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A History of Europe in 6 Projects

European Investment Bank

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Foreword

Historians view their subject through many lenses. Some choose to focus on war or revolution. Others concentrate their attention on the lives of a few great men and women. For some, the essence of history is heard in the voices of ordinary people or figured in the fluctuations of economic indicators. In truth, to sense history one must listen to all these voices and translate them into a comprehensive understanding. This book gives us another vital element of the full chronicle we seek. It is the story of a bank and its work, of which many are unaware. Yet it is a tale that all who would better understand our continent should read.

The European Investment Bank (EIB) is a feature in the economic life of every region of Europe and, often, beyond. You will read here, for example, the stories of great innovation in the Bank's support for Airbus Industrie. One striking factor in that chapter is the massive network of suppliers and numerous Airbus factories across Western Europe that feed into the final assembly plant in Toulouse. When we fly on an Airbus plane,

it is European integration that lifts us into the skies. This interconnectedness has been at the heart of the EIB's work throughout its history and it continues to be so today. Across Europe, the Bank's investment draws the many countries of the European Union closer together. Our support for North Africa, the Middle East and Europe's Eastern Neighbours creates growth and opportunity in these regions that, in turn, makes our own countries stronger. Most of all, the Bank improves lives all over the world. At a time when the value of multilateralism is being undermined, the EIB's work serves as a constant reminder of the power of integrated European efforts.

The EIB has played an important role in helping Europe deliver on the promise of prosperity to its citizens. As you will read in this book, the EIB has consistently financed European innovation, from massive projects like the European Organisation for Nuclear Research (CERN) with its large hadron collider to start-ups that have changed our lives, like Skype. Faced with challenging demographics and rising competition, the EU economy will need to be even more competitive. We will continue to invest in Europe's future.

Those who strive for a Europe charged with new life and creative energy will – I hope – be inspired by the history of the EIB. They can take comfort in knowing that this is an institution that will, as Seneca said, "find a way, or invent one."

Werner Hoyer
President, European Investment Bank

Introduction

Good Intentions Made Reality

Good Intentions Made Reality

In an 18th-century priory southeast of Brussels, the representatives of six European nations gathered between June 1956 and March 1957. They were charged with the task of hammering out a treaty that would establish the European Economic Community. Though the negotiations were lengthy, there was some urgency, too. They worked in the shadow of a political reality shaped by the unparalleled carnage and devastation of World War II and a decade in which European countries saw their power diminished almost to the status of mere pawns in the superpower conflict between the US and the USSR. Yet the trauma of war spurred new ideas of peace and unity. The first tentative steps had been taken toward greater pan-European solidarity with the creation of the European Coal and Steel Community in 1952. At the Château of Val-Duchesse, the six nations aimed to go still further, but it was only after months of intense debate and bargaining that they reached an agreement. With the text barely finalised, the delegates travelled to the Italian capital, where the

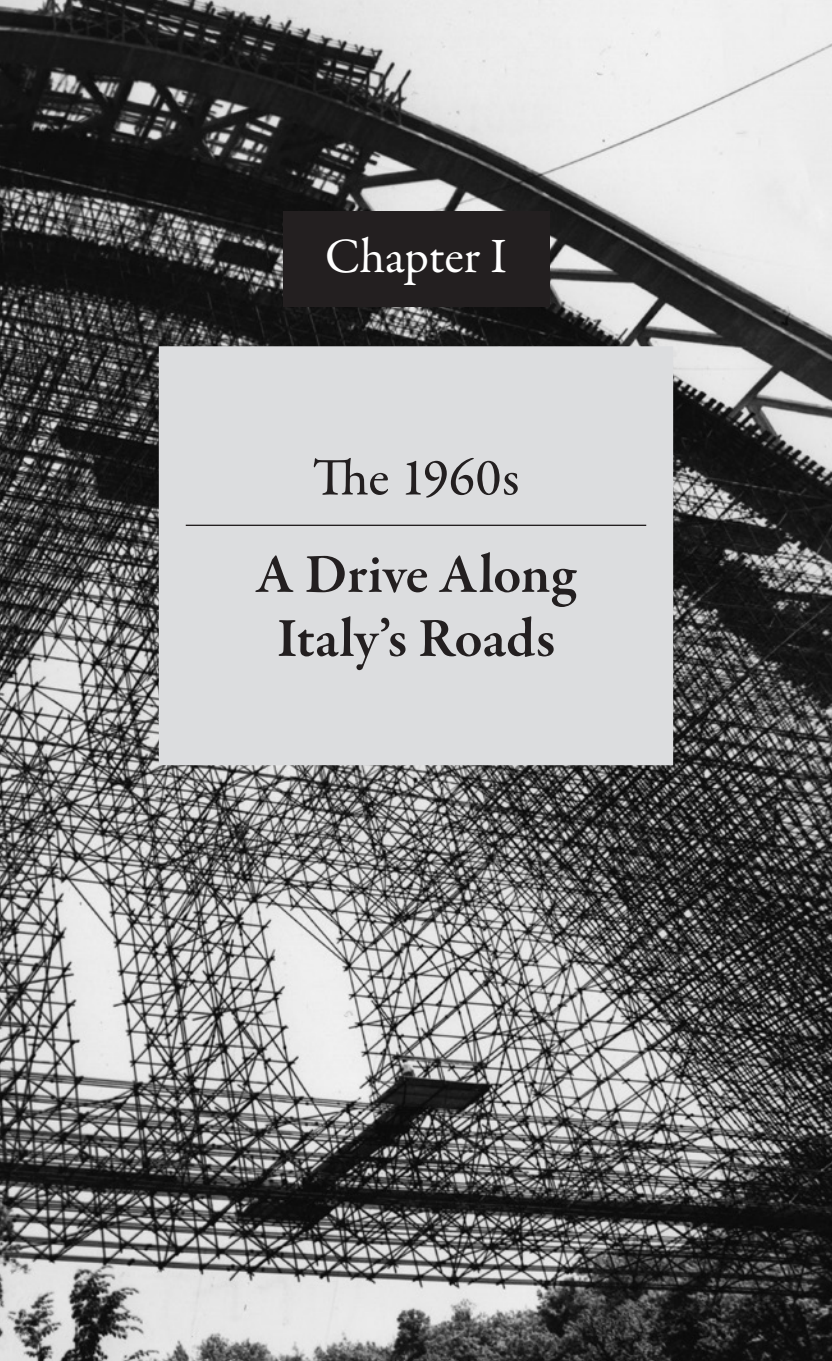
Treaty of Rome was signed on 25 March amid the splendour of Michelangelo's architectural innovations at the Palazzo dei Conservatori on the Capitoline Hill. Presented in a thick book and signed in black ink by prime ministers, a chancellor, foreign ministers, civil servants and diplomats, the document included the articles that founded the European Investment Bank.

The treaty came into effect on 1 January 1958 and the Bank officially opened for business in March of that year. Since then, the EIB's story has been profoundly intertwined with the development of Europe from the original six countries to 28 Member States. Its narrative has moved concurrently with the economic and social history of the continent, and with the changing relationships between Europe and its neighbours.

When the signatories set pen to paper for the treaty in Rome, they joined in what one historian has called "a declaration of future good intentions." They also wrote the first page of a history of Europe that is markedly different from the one most of us might recount. It is a tale that eschews the fireworks and friction on which historians typically train their

focus. The chronicle of the EIB tells of an organisation whose work is central to the functioning of everything around us, from bridges to electricity grids, from the technological innovations of start-ups to the medical research programmes of pharmaceutical firms – and yet it has remained largely untold. The transformations brought about by the EIB should go unnoticed no longer, for they are among the best examples of what Europeans can achieve when they work in concert.

