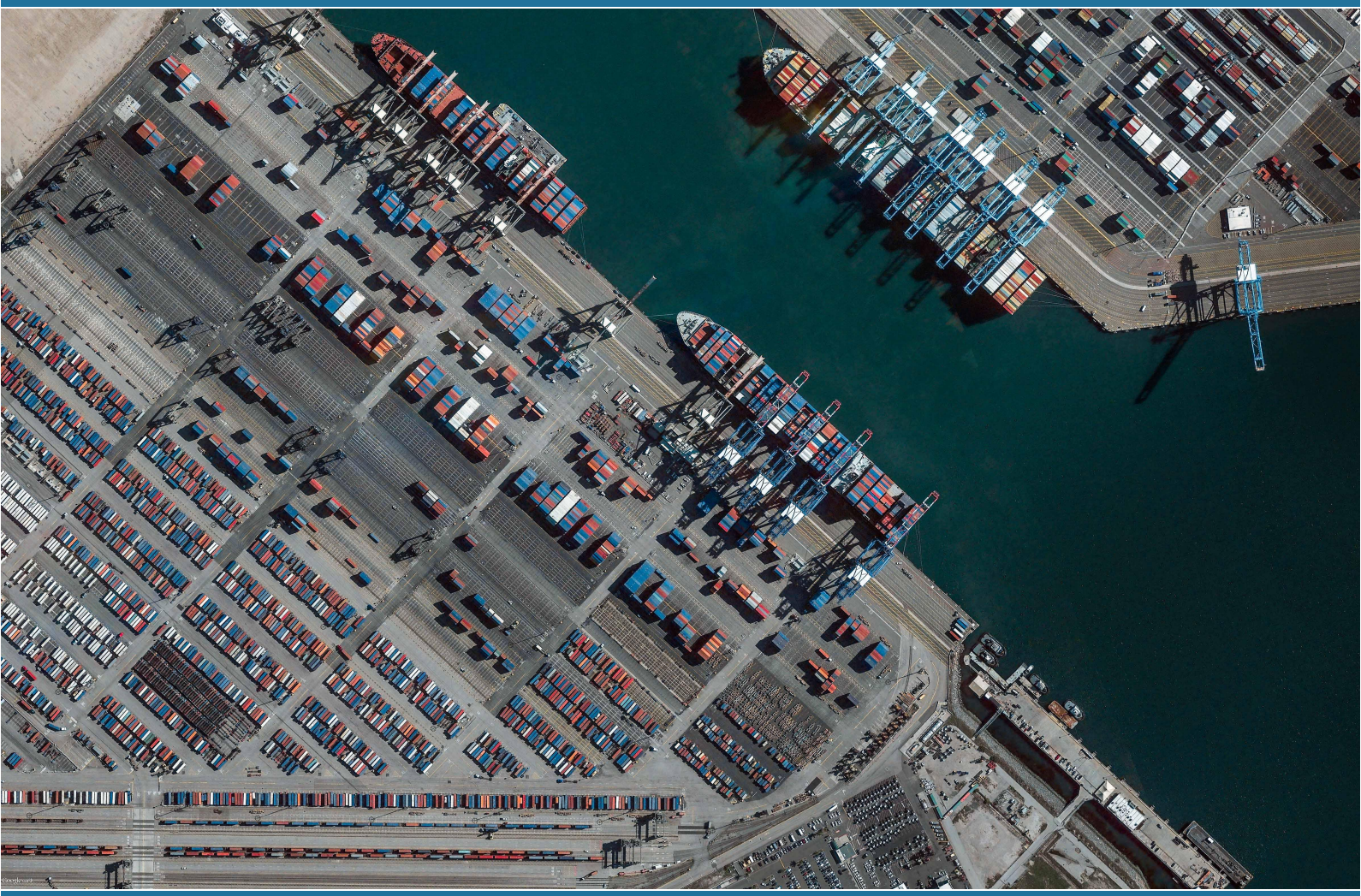
# The Infrastructure Company Classification Standard (*TICCS®*)



EDHEC*infra*
building benchmarks
for infrastructure investors

March 2020

# Contents

# 1. *TICCS*® Overview

*Private infrastructure investment is developing rapidly as a global asset class. This evolution requires a clear and robust classification of the individual infrastructure companies that equity investors can acquire or debt investors can lend to. The Global Infrastructure Company Classification Standard (TICCS®) was created by EDHEC*infra *to provide investors with a frame of reference to approach the infrastructure asset class. It offers an alternative to investment categories that were inherited from the private-equity and real-estate universe (e.g., "Core" vs. "Core+"), which may not be the most informative when trying to group infrastructure investments and design strategies or simply to document the structure of the sector. TICCS® is designed to be compatible with other standard investment-classification schemes, but it also uses fundamental insights from the academic literature to create a classification that embodies some of the key aspects of infrastructure businesses' risk profiles.*

## What is *TICCS*®?

Any infrastructure investment ultimately corresponds to shares (or quasi-equity) invested in a company or debt instruments issued by a company (or borrower). The Infrastructure Company Classification Standard or *TICCS*® is a taxonomy designed to classify and organise data about equity and debt investments in infrastructure companies.

*TICCS*® is a class-based taxonomy: it consists of four pillars (business risk, industrial activity, geo-economic exposure and corporate governance) each of which is made of non-overlapping super-classes, classes and sub-classes of *pure* characteristics.

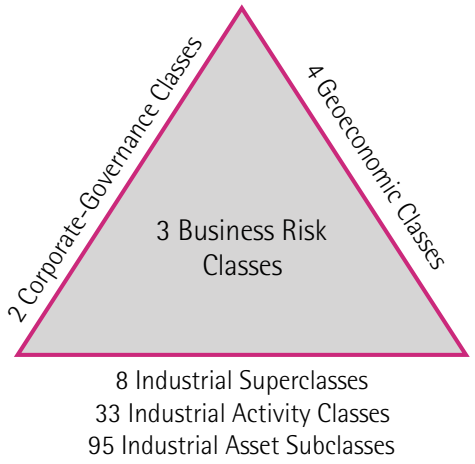
Real-life infrastructure companies *always* belong to each individual pillar and may also fall into *multiple* classes within each pillar e.g. an infrastructure project company may own both a water treatment plant and a power generation asset. This 'one-to-many' approach to classifying infrastructure companies allows keeping the *TICCS*® taxonomy pure, which was a recommendation of the TICCS Review Committee in January 2020, following the 2019 Market Consultation. In practice, if a company falls under multiple *TICCS*® categories within a pillar, users may assign weights to each class e.g. in the example above: 30% water, 70% power.

Some classes tend to be correlated across pillars. For instance, network utilities (IC80) tend to be corporates (CG02). *TICCS*® ignores such correlations but applying *TICCS*® allows documenting the structure of the investment universe empirically in terms of each pillar. Thus, the largest share of the investible market on the equity side is made of corporate utilities.

*TICCS*® is also about risk. However, *TICCS*® is not designed to discriminate between pure sources of systematic risks in infrastructure companies. Rather, as a taxonomy of infrastructure companies, *TICCS*® aims to be an exhaustive list of objective, real world, distinguishing characteristics i.e. a system to organise information about actual firms.

Each *TICCS*® pillar captures a different dimension of what makes infrastructure companies unique and relatively more homogenous. In that sense, the *TICCS*® pillars capture differences in aggregate risk profile that represent combina-

*Figure 1: The 4 Dimensions of the TICCS® framework*




tions of systematic risk factors, but these are not the object of the taxonomy.

