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Nexus 2016

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Introduction

Welcome to the 2016 edition of *Nexus* – Norton Rose Fulbright’s flagship journal for the infrastructure sector.

In this edition we take a look at the commercial and legal issues, trends and themes currently changing the face of the global infrastructure sector.

Our focus includes:

- ‘The Belt & Road Initiative’ – a modern day silk road: where China is investing and how it will change the face of global infrastructure development.
- New horizons for European Infrastructure development: The European Investment Project Portal gets set to launch – what you need to know when investing in infrastructure in Europe.
- The future of telecoms towers infrastructure sharing: the explosion of mobile technology usage worldwide has left telecoms networks struggling to catch up with demand, particularly in developing nations. A key factor in solving this problem is the increasing use of infrastructure sharing by multiple operators.
- Alberta’s Fort McMurray West 500 kV Transmission Project: a case study of the expanding role of the Public Private Partnership model in the North American energy sector.
- Challenges and solutions in ensuring the next wave of rail infrastructure development in Africa: much of Africa remains inaccessible by rail and the network which does exist is often antiquated and need of significant redevelopment. In this piece we explore the challenges and solutions of meeting the need to expand rail technology across this vast continent.
- Global safety trends in Infrastructure: with regulation for the global infrastructure sector ever increasing, we take a look at the a few of the notable trends in safety legislation and enforcement.
- Developing R&D and manufacturing infrastructure in the life sciences sector: the pharmaceutical and life sciences sector is one of the fastest growing industries in the world, and demand for the infrastructure required to support this sector is greater than ever, particularly in Asia.
- Solvency II and the calibration of infrastructure risk: the new legislative framework known as Solvency II has the potential to completely reshape the way European Insurance funds invest in infrastructure. We investigate some of the likely ramifications for the sector.

We hope you find this resource useful.

As always, if you have any comments or suggestions on topics to cover for future editions, we would love to hear them.

Nick Merritt

Global head of infrastructure, mining and commodities

Tel +65 6309 5318

nick.merritt@nortonrosefulbright.com

1

‘The Belt & Road Initiative’ – A modern day silk road

by Tom Luckock, Beijing, Hannah Logan and Amanda Montano, London

The Belt & Road Initiative (B&R) is without a doubt the most ambitious, strategic interconnected infrastructure initiative devised in recent memory.

What?

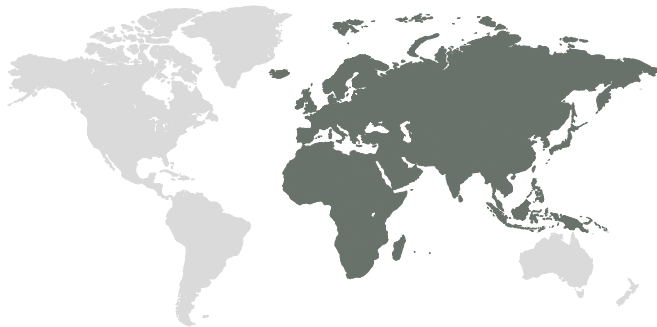
Launched by Chinese President Xi Jinping in 2013, the initiative aims to connect major Eurasian economies through infrastructure, trade and investment. It will see a RMB1.5 trillion infrastructure investment pipeline¹ stretching over 10,000 km over more than 60 countries with a total population of 4.4 billion² and 40% of global GDP³ across Asia, Europe, the Middle East and Africa, and cover projects across the infrastructure and energy sectors from small scale renewables to large scale integrated mining, power and transport projects. After its announcement in 2015, over 1400 contracts worth over US\$37 billion were signed by Chinese companies in the first half of 2015.⁴



4.4 billion population



40% of global GDP



1400 contracts



US\$37 billion

Full details of both the project pipeline and the specific requirements for a project to qualify as a B&R project are still not fully certain. What is clear is that the potential opportunities for infrastructure investment are immense.

For any host country or investor interested in infrastructure in B&R regions, Chinese capital cannot be ignored. Tapping it can be difficult but a foreign investor who can navigate the issues involved is potentially unlocking the key source of capital and equipment for the B&R regions' major projects over the next fifteen years.

Where?

The Belt & Road Initiative has two main elements: the Silk Road Economic Belt and the 21st Century Maritime Silk Road.

The Silk Road Economic Belt will be an overland network of road, rail and pipelines roughly following the old Silk Road trading route that will connect China's east coast with Europe via a new Eurasian land bridge. 5 regional corridors will branch off the land bridge, with Mongolia and Russia to the North, South East Asia, India, Pakistan and Bangladesh to the South, and central Asia, West Asia and Europe to the West.

The 21st Century Maritime Silk Road is a planned sea route with integrated port and coastal infrastructure projects running from China's east coast to Europe, India, Africa and the Pacific through the South China Sea and the Indian Ocean.

The geographic scope of the Belt & Road Initiative is fairly fluid and on some interpretations has also been extended to Australia and the UK.

A snapshot of the land corridors and a map showing both the Belt and the Road is set out overleaf.

¹ HSBC, 'On the new silk road III-paving the way: from vision to reality' (21 April 2015), accessed at: http://www.hktdc.com/resources/MI_Portal/Article/obor/2016/01/472891/1452138324798_OnTheNewSilkRoadIII.PDF

² Verghese, K, 'Opportunity Beckons, Asian Legal Business' (28 January 2016), accessed at: <http://www.legalbusinessonline.com/features/opportunity-beckons/71543>

³ Hofman, B, China's One Belt One Road Initiative: What we know thus far' (12 April 2015), accessed at: <http://blogs.worldbank.org/eastasiapacific/china-one-belt-one-road-initiative-what-we-know-thus-far>

⁴ Chinese Ministry of Commerce

Economic Corridor	Countries include	Focus
New Eurasian Land Bridge (Jiangsu province to Rotterdam, Netherlands)	<p>Central and Eastern Europe: Albania, Bosnia, Bulgaria, Croatia, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Macedonia, Poland, Romania, Serbia</p> <p>Western Europe: Netherlands, Germany</p>	<p>Aim: new major road and rail logistics passageway from China to Europe which is faster than sea transport and cheaper than air routes.</p> <p>Project spotlight: international freight train line from Lianyungang via Xinjiang province to Kazakhstan (February 2015).</p> <p>Hot topic: covering 10,900km in length China is working with customs departments in countries such as Kazakhstan, Poland and Russia to reduce customs clearance costs along the route.</p>
China – Mongolia – Russian Corridor (Beijing/Tianjin/Hebei/Dalian to Russia)	Belarus, Moldova, Mongolia, Russia	<p>Aim: utilise existing international freight lines and construct a northern passageway to connect Beijing, Dalian and Tianjin with Western Europe.</p> <p>Project spotlight: Chinese contracts for high-speed rail, energy, infrastructure and aerospace worth US\$25 billion signed with Belarus, Russia and Kazakhstan (May 2015).</p> <p>Hot topic: the corridor fits with Russia's Transcontinental Rail Plan and Mongolia's Prairie Road Programme.</p>
China – Central Asia – West Asia Corridor	<p>Central Asia: Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan</p> <p>West Asia: Afghanistan, Armenia, Azerbaijan, Bahrain, Georgia, Iran, Iraq, Israel, Jordan, Kuwait, Qatar, Oman, Saudi Arabia, Syria, Turkey, Yemen</p>	<p>Aim: important gateway for oil and natural gas, running from Xinjiang to the Arabian Peninsula, Turkey and Iran.</p> <p>Project spotlight: Chinese contracts signed with Kazakhstan, Kyrgyzstan and Tajikistan to work on trade facilitation and logistics.</p> <p>Hot topic: A Chinese consortium acquired a 64.5% stake in the Kumport container terminal in Turkey in September 2015, This was the largest foreign capital investment in Turkey to date.⁵</p>

⁵ <http://www.invest.gov.tr/en-US/infocenter/news/Pages/280915-cosco-pacific-buys-turkish-kumport.aspx>

⁶ <http://www.ft.com/cms/s/0/0e73c028-e754-11e4-8e3f-00144feab7de.html#axzz43ib8xDHI>

⁷ <http://in.reuters.com/article/china-india-idINKBN00103320150516>

Economic Corridor	Countries include	Focus
China – Indochina Peninsula Corridor (Pearl River Delta Economic Circle (Guangzhou, Hong Kong and Shenzhen) to Indochina)	Brunei, Cambodia, Indonesia, Laos, Malaysia, Myanmar, Philippines, Singapore, Thailand, Timor-Leste, Vietnam	<p>Aim: greater expansion into markets traditionally dominated by Japan and Korea.</p> <p>Project spotlight: Chinese consortium awarded the contract for electrification and double-tracking of the Gemas – Johor Bahru rail route (December 2015)</p> <p>Hot topic: the route aligns with the plans of the Greater Mekong Sub-Region, an economic area formed by the Asian Development Bank.</p>
China – Pakistan Corridor (Xinjiang province to Gwadar, Pakistan)	Bangladesh, Bhutan, Maldives, India, Nepal, Pakistan, Sri Lanka	<p>Aim: shortcut to the Middle East and Africa via Dubai and Oman, bypassing the Strait of Malacca. Expansion into large-scale infrastructure projects, building on China's previous focus on small scale renewables. This corridor is to some extent the test pilot for the Belt and Road Initiative and is expected to be a priority, given Pakistan's lack of infrastructure development.</p> <p>Project spotlight: Chinese contracts signed worth approximately US\$45 billion⁶ covering energy, ICT and transport infrastructure (April 2015). The US\$1.95 billion 660MW Thar Coal project reached financial close in February 2016, the first integrated mining and power project in the corridor.</p> <p>Hot topic: the Indian government has opposed this route, as it passes through Kashmir.</p>
Bangladesh – China – India – Myanmar Corridor	Bangladesh, India, Myanmar	<p>Aim: connect China with South Asia as part of China's wider strategy for integration with western Asia, again reducing reliance on the Straits of Malacca.</p> <p>Project spotlight: Chinese contracts worth more than US\$22 billion covering telecoms, steel, solar energy and film signed with India (May 2015).⁷ A 2,800km K (Kolkata) -2-K (Kunming) road is at the heart of the corridor.</p> <p>Hot topic: progress of the road has been difficult as a section passes through Arunachal Pradesh – an area both subject to a territorial dispute between China and India, and prone to insurgency.</p>



Source: The Centre for Geopolitics & Security in Realism Studies (CGSRS), original source: Tim Summers, "Roadmap to a wider market" in *The World Today*, October – November 2015

Why?

The primary goal is to create new trading routes and business opportunities within China and beyond. Behind this, the drivers (both official and unofficial) are complex, diverse and interconnected.

On a domestic level, China wants to stimulate regional investment to better integrate poorer inland provinces into the Chinese economy, and to mitigate urban migration, wealth disparity and unrest from ethnic minorities.

The B&R regions will serve as new markets for China's production over-capacity, foreign exchange reserves and more recent economic slowdown, and give Chinese contractors and sponsors in the infrastructure sector opportunities for expansion into, and connectivity with, both established and emerging markets. A focus on manufacturing capacity relocation as opposed to exports will also help to mitigate rising labour costs and pollution concerns and help China to achieve its global emission reduction commitments.

The routes themselves will facilitate trade, cooperation and relationships with host countries and partners in developing projects along the routes. The sea route is also inspired by China's ambition to become a global maritime power player.

The Belt & Road Initiative is part of a refocus of outward investment, for the Chinese economy and for Chinese diplomacy.

Where is the money coming from?

The Asian Development Bank (ADB) has estimated that US\$750 billion per year is needed to fund infrastructure needs in Asia to 2020.⁸ The ADB and the World Bank have so far committed funds of only US\$30 billion between them.⁹

⁸ ABDI Working Paper Series, 'Financing Asia's Infrastructure: Modes of Development and Integration of Asian Financial Markets' (2010), accessed at <http://www.adb.org/sites/default/files/publication/156084/adb-wp229.pdf>

⁹ China-Britain Working Council and Foreign & Commonwealth Office publication, accessed at http://www.cbcc.org/cbbc/media/cbbc_media/One-Belt-One-Road-main-body.pdf

Both state owned enterprises (SOEs) and state financial institutions are being directed by Beijing to invest in B&R projects, both to fund the development of the projects and as an outlet for excess liquidity domestically as a result of over-capacity and the Chinese downturn. The China Development Bank (CDB) has also reportedly reserved more than US\$890 billion for the B&R area.

Chinese policy banks will be the main source of B&R finance. Recognising the need for dedicated funding to support the Initiative, and to address the regional shortage in funding, China has also launched two new financial institutions: the Asian Infrastructure Investment Bank (AIIB) and the Silk Road Fund.

The AIIB is a multilateral development bank led by China and located in Beijing with a mandate for infrastructure investment across Asia Pacific and its member states. It is expected to work in a similar fashion to the ADB. Countries scrambled to join China as founding members, with over 50 signing up at its launch in 2015. The bank's authorised capital is US\$50 billion, planned to rise to US\$100 billion over time. Funding obligations will align to investment stakes, with China taking a 30% stake. The AIIB is expected to be very active in funding B&R projects.

By contrast, the dedicated Silk Road Fund is funded mainly with Chinese capital and will focus on funding transport and other infrastructure, resources and connectivity projects across the B&R, with a focus on Asia. The initial US\$40 billion seed capital is funded by the CDB, China Eximbank, the China Investment Corporation and SAFE (China's State Administration of Foreign Exchange). There are reports that the Silk Road funding has already been fully deployed. The ADB is also expected to be active in providing funding for projects in the B&R area and has recently signed a framework agreement with the Chinese government to this end.

The new financing institutions and directives to state-owned companies also have a secondary advantage of readjusting sources of capital in Asia to be driven by Asia, and with Beijing in the driving seat. A recent study found a clear shift in China's lending focus. 51% of B&R loans from Chinese financial institutions in 2015 went to Asia, compared to 27% in 2013, when the lion's share went to Africa.

Chinese focus

As a government initiative focused on infrastructure development, the main players will be state-owned enterprises taking a contractor or sponsor role and financial institutions such as CDB, CEXIM, ICBC and SINOSURE active

in the infrastructure space. Key Chinese EPC contractors and sponsors already active within B&R countries include CCCC, Harbin Electric, China Power Group, CMEC, Huaneng, China Rail, China Rail Construction, SEPCO, Power China and Datang.

Nuclear is an area to watch – China already has almost half of the global nuclear pipeline up to 2030, and a leading Chinese nuclear developer estimates 80% of the 300 new reactors planned by 2030 will be in B&R countries.

The traditional sweet spot for Chinese capital is emerging markets. The core B&R regions fall into this category. In these more difficult jurisdictions, Chinese pricing of kit and debt is competitive and Chinese funds can be deployed comparatively quickly. Such countries are typically not covered by commercial banks, are often perceived to have political risk and often have relaxed labour controls, allowing for the deployment of Chinese labour.

Foreign investors willing to take a degree of country risk and co-invest with China in such jurisdictions can take advantage of Chinese capital and these associated benefits. The most important of these is the commercial and political risk insurance cover provided by SINOSURE (the Chinese state-owned export credit insurance provider) to support Chinese companies, offering a partial fix for host country political risk. The fact that Chinese investors and contractors are often SOEs and that a project falls within the B&R Initiative framework, means that a foreign investor can take additional comfort from the full weight of the Chinese government sitting behind them, and the political relationships which the government will have with B&R countries. Ultimately a state owned offtaker will be less likely to default on projects financed by Chinese policy banks with the effect that Chinese banks should essentially achieve preferred creditor status similar to the multilaterals in much of the B&R.

On the flipside, for more established jurisdictions such as the Middle East and Turkey, China needs outside help and is looking to partner with well-known foreign companies who have a track record of doing business in these countries and are better able to win contracts.

Opportunities and questions for investors and host countries

So what do foreign investors and host countries need to look out for when looking at B&R investment opportunities?

- **Is the target country open to Chinese investment?**
Some countries continue to be sensitive to investment by Chinese companies, particularly state owned enterprises.

Partnering with a Chinese company is likely to bring additional scrutiny from foreign investment approval authorities, not least because any B&R partner is likely to be state-owned.

- **Is political risk cover available?** Political risk is a key issue facing projects in certain B&R countries. SINOSURE is one of the few active cover providers in these regions. SINOSURE cover is only available in support of exports of Chinese goods and services. This can be a flexible concept but the Chinese content should be at least 60% of the value of the project. In practice this means that the key equipment must be from China, while balance of plant and civil works can be locally (or internationally) sourced. SINOSURE also requires that Chinese banks hold at least 70% of any funding. Where AIIB is providing financing, SINOSURE cover should not be necessary given AIIB's mandate to assume political risk.
- **Where are the sector opportunities?** Initial cornerstone projects will focus on rail, road and port transport infrastructure, in order to build, extend and upgrade the core elements of the Belt & Road Initiative. Many ports on the 21st Century Maritime Silk Road currently lack the depth and equipment capacity to accommodate large ships. Transport infrastructure investments are hoped to provide shippers with more options for transporting freight whether by air, sea, road or rail, boosting shipping and cargo demand. B&R projects will also include projects across the energy and economic infrastructure sectors along the B&R routes, as well as the supply of rolling stock and potential future expansion into telecoms and social infrastructure.
- **What are the investment opportunities?** The typical opportunity open to a foreign investor looking to tap into Chinese B&R capital will be a sponsor role. There is no formal Chinese ownership requirement for B&R projects and many will be fully foreign-owned. However, larger Chinese utilities and infrastructure companies, such as CCC, China State Construction Engineering Corporation (CSCEC), China Railway Rolling Stock Corporation (CRRC) and China Rail, will generally require that they are the majority shareholder in order to consolidate the investment on their balance sheet.

A foreign investor in a SINOSURE backed transaction (which will include any project funded by a Chinese bank) will not be able to take sole key EPC, sub-contractor or supplier roles because the project would then fail to meet SINOSURE requirements for China content. Given that Chinese contractors typically have a less focused approach to project management, as long as the China content requirement is met, new opportunities for foreign

sponsors with more infrastructure experience may open up in new jurisdictions through B&R involvement. For projects not backed by SINOSURE (for example those funded by the AIIB) there is scope for foreign companies to take a contractor role as well.

Co-financing opportunities should exist alongside Chinese banks and the AIIB. However, in the case of Chinese banks, as noted above SINOSURE requires that Chinese banks hold at least 70% of any funding. Co-financing also tends to be more messy and time-consuming than simply tapping Chinese debt. Projects funded by the AIIB may be particularly time-consuming given the level of scrutiny which is likely to be demanded by its membership.

