



INFRASTRUCTURE & INCLUSION

HOW CAN INFRASTRUCTURE STAKEHOLDERS MOVE TOWARDS
INCLUSIVE AND JUST INFRASTRUCTURE



VAUBAN
INFRASTRUCTURE PARTNERS

Infra
vision



Altermind



RESEARCH BY



Leading Think Tank for the infrastructure sector, the platform has been created in March 2024, leveraging on four years of research, and is now open to all stakeholders. For companies, investors and individuals looking to strengthen the position of the infrastructure asset class as a building block of the society of tomorrow

SPONSORED BY



Vauban Infrastructure Partners is a leading infrastructure asset manager focused on the core infrastructure market. Headquartered in Paris, Vauban employs 75 professionals and targets predominantly European brownfield mid-market assets, and pursues a long-term, yield-driven strategy matching the underlying nature of the assets and long-term commitment to all stakeholders' interests through a strong focus on creating sustainable value & unique ESG approach. To date, Vauban has raised over USD 10bn across 7 funds in core infrastructure, and has invested in the mobility, energy transition, social infrastructure, and digital infrastructure sectors spanning 12 different geographies.

WITH THE SUPPORT OF



Altermind is a consulting firm enhanced by the insight of the international academic world. Its teams, based in Brussels, London, Milan, Munich and Paris, offer executives a 360-degree intervention capacity on the most complex issues.

FOREWORD

Since its creation, Vauban Infrastructure Partners has sought to finance essential public infrastructure that provide long-term sustainable solutions to local communities: clean water, efficient waste management, safe and low-carbon transportation, very high-speed communication networks, and a broad range of social services around education, health, justice and leisure.

We consider that we have a shared duty as investors to build and maintain vital infrastructure systems so that communities can thrive in a sustainable environment. In addition, we strongly believe a close collaboration among infrastructure stakeholders is vital for creating long-lasting shared value.

This is why we launched in March 2024 a new entity, based on a think tank model: InfraVision. At its core, InfraVision rests on two pillars: thought leadership and knowledge sharing. It focuses on anticipating future infrastructure needs by analyzing the impact of the biggest changes in the world economy, such as demographic shifts, technological advancements, and environmental and social challenges, with the support of the whole infrastructure ecosystem.

In 2024, InfraVision, in collaboration with Altermind, conducted a research study examining the complex relationship between infrastructure and inequalities. Although infrastructure serves as the backbone of modern society, shaping the ways we live, work, and interact with one another, they are not neutral. The ways in which assets are planned, financed, and maintained sometimes reflect and reinforce income, social and spatial inequalities. As nations around the world confront the urgent challenges of climate change, population growth, and technological transformation, the need for more inclusive and just infrastructure has never been greater.

Throughout the year, we organized a series of “events” to gather high-level insights from top international experts, asset managers, policymakers, NGOs and local public authorities: a webinar on the ‘just transition’ of infrastructure, a breakfast panel exploring the regulatory and business levers to accelerate the inclusive transition of infrastructure, three podcasts on impactful business strategies and initiatives, and a masterclass from 2019 Nobel Memorial Prize winner Esther Duflo.

With this study, we hope to enhance the just transition of infrastructure, make infrastructure more accessible, affordable and acceptable to all, and strengthen our commitment to a long-term and inclusive investment approach.

Gwenola Chambon,
CEO, Founding Partner

Mounir Corm,
Deputy CEO, Founding Partner

EXECUTIVE SUMMARY

Infrastructure forms the backbone of societies and is expected to drive inclusive economic growth, ensuring that everyone has access to the benefits of infrastructure projects without being left behind. The ultimate purpose of infrastructure is not only to provide physical structures or services but to generate positive social impact and reduce inequalities within society. From basic services (water, sanitation, electricity, waste management) to connectivity infrastructure (transportation, ICT), successful infrastructure projects have a ripple effect on GDP, income growth, local and regional development, and more tentatively, on distributive equity at the macro level.

Yet, a micro-level analysis reveals more complexities and nuances regarding the impact of infrastructure: merely provisioning infrastructure may not be sufficient, and traditional inequalities can be perpetuated as an unintended result of the delivery and pricing methods chosen for essential services or the design of certain infrastructure. Overall, the methods used for planning, financing and maintaining assets can exacerbate income, social, and spatial inequalities. Transportation systems are a case in point and remain the most exposed and studied infrastructure in this regard. Although they mostly increase business activity and productivity and can create urban-regional development ecosystems, transportation infrastructure may also deepen inequalities, by draining activity from less dynamic nodes to more dynamic nodes.

Given the potential for infrastructure to drive positive social change and yet the inherent risks of uneven distributional effects, the world needs to evolve toward more 'inclusive infrastructure'. This concept, already gaining traction, is defined by the GI Hub as "any infrastructure that enhances positive outcomes in social inclusion and ensures that no individual, community or social group is left behind or prevented from benefiting from improved infrastructure."

The challenge is massive, as achieving inclusive infrastructure requires a fundamental shift in how projects are designed, financed, and implemented. In addition, the future of infrastructure is full of uncertainties, and most of the megatrends disrupting the sector over the next decades may deepen the distributional gap within and between countries: urbanization, population growth, digitalization, climate change, etc.

In particular, future green infrastructure will have to be built in a highly inclusive way: Failing to do so will result in the ecological transition being a social regression as climate change-related policies (electromobility, energy-efficiency renovation of housing, etc.) have more significant effects on lower-income households and vulnerable groups. This is all the more the case for populations in low-income countries, which are the most exposed to extreme poverty gaps, are the least resilient to exogenous economic and climate shocks, and at the same time disproportionately bear the cost of climate-related events such as extreme weather, rising sea levels, and prolonged droughts.

In this context, engaging in a ‘just transition’ is critical for infrastructure stakeholders to guarantee that the substantial benefits of a green economy transition are shared widely, while also supporting those who stand to lose economically—countries, regions, industries, communities, workers or consumers. A trailblazer in fighting social inequality, the EU has already been reinforcing its arsenal of policy and regulatory instruments over the past decade to overcome the social challenges of a low-carbon economy transition. For instance, the Just Transition Mechanism was adopted in 2021 to ensure that the economic and social costs of the green transition are not disproportionately endured by regions that are the most reliant on carbon-intensive energies.

In any case, addressing social considerations should take precedence, as the social context often dictates how successfully environmental and economic initiatives will unfold. Focusing on the social dimension also creates an inclusive framework that acknowledges the variety of needs across different regions and populations. To embrace and accelerate the just transition, infrastructure businesses and operational strategies must integrate social considerations at every stage of each project (planning, design, implementation, operations, decommissioning), moving from a targeted to a comprehensive approach. A core set of standardized principles could serve as a compass to guide the development of infrastructure that is not only functional and sustainable but also socially equitable and inclusive: acceptability, adequacy, availability, accessibility, and affordability. Those principles form a bedrock that not only meets but also anticipates the multifaceted needs of communities.

Stakeholder engagement and pricing will be the cornerstones of those inclusive-driven strategies as they make sure that all segments of the population can be part of infrastructure project design and, regardless of their income level, access and benefit from their services. At this stage, while integrating inclusion aspects in pricing strategies has already revealed to be challenging, the need to engage in the green transition makes the equation even more complex to solve. Pricing strategies based on the most vulnerable consumers' ability to pay should therefore be directly integrated into a multidimensional framework and pricing models.

Strong commitments from the private sector and support from public authorities will also be essential: beyond subsidies, public-private partnerships (PPPs) and public contracts will have to be geared toward extrafinancial outcomes from design to operation. As infrastructure projects have long-term horizons (often spanning 10 to 30 years), multi-governance mechanisms must also be implemented to maximize social and long-lasting value. By involving all relevant stakeholders in a coordinated manner, those schemes can help ensure that infrastructure serves the broader public interest.

As urbanization accelerates, with cities expected to house 80% of the global population by 2050, the inclusive transition of urban areas becomes both critical and urgent. Urban planners will have to apply all those levers to become greener and inclusive: a systemic approach of urban planning—encompassing economic, social, spatial, environmental, and political aspects—will be key to address the needs of everyone and to build integrated urban infrastructure ecosystems.

METHODOLOGY

A report combining academic expertise and business insights

The present report aims at providing Vauban IP with a forward-looking approach on inequalities and infrastructure. It has been conducted jointly with Altermind, a consulting firm enhanced by the insight of the international academic world.

The report focuses on how the adoption of more inclusive practices and services can help the infrastructure sector tackle the challenges of our times, including social divides between and within countries and the effects of climate change.

Reflecting Vauban IP and Altermind's DNAs, the report combines academic expertise with business insights, relying on the review of the existing literature and the outcomes of a series of thematic events.

Those events have mobilized a wide range of expertise with a multistakeholder approach to fully understand the concepts of inequalities, inclusion and 'just transition'.

In addition to academics and industrials, a group of thought leaders, representatives from multilateral organizations and policy-makers have participated in the following events:

A webinar on 'inclusive infrastructure'

composed of a keynote speech on the just transition of infrastructure by László Andor (former EU Commissioner for Employment, Social Affairs and Inclusion, and Secretary General of the Foundation for European Progressive Studies); a deep dive on inequalities and transportation by Zoi Christoforou (Senior Lecturer at the École Nationale des Ponts ParisTech and an Associate Professor at the University of Patras in Greece); and a fireside chat on 'inclusive design & infrastructure' with Sadie Morgan (architect and co-founding director of dRMM).



A breakfast panel at Vauban IP's office

exploring the regulatory and pricing prerequisites to evolve toward more inclusive infrastructure, with the insights of Elisabeth Kotthaus (Head of Unit for Social Affairs, Passenger Rights & Equal Opportunities, DG-MOVE at the European Commission), Nicolas Pinaud (Deputy Director of the Directorate for Financial and Enterprise Affairs of the OECD), Sara Fisher Ellison (Senior Lecturer at the MIT Department of Economics), Jérôme Stubler (CEO of Equans), Sébastien Fraisse (CEO of Indigo) and Philippe Gagnepain (Professor of Economics at University Paris 1 Panthéon-Sorbonne)



A series of three podcasts discussing the business and operating levers to maximize the social impacts of infrastructure and create 'shared social value'. Three themes were discussed:

- The relationship between inequalities and infrastructure with Xavier Girre (EDF Senior Executive VP responsible for Performance, Impact, Investments, and Finance), Sergio Oslé (COO of Telefónica in Spain) and Antoine Picon (Professor of the History of Architecture and Technology at the Harvard Graduate School of Design).



- The strategic and operating paths to develop toward more inclusive assets with Sébastien Petithuguenin (CEO of Paprec), Simon Whistler (Head of Real Assets at the UN Principles of Responsible Investment) and Bryan T. Adey (Professor of Infrastructure Management at ETH Zurich).



- The development of 'inclusive cities' with Yves Lederer (CEO of Coriance), Harvey Hollins (former Director of Urban and Metropolitan Initiatives for the State of Michigan, Office of the Governor) and Séverine Laugier (Social innovation and new economic models for growth Project Director at Sodexo).



A keynote speech by 2019 Nobel Prize

Winner Esther Duflo on inequalities linked to infrastructure investment in developing countries, shedding light on key issues such as the influence of railroads on national economic growth and the looming risks that climate change poses to infrastructure.



In addition, a survey was conducted in July 2024 by Altermind with Laurent Cordonier (Director of Research at the Descartes Foundation) to assess and analyze public perceptions of social inequalities related to infrastructure in France. The survey, which was based on a sample of 2,002 respondents, outlines the existing interlinkages between inequalities, climate change and infrastructure, and identifies key catalysts to evolve toward greener and more social-driven infrastructure.

SUMMARY

08	1. INFRASTRUCTURE & SERVICES FOR ALL: LAYING THE FOUNDATION FOR MORE INCLUSIVE INFRASTRUCTURE
08	SHRINKING INEQUALITIES THROUGH INFRASTRUCTURE: IT'S HARDER THAN IT LOOKS
08	INEQUALITIES: A MULTIFACETED, COMPLEX AND HIGHLY DISCUSSED CONCEPT
14	THE EQUITY EFFECTS OF INFRASTRUCTURE: OVERALL POSITIVE, YET UNEVEN
19	MAKING INFRASTRUCTURE MORE INCLUSIVE: BEST PRACTICES EMERGING
19	INCLUSIVE INFRASTRUCTURE: A BEST-IN-CLASS ASSET
24	DRIVING INCLUSIVE INFRASTRUCTURE WORLDWIDE: ADDRESSING REGION AND SECTOR PARTICULARITIES
30	2. THE 'JUST TRANSITION': A NEW AND MOST CRITICAL CHALLENGE FOR INFRASTRUCTURE STAKEHOLDERS
32	MAXIMIZING THE SOCIAL IMPACT OF INFRASTRUCTURE: MAJOR CHALLENGES AHEAD
34	TACKLING DEMOGRAPHIC AND SPATIAL DIVIDES
36	LEAVING NO ONE BEHIND IN THE GREEN TRANSITION
42	THE PATH TOWARD THE 'JUST TRANSITION' OF INFRASTRUCTURE
42	DESIGN EQUITABLE GREEN PUBLIC POLICIES FOR INFRASTRUCTURE
47	A MARGIN FOR PROGRESS: TOWARD A "NEW FAIR DEAL" FOR INFRASTRUCTURE
50	FIRESIDE CHAT: GWENOLA CHAMBON & ESTHER DUFLO
52	3. CRAFTING INCLUSIVE AND JUST-DRIVEN BUSINESS STRATEGIES TO ENSURE MAXIMUM COVERAGE
52	PUT SOCIAL VALUE AT THE CORE OF BUSINESS STRATEGIES: A 'FIVE A COMPASS'
52	ACCEPTABILITY & ADEQUACY: THE PREREQUISITES
57	AVAILABILITY, ACCESSIBILITY & AFFORDABILITY: THE BREAKING POINT
60	ALIGNING SOCIAL WITH ENVIRONMENTAL GOALS: ASSET MANAGERS MOVING FORWARD
60	ADAPT BUSINESS STRATEGIES TO CHANGING USERS' EXPECTATIONS AND PERCEPTIONS
62	ASSET MANAGERS AND OPERATORS PAVING THE WAY
70	4. THINK BIG, ACT ON TARGET: KEY LEVERS TO DEVELOP TOWARD A WORLD OF INCLUSIVE AND JUST INFRASTRUCTURE
70	GETTING INCENTIVES RIGHT: SHARING THE SOCIAL AND ENVIRONMENTAL DIVIDENDS
70	SEARCHING FOR MULTIDIMENSIONAL AND 'JUST PRICING' PRICING MODELS
74	THE NEED FOR A MULTISTAKEHOLDER AND COLLABORATIVE APPROACH WITH PUBLIC POLICY MAKERS
80	GETTING GOVERNANCE RIGHT: TOWARD A NEW SOCIAL CONTRACT
80	BUILDING INTEGRATED AND PEOPLE-DRIVEN GOVERNANCE MECHANISMS
82	MAKING IT REAL: BETTER URBAN PLANNING FOR MORE INCLUSIVE CITIES
86	5 PERSPECTIVES FOR INFRAVISION: TAKING UP ALL "TRANSITIONS"
90	APPENDIX 1: BIOGRAPHIES OF EXPERTS
93	APPENDIX 2: GLOSSARY
94	APPENDIX 3: MAIN BIBLIOGRAPHIC REFERENCES
95	APPENDIX 4: LIST OF FIGURES, EXPERT POSITIONS, FOCUS, CASE STUDIES AND TABLES

INFRASTRUCTURE & SERVICES FOR ALL: LAYING THE FOUNDATION FOR MORE INCLUSIVE INFRASTRUCTURE

Key takeaways

→ Despite a reduction in income inequalities since the 1980s, substantial disparities in income and wealth distribution persist between the Global North and South, as well as within the Global South

→ While income inequalities serve as a fundamental and primary benchmark to assess the health and fairness of a society, the 'capability framework' designed by Amartya Sen can help gauge inequalities far beyond economic disparities, encompassing factors such as gender, ethnicity, spatial divides and social class

→ The level of inequalities related to access to infrastructure has long been a critical decision factor for public authorities when designing projects and policies, and the distributional implications of infrastructure development offer some suggestive evidence of an equity-enhancing effect

→ Yet, a micro-level analysis reveals more complexities and nuances regarding the impact of infrastructure: merely provisioning infrastructure may not be sufficient, and traditional inequalities can be perpetuated as an unintended result of the delivery and pricing methods chosen for essential services or the design of certain infrastructure

→ Given the potential for infrastructure to drive positive social change and the inherent risks of uneven distributional effects, certain inclusive best practices have been emerging to enable infrastructure to become more virtuous and enhance social equity as a core objective

→ According to the type of asset and localization, the approach and challenges differ significantly for those 'inclusive infrastructures' but the expected outcomes remain the same: the delivery of infrastructure services to everyone

Shrinking inequalities through infrastructure: it's harder than it looks

Inequalities: a multifaceted, complex and highly discussed concept

INCOME INEQUALITIES PERSISTING AT EVERY LEVEL

Inequality is a polarizing concept that has long structured social dynamics within and between countries and at the same time sparked intense debate throughout modern history. The intuition behind it is relatively easy to grasp; yet, since the Enlightenment, and continuing in contemporary times, there has been a wide **range of approaches of inequalities**, the methods for measuring it, and the extent to which they are acceptable in a democratic society.

In this regard, **income inequalities still serve as a fundamental and primary benchmark** to assess the health and fairness of a society, and make robust comparisons. Unsurprisingly, there is a significant North-South divide with sharp disparities in income and wealth distribution, highlighting **the importance of economic inequalities between and among countries, worldwide**. The average income of people living in the European Union is thus 11 times higher than the average income of people in sub-Sa-

haran Africa; the income of people in North America is 16 times higher than that of sub-Saharan Africans¹.

In addition, the Gini coefficient indicator², which measures the dispersion of income among the members of a population on a scale from 0 to 1 (higher values indicate higher inequality), offers a valuable way to assess wealth distribution inequalities within each country. The Global South consistently scores closer to 1 on this scale, signaling pronounced disparities in how wealth and income are distributed among their populations. Conversely, countries in the Global North, while not immune to inequalities, tend to have lower Gini coefficients³, reflecting more equitable distribution (Figure 1).

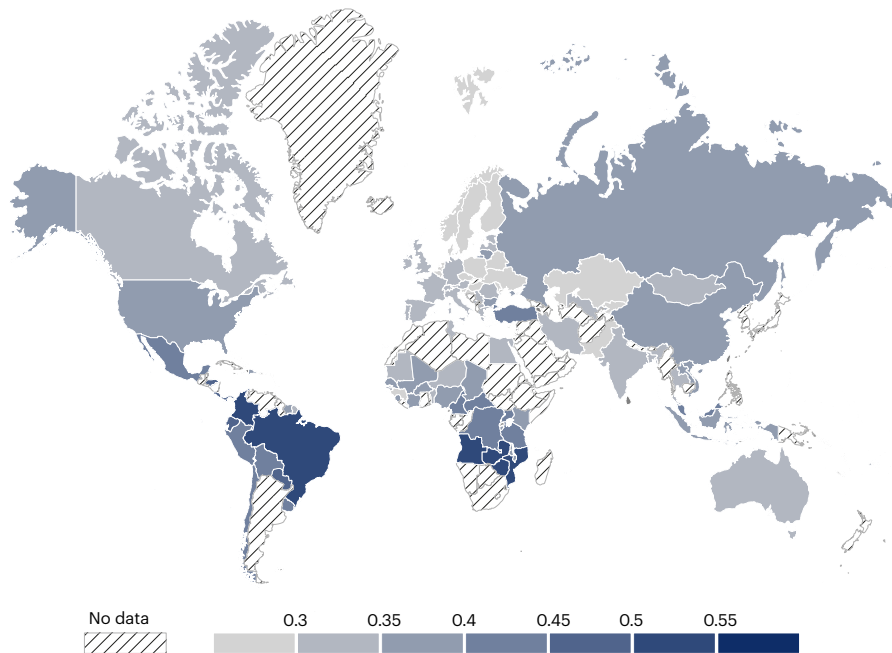
Yet, **studying the evolution of inequalities over time**, rather than just their level at a single point in time, offers a richer and more comprehensive understanding of income inequalities. For instance, viewed from a broad perspective, global inequalities are in decline as developing economies led by China and India have considerably narrowed the gap in wealth and income with richer countries since the 1980s⁴.

Over the past century, income inequalities have also dramatically dropped in Northern countries, but were followed by substantial rises in some countries—but not in others. The proportion of income held by the top 1% dropped by 50% or more, falling from about 20-25% of total income before World War I to 10% or less by the 1970s⁵.

FIGURE 1:

Income inequality: map of Gini coefficient, 2023³

Source: Our World in Data, World Bank Poverty and Inequality Platform, 2024



However, from the 1980s, **high-income countries began to diverge**, following two distinct trajectories (Figure 2):

- Inequalities began to rise again in many high-income countries, tracing a U-shaped pattern, especially in the US: After a sustained rise over the last 40 years, before-tax income inequalities in the US are roughly at the same level today as they were a century ago;
- Other countries, especially in the EU and Japan, experienced significant

declines in income inequalities during the early to mid-twentieth century but have since maintained relatively stable (yet slightly increasing) levels of inequalities. Countries such as Japan, Sweden, Spain, France, and the Netherlands exemplify this more L-shaped trend.

Overall, **the Gini coefficient rose in 70% of OECD countries between 2000 and 2017** and, during this time, wealth inequality grew in all G-7 countries⁶ except the UK⁷.

⁽¹⁾ Data Bank World Development Indicators, 2019.

⁽²⁾ The Gini coefficient provides comprehensiveness, versatility, international comparability, and ease of interpretation enable to make more granular analyses.

⁽³⁾ The Gini coefficient¹ measures inequality on a scale from 0 to 1. Higher values indicate higher inequality. Depending on the country and year, the data relates to income measured after taxes and benefits, or to consumption, per capita.

⁽⁴⁾ McKinsey Global Institute, *Inequality: A persisting challenge and its implications*, 2019.

⁽⁵⁾ Our World in Data, "How has income inequality within countries evolved over the past century?", 2023.

⁽⁶⁾ Canada, France, Germany, Italy, Japan, the United Kingdom, and the United States.

⁽⁷⁾ McKinsey Global Institute, *Inequality: A persisting challenge and its implications*, 2019.

FIGURE 2:

Trajectories of income inequalities in high-level countries (before-tax income share of the richest 1%)⁸

Source: Our World in Data, World Inequality database, 2024



REFINING THE APPROACH TO INEQUALITIES: THE CAPABILITY FRAMEWORK

While statistical models provide valuable data and insights, they often **fail to capture the broader social, economic, and political contexts**. Purely numerical indicators may for instance overlook the nuances of human well-being, equity, and justice visions, which can shape societal structures and influence long-term development outcomes.

The real challenge therefore lies in **framing and quantifying the dynamic system behind inequalities**, where disparities in resources and opportunities lead to diverse economic and social outcomes. The discussions around alternative methods highlight the importance of integrating qualitative assessments and participatory approaches. These methods can provide a more comprehensive understanding of societal needs and aspirations, ensuring that policies and investments align with the public's values and priorities.

The **'capability framework'** initially designed by Amartya Sen is one of them. At the core of the capability approach is a normative commitment to conceptualize well-being in terms of capabilities and

functions. The framework changes the focus from means (the resources people have and the public goods they can access) to ends (what they are able to do and be with those resources and goods), stressing people's opportunities to make use of commodities to achieve well-being. Whether someone can convert a set of means into a functioning crucially depends on certain personal, sociopolitical, and environmental conditions, which are called 'conversion factors'.

This approach extends far beyond income disparities, **encompassing factors such as gender, race, ethnicity, and social class**, which shape people's access to opportunities, resources, and freedoms. These multidimensional inequalities deeply affect life outcomes and individual well-being, limiting the ability of marginalized groups to realize their full potential.

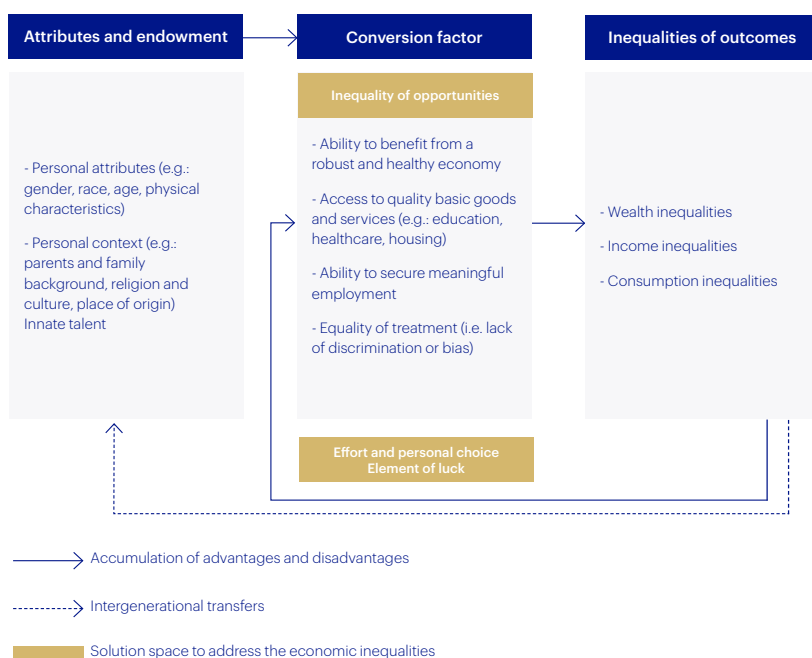
INEQUALITIES AT THE TOP OF THE POLITICAL AGENDA?

Shrinking—as best as one can—the multiple social disparities mentioned above requires efforts to ensure equality of opportunity and equality of outcomes, which involve expanding access to essential services (quality healthcare and education), reducing urban-rural and in-

FIGURE 3:

A framework of capabilities

Source: McKinsey Global Institute



tergenerational divides, reimagining skill development, combating biases and discrimination, and using improved metrics and incentives to drive social value creation.

The task is not easy and public expectations are rising. Statistics point to a clear expectation from the public for projects that not only bolster economic growth but also contribute to social fairness. According to the 2024 Special Eurobarometer on Social Europe⁹, nearly 9 in 10 Europeans (88%) consider that a social Europe (i.e. a Europe that is committed to equal opportunities and access to the labor market, fair working conditions and social protection and inclusion) is important to them personally, including 43% who say it is “very important”.

In this context, since remarkable economic growth and widespread improvements in well-being over the past several decades have not yet succeeded in closing those deep divides within and between countries, inequalities have moved to the forefront of political agendas worldwide. In 2020, for the first time within the context of internationally agreed development goals, the United Nations 2030 Agenda included targets to reduce inequalities based on income. “Leave no one behind” is now Goal 10 of the Sustainable Development Goals (SDGs), which calls for ensuring equal opportunity and draws attention to attributes and circumstances that affect access to opportunity, namely age, sex, etc.¹⁰

⁽⁹⁾ European Commission, “Special Eurobarometer 546”, 2024.

⁽¹⁰⁾ United Nations Department of Economic and Social Affairs, *Inequality in a rapidly changing world*, World Social Report, 2020.



FOCUS 1

Perceptions: more important than ever?

Beyond facts, figures and frameworks, perceptions of inequalities in people's everyday lives matter, maybe even more. In France, for instance,

perceptions of inequalities remain very high in 2024: According to a study led by Altermind, 62% of the interviewed people feel inequalities in accessing

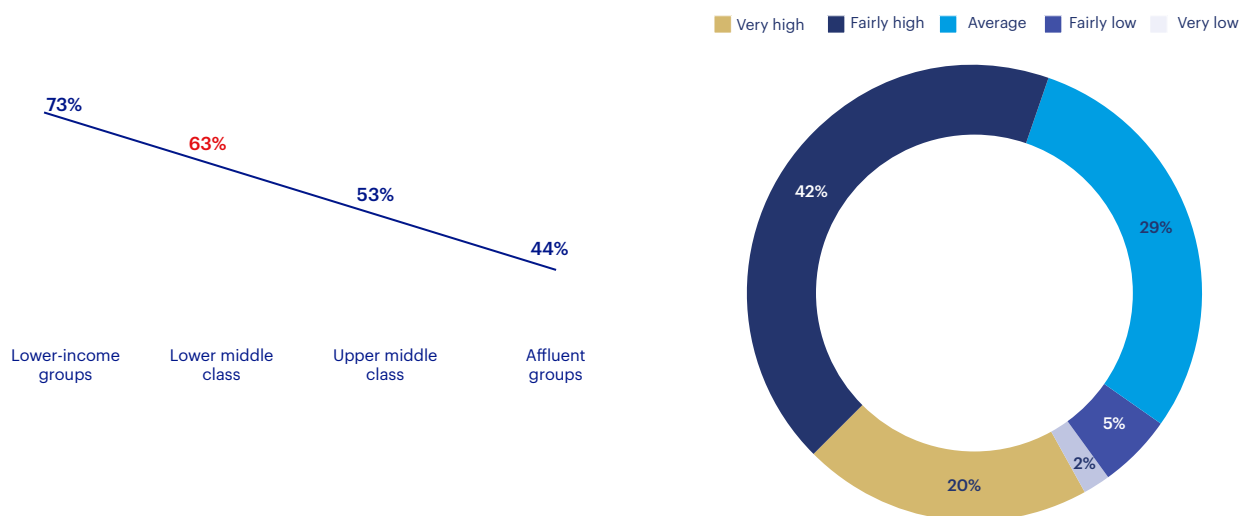
essential everyday life goods and services are high or very high in France.

FIGURE 4

Perception of inequalities in France

Source: ViaVoice, Altermind, 2024

In France, would you say that the level of social inequalities in access to certain goods and services is...



Social inequalities refer to the differences that exist between individuals in access to certain goods and services (such as transportation, healthcare, culture, education, high-performance telephone and internet services, etc.), particularly due to the costs and availability of these goods and services, or the individual's place of residence, social status, etc.

The equity effects of infrastructure: overall positive, yet uneven

INFRASTRUCTURE DEVELOPMENT: THE BALANCED ROLE OF PRIVATE OPERATORS AND PUBLIC AUTHORITIES

Public and private infrastructure, including transportation, energy systems, waste management, communication, and healthcare facilities, are the backbone of the world's economies and impact both businesses and societies. **This makes them central to discussions about inequalities.**

Historically, infrastructure investment, development and maintenance have been a joint effort, characterized by both competition and collaboration between public authorities and private enterprises. This partnership has ensured that **infrastructure is not only designed to be efficient and innovative but also to be equitable and accessible** to the broader population:

- Public authorities have always played a pivotal role in these sectors, often stepping in to provide funding, regulation, and oversight to ensure that public interests are safeguarded. Their involvement is not merely incidental but foundational, addressing market failures, ensuring universal access, and setting standards that guide private sector participation. This is especially the case for nationwide broadband networks, large-scale renewable energy projects, or extensive public transportation systems, which require substantial upfront investment and may not be immediately profitable;
- Meanwhile, private entities contribute through investments, technical expertise, and cutting-edge solutions, driving efficiency and advancements that might be beyond the immediate capacity of public institutions. For example, private companies have been at the forefront of technological advance-

ments in sectors like telecommunications, with innovations such as 5G technology and smart grids in the energy sector.

This dynamic has usually led to a **complementary relationship where both sectors leverage their strengths for the common good**. It has also emphasized the need for a comprehensive approach to infrastructure development and highlighted the crucial role of public authorities in balancing public welfare with private sector efficiency, often referred to by economists as the 'equity-efficiency trade-off' (Focus 2).

THE SOCIAL SPILLOVERS OF INFRASTRUCTURE: A MACRO-LEVEL ANALYSIS

In this context, the level of inequality has long been a critical decision factor for public authorities when designing projects and policies related to infrastructure, and the distributional implications of infrastructure development offer **some suggestive evidence of an equity-enhancing effect**.

Indeed, the **ultimate purpose of infrastructure** is not merely to provide physical structures or services but to **generate positive social impact and reduce inequalities** within society. From basic services (water, sanitation, electricity, waste management) to connectivity infrastructure (transportation, ICT), successful infrastructure projects have a ripple effect on GDP (Focus 3), income growth, local and regional development, and more tentatively, on distributive equity (in terms of reducing both inequality of outcomes and opportunities) at the macro level.

At the aggregate level, economic studies have also shown infrastructure can have **a major positive impact on income inequalities and on key development areas**, including income inequalities and poverty, contributing to improvements in health (SDG 3), nutrition (SDG 2), education (SDG 4), and women empowerment (SDG 5). Still, the magnitude and direction of the effect of infrastructure on income inequality depend on such factors as the type of infrastructure (Table 1).

FOCUS 2

The equity-efficiency trade-off: Okun's 'leaky bucket'

The equity-efficiency trade-off lies at the basis of public economics and public choices. The trade-off was well summarized in the 1970s by Arthur Okun's analogy between inequality and a "leaky bucket": if some people are suffering from thirst while others have plenty of water, he argued, then water should be transferred to the thirsty people even if the only way to do so is to use a leaky bucket, resulting in a loss of efficiency (water). In more practical words, a redistributive program will probably lead to resources losses along the way through administrative costs, deadweight loss, or other costs imposed by the program. According to Okun, government policies are 'leaky buckets' that can never be perfectly efficient, involving trade-offs between costs and benefits.

⁽¹¹⁾ Aschauer D.A., "Is Public Expenditure Productive?", *Journal of Monetary Economics*, n° 23, pp. 177-200, 1989. This work concluded that the elasticity of GDP to infrastructure capital was 0.4.

⁽¹²⁾ Didier M., Prud'homme R., *Infrastructures de transport, mobilité et croissance*, CAE Report n°69, 2007.

⁽¹³⁾ International Monetary Fund, "World Economic Outlook, chapter 3: Is it time for an infrastructure push? The macroeconomic effects of public investment", 2014.

⁽¹⁴⁾ Caldéron C., Moral-Benito E., Servén L., "Is Infrastructure Capital Productive? A Dynamic Heterogeneous Approach", *Policy Research Working Paper 5682*, 2011.

⁽¹⁵⁾ Fouquerey E., *Évaluation de l'impact économique de court terme et le de long terme des chantiers de grandes infrastructures de transport: le cas de la LGV SEA Tours Bordeaux*, 2016.

Assessing the impact of transport infrastructure investment on GDP

Evaluating the macroeconomic effects of infrastructure investment has been the subject of many discussions since Aschauer's first work on public expenditure in 1989¹¹. The empirical results available in the literature are characterized by considerable heterogeneity, which has led to the conclusion that "a global approach to the contribution of transport infrastructure to growth is limited"¹².

