during the Defects Liability Period, the carrying out of the Tests after Completion and meeting the Performance Guarantees.

Appendix 2 Diagrammatic representation of performance testing, performance guarantee and compensation arrangements for a sample solar PV project



Appendix 3 PwC Project Structure and Experience

Our integrated multi-disciplinary approach to renewable projects

Our multi-disciplinary capability enables us to provide integrated services across all stages of a complex and large scale infrastructure project, providing our client with a single, end-to-end service provider.

Business case and feasibility

- Set clear goals and direction
- Identify opportunities among key market segments and participants
- Map potential supply chains
- Lead feasibility study and link in with technical consultants

Strategy and structuring

- Identify optimal deal structure
- Analyse, advise and prepare delivery and contracting and procurement plans
- Advise and prepare optimal tax and corporate structure
- Prepare and negotiate legal project agreements

Equity raising

- Prepare valuation report
- Prepare/audit financial model
- Advise on optimal equity investors
- Run equity tender process
- Prepare and negotiate SPA and related transaction documents

Debt raising

- Advise on optimal debt syndicate including ECAs
- Run debt tender process
- Prepare debt term sheets
- Negotiate debt package and debt agreements

Due diligence

- Undertake multi-disciplinary due diligence – covering tax, legal, financial and commercial
- Prepare key take-out and gap analysis, including risks and mitigants

Financial close

- Execute all legal agreements (project, debt and equity) and opinions
- Completion mechanics for equity and debt (assuming simultaneous close)

Post financial close

- Prepare of Procedures and Guidelines Manuals for construction and operation phases
- Assist with contract interpretation and management
- Assist with claims and disputes

Our services

Involvement of our teams is as required, but they are always available to you.

Single contact

Infrastructure advisory

Legal

Tax

Tax

Debt advisory

Financial advisory

Capital projects & contract assurance

PwC is an end-to-end service provider

In the context of the current increase in activity on complex and large scale infrastructure projects, particularly in the mining and resources, energy, and oil and gas sectors, we have a truly integrated advisory offering.

Our team operates across the entire life-cycle of a project. Infrastructure advisory, legal, tax, financial advisory, debt advisory and financial due diligence services are performed pre-financial close and legal, project management and contract assurance and management services are performed post financial close.

Our integrated advisory offering is in acknowledgement that large scale infrastructure projects are the product of resolving a complex matrix of multi-disciplinary technical priorities. An integrated multi-disciplinary approach focuses on the infrastructure solution rather than the solution to individual technical problems.

Our experience as an integrated service provider allows us to offer practical solutions to competing technical priorities more quickly and efficiently than traditional service providers. This, in turn, enables clients to deliver infrastructure solutions more efficiently than their competitors.

Why not the traditional model?

In the traditional model, you may find yourself dealing with a number of different suppliers across a project.

McKinsey & Company

KPMG

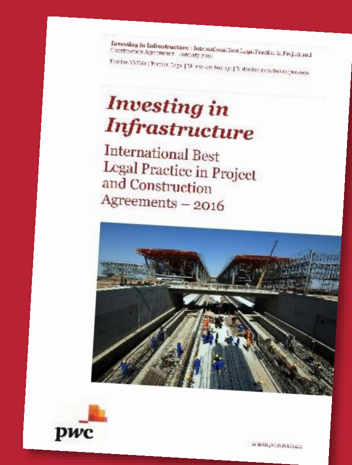
WorleyParsons resources & energy

KING&WOOD MALLESONS

MERCER

MACQUARIE

Read more about investing in infrastructure



www.pwc.com.au/legal/investing-infrastructure.html

Key Project Experience – Bungala Solar Project

Project highlights

FIRST FOR REACH SOLAR ENERGY

FIRST WITHOUT GOVERNMENT FINANCING

FIRST FOR ENEL GREEN POWER IN AUSTRALIA

FIRST ENEL GREEN POWER / DUTCH INFRASTRUCTURE FUND JOINT VENTURE

Reach Solar energy's Bungala Solar Project will be the largest solar farm in Australia and the Southern Hemisphere. It will contain 860,000 panels over 585 hectares in Port Augusta, South Australia

The construction phase will create over 400 jobs for the Port Augusta region. Design and construction will commence immediately, with first electricity to be on the grid by April 2018 and the farm fully operational by September 2018.