## *TICCS®*, A Standard for the Industry

*TICCS®* is a common classification standard that can be used by asset owners and managers, regulators, banks, and other investors across the various stages of the infrastructure-investment value chain, including consultants and researchers. It is designed to help investment and research professionals:

- take into account the evolution of the infrastructure-procurement landscape in space and time;
- compare sectoral- and business-risk exposures of investor portfolios with broad market benchmarks;
- document investable infrastructure markets;
- analyse the contribution of individual categories of companies to an infrastructure portfolio; and
- design consistent sector- and business-risk-driven investment strategies in infrastructure globally.

## *TICCS®* Structure and Methodology

*TICCS®* is a four-pillar multi company-classification system designed to capture the characteristics of infrastructure investments. It consists of:

- 3 classes and 5 sub-classes of business risk;
- 8 industrial superclasses, corresponding to 33 industry classes of specific industrial activities and 95 industrial asset-level subclasses;
- 4 geoeconomic classifications; and
- 2 corporate-governance classes with 4 subclasses

Companies are classified on the basis of individual qualitative and quantitative criteria, including their contractual and regulatory structure and environment; their source of revenues; and their type of industrial activity, including the complexity and level of uniqueness of the relevant infrastructure both from a construction and an operational perspective. Their financial and corporate structure is also taken into account.

## Key Features of *TICCS®*

- **Robust**: *TICCS®* is built on the basis of academic research about the financial economics of infrastructure companies.
- **Global**: The range of categories available ensures that any private infrastructure company worldwide can be integrated into this framework, be it a regulated utility or a solar-project company.
- **Risk focused**: While *TICCS®* aims to categorise companies on the basis of their prima facie characteristics, it focuses on groupings that are

relevant to understanding risk and that play a role in asset pricing and portfolio construction.

- **Dynamic**: Infrastructure companies evolve over their lifecycles and with changes in national and sector regulation. The evolution of their characteristics plays an important role in infrastructure investment and can be reflected consistently and homogeneously over time.

## The *TICCS*® Comparative Advantage

*TICCS*® is built in the context of the EDHEC*infra* database of private infrastructure investments, the largest of its kind, which tracks the financial performance of hundreds of infrastructure companies globally. Each national market included in the EDHEC*infra* universe is analysed in detail, including all the relevant aspects of infrastructure-procurement history and regulation in order to match this classification. *TICCS*™ is also reviewed regularly as new markets and companies are added to the EDHEC*infra* universe. The design of this universe is described in the **Index Methodology Standards** document available on the EDHEC*infra* website.

# 2. Defining Infrastructure

## What is infrastructure?

### Approaches to Defining Infrastructure

There are several ways to define what constitutes or is considered 'infrastructure'. The OECD proposes a broad definition encompassing the 'system of public works in a country, state or region, including roads, utility lines and public buildings'. However, this can be hard to operationalise. The World Bank proposes a limited list of 'essential' services (see appendix) that seems restrictive for the purpose of classifying all potential infrastructure investments globally. The OECD and World Bank approaches are rooted in public-policy considerations and focus on what infrastructure does, that is, service delivery.

For the purposes of classifying **investments** in infrastructure, a better approach focuses on what infrastructure 'is like'. This is the route taken by financial regulators in their effort to define **qualifying infrastructure assets** under various prudential frameworks. Criteria-based definitions of qualifying infrastructure companies exist under the Basel-II Accord, the Solvency-II Directive, and the CRR-2 Regulation of European banks (See appendix for details.)

These definitions focus on the financial economics of infrastructure companies and aim to identify criteria differentiating them from other types of corporate equity or debt investments, especially with respect to known or expected differences in their risk profiles.

The definition put forward by the European Insurance and Occupational Pension Authority (EIOPA) for Solvency-II stipulates that 'the infrastructure assets and infrastructure project entity are governed by a contractual framework that provides debt providers and equity investors with a high degree of protection'. EIOPA argues that 'the cash flows generated for debt providers and equity investors shall be considered predictable' and in particular that the revenues qualifying infrastructure investment should be either:

1. 'availability-based',
2. 'subject to a rate-of-return regulation'; or
3. 'subject to a take-or-pay contract' (see appendix).

Such prudential definitions aim to isolate what is expected to be a lower level of business and financial risk found in infrastructure companies.

### The *TICCS*® View

*TICCS*® is not strictly speaking a definition of what is and what is not 'infrastructure' but a taxonomy designed to organise in an objective manner the constituents of the infrastructure investment universe.

To this end, *TICCS*® relies on a set of fundamental assumptions about what makes infrastructure companies different from other businesses. These assumptions are rooted in financial economics and academic insights into the nature of such investments.

In that sense, *TICCS*® is normative: it is not enough to be labelled 'infrastructure' or to be 'infrastructure-like' to quality under the taxonomy.

Instead a number of fundamental economic criteria have to be present for a company and its assets to be meaningfully designated as infrastructure:

- **Single-use investment**: infrastructure assets can be described as "relationship-specific" i.e. the investment required only makes sense in

the context of a 'relationship' – typically a contract, license or concession, which justifies the demand or usefulness of the investment.

- **Sunk or irreversible capital investment**: a relationship must exist for infrastructure investment to take place because the initial capital expenditure is 'sunk' i.e. irreversibly invested and unusable for any other purpose than the one originally intended.
- **Large size requiring a long repayment period**: not only are infrastructure investments sunk, they must be sizeable in absolute terms, making the repayment period necessarily long (multiple decades).
- **High operating leverage**: operating infrastructure at its design capacity implies highly predictable fixed (operating) costs and low variable costs, resulting in high operating leverage. In turn, investing in infrastructure requires a higher degree of certainty in future revenue streams, which underpins the requirement for long-term contracts, especially since infrastructure assets have little to no alternative uses.
- **Infrastructure as a service**: infrastructure companies have value because their assets provide a useful service to its users, the demand for which is the sole justification for the investment. Thus, despite consisting mainly of large tangible, immobile assets, the nature of infrastructure assets and the business of infrastructure companies is to provide a service.
- **Not a store of value**: it follows that, unlike other 'real' assets such as land, building, commodities or art, infrastructure investment cannot be considered as a store of value, infrastructure assets must be useful (and infrastructure companies provide a service) for them to have (social, economic and financial) value.

Assets and companies that can be categorized under *TICCS*® are expected to meet these fundamental criteria, all of which are the result of the long-term and durable nature of infrastructure assets and the companies that hold them and the commitment of their owners to only recoup the value of their investment over a long time period.

*TICCS*® takes these myriad perspectives into account and uses a four-pillar multi-criteria approach that uses a number of academic insights about the industrial nature as well as financial economics of infrastructure companies:

1. A **business-risk classification** takes into account the financial economics of infrastructure companies, in particular the role of contracts and regulation.
2. An **industrial classification** uses a very granular taxonomy of industrial activities, technologies, and asset-level characteristics that capture the potential diversity of infrastructure companies' services and products.
3. A **geoeconomic classification** captures the degree of common economic exposure of different infrastructure companies;
4. A **corporate-governance classification** reflects the expected difference of behaviour between single-project and multiproject infrastructure ventures.

The rest of this document presents each pillar of the *TICCS*® classification in more detail.

# 3. Business-Risk Classifications

The first *TICCS*® pillar is the business-risk classification of infrastructure companies. Broad families of business-risk or business-model profiles can be identified on the basis of how stand-alone, investable infrastructure is created using different forms of long-term contracts. In turn, these families of infrastructure-business risk are fundamental drivers of the financial structure and total risk profile of infrastructure companies. *TICCS*® business-risk profiles are found across various industrial activities classifications (the second *TICCS*® pillar).