- **Know your partner's finance arrangements** – the contractor, not the borrower/sponsor, is the Chinese bank's customer. That means that a foreign investor will need to look to whether the contractor can secure finance on attractive terms and to overcome negotiation obstacles. Investors should establish early on the substance to Chinese finance support, as contractors can make rash promises around finance when securing an EPC mandate. In particular, investors should be cautious around promises of concessionary terms and should check the bank's position on recourse to sponsors and change of control. Key points should be negotiated up front and, ideally, a finance term sheet stapled to agreements with the contractor.
- **Execution risk** – the more international Chinese companies and private Chinese companies can readily meet tight bid timelines. Local Chinese state owned enterprises with less international experience typically find this more difficult, causing delays in obtaining internal approvals. Project execution risk also tends to be higher when foreign companies partner with Chinese companies. Negotiations can drag on, agreed positions can be re-opened, requirements for recourse to the sponsor may be raised each time a new obstacle is encountered and outbound and credit approvals can fail to materialise. A key to managing execution risk is to maintain competitive tension from a non-Chinese contractor for as long as possible.
- **Sovereign support** – Chinese banks tend to require SINOSURE cover in order to fund a project unless there is strong sponsor support. Larger SINOSURE transactions also require the approval of the State Council, which is the executive arm of the Chinese government. SINOSURE itself has traditionally required sovereign support, particularly for energy projects. Whilst an additional hurdle, strong sovereign support for infrastructure projects will mean easier approvals.

- **Regulatory approvals** – Chinese outbound approvals and Chinese bank credit approval processes are not well understood. Carefully managed, the risks these approvals present are minimal. The key is to understand which regulators need to approve the transaction, when the approvals will be obtained and whether the transaction documents need to be conditional upon outbound approval. It is important to be aware of potential problems as early as possible.
- **Credit approval** – Chinese bank support can be a frequent source of delays. Term sheets and commitment letters can be pulled together quickly but credit approval can take time. The credit departments of the Chinese banks are among the busiest in the world. A simple structure that follows established Chinese precedents and documentation will be approved more quickly than a new one. A Chinese partner will generally need board, shareholder, credit and various governmental approvals or registrations – and all of them need to understand the structure of the transaction.
- **Connectivity** – support may be available from domestic policy within an investor’s home country or region. The EU and China for example have agreed to enhance cooperation on investments, with China contributing to the EU’s Juncker Investment Plan. The EU-China Connectivity Platform is also aimed at developing synergies between China’s Belt & Road Initiative and the EU connectivity initiatives in areas such as transport and telecoms.

Spotlight on B&R contractors

CRCC is leading the B&R charge in the rail sector. A consortium led by CRCC is expected to be a favourite to win the construction contract for the Kuala Lumpur-Singapore high-speed railway, the first of its kind in Southeast Asia.¹⁰ In December 2015, the Malaysian government awarded a Chinese consortium, also led by CRCC, the contract for electrification and double-tracking of the Gemas – Johor Bahru route.¹¹ In 2014 CRCC signed a US\$11.97 billion contract with the Nigerian government to build a coastal railway line in the country.

Potholes along the way?

Although the Belt & Road Initiative brings many opportunities for investors, there are still many challenges and risks. Differing economic and political situations of B&R countries means there are inherent risks, ranging from political instability and security concerns, to legal, regulatory and funding challenges. Potential investors will need to conduct detailed due diligence and understand project and financing structures as well as the legal and regulatory regimes of the countries along the B&R routes.

Geographically, some of the terrain is harsh, involving long distances, high costs and potential security and insurance concerns.

Some of the regions covered by B&R are plagued by territorial disputes and local wars, endangering the implementation of the Initiative. Religious extremism may jeopardise the safety of projects. Local corruption, tensions with neighbours and domestic issues may also hinder projects. Political risk guarantees may help, but these may not be available for all jurisdictions and projects, particularly those going across several borders.

Other examples of political instability were seen during the construction of the controversial Myitsone Hydropower Project in Myanmar, which was suspended due to NGO opposition in 2011.¹² Likewise, the Sino-Thai railway project – featuring 873km dual tracks – has been protested against by Thai citizens.¹³ Works on the US\$1.4 billion offshore Colombo Port City project being constructed by CCCC, which was suspended by the Sri Lankan government in March 2015, have only recently been resumed.¹⁴ The project was initially suspended because of regulatory and environmental concerns, and a perceived scope for lack of transparency.

Other countries have generally been supportive of the Belt & Road Initiative, recognising the scope for co-investment and cooperation, but some are wary of China’s potential ambitions locally and on the world stage.

¹⁰ <http://www.ft.com/cms/s/3/1097a510-e5e4-11e5-a09b-1f8b0d268c39.html#axzz43ib8xDHi>

¹¹ <http://www.railwaygazette.com/news/news/asia/single-view/view/chinese-consortium-to-complete-malaysian-electric-spine.html>

¹² <http://www.bbc.co.uk/news/world-asia-pacific-15123833>

¹³ <http://www.nationmultimedia.com/politics/Sino-Thai-railway-project-can-wait-until-terms-are-30274293.html>

¹⁴ <http://thediplomat.com/2016/03/sri-lankas-port-city-project-is-back-in-business/>

From a financing perspective, low host country credit ratings may present a challenge. Co-financing sources would also be wider if the US and Japan agreed to join the AIIB as members, but the funding gap in Asia and other B&R countries will not be met by AIIB funding alone. For the B&R Initiative to be successful and sustainable, China will need to engage the private sector and the commercial banks.

Some B&R countries are likely to present regulatory challenges in project approvals and implementation, particularly at a local level. Traditionally, infrastructure projects require high-standard management, have long operating cycles and uncertain profits. Therefore, it is vital that investors have a clear understanding of the relevant legal systems, security structures and risk management profiles. Regulatory reform will also be needed both in China and to open up markets in B&R countries, including in the areas of financial integration, customs clearance, anti-bribery and foreign investment.

When it comes to identifying enforcement risks, foreign investors tend to over-emphasise enforcement risks when dealing with a Chinese EPC contractor. Chinese parent company guarantees will invariably be with a mainland Chinese state owned enterprise, probably based in Beijing. This means a Singapore, London or Hong Kong arbitration award may ultimately need to be enforced in courts in Beijing. China has introduced procedures to ensure that such awards are readily enforced in China, and in practice, this should usually be the case. However, occasionally sponsors have encountered issues calling bank guarantees from Chinese banks. Chinese law allows a PRC court to claim jurisdiction to restrain a call on the bank guarantee where there is any claim of fraud. This risk should not be overstated, but sponsors should still consider asking for bank guarantees issued by a non-Chinese bank.

More generally, the current world economy remains unstable and investment appetite uncertain.

A long and winding road

For B&R to be fully successful, projects need to get built quickly. Perhaps the biggest impediment is different standards. The B&R Initiative covers more than 60 countries, with different regulatory regimes, tax systems, forex controls and engineering standards. One aim could be to standardise the selection of projects and even seek to standardise non-sector specific requirements for B&R projects in a host country. More private sector involvement from China could also speed up project deployment as SOE requirements would not apply.

2

New horizons for European Infrastructure development: The European Investment Plan Portal gets set to launch

by Chris Brown and Tomas Gärdfors, London

In 2016, the European Investment Project Portal (EIPP) is expected go live. The EIPP is the creation of the European Commission (EC) and European Investment Bank (EIB). It is a key element of the second stage of the Investment Plan for Europe.

What is the purpose of the EIPP?

The EIPP aims to mobilise investment in the EU economy, through an online platform that will promote projects across all regions and attract potential investors across the world. The projects will be presented in a database, with an interactive project map and project directory.

Projects in the EIPP must meet the following admission criteria¹

Worth at least €10 million in terms of required investments.

Within one of the wide range of listed sectors.

Promoted by a public or private legal entity in an EU member state.

Compatible with all applicable EU and national laws.

Expected to start within three years of the project submission.

¹ <http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32015D1214>

What is the European Investment Plan?

The European Investment Plan arose as a result of low levels of investment in the EU since the global financial crisis. Also known as the Juncker Plan, the Plan was announced by the European Commission in November 2014. The aim was to facilitate investments of over €315 billion across the EU over the following three years, to support investment in the economy, and to create an investment friendly environment.

The European Fund for Strategic Investments (EFSI) was the first pillar of the Plan in 2014. It regulates the fund and aims to finance both infrastructure and innovation projects, as well as SMEs and Mid-Caps. The European Investment Advisory Hub (EIAH), in 2015, and the EIPP, in 2016, are the second pillars of the Plan. They were set up to support the goals of the EFSI and improve the market function for investors.

The EIB is providing €5 billion to the EFSI and the EU is contributing a further €16 billion from its budget in the form of an EU guarantee, which, in aggregate and with a multiplier of 15, aims to facilitate over €315 billion of investments over the next three years.

Current projects

The following table shows the projects which are currently approved, with a large proportion of the €315 billion yet to be invested.

By December 2015, 9 projects had already been financed by the committee, including:

Project	Country	Project	Country
Arvedi Modernisation Programme	Italy	Copenhagen Infrastructure	Denmark
Äänekoski Bio-product Mill	Finland	Galloper offshore	UK
Capenergie 3 Fund	France	Grifols	Spain
Smart meters	UK	Nobelwind offshore	Belgium
Abengoa research, development and innovation	Spain		

By the November 2015 meeting, the EIB had approved a number of other projects, including:

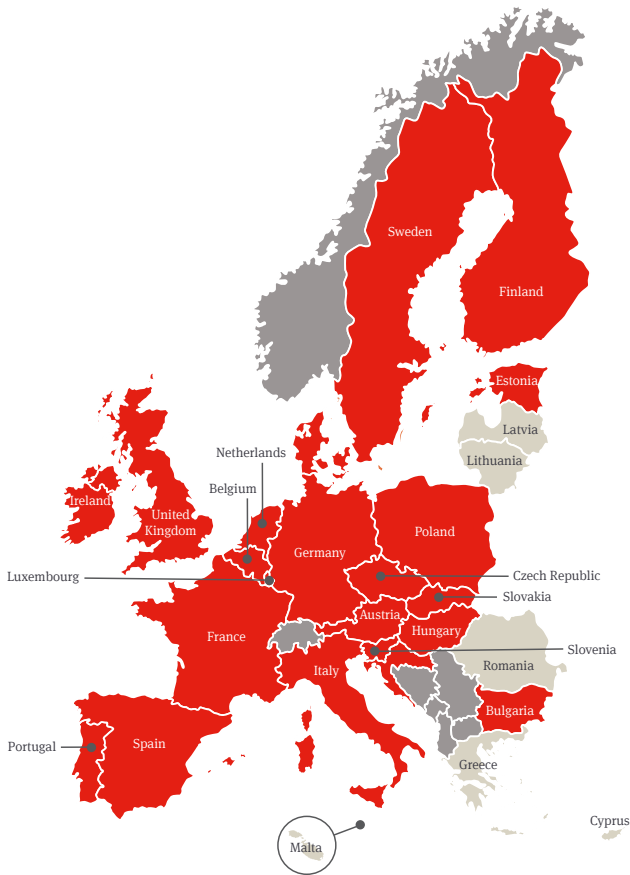
Project	Country	Project	Country
Third Beatrix Lock	The Netherlands	Autovia Venete widening	Italy
Primary Care Centres	Ireland	D4/R7	Slovakia
Midland Metropolitan Hospital PF2	UK	Beatrice Offshore wind	UK
Impax New Energy Investors II	UK	London energy efficiency	UK
Redexis Gas Transmission and Distribution	Spain	HBOR risk-sharing	Croatia
TI-accelerated high speed broadband rollout	Italy	Energy efficiency in residential buildings	France
Nord Pas de Calais high-speed broadband	France	Alsace high-speed broadband	France
SaarLB renewable energy project finance guarantee	Germany & France	A355 Grand Contournement Ouest de Strasbourg	France

Source: <https://ijglobal.com/articles/98642/efsi-investment-committee-members-emerge>

Other finance products

There are a wide range of different financing products which are available under the EIP. In addition to financing projects, the EIP also provides finance to companies which are fast growing and/or engaged in research and development.

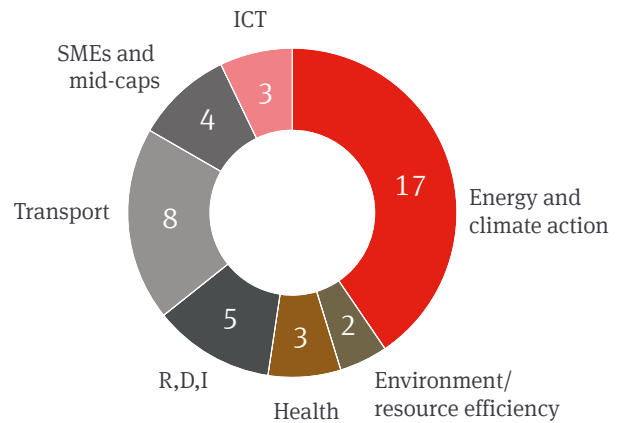
This map shows the location of projects in January 2016.



What kind of projects and businesses does the plan help fund?

The EFSI funds a variety of projects and businesses across a wide range of industry sectors.

Almost by definition, the EFSI is targeted at those projects and businesses that are struggling to raise more traditional forms of finance. Hence they are likely to be more complex and challenging to bring to financial close.



3

Sharing of Telecoms Infrastructure – opportunities in 2016

by Martyn Taylor, Sydney and Dan Metcalfe, Oliver Stacey and Felicity Brown, London

The network operators' market is increasingly competitive and operators are constantly looking for ways to reduce their costs and streamline their business.

Telecoms infrastructure makes up a substantial proportion of operators' capital investments and, in emerging markets, most of their operating costs. With the constant roll out of new technology (including, in many jurisdictions, 4G services), together with, particularly in emerging markets, increased demand and pressure for network capacity and coverage in rural areas, one way of freeing up cash for the development of their networks is for operators to share their towers with competitors or dispose of their towers to (and leaseback from) specialised tower operating companies (towercos). Tower divestment also leaves towercos to manage the 'grass and steel' side of the business whilst operators focus on their core business of technology and customer service.

This model is well established and actively encouraged by governments in many jurisdictions across the world. There is already an established towers market in North America and India, and the model is receiving increasing attention in emerging markets such as Africa, Central and Latin America and Asia (particularly in Myanmar, Thailand and Indonesia). Opportunities are plentiful throughout the cycle, from asset divestments by operators and debt raising by towercos, through mergers and acquisitions activity as markets consolidate, to IPOs and other exit strategies for towercos and their investors.

2015 thus far has seen the first full portfolio divestment in Africa (by Airtel), the headline-hitting acquisition of Crown Castle by Macquarie in Australia and the emergence of new markets in North Africa (with Eaton Towers entering Egypt) and the Middle East (with Mobily and Zain both looking to sell towers in Saudi Arabia).

This article offers an introduction to the "towerco" model and the different ways of structuring tower transactions, together with examples from our experience in advising on a number of transactions in the market.

The towerco model

The towers model is predicated on a desire of operators to release cash from their passive infrastructure. However, this is not only a cost-saving measure for network providers. The model also enables them to focus on their core business model of acquiring and servicing customers, and expanding network coverage and services in the midst of ever-increasing competitive pricing pressures, without having the distractions and complexities of operating passive assets. Whilst there are a number of variations on the model, the concept sees the operators divesting themselves of their towers and other passive infrastructure. The network operator will then lease space on the tower from the tower company for their transmissions equipment under long term lease arrangements. The leasing is a non-exclusive arrangement, enabling the tower companies to “co-locate” other operators on those same towers. The greater the number of tenants, the better for the towers companies (and their financiers), as this drives up revenues from largely the same base costs.

Tower companies also offer a “build to suit” service, by which they construct new towers for an operator, based on operator request as to location, specifications and timing together with colocation opportunities on other portfolios which the tower company acquires. Build-to-suit programmes are particularly common in emerging markets where network rollout is still in the process of being completed. By entering into these arrangements with tower companies, operators are able to reduce the future capital expenditure and operational expenditure associated with constructing and operating new towers. Generally, the ‘build to suit’ model is also based upon non-exclusive tenancy, with tower rents for the operator who contracted the towers starting high and reducing with the number of operators who co-locate on each site.

The legal structures of infrastructure sharing

There are a number of different legal structures available to implement the model. The most common of these is the sale and leaseback structure. Under this structure, mobile operators sell towers to an independent tower company. The towers are then leased back to the operator as well as other operators with whom the tower company has a relationship. The tower company is then responsible for the operation and maintenance of the tower.

The model can also be operated under an outsourcing structure. In this scenario the tower company does not obtain ownership of the towers, instead simply providing “managed services” for the network provider. For example, the first Eaton Towers transaction in Ghana, with Vodafone as the counterparty, was structured on the basis of this model. This model allows operators to reduce operational expenditure and obligation as tower companies are able to offer the same service for reduced costs for the operator, without relinquishing ownership of the towers.

The tower companies themselves also operate on a number of different legal structures. Some tower companies (such as Eaton Towers) are operated on a totally independent basis, with no legal connection to their network operator tenants. This structure allows operators to maximise the cash released on disposal of the towers.

Other tower companies have operations structured as joint ventures with their operator partner. This allows the operator to retain some equity in the joint venture tower company and in doing so benefit from the favourable arbitrage between operator and tower company valuations and in retaining a level of control over the tower business. However, in opting to form a joint venture, operators will reduce the amount of cash available from monetising their tower assets and this model also creates complexities in ensuring towerco independence. Another reason behind structuring tower companies as joint ventures may be regulatory requirements. In a number of jurisdictions there are legislative requirements for locally incorporated/resident persons to hold telecommunications licences (including passive infrastructure licences) and interests in land. These restrictions are often addressed by the relevant tower company establishing a locally incorporated operating vehicle to own and operate the towers, which may itself be owned by foreign shareholders. However, some jurisdictions do impose a requirement for a minimum local ownership stake in the operating company and as such joint ventures between a state owned or local operator and an international tower company may offer a solution.

Types of infrastructure sharing

There are two broad types of infrastructure sharing; passive infrastructure sharing and active infrastructure sharing. Passive mobile infrastructure includes tower sites and all infrastructure on them, such as the towers themselves, cables, ducts, shelters and power facilities and cooling systems (but excluding radio equipment) and the sharing of such sites or towers is the main focus of this article.

Active infrastructure sharing involves an operator giving one or more third party operators access to all or part of its network. A tower company will generally seek to restrict operators' ability to participate in active infrastructure sharing as otherwise a tenant operator could share its active infrastructure with another operator, removing the need for that operator to lease space on the tower for itself. As tower companies build their models on specific tenancy ratios, it is important that they are able to position themselves to attract new tenants. However, tower companies may also seek to use active infrastructure sharing to their advantage, by requiring operators who lease space on their towers to pay an enhanced rental fee should they wish to share their active infrastructure on such towers.

Regulatory pressure

Increasingly, governments and regulatory bodies see infrastructure sharing as a way of achieving competition between network providers. Where a tower company has acquired the towers of an operator it can make them available to new smaller entrants thereby permitting them an easier entry into the market where they may otherwise have been constrained by the cost of rolling out a new network as well as the related infrastructure. In addition, where operators have sold their towers, the proceeds of sale and reduction in ongoing capex allows them to invest in new technologies and better network quality of service for the benefit of subscribers.

