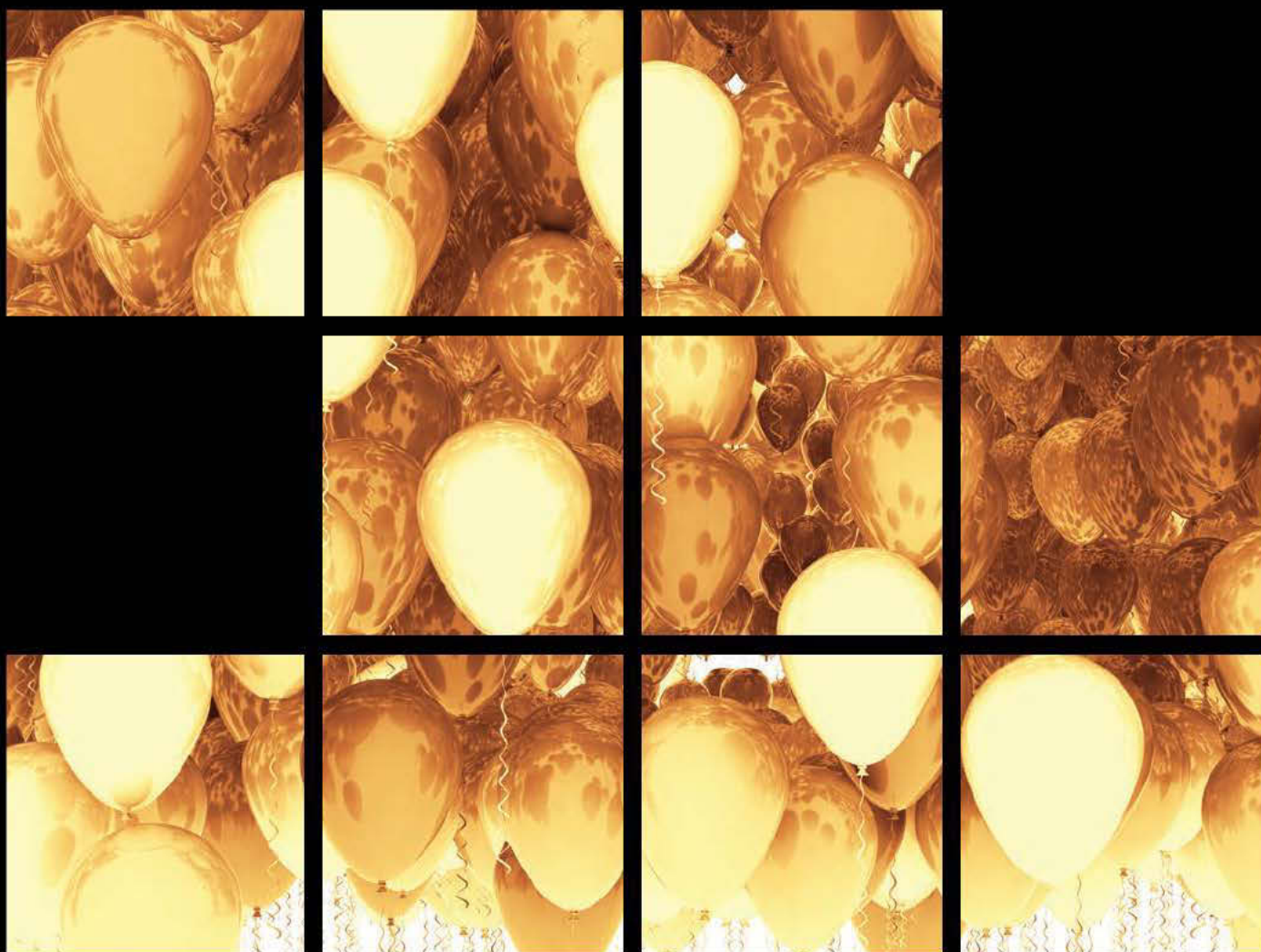


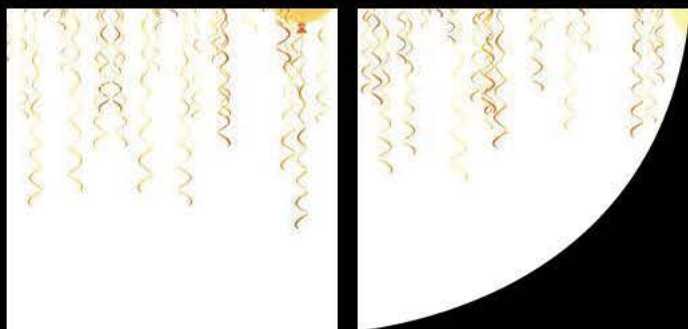
**20TH ANNIVERSARY EDITION**  
**DECEMBER 2017**

# IJGlobal

**Project Finance & Infrastructure Journal**



**Celebrating 20 years  
of energy and  
infrastructure finance**





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It is not just infrastructure finance which has come a long way since 1997

# With the benefit of hindsight

It happened by chance. The clearing of dusty shelves as part of an office move at the start of 2017 uncovered the first ever edition of *Project Finance Magazine* and dug up long-buried memories of how the magazine first started.

Euromoney had for some time been running news on project finance in a combined publication, *Trade & Project Finance* magazine. But that publication was not focused on the financing of infrastructure. *Trade Finance* had been running a decade already, the project element was a recent add-on, a sideshow.

Euromoney finally took the decision to create a dedicated project title following its acquisition of Institutional Investor in 1997. Institutional Investor already had its own title called *Infrastructure Finance* which rolled in with the project parts of *Trade & Project Finance* to create the new *Project Finance* magazine.

Mergers then, played a role in our business from the very start. And 14 years later Euromoney made another pivotal acquisition, when it took over *Infrastructure Journal* (which had been running for almost as long as *PF*). Another merger, and another name change.

*IJGlobal* may have only been in existence since 2013, but the underlying business is now 20 years old. Throughout that time we have aimed to closely track infrastructure and energy transactions across the globe, while identifying trends and commenting on the best and worst of the industry.

The latest name change may have been a product of circumstance, but it was fitting. The infrastructure market had long ceased to be solely focused on project finance banking, and the rebranding as *IJGlobal* offered us an opportunity to broaden our horizons. In the last few years the business has built on its long experience to bring the same level of forensic analysis to M&A transactions, fund raising by infrastructure funds, and the participation of institutional investors.

When we began discussing the idea of an anniversary edition, it immediately caught the imagination of our journalists. In 1997 the UK was on the verge of an explosion of PFI deals which would transform the market and with that as our starting point, we started to look at the high and lows of the various cycles, across multiple sectors and geographies, which have shaped the market over those last two decades.

Luckily for us, it caught your imagination too. I want to express sincere gratitude to all of the senior market professionals who have offered comments and advice, contributed articles, or taken part in roundtables as part of this project. This edition is dedicated to you and hopefully stands as a fitting testament to your hard work over the last 20 years.

Many of you commented on how different your working lives are now compared to 1997. The growth of the internet and cheap air travel have made the world so much smaller. The way you communicate, transact and manage your time have been dramatically changed. It is no different in publishing. An old editor of mine used to reminisce about the monthly schedule of bringing a magazine to press: two weeks of boozy lunches with contacts; a week hitting the phones for additional details; another week to write the thing; then repeat. I am not sure he thought things had changed for the better.

But in many ways the market is still the same as it was in the late 1990s. Infrastructure finance is all about taking bets on the future, and in order to do that you have to appropriately allocate risk. Slack due diligence was as big a mistake then as it is now.

In 20 years' time the assets being financed may have changed considerably, or, as someone suggests elsewhere in this edition, it might be services rather than assets that are being financed. But infrastructure, in whatever form it takes, will continue to impact all of our lives, and the world will still need skilled professionals to deliver it. ■

**Jon Whiteaker**  
Editor



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Financing to raise capital to repay existing indebtedness and senior notes of affiliated entities and to pay the transaction fees and expenses related thereto along with other general corporate purposes  
Collateral Agent and Depositary Bank  
December 2016



## **Tenaska Pennsylvania Partners, LLC** **USD 780 Million**

Westmoreland Generating Station  
First Lien Collateral Agent,  
Second Lien Collateral Agent  
April 2016



## **CPV Towantic, LLC** **USD 753 Million**

Financing for the development, construction, and operation of a natural gas-fired combined cycle power generation facility located in Oxford, Connecticut  
Collateral Agent and Depositary Bank  
March 2016



## **Transmisora Electrica Del Norte, S.A.** **USD 510 Million** **USD 235 Million CLP Tranche**

600 KM electricity transmission facilities in Chile  
Offshore Collateral Agent and Depositary Bank  
December 2016



## **Roadrunner Solar Portfolio, LLC** **USD 109 Million**

Financing of solar projects in Chaves County, New Mexico and Lyon County, Minnesota  
Collateral Agent and Depositary Bank  
December 2016



## **Marshall Wind Energy, LLC** **USD 105 Million**

Financing of a wind power generation project located in Marshall County, Kansas  
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June 2016



## **ORNI 47 LLC** **USD 92 Million**

20 MW geothermal power DAC phase 1 project in Nevada  
Collateral Agent and Depositary Bank  
November 2016

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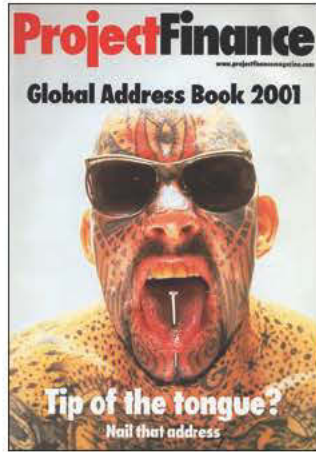
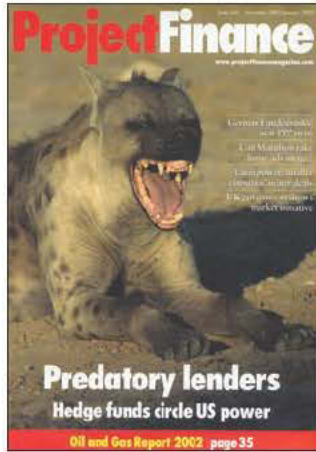
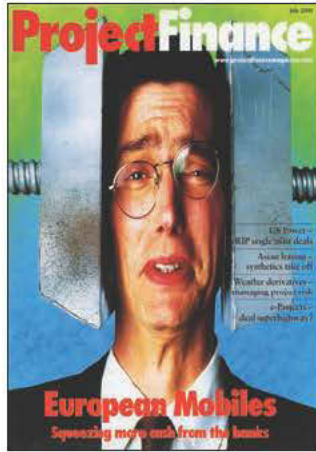
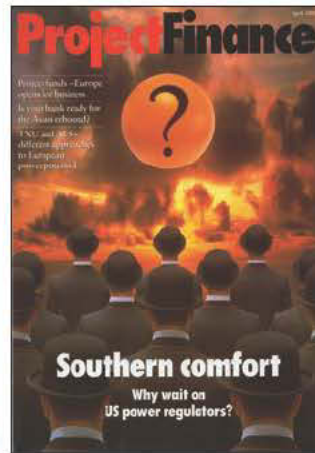
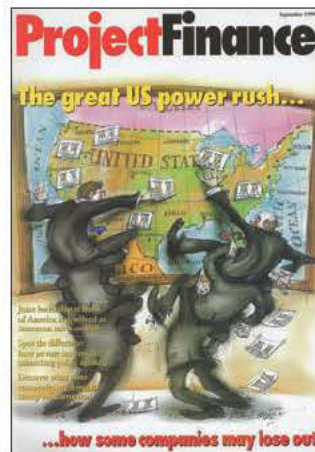
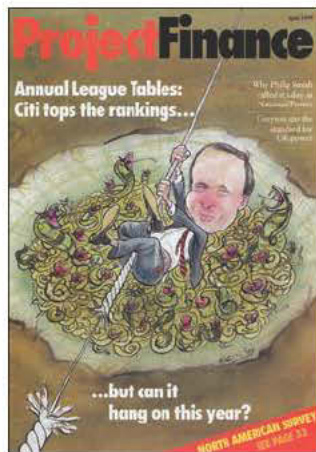


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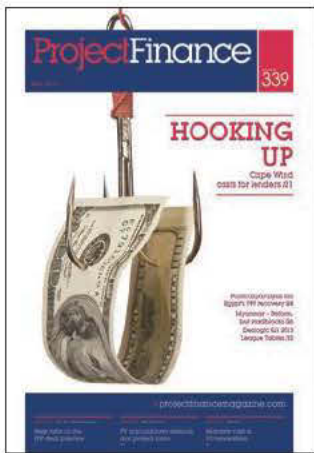
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# 20 YEARS OF FRONT COVERS









# 10 deals over 20 years

*IJGlobal* spent the last few months of 2017 quizzing senior market professionals around the world about the most significant deals from their careers. We were as much interested in failures as successes. What we really wanted to talk about were the financings that helped shape the infrastructure market over the last 20 years.

After much head-scratching and debating a long list was whittled down to just 10 transactions, each of which is profiled in the following pages.

This list is in no means a top 10 of the last two decades. Some of the deals turned out to be absolute stinkers. But we think the selection best demonstrates the evolving challenges facing infrastructure over the period, and some of the novel solutions created to overcome them.

There has been an attempt to highlight a range of sectors and geographies, and deals have been picked from the start to the end of the period. The legacy of the financings closed in the first decade is obviously much clearer to perceive, but the more recent deals show potential to leave an indelible mark.

There are great stories which we unfortunately could not include. Many pointed to the tangled history of financings completed by power company Drax as the ultimate tale of resilience and redemption. Its journey from debt write-offs, through market collapse, to biomass conversions, quite neatly tells the story of UK power over the last 20 years.

There was no room either to discuss the traumas of the WorldCom fraud scandal, how the failure of the Winelands project stalled the nascent South African toll road market, or the ongoing and frustrating inability of Kuwait to procure PPPs.

Successful financings such as for the Tour-Bordeaux high-speed rail project in France, and for the Via Parque Rimac toll road in Peru were also part of the debate but didn't quite make the cut.

We have focused on construction financings and make no apologies for that. Secondary market transactions may make up the bulk of activity at present, but it is new projects which keep the market alive long-term.

And it is by learning from these ground-breaking deals that mistakes from the past will (hopefully) be avoided in the future. ■

By Jon Whiteaker



# Dabhol trouble

**WHAT WE SAID THEN:** “Many Indian power projects have attracted attention in recent years – mostly for the wrong reasons. Not Dabhol II.”

(ed. Not our finest hour).

Time to confess. In 2000 *Project Finance* magazine gave Dabhol II the Asian Power Deal of the Year award. But in our defence, it was impossible to see at the time how the project would become one of the largest white elephants ever in global power finance, or how its principal sponsor Enron was on the verge of collapse and disgrace.

At first glance the expansion financing for the Dabhol gas-fired power plant in Maharashtra state had much to recommend it as an award winner. It was India's largest ever non-recourse financing and the expansion was due to make Dabhol the largest gas-powered IPP anywhere in the world.

But like much to do with Enron, looking below the surface uncovered all sorts of horrors. We do not have space here to tell the whole story of how dodgy accounting and endemic corruption brought down one of the world's largest energy companies. But the post-financial close Dabhol disputes were an early warning that all was not well with the company from Texas.

The support Enron secured for the financing of Dabhol and the speed at which it completed the deal demonstrate how powerful the sponsor was at the time. Enron raised just over \$1 billion in debt from local and international banks, as well as two ECAs, in less than a year. This was at a time when many banks were wary of emerging market risk, in the wake of the Asian financial crisis of 1997.

Dabhol II entailed the construction of a 1,444MW expansion to the existing Dabhol plant, taking it to 2,184MW in total; a 5mmtpa regasification facility; a 135,000 cubic metre LNG vessel; and the

development of associated port facilities including fuel jetty, navigation channel and breakwater.

The project was the first LNG terminal financed on the basis of multiple suppliers of LNG: a 20-year agreement with the Oman LNG company to buy 1.6 million tonnes of LNG per year and 480,000 tonnes more from Abu Dhabi Gas Liquefaction under a separate 20-year deal.

Even before the formal agreement for the first phase had been signed with Dabhol Power Company (a consortium led by Enron and also featuring GE and Bechtel), the World Bank had warned that the proposed contract was too one-sided in favour of the sponsors. The deal was negotiated on a bilateral basis with no competitive tender.

The plant benefited from a very generous power purchase agreement signed with the financially insecure Maharashtra State Electricity Board (MSEB). The terms of the PPA drew much criticism, but the fatal blow they would inflict on the project only became clear a few years latter.

Stage one of the project came online in May 1999 and the financing for stage two was completed shortly afterwards.

At the same time MSEB was cancelling a purchase agreement with local generator TEC. The local company sold power to the electricity board at less than half the price of Dabhol, but unlike with Dabhol it was not obligated to take TEC's power.

MSEB could have purchased power from other generators at a third of the price of Dabhol if it wasn't obligated to buy from Enron under the terms of the PPA. By June 2000 it has been reported that MSEB owed an outstanding bill of \$50 million to Dabhol Power Company.

This led to attempts at renegotiation, then legal challenges to the PPA, threats by Enron to close down the plant and walk away, and finally lobbying by the US government on behalf of Enron.

And then came the unravelling of Enron, as it was revealed that its financial was sustained only through accounting fraud. The company, which had been the seventh largest US corporate in the world, filed for bankruptcy in late 2001.

Dabhol was shut down by Enron in 2001. The state-owned National Thermal Power Corporation, state-run gas firm GAIL and a group of Indian banks took over the plant in 2005, eventually bringing it back online in July 2007. ■

## Dabhol II

**Financial close:** June 1999

**Description:** Financing the construction of a 1,444MW expansion of the Dabhol gas-fired power plant, a 5mmtpa regasification facility, a 135,000 cubic metre LNG vessel, and associated port infrastructure.

**Sponsors:** Enron; Bechtel; GE Capital Structured Finance

**Debt:** \$1.082 billion

**ECAs:** Jexim; OND

**Joint arrangers:** Credit Suisse; First Boston; ABN Amro

**LNG suppliers:** Oman LNG; Abu Dhabi Gas Liquefaction

**Offtaker:** Maharashtra State Electricity Board



# The mark of shame

**WHAT WE SAID THEN:** *“In a world where failures always receive greater focus than successes, Metronet’s impact will be enduring while the success of Tube Lines will be a footnote.”*

The Metronet concession to operate nine London Underground lines has done more than any other deal to damage the reputation of PFI. Over a decade after its collapse, the UK market is still branded with a mark of shame for what critics characterise as the prime example of why PFI doesn’t work.

These criticisms are overstated, though Metronet was certainly a mess.

The incoming Labour government plans in the late 90’s to take the management of the tube out of the hands of state-owned London Underground seemed sensible. The underground was delivering an increasingly poor service and many of its stations were in desperate need of renovation.

And London Underground had struggled to deliver upgrades on time or budget. The Jubilee Line extension had an estimated cost of £1.5 billion and was due to open in April 1998. When it was finally delivered at the end of 1999, the bill had risen to £4 billion.

The government wanted to inject some private sector efficiency into the tube upgrades, but from inception the scheme was politically controversial. It did not help that incoming Mayor of London Ken Livingstone was against the project. Ownership of the underground at that time was passed to the newly established Transport for London (TfL), run by the Mayor’s office.

The project was split into two concessions, Metronet and Tube Lines. Metronet was the larger of the two, covering the maintenance and renewal of the Bakerloo, Central, Victoria, District, Circle, Metropolitan, Hammersmith and City, and East London lines. Tube Lines would manage just the Jubilee, Piccadilly and Northern Lines.

The Metronet consortium won a 30-year concession (the government

had initially aimed for 7.5 years but had eventually agreed to go longer) and reached financial close, via two holding companies, on a £2.65 billion bank and bond financing in 2003. The sponsors were exposed to 50% of the revenue risk, with the rest of the revenues from Department of Transport grants, although the contract also benefited from a 95% letter of comfort from government.

By October 2005 Metronet had informed TfL that there would be significant cost overruns not anticipated at the time of bidding, and in February 2006 stated that these additional costs totalled £1.2 billion for the first 7.5 years of the concession. Metronet fell into administration in July 2007, and though put back out to tender, TfL was the sole bidder for its contracts in November of that year.

Some blame the complexity of the contracts which were split into 135 separate documents amounting to 28,000 pages. An often highlighted detail is how the contracts had to try to determine consistency between how far away drivers were from the nearest toilets once they clocked off – a kind of ‘bog standard’.

You can also argue that the 95% letter of credit meant risk was not properly shared with the private sector, making cost overruns more likely.