This book tells one set of stories from the many that could be recounted about the EIB. There are six, one for every decade of the EIB story, each showing how the EIB stood behind the key developments in Europe's economy, responding to the changes in the continent and the Union of which it is a crucial part. They are the story of how the EIB helped turn good intentions into reality.



Chapter I

The 1960s

A Drive Along Italy's Roads

A Drive Along Italy's Roads

Let us start this story of the six decades of the European Investment Bank with a project that began 2 200 years ago and was finally completed within the last decade.

Crossing the Tuscan-Emilian Apennines between the cities of Florence and Bologna has always been a challenge. The mountain ridges shaped the history of Italy – and the design of the country's road system. They were a barrier to Hannibal, the Carthaginian military commander, whose forces ran into serious difficulties in the marshes of the River Arno when he crossed the Apennines and came down to Pistoia and Fiesole in 217 BC. The first attempts to create a true road connecting the areas north of the Apennines to the south did not take shape until the Roman consul Gaius Flaminius established the *Flaminia Minor* in 189 BC. It was a route for military use that went from Claternae, near Bologna, to Arezzo, south of Florence. Flaminius aimed to create a quick means of communication and control over the territories of Emilia and Romagna, which Rome had recently conquered.

The consul's contribution, however, never reached the status of the other consular roads, the high-speed motorways of the Roman era. Probably this was due to the problems experienced by travellers at high elevations as the road passed through the Apennines. In fact, it was no longer marked in the *Tabula Peutingeriana*, an ancient Roman map drawn up in 360 AD to show all the military roads of the Roman Empire, including details of stopover points, distances from cities and the courses of rivers. The absence of the *Flaminia Minor* from the *Tabula* indicates that the road had fallen out of use.

Not until the Autostrada del Sole project of the late 1950s and early 1960s did a highway link forge its way through the Apennines between Bologna and Florence. The construction of this highway, numbered A1, was a vital economic move for Italy, a country encircled by formidable natural boundaries in the form of the Alps, the Apennines and the sea. The Autostrada joined Milan with Naples, via Rome and Florence. Prime Minister Aldo Moro officially opened it in 1964. Then, the European Investment Bank joined in, financing links and highways to expand on the A1. These roads were a central part of

the EIB's work during its early years. They were aimed at linking Italy to the rest of Europe by joining up with roads that passed through the Alps. They tied the economically less developed south of Italy to the country's north and, thus, to the wealthier countries beyond the Italian border. "The EIB really connected Italy to the rest of Europe and played a part in the country's development," says Antonino Giuffrida, a senior engineer in the Bank's strategic roads division, who has worked on the study and appraisal of many more recent Italian highway and road projects financed by the EIB.

Busy in the Mezzogiorno

As soon as the EIB was founded, it joined with the Italian agencies responsible for the country's economic development. The system put in place soon after the Treaty of Rome had all EIB funding for Italy channelled through intermediaries such as the Cassa per il Mezzogiorno, a special fund managed by the state, and other bodies that specialised in long-term finance, such as the Istituto per lo Sviluppo Economico dell'Italia Meridionale. At the same time, the EIB's early presidents – Pietro

Campilli, who was in office from February 1958 to May 1959, and Paride Formentini, who served until September 1970 – were both Italians. They gave their support to the idea that Europe would prosper generally if its poorest regions were given an economic boost.

From 1959 to 1972, over 60% of EIB lending to Member States was granted to Italy, in particular the Mezzogiorno. Of this, 43% went to infrastructure projects. While the EIB loans supported businesses in the south, including chemical plants and even a brewery in Taranto, the road links to markets in the north were vital to the prosperity of all other projects. Thus the EIB financed construction of 475 kilometres of highway serving southern Italy during the period, including: the Adriatic highway running from the north down to Apulia; a highway across the Apennines to link the Tyrrhenian and Adriatic coasts; and two highways in Sicily linking Messina to Patti and Catania.

Elsewhere in Italy, the Bank financed other major roads during the 1960s: a major section of highway in the Brenner Pass; the highway between

Quincinetto and Aosta in the Val d'Aosta; in Abruzzo, a highway and the Gran Sasso tunnel; and the Autostrada dei Fiori between Sanremo and the French border.

EIB finance for a range of other infrastructure in southern Italy included work done by the SIP telephone company to extend and modernise the telecommunications network. The Bank lent 30% of the total cost of five power stations at Mercure, Taloro, Gallo, Brindisi, and Salerno, which would cover 10% of the Mezzogiorno's electricity needs. Between 1963 and the end of the decade, the regions of southern Italy that received the most EIB funding doubled productivity levels in some cases, such as Sardinia, or saw significant rises, as in Sicily and Apulia.

Against the forces of nature

Even with all these great projects, the EIB's work on Italian roads was not finished. After all, the mountain passes through the Apennines are so high – the lowest is 917 metres above sea level – that the A1 was, for decades, steep and twisting on the Bologna-Florence section. The result was heavy traffic and a large number of accidents. Between

2000 and 2010, this stretch of highway carried more than twice the traffic for which it was originally designed. It recorded one of the highest accident rates in Italy, with over 2 000 road accidents during that decade.

In 2015, the EIB financed several operations to build the Variante di Valico, a new highway that was to be part of a better motorway system. It was built to accommodate four times the traffic of the previous A1, with lower gradients, smoother curves, and modern systems for traffic control and road safety. The new road is about 225 metres below the level of the previous A1. Instead of clinging to the mountainsides, it passes through them. The stretch of road includes 44 tunnels and more than 40 viaducts and bridges.

"The execution of this project was a real battle against the forces of nature," explains Giuffrida, who was part of the EIB team that studied the project. "From a geological point of view the new highway crossed one of the most complex areas in Europe." The ground contained explosive gases, as well as surface and ground water. The area is subject to high seismic activity and has the highest risk of landslides

in Italy. Thus the bridges have foundations up to 30 metres deep and all the viaducts are equipped with special seismic isolators to minimise the movements of the structures in case of earthquakes.

But the most challenging part of the project was the excavation of the tunnels. Crossing the border between Tuscany and Emilia-Romagna, the Galleria Sparvo required the use of the biggest tunnel-boring machine ever built in Europe. This massive machine was named Martina – like ships, tunnel-boring machines are given female names. It had a diameter of 15.61 metres, taller than a five-storey building. Martina was also 130 metres long and weighed 4 500 tonnes. Under optimal conditions Martina could reach the remarkable speed of 22 metres per day, compared to 80-90 centimetres per day with traditional methods of excavation.

Yet the Sparvo was just one of the 44 tunnels needed to complete the highway project. When the Variante di Valico highway opened to traffic in 2015, the travel time between Bologna and Florence was cut by 5 minutes. It was as if Italy had become shorter.

Since those early days of Italian road-building, the EIB has funded highways throughout the

continent. Just as the less developed regions of Italy were hooked into a broader network during the 1960s, so newer Member States found a need to build more highways, creating connections with their new partners. When Poland, the Czech Republic, and Slovakia joined the EU, their infrastructure was still characterised by the old Soviet preference for rail over road transport. Poland's highway density was a mere fraction of Germany's, for example. "The parallels with the roads that were developed in Poland and the early years of the Bank in Italy are pronounced," says Neil Valentine, head of the strategic roads division. "The aim has been to integrate Poland into Europe, supporting the development of the single market."

Underlying this is the philosophy of the Trans-European Networks, which goes by the acronym TEN-T in its transport manifestation. Backed by the EIB and by EU grants, main arteries get priority, because they promote economic activity.

Safety in the tunnels

Once the roads are built, the EIB's job is not done. Increasingly the Bank is involved in projects to make those roads safer.