Other motivating factors behind mandated infrastructure sharing for governments and regulatory bodies are the social and environmental benefits. The divestment of towers by network providers allows for expansion into rural areas (where revenue generation is traditionally lower than in urban areas due to lower prospective tenancy ratios) which desperately require connectivity. In some cases rural connectivity is a condition of governmental bodies granting new licences and spectrum to operators. Certain jurisdictions have also imposed restrictions on building in high density areas to reduce emissions and in reaction to complaints that towers and their power generators are noisy, noxious and unattractive additions to the landscape. Furthermore, the operation and management of towers by independent tower companies avoids duplication of towers as fewer towers are required to service the needs of the network providers in any country. This has positive implications for the overall carbon footprint of the telecoms infrastructure, in particular in emerging markets where towers are often powered by diesel generators due to the unreliability of the grid.

However, it is worth noting that in certain jurisdictions the regulatory and licensing environment can act as a hindrance to the development of the tower company model. Specific passive infrastructure licensing regimes are in place across developed market jurisdictions and in many emerging market jurisdictions, such as Brazil and Nigeria, but in certain emerging market jurisdictions the regulatory and licensing regimes have struggled to keep up with the pace at which the tower company model has developed. As such, tower companies may find themselves being associated with operating companies and subject to a much more stringent licensing regime than may be appropriate for the more limited nature of their business, or not subject to any regime at all which causes uncertainty. Where this is the case, more involved dialogue with the telecoms regulator is necessary to understand requirements. For example, in Burkina Faso there is currently no passive infrastructure regime, yet on recent transactions the regulator has been looking to promote infrastructure sharing. Further, across emerging markets much of the regulatory regime can be slow, with permitting applications (as may be required for planning, building or environmental permits) in certain jurisdictions taking up to 12 months for approval, which is detrimental to business, although positive steps are being taken to address this issue in countries such as Brazil with the introduction of specific laws to promote and ease this process.

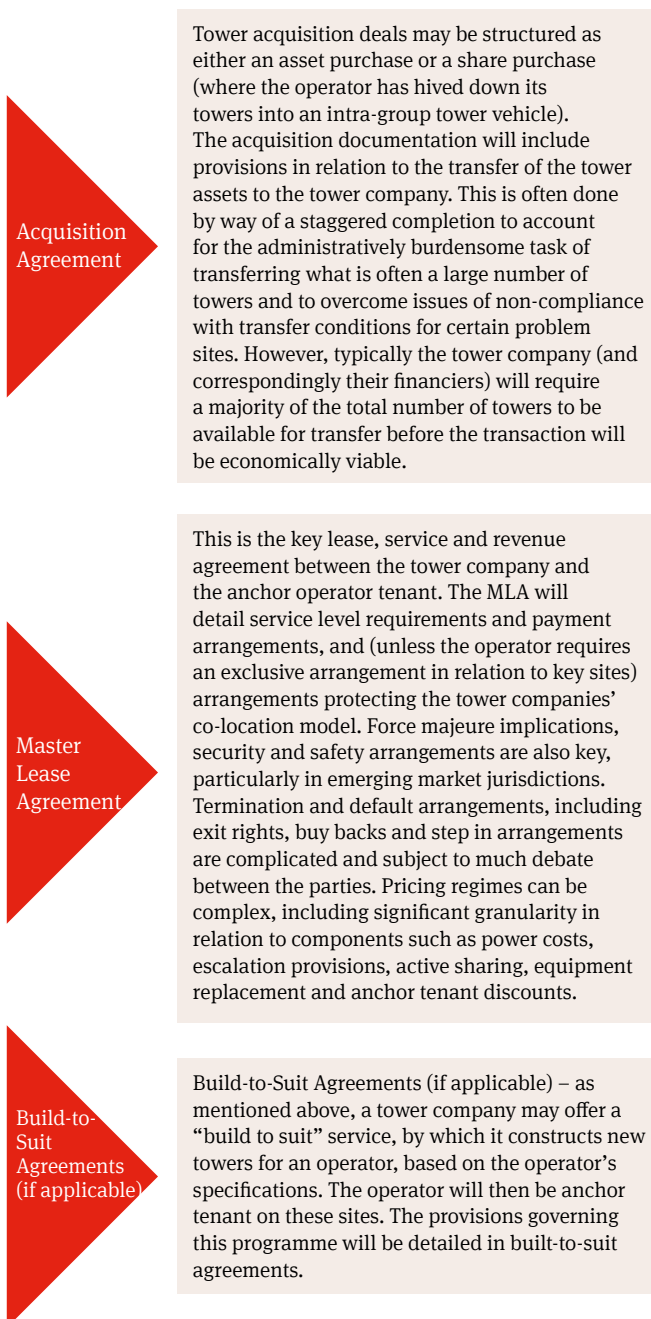
Financing

Typically, tower companies seek financing to enable the purchase of tower assets from operators and to fund refurbishment of towers and ongoing build-to-suit and development obligations. Whilst the "major" tower companies, such as American Tower and SBA Communications, are often funded from equity or by corporate debt facilities, junior tower companies, on the other hand, are often forced to obtain more structured financing.

Financiers of such structured debt will likely require a comprehensive security package and a parent company guarantee. The form of this security package will likely be a significant consideration for lenders, depending on the size of the tower company, its operating history and other credit factors. Lenders to smaller tower companies, or where the financing is structured on an off-balance sheet basis, will typically require security over the shares in the tower company together with security over the tower companies assets including licences and permits, tenancy arrangements, the towers themselves and sometimes the land on which they are situated. Security costs and

perfection times can vary from country to country, but an understanding of these is very important from the perspective of any time and cost planning for a transaction.

The financing documentation for a towerco acquisition and development financing will typically include a comprehensive covenants package. Financial covenants will include leverage and debt service coverage testing. Lenders will also require covenants as to information in relation to and compliance with the terms of key transaction documents, together with security over these documents. Such key documents will include:



Given the potential social and economic benefits of the development of telecoms infrastructure to developing nations, there is a strong history of DFIs providing debt (and equity) to tower companies, both on a bilateral level and as part of combined financing structures. Commercial banks and DFIs will largely lend on similar terms within the same structured finance structure, albeit with certain variations in focus. In particular DFIs are sensitive to environmental and social risks and also sanctions and corrupt practices and will insist upon the inclusion of a strict covenant package in this regard.

For those mid-tier tower companies with a more established operating history, a bond issuance at parent company may be attractive. A bond financing would typically allow the tower company to operate more flexibly without many of the restrictions of a structured opco loan financing, and may also be more economically attractive in the longer term. However, loans are more adjustable to the needs of a developing tower company, whether by providing local currency and dollar financing and an ability to utilise the facilities over time as financing needs arise, as well as being more easily adaptable if the lenders are willing to accommodate change, based on the closer relationship between lenders and their borrower. As tower companies diversify and develop their portfolios, and acquire a good operating record, the bond market will become more available to them.

Network operator’s perspective

The towers model allows network operators both an opportunity to obtain a cash injection and an opportunity to avoid the cost and hassle of tower management. This hassle is particularly well-avoided in emerging market jurisdictions such as Myanmar, where in negotiations network operators push hard for towercos to accept responsibility and risk for things like permitting, security management, labour issues, and constantly changing government regulations and directives that impact on their ability to maintain tower sites. Operators also tend to press for the strongest obtainable penalties where towercos fail to deliver on site roll-out timelines (in a build-to-suit scenario) and service level agreements (for existing sites). Having an effective penalty scheme in place is seen as particularly important by operators who obtained their network licences through a competitive tender process which resulted in licences being conditional on network roll-out at a particular pace and to a particular service standard.

Another priority for many network operators is to be sure the towerco is not going to fall foul of any anti-money laundering or bribery and corruption standards. Many large network operators have financing obligations which do not permit

them to deal with service providers who do not conform to certain standards for such matters, as well as obligations under international child labour and similar laws. This can sometimes present difficulties as the standards are often very stringent.

Pricing is, as always, one of the hottest issues. Many anchor tenant operators wish to see ‘most favoured customer’ clauses in a MLA, which commit the towerco to offering them the lowest rent of any tenant on a comparable site, together with other discounting arrangements. This is usually a source of contention in negotiations and can present additional difficulties when a subsequent tenant on a site requests the same clause.

Exit options for towercos

The towerco model is predicated on a desire of operators to release cash from their passive infrastructure. However, not only is this a cost-saving measure for network providers. The model also enables them to focus on their core business model of acquiring and servicing customers, and expanding network coverage and services in the midst of ever-increasing competitive pricing pressures, without having the distractions and complexities of operating passive assets. Whilst there are a number of variations on the model, the concept sees the operators divesting themselves of their towers and other passive infrastructure. The network operator will then lease space on the tower from the tower company for their transmissions equipment under long term lease arrangements. The leasing is a non-exclusive arrangement, enabling the tower companies to “co-locate” other operators on those same towers. The greater the number of tenants the better for the towers companies (and their financiers), as this drives up revenues from largely the same base costs.

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Conclusions

The towerco model is developing globally, and is gaining traction across a range of emerging economies. Africa, South America, Myanmar and Indonesia are those leading the way in the current environment, as operators and governments align their interests in utilising and encouraging the model.

The nature of activity in each market will depend on the stage of development of the same. In new markets, acquisitions and divestments and loan financing of the same will dominate the landscape, however in those markets where the model and towercos themselves are more established with diversified portfolios then bond financings and corporate activity, whether M&A or IPO, can be expected to be more widespread.

In each case, regulatory issues and legal documentation will be central to the ability of transactions to progress, and it remains crucial to the success of any transaction to have an in depth knowledge and understanding of the key issues at stake.

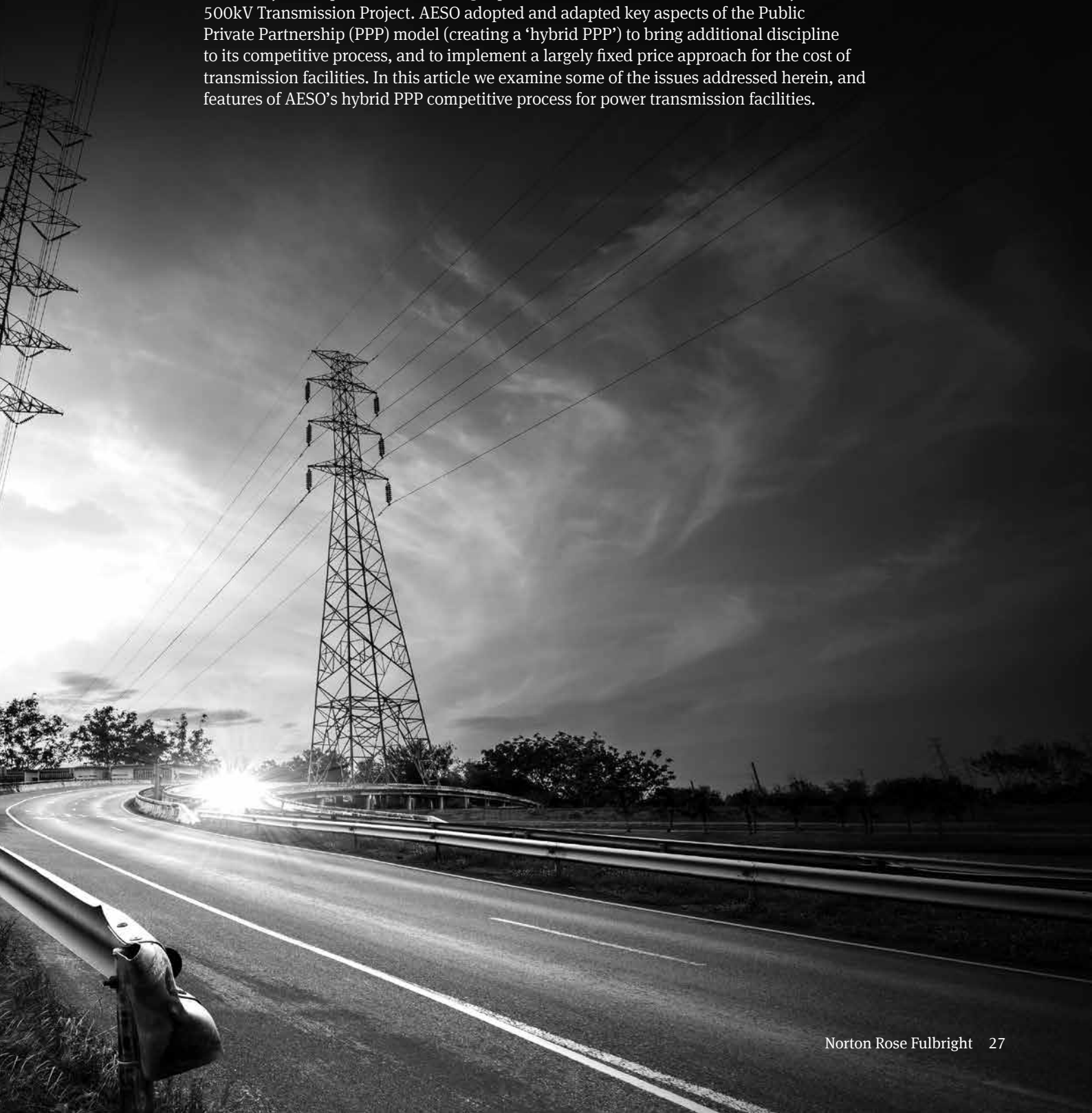
4

Alberta's Fort McMurray West 500 kV Transmission Project: a case study in expanding Public Private Partnership scope

by John Carleton, David Eeles and Lincoln Mitchell, Calgary

Government monopoly ownership of power transmission grids is no longer necessarily a given.

In fact, in jurisdictions throughout North America and the wider world private investment in power transmission has been almost universally successful. Typically, such investment is undertaken using a rate-based recovery of costs model. In Alberta, Canada, the Alberta Electric System Operator (AESO) sought private investment for the Fort McMurray West 500kV Transmission Project. AESO adopted and adapted key aspects of the Public Private Partnership (PPP) model (creating a 'hybrid PPP') to bring additional discipline to its competitive process, and to implement a largely fixed price approach for the cost of transmission facilities. In this article we examine some of the issues addressed herein, and features of AESO's hybrid PPP competitive process for power transmission facilities.



Fort McMurray West 500 kV Transmission Project

In December 2014, AESO (a not-for-profit statutory corporation responsible for, among other things, planning and developing Alberta's transmission system) successfully completed its first competitive process for the development of transmission infrastructure under a PPP type contract. It awarded the Fort McMurray West 500 kV Transmission Project (Project) to Alberta PowerLine Limited Partnership based on its C\$1.43 billion¹ bid for the right to develop, design, build, finance, own, operate and maintain the Project for approximately 40 years. AESO's long term planning estimate had been C\$1.8 billion² (an estimate which related only to the construction of the Project).³

The successful award of this Project represented the culmination of several years' effort by AESO to develop an innovative hybrid PPP program to address specific electricity transmission needs in Alberta, and to comply with a mandate to develop a competitive process which would open the market to new market entrants and use competitive pressure to reduce costs.

AESO's hybrid PPP program is a first-of-its-kind process for Alberta's development of electrical transmission facilities (a new asset class for PPPs in Canada) in which the successful bidder (Project Co) becomes a 'transmission facility owner' governed both by legislation and the PPP type agreements between AESO and Project Co.

Project background

In the face of projections indicating Alberta needed C\$14.5 billion in transmission investment between 2009 and 2019, the Alberta government decided that major transmission facilities would be procured using a different business model from that used by AESO when assigning incumbent utilities the responsibility to develop, own and operate such facilities, with costs subject to a prudency review by the Alberta Utilities Commission. In 2010, the Alberta government issued a mandate requiring AESO to develop and implement a competitive process for specified major transmission facilities. AESO's objectives for the competitive process included:

- Minimising life-cycle costs through the use of competitive pricing.
- Creating opportunity for maximum innovation throughout the life-cycle of the facilities.
- Creating opportunity for new market entry.
- Allocating risk to most efficiently and effectively mitigate it and reduce costs.⁴

In determining the most effective model to meet its objectives, AESO considered several possible structures but settled on a 'single owner' model in which Project Co is responsible for all development activities, engineering, procurement, construction and financing for a project and will own, operate and maintain the project for a specified term. AESO selected the single owner model because in its view, this model delivers (among other benefits) the greatest degree of cost optimisation (since Project Co can optimise costs across the life cycle), and promotes innovation and accountability.⁵ By selecting this model, AESO moved away from the traditional process for delivering new transmission infrastructure in Alberta to a greenfield PPP type process.

A PPP is frequently defined as "a long-term contract between a private party and government entity, for providing a public asset or service, in which the private party bears significant risk and management responsibility, and remuneration is linked to performance."⁶ While the competitive process developed by AESO falls within that definition, AESO's process, in several respects, departed significantly from PPP precedents used in Alberta and other jurisdictions. Some of these differences are discussed below.

⁴ Alberta Electric System Operator, 'Alberta Electric System Operator Competitive Process Application' (30 March 2012) at 2-3, online: <http://www.aeso.ca/downloads/2012-03-30_AESO_Competitive_Process_Application_-_Final_Clean.pdf>.

⁵ Ibid at 3-4.

⁶ The World Bank, the Asian Development Bank and the Inter-American Development Bank, 'Public Private Partnership Reference Guide' (2014) at 18, online: <http://www-wds.worldbank.org/external/default/WDSContentServer/WDSP/IB/2014/09/08/000442464_20140908133431/Rendered/PDF/903840PPP0Ref0Box385311B000PUBLIC0.pdf>.

¹ In 2019.

² In 2013.

³ AESO's long term planning estimate for this project was C\$1.8 billion +/- 50 per cent.

Development period

One of the key differences between AESO's hybrid PPP process and most other Canadian linear PPP processes is the broad scope of project development activities assumed by Project Co. In many other linear PPP projects in Canada, the required land and regulatory approvals are secured by the authority prior to awarding the project. In keeping with its single owner model philosophy, AESO's process requires Project Co be responsible for a wide range of development activities, including, preliminary design, landowner consultation, siting, land acquisition, regulatory approvals for the project from the Alberta Utilities Commission, and approvals from all other regulators.

Land acquisition

According to the World Bank et al.'s Public Private Partnership Reference Guide "land acquisition can be one of the most challenging aspects of developing a PPP project – delays in obtaining land have created significant hurdles or even blocked some promising PPP projects."⁷ As a result, the general approach to linear project land acquisition in Canada, and a common approach worldwide, is for the authority to release or acquire the necessary corridor prior to award. AESO decided to assign land acquisition responsibilities to Project Co in part because this approach is in-line with its single owner philosophy, and because land acquisition is an activity which would normally be undertaken by an incumbent utility and therefore falls naturally to Project Co. A key criterion for selection of Project Co was its demonstrated ability to manage stakeholders leading to timely land acquisition. AESO carries risk associated with unforeseeable delay not attributable to Project Co, but general responsibility for land acquisition lies with Project Co.