Others complain that the upgrade should simply have been paid for through government issued bonds, not least as the management of the underground eventually fell back into public hands anyway. This argument seems to ignore that Tube Lines did not collapse in the same way and in fact delivered the first 7.5 years of its concession almost to budget. Although it was eventually transferred into TfL ownership in 2010, Tube Lines remains a distinct subsidiary business unit.

The main differences between Tube Lines and Metronet were scale and planning. While Tube Lines started capital works early, Metronet delayed, meaning true costs were identified much later. Tube Lines also sensibly signed no long-life sub-contracts unlike Metronet, and instead relied on continual tender procedures.

Rather than being typical of PFI contracts, Metronet stands apart for its dizzying complexity and excessive ambition. ■

## Metronet BCV and SSL

Financial Close: April 2003  
 Concession period: 30 years  
 Concession awardee: London Underground  
 Sponsors: Metronet consortium (WS Atkins; Thames Water; Balfour Beatty; EDF Energy; and Bombardier)  
 Total debt: £2.65 billion  
 Bank debt: £1 billion  
 Lead arrangers: Deutsche Bank; CIBC World Markets; Royal Bank of Scotland; Abbey National

Arrangers: Banca Opi; Bayerische Landesbank; CDC Ixis; Bank of Ireland; Credit Agricole; Dexia; Depfa; HypoVereinsbank; ING; KBC; WestLB; KfW; NIB Capital  
 Co-arrangers: Helaba; NordLB  
 Bond debt: £1.05 billion  
 Lead managers: Deutsche Bank; Royal Bank of Scotland; UBS Warburg  
 Monoline bond wraps: FSA; Ambac  
 EIB debt: £600 million





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# Missed opportunity

**WHAT WE SAID THEN:** *“It was an eminently finance-able project using modern technology, offering Seattleites a six-minute service on elevated system that would provide a critical transport link that could boast both environmental and economic benefits. But it’s dead in the water.”*

This project set the blueprint for how governments can engineer the loss of public support for a major development.

Seattleites were asked to vote five times on the proposed elevated monorail line in their city centre. After each vote the government changed its plans and set the new scheme to another vote. The first four times the city’s inhabitants voted for the monorail. The fifth and final time they voted against it.

The Washington State-owned agency established to deliver the project, the Elevated Transport Company, was finally dissolved in 2005. It had spent a reported \$125 million on a project that never happened.

It is fair to assume that if the public authorities had put together a viable plan for the monorail in the first instance, it would probably be carrying commuters today.

Seattle already has a short 1.4-mile monorail line in the city centre which was constructed when the city held the World’s Fair in 1962. Different plans for extending the monorail system were put to Seattle voters in 1997 and 2000. Both passed but only narrowly, with 53% and 56% support respectively.

Crucially ETC had not yet spelled out a full funding plan for the project project, or details on the specific routes. Only in 2002 was a five-line system plan published and a funding method announced. A new 1.4% motor vehicle excise tax would be levied on citizens to pay the selected concessionaire under the concession. This again was put to a public vote and, despite some public opposition to the routes and design, again was passed but by only 50.2%.

The project had finally begun to gain some momentum. The first section, the 14-mile green line, was put out to tender and in September 2004 a proposal put forward by the consortium Cascadia Monorail Company was approved by government.

The Cascadia group, which included 20 companies, was the only bidder for the project, which never looks great. A rival consortium led by Canada’s Bombardier was in the running for a while, but failed to submit a final proposal.

But just as the monorail seemed to be gaining momentum, its wheels ground to a halt. In October 2004 Seattle City Council hired consultancy Juan Padron & Associates of Atlanta to determine whether the project was financially viable.

The motor vehicle tax had not generated the revenues predicted and costs estimates had also increased. And crucially, the City Council seems to have gone off the plans, perhaps due to growing opposition.

In November 2004 a fourth vote on the project took place, this time a recall initiative looking to get it scrapped. The initiative would have banned the project from using the air space above the public

city streets. Though the recall was not successful, with 64% rejecting it, the monorail’s days were numbered.

A plan to meet the funding shortfall proved highly controversial. It extended the tenor of tax and bond repayments to 50 years, increasing the overall cost of the project. Then Mayor Greg Nickels withdrew city support for the project in September 2005, saying: “Put simply, the monorail does not have enough money to pay for the project”.

A fifth ballot was put to the public two months later. This final vote proposed a shortened version of the Green Line to reduce costs, but was rejected by the citizens of Seattle by 65% to 35%. Seattleites had finally lost confidence that their elected official were capable of delivering the new monorail.

Seattle’s transport plans have involved more than just monorail over the last two decades, and light rail has had success where the Green Line missed out.

The first stage of the city’s Link light rail system was completed in 2003, and a second began operating in 2009, with various other lines planned.

These projects are not being developed as PPPs. ■

## Seattle Monorail (Green Line)

**Financial Close:** Never happened  
**Description:** A design, build, operate and maintain concession for the 14-mile Green Line to enhance travel between downtown Seattle and its surrounding communities.  
**Concession period:** 15 years  
**Concession awarder:** Seattle City Council

**Sponsors:** A consortium led by Fluor and featuring 20 urban mass transit firms such as Hitachi; Mitsui; Alcatel; HDR Engineering; Howard S. Wright Construction; Hoffman Construction; RCI Construction Group; Atkinson Construction  
**Project cost:** \$1.7 billion



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Latin America Power, Chile – Placement Agent\*, US Private Placement  
Watty Vos Boulevard, Aruba – Mandated Lead Arranger, Bookrunner

#### NORTH AMERICA

Vista Ridge, USA – Coordinating Lead Arranger  
Edgeconnex Data Center, USA – Coordinating Lead Arranger, Joint Bookrunner  
TerraForm Power Operating LLC, USA – Joint Bookrunner  
Long Beach Civic Center, USA – Sole Construction Lender  
Pin Oak Terminals, USA – Mandated Lead Arranger

#### ASIA-PACIFIC

Pengerang Terminal, Malaysia – Financial Advisor, Mandated Lead Arranger  
UPC Sidrap, Indonesia – Mandated Lead Arranger  
Coopers Gap Wind Farm, Australia – Mandated Lead Arranger  
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#### EMEA

Nacala Logistics Corridor, Mozambique and Malawi – Mandated Lead Arranger, JECA Coordinator  
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# Cheating death

**WHAT WE SAID THEN:** *“The most tangled PPP procurement process in the US, a market that has produced more tangled PPP procurements than most”.*

The financing for the Port of Miami tunnel endured as many barely believable plot twists as your average Dan Brown novel. It finally reached financial close in 2009, having seemed dead in the water less than a year beforehand.

The tunnel financing was meant to be the first availability payment-based deal in the US, and the first PPP deal in Florida. The demise of Babcock & Brown put paid to that, allowing ACS' I-595 financing to beat it to both.

The Florida Department of Transportation (FDOT) first touted the project at an industry meeting in Miami in December 2005. By November 2006 it had shortlisted all three groups which had expressed an interest.

A JV between ABN Amro and Bouygues was one of the shortlisted groups, forming the Miami Access Tunnel, though significantly, Babcock & Brown had taken over ABN's North American infrastructure group by the time the bids were submitted in March 2007.

Miami Access Tunnel was named preferred bidder in May and lined up a financing structure which used private activity bonds rather than TIFIA debt, with Lehman Brother providing an underwritten commitment for a wrapped bond. Financial close was all set for the end of 2007.

The start of the financial crisis later that year made the sponsors change their plans, giving the sudden fragility of monoline insurers. Trying to make an unwrapped deal work within the confines of a \$33.6 million annual availability payment, all options were considered.

Fluctuating input costs throughout 2008 created addition uncertainty, but by July of that year the sponsors had applied for a TIFIA loan and were planning to launch a bond issuance in September. Then Lehman Brothers collapsed, which meant

the project's underwriter and hopes of stable bank debt pricing were gone.

When then Babcock & Brown started its final journey to oblivion, the sponsor group began to fall apart. However several Babcock & Brown employees migrated to French fund Meridiam, and sought to take over the deal. FDOT initially disapproved of the equity swap and announced in December 2008 it was pulling the plug on the project, only to reverse this decision the following year. It toyed with re-bidding the concession, but eventually allowed Meridiam and Bouygues to proceed.

Commercial close was met in June 2009, with financial close in October.

The financing broke down into a \$322 million five-year loan from 10 banks priced at 300bp, and swapped to a fixed rate of 6.63% repaid entirely from milestone (\$100 million) and final acceptance (\$350 million) payments from FDOT, and a six-year loan of \$22 million,

repaid from the first year's availability payments. Alongside the commercial bank debt was a \$341.5 million 35-year TIFIA loan priced at 4.31% (on 15 October), repaid from availability payments, with a grace period on interest until 2016, and on principal until 2033, and \$40 million in capitalised TIFIA interest.

A last-minute scare involved the City of Miami initially balking at the required terms of a \$50 million letter of credit backing its contribution to the concession's availability payments. The City insisted on voting on the LOC which, although approved, pushed back financial close by a couple of weeks.

The tunnel finally opened to traffic in August 2014, with Bouygues suffering heavy fines as a result of the project missing its original June opening date. The development continued to attract criticism as a waste of money and an extravagance during its construction, but some projects just don't die, whatever you throw at them. ■

## Miami Access Tunnel

Financial close: 15 October

Size: \$1.062 billion

Description: 35-year DBFO concession to build a 1.2km tunnel and associated access roads between Watson Island and Miami's port at Dodge Island.

Sponsors: Meridiam (90%), Bouygues (10%)

Equity: \$80 million

Debt: \$322 million in five-year commercial bank debt, \$22 million six-year loan and \$341 million 35-year TIFIA loan, \$40 million in capitalized TIFIA interest

Lead arrangers: BBVA (documentation agent), BNP Paribas (administrative agent), Calyon, Dexia Credit Local,

ING, RBS, Santander, Societe Generale, UniCredit and WestLB

Sponsor advisers: Davies Ward Phillips & Vineberg (legal – transaction), Greenberg Traurig (legal – Florida), Macquarie (financial – bank debt), Barclays Capital (financial – bond option), Arup (engineer), Willis (insurance)

Banks' legal advisers: Milbank Tweed; Rogers Towers

TIFIA advisers: Hawkins, Delafield & Wood (legal), Scully Capital (financial)

FDOT advisers: Jeffrey Parker & Associates (financial) Nossaman (legal), Parsons Brinckerhoff and TY Lin (technical) and Marsh (insurance)





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# Gas glut

**WHAT WE SAID THEN:** *“In terms of sheer scale and complexity PNG LNG represents not only the largest PF deal ever but also a true pathfinder that has profound implications for the regional energy finance market”.*

The LNG export market over the last decade has seen huge cycles of high demand followed by surplus as a result of overbuild. The first few years of this decade saw a succession of very large LNG infrastructure developments in Australia. But these were pre-dated by an even bigger project in neighbouring waters, the \$17 billion Papua New Guinea LNG.

It \$14 billion debt package was at the time the largest project financing ever in the world, which is remarkable given its emerging market location. But like many of the Australian projects financed around that time, PNG LNG suffered significant cost overruns, pushing capital expenditure above \$19 billion.

The first gas shipment from PNG LNG was made in May 2014. The proceeding five years had witnessed the build-up of the US shale gas boom, which eventually resulted in a crash in oil and gas prices. This price depression has put pressure on oil companies around the world, and PNG LNG's shareholders are no exception.

Add to this growing local disillusionment with the project given its perceived lack of positive economic impact for Papua New Guinea, and it has been a far from straightforward post-financial close period for PNG LNG.

ExxonMobil is the lead sponsor for the project as the largest of seven shareholders. The sponsors finalized the term sheet for the original project financing in July 2009, with commitment letters signed in December of that year. Original plans for a bond element to the deal were dropped, given the appetite shown by commercial lenders.

The 17-year ECA debt broke down as: \$3 billion from US Exim; \$1.8 billion from JBIC; Australia's EFIC provided \$350

million; SACE \$900 million; NEXI \$950 million; and China Exim \$1.3 billion.

The \$1.95 billion uncovered commercial bank tranche was provided by 17 lenders. The loan had a 15-year tenor with pricing starting at 325bp over Libor, rising to 400bp after the 4.5-year construction period and stepping up to 425bp between years nine and 15.

ExxonMobil co-lent \$3.75 billion distributed across the facilities on a pro rata basis, following the term of each facility.

The huge required capital expenditure is because PNG LNG is essentially three projects in one: the upstream gas fields, a 450km pipeline and then the LNG plant.

To cover construction risk, the sponsor group provided a completion guarantee that worked in such a way that stronger members of the group could cover those in danger of default. Offtake risk was given a natural hedge through the

diversity of the offtake group, and Exxon's central presence on the deal had been seen from the start as mitigating any possible operation risk.

The most significant risk for lenders was that of Papua New Guinea – a B-rated economy that has suffered from periods of political instability in the past. This aspect of risk is largely mitigated by the fact that the PNG government is a member of the equity group, and that there is a stakeholder benefit agreement in place that spotlights local stakeholder gains, which is intended to mitigate country risk through economic incentive.

An independent report by Acil Tasman commissioned in 2007 estimated that the project would double PNG's national GDP once operational. Recent news reports of continuing public opposition to PNG LNG suggest the sponsors have not been entirely successful at winning hearts and minds however. ■

## Papua New Guinea LNG

Financial close: 15 March 2010

Description: Construction of a 6.6 million tonnes-per-year LNG facility in Papua New Guinea

Size: \$17 billion

Sponsors: ExxonMobil (33.2%), Oil Search (29%), Santos (13.5%), the PNG government (16.6%), Nippon Oil Corp (4.7%), PNG landowners through Mineral Resources Development Company (2.8%) and Petromin PNG Holdings (0.2%)

Debt: \$14 billion

Financial adviser to the sponsors:

Societe Generale

MLAs: NAB, ANZ, Westpac, CBA, BTMU, SMBC, BNP Paribas, Calyon,

China Development Bank, CIC, DnB NOR Bank, Intesa Sanpaolo, Mizuho Corporate Bank, Natixis, Societe Generale, Standard Chartered Bank and UniCredit ECAs/Multilaterals: JBIC, EFIC, US-Exim, SACE, China-Exim, NEXI  
Legal advisers: Sullivan & Cromwell, Allens Arthur Robinson (sponsors); Latham & Watkins, Blake Dawson (lenders); Latham & Watkins (ECAs/Multilaterals)  
Consultants: Shaw (technical); D'Appolonia (E&S); NSAI (reserves); Gas Strategies (market); Control Risks (security); Miller (insurance); Poten & Partners (shipping)  
Model Audit: PKF



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# Perfect chemistry

**WHAT WE SAID THEN:** *“Among this mammoth financings’ ground-breaking features was the largest ever (and second only) Middle Eastern sukuk bond, the largest ever direct loan from US Exim, and the participation of Spanish ECA FIEM on a project financing for the first time”.*

Downstream project financings were all the rage in Gulf states for a few years. Greenfield developments got bigger and more integrated, even after the global financial crisis, until they peaked with the \$20 billion Sadara petrochemicals development.

By the time Sadara was financed, there had been more than 10 years of successive refinery and petrochemicals deals in Saudi Arabia. And developments undertaken in partnership with US companies were nothing new, as 2004’s \$1 billion Jubail Chevron Phillips deal demonstrated. But Sadara was larger and more complex than any downstream deal from the preceding decade.

The deal turned out to be a swansong. It was the last in a so-called super-cycle of Saudi petchem projects. The build-up of downstream industries was part of a long-term plan to diversify the Saudi economy and lessen its dependence on oil sales. Under a new regime since 2015, the Saudi government is now switching focus to other industries, such as renewables.

Sadara also marked something of a blow-out for US Exim. The ECA has spent the last couple of years lacking a quorum on its board of directors, meaning it has not been able to authorise loans of more than \$10 million. Signing off on a direct loan of \$4.7 billion for a single project in Saudi Arabia must seem like a strange dream to Scott Schloegel, the only surviving US Exim board member from when Sadara closed in 2013.

US Exim wasn’t alone in its enthusiasm for Sadara. Everyone piled in. Alongside seven ECAs, a bank club of 31 participated in the deal.

Saudi Aramco (65% equity) and Dow Chemical (35%) were the sponsors

of the project, which is broken down into 26 separate commercial units.

That level of complexity was a boon for lawyers and contractors alike. Among the companies undertaking specific construction or engineering contracts for the project were: Fluor; Jacobs Engineering; ABB; Foster Wheeler; Linde; Tecnicas Reunidas; and Maire Tecnimont.

The Sadara financing comprised \$2.2 billion of uncovered commercial bank debt, a \$2 billion sukuk bond issue, a \$1.3 billion loan from Saudi Arabia’s Public Investment Fund, and \$7 billion in contributions from ECAs. Aramco had planned to issue \$1.4 billion in bond debt, but the sukuk proved so popular (it was 2.6x oversubscribed) the sponsor increased that component.

Most ECAs provided cover for bank loans, including UK Export Finance (\$700 million), Euler Hermes of Germany (\$425 million), Coface of France (\$70 million) and K-Sure of Korea (\$500 million).

Korea’s Kexim was the only ECA besides US Ex-Im to provide a direct loan, with a \$320 million facility.

The strength of the sponsors, implicit support from the Saudi state in the event of default, and predicted annual revenues of some \$10 billion helped push pricing below market rates: the international US-dollar bank tranche had a pre-completion margin of 125bp over Libor, rising to 185bp; the Islamic piece, denominated in Saudi riyals, is priced at the equivalent of 75bp, and then steps to 135bp before maturity; the 15.75-year sukuk carries a pricing of 95bp over six-month SAIBOR.

The sponsors provided completion guarantees obligating them to repay bondholders in full if the plant was not complete by 31 December 2020. But there was little danger of that.

The project was completed in September 2017, and in doing so became the largest chemicals facility constructed in a single phase anywhere in the world. ■

## Sadara Chemical Company

Financial close: 28 June 2013

Size: \$19.3 billion

Description: Construction of at least 26 chemical manufacturing units in Jubail City in Al Sharqiya, Saudi Arabia.

Sponsors: Saudi Aramco (65%), Dow Chemical (35%)

Debt: \$2 billion sukuk, \$2.2 billion uncovered commercial bank debt, \$1.3 billion PIF piece and \$7 billion in export credit funding.

ECAs: US Ex-Im; UK Export Finance; Euler-Hermes; FIEM; Coface; K-Sure; Kexim

Bond arrangers: Deutsche Bank; Riyadh

Bank; Bank Al Bilad

Commercial lenders: 31 local, regional and international banks

Advisers: RBS; Riyadh Bank; Shearman & Sterling; Hatem Abbas Ghazzawi (Dow); White & Case; the Law Offices of Waleed N Al-Nuwaiser (Aramco); Allen & Overy; Zeyad S Khoshaim Law Firm; Milbank Tweed Hadley & McCloy; Law of Abdulaziz H Al Fahad; Nexant; Daelim; Fluor; Jacobs Engineering; ABB; Foster Wheeler; Linde; Tecnicas Reunidas; Maire Tecnimont



# Pipe dreams

**WHAT WE SAID THEN:** *“In addition to breaking into a virgin market, the financing was closed successfully in less than three months in what could only be described as a turbulent political climate”.*

New routes to transport oil and gas from the Caspian Sea have been sought since the fall of the Soviet Union, but long seemed a pipe dream (pun intended).

Financing of the 1,780km Baku-Tbilisi-Ceyhan (BTC) pipeline in 2004 finally made those dreams a reality. Not only has the deal had an outsized impact on global energy markets, but it was devilishly difficult to put together.

If the project were not politically sensitive enough, it had to absorb the twin shocks in 2013 of the Rose Revolution in Georgia, a key transit country, and the death of President Heydar Aliyev of Azerbaijan.

BTC also came under a tremendous amount of scrutiny by NGOs, governments and environmental groups. It became the first major project to be developed following the adoption of the Equator Principles, though critics argued its very existence undermined those principals

The \$3.6 billion project entailed the construction of the pipeline; the Sangachal terminal in Baku (which has two storage tanks); the Ceyhan export terminal in Turkey (which has seven crude oil storage tanks and a jetty with the capacity to load two tankers simultaneously); and eight pumping stations (two in Azerbaijan, two in Georgia and four in Turkey).

A group of 11 international oil companies, led by BP and Azerbaijani state-owned SOCAR, are sponsors for the project. The financing was led by the IFC and EBRD, while seven export credit agencies also participated, as did a club of 15 commercial banks.

Some 17,000 signatures were needed at the signing ceremony in Baku, testament to sheer number of parties involved in the deal.