Road traffic injuries are among the ten leading causes of health problems worldwide, carrying with them a huge social cost. In Italy, each year more than 3 300 people die and 250 000 people are injured in accidents on the roads. It is as if the entire population of Verona, Nottingham, Aachen, or Bordeaux had a harmful traffic smash every year. The causes of accidents include vehicle technology, weather conditions, speed, traffic and even the age and gender of drivers (accident rates are significantly higher for men than for women.) However, a large share of the traffic accidents (approximately 20%) can unquestionably be attributed to defective or ill-conceived infrastructure that causes errors of perception and increases the risks and consequences of accidents. This is particularly true of tunnels, where accidents are characterised at once by a lower probability of occurrence and more potentially catastrophic results. That is important in Italy, which has more than 900 kilometres of road tunnels, the highest in Europe.

In 2013 the Bank started working to establish general agreements to finance a multi-annual programme to modernise Italy's road network, involving ANAS, the national road authority, and

ASPI, the main Italian motorway concessionaire, as well as the Ministry of Finance to manage the loans and the Ministry of Infrastructure to prioritise the investments. A first tranche of these road safety investments – distributed across all 20 Italian regions, over 2 800 kilometres of motorways, 5 800 kilometres of national roads and 300 tunnels – was financed by the Bank to the tune of €500 million between 2013 and 2016.

The road safety upgrades include the replacement of obsolete two-wave steel safety barriers, which were designed with traditional methods and not checked through full-scale crash tests. Instead, the upgrades install three-wave barriers and road restraint systems designed to redirect and, where necessary, contain the vehicles. The projects include the installation of modern signalling devices, sensors for monitoring traffic and speed, new lighting and ventilation plants in tunnels, as well as noise barriers along residential roads and photovoltaic surfaces at service stations. Overall, these safety enhancements will avoid the need to reduce speed limits on specific road sections and will enable the traffic to flow better, with reduced carbon dioxide emissions and less noise generated by road and highway traffic.

The safety projects will also seek to solve the mystery of the 1 865-metre Galleria Tremonzelli, the longest tunnel on the A19 highway between Palermo and Catania. It is known locally as the "Bermuda triangle of tunnels," due to inexplicable phenomena observed by many road users. In the last two decades there have been dozens of anomalous occurrences reported in this tunnel, including car engines that turn off unexpectedly, inexplicable fires and sudden blackouts of the lighting in the gallery. All this triggered dangerous accidents that in some cases resulted in casualties. Among the hypotheses put forward to explain the mystery, some are rather imaginative. They include the presence of extra-terrestrials or demons, unknown electromagnetic fields and secret experiments with unconventional weapons.

New roads lead to the EU

Many of the road projects carried out by the Bank inside the EU today are aimed at upgrading highways that have been around for decades, like the ones in Italy. Often this involves making the highways more environmentally sustainable and safe.

Outside the EU, however, there are still major highways under construction with EIB financing in Serbia, Ukraine, Belarus, Georgia and Armenia.

By the end of the seventh decade of the EIB's work, Valentine, the Bank's roads division chief, believes technology will have transformed the kinds of vehicles using the roads. Driverless cars will make it possible for urban centres to become more environmentally friendly and less crowded. At the same time, highways will develop new "smart" technologies that control traffic flows and get drivers to their destinations quicker. "We need a very wide range of skill sets to analyse all these different approaches," he says. "It's all about building the assets to help the economy develop and to facilitate trade." That, after all, is the same mission the Bank was fulfilling in southern Italy 60 years ago.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Chapter II

The 1970s

A Bank Aboard the Airbus

A Bank Aboard the Airbus

The first journey for the wing of an Airbus A380 airliner doesn't involve a take-off. In fact, it travels by the rather old-fashioned conveyances of barge and ship. Constructed in Broughton in the UK, the giant wing is shipped from North Wales to Toulouse, where it is fitted to the body of the biggest airliner in the world. Other sections arrive at the assembly hall from Hamburg and Cadiz. Airbus is a success story for European cooperation, in that an aircraft produced in several countries and with suppliers in still more countries runs neck and neck with Boeing in the world airliner industry.

The EIB has been on board every new Airbus developed since the A300, whose original manufacturing facilities in Toulouse and St. Nazaire were financed with a loan of 80 million French francs in 1971. The A300 was a response to the fragmented nature of aircraft manufacture at that time and the need to consolidate into larger companies to finance the big research and development bills of increasingly complex projects. "Large high-tech projects required large capital expenditure," says José Doramas Jorge Calderón,

senior economist in the EIB's air, maritime and innovative transport division. "Bigger companies or consortia, it was clear, could handle that better."

In the US, companies like Boeing, Douglas and Lockheed, which at that time had 80% of the world airliner market, sensed the need for consolidation. Europe saw it too. Airbus started as a multi-national project with participants from France, Germany, the UK and the Netherlands, which was backed mainly by the French and German governments. Airbus Industrie was formed in 1970 by Aérospatiale of France and Deutsche Airbus. In 1971 it gained a Spanish partner, Construcciones Aeronáuticas, and its earlier association with Hawker Siddeley Aviation turned into a full British stake in 1979 with British Aerospace.

Finance for a new concept

The A300 was a new concept in aircraft technology. First flown in 1972 and introduced in 1974, it had a double aisle and only two engines, compared to the single aisle and four engines on the Boeing 707 or Douglas DC-8, its most immediate competitors for long-haul routes. For

short-haul routes it was much bigger than the Boeing 727, which had three engines. It was almost as big as a 747, but with fewer engines and therefore better economy. Airbus followed that development with the A320, which revolutionised cockpit technology. It exchanged the traditional wheel used by the pilot for a joystick and introduced the "fly by wire" electronic interface to replace the mechanical control systems of previous airliners. When the A380 entered commercial service in 2007, it gave airlines the option of boosting returns by increasing the number of passengers to as many as 800, if all seats were economy, though most airlines use business and first class sections that reduce the seating to somewhat more than 500. Lately, the extended use of carbon fibre structural parts in wide-bodies like the A350 made the aircraft lighter and reduced the environmental impact. The Bank supported all these technological breakthroughs and the development of the aerospace industry through many R&D projects directly with Airbus or with Airbus suppliers like Rolls Royce for the planes' engines.

"Airbus really goes through the decades with the Bank," says Klaus Heege, an aeronautical

engineer and pilot who worked on Airbus deals until his retirement from the EIB in 2014. "At a time when Europe has some problems, it's important to remember the value of projects like this, which have brought workers and companies together from different European countries with completely different cultures and working procedures. The Bank has been behind this all along."

Economic impact

The EIB measures its loans by their impact on the lives of Europe's citizens. Certainly there has been an impact on anyone who has so much as flown on an Airbus. But the real impact is in the jobs related to Airbus all across the continent. In France, Airbus employs 26 000 people in its facility in the Blagnac suburb of Toulouse, as well as in Nantes and St. Nazaire. Its German operations employ 17 000 across northern Germany. In Spain, where the horizontal tails of all Airbus planes are designed and manufactured, 3 000 people work at facilities in Getafe, Puerto Real and Illescas. Airbus

spends £4 billion each year with suppliers in the UK, where its operations support 110 000 jobs.

Klaus Heege joined the EIB in the 1990s after working with a small manufacturer of private aircraft and, later, with Dornier in Friedrichshafen. He and Jorge Calderón worked on financing research and development leading to the A380 and on Rolls Royce financing that was connected to Airbus, along with Spanish small and medium-sized enterprises that were suppliers to big airliner projects. In 2014 the EIB provided finance for research and development related to the A330neo, as well as for a number of Airbus suppliers across Europe throughout the preceding decade. The support of a big bank like the EIB is particularly relevant to major projects like Airbus, Heege says, because of the high costs of research and development and the safety requirements of air transport. "There can be no room for trial and error once the product is completed, for obvious reasons," he says. "Before you put the product out there, you have to be sure that it really works." The EIB's presence helped accelerate each stage of development and manufacture. And it's still doing so.