PwC brought together a team of 60 experts from across industry and capability to seamlessly integrate across the entire transaction lifecycle.

After attracting significant local and international interest, Bungala Solar Project was sold to a consortium of ENEL Green Power (Enel) and the Dutch Infrastructure Fund (DIF) in March 2017, a landmark result for both the client and the industry.

The Bungala Solar project:

860,000 solar panels

Employ 400 Australians

Largest solar farm in the Southern Hemisphere

585 hectares in Port Augusta

Fully operational by Sept 2018

Our multi-disciplinary capability enabled us to provide integrated services across all stages of the project – providing Reach with a single end to end interface on a complex sale process

A transformed approach to integrated project delivery

Business case and feasibility

In September 2016, PwC and Reach partnered together to begin work on the Bungala solar project. Working together, the business case and feasibility study identified key market segments and showcased commercial advice on the technical aspects of the project.

Strategy and structuring

PwC brought tax, legal and transactions experts to the table to identify the optimal deal structure. PwC also acted as the Reach legal counsel, analysing, advising and preparing delivery and contracting procurement plans, and preparing and negotiating legal project agreements.

Equity raising

PwC prepared a valuation report and undertook bespoke financial modelling to underpin the investor process. There were over 50 potential domestic and international investors identified. PwC ran the tender process, and prepared and negotiated the required SPA and related transaction documents.

Debt raising

Drawing on deep financial services industry expertise and global networks, PwC advised on the optimal debt syndicate including international and domestic banks. The debt tender process extended to debt term sheets, debt package, and debt agreements.

Due diligence

The due diligence process leveraged the PwC integrated offer – providing Reach with a multidisciplinary DD report which covered off on tax, legal, financial and commercial considerations, and providing a key take-out and gap analysis, including risks and mitigants.

Financial close

Leveraging a range of experienced M&A professionals, PwC executed all legal agreements (project, debt and equity) and opinions; and the completion mechanics for equity and debt through complex and truncated timeframes.

Post financial close

Supporting the continued success of the project, PwC will assist with ongoing contract interpretation and management, and further detail for the construction and operation phases.

Access our *Renewable Energy Portal* www.pwc.com.au/legal/renewable-energy.html

Key Project Experience – Columboola Solar Project

Project highlights

FIRST FOR LUMINOUS ENERGY IN AUSTRALIA

NO GOVERNMENT FINANCING

MERCHANT SITE OFFTAKE ARRANGEMENT

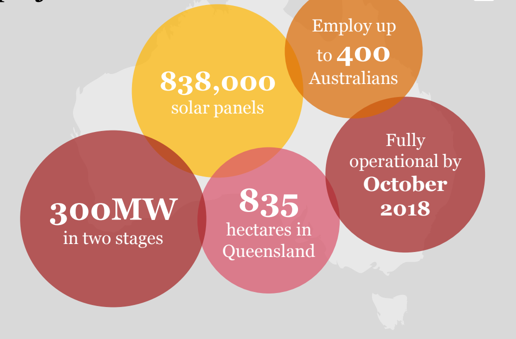
PwC and Luminous partnered in 2017, with PwC bringing a team more than 30 experts from across industry and capability to seamlessly integrate across the entire transaction lifecycle.

The risk-sharing arrangement underpinning the PwC-Luminous partnership aligns the interests of both parties, with the completeness, probity and efficiency of the transaction being equal goals for its shared success.

From project conception to financial close, PwC and Luminous have streamlined the development process to 10 months, with financial close expected imminently and project commissioning in October 2018.

The Columboola project will mark another full-delivery solar transaction for PwC, with the firm's depth of experience exhibited across the different project structures, including the various offtake and finance strategies.

The Columboola Solar project:



A transformed approach to integrated project delivery

Business case, strategy & structuring

PwC has brought tax, legal and transactions experts to the table to offer technical and commercial advice, and to identify the market opportunities and optimal deal structures. PwC also acts as Luminous legal counsel - analysing, advising and preparing delivery and contracting procurement plans, and drafting and negotiating legal project agreements.

Technical project setup

Drawing on extensive energy market expertise, PwC is organising the technical setup of the project, including property ownership structures, development approvals and the negotiation of the connection agreement and merchant site offtake arrangements.