Regulatory approval

AESO cannot (unlike other authorities such as the Department of Transportation) influence, issue or obtain regulatory approvals for corridors or facilities. Therefore, as with the responsibility for land acquisition, responsibility for obtaining regulatory approvals is allocated to Project Co. The key approval for the Project is granted by the Alberta Utilities Commission (a third party to the PPP type agreement between AESO and Project Co). And again, a key criterion for selection of Project Co was its demonstrated ability to manage regulatory processes in a timely manner. As with land acquisition, the risk of unforeseeable delay not attributable to Project Co is assumed by AESO, but general responsibility for achieving required regulatory approvals promptly rests with Project Co.

Project development agreement and risk allocation

Given the comprehensive nature and extent of development activities assigned to Project Co, and the extended period between award and financial close, AESO took the unusual step of dividing the PPP type contract into two separate agreements:

- A project development agreement, setting out the rights and obligations of the parties relating to development and financing activities; and
- A project agreement, setting out the rights and obligations of the parties relating to construction, operation, maintenance and ownership of the transmission facility.

While the project agreement could draw upon national and international PPP experience, the project development agreement was largely created without the benefit of either national or international precedent. The scope and nature of the development related activities also exposed Project Co to a number of risks not normally assumed by a proponent in a Canadian PPP, including:

- Regulatory risk associated with bringing a facility application before the Alberta Utilities Commission;
- Risks associated with obtaining regulatory authorisations under environmental legislation; and
- Risks associated with proceedings brought to repeal or terminate any regulatory approvals previously obtained.

These risks were discussed extensively in collaborative meetings between AESO and proponents of the hybrid PPP during the 'request for proposals stage' of the competitive process, and were ultimately shared between AESO and Project Co. Project Co has general responsibility for timely acquisition of Alberta Utilities Commission approvals (including corridor approval) and environmental approvals. AESO bears the risks associated with:

- Delay or rejection connected to the regulatory approval process (provided Project Co has made and pursued bona fide applications in a timely manner).
- Proceedings which may be brought to repeal or terminate regulatory approvals which were successfully obtained by Project Co.

⁷ Ibid at 149.

Delayed financial close

The project development phase (which is expected to take up to 30 months) results in a significant period of time expiring between the Project being awarded and its financial close. This gap between award and financial close is much longer than is typical in most infrastructure PPPs in Canada where financial close occurs concurrently with or within a relatively short period following the project being awarded.

Some PPP processes do provide for a gap between a project being awarded and its financial close, generally to allow lenders to complete due diligence and review of the PPP agreements. This practice is however, inherently risky, since there is no guarantee that Project Co will be able to secure financing within the required timeframe or parameters. Other PPP processes mitigate this risk by requiring bid bonds, some insist on credit spread re-sets with bond mark indices to account for the passage of time from award to financial close, while others still contemplate no risk by requiring bids with underwritten financial commitments or by providing a stapled financing option.

Given the estimated 30-month development phase for the Project, no stapled, committed or quasi-committed (lender due diligence) financing options would be achievable. In addition, the potential for significant changes in commodity prices and base rates during this phase presented challenges in the development of a fixed-price competitive process, since the bidders would not be able to submit binding final prices in their bids. To address these issues, AESO developed a methodology in which:

- Bidders submitted 'indicative' financing plans and costs based on existing capital market conditions along with an indicative rating from a major rating agency.

- Plans and costs were evaluated by financial experts retained by AESO to determine whether they were credible, robust and deliverable under current market conditions.
- The bidder with the lowest credible, robust and deliverable bid is selected as the Project Co.
- Following the development period, the bid price is adjusted to account for inflation and changes in commodity and labour prices based on pre-determined indices (with a hard cap on construction cost increases).
- Project Co (with oversight from AESO) then runs a 'debt funding competition', in which potential lenders compete to provide committed financing for the Project, reflecting then current market conditions, with Project Co having responsibility for maintaining (during the gap), its and the project's creditworthiness for debt funding rating purposes.
- The debt funding competition seeks committed financing based on the bid's indicative plan and alternate structures determined by AESO and Project Co (if risk allocation is altered).

The indicative bid/debt funding competition was developed following extensive discussions with bidders and their financial partners. The debt funding competition also provides a mechanism which would allow and incentivise potential lenders to develop and submit innovative financial structures, which could further reduce financing costs.

Regulation by contract

The success of recent private investment in the transmission sector in countries like the United States and Brazil has demonstrated that, while the network must be operated by a government entity or system operator (like AESO) to ensure non-discriminatory access, private investment in the transmission sector is feasible, particularly when the investment is related to the construction and operation of discreet segments of transmission network, for which the private entity receives regulated revenue for complying with its contractual obligations relating to maintenance and performance.⁸

AESO's hybrid transmission PPP follows and builds on this success employing a model in which:

- Project Co becomes a regulated transmission facility owner under legislation and, therefore, subject to existing legislative obligations regarding ownership, operation and maintenance of transmission facilities in Alberta.
- Project Co is also governed by the requirements in PPP type agreements, including obligations relating to the development, design, construction, maintenance and (notably) stipulated performance of the transmission facilities.
- Following energisation of the Project, Project Co has a right to receive monthly payments which are fixed, contract based rates rather than typical regulated rates following prudency review.
- AESO, as the system operator, has all necessary rights and powers to operate the Alberta grid in accordance with its legislative mandate (and to direct Project Co to operate the transmission facilities under its control in a corresponding manner).

⁸ International Finance Corporation, 'Handshake Issue #13' (March 2014) at 62, online: <http://www.ifc.org/wps/wcm/connect/8337738043d4b1628717bf869243d457/Handshake_Issue13_Online.pdf?MOD=AJPERES>.

- AESO, as the counterparty to the PPP type agreements, is governed by its obligations and commitments to Project Co in the PPP type agreements in addition to its obligations under legislation.

Innovation

PPP proponents argue that “specifying outputs in a contract, rather than prescribing inputs, provides wider opportunity for innovation” and that competitive procurement “incentivises bidders to develop innovative solutions for meeting these specifications.”⁹ AESO concurred with this view and adopted this approach by detailing the functional specifications for the Project but not describing how such specifications were to be satisfied, thereby incentivising the bidders to provide innovative and lowest cost solutions; potentially to the advantage of future transmission development (PPP or otherwise).

Performance metrics

Using historical performance data from the Canadian Electrical Association and other sources relating to transmission facilities, AESO developed first-of-its-kind (for North America) performance metrics which were incorporated into the project agreement. Under the project agreement, if Project Co fails to comply with these metrics, AESO is entitled to make payment deductions. More significantly, AESO identified certain ‘major mis-operation events’ which could present risk to the reliability of the Alberta grid. In the event of any such major mis-operation event, Project Co is subject to significantly higher payment deductions and other consequences. The PPP based performance requirements are in addition to those generally imposed by Alberta law on utility owners and create the opportunity for improved performance of the grid.

Conclusions

Private investment in transmission facilities has been a successful approach to providing needed infrastructure development. PPP principles can be expanded and altered to account for the unique timing aspects and requirements of transmission facilities and their integration into a power grid. PPP contract based transmission development can be achieved without limiting the scope of responsibilities which are typically required of incumbent utilities. Adopting a PPP approach can reduce costs while allocating risk effectively, and bring innovation to power transmission system development. This case study is an example of how a hybrid PPP process can be expanded to new asset classes, including those such as transmission that are also subject to a regulatory regime.

[Norton Rose Fulbright acted as legal counsel to the Alberta Electric System Operator in respect of the regulatory approval, development and implementation of its hybrid PPP program for the Fort McMurray West 500kV Transmission Project. The Fort McMurray West 500kV Transmission Project is one of the most capital intensive PPP projects ever awarded in Canada and is the first such project awarded in the electricity transmission sector.]

⁹ Supra note 3 at 33.

5

Financing rail infrastructure projects in Africa – challenges and solutions

by Andrew Robinson, Durban and Andrew Buisson, London



The former chief economist of the African Development Bank, Professor Ncube, has forecast that growth in Africa will decrease to 4.5 per cent during 2015 and is unlikely to rise to more than 5 per cent next year. This is a consequence of the slowdown in China and the associated end of the ‘commodity super cycle’ that has driven the economies of Africa’s developing countries.

In contrast to this prediction however, the current value of rail projects across Africa is estimated at US\$495 billion. This represents a significant investment in a continent where less than 15 per cent of all freight is carried by rail and where urban centres have only just reached the required numbers to make mass inter-city metro transport a viable possibility.

Notwithstanding the gloomy growth outlook, the maintenance and development of transport infrastructure along the entire supply chain of the continent is seen as a pre-requisite to growth in Africa. This is particularly relevant where commodity rich African countries are landlocked, transport costs are considerably higher than in other regions and the transport network is either non-existent, antiquated or in a state of disrepair.

The global slowdown aside, appetite for investment in commercial rail projects remains. In this article we briefly discuss the three main types of rail project and set out, in general terms, the key challenges investors face. Not all of these challenges are peculiar to Africa, but investors who become involved in Africa-based projects have a much better chance of success when guided by local knowledge.



Main types of rail project

Rail projects in Africa can be broadly split into three categories.

1. Upgrade of existing rail networks

Existing rail networks in Africa are generally in fairly poor condition and require upgrades to rail infrastructure, stations and rolling stock, as well as network extensions, in order to adequately service passenger and freight demands. Often there will be existing state owned entities or other operators in place, and the planning and regulation of the various rail systems may vary in vision, content and implementation. Of course there are some areas, such as South Africa, where there have been well operated and maintained passenger services, regulated to some extent, as well as dedicated lines of high quality for the movement of commodities (a good example being the 861km Sishen-Saldanha iron ore line). In other areas, such as Namibia, local rail freight services have had to contend with a colonial rail infrastructure that cannot provide for extended freight rail services without considerable investment to upgrade the current track. The regulation of the rail system presents its own challenges: rail safety regulators may well be found for passenger rail issues – but economic rail regulators – or even operational regulators – may be needed to control issues such as tariffs, line access and utilisation.

There is also significant scope for confrontation between the state's operation of rail infrastructure and rolling stock and the requirements of private operators. For example, long-term issues may arise if the operators do not adhere to standards placed upon them by the state, whilst the state in turn may utilise the line in a much less regulated way, leading to infrastructure, maintenance, environmental, health and safety and possibly social issues.

Whilst development of appropriate regulations is a positive step, longer-term investors will want some kind of certainty that this development will not radically affect their investment assumptions. If the cost of complying with new regulations cannot practically be passed to customers, then the investors may wish to look for an appropriate stabilisation regime, either in terms of exemption from application of new laws or a right to be kept in a financially neutral position.

2. Pit to Port developments

So-called “pit to port” developments may take place outside the regulated networks and often require the creation of new lines. These developments are mostly driven by mining companies or specialist logistics providers with varying levels of government support; there are good examples of major projects (both underway and planned) in Mozambique, Cameroon, Guinea and Liberia, amongst others. Investors in mining projects are used to taking the significant development risk involved in mining ventures and to that extent are also used to taking the risk of developing the associated infrastructure, but where the infrastructure provides a long-term public benefit, for example by opening up potential corridors for other mineral developments, there may be grounds for the government providing a greater level of commercial support, for example, by underpinning part of the debt and/or guaranteeing levels of traffic.

Third-party track access arrangements can be a key issue in these projects. Governments will want to avoid a situation where they have provided a long-term concession to a monopoly user which then effectively locks out potential opportunities for others by refusing access; accordingly, many projects have built in the concept of an agreed methodology for allowing third party access based on the new users taking on an appropriate share of the initial infrastructure cost. In certain appropriate circumstances the state may also wish to impose a public service (passenger) requirement on the line, however there may be practical limitations to this given the very different requirements of passenger trains and freight trains (in terms of speeds and stopping times).

If a proposed line can practically facilitate other freight and passenger options, this clearly creates efficiencies and reduces dependency on a single commodity. This may be the point to consider whether the rail line can then be spun off as a stand-alone project, helping to develop a new “transport corridor” for the country. This in turn would reduce the financing burden on the mining project which originated the line, but at the expense of creating a dependency to the extent the line falls outside its control.

3. Urban/Metro developments

New metro projects often create their own standalone networks, but these projects can be highly technical, and therefore have their own complications in terms of structuring and funding. The general view is that it is very difficult to make greenfield metro projects self-funding, even in developed countries, and virtually all demand-risk metro projects have failed to meet their original traffic projections. In practice this means that the government would need to retain a significant portion (if not all) of the demand risk to make it externally financeable.

Nevertheless it is possible that this assumption could be challenged by developments in some major cities in Africa, where an urban metro scheme would offer significant time benefits against chronic congestion (where road infrastructure has not kept up with increased private car use), which may mean that passenger numbers may be high enough to secure appropriate financing even on relatively low fares. However, to date there are limited examples of existing urban/metro projects in Africa. The Gautrain project in South Africa provides a good example of a greenfield inter-urban rapid transit railway system; more recently a new light rail system has been inaugurated in Addis Ababa in Ethiopia, being the first project of its kind in sub-Saharan Africa, conceived with the assistance of Chinese export finance.

Moving forward – the role of the state in rail projects

In most African countries the ‘below’ rail (fixed infrastructure) and ‘above’ rail (rolling stock) assets are owned or controlled by the state, usually through state-owned enterprises. While the state may subcontract certain of its obligations to concessionaires, franchisees, haulage operators or similar entities, funders are for obvious reasons more attracted to those rail infrastructure projects which are guaranteed by the state. Accordingly, the state clearly has the principal role to stimulate ongoing development in the network.

Public Private Partnerships (PPPs) are a means to do this, but have not been as successful in Africa as had been hoped. Where they have been used, the best capabilities of both the public and private sectors have not consistently combined to produce mutually beneficial results. Some private investors are reluctant to commit their resources over the length of time necessary for a PPP to operate efficiently, and another key issue associated with PPPs is the length of time the process can take to produce the public infrastructure required. While politicians are keen to promise and deliver the desired infrastructure quickly, and need privately available skills to do so, the state usually wants to preserve all its decision-making prerogatives. The state may also underestimate the time needed to conduct a transparent and competitive procurement process, as well as the time that private investors need to undertake the appropriate feasibility studies in order to develop a business case and secure all the necessary permits and approvals. This will be exacerbated where the project is greenfield and faces the difficulties involved with accurately predicting the demand risk.

Some PPP projects have been criticised because they have not clearly defined the expectations and roles of the government (and its various departments) and the private participant. The high level of interface with the existing built environment or over a significant corridor means that rail projects can involve a large number of government departments for approvals. Projects can be held up indefinitely for want of political will to free up the rail corridor or provide other approvals. Even where government guarantees exist, investors and lenders will want certainty the project is going to work rather than falling back on a guarantee that may be difficult to enforce in practice.

Rail gauges

Many rail projects in Africa face two fundamental issues: firstly, a disconnected, extremely old and poorly maintained rail system, and, secondly, a number of gauges that do not facilitate an efficient commercial or metro rail service, most commonly Cape gauge (1067mm), as well as a large extent of 1.000m narrow gauge.

There seems to be general agreement that new projects should be based on standard gauge (1435mm). There are several instances throughout Africa where direct access to commodities or ports is hampered by the fact that, across the various regions through which the rail line proceeds, different gauges have been used.

Any project must therefore consider whether it is better to simply refurbish the narrow gauge line or to replace it with a standard gauge line to increase speed and capacity on the network. By way of example, Nigeria is taking the latter approach with the current upgrade of the line between the capital Abuja and Kaduna in the north-west of the country.

Standardisation of gauge will also assist intra-regional connectivity where similar projects are taking place in neighbouring countries, and intergovernmental agreements have already been signed among Kenya, Uganda and Rwanda to this effect.

Interconnectivity

The African railway system is not interconnected. While there may be some major arterial rail links, there is very little incentive to develop branch lines, as it is simply not economically practical to build or operate them. One overall strategy appears to be to develop a standard gauge North/South line, and to develop branch lines that would serve major metropolitan, industrial and natural resource nodes. As Africa has sought to introduce the concept of commodity beneficiation, raw materials are now more likely to move from a mine to a processing plant, and then on to a port for export, and this in turn is a driver for new rail infrastructure development (such as that proposed in the Zambian copper belt). In certain circumstances, specialised products need to be brought in to assist in the beneficiation process, which requires bespoke rail wagons and improved rail infrastructure. If these have not been built, purchased or developed, then the main rail initiative, focussing on the export of beneficiated material, may simply not be feasible.

Maintenance

There have been numerous transport surveys and strategies that have highlighted the lack of transport and logistics skills generally within Africa. This is of major concern to investors for whom the repair and maintenance of locomotives, rolling stock and rail infrastructure is pivotal to the financial sustainability of any project. Locomotives require very careful monitoring and maintenance schedules, as well as suitably equipped workshops to carry out this process. Consequently most rail projects will require that these facilities and related skills be provided.

Technical expertise and power

A further issue relating to the maintenance of locomotives and rolling stock is the need for a sufficient pool of skilled labour and technical expertise. It is often necessary to ensure that there are proper plans in place to retain, recruit and/or adequately compensate skilled employees to avoid any delays, increased costs or projects being abandoned. Transport skill migration is a legitimate worry for rail operators. These skills are much sought after, but as a consequence of the inattention paid to rail infrastructure generally, little has been done to maintain a constant supply of employees with these skills.

In addition, an adequate and regular supply of diesel and electricity form a critical part of the operation of any rail system. However, the ability of the relevant utility provider to produce sufficient uninterrupted power can sometimes present a challenge.

The importance of continued economic growth

Most investors will only be able to fully achieve their objectives if the economy in the country in which they have invested continues to improve, or at least avoids any material adverse decline. Investment into African infrastructure projects is regarded as high return, but also high risk. The recent (and hopefully short-term) decline in demand for Africa's resources has seen a growth slowdown, which has not been helped by other socio-economic difficulties including foreign currency shortages, disease, civil unrest, unemployment, and shortages of skills, food, manufactured goods, fuel and electricity.

The applicable law

Most African infrastructure deals are contracted under local laws, which is usually mandatory when contracting with the state. In contrast many other contractual arrangements, such as for construction, supply of equipment and financing are often made subject to the laws of other jurisdictions on grounds of legal certainty or to reflect the provenance of the relevant services.

The international nature of the projects means that care must be taken to ensure that any dispute can be referred to suitable tribunals, and that any foreign award can be enforced in the jurisdictions of both the project assets and the project parties. It is also important to establish how the local judicial structure will respond to matters where urgent relief is required or where rights need to be enforced. It is always useful to have a good understanding of the efficacy of the court system, the costs involved in the legal process (in some jurisdictions court costs can be prohibitive), and the general ability of the courts to have judgements or orders enforced.