However, most recent studies by the International Monetary Fund (IMF) and the World Bank provide some useful pointers:

- An IMF study shows that, in developed countries, an increase in public investment spending of 1% of GDP leads to an increase in output of 0.4% during the year and 1.5% in the four years following the increase (i.e. a multiplier effect of 0.4 and 1.4)¹³. It identifies the factors that increase the impact of investment: economic

conditions (the effect is greatest when growth is weak), investment efficiency and debt financing;

- Long-term effects appear to be relatively limited: A World Bank study estimates the average level of GDP elasticity to infrastructure capital at 0.08. According to this study, there are no significant long-term effects and there is no saturation effect in terms of the marginal productivity of infrastructure capital as it accumulates¹⁴.

In addition to a global approach, a project-by-project approach seems more robust. For example, in the rail sector, the multiplier effects of the construction of the Tours-Bordeaux high-speed line (worth USD8.5bn, 50% subsidized) have been estimated at 1.96 (USD1 invested generates USD1.96 of production) and 2.44 (1 direct job generates 1 indirect job and 0.44 locally generated jobs)¹⁵.

⁽¹⁶⁾ United Nations, "The infrastructure—Inequality—Resilience nexus, Global Sustainable Development report", 2016.

⁽¹⁷⁾ Willoughby, C., (2004). Infrastructure and the MDGs, sponsored by DFID, unless noted otherwise. a—Calderón & Chong (2004); b—Calderón & Servén (2004); c—Seneviratne & Sun (2013); d—Calderón & Servén (2008); e—Calderón & Servén (2010); f—Majumder (2012); g—Khandker & Koolwal (2007); h—Bajar & Meenakshi (2005); i—Lopez (2004).

⁽¹⁸⁾ Large is thought as more than 20% improvement with significant infrastructure development or a more than 0.2 point increase with 1 point infrastructure increase. Moderate is considered as 10-20% improvement or a 0.1-0.2 point increase, and small is 5-10% improvement or a 0.05-0.1 point increase that is statistically significant. The values for inequality denote the range of infrastructure development's impact on income/consumption inequality. The first value refers to the most negative effect identified, and the second value refers to the most positive.

TABLE 1:

Infrastructure's potential impact on key development areas¹⁶

Source: GI Hub⁽¹⁷⁾

The magnitude of the effectiveness is given as large (+++/---), moderate (++/-), small (+/-) or neutral (0)⁽¹⁸⁾.

	Income poverty	Education	Gender parity in education	Child and infant mortality	Maternal health	Communicable disease	Environmental protection	ICT and trade	Income inequality
Infrastructures:									(-,+++) ^{abcdef}
Transport (local)	+++	++	++	+	+		+	+	(-,+++) ^{agh}
Transport (regional)	+++	+	+	++	+	+	-	+++	
Modern energy	+++	+	+	++	+	+	++	+	(-,+++) ^{afh}
Telecoms	++	+	+	+	+	+	+	++	(0,+) ^{ahi}
Water (private use)	++	++	+	+++	+	+	+++	+	(+,+++) ^{ad}
Sanitation	+	+	++	+	+	+	++	+	+++ ^d
Water management	+++		+	+			++		

In practice, US state-level panel data on infrastructure spending and on per capita income inequality from 1950 to 2010 reveal that **highways spending growth in a given decade correlates negatively with Gini indices** at the end of the decade, suggesting a causal effect from growth in infrastructure spending to a reduction in inequalities, through better access to job and education opportunities¹⁹. More significantly, this relationship is stronger with inequality at the bottom 40% of the income distribution (Figure 5).

The positive relationship is particularly striking regarding key development areas, such as gender equality. As women and girls around the world continue to be disproportionately burdened by a lack of access to basic infrastructure or by gender-blind design and operation of infrastructure²¹, ensuring infrastructure is gender-sensitive is critical. In turn, economic growth is highly dependent on inclusive and gender responsive infrastructure: for example, in the transportation sector, research reveals a negative correlation between commuting times and the participation of women in the workforce²². An additional 1 minute of commuting time in metropolitan areas is linked to an approximate 0.3% point drop in women's labor force participation²³.

Similarly, **inequalities based on race or disabilities** contribute to unequal access to infrastructure and have substantial economic implications. In OECD nations, non-white communities still face persistent systemic and cumulative barriers, including discrimination, poverty, and limited social networks.

For example, US states with high concentrations of Black residents frequently lag behind national averages in economic opportunity, employment, and access to healthcare. The isolated rural communities most affected by 'disconnection' were those with a predominantly African-American population: 54.9% of households in these areas had access to broadband access, compared to 70% in rural communities where the African-American population is below the national average²⁴. Altogether, racial and ethnic inequalities have cost the US economy over USD51tn since 1990²⁵.

LOOKING CLOSELY: UNEVEN DISTRIBUTIONAL EFFECTS AT THE MICRO LEVEL

A micro-level analysis reveals more complexities and nuances regarding the impact of infrastructure: merely **provisioning infrastructure may not be sufficient** and traditional inequalities can be perpetuated as an unintended result of the delivery and pricing methods chosen for essential services or the design of certain infrastructure.

Transportation systems are a case in point and remain the most exposed and studied infrastructure in this regard. Although they mostly increase business activity and productivity²⁶ and can create urban-regional development ecosystems, transportation infrastructure may also deepen inequalities, by draining activity from less dynamic nodes to more dynamic nodes. While the initial investment is important, regular maintenance of existing infrastructure is also critical as poor quality infrastructure impacts people directly, which can affect well-being²⁷.

Furthermore, **the benefits of infrastructure development are not necessarily equally shared.** A study led by Bajar and Rajeev in 2015²⁸ measured the impact of infrastructure investments on inequalities at a regional level in India: The main conclusion is that power and roads tend to exacerbate inequalities rather than reduce them, as public goods are allocated at a flat, albeit subsidized rate, which helps those who are already better endowed with higher incomes. The poorest groups also benefit from the access to improved or new roads, but much less in comparative terms: For example, all farmers are charged a flat rate for electricity, mainly used for pumping water, but this tends to benefit large land owners more than small scale farmers.

⁽¹⁹⁾ Banque de France, *To What Extent can Long-Term Investment in Infrastructure Reduce Inequality*, 2017.

⁽²⁰⁾ *Ibid.*

⁽²¹⁾ UNOPS, *Infrastructure for gender equality and the empowerment of women*, 2020.

⁽²²⁾ Black D. et al., "Why do so few women work in New York (and so many in Minneapolis)? Labor supply of married women across US cities", 2012.

⁽²³⁾ OECD, "Sustainable Connectivity. Closing the Gender Gap in Infrastructure", 2019.

⁽²⁴⁾ Zahnd W.E., Bell N et al., "Geographic, racial/ethnic, and socioeconomic inequities in broadband access", *The Journal of rural health*, 2021.

⁽²⁵⁾ World Economic Forum, *Racial and ethnic inequality has cost US economy \$51 trillion since 1990*, 2021.

⁽²⁶⁾ Asian Development Bank Institute, "Balancing the Spillover Effects of High-Speed Rail Infrastructure investment in Asia", 2021.

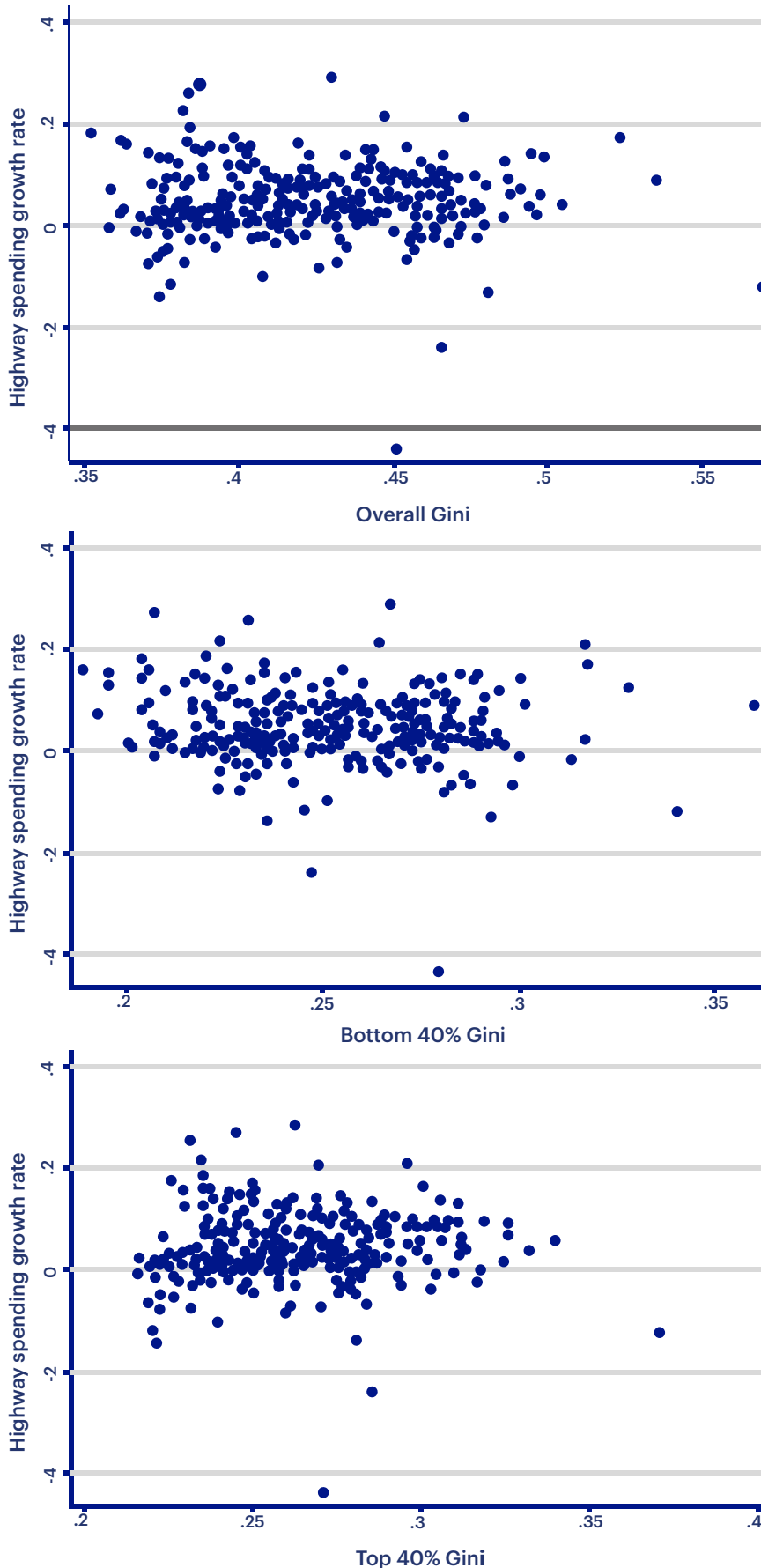
⁽²⁷⁾ OECD, "Inclusive Infrastructure: Scaling-up local investment in the United States", 2024.

⁽²⁸⁾ Bajar, S., Rajeev, M., "The Impact of Infrastructure Provisioning on Inequality in India: Does the Level of Development Matter?", *Journal of Comparative Asian Development*, Volume 15, 2016 - Issue 1.

FIGURE 5:

Highways spending growth rate and Gini indices

Source: Banque de France⁽²⁰⁾



EXPERT POSITION 1

Zoi Christoforou: Transport and inequalities

“Road transportation, particularly highways, can be a catalyst for social sustainability. A strong correlation exists between road infrastructure funding and inequality. For instance, a decade of underinvestment in highways in the US has been linked to rising inequality, particularly impacting the bottom 40% of the income distribution. Locally, significant progress has been made in making transportation infrastructure accessible for individuals with disabilities, though further improvements are needed, such as adjustable car models and accessible parking facilities.”



Zoi Christoforou
Professor at École Nationale des Ponts
Paris Tech

EXPERT POSITION 2

Sara Fisher Ellison: Transport and the role of the public sector

“Efficient transportation infrastructure, such as a rail network, is a public good with the potential of huge positive spillovers to all residents, including those who might not benefit directly by being a passenger. These benefits can come in the form of economic growth, predictability of investments, improved health, social interaction and mobility, decreased road congestion, and, of course, environmental protection. These positive spillovers will not typically be internalized by private firms, so a robust public sector participation is necessary. Furthermore, the public sector has an important role in ensuring an inclusive distribution of these positive effects, which may not occur with private incentives alone, even if projects are funded at a socially efficient level. An inequitable distribution can happen, for instance, if the building

of a new station increases property values, thus pricing renters out of the market but providing a windfall for property owners. Or when groups with less wealth and political clout are displaced by the building of a new line that was located in a way to leave wealthier areas intact. An inclusive transportation infrastructure will, in other words, be concerned both with the level of public funding but also with the distribution of the costs borne and benefits enjoyed across different groups and strata of the population.”



Sara Fisher Ellison
Senior Lecturer at the MIT Department of Economics

EXPERT POSITION 3

Elisabeth Kotthaus: Gender equality initiatives benefit all!

“While transport is often considered neutral and benefiting all users alike, we have learned that when we plan projects with a particular focus, the outcomes benefit everyone. Improving mobility options for certain groups of transport users, such as persons with disabilities, or women—who often have different daily mobility patterns than men, or more generally, taking into account the needs of those with caregiving responsibilities will have positive effects in general. This point cannot be emphasized enough: what we do for one specific user group often ends up benefiting all user groups, be it in terms of accessibility, availability, affordability, or safety of transport.”



Elisabeth Kotthaus
Head of Unit at the Directorate-General of Mobility and Transport, European Commission



Making infrastructure more inclusive: best practices emerging

Inclusive infrastructure: a best-in-class asset

CORNERSTONE OF QUALITY INFRASTRUCTURE SYSTEMS

Given the potential for infrastructure to drive positive social change and yet the inherent risks of uneven distributional effects, a **class of socially driven assets has been emerging over the past decades: inclusive infrastructure**. This concept, already gaining traction, is defined by the GI Hub as “any infrastructure that enhances positive outcomes in social inclusion and ensures that no individ-

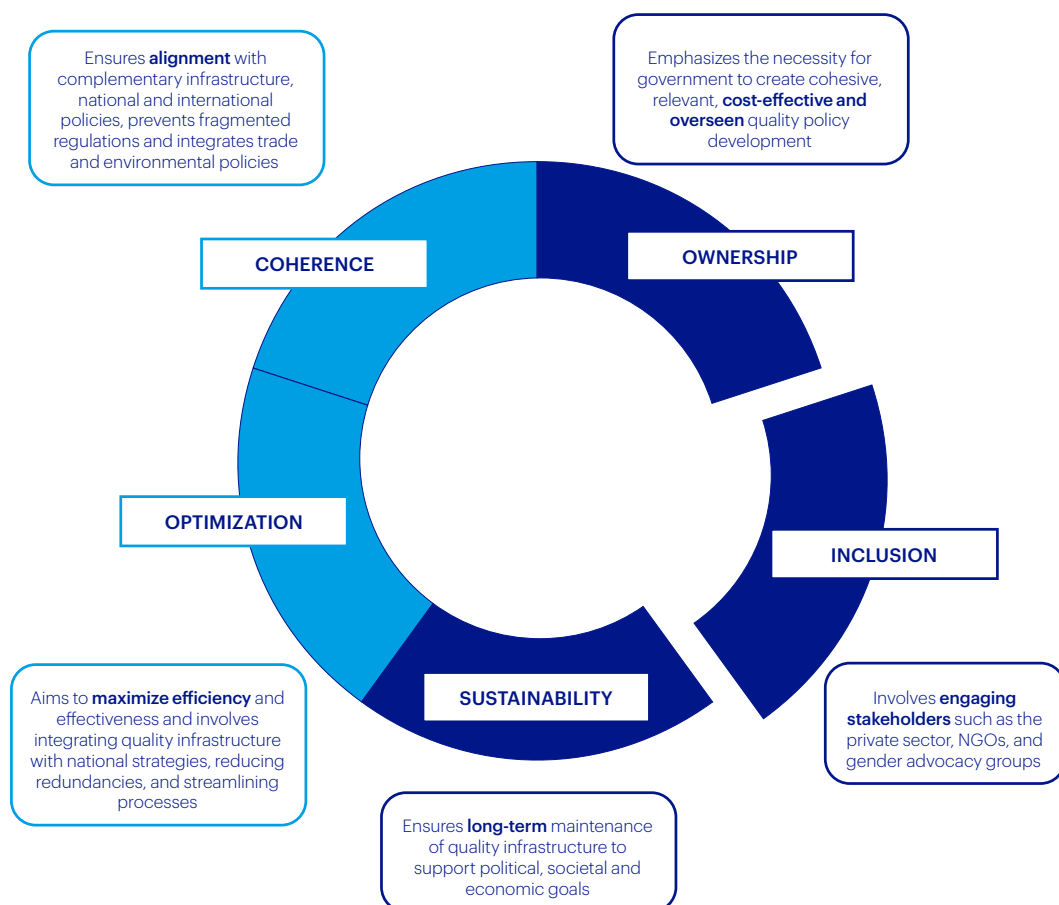
ual, community or social group is left behind or prevented from benefiting from improved infrastructure”²⁹. In other words, inclusive infrastructure accounts for the needs of everyone, ensures equal and affordable access to quality services, and enhances access to development opportunities for the broadest segments of society, especially vulnerable and marginalized groups.

The concept of inclusive infrastructure has recently become a **key pillar of ‘quality infrastructure networks’**, which encompass technical standards to promote and sustain economic development, as well as environmental and social well-being³⁰. These quality systems are based on policies aiming to reform, consolidate, refine and maintain an effective and efficient level of quality infrastructure according to 5 principles: coherence, ownership, inclusion, sustainability and optimization (Figure 6).

FIGURE 6:

Guiding principles to build ‘quality infrastructure’

Source: Altermind, UNIDO



⁽²⁹⁾ Global Infrastructure Hub, “Inclusive Infrastructure Hub”, 2019.

⁽³⁰⁾ UNIDO, *Quality Infrastructure: Good governance in quality policy design*, 2022.

SOCIAL INFRASTRUCTURE, INCLUSIVE BY ESSENCE?

Among inclusive systems, one type of infrastructure stands out for its ingrained social impact: **social infrastructure**. Social infrastructure provides essential societal resources that support well-being. These assets include community and individual support services and resources such as healthcare, education, early childhood, community support, community development, culture, sport and recreation, parks and emergency services³¹.

Within social infrastructure, **a distinction can be made between ‘formal’ and ‘informal’ systems**:

- Formal systems include traditional support services and resources such as schools or hospitals;
- Informal systems are often associated with bottom-up initiatives in low- and middle-income countries delivering services that the State and the formal sector cannot provide³². Informal infrastructure is community-led and tends to provide unstandardized spaces for encounters, micro publics that are not included in formal social infrastructure such as libraries³³.

One of the main purposes of community-led informal social ventures is to

alleviate social exclusion. Using the case of Germany, Figure 7 illustrates how community-led infrastructure can influence local cohesion, enhancing the sense of community and providing greater opportunities to meet social needs, ultimately improving the perceived quality of life. The combination of formal and informal systems enables quality of living for all communities, as community-led infrastructure helps mitigate the impacts prevalent in disadvantaged areas of Germany (such as demographic rise or low municipality budget).

Although social infrastructure systems aim to provide essential social services, they face as many challenges as any other infrastructure asset and must adapt to **address growing social concerns and maximize existing opportunities**, such as digitalization, to become more inclusive.

Hospitals make a good example: Between insurance costs, inadequate transportation systems and appointment availability issues, potential patients often encounter major obstacles in accessing public or private health facilities. Studies in low and middle-income countries found that **‘telehealth’ services can reduce travel time, prevent unnecessary visits and travel expenses associated with healthcare**, and provide an early response to emergencies in rural areas³⁵.

⁽³¹⁾ Australian Urban Observatory, 2024.

⁽³²⁾ Rigon A., Walker J., Koroma B., “Beyond formal and informal: Understanding urban informalities from Freetown”, 2020.

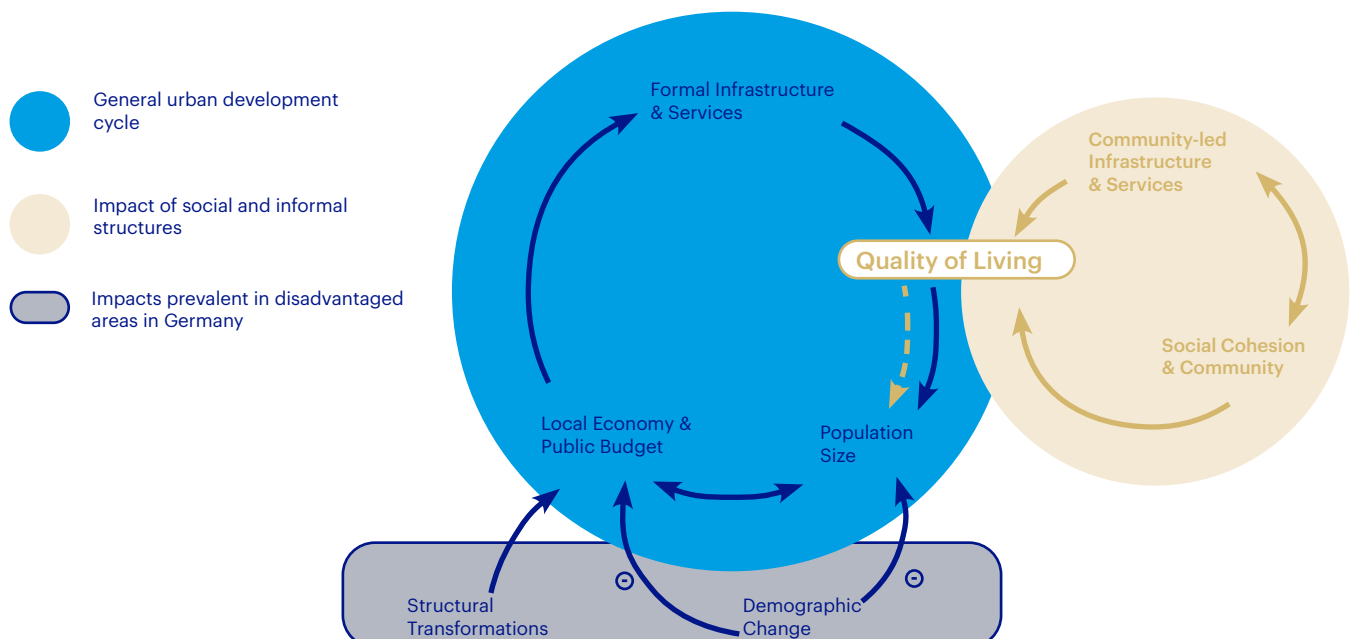
⁽³³⁾ Alcaide Manthey S. N., “The role of community-led social infrastructure in disadvantaged areas”, 2024.

⁽³⁴⁾ Alcaide Manthey S. N., “The role of community-led social infrastructure in disadvantaged areas”, 2024. The yellow box contains two factors most prevalent in disadvantaged areas in Germany, namely structural transformations and demographic change. With the aim to contribute to a more solution-focused paradigm, the red cycle (informal infrastructure) indicates a potential counterweight to the blue cycle (formal infrastructure).

FIGURE 7:

Quality of living is the result of ‘formal’ and ‘informal’ systems

Source: Alcaide Manthey S. N., The role of community-led social infrastructure in disadvantaged areas, 2024⁽³⁴⁾



For example, a study in Brazil reports average travel time saved as a result of telehealth was 289.6 minutes, which accounted for USD 19 saved per consultation³⁶. Among LGBTQ+ populations, telehealth facilitates access to sensitive care, ensuring privacy and confidentiality³⁷.

Access to cultural initiatives is another compelling example. In France, 71% of senior executives attended a theater or concert at least once during the year, compared to 38% of employees and workers³⁸. To bridge this ‘knowledge gap’ and enable participation for all³⁹,

UNESCO recommends that “the concrete opportunities [are] available to everyone, in particular through the creation of appropriate socio-economic conditions, for freely obtaining information, training, knowledge and understanding, and for enjoying cultural values and cultural property”⁴⁰. The concept of ‘**inclusive institution**’, such as the Paris Philharmonic, has thus recently emerged to describe facilities providing more specialized activities and actions for people with special needs (Case Study 1)⁴¹.

⁽³⁵⁾ Ghosh R., Healy A., Prabhune A., Mallavaram A., Raju S., Chockalingam N., “Provision of rehabilitation and assistive technology services in a low resource setting during the COVID-19 pandemic and introduction of telehealth: service users’ and providers’ perspectives”, 2022.

⁽³⁶⁾ Lima D. P., Gomes V. C., Viana Júnior A. B., Assis F.M.C., Oliveira P.H.A., Cunha L.C.V., et al., “Telehealth for Parkinson disease patients during the COVID-19 pandemic: the TeleParkinson study”, 2022.

⁽³⁷⁾ Stoehr J. R., Hamidian Jahromi A., Leigh Hunter E., Schechter L. S., “Telemedicine for Gender-Affirming Medical and Surgical Care: A Systematic Review and Call-to-Action”, 2022.

⁽³⁸⁾ Observatoire des Inégalités, 2018.

⁽³⁹⁾ According to UNESCO, participation represents “the concrete opportunities guaranteed for all—groups and individuals—to express themselves freely, to communicate, act, and engage in creative activities with a view to the full development of their personalities, a harmonious life and cultural progress of society”.

⁽⁴⁰⁾ UNESCO, *UNESCO Recommendation on Participation by the People at Large in Cultural Life and Their Contribution to It*, 1976.

⁽⁴¹⁾ González-Herrera A. I., Díaz-Herrera A. B., Hernández-Dionis P., Pérez-Jorge D., “Educational and accessible museums and cultural spaces”, 2023.



Inclusive infrastructure: experts' insights from the workshops

During the workshops conducted by Altermind and Vauban IP, participants were asked as a starting point to share their definition and vision on the concept of 'inclusive infrastructure'.

"A typical definition of inclusive infrastructure is that it should be roughly equally accessible and usable for everyone, considering geographic accessibility, operating characteristics, and price. However, I would also propose something more ambitious: We should prioritize accessibility even more strongly for those who don't have good alternatives—those for whom owning, garaging, or driving a car would be difficult or impossible."

Sara Fisher Ellison, Senior Lecturer at the MIT Department of Economics

"Inclusive infrastructure are deeply embedded in their local territories, generating positive impacts, particularly in three areas: ecological sustainability, promotion for better health, and inclusion & employability."

Séverine Laugier, Social Innovation and New Economic Models for Growth Project Director at Sodexo

"Inclusive infrastructure should be viewed as a public service with universal obligations. Everyone, including those in low-density areas, should have affordable access. This is a mission for public authorities, which should include objectives like decarbonization and ensuring equal access for all."

Philippe Gagnepain, Professor of Economics at Paris School of Economics - Université Paris 1

"Inclusive infrastructure is infrastructure development that intentionally seeks input from and involves the community in the planning and development process. With younger generations, like Millennials and Gen Z, disengaging from local decision-making processes that could benefit them, the infrastructure development process must be designed in a way to solicit input from all members of the community—e.g. the innovative use of technology could serve as an effective tool for engagement."

Harvey Hollins, former Director of Urban and Metropolitan Initiatives for State of Michigan, Office of the Governor

"Infrastructure are not inherently inclusive; in fact, they often reinforce existing power structures, making powerful regions even more dominant. However, infrastructure can become more inclusive, for instance by turning waste into energy and raw materials, thereby localizing resource use and adding value to society and the environment."

Sébastien Petithuguenin, CEO of Paprec Energies

"Infrastructure should be essential support that leaves no one aside. The promise of nineteenth-century networks—from roads to parks—was to reduce inequality through broad connections, much like the early visions of the Internet and social networks. However, in reality, these networks often heightened inequalities, particularly in access and service levels. To be truly inclusive, infrastructure must be paired with widespread access to information"

Antoine Picon, Professor of the History of Architecture and Technology at the Harvard Graduate School of Design

"From a telco infrastructure perspective, being inclusive means ensuring everyone has access to ultra-broadband, no matter where they are. This is often supported by widespread mobile technologies, with nearly universal 4G and 5G coverage, and fiber connectivity that delivers gigabit speeds to homes, whether in urban centers or rural areas."

Sergio Oslé, COO of Telefonica in Spain

"Energy is a basic essential need used by all, and energy infrastructure are under major modifications, being more distributed, they need to be interconnected and managed as a universal resource optimizing usage of its decarbonized part."

Jérôme Stubler
CEO of Equans

The Paris Philharmonic: an 'inclusive institution'



The Paris Philharmonic is a groundbreaking cultural model, offering a rich variety of experiences that go beyond the boundaries of traditional concert venues. Located in Parc de la Villette, it serves as a dynamic hub with concert halls, the Orchestre de Paris, the National Museum of Music, an innovating educational center, the largest resource platform and ideas lab dedicated to music in Europe, along with its own publishing house. Drawing in 1.5 million visitors annually⁴², the Philharmonic fosters social unity and diversity.

The success of the Philharmonic is reflected in a 58% rise in attendees under 28, showcasing its dedication to engaging younger audiences, particularly in classical music. Its educational programs cater to all age groups, from preschool to adults, with workshops, concerts and conferences that emphasize artistic and cultural education. The Philharmonic will continue to expand its community outreach through projects like Sympholia, a

monumental paper sculpture created by 10,000 children in collaboration with Kylian Mbappé's association "Inspired by KM". Over 20 months, children contributed original sound compositions, which were played throughout spatialized speakers in the installation, providing a multi-sensory experience for visitors⁴³.

Accessibility remains a cornerstone of the Philharmonic's ethos. It shares for example a strong collaboration with the Culture Relax association, holding 'Relax' performances five times per season. Each concert creates a welcoming environment for all attendees, including audiences with complex disabilities. The Philharmonic has also made significant strides in using vibratory technology with the implementation of SoundX technology, currently in an experimenting phase during concerts, ensuring that deaf audiences and individuals with hearing impairments can experience music through tactile and auditory feedback, further strengthening the Philharmonic's inclusive mission⁴⁴.

"The Paris Philharmonic remains a rare example of an inclusive and forward-thinking cultural space in France. Through its ongoing efforts to break down both social and physical barriers, it sets a strong precedent for other institutions to emulate. By making accessibility and inclusivity central to its mission, the Philharmonic not only broadens the scope of its cultural programs but also underscores the importance of creating a welcoming environment for diverse audiences. Although institutions like the Paris Philharmonic have made notable progress, France still lags behind countries like Great Britain, which have achieved significant advances in promoting inclusivity in cultural and public spaces. A broader systemic change is therefore crucial in France, not only within individual cultural institutions but also through national cultural policies."

Olivier Mantei,
Director General of the Cité de la
Musique—Paris Philharmonic.

⁽⁴²⁾ Diapason, "La Philharmonie de Paris retrouve sa fréquentation d'avant la pandémie", 2023.

⁽⁴³⁾ Philharmonie de Paris, "Symfolia, Rachel Marks du 31 Mai au 8 septembre 2024", 2024

⁽⁴⁴⁾ ICOM, "L'accessibilité à la Philharmonie de Paris : vivre la musique à son rythme", 2024.

Driving inclusive infrastructure worldwide: addressing region and sector particularities

Across sectors, certain inclusive best practices have emerged to enable infrastructure to become more virtuous and **enhance social equity as a core objective**. According to the type of infrastructure and localization, the **approach and challenges differ significantly but the expected outcomes remain the same**: shrink inequalities and reduce exclusion.

PASSENGER TRANSPORTATION: FIGHT SOCIAL AND SPATIAL DISPARITIES

Improving access to transportation services can significantly reduce trade costs and travel times, allowing additional productive opportunities, less socio-spatial disparities and more participation in society, notably for **disabled populations**. The transport accessibility gap remains very high worldwide despite many policy commitments and initiatives: In the UK for instance, those

FOCUS 4

Japan policy for transport accessibility: building 'barrier-free' infrastructure

Japan's transportation infrastructure is a model of inclusion and efficiency, significantly enhancing living standards. By 2020, 91.8% of the 3,580 stations had been equipped with elevators, slopes, and other accessibility features. Tactile paving was installed at 95.1% of the stations, and 88.5% of the stations had barrier-free toilets (Figure 8)⁴⁵. Now, the Shinkansen ("bullet trains", high-speed, highly reliable, and technologically advanced trains connecting major cities in Japan) and

urban transit systems incorporate features such as low-floor trains and multilingual signage to accommodate diverse needs. These features help ensure that people with disabilities and the elderly can navigate the system easily.

These advancements are the result of the National Diet of Japan enacting the "New Barrier-free Law" in 2006, which was completed by the new Basic Policy on Promotion of Transportation Facilitation. For 2021-2026, the goal is now

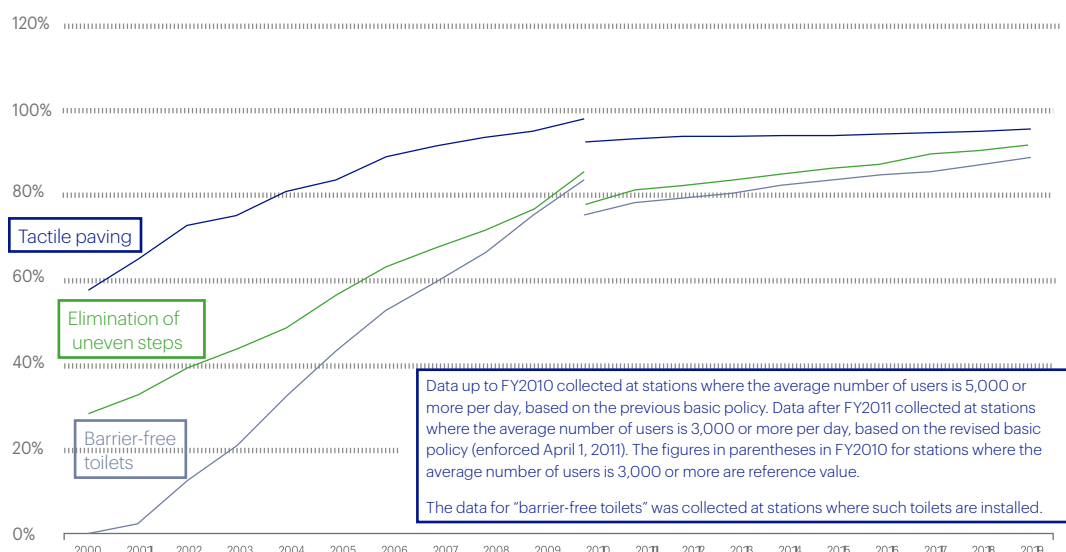
to ensure that all stations with an average daily user count between 2,000 and 3,000 are equipped with facilities that eliminate obstacles such as stairs and steps. Japan's comprehensive urban planning also emphasizes accessibility with well-designed pedestrian paths and accessible public spaces, contributing to social integration and improved quality of life⁴⁶.