## Academic Insights

While infrastructure assets are usually understood to be tangible assets–physical structures of steel and concrete–from the point of view of financial economics, infrastructure investment is better defined as a high-sunk-cost, long-term investment in immobile, relationship-specific assets. It is contracts, not concrete, that matter.

In other words, the physical characteristics of tangible infrastructure only determine the need for long-term contracts, which in turn determine the investment profile of infrastructure investments. Outside of contractual and regulatory relationships, tangible infrastructure assets have no or little value. This is what fundamentally differentiates infrastructure from other so-called real assets: infrastructure is never a store of value. It needs to be used to have value. And its usability is entirely determined by a combination of long-term contractual commitments.

The contracts that allow infrastructure investment to take place are characterised by risk-sharing mechanisms embodied by their revenue model. While numerous risk-sharing agreements can be envisaged, in practice, three types of contractual arrangements are used:

The first type are *contracted* or availability-payment schemes, by which a public- or private-sector client commits to paying a fixed income over a pre-agreed period, typically in excess of two decades. In exchange, the investor accepts more or less unlimited responsibility for the investment, operating, debt, and equity cash flows incurred to invest in the delivery of an infrastructure service, according to an agreed output specification. Terminal value can be set to zero and control of the physical assets is returned to public-sector clients at the end of the contract. This model is typically used to deliver social infrastructure projects like schools, hospitals, or government buildings. It is also common in the energy sector, including in renewable-energy projects, but it can also be found in a range of other sectors including transportation projects such as roads or port terminals.

The scond type of arrangements are *merchant* or commercial schemes, by which the public- or private-sector client enters into a similar long-term contract with an investor but in exchange for a risky income stream. This is typically the case with tolled transportation projects, for which an investor is granted the right to collect tolls/tariffs from users. Likewise, terminal value is often zero in most jurisdictions. This model is typically used for transport projects with real tolls but also energy projects connected to a competitive power or gas market, as well as privatised airports or certain rail projects. Merchant telecom companies are also common.

*Regulated* schemes are typically associated with large network industries that benefit from a natural monopoly, such as water or gas utilities or power distribution networks. They require regulation in order to ensure efficient operations at a reasonable cost to end users, who are

*Table 1: TICCS® Business-Risk Classification*

| Business-Risk Classes | Business-Risk Subclasses | |
|---|---|---|
| *Code and Defintition* | *Code and Defintition* | *Synonyms* |
| **BR1 – Contracted**: Contracted infrastructure firms enter into long-term contracts to pre-sell all or most of their output at a pre-agreed price. All or the majority of market risk (price and/or demand) is transferred to a third party. The contract is for a significant period of the investment's life, typically one or several decades. | **BR10 – Fully contracted income**: Fully contracted infrastructure firms enter into a long-term contract by which they will provide a service or product corresponding to the entirety of their activity. Hence they do not engage in any other activity during the life of the contract. | - Availability-based infrastructure or project<br>- Take-or-pay off-take agreement<br>- Capacity agreements<br>- Tolling agreements<br>- Large-scale generation certificates (LGCs) and small-scale technology certificates (STCs) |
| | **BR11 – Partially contracted income**: Partially contracted infrastructure firms commit to deliver a certain level of service or output below their full capacity level. | - Shadow tolling arrangements<br>- Partial capacity agreements<br>- Partial power purchase agreements<br>- Feed-in tariff |
| **BR2 – Merchant**: Merchant infrastructure firms are mostly or fully exposed to market risk (price and demand risk). | **BR20 – Variable income**: Merchant infrastructure firms collect fees and tariffs from end users as a function of the effective demand for service. | - Real toll roads<br>- Merchant power plants |
| **BR3 – Regulated**: The regulator can set allowable limits on tariffs, rate of returns, or revenues. Also referred to as "discretionary regulation." | **BR30 – Rate-of-return regulation**: The regulator is expected to set tariffs high enough to cover the costs of an efficient firm, including operating-expense depreciation and a reasonable return on invested capital. | - Cost-of-service regulation<br>- Commission regulation (US) |
| | **BR31 – Price-cap regulation**: The regulator sets a multiyear price cap typically defined in terms of the rate of inflation minus an expected rate of productivity improvement. Firms can increase their profits by cutting costs between regulatory reviews, thus creating incentives for efficiency gains. | - Incentive regulation |

typically captive and receiving "essential services" from the companies in question. Terminal value may not always be set to zero, for example, privatised utilities own tangible assets outright and in perpetuity. Regulators set tariffs to achieve multiple economic and financial objectives and often aim to mimic competitive market forces through so-called yardstick competition. Such schemes exist because of the universal tendency of monopolies to overcharge and underinvest (irrespective of public or private ownership). They also create up- and downside limits on business risk, which sets them apart from contracted and merchant infrastructure companies. For a detailed discussion of these three types of arrangements and of the related academic literature, see Blanc-Brude (2013). For a discussion of the role of contracts in infrastructure finance see Brealey et al. (1996). An empirical analysis of the difference of cost of capital and credit risk between contracted and merchant infrastructure business models is provided by Blanc-Brude and Strange (2007) and Blanc-Brude et al. (2018). For a detailed discussion of regulated infrastructure, see Gomez-Ibanez (2003).

## The *TICCS*® Business-Risk Classification

Using the insights above, *TICCS*® includes three business-risk classes. Each business-risk class can be further divided into subclasses.

- BR1: Contracted infrastructure companies
  - BR10: fully contracted infrastructure companies
  - BR11: partially contracted infrastructure companies
- BR2: Merchant infrastructure companies
  - BR20: variable-income infrastructure companies
- BR3: Regulated infrastructure companies
  - BR30: Rate-of-return regulated infrastructure companies
  - BR31: Price-cap regulated infrastructure companies

Table 1 describes the *TICCS*® business-risk classification.

# 4. Industrial Classification

The second *TICCS*® pillar categorises infrastructure companies by groups of industrial activities. Industrial-sector group classifications (or superclasses) represent broad areas of industrial activity but also transaction or project-development expertise. Industrial sector and subsector classifications (or classes and subclasses) represent specific industrial activities and types of physical assets and technologies.

## Academic Insights

Standard industrial classification can be ill-suited to represent different types of infrastructure companies. They focus on broad industrial activities only but do not take into account other aspects of the delivery of infrastructure projects and services. For instance, an airport operator and an airline-catering company are typically bundled together. Thus, under MSCI's Global Industrial Classification Standard, 'operators of airports and companies providing related services' are classified together.

Likewise, many road-operating companies are categorised as construction firms, while some project-financing vehicles are often found under 'financials.'

Instead, the activities of infrastructure companies can be seen as broad families of technical and financial skill sets that are relevant not only to creating and operating but also to investing in infrastructure companies.

Infrastructure investments also require highly specialised knowledge of various industrial processes, such as power generation or the construction and maintenance of major structures but also project management and financial structuring.

Transportation projects have common technical and industrial features, as do renewable-energy or social infrastructure projects, which correspond to broad groups of professionals that have the relevant know-how to understand and execute individual transactions.

For instance, stand-alone power generation facilities may use different fuel types and water-treatment companies may serve residential (potable water) or industrial clients (ultra-pure water). Wind power generation may be on-shore or off-shore. Such industrial activities can be sufficiently differentiated to warrant individual classifications. For example, different types of power-generation fuel (coal vs. gas vs. nuclear) have an impact on the level of regulatory risk taken by investors.