The financing featured four

multilateral-backed loans: Two 12-year \$125 million A loans from IFC and EBRD and two 10-year \$125 million B loans. OPIC also put up \$100 million in political risk insurance for a commercial bank tranche.

Total syndicated debt was \$1.6 billion with a 12-year tenor. Of the remaining funds, \$923 million came from loans from consortium members BP, Statoil, Total and ConocoPhillips.

Pricing on the ECA loans was dependent on cover: US Ex-Im and ECGD provided 100% cover; Nexi 97.5% political and 95% commercial; Sace the same cover at 95% and 90% respectively; Hermes and Coface 95% commercial and political.

Average pricing across the loans was 225bp pre-completion and 270bp post-completion. The project was backed by pre-completion guarantees from the sponsors and a debt service undertaking after the pipeline opened.

Legal challenges facing the sponsors included: signing an international treaty

to supersede domestic laws of each of the three host countries; agreeing to all disputes being submitted to private arbitration under UK law; separate agreements with each government individually, and another one between the group of companies and all three different governments collectively; exemptions for contractors and subcontractors building and operating the pipeline from domestic taxes, thereby dramatically lowering costs for the consortium; each country having to commit its security forces to ensuring the project's safety while the consortium was exempt from any legal responsibility for the actions of those security forces; and multiple land rights issues.

Oil first reached Ceyhan in Turkey in May 2006, and the sponsors closed on a five-year \$1.63 billion additional facility for the pipeline in 2015 with an eight-bank club. By that time, it had already carried 2.28 billion barrels of crude oil to Europe. ■

## Baku-Tbilisi-Ceyhan Pipeline

Financial close: 28 June 2013  
Size: \$3.6 billion  
Debt: \$2.6 billion  
Sponsors: BP Global(30.1%); SOCAR (25%); Chevron (8.9%); Statoil (8.71%); TPAO (6.53%); Eni SpA (5%); Total (5%); Itochu Corp (3.4%); Inpex (2.5%) ConocoPhillips (2.5%); Hess Corporation (2.36%)  
DFI lenders: IFC; EBRD  
ECAs: JBIC; NEXI; US Exim; ECGD; COFACE; Euler Hermes; SACE  
Commercial banks: ABN AMRO; Citibank; Mizuho; SG; Banca Intesa; BNP Paribas; Crédit Agricole Indosuez; Dexia; HypoVereinsBank; ING; KBC;

Natixis; Sanpaolo IMI; WestLB; Royal Bank of Scotland  
Political risk cover: OPIC  
Financial adviser to the consortium: Lazards  
Legal advisers: Allen & Overy; Baker Botts; Ashursts; Sullivan & Cromwell; Maples and Calder; Freshfields  
Financial advisers to the ECAs: Taylor De Jongh (Most ECAs); PwC (Hermes)  
Technical advisers to the lenders: Worley Parsons; Paragon; Netherland, Sewell and Assocs; Mott McDonald  
EPC contractors: Spie Capag; CCIC; Botas



# The earth moved

**WHAT WE SAID THEN:** *“Construction and geological risk, particularly in the latter part when the cushion gas is being inserted, is difficult to quantify”.*

Possibly the most dramatic instance over the last 20 years of event risk, the Castor underground gas storage project in Spain failed because it unexpectedly caused earthquakes.

But while the Castor facility was eventually closed down, bond holders and sponsors were not left out of pocket, making it a fine example of good structuring.

The original financing for Castor closed in July 2010. It funded construction of the underground gas storage facility which included both onshore and offshore elements. Wells were located 21km off the east coast of Spain providing around 1.9 billion cubic metres of storage capacity. The gas was compressed 15km inland from the coastal town of Vinaros for injection into the gas reservoir, ready to be pumped back into the Enagas-operated pipeline network.

Sponsors ACS, Enagas and Eurogas raised €1.318 billion in 10-year mini-perm debt from a group of around 20 banks. Banesto, Caja Madrid, Credit Agricole, Santander and Societe Generale were MLAs on the transaction.

The project carried no market or volume risk, but as we said at the time, pretty high geographical risks which were not compensated by high returns as in oil exploration development. To provide some protection, the sponsors agreed a five-year window in which they could walk away (on reasonable grounds) and receive compensation.

Construction began in 2008 and was completed in 2012, although when the debt was refinanced in July 2013, the project was still waiting for Spanish government approval after running into trouble.

The lingering impacts of the financial crisis led the government to increase the debt tenors on the project

from 10 to 20 years, in order to reduce the burden of charges on Spanish gas and power users.

Then in January 2013, the Spanish authorities approved a ministerial order allowing the project to use gas from a third party. Enagás, the operator of Spain's gas grid, and Castor's largest customer, had already agreed to buy half of ACS' stake at completion. It now took over from the project the role of buying cushion gas.

The bond refinancing represented the first ever use of the European Investment Bank's project bond credit enhancement (PBCE) product. This attracted criticism due to the lack of demand risk or much completion risk on the transaction. But the EIB seem very keen to test its new toy, which saw it take a €200 million unfunded commitment that starts out as equivalent to 14% of senior debt, eventually decreasing as the bonds amortise, and staying equivalent to 20% of outstanding principal.

With the PCBE, Castor achieved a rating from Fitch one notch above Spain's sovereign rating a raised a total

of €1.43 billion.

Then Castor was shut down in 2014 after the detection of more than 200 minor earthquakes the previous year.

Full repayment of the bonds happened in November 2014 following a Royal Decree which terminated the Castor concession. Escal was forced to relinquish the project, but the decree ordered Enagas to arrange around €1.3 billion in bank debt from a club of lenders to repay the concessionaire. The government got the banks to compensate Escal and in exchange for payment rights from the Spanish gas system. The banks agreed to receive payments for 30 years (around €80 million per year) from January 2016.

Spain was stuck with a significant bill, but the deal participants were compensated quickly and in line with legislation. EIB even got to try out PBCE, which was rolled out a few more times before everyone realised it was a solution looking for a problem.

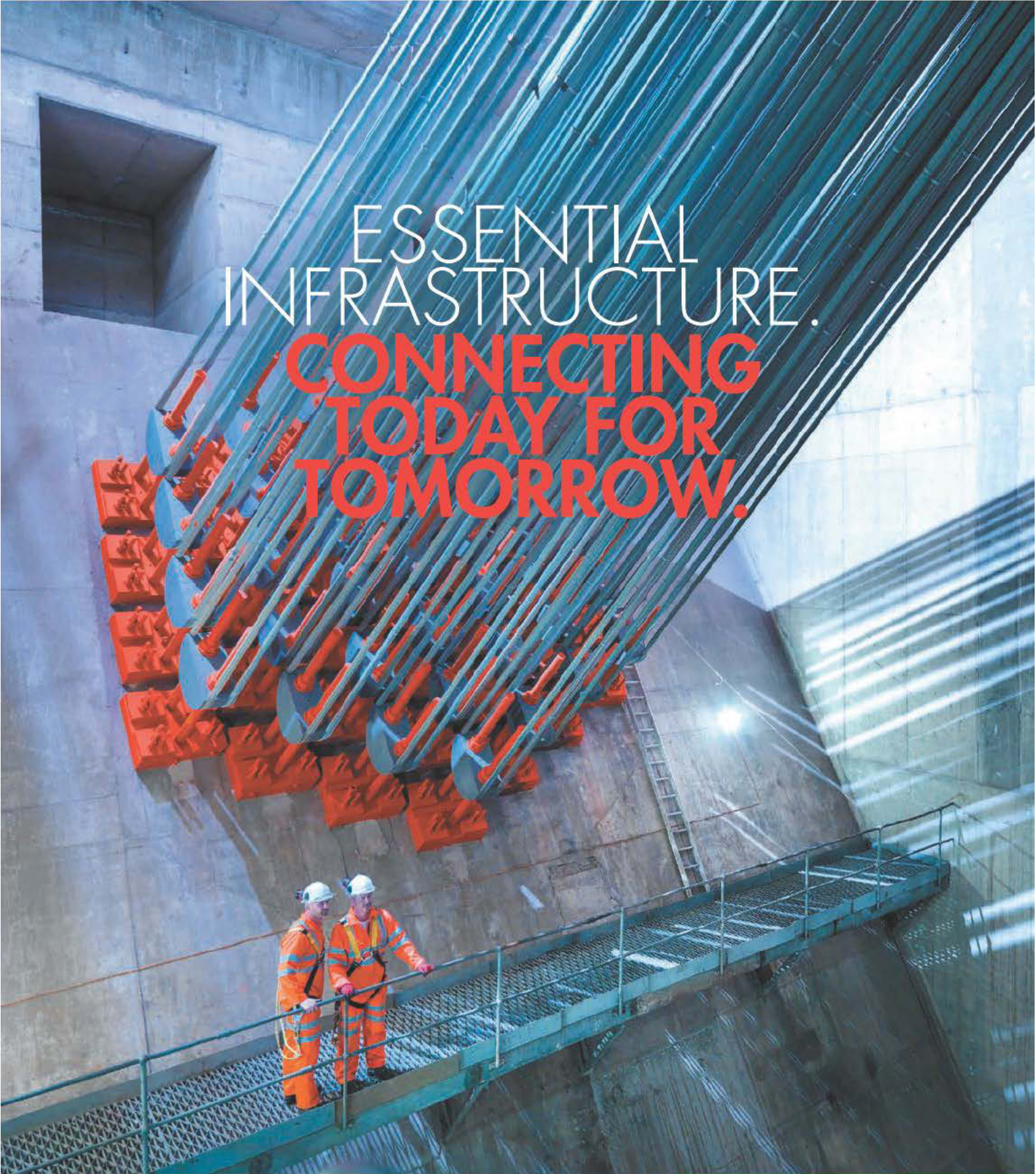
In May of this year the Spanish government confirmed that it has no plans to reopen the Castor facility. ■

## Castor UGS refinancing

Financial close: 25 July 2013  
Size: €1.7 billion  
Sponsors: ACS (67%); Castor UGS (33%, with Dundee Energy representing 74% of that shareholding)  
Debt: €1.43 billion  
Bookrunners: Bankia, BNP Paribas, La Caixa, Crédit Agricole, Natixis, Santander, SG  
Maturity: 2034  
Coupon: 5.76%


Project bond enhancement: EIB  
Monitoring adviser: Trifinium  
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## ARDIAN



# A new model

**WHAT WE SAID THEN:** *“The new Thames Tideway Tunnel sewer in London has achieved construction phase stable returns for investors and a cost of capital well below the industry average at 2.497%, all under a bespoke regulatory regime.”*

When all the usual options are blocked off, it forces you to get creative. And so it was for Thames Water and its planned super sewer.

A number of procurement models for major infrastructure projects now seem discredited in the UK. They are either seen as undesirable by politicians or the public (too much private sector profit), or seen as unworkable by the industry (not enough private sector profit).

This created a challenge for Thames Water when it came to funding a new £4.2 billion sewage network underneath central London. The Thames Tideway Tunnel will divert around 39 million tonnes of untreated sewage from overflowing into the River Thames. Thames Water has designed a tunnel that would run 25km from Acton in the west to Abbey Mills Pumping Station in the east, 65m below ground with a 7m diameter. It has an expected life-cycle of 120-year.

Although it agreed to invest £1.4 billion on preparatory works and construction of the Lee Tunnel, Thames Water was unable to bear the full costs itself. So, it set about designing a completely novel way to deliver a major project.

The introduction of the Flood Water & Management Act in 2013 allowed the utility to tender new infrastructure to a third-party financier. Thames Water tendered for an independent infrastructure provider (IP), with its own license from regulator Ofwat, to undertake the rest of the work.

The Bazalgette consortium, comprising Amber Infrastructure-managed fund INPP, Allianz Capital Partner, Dalmore Capital, DIF and Swiss

Life, won the competition to be the IP in July 2015. Bazalgette will commit £1.275 billion in equity to the IP vehicle Bazalgette Tunnel Limited, which was due to be drawn down until early 2018. Regulated revenue streams therefore start immediately during construction.

Thames Water customer bills repay debt and provide equity returns through an additional bill charge on behalf of the IP.

Ofwat regulates utilities' customer charges every five years – with a calculation of weighted average cost of capital (WACC) multiplied by regulated asset base (RAB). Bidders' success depended upon their bid WACC (BWACC).

However unlike for a normal utility, the IP will have its own revenue structure for construction and testing up to 2030 based on BWACC x RAB. After 2030 the IP is subject to Ofwat's five-yearly WACC determinations.

The sponsors had to raise debt to draw over more than seven years. Once equity is absorbed the senior debt will be drawn. RBC and Evercore put together a £1 billion 10-year revolving debt facility with a margin of 85bp over Libor, and commitment fee at 35% of that.

Periodic public bond issuances at terms and timings of favourable market conditions will repay the debt. Bazalgette has already issued several bonds since reaching financial close, including a £250 million green bond in November 2017.

Construction contractors for the west, central and east lots had target cost contracts, rather than turnkey. Overall their contracts have a total value of roughly £1.77 billion. Overruns or upside on those contracts are shared between the IP and contractors. Tunnelling is due to begin in 2018 and continue until 2021. All works are scheduled to be complete by 2023.

Not only is the project's structure genuinely innovative, but the tunnel itself will be a major feat of engineering. The big question mark hanging over the development is how strong public support for it will be moving forward. The increase in water utility bills to repay the capital cost will be introduced gradually, and there is surely a risk of a public backlash once those bills start rising.

Until then, everyone one involved in the deal can continue to marvel at how clever they all are. ■

## Thames Tideway Tunnel

**Financial close:** August 2015

**Size:** £4.2 billion

**Sponsors:** Bazalgette Tunnel Limited (INPP; Allianz Capital Partner; Dalmore Capital; DIF; Swiss Life)

**Commercial lenders:** RBC; Credit Agricole; Lloyds; MUFG; RBC; Santander; SMBC

**Awarding Authorities:** Thames Water;

Department for Environment, Food and Rural Affairs (UK); Ofwat

**Advisers:** UBS; RBC; Evercore Partners; KPMG; PwC; Ernst & Young; Clifford Chance; Freshfields Bruckhaus Deringer; Hogan Lovells; Ashurst; Linklaters; Herbert Smith Freehills; Norton Rose Fulbright; Sharpe Pritchard; Berwin Leighton Paisner; Arcadis



# Keeping on track

**WHAT WE SAID THEN:** *“It brings together many strands of project finance over the last 20 years, everything from risk allocation in concession agreements to managing political risk in a big-ticket ECA financing.”*

Not many projects in the world have the size and scope of the Nacala Logistics Corridor. To build a road and port network across two countries is impressive, to have done so in East Africa while raising \$2.73 billion of debt is well worthy of recognition.

It is the most recent of the deals we have chosen to highlight, and so its long-term legacy is unknown. But whether it is for good or bad reasons, we feel certain it will be a transaction still talked about in another 10 years.

The scale of the project is difficult to imagine. The route travels 912km from Vale’s Moatize coal mine in the Tete region of northern Mozambique to the port of Nacala, travelling through land-locked Malawi.

The project entails the construction of 230km of new lines and the rehabilitation of 682km of existing track, and also the construction of a coal export terminal at Nacala with a loading capacity of 18 million tonnes per year of coal and a further four million tonnes per year of general cargo. The rail portion has the capacity to transport 22 million tonnes per year, of which 18 million is assigned to Vale’s Moatize mine.

The management of Vale port and the connecting rail lines in the north of Mozambique had been awarded to Corredor de Desenvolvimento do Norte (CDN) consortium under a PPP contract in 2005. The full structure of the consortium is not in the public domain, but shareholders are understood to include Mozambique’s national railway company Caminhos de Ferro de Moçambique (CFM) and US companies Edlows Resources and Railroad

Development Corporation.

The promised upgrades to the network and port failed to materialise however and the concession was understood to be losing money when it caught the eye of Brazilian mining company Vale, which owns and operates the Moatize mine in the country’s Tete province.

Existing rail links between Moatize and the country’s ports were lacked capacity, and so Vale saw an opportunity to ensure it could maximise the Moatize mine’s export potential. From 2009 onwards, the mining company began to acquire an increasing stake in the Nacala concession.

The cost to upgrade the network and create a new more direct line to the port, cutting through Malawi, was considerable. Nacala began work on the network in 2012, paying for it on balance sheet while seeking a debt financing package and a co-sponsor with sufficient available funds.

Help was going to come from Japan. The ProSavanna programme is run by the Japanese government and

seeks to develop industrial agriculture in Mozambique. Nacala Port is crucial to the ProvSavana project as it is where equipment and machinery will be imported through and future production exported out of.

Japanese company Mitsui officially acquired a 50% stake in the logistics corridor and a 15% stake in the Moatize Mine in April this year, but Japanese banks and ECAs have been working on this deal for many years.

That Vale only completed financing eight years after it bought into the project, and two years after the coal export terminal was completed, demonstrates the complexity of getting the deal to financial close. Land rights have been particularly slow to resolve.

The debt package is split between: a \$400 million facility covered by Export Credit Insurance Corporation of South Africa (ECIC) priced at 35-400bp over Libor; a \$1 billion NEXI-covered facility priced at 190bp over Libor; a direct loan from JBIC of \$1.03 billion; and a \$300 million direct loan from AfDB. All the debt has a tenor of 14 years. ■

## Nacala Logistics Corridor

**Financial close:** November 2017

**Size:** \$4.9 billion

**Description:** Construction of 230km of new lines, the rehabilitation of 682km of existing track, and construction of a coal export terminal at Nacala, Mozambique

**Sponsors:** Vale (85%); Mitsui (15%)

**Debt:** \$2.73 billion

**Commerical lenders:** Standard Bank,

Investec, ABSA, Rand Merchant Bank, SMBC, MUFG, Mizuho, SMTB, Nippon Life Insurance Company, Standard Chartered

**ECAs:** JBIC; NEXI; Export Credit Insurance Corporation of South Africa

**DFI:** AfDB

**Financial adviser to Vale:** HSBC

**Legal advisers:** White & Case (Vale); Linklaters (lenders)



# BRIDGE INFRASTRUCTURE DEBT PLATFORM

## A GROWING FORCE AND INNOVATIVE CONVICTION DRIVEN INFRASTRUCTURE DEBT MANAGER

**08/2014 – 11/2017**  
**EUR 400m to EUR 1.3bn of AUM**

### 2017

Greenfield offshore wind farm (Germany)

MLA – EUR 75 MILLION

### 2017

Acquisition of harbour towage form (Italy)

MLA – EUR 40 MILLION

### 2016

Vela portfolio acquisition – Solar deal of the year (Spain)

MLA – EUR 40 MILLION

### 2016

Teeside Biomass – European Biomass deal of the year (UK)

MLA – GBP 55 MILLION

### 2016

Altitude portfolio refinancing (France)

MLA – EUR 29 MILLION

### 2016

Autovia del Pirineo A-21 refinancing (Spain)

MLA – EUR 48 MILLION

### 2015

Meerwind offshore refinancing (Germany)

MLA – EUR 58 MILLION

### EDMOND DE ROTHSCHILD ASSET MANAGEMENT

Edmond de Rothschild Asset Management (“EdRAM”) is the asset management division of Edmond de Rothschild, an independent, family-owned Group specialising in private banking and asset management. EdRAM is a multi-specialist, with recognised expertise in equities, corporate debt, infrastructure debt, asset allocation, overlay and quantitative asset management. EdRAM has €57bn under management as at 31<sup>st</sup> December 2016 and employs approximately 500 people.

### BRIDGE – INNOVATIVE AND CONVICTION DRIVEN INFRASTRUCTURE DEBT PLATFORM

EdRAM UK acts as investment advisor to and delegated manager of Benjamin de Rothschild Infrastructure Debt Generation (“BRIDGE”).

BRIDGE infrastructure debt funds enable institutional investors to access infrastructure assets with secured and stable revenue streams. It sources and structures deals mostly from sponsors and is one of the few independent debt teams investing only on behalf of clients.

BRIDGE funds have a long-term investment strategy and cover all sectors of infrastructure, notably energy, renewables, utilities, transportation, telecommunications and social infrastructure. BRIDGE is about Energy Transition, Trans European Network, Data Access to all, Upgrading of Utilities, Social infrastructure.

BRIDGE always seeks to act as MLA to structure, as a sole lender, or as part of a club efficient debt instruments in line with our investor’s guidelines. Leading sponsors see BRIDGE as a credible and trustworthy second generation debt platform capable of structuring and closing complex transactions

### WHEN TRADITION MEETS BEING A BOLD BUILDER OF THE FUTURE

Since launch, BRIDGE has become a successful, innovative and fast growing means infrastructure debt platform. Three years from inception, the BRIDGE team has €1.3bn of assets under management and has invested €1bn in 26 European transactions with spreads well above 200bps for senior, IG, S2 infrastructure eligible debt. BRIDGE currently comprises four investment vehicles, with deal ticket sizes ranging between €8-120 million.