Chapter III

The 1980s

Urban Development

Gets on the Agenda

Urban Development Gets on the Agenda

After rugby matches in the 1970s, fans would spill out of the stadium at Cardiff Arms Park, heading toward the docks to drink in the pubs of the Welsh capital's red light district in Tiger Bay. The area got its name in the heyday of the city as a port for coal exports, when it was known for the rough and sometimes murderous exploits of sailors on shore leave. By the 1980s, the exports had ended with the closure of the nearby mining industry. Only the rough reputation remained. Retired architect David Poole recalls working on a renovation project near the docks at that time. He and a colleague had climbed a scaffold to examine a building. Looking down, they saw a young boy ride his bicycle down the street carrying a brick. The boy threw the brick through the window of Poole's car and leaned in to steal his bag. Suddenly another boy arrived, mugging the thief and taking the bag in his turn. "It really was a rough spot," says Poole. "It had got pretty bad down there."

But in the late 1980s Cardiff's docks were the focus of a major urban regeneration project. A barrier

built across the bay turned the convergence of the Rivers Taff and Ely into a lagoon around which public buildings, arts and entertainment centres, and restaurants were built. The EIB contributed to the development with financing for a congress centre, a hotel and an office building. Now Cardiff Bay is a major tourist attraction and a vibrant focus for city life that has also significantly boosted the economy of the rest of the city. Each Friday Poole and former colleagues from the regeneration work Padrig Davies and David Rees meet at a French restaurant named Côte by the bay and marvel at the change over the decades. "This has made a hell of a difference to Cardiff," says Rees. "The whole city is transformed, and it started here in the docks."

An urban focus

The decline of heavy, export industries all across the UK in the previous decade made the 1980s a time of change in the country's docks. The EIB funded projects in London's Canary Wharf as well as in regional centres like Cardiff. Previously, urban finance had been largely ancillary to other Bank

loans that simply happened to be in cities. Gradually, the Bank developed a growing urban focus, alongside changes in EU policy at the 1999 Amsterdam Summit. In 2016, the EIB's prominent role in the EU Urban Agenda was enshrined in the Pact of Amsterdam. The pact defined a new working method to promote growth in cities and to tackle social challenges. The Bank's financing and advisory services for urban development were specifically referred to in the pact itself.

There are compelling reasons why towns and cities have become such a focus of EIB activity. In 2008, more than 50% of the world's population lived in urban settlements. By 2030, that will have risen to 60% and will be equivalent to the total global population in 1987, when Cardiff was getting its makeover. With the growth in cities, there's also an increase in their impact on the environment. As major centres for the transformation of primary resources and goods, cities are the most important engines of economic growth. They're also the most significant source of contamination, pollution and waste. Cities are good for economic progress, but they also pose a threat, unless the pace and patterns of urbanisation are channelled appropriately.

For example, given current rates of urbanisation, cities will account for an increasingly large proportion (already at more than 70%) of global energy use and CO_2 emissions. The inevitable and significant impact on global warming provides an obvious rationale for focusing on cities in energy management, climate change mitigation and adaptation.

From Barcelona to Eastern Europe

Brian Field worked as a special managerial advisor on urban planning and development at the EIB for many years before becoming a professor at University College, London. In an earlier academic incarnation during the 1970s, he used to take his students to Cardiff Bay to study a perfect case of urban blight. He traces the trajectory of EIB urban lending from Cardiff and other 1980s projects through social housing schemes in Glasgow during the late 1990s and on to the London Olympics, where the Bank financed the athletes' village on the basis that it would subsequently become a social housing legacy project in the Stratford neighbourhood. "Cardiff's regeneration has been spectacular," says Field. "The Bank has had a similar

effect across a very wide range of cities – you need only look at the transformation of Barcelona, and then into EIB-financed urban regeneration initiatives in Eastern and Central Europe."

Under the Treaty on European Union, the EU has formal responsibility for Regional Policy whilst Urban Policy is under the jurisdiction of the Member States, either at national or local level (regions, cities, towns). However, the EU's promotion of employment, growth, and quality of life also requires a concerted effort at the local level. Against this backdrop, the regional and specifically the urban context has become a key area of concern and focus for public policy. The urban dimension is incorporated at EU level through Cohesion Policy. The notion of its importance has grown gradually.

The Bank's urban lending got a major boost during the years in which Central and Eastern European countries joined the EU. Gerry Muscat, head of the urban development division, worked in Eastern Europe for the European Bank for Reconstruction and Development at that time and saw how the dismantling of centrally planned economies there led to increased opportunities for

municipalities and regions to manage their own development. "Suddenly they had their own sources of revenue and they could invest as cities," says Muscat. "It empowered them to think about urban development for themselves."

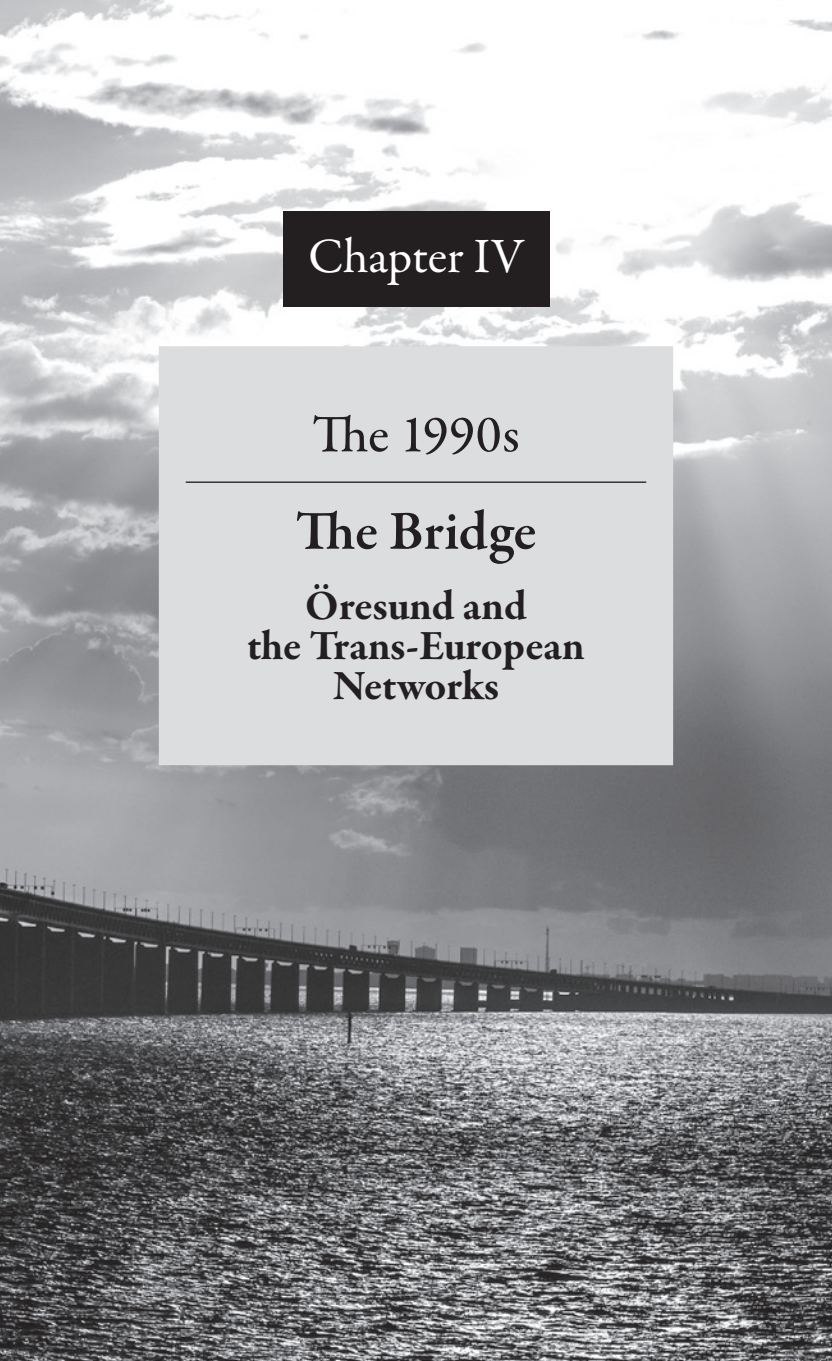
The EU Urban Agenda defines a set of key priorities which resonate across European cities.