## The *TICCS*® Industrial Classification

*TICCS*® uses a multicriteria classification system focusing specifically on infrastructure-related industrial activities, as well as varying degrees of complexity, size, and scale. Using the insights above, *TICCS*® includes the following industrial classes and subclasses:

- 8 industrial-group classifications (or superclasses)
- 33 industrial classes
- 95 industrial subclasses or asset-level categories

Table 2 describes the *TICCS*® industrial classification. Table 3 provides the corresponding definitions.

*Table 2: TICCS® Industrial Classification*

| Industrial Superclass | | Industrial Class | | Industrial Asset Subclass | |
|---|---|---|---|---|---|
| Code | Name | Code | Name | Code | Name |
| IC10 | Power Generation x-Renewables | IC1010 | Independent Power Producers | IC101010 | Nuclear Power Generation |
| | | | | IC101020 | Gas-Fired Power Generation |
| | | | | IC101030 | Coal-Fired Power Generation |
| | | | | IC101040 | Combined Heat and Power Generation |
| | | | | IC101050 | Other Fossil-Fuel-Fired Power Generation |
| | | IC1020 | Independent Water and Power Producers | IC102010 | Power and Water Production |
| IC20 | Environmental Services | IC2010 | Waste Treatment | IC201010 | Non-Hazardous Waste Treatment |
| | | | | IC201020 | Hazardous Waste Treatment |
| | | | | IC201030 | Waste-to-Power Generation |
| | | | | IC201040 | Waste incineration |
| | | | | IC201050 | Gaseous Waste Treatment |
| | | IC2020 | Water Supply and Treatment | IC202010 | Potable Water Treatment |
| | | | | IC202020 | Industrial Water Treatment |
| | | | | IC202030 | Sea Water Desalination |
| | | | | IC202040 | Water Supply Dams |
| | | IC2030 | Wastewater Treatment | IC203010 | Residential Wastewater Treatment and Reuse |
| | | | | IC203020 | Industrial Wastewater Treatment and Reuse |
| | | IC2040 | Environmental Management | IC204010 | Flood Control |
| | | | | IC204020 | Coastal and Riverine Locks |
| | | | | IC204030 | Energy Efficiency |
| | | | | IC204040 | Carbon Capture |
| IC30 | Social Infrastructure | IC3010 | Defence Services | IC301010 | Strategic Transport and Refuelling |
| | | | | IC301020 | Training Facilities |
| | | | | IC301030 | Barracks and Accommodation |
| | | IC3020 | Education Services | IC302010 | Schools (Classes and Sports Facilities) |
| | | | | IC302020 | Universities (Classes, Labs, Administration Buildings) |
| | | | | IC302030 | Student Accommodation |
| | | IC3030 | Government Services | IC303010 | Police Stations and Facilities |
| | | | | IC303020 | Courts of Justice |
| | | | | IC303030 | Prisons |
| | | | | IC303040 | Street Lighting |
| | | | | IC303050 | Social Accommodation |
| | | | | IC303060 | Government Buildings and Office Accommodation |
| | | IC3040 | Health and Social Care Services | IC304010 | Hospitals |
| | | | | IC304020 | Clinics |
| | | | | IC304030 | Residential and Assisted Living |
| | | | | IC304040 | Crematorium |
| | | IC3050 | Recreational Facilities | IC305010 | Stadiums and Sports Centres |
| | | | | IC305020 | Public Parks and Gardens |
| | | | | IC305030 | Convention and Exhibition Centres |
| | | | | IC305040 | Arts, Libraries, and Museums |
| IC40 | Energy and Water Resources | IC4010 | Natural Resources Transportation Companies | IC401010 | Gas Pipeline |
| | | | | IC401020 | Oil Pipeline |
| | | | | IC401030 | Water Pipeline |
| | | | | IC401040 | Wastewater Pipeline |
| | | | | IC401050 | LNG Ships |
| | | IC4020 | Energy Resource Processing Companies | IC402010 | Liquefied Natural Gas - Liquefaction |
| | | | | IC402020 | Liquefied Natural Gas - Regasification |
| | | | | IC402030 | Crude Oil Refinery |
| | | IC4030 | Energy Resource Storage Companies | IC403010 | Gas Storage |
| | | | | IC403020 | Liquid Storage |
| | | | | IC403030 | Other Storage |
| | | | | IC403040 | Floating Storage Units - FSU |
| IC50 | Data Infrastructure | IC5010 | Data Transmission | IC501010 | Telecom Towers |
| | | | | IC501020 | Long-Distance Cables |
| | | | | IC501030 | Communication Satellites |
| | | IC5020 | Data Storage | IC502010 | Data Centres |
| IC60 | Transport | IC6010 | Airport Companies | IC601010 | Airport |
| | | IC6020 | Car Park Companies | IC602010 | Car Park |
| | | IC6030 | Port Companies | IC603010 | Tool Port |
| | | | | IC603020 | Bulk Goods Port |
| | | | | IC603030 | Container Port |
| | | | | IC603040 | Other Port |
| | | IC6040 | Rail Companies | IC604010 | Heavy Rail Lines |
| | | | | IC604020 | High Speed Rail Lines |
| | | | | IC604030 | Freight Rail Rolling Stock |
| | | | | IC604040 | Passenger Rail Rolling Stock |
| | | IC6050 | Road Companies | IC605010 | Motorways |
| | | | | IC605020 | Motorway Network |
| | | | | IC605030 | Dual-Carriage way roads |
| | | | | IC605040 | Stand-Alone Tunnels |
| | | | | IC605050 | Stand-Alone Bridges |
| | | IC6060 | Urban Commuter Companies | IC606010 | Urban Light-Rail |
| | | | | IC606020 | Underground Mass Transit |
| | | | | IC606030 | Overground Mass Transit |
| | | | | IC606040 | Bus Transportation |
| IC70 | Renewable Power | IC7010 | Wind Power Generation | IC701010 | On-Shore Wind Power Generation |
| | | | | IC701020 | Off-Shore Wind Power Generation |
| | | IC7020 | Solar Power Generation | IC702010 | Photovoltaic Power Generation |
| | | | | IC702020 | Thermal Solar Power |
| | | IC7030 | Hydroelectric Power Generation | IC703010 | Hydroelectric Dam Power Generation |
| | | | | IC703020 | Hydroelectric Run-of-River Power |
| | | | | IC703030 | Pumped Hydroelectric storage |
| | | IC7040 | Other Renewable Power Generation | IC704010 | Biomass Power Generation |
| | | | | IC704020 | Geothermal Power Generation |
| | | | | IC704030 | Wave Power Generation |
| | | IC7050 | Other Renewable Technologies | IC705010 | Battery storage |
| | | | | IC705020 | Off-Shore Transmission (OFTO) |
| IC80 | Network Utilities | IC8010 | Electricity Distribution Companies | IC801010 | Electricity Distribution Network |
| | | IC8020 | Electricity Transmission Companies | IC802010 | Electricity Transmission Network |
| | | IC8030 | District Cooling/Heating Companies | IC803010 | District Cooling/Heating Network |
| | | IC8040 | Water and Sewerage Companies | IC804010 | Water and Sewerage Network |
| | | IC8050 | Gas Distribution Companies | IC805010 | Gas Distribution Network |
| | | IC8060 | Data Distribution Companies | IC806010 | Data Distribution Network |