BRIDGE’s fund raising is on-going with more diversified and higher yield investment strategies in line with Edmond de Rothschild’s commitment to the sector and sustainable development since 250 years. BRIDGE will build the infrastructure of tomorrow and is long term committed player.

### UNIQUE PORTFOLIO AND PIPELINE

BRIDGE invests beyond the traditional definition of core infrastructure. The investment portfolio demonstrates EdRAM’s ability to build a diversified asset base. BRIDGE has invested in, and continues to source, major transactions alongside established institutions, acting as mandated lead arranger. BRIDGE can invest in landmark transactions but also in more niche, proprietary transactions, such as innovative renewable deals, care homes or tug boat harbour operations.

### EXPERIENCED INVESTMENT TEAM

BRIDGE’s London-based investment team is part of Edmond de Rothschild’s Infrastructure, Real Assets & Structured Finance and comprises 11 professionals who during their careers have between them arranged more than €100bn of landmark infrastructure deals over the last 20 years across the globe. The depth of expertise of the team demonstrates the Edmond de Rothschild Group’s commitment to BRIDGE.



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# The European angle...

Twenty years of infrastructure debated and discussed by a distinguished panel of industry professionals. By Angus Leslie Melville.

**T**wenty years ago the first edition of *Project Finance* magazine rolled off the presses, laying down a marker for infrastructure journalism and starting a journey that in 2013 would see the title join forces with *Infrastructure Journal* to create the combined might of *IJGlobal*.

To celebrate reaching this landmark, *IJGlobal* pulled together two high-level sessions – one in London and the other in New York – where leading lights from the industry gathered to debate the last 20 years.

Both sessions started with white-glove perusal of the first edition of *PFM*, during which reactions ranged from delight at recognising old friends and former bosses to surreptitiously sliding past those who brought back less fond memories. Occasionally fingers stabbed at pages, swiftly followed by *sotto voce* discussions, vigorous head nodding and rueful smiles.

As the delegates took their places at the Euromoney London headquarters, conversation immediately turned to the European project finance market – the highs, the lows and surviving the global financial crisis which severely curtailed infrastructure investment programmes.

In that time, we have seen the market evolve from being dominated by large-scale power projects through the dash for gas, the emergence of renewable energy and its development to utility-scale offshore; the rise and fall of greenfield PPP (hopefully seeing its return before long); and the emergence of infrastructure funds.

The UK played a central role in discussion for its part in the evolution of the European project finance market, having delivered some 700 social infrastructure and transport PF transactions with an investment value of around £60 billion, far exceeding any

## The roundtable participants were:

- Richard Abadie – global head of capital projects and infrastructure at PwC
- Allan Baker – global head of power project finance and advisory at Société Générale
- Harry Bright – head of credit markets at Santander
- Thierry Déau – founder, chairman and chief executive at Meridiam Infrastructure
- Andrea Echberg – partner at Pantheon Ventures
- Laurent Fayollas – managing director (Paris) at Ardian Infrastructure
- Phillip Fletcher – power and infrastructure partner at Milbank Tweed Hadley & McCloy
- James Hall-Smith – head of environmental infrastructure at InfraRed Capital Partners
- Angus Leslie Melville – editorial director *IJGlobal* (chair)
- Caroline Miller-Smith – power and infrastructure partner at White & Case
- Darryl Murphy – head of infrastructure debt at Aviva investors

market at the time – and since.

The UK market – crossing three administrations, as it did – was credited for kick starting PPP around the world by demonstrating that infrastructure investment can (and should) transcend political cycles.

In a short space of time, hospitals were transformed from places that patients feared they would leave feet-first to modern facilities; schools went from Victorian hell-holes to modern-day hell-holes; and waste

projects started hitting stumbling blocks the minute the touch paper was lit.

From these early days of private sector involvement in the delivery of infrastructure in the UK, the PPP procurement model has spread around the globe delivering government-driven agendas in markets as far flung as Australia, Canada, Singapore, Bahrain, Italy, Poland and Russia... with the list of participating nations growing every year.

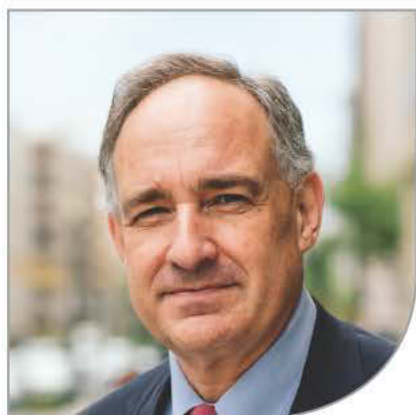
Fresh markets open up to the potential of PPP each year, tailoring the model to their own specific markets – sometimes improving on the structure first dreamt up in the UK – but always seeking to benefit from on-time, on-budget delivery of societal upgrades.

A lot has changed since the early days. As PwC infra head Richard Abadie says: “Infrastructure wasn’t an asset class in 1997. It was a fringe business in any organisation, and when you said you worked in infrastructure, people thought you were the IT guy fixing systems in the basement. But when you look at how far we’ve come in 20



Harry Bright, head of credit markets, Santander





Phillip Fletcher, power and infrastructure partner at Milbank

years, it's pretty impressive."

And indeed the PPP phenomenon, its evolution over the years to where the global market stands now – frequently suffering set-backs, but always moving forward – it is indeed impressive.

## From a British acorn...

While PPP has fallen from grace in the UK, the pathfinding role it played in the evolution of the global market is indisputable.

Pantheon Venture's Andrea Echberg says: "People underestimate the exports that we've seen from the UK model. It can be a bizarre thing to sit in Turkey or Mozambique talking about the risk allocation in SoPC4. We have – as an industry – achieved an awful lot, and there are still parts of the world that are embracing it for the first time, seeing it as hugely positive."

Abadie adds: "If you look back to the late 1990s and early 2000s compared to where we are today, most Eastern European countries weren't members of the European Union and connectivity – whether telephone, road, rail or aviation – was almost non-existent.

"Now, when you travel through all parts of Europe, we take for granted a certain minimum standard of infrastructure, and that you certainly wouldn't have seen 20 years ago."

In essence, the UK served as a "laboratory for PPP" says Darryl Murphy, head of infrastructure debt at Aviva

Investors, allowing other markets to benefit from its experience – good as well as bad.

However, proving the maxim that hindsight is 20/20, many projects that were joyfully procured as PPPs in the early days of the model – London Underground being an excellent example – would nowadays never have been delivered in this manner. And this is where the model has evolved to allow different breeds of project to progress.

"Thames Tideway is interesting" says Murphy. "This is one of the few cases I can think of where a very different model is used in procurement, as opposed to something that you might recognise as looking like PPP.

"But again, it's shown that the UK has been a bit of a laboratory for new models – little twists on the PPP model. There has probably been more to come out the UK than any other jurisdiction in terms of different ways to actually procure projects."

Harry Bright, head of credit markets at Santander, adds: "Thames Tideway Tunnel is a significant infrastructure project for which the need had long since gone past. As such, it created an environment in where financing was a necessity.

"The tweak that employed – whether it's the right tweak or not – was necessary as it needs to be built. A lot of intellectual skill went into this project to get to the end game, rather than taking the approach of 'what's the absolute bottom line, penny value for money.' I think in that it got to the right conclusion for what we need."

Laurent Fayollas, Paris-based managing director at Ardian Infrastructure, agrees that evolution of the model is essential for its future success. He says: "The model is constantly evolving. When it is adopted by another country it may start off being exactly the same as – say – the UK's. But if it progresses every time it is adopted and we learn from what has been done before, that is a very positive situation."

And this learning process has propagated an international market that can learn from the experiences of others – the disasters (sadly) providing perhaps the most useful case studies.



Thierry Déau, founder, chairman and chief executive, Meridiam Infrastructure

## Mistakes of the past 20 years

While the success of the British PPP market in its heyday gave the global market a pathfinder, its greatest disaster – the London Underground projects – gave its detractors a weapon for all seasons.

In much the same way that the Titanic could have been used as a solid argument against the construction of large ocean-going liners, LUL has served as a fly in the ointment – the perfect weapon for detractors.

As Murphy says: "It's galling, particularly for anyone involved in it, to look back and think 'Yes, it was definitely a deal-too-far in terms of the model'. However, it's been used as a millstone around our necks ever since."

And he's right, every time an academic seeks to attack the PPP model, they wheel out London Underground as the primary reason for not using it. With a few well-crafted paragraphs by an academic who has studied the procurement or one deal, all the many achievements are written off in favour of an argument-winning slam-dunk.

Troublesome projects aside, another driver for disaster in a PPP market is the desperation of sponsors to grow market share. In the early days, the temptation to low-ball deals saw the likes of Jarvis over-extend to the point of no return.

Thierry Déau – Meridiam Infrastructure founder, chairman and chief exec – says: "The whole industry can be impacted by this. When it's very



enthusiastic and you have too much money, there are lots of contractors – that is when people tend to treat the risk as: ‘we’ll deal with it later’.

“It’s true for investors too. Prices don’t go down only because the contract is well done. It goes down because investors go crazy and they do whatever, and so it’s true for the contractors. There’s a big pie and there’s lots of competition – everybody jumps in, everybody is enthusiastic. Every risk that the year before people thought was crazy becomes the new norm.”

However, when it comes to projects across Europe the overall view is that the sector had performed well, benefiting from professional due diligence and experienced practitioners.

One cannot ignore the likes of Spanish solar which was impossible to factor into risk analysis and the Perpignan-Figueras rail line which was hit by the Euro crisis, but by-and-large the view in the room was that project finance had performed exceptionally well across all markets. And where it had not performed so well (usually in fledgling markets), the procurer could take solace from the reality that they infrastructure wasn’t going anywhere!

Beyond the usual clarion cries of lack of deal flow, and insistence that “people doing stupid things” – which usually translates as the price of debt being pushed lower than it should go, or the price for assets going through the roof – the overall view is that they, pretty much, got it right.

## Twenty-year challenges – compared to today

It was a very different world back in 1997 compared to today’s market. The banks were emerging from having financed the big wave of privatisations, the power sector was dying off a bit and the dash for gas was in full effect.

It was in this environment that PFI was born and the market cottoned on to the potential of taking power station methodology and project finance... and establish a whole new asset class.

James Hall-Smith, head of environmental infrastructure at InfraRed,



Andrea Echberg, partner, Pantheon Ventures

says: “One of the challenges we faced 20 years ago was that there was no established exit market, and it was uncertain as to how the secondary market would evolve.

“Furthermore, in the very early days the standard form concession agreement was being developed, so each issue was up for being negotiated from first principles and this took time. In particular, we were keen to be able to attract senior debt, so we spent a lot of time negotiating compensation on termination.

“That was one of the key challenges at the time in order to bring in the low-cost debt and to create the gearing that we expected.”

Attracting lenders is not a problem that the market faces today, but the banks (and it was a bank market then) had to be won over. Nowadays, that makeup has shifted dramatically, with a flood of lenders looking to deploy their balance sheets.

Meridiam’s Déau says: “We actually finance about 80% of the €2 billion we finance every year with institutional money on a greenfield basis. I am not sure the cheapest is actually what we’re looking for, rather than the long-term fixed-rate and a real partnership with the institutional debt, which is very different.

“The pricing is coming down mostly because the banks are trying to get back in there and they are doing crazy things. Very often, the arbitrage for us is to prefer a slightly more expensive long-term partnership with an institutional investor, because we are looking for long-

term cashflows rather than some cheap alternative which is going to last for 10-15 years in reality. The headline may say 2.5 but it’s essentially 1.5.

“There is a lot of value in the long-term capacity of institutional investors on the debt side. I would actually see it as a positive compared to what we used to have back in the days where banks would always be a little bit stuck with these long-term portfolios they had, even though they could securitise.”

Short-term lending always comes as music to bank lenders’ ears and the maturing of renewable energy as a new sector for them to lend to – and indeed a new direction for them to evolve their careers as the greenfield market dried up during the GFC – came as a fillip.

## The renewable energy boom

Like the Fifth Cavalry coming over the horizon, the market looked to the arrival of renewable energy as the instrument by which they would save the day – and it was government support (a fickle creature at best) that made it all possible.

The room was of the broad view that subsidies made the European renewable energy market and that – in spite of detractors – it had created an environment that allowed a new sector to bloom and prosper.

Not taking into account the Spanish situation, as Société Générale global head of power Allan Baker says, “regulation and the subsidy mechanisms morphed over time” to suit the demands of the day, inadvertently creating a whole asset class.

“With the exception of a handful of jurisdictions,” says Baker. “It’s been quite an unusually well-managed process with governments leading its evolution through different transition phases of the industry.”

White & Case power and infrastructure partner Caroline Miller-Smith says of the Spanish subsidy debacle: “That’s a classic example of a great failure of procurement of that whole solar PV programme, because it was left unchecked.

“The system already had a massive deficit before they embarked on this great



big uncontrolled spending spree, and it brings you back down to the affordability of infrastructure being one of the fundamentals that you have to look at – the affordability to the end user as well.

“If you contrast what they did in Spain with Portugal, where they really thought about what capacity they wanted and then tendered that out, getting people to pay for those megawatts, it was a really big mistake based on not even thinking about what the impact on affordability would be.”

And it's not over. SocGen's Baker says: “We're heading back into that cycle again with people taking bets on what the future looks like – a perfect example being the German offshore wind sector where recent bids are at zero subsidy... but on the basis that the electricity price increases and that there are 15MW turbines available by before FID.

“It's a big punt on the future, and procurement of that capacity now on that basis is not as certain as some of the capacity previously awarded. It may never materialise.”

Concerns raged over renewable energy and the move away from subsidies. They noted that every new solar photovoltaic project around the world seemed to be achieving the lowest price – every project going lower based on drivers that do not always make sense.

“A lot of those bids don't even have EPC contracts,” says Baker. “Their assumption is that once they've won the tender they'll be able to negotiate a good price with their EPC and their suppliers – which takes you right back to the point with suppliers underbidding their services and conceivably failing because of it.”

InfraRed's Hall-Smith lauded the role played by subsidies in the renewables space over the last 20 years, labelling them “transformational” as well as successful.

“On the back of feed-in tariffs, a vast amount of investment has been poured into renewable energy and – as a result – an industry has been born and matured over the last 10-15 years to the point where, in some countries, we can invest in renewables without subsidies,” he says.



James Hall-Smith, head of environmental infrastructure, InfraRed Capital Partners

“If you look at the offshore wind industry, I don't think anyone believed that the price would come down as quickly as it has done, and that's exactly the job the subsidies were put in place to do. These subsidies have provided the means to encourage investment in infrastructure outside public procurement. It's a different model, and it relies on the private sector being entrepreneurial to create the infrastructure opportunities.”

But Hall-Smith recognises that renewables is moving into a new phase – a non-subsidised phase.

“We are seeing a maturing of the market that does not require subsidies in many parts of the world and I think that's very exciting,” says Hall-Smith. “We've reached a tipping point and, in my view, we'll see an acceleration of investment in renewables.

“But what comes with that is the need and responsibility to balance grids and protect grids from intermittent and unpredictable renewable energy, so – inevitably – there is an opportunity to invest in balancing infrastructure.

“Whether that's flexible generation, batteries, interconnectors, pumped storage, smart meters, smart grids, smart use of electricity... these are all themes that are investable. In our view, it's an expanding market where we can see opportunities over at least the next five years to invest a great deal of capital.”

Meridiam's Déau is of much the same mind, seeing a continued evolution

of the energy mix where renewables will play a stronger role.

“I think that managing the energy flows and energy saving is key,” he says. “Look at all the commitments we are making on COP21, and we're not even halfway to where we should be.

This is where contract for difference will actually make a huge difference in terms of building grids, networks and interconnectors for Europe.

“But that depends on whether the whole European system will adopt this type of contract, because the RAB model is no longer sufficient to support investment in major energy infrastructure. I believe that's where the smart meters and all these things will be really key.”

## A shrouded future – for renewables

Much as nobody back in the day could have predicted the internet, smart phones or fidget spinners, trying to second guess where the renewable energy market is heading is dodgy territory.

While many a punt is being taken on falling price of solar panels along with continued growth in offshore wind turbine size, all agree that this strategy is fraught with peril.

Abadie says: “What we can't do today is anticipate the technologies in five years' time, 10 years' time, or 15 years' time. If you look back on history in all areas of life, we have had wage inflation, we have had productivity efficiency, and in infrastructure we've had the same thing.”

Miller-Smith says: “It's also incredibly challenging from a public policy perspective, trying to work out where public policy is going to go over the next 10 or 15 years and how it's going to affect the new generation of energy infrastructure assets.

“You see it on a microcosmic level for interconnectors, which are relatively large and investable assets, but there are all sorts of different pools in terms of do we encourage first-mover advantage? Do we not? How do we protect the consumer? How do we not? How do you deal as a regulator and a government



with a complex web of private sector utilities, local opportunities, new players like automotive companies coming in, to protect the consumer ultimately and protect the taxpayer? How do we evaluate that as a risk?”

Coupled with these issues, the technologies supporting renewable energy across all sectors may be evolving on a daily basis, but in some cases it will head in a completely different direction.

Echberg says: “Disruptive technologies are very real issues for infrastructure investors now. When we look at these high barriers to entry, there are things that you just wouldn’t expect. If you are buying a car park, traditionally you would have a look and say: ‘Have I got a monopoly on this whole city?’ not: ‘Is Uber going to bring in driverless cars and nobody’s going to need a car park anymore’.

“I think that whole threat of disruptive technologies, and the pace of technological change is accelerating.”

And this bodes ill for the future. As Déau warns: “We’re entering a world where – in the energy sector – a stranded asset will be a huge risk. In fact it’s counterintuitive, but we almost have to think short-term in this sector, 10-15 years is probably safer than thinking long-term, because of disruption.”

This is much less complicated in more traditional infrastructure sectors. As Murphy points out: “Technological change hasn’t really impacted infrastructure directly. Most of the stuff we do today, the assets we’ve done in 20 years look and feel the same. Trains might look a bit sleeker, but they’re still a similar sort of thing.

“Renewables is the one area where we really did imagine these enormous turbines in the middle of the sea. Probably not 20 years ago, but they were not unheard of at that point. But other than that, I think maybe we’re falling into the trap of thinking the future’s always different, but I do think there will be much bigger changes that will impact infrastructure.”

And one of the changing faces of infrastructure has to be the people who enable projects – the lenders.



Richard Abadie, global head of capital projects and infrastructure, PwC

## New sources of capital...

While nobody at the table suggested Bitcoin was going to play a role in the future of infrastructure financing, there was recognition of how the market has shifted in the last 20 years.

This is a space that has witnessed considerable shifts – from the birth and swift evolution of infrastructure funds through to a lending sector initially dominated by banks, but where less traditional players now hold considerable market share.

Meridiam’s Déau says: “From the greenfield perspective, it’s not about the money. Whether you are talking funds or direct investment, you need people to be patient and understand this complex structure and stick around for two years to close the deal, then monitor the deal during construction and beyond.

“It’s a different set of skills, and skills have always been the biggest challenge and hurdle in the development of greenfield – rather than money.”

Déau continues: “To my mind, the money is there – as are the pension funds. When we raise funds, we end up with two or three times as much money as we want. We actually have to limit the size of the fund to match the greenfield market.

“When people say investors don’t take greenfield risk, it’s not true, there are a gazillion of them taking greenfield risk, it’s just that they can’t access it. Those large ones that can afford to create teams to go there, they’ll do it. It’s all a question

of whether you can mobilise the pool of talent to actually get into greenfield.

“But everybody’s agnostic. I think everyone is now happy to invest in greenfield in one shape or form – fund, fund of fund, direct or whatever.”

Abadie adds: “The challenge about supply of capital and opportunities to invest, in my view, is not unique to infrastructure. Every asset class – fixed income, listed equities, you name it – you’ll have exactly the same problem.

“The question is, what is the consequence of excess supply of capital and limited investment opportunities? And it’s price compression, that’s what we’re seeing now. How does that correct itself?

“We’ve had 10 years’ of basically zero-to-negative interest rates. If and when those change, all asset classes will be re-priced, and I think that’s not just a pricing or valuation question. A lot of the supply of capital is chasing fewer assets in the greenfield space, and that’s created a compounding effect on pricing and everything beyond.”

And with so much money looking for a home – combined with a constrained greenfield market and an overheated brownfield market, it would appear the ingredients are there in place for “interesting times”.