Tender management

PwC has managed the full competitive tender process for the EPC and O&M contractors, assessing the bids and bidders through its legal, financial and commercial advisory teams. PwC is also running the negotiations and preparing the required SPA and related transaction documents.

Equity raising

PwC will prepare a valuation report and undertake bespoke financial modelling to underpin the investor process. PwC expects significant interest from a range of domestic and international players, with the aim of selling.

Due diligence

The due diligence process leverages the PwC integrated offer – creating for Luminous a multidisciplinary DD report which covers off tax, legal, financial, regulatory and commercial considerations, and will provide a key take-out and gap analysis, including risks and mitigants.

Market Sounding

Leveraging PwC's experience with varied energy project structures, a strategy of market engagement has identified the opportunity for a merchant site arrangement, allowing Columboola to take advantage of floating wholesale energy prices and Queensland's exceptional growth in energy demand.

Financial close

PwC will execute all legal agreements (project, debt and equity) and opinions, the completion mechanics for equity through complex and truncated timeframes, and will assist with continued contract interpretation and management, and further detail for the construction and operation phases.

Access our *Renewable Energy Portal* www.pwc.com.au/legal/renewable-energy.html

Key Project Experience – Terrain Solar Projects

Project highlights

FIRST FOR TERRAIN SOLAR

NO GOVERNMENT FINANCE

MIXED PPA & MERCHANT SITE OFFTAKE STRATEGY

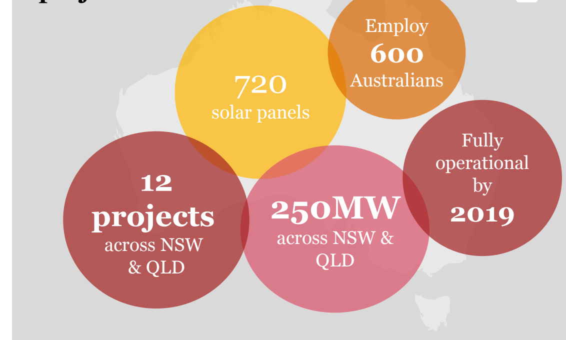
Terrain and PwC partnered in 2017, together developing a portfolio of 12 solar PV farms across NSW and QLD from initial concepts to financial close through a variety of transaction structures.

The 12 sites are between 25-100MW each, incorporating battery storage where applicable. By developing multiple projects concurrently, PwC and Terrain leverage economies of scale in the setup, and project bundling in the sale process.

The risk-sharing arrangement underpinning the PwC-Terrain partnership aligns the interests of both parties, with the completeness, probity and efficiency of the transaction being equal goals for its shared success.

Construction on the first project, Molong, is expected to commence in 2017, and be operational by 2018. Kingaroy, Wagga Wagga and Warwick are expected to follow shortly.

The Terrain Solar projects:



A transformed approach to integrated project delivery

Strategy and structuring

PwC has brought tax, legal and transaction experts to the table to offer technical commercial advice and identify the market opportunities and optimal deal structures. PwC also acts as Terrain legal counsel – analysing, advising and preparing delivery and contracting procurement plans, and drafting and negotiating legal project agreements.

Land procurement & technical setup

Drawing on extensive energy market expertise, PwC is working with Terrain to identify land, undertake technical site monitoring and negotiate lease arrangements, development approvals, technical specifications and connection agreements across the 12 sites in NSW and QLD.

Equity raising

PwC will prepare a valuation report and undertake bespoke financial modelling to underpin the investor process. Strong interest from domestic and international investors has been identified, and PwC will run the tender process, and prepare and negotiate the required SPA and related transaction documents.

Debt raising

Drawing on deep financial services industry expertise and global networks, PwC advises on the optimal debt syndicate including international and domestic banks. The debt tender process extends to debt term sheets, debt package, and debt agreements.

Due diligence

The due diligence process leverages the PwC integrated offer – creating for Terrain a multidisciplinary DD report which covers off tax, legal, financial, regulatory and commercial considerations, and provides a key take-out and gap analysis, including risks and mitigants.

Market sounding

Leveraging PwC's experience with varied energy project structures, a strategy of market engagement will determine the optimal mixture of PPAs, merchant site and other offtake arrangements most suitable for the portfolio, allowing Terrain to take advantage of current and forecast energy demand and supply dynamics.