*Table 3: TICCS® Industry-Classification Definitions*

| Industrial Superclass | | Industrial Class | |
|---|---|---|---|
| Code | Definition | Code | Definition |
| IC10 | Stand-alone power generation using a range of technologies except wind, solar, and other renewable sources. | IC1010 | Independent power producers (IPP) provide electricity to power distribution and transmission companies or directly to industrial or commercial clients. |
| | | IC1020 | Independent water and power producers (IWPP) are power producers with a colocated water-desalination or filtration facility. Industrial, potable, or ultra-pure water is typically a by-product of the power generation process. |
| IC20 | Companies involved in the treatment of water, wastewater, and solid waste for sanitation and reuse purposes. | IC2010 | Waste treatment services include the collection and disposal of waste refuse from residential, commercial, or industrial sources. |
| | | IC2020 | Stand-alone water treatment companies produce water for various uses, including residential, commercial, and industrial end users. |
| | | IC2030 | Stand-alone wastewater treatment companies treat wastewater from residential, commercial, and industrial sources to a certain discharge or reuse standard. |
| | | IC2040 | Environmental management companies invest in projects that conserve natural resources, protect habitats, and control hazards. |
| IC30 | Companies involved in the delivery of support and accommodation services for public or other services. | IC3010 | Defence infrastructure companies provide noncombatant support services to public-sector military organisations, including strategic transport, training facilities, and telecommunications. |
| | | IC3020 | Infrastructure companies providing education services through the development and maintenance of school and university buildings and related facilities for the use of public or private institutions. |
| | | IC3030 | Infrastructure companies providing support and accommodation services to government departments and other public-sector organisations and agencies. |
| | | IC3040 | Healthcare infrastructure companies provide support service and facilities to public- or private-sector medical treatment units. |
| | | IC3050 | Convention, entertainment, and recreational facilities infrastructure companies deliver and maintain various large-scale leisure facilities typically requiring a bespoke structural-engineering component. |
| IC40 | Companies involved in the treatment and delivery of natural resources. | IC4010 | Natural Resources Transportation Companies develop and operate high-pressure transmission pipelines and natural resources transportation. |
| | | IC4020 | Energy natural resource processing companies transform crude oil, natural gas, and other commodities into various derivative or transformed products. |
| | | IC4040 | Energy natural resource storage companies provide storage services to private and public clients by exploiting large natural caverns or buildings and maintaining over- or underground tanks. |
| IC50 | Companies involved in the provision of telecommunication and data infrastructure. | IC5010 | Data transmission companies involved in the construction, operation, and maintenance of data transmission assets including telecommunications towers, land or sea based long-distance communication cables, and communication satellites. |
| | | IC5020 | Data storage companies involved in the development, operation, and maintenance of physical data storage infrastructure. This does not include companies that offer data storage in addition to other products. |
| IC60 | Companies involved in the provision of transportation infrastructure services. | IC6010 | Airport companies build, maintain, and operate airport terminals, runways, and associated support and logistical services. Large airports also lease property for commercial and retail purposes. |
| | | IC6020 | Car park service companies provide individual and commercial end users with vehicle-parking facilities. They are relatively small-scale structures built over- and underground mostly within large urban areas. |
| | | IC6030 | Port infrastructure companies build, maintain, and operate port jetties, passenger terminals, and freight transit and storage facilities. |
| | | IC6040 | Rail companies provide long-distance, intercity passenger and freight services. |
| | | IC6050 | Road companies build, maintain, and operate roads and motorways including bridges and tunnels. |
| | | IC6060 | Urban commuter companies build, maintain, and operate urban rail routes from light (tramway) to mass-transit rail tracks, including over- and underground rail lines. |
| IC70 | Stand-alone power generation and transmission companies using wind, solar, hydro and other renewable energy sources. Also energy storage companies. | IC7010 | Wind power companies produce electricity using wind power to operate various types of electromagnetic turbines. |
| | | IC7020 | Solar power companies produce electricity by capturing solar radiation using a range of solar-cell technologies. |
| | | IC7030 | Hydroelectric power generating companies use water to produce electricity. This can either be from a dam or from a river. |
| | | IC7040 | Other renewable power generation companies using various physical phenomena or alternative renewable fuels (other than the wind, sun, or hydro) to generate electricity. |
| | | IC7050 | Other renewables technology companies use a variety of different methods to provide, store and transmit renewable energy. |
| IC80 | Companies operating an infrastructure network with natural monopoly characteristics (barriers to entry, increasing returns to scale). | IC8010 | Electricity distribution companies distribute medium-voltage electricity to final consumers. |
| | | IC8020 | Electricity transmission companies transmit relatively high-voltage electricity from the point of generation source to a distribution network. |
| | | IC8030 | Heating or cooling companies provide service in urban areas using combined heat and power to recycle or reuse waste heat. |
| | | IC8040 | Water and sewerage companies provide potable water treatment and distribution services as well as the collection, treatment, and disposal of wastewater and sewerage. |
| | | IC8050 | Gas distribution companies operate low-pressure pipeline networks delivering natural gas to end residential, commercial, and industrial consumers. |
| | | IC8060 | Data distribution companies involve in provision of essential data network especially to sectors of economy (e.g. financial systems, industrial supply chain, public utilities, etc) through utilisation of fiber networks, cell towers, data centers and other data infrastructure. |

# 5. Geoeconomic Classification

The third *TICCS*® pillar classifies infrastructure companies into four levels of geoeconomic exposure that are relevant to understanding potential correlations between investments. Business-risk families defined in the first *TICCS*® pillar capture the resemblance between infrastructure firms' business models, including how they may or may not covary as contracted or merchant companies. But an additional dimension is the exposure of each company to different geographic levels of the economy which they serve.

## Academic Insights

Infrastructure companies operate large immobile structures. Their position in space is a lifelong constant. However, the type of economic activity they are involved in can correspond to different economic factors, creating a multitude of possible interactions between infrastructure companies.

A first intuition is that two merchant toll roads can be expected to be less correlated if they are farther away from each other in space. This assumes that traffic variability is mostly determined by local economic conditions. However, the roads in question could be part of a regional transport corridor spanning hundreds or thousands of kilometres and thus exhibit a high level of revenue-risk dependency.

Likewise, two contracted infrastructure companies can be expected to be relatively unrelated unless they have a similar or the same counterparty, which could be a local government.

Certain infrastructure companies are part of and exposed to the global economy. This includes large transportation hubs such as major airports and ports, which are not only exposed to the business cycle but, as a result of that, tend to be correlated with each other (see for example Choi et al., 2006; Lee, 2009).

Conversely, global and regional or national infrastructure companies can be less correlated with each other even though they may be relatively close in space and have similar business models. This is the case in the port sector, which can be divided into several categories of global container-shipping hubs; regional ports, which act partly as distribution networks of global port traffic; and national or subnational ports which cater to the local economy.

Certain infrastructure companies are also exposed to global commodity prices: gas pipelines or coal terminals, even when they have a contracted business model, face a highly correlated counterparty risk because commodity price movements can make their off-take contracts uneconomic or bankrupt their sole client (Bonetti et al., 2010).

## The *TICCS*® Geoeconomic Classification

The EDHEC*infra* data-collection process includes recording the GIS data of infrastructure assets in order to understand their exact positions in space. To qualify this information, and using the insights above, the third *TICCS*® pillar uses four classes of geoeconomic exposure to classify infrastructure companies:

- Subnational infrastructure companies
- National infrastructure companies
- Regional infrastructure companies
- Global infrastructure companies

Table 4 describes the *TICCS*® geoeconomic classification.