Pantheon’s Echberg says: “There is a huge wave of capital out there looking for a home, and not so many opportunities. Yet on the other hand, if you look at the need for investment into infrastructure, it far outweighs the amount of capital that’s there.

“The trick is being able – with government support – to transfer an opportunity into the characteristics that investors need, which tend to be looking more for the brownfield yielding assets.

“That’s what was clever about Tideway Tunnel, they took an extremely complex engineering project and they turned it into a utility, very simply, and that enabled investors to put money in from day one.

“I think, globally, if that can be repeated and modified and taken across the



world it will give more opportunities for infrastructure investors, and hopefully cool down some of the pressure on the market.”

## The power sector

Much of the conversation was dominated by PPP, not focusing on the energy space beyond renewables – a natural consequence of the delegate list.

However, Phill Fletcher, projects partner at Milbank Tweed Hadley & McCloy, has strong feelings on the subject having been one of the formative figures in the European infra/energy space.

He was on the ground during the drive towards innovation in the European power industry which drew inspiration in the early- and mid-1990s from the privatisation of both generation and distribution in the UK and the subsequent dash-to-gas, which saw the successful financing of a large number of independent power projects.

“Companies like AES, Enron, Entergy, International Power and others brought both new and refurbished generation to the market that relied on long-term offtake arrangements with distribution companies and traders,” says Fletcher.

“The European Commission issued a number of far-reaching directives that gave impetus to the opening of European power markets, and – in large part as a result of these directives – the IPP model moved onto the continent, beginning with Portugal, where the PEGO coal-fired plant



Caroline Miller-Smith, power and infrastructure partner, White & Case

was privatised and the Tapada CCGT plant, which relied on a new trans-Mediterranean gas pipeline from Algeria, was developed.

“Italy adopted the CIP-6 standard form contract, and with their offtake thus assured, at least a dozen combined heat and power and other innovative projects reached financial close in Italy.”

But that all changed with growing environmental and safety concerns which led to a dramatic reduction in the role of both coal-fired and nuclear generation in Europe, and movement towards renewables.

“These began tentatively with smaller projects,” says Fletcher, “initially most prominently in Spain, but quickly appearing across Europe, which benefited from feed-in tariffs and a variety of other incentives. They have grown to utility-scale offshore wind projects in Germany,

Denmark, Holland and the UK.”

Eastern Europe has also taken steps to open markets, with both thermal and renewable projects developed from Hungary to Bulgaria.

“Not all, of course,” says Fletcher, “have been smooth through these decades, with bumps in the road in the UK and elsewhere when TXU, Enron and others faced insolvency, but the drive towards technical, regulatory and financial innovation has continued unabated.”

And much of that drive towards renewables has been led by the greening of the power generating industry.

## PFM cover issue – the environment

As the meeting eased to a conclusion, discussion moved on to the cover story of the first issue – which dealt with environmental impact. Back when the first mag was being read across the globe by pioneers of the infrastructure market, this was a hot topic... as it is today, though dealt with in a very different way.

For those of you with enough grey hair to remember, the Equator Principles were all the rage and sounded so much more appealing than the Environmental Social Governance moniker that gets bandied around nowadays.

As Thierry Déau says: “There is not one single project today where you can avoid speaking about environment. It has become almost the guiding principles for all sorts of projects, especially on the greenfield side, where we are most active.”

Darryl Murphy adds: “Looking across the 20-year period, I suspect that things like the Equator Principles haven’t necessarily moved on a lot in that time. However, if you look from an institutional point of view, it’s not just about the environment, ESG is now an all-enveloping concept.”

Evolution of the infrastructure market over 20 years has been impressive and diverse, leading delegates to believe that it will continue to evolve in the years to come. Though they universally agreed they would not still be working in another 20 years time! ■

## Greatest impact

People identified by round table guests as having had greatest impact on the market:

- Jeff Barratt – Norton Rose Fulbright
- Richard Bowker of EC Harris fame
- Steve Greenwald – Credit Suisse
- John Hilleard of Credit Lyonnais fame
- Tony Mallin – Star Capital
- Sir Adrian Montague – Aviva Investors
- Nicholas Moore – Macquarie
- James Stewart – KPMG
- Graham Vinter – he wrote the book, formerly A&O now Covington & Burling



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# Moving the market

Allen & Overy partners Gareth Price, David Lee, Bimal Desai and Chris Andrew identify five key trends which have fundamentally changed the energy and infrastructure market over the last 20 years.

As 1996 drew to a close, Toni Braxton was topping the UK Charts with “Un-break My Heart”, having achieved similar success in the US, despite being the only music video ever to feature a romantic game of “Twister” (in flashback, so pre-heartbreak). Arsenal won the 1997/8 Premier League, celebrating at Highbury, Tony Blair was elected Prime Minister (May 1997) and England drew away in Rome to qualify for the 1998 World Cup in France.

And in 1997, oil was \$18 per barrel, 1GB of hard drive storage cost around \$100 and UK GDP was \$1.5 trillion. Fast forward to 2017 with \$57 per barrel oil; 1GB of hard drive storage at \$0.03; a doubling of UK GDP and a quadrupling of the Dow Jones Industrial Average from 6,442 to 23,562.

Some prices have gone up, some reduced, but over 20 years a great deal has changed. Changes in the energy and infrastructure sectors are, by comparison, much more gradual and predictable, with the greatest shifts being best observed over a lengthy timescale. Obviously, this is with the benefit of hindsight.

Looking back over the last 20 years we at Allen & Overy have seen five key shifts in the sector.

## 1. The growth in PPP (1997-2007)

In the early days of PFI, very few deals were done. It was only following the landslide election of Tony Blair's Labour Party that serious moves were made to unblock the many deals in the market.

Philosophically, the approach of PPP was very much in line with the ‘Third Way’ politics that were being practised on



Gareth Price, Global Head of Projects and Co-Head of Energy, Partner – London

both sides of the Atlantic. That is, rather than adopting the traditional Labour approach of simply increasing taxes and spending more or adopting a Conservative approach along the lines of “let the market decide”, the role of the government was seen as to agree to pay for outputs or outcomes, so that if an output was not delivered then payment was not made. Agreeing long-term PPP contracts with 25-30 year payment horizons was seen as a way of achieving that. It did not matter who owned the asset, rather the key point was what services were being delivered.

For the years leading up to 1997, the Conservative government under John Major required every public project to be tested to see if PFI was suitable, which led to a logjam and clearly unsuitable projects being tested as to whether a project could be “shoe horned” into a PFI approach. With the new Labour administration in 1997, a pragmatism and commercial approach was to the fore. A group of private sector specialists joined HM Treasury (the Treasury

Taskforce) and under Adrian Montague (now Sir Adrian) set about streamlining, standardising and organising the process that led to an acceleration in deals being done. It also became much clearer which deals were suitable for a PFI approach (a small percentage for which competition was high, demand was known, delays in construction were normal for government and some innovation in design to reduce costs over the long-term was possible) and which were not.

The delivery of new infrastructure under long-term output specified contracts (for those government services susceptible for long-term demand predictions) continued at pace for more than a decade, governments from around the world began to follow the UK approach to long-term infrastructure contracting by setting up their own central task forces and billions of pounds of investment in new infrastructure was the result.

The financial crisis and political antipathy to PPP led to its demise. The main difficulty that has endured with PPP in many countries, including the UK, is in explaining benefits (that are complicated and involve detailed risk analysis) against the two straightforward points that governments can borrow more cheaply than the private sector and profits are being made by investors (even after risks had already been managed). Despite numerous NAO Reports analysing PPP projects and declaring them value for money, the level of debate always returned to the borrowing point and profit point.

For long-term concession based financing in the UK to restart again (whether it is called PFI, PPP, PF2 or is rebadged again) requires a fundamental



## FIVE KEY TRENDS

change in the attitude of procuring entities in the UK.

### 2. The creation of infrastructure as a separate asset class (2006-2010)

Around the time of the global financial crisis (shortly before and shortly after), there were two major events that with the benefit of hindsight were seismic in the development of the infrastructure and energy markets. The first occurred in 2006 when Macquarie managed funds led a consortium that purchased Thames Water from RWE, the German utility and the second in 2008 when OMERS (the Ontario Municipal Employees Retirement Scheme) opened in London with its infrastructure arm a key component of the office, declaring the importance of the move from public to private infrastructure markets.

For the European infrastructure market, these were the first steps in what has become a highly developed market by which consortia began buying private or publicly held infrastructure to hold for the short, medium or (eventually) long-term.

This we think is in part a response to the financial crisis, as it reflects a desire from these long-term investors to find yield bearing investments that are not correlated with the public markets, and in part a result of increased public sector awareness (at least in some countries) of the need to provide for pension provision by investment rather than paying for it from current taxation.

While yield seeking may cease to be a driving force once interest rate normalisation is achieved the desire for “alternatives” to achieve portfolio diversification will not disappear. We therefore anticipate that this is a new and exciting market that is here to stay – a great example of how opportunity arises out of crisis and how our teams can easily be reconfigured to work with clients to innovate and achieve their aims.

### 3. The rise of the financial investor

Across the broader infrastructure and



David Lee, Global Head of Infrastructure Partner – London

energy markets, we have also seen the rise of independent financial equity in all of the projects, energy and infrastructure sectors. This is in part due to the search for yield and diversification by large investors and funds, but also the result of the creation of a broader infrastructure asset class that can, for the right asset, include renewable energy, mid-stream oil and gas as well as

**“While yield seeking may cease to be a driving force... the desire for “alternatives” to achieve portfolio diversification will not disappear”**

transmission and distribution assets and which extends to ferries and motorway service stations.

So we have a new set of investors, to add to the traditional power developers, construction companies and oil and gas players who can invest in certain jurisdictions (the list is lengthening) and certain assets. Financial investors (whether private funds, specialist infrastructure or energy funds, pension funds or sovereign controlled funds) are one of the most significant available sources of capital in the OECD. Outside of the OECD, the last decade has also seen the emergence of

Chinese strategic and financial SOEs as key players in the development and capital recycling of energy and infrastructure assets alongside the more traditional North Asian investors from Japan and Korea. The next 20 years will surely see further growth in North Asian foreign direct investment in the global energy and infrastructure markets.

The growth and shift in the global energy markets will, we think, see this continue as energy companies divest non-core assets, through choice or regulation.

### 4. Oil and gas

While oil may have moved from \$18 per barrel in 1997 to \$57 in 2017, this hardly tells the full story. The last 20 years have seen the price of oil rise exponentially to over \$100 per barrel (with Goldman Sachs predicting an era of \$200 per barrel oil at one stage) to less than \$40 per barrel post the global financial crisis. While the financial crisis played some part in taking the wind out of the price of oil, prices quickly recovered up to 2014 and the real story behind today's relative low oil price world has been the advance in shale oil and gas extraction technology and the growth of a whole new sector of the oil industry, particularly in the US.

Commentators differ on whether:

- a. the rapidly decreasing costs of extracting shale oil and gas coupled with the ability in the flexible US system for producers to ramp up production quickly means that oil prices are range bound in the \$50 to \$60 per barrel for the foreseeable future as higher prices will lead to increased shale oil production leading to oil prices falling back again; or
- b. the current relatively low oil price environment coupled with the ever-increasing costs of new oil exploration has led to a significant reduction in exploration and new production activities by the oil majors which eventually will lead to a fall in oil production and a subsequent increase in oil prices in the 2020s.

The third unknown affecting the price of oil in the next 20 years will be



the potential for a rapid reduction in oil demand with the take up of electric vehicles.

Electric vehicles, however, require electricity and so any significant increase in the use of electric vehicles will lead to an increase in demand for electricity. The use of oil and (subject to President Trump's efforts in the US) coal in the generation of electricity have been in steady decline over the last 20 years as the demand for cleaner energy sources has led to a corresponding increase in the use of gas in particular, but also renewables such as solar and wind. Since 1997, the world has seen a huge increase in LNG production with Qatargas 1 and Oman LNG in the late 90s, followed by significant expansions with further Qatargas LNG trains and Ras Laffan LNG trains as Qatar exploited the vast North Field and Australia undertook a series of major LNG projects such as North West Shelf.

As with oil, however, the LNG story is also in a state of flux today. The discovery of low cost shale gas in the US has led to a collapse in gas prices in the US so that a jurisdiction which was predicted to be a significant LNG importer in the 2000s is now seen as an LNG exporter with several LNG regasification projects for the import of LNG into the US looking to convert to liquefaction projects. The traditional linkage of LNG pricing to oil prices in the Far East markets of Japan, Korea and China has meant significantly lower LNG pricing deterring investment in new LNG projects. 2017 was predicted to see FID taken on projects with a production capacity of over 40 mtpa – in reality FID was taken on only 3.3 mtpa (the Coral LNG project offshore Mozambique). In addition, there is a general reluctance amongst LNG buyers to enter into traditional long-term take or pay LNG sale and purchase contracts which have traditionally been used to underpin the billions of dollars of investment required for large scale LNG projects. Such factors are likely to lead to an evolution of the usual LNG project model in the future but where and how the LNG industry will develop is difficult to predict at present. One trend that is, however, likely



Bimal Desai, Partner – Dubai

to intensify is the use of Floating LNG liquefaction units for stranded gas reserves and/or projects in unstable territories and the use of Floating LNG Regasification Units to bring smaller scale and shorter-term LNG supplies to new buyers.

The other major story of the last 20 years which is worth touching upon is the growth of the midstream industry in the form of the multitude of petrochemical

**“Perhaps the Kyoto Protocol, appositely adopted 20 years ago this month in December 1997, should now be seen as a watershed”**

projects in the Middle East. The lack of cheap gas (prior to the introduction of shale gas) in the US and in Europe; the availability of cheap and comparatively plentiful gas in the Middle East; the relative proximity of the Middle East to the growth markets of Asia; and the desire of Middle Eastern countries to move up the value chain so that they could earn more and provide local employment from their oil and gas resources are all factors which have contributed to a series of large scale petrochemical projects in Saudi Arabia, Qatar and Oman over the last 20 years.

The largest of these have traditionally been undertaken by state-owned enterprises such as Saudi Aramco,

Oman Oil and Qatar Petroleum often with Western or Asian partners bringing technology and/or expertise but a welcome trend has also been the increasing involvement of private companies in leading such projects primarily in Saudi Arabia – examples include Sipchem, Tasnee, Sahara and Saudi Industrial Investment Group who have been involved in several billion dollar projects again usually with Western or Asian partners. Ironically, the availability of cheap gas in the region which originally attracted developers to these projects is now increasingly unavailable as Saudi Arabia and Oman no longer have the same abundant supply and, while Qatar has the gas reserves, it is sensibly seeing how the North Field develops before committing to significant new projects. The advent of cheap shale gas in the US has in fact pulled developers back to the US with, for example, Chevron Phillips, having successfully developed four projects in Saudi Arabia and Qatar, building their latest petrochemical plant back in Texas.

## 5. Power – decarbonisation and intervention

In the power sector (and elsewhere) the 1990s could be broadly characterised as a period of liberalisation, as governments withdrew from positions of ownership and control. In the UK the “dash for gas” gave way to the New Electricity Trading Arrangements at the turn of the millennium followed by price volatility which plunged many IPPs into default. In contrast, development of IPPs/ IWPPs in, for example, MENA continued much more strongly.

However, perhaps the Kyoto Protocol, appositely adopted 20 years ago this month in December 1997, should now be seen as a watershed. For the first time many industrialised nations committed themselves to reducing CO<sub>2</sub> emissions. These national (or European) targets manifested themselves in legislation such as the first EU Renewables Directive in 2001 and subsequently the UK Climate Change Act.

Attempts explicitly to price carbon, such as the EU Emissions Trading Scheme



## FIVE KEY TRENDS

and the UK Carbon Price Floor, proved challenging to implement effectively. To seek to achieve their decarbonisation commitments governments were driven down the route of support for selected low carbon generation technologies, in various forms of feed-in tariffs, green certificates or tax incentives.

Governments therefore re-entered the realm of intervention, to determine technology choices for power generation. The pace of change made calibration of support levels difficult however and governments found themselves increasingly caught in a “trilemma” of apparent trade-offs between affordability, decarbonisation and security of supply. In the light of the GFC and fluctuating prices for price setting fossil fuels (see above) some governments sought retrospectively to roll back subsidy levels, to the consternation of investors and in many cases resulting in successful legal challenges.

Nevertheless, continuing technological advance, and the use of auctions to drive down subsidies funded by consumers, have resulted in European onshore, and in particular circumstances perhaps also offshore, wind approaching grid parity. Meanwhile relentless downwards pressure on solar PV costs has seen prices drop as low as \$0.03 per kWh, with widespread grid parity. Global installed solar capacity has grown exponentially a thousand-fold over this period.

Governments have also found that intervention begets further intervention, as the promotion of (intermittent and low marginal cost) renewables has profoundly disrupted the dynamics of power markets. Traditional utilities’ balance sheets have been put under unprecedented strain, leaving them unable to fund systemic evolution despite the introduction of capacity mechanisms to provide counter-subsidies to thermal plants. These challenges have been magnified by reaction to the Fukushima disaster in 2011, and the aging of the global nuclear fleet resulting in a turn away from nuclear generation in a number of instances; the shale gas



Chris Andrew, Partner – London

revolution; and mandatory phasing out of coal generation (as has been announced in many Western European countries).

There seems no prospect of any imminent phase out of coal generation in Asia-Pacific, where generation (from all sources) has tripled over this period. This growth seems set to continue, accounting for of the order of half of global investment in generation in the medium term. China leads the world in generation capacity for both coal and renewables but, the large majority such new regional capacity seems likely to be low carbon generation, with carbon intensity declining significantly.

Over this period global renewable capacity has almost tripled. It appears that carbon emissions are being decoupled from GDP growth, even if they may not be consistent with Paris Agreement targets. Looking forward to the challenges of enabling the decarbonisation of transportation and heating, there will be increasing opportunities in managing a growing share of intermittent generation with storage requirements, grid adaptations and demand side response/efficiency measures. A huge investment will continue to be needed for the on-going transition of our energy systems.

For the partners at Allen & Overy, infrastructure and energy have been two key global sectors of challenge and growth and we are proud to have contributed to our clients’ achievements across the globe. We look forward to the next 20 years with a continued sense of excitement. ■

## Notes

- 1 A match attended by the then Chancellor of the Exchequer Gordon Brown with special adviser Ed Balls.
- 2 Interestingly, cost overruns caused by delay to construction to be paid for by government in “traditional” contracting are blamed on government and profits earned by counterparties as a result of those delays ignored, largely we suspect, because those profits are earned at the same time as the risks being managed. Professor Dieter Helm regularly makes similar observations when arguing for a RAB based model for these transactions – our observation is that this is one of a number of solutions worth considering, but the fundamental points above remain.
- 3 See Chapter 21 of “*Project Finance*” (4th edition) by Vinter, Price and Lee.
- 4 Now more than ever, the John Oliver description of infrastructure is accurate – <http://time.com/3727970/john-oliver-last-week-tonight-infrastructure/> “...it’s roads, bridges, levies, overpasses – or anything that could be destroyed in an action movie”.

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# ... and now the American angle

Senior market professionals in New York discussed the problems with P3, the future of LNG, and the people who inspired them. By Jon Whiteaker.

**F**or our review of the last 20 years of infrastructure finance in the US and wider Americas, we gathered in our office in New York some market legends. All of our panellists had already been working in infrastructure when the first edition of *Project Finance* magazine came back from the printers in November 1997, making them well-placed to analyse the following two decades.

During their time in industry they have seen major market failures in the telecoms and power sectors, have been swept up by the shale gas boom, toiled away on various P3 projects, and witnessed the dramatic rise of renewable energy.

Over the course of a couple of hours these bastions of project finance dissected big stories of the past, hot topics of today, and speculated on future trends. They also spent some time arguing about whether last year's LaGuardia Airport financing was historic or over-hyped.

They began by talking about how important environmental, and increasingly social, issues are now to infrastructure development. But the discussion quickly turned to the juicier topic of competition in debt and equity markets.

## State of play

With President Trump striving to 'Make America Great Again', it is no wonder that the conversation in New York touched on issues of political leadership and the impact of foreign entrants into the US market.