Where it is difficult to get substantial certainty investors may consider insuring against political risk, such as the risks of expropriation, restrictions on repatriation or exchange of funds or the general risk of a state entity defaulting on its obligations. In addition, the use of development banks to co-finance a project will give a measure of stability (given that the same institutions often hold the purse strings for bilateral loans). Furthermore, the project may be structured so as to use appropriate investment vehicles in order to benefit from bilateral investment treaties (BITs) which provide legal coverage for a range of political risks, and also may provide for ICSID-administered arbitration, which brings in the implicit support of the World Bank to ensure that judgments are satisfactory.

Prepare for the unexpected

A carefully crafted force majeure clause is essential – it is most important that an investor is aware of local or territorial circumstances that may arise and which could prevent one or both parties from performing any contractual obligation. One method of spreading certain risks is to ensure that appropriate insurances are in place in respect of parties who may be unable to fulfil their obligations, or are in breach of the obligations they are supposed to fulfil. Investors must also consider what risks are uninsurable, or cannot be economically insured, and make appropriate arrangements in that regard.

Many contracts with state entities make a distinction between political and non-political force majeure; political force majeure being those events where the government has a greater degree of influence (expropriation, hostilities, national strikes, interference by government authorities), and therefore the government may be asked to give a greater degree of financial protection (for example, a “make whole” provision, or a right of termination with return of profit). This category also often includes protection against changes in law or the regulatory approach of government departments (especially where consents have additional conditions imposed) or this may be dealt with through stabilisation clauses. These provisions may be necessary in the absence of the other legal routes of protection referred to in the previous section.

Some African rail infrastructure projects have attracted funding by providing a sovereign guarantee that debt will be underwritten in the event of default, however this of itself does not always guarantee an exit route where the project is not delivering. For example, if the concessionaire defaults the government might choose not to exercise its right to terminate the project in which case that project may lie in limbo indefinitely, and the lenders may still have to find an alternative work-out solution or negotiate with the government for an early exit. To that extent, the sovereign guarantee is not always a panacea against project risk.

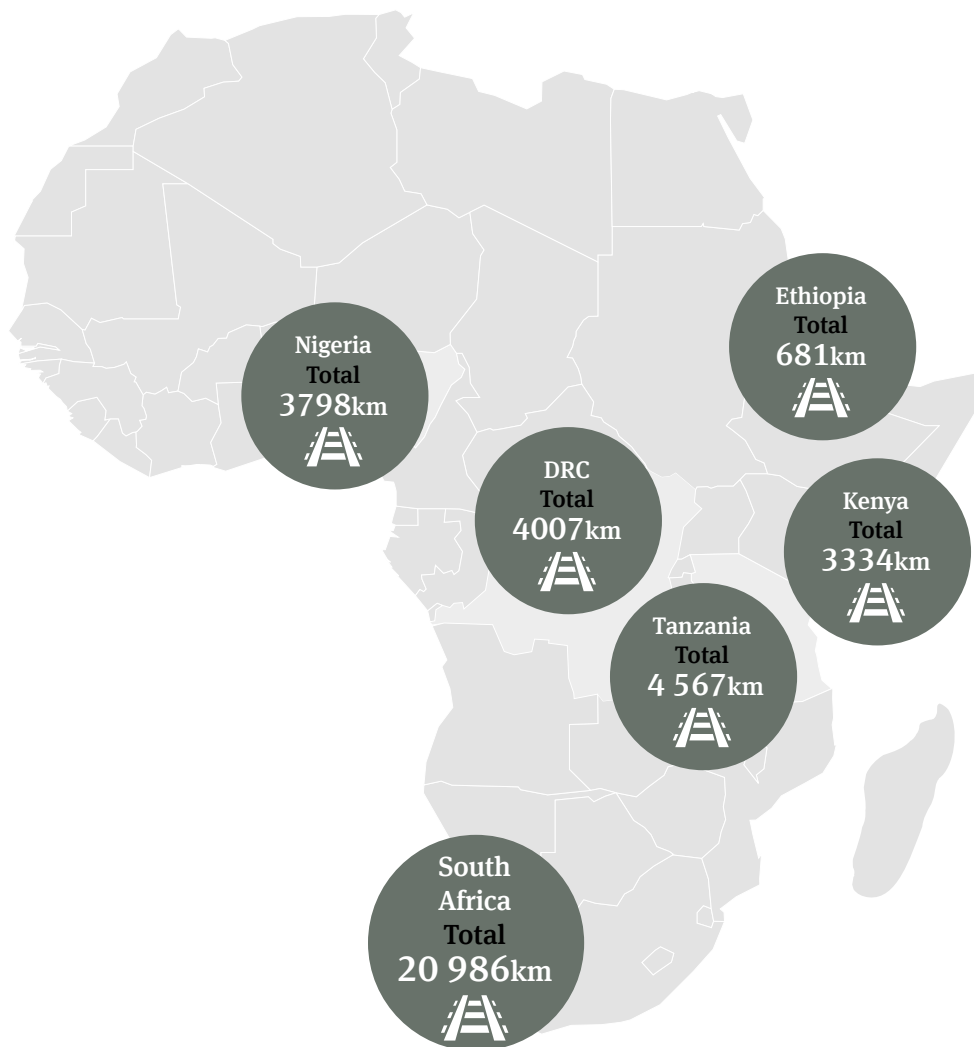
Conclusion

Like any developing investment environment, Africa is not without its challenges and obstacles. What is very clear is that a broad experience of different solutions for transport infrastructure projects, coupled with appropriate “in country” knowledge of how to overcome and avoid the challenges and obstacles that are specific to each market, will be vital to the success of any venture.

Rail network lengths and gauges

Rail network lengths in selected key African economies (km)

Country	South Africa	Tanzania	DRC	Nigeria	Kenya	Ethiopia
Total	20 986	4 567	4 007	3 798	3 334	681
Cape gauge (1067mm)	19 756	1 860	3 882	3 505	–	–
Standard gauge (1435mm)	80 (electrified)	–	–	293	–	–
Other narrow gauge (1000mm)	–	2 707	125	–	3 334	681
Of which electrified	80 (standard) 8 271 (Cape)	–	858 (Cape)	–	–	–



**Information taken from the CIA World Fact Book – <https://www.cia.gov/library/publications/the-world-factbook/fields/2121.html> (2014)

New/Pipeline projects



Upgrade of existing rail networks

Nigeria – standard gauge modernisation project (upgrade of 2753km of Cape gauge line)

Tanzania – intermodal and rail development project: Dar es Salaam – Isaka

Kenya – new standard gauge 609km railway line: Mombasa – Nairobi

Ethiopia – 780km electrified link from Addis Ababa to Djibouti



Pit to port developments

Guinea – Rio Tinto project to link Simandou mine to Guinean coast (iron ore)

Mozambique/Malawi – Vale project to link Moatize to Nacala via Malawi (coal)

Cameroon/Congo – Sundance project to link Mbalam/Nabebe mines to Cameroon coast (iron ore)

Zambia – Grindrod project to link copperbelt mines/smelters with existing rail network

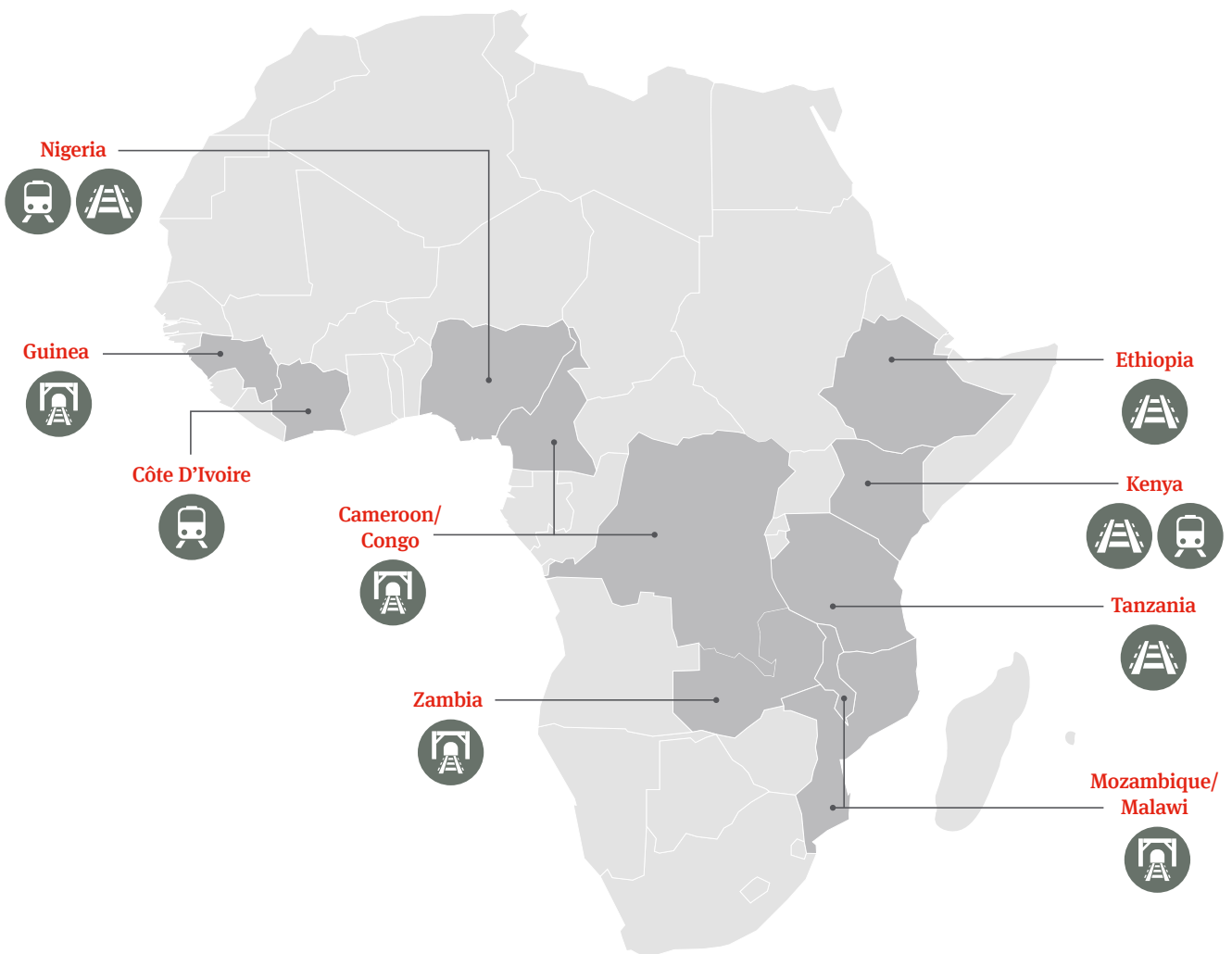


Urban/metro developments

Nigeria – Blue line (east-west) and Red line (north-south) metro lines in Lagos

Kenya – Nairobi commuter rail project

Côte D'Ivoire – Abidjan metro line 1 project



6

Global safety trends in infrastructure

by Caroline May, London and Aaron Anderson, Brisbane



Background

Globally, the construction industry accounts for at least **60,000** workplace deaths a year



Mining employs around **1%** of the global labour force, yet generates **8%** of fatal accidents.

The construction industry is inherently hazardous due to the nature of the work being carried out. As a result, the industry sees a high number and rate of work-related injuries, illnesses and fatalities. Similarly, “each year, a large number of fatalities occur in mines globally. Most of these fatalities occur in developing countries and rural parts of developed countries. Nonetheless, even in the United States an average of 93 people died in mining accidents during the period 1991-1999 ... Currently, China accounts for a large proportion of mining accident related fatalities, particularly in the area of coal mining” (Dhillon, 2010).

This infographic seeks to present a snapshot of recent global trends in infrastructure, construction and mining safety by analysing critical risks in the sectors and reviewing recent accident data and case law on health and safety matters in these industries globally. We also provide some high level thoughts on risk management tools and proactive approaches in safety management given the data represented in the infographic.



Work health and safety on construction sites globally

Most common causes of incidents

In 2012, there were 1,500 workplace accidents in Ho Chi Minh City, killing 106 people, an increase of 13 deaths from 2011. Nearly 50% of these accidents occurred at construction sites.

A 2007 study of the construction industry in Thailand identified that the 4 most common types of accidents are:

- Workers being cut or pierced by sharp objects
- Objects collapsing or falling
- Objects in workers' eyes
- Workers being hit by objects

Electrocutions are the fourth leading cause of death among construction workers in the United States. An average of 143 construction workers are killed each year by contact with electricity (based on US Government data for 12 years, 1992 through 2003).

More than 1 in 5 (22.2 %) fatal accidents at work in the EU (+Croatia) in 2012 took place within the construction sector.

A 2015 Eurostat report published that in 2013, the following number of fatal work accidents occurred in the agriculture and construction industry:

- 616 in France
- 463 in Italy
- 422 in Germany
- 252 in Romania
- 235 in the UK
- 232 in Spain
- 227 in Poland
- 130 in Australia

Recent incidents on mining sites

In the US, between 2003 and 2012, leading major causes of underground mining fatalities accounting for 90% of injuries:

- Fall of ground (32%)
- Ignition, explosion of gas or dust (23%)
- Powered haulage (22%)
- Machinery (10%)
- Slip or fall of person (4%)

Between 2007-2008 and 2011-2012 36 mining workers died from work-related injuries in Australia.

On August 12 2015, the same day as the explosion in a Tianjin chemical warehouse, a vanadium mine in the Shaanxi province collapsed and buried at least 65 people under a landslide.

Although safety in the Chinese mining industry has undergone significant improvements, it still has one of the highest incident rates across the world:

- there were almost 2,000 fatalities in Chinese coal mines in 2011 and about 1,000 fatalities in 2014
- 66 miners died in a 1.5 mile wide landslide at a Tibetan mine in 2013
- 13,000 miners suffered accidents at work in Turkey in 2013
- 17 people died in an explosion in a Russian coal mine in 2013

An Australian mechanical engineering student investigated international mining fatality databases and found that:

“the main root cause of death in mining operations as seen from the review is Fall of Roof/Sides/Highwall and accounts for approximately 24% of all mining fatalities. Unintended Operation of equipment follows second accounting for 13% of all mining fatalities and Fall from Heights third at 9%” (MacNeill, 2008)

Critical risks

What are critical risks?

“Certain risks, while remote, have such severe consequences that they deserve attention disproportionate with their risk score [under the traditional risk management approach]. In the safety context, fatal risks fall in that category. These risks are called critical risks.” “While critical risks are often defined as low frequency, high consequences events, they are better understood as risks of a catastrophic event, regardless of the likelihood. A high frequency, high consequence event does not cease to be critical; it is just that the traditional risk management approach operates effectively to address it. By contrast, traditional risk management is ineffective in managing high consequence, low likelihood events because the low likelihood disguises the nature of the risk. However their catastrophic consequences make them a priority for the officers of the organisation.”

Hints for managing critical risks

- ✓ **Identify**
Current control measures for critical risks
- ✓ **Ask**
Are the control measures working effectively?
Have you built in multiple controls for the risks?
- ✓ **Fresh eyes**
Conduct risk assessments & bow tie analyses
- ✓ **Focus**
On the critical controls identified in the analyses
- ✓ **Resource**
Critical control implementation
- ✓ **Develop**
Performance indicators focused on effectiveness of critical controls
- ✓ **Monitor**
Performance of critical risk controls through scrutiny of KPs, incidents, audits, discussions, safety observations
- ✓ **Respond**
When information indicates that change or intervention is needed

Critical risks in construction

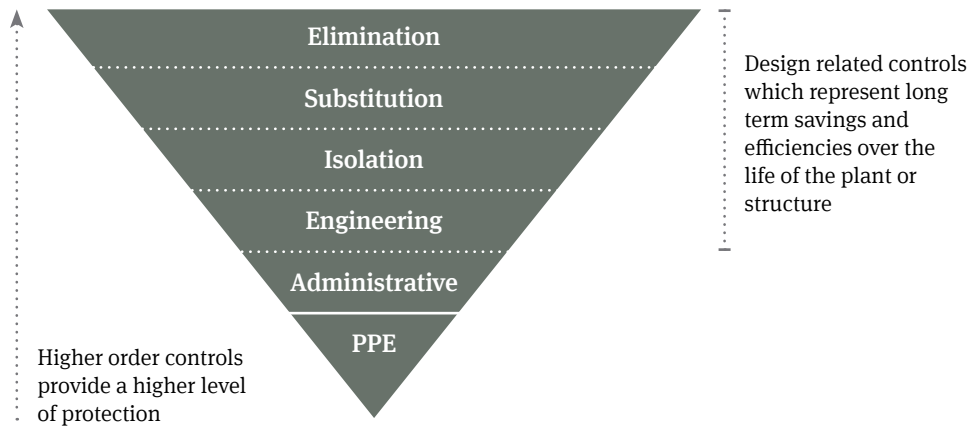
1. Working at height
2. Working underground
3. Machinery, plant and equipment
4. Hazardous substances
5. Electricity

Critical risks in mining

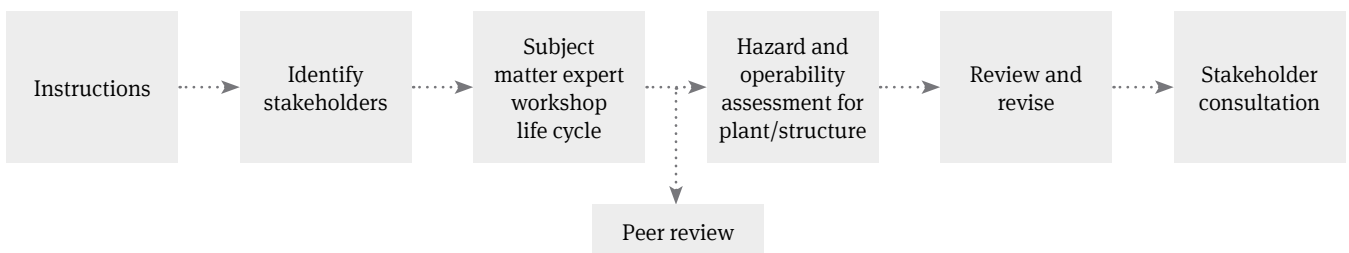
1. Fall of roof, sides or highwall
2. Unintended operation of equipment
3. Fall from heights
4. Gas ignition explosion
5. Electricity

A proactive approach to safety in design for infrastructure

Hierarchy of controls



Safety by design lifecycle



Key takeaway messages

1	2	3
Identify your organisation’s critical safety risks	Review controls in place for managing your critical safety risks, ensure multiple redundancies for resilience and realign systems where necessary	Adopt a safety in design lifecycle approach to all processes, systems, plant and structures

Case studies

China

Tianjin explosion

Two explosions at a port containing flammable and hazardous chemicals killed approximately 147 people on 12 August 2015. Investigations into the cause of the blast continue, however BBC reported that calcium carbide may have been exposed to water that was being used to control a blaze, creating a high explosive gas blast which may have then detonated other chemicals.

It has been reported that authorities found 3 waste water discharge monitoring stations in the evacuated area which revealed excessive levels of cyanide. One station recorded a level that was more than 27 times the standard limit. At least 1 employee of Tianjin Dongjiang Port Ruihai International Logistics has been arrested.