European cities should become low carbon, low waste and smart flow cities. These "Smart Cities" require the efficient management of resources (especially with respect to energy and transport) based on smart infrastructure solutions. Examples include supporting sustainable urban mobility and accessibility, energy efficiency and use of renewable energies, and building on the digital agenda.

The Urban Agenda urges European cities to become environmentally friendly, climate resilient and compact. This embeds urban development in green infrastructure and nature-based solutions. Examples include building short circuit food production, minimising urban sprawl, land-take and soil sealing, as well as improved conservation of natural habitats.

European cities should also become more inclusive places under the Urban Agenda, meaning that they are living, caring, inter-generational places. This includes improving quality of life by developing affordable housing, regenerating deprived neighbourhoods, improving access to key urban services, developing the local economy and creating jobs.

Muscat puts it more starkly: "The challenges of Europe are in many ways urban challenges: climate change, refugees, radicalisation and terrorist threats, and social inequity. Urban development is a major part of the solution, because it builds social infrastructure and fosters job creation."



Chapter IV

The 1990s

The Bridge

Öresund and the Trans-European Networks

The Bridge: Öresund and the Trans-European Networks

With the scent of the sea in his nostrils, the fresh air against his face and the bright water stretching so far away, Ola Ghatnekar crosses the Öresund Bridge on his Kawasaki ER-6n. The four-stroke engine powers him high over the narrow channel between his native Sweden and Denmark. He is on his way from his home in Malmö to work as a health economist in Kastrup, just outside Copenhagen. But for now his mind is clear of the stresses of office life. "It's really something," he thinks. "A little moment of mindfulness." The tang of the water makes him emotional. It is so beautiful up here. It is what everyone says when you ask them about the Öresund Bridge. It is so beautiful. But right now Ghatnekar really feels it. Up here on the bridge, the sweeping, steel-girdered, 82 000-tonne connection built between 1995 and 1999, and which opened in 2000. He rides one of the four road lanes on the top of the bridge, while his wife Anna is on a train to Copenhagen on the lower deck.

When he gets to work, it is only 24 minutes since he twisted the clutch and powered his Kawasaki out of Malmö. He has passed across the three cable-stayed sections of the bridge – the longest is almost 500 metres – and down into the Drogden Tunnel, the second part of the crossing, a 3 510-metre tube made up of 20 reinforced concrete segments each weighing 55 000 tonnes. He leaves his bike in the parking lot and goes into the office. Half of his colleagues are Swedes who have made the same crossing, either by motorbike or car or train. All of them, crossing to jobs that they might not have been able to take before the bridge. Ghatnekar's wife used to spend hours each day on a hydrofoil, forced to use her elbows to get through the crowds, then jolted by the waves for 45 minutes. Compare that to the moment of peace Ghatnekar experiences now. "I would never have done it. I would not have been working in Denmark without the bridge," he says.

At the end of the day, Ghatnekar rides back to a city transformed by this bridge, which brought the job opportunities of Copenhagen to Swedes and cheaper housing to Danes priced out of the property market in their capital city.

Advantages of the route

The site of the Öresund Bridge was not always seen as the most likely way to cross the strait between Sjaelland and Skåne. Less than 50 kilometres to the north, the straits at Helsingør in Denmark and Helsingborg in Sweden are narrower. Traditionally ferries ran between the two cities with passengers and freight – and continue to do so. Many Danes opposed the idea of a bridge there, fearing that it would simply add traffic to their roads and make them a transit point for Swedish trucks on their way to the rest of Europe. Instead, by moving the bridge to its final position, the Danes were able to: bring Swedish traffic to Copenhagen Airport, which is right at the point where the crossing is completed; boost the city's labour market with new workers from Malmö; and provide an alternative housing stock across the water.

"The bridge isn't just about transit," says Maj Theander, who worked on the EIB's financing for the Öresund Bridge trains. "It's also about regional integration."

"It's a very successful story and it shows how the TEN-T is supposed to work," says Theander, who grew up near Helsingør.

Trans-European Networks flagship

At the start of the 1990s, the 12 Member States set up the Trans-European Networks to support the development of infrastructure across the EU. TEN-T is the transport element, though there are other TEN programmes, like TEN-E for energy networks. "It's a European objective to have international corridors for trade, integration, and mobility within the EU," says Theander, who is head of the Bank's safeguards and quality management department. "They break down physical barriers. In terms of TEN-T, the Öresund Bridge is a flagship project."

The bridge certainly has a big influence on life around it. A third of Swedes and two-thirds of Danes live in nearby areas. Every day 75 000 people use the bridge, 45% of them taking the 35-minute train ride. More than half of freight between Sweden and Denmark crosses the bridge. According

to a regional organisation representing Öresund-area municipalities and governments, the bridge has been worth €8.4 billion to the economies of Sweden and Denmark. That's a good payback on a €4 billion project, almost half of which was financed by the EIB.

"It has made a big difference to Malmö, and also to Copenhagen," says Britt Andresen, chief analyst at the Öresund Institute, a regional member-financed non-profit organisation based in Malmö.

A bridge for labour

Early in the 1990s Malmö lost a series of industrial businesses within a matter of months. Added to the closure of the shipyard not long before, the result was high unemployment. With the arrival of the bridge, the city's prospects changed profoundly. Copenhagen's international airport was now just minutes away, so a number of corporations set up their headquarters in Malmö. The increased traffic from Swedish travellers enabled the airport to attract more carriers and more routes, which in turn made Malmö still more

attractive. When Copenhagen property prices skyrocketed between 2004 and 2006, many Danes found more affordable housing across the bridge in the Malmö area. In the other direction, companies in Copenhagen were able to hire from an expanded pool of workers in Sweden. "The bridge was really essential for the Copenhagen labour market," says Andresen. "It brings people from Malmö and also from Lund across to work in Copenhagen."

Of course, like everyone else in the region, Andresen doesn't see the bridge in purely economic terms. Driving home from Copenhagen one night with a friend, she looked out across the water with the moon reflected on the surface of the sea. "Wow, what a beautiful moment," she thought. "It really is such a beautiful bridge."

Energy lifelines

The Öresund Bridge is a Trans-European Networks flagship. What about the lines that move electricity and gas around the continent?

Crawl through a tunnel 8.5 kilometres long under the Pyrenees and you will be following the trail of energy integration's future. The tunnel is part of a 63-kilometre interconnector that carries electricity between Santa Llogaia, near Figueres in Spain, and Baixas, close to Perpignan in France. Completed in 2015, this collaboration between Réseau de Transport d'Électricité and Red Eléctrica de España, the French and Spanish electricity transmission system operators, doubled the electricity exchange capacity between the Iberian Peninsula and the rest of Europe to 2 800 MW. The benefits flow in both directions through the exchange of surplus renewable generation from wind and hydropower, and more efficient use of gas and nuclear plants, creating greater security of supply. The project was the first line to cross a European border using innovative high-voltage direct current technologies that offer big advantages over traditional techniques. The cables are lighter and easier to install and the

converters make for more flexible operation of the interconnector. Almost half of its €721 million cost was funded by the EIB.