*Table 4: TICCS® Geoeconomic Classification*

| Geoeconomic Classes | | |
|---|---|---|
| *Code and Name* | *Definition* | *Examples* |
| **GE1 – Global infrastructure companies** | The relevant infrastructure is exposed to global economic factors, e.g., international airports, oil and gas pipelines, some ports, etc. | Major transportation hubs, projects exposed to global commodity prices. |
| **GE2 – Regional infrastructure companies** | The relevant infrastructure is exposed to a group of national economies, e.g., energy transmission between two or more countries, airports serving regional routes. A regional regulator or legal framework may also exist such as the European Union. | Medium-size container ports, transborder projects like transmission lines or certain road corridors. |
| **GE3 – National infrastructure companies** | The relevant infrastructure is exposed to the national economy, e.g., domestic airports and national electricity transmission assets, and is relevant to the national government or a national regulator. | Large-scale road or telecommunicaton networks, companies regulated by a national-level entity. |
| **GE4 – Subnational infrastructure companies** | The relevant infrastructure serves the local economy, e.g., schools and hospitals, and has subsovereign public clients or counterparts. | Municipal or other subsovereign-entity social infrastructure projects. |

# 6. Corporate-Governance Classifications

The fourth *TICCS*® pillar classifies the corporate-governance structure of infrastructure companies into two classes and two subclasses. The behaviour of a firm and its managers differs depending on if it was created to develop a single project or multiple projects. Furthermore, the level of external debt financing impacts the behaviour of a firm as well. External debt financing creates a demand for monitoring on the part of creditors, especially with single-project firms. External monitoring impacts the predictability of behaviour of the firm and its managers.

## Academic Insights

Infrastructure companies typically take one of two corporate forms: "projects" or "corporates." Infrastructure project companies are single-project firms or project-financed. Infrastructure corporates are multiproject companies more akin to corporate-governance structures found in other industrial sectors. These two types of firms can be expected to have fundamentally different behaviours.

Infrastructure project companies are created in the context of a long-term contract between an investor (the owner of the project company) and a public- or private-sector client. Project companies are created for the sole purpose of delivering a new tangible infrastructure asset and operating it for the length of the contractual period. Infrastructure project companies are also referred to as special-purpose vehicles (SPVs) or special-purpose entities (SPEs). They typically serve as the focal point of a nexus of contracts between investors, builders, operators, a client, and providers of long-term finance, usually in the form of long-term senior debt. The formal definition of project financing put forward in the Basel-II Accord is reproduced in the appendix.

Debt plays a significant role in project finance because it tends to be the main source of capital. The theoretical literature on project finance and corporate governance (see for example Shah and Thakor, 1987) highlights the role of leverage as one of the most counterintuitive dimensions of project financing. Project financing reduces the net financing costs associated with large capital projects (Esty, 2004) because external debt plays an important disciplinary role by preventing managers from wasting or misallocating free cash flows and deterring related parties, including the public sector, from trying to appropriate them (Jensen and Meckling, 1976; Hart, 1995).

Because leverage mitigates these costly incentive conflicts among capital providers, managers, and investors, it increases expected cash flows available to capital providers, thereby establishing a link between financing structure and asset values. In this context, the presence of significant loan financing is a signal of creditworthiness (Fama and French, 1997).

Indeed, infrastructure assets have few growth options, which hinders overinvesting in negative-NPV projects and makes investment decisions more easily monitored by external claim holders. When raising financing, infrastructure project companies typically commit to a given capital program and are not able to seek other sources of financing without the explicit involvement of their original creditors. In the event of various credit events, senior creditors have control rights akin to those of majority shareholders and can require a financial restructuring or even take over the company from its original owners.

The empirical literature on infrastructure project finance (Brealey et al., 1996; Esty, 2002; Blanc-Brude and Strange, 2007; Blanc-Brude et al.,

*Table 5: TICCS™ Corporate-Governance Classification*

| Corporate-Governance Classes | Corporate-Governance Subclasses | |
|---|---|---|
| *Code and Defintition* | *Code and Defintition* | *Synonyms* |
| **CG1 – Infrastructure project companies**: Companies according to the Basel-II defintion of project finance created for the sole purpose of building and operating a well-defined tangible infrastructure asset limited in time and space. | **CG10 – With creditor oversight project companies**: Infrastructure project companies with presence of external senior debt. | - Special-purpose vehicle<br>- Special-purpose entity<br>- Single-project company |
| | **CG11 – Without creditor oversight project companies**: Infrastructure project companies without presence of external senior debt. | |
| **CG2 – Infrastructure corporates** | | - Multiproject company |

2018), shows that project financing typically relies on high levels of nonrecourse external debt financing (typically between 60 and 90%) and concludes repeatedly that project finance loans have different characteristics from corporate debt. In corporate finance, debt can be used to increase returns on equity, creating incentives to take risks. In project finance, because the financial viability of a single project has to be demonstrable ex ante with a high probability, debt is used to minimise the cost of capital and creates incentives to minimise risk.

In contrast, infrastructure "corporates" or multiproject companies have all the usual characteristics of the firm: managers have more freedom to make various investment decisions and can change course both strategically and financially over time. They can take on new projects, including those in sectors that are not directly related to infrastructure (e.g., utilities investing in media companies) or invest internationally in other infrastructure firms (e.g., European utilities invested in Asian utilities in the mid-1990s), thereby changing their business-risk profile.

Likewise, infrastructure corporates are free to change their financial structures and can use multiple sources of private and public financing. Creditors play a much more limited monitoring role and do not have different control rights in the event of default than with other corporate borrowers. Nor do they play a leading role in the financial structuring of the firm either before or after credit events.

As a result, high or increasing levels of indebtedness in infrastructure corporates is typically interpreted as signalling higher credit and equity risk. UK water utilities are a case in point (see Helm, 2009).

## The *TICCS*® Corporate-Governance Classification

Single-project infrastructure companies can be found in any of the industrial classifications identified in the *TICCS*® second pillar, in particular social infrastructure, road, and conventional or renewable power generation projects. Infrastructure corporates or multiproject companies tend to be found in the utilities sector and in some transportation sectors (ports and airports), where they have often existed for several decades. Regulated infrastructure companies defined in the first *TICCS*® pillar also tend to be infrastructure corporates. In principle however, the *TICCS*® corporate-governance classifications are not exclusive of any of the other classes defined in the other three pillars.

As noted above, external debt financing creates monitoring mechanisms that can be expected to have a significant impact on the behaviour of managers and and the predictability of the firm's activities and risk profile.

As asset owners and managers become the new owners of infrastructure project companies, they sometimes reimburse senior creditors early (prepayment) and replace external senior debt instruments with shareholder-provided debt or

refinance project debt at the portfolio or group level (e.g., holdco).

Such decisions can lower the cost of external financing, but they also remove the project-level monitoring function of external creditors that is so characteristic of single-project infrastructure companies and has contributed to its historic performance track record.

Using these insights, the *TICCS*® fourth pillar includes two classes of corporate governance and four subclasses. We differentiate between subclasses of "monitored" and "unmonitored" companies as shown.

- CG1: Infrastructure projects
  - CG10: Infrastructure project companies with presence of external senior debt.
  - CG11: Infrastructure project companies without presence of external senior debt.
- CG2: Infrastructure corporates

Table 5 describes the *TICCS*® corporate-governance classification.