Key lessons

Ensure there is no risk of hazardous substances reacting to cause an explosion. Enforce strict policies monitoring the levels of such substances.

USA

Upper Big Branch coal mine explosion

The 2010 Upper Big Branch coal mine explosion in West Virginia, US, led to the deaths of 29 workers. David Hughart, a former executive of Massey Energy pleaded guilty to concealing safety violations from federal inspectors and was sentenced to nearly 4 years in prison and 3 years of supervised release for all of the offences linked to the disaster.

“The basic mechanics of the explosion were aided by the mine’s poor ventilation, inoperable sprinklers, worn and unmaintained equipment, and inadequate rock dusting. These conditions, in turn, were the product of the criminal corporate culture at Massey Energy, which placed production ahead of miners’ health and safety.”

Key lessons

A focus on critical risks and their management is required to avoid catastrophic disasters.

New Zealand

Royal Commission on the Pike River Coal Mine Tragedy (30 October 2012)

A New Zealand underground coal mine on the West Coast of New Zealand’s South Island exploded in November 2010, killing 29 men immediately or shortly afterwards from the blast or toxic atmosphere.

“The company did not have a clear strategy from the board that set out its vision, objectives and targets for health and safety management... The Pike health and safety management system was never audited internally or externally. If it had been, deficiencies would have been identified, including the gap between the standards and procedures laid down in the Pike documents, and the actual mine practices.” (Royal Commission on the Pike River Coal Mine Tragedy, 2012)

Key lessons

Audit systems to ensure they are effective.

Australia

Department of Workplace Health and Safety v Allscuff Systems and Ralph Michael Smith 2015

A swing stage platform and associated rigging components detached, falling 26 levels from the side of a high-rise building under construction on Australia's Gold Coast, leading to the death of two employees working on the work platform.

"The swing stage suspension system installed was not consistent with either the information contained in the manufacturer's documentation nor the relevant Australian standards. In short, the gross deficiencies identified shows that the method of construction – rather, the method of connection between the counterweight box and the swing stage suspension needles was woefully inadequate."

(Department of Workplace Health and Safety v Allscuff Systems and Ralph Michael Smith (unreported, 27 February 2015, Magistrate Kilmartin))

In light of Allscuff Systems' "gross negligence and foolishness", it was fined \$700,000. The Allscuff officer, Mr Smith, received a suspended sentence of 12 months imprisonment.

Key lessons

Identify all standards relevant to your operations and apply them.

China

Xiaojiawan coal mine disaster

On 29 August 2012, a gas explosion inside a coal mine in the Sichuan area killed 45 workers. A further 54 were injured. The Government had announced in May 2012 that it would shut down 625 coal mines by the end of the year, in an attempt to minimise the dangerous conditions faced across the country. According to the director of the State Administration of Coal Mine Safety, the carbon monoxide levels in the tunnel where the miners were trapped was high and the roof was collapsing. The rescue was therefore very difficult.

Key lessons

Design and implement ventilation systems that will ensure the health and safety of workers, particularly in emergency evacuations.

Britain

Building collapse in central London

A worker died in April 2014 when a mini-digger fell from the 2nd floor of a 6-storey building in Mayfair, London to the 1st floor below. The building was undergoing demolition work to be converted into residential property when a mini-digger demolishing a concrete floor slab of approximately 12 square metres fell, crushing the worker. The operator of the mini-digger was also taken to hospital with minor injuries and was released later that day.

Key lessons

Consider design of operations where there is interaction between different work crews and coordinate activities.

Consider effective use of exclusion zones.

Sources

Asia News Network- 37 miners confirmed dead in Sichuan colliery blast, 2012, <http://jnews.asiaone.com/jNews/AsiaOne%2BNews/Asia/StoryjA1Story20120831-368785.html#sthash.18usYxs6.dpuf>

BBC News – The dangers of mining around the world, 2010

BBC News- Turkey's mining safety: Bleak track record, 2014

Deloitte – Tracking the trends 2014, The top 10 issues mining companies will face in the coming year, 2014

Department of Workplace Health and Safety v AllscuffSystems and Ralph Michael Smith (unreported, 27 February 2015, Magistrate Kilmartin)

Dhillon, B. (2010) 'Mine safety: A modern approach', Springer

Eurostat – Statistics explained, http://fec.europa.eu/eurostat/statistics-explained/index.php/Accidents_at_work_statistics

Evening Standard- Worker killed by falling digger on London building site named as Dainius Rupsys, 2014, <http://www.standard.co.uk/news/london/londonworker-killed-by-falling-digger-on-london-building-site-named-as-dainius-rupsys-9259677.html>

Health and Safety Executive- Health and safety in construction in Great Britain, 2014

Horny, L. Shepherd, C. China's president vows to investigate deadly port blast, 2015

International Labour Organisation- Joint Press Release ILO/WHO Number of Work related Accidents and Illnesses Continues to Increase ILO and WHO Join in Call for Prevention Strategies, 2005

Kohler, f. 20 IS. Looking ahead to significant improvements in mining safety and health through innovative research and effective diffusion into the industry. International journal of Mining Science and Technology 25(3)

MacNeill, P. (2008) International Mining Fatality Database, http://www.resourcesandenergy.nsw.gov.au/f_dataf_assets/pdf_file/0009/182484/International-Mining-FatalityDatabase-project-reportpdr

Mining Examiner- Former Massy executive gets 42 months in jail over Upper Big Branch tragedy, 2013

People's Daily- Sodium cyanide in Tianjin to be collected, neutralized soon, 2015, <http://en.people.cn/n/2015/0817/fc90882-8937301.html>

Royal Commission on the Pike River Coal Mine Tragedy, 2012

Safe Work Australia – Work-related injuries and fatalities involving a fall from height, 2013

Safe Work Australia – Work Health and Safety Perceptions: Construction Industry, 2015

Safe Work Australia- Mining Fact Sheet, 2013

Srinavin, K. (2007). Characteristics of accidents on construction work in Thailand and prevention guide. CIB World Building Congress, 1168-1175

Thanh Nien News- Workplace accidents on the rise in Vietnam, 2013, <http://fwwww.thanhniennews.com/society/workplace-accidents-on-the-rise-in-vietnam-64S.html>

United States Department of Labor – Commonly used statistics, <https://fwww.osha.gov/foshstats/commonstats.html>

7

Developing R&D and manufacturing infrastructure in the life sciences sector

by Matt Hardwick, Sonam Kathuria and David Carter, London

As with the other process sectors, the life science industries (comprising the pharmaceuticals, biotech and medical technology industries) rely on the construction and operation of high value and complex process plant infrastructure.

One of the distinguishing features of the life sciences industries, in contrast to the wider process sector, is the robust, complex and rapidly evolving regulatory landscape to which they are subject. This undoubtedly impacts on the way in which process plant infrastructure will be procured and delivered in these vital sectors.

What merits particular attention from a regulatory perspective is the concept of Good Manufacturing Practices (GMPs). As part of the wider quality management system, GMPs set down regulatory guidelines on good practice for the manufacture of active pharmaceutical ingredients. GMPs represent the minimum standards that must be achieved before developer is granted a licence to manufacture.

Directly connected with this, and in addition to more general requirements around product safety, are requirements around anti-contamination procedures and controls and accordingly the reliance that these industries place on so-called 'clean room' technologies.

The interface between these clean room technologies and the process infrastructure they house creates particular issues to be considered when formulating contractual structures for the delivery of relevant process plant infrastructure.

In this article we will consider the key issues from a regulatory, risk allocation and contract structuring perspective that will be relevant for developers of process plant infrastructure when seeking to secure project realisation in accordance with their key time, cost and specification requirements.

Overview of the sector and outlook

Demographic changes in both developed and emerging markets are culminating in an increasingly ageing population globally. It is believed that this, along with growing populations and growing affluence in emerging markets, is likely to translate into increasing life sciences spend in the coming years.

The EIU estimate increases in global pharmaceuticals sales by 6.9% per annum between 2014-18.¹

The development of new manufacturing and R&D facilities by life sciences companies directly or through partners is likely to increase as a result of a variety of factors:

- The trend away from ‘volume’ based care to ‘value’ based care, arising in part from a desire by governments and other payers to control healthcare spending, is likely to spur R&D in existing drugs and treatments as life sciences companies look to enhance the real-life effectiveness of existing treatments and seek to maintain market share and profitability.
- There will be a need for new facilities to maintain market share or to achieve market penetration as demand for treatments in emerging markets grows, particularly if emerging economies seek to impose import controls and requirements for domestic production to stimulate local manufacturing investment.
- R&D advances will see the development of new treatments, technologies and drugs that life sciences companies will look to commercialise quickly to best secure a competitive advantage.

While the industry outlook is generally encouraging, there are a number of key challenges facing those operating in the sector, such as (i) impending patent expiry cliffs for ‘blockbuster’ drugs, (ii) increased competition from generics, bio-similars and the emerging markets generally and (iii) governments and the other payers increasingly looking to control costs (e.g. through price controls).

So, despite the positives outlined above, it is likely that there will be those operating in the sector who may experience a squeeze on returns and profitability in the near to medium term.

It will therefore be essential for those developing new R&D and manufacturing capacity to carefully consider the types of issues raised in this article in order to properly manage the risks associated with infrastructure delivery:

- to secure access to market within projected timescales
- to achieve anticipated returns and profitability from new products/markets; and
- more widely, to maintain market share and projected growth rates.

Good Manufacturing Practice (GMP)

Regulatory requirements in the life sciences industries will impact on the way in which process plant infrastructure is procured and delivered. Of particular significance is the requirement for GMP compliance.

In broad terms, GMP can be described as the minimum regulatory standards that a manufacturer must meet in its production and manufacturing processes in order to obtain and maintain a license to manufacture.

It will be helpful, for the purposes of this briefing, to provide a high level overview of the regulatory framework under which these requirements are implemented. More detailed and jurisdiction specific advice should of course be sought on a case-by-case basis.

The World Health Organisation

At a global level, the World Health Organisation (WHO) has established its own GMP guidelines which tend to be applied mainly in developing countries. The WHO recommends several types of inspection for manufacturing facilities to establish and monitor GMP compliance and will make recommendations for regulatory actions in the case of non-compliance. The WHO GMP guidelines and requirements are often adjusted to meet local conditions and defer to the licencing, inspection and enforcement of the national regulatory body.

The GMP standards of the WHO can be found generally in the GMP standards of developed countries, where they typically form a sub-set of more detailed quality and safety assurance systems.

European Union

Under EU law, all manufacturers and importers of medicines located in the European Economic Area must hold a manufacturing licence.

¹ World Industry Outlook: Healthcare and Pharmaceuticals; Economist Intelligence Unit, May 2014.

Whilst the European Medicines Agency (EMA) oversees and coordinates compliance monitoring, the licencing regime is managed by the regulatory authorities of the individual Member States, which are responsible for issuing licences for activities taking place within their territories.

In particular, the regulatory authorities are required to perform all necessary inspections to ensure that applicants for and holders of a manufacturing licence adhere to EU-level principles and guidelines of GMP.²

United Kingdom

In the UK, the Medicines and Healthcare Products Regulatory Agency (MHRA) is the competent or relevant regulatory authority. In compliance with EU law, in order to make, assemble or import medicines in the UK it is necessary to first obtain a manufacturer's licence.

The MHRA will only issue a licence to manufacture when it is satisfied, following an inspection of the site of manufacture, that the facility and the site conforms with GMP. Following issue of a licence, the MHRA will then perform periodic inspections to assess compliance with the relevant regulatory requirements, including GMP and compliance with the provisions of the manufacturing licence. Critical deficiencies identified during any such inspection may lead to revocation of the manufacturing licence and/or criminal sanctions.

United States

In the US, whilst the activities of the Food and Drug Administration (FDA) are much broader than the activities of EMEA and the MHRA (i.e. not being limited to pharmaceuticals regulation alone), its role with regard to pharmaceutical regulation is broadly similar.

The FDA uses the term 'current' GMP (cGMP) in the context of the manufacture of pharmaceutical products to emphasise that manufacturers have to employ up-to-date technologies and systems to comply with regulation and to be licenced to market and have the right to manufacture.

The approval and licencing process for new drug and generic drug marketing applications includes a review of the manufacturer's compliance with the cGMP. FDA inspectors will determine whether the developer has the necessary facilities, equipment and skills to manufacture the new product for which it has applied for approval. Decisions regarding compliance with cGMP regulations are based

upon inspection of the facilities, sample analyses, and the compliance history of the developer.

The FDA can issue a warning letter or initiate other regulatory actions against a company that fails to comply with cGMP. Failure to comply can also lead to a decision by the FDA not to approve an application to market a drug and the withdrawal of the right to manufacture.

International Harmonisation

The International Conference on Harmonisation of Technical Requirements for Registration of Pharmaceuticals for Human Use (ICH) has representatives from the regulatory agencies and the pharmaceutical industries of the EU, the US and Japan. The ICH's primary objective is the harmonisation of regulatory requirements related to quality, safety and efficacy of medical products and to support mutual recognition among the three regulatory authorities.

The key achievement of ICH has been the harmonisation of GMP among the relevant regulatory authorities through the Good Manufacturing Practice Guide for Active Pharmaceutical Ingredients. This was developed and recommended for adoption in the EU, Japan and the US in 2000.

Note that there is an important difference in perspective between the EU/Japan approach and the US, with regard to demonstrating compliance. For the EU/Japan, more reliance is placed on written procedures (such as SOPs), as sufficient evidence of GMP compliance. For the US, such procedures are only a beginning of such evidence with batch records, in-process sampling, and final release data as requisite endpoints of showing GMPs being met.

Qualification and Validation

'Qualification' and 'validation' requirements represent subsets of the more general GMP requirements. It will be helpful for the purpose of this briefing to consider these aspects of GMP in high level terms to provide the reader with a view of the specific areas that the relevant authorities will be assessing to establish whether or not the developer has demonstrated GMP compliance.

We will later go on to consider how the risk of GMP compliance in this regard may be managed through the supply chain with particular focus on the testing and handover of the plant.

² The principles and guidelines are prescribed in Commission Directive 2003/94/EC and the legal basis for the guidelines arises from Art 47 of Directive 2001/83/EC and Art 51 of Directive 2001/82/EC.

It is worth noting that in Europe, recent updates to guidance in respect of qualification and validation requirements³ have been introduced to update and modernise the relevant regime and to more generally bring the guidance in line with FDA Guidance on Process Validation.

Qualification

Qualification requirements typically apply to equipment, facilities, utilities or systems and fall within the following key categories:

Installation Qualification (IQ) – this will include verification that the relevant item conforms with the specification, that there has been correct installation of components, instrumentation, equipment, pipe work and services against the engineering drawings and specifications and that there has been verification of the materials used in construction.

Operational Qualification (OQ) – this will include verification that the relevant item achieves the specified operational requirements (throughput, power consumption, confirmation of upper and lower operating limits).

Performance Qualification (PQ) – this will include the testing of the item as per the OQ, but this time at full load/throughput. So, the tests will use manufacturing materials in a ‘live’ operational environment.

The categories above and the criteria under each category will vary depending on the relevant project circumstances. The qualification requirements will typically be performed in the sequence above but there may be justification, for instance, in running the PQ at the same time as the OQ and process validation.

The qualification tests may also be supplemented with design qualification tests, factory acceptance testing and site acceptance testing.

Process Validation

Process validation is documented evidence that the process, when operated within established parameters, can perform effectively and reproducibly to produce a medicinal product meeting its predetermined specifications and quality attributes.⁴

The traditional validation process involves a number of batches of the finished product being manufactured

under routine conditions to confirm reproducibility. In contrast, continuous process verification provides for the manufacturing process performance to be continuously monitored and evaluated. The continuous validation approach may be used where it has been established during development that the relevant control strategy provides a high degree of assurance of product quality. Nevertheless, the continuous validation process may be used in addition to or instead of the traditional validation process, this is often referred to as the hybrid approach to process validation.

Ongoing process validation through lifecycle is a requirement under the FDA and now the EMA guidelines. This is in addition to the traditional, continuous or hybrid approaches that may be employed. The rationale here is perhaps obvious, manufacturers should monitor product quality to ensure that a state of control exists throughout the product lifecycle. The requirements in this regard will be dictated on a case-by-case basis and may change through the product lifecycle as the level of process understanding and/or plant performance may change. This is clearly an operational issue although we consider below if and how this may remain a construction risk given that any failure may arise from defects in the plant.

Importance of GMP compliance

A failure to achieve and demonstrate compliance with the relevant GMPs will give rise to liabilities beyond those merely connected to construction cost overrun and delay. A refusal to licence or enforcement by regulators against an existing licence can have a catastrophic effect on developers, impacting on their revenue and profit lines and possibly leading to adverse media coverage, brand damage, market share loss, and considerable liability costs.

Compliance with the relevant GMP standards must therefore be carefully managed through the procurement of new R&D or manufacturing capacity. These obligations of course need to be managed through the full life of the plant meaning that continued regulatory compliance during operations remains an absolute requirement that must be addressed contractually or otherwise by any developer.

Of course, it must be remembered that GMPs represent minimum standards only. Most life sciences companies will seek to adhere to GMPs but will also look to overreach these requirements with their own best practice standards. The principles above around considerations in procurement strategy should apply equally to these enhanced standards.

We consider further below how GMP compliance may be appropriately managed through the construction supply chain.

³ Guidance on Process Validation for Finished Products – Information and Data to be provided in Regulatory Submissions (February 27, 2014) and EU Guidelines for GMP for Medicinal Products for Human and Veterinary Use – Annex 15 – Qualification and Validation (March 30, 2015).

⁴ ICH Q7.

Also comprised within GMP are requirements with regard to anti-contamination procedures and controls and accordingly the reliance that these industries place on so called ‘clean room’ technologies.

Use of this technology gives rise to certain interface issues that requires attention from a contract structuring perspective. These are discussed next along with how GMP compliance may be appropriately managed through the construction supply chain.

The Clean Room/Process Technology Interface

So what do we mean by clean room technology and how is this distinguished from the process technology?

Process technology

When we refer to process technology, we are referring to the technology used to facilitate:

- primary processing, which is the bulk production of the active pharmaceutical ingredient (the API) which may involve fermentation, chemical synthesis or extraction
- secondary processing, which is the conversion of the API into products suitable for administration – i.e. the finished dosage forms (e.g. tablets, powders, capsules, liquids, creams, aerosols and injectables).

Primary and secondary processing may take place on the same site, adjacent sites or on completely different sites.

Clean Room technology

In contrast to the process technology, the cleanroom technology is the environment in which the process technology is housed.

A clean room is an area of the facility in which the concentration of airborne particles is controlled to specific limits. The level of control will be dependent on the particular standards required.

In order to control contamination there must be control of the entire environment. Air flow rates and direction, pressurisation, temperature and humidity all need to be properly and effectively controlled and often central to the process is the use of specialised filtration systems such as High Efficiency Particulate Air Filters.