FIGURE 8

Trends to barrier-free facilities at railway stations

Source: Promoting the Barrier-free Design of Railway Facilities, Government of Japan, 2021

Lecture: In 2019, tactile paving equipped 95.1% of train stations with more than 3,000 users per day



with disabilities take 38% fewer trips than those without, a figure which has not changed between 2007 and 2019. The addressable socio-economic benefits of completely closing the transport accessibility gap for disabled people would yet reach around USD95bn per annum in the region⁴⁴. In this regard, Japan's transport infra-structure has become a model of inclusion and efficiency by strengthening train station accessibility through universal design and multimodality (Focus 4).

ELECTRIC SYSTEMS: GUARANTEE 'ENERGY SECURITY' FOR ALL

Inclusive programs that tackle energy insecurity in emerging countries and energy precarity in developed nations are essential for fostering social equity. Similarly to emerging countries, energy insecurity remains a major challenge in high-income countries, where households struggle to afford adequate heating or must spend a disproportionate amount of their income on energy: 46% of Europeans declared being cold but not turning up the heating at home in 2023⁴⁷. Advanced technology and agile solutions, such as adaptable energy grids able to operate under rapidly changing conditions, can help transition toward more fair energy systems.

WATER AND WASTE MANAGEMENT: ENSURE PUBLIC HEALTH

Effective waste and water management are key pillars for development as they can significantly reduce waterborne diseases and improve public health outcomes⁵⁰. In India, about 21% of communicable diseases are water related⁵¹. At this stage, marginalized groups and low-income communities sometimes lack basic water and sanitation to a staggering degree: in Guatemala only 33% of the indigenous population has access to sanitation, compared to 77% of the non-indigenous population⁵². The challenges of managing these resources inclusively underscore the need for better planning, investment, and regulatory frameworks like in Belo Horizonte where the government entered in partnerships with *catadores* (waste-pickers) to improve city waste management (Focus 6).

FOCUS 5

India's Saubhagya Scheme: makes the grid accessible everywhere

India's Saubhagya Scheme was an Indian government project that aimed to provide electricity to all households in rural and underserved areas. It electrified more than 28.17m households⁴⁸. Between 2017 and 2022, the scheme provided:

- Last mile connectivity and electricity connection to all un-electrified households in rural areas;
- Last mile connectivity and electricity connection to all remaining economically poor un-electrified households in urban areas. Non-poor urban households were excluded from this scheme;
- Solar photovoltaic systems on a standalone system for un-electrified households located in remote and inaccessible villages/habitations, where grid extension was not feasible or cost effective⁴⁹.

According to the Ministry of Power of India, India's Saubhagya Scheme worked through a free metered connection for economically poor households and a charge of USD5.96 for households other than poor, only after release of connection.

EXPERT POSITION 5

Sébastien Petithuguenin: The role of waste management to build more equitable societies

“It is crucial to recognize that waste management infrastructure plays a vital role in reducing societal inequalities. Proper waste treatment protects water and air quality, which in turn safeguards the health of the poorest individuals who cannot easily relocate and must endure their existing environmental conditions. By ensuring effective waste management, we can promote a healthier and more equitable environment for all members of society.”



Sébastien Petithuguenin,
CEO of Paprec Energies

⁽⁴⁴⁾ Motability, *The Transport Accessibility Gap*, 2022.

⁽⁴⁵⁾ Government of Japan, "Promoting the Barrier-free Design of Railway Facilities", 2021.

⁽⁴⁶⁾ World Bank, *QII Annual report quality infrast*

⁽⁴⁷⁾ IPSOS, "29% of Europeans say they are currently in a precarious financial situation", 2023.

⁽⁴⁸⁾ Indian Ministry of Energy.

⁽⁴⁹⁾ Ministry of Power of India, "Saubhagya - Pradhan Mantri Sahaj Bijli Har Ghar Yojana", 2019.

⁽⁵⁰⁾ World Health Organization.

⁽⁵¹⁾ World Bank, "Waterlife: Improving Access to Safe Drinking Water in India", 2017.

⁽⁵²⁾ Ghosh Moulik S., "Inclusion in water: breaking down barriers", World Bank, 2018.

Paprec incineration plant in Mumbai

P —

Paprec has accelerated its international development through infrastructure projects that address both social and environmental issues. Paprec Energies is the only European player able to design, build

and operate waste to energy plants of all sizes. It is present now in ten countries. In Thailand, for instance, Paprec has secured a deal in Songkhla to construct a waste to energy plant. The Indian division of

Paprec Energies, based in Chennai, will design the boiler, provide some supplies, and oversee the construction of this critical waste treatment facility for this area.



TELECOMMUNICATIONS: REDUCE THE 'DIGITAL DIVIDE'

In OECD countries, a series of vulnerable groups are still facing digital exclusion, such as the elderly and those living in rural areas:

- Elderly people are more excluded from internet access compared to other age groups: in the US in 2019, only 73% of people over the age of 65 had access to the internet, compared to 100% of individuals aged 18-29. A key factor contributing to the exclusion of senior from the digital world is the lack of basic digital skills: in 2021, only 25% of people aged 65-74 in the EU possessed basic digital competencies⁵⁴;
- Household adoption of the internet remains also smaller in rural areas than in urban locations. This situation is particularly seen in countries where the global internet adoption rate is low: in Greece, for example, in 2017, less than 80% urban household have an access to the internet, while only 50% have on in rural areas. Although this gap is narrowing, actual access to services—relying on a high-quality

internet connection, remains limited in rural areas. For instance, in Canada in 2015, while both 90% of the urban and rural areas have access to download speeds of 1 Mbps, only 40% of rural areas have access to a 100 Mbps connection, compared to nearly 100% in urban locations⁵⁵.

Programs related to affordable telecom access can therefore enhance inclusion in rural areas as they enable all citizens to engage in the digital economy, access education, banking, payment methods, and participate in civic activities or detect fake news.

In emerging countries, the return on investment is even higher. Evidence in Africa shows that increasing mobile broadband connectivity and affordability through public funding can help reduce poverty in the long term: a study conducted in Nigeria—where the affordability of 1GB of data as a percentage of GNI per capita is high (Figure 9)—underlines that after a year or more of mobile broadband coverage, the total consumption in households increased by more than 6% and that two or three years of 3G/4G coverage increased labor force participation for women⁵⁶.

FOCUS 6

Integrated waste management in Belo Horizonte, Brazil⁵³

In 1993, Belo Horizonte introduced its Integrated Solid Waste Management (ISWM) model, a selective approach to waste collection and treatment. ISWM was intended to improve waste collection and management and to increase recycling rates.

One aspect of the initiative was to promote the collection of recyclables by cooperatives of *catadores*, recognizing that these workers were already contributing to recycling activities in Belo Horizonte. By entering a partnership with them, the city would improve their productivity and help the city meet its environmental and socioeconomic goals.

The policy emphasized the “segregation of waste at source to minimize environmental impacts and maximize social and economic benefits in local communities”. The city installed more than 100 voluntary drop-off sites for household waste, which was then delivered to the cooperative warehouses for sorting.

By 2012, over 95% of households were covered by the city's waste collection services and 93% of waste was disposed of in environmentally sound landfills. Around 600 people were officially employed in the waste management sector through various cooperatives that had individual contracts with the city.

⁵³ Global Delivery Initiative, “Solid Waste Management Systems through Social Inclusion: The case of Belo Horizonte, Brazil”, 2021.

⁵⁴ European Union agency for Fundamental Rights, *Fundamental rights of older people: ensuring access to public services in digital societies*, 2023.

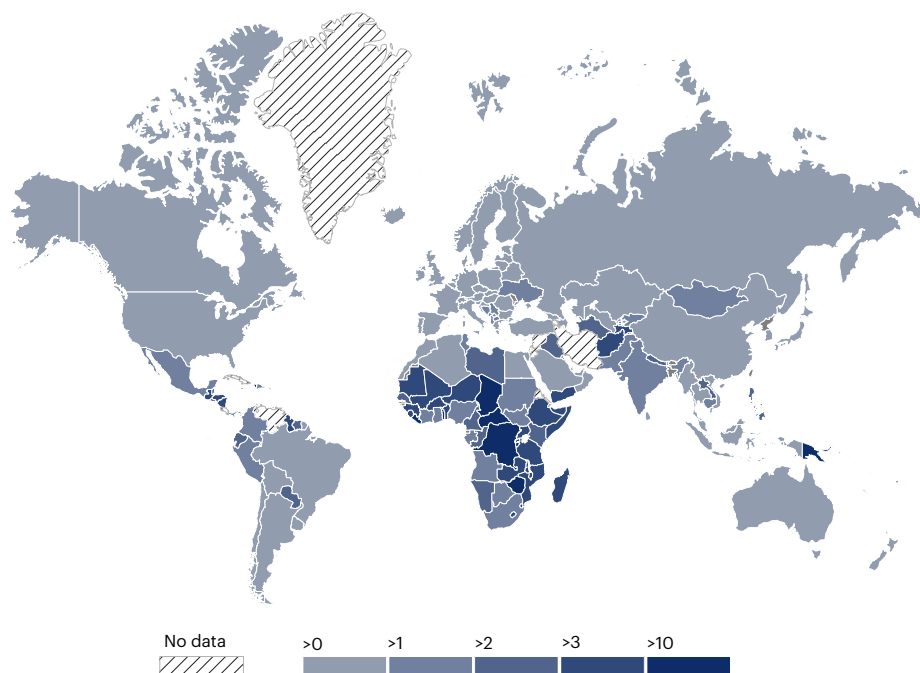
⁵⁵ OECD, *Bridging the rural digital divide*, 2018.

⁵⁶ Aranda-Jan C., Qasim Q., “Increasing access to technology for inclusion”, World Bank, 2023.

FIGURE 9:

Affordability of 1GB of data as a percentage of Gross National Income per capita

Source: Increasing access to technology for inclusion, Clara Aranda-Jan, Qursum Qasim, World Bank, 2023



The National Strategy for Digital Inclusion in France

France set up a National Strategy for Digital Inclusion in 2017. The primary objectives of the National Strategy were to provide basic training in remote French territories through the deployment of digital ambassadors. This initiative was part of a broader National Strategy aimed at promoting digital inclusion by offering training in digital professions and accelerating the digital transition of businesses and the state.

This National Strategy was endowed with USD280m as part of Plan France Relance and has resulted in 3 axes:

- The recruitment and training of 4,000 France Services digital advisors, who offer digital initiation workshops as close as possible to French men and women;
- Equipping digital mediators through support for local networks offering digital activities;
- Providing training, as well as simple, secure tools for caregivers (social workers, local authority staff, etc.), to enable

them to better support French citizens who cannot handle administrative formalities on their own and direct them to France Services digital advisors⁵⁷.

The beneficiaries of digital advisors tend to be older, with few qualifications, more often women, and living in suburban or rural areas (Table 2). Although the number of digital advisors remains low, surveys show a very high satisfaction rate among people who have benefited from the support of a digital advisor⁵⁸.

TABLE 2

Category description of the main beneficiaries

Source: La médiation numérique, Survey regarding digital advisors, Adso study, July 2024

Lecture: Among the primary beneficiaries, 87% were retirees and 87% (74%+13%) had a low level of education.

	Beginner Seniors (26%, n=303)	Experienced Seniors (35%, n=414)	Advanced Training Program (26%, n=311)	Integration Program (13%, n=150)	TOTAL (100% N=1178)
Retired	87%	81%	59%	19%	69%
Inactive	6%	7%	3%	4%	5%
In training / Job seeking	2%	5%	9%	61%	12%
Employed	5%	7%	29%	16%	13%
72 years old and older	41%	38%	21%	7%	30%
66-71 years old	27%	25%	23%	7%	22%
59-65 years old	23%	23%	22%	15%	22%
Under 59 years old	9%	14%	34%	72%	25%
No diploma	13%	8%	2%	51%	13%
High school diploma or less	74%	70%	55%	47%	64%
Higher education	14%	22%	43%	3%	23%
Man	24%	24%	33%	39%	28%
Woman	76%	76%	67%	61%	72%

⁽⁵⁷⁾ Société numérique, Rapport d'activité, 2022.

⁽⁵⁸⁾ Asdo études, La médiation numérique, Une enquête auprès des publics des conseillers numériques, 2024.



Telefónica: partnering for more digital inclusion

T

Telefónica has significantly advanced social and economic development by expanding connectivity and digitalization to a broader population. In 2023, Telefónica was the world's top-ranked ICT company in digital inclusion according to the Digital Inclusion Benchmark. Telefónica scored 85.2 points out of 100, with a clear margin over the next 200 most influential technology companies in 39 economies, making it the world's top-ranked ICT company in digital inclusion.

"In digital inclusion, Telefónica achieves a perfect score in the area of use for its efforts in cybersecurity, data privacy and child online safety. The company goes above and beyond by committing to a time-bound goal for incorporating accessible design principles into all its services and products. It also ranks first for its skills development programs, which

include impact assessments. In innovation, the company supports start-ups, promotes sustainability practices, and discloses its ethical AI principles. Telefónica is highly transparent about its activities, and its annual consolidated management report aligns with international reporting standards."

World Benchmarking Alliance, Digital Inclusion Benchmark 2023

For instance, in 2019, Telefónica with Meta, BID Invest, and CAF created the program Internet para Todos (IpT) aiming to build telecom infrastructure and deploy a wholesale mobile network in rural areas in Peru. A key feature of IpT is that it is accessible to all telecommunications operators, as it is set up as a Rural Mobile Infrastructure Operator (OIMR). This allows any operator to utilize IpT's network upon reaching a community, thereby offering

communication services in extended rural areas. Since 2019, IpT has provided 4G internet access to over 3.3m Peruvians across more than 16,000 rural population centers bringing progress, opportunities, and inclusion to the most remote areas of Peru.

"Digital inclusion is about more than just expanding connectivity to all areas, including rural regions. It also involves providing digital skills training and ensuring access to secure digital solutions. Our aim is to make technology accessible to everyone, enabling them to take full advantage of the opportunities that digitalization brings. In doing so, we can create more fair, more prosperous, and sustainable societies."

Sergio Oslé, COO of Telefónica in Spain





THE 'JUST TRANSITION': A NEW AND MOST CRITICAL CHALLENGE FOR INFRASTRUCTURE STAKEHOLDERS

Key takeaways

→ The future of infrastructure is full of uncertainties, and most of the megatrends disrupting the sector over the next decades may deepen the distributional gap within and between countries: urbanization, population growth, digitalization, climate change, etc.

→ Green infrastructure in particular will have to be built in a more inclusive way: Failing to do so will result in the ecological transition being a social regression as climate change-related policies have more significant effects on lower-income households and vulnerable groups

→ In this context, the just transition seeks to ensure that the substantial benefits of a green economy transition are shared widely, while also supporting those who stand to lose economically—countries, regions, industries, communities, workers or consumers

→ To take up the just transition challenge, the EU has moved forward to reconsider the way green public policies are designed and implemented for infrastructure, especially facing the energy crisis. The next step could be to define a “New Fair Deal” to adapt and enrich the “Fit for 55” program with social aspects

Maximizing the social impact of infrastructure: major challenges ahead

Considering that 72% of the targets associated with SDGs are related to infrastructure, transforming existing infrastructure and building new ones with maximum social outcomes will be critical. **Market dynamics are clearly favorable:** private investment in infrastructure has reached unprecedented levels, surpassing USD 1,000bn in global assets under management for the first time in 2021-2022, making infrastructure the fastest-growing market.

Demand for infrastructure is also rising:

a wave of infrastructure project renovations, replacements and new constructions for infrastructure shall happen over the next 15 years as 75% of the infrastructure expected to exist by 2050 are yet to be built. According to the Global Infrastructure Hub Outlook, the investment needed in infrastructure in 56 countries studied worldwide will double by 2040 compared to investment in 2015, from 2.3 to USD 4.6t⁶¹.

Still, **the future of infrastructure is full of uncertainties**, especially regarding the evolution of social inequalities. Among the 20 megatrends disrupting the infrastructure sector over the next decades, the three most challenging ones may deepen inequalities over the long term (Figure 10):

- The two so-called “transitions” (ecological and digital transitions) will disrupt modern economies and reshape skills and job structures, posing substantial risks to the most vulnerable and excluded populations;
- Urbanization and population growth, as well as aging demographics in Northern countries, are considered the top megatrends impacting the industry, with critical consequences on territorial housing policies and urban planning;
- Although progress has been achieved, the global divide between Northern and Southern countries could be associated with an increasing and long-lasting distributional gap.

FIGURE 10

Megatrends impacting the infrastructure sector over the next decades⁶¹

Source: GI Hub

		HIGHEST	LOWEST
		IMPACT TO INDUSTRY	PREPAREDNESS TO HANDLE
Emerging markets	1	Urbanization and population growth	Rise of climate change
	2	Rise of green energy resources	Rise of natural disasters and resilient infrastructure
	3	Rise of IoT, sensors and smart infrastructure	Global divide and increased social inequality
	4	Infrastructure financing gap	Resource scarcity and rise of circular economy
	5	Private participation in infrastructure	Rise of security risk
Mature markets	1	Urbanization and population growth	Rise of climate change
	2	Aging infrastructure	Global divide and increased social inequality
	3	Rise of climate change	Rise of natural disasters and resilient infrastructure
	4	Rise of natural disasters and resilient infrastructure	Resource scarcity and rise of circular economy
	5	Rise of green energy resources	Rise of distrust and pressure for increased transparency

	Society and workforce
	Technology
	Geopolitics and regulation
	Market and customers
	Sustainability and resilience

⁽⁶¹⁾ Global Infrastructure Hub, "2021 Global Infrastructure Outlook", 2021.

⁽⁶²⁾ GI Hub, "Megatrends shaping the future of infrastructure", 2020: The survey received responses from more than 400 respondents in 70 nations, with 35% of respondents from emerging markets, and 65% from mature markets. All G20 nations were represented. Respondents came from the full spectrum of different organizational types—including government, international organizations, multilateral development banks, contractors and operators, private investors, technology firms, academia and think tanks—and represented all organizational levels, including a large number of CEOs and directors.

Tackling demographic and spatial divides

BRIDGE THE NORTH-SOUTH 'DISTRIBUTIONAL GAP' OF INFRASTRUCTURE

Disparities in infrastructure access and quality are persisting globally (between Northern and Southern countries) and within countries, exacerbating inequalities. In 2023, approximately 783m people still lacked access to clean water, 2.5bn lacked adequate sanitation, and nearly 1bn were without all-weather roads⁶³.

Although those inequalities are declining, a major change has yet to occur to accelerate and amplify this trend.

Energy systems provide a clear illustration. Even if the number of people without access to electricity declined from 1.4bn in 2010⁶⁴ to 685m people in 2022, it climbed back for the first time in a decade in 2022 (10m more than in 2021) as population grew—mostly in Sub-Saharan Africa—at a higher rate than that of new electricity connections⁶⁵. By 2030, under current policies there will still be 660m people lacking electricity access and around 1.8bn without access to clean cooking technologies and fuels.

Recent satellite data mapping of urban built-up heights have stressed those North-South and South-South extreme gaps using per capita urban built-up infrastructure as a metric⁶⁶:

- The average per capita urban built-up infrastructure of the Global North is approximately 300m³, which is about three times that in the Global South (108m³). Some countries in the Global North (e.g., the United States) have per capita built-up infrastructure larger than 600m³, while it is as low as 20m³ in some countries in the Global South, such as Bangladesh, reflecting an extreme 30-fold disparity (Figure 11);
- Overall, a total of 45 countries in the Global North with a combined 16% of the global population have nearly equal amounts of global urban built-up infrastructure as 114 countries in the Global South, which account for 74% of the global population (Figure 12).

⁶³ Global Infrastructure Hub, "Inclusive Infrastructure and Social Equity", 2019.

⁶⁴ International Energy Agency (IEA), "Number of people without access to electricity by region, 2010-2023", 2023.

⁶⁵ International Energy Agency (IEA), "Progress on basic energy access reverses for first time in a decade", 2024.

⁶⁶ Zhou, Y. et al., "Satellite mapping of urban built-up heights reveals extreme infrastructure gaps and inequalities in the Global South", Proceedings of the National Academy of Sciences, 2022.

⁶⁷ The shares of urban built-up infrastructure in the Global North and South. A total of 45 countries in the Global North and 114 countries in the Global South have roughly equivalent percentages of global built-up infrastructure. Country names and their portions are shown in the figure.

FIGURE 11

Distribution of per capita urban built-up infrastructure (per capita per m³)⁶⁶

Source: Zhou, Li, Chen, Sato, 2022

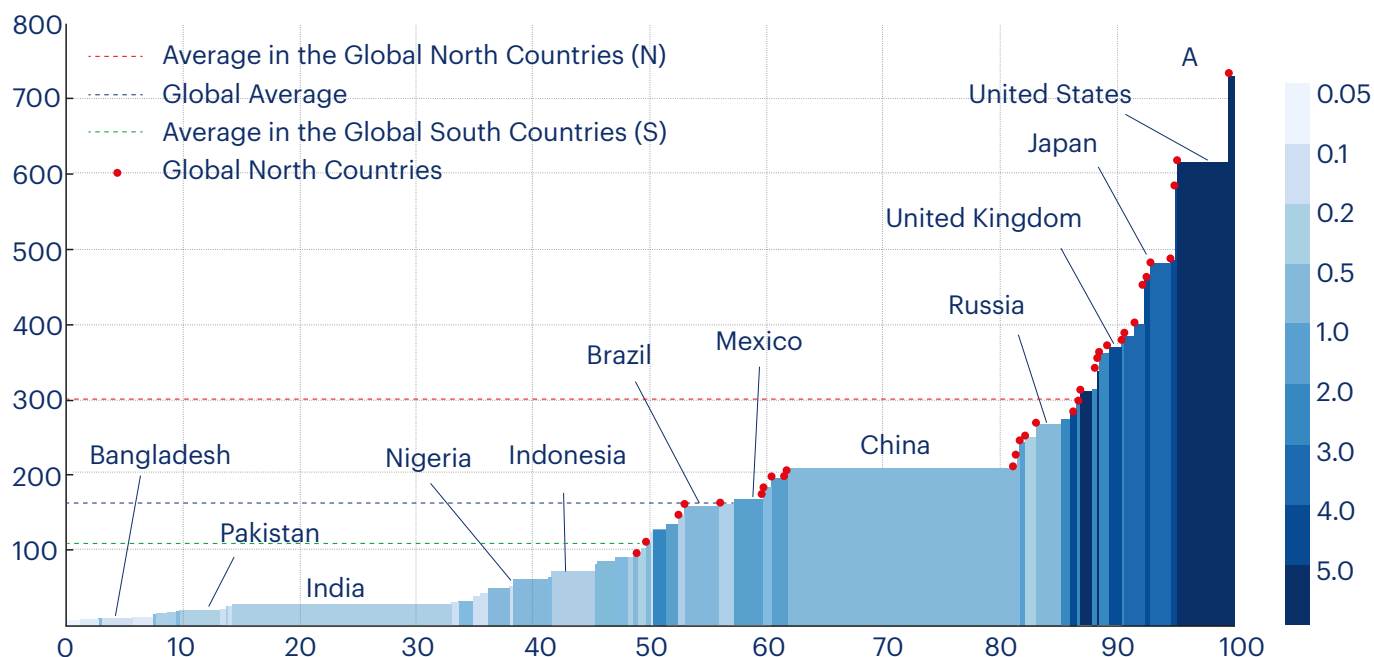
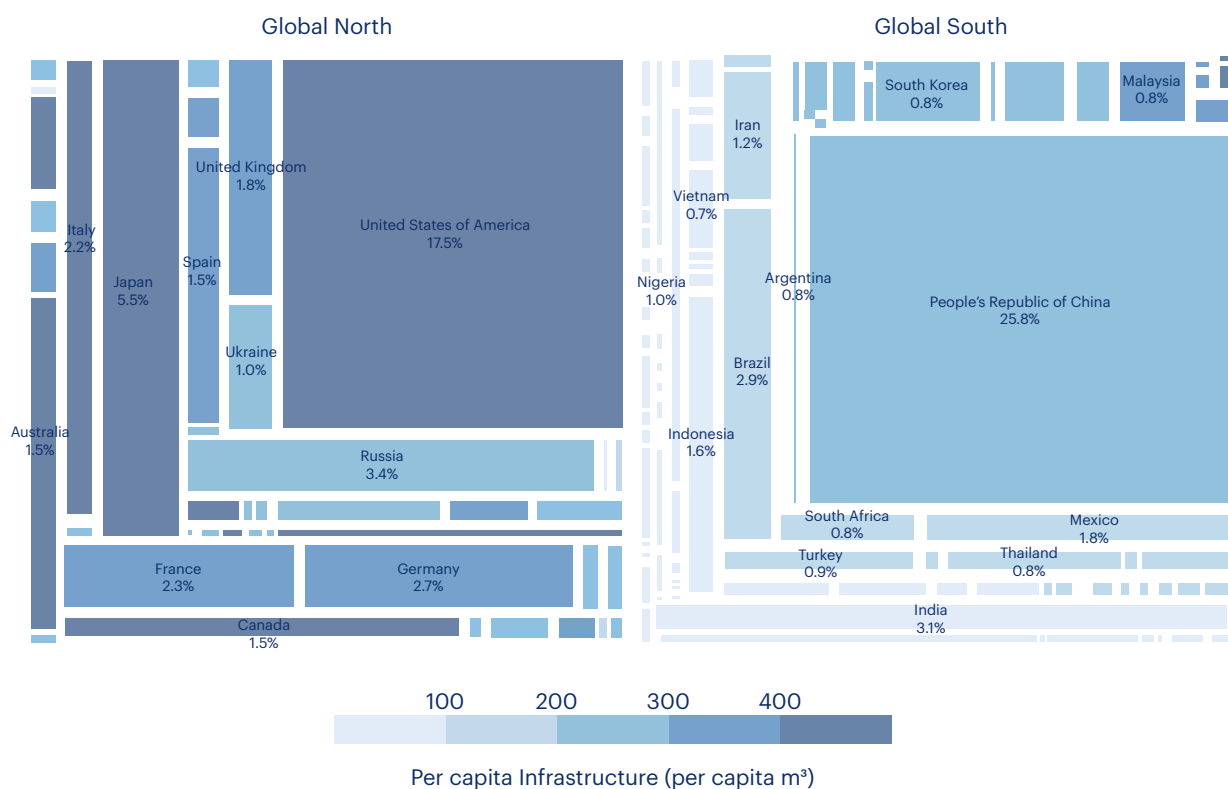


FIGURE 12

Share of urban built-up infrastructure in the North and South (per capita per m³)

Source: Zhou, Li, Chen, Sato, 2022



MANAGE THE URBANIZATION RISKS

As **the global urban population**, currently around 4.4bn people, **is expected to grow to around 7bn by 2050**⁶⁸, cities are expected to store most of the economic, social and environmental value, thus creating an imbalance in opportunity and threatening urban sustainability in the long term. Today about 80% of global GDP is attributed to urban areas⁶⁹.

Urban infrastructure are in the frontlines. A study led by Pandey, Belsford and Seto has found that urban infrastructure inequalities (i.e. availability, provisioning, or access to infrastructure) are a characteristic feature of urbanization—even more than a simple outcome of urbanization⁷⁰. As urban areas are expected to almost double in size by the middle of the twenty-first century⁷¹, **concomitant infrastructure expansion therefore presents both a challenge and an opportunity to shape future inequalities.** Due to the infrastructure's long lifespan, the stakes are huge as those infrastructure inequalities can persist for a prolonged period⁷².

To bridge the gap, the world still faces a double issue:

- First, **there are not enough projects to invest in.** The World Bank estimated in 2022 that the pipeline of investable infrastructure projects across sustainable infrastructure in emerging markets represented USD 1.2t i.e. half of emerging economies' estimated annual sustainable infrastructure investment needs. Furthermore, many projects are still in the very early stages of conception and will not be ready for years⁷³;
- Second, **private sector investment largely favors mature markets**—private investment accounts for roughly 20% of total infrastructure investment in emerging markets, which compares with 70% in developed economies⁷⁴. Over half of private investments in infrastructure in emerging markets require cofinancing with development banks⁷⁵, but, at the same time, development finance institutions (DFIs) and multilateral development

banks (MDBs) have taken a hit in a world of higher interest rates and public debts (see section #4).

ENSURE AN EQUITABLE DIGITAL TRANSITION

The shift toward a digital economy poses a risk of widening the digital and spatial divides, which has already been accelerated by Covid-19. The rise of remote work, artificial intelligence, and smart cities has increased data transmission, storage, and processing needs. This surge in demand calls for more wireless connectivity, fiber-optic networks, 5G towers, and data centers—US data center demand is forecast to grow by 10% a year until 2030⁷⁶. Populations with limited access to digital infrastructure, such as high-speed internet and modern devices, or those lacking digital literacy skills, are at a significant disadvantage. This divide is particularly pronounced in rural areas, among older adults, and within lower-income groups.

Leaving no one behind in the green transition

CLIMATE CHANGE: A MULTIPLIER OF INEQUALITIES IN OECD COUNTRIES

The inclusive transition of infrastructure faces a new, unique, and most critical challenge: The climate crisis. As societies increasingly recognize the need for inclusion in urban areas and infrastructure development, they are simultaneously grappling with the urgent demands of ecological sustainability. Currently responsible for 79% of global GHGs⁷⁷, the sector of infrastructure is on the front lines and the level of investment required is particularly high: it is estimated at USD 6.9 trillion in global investment each year until 2030 to achieve the Paris Agreement's climate targets⁷⁸.

The dual climate-inclusive transition thus creates complex dynamics, as efforts to build inclusive spaces must now also account for environmental considerations, such as reducing carbon footprints, conserving natural resources, and fostering biodiversity. This adds **another layer of complexity to the planning process**, as stakeholders must navigate competing interests and limited resources.

⁽⁷⁰⁾ Pandey B., Brelsford C., Seto K. C., "Infrastructure inequality is a characteristic of urbanization", 2022.

⁽⁷¹⁾ Huang K., Li X., Liu X., Seto K. C., "Projecting global urban land expansion and heat island intensification through 2050", 2019.

⁽⁷²⁾ Overseas Development Institute, Spatial Inequality and Urban Poverty Traps, 2010.

⁽⁷³⁾ World Bank, *Mind the gap: Time to rethink infrastructure finance*, 2022.

⁽⁷⁴⁾ Global Infrastructure Hub, "Inclusive infrastructure and social equity", 2019.

⁽⁷⁵⁾ Global Infrastructure Hub, "Over half of private infrastructure investment in developing markets need co-financing from non-private institutions", 2024.

⁽⁷⁶⁾ UNOPS, *Infrastructure for climate action*, 2021.

⁽⁷⁷⁾ OECD, *Financing Climate Futures: Rethinking Infrastructure*, 2018.

⁽⁷⁸⁾ McKinsey&Company, *Investing in the rising data center economy*, 2023.

In this context, **green infrastructure shall transform or be constructed in a more fair way**. Failing to do so will result in the green transition being a **social regression** as climate change-related policies are likely to have more significant effects on lower-income households and vulnerable groups. These groups, who are often already disadvantaged by factors such as poverty, lack of access to resources, and social marginalization, therefore face even greater challenges as they struggle to adapt to the changing environment.

In transportation, **the examples of electromobility** (Focus 8) and the **low-emission zones** are striking and illustrate the complexities of making the green transition socially inclusive (Focus 9).

EXPERT POSITION 6

Jérôme Stubler: EV, a critical social issue in the energy transition

“Decarbonization of energy mean electrification. So the transition to EV vehicles will happen over the next 20 years. This will likely reduce the need for traditional refueling stations. As a result, many of these stations may close, requiring people owning fuel cars to travel further to find a refueling station. This shift will disproportionately affect those with fewer resources, as wealthier individuals will have the advantage of home charging options. This requires a proper concession model allowing to ease the access to EV to all and to spread recharging points also in less demanding areas.”



Jérôme Stubler
CEO of Equans

FOCUS 8

Electric vehicles: too expensive to be fair

Implementing the ‘just transition’ of infrastructure presents significant challenges due to the **complex interplay of economic, social, and technological factors**.

The example of electromobility is compelling, demonstrating both the significant environmental benefits of transitioning to low-carbon transportation and the social risks associated with it. While the shift to EVs is crucial for reducing carbon emissions and reducing reliance on fossil fuels, their rapid and massive adoption presents nuanced challenges to both social equity and environmental stewardship within the transportation sector⁷⁹.

On the one hand, certain segments of the automotive value chain will see job growth, such as in battery manufacturing and EV charging infrastructure, while others, like internal combustion engine manufacturing, auto repair and maintenance, and gasoline station jobs, will experience declines. For instance, in its most ambitious scenario (EVs reaching 62% of light-duty vehicle sales in 2030, 100% by 2033), the State of Michigan would gain 17,000 direct jobs in auto manufacturing and around 12,000 indirect jobs in the supply chain in 2030 compared with the “No Transition scenario”⁸⁰.

On the other hand, pricing will be the success or failure factor for EVs as convenient and affordable publicly accessible chargers and cars will be increasingly important as EVs scale up. To help address this, governments have provided support for EV charging

infrastructure through measures such as direct investment to install publicly accessible chargers or incentives for EV owners to install charging points at home⁸¹. At this stage, research shows that the newness of EVs, their high upfront cost, and the need for better and cheaper charging access means equity has been overlooked⁸²:

- EV buyers are predominantly male, high-income, well-educated homeowners with multiple vehicles in their household and access to home charging;
- While the range of available electric vehicle models is expanding, most new models are luxury vehicles or SUVs, which are more expensive than earlier versions;
- Incentives for EVs often lack an equity focus, as many are provided after purchase and tend to favor higher-income buyers;
- Additionally, EV charging infrastructure is unevenly distributed, with a greater need for affordable charging options in lower-income residential areas.

In California, the largest and most researched personal EV market in the US, buyers have a mean income of USD190,000 per year, 81% own their home, 81% are college graduates, and 75% are male⁸³. Research has also found that among EV buyers in Maryland, only 4% of personal EV owners are African-American, compared to 30% of the state population⁸⁴.

⁽⁷⁹⁾ Rouhana F., Zhu J., Chacon-Hurtado D., Hertel S., Bagtzoglou A. C., “Ensuring a just transition: The electric vehicle revolution from a human rights perspective”, 2024.