Energy infrastructure is capital intensive. But its development is key for the EU, so that energy markets can be integrated and energy and climate goals met. It's also a crucial prerequisite for EU economic strategy, which aims to enable consumers to benefit from new technologies and smart, efficient energy use. The benefits of full market integration by 2030 have been put at €30 billion per year for gas markets and as much as €40 billion a year for electricity markets, according to a study carried out for the European Commission by Booz & Company (now known as Strategy&). The EIB has extended loans of €19 billion to EU Projects of Common Interest contributing to the integration of energy markets since 2000, of which €7.4 billion enhance cross-border electricity transmission capacities and €11.6 billion are for gas transmission. Support for the construction of infrastructure is the Bank's main role in this vital sector. The EIB invests in projects that support growth, energy security, and the sustainability of energy production and use in European markets. "These are all efforts to guarantee

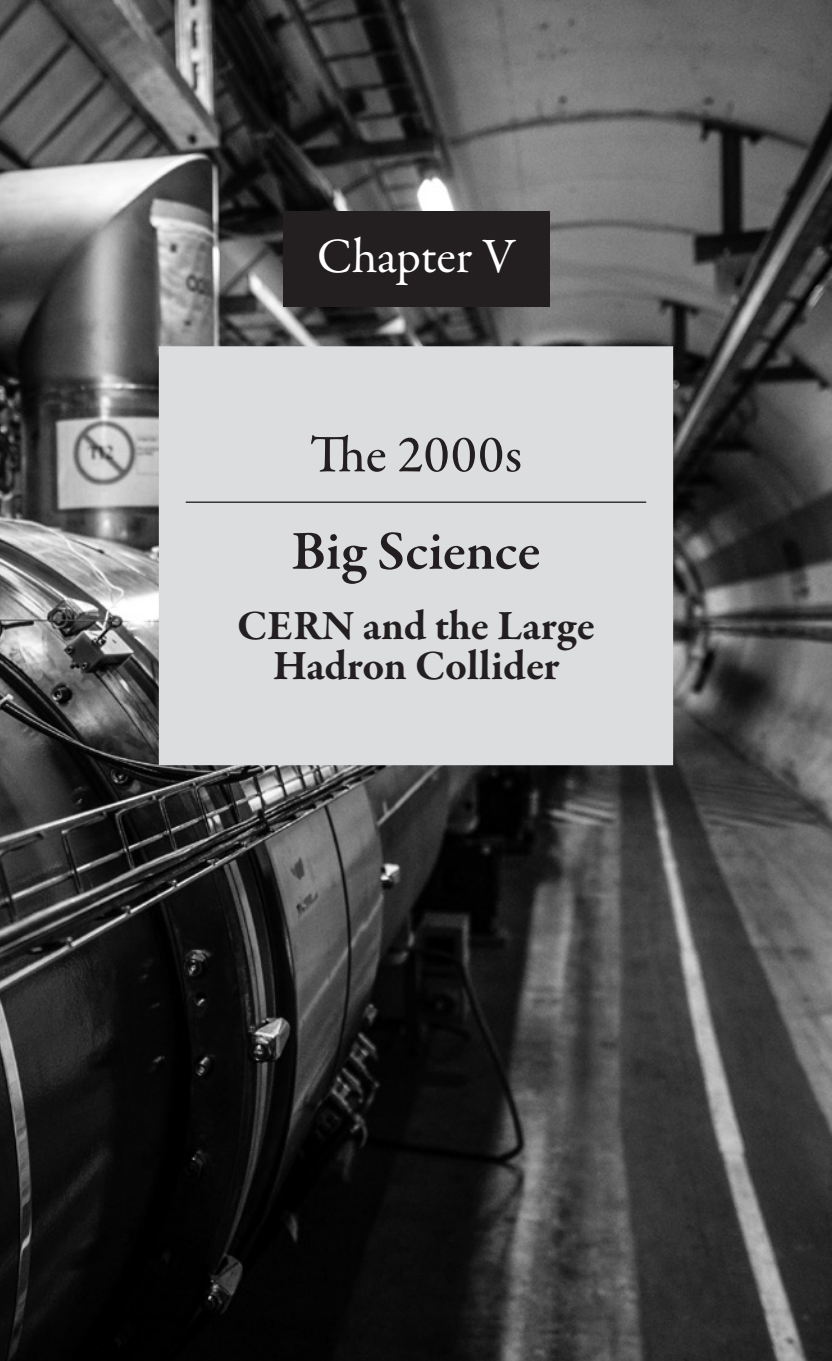
everyone access to affordable, clean, resilient and sustainable energy systems," says Nicola Pochettino, head of the EIB's electricity networks division.

While the EU works to harmonise different national energy regulations, the EIB's work enables countries to put them into effect. You can give consumers and businesses the *right* to do something, but if you don't build the pipes and cables to enable them actually to do it, the benefits will obviously never accrue. This is a vital consideration in areas of Europe which have been less integrated. After the Santa Llogaia-Baixas connection, commercial exchange capacity between Spain and France doubled, though further interconnectors need to be developed to meet EU targets.

Interconnections that drive down prices

The impact of such projects is tremendous in Southern Europe. For the Baltic States it is even more significant, because they remain part of the old power systems of the Russian Federation and are highly dependent on Russian gas supplies. Depending on the political situation, that could be a

risk to their energy security. The EIB funds a number of projects to integrate the Baltics fully into the EU's internal market. In Klaipėda, the EIB financed a liquefied natural gas import terminal and the gas pipeline that connects it to Lithuania's gas network. The terminal and the pipeline make Lithuania less dependent on Russian gas, in this case because it can be supplied by sea. Further investment in the gas network pipelines, including the EIB-financed 110-kilometre pipeline between Klaipėda and Kursenai in Lithuania, aims at ensuring that Latvia and Estonia can also benefit from an alternative to Russian gas. The competition from the new supply option has been key in driving a 20% reduction in Russian gas prices to Lithuania.



Chapter V

The 2000s

Big Science

CERN and the Large Hadron Collider

Big Science: CERN and the Large Hadron Collider

It was finally happening. In a 27-kilometre tunnel, mighty magnets kept a stream of particles in orbit, while high-powered lenses focused them. At the European Organisation for Nuclear Research, Dr Frédérick Bordry came excitedly to his feet in the control room of the world's biggest particle accelerator, the most powerful tool for investigating the mysteries of physics: the large hadron collider. A quarter century after the start of operations, they had remade the conditions that existed at the beginning of the Big Bang. Bordry and his fellow scientists were able to observe the collision as two proton beams smashed into each other at the speed of light. The head of the technology department at the international facility near the Swiss-French border, he raised a glass of champagne to celebrate. "Wow, that's really something," thought Bordry, who's now director of accelerators. "This is an amazing leap toward a deeper understanding of the conditions of matter."

That was in March 2010. But the origin of the universe and the conditions of matter are puzzles not to be solved in one great blast. It took decades to reach that moment. Like the other scientists working at CERN (the French-language acronym of the organisation's original name) Bordry knows there is endless study ahead of him and the other scientists, whose project is slated to run at least until the end of the 2030s. "We are now able to explain about 4% of the mass of the universe," he says. "That's a great achievement, but it's still just a small proportion of everything that there is for us to know. Now we want to discover things like dark matter."

Even so, the data and techniques pioneered by the development of fundamental research at this large facility are already spun off into a number of start-up companies, some of the research material is available to private companies under licence, and CERN is planning to expand its incubator programme in collaboration with other research institutes and universities.

Unique for the Bank

That is exactly what the EIB envisaged when it signed a €300 million credit facility for CERN in

2002 that was used to finance part of the construction of the large hadron collider. It was a decade that saw a major shift of emphasis toward innovation at the Bank. At first that was in support of a European Council decision in 2000 to create a robust knowledge economy across Europe. The Council's plan was ultimately diverted by the 2008 financial crisis, but by then the EIB had already more than met its target for innovation investment for the entire decade. CERN was undoubtedly conducting the most complex scientific research of any project funded by the EIB during that decade, but many others benefitted from the Bank's emphasis on this sector. "It was really unique, compared to anything that the Bank had done up until then," says Aristomenis Pofantis, deputy technical advisor in the Bank's innovative industries division. "It was completely new to the Bank."