These specifications and developer requirements must be clearly defined at the outset of any project to avoid quality failure, developer disappointment and disputes between the developer and its supply chain.

The increase in regulatory interest in life sciences globally mentioned above, is fuelling the rapid growth in the cleanroom technology market globally. Projections suggest a growth rate in the market of 5.2% per annum, taking the value of this market to approximately US\$4.29bn by 2020. This growth is also being further stimulated through increased demand for sterilised pharmaceutical formulation and the development of new biologics.⁵

Fully integrated design/build solutions?

A key issue for stakeholders in the life sciences industries will be what is perceived to be the interface risk arising between:

- the different stages of the process technology, often being procured from different suppliers – giving rise to so-called ‘hand-off risk’, this refers to defects at one stage affecting production are handed off into all subsequent stages
- the process technology and the clean room technology
- the cleanroom technologies at each stage of the process
- the process plant facility as a whole and the ancillary facilities/plant (e.g. waste water treatment, electricity substation etc).

When we talk of interface risk we are referring to the risk, for example, of:

- the design or technology being delivered by different parties failing to be compatible such that the combined results fail to meet the developer requirements
- the acts or omissions of one contractor delaying other contractors and/or causing additional costs to other contractors giving rise to claims against the developer
- unintended gaps in responsibility and, accordingly, liability cover as between the different contracts.

Where such risks cannot be or are not allocated to and absorbed by the supply chain, they will tend to rest with the developer. Accordingly, this will open the developer up to time and cost claims from the supply chain should the relevant interface risk materialise.

⁵ Cleanroom Technology, May 2015.

It is perhaps surprising that few contractors operating in the sector offer full design and construction capabilities for both process and clean room technologies such that they are prepared to assume full risk in delivery of all aspects of the project including absorbing the interface-type risks identified above. Given the level of interface involved between the individual facets of a typical project in the life sciences sector, this would surely be a big selling point for any contractor and would be likely to enable it to offer a price advantage over its competitors.⁶ Instead, a contractor offering a turnkey solution without full in-house capability is likely to be a more expensive proposition given that it will tend to price the risk it assumes in third party subcontracts for components outside of its own competencies.

This feature has tended to move the life sciences industries more towards a multi-contracting approach (that we describe below), since any single contractor may be unable or reluctant to assume full integration risk between the different process technologies particularly involving novel elements and between the process technologies and the cleanroom technology.

This is of course not to say that the single contractor EPC solution (also described below) has not been successfully deployed in these sectors. Developers should be aware however that the assumption by the contractor of a high level of interface risk is likely to have a material impact on the overall outturn cost.

Contract structures

There should always be proper and full engagement by the developer and its in-house engineering team at conceptual design stage. It is at this time that developer requirements should be established and clearly communicated to all relevant parties.

Following completion of conceptual design, developer focus should be on the selection of an appropriate contract delivery structure. These considerations should take place before the commencement of detailed design. Experience shows that detailed design will tend to influence how contract delivery will be structured which will of course narrow developer choice and the opportunity for flexibility in procurement.

As a practice, we expend a significant portion of our time with our clients during this period of project formulation. It is important that the developer achieves its required position with regard to risk allocation and pricing and all potential

options should be reviewed and analysed during this pre-detailed design phase on a cost-benefit-analysis basis.

Experience shows that a lack of detailed considerations at these early stages by the developer and its advisers/consultants defining the specification and subsequently structuring the contract delivery structure can often lead to problems later. These problems can often strain relations between the developer and the supply chain leading to dispute. Ultimately, the risk to developers arising from a lack of planning is the potential for time and cost overrun risk exposure.

We provide below a high level description of some of the key contract options and issues to be addressed in light of matters already considered in this briefing.

Multi-contracting

The multi-contracting model will see the developer identifying the individual works and supply packages, procuring the contractors and suppliers, entering into contracts with them and managing itself the interface (design, programme, integration etc.) between the different packages and the achievement of the overall global project targets – such as planned budget, planned completion and planned date of full operations (the Key Project Targets).

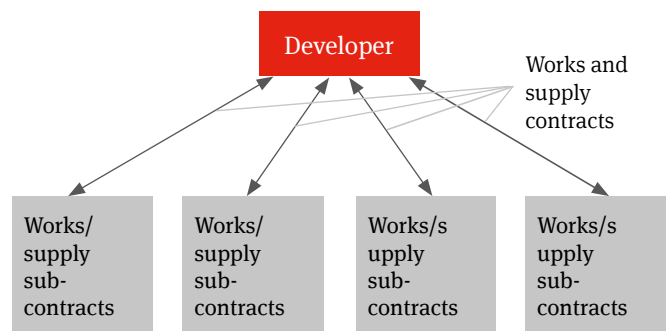


Figure 1. Multi-contracting solution

There are number of reasons why the developer may choose a multi-contracting solution.

Given the high degree of interface risk involved between the different facets of a typical project in the life sciences sectors, there may be a more limited number of contractors able and willing to assume full risk in delivery of the project on time, on budget and to a required technical and performance specification (often referred to as a ‘wrap’ of construction delivery risk). Contractors prepared to offer this wrap of construction delivery risk may in return include significant risk contingencies in their price for the works. This may

⁶ John Challenger, review of past and future design challenges, cleanroom technology March 2015.

impact on the developer's returns and even the economic viability of the project. In contrast, the multi-contracting option is often seen to offer price advantages.

A multi-contracting approach tends to provide the developer with a degree of flexibility both in design development and in the procurement of the works and supply packages. Where a single contractor EPC solution is selected (see below), the contractor will typically agree to fix its price for project delivery based on known developer requirements at contract signature and there will be little scope for the developer further influencing design direction or procurement choice going forward (at least not without it having a significant price impact for the developer).

If a multi-contracting solution is selected, experience shows that the developer will require an experienced and well-resourced internal team to manage the procurement and the delivery of the works.

It may be the case that such resource and experience is not available to the developer and there may be the need to employ an experienced project management consultancy to act as the 'developer team'. Obviously, this team should not be left to second guess developer requirements and so there must be clear lines of communication, such that developer requirements and specifications are clearly communicated and understood at project inception and throughout implementation.

Single contractor EPC

The multi-contracting route can be contrasted with a single contractor turnkey solution under which the relevant contractor will wrap construction delivery risk for a fixed price. This model is often referred to as an engineer, procure and construct (EPC) model.

Whilst the developer will procure the relevant contractor and contract directly with it, the wrap of construction delivery risk being provided by the EPC contractor will (subject to the developer knowing specifications which can be priced by the contractor) typically see it assuming responsibility for identifying the individual supply and works packages, procuring the contractors and suppliers, entering into the individual works and supply contracts, managing the interface risk highlighted above (both practically and from a risk and a liability perspective) and for the achievement of the Key Project targets.

Often, the name on the front cover of a contract doesn't reflect the content and minor deviations from key requirements can mean that unintended time and cost risk may filter back to the developer. Diligence should be

exercised to ensure that the contract delivers the expected risk allocation, so as to avoid nasty surprises for the developer during project implementation.

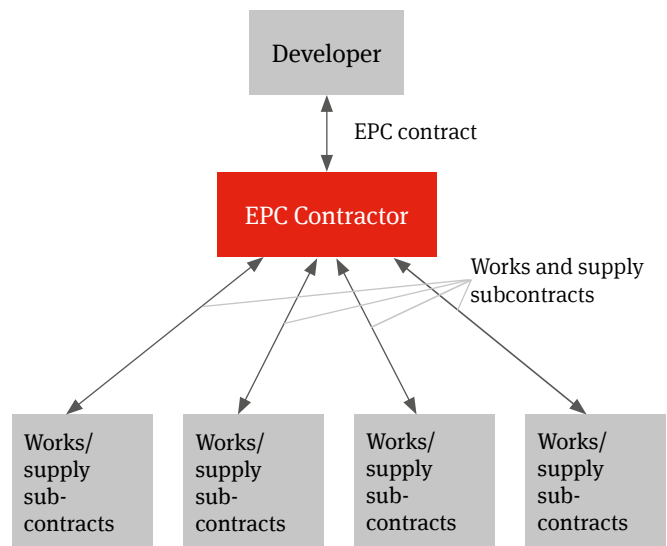


Figure 2. EPC solution

There are of course a number of hybrid contractual structure models which may also be considered by the developer.

Whilst the multi-contracting solution may give rise to capital cost savings when compared with a single contractor EPC solution, it is likely that greater amounts of risk are retained and need to be managed by the developer.

It is the means by which these risks are managed by the developer that is critical in achieving project success.

The availability of an experienced and well-resourced internal developer team or an experienced project management consultancy will go some way to assisting the developer in managing the retained risks referred to above and which are connected with a multi-contracting solution.

Experience shows however that the ability to manage retained risks can be enhanced significantly through the use of an engineer, procure and construction management (EPCM) contractor. We have seen the benefits that use of an EPCM solution can have in the realisation of process plant infrastructure delivery across a number of sectors for developers procuring infrastructure delivery on a multi-contracting basis.

EPCM

An EPCM contract is essentially a professional services appointment under which the EPCM contractor's services will usually be limited to the production of detailed design and the procurement, construction management and coordination of the works and services necessary to deliver the project.

It is important to recognise that it is not a contract for the carrying out of construction works.

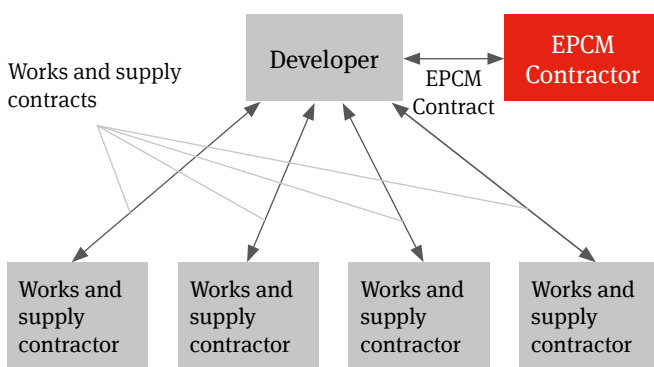


Figure 3. EPCM solution

The EPCM Contractor will contract directly with the developer and it is usually the developer that contracts with the works and supply package contracts (procured and managed by the EPCM contractor) not the EPCM contractor. The authority of the EPCM contractor to act on behalf of the developer and to manage the works and services will usually be documented in the EPCM contract and acknowledged in the works and services contracts.

Whilst often confused with the EPC contracting solution (mainly due to use of a very similar acronym), the EPCM and EPC contracting solutions are very different in terms of the nature of the obligations undertaken and the risk allocation assumed by the respective contractors. In contrast to the EPC model, which is based on risk transfer and more limited client/contractor interaction, the EPCM ethos is more about collaboration and cooperation and less about risk transfer.

The EPCM contractor will not backstop project delivery risk and, importantly, the achievement of the Key Project Targets. The EPCM contractor will however be responsible for managing the same on behalf of the developer but the levels of liability assumed by the EPCM contractor for failing in the performance of its obligations will typically be more limited (e.g. 10-20% of the EPCM services fee). If there is significant

failure in the achievement of the Key Project Targets, the 'buck' will ultimately stop with the developer.

Whilst reputation in securing project delivery will be an important factor for the EPCM contractor, the developer will need to consider and implement contractual mechanics to appropriately incentivise the EPCM contractor to effectively and proactively manage and control project delivery and the achievement of the Key Project Targets.

The approach typically adopted under an EPCM solution relies on an incentive structure which provides positive (and sometimes negative) incentives to the achievement of the Key Project Targets and other associated targets e.g. health and safety performance, meeting the EPCM budgeted price etc. These provisions are generally bespoke and may be underpinned by fairly complex calculations but equally can be fairly straightforward depending on the approach preferred by developers.

Since the EPCM contractor will typically set the Key Project Targets and other associated targets through its procurement and programme planning obligations, appropriate due diligence will need to be undertaken by the developer team to establish that these are sensible in the context of the project and the relevant incentive payments/penalties proposed.

EPCM and the management of retained risk

While assistance and support from a highly experienced EPCM contractor will be very important, it will not provide an ultimate backstop for a failure in achieving the Key Project Targets. Since these risks may then ultimately rest in the most part with the developer, it will be necessary for the developer to consider and plan for how these risks will be mitigated and/or managed. The developer should therefore also look to consider the following as part of risk planning:

- hands on management and support by the developer team to assist and direct (as appropriate) the EPCM contractor
- ensuring the terms of the works and supply contracts are robust with all typical 'on-market' protections (see below)
- the use of interface management contracts (see below);
- insurance
- enhanced testing of process and product at key interfaces to mitigate hand off risk and its consequences
- access to cash contingencies.

Form of contract

The terms on which the works and services contracts are procured under EPCM or other multi-contracting model will remain very important. Where possible, these should be procured on a fixed price basis and should be on robust terms backed by a comprehensive security package arrangement. Whilst procurement will be led by the EPCM contractor, the developer will want to keep a very close eye on this and the forms of contract used and it would be sensible to include template forms in the EPCM contract terms.

The process plant sector as a whole tends to use an array of different standard form contracts. The most popular, in our experience, include the forms produced by the Institute of Chemical Engineers (IChemE), the forms produced by Fédération Internationale des Ingénieurs-Conseils (the International Federation of Consulting Engineers) (FIDIC) and the forms produced by the American Institute of Architects (AIA). They tend to be known by contractors operating in the sector and tend to be an acceptable starting point, with different ‘books’ being produced for different types of work and pricing structures. It is always sensible to harmonise the forms used across the project such that the different contracts work well together and this will of course also enable more efficient management of the individual packages.

Developers should look to harmonise dispute resolution procedures across the contracts and in particular, to provide for the right consolidate claims to enable it to bring related disputes under the same umbrella to avoid the inefficiency of multiple claims running at the same time on the same or connected issues. This may also be achieved through the interface arrangements described below.

The developer, along with their advisers or the EPCM contractor, may also propose bespoke forms of contract which may be another acceptable starting point. Bespoke forms may however on occasion be viewed with mistrust by contractors and suppliers and may be seen as a venture into the unknown when compared with the industry standard forms identified above. Unless properly managed, this approach could delay the procurement timetable.

An understanding of the risk allocation under the form of contract proposed will be important for the developer and will shape the need (as applicable) for amendments to the contract form proposed.

EPC Islands

Developers may look to establish, where possible, an ‘EPC island’ approach under the EPCM structure. The idea here is that identified and discrete sections of the project will be delivered and ‘wrapped’ by a single contractor and this will assist in reducing the level of interface risk being retained by the developer. This is often seen for key aspects of the process technology or ancillary facilities such as waste water treatment or power.

If an EPC island approach is to be adopted, care should be taken to limit the level of design development in relation to the relevant package(s) during the pre-procurement phase. In our experience, EPC contractors may be reluctant to assume risk in detailed design produced by third parties (i.e. the EPCM contractor), at least not without pricing on a contingent basis the risk of accepting such design.

There is of course a balance to be struck between the developer having clarity on the specification required and the exposure it can accept to the cost premium likely to be charged for the EPC contractor in assuming risk in third party design.

Interface management contracts

We have mentioned interface management contracts above in the context of interface risk. The use of these arrangements will represent a fairly innovative approach under which the works and supply contractors on the project (or for a discrete aspect of the project having high degrees of interface) will enter into a multi-party interface agreement.

A ‘collaborative’ or ‘alliancing’ approach has widespread use across the construction industry and is of great value in that it encourages and incentivises cooperation and coordination between individual contractors in the supply chain. The approach advocated here takes the alliancing approach one step further, hardwiring some of the key principles contractually between supply chain members.

An interface agreement should seek to establish how the parties will cooperate with one another, how they will resolve disputes and importantly it will seek to allocate the risk (time and cost) of managing interfaces to the supply chain.

We have experience of successful implementation of these types of bespoke arrangements on high value multi-contracting process plant projects and would suggest that they represent a ‘high water mark’ in terms best practice in managing infrastructure delivery under an EPCM contract solution.

Testing of the plant

Given that process plant infrastructure employed in the life sciences industries will typically be performance based and that compliance of the facility with safety and regulatory requirements will be an absolute requirement, very close attention will need to be paid to the terms on which the works or parts thereof are tested both prior to and following handover of the facility.

The satisfaction of relevant regulatory requirements and the securing of a licence to manufacture should ideally be a condition of hand over of the plant or a section (as the case may be). It will not usually be appropriate for the developer to define these requirements in the specification, as this may create a risk of developer error or the risk of interpretational arguments undermining the position that the developer thought it was achieving.

Works delivery on a multi-contracting basis may present challenges in this regard (i.e. no one contractor able on its own to satisfy the relevant requirements for licensing). The solution is the implementation of a fully integrated testing regime across all relevant works packages. The obvious place for this to be managed and for risk to be allocated is under the terms of multi-party interface agreement of the type discussed above.

It is important to recognise that in making regulatory compliance for full commercial operation a condition of hand-over, the risk of delay to commercial operations is transferred to the contractors, typically through payment of delay damages. These damages will represent important leverage over the contractor(s) and will incentivise the contractor(s) to do all that is necessary to remediate the relevant failures promptly in order to mitigate the relevant exposure.

Whilst the developers may wish to retain a right to reject the plant in these circumstances, this is unlikely to be an appropriate remedy in most circumstances as it must be weighed against the losses to the developer arising from a delay or failure in getting a new product to market.

Contractors will usually look to limit their delay damages exposure to an agreed cap. It will be important that the cap on delay damages is appropriately sized in view of the developer's costs and losses arising out of the delay up to an agreed long stop date. It should be supplemented with a right to terminate the contract when the cap is reached. Such a termination right in these circumstances (whilst unlikely to be used) will provide important further leverage to secure an extension to the delay damages liability sub-cap.

The approach suggested above will involve certain operational tests being included in the pre-hand over requirements (e.g. Operational Qualification and Performance Qualification). This approach may require interface between the contractors and the operational contractors and this will need to be carefully managed contractually to ensure that acts or omissions of the operational contractors cannot derogate away from the responsibility of the contractor(s) to fully satisfy the hand over requirements.

Whilst indefinite retention of security would not be appropriate in respect of the on-going process validation as described above, it may be appropriate however for security in this regard to be held for a fixed period post-handover of the works until the first round of regulatory inspections have been completed (e.g. in relation to on-going process validation). The release of security should not however release the relevant contractor from liability to the extent that it otherwise continues under the terms of the relevant contract.

Outside of the absolute requirements arising from regulation, the developer will also want to establish performance of the plant against key performance indicators post-handover.