⁽⁸⁰⁾ World Resources Institute, “A Roadmap for Michigan’s EV Future: an assessment of the employment effects and just transition needs”, 2023.

⁽⁸¹⁾ International Energy Agency, “Policies to promote electric vehicle deployment”, 2021.

⁽⁸²⁾ MIT Science Policy Review, “A perspective on equity in the transition to electric vehicles”, 2021.

⁽⁸³⁾ Bauer B., Bravi S., Motta M. & Chan G. K.-L. “Enabling quantum leap: Quantum algorithms for quantum chemistry and materials. Tech. Rep., National Science Foundation”, 2019.

⁽⁸⁴⁾ Smith C., Hill A. K., Torrente-Murciano L. “Current and future role of haber-bosch ammonia in a carbon-free energy landscape”, 2020.

Low emission zones: major social risks ahead

Low Emission Zones (LEZ) are designed to reduce air pollution by restricting the circulation of the most polluting vehicles within specific areas, mostly city centers. These restrictions can range from complete bans to specific fees and are often seen as an application of the 'polluter pays' principle. The implementation of LEZs has expanded rapidly across Europe, with 320 zones in place by 2022 and an expected increase to 507 by 2025⁸⁵.

These measures have shown their efficiency, as global pollution reduced within the limit of the LEZ⁸⁶. In particular, health improvements have been observed in zones in Japan, UK and Germany, where, for example, LEZ hospitals have observed a reduction of 7 to 12% of strokes⁸⁷.

However, the design and implementation of LEZs has led to significant social challenges, particularly for lower-income households. While these policies have been primarily focused on reducing pollution, their social impacts have often been considered secondary⁸⁸.

These obligations led to social exclusion by increasing costs and access to city centers where

capital and resources are concentrated:

- Low-income households are more likely to own older, more polluting vehicles, which are subject to restrictions or higher fees under LEZ regulations. For example, the Berlin LEZ was projected to exclude 65% of the vehicle fleet from the zone by 2010, based on the fleet as it existed in 2005⁸⁹;
- As upgrading to a low-carbon emitting car is costly, smaller businesses can be disproportionately affected by the rising costs associated with LEZ compliance⁹⁰.

Still, the impact of LEZs also varies depending on the urban context, particularly in terms of public transportation availability. In Brussels, lower-income areas generally have better access to public transport, which can help mitigate some of the negative effects of LEZs. Conversely, low-income households in London are more likely to face transportation challenges, as they have less access to efficient public transport options, making the restrictions imposed by LEZs burdensome⁹¹.

Sébastien Fraisse: Low emission zones, high social costs on the line

“The implementation of Low Emission Zones (LEZs) is sensitive and contentious in France, unlike in other European countries where they have been established for years. Although LEZs address public health concerns, their public acceptance remains a challenge and their success depends on this public acceptance. In our urban mobility observatory, we asked the French about their views on LEZs: while over 75% of French respondents believe LEZs complicate city travel, 73% also acknowledge they improve life for pedestrians, indicating mixed feelings. Simple bans on certain vehicles could lead to social exclusion as well by restricting access to city centers. I believe in a more nuanced approach, as seen in Germany and Spain, allowing limited access to these zones perhaps once a week or twice a month to ensure people are not completely cut off from city life. This is crucial for maintaining social interaction and community engagement.”



Sébastien Fraisse
CEO of Indigo

A MULTIPLE BURDEN FOR LOW-INCOME COUNTRIES

This is all the more the case for **populations in low-income countries**, which are the most exposed to extreme poverty gaps, are the least resilient to exogenous economic and climate shocks, and at the same time disproportionately bear the cost of climate-related events such as extreme weather, rising sea levels, and prolonged droughts (Figure 13). The green transition requires them to simultaneously address economic, social, and environmental challenges with limited resources and capacity, while also dealing with the immediate impacts of climate change.

As high-income countries pick up the pace of their climate change mitigation and adaptation strategies, it is thus critical that they do not transfer the burdens of the transition onto developing countries. When imposing standards and other measures that constitute both tariff and non-tariff barriers to trade, **the additional risk is that emerging countries are excluded from effective participation in value chains and clean energy investment opportunities**, thus widening **the technological divide with rich countries**.

For emerging countries, 2030 climate targets require an increase in average per capita emissions rather than a reduction⁹² and their economic development will rely heavily on carbon-intensive industries, such as mining, agriculture, and fossil fuel extraction. Transitioning away from these sectors can result in significant economic disruption, including job losses and reduced national income.

The challenge seems to be even more complex as **inequalities in average per capita emissions ‘between’ world regions remain large and the gap is still widening** between those who emit the least and those who emit the most, especially at the country-level (Figure 14). In East Asia, the poorest 50% emit on average 2.9tCO₂e per annum, while the middle 40% emit nearly 8t, and the top 10% almost 40t. This contrasts sharply with North America, where the bottom 50% emit fewer than 10t, the middle 40% around 22t and the top 10% around 69tCO₂e. For the poorest countries, which usually have the lowest emissions, **this situation seems to be the most unfair and poses the most significant risks for the future**: Countries in Africa have some of the lowest national GHG emissions, and yet the continent is home to many of the world's most climate-vulnerable countries.

⁽⁸⁵⁾ Clean Cities, “The development trends of low- and zero-emission zones in Europe”, 2022.

⁽⁸⁶⁾ Sarmiento L., “The air quality and well-being effects of low emission zones”, *Journal of public economics*, 2023.

⁽⁸⁷⁾ Chamberlain R., *The Lancet*, in The Guardian, “Low emission zones are improving health, studies show”, 2023.

⁽⁸⁸⁾ ADEME, *Benchmark des zones à faibles émissions à travers l’Europe*, 2023.

⁽⁸⁹⁾ La Grande Conversation, “Retours d’expérience de quatre ZFE européennes: Berlin, Bruxelles, Londres, Madrid”, 2023.

⁽⁹⁰⁾ ADEME, *Benchmark des zones à faibles émissions à travers l’Europe*, 2023.

⁽⁹¹⁾ Verbeek T., “The ‘just’ management of urban air pollution? A geospatial analysis of low emission zones in Brussels and London”, *Applied Geography*, 2022.

⁽⁹²⁾ Nature sustainability, “Global carbon inequality over 1990-2019”, 2022.

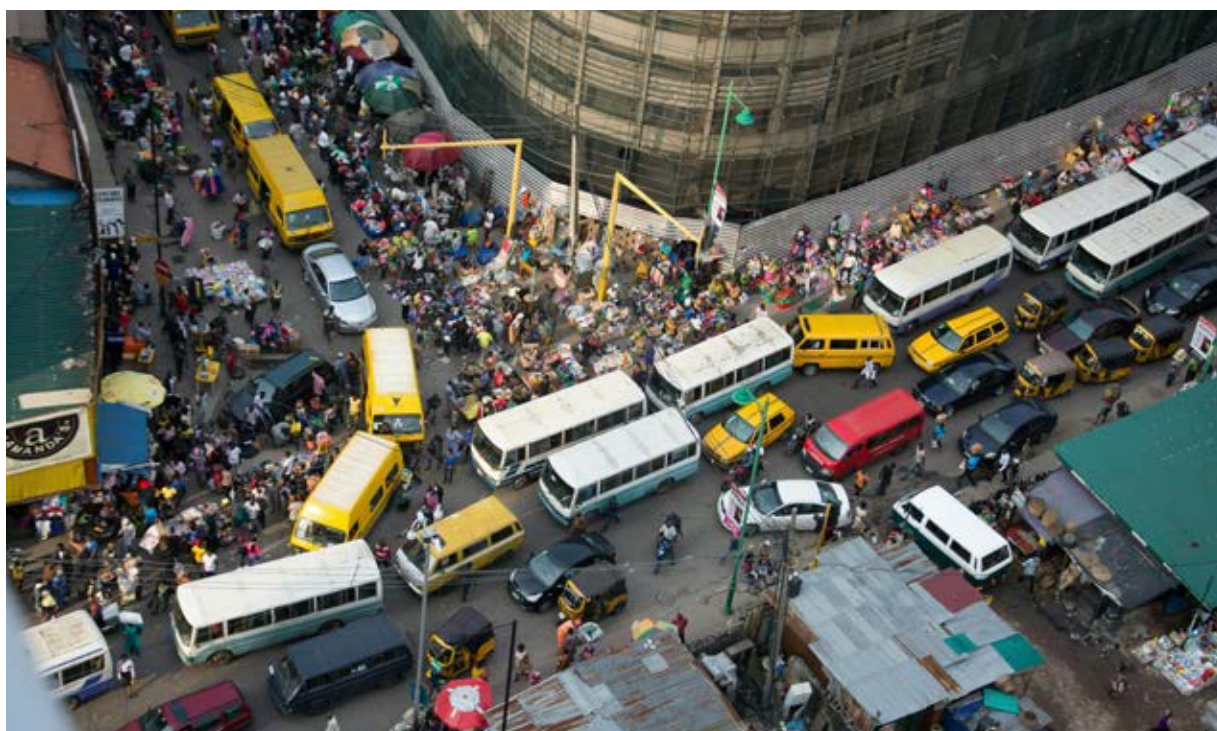


FIGURE 13

Vulnerability to climate change per country

Source: World Economic Forum, 2022

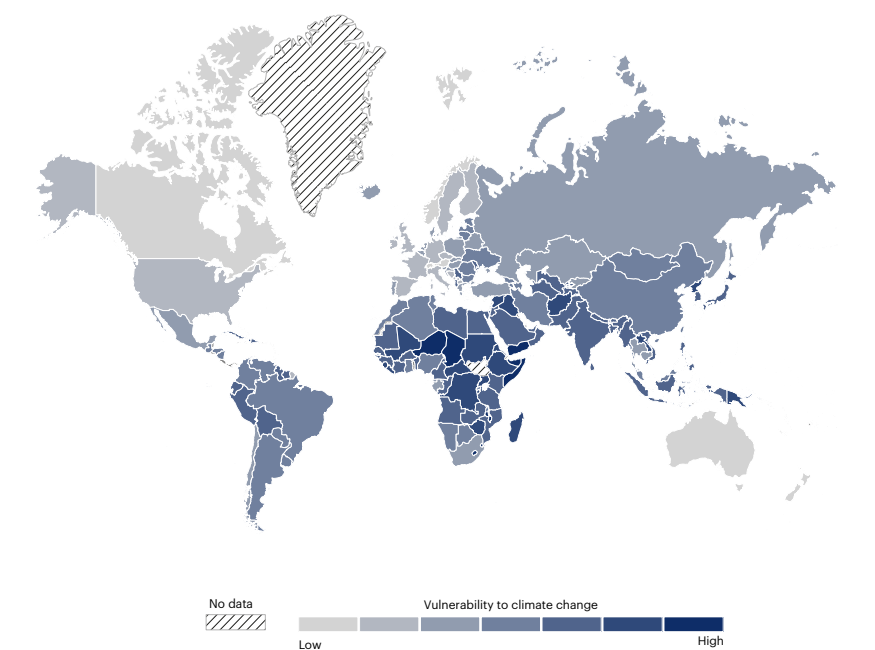
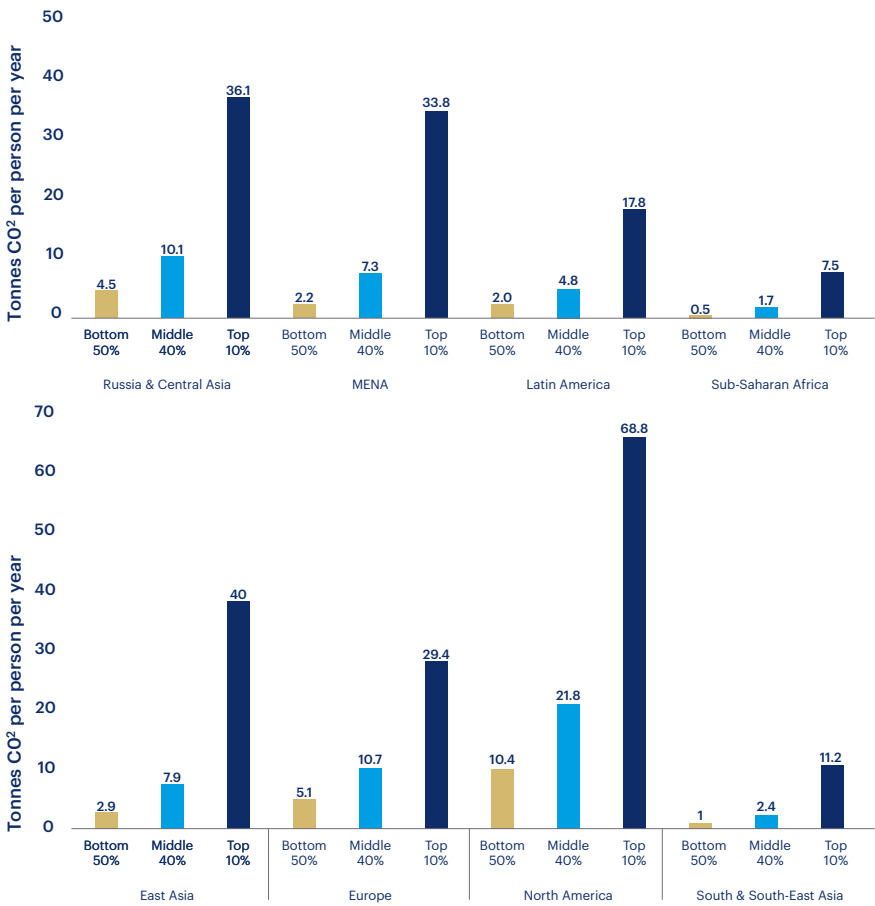


FIGURE 14

Per capita emissions by group in 2019 (tCO₂e per capita)

Source: Lucas Chancel, 2022



MAKE INFRASTRUCTURE MORE AND MORE RESILIENT

Considering the rising amount of natural disasters and environmental hazards, the **'resilience' dimension has become more and more critical** to fully understanding the implications related to the interlinkages between inequalities and infrastructure, and help marginalized people withstand and recover from climatic shocks (Figure 15). Resilience is an attribute of complex systems (as ecosystems, people's livelihoods, cities and infrastructure) and is usually defined as the ability of a system to adapt to a crisis and maintain its core functions⁹³. By **creating 'social safety nets'**, resilience plays a key role in mitigating the adverse effects of unforeseen events on levels of inequalities.

When infrastructure are robust and able to absorb major exogenous shocks, they can **provide vital support to disadvantaged populations** during crises, thereby reducing the disparities that are usually exacerbated by economic downturns or natural disasters. On the contrary, low resilience of infrastructure to economic and environmental shocks can have tremendous impact on vulnerable populations due to the lack of robust social protection programs—such as unemployment benefits, healthcare, housing assistance, and disaster relief—leaving these groups with few safety nets to fall back on during times of crisis⁹⁴.

⁽⁹³⁾ United Nations Department of Economic and Social Affairs, *Global Sustainable Development Report, 2016*: The IPCC defines resilience as "the ability of a system and its component parts to anticipate, absorb, accommodate, or recover from the effects of a potentially hazardous event in a timely and efficient manner, including through ensuring the preservation, restoration, or improvement of its essential basic structures and functions".

⁽⁹⁴⁾ United Nations Department of Economic and Social Affairs, *Global Sustainable Development Report, 2016*.

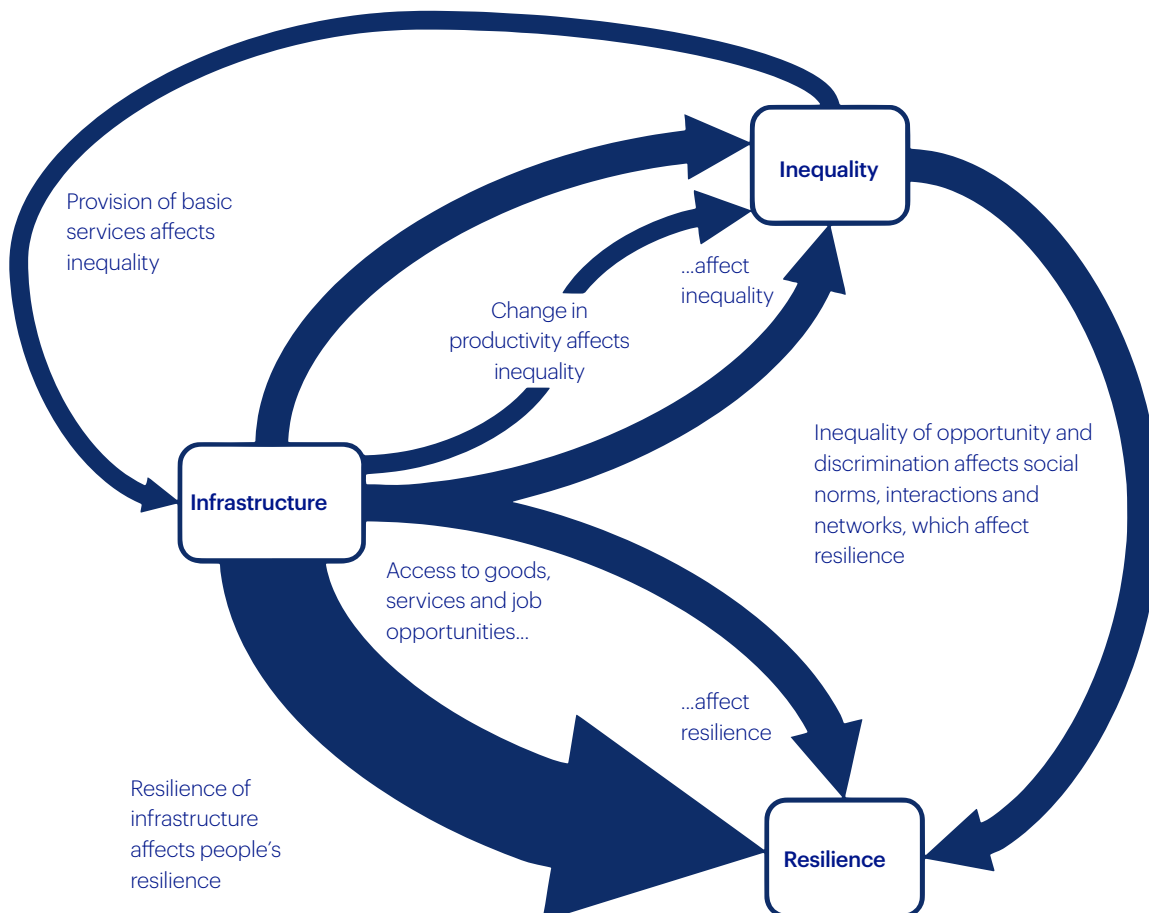
FIGURE 15

Evidence map of the infrastructure-inequality-resilience nexus

Arrows correspond to the impact from one dimension to another (the bigger the arrow, the bigger the impact)

Source: United Nations Department of Economic and Social Affairs, 2016

Balance of political power affects government's investment decisions on infrastructure



The path toward the ‘just transition’ of infrastructure

Design equitable green public policies for infrastructure

THE ‘JUST TRANSITION’ OF INFRASTRUCTURE: A CALL FOR ACTION

To make the green transition socially acceptable, public policymakers must design public policies that ensure climate mitigation and adaptation costs are **spread equitably across the population**, and benefits are shared equally. The concept of a just transition acknowledges that potential as well as the need to address trade-offs on the path toward sustainability. In other words, a just transition seeks to ensure that the substantial benefits of a green economy transition are shared widely, while also supporting those who stand to lose economically—countries, regions, industries, communities, workers or

consumers⁹⁶.

This requires not only targeted measures (Figure 16) but also a process of embedding equity and inclusion in sectoral policy areas.

In this regard, according to the United Nations Office for Project Services (UN-OPS), inclusive and climate-compatible infrastructure development can have a major positive impact in breaking the cycle of marginalization and vulnerability to climate change impacts (Figure 17).

The call for action is clear. According to the survey conducted by Altermind in July 2024, French citizens consider that the highest cost in the daily life of the green transition and the social and territorial divides it can create, are two major negative effects that should be addressed as a priority by public authorities (Figure 18). At this point, 63% of the French population feels that green policies do not adequately address these concerns (Figure 19).

The French “Conseil National des Politiques de Lutte contre la Pauvreté et

EXPERT POSITION 8

László Andor: Europe needs, right now, a socially just transition

“Europe is facing multiple crises nowadays, reinforcing the urgency of a green transition designed with fairness and aiming at maximum social outcomes:

- A combination of high inflation, skyrocketing energy prices, and a negative outlook for the European and global economies, are generating a cost-of-living crisis;
- An uncertain geopolitical era coupled with globalized economic warfare which amplifies the importance of the energy transition that is both sustainable and inclusive;
- Record temperatures and flooding, and general rise of weather extremes with dramatic consequences for the safety, health and well-being of citizens.

In these hard times in Europe, it is even more important for the green transition to be designed fairly and with social disparities in mind in order to gain widespread public support and not risk losing democratic stability in the process.”



László Andor, former EU Commissioner for Employment, Social Affairs and Inclusion, and Secretary General of the Foundation for European Progressive Studies

FIGURE 16

Social priorities according to principal groups affected by the net-zero transition⁹⁷

Source: Making Transition Plans Just, Grantham Research Institute, 2022

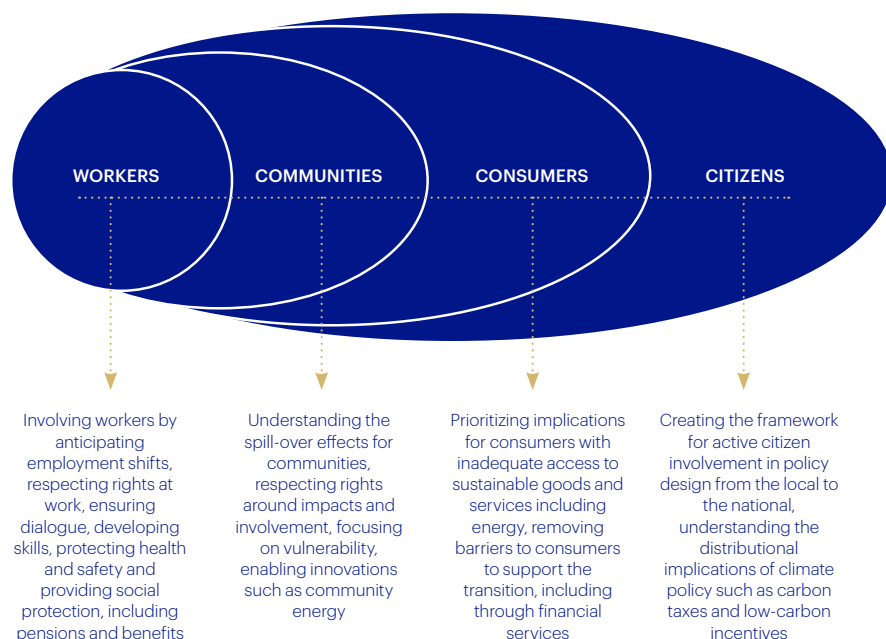
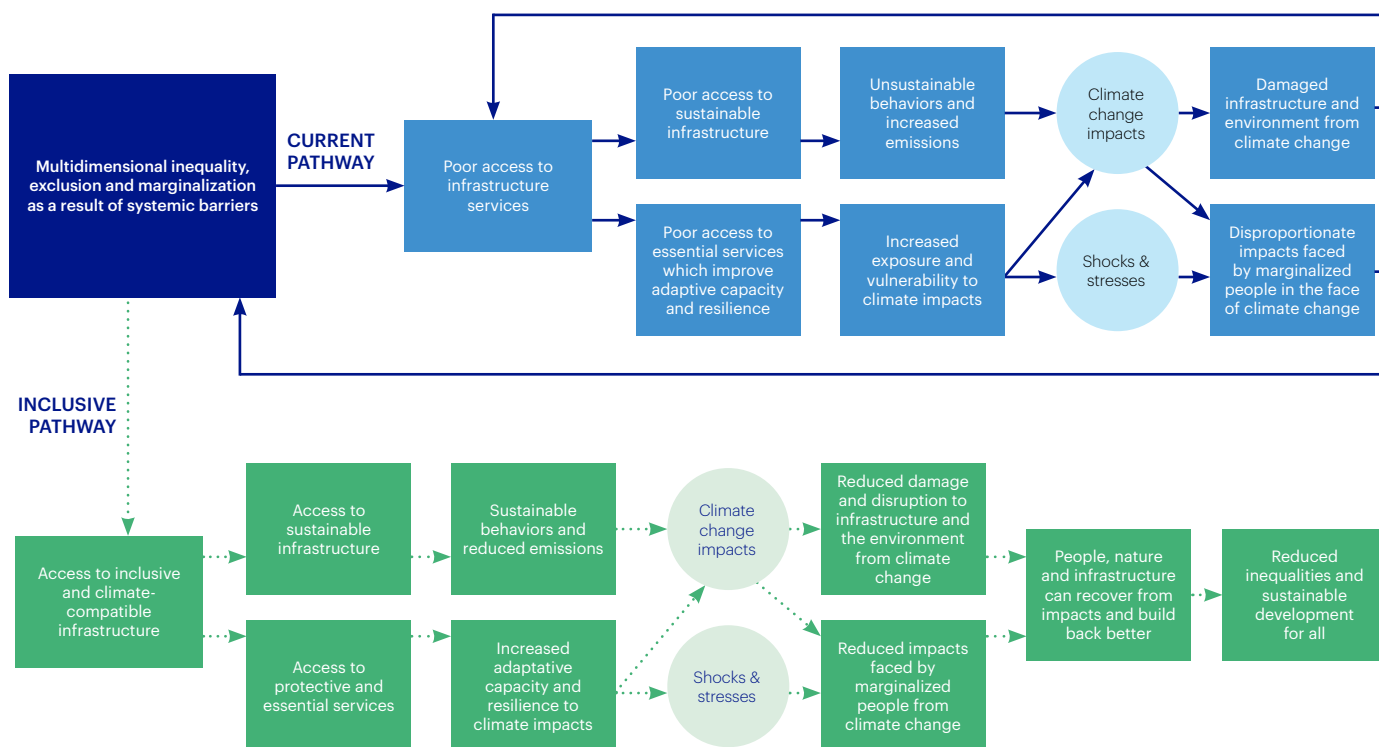


FIGURE 17

Impact of inclusive and climate compatible infrastructure and inequalities

Source: UNOPS



l'Exclusion Sociale" (CNLE) has also warned policy makers about the necessity to articulate the green transition with poverty and inequalities policies, otherwise low-income households will remain excluded from the transition benefits, and inequalities will grow. Using the example of the 'yellow jackets' protest, the CNLE has been calling on the French government for a new social and environmental pact, focusing notably on the concrete contributive capacity of low-income households⁹⁸: of the demonstrators, 26% were workers, 21% were employees, and 17% were retirees from the working class⁹⁹.

At this stage, public policies for social and green infrastructure have been overall inadequate and have not effectively reached those who need them most. Policies related to energy-efficiency renovation of housing are a case in point and have highlighted the three major regressive social risks of energy performance certificates on poorer households:

- **Spending effect.** Policies that increase the prices of carbon-intensive goods disadvantage households with carbon-intensive consumption baskets, the price of which is set to increase with mitigation policies¹⁰⁰. The spending effect of climate policies is regressive notably because the share of energy spending decreases with a higher income;
- **Housing prices.** Energy efficiency requirements set by governments will require significant investments by property owners. Research shows that the least energy-efficient properties are often located in areas with lower levels of income, where households might be less able to pay for renovations¹⁰¹. Although energy efficiency renovations in social housing have resulted in substantial reductions in energy consumption, leading to lower energy bills for residents (between

⁽⁹⁶⁾ According to the International Labour Organization (ILO), a just transition means "greening the economy in a way that is as fair and inclusive as possible to everyone concerned, creating decent work opportunities, and leaving no one behind".

⁽⁹⁷⁾ UN PRI, "Inevitable Policy Response, Why a just transition is crucial for effective climate action", 2019.

⁽⁹⁸⁾ CNLE, *Faire de la transition écologique un levier de l'inclusion sociale*, 2024.

⁽⁹⁹⁾ ELABE, « Les "Gilets jaunes" : la partie émergée de la crise sociale française ? », 2019.

⁽¹⁰⁰⁾ Delgado-Tellez M., Ferdinandusse M., Nerlich C., "Fiscal policies to mitigate climate change in the euro area", *Economic Bulletin Issue 6*, 2022, 2022.

⁽¹⁰¹⁾ Oxford Economics, "The cost of achieving net zero housing will add to inequalities in the UK", 2022.

USD200 and USD500 per year in Paris¹⁰²), the transition period can be challenging for those lower-income households who may face higher rents¹⁰³ or displacement before they can benefit from reduced energy bills and improved living conditions;

- **Skills specificity.** Green housing initiatives require workers who are proficient in energy-efficient design, installation of renewable energy systems like solar panels, and the use of eco-friendly materials. These tasks require medium-to-high levels of technical knowledge¹⁰⁴, along with additional on-the-job training¹⁰⁵ and understanding of new building technologies and compliance with environmental regulations.

FIGURE 18

Social divides & increasing costs: two main concerns of the green transition

Source: ViaVoice, Altermind, 2024

The ecological transition can have negative effects
In your opinion, which three do you think should be avoided as a priority?

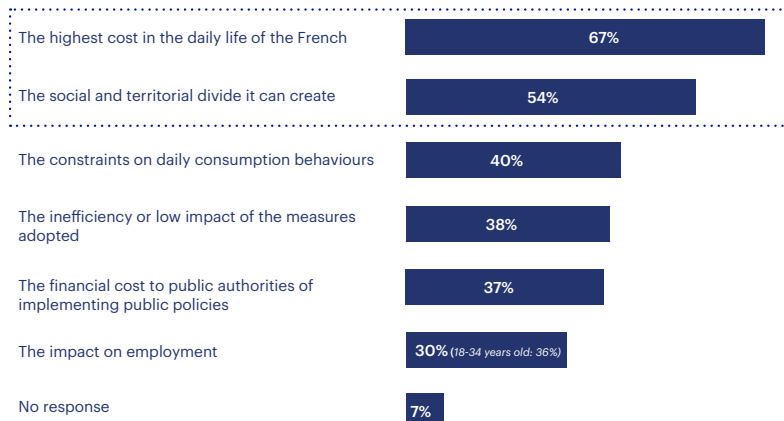


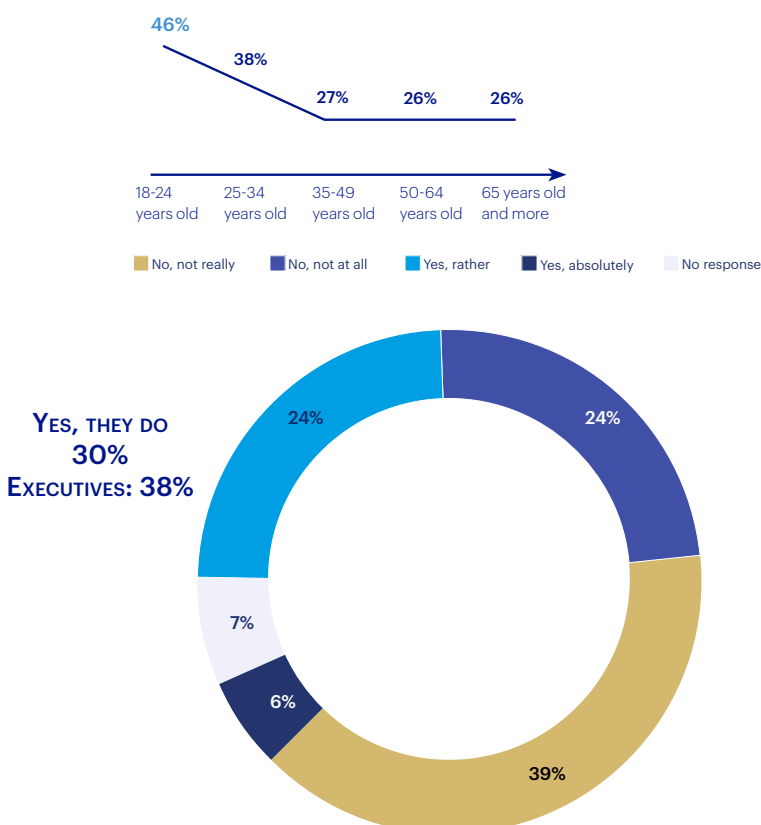
FIGURE 19

Designing green policies embedding social dimensions

Source: ViaVoice, Altermind, 2024

There are public policies that encourage people to adopt environmentally responsible behaviors (such as financial aid for installing solar panels at home, subsidies for upgrading homes to meet energy standards, the deployment of electric vehicle charging stations, etc.)

In your opinion, do these measures sufficiently take social inequalities into account (i.e., do they benefit the poor as much or more than the rich)?



⁽¹⁰²⁾ TheMayor.EU, "Paris reports positive impact from energy renovation on social housing", 2023.

⁽¹⁰³⁾ European Commission (DG Energy), "Energy performance certificates in buildings: A study of France", 2013.

⁽¹⁰⁴⁾ Saussay A., Sato M., Vona F., & O'Kane L. "Who's fit for the low-carbon transition? Emerging skills and wage gaps in job ad data", *OECD Environment Working Papers*, No. 180, 2022.

⁽¹⁰⁵⁾ Consoli D., Marin G., Marzocchi A., & Vona F., "Do green jobs differ from non-green jobs in terms of skills and human capital?", *Research Policy*, 2016.

POLICYMAKERS MOVING FORWARD

A trailblazer in fighting social inequality, the EU has been reinforcing its arsenal of policy and regulatory instruments over the past decade to overcome the social challenges of a low-carbon economy transition.

Adopted in 2021, the Just Transition Mechanism (JTM)⁽¹⁰⁶⁾ is the EU's instrument aimed at ensuring that the economic and social costs of the green transition are not disproportionately endured by regions that are relying on fossil fuels. While all EU countries are eligible for funding, resources are focused on regions facing the greatest difficulties, particularly those needing to phase out coal, lignite, peat, and oil shale or transform carbon-intensive industries.

The JTM relies on three main funding sources:

- **The Just Transition Fund (JTF)**, which supports the economic diversification and conversion of affected regions through financial

support reaching USD30 to 50bn. It will support investments in small and medium-sized enterprises (SMEs), new business creation, research and innovation, environmental restoration, clean energy, and worker reskilling;

- **The just transition scheme, under InvestEU⁽¹⁰⁷⁾**, will allocate a total of USD1.8bn for broader investments, including energy and transport infrastructure, digitalization, and the circular economy;
- **The public sector loan facility** combines a USD1.5bn grant from the EU budget with up to USD10bn in loans from the European Investment Bank to fund energy and transport infrastructure, district heating networks, energy efficiency measures, and social infrastructure⁽¹⁰⁸⁾.