Financial close

PwC will execute all legal agreements (project, debt and equity) and opinions, the completion mechanics for equity and debt through complex and truncated timeframes, and will assist with continued contract interpretation and management, and further detail for the construction and operation phases.

Access our Renewable Energy Portal www.pwc.com.au/legal/renewable-energy.html

Appendix 4 Key project experience – South Australia Energy Plan

Key project experience South Australia Energy Plan

Project highlights

Key achievements

Leading transition to renewable energy **globally**

4 part procurement program

First for solar thermal in Australia

World's largest lithium ion battery

Partnership between the South Australian Government and the renewable energy industry

FINANCIAL REVIEW

Elon Musk's Tesla battery deal is a giant step for SA and the grid

Jay Weatherill's big new Tesla battery will be a giant step for South Australia and the National Electricity Market.

Not only will it be the largest installed anywhere in the world, but it will show - within a year - if batteries can fulfil their theoretical role of shoring up the power grid as wind and solar energy crowd out coal power.

But batteries like the 100-megawatt set to be built in Jamestown, SA, at French company Neoen's 315MW Hornsdale wind farm, won't be a panacea for all the ills troubling SA's wind and solar power reliant grid.

A 100-megawatt battery with capacity of 129 megawatt hours - about an hour and 18 minutes' duration at full throttle - could help avert partial blackouts like the one that hit about 60,000 SA households when wind and gas plants fell short during a heatwave on February 8.

Description of project

The South Australian Government's Energy Plan is a four part procurement program to secure the generation and security of the State's energy supply. The AUD550 million energy plan is leading the transition to renewable energy globally, and includes the world's largest lithium ion battery.

PwC is lead commercial and financial adviser on the delivery of the energy plan, and has brought together an integrated team of sector and government procurement specialists to navigate the interplay between key project elements, and to develop evaluation plans, advise on negotiation strategies, FIRB approvals and conduct detailed financial and commercial evaluation of tenders.

Key facts and figures across energy plan

The South Australia Energy Plan

AUD550 million energy plan

12,000+ heliostats to make up the solar thermal plant (Solar Reserve)

AUD150 million Renewable Technology Fund to fast track commercialisation of new renewable technologies, further support grid reliability

Procurement of temporary generation and **gas power plant**

World's largest **100MW** lithium ion battery (Hornsdale power reserve: Neoen and Tesla)

Procurement of State Government energy needs from **renewable sources**

Government **$$$** savings – caps on rising costs of electricity

Integrated and parallel project delivery across entire energy plan

Key deliverables

100MW lithium ion battery

PwC's integrated advisory team, including tax, legal and transactions experts, offered strategic advice around the procurement process. This included the development of comprehensive evaluation plans to assess around 90 bidders (where the majority were based overseas), shortlisting bidders with a view to ensuring timely delivery of the project, increased energy supply and value for money. The 100MW Hornsdale Power Reserve ('Neoen/Tesla big battery') near Jamestown is now complete and is currently the world's largest storage battery. It has also been demonstrated to provide grid stability beyond the South Australian electricity grid to the entire NEM.

150MW solar thermal plant

PwC advised on the tender process, with interest from a number of large international solar technology manufacturers, to construct a new AUD650 million solar thermal power plant near Port Augusta. The plant is now known as the Aurora Solar Energy Project. The PwC team performed detailed financial and commercial evaluation of tenders (including whole of life cost assessments), resulting in the signing of a long-term contract (20 years) for the supply of 75 per cent of the power required by State government agencies and users.

250MW gas power plant

PwC advised on the end-to-end tender and evaluation process for securing a provider to deliver on the AUD360 million gas-fired power plant. The 250MW capacity system, designed to provide backup power during times of peak demand, attracted worldwide interest from more than 30 companies.

South Australia Renewable Energy Technology Fund

The Renewable Energy Technology Fund has been set up to support the energy plan, and fastrack the deployment of technologies to enhance renewable energy generation in South Australia. PwC reviewed and shortlisted proposals from tenderers and provided support and advice in negotiations to ensure value for money, accelerate private sector investment of renewable technologies (including battery facilities, pumped hydro, solar thermal, biomass and hydrogen) and collaborate with industry on future investment opportunities.

PwC's ability to collaborate between technical advisors and the Government's procurement team was critical to success.

Contacts

For further information about how these issues may affect your business, please contact:

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