The research produced by CERN during that decade of great innovation, however, was strong enough to make it easy for the EIB to provide a further credit of up to 250 million Swiss francs in 2016. "This loan is to finance the upgrade of the existing large hadron collider by increasing its capacity in a project called HL-LHC, for high-

luminosity large hadron collider," says Juan de Pierpont, the senior loan officer on the second deal. "With our financing we accelerate their capacity to invest."

Here is how that works: CERN's 22 member states send it an annual budget of 1.2 billion Swiss francs. The budget is constant and doesn't allow for increased budgetary needs connected to a big, new technological operation. To cover the exceptional expenses linked to this major upgrade, CERN draws on the EIB's credit facility and, later, pays the funds back out of its regular budget. "Without the EIB we would have to go to commercial banks," says Catherine Spencer, CERN's head of treasury. "The EIB's terms and conditions are much more attractive to us and better match our needs."

Knowledge transfer

On a high theoretical level, CERN's research made headlines with its discovery of a particle linked to the mechanism that gives mass to elementary particles, famously known as the Higgs boson. Its Knowledge Transfer Group, however, has worked on spinning out its research into 16 new companies

so far, as well as sharing the research broadly. On the roof of Geneva Airport, for example, the ultra-high vacuum panels that supply the heating and air-conditioning are based on the vacuum inside the large hadron collider. Proton therapies for cancers are being developed in Italy and Austria, while in France CERN's high-field magnets have been adapted for use by neurologists.

It is not the first time CERN's research has made a real world impact. After all, it was a British scientist working at CERN who invented the worldwide web in 1989. Next, according to chief of industry relations Thierry Lagrange, CERN aims to set up an initiative called ATTRACT along with other research institutes, universities and corporations. The aim is to draw private sector finance to ideas born of scientific work.

The EIB may become involved in financing the ATTRACT programme. Already the Bank has expanded beyond its initial (and initially unique) CERN deal into other super-complex scientific work.

In 2009 the Bank financed the Sincrotrone Trieste Extension with a €20 million loan to extend

the research capacities of the Free Electron Laser at the large electron-accelerating synchrotron facility at Trieste, Italy. The laser produces ultrashort pulses of ultraviolet and X-ray light with gigawatt peak power levels, leading to extremely bright radiation sources. This opens the way to stroboscopic characterisation of dynamic phenomena in materials at the molecular level. In 2004 the Bank had already financed the upgrade of the existing synchrotron at the site with a €60 million loan.

A €65 million loan upgraded the European Synchrotron Radiation Facility facilities in Grenoble, France, in 2015. It aims to optimise and increase the coherence and brilliance of X-ray beams. They will be used in photon science in a large spectrum of micro-analytical techniques.

The European Spallation Source got a €100 million EIB loan in 2016. It will fund international scientific research infrastructure in Lund, Sweden, and in Copenhagen. With neutron beams 100 times brighter than current facilities, this project uses neutron-scattering techniques that offer the possibility of monitoring material structures and motion at a molecular level. It opens up new

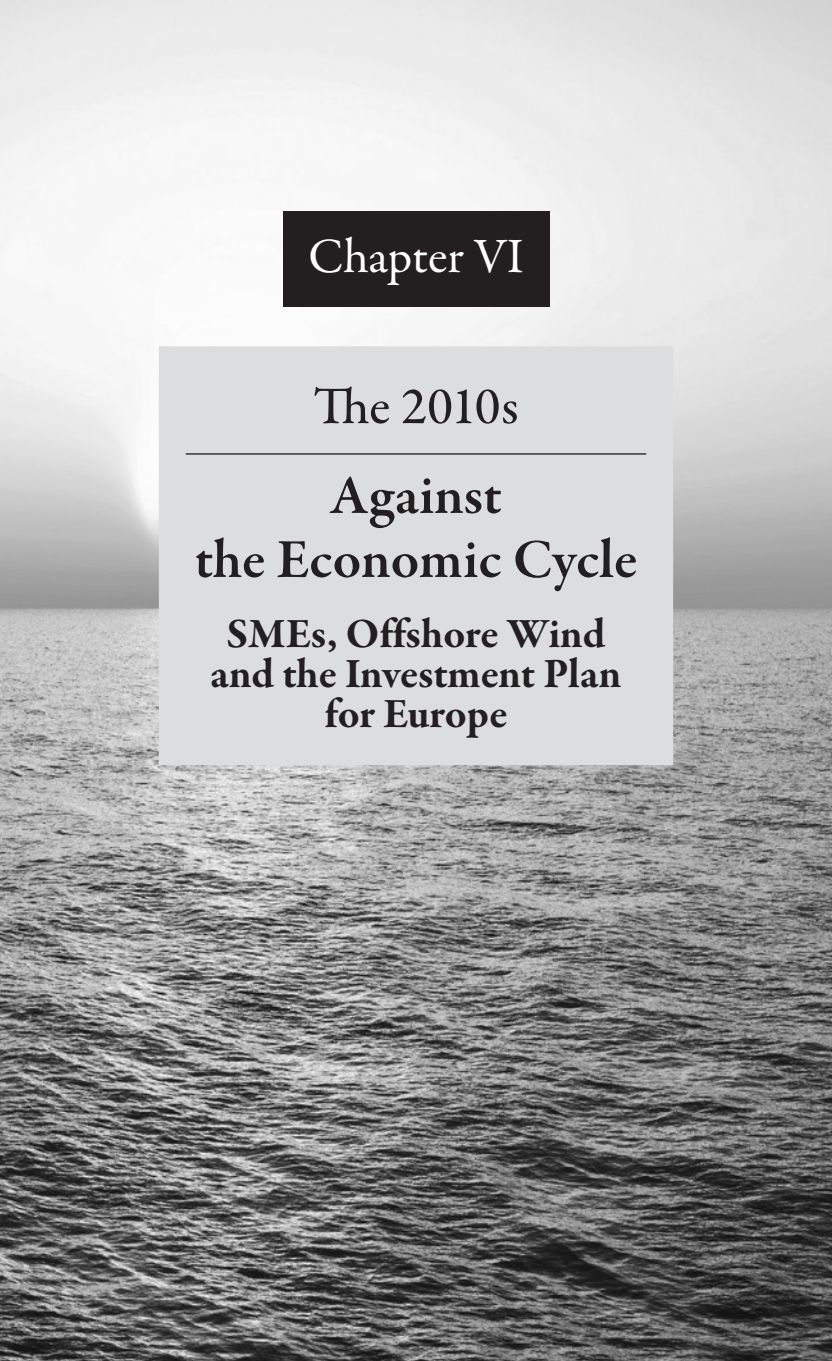
opportunities for researchers in multiple disciplines such as life sciences, environment, energy, transport and engineering, as well as physics, chemistry and even archaeology.

Chapter VI

The 2010s

Against the Economic Cycle

SMEs, Offshore Wind and the Investment Plan for Europe



Against the Economic Cycle: SMEs, Offshore Wind and the Investment Plan for Europe

Guarantees for Small and Medium-Sized Enterprises

In central Bohemia, 30 kilometres south of Prague, TG Scarabeus manufactures specialised foils and packaging, as well as recycling plastic packaging, which it sells in the Czech Republic and Slovakia. The company, founded in 2004, had to buy new machinery to keep pace with technological changes in the industry and needed €137 000 to pay for it. In 2016 credit was short for small businesses in the Czech Republic – as it was across Europe – so Scarabeus's owner Miroslav Goiš turned to a guarantee system that ultimately is backed by the European Investment Fund, the EIB Group's specialist provider of risk finance for small and medium-sized enterprises. Using the EU budget guarantee of the Investment Plan for Europe, an EIF counter-guarantee backed a

guarantee from ČMZRB, a Czech bank, which in turn enabled Goiš to receive a loan of €122 000 from Česka Spořitelna, the Czech savings bank. If that sounds complicated, it's because financing for SMEs across Europe is not simple. In fact, it's a tricky issue that the EIB Group has been working hard to deal with throughout the second decade of this century. Small companies and start-ups are a vital area of the economy and have a great need for financing, yet they often find banks unwilling to lend to them because they lack a track record. The bottom line is clear for Scarabaeus. "Without the guarantees, we couldn't cover the loan," says Goiš. "Over time, our competitiveness would go down. So we're really happy that we got the help from ČMZRB."