⁽¹⁰⁶⁾ The JTM is part of the EU's Sustainable Europe Investment Plan, which is the financial component of the Green Deal.

⁽¹⁰⁷⁾ The InvestEU Fund aims to mobilize more than €372bn of public and private investment through an EU budget guarantee of €26.2bn that backs the investment of implementing partners such as the European Investment Bank (EIB) Group and other financial institutions

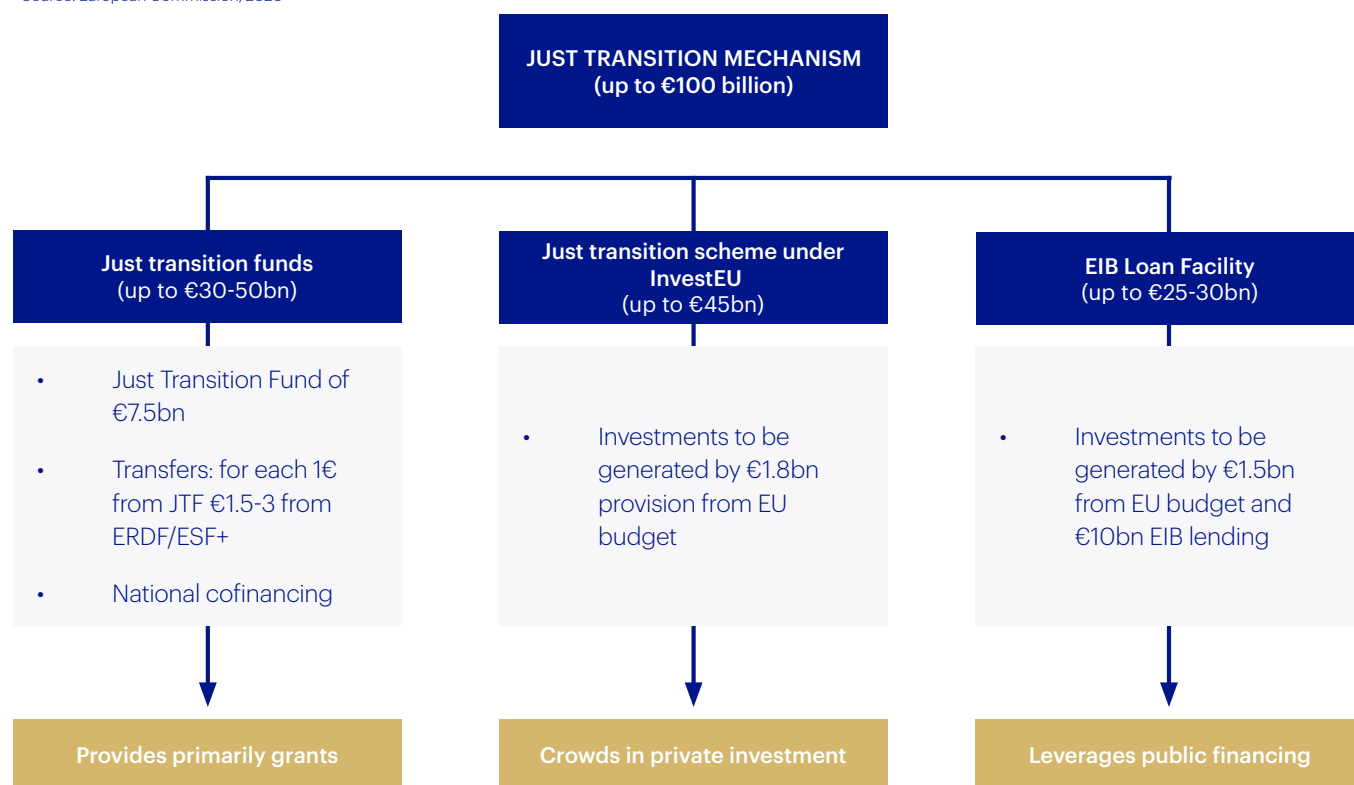
⁽¹⁰⁸⁾ EIB, "Working toward a just transition", accessed in 2024.

Figure 20 displays the three components of the Just Transition Mechanism.

FIGURE 20

The three pillars of the Just Transition Mechanism

Source: European Commission, 2020



Often overlooked, **the impact of the green transition on the job market** has also become a key pillar of the Green Deal. A just transition needs to provide quality jobs for everyone: this requires ensuring that those whose jobs will be affected are offered quality professional and/or training opportunities to make the green transition socially acceptable. Yet, the effects of the green transition on existing jobs and job creation are difficult to predict and remain highly dependent on regional, national and local conditions, as well as types of occupation and task level specificities.

In this context, the EU has implemented several initiatives to address skills shortages in various industries, while ensuring a fair transition in the job market (Focus 10). Financial and organizational support has been provided for key energy sectors, including batteries, heat pumps, and wind energy, along with the creation of skills partnerships to facilitate worker training.

As part of the European Skills Agenda, which aims to upskill and reskill 120m adults annually from 2020 to 2025, the European Commission has also launched the European Year of Skills in 2023. This initiative is designed to empower individuals and companies, particularly small and medium-sized businesses, by promoting the reskilling and upskilling necessary for green and digital transitions, thus accelerating innovation and competitiveness.

FOCUS 10

Reskilling workers in the EU

The EU's Net-Zero Academies

Adopted in May 2024, the EU's Net-Zero Industry Act (NZIA) sets a benchmark for the manufacturing capacity of strategic net-zero technologies to meet at least 40% of the EU's annual deployment needs by 2030. It will notably do so by improving the conditions for investment in net-zero technologies, increasing market access, and accelerating and simplifying permit procedures⁽¹⁰⁹⁾.

However, the co-legislators recognized that the changes created by this regulation would not be efficient or fair without acting on the job market. As a result, they established Net-Zero Industry Academies to create specialized training programs across EU countries. These academies will offer learning credentials to enhance learner mobility and qualification portability in regulated professions. Each academy will focus on a specific net-zero technology and train 100,000 individuals within three years of their establishment.

The European Commission has inaugurated the first of these academies: the European Solar Academy. By 2030, the EU's solar photovoltaic (PV) manufacturing sector will require an estimated 66,000 skilled workers to meet renewable energy targets and maintain industrial competitiveness⁽¹¹⁰⁾.

The Solar Academy plans to train 100,000 workers over the next three years to bridge this skills gap. Modeled after the European Battery Academy, the Solar Academy will collaborate with industry stakeholders to create and certify training programs, enhancing workforce mobility within the Single Market.

Reskilling workers from a Portuguese refinery using EU funds

In May 2021, the shutdown of the Matosinhos oil refinery in Northern Portugal resulted in the unemployment of 140 workers, who faced significant difficulties in securing similar quality jobs. To mitigate this challenge, a new training initiative, funded by the EU's Just Transition Fund (JTF), has been introduced to assist these workers in transitioning to roles within the green economy⁽¹¹¹⁾.

The Instituto do Emprego e Formação Profissional (IEFP), which manages vocational training and active employment policies in Portugal, is deploying JTF resources to create specialized training programs. These programs are tailored to capitalize on the existing skills of the former refinery workers, directing them toward occupations in high demand, such as train drivers. The training course was developed through a collaborative process that included former refinery workers, IEFP, and local authorities from the beginning.

⁽¹⁰⁹⁾ European Commission, "Proposal for a regulation on establishing a framework of measures for strengthening Europe's net-zero technology products manufacturing ecosystem (Net-Zero Industry Act)", 2023.

⁽¹¹⁰⁾ European Commission, "Net-Zero Industry Act makes the EU the home of clean tech manufacturing and green jobs", 2024.

⁽¹¹¹⁾ European Commission, "The ESF+ in Portugal", accessed in 2024.

A margin for progress: toward a “New Fair Deal” for infrastructure

FIRST: GET THE SOCIAL RIGHT

In infrastructure policies, **addressing social considerations should take precedence**, as the social context often dictates how successfully environmental and economic initiatives will unfold. Focusing on the social dimension also creates an inclusive framework that acknowledges the diversity of needs across different regions and populations. By getting the social aspects right first, policymakers can create a robust foundation that is equitable and sustainable.

Public perceptions back this approach. In France, reducing social inequalities and creating local jobs strands are perceived as major priorities for infrastructure public policies, even more important than the low-carbon transition (Figure 21 and Figure 22): according to Altermind’s survey, **43% of respondents consider that reducing social inequalities should be a priority of public infrastructure policies** (just 3pp below increasing security, which ranks first). Creating local jobs also ranks in the top three priorities, with 35% of respondents highlighting its importance; conversely, environmental expectations rank only fourth in the list.

In this context, **the review of the European Pillar of Social Rights (EPSR)**, scheduled in 2025, could be a unique opportunity to promote more socially-driven infrastructure. Launched in 2017, the EPSR has marked a significant milestone in the EU’s history, underscoring its commitment to strengthening the social dimension of European integration across member states. It comprises 20 essential principles divided into three areas: equal opportunities and access to the labor market, fair working conditions, and social protection and inclusion (Figure 23).

As an EU social policy framework, the EPSR has undoubtedly played a crucial role in driving substantial social progress. By 2030, the EU aims to (i) have at least 78% of the population between 20 and 64 at work, (ii) have at least 60% of all adults participating in training every year,

and (iii) reduce the number of people at risk of poverty or social exclusion by at least 15m people. To reach those targets, significant efforts are still required, especially regarding the Principle 20 “everyone has the right to access essential services of good quality, including water, sanitation, energy, transport, financial services and digital communications”.

FIGURE 21

Priorities of public infrastructure policies

Source: ViaVoice, Altermind, 2024

In your opinion, what should be the priorities in terms of public infrastructure policies?

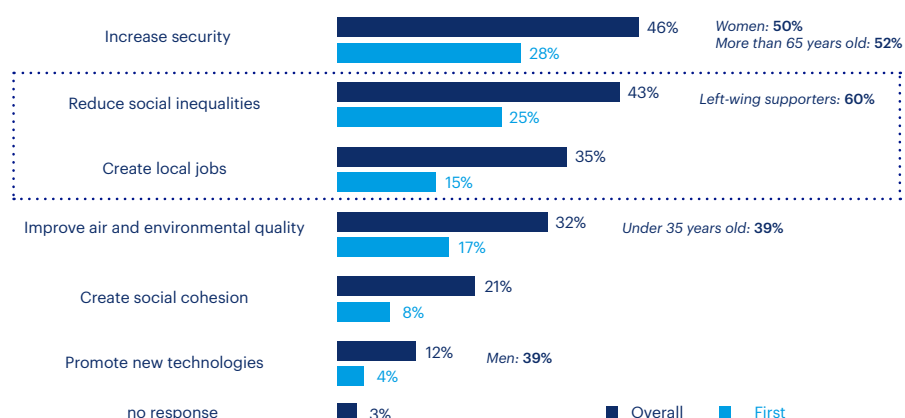


FIGURE 22

Priorities of public infrastructure policies by type of infrastructure

Source: ViaVoice, Altermind, 2024

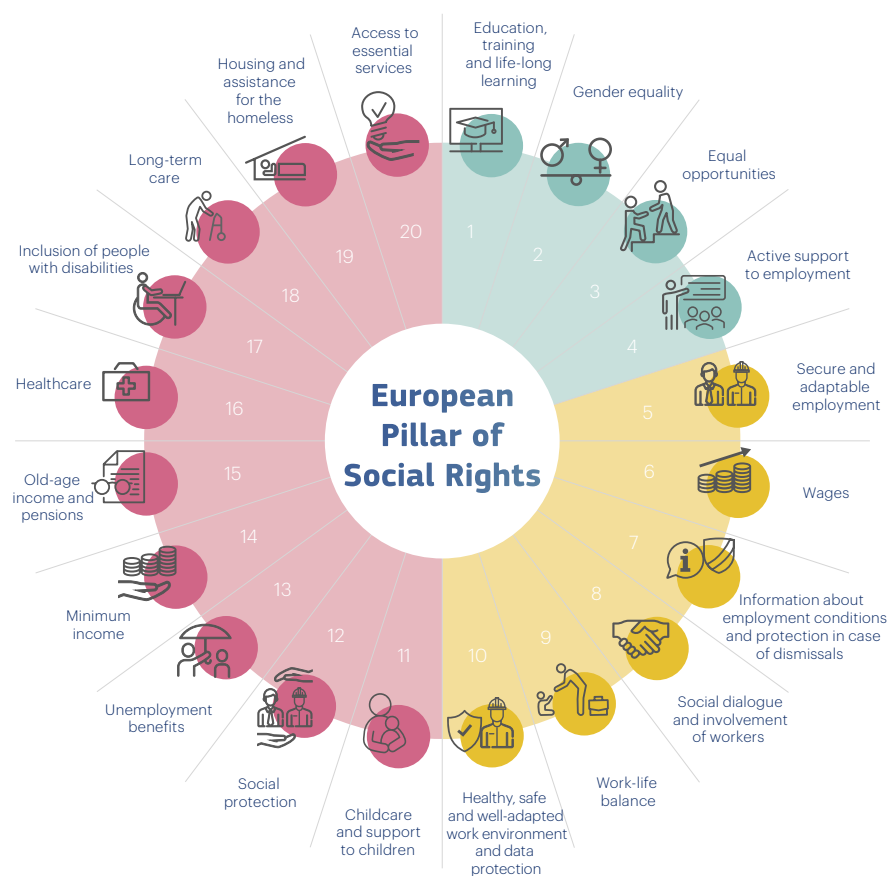
In your opinion, for each sector, which is more important: reducing inequalities or facilitating the ecological transition?



FIGURE 23

The European Pillar of Social Rights

Source: European Pillar of Social Rights



⁽¹¹²⁾ European Commission, “Accelerating the green transition: the role of digital infrastructures in decarbonising energy and mobility sectors”, 2024.

⁽¹¹³⁾ European Commission, *Forging a sustainable future together—Cohesion for a competitive and inclusive Europe—Report of the High-Level Group on the Future of Cohesion Policy*, 2024.

⁽¹¹⁴⁾ European Commission, *Forging a sustainable future together—Cohesion for a competitive and inclusive Europe—Report of the High-Level Group on the Future of Cohesion Policy*, 2024.

SECOND: ‘SOCIAL-PROOF’ THE GREEN AND DIGITAL TRANSITIONS

To ensure a long-lasting ‘just transition’, the **EU needs a “New Fair Deal”**, which could be a clear ambition for a more just and cohesive Europe, designed to balance economic growth, social equity, and environmental sustainability across Member States. This deal would enrich the “Fit for 55” programs of social aspects to address disparities within and between countries, ensuring that the benefits of the EU’s economic and environmental policies are distributed more equitably.

A dedicated focus will have to be made on the combined effects of the ecological and digital transitions, which are creating a challenging landscape for infrastructure, with many social influences including economic, social and job displacement of the most vulnerable populations. **Indeed, the combination of both transitions are multiplying the social risks associated with them:** the integration of digital infrastructures and

Generative AI with energy and mobility sectors is now a cornerstone of the EU’s strategy to achieve climate neutrality by 2050. By harnessing advanced digital technologies, Europe plans to fast-track its green transition, cut carbon emissions, and bolster its industries through a more efficient and resilient energy system¹¹².

The emergence of a New Fair Deal is in line with the EU Future of Cohesion policy report published in February 2024¹¹³, which states that addressing social exclusion has become increasingly urgent, especially in the context of the climate crisis, geopolitical risks, and digital transformations¹¹⁴. Europe needs cohesion policies that address all needs, consider the specific challenges and requirements of the most vulnerable areas while simultaneously taking up the structural challenges of our time. These policies should be adaptive, location-based, and inclusive of all stakeholders.



FIRESIDE CHAT

Gwenola Chambon (CEO of Vauban IP) & Esther Duflo (Professor of Economics at MIT and 2019 Nobel Prize winner)

Gwenola Chambon – In 2024, the focus of InfraVision is on inclusion. One key takeaway from the start of our research is that providing infrastructure doesn't seem to be enough to reduce inequalities. What's your take on this?

Esther Duflo – Indeed, with any major project the gains and losses must be shared equitably across regions or communities. Unfortunately, this rarely happens, as these outcomes are always mediated by political processes. For example, with a major highway construction, the benefits may include employment opportunities, but the associated costs—like pollution—often affect different groups. In many cases, the people who bear the costs, such as residents along the highway, are not the ones who reap the benefits. How do you compensate those affected? It's a challenge that is rarely addressed without political intervention.

For instance, research on highway construction in China shows that the development can benefit cities that are at either end by boosting commerce and providing jobs. However, it often harms anyone in between, depleting local resources and workforce.

GC – Building on what you're saying, our research also highlights that infrastructure must meet a multiple '5-A compass' including accessibility, affordability, and availability. Do you agree with this framework, or would you add other dimensions?

ED – That framework is essential, but another key factor to consider is displacement. For example, when we improve infrastructure in cities, such as through public transportation

systems, they can have this triple A parameters as long as the pricing system is fair. However, even with fair pricing, areas that were once less desirable become highly sought after, driving up prices and displacing long-time residents. This process, not necessarily bad by itself, can cause significant pain when those displaced aren't compensated fairly. This is one of the biggest challenges with infrastructure projects—the people who lose out are often left behind without adequate support.

GC – Reflecting on the past 30 years, what priorities would you emphasize to address inequalities in infrastructure, considering the successes and mistakes of the past?

ED – I believe the most critical need for developing countries will be access to electricity. However, this energy must be generated in a way that doesn't exacerbate the climate crisis. For instance, increasing access to electricity is crucial for people to cope with extreme heat through air conditioning, but if this power is generated from coal, it could spell disaster. There has also been significant progress in road construction and transportation. Particularly in Africa, those efforts need to continue: some remote areas don't benefit from global trade. Additionally, communications infrastructures have been revolutionary for developments, particularly the advent of mobile technology, which has enabled mobile payments and other innovations, changing the game for many developing countries. The next step is to ensure faster, more reliable communication, such as 5G, to keep up with modern demands.





GC – Considering the major growth and the rapid urbanization of the global population, what infrastructure recommendations would you make for urban areas to address these challenges without deepening inequalities?

ED – This is indeed a massive challenge. Many cities in developing countries are not equipped to handle the population that live there today, let alone the influx of people migrating from rural areas due to climate change and other factors. One of my key recommendations, though controversial, is to allow for vertical expansion in cities. In many cities, even in poor countries, there are restrictions on building heights. As a result, cities expand horizontally, creating urban sprawl, which in turn leads to long commutes and inefficient city layouts: a prime example is Dakar, where people often spend hours commuting across sprawling, disconnected areas.

This approach, however, often faces regulatory hurdles. In richer countries, building infrastructure is also stymied by strict urban regulations. For example, in the US it has become almost impossible to develop mass public transportation systems due to widespread public opposition. The ‘not in my backyard’ mentality has become a barrier **even bigger than costs and technical capabilities.**

GC – What’s your vision for future infrastructure that addresses inequality most effectively?

ED – The will to address these issues must come from political leadership. At the end of the day, the regulations we face are a product of the democratic process, reflecting the interests of the people. The challenge is that democratic processes tend to have shorter time horizons, making it difficult to align with long-term infrastructure planning. However, I believe that citizens are capable of understanding the need for long-term investment if it is clearly explained to them. The difficulty lies in convincing them to look beyond their immediate interests. We need to find a balance that ensures equitable distribution of resources and opportunities between those who have and those who have not, even if it means challenging the status quo.

GC – Could you share more about Abdul Latif Jameel Poverty Action Lab (J-PAL)?

ED – I’m part of a network of about a thousand researchers worldwide, which I created 20 years ago. We work on any and all issues that primarily affect the poor, mostly using randomized control trials. Our research often looks at the individual level. On infrastructure matters, considerations such as pricing regulations, ease of access or last mile subsidies can be determined at many levels. For instance, we have worked on water connection programs. We’ve found that access to clean water dramatically reduces the mental and physical burden on individuals, particularly women, who are traditionally responsible for water collection.

CRAFTING INCLUSIVE AND JUST-DRIVEN BUSINESS STRATEGIES TO ENSURE MAXIMUM COVERAGE

Key takeaways

→ Strategies for infrastructure development must integrate social considerations at every phase of each project and evolve from a targeted approach to a more comprehensive one

→ A core set of 5 standardized principles should serve as a compass to guide the development of infrastructure that is not only functional and sustainable but also socially equitable and inclusive: acceptability, adequacy, availability, accessibility, and affordability

→ Stakeholder engagement and pricing will be the cornerstones of inclusive-driven infrastructure strategies as they ensure that all segments of the population can be part of infrastructure project design and, regardless of their income level, access and benefit from their services

→ To embrace the ‘just transition’ (combining inclusive and environmental aspects), asset managers shall adapt their business value proposal to users’ perceptions of the most effective strategies to implement and the widening scope of inclusive and environmental expectations

→ With the valorization of ESG interests, the academic ecosystem as well as corporates have pushed for the development of new accounting tools that integrate social and environmental impacts, in line with more and more constraining regulations in terms of extrafinancial reporting

Put social value at the core of business strategies: a 'FIVE A COMPASS'

Acceptability & adequacy: the prerequisites

A USER-CENTRIC APPROACH

Adequacy and acceptability are two fundamental and intertwined preconditions to foster social outcomes in infrastructure systems, especially at the project planning and design phases (but not only). In essence, inadequate project planning can compromise the project’s objectives, resulting in financial losses, operational inefficiencies, and damage to stakeholder relationships¹⁰⁷.

Urban planners and infrastructure operators should therefore adopt a **user-centric approach to general service design** to provide the relevant ones for the targeted population. The concept of “**universal design**” is interesting in this regard: theorized in 1997, it consists in crafting environments that are useful to the “greatest extent possible”¹¹⁶. Adopting universal design aims to promote inclusion right from the initial design and planning stages by ensuring that facilities and systems are intuitive, usable, and accessible to everyone, thus removing barriers that might prevent disadvantaged or marginalized populations from accessing essential services.

Doing so is the first step toward **building a social license to operate (SLO)**, i.e. an informal “social contract” between all stakeholders giving project holders the consent they need to develop, deliver and operate a project, by engaging with stakeholders and aligning interests.

A survey led by Vauban IP with Altermind and IFOP in 2022 has underscored the importance of engaging very early on with local stakeholders to ensure the success and sustainability of projects¹¹⁷:

- The three most impactful measures for the public to build an SLO are upstream consultation, participation of local residents’ associations in the design and steering of the project, and the donation of a share of the profits to local associations;
- Regardless of the infrastructure (a heating network and a tramway were tested in the survey), upstream consultation is the most impactful proposal in all countries as it provides communities with the possibility to make proposals on the design and to give their opinion on a dedicated website throughout the project. The sharing of benefits with local associations also has a significant positive impact, particularly in France and Spain.

EXPERT POSITION 9

Gwenola Chambon: The Five-A compliance compass

“Social value-driven strategies for infrastructure development should integrate social considerations at every stage of each project (planning, design, implementation, operations, decommissioning). To achieve this goal, a core set of standardized principles should serve as a compass to guide the development of infrastructure that is not only functional and sustainable but also socially equitable and inclusive: acceptability, adequacy, availability, accessibility, and affordability. Those principles form a foundation that not only meets but also anticipates the multifaceted needs of communities, fostering infrastructure that promotes social well-being. Within this compass, pricing represents the North and should be in all stakeholders’ minds when projecting an infrastructure.”



Gwenola Chambon
CEO of Vauban IP

EXPERT POSITION 10

Sadie Morgan: Universal design for more acceptability

“By putting people first, not only by considering their needs but also their lived experiences, is crucial to delivering inclusive infrastructure. This means a design process that relies on a holistic and inclusive approach to infrastructure, emphasizing community engagement, sustainability, accessibility, and flexibility to meet current and future user needs. Inclusive and accessible stakeholder engagement should be initiated from the beginning of the process, with a particular focus on including users from excluded populations in ‘hard to reach’ communities. Utilizing discussion groups and simulations, notably through virtual reality, with user associations and NGOs, can help gather valuable user experience feedback.

HS2’s conception in Great Britain has been relying on those principles, commissioning a landmark study to test design from the passenger’s perspective. This was then developed into a virtually simulated experience using a methodology that accurately simulates a passenger’s journey. Inclusion, considered from the outset of the project, led to the development of precise technical, aesthetic and visual characteristics. With clear, inclusive specifications, measures such as accessible seating, clear signage and appropriate lighting helped to broaden the range of users who could usefully benefit from the service.”



Prof. Sadie Morgan
Architect, co-founding director of
dRMM, Commissioner of the National
Infrastructure Commission in the UK

⁽¹¹⁵⁾ Batthi M., “Adequate Planning of Infrastructure Development Projects - Importance and Cost of Ignoring”, 2024.

⁽¹¹⁶⁾ Rajé F., “Leave no-one behind: infrastructures and inclusion”, K4D, 2018.

⁽¹¹⁷⁾ Vauban IP, *Social License to Operate, Social License to Invest*, 2022.

The 'Design Vision' of the High Speed Two project in the UK¹¹⁸

High Speed Two (HS2) is the UK's high-speed rail network under construction. Once operational, HS2's British-built bullet trains will provide zero-carbon journeys between the UK's two largest cities, Birmingham and London, with services continuing to Manchester, the North West and Scotland using the conventional railway network, cutting journey times.

The HS2 project is a textbook example of inclusive design in infrastructure project management. To "match the aspirations of the UK's most ambitious infrastructure project in over a century", an HS2 Independent Design Panel was established in 2015 at the request of the Secretary of State for Transport to help ensure that, through great design, HS2 delivers real economic, social and environmental benefits. A

dedicated website has been set up to update people on the progress of the project:

<https://www.hs2.org.uk/>

HS2 'Design Vision' is therefore based on three core design principles of people, place and time:

- **People: designing for everyone to benefit and enjoy.** It must be designed with the needs of a diverse range of stakeholders in mind, engaging with impacted people, communities and businesses during the life of the project to offer social and economic opportunities;
- **Place: designing for a sense of space that improves the quality of life.** HS2 will be designed for a sense of place, supporting quality of life through new connections with where one

lives, works and visits. Benefits must be wide-ranging, regenerating areas and communities, and providing a local sense of community within the national story. It must also focus on creating new environments, including a 'Green Corridor' to mitigate construction impacts.

- **Time: designing to adapt for future generations.** HS2 is committed to being on time and budget, without compromising quality. Reducing journey times for people traveling between UK cities is only the start of the story. It needs to be designed for future generations, built to last and stand the test of time, and provide talented people with the right environment to design an inspirational railway.

FIGURE 24

The Design Vision

Source: Sadie Morgan



STAKEHOLDER ENGAGEMENT: TIME-SAVING, COST-SAVING IN THE LONG-TERM

Business strategies have primarily focused on economic and financial value, encompassing everything from value proposition to value capture, value creation, and delivery. In the era of “stakeholder capitalism”, many companies are now integrating “shared value” (achieving financial success while also providing societal benefits) principles into their core strategies, aiming to not only generate profits but also address societal challenges and contribute to the well-being of communities¹¹⁹.

Indeed, **public acceptance can be a time- and cost-saving strategy** for infrastructure projects by preventing blockages and conflicts while enhancing collaboration with stakeholders. Getting and maintaining a social license is key to ensuring an infrastructure project proceeds on schedule and budget and

generates revenues during the operation phase. Companies managing operations with significant environmental and social impact should look for the consent of non-market stakeholders (local communities, NGOs, etc.) to avoid repeated episodes of stakeholder conflict negatively impacting their activities.

Social license has also become an important factor in the preservation of enterprise value. Higher profits can be a by-product of value created for a society: companies focusing on stakeholder welfare as an end goal increase their total value (“grow the pie”) more than those solely focused on financial results¹²⁰. Besides, academic research has shown evidence of a positive relationship between stakeholder engagement processes and the financial valuation of a firm, holding constant the objective valuation of the physical assets under its control (Focus 12).

FOCUS 12

Generating financial value with stakeholder engagement¹²¹

An academic study provides direct empirical evidence in support of instrumental stakeholder theory’s argument that increasing stakeholder support enhances the financial valuation of a firm, holding constant the objective valuation of the physical assets under its control.

The authors undertook this analysis using panel data on 26 gold mines owned by 19 publicly traded firms over the period 1993–2008. They coded over 50,000 stakeholder events from media reports to develop an index of the degree of stakeholder conflict/cooperation for these mines.

The incorporation of the index on stakeholder cooperation in a market capitalization analysis significantly reduces the discount placed by financial markets on the net present value of the gold controlled by the firms studied.

Among the key findings of the study, investors recognize on average:

- USD0.28 for every USD1 of gold in the ground (Net Present Value);
- USD0.46 of every USD1 of gold in the ground when country-level political risk is accounted for;
- USD0.87 of every USD1 of gold in the ground when project-specific stakeholder relations are also accounted for.

⁽¹¹⁸⁾ HS2 website, “HS2 Design Vision Booklet”, 2022.

⁽¹¹⁹⁾ Vauban IP, *Social License to Operate, Social License to Invest*, 2022.

⁽¹²⁰⁾ Edmans, Alex (2020): *Grow the Pie: How Great Companies Deliver Both Purpose and Profit*, Cambridge University Press.

⁽¹²¹⁾ Henisz W., Dorobantu S., Nartey L., “Spinning Gold: The Financial Returns to External Stakeholder Engagement”, *Strategic Management Journal*, 2011.

Sodexo: “La Passerelle”, designed for impact and inclusion



At its creation, the objective of Sodexo’s department of “societal innovation” was to invent new business models that would meet Sodexo’s ambition to create value for local players and contribute to improving the quality of life in less privileged areas. In 2021, Sodexo announced the launch of “La Passerelle”, a social hub designed to have a greater impact on employability, health and social cohesion in priority neighborhoods.

La Passerelle is a place anchored in the heart of the city, bringing together several activities around:

- A vegetable factory: as the economic driver behind the project, the vegetable processing plant will support the model while helping to improve the employability of local residents and promote a more local, plant-based diet;
- A daycare facility: the facility will have 21 places available for residents, as childcare continues

to be one of the main obstacles to employment and training. Support workshops will also be offered to parents who are seeking to enter the job market;

- A training room: to compensate for the insufficient availability of training facilities in the community and respond to local demand, this room will offer skills training led by a local provider;
- A community space: the community space will be jointly managed by local stakeholders and will host a program of activities aimed at residents from the local neighborhood. These activities might include, for example, workshops on the links between health and nutrition.

“La Passerelle” has already created 20 jobs and provided training for 500 people. Finally, the building is an eco-designed infrastructure with a low-carbon footprint to avoid any negative impact on the

neighborhood. The building will feature a wooden façade and a green roof, helping to combat urban heat islands and its operating principle will primarily be based on the circular economy, from supply to waste management. La Passerelle is certified BDF (Bâtiment durable francilien) and is an ESUS company (social economy certification).

“When Sodexo decided to implement the company in Saint-Denis and with this social project, we took time to listen to NGOs, associations, inhabitants, just to design the building, answering the specific needs of these people. There is a vegetable processing plant and that’s the economic driver of the location. This factory contributes to the employability of the residents and promotes a more local plant-based diet.”

Séverine Laugier
Social Innovation and New Economic Models for Growth Project Director
at Sodexo

Availability, accessibility & affordability: the breaking point

'INCLUSIVE PRICING': A COMPLEX EQUATION TO SOLVE

Affordability is the cornerstone of inclusive-driven infrastructure strategies as it ensures that all segments of the population, regardless of their income level, can access and benefit from services and infrastructure. This means making sure that the infrastructure can reach all parts of the population (availability, i.e. both the physical presence of infrastructure and its operational readiness to meet the needs of users) and that everyone can use it without significant barriers (accessibility).

The task is intricate as private (maximize profitability) and social interests (ensure affordable service access) might diverge. Affordability is directly determined by pricing levels, which result from a series of intertwined factors that may compete with one another: the availability of infrastructure, costs and needed investment, alongside consumers' ability to pay.

In practical words, a private economic operator would not typically set socially driven prices (in other words an **'inclusive price'**) unless the market-driven price is close to the social price due to for example, competitive setting, low costs or availability:

- In a monopolistic market, the operator has no incentive to lower prices below the maximum it can charge while still retaining enough consumers;
- In a competitive market, the operator will set prices based on costs without considering social pricing, as covering costs is essential. If costs are high, the operator may set prices higher than what would be considered socially driven;
- Regardless of market competition, if infrastructure availability is limited and demand exceeds supply, the operator will logically set prices above costs. Lower prices would not increase availability or make the infrastructure accessible to everyone.

To truly achieve affordable pricing for users (**'inclusive pricing'**), affordability must be **a central objective from the very beginning of the project** during the design phase. The ultimate goal should be to plan, build/transform and market infrastructure services at the lowest possible cost for end-users but at a level that remains attractive for the private sector. Indeed, **financial and business targets should not**—and cannot—be entirely sacrificed for socially driven needs as price setting can hardly consider external factors or broader social welfare, given that they rely on economic rationale. An efficient infrastructure operator must set prices that guarantee growth for its business and sufficient investment capacities for the long-term viability and quality of the service delivered.

THE GREEN TRANSITION: A NEW LAYER OF COMPLEXITY

Considering the high upfront and fixed costs usually linked to the green transition (such as investments in renewable energy, sustainable technologies, and infrastructure upgrades), setting an 'inclusive' price can appear to be even more challenging and add a new layer of complexity in pricing strategies.

Yet, **failing to do so can have major negative consequences**. It could stifle innovation, as smaller companies or communities might be unable to afford participation in green initiatives, creating a divide in the adoption of sustainable practices. This would also hinder economies of scale, as widespread participation is essential for reducing costs over time. Furthermore, an ill-conceived pricing model could trigger political or social resistance to the green transition, leading to public opposition or policy backlashes. Ultimately, these consequences could prevent green infrastructure from scaling effectively, slowing down the overall transition to a more sustainable economy.

The experience of Autolib' in France has shed light on all those risks (Focus 13).

Autolib': a pricing failure

The Autolib' program in Paris, an ambitious electric car-sharing service launched in 2011, ultimately failed, largely due to its flawed pricing strategy. Initially designed to offer an affordable and eco-friendly alternative to car ownership, Autolib' struggled to cover operational costs, attract a sufficient user base, and

remain competitive in a dynamic market. The pricing model played a central role in the program's ultimate failure, leading to its termination in 2018 after years of financial losses.