On the latter Adam Sherman of SMBC said: "The Japanese, the Chinese, the Koreans are investing so much money in the West, whether it's North America

## List of participants:

- Eric Silverman, partner at Milbank, Tweed, Hadley & McCloy
- Kent Rowey, partner at Allen & Overy
- James Guidera, managing director & group head at Credit Agricole CIB
- Duncan Caird, head of infrastructure & real estate group at HSBC Global Banking and Markets
- Adam Sherman, managing director and group head of public and infrastructure finance group at SMBC
- Laurie Mahon, Vice Chair, US Investment Banking, Managing Director and Co-Head, Global Infrastructure & Power, Global Investment Banking, CIBC Capital Markets
- Richard Randall, executive director, global head of debt investments at IFM Investors
- John Anderson, senior vice-president, senior managing director, head of corporate finance at John Hancock
- Kerri Fox, chief financial advisor at Steelhead LNG
- Cherian George, managing director – infrastructure & project finance (Americas) at Fitch Ratings
- Daniel Riordan, president, political risk, credit and bond at XL Catlin
- Ruth McMorro, executive vice-president at Parsons

or EMEA, and we're just seeing a nearly unlimited amount of capital that calls us virtually every day to try to find a deal."

There is increasing Korean interest in the US power market at present, and Chinese investors have been upping their participation on deals in recent years. But Sherman identified Japanese investors as having had the largest impact on the market.

"A lot of the institutional money coming out of Japan is looking for government, quasi-government or contracted revenue, looking for the safe deals that really don't exist or just have narrow spreads. Frankly, they're in many ways fuelling the compression of spreads, because in Japan the spreads are negative (or so tiny) that getting 100bp (on deals

used to be at 175bp) may be quite an attractive investment for them. I don't think we've really seen the end of it."

This flood of institutional money is exacerbating the other great trend since the financial crisis (in the Americas and most of the globe): too much capital and not enough assets.

Some panellists highlighted how many investors now seem willing to accept zero or negative profit just to get a foothold in a new market. This byproduct of increased competition is of course having a distorting effect.

While A&O's Kent Rowey acknowledged the returns compression that this added competition in equity produces, he also pointed out how increased competition in the capital





The roundtable participants

markets is creating efficiency.

“Every time a deal comes out there is now an international audience looking at it, and I think that that’s really created a revolution in raising capital”, said Rowley.

With increasing capital available, both as debt as well as equity, what role now for traditional project finance banks?

Richard Randall of IFM Investors said: “The money that is coming in from Asia is wealth that’s been created during our careers, there has been a tremendous growth, and this is pension fund money and insurance money which is 20 to 30-year money that’s looking for a home. If you step back from it, the right economic thing to happen is for that to displace the overnight money which is coming from banks which essentially operate with state guarantees. If the markets were efficient this pension and insurance fund money would crowd out the bank money.”

But Adam Sherman disagreed, saying: “I don’t see banks as a problem, I see banks as intermediaries. I think the same pension funds are depositing money

with banks so that they have cash and they have liquid funds, but they themselves are relying on the banks. Banks are not just institutions that borrow short and lend long. Banks are investment banks. There is not a single global bank in the world that doesn’t have a huge investment banking and capital markets desk.”

While the internationalisation of American markets has been an ongoing trend over the last two decades, the US at least seems to be heading in a new direction towards protectionism.

The roundtable participants discussed The Committee on Foreign Investment in the United States and its potentially chilling impact on Chinese investment. Daniel Riordan highlighted how attempts at Chinese direct investment now get pushed into a 45-day investigation period and often lead to disapprovals.

“You look at the rhetoric of the current administration against inbound Chinese investment and imbalance of trade, I just wonder what kind of effect that’s going to have on both appetite of Chinese

investment and the overall balance of Asian investment”, said Riordan.

While protectionist policies limit competition, increased political risks limit opportunities.

Laurie Mahon of CIBC commented: “We don’t make laws in the US anymore, we just issue executive orders and mayoral proclamations, so whose risk is that? A lot of documents don’t cover that.”

Cherian George added: “There is always a distrust in government in almost every country, it somehow seems to have gotten to a point of complete dysfunction in this country [the US], when you would think that we would lead the world, and we can’t get anything done.”

## The problem with P3

One of the greatest frustrations for project finance professionals based in the US is the lack of domestic P3 development over the last 20 years.

IJGlobal data shows that during the period Canada has project financed three times as many greenfield transport and



social infrastructure projects than the US. And this despite a general acceptance that US infrastructure is crumbling and various assets are in desperate need of replacement.

Richard Randall said: "I look at the market for PPPs and it's not a very good track record in this country, which is one of the reasons why it hasn't moved forward. Prime examples are the multiple failed toll roads all over the place. I think the two biggest problems the government have with managing infrastructure is building it efficiently and quickly, and then managing the lifecycle."

Highly leveraged financings based on overly optimistic traffic forecasts, such as the 2006 deal for the Indiana Toll Road, have given the market a bad reputation. And the problem is nothing new. When the Dulles Greenway opened in 1995, traffic almost immediately fell short of projected levels leading to a reduction in tolls. That project was then restructured in 1999, before being sold on to Macquarie in 2005.

Cherian George says: "The problem with toll roads hasn't changed. The issue is the ability to forecast traffic. It's gotten a little better but it hasn't changed enough to make a significant difference. When you're off by 80% or 60%, it doesn't matter how you structured the deal, it's going to collapse. What is different is that assumptions and deal structures are more conservative for demand-based transactions and that provides a runway of stability despite underperformance."

The federal system adds to complexity in the US, with each state and city hall having its own ideas of how to invest in infrastructure, and differing levels of understanding of the complexities involved.

But even when governments do embrace private investment, it is not always done for the right reasons, or properly justified to the public. Many at the roundtable highlighted the illogical reasoning of turning to private investment when the general public expresses opposition to government funds being spent on infrastructure.

"The fundamental problem is leadership", according to George,



Cherian George, Fitch Ratings

"because you've got elected officials who are disingenuous and basically say, 'You don't have to pay, ...or there is another way to do it, we'll make government more efficient and you won't really have to pay, or the money from Australia and Spain will come and solve your problem.'"

Other panellists said undertaking PPPs in the US is more difficult than in many emerging markets, and in some ways difficulties are increasing.

The echo chamber of social media and 24-hour news makes managing reputational risk that bit more difficult, and the speed of technological advancement further complicates the structuring of concession agreements which run for decades.

Laurie Mahon says: "By the time an RFP gets released for a new transit line, the technology that the governmental engineers have written into it has already been superseded two generations--not just one but two. It is impossible to do things the way we are doing them with the pace of change the way it is."

As if to emphasise this point, Elon Musk announced in November 2017 that his Boring Company would be bidding a hyperloop solution for the transit link between O'Hare airport and downtown Chicago. The first commercial example of hyperloop may be some way off, but when it arrives it will be a step into the unknown.

## Intermittent power

With US P3s still as rare as ever, the bulk

of stateside project financing concerns energy assets, and the power market in particular has long provided ample opportunities for investment.

The US power market has been an attractive place to do business over the last two decades, but it was the worst of times which shaped the transactions of today.

"1999 through 2002 when we had all the merchant bankruptcies, that was the defining moment in the industry in my career", said Richard Randall.

Deregulation legislation passed by the California Legislature in 1996 had the unintended consequence of allowing power producers to push up wholesale market prices through market manipulation. The subsequent Western US energy crisis saw a shortage of electricity supply, the bankruptcy of Pacific Gas and Electric Company and near bankruptcy of Southern California Edison.

Then in 2001 one of the biggest culprits of the crisis, energy trader Enron, itself collapsed after its complex weave of financial misreporting suddenly unravelled. Due to its central role in power trading, Enron's failure then put pressure on various power generators, leading to a fire-sale of assets.

Eric Silverman comments: "It was almost unthinkable that the most creditworthy corporations would not be able to fund their short-term working capital needs without government intervention. That was something that only happened in third world countries, where the capital market seized up and nobody would buy the commercial paper, but we had that right here. That was a complete shock."

Like most failures, the merchant power crisis was instructive and ultimately beneficial for the industry.

"I think the industry's recovery from that is the reason that it sailed through the financial crisis without really missing a beat", said Richard Randall, "and I think it's a remarkable point of this industry that it did do that, we got through the financial crisis without any material increase in default rates or losses."



Now the power market faces new challenges. The emergence of utility scale renewables at virtual grid parity is transforming power markets not just in the US, but right across the Americas. Renewables found their feet through heavy subsidisation over the last decade, but can now compete with coal- and gas-fired generation in markets across the world.

Chile regularly attracts bids of around \$0.03 per kWh in its solar power tenders, making it one of the cheapest countries in the world for renewables. It is not a strange outlier in the region, just at the front of a surge of ever reducing green power prices.

The current US administration seems keen to try to turn that tide, planning subsidies to support coal-fired and nuclear power plants threatened with becoming stranded assets. The likely success of this strategy though is questionable.

"No matter what Trump says, it's hard to see anyone putting a dime into a coal-fired power plant in this country again", according to Richard Randall.

Government attempts to distort the market are nothing new though, as John Anderson explained: "Many of us got into this business in the 80s when qualified facilities were favoured with the right to sell to a utility under long-term power contracts so that more high efficiency gas-fired power plants would be built."

And though Trump's intervention may not save the domestic coal industry, the problems of intermittency mean we are still some way off an entirely renewables future.

Kerri Fox pointed to the rise of renewables being matched by demand for new gas-fired generation: "In 2010 there was a string of 10-year gas-fired power projects done in California. Why were those necessary? They were necessary because of all the renewable additions and resulting intermittency risk."

Eric Silverman warned: "There is an increasing politicisation of energy development activity, core development, and the notion that there is nothing wrong with just leaving hydrocarbons in



Laurie Mahon, CIBC Capital Markets

the ground, just leave them in the ground and we can all make do with solar panels and Tesla electric vehicles for the next 50 years... for somebody who's been looking at this for 35 years, to see this taking hold here on our soil right now is a bit alarming."

### LNG boom or bust?

The improvement in shale gas extraction technology has been one of the most disruptive impacts on the US economy over the last 20 years. The first economical fracture in Barnett Shale may have occurred in 1998, but it was another 10 years or so until the seismic impact of domestic shale gas extraction was being felt.

In 2005 annual shale gas production in the US totalled 1.97 trillion cubic feet (Tcf), according to a report last year from the US Energy Information Administration (EIA), with virtually no increase over the preceding 15 years. By 2010 this had shot up by 6.16 Tcf, and five years later this had more than doubled again to 13.64 Tcf. By 2040 the EIA expects domestic production to have reached 29 Tcf.

The moribund US LNG market was completely upended, with terminals such as Freeport reconfigured to export rather than import gas to cash in on the domestic glut. These projects required billions of dollars of investment, sparking activity for the project finance market.

Development has slowed in recent

years however, as low oil and gas prices and abundance of supply have made previously planned projects uneconomical. At the end of 2014 there were almost 40 liquefaction projects proposed in the US, but only a handful have been financed so far.

Kerri Fox said: "It's cyclical like many industries, but the swings are bigger. There is overbuild, and then there is a large supply-demand imbalance where nobody builds, and then there is a supply gap again."

The US is not the only country to have been building its LNG export capabilities. Developers in Australia are grappling with huge cost overruns at numerous terminals under construction, while Qatar has also long been a major exporter. Confidence that future demand will meet this supply is based on a divergence of buyers. It is no longer enough to secure long-term sales contracts with Japanese or Korean corporates.

Eric Silverman said: "There is an acute anxiety right now at how much of a glut there is of LNG... [particularly for] the period of 2020-25... when you look at the relative credit quality of the companies that have signed some of these long-term offtakes, I'm not even sure that we've really absorbed all the potential event risk that's on the table."

Event risk is also a concern for Duncan Caird. He sees the transformation of fortunes for previously struggling import terminals over the last decade should act as warning to today's investors. Once the shale gas revolution began, prices started moving rapidly.

"I do think equity and potentially debt is going to be along for an interesting ride as suddenly something happens", Caird said.

### On the horizon

In conclusion, panellists want more leadership from government, still see problems with P3, are worried about the politicisation of power, and are wary of the next big disruptive event in the oil & gas market.

But there was also plenty of



## Influential people in infra

Richard Randall: “Blair Thomas who founded EIG, was at TCW for a long time, he kind of inspired me to keep watching the market where the opportunity would arise for institutional investors to take part in this market, and because of their long-term liabilities, they inherently had to be a better natural holder of this capital. It’s taken a long time to develop, and he was at the forefront of that, he started his efforts in the mid-90s at TCW, spun that out into EIG, and is probably I think one of the more successful managers of pension fund institutional money into the infrastructure market.”

John Anderson: “Dick Grant at the Chase Manhattan Bank, he was my leader in deals in Latin America and the US and in Europe, and he had one

or two axioms I remember. One was: ‘things don’t happen, things are made to happen,’ and the other was: ‘all human progress can be traced back to the actions of one unreasonable person.’ That just captures the great tenacity that we have in the project finance community. I use Dick as an example that’s front of mind for me, and represents so many people I’ve met with that behaviour of intellectual rigour, sweating the details, sticking with it, taking initiative, being creative, first of their kind type financings.”

Laurie Mahon: “Adebayo Ogunlesi was the first mainstream banker I ever knew who took infrastructure out of municipal finance on Wall Street and put it in project finance. He went on to mainstream infrastructure and energy

and project finance into investment banking, and then created GIP, which has been phenomenally successful. So, I see Bayo as an icon of this business. Especially as he is a man of colour. It’s interesting to me and perhaps not coincidental that the infrastructure finance world is more inclusive than your typical investment banking team.”

Kerri Fox: “Jay Worenklein, because he’s somebody in the industry that I have watched go from lawyer to banker to developer to lawyer to developer... He has demonstrated that you can be a project finance specialist, you do not necessarily have to be just a banker or a lawyer or a developer, that there is a project finance speciality. That has meant a lot to me in my career. He has been a great mentor.”

optimism expressed by our group. Many see burgeoning opportunities in the renewable power and storage sector, with energy sharing through electric vehicles and more off-grid distribution touted as potential trends.

Asked about the market in 2037, Kerri Fox said: “I think we will have financed a big wave of energy storage projects, biofuel projects, maybe automated transportation projects... I think there will be a lot of expansion beyond what is now considered kind of classic, if you will, renewable sectors for project finance.”

Others see the role of project financiers transformed in future decades. Laurie Mahon suggested that emerging technologies could move the market away from financing assets and towards financing services instead, with one of the biggest revolutions set for the transport industry.

“I once had a professor at MIT who said: ‘Transportation is the most primitive form of communication,’ and so I think in 20 years we will have converted much of what we now need



Eric Silverman, Milbank, Tweed, Hadley & McCloy

transportation for into communication”, Mahon says. “We will then have to completely revamp how we think about transportation assets, because if you don’t have journey to work trips, there is not a transportation planner in the world who would know how to plan a transportation system, because everything is about journey to work or moving freight... I think we’ll see that convergence of transportation going away in favour of communication, and then that changing land use.”

Most at the roundtable said leading companies in the industry are well capable of attracting the talent needed to face these new challenges. As one remarked, it takes a certain kind of individual entering the world of finance to choose a life of low frequency but highly complex transactions. But once young professionals get a taste for project finance, they tend to get hooked.

As Eric Silverman said: “There is something about this space that has a magnetic pull, I think because at some basic level you can feel like you’re doing something positive about something, and in a world where there is always another terror attack or natural disaster headline, I find myself coming into the office and feeling better, because something that’s on my desk or people who I’m interacting with are actually trying to solve a problem or build something that’s going to be more sustainable, efficient or expand the grid or do something great in solar or whatever. I think in energy/ infrastructure development there is a focus on doing the right thing, trying to do things to make the world better.” ■



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# Eclectic electric

Ian Dixon, head of EMEA and APAC, infrastructure and project finance, Fitch Ratings, reviews the recent decades of and future for the power sector.

I am reluctant to admit it but I've been around the Infrastructure market for nearly 10 years longer than *IJ*! Certainly during this time I've seen the market evolve and grow to what it is today. My career path has enabled me to lend money, provide equity, guarantee long term bonds, advise, structure bonds and now rate bonds. I have been actively involved in deals across the Infrastructure sector, in mining, oil and gas, pipelines, power, entertainment, transportation, PPP and renewables around the globe. But the sector which currently sticks out to me for as the most fascinating is power and renewables.

At Fitch Ratings we have recently published our 10 Years Power and Renewables Report – A Phenomenal Growth in Renewables. The report looks at the last 10 years and the next 10 years and highlights why this sector is the one to watch in the future.

Power and renewables is a global business, but continues to operate through localised markets. This is due to a wide range of factors impacting the energy mix, such as the availability of natural resources locally, the presence of gas/oil pipelines, electricity transmission lines or interconnectors, and political factors. Every power or renewables project has unique aspects arising from its location – it's not easy to replicate deals around the globe.

## In the beginning

Before project finance techniques were developed, most power plant development was largely funded by government or state-owned entities. Alongside more traditional forms of power, such as coal-fired generation, some of these projects were for nuclear or hydro power facilities (in the US). All of these types of generating

asset were 'base load'.

If we go back to the late 80's and early 90's there started to be project financed thermal coal and gas power plants either side of the pond which were a success. However, there were failures as well, where merchant risk deals suffered during low prices and subsidies in the US were challenged. So have lessons been learnt?

A key event for electricity markets occurred in the UK in 1990 when Margaret Thatcher's government privatised the

**“In Europe, coal-fired generation has declined by 19% since 2007 and gas-fired generation by 10%, with new capacity mostly provided by renewables”**

electricity supply industry. This process was then used as a model or at least a catalyst for deregulation in several other countries. By the mid 90's the market had evolved and international developers (such as National Power and Enron) had started to enter overseas markets such as Portugal, India and China, which shone a light on the challenges of developing large projects on the international stage. More lessons were learnt by developers and bankers on these deals.

At the beginning of this century (when *IJ* was still in shorts!), was the next big development – the early days of renewables. The first projects in the wind

sector were funded but some risks were not recognised. The technology used was not fully developed so the performance of turbines were not in line with the base case due to lack of wind, foundation issues, drive shaft shatters, turbine not performing etc. As ever, it is the early pioneers in a new sector that will always be taking additional risks (and hopefully the returns).

## Renewables revolution

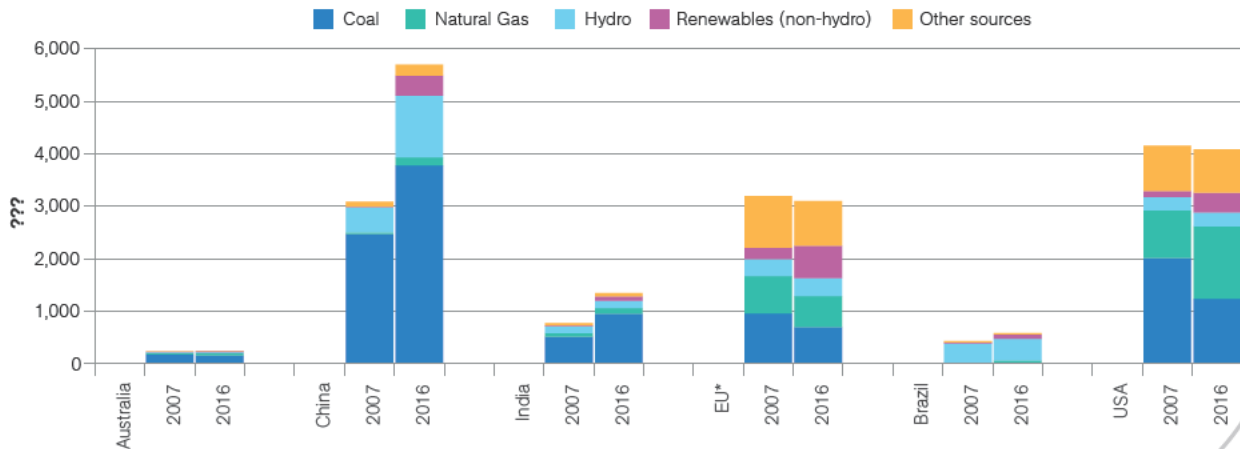
Global power generation from renewable sources has almost quadrupled in the last 10 years, while global installed renewable capacity has grown over 6x times to 770GW by the end of 2016. This growth would not have happened without government subsidies and other incentives, which have helped create an active industry, albeit with many regional differences.

Renewables are growing in developed and developing markets. Government incentives led to the development of renewables and it is not expected that the current US administration's rejection of the Paris Accord will affect the sector's growth; a global industry has now been created that will self-sustain growth. Given the significant decline in the cost of installing solar and wind power over the last decade renewables are now starting to achieve grid price parity, pricing out traditional power and making incentives in some countries and regions redundant.

Self-generation is growing in this market, predominantly through the use of solar PV in the residential sector. Local, decentralised, distribution systems are being set up, lessening the reliance on both transmission grids and centralised utilities. Generally, this is occurring faster in sparsely populated areas, or in developing markets lacking transmission networks.