The essence of the EIB Group's work in the SME sector is that it acts against the economic cycle. This strategy underpins EIB operations in many sectors, particularly during a decade that has seen the EIB and the EIF spearhead the Investment Plan for Europe's campaign to revive the continent's economy and crowd-in private capital.

In the case of the SME loans, the aim is that banks which actually lend to small businesses have to

worry much less about the risk of the loan, because a European Commission initiative called COSME transfers much of that risk to the EIF with the backing of the Investment Plan for Europe's EU budget guarantee. Of course, that makes the bank much more likely actually to *grant* the loan – and that's good for small businesses. With the EU budget guarantee, the EIB and the EIF aim to make banks and private investors feel more secure about putting their money to work. That's important in the Czech Republic, for example, where the EIF signed its deal with ČMZRB in August 2015. The EIF will counter-guarantee the guarantees made by ČMZRB, a state-owned development bank, to the tune of €115 million. "There's enough liquidity, but banks require collateral, and that's missing," says Lubomir Rajdl, deputy chief executive of the Prague-based bank. "Our programme is really filling a market gap."

It's such a market gap that demand among Czech SMEs led to an increase in the size of the counter-guarantee. In late 2016, the EIF agreed to boost it to €389 million. By the end of 2016 the counter-guarantee had supported 1 880 projects and was securing loans totalling €185 million. By the

end of the programme in 2018, ČMZRB expects the counter-guarantee to be backing 3 800 SMEs with loans totalling €556 million.

One of ČMZRB's first guarantees under this programme was on a €92 500 loan to OVEX Plus, a waste management company in Ostrava, the Czech Republic's third-largest city. With the loan and some of its own money, OVEX bought a new technology that facilitates the dust-free storage of ash produced by the energy, coal and metal industries across Moravia and Silesia. That's important in a region where air quality is seriously affected by industrial production. "The technology helps boost our position in the power and energy market in a sustainable and effective way," says Miroslav Olszovy, executive director at OVEX. "There are also positive environmental aspects of the new technology, which is important, especially for our region."

These small loans extend the reach of the Investment Plan for Europe to every corner of the continent. On the Danube's Bulgarian bank, Georgi Dikov runs a factory that makes scaffolding and construction equipment. He received a €34 000 loan from Cibank in Sofia, backed by the Investment

Plan for Europe, for the purchase of a second-hand harvester from Germany. Dikov employs 45 people in his factory and five others on a 100-hectare plot of agricultural land in Oryahovo, a town of 5 000 people where the unemployment rate is higher than the Bulgarian average and wages are half the national average. It's an area with relatively few highly trained workers. "I train people with no education," says Dikov, "and I turn them into specialists."

Winds of change

The Cestas photovoltaic plant, which was inaugurated in December 2015, produces clean energy that's equivalent to the domestic usage of at least a third of the residents of nearby Bordeaux. The activation of its one million solar panels marked a big milestone in climate-friendly energy: Cestas was the first major photovoltaic project to be truly competitive with fossil fuel power stations. It was the climax of a long journey for the solar photovoltaic industry. Growth had been slow each year of the 1990s and most of the first decade of this century. However, technological developments and increasing economies of scale brought a boom. And

the EIB was there all along. "Cestas is the first big photovoltaic project we see that's competitive with a fossil fuel alternative," says David González García, senior engineer in the EIB's renewable energy division. "Costs have been going down for 15 years, and now there's higher supply, standardised equipment, and great economies of scale."

The EIB's role in solar photovoltaic is one that's mirrored in other renewable energy sectors and, in particular, in the offshore wind industry. The Bank often took on solar photovoltaic deals that didn't attract sufficient private investment. That helped bankroll the research that ultimately made the industry a viable economic prospect. The EIB's approach is similar in other, less mature, renewable sectors, where it has made big investments in offshore wind farms and the massive concentrated solar power development at Ouarzazate, Morocco. Offshore wind and concentrated solar both produce relatively small proportions of the world's electricity at present, but the evolution of solar photovoltaic offers an encouraging path for them to follow.

The EIB's role in supporting innovation is key to understanding the development of offshore wind

power. The industry could have easily been wiped out in 2008, when the global financial crisis made investors especially leery of risk. Though *onshore* wind farms were relatively well-developed, *offshore* technology was still in its early stages. The EIB stepped in when private investment dried up. "Commercial banks were very reluctant to take the risk," says Alessandro Boschi, head of the EIB's renewable energy division. "The offshore wind industry wouldn't have started moving without the presence of the EIB."

Certainly 2008 would have appeared to be a risky time to invest in Belwind, a Belgian project to build Europe's biggest wind farm 46 kilometres off the Zeebrugge coast in water as much as 37 metres deep. "There was no private money because of the financial crisis," says Melchior Karigl, an EIB project finance loan officer. Karigl and his colleagues, however, were impressed by the technology that would enable Belwind to sink foundations deeper into the sea than any other project at the time – and also by the audacity of the plan to construct 5 turbine towers over an area of 17 square kilometres. The EIB funded Belwind to the tune of €300 million, half the cost of the project. Belwind

now produces enough electricity to power 160 000 homes in Belgium.

The Bank's investments continue to support an industry that is in a constant state of technological change. Take the blades of the world's biggest wind turbine, for example. They are 80 metres long, equivalent to the wingspan of an Airbus A380. The circle they make when they sweep around is larger than the iconic London Eye. And 44 of these turbines are being installed in the Norther wind farm, 22 kilometres off the coast of Belgium. Thanks to technological advances and firm financing, wind power is also increasingly affordable. "Electricity generation technologies take a long time to mature," says engineer González. "For instance, steam turbines took nearly 80 years to become widespread. So for wind turbines to mature, you will need enough trial space and enough investment in research and development for the same to happen."

The EIB is certainly facilitating this trial space. Its deals in 2016 alone are a good illustration. A £525 million loan for construction of the Beatrice wind farm to be built 14 kilometres off the coast of Scotland was the largest single investment in an

offshore wind farm. Beatrice will include 86 turbines, generating up to 588 MW, enough to satisfy the needs of 520 000 homes. The Bank added a £160 million loan to construct transmission networks reaching two more offshore wind farms and £500 million to finance reinforcements of a regional network making it possible to connect more renewable energy producers. An agreement with Rentel Wind Farm for up to €300 million will erect 42 wind turbines 34 kilometres off the Belgian coast. With an installed capacity of around 300 MW, this will be enough power for approximately 258 000 homes. A deal with Norther to provide €438 million for its London Eye-sized turbines will generate a nominal capacity of close to 370 MW.

All these offshore wind farm loans were at least partly backed by the EU guarantee under the Investment Plan for Europe. That's likely to be the story for the next decade of the Bank's history, too.

A bridge across an entire sea. The world's biggest airliner. Motorways over high mountain passes. Urban wastelands transformed. A scientific project to recreate the very conditions at the birth of the planet. These are chapters in the story of the bank that financed the infrastructure and innovation upon which Europe's economy is built.

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As it passes 60 years of operations, the EIB and the transformations it brought about should go unnoticed no longer, for they are among the best examples of what Europeans can achieve when they work in concert.

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