The pricing model, which aimed to attract a broad user base by keeping subscription and usage fees relatively

low, could not balance the substantial costs associated with the service's operations, maintenance, and charging network required for the EVs. By 2017, the service for end-users was more expensive than taking a cab for a typical 45-minute trip.

TABLE 3

Price evolution 2011-2017

Source: Christoforou, 2024

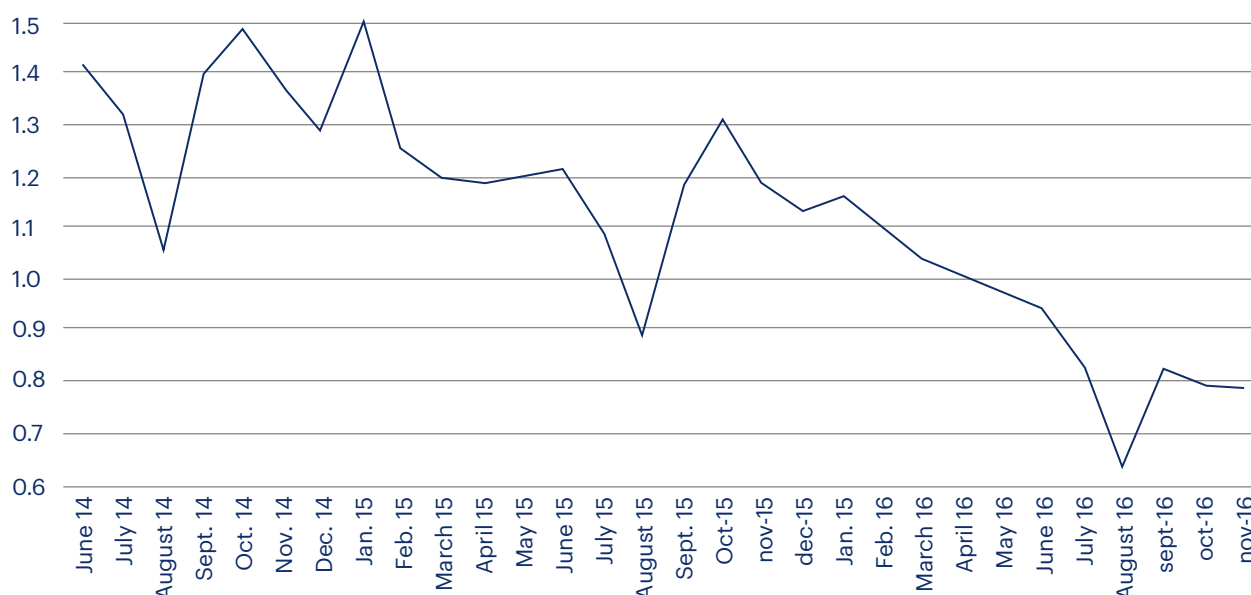
Prices for car-sharing users			
	Subscription	Duration	
	1 year	1 st 1/2h	2 nd 1/2h
2011	€144	€5	€4
2013	€180	€5.5	€5.5
2017	€120	€7	€7

Overall, the number of subscriptions increased but usage declined. In addition, the expected social outcome was never met as the typical user profile was a high-income, Paris (or western suburb) resident, for professional or occasional purposes such as carrying heavy objects at IKEA.

FIGURE 25

Number of rentals per subscriber per week

Source: Autolib' Métropole, 6t-research, 2016



Another critical flaw in the pricing model was the lack of flexibility and responsiveness to market conditions. As ride-sharing services like Uber and Lyft became more popular and affordable, Autolib' struggled to adapt its pricing to remain competitive. Unlike these emerging competitors,

Autolib's pricing was relatively static, failing to offer dynamic pricing models or promotions that could have attracted more users during off-peak hours or countered the growing competition from other mobility options.

MAXIMIZE THE USE OF INFRASTRUCTURE

When infrastructure operations end, efforts turn to decommissioning, which is likely to impact the local job market. Facility owners or decommissioning implementers need to take these factors into account in their plans when designing and choosing materials to build each infrastructure project.

For stranded asset operators, this can be a major opportunity to maintain business activity with a **renewed value proposal while enhancing inclusion and protecting local communities**. For

instance, CO₂ capture technology can be retrofitted to existing plants. In such cases, retrofitting allows existing plants to continue operating with much lower emissions, preserving infrastructure, local jobs, and economic stability in regions dependent on high-emission industries. To understand the economic implications of phasing out a polluting sector at a national scale, Germany's plan to retire 40GW of coal-fired capacity by 2038 is accompanied by a EUR40bn package to support affected communities¹²².

⁽¹²²⁾ International Energy Agency, *Special Report on Carbon Capture Utilization and Storage*, 2020.



Aligning social with environmental goals: asset managers moving forward

Adapt business strategies to changing users' expectations and perceptions

ENERGY AND TRANSPORTATION IN THE FRONT LINES OF THE JUST TRANSITION

To embrace the 'just transition', **asset managers shall adapt their business value proposal to users' perceptions** about the most effective measures. Engaging stakeholders effectively therefore requires a thorough understanding

of their needs and concerns, ensuring that proposed initiatives resonate with their priorities.

This dual focus on users' social and environmental needs enhances the infrastructure manager's ability to anticipate and respond to shifting stakeholder demands while maintaining a competitive edge (Figure 26 and Figure 27). **Agility in service development allows for quick adjustments** based on evolving environmental standards and social needs, ensuring that the service remains relevant, sustainable and profitable.

As the world shifts toward more sustainable models, **the transportation and energy sectors** are central to the global economy with major carbon footprint and social concerns, making them critical areas for addressing the just transition challenge.

EXPERT POSITION 11

Bryan Adey: "Data for infrastructure", stay up to date with users' behaviors and expectations

"Data analytics is experiencing significant and growing expansion. The increasing abundance of data, in tandem with sophisticated algorithms—many of which are categorized under artificial intelligence—holds immense potential. When harnessed by the appropriate stakeholders, these tools can deliver deep insights into the needs and behaviors of individuals interacting with infrastructure, facilitating the exploration of various scenarios and leading to more thorough and precise analyses. By effectively leveraging this information, stakeholders can drive more informed and inclusive decision-making processes. However, without the engagement of the right stakeholders, there is a risk that the same data and algorithms could be misapplied, potentially resulting in less inclusive infrastructure. Therefore, robust safeguards must be implemented to ensure that these tools are used to promote equitable and inclusive outcomes."



Bryan Adey
Professor of Infrastructure Management
at ETH Zurich

FIGURE 26

Social and environmental measures effectiveness perceptions for transportation

Source: ViaVoice, Altermind, 2024

For each of the following proposals, would you say it seems effective or not in both decarbonizing transport and reducing social inequalities related to transport?

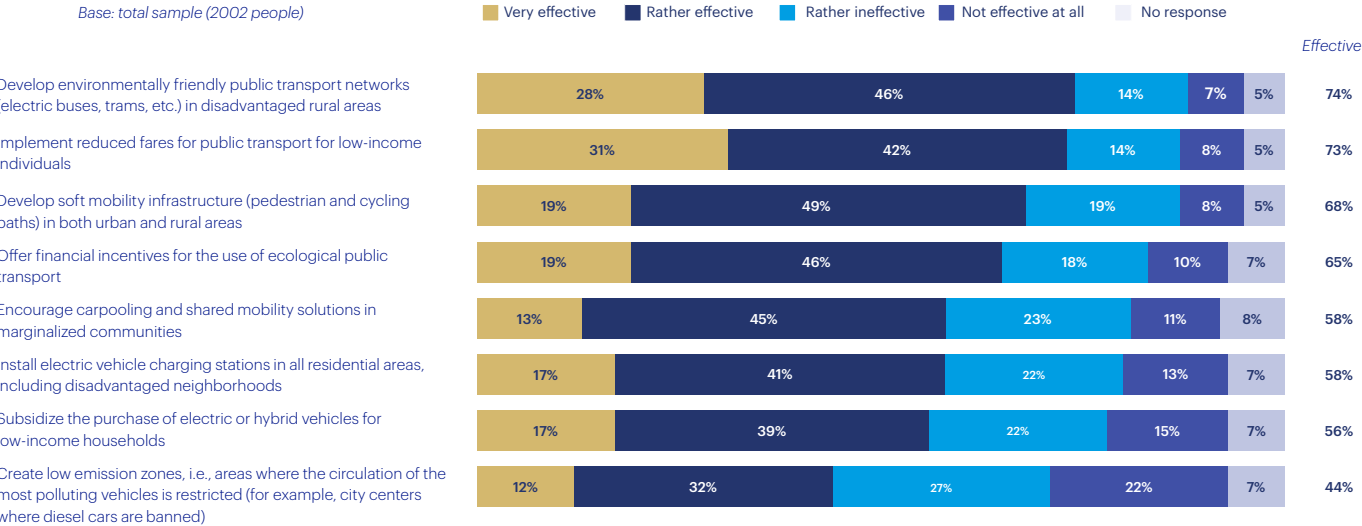
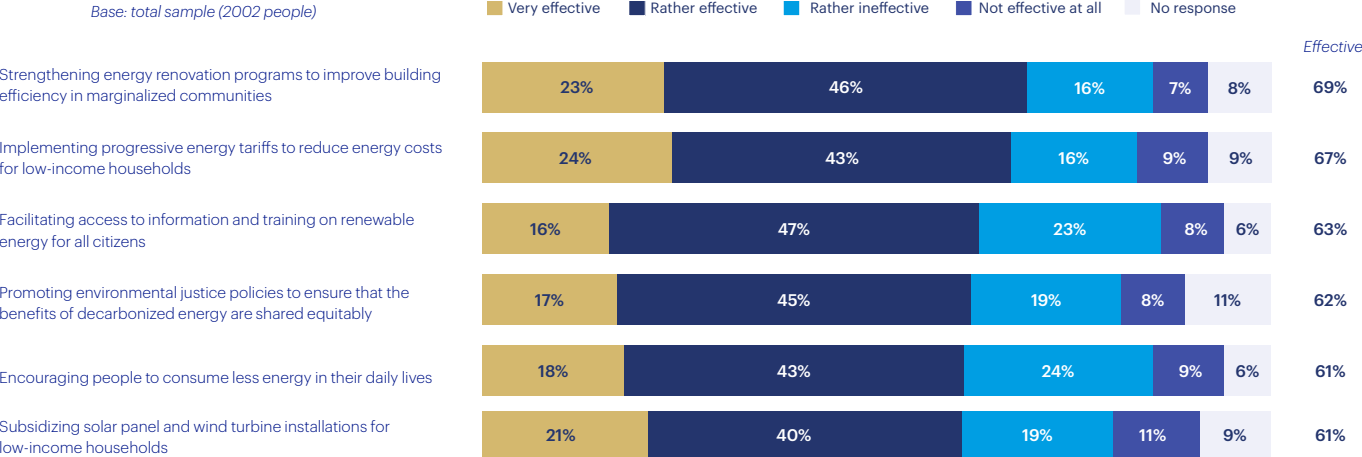


FIGURE 27

Social and environmental measures effectiveness perceptions for energy

Source: ViaVoice, Altermind, 2024

For each of the following proposals, would you say it seems effective or not in both facilitating access to decarbonized energy and reducing social inequalities?



ACKNOWLEDGE CSR IS CHANGING EXPECTATIONS AS WELL

In the realm of achieving a just transition, industrials and infrastructure managers must also keep in mind **the widening scope of inclusive and environmental expectations** (see section #1). In this regard, corporate and social responsibility (CSR) has become a critical concern for users as more than 50% of consumers are willing to pay more for a product or service if the business prioritizes sustainability. Businesses that are socially responsible can also appear more attractive to investors: 61% of investors consider CSR a sign of “ethical corporate behavior, which reduces investment risks”¹²³.

In this context, addressing new demands from users, employees and suppliers is critical. For instance, **gender equality has clearly gained in importance** as part of CSR of businesses (Figure 28). In addition, gender equality in business stands out not only as a vector of social integration and equity, but also for its paramount economic importance: reducing the gender gap in labor markets has the potential to boost GDP in emerging markets and developing economies by nearly 8%¹²⁴.

Asset managers and operators paving the way

A RISING MOBILIZATION FROM THE PRIVATE SECTOR

Infrastructure managers and operators are increasingly recognizing their critical role in ensuring a just transition, as the global shift toward sustainable energy and low-carbon economies accelerates. This commitment must be enhanced as they are uniquely positioned to influence the distribution of the benefits and burdens of this transition, ensuring that no community or demographic is left behind.

Benefits include investing in the skills necessary to implement forward-looking strategies for the green transition, which enhances workforce productivity and boosts employee retention while also mitigating legal, reputational, market, and technological risks over the long term. Additionally, companies may experience improved access to financing, as more investors are incorporating environmental and social risk assessments into their due diligence¹²⁵.

¹²³ Forbes, “The Growing Importance Of Social Responsibility In Business”, 2020.

¹²⁴ IMF, “Countries That Close the Gender Gaps See Substantial Growth Returns”, 2023.

¹²⁵ London School of Economics, “Companies and just transition in Europe: how public policy can energize private action”, 2023

¹²⁶ EDF Group, “Pour une transition énergétique juste et inclusive”, accessed in 2024

¹²⁷ EDF Group, “Our raison d’être”, accessed in 2024.

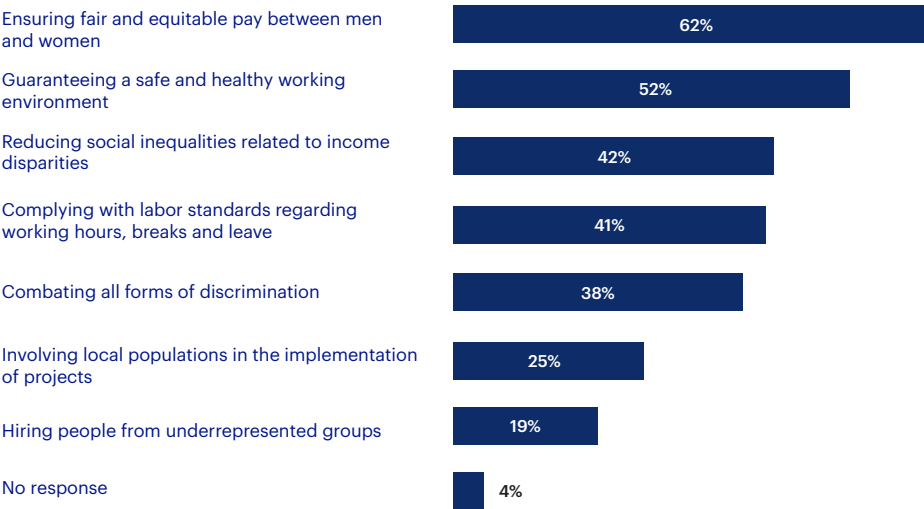
¹²⁸ Agence Française de Développement (AFD), “Au Laos, un barrage hydroélectrique exemplaire”, accessed in 2024.

FIGURE 28

CSR: most important expectations

Source: ViaVoice, Altermind, 2024

In France, companies are required to comply with certain social regulations
Among these obligations, which ones do you consider to be the most important?



INFRASTRUCTURE-AS-A-SERVICE: A PROMISING BUT CHALLENGING BUSINESS MODEL FOR THE JUST TRANSITION

Infrastructure-as-a-Service is a business model which delivers access to the infrastructure based on predefined pricing structures for users, while the private operator ensures the asset's functionality and performance. One of the most prominent contractual models in infrastructure sectors adopting the Infrastructure-as-a-Service approach is highway concessions¹²⁶. The focus is on operating assets not only as mere infrastructure but as dynamic platforms that offer additional value and services, which may deliver new outcomes such as costs optimization and environmental benefits.

Managed lanes are a good example. The managed lane is a 'freeway-within-a-freeway' where a designated set of lanes is separated from the general-purpose lanes within the same roadway. Examples of operating managed lane projects include high-occupancy vehicle (HOV)

lanes, value priced lanes, high-occupancy toll (HOT) lanes¹²⁷. Priced managed lanes can therefore offer environmental benefits over general-purpose lanes by reducing GHGs emissions from stop-and-go traffic and promoting the use of carpools and mass transit. Priced managed lanes (PMLs) have been 'game-changers', notably in US states such as California, Florida, Georgia, Minnesota, Texas, Virginia, and Washington. For instance, when the Georgia Department of Transportation introduced PMLs on the I-75 corridor, speeds in the general-purpose lanes increased by 20 mph, reducing congestion and improving the travel experience¹²⁸.

While Infrastructure-as-a-Service models represent a unique opportunity for better infrastructure management and the transition to a low-carbon economy, social inclusion must now be considered as 'must-have' outcome. It should also be the case for discount toll rates for green vehicles, which are harder to purchase for low-income groups.

⁽¹²⁶⁾ Vauban IP, Altermind, Report on circular infrastructure, 2023.

⁽¹²⁷⁾ US Department of Transportation, Federal Highway Administration, Tolling and pricing programs, Managed lanes: a primer.

⁽¹²⁸⁾ HNTB, Best practices in priced-managed lanes can improve mobility for everyone, Building a better ride through choice and reliability.

EDF: the just transition as the core of EDF's raison d'être



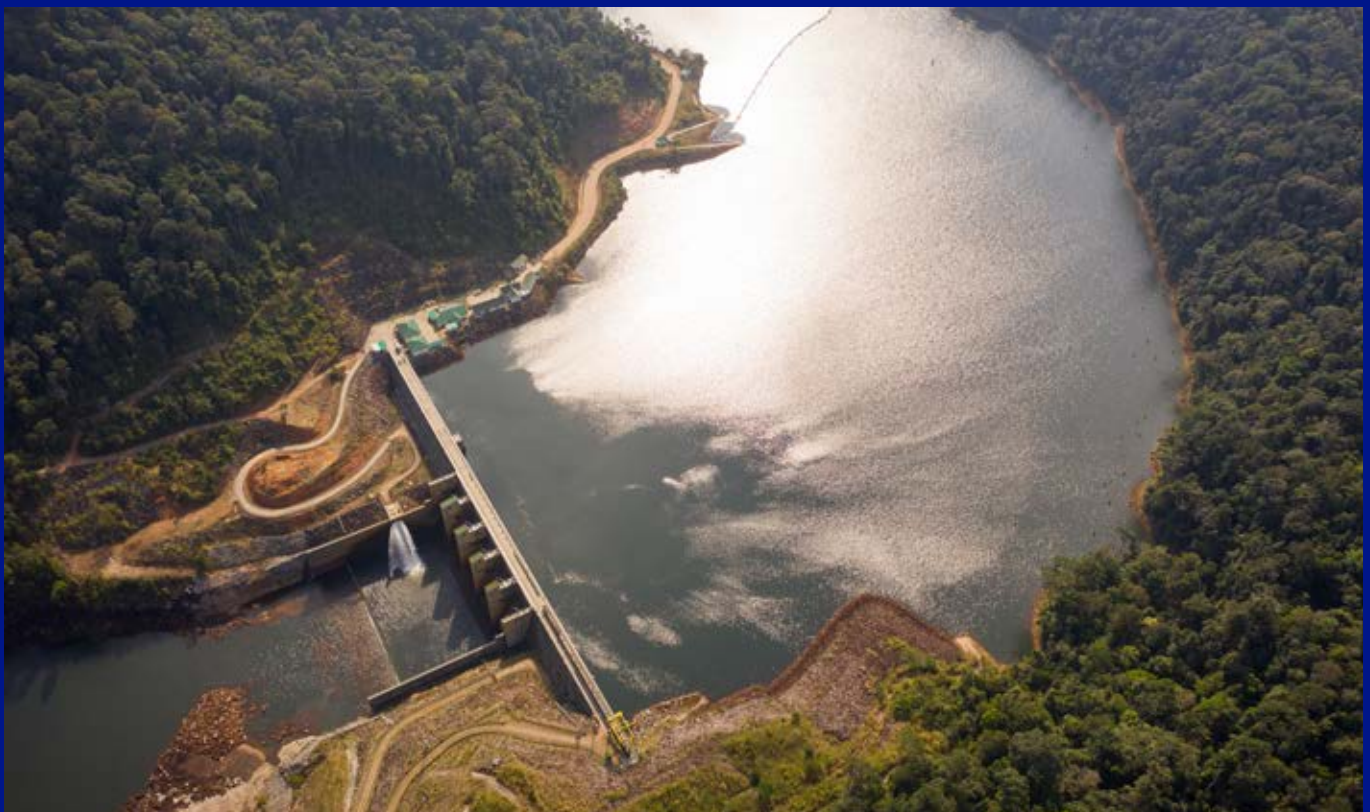
EDF aims to create a carbon-neutral energy future that fosters a just and inclusive energy transition, promoting well-being and economic growth. As the world's largest producer of energy with zero direct CO₂ emissions¹¹⁸, over 90% of EDF Group's¹¹⁹ net investments are dedicated to decarbonizing the electricity system.

With the achievement of its environmental and social objectives, EDF's commitment to Laos materializes EDF's ambition to be a responsible leader in hydropower development. In the 2000s, EDF participated in the construction of the Nam Theun 2 hydropower project, which represented 85% of the country's electricity generation at the time. The Nam Theun 2

Resettlement objectives are also part of an ambitious environmental and social program developed in collaboration with the government and the Nam Theun 2 Power Company (NTPC). This project has included a comprehensive public health program, a development plan for the 100,000 people living downstream, the creation of the largest Biodiversity Protection Area of Laos (4,000 km²), and the Resettlement Program for the 6,300 inhabitants of Nakai District who were directly affected by the impoundment of the 490km² reservoir.

The program, developed in consultation with the local community, not only meets but in some cases surpasses the safeguard standards set by the World

Bank (WB) and the Asian Development Bank (ADB). These organizations, along with the Agence Française de Développement, the European Investment Bank, and 27 private sector banks, were key financiers of the hydropower project. The implementation and outcomes have been closely monitored by various external agencies, including international development organizations, NTPC lenders, and the POE (Panel of Experts), from the project's early stages. The total cost of the environmental and social programs over the 25-year concession period exceeds USD200m.



Coriance: committed to better clean energy access in vulnerable areas

C

Coriance oversees critical urban heating and cooling networks with a strong commitment to advancing renewable energy solutions. The company's extensive 500km network is predominantly powered by 68% renewable and recovered energy sources, such as biomass, geothermal, and other sustainable options¹²⁹. Coriance plays a pivotal role in addressing energy insecurity by ensuring that these energy solutions are not only sustainable but also accessible to communities in need.

A notable inclusive practice of Coriance's efforts is its proactive engagement in many areas where

energy inflation significantly affects residents, necessitating a just energy transition. For example, in partnership with the city of Les Mureaux, Coriance spearheaded the 'Les Mureaux Bois Énergie' (MBE) project. Prior to Coriance's involvement, the heat distributed in this area was primarily derived from fossil fuels. However, since 2014, a new biomass boiler, developed and operated by MBE, has ensured that the majority of the heat distributed through the network is generated from renewable energy sources. The installation of this biomass boiler in the Musicians' neighborhood also facilitated the integration of the Grand-Ouest, Vigne

Blanche, and Musicians heating networks, guaranteeing that all are supplied with locally-sourced renewable energy.

Since the project's launch, 3,500 housing units have been connected to this environmentally friendly heating network. By using 72% renewable energy for heat production, this initiative has successfully allowed the residents to avoid most of the impact of the energy crisis and to reduce carbon emission by 5,900 tons annually¹³⁰.

⁽¹²⁹⁾ Coriance presentation, 2021.

⁽¹³⁰⁾ Coriance website, "Les Mureaux Bois Énergie (MBE)", accessed in 2024



MAKE THE MOST OF EXTRA-FINANCIAL PERFORMANCE REPORTING

With the valorization of ESG interests, **the academic ecosystem as well as corporates have pushed for the development of new accounting tools** that integrate social and environmental impacts. To do so, a series of “multi-capital” accounting tools have been launched to determine the financial value created or destroyed by a company in society. By converting impact measurements into monetary equivalents, these methodologies shall help managers and investors develop impact measurement.

One methodology stands out: the Impact Weighted Accounts (IWA), developed by George Serafeim from the Harvard Business School, serves as a standard method for integrating “impact” into business reporting and analysis. In practice, IWA consists of inserting entries/lines in a traditional financial statement to supplement the assessment of financial health and performance by reflecting a company’s positive and negative impacts on employees, customers, the environment, and society at large. According to IWA methodology, the key to understanding the total value of a company is the ability to measure its impact across multiple dimensions using the same unit (Figure 29).

The ambition to convert impact into monetary units as an indicator of value, rather than using other units and/or a multitude of metrics, enables **a paradigm shift from the traditional “risk-return” analysis to “risk-return-impact” analysis**.

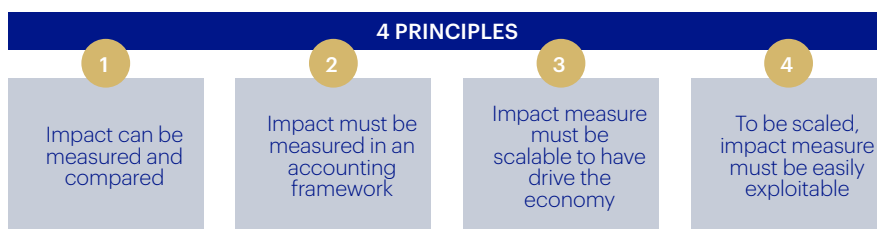
This methodology was used in several case studies (Table 4).

These initiatives are in line with the current regulatory momentum in terms of extrafinancial reporting. Indeed, the EU continues to promote investments with a social impact through its larger legislative framework on sustainable finance. Through the Corporate Sustainability Reporting Directive, the Sustainable Finance Disclosures Regulation, and the proposed Corporate Sustainability Due Diligence Directive, European legislation tends to be more and more stringent regarding extrafinancial reporting.

FIGURE 29

Principles of Impact Weighted Accounts (IWA) methodology

Source: Harvard Business School



FOCUS 14

More and more constraining regulatory requirements for investors: the Sustainable Finance Disclosure Regulation (SFDR)¹³¹

The Sustainable Finance Disclosure Regulation (SFDR) imposes a series of obligations on financial market participants and financial advisors to enhance transparency and ensure that sustainability risks are consistently integrated into investment decisions and advice. It thus differs from the Corporate Sustainability Reporting Directive (CSRD), which broadens sustainability reporting obligations for all large companies, focusing on transparent, comparable, and comprehensive environmental and social disclosures.

Firms are required to disclose how they integrate ESG factors into their investment processes, whether they are making

sustainability-related claims or not. This includes providing detailed information on the policies they have in place to assess and manage sustainability risks, as well as disclosing any adverse impacts their investment decisions might have on sustainability factors.

Furthermore, financial products promoting environmental or social characteristics (often referred to as “light green” products) and those with sustainable investment objectives (“dark green” products) must provide additional disclosures, including specific details about their sustainability objectives, how these objectives are met, and relevant performance metrics.

This existing framework confirms a growing dynamic for infrastructure investments that are not only economically viable but also socially beneficial (Focus 14).

⁽¹³¹⁾ JP Morgan, “Comprendre le règlement SFDR: Guide du règlement européen sur la publication d’informations de durabilité dans le secteur des services financiers à l’intention des investisseurs”, 2023.

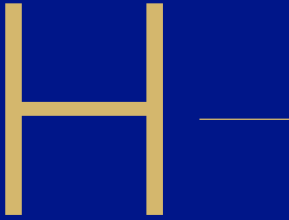
TABLE 4

Application of IWA on 4 enterprises

Source: Fair, Impact Weighted Accounts, 2022

	Facebook	Salesforce	Starbucks	PepsiCo
GICS Sector	Communication Services	Information Technology	Consumer Discretionary	Consumer Staples
Number of Employees	19,679	21,148	191,287	114,260
US Revenue	\$24,100,000,000	\$7,275,951,360	\$16,809,260,000	\$38,856,770,000
US EBITDA	\$12,615,000,000	\$1,457,000,000	\$4,286,100,000	\$7,133,550,000
US Total Salaries Paid	\$2,480,099,212	\$2,432,029,913	\$8,505,904,138	\$8,186,016,445
Employee Impact				
Wage Quality	\$2,464,102,038	\$2,418,533,192	\$8,488,921,179	\$8,183,585,366
Opportunity	(\$105,149,756)	(\$148,239,872)	(\$1,738,544,298)	\$881,355,971
Health and Well-being	(\$24,817,807)	(\$3,048,977)	(\$135,481,752)	(\$113,565,652)
Subtotal	\$2,334,134,475	\$2,267,244,343	\$6,614,895,129	\$7,188,663,743
Labor Community Impact				
Diversity	(\$928,445,067)	(\$770,076,824)	(\$1,267,683,813)	(\$2,432,281,323)
Location	\$94,215,698	\$88,677,007	\$256,716,923	\$291,492,914
Subtotal	(\$834,229,369)	(\$683,399,818)	(\$1,010,966,894)	(\$2,140,788,409)
Total Impact	\$1,499,905,106	\$1,583,844,525	\$5,603,928,239	\$5,047,875,334
Impact% Revenue	6%	22%	33%	14%
Impact% EBITDA	12%	109%	131%	71%
Impact% Salaries	60%	65%	65%	62%

ALiS: building on the just transition of highways

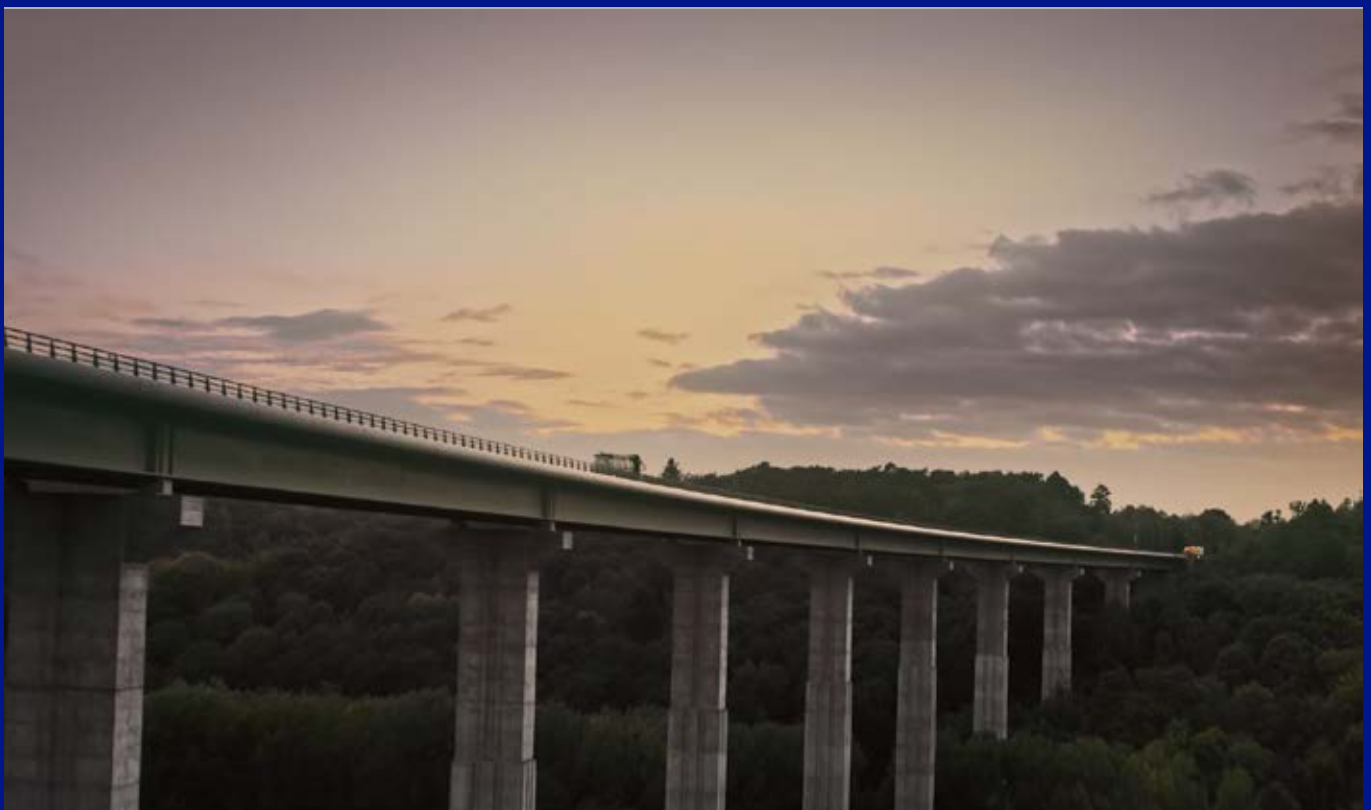


Highways are, by nature, inclusive infrastructures evolving in a large ecosystem. They contribute to reduce the geographical exclusion of populations, especially from rural areas. By opening up territories and including multiple actors, highway concessions have an increasing role to play in this dynamic of integration and partnerships between the infrastructure and its ecosystem. ALiS, a concessionaire with 81 employees based in Normandy, in the Eure and Orne departments, covers 125km of highway and fully assumes its local role.

Beside participating in several local initiatives for the local development, ALiS has proactively supported the public authorities in their action to ban lorry transit through the municipalities. To accompany this ban and to encourage clients to use the highway, ALiS has proposed granting a discount of 20% (maximum discount allowed by the European Directive) on the toll rate to vehicles class 3 and 4 (lorries) carrying out at least 20 journeys in the same calendar month. By supporting the local authority's initiative, reducing drastically

the traffic of lorries in surrounding communities, ALiS has gained in legibility as a key local player.

ALiS is also working hard to achieve gender equality. In the very male-dominated profession of motorway workers, ALiS is proud to have 3 women out of a total of 23 workers, one of the best ratios of any concession company in France.



Telefónica: using the IWA framework to link ESG impact with financial performance

T

Telefónica strives to understand the social and environmental impact it generates to operate more sustainably and produce greater societal value.