**Power Generation by Fuel Type in Selected Regions, TWh**



Source: BMI <https://bmo.bmiresearch.com/> – A Fitch Group Company

There are different trends in developed and developing markets for supplying electricity. In developed markets a number of coal-fired plants have been decommissioned and some gas-fired plants are now only used for peaking power. In Europe, coal-fired generation has declined by 19% since 2007 and gas-fired generation by 10%, with new capacity mostly provided by renewables. In contrast, in developing markets power generation using coal and gas is rising to satisfy growing demand, with renewable generation contributing, albeit in varying degrees depending on the market. For

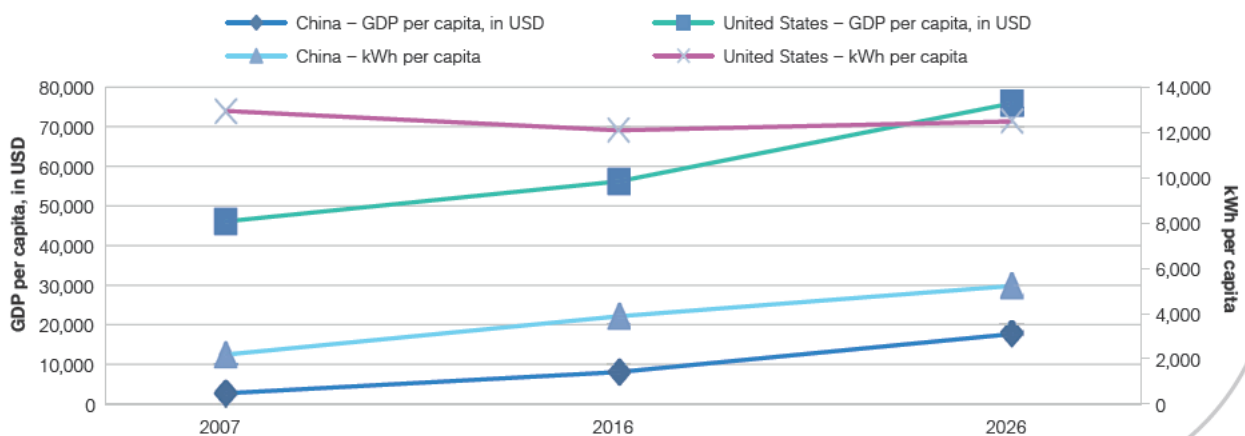
example, between 2007 and 2016 China and India increased power generation using coal by 53% and 83% respectively.

## Dampened demand

Interestingly demand for power in developed markets is not growing, despite population and GDP growth, due to greater energy efficiencies and climate change awareness. Demand for power is increasing in developing markets, but power use per capita remains well below that in developed markets. Power demand in developing markets has undergone an unprecedented increase, due to their playing catch up

with more established regimes, and global economic growth in general. China's per capita electricity consumption has increased from 2,178 kWh in 2007 to 3,868 kWh in 2016 (a 78% increase) and it is projected to grow to 6,000 kWh by 2026. This is still 50% of the 12,000 kWh per capita projected in the US by 2026 (which is not growing). While developing markets will continue to increase their energy use over the next 10 years the demand trend in developed markets is likely to be flat. Smart meters are gradually being rolled out in developed markets, allowing for better real-time demand and price signalling; the

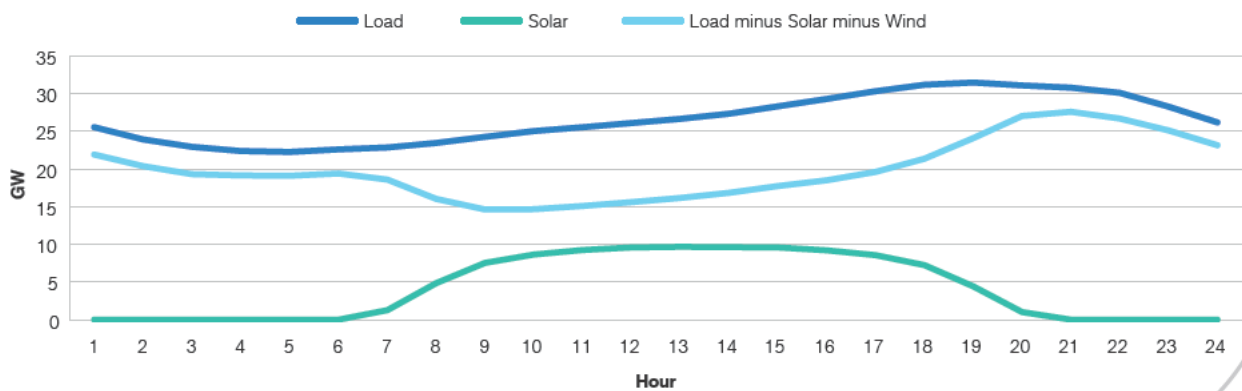
**Power Consumption Per Capita and GDP Per Capita**



Source: BMI <https://bmo.bmiresearch.com/> – A Fitch Group Company



California's "Duck Curve": Hourly Electric Load vs Load Less Solar/Wind – 1 July 2017



Source: California ISO; capacity ([http://content.caiso.com/green/renewrpt/20170701\\_DailyRenewablesWatch.txt](http://content.caiso.com/green/renewrpt/20170701_DailyRenewablesWatch.txt)), load ([www.caiso.com/documents/historicalEMSHourlyLoad-July2017.xlsx](http://www.caiso.com/documents/historicalEMSHourlyLoad-July2017.xlsx))

digital integration of consumer devices and appliances within households is likely to accelerate this process. Electric vehicles undoubtedly will add to power demand, but the extent to which this will affect national grids will depend on the technologies and charging modes used.

Renewable installations can create problems for the grid and incumbent utility operators and may result in intra-day variability in energy supply. In particular, in locations with significant amounts of solar capacity, solar-generated electricity displaces traditional plants during the daylight hours. But as solar generation declines very quickly in the evening, a significant ramp-up of base-load (mostly gas) capacity is required to meet peak demand. This pattern produces the net load profile observed in California, which famously is known as the “duck curve”; it can have a significant impact on wholesale power pricing and can, in extreme cases, lead to periods of negative pricing.

### Future trends

The ongoing deployment of renewables coupled with more efficient storage systems is expected to lead to lower market wholesale prices, given reductions in their capital and operational costs and, at least for wind/solar resources, the absence of fuel costs. Periods of negative power pricing, which have been observed in some markets, may become more frequent and prolonged.

This may be exacerbated by the presence of older renewable installations, the capital costs of which have now been fully amortised and which will benefit from very low marginal costs of production. Lower wholesale electricity prices may force the closure of the highest cost producers. Wholesale power prices will become increasingly volatile in many markets impacting merchant power transactions.

Renewables will not be the only power projects being developed – countries with domestic coal resources are likely to continue to make use of them, with the likes of India and China remaining heavily reliant on coal-fired generation, amid an increasing share of renewables. Additionally, the LNG market is oversupplied and is likely to remain so until the early 2020s. There are many projects under construction globally, presenting opportunities for gas-fired generation in markets with imported LNG; this is subject to the development of a suitable supporting import infrastructure. Over the last 10 years the shale boom has showed that the unexpected can happen, as the extraction of natural gas in US shale formations was deemed uneconomic prior to 2007. The advances in technology reversed this, with shale gas discovery making a profound impact on the gas and power markets in the US within a relatively short time-frame of about five years. Similar

technological advances or reduction in capital costs for energy technologies cannot be ruled out.

In this sector there are many ‘known unknowns’ and more game-changing events could occur, such as the 2011 Fukushima disaster, which triggered a global reassessment of nuclear power, or the discovery of shale gas in the US. Such events could be related to geopolitical factors, technology, or significant climate change events. The changes driven by these events may be sudden and disruptive.

So what will project financiers be funding in this sector going forward? This sector has seen many deals over the years but I see it being another 10 busy years ahead including:- more renewables projects in general, storage projects, electric vehicle charging networks, M&A deals for consolidating renewable projects, new transmission lines and, as ever, a few restructurings.

The future of power and renewables is uncertain given the pace of change from different technologies, the reaction of governments and regulators together with the capital investment that will be needed. It is a sector to watch and, as in the past, it is rather unpredictable how the next 10 years will unfold. But I strongly suspect there will be “some tears before bedtime”! ■

Data Sourced from BMI <https://bmo.bmiresearch.com/> - A Fitch Group Company



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# A look back to the future for the secrets of success

*IJGlobal* has rated Arup as the top technical adviser for project finance over the past 20 years. Craig Forrest, Arup's global director of business and investor advisory, sets out what they have learnt over the past two decades and how it has laid the foundations for the next 20 years.

Arup has always taken a 'total design' approach to everything we do, including vital infrastructure. This led it to recruit its first economist in 1979, a revolutionary approach to take for what was predominantly an engineering design firm. This forward-thinking view, in a time of great cultural and economic change and uncertainty, helped to challenge conventional wisdom on how to build a seminal infrastructure project. The fact that we maintain this challenging and forward-thinking approach, whatever the trends or weather, is why clients continue to work with us on the many new opportunities emerging in a market that is once again undergoing rapid change.

Today Arup is regulated by the Financial Conduct Authority (FCA), with its own corporate finance business and a range of specialist economists working with engineers and other professionals with deep sector knowledge. This is now common practice for engineering firms, but back in 1979 economics was a radical departure from the conventional approach to design in the built environment. Arup used its growing breadth of expertise to pioneer the private financing of major infrastructure projects – starting with one of the biggest the UK had ever seen: the High Speed 1 (HS1) railway line.

## Pioneering private finance

HS1 was Arup's first opportunity to demonstrate the power of bringing technical and financial advisory expertise together for a large-scale infrastructure

project. This collaboration of in-house economists and infrastructure experts meant we could be bold in proposing connecting the Channel Tunnel to London via a station at Stratford, East London. Although not initially the preferred route, our convincing, collective approach meant it was given the greenlight, and travelling from King's Cross to Paris in under two hours is now commonplace.

Arup's advice and involvement didn't end at the route signoff. We were a founding member of London and Continental Railways, the firm that was awarded the concession to build and operate the Channel Tunnel Rail Link. Arup formed Rail Link Engineering (RLE) together with its consortium partners to design and project manage the 109km high-speed railway. By effectively taking sweat equity in the project, we were doing something that was then very unusual for a consulting firm.

The rise of private finance in government procured infrastructure over the last two decades, as chronicled by *IJGlobal*, highlights how the sector has evolved and how Arup was at the nexus of this with the funding, strategy, development and operation of HS1 in the early days.

Over the last 20 years, governments and investors began to require designers and advisers to be aligned on objectives and work together to develop creative solutions that unlock the wider benefits of infrastructure in the built environment. The route Arup proposed for HS1 went on to facilitate multibillion-pound regeneration

along the route and demonstrated how the role of the engineer was required to change at the dawn of this new infrastructure sector. It was this proactive, partnership approach advising Government and foundation of infrastructure understanding that underpinned the success of HS1, and from here we have continued to have a close relationship with Government and investors.

## Applying expertise globally

Getting this head start in public-private finance paid off for our clients and enabled Arup to become a trusted advisor on projects of which we remain incredibly proud. We applied our early experience to pioneering projects around the world – including the first major public-private infrastructure project in the US, the Presidio Parkway in San Francisco. The design used road tunnels and parkland to replace the ageing and under-capacity Doyle Drive as the gateway to the Golden Gate Bridge.

The client drew on the skills of our financial and technical specialists during procurement of the project's second phase. Our analysis showed that a design-build-finance-operate-maintain approach would give the best value for money. This became the basis upon which public approvals were granted to pursue a public-private partnership (P3) deal.

The P3 has delivered the construction project on time and at a lower cost than conventional procurement methods and ensured the long-term operations and maintenance contract mean the roadway is as safe as possible



for the next thirty years. Presido Parkway was a pathfinder project that has helped shape how the public and private sector work together to deliver social benefit in infrastructure in North America.

## Finding new solutions

We're all too aware that not all public-private partnership, or Private Finance Initiative (PFI), deals over the years have enjoyed this sort of success. In fact, the model itself is under threat, creating a challenge for nations, cities and regions that need to work with the private sector to invest in the future and the investors keen to support essential infrastructure. This is why we're investing our own money in research to better enhance the equitable benefits of private finance in public projects and by applying different models from across the sectors in which we work. We are able to invest in market-leading research and solutions because our firm has always been and is independent – owned in trust on behalf of our employees, who all share our commitment to shaping a better world.

As well as insight through research, we've gained invaluable experience over years in client work – through the growth in public-private financing of infrastructure, the wave of privatisation that has swept across markets such as Europe, and the mergers and acquisitions that followed. We have been the trusted advisor on utility acquisitions and disposals in Scandinavia, France, Germany, Spain, Italy and Poland. This is just a few of the countries where our local capability and global expertise combined to provide business advice in complex organisations, as funds grew to invest in regulated economic infrastructure. The growth of this asset class requires a unique combination of advisory and engineering skills to maximise value for customer needs, and our DNA of blending financial and technical capability enables Arup to support this thriving sector.

With public finances around the world under increasing pressure and governments seeking new sources

of infrastructure investment, we've applied our expertise in privatisation to help clients tap into global markets. This year saw us advise a consortium when it acquired a controlling stake in one of Australia's biggest public energy companies, Endeavour Energy, in a deal that will deliver a A\$7.6 billion windfall to the New South Wales government.

**“Presido Parkway was a pathfinder project that has helped shape how the public and private sector work together to deliver social benefit in infrastructure in North America.”**

We understand that wherever the opportunities are, our clients expect the same way of working – a global approach to investment informed by the local knowledge of our offices in the region. The trust we've developed is the bedrock of our approach to advising on investment in renewables, such as the Equis deal that closed in October this year.

## Powering renewables growth

Strong advice has also helped create the right conditions for renewables to flourish. We have placed high priority on being at the forefront of renewables, working with governments to bring these insights to clients. A decade ago we advised the UK government on Renewables Obligation (RO) banding – producing the levelised costing forecast for onshore and offshore wind, biomass solar and other renewables. We were able to show how, over time, the development of supply chains and advances in technology would reduce the levelised cost and make these technologies attractive for both government and investors.

With the RO scheme in place, the UK has gone on to become one of the most successful markets in the world for offshore wind. And we've taken our experience from here and applied it to renewables investment deals in markets such as Australia, South Africa and the US. When Dong Energy required new capital, we advised of the recapitalisation of the business. Dong used this investment to move into new sectors and transform the business into a low carbon investment vehicle.

The experience built-up in the earliest development of new green technologies is again applied globally to support developing markets. This year has seen landmark investments into renewables across Asia with the acquisition of Equis, a pan-Asian renewable developer and operator, and EDC the world's largest geothermal operator. Because we understand the scale and complexity we can overcome possible barriers to investment that would constrain the sector. Navigating the complex commercial, regulatory and technical issues with our clients helps further support the development of the sector in emerging markets.

Our ability to apply independent research, multidisciplinary teams and deep industry experience means that where others see challenges in renewable investment opportunities, we see opportunities. For example, Australia's growth in renewables has led to problems with intermittency of electricity supply and blackouts. We've invested money with the Australian Renewables Energy Agency (ARENA) to research the feasibility of developing freshwater hydro schemes to supply energy when renewables wind and solar projects aren't generating. We know that by investing our own money in exploring these innovative solutions, we can open up new possibilities for investors – and be the firm best placed to advise those investors.

Over the last ten years the development of renewables as an attractive investment sector has faced technological and regulatory challenges that at times



can negatively impact on confidence. Our approach to working with governments to develop policies for emerging sectors and addressing technical solutions that the sector faces, creates a blend of skills investors need to unlock the potential of low carbon solutions.

## Looking to the future

Transitioning to renewable energy is just one of the challenges facing governments and cities around the world as they seek to become more resilient to potential shocks and stresses. Through its work with the C40 group of 120 leading cities and organisations such as the Rockefeller Foundation, Arup is helping city leaders understand how they can respond to trends such as climate change, urbanisation and ageing populations.

Often, this means examining new ways of getting investment into new technologies – whether that's high-speed broadband or networks of streetlamps that also provide Wi-Fi. Against this backdrop, traditional notions of infrastructure are changing and clients are seeking our advice on deals involving everything from media to shipping. The definition of infrastructure continues to expand and Arup continues to develop the skills to meet the challenges of the sector.

Hindsight means that the past always looks more certain than it was in reality and the future always more uncertain. The future is no less certain in 2018 than it was in 1979. Our experience tells us that with deep, broad knowledge, good quality research, trusted relationships and a proactive, forward-looking approach we will continue identifying powerful infrastructure investments for decades to come.

## Where will the next big infrastructure investment opportunity come from?

This is a question we're looking hard at across our advisory work – through initiatives such as our project with the UK government to understand the role of the country's gas network in a low-carbon

future. Exploring whether the network will still be needed if technology such as heat pumps replaces thermal generation or if it adapts to hydrogen, is helping to map out the landscape for the next generation of infrastructure deals.

Many of these deals will come in emerging markets because infrastructure investment has a vital role to play in the developing world. In Africa, we're working with developers to provide the technical and economic capabilities they need to bring investment into assets such as renewables and ports – infrastructure that delivers benefits to society and boosts GDP. The lack of capability to structure and develop opportunities can be a significant barrier and again Arup invests its own time and money to enable these opportunities to enhance lives through infrastructure.

In emerging markets, the challenge is not just bringing in investment but doing so in the right way. As an independent firm that follows strict ethical guidelines, we work with clients who have strong governance and share our ambitions for shaping a better world. We have no shareholders to please, and no personal bonuses riding on completing deals no matter what. This leaves us free to focus on ensuring investments deliver the widest possible benefits.

## Managing assets

Of course, infrastructure advice isn't just about closing a deal – it also embraces what happens afterwards. Through successive investments, funds have become global infrastructure operators with large portfolios of assets. They require strong management systems and governance to maximise the return on their investments in the long term, so we have increasingly been involved in helping investors get the best from their people, projects assets and investments. This involves looking at management structure to ensure a resilient and efficient investment for the long-term. Over the past twenty years, in response to challenges faced by our clients in areas like water, rail, aviation, energy, city planning and property,

Arup has been steadily investing in the skills and expertise to provide a unique approach to management consultancy. As with our investment advice, we draw on a deep technical knowledge of these industries practical understanding of our clients and the work they deliver. This approach enables us to help clients with a range of challenges from creating a high-performing structure and leadership, managing assets and ensuring their organisation and service is resilient against future shocks.

Our investors are asking how do we make sure that we are best in class? How do we ensure that we are improving efficiency and increasing shareholder value? And how do we minimise the reputational risk associated with factors such as environmental performance? Today, Arup has the multidisciplinary teams to help to answer these complex management questions to enhance value at every level of a project their investment is driving.

## Turning digital disruption into opportunities

There is a key tool that will enable us as advisers to find even better answers to these questions: data analytics and digital technology. Sensors and other smart technology already enable us to provide a host of metrics about different assets – from the way traffic uses a toll bridge to how a sewer system copes with stormwater. We are working on ways to use this asset performance data to take faster, more effective decisions about managing investment portfolios.

We are preparing for the future which will be a digital world, where disruption can create new opportunities for investing in infrastructure – a deeper understanding of the technical and economic aspects of those deals will increase the likelihood of success for everyone involved. At Arup we believe that by continuing to shape more effective infrastructure investment across our key markets of energy, transport, water and cities, we can help our clients to shape a better world. ■



**DATA ANALYSIS:** We reveal the companies which have successfully absorbed the shocks of the last 20 years to be the best-of-the-best over the period. By Jon Whiteaker.

## Ultimate bragging rights

All of the deals have been counted, the commitments considered, and the results are in. Over the next few pages we reveal the top MLAs, legal advisers, bond arrangers, tech advisers and DFIs based on 20 years of market activity.

Many firms have kept their lofty positions throughout the period: if you were a leading project finance law firm or tech adviser in 1997, it is likely that you are still one today.

The MLA tables have however seen more volatility. Some may be surprised by BNP Paribas at the top of the tree, but the bank has been rewarded for its consistency. Many of the other leading banks over the first 10 years have dropped away sharply or disappeared entirely (WestLB), while the dominance of the Japanese banks is very much a modern phenomenon.

The dominance of JBIC has a longer history, though the China Development Bank has been making up ground in recent years. It is also noteworthy that eight of the top 20 DFI lenders are based in Asia.