# 7. Implementation Guidelines

## Pillar 1 – Business Risk

Business risk classifications pertain to the business model of infrastructure companies and thus focus on the nature of their revenue stream, and not on other types of cash flows (e.g. costs). Business risk classifications are dynamic i.e. they can change over time as a company's business model evolves. This classification is assessed on an ongoing basis for companies included in the EDHEC*infra* universe.

### Defining 'Contracted' infrastructure companies (BR1)

1. A minimum of 50% to 70% of revenues should be contracted for a material period of time going forward from the data of evaluation
2. The contracted period is considered material if it represents between 50% and 75% of the remaining asset life.

Hence the two-by-two matrix as described within Table 6.

These guidelines are to be applied on a case by case basis. For example, a company that enters into relatively short-term contracts but that are expected to renew automatically with a degree of certainty can be considered Fully Contracted if this pattern is expected to continue for the rest of the firm's life. Conversely, a company that corresponds to a 50-year asset (say, a bridge) with a 25-year revenue contract that is not expected to be renewed would be considered Partially Contracted.

Contracted revenues may be linked to an index. This is considered an attribute of the company's business risk classification but not a category in itself. As a result, *TICCS®* does not distinguish between contracted revenues that are index-linked and contracted revenues that are not.

### Defining 'Merchant' infrastructure companies (BR2)

1. The company's business is not regulated in the sense of the BR3 class (see below).
2. Less than 50% of the company's revenues are contracted for less than 50% of the remaining asset life (see above).

### Defining 'Regulated' infrastructure companies (BR3)

1. The business is regulated by a third party (which may or may not be independent from the local or central government).
2. Regulation pertains to the business model of the firm e.g. tariffs, capex, return on capital, but not to other regulated aspects of business activities e.g. health and safety, which are not specific to infrastructure.

## Pillar 2 – Industrial Activities and Assets

### Defining Industrial Activities

The classification of any firm under this pillar should *always start at the asset subclass level.* The remaining classifications (Industrial activity classes and super-classes) simply flow from the Asset sub-class level.

While infrastructure companies tend to own only one type of industrial asset, even a single asset, some companies can have multiple types of assets e.g. a power generation unit and a water treatment plant. In this case, the firm in question may be categorized in multiple industrial activity classes or super-classes.

*Table 6: TICCS® Business-Risk Classification Selection Rules*

| | | Share of Revenues Contracted | |
|---|---|---|---|
| | | *50%* | *70%* |
| **Share of Remaining Life** | *75%* | Partially Contracted **(BR11)** | Fully Contracted **(BR10)** |
| | *50%* | Not Contracted | Partially Contracted **(BR11)** |

*Identifying Industrial Assets*

*TICCS®* includes a detailed definition of each type of industrial asset considered under the second pillar.

*Minimum investment size*

Because infrastructure assets are understood to represent a sizeable investment requiring a long-term repayment period, a minimum cumulative capital expenditure of USD50m (in 2005 dollars) is added as a filter in the EDHEC*infra* universe.

## Pillar 3 – Geo-economic Classification

The *TICCS®* Geo-economic classification aims to capture how any infrastructure company may be impacted by the business of other infrastructure companies (correlation in business risk). Two infrastructure companies may be very far apart in space but very closely related business-wise, and vice-versa.

This is in part related to the firm's business model:

- Any fully contracted company (BR11) would be exposed at the level of the contract counterparty e.g. the national government for a road concession in France (GE3), a subnational entity for a Hospital PFI in the UK (GE4).
- A partially contracted company (BR12) can be exposed to two different levels of geo-economic risk e.g. an LNG terminal with a national off-taker (GE3) and a spot market exposure (GE1)
- Merchant companies (BR2) are the most exposed to geo-economic risks
  - Companies in the Transport (IC60) and Data (IC50) industrial classes like large airports and ports and cable companies are exposed to the global economy (GE1)
  - Certain toll roads or ports and airports are exposed to regional economic fluctuations (GE2)
  - Most merchant infrastructure is linked to the national or subnational (e.g. ring road) economy.
- Regulated companies (BR3) are exposed to their regulator, which is typically a national entity (CG3) but not necessarily.

## Pillar 4 – Corporate Governance

The distinction between projects and corporates aims to capture expected differences of behavior between firms. These differences are primarily driven by the purpose for which the firm was created and the balance between the control rights of equity owners and those of external creditors.

### Defining Infrastructure 'Project Companies' (CG1)

Single-project vehicles (SPVs) or companies are identified thus:

1. The company was created (or activated) for the purpose of holding an infrastructure asset or assets in the context of a single contract or tender;
2. Its financing was raised for the sole purpose of developing and operating this or these assets;
3. External financiers (when they are present) have significant control rights including contingent control rights (step-in rights);
4. Its business model has finite life (expected end date) tied to the asset or contract life.

Projects may or may not be exposed to significant creditor oversight. The difference between the CG11 and the CG12 classification is deter-

mined by the presence of external senior debt in the capital structure.

A collection or portfolio of single-project companies continues to be a collection of individual projects and does not become a corporate entity.

**Defining Infrastructure 'Corporates' (CG2)**

Infrastructure Corporates are companies that do not meet the criteria to be classified under CG1. They are typically part of a larger group of companies and benefit from financial and revenue support from this group.

*Choice of corporate entity*

The corporate entity to be considered should be the one that best represents the infrastructure business as a whole. In other words, *TICCS®* does not determine whether the *HoldCo, BidCo* or *ProjCo* should be considered. This is a matter of judgement to be exercised on a case-by-case basis, depending on the nature of these corporate structures. For example, if the *HoldCo* carries most of the debt related to the underlying investment (e.g. Heathrow) then it would be considered the most relevant level for the purpose of identifying or classifying infrastructure investments.

## Appendix: Accepted Definitions of Infrastructure

### OECD Definition of Infrastructure

Infrastructure: "The system of public works in a country, state or region, including roads, utility lines and public buildings."

Source: https://stats.oecd.org/glossary/detail.asp?ID=4511

### World Bank Definition of Infrastructure

- "Electricity - generation, transmission, and distribution
- Natural gas - transmission and distribution
- ICT - ICT backbone like hard infrastructure cable assets (such as fiber optic networks and other types of broadband networks) where the government is involved either through being a contracting authority (i.e. a party to a concession agreement), the owner of the assets, or some other form of government support.
- Airports - runway and terminal
- Ports - channel dredging and terminal
- Railways - fixed assets, freight, local passenger/light rail, and regional passenger
- Roads - bridge, highway, and tunnel
- Treatment plant - potable and sewerage treatment plants
- Utilities - water utilities with and without sewerage service, sewerage collection and treatment"

Source: https://ppi.worldbank.org/methodology/glossary

### Basel-II Definition of Project Finance

"Project finance is a method of funding in which investors look primarily to the revenues generated by a single project, both as the source of repayment and as security for the exposure. In such transactions, investors are usually paid solely or almost exclusively out of the money generated by the contracts for the facility's output, such as the electricity sold by a power plant. The borrower is usually a Special Purpose Entity (SPE) that is not permitted to perform any function other than developing, owning, and operating the installation. The consequence is that repayment depends primarily on the project's cash flow and on the collateral value of the project's assets." (BIS 2005)

### Solvency-II Defintion of Qualifying Infrastructure

1. For the purposes of this Regulation, qualifying infrastructure investment shall include investment in an infrastructure project entity that meets the following criteria:
   (a) the infrastructure project entity can meet its financial obligations under sustained stresses that are relevant for the risk of the project;
   (b) the cash flows that the infrastructure project entity generates for debt providers and equity investors are predictable;