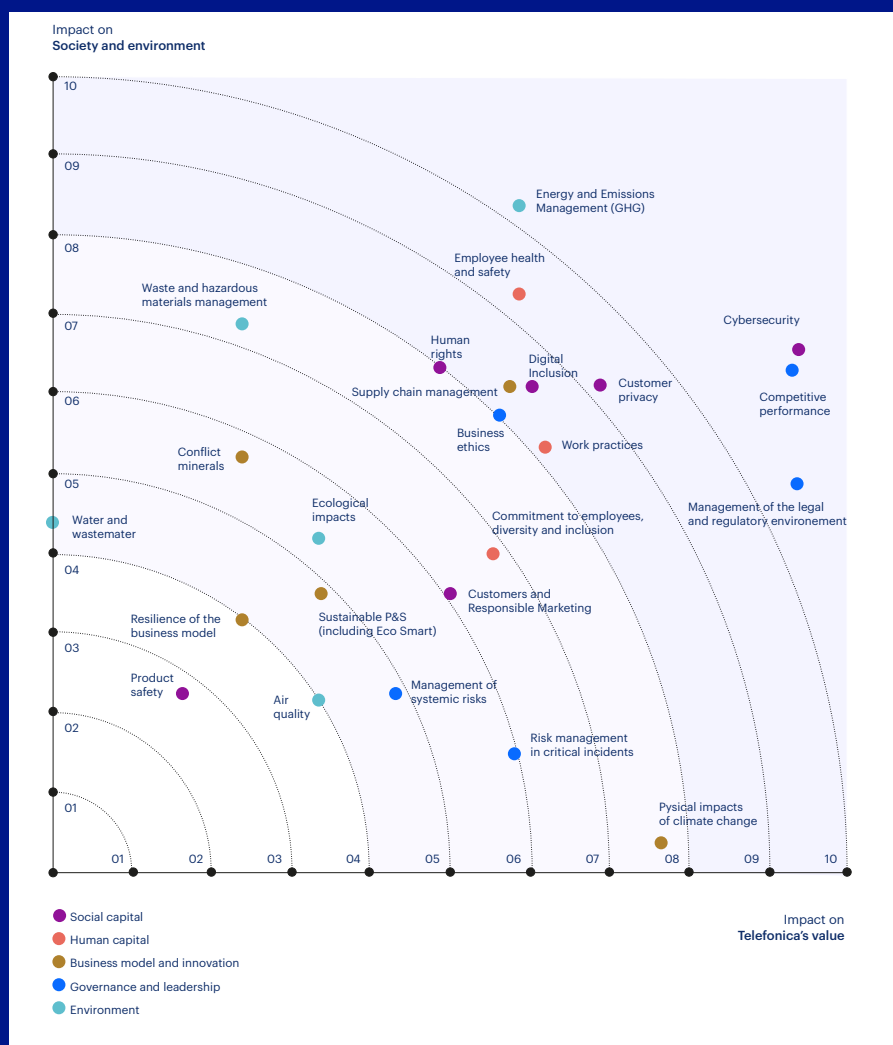
To this end, Telefónica has developed a comprehensive model based on various academic and commercial frameworks, including those proposed by the Chair of Social Impact at the Spanish University ICADE, the analysis models from the Impact Management Project (IMP), and notably, the work by Harvard University's IWA Initiative. This model allows Telefónica to continually improve its social and environmental impact by focusing on solutions and projects with the highest added value.

Using this model, Telefónica calculates its impact on regional development through job creation. The company has contributed to the creation of over **1.2m jobs**, encompassing direct, indirect, and induced employment (jobs generated by consumption in other industrial sectors). Consequently, for every person Telefónica employs, **10.4 additional jobs** are generated in the countries where the company operates.

FIGURE 30

Application of IWA on 4 enterprises

Source: Telefónica



THINK BIG, ACT ON TARGET: KEY LEVERS TO DEVELOP TOWARD A WORLD OF INCLUSIVE AND JUST INFRASTRUCTURE

Key takeaways

→ While integrating inclusion into pricing strategies is already challenging, the added necessity of engaging in the green transition makes the equation even more complex to solve: pricing strategies should be defined based on the most vulnerable consumers' ability to pay and incorporated into a multidimensional framework that also includes green transition goals (a 'just' price)

→ To enhance the just transition, support from public authorities is essential: Beyond subsidies, public-private partnerships (PPPs) and public contracts will have to be geared toward extrafinancial outcomes from design to operation

→ Public authorities will have to find innovative ways to increase debt financing and strengthen equity financing for social causes; the role of multilateral institutions such as development banks will also be critical

→ As infrastructure projects have long-term horizons (often spanning 10 to 30 years), multi-governance mechanisms must be implemented to maximize social and long-lasting value. By involving all relevant stakeholders in a coordinated manner, those schemes can help ensure that infrastructure serves the broader public interest

→ Practically, cities, which will account for 80% of the population by 2050, will have to apply all those levers to become greener and inclusive: A systemic approach of urban planning—encompassing economic, social, spatial, environmental, and political aspects—will be key to address the needs of everyone and build integrated urban infrastructure ecosystems

Getting incentives right: sharing the social and environmental dividends

Searching for multidimensional and 'just pricing' pricing models

While integrating inclusion aspects in pricing strategies is already challenging, the need to engage in the green transition makes the equation even more complex to solve. Therefore, pricing strategies based on the most vulnerable consumers' ability to pay should be directly integrated into a multidimensional framework that encompasses efficiency-driven objectives and other emerging factors. In this context, the support from public stakeholders to infrastructure operators is critical.

USING PRICE DISCRIMINATION: A PRIVATE-RATIONAL LEVER

Price discrimination, which involves implementing differentiated **tariffs based on users' ability to pay**, seeks to make infrastructure more inclusive by shifting the cost burden from financially vulnerable consumers to those who can afford to pay more. This method effectively balances the need for cost recovery with the goal of socially driven pricing, enabling cost redistribution to ensure broader access while maintaining the operator's financial viability.

Although theoretically efficient in aligning equity and efficiency, **implementing this strategy in practice can be challenging**. Accurately assessing consumers' ability to pay may be difficult and costly, with possible errors leading to unfair impacts on certain groups and complex infrastructure management (Focus 15), potentially reducing its effectiveness.

PLAYING WITH COSTS AND ABILITY TO PAY WITH SUBSIDIES: A PUBLIC-RATIONAL LEVER

The interplay between pricing and subsidies is crucial in public intervention, especially when infrastructure assets are essential for end-users or society as a whole. To achieve inclusive-driven prices below market-driven ones, **subsidies can bridge the gap on either the supply or demand side**. If an operator has already set prices as low as financially feasible, subsidies can help achieve socially driven prices.

Supply-side subsidies reduce the operator's costs but might not specifically or efficiently target those who need them most, as affordability is already ensured for a segment of users. Demand-side subsidies directly allocated by public authorities could be more effective for equity-driven goals, allowing specifically low-income households to access services at affordable rates. In that case, the operator will set a market-driven price, being economically efficient, and all end-users will be able to access the infrastructure at this market-driven price.

FOCUS 15

Price discrimination in the water supply: dealing with asymmetric information

In the water management industry, differentiated pricing based on consumer segments could be implemented to enhance social well-being in the supply of water. Different groups of consumers could be defined—depending on goals and matched with a specific pricing structure, which requires that the operator is able to identify perfectly consumer groups and monitor the allocation of the different tariffs. For this pricing to be aligned with equity goals based on an income-based definition of equity, consumer groups would have to be defined according to their ability to pay: high-income consumers would pay more for water consumption and subsidize the consumption of the low-

income ones. The operator would be able to cover its costs by charging some groups of consumers more, and other groups less.

In practice, the difficulty is for the operator to access this consumer information and if relying on their declaration, the risk of wrong ones is too large. This means that the operator will be forced to use proxies such as the level of consumption which is far from being perfectly correlated with the ability to pay. High-income consumers will have to pay a high enough price to cover both the costs incurred by their consumption and the costs incurred by low-income groups.

FOCUS 16

Consumer energy subsidies instead of inclusive-driven tariffication

Subsidies for energy access can be implemented through various schemes. Fixed reductions for low-income identified households can be directly applied to the “theoretical” market-driven price: consumers will then pay a social-driven price instead of the market-driven price fixed by the operator. The reduction applied by the operator can be compensated by taxes directly paid by all the consumers. French tax for public energy service has been collected directly from electricity bills and managed by both the operator and public authorities.

These tariffs can be considered too complex given the need for the operator and public authorities to correctly cooperate, identify, and reach low-income households. This issue emerged for instance with the French social-driven pricing for energy, which was used until 2018. This tariff, targeting low-income households, was initially provided to public health complementary insurance beneficiaries—a subsidy with a limited take-up rate

and relying on individual application. The gas subsidy program for collective housing only reached 80,000 subscribers in 2013, while 400,000 beneficiaries were initially expected¹³².

To solve this issue, subsidies have been allocated directly to consumers based on their income without the operator’s intervention—high-income consumers do not pay an extra fee on their energy bills. These demand-side subsidies allow low-income consumers to pay the market-driven price as all other consumers.

In doing so, public authorities (which have the most accurate and exhaustive data about consumers using annual declared income levels by household) directly reach targeted consumers and manage the allocation of the subsidy. Subsidies are then directly sent to households as a means of payment for their energy bills: The take-up rate for this aid is thus approaching 80%¹³³.

⁽¹³²⁾ ADEME, *Rapport d’audit sur les tarifs sociaux de l’énergie*, 2013.

⁽¹³³⁾ Cour des comptes, *Le chèque énergie*, 2022.

A MULTIDIMENSIONAL FRAMEWORK FOR A “JUST” PRICE

Offering services for free or at very low prices can significantly boost demand by allowing everyone to access the infrastructure. While removing price barriers can enhance access, it can also affect operational and quality effectiveness and negatively affect service delivery:

- On the one hand, overwhelming infrastructure not designed for high volumes or draining limited resources can strain the system, leading to congestion and declining service quality if additional investments are not made. This increased demand can strain resources and foster congestion, leading to a decline in service quality;

- On the other hand, lower prices can prevent investment in quality and operational effectiveness. Pricing structures and market constraints influence operational efficiency; high prices encourage businesses to invest in advanced technologies and optimize processes to maintain profitability, leading to improved efficiency. Free or heavily subsidized services may diminish incentives for efficient resource use, resulting in potential inefficiencies and suboptimal service.

Pricing strategies should be defined based on the most vulnerable consumers’ ability to pay and should be incorporated into a **multidimensional framework that also includes green transition goals**.

FOCUS 17

Setting the pricing strategy of the ‘just transition’: an intricate challenge

Prices are key levers to encourage and promote environmentally friendly uses and practices to achieve green transition targets: reduced prices will incentivize consumers to use greener services whereas increased prices will dissuade them from opting for non-green alternatives.

The transportation and energy sectors are two insightful cases to grasp the complex pricing equation of the just transition of infrastructure, and the need for a multidimensional approach and support from public policy makers.

In the transport sector, academic literature highlights that underpricing road access increases car usage¹³⁴, while more flexible two-part pricing enhances access to public transportation¹³⁵. These policies have produced externalities: the first has increased consumer reliance on cars¹³⁶, while the second has alleviated road congestion¹³⁷. In this context, with the ecological transition in mind, the focus must shift from consumers’ immediate reactions to the externalities these reactions produce. Pricing should therefore ensure that services are accessible to most consumers without promoting excessive use.

The energy market is heavily subsidized by governments, which bear a responsibility to provide a minimum service to all citizens. The price setting will therefore have to combine consumers’ protection, market value, and consideration for negative environmental impacts¹³⁸:

- First, price volatility and shocks must be avoided, as they can have harmful effects, particularly on low-income households¹³¹;
- Second, prices should reflect the true cost of energy and its environmental impact, often addressed through carbon taxation. Still, setting the appropriate price for carbon is challenging, with 68 different carbon pricing initiatives currently implemented worldwide¹³²;
- Third, infrastructure operators must ensure their business model remains profitable (see section #3).

Without the help of public policies, particularly in the environmental field, it would therefore be extremely difficult for infrastructure managers to solve this equation.

⁽¹³⁴⁾ Taming Traffic, *Strategies to reduce driving and prioritize sustainable transportation in cities*, 2021.

⁽¹³⁵⁾ Gagnepain P., Massoni S., Mayol A., Staropoli C., “The Effect of Public Transport Pricing Policy: Experimental Evidence”, 2024.

⁽¹³⁶⁾ Taming Traffic, *Strategies to reduce driving and prioritize sustainable transportation in cities*, 2021.

⁽¹³⁷⁾ Gagnepain P., Massoni S., Mayol A., Staropoli C., “The Effect of Public Transport Pricing Policy: Experimental Evidence”, 2024.

⁽¹³⁸⁾ AIE, *Subventions aux combustibles fossiles dans les transitions vers les énergies propres: le temps d’une nouvelle approche ?*, 2023.

⁽¹³⁹⁾ Ibid.

⁽¹⁴⁰⁾ Ibid.

⁽¹⁴¹⁾ Law preparing for the transition to a low-carbon energy system and containing various provisions on water pricing and wind turbines.

Wilfried Sand-Zantman: Social and environmental pricing, theories and applications

“The key factors for tariff design in infrastructure are the objectives (such as efficiency and redistribution) and available consumer data (like preferences and income). Efficiency demands that prices reflect the marginal cost of production, thus higher tariffs should apply during peak times or scarcity to deter excessive use.

Redistribution can either align with or deviate from these principles. If it is easy to distinguish the groups to be favored, these groups may be subject to specific tariffs—the shortfall being made up by higher tariffs for the other groups, or by subsidies. If it is more difficult to distinguish between groups, tariffs may vary according to consumption levels (with unit prices and/or subscription tariffs that vary with consumption levels).

For example, the average prices applied to small consumers would be lower than those applied to large consumers. While this pricing structure allows certain groups to be favored and encourages sobriety, it can lead large consumers to consume much less, thereby jeopardizing the operator’s financial equilibrium. This is why, when tariffs pursue multiple objectives, economic theory suggests the use of public subsidies in addition to revenue from consumers.

The water sector has recently introduced pricing innovations to meet certain specific objectives (following the Brottes law of 2013).

With a view to social pricing, some municipalities (such as Dunkerque and Lyon) have introduced tariffs that increase in line with the consumption of the variable component, so that the price per m³ rises with the volume consumed.

Other municipalities (such as Saint-Paul-Lès-Dax) have opted for a reduction in the fixed part of the tariff, which raises the question of the decoupling between the cost structure (mainly fixed) and the revenue structure (variable).

To adjust prices to the availability of resources, other municipalities (such as Toulouse) have introduced seasonal water pricing, with higher prices in summer than in winter.

In brief, pricing systems reflect the preferences of the designers of these tariffs in terms of efficiency or redistribution, but also the means at their disposal. While the desire to offer affordable fares for all is widely shared, there are many ways of implementing them. To maintain the economic equilibrium of operators, some will favor cross-subsidies between consumers, while others will call on taxes.”



Wilfried Sand-Zantman
Professor at ESSEC Business School and
Associate Researcher at the Toulouse
School of Economics

The need for a multistakeholder and collaborative approach with public policymakers

ADAPT PUBLIC CONTRACTS

As public intervention is critical to ensure equal access to infrastructure, public-private partnerships (PPPs) will now have to be geared toward socially positive outcomes from design to operation. This means that the attribution of a project must take into account the bidder's plans for social outcomes, and the investment's financing and/or funding must be linked to a project yielding net positive social outcomes at each feasible stage of the asset lifecycle through **outcome-based financing or pay-for-success models**.

In key infrastructure such as transport or social infrastructure, public authorities are the principal buyers, which puts on them a massive responsibility to maximize the social outcomes of every project. Each year, over 250,000 public authorities in the EU are active in public procurement, which represents roughly USD2t annually or 14% of the EU GDP¹⁴². Private debt and equity investors also play a huge role in financing and delivering the infrastructure assets, either as providers in public procurement contracts or directly via private sector investment. In this context, public policymakers must find new ways to leverage the government-as-a-client's clout by including extrafinancial goals and taking more stakeholder groups into account in public procurement processes (Focus 18).

In addition, although PPPs have been more typically utilized for the delivery of economic infrastructure (such as roads, airports, rail, or other transport projects), governments are now also considering to use them for social infrastructure, such as schools, healthcare facilities and affordable housing—with social impact as the ultimate outcome.

This has given rise to new concepts such as **people-first PPPs** or **public-private-people-partnerships (PPPPs)**, formally endorsed by the UN Economic Conference for Europe (ECE). The great design behind PPPs is to leave behind a paradigm where PPPs are only signed between the procurement authority and the infrastructure operator.

Aligning all stakeholders' interests requires sharing the **social dividends** with the infrastructure operator. This has already been done for environmental targets: some PPPs incorporate provisions relating to energy savings or carbon emissions which affect the payments received by the private partner. Sharing mechanisms incentivize the private partner to achieve positive climate-linked objectives. Addressing social results in the same manner could provide adequate incentives for project operators to invest their efforts in achieving these goals.

FOCUS 18

Social procurement in Victoria, Australia

The Victorian Government in Australia has demonstrated the effectiveness of social procurement strategies in promoting inclusivity within infrastructure projects. As part of the 'Victoria's Big Build' initiative, it implemented policies aimed at increasing the participation of Aboriginal businesses in public procurement. This approach has yielded significant results: For instance, engagement with certified Victorian Aboriginal businesses and other Aboriginal organizations increased by 37% since 2019.

EXPERT POSITION 13

Philippe Gagnepain: Rethink contract design

“On the cost side of infrastructure projects, it is important to use good incentive contracts as costs can be huge. For instance, in public transportation, costs are at least, twice higher than revenues. On the demand side, public authorities and governments have a good understanding of what should be done, and this can be easily written in contracts.”



Philippe Gagnepain
Professor of Economics at University
Paris 1 Panthéon-Sorbonne

⁽¹⁴²⁾ European Union, Internal Market, Industry, Entrepreneurship and SMEs “Public procurement”.

FIGURE 31

The changing role of PPPs

Source: Altermind

	CLASSIC SCHEME	ENHANCED SCHEME	EXAMPLES
1 Primary Objective	Focus on financial returns and efficiency	Emphasis on social impact and sustainable development	Metro Cable, Medellin, Colombia: Involved local communities in planning, improving accessibility and quality of life for residents in underserved areas
2 Stakeholder involvement	Primarily involves government and private sector entities	Actively includes community stakeholders and NGOs	1915 Çanakkale Bridge, Türkiye: Improved local livelihoods via stakeholder engagement and local job creation
3 Decision-making process	Top-down approach, driven by contractual agreements	Inclusive, participatory process with stakeholder input	Sydney metro project, Australia: Sydney metro project was based on strong relationships and engagement between the community, Federal, State, and local government, contractors and advisors
4 Innovation and flexibility	Driven by private sector expertise	Encourages innovative solutions with community involvement	Barcelona's urban planning, Spain: Superblock model allowed to relocate road space for pedestrian and community use, integrating feedback from residents to adapt urban environments
5 Transparency and flexibility	Limited to contractual obligations	High emphasis on transparency, accountability to all stakeholders	Thailand: Between 2015 and 2020, transparency initiatives in Thailand's infrastructure projects reduced corruption, saved \$360m, and positively impacted community relations
6 Assessment	Relies on quantitative metrics such as cost and time efficiency	Includes qualitative assessments, measuring community impact and stakeholder satisfaction	UNECE's PIERS methodology: Focuses on (i) Access and equity, (ii) Economic effectiveness, (iii) Environmental sustainability, (iv) Replicability and (v) Stakeholder engagement



Equans and Rotterdam Municipality: taking up the challenge of EV charging for all

E —

Equans is strategically positioned to drive the electrification of vehicles, a critical component in the decarbonization of transport. The company excels not only in installing complex fast and ultra-fast charging stations, but also in managing the software required for operations such as supervision, remote management, and payment.

Looking ahead, Equans will be involved in providing the charging infrastructure for the Municipality of Rotterdam using the Last Mile Solutions (LMS) platform. Residents

and commuters in the 30 affiliated municipalities will also be able to request a charging card from Equans, allowing them to safely and reliably charge vehicles across the region without roaming fees or additional costs. Thanks to this partnership, this card will be valid across the entire European charging network supported by LMS (300,000 charging points).

"The Netherlands has proactively addressed the social risks associated with EVs by implementing tenders for private concessions to ensure the installation of recharging stations across the entire country. This approach ensures that even in less profitable areas, investments are made, and special provisions are included for individuals with disabilities. Over time, the tendering process has evolved, becoming increasingly effective with each iteration."

Jérôme Stubler, CEO of Equans



APPROPRIATE PUBLIC-PRIVATE RISK-SHARING

To ensure that infrastructure remains profitable, affordable and delivers maximum social value, it is crucial to adopt a **fair approach to public-private risk-sharing**. A broader, more systematic review of the contribution of infrastructure assets through PPPs could help:

- Evaluate how infrastructure assets can contribute to attaining SDG goals by their mere existence (inately inclusive) or through specific contractual mechanisms that will bring positive social spillover effects (designed to be inclusive);
- Determine how public authorities and governments can ultimately decide which social outcomes are most desirable, with infrastructure asset investors and operators to bring value for money;
- Assess how cost-efficiency allows infrastructure operators to give back to the community, as money not spent on a specific infrastructure asset can lead to a greater social multiplier effect in another area (e.g. providing hospitals at a low cost will free up government resources to invest in schooling);
- Examine how profit-sharing provisions can also serve this purpose. These provisions can include mech-

anisms such as variable contract durations based on revenue, price reductions during periods of high revenue, or better-fortune clauses. For example, French highway concession agreements incorporate these types of provisions.

PUT FINANCE AT WORK FOR THE COMMON GOOD

To enhance the contribution of the financial community to “social welfare”, public authorities will have to find innovative ways to increase debt financing and strengthen equity financing for social causes. The cost of debt and equity attributable to the project partners and their lenders is a crucial part of the equation. While ramping up debt and equity financing for social causes is crucial, the financial industry now has plenty of tools to channel these funds into projects with a net positive social impact (Table 4).

EXPERT POSITION 14

Simon Whistler: The UN supporting the just transition of the financial community

“Infrastructure investors have traditionally focused on social factors, albeit not always with an emphasis on inclusion. Most projects now require some form of social impact assessment to get started, which provides a basic understanding of the project’s potential impacts and the stakeholders involved. However, this does not necessarily mean that inclusion is a primary consideration. There is a need for more systematic and in-depth approaches to understand the various connections between different stakeholders and how they interact with the infrastructure being created or updated.

The Principles for Responsible Investment (PRI) supports investors in developing just and fair investment strategies that achieve significant social impact in line with their fiduciary duties and own ambitions. We work with investors to enhance their understanding of key concepts like just transition and inclusivity in investments, providing guidance and support through working groups, sharing best practices, and developing frameworks to measure investment impact. PRI also works to create an enabling environment for investors, engaging with policymakers to create sustainable finance frameworks that incentivize responsible investing and outlining successful strategies.”



Simon Whistler
Head of Real Assets, Principle of Responsible Investment

TABLE 5

Leveraging finance for common good on the debt and equity sides

Source: Altermind

SOURCE	INSTRUMENT	DESCRIPTION	USE OF PROCEEDS	PROJECT EVALUATION
Debt	Social Impact Loans	The SLP ¹⁴³ define the social loan market as aiming to facilitate and support economic activity mitigating social issues and/or achieving positive social outcomes.	UoP should notably cover affordable infrastructure and housing, food security, sustainable systems, and socioeconomic advancement and empowerment.	Borrowers are required to disclose the social objectives of the project, along with the process used to categorize it as a “Social Project”.
	Social impact Bonds	A social impact bond (SIB) is an agreement with the public sector or a governing authority that funds improved social outcomes in specific areas and shares part of the resulting savings with investors ¹⁴⁴ .	To qualify as a social bond, the proceeds must finance or refinance projects that achieve positive social outcomes or address social issues ¹⁴⁵ .	Issuers can refer to a pre-issuance checklist published by the ICMA detailing all the information that needs to be provided to investors ¹⁴⁶ .
Equity	Asset securitization	Asset securitization involves issuing securities backed by the income streams from individual projects (project bonds), a portfolio of projects (typically through trusts), or by a pool of loans (asset pooling).	UoP must demonstrate a social benefit, making this format very flexible to adapt to the local specifics of social impact projects.	Evaluation of projects is quite flexible, allowing for the raising of capital for initiatives that may not yield immediate financial returns but have the potential for social impact and long-term profitability.
	ESG investing	ESG integration can make infrastructure projects more attractive to private investors by demonstrating a commitment to sustainability and social responsibility.	Impact investors may require not only a specific purpose but also a management plan to achieve that purpose.	The SDGs, created by the UN in 2015, offer a framework of 17 goals and 169 targets to tackle global issues like poverty.

¹⁴³ The Social Loan Principles (SLP) were edicted in April 2021 by the Loan Markets Association (LMA), Asia Pacific Loan Markets Association (APLMA) and the Loan Syndications and Trading Association (LSTA).

¹⁴⁴ Repayment and ROI for a social impact bond depend on meeting the specified social goals.

¹⁴⁵ Social Bond Principles (SBP) from the International Capital Market Association (ICMA). These projects typically target groups such as those below the poverty line, marginalized communities, migrants, the unemployed, women, sexual and gender minorities, people with disabilities, and displaced persons.

¹⁴⁶ International Capital Market Association (ICMA).

EXPERT POSITION 15

Xavier Girre: The role of multilateral institutions for the just transition in emerging countries

“A successful green transition requires it to be a just transition, ensuring equitable access to infrastructure for everyone. To achieve this, it’s essential to develop customized technical solutions that address the unique conditions of different localities. Increasing infrastructure investment is also vital, with support from major financial and multilateral institutions like the World Bank Group, Asian Development Bank, and African Development Bank. Their contributions enhance the financial viability of projects, creating a win-win scenario for both investors and end customers.”



Xavier Girre
EDF Executive Senior VP, Chief
Performance Officer - Impact
Investment Finance.

In the dual social-climate transition, a major challenge will also be to **secure adequate public funding and financing strategies to compensate vulnerable groups**. This is especially difficult given the urgency of the transition, the substantial initial investment needed and the difficulty of incentivizing the private sector.

In the EU, the launch of the Social Climate Fund ('SCF') in 2023 embodies the will to take a step further, especially in a time of major uncertainties on electric market prices with the Russia-Ukraine crisis. The measures supported by the SCF aim to provide both (i) temporary direct income support that will alleviate the immediate loss in purchasing power of households and micro-enterprises, and (ii) medium- to long-term measures and investments aimed at enhancing the energy efficiency of buildings, the decarbonization of heating and cooling, the integration of renewable energy generation and storage in buildings, and access to low-carbon emission mobility (Focus 19).

In emerging countries, massive investments in infrastructure projects, such as transportation networks, energy systems, and social infrastructure, will be vital for economic growth and social development. The financing gap, representing the shortfall between financial needs and government revenues, is estimated at USD2.5t for overall SDG needs and USD1 to USD1.5t specifically for infrastructure¹⁴⁷.

Given these substantial needs, financing must come from all available sources: private, official, cross-border, and do-

mestic. However, low savings rates in many emerging and low-income economies limit domestic financing options, making access to foreign funds crucial. This is where **multilateral institutions (MDBs) play a key role**. By providing the expertise, resources, and funding needed for infrastructure development, MDBs can allow for more infrastructure project financing in two ways:

- Direct mobilization involves MDBs and other financiers jointly funding a project;
- Indirect mobilization happens when investments in similar projects follow without the MDB's direct involvement, often spurred on by the MDB's initial endorsement or groundwork.

As a result, MDB loans are often preferred for these reasons:

- **MDB loans are generally more affordable** than private sector loans, as MDBs benefit from strong credit ratings, enabling them to issue low-interest bonds and lend to member countries at a minimal margin;
- **MDB lending is counter-cyclical**, increasing during times of international liquidity shortages or financial distress when other financing sources are limited;
- **MDBs can also attract additional resources** from official or private sources for the projects or sectors they support.

FOCUS 19

The Social Climate Fund: turning revenues into financial support for vulnerable groups

In 2023, the EU adopted a revision of the EU Emissions Trading System (ETS) to align it with the objective to reduce GHG emissions by 55% by 2030. As part of this revision, the co-legislators created a separate, new ETS ("ETS 2") specifically for buildings and road transport—sectors that were previously excluded from the ETS altogether.

Fuel suppliers that are subject to the obligations of the new ETS in the road and building sectors will pass on the costs of carbon to consumers, resulting in a price increase for essential energy uses: heating, cooling, cooking and road transport—among others.

To support those most affected by these new environmental rules, the EU's co-legislators adopted a regulation creating a Social Climate Fund (SCF). The SCF is specifically designed to provide financial support to households in energy and/or transport poverty and micro-enterprises, both of which will likely disproportionately bear the costs of these new measures.

Member States will be required to submit a Social Climate Plan to the European Commission by June 30, 2025, featuring a list of existing or new national measures to support the goals mentioned above. The individual plans will notably be financed through earnings from ETS 2 itself—which will become fully operational in 2027—with Member States contributing to at least 25% of the total cost of their respective plan.

¹⁴⁷ Avellán L., Galindo A. J., Lotti G., Rodríguez J.B., "Bridging the gap: Mobilization of multilateral Development Banks in Infrastructure", *World Development*, Volume 176, 2024.

Getting governance right: toward a new social contract

Building integrated and people-driven governance mechanisms

AN EFFECTIVE MULTILEVEL GOVERNANCE

As infrastructure projects have long-term horizons (often spanning 10 to 30 years), **multi-governance mechanisms** must be implemented to maximize social and long-lasting value. By involving all relevant stakeholders in a coordinated manner, those schemes can help ensure that the infrastructure serves the broader public interest, rather than the narrow interests of a few powerful groups.

On the one hand, **national infrastructure planning is critical** to design and define a long-term and shared vision of inclusive infrastructure principles and characteristics. Although the development of national infrastructure plans is managed by national institutions, it is essential to involve all government stakeholders, including government departments and procurement authorities, in the process.

Such plans must not overlook the need to consider **the local needs of the communities** affected by new or existing infrastructure. A 2018 Federal Reserve Bank of Philadelphia study found that from a median neighborhood, only 12% of the jobs of the region is accessible in a less than 60-minute bus commute. This inefficiency is due to transit systems routing through central hubs instead of directly connecting job centers with residential areas. More direct routes would help workers reach jobs faster, aiding in job retention and managing personal emergencies¹⁴⁸.

To counter the unintended effects of such infrastructure designs, Raghuram Rajan, Professor of Finance at Chicago Booth, former Governor of the Reserve Bank of India and ex-IMF chief economist, advocates for **rebalancing this power by empowering local**

communities and embracing “inclusive localism”¹⁴¹. He argues that society functions best when the market, state, and community are in balance. However, as markets expand, the state grows alongside them, concentrating power in central hubs and leaving peripheral areas neglected, fueling dissatisfaction in some communities.

“CAPACITY BUILDING”: FOUNDATION OF A NEW SOCIAL CONTRACT

Transitioning to sustainable governance structures will require a more profound change in societies’ social contract. As Minouche Shafik highlights¹⁴³, major changes, like shifts in demographics and technology, challenge traditional structures, and recent crises—such as the pandemic and climate emergencies—have revealed **the need for an update of our contract**. On this journey, companies should prioritize involving a broader range of stakeholders to safeguard our social contract, creating inclusive, long-term infrastructure, improving living conditions, and enabling people to maximize and develop their potential.

Therefore, imagining sustainable governance models for inclusive infrastructure requires more than just planning physical structures and including neglected communities in decision processes. It is also about empowering vulnerable groups by giving them the relevant information, knowledge, and skills these groups need to access broader benefits from infrastructure, like markets, jobs, and services.

Named **“capacity building”**, this approach consists in improving the ability of individuals, organizations, and institutions to effectively plan, implement, and manage infrastructure initiatives. By applying a limited set of measures to build key functional capacities, it becomes possible to maximize outreach, raise inclusivity awareness, and address skill gaps, ensuring that disadvantaged groups are equipped to engage with and benefit from infrastructure initiatives.

FOCUS 20

National infrastructure planning authorities in the UK

THE NATIONAL INFRASTRUCTURE COMMISSION (NIC)

The National Infrastructure Commission (NIC) was set up in 2015 to produce a clear picture of the UK’s future needs for nationally significant economic infrastructure and advise on pressing infrastructure issues.

The NIC has prepared its first National Infrastructure Assessment (NIA) in 2018, which analyzes the UK’s long-term economic infrastructure needs, outlines a strategic vision over the next 30 years and sets out recommendations for how the identified needs should be met.

For instance, it has completed detailed studies on Smart Power, covering interconnection, storage and demand flexibility, which could save consumers up to £8 billion a year by 2030; Transport for a World City, on taking Crossrail forward as a priority, with the aim of submitting a hybrid bill by Autumn 2019; and High Speed North, for the development of a long-term strategy for High Speed 3 (HS3), beginning with the Leeds-Manchester corridor, combined with more immediate action to improve the performance of key road and rail links in the north.

THE INFRASTRUCTURE AND PROJECTS AUTHORITY (IPA)

The Infrastructure and Projects Authority (IPA) will track and report regularly on the progress of the government’s infrastructure priorities. The IPA plays a crucial role in providing expert project delivery advice, support, and assurance to government departments and their major projects. The organization primarily focuses on projects within the Government Major Projects Portfolio (GMPP), which represent the largest, most complex, and often the most expensive and challenging initiatives in government.

In May 2024, ahead of the United Kingdom general election, the Labour Party announced plans to merge the Infrastructure and Projects Authority (IPA) with the National Infrastructure Commission. This merger aims to accelerate the delivery of major infrastructure projects in the UK. The new entity will be named the National Infrastructure and Service Transformation Authority¹⁴².

The Investing in Canada Plan: the use of integrated bilateral agreements (IBAs)

Infrastructure planning in Canada is guided by long-term perspective plans across tiers of the government. At the federal level, the Investing in Canada Plan was launched in 2016. It is a 12-year plan for infrastructure development that has identified USD180bn of investments on five priorities: Public transit, green infrastructure, social development, trade and transportation, and rural and northern communities. To date, the Plan has invested over USD151bn over 93,000 projects in cooperation with 20 federal departments and agencies.

Integrated bilateral agreements (IBAs) signed between the federal and provincial governments are an integral part of the planning process in Canada. These IBAs function as collaborative documents, establishing the terms and conditions through which infrastructure funding would be delivered to the provinces and territories over the period. Planning for projects under IBAs requires provinces and territories to develop and submit multi-year plans that identify potential projects. With emphasis on the outcomes within IBAs, and with predictable, long-term funding, the provinces and territories can structure their investments in a way that achieves meaningful long-term results.

Antoine Picon: “People are the new infrastructure” of the green transition

“There is an imaginary dimension in infrastructure. In the nineteenth century, networks symbolized dreams of connection as much as they delivered real links, often promoted by utopian thinkers. Today, infrastructure touches on the essence of the new social contract. In essence, infrastructure—from energy to communication—is about shaping society and envisioning a more inclusive future. The United Nations Conference of Parties (COP) discussions have spotlighted biodiversity and the economic significance of nature. Technology once saw itself as existing within nature, but now it must be recognized as part of the environment, requiring a unified approach to biodiversity.”