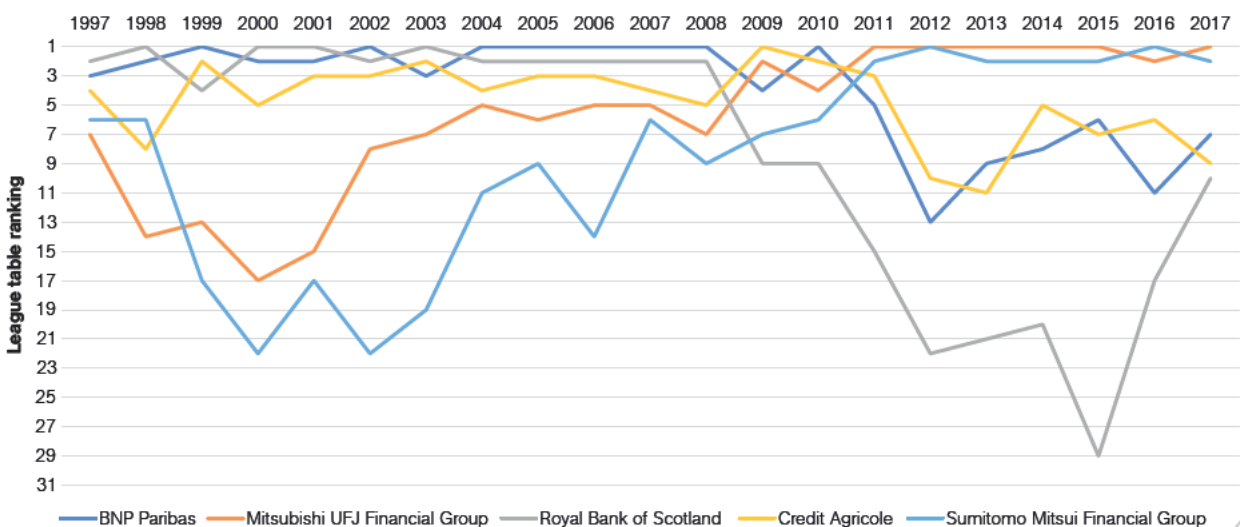
All of the rankings are based on the combined data sets of *IJGlobal* and its predecessor titles *Project Finance* magazine and *Infrastructure Journal*. The data only covers project finance transactions that reached financial close over the period.

If you have ranked highly congratulations, if not don't worry. There is always the next 20 years.

### GLOBAL MLA LEAGUE TABLE 1997-2017

Rank	Company	Sum of Split deal value plus inflation (\$m)
1	BNP Paribas	169,618
2	Mitsubishi UFJ Financial Group	139,658
3	Royal Bank of Scotland	135,643
4	Credit Agricole	127,187
5	Sumitomo Mitsui Financial Group	120,111
6	Mizuho Financial Group	103,151
7	Societe Generale	94,813
8	ING Group	88,946
9	Citigroup	72,377
10	WestLB	67,925
11	Banco Santander	67,437
12	HSBC	60,241
13	Barclays	58,657
14	BBVA	55,732
15	Commerzbank	54,008
16	Australia and New Zealand Banking Group	50,050
17	Intesa Sanpaolo	47,497
18	JPMorgan	47,359
19	Deutsche Bank	46,289
20	BayernLB	46,150

Yearly league table ranking of top five MLAs



Source: IJGlobal



## GLOBAL MLA LEAGUE TABLE FIRST 10 YEARS – 1997-2006

Rank	Company	Sum of Split deal value plus inflation (\$m)
1	BNP Paribas	99,423
2	Royal Bank of Scotland	95,109
3	Credit Agricole	69,693
4	Mizuho Financial Group	51,919
5	Citigroup	49,032
6	WestLB	48,408
7	Societe Generale	46,729
8	Commerzbank	46,505
9	Mitsubishi UFJ Financial Group	43,570
10	ING Group	43,062
11	Barclays	37,788
12	JPMorgan	37,395
13	Sumitomo Mitsui Financial Group	33,608
14	Intesa Sanpaolo	30,420
15	BayernLB	29,974
16	Bank of America	29,536
17	Bayerische Hypo- und Vereinsbank – HVB Group	29,348
18	KBC Group	25,028
19	Credit Suisse	24,090
20	Banco Santander	23,176

## GLOBAL MLA LEAGUE TABLE SECOND 10 YEARS – 2007-2017

Rank	Company	Sum of Split deal value plus inflation (\$m)
1	Mitsubishi UFJ Financial Group	96,088
2	Sumitomo Mitsui Financial Group	86,503
3	BNP Paribas	70,195
4	Credit Agricole	57,494
5	Mizuho Financial Group	51,232
6	Societe Generale	48,084
7	ING Group	45,884
8	Banco Santander	44,261
9	HSBC	41,162
10	Royal Bank of Scotland	40,534
11	BBVA	36,121
12	Groupe Banque Populaire	29,739
13	Commonwealth Bank of Australia	28,539
14	National Australia Bank	27,630
15	Australia and New Zealand Banking Group	26,967
16	Unicredit	25,463
17	Standard Chartered Bank	24,819
18	Deutsche Bank	24,798
19	Citigroup	23,345
20	Barclays	20,868

## The top MLAs by market share, 1997-2017





## LEGAL ADVISERS LT (1997-2017)

Rank	Company	Market Share (%) by Value
1	Allen & Overy	7.67
2	Clifford Chance	7.06
3	Latham & Watkins	4.69
4	Linklaters	4.61
5	White & Case	4.45
6	Milbank Tweed Hadley & McCloy	3.65
7	Norton Rose Fulbright	2.93
8	Herbert Smith Freehills	2.91
9	Shearman & Sterling	2.74
10	Baker & McKenzie	2.25
11	Allens	2.25
12	Ashurst	2.1
13	Vinson & Elkins	2.03
14	Freshfields Bruckhaus Deringer	1.84
15	Chadbourne & Parke (Pre-Merger)	1.59
16	Sullivan & Cromwell	1.41
17	Skadden Arps Slate Meagher & Flom	1.4
18	Hogan Lovells	1.24
19	King & Wood Mallesons	1.16
20	DLA Piper	1.11

## BOND ARRANGERS LT (1997-2017)

Rank	Company	Market Share (%) by Value
1	JPMorgan	7.45
2	Royal Bank of Canada	6.97
3	Citigroup	6.89
4	Bank of America	5.09
5	Goldman Sachs	4.74
6	Barclays	4.71
7	HSBC	4.23
8	Deutsche Bank	4.05
9	Credit Suisse	3.94
10	BNP Paribas	3.34
11	Mitsubishi UFJ Financial Group	2.93
12	Credit Agricole Group	2.6
13	Santander	2.45
14	Morgan Stanley	2.38
15	Royal Bank of Scotland	2.2
16	Societe Generale	1.89
17	Scotiabank	1.85
18	Wells Fargo	1.82
19	UBS	1.51
20	BBVA	1.48

## TECH ADVISERS LT (1997-2017)

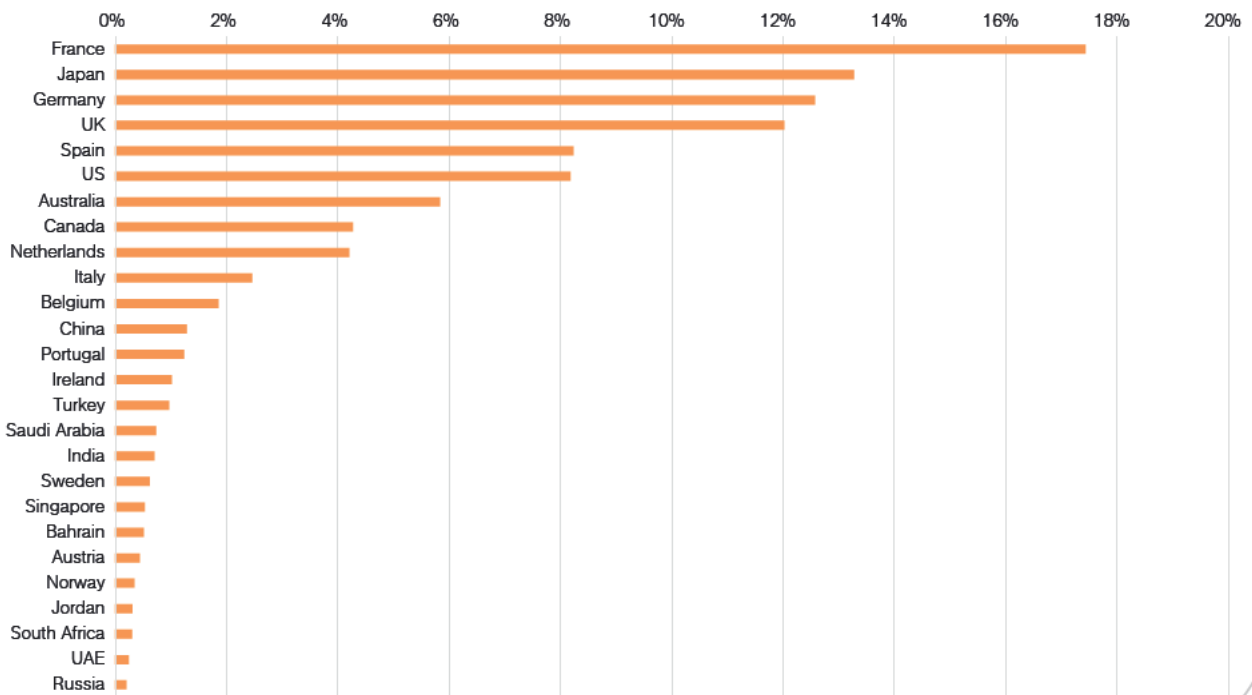
Rank	Company	Market Share (%) by Value
1	Arup	13.18
2	Mott MacDonald	11.25
3	SNC-Lavalin Group	4.55
4	Jacobs	2.56
5	Poten & Partners	2.32
6	Nexant	2.27
7	Stone & Webster	1.95
8	SgurrEnergy	1.89
9	Fichtner	1.88
10	AECOM	1.8
11	Halcrow Barry	1.76
12	CH2M Hill	1.71
13	Lummus Consultants International	1.65
14	Garrad Hassan	1.63
15	Steer Davies Gleave	1.43
16	IHS	1.34
17	WSP Group	1.17
18	URS/Scott Wilson	1.15
19	LeighFisher	1.1
20	BTY Group	1.01

## GLOBAL DFI LEAGUE TABLE – 1997-2017

Rank	Company	Sum of Split deal value plus inflation (\$m)
1	Japan Bank for International Cooperation	68,576
2	European Investment Bank	47,051
3	KfW	39,534
4	China Development Bank	34,338
5	Export Import Bank of the United States	23,176
6	International Finance Corporation	21,820
7	Export Development Canada	20,382
8	Industrial and Commercial Bank of China	19,596
9	Export-Import Bank of Korea	17,775
10	BNDES	17,539
11	European Bank for Reconstruction and Development	12,266
12	Korea Development Bank	9,924
13	China Construction Bank	8,272
14	Arab Petroleum Investments Corporation	7,184
15	Asian Development Bank	6,752
16	IADB	6,104
17	Vnesheconombank	6,064
18	Overseas Private Investment Corporation	5,105
19	Agricultural Bank of China	4,919
20	Banobras	4,409



**Bank Debt Issued by Nationality 1997-2017**



Source: IJGlobal

## EUROPE MLA LEAGUE TABLE 1997-2017

Rank	Company	Sum of Split deal value plus inflation (\$m)
1	BNP Paribas	77,051
2	Royal Bank of Scotland	73,061
3	Credit Agricole	52,588
4	Societe Generale	38,717
5	ING Group	38,327
6	Banco Santander	35,467
7	BBVA	34,076
8	WestLB	32,676
9	Intesa Sanpaolo	32,502
10	Sumitomo Mitsui Financial Group	32,126
11	Mitsubishi UFJ Financial Group	31,089
12	Barclays	29,500
13	Commerzbank	27,914
14	Mizuho Financial Group	26,161
15	Lloyds Banking Group	23,011
16	Deutsche Bank	22,525
17	Unicredit	22,409
18	BayernLB	22,337
19	Dexia Group	21,244
20	Citigroup	19,687

## NORTH AMERICA MLA LT 1997-2017

Rank	Company	Sum of Split deal value plus inflation (\$m)
1	Mitsubishi UFJ Financial Group	39,189
2	Credit Suisse	25,561
3	Royal Bank of Scotland	24,357
4	Citigroup	23,601
5	Credit Agricole	23,562
6	Societe Generale	21,555
7	BNP Paribas	20,677
8	ING Group	20,522
9	Mizuho Financial Group	19,728
10	Sumitomo Mitsui Financial Group	18,429
11	Scotiabank	17,619
12	JPMorgan	16,913
13	Bank of America	16,077
14	Morgan Stanley	15,927
15	Goldman Sachs	15,261
16	Toronto-Dominion Bank	14,196
17	Commerzbank	14,181
18	Banco Santander	12,756
19	Barclays	12,538
20	Royal Bank of Canada	12,029



## LATAM MLA LEAGUE TABLE 1997-2017

Rank	Company	Sum of Split deal value plus inflation (\$m)
1	BNP Paribas	16,136
2	Banco Santander	16,056
3	Mizuho Financial Group	13,084
4	Credit Agricole	12,530
5	Sumitomo Mitsui Financial Group	12,470
6	Citigroup	11,991
7	Mitsubishi UFJ Financial Group	11,604
8	BBVA	11,551
9	Royal Bank of Scotland	9,310
10	ING Group	9,205
11	Itaúsa Investimentos Itaú	8,687
12	HSBC	7,262
13	Societe Generale	6,323
14	WestLB	6,003
15	Commerzbank	4,708
16	Bradesco	4,677
17	Deutsche Bank	4,588
18	Scotiabank	3,648
19	JPMorgan	3,126
20	BayernLB	2,895

## ASIA PACIFIC MLA LEAGUE TABLE 1997-2017

Rank	Company	Sum of Split deal value plus inflation (\$m)
1	Mitsubishi UFJ Financial Group	40,643
2	Australia and New Zealand Banking Group	39,480
3	Sumitomo Mitsui Financial Group	36,966
4	BNP Paribas	33,412
5	National Australia Bank	31,030
6	Mizuho Financial Group	30,962
7	Commonwealth Bank of Australia	30,133
8	Westpac	28,331
9	Credit Agricole	22,303
10	Royal Bank of Scotland	16,287
11	Bank of China	16,217
12	Societe Generale	15,651
13	HSBC	14,560
14	Standard Chartered Bank	13,365
15	ING Group	12,156
16	WestLB	11,843
17	KBC Group	9,321
18	Chevron	9,270
19	Citigroup	8,969
20	Canara Bank	7,729

## MENA MLA LEAGUE TABLE 1997-2017


Rank	Company	Sum of Split deal value plus inflation (\$m)
1	Sumitomo Mitsui Financial Group	18,881
2	HSBC	18,785
3	Mitsubishi UFJ Financial Group	16,114
4	BNP Paribas	16,046
5	Credit Agricole	12,911
6	Mizuho Financial Group	12,372
7	Societe Generale	10,177
8	Royal Bank of Scotland	10,113
9	Standard Chartered Bank	9,734
10	Banque Saudi Fransi	8,289
11	Arab Bank	7,284
12	BayernLB	6,898
13	First Abu Dhabi Bank	6,303
14	ING Group	6,195
15	Gulf International Bank	6,181
16	Riyad Bank	6,062
17	Citigroup	6,014
18	Samba Financial	5,716
19	Arab Banking Corporation	5,307
20	Barclays	5,202

## SSA MLA LEAGUE TABLE 1997-2017

Rank	Company	Sum of Split deal value plus inflation (\$m)
1	BNP Paribas	6,296
2	Standard Chartered Bank	6,228
3	Standard Bank	6,115
4	Barclays	3,705
5	Nedbank Group	3,613
6	Credit Agricole	3,292
7	FirstRand	2,698
8	ING Group	2,541
9	Royal Bank of Scotland	2,513
10	Societe Generale	2,389
11	Citigroup	2,116
12	Investec	1,555
13	Sumitomo Mitsui Financial Group	1,239
14	KBC Group	1,219
15	Natixis	1,185
16	Commerzbank	1,121
17	WestLB	1,077
18	European Investment Bank	1,055
19	United Bank for Africa	1,034
20	Mitsubishi UFJ Financial Group	1,018



## 2018 EVENTS

March	<b>20th Anniversary IJGlobal Awards 2017: European &amp; African Awards Dinner</b>	London
March	<b>African Energy &amp; Infrastructure Finance Forum</b>	London
March	<b>Renewable Energy Finance Forum (REFF) Latin America</b>	Miami
March	<b>11th Latin American Energy &amp; Infrastructure Finance Forum</b>	Miami
March	<b>20th Anniversary IJGlobal Awards 2017: Americas Awards Dinner</b>	New York
March	<b>4th OGFAmsterdam</b>	Amsterdam
March	<b>3rd Asia Pacific Energy &amp; Infrastructure Finance Forum, followed by: IJGlobal Awards 2017: Asia Pacific Awards Dinner</b>	Singapore
March	<b>IJGlobal Awards 2017: Middle Eastern &amp; North African Awards Dinner</b>	Dubai
May	<b>19th Renewable Energy Finance Forum (REFF) Europe</b>	London
May	<b>2nd Chile Energy &amp; Infrastructure Finance Forum</b>	Santiago
May	<b>4th Indonesia Infrastructure Finance Forum</b>	Jakarta
June	<b>European Transportation Infrastructure Finance &amp; Acquisition Forum</b>	TBC
June	<b>2nd Asia Renewable Energy Finance Forum (REFF)</b>	Singapore
June	<b>15th Renewable Energy Finance Forum (REFF) Wall Street</b> , in partnership with 	New York
June	<b>14th Mexican Energy &amp; Infrastructure Finance Forum</b>	Mexico City
June	<b>2nd Argentina Energy &amp; Infrastructure Finance Forum</b>	Buenos Aires
July	<b>13th Pan-Canadian Infrastructure Finance Forum</b>	Whistler
September	<b>2nd Philippines Energy &amp; Infrastructure Finance Forum</b>	Manila
September	<b>13th North American Energy &amp; Infrastructure Finance Forum</b>	New York
September	<b>9th Peruvian Energy &amp; Infrastructure Finance Forum</b>	Lima
September	<b>9th World Energy &amp; Infrastructure Summit</b>	Barcelona
November	<b>10th Brazilian Energy &amp; Infrastructure Finance Forum</b>	Brazil
November	<b>Australia Energy &amp; Infrastructure Finance Forum</b>	Australia
December	<b>3rd Caribbean Infrastructure Forum</b>	Jamaica









Note: World events calendar subject to change



# A key player in the Global Infrastructure Market



- ❖ Strong worldwide expertise in financial advisory, debt arranging, equity raising and infrastructure M&A
- ❖ An infrastructure platform dedicated to institutional investors

<p><b>2017 - France</b></p>  <p>Sale by Total of 29% stake in SPMR</p> <p><b>Confidential</b></p> <p>Financial Advisor</p>	<p><b>2017 - France</b></p>  <p>Macquarie Atlas Road Acquisition of a 4.86% indirect stake in APRR from MEIF II and MMIT I &amp; II</p> <p>M&amp;A &amp; Financing Advisory</p>	<p><b>2017 - Spain</b></p>  <p>Complejo Medioambiental de Gipuzkoa Fase 1</p> <p><b>EUR 239,400,000</b></p> <p>Mandated Lead Arranger</p>	<p><b>2017 - Germany</b></p>  <p>Deutsche Bucht 252 MW Offshore Wind</p> <p><b>EUR 1,300,000,000</b></p> <p>Mandated Lead Arranger, Documentation Bank, Hedging Execution Bank</p>
<p><b>2017 - Spain</b></p>  <p>Acquisition by CVC of 25% stake in CLH</p> <p><b>Confidential</b></p> <p>Financial Advisor</p>	<p><b>2017 - Saudi Arabia</b></p>  <p>Shuaibah Expansion II IWP 55 MIGD Desalination Plant</p> <p><b>USD 275,000,000</b></p> <p>Mandated Lead Arranger, Fixed Rate Tranche Arranger, Hedge Provider</p>	<p><b>2017 - UAE</b></p>  <p>Dewa III Solar PV 800 MW PV Plant</p> <p><b>USD 650,000,000</b></p> <p>Mandated Lead Arranger, Documentation Bank, Technical &amp; Insurance Bank, Agent &amp; Account Bank, Hedge Provider</p>	<p><b>2017 - Mexico</b></p>  <p>907MW Norte III CCGT</p> <p><b>USD 716,000,000</b></p> <p>Coordinating Lead Arranger, Sole Fixed Rate Tranche Placement Agent, LC Fronting Bank &amp; Hedging Provider</p>