Typically, the contracts for plant delivery will provide for certain performance guarantees in respect of the key performance indicators (power consumption, throughput, availability) which are tested over a prolonged period of full operations (six months to two years). Any failure to demonstrate the guaranteed levels of performance will give rise to an obligation on the part of the relevant contractor to pay a performance liquidated damages to compensate the

developer for its costs/losses arising from the performance shortfall for an agreed period. Since contractors again may seek to limit their performance damages exposure to a capped amount, in order to ensure that the performance damages provide for an adequate remedy, the developer should either look to:

- agree minimum performance levels that must be achieved before the contractor(s) can be considered to have discharged their/its responsibilities; or
- secure a position where the post hand over performance tests are performed in an abridged format as a condition to hand over of the plant such that once the plant is handed over, the developer will have a high level of confidence that a level of performance may be achieved that is acceptable to the employer or (in the case of underperformance) can be compensated in full by the liquidated damages regime (notwithstanding any agreed cap on liability).

Experience shows that this is the most important period in the construction phase of a project.

Conclusion

Regulatory compliance and the management of time and cost overrun risk should be high on the agenda for developers planning the design and construction of new R&D and/or manufacturing facilities in the life sciences industries.

If a multi-contracting solution is to be adopted, planning the management of retained developer risks will be of paramount importance. We have identified in this article a number of key methods that may be adopted to manage and mitigate the relevant risks. There is however no 'one size fits all' magic solution and each project must be considered on its particular facts such that the optimum project delivery solution may be adopted achieving the developer requirements.

A lack of attention in this regard can often mean the difference between delivery of process plant infrastructure on time, on budget and to a required technical specification in compliance with regulatory requirements and an expensive project failure.

8

Solvency II and the calibration of infrastructure risk

by Bob Haken and Noleen John, London

The recovery of global economies depends as much on stimulating growth through investment as it does on fiscal policies.

It is natural therefore that policy-makers have been looking at possible inhibitors to private sector investment and challenging those responsible for regulation to find prudentially sound ways to facilitate such investment, with the European Commission launching its Investment Plan (also known as the Juncker plan) in November 2014. In order to help stimulate long-term investment in European infrastructure projects, the European Commission has adopted measures to introduce a new infrastructure asset class under Solvency II.



Insurance companies (which for the purposes of this article includes reinsurance companies), alongside pension funds and investment funds, are the largest institutional investors, with one estimate putting the total size of the investment portfolios of the European industry at \$9.3 trillion. As with any investor, insurers are looking for the greatest return for the lowest risk, but there are certain specificities which affect their investment appetite. Insurers, particularly life companies, take a long-term view of their investments as the liabilities which are being covered can extend 40 or more years into the future so insurers often hold long-term instruments to maturity. As such, stable cash flows are typically more attractive than the ability to make short term gains. Diversification is also important, both against other investment risks and against the underwriting risks taken by the insurers. However, the downside to long-term investments is often the higher capital charges they attract, particularly under the new regulatory regime that will apply from 1 January 2016. Before considering the Commission's new policy on infrastructure investment, it is worth recapping briefly on what Solvency II aims to do and how it goes about it.

Solvency II amounts to a complete re-write of the regulatory regime for the European insurance industry. It repeals 14 existing European directives and introduces for the first time a risk-sensitive holistic approach to the regulation of insurers. Despite the column inches that have been devoted to the impact that Solvency II will have on capital, the most revolutionary aspect of Solvency II is actually its focus on risk management. The aim of Solvency II is to put risk management at the heart of an insurer's operations, so that it can properly articulate to itself, its senior management, regulators and ultimately its customers which risks it is prepared to run, its tolerance of those risks and the processes it has in place to identify, manage and mitigate its risks. Capital is important, as "the main objective of insurance and reinsurance supervision is the adequate protection of policy holders and beneficiaries" (per the recitals to the Solvency II directive), but it acts as the reward for good risk management and the punishment for poor risk management – those insurers with clear risk appetites and controls will benefit from lower capital requirements.

This is in sharp contrast to the current system of insurance regulation across Europe which measures capital essentially against the size of its business, taking no or very little account of the particular risks faced by an individual insurer and ignoring entirely non-underwriting risks such as market risk. The standard formula (which most insurers will use to determine their capital requirements under Solvency II) is broken down into modules, which cover not only underwriting risk but also market risk, counterparty default

risk, intangible asset risk and operational risk. Insurers will therefore be required to hold capital against the risk that their investments lose value.

Not all insurers will use the standard formula. The largest and most sophisticated insurers will use their own internal models to calculate their capital requirements (or in some cases a hybrid such as a partial internal model). Before an internal model can be used, it must be approved by the appropriate national regulator. This is no small decision for a regulator to take as it effectively hands the ability to an insurer to determine its own capital level and quite correctly internal models are subject to very high standards. In the UK, 18 insurance groups and the Society of Lloyd's have been granted approval to use their own internal model from 1 January 2016. Internal models will need to consider the same set of risks as the standard formula, but the structure and calibrations of internal models will differ from insurer to insurer, meaning that the treatment of particular risks under the standard formula is perhaps only relevant as a form of benchmark.

The calculation of the capital requirement for market risk under the standard formula is prescribed by a delegated regulation which came into force in January 2015. The regulation focuses less on the form of the particular investment and more on the actual risk to which it exposes the insurer. The module is therefore broken down into interest rate risk, equity risk, property risk, spread risk and currency risk. Within those broad descriptions the Commission, based on technical advice received from EIOPA, has sought to calibrate each risk based on empirical evidence of actual fluctuations in value. Each module works by asking how much "own funds" (i.e. capital) would be lost if a particular event or set of circumstances were to occur instantaneously. For example, the capital charge for real estate equates to loss that would result from an instantaneous decrease of 25% in the value of immovable property. Unlisted equities, by way of contrast, are subject to a shock of a 49% reduction in value.

In February 2015, the European Commission requested that EIOPA provide it with advice on the viability and calibration of a new infrastructure asset class to be recognised under Solvency II. EIOPA wrestled with how best to fit infrastructure within the Solvency II framework. The formal advice provided by EIOPA to the European Commission suggested creating a new asset class under the standard formula for infrastructure project investments so as to reduce the risk charges for qualifying project investments in both debt and equity.

The European Commission swiftly adopted EIOPA's recommendations as part of the measures introduced under the Capital Markets Union. The amendments to the Solvency II delegated regulation introduce the concept of "qualifying infrastructure investments" which are investments that present preferable risk characteristics. The own funds that insurers need to hold against such qualifying investments should therefore be lower than for non qualifying infrastructure investment or other similar investments. Where qualifying infrastructure investments are held in a matching portfolio (e.g. to cover annuities) the spread stress applicable should be the lower of the matching adjustment stress or the qualifying infrastructure stress.

For qualifying infrastructure investments which are debts, the spread risk charge will be calculated using a modified approach based on the rating of the issuer (or an assumed minimum rating of BBB) and the duration of the debt. This would for example lead to a reduction of around 30% in the risk factor stress applied to a BBB rated infrastructure project with a duration of 3 years. Risk charges for equity investments will be based on an assumed 30% reduction in value (which is lower than the 39% reduction specified for listed equities).

There are a number of conditions to be satisfied by an insurer in order to treat equity or debt as 'qualifying infrastructure investments'. There are also ongoing performance and risk management requirements. The qualifying conditions include requirements that the entity is an SPV that can meet its financial obligations under relevant stressed scenarios and that the cashflows are predictable. In order for cash flows to be predictable, the revenues of the project should be funded by payments from a large number of users of the goods or services, an EEA government (or specified local government, multinational bank or multilateral organisation), an entity with at least an investment grade rating or an entity that can be replaced without a significant change in the level and timing of revenues.

The contractual framework governing qualifying infrastructure investment must provide a high degree of protection in relation to the funding of the project and any losses that would flow from termination of the goods or services to be provided by the project. For bonds and loans this will mean that debt providers should have security to the maximum extent permitted by law in the assets of the project and that equity is pledged to them, so that they can take control of the project prior to default. A requirement that new debt cannot be issued without the consent of the debt providers must also be included along with control over specified cash flows. Another important requirement applicable to bonds or loans is that the insurance company

needs to be able to demonstrate to its supervisor that it is able to hold the investment to maturity.

External credit rating is also helpful for items to be classified as qualifying infrastructure investments as it is expected that debt should be at least investment grade. However, if no appropriate rating is available, a number of additional conditions will apply - including that the project and its assets are located in the EEA or the OECD and that the infrastructure debt is senior to all other claims (other than statutory claims and claims from derivatives counterparties). These additional conditions appear to be designed to ensure that the risk of the project not delivering are mitigated. Where the project uses innovative technology there is a requirement that this be subject to due diligence to verify that the technology is tested.

As already stated, risk management needs to be at the heart of an insurance company's business. The Solvency II requirements relating to both the initial investment and ongoing monitoring are also fairly onerous. They include appropriate due diligence and a documented assessment of how the project meets the relevant criteria to qualify as a qualifying infrastructure investment. Ongoing monitoring should include performing stress tests on the cash flows and collateral values supporting the project. Where the investment in the infrastructure project is material, the insurance company's risk management should include active monitoring during the construction phase. The insurance company's asset liability management policy should also reflect the need for bonds and loans to be held to maturity.

This recalibration of Solvency II also seeks to breathe life into the European Long Term Investment Fund (ELTIF) Regulation, which has been developed in order to channel funds into the infrastructure sector. It is expected that investments in ELTIFs will benefit from the same capital charges as investments in European Venture Capital Funds and European Social Entrepreneurship Funds, which benefit from the same lower equity capital charge as equities traded on regulated markets (i.e. based on a 39% assumed reduction in value).

Although the original 3 month review period was extended at the initiative of the European Parliament, the Commission's proposals entered into force unamended on April 2, 2016. Whether that will unlock much-needed investment from the insurance industry or whether the hurdles have been set too high for most practical purposes remains to be seen.

Contacts

Nick Merritt

Global head of infrastructure, mining and commodities, Singapore

Tel +65 6309 5318

nick.merritt@nortonrosefulbright.com

United States

Michael E. Pikiel

Partner, New York

Tel +1 212 318 3134

michael.pikiel@nortonrosefulbright.com

Jeffrey H. Goodman

Partner, Washington DC

Tel +1 202 662 4730

jeffrey.goodman@nortonrosefulbright.com

Jeremy A. Hushon

Partner, Washington DC

Tel +1 202 662 4652

jeremy.hushon@nortonrosefulbright.com

Sarah Devine

Partner, Washington DC

Tel +1 202 662 4516

sarah.devine@nortonrosefulbright.com

Emeka Charles Chinwuba

Counsel, New York

Tel +1 212 318 3426

emeka.chinwuba@nortonrosefulbright.com

Canada

Crae Garrett

Partner, Calgary

Tel +1 403 267 8254

crae.garrett@nortonrosefulbright.com

Geoffrey Gilbert

Partner, Ottawa

Tel +1 613 780 3764

geoffrey.gilbert@nortonrosefulbright.com

Robert Borduas

Partner, Montréal

Tel +1 514.847.4524

robert.borduas@nortonrosefulbright.com

Australia

Alen Pazin

Partner, Perth

Tel +61 8 6212 3276

alen.pazin@nortonrosefulbright.com

Jo Crew

Partner, Melbourne

Tel +61 3 8686 6313

joanne.crew@nortonrosefulbright.com

James Morgan-Payler

Partner, Melbourne

Tel +61 3 8686 6503

james.morgan-payler@nortonrosefulbright.com

Adrian Ahern

Partner, Sydney

Tel +61 2 9330 8216

adrian.ahern@nortonrosefulbright.com

United Kingdom

Martin McCann
Global Head of Business, London
 Tel +44 20 7444 3573
 martin.mccann@nortonrosefulbright.com

Chris Brown
Partner, London
 Tel +44 20 7444 3822
 chris.brown@nortonrosefulbright.com

Mark Berry
Partner, London
 Tel +44 20 7444 3531
 mark.berry@nortonrosefulbright.com

Andrew Buisson
Partner, London
 Tel +44 20 7444 3949
 andrew.buisson@nortonrosefulbright.com

Daniel Metcalfe
Partner, London
 Tel +44 20 7444 2551
 daniel.metcalfe@nortonrosefulbright.com

Matthew Hardwick
Partner, London
 Tel +44 20 7444 5550
 matthew.hardwick@nortonrosefulbright.com

South Africa

Muzi Kubeka
Partner, Johannesburg
 Tel +27 11 685 8699
 muzi.kubeka@nortonrosefulbright.com

Steven Gamble
Partner, Johannesburg
 Tel +27 11 685 8944
 steven.gamble@nortonrosefulbright.com

The Netherlands

Wouter Hertzberger
Partner, Amsterdam
 Tel +31 20 462 9427
 wouter.hertzberger@nortonrosefulbright.com

Daphne Broerse
Partner, Amsterdam
 Tel +31 20 462 9377
 daphne.broerse@nortonrosefulbright.com

Germany

Dirk Trautmann
Partner, Munich
 Tel +49 89 212148 447
 dirk.trautmann@nortonrosefulbright.com

Anthony Morton
Partner, Frankfurt
 Tel +49 69 505096 120
 anthony.morton@nortonrosefulbright.com

France

Anne Lapierre
Partner, Paris and Morocco
 Tel +33 1 56 59 52 90
 anne.lapierre@nortonrosefulbright.com

Alain Malek
Partner, Paris and Morocco
 Tel +33 1 56 59 53 00
 alain.malek@nortonrosefulbright.com

Poupak Bahamin
Partner, Paris
 Tel +33 1 56 59 54 38
 poupak.bahamin@nortonrosefulbright.com

Christophe Asselineau
Partner, Paris
 Tel +33 1 56 59 50 00
 christophe.asselineau@nortonrosefulbright.com

Italy

Arturo Sferruzza
Partner, Milan
 Tel +39 02 86359 481
 arturo.sferruzza@nortonrosefulbright.com

Gennaro Mazzuocolo
Partner, Milan
 Tel +39 02 86359 475
 gennaro.mazzuocolo@nortonrosefulbright.com

Poland

Rafal Hajduk
Partner, Warsaw
 Tel +48 22 581 4930
 rafal.hajduk@nortonrosefulbright.com

Middle East

Joanne Emerson Taqi

Partner, Bahrain

Tel +973 16 500 214

joanne.emersontaqi@nortonrosefulbright.com

Charlotte Bijlani

Partner, Dubai

Tel +971 4 369 6308

charlotte.bijlani@nortonrosefulbright.com

Paul Mansouri

Partner, Abu Dhabi

Tel +971 2 615 1729

paul.mansouri@nortonrosefulbright.com

Japan

George Gibson

Partner, Tokyo

Tel +81 3 5218 6823

george.gibson@nortonrosefulbright.com

China

Tom Luckock

Partner, Beijing

Tel +86 10 6535 3135

tom.luckock@nortonrosefulbright.com

Barbara Li

Partner, Beijing

Tel +86 10 6535 3130

barbara.li@nortonrosefulbright.com

Paul Wee

Partner, Beijing

Tel +86 10 6535 3123

paul.wee@nortonrosefulbright.com

Peter Haslam

Partner, Hong Kong

Tel +852 3405 2308

peter.haslam@nortonrosefulbright.com

Singapore

Nick Merritt

**Global head of infrastructure, mining and commodities,
Singapore**

Tel +65 6309 5318

nick.merritt@nortonrosefulbright.com

Vincent Dwyer

Partner, Singapore

Tel +65 6309 5458

vincent.dwyer@nortonrosefulbright.com

Thailand

Somboon Kitiyansub

Partner, Bangkok

Tel +662 205 8509

somboon.kitiyansub@nortonrosefulbright.com

Greece

Dimitris Assimakis

Partner, Athens

Tel +30 210 94 75 415

dimitris.assimakis@nortonrosefulbright.com

Russia

Aydin Jebrailov

Partner, Moscow

Tel +7 499 924 5101

aydin.jebrailov@nortonrosefulbright.com

Levon Kocharyan

Partner, Moscow

Tel +7 499 924 5116

levon.kocharyan@nortonrosefulbright.com

Valentina Gluhovskaya

Senior partner, Moscow

Tel +7 499 924 5110

valentina.gluhovskaya@nortonrosefulbright.com

Kazakhstan

Yerzhan Kumarov

Partner, Almaty

Tel +7 727 331 1020

yerzhan.kumarov@nortonrosefulbright.com

Contributors

‘The Belt & Road Initiative’ – A modern day silk road

Tom Luckock

Partner, Beijing

Tel +86 10 6535 3135

tom.luckock@nortonrosefulbright.com

Hannah Logan

Senior associate, London

Tel +44 20 7444 3464

hannah.logan@nortonrosefulbright.com

New horizons for European Infrastructure development:
The European Investment Plan Portal gets set to launch

Chris Brown

Partner, London

Tel +44 20 7444 3822

chris.brown@nortonrosefulbright.com

Tomas Gärdfors

Partner, London

Tel +44 20 7444 2658

tomas.gardfors@nortonrosefulbright.com

Sharing of Telecoms Infrastructure – opportunities in 2016

Martyn Taylor

Partner, Sydney

Tel +61 2 9330 8056

martyn.taylor@nortonrosefulbright.com

Dan Metcalfe

Partner, London

Tel +44 20 7444 2551

daniel.metcalfe@nortonrosefulbright.com

Oliver Stacey

Partner, London

Tel +44 20 7444 5038

oliver.stacey@nortonrosefulbright.com

Felicity Brown

Associate, London

Tel +44 20 7444 3167

felicity.brown@nortonrosefulbright.com

Alberta’s Fort McMurray West 500 kV Transmission Project:
a case study in expanding Public Private Partnership scope

John Carleton

Partner, Calgary

Tel +1 403 267 9406

john.carleton@nortonrosefulbright.com

David Eeles

Partner, Calgary

Tel +1 403 267 8232

david.eeles@nortonrosefulbright.com

Lincoln Mitchell

Associate, Calgary

Tel +1 403 267 8220

lincoln.mitchell@nortonrosefulbright.com

Financing rail infrastructure projects in Africa –
challenges and solutions

Andrew Robinson

Director, Durban

Tel +27 31 582 5630

andrew.robinson@nortonrosefulbright.com

Andrew Buisson

Partner, London

Tel +44 20 7444 3949

andrew.buisson@nortonrosefulbright.com

Global safety trends in infrastructure

Caroline May

Partner, London

Tel +44 20 7444 3251

caroline.may@nortonrosefulbright.com

Aaron Anderson

Partner, Brisbane

Tel +61 7 3414 2897

aaron.anderson@nortonrosefulbright.com

Developing R&D and manufacturing infrastructure
in the life sciences sector

Matt Hardwick

Partner, London

Tel +44 20 7444 5550

matthew.hardwick@nortonrosefulbright.com

Sonam Kathuria

Associate, London

Tel +44 20 7444 5487

sonam.kathuria@nortonrosefulbright.com

David Carter

Associate, London

Tel +44 20 7444 3306

david.carter@nortonrosefulbright.com

Solvency II and the calibration of infrastructure risk

Bob Haken

Partner, London

Tel +44 20 7444 2068

bob.haken@nortonrosefulbright.com

Noleen John

Consultant, London

Tel +44 20 7444 3197

noleen.john@nortonrosefulbright.com