(c) the infrastructure assets and infrastructure project entity are governed by a contractual framework that provides debt providers and equity investors with a high degree of protection including the following:

(a) where the revenues of the infrastructure project entity are not funded by payments from a large number of users, the contractual framework shall include provisions that effectively protect debt providers and equity investors against losses resulting from the termination of the project by the party which agrees to purchase the goods or services provided by the infrastructure project entity;

(b) the infrastructure project entity has sufficient reserve funds or other financial arrangements to cover the contingency funding and working capital requirements of the project;

- Where investments are in bonds or loans, this contractual framework shall also include the following:

(i) debt providers have security to the extent permitted by applicable law in all assets and contracts necessary to operate the project;

(ii) equity is pledged to debt providers such that they are able to take control of the infrastructure project entity prior to default;

(iii) the use of net operating cash flows after mandatory payments from the project for purposes other than servicing debt obligations is restricted;

(iv) contractual restrictions on the ability of the infrastructure project entity to perform activities that may be detrimental to debt providers, including that new debt cannot be issued without the consent of existing debt providers;

(d) where investments are in bonds or loans, the insurance or reinsurance undertaking can demonstrate to the supervisor that it is able to hold the investment to maturity;

(e) where investments are in bonds for which a credit assessment by a nominated ECAI is not available, the investment instrument is senior to all other claims other than statutory claims and claims from derivatives counterparties;

(f) where investments are in equities, or bonds or loans for which a credit assessment by a nominated ECAI is not available, the following criteria are met:

(i) the infrastructure assets and infrastructure project entity are located in the EEA or in the OECD;

(ii) where the infrastructure project entity is in the construction phase the following criteria shall be fulfilled by the equity investor, or where there is more than one equity investor, the following criteria shall be fulfilled by a group of equity investors as a whole:

- the equity investors have a history of successfully overseeing infrastructure projects and the relevant expertise;
- the equity investors have a low risk of default, or there is a low risk of material losses for the infrastructure project entity as a result of the their default;
- the equity investors are incentivised to protect the interests of investors;

(iii) the infrastructure project entity has established safeguards to ensure completion of the project according to the agreed specification, budget or completion date;

(iv) where operating risks are material, they are properly managed;

(v) the infrastructure project entity uses tested technology and design;

(vi) the capital structure of the infrastructure project entity allows it to service its debt;

(vii) the refinancing risk for the infrastructure project entity is low;

(viii) the infrastructure project entity uses derivatives only for risk-mitigation purposes.

2. For the purposes of paragraph 1(b), the cash flows generated for debt providers and equity investors shall not be considered predictable unless all except an immaterial part of the revenues satisfies the following conditions:

(a) one of the following criteria is met:

(i) the revenues are availability-based;

(ii) the revenues are subject to a rate-of-return regulation;

(iii) the revenues are subject to a take-or-pay contract;

(iv) the level of output or the usage and the price shall independently meet one of the following criteria:

- ✓ it is regulated;
- ✓ it is contractually fixed;
- ✓ it is sufficiently predictable as a result of low demand risk;

(b) where the revenues of the infrastructure project entity are not funded by payments from a large number of users, the party which agrees to purchase the goods or services provided by the infrastructure project entity shall be one of the following:

(i) an entity listed in Article 180(2) of this Regulation;

(ii) a regional government or local authority listed in the Regulation adopted pursuant to Article 109a(2)(a) of Directive 2009/138/EC;

(iii) an entity with an ECAI rating with a credit quality step of at least 3;

(iv) an entity that is replaceable without a significant change in the level and timing of revenues."

Source:https://ec.europa.eu/transparency/regdoc/rep/3/2015/EN/3-2015-6588-EN-F1-1.PDF

**EU Capital Requirement Regulation Use of the EIOPA Definition**

"A preferential treatment to specialised lending exposures aiming at funding safe and sound infrastructure projects. These are defined through a set of criteria able to reduce the risk profile of the exposure and enhance the capacity of institutions to manage that risk. The criteria are consistent with those identifying qualifying infrastructure projects that receive a preferential treatment in the Solvency II framework."

Source: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52016PC0850

# References


- Blanc-Brude, F. (2013). Towards Efficient Benchmarks for Infrastructure Equity Investments. *EDHEC-Risk Institute Publications*.
- Blanc-Brude, F., M. Hasan, and T. Whittaker (2018). Calibrating credit risk dynamics in private infrastructure debt. *Journal of Fixed Income 27*(4).
- Blanc-Brude, F. and R. Strange (2007). How Banks Price Loans to Public-Private Partnerships: Evidence from the European Markets. *Journal of Applied Corporate Finance 19*(4), 94–106.
- Bonetti, V., S. Caselli, and S. Gatti (2010, April). Offtaking Agreements and how They Impact the Cost of Funding for Project Finance Deals. *Review of Financial Economics 19*(2), 60–71.
- Brealey, R. A., I. A. Cooper, and M. A. Habib (1996). Using Project Finance to Fund Infrastructure Investments. *Journal of Applied Corporate Finance 9*(3), 25–39.
- Choi, J. H., G. A. Basrnett, and B.-S. Chon (2006). Comparing world city networks: A network analysis of internet backbone and air transport intercity linkages. *Global Networks 6*(1), 81–99.
- Esty, B. C. (2002). Returns on Project Financed Investment. *Journal of Applied Corporate Finance 15*(1), 71–86.
- Esty, B. C. (2004, June). Why Study Large Projects? An Introduction to Research on Project Finance. *European Financial Management 10*(2), 213–224.
- Fama, E. F. and K. R. French (1997). Industry costs of equity. *Journal of Financial Economics* (43), 153–193.
- Gomez-Ibanez, J. (2003). *Regulating Infrastructure*. Monopoly, Contracts and Discretion. Harvard University Press.
- Hart, O. D. (1995). *Firms, Contracts, and Financial Structure*. Clarendon Press.
- Helm, D. (2009). Infrastructure Investment, the Cost of Capital, and Regulation: An Assessment. *Oxford Review of Economic Policy 25*(3), 307–326.
- Jensen, M. C. and W. H. Meckling (1976). Theory of the Firm: Managerial Behavior, Agency Costs and Ownership Structure. *Journal of Financial Economics 3*(4), 305–360.
- Lee, H.-S. (2009). The networkability of cities in the international air passenger flows 1992-2004. *Journal of Transport Geography 17*(3), 166–175.
- Shah, S. and A. Thakor (1987). Optimal Capital Structure. *Journal of Economic Theory 42*, 209–243.

# EDHEC*infra* Documentation (2020)

## EDHEC*infra* Index Data & Analytics Documentation

- Infrastructure Indices Methodology Standard (Unlisted Equity & Private Infrastructure Debt) - Revised March 2020
- The Infrastructure Company Classification Standard (*TICCS*™) - Revised March 2020
- Global Infrastructure Investment Data Standard for Asset Pricing and Benchmarking - Revised March 2020
- Data Contributor Code of Conduct for Infrastructure Investment Benchmarks - Revised March 2020
- Unlisted Infrastructure Asset Pricing Methodology (A Modern Approach to Measuring Fair Value in Illiquid Infrastructure Investments) - Revised March 2020

**Available at docs.edhecinfra.com**

For more information, please contact:
Karen Sequeira on +65 6438 0030
or e-mail: karen.sequeira@edhec.edu

**EDHEC Infrastructure Institute**
**EDHEC Asia-Pacific**
One George Street - #15-02
Singapore 049145
Tel.: +65 6438 0030

**edhec.infrastructure.institute**