Antoine Picon
Professor of the History of Architecture and Technology at the Harvard Graduate School of Design

⁽¹⁴⁸⁾ Federal Reserve bank of Philadelphia, “Getting to Work on Time—Public Transit and Job Access in Northeastern Pennsylvania”, 2018.

⁽¹⁴⁹⁾ Rajan R., “Communities, the state, and markets: the case for inclusive localism”, *Oxford Review of Economic Policy*, Volume 37, Issue 4, Pages 811–823, 2021.

⁽¹⁵⁰⁾ DLA Piper, “Infrastructure investment under a new Labour government”, 2024.

⁽¹⁵¹⁾ Vauban IP, *Social License to Operate, Social License to Invest*, 2022.

Making it real: better urban planning for more inclusive cities

Practically, cities, which will account for 80% of the population by 2050, will have to apply all those levers to become greener and inclusive: a systemic approach to urban planning—encompassing economic, social, spatial, environmental, and political aspects—will be key to address the needs of everyone and build integrated urban infrastructure ecosystems.

DESIGN CITIES FOR ALL

Although cities have generally been regarded as epicenters of greater opportunities and productivity, serving as vehicles for accelerating economic growth and regional development, they have long been “growth-driven”. Amid the challenges of our era, particularly the rapid surge in urbanization, cities hold a distinct responsibility to ensure that every resident, regardless of their background or circumstances, has the opportunity to fully engage in city life.

To do so, a **systemic approach to inclusive cities**—encompassing economic, social, spatial, environmental, and political aspects—offers a 5-level comprehensive framework for cities to address the diverse needs of their populations and build integrated urban infrastructure ecosystems¹⁵²:

- Economic inclusion is the process by which individuals and house-holds are gradually integrated into the broader economic and community development. By alleviating material inequalities and addressing structural barriers to marginalized groups, their economic conditions and status are improved;

- Social inclusion is the process of ensuring that all societal groups, especially those disadvantaged due to factors such as age, gender, disability, race, ethnicity, origin, religion, or economic status, feel safe, involved, valued, and respected;
- Spatial inclusion requires cities to provide affordable land and housing in key areas, along with accessible public infrastructure and essential services like healthcare, energy, waste management, and ICT infrastructure;
- Environmental inclusion emphasizes that current production and consumption patterns should not compromise the needs and interests of future generations, with climate-proof energy and transportation systems;
- Political inclusion advocates for equal rights and opportunities for all citizens to participate in and contribute to democratic institutions and processes, including elections, legislative processes, political parties, and the composition of parliament.

FOCUS 22

Eurocities: the network of European cities committed to more inclusive urban areas

With the Eurocities initiative, cities across Europe are committed to fostering a more inclusive continent by implementing the European Pillar of Social Rights at the local level. Through the InclusiveCities4All campaign, the Eurocities initiative is showcasing the vital role of cities as reliable partners to the EU in developing and executing measures that benefit everyone. The program is growing: in 2023, Eurocities welcomed ten new members, including Brussels, Düsseldorf, Kadikoy, Munich, Nuremberg, Oslo, Paris, Riga, Stockholm, and Zurich.

Bilbao's transformation is a prime example of urban renewal and innovation supported by Eurocities. Over the years, Bilbao has evolved from a primarily industrial city into a modern hub that emphasizes culture, education, entrepreneurship, and sustainable urban development. This metamorphosis is demonstrated by several key projects, including the construction of the Guggenheim Museum Bilbao, the revitalization of the estuary, and the creation of new infrastructure such as the airport, metro, tram system, and universities. These initiatives have turned Bilbao from a gray, polluted area into a lively and cosmopolitan city, all while maintaining its unique historical identity. This comprehensive renewal has made Bilbao an international benchmark for other cities aiming to undergo similar transformations.

⁽¹⁵²⁾ Zhao R., de Jong M., Edelenbos J., “Will the true inclusive city rise? Mapping the strengths and weaknesses of the city ranking systems”, 2023

Indigo: partnering with cities to ensure more viable urban areas in the future

F

Future parking facilities should be seamlessly integrated into the urban landscape to enhance overall mobility and support a range of services. The evolution of mobility and the shift toward renewable energies requires a rethinking of underground parking in cities. Since 2019, in collaboration with architect and urban planner Dominique Perrault, Indigo has been developing tomorrow's urban parking solutions.

Indigo aims to offer a more inclusive customer journey and address emerging social and environmental challenges. By the end of 2023, Indigo had deployed 4,000 electric charging stations in

700 parking facilities across France, establishing itself as a national leader in this area. Without compromising their attractive tariffs, the company plans to double this number, reaching 8,000 by the end of 2024.

As a partner to cities, municipalities, hospitals, and universities, Indigo is also committed to local communities. Parking activities are a key component of the urban mobility chain and naturally contribute, through targeted actions, to the attractiveness of city centers by supporting the retention of businesses and jobs. For instance, as a long-standing partner of the city of

Salon-de-Provence, Indigo has collaborated with various measures taken by the city to revitalize its area by promoting the economic activity of its downtown.

"Today, we are working on numerous projects to support the evolution of cities, responding to the growing demand for urban areas to be both peaceful and accessible. Therefore, we are designing and constructing new car parks to enable the development of more pedestrian zones in cities."

Sébastien Fraisse, CEO of Indigo



A ROADMAP FOR MORE INCLUSIVE URBAN PLANNING

Using this 5-level framework, an integrated and cross-sectoral approach to urban areas is critical, focusing on planning, development, localization and delivery. As a result, in the process of creating inclusive cities, **a twofold strategy can be adopted, focusing on both policy and project levels:**

- At the policy level, city planners should consider underserved groups in urban planning policies (such as land use plans, city zoning strategies, etc.), as well as national development planning policies. In addition, to adjust to a changing environment, continuous urbanization can strain the resources and the available space in a city and may lead to social challenges that require the exploration of alternative development options;
- At the project level, strategies must be aligned with the city's development plans, especially on land use and social integration, so that projects contribute to the overall city master plan.

Evidence-based analysis can also be very relevant and useful to prioritize infrastructure projects (Focus 23).

Overall, several cities have been implementing best-in-class inclusive measures as part of their urban planning plan:

- Vienna launched in 1992 a policy to build secure housing adapted for women's needs¹⁵⁵. 30 years later, this policy has led to several achievements, such as Aspern Seestadt¹⁵⁶, which will host 30,000 residents in 2030, constructed with an environmental and gender-sensitive lens;
- Luxembourg City has been recognized by the European Commission for its exemplary 'Design for All' accessibility approach. The city has introduced accessible public transport, with vehicles equipped for the hearing- and visually-impaired, as well as ramps and low floors to facilitate travel. Additionally, public communications have been made

FOCUS 23

Use evidence-based analysis for project prioritization

The impact assessment shall become more and more critical for decision-making, either by calculating the financial impact through social cost-benefit analysis (SCBA) or examining the potential impacts on decision-making through the wider economic impacts (WEI). SCBA is widely used in numerous countries, including the US, New Zealand, England, Australia, Singapore, Chile, and Ireland, to evaluate and prioritize major infrastructure projects—especially those requiring substantial investments. Private actors must be fully involved in such exercises to allow for proper planning and capacity building. All relevant stakeholder groups should be involved.

However, governments and government contracting authorities (GCAs) often face challenges in conducting thorough, evidence-based prioritization due to limited resources, capacity constraints, and conflicting stakeholder interests. Many governments rely on basic

project appraisal elements for infrastructure decision-making, especially at the subnational level.

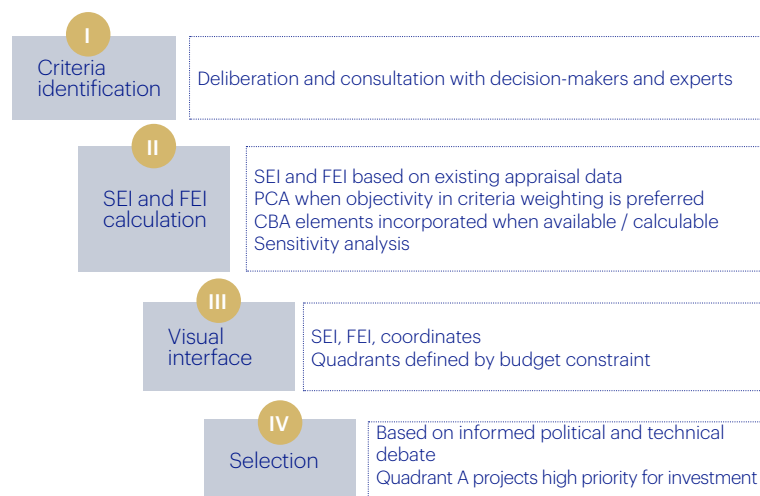
To address these limitations and avoid unsystematic project selection, governments can benefit from implementing multi-criteria analysis. For instance, the World Bank has introduced the Infrastructure Prioritization Framework as an interim decision-structuring tool¹⁵³. This 'stepping stone' approach aids in project prioritization decision-making by (i) comparing pre-screened projects with basic appraisal; (ii) allowing for technical deliberation; and (iii) structuring the decision process when information and capacity are limited but sufficient for systematic comparison.

As a flexible multi-criteria tool for infrastructure prioritization, the framework's key strengths are its incorporation of key policy goals, the systematic framing of infrastructure decisions, and the use of available elements of project appraisal.

FIGURE 32

Sequence of the Infrastructure Prioritization Framework

Source: World Bank¹⁵⁴



inclusive, with decisions available in sign language, ensuring that all residents can actively participate in civic life¹⁵⁷;

- In Singapore, affordable housing solutions are carefully located to ensure the proximity of these communities to healthcare facilities, transport links (bus stops and train stations), and working districts. Conversely, the lead-contaminated water crisis in Flint (USA) demonstrated how poor urban planning

can harm marginalized communities. This crisis stems from the city's inability to address the consequences of large-scale population loss, the Flint region's unwillingness to engage in regional planning, and a societal lack of care for infrastructure (Focus 24).

Flint water crisis in the United States: the social costs of non-inclusive governance

In April 2014, the city of Flint, Michigan, USA switched its water source from the Detroit Water and Sewerage Department (which gets its water from Lake Huron) to the Flint River, while it awaited the completion of a new pipeline to Lake Huron that would allow the city to join the Karegnondi Water Authority (KWA)¹⁵⁸.

Supposedly, making the change to the KWA would save the Flint region USD200m over 25 years. However, when the switch was made to the Flint River, corrosion control chemicals were not sufficiently added to Flint's water distribution system, even though the river is more acidic (has a lower pH) than Lake Huron. Coupled with the failure to implement necessary corrosion inhibitors, this resulted in lead

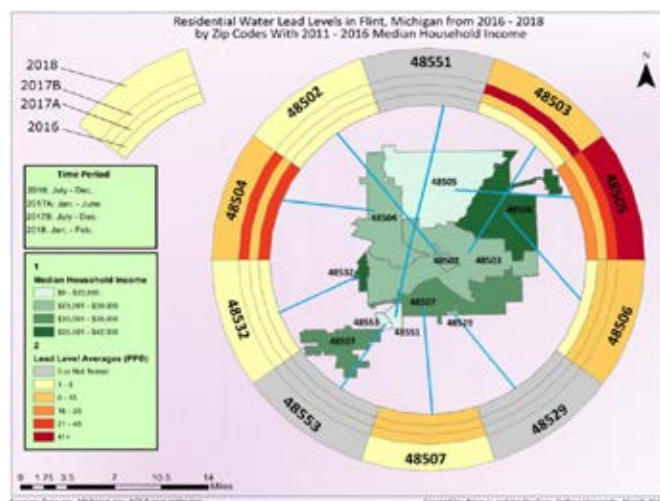
leaching from aging pipes into the water supply. Approximately 140,000 residents were exposed to elevated lead levels¹⁵⁹, with marginalized communities bearing the brunt of the severe health risks associated with lead contamination.

This crisis exemplifies "predatory inclusion", where predominantly Black communities are confined to neglected properties and systematically excluded from opportunities¹⁶⁰. The crisis also demonstrated that such communities lacked meaningful input into decisions affecting their environment and quality of life, with their concerns about pollution and health impacts frequently minimized or dismissed (Figure 33)¹⁶¹.

FIGURE 33

Residential Water Lead Levels in Flint, Michigan from 2016 to 2018

Source: Brian Li, Hayley Gray, 2018



Lecture: In 2018, the lead levels in district 48 505 reached an average of over 41 parts per billion (PPB), while the median household income in this area was capped at USD23,000

"The water switch happened over a year before it became a crisis. In Flint, I learned that the community was unaware of the decision to change the water source. Civic engagement is crucial. We must involve residents through accessible platforms and clear language, ensuring transparency from local, state, federal, and county officials. Better public engagement could have

prevented much of the crisis before the switch was authorized."



Harvey Hollins, former Director of Urban and Metropolitan Initiatives for State of Michigan, Office of the Governor

⁽¹⁵³⁾ Marcelo D., Mandri-Perrott C., House S., Schwartz J. Z., "An Alternative Approach to Project Selection: The Infrastructure Prioritization Framework", 2016.

⁽¹⁵⁴⁾ Marcelo D., Mandri-Perrott C., House S., Schwartz J. Z., "An Alternative Approach to Project Selection: The Infrastructure Prioritization Framework", 2016.

⁽¹⁵⁵⁾ Stadt Wien, "Alltags- und Frauengerechter Wohnbau", accessed in 2024.

⁽¹⁵⁶⁾ Guiding architects, "Une ville réimaginée: Seestadt Aspern Vienna – intégration de la dimension de genre dans la planification urbaine", accessed in 2024.

⁽¹⁵⁷⁾ European Commission, "Luxembourg City wins 2022 Access City Award for becoming more accessible to persons with disabilities", 2022.

⁽¹⁵⁸⁾ Morckel V., *Why the Flint, Michigan, USA water crisis is an urban planning failure*, February 2017.

⁽¹⁵⁹⁾ Zeitz Ruckart P., Ettinger A. S. et al., "The Flint Water Crisis: A Coordinated Public Health Emergency Response and Recovery Initiative", *J Public Health Manag Pract*, 2019.

⁽¹⁶⁰⁾ Cavender K. P., *Predatory Inclusion and the Flint Water Crisis*, 2023.

⁽¹⁶¹⁾ Mohai P., "Environmental justice and the Flint water crisis", Michigan Sociological Association Annual Meeting, 2017

PERSPECTIVES FOR INFRAVISION: STUDYING ALL “TRANSITIONS” AND THEIR DYNAMICS OVER THE NEXT DECADES

Five intertwined transitions shaping the future of infrastructure

Infrastructure, by its nature, must serve diverse populations, environments, and systems, making it a focal point where multiple global megatrends converge. The study conducted on ‘inclusive infrastructure’ has revealed how economic climate, social, digital and geopolitical transitions are reshaping the landscape.

- The economic transition reflects the evolving global economy, where traditional infrastructure funding methods are being challenged by new financial innovations and models, changing market demands, and the need for more sustainable, inclusive growth models;
- The geopolitical transition highlights the shifting balance of power and the reconfiguration of global alliances, which have a direct impact on infrastructure planning and funding. Global trade routes, energy supplies, and defense infrastructure are all affected by geopolitical dynamics. As nations recalibrate their strategies, understanding how geopolitical forces influence the allocation of resources and infrastructure priorities becomes crucial;
- The social transition refers to the demographic shifts and evolving societal expectations that are reshaping the demand for infrastructure (aging populations, urbanization, and middle-class shrinking). By examining

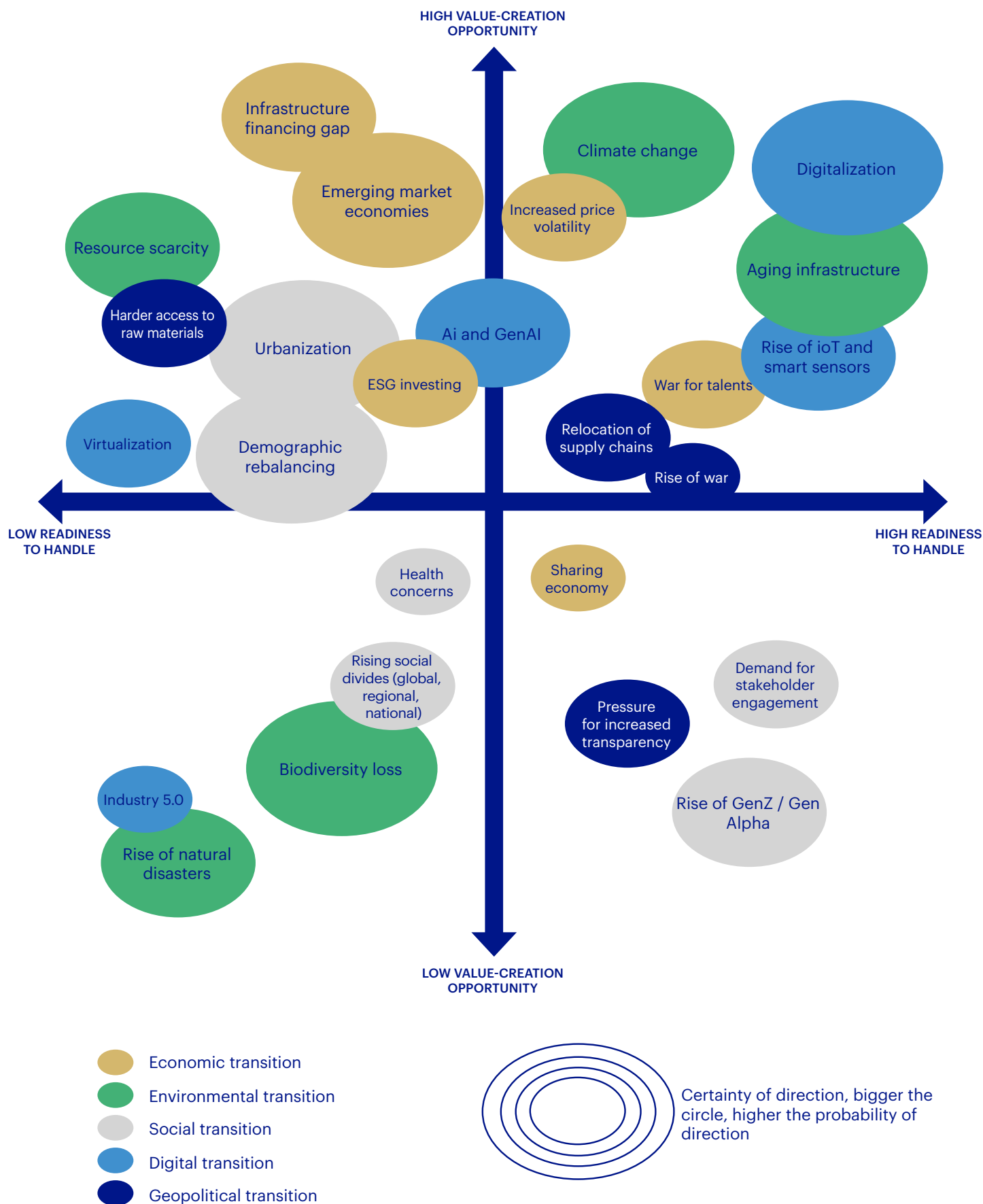
these social trends, we gain insights into how infrastructure must evolve to meet diverse community needs, provide equitable access, and improve quality of life;

- The climate transition underlines the urgent need to mitigate and adapt to climate change, and evolve toward more sustainable and resilient infrastructure. This includes the shift toward renewable energy systems, green building standards, and the design of infrastructure that can withstand extreme weather events;
- The digital transition is based on the integration of advanced technologies into infrastructure systems. The rise of smart cities, digital connectivity, and automation is transforming the way in which infrastructure requires an understanding of the role of data, cybersecurity, and innovation in driving efficiency and enhancing infrastructure performance in the digital age.

Each of these transitions carries profound implications for infrastructure development and investment, and studying them offers insight into how future infrastructure systems must adapt to serve societies effectively. Still, it is no longer feasible to consider one transition in isolation from the others; they collectively structure the future of how infrastructure is built, financed, and maintained.

5 transitions, 26 megatrends

Sources: Altermind, inspired by GI hub and expert's analyses



Roadmap for InfraVision

Against this backdrop, InfraVision's work will focus on these five key transitions, and examine how infrastructure players can manage their interconnections, prepare for the disruptions they bring, and benefit from the value-creating opportunities they offer.

At this stage, InfraVision has outlined a series of themes to study in the coming years

Theme #1—Sustainable Economic and Financial Models

SUSTAINABILITY, RESILIENCE AND MARKET SHIFTS

- Examine how evolving global market demands will affect infrastructure planning and investment;
- Identify how the five transitions align to support long-term infrastructure viability for a “just transition”;
- Assess new opportunities for investment in sustainable growth areas like renewable energy, smart cities, and green transportation.

INNOVATIVE FINANCING MECHANISMS

- Explore public-private partnerships (PPPs), green bonds, impact investing, and emerging infrastructure financing models;
- Study how to balance the need for profitability with social and environmental sustainability, notably in tariffication.

Theme #2—Infrastructure in a Shifting Global Order

GLOBAL TRADE AND INFRASTRUCTURE NETWORKS

- Investigate the impact of shifting global alliances, trade routes, and energy supply chains on critical infrastructure planning and development;
- Analyze how changes in geopolitical landscapes (e.g., Belt and Road Initiative, US-EU-China relations) are reshaping infrastructure priorities globally.

SECURITY AND STRATEGIC INFRASTRUCTURE

- Examine how geopolitical transitions affect the allocation of global resources, particularly for energy and water systems;
- Develop strategies to secure critical infrastructure (energy grids, transportation systems, water supplies) from digital threats.

Theme #3—Spatial Planning for Infrastructure

SOCIAL AND SOCIETAL TRENDS IN INFRASTRUCTURE

- Investigate how aging populations, urbanization, and the shrinking middle-class influence infrastructure demand and design;
- Focus on the integration of smart technologies to enhance urban and rural living while ensuring inclusivity.

DESIGNING SUSTAINABLE URBAN AREAS FOR 2050

- Study how rapid urbanization affects infrastructure needs in megacities and emerging urban centers, notably in emerging countries;
- Research how urban infrastructure can be adapted to withstand climate-related risks, such as extreme weather and resource shortages;
- Develop strategies for inclusive urban planning infrastructure development.

Theme #4—Digital Integration and Smart Infrastructure

DIGITAL SYSTEMS APPLIED TO INFRASTRUCTURE

- Research infrastructure needs for 5G, high-speed broadband, and digital platforms to support smart urban solutions;
- Explore how to develop smart cities that leverage data, IoT, and AI to improve urban management, transportation, and public services.

PROSPECTIVE TECHNOLOGIES FOR INFRASTRUCTURE

- Focus on how automation (e.g., autonomous vehicles, AI-driven maintenance) can improve the efficiency of infrastructure systems and financing.

VISIT OUR WEBSITE:
INFRAVISION-THINKTANK.COM



Think Tank with the ambition to build strong positions on forward-looking and hot topics related to infrastructure.

Thought leadership and knowledge sharing with the support of the whole infrastructure ecosystem.

CONTACT US

For more information or to submit your application, please contact us or send your intentions through the link below.

Our LinkedIn : <https://lnkd.in/eXdM66YD>



Check our website for more informations !

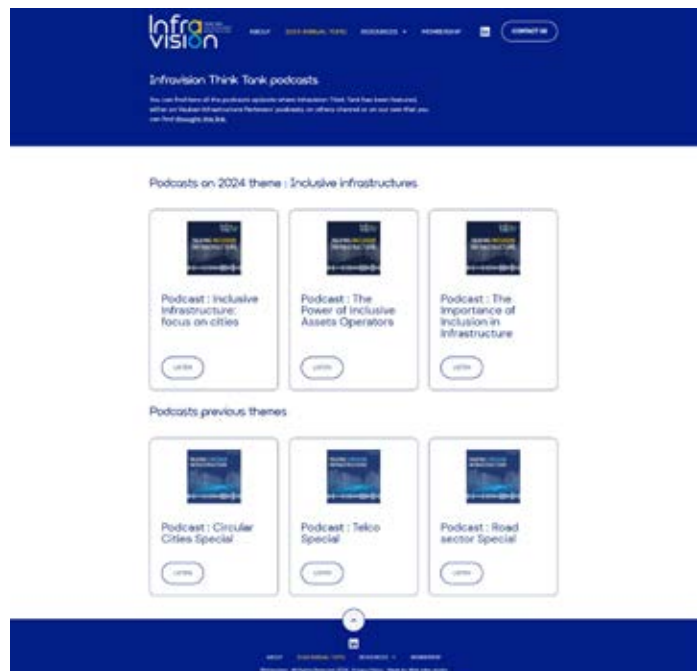
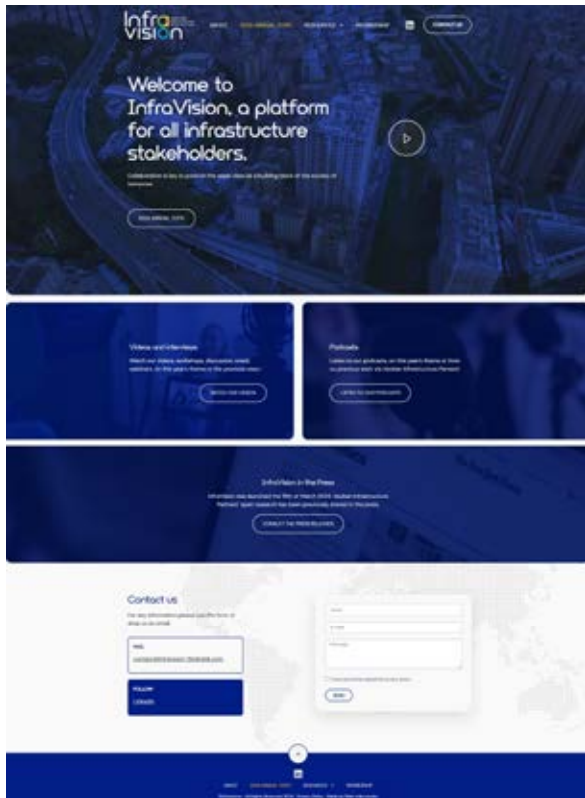


<https://infra-vision-thinktank.com/>

Check our YouTube channel !



youtube.com/@InfraVisionThinkTank



BIOGRAPHIES OF EXPERTS

BRYAN T. ADEY

Bryan T. Adey is the Professor of Infrastructure Management at ETH Zurich and head of its Institute for Construction and Infrastructure Management. His work focuses on improving the efficiency and effectiveness of infrastructure management. This includes estimating the risk related to infrastructure and the resilience of the infrastructure systems. He works on infrastructure management issues related to many types of infrastructure, including road networks, rail networks, water distribution networks, sewer networks and building portfolios. He is also the deputy head of the Department of Civil, Environmental and Geomatic Engineering. Prof. Adey holds a Doctorate in Technical Sciences from ETH Lausanne and an MSc in Structural Engineering from the University of Alberta.

LÁSZLÓ ANDOR

László Andor is a Hungarian economist and the Secretary General of the Foundation for European Progressive Studies (FEPS). He is also a former EU Commissioner for Employment, Social Affairs, and Inclusion. László Andor has held academic positions at Corvinus University, Hertie School of Governance, ULB, and Sciences Po. He has been involved with think tanks such as EPC and Friends of Europe. László Andor holds degrees from Corvinus University, University of Manchester, and the Hungarian Academy of Sciences, and has received honors such as the Legion of Honor.

ZOI CHRISTOFOROU

Zoi Christoforou is a Senior Lecturer at the École Nationale des Ponts ParisTech and an Associate Professor at the University of Patras in Greece. She oversees transport modules at the École Polytechnique and has expertise in transport studies, traffic engineering, and transport safety. Her research focuses on modeling vehicle, train, pedestrian, and personal mobility device movements. She has held significant roles, including project manager for the Athens Olympics' Transportation Planning Department. She also consults on urban

and peri-urban mobility projects, including new mobility solutions. Zoi Christoforou also holds a PhD from the École Nationale des Ponts et Chaussées.

ESTHER DUFLO

Esther Duflo is the Abdul Latif Jameel Professor of Poverty Alleviation and Development Economics at MIT and co-founder of J-PAL. Her research focuses on designing effective social policies for the poor, covering health, education, financial inclusion, environment, and governance. She has received many awards, including the 2019 Nobel Prize in Economic Sciences. She co-authored *Poor Economics* and *Good Economics for Hard Times* with Abhijit Banerjee. Esther Duflo is also a member of the National Academy of Sciences and a Corresponding Fellow of the British Academy. Esther Duflo graduated from the École Normale Supérieure in Paris with degrees in history and economics and earned her PhD in Economics from MIT in 1999.

SARAH FISHER ELLISON

Sarah Fisher Ellison is a Senior Lecturer in Economics at MIT. Her research has been primarily in industrial organization, with substantial work on the pharmaceutical industry and ecommerce. This research has been published in top international journals, won multiple awards, and been widely cited. Topics in urban and spatial economics have become a more recent area of interest, with ongoing work on real estate markets and transportation infrastructure. She has also had a distinguished teaching career, winning multiple awards and creating an online course that had attracted over 100,000 learners. She has served on the editorial boards of several top journals and is currently serving as the faculty lead for MIT's Masters in Data, Economics, and Design of Policy.

SÉBASTIEN FRAISSE

Sébastien Fraisse is the President of the executive board of Indigo parking. He has dedicated his career to serving urban dwellers. He began his career at the Ministry of Public Works, overseeing major road projects in Moselle, France. After joining ASF in 2001 and following VINCI's acquisition of ASF, he became Deputy Managing Director for AF (VINCI Autoroutes). Later, he joined VINCI Park as Executive Vice President, France. In 2014, he became a member of Indigo Group's Executive Board, and in November 2022, Group Managing Director. In April 2023, he assumed the role of President of the Executive Board. Sébastien Fraisse is a graduate of École Polytechnique and École Nationale des Ponts et Chaussées engineering schools.

PHILIPPE GAGNEPAIN

Philippe Gagnepain is a Professor of Economics at Paris School of Economics - Université Paris 1. His research focuses on empirical industrial organization, with a particular emphasis on competition and regulation. He has extensively studied sectors such as public transportation, mobile telephony, and air transport, analyzing how firms operate either as regulated monopolies or in competitive environments. He has published extensively, including the paper "Contract Choice, Incentives, and Political Capture in Public Transport Services," co-authored with Marc Ivaldi. Dr. Philippe Gagnepain holds a PhD in Economics from Toulouse School of Economics.

HARVEY HOLLINS

Harvey Hollins is the founder and managing director of Hollins Consulting. With over seven years of experience as the former Director of Urban and Metropolitan Initiatives for the State of Michigan, he has earned a strong reputation as an expert in urban economic development. He also has an extensive background in government administration and is recognized for his expertise in crisis management. Harvey holds a Master's degree in Public Policy from the University of Michigan.

ELISABETH KOTTHAUS

Elisabeth Kotthaus is the Head of Unit at the European Commission's DG Transport. Committed to inclusive and equitable policies, she is recognized for her expertise in developing regulations to strengthen passenger rights in Europe, and she promotes diversity and inclusion in the transport sector. Joining the European Commission in 2005, Elisabeth has worked in various areas including TEN-T, the internal market for electricity and gas, anti-fraud, transport, Justice & Home Affairs, and the Digital Agenda. Prior to her role at the Commission, she was a partner specializing in employment law at a major law firm in Germany.

SÉVERINE LAUGIER

Séverine Laugier is the Social Innovation and New Economic Models for Growth Project Director at Sodexo, a position she has held since October 2018. In this capacity, she integrates innovative solutions that enhance Sodexo's impact on society and promote sustainable business practices. Before this role, she served as the External Affairs Manager at Sodexo Benefits and Rewards Services, where she managed international and public affairs. She coordinated subsidiaries in Latin America, Europe, and Asia, while also engaging with European institutions. Séverine Laugier holds a Master's degree in European Law from the University of Aix-Marseille.

YVES LEDERER

Yves Lederer is the CEO of Coriance, a district heating company specializing in renewable energy solutions. Coriance, established over 25 years ago, has become a leader in the energy transition sector by focusing on green energy sources such as geothermal, biomass, and waste incineration, to provide district heating networks. The company now boasts over 500 employees, operates 44 production sites, and invests around USD100m annually. In 2022, Coriance avoided the emission of approximately 600,000 tons of CO₂, showcasing its commitment to environmental sustainability. Yves Lederer is a graduate of SKEMA Business School.

OLIVIER MANTEI

Olivier Mantel is a renowned French cultural leader and Director General of the Paris Philharmonic. He co-founded Accentus, a leading chamber choir, and played a key role in professionalizing the French music scene. Olivier Mantel also co-founded Instant Pluriel, launching the musical season at the Bouffes du Nord and La Chambre Philharmonique. He is co-partner of The Bouffes du Nord and Athénée theaters in Paris. Previously, he served as Director of the Opéra-Comique, contributing to its revival. Olivier Mantel holds several honors, including being a Chevalier of the Légion d'honneur and the Ordre National du Mérite. He studied literature and musicology at the Sorbonne and EHESS.

SADIE MORGAN

Sadie Morgan is a renowned British architect and co-founding director of dRMM, a RIBA Stirling Prize-winning architecture studio. As a board member of the National Infrastructure Commission, she shapes the strategic vision for the UK's infrastructure, ensuring projects are sustainable and future-proof. Sadie Morgan chairs the Independent Design Panel for High Speed Two (HS2), guaranteeing high design standards for this critical transport project. She also contributes to the Thames Estuary 2050 Growth Commission and serves as one of the Mayor's Design Advocates for the Greater London Authority. Sadie Morgan holds an MA from Royal College of Art.

SERGIO OSLÉ

Sergio Oslé is the CEO at Telefónica Spain. He is a telecommunications engineer with an MBA from Stanford University Graduate School of Business. He spent 13 years as a partner at McKinsey & Co, overseeing the Telco and Media accounts. In 2017, he joined the Telefónica Group, becoming President of Movistar+. With a passion for communications, technology, video, and entertainment, Oslé possesses a profound understanding of the pay television industry and global audiovisual markets. In his role as COO of Telefónica Spain, he han-

dles various critical areas, including Commercial and Marketing, Video Spain, Network and IT Operations, Territories, Transversal Processes, and Simplification. His expertise and vision have been instrumental in shaping the telecommunications landscape.

SÉBASTIEN PETITHUGUENIN

Sébastien Petithuguenin is the CEO of PAPREC Energies, part of PAPREC Group, a leading French recycling company. Starting his career as a Business Analyst at Connex UK, Sébastien later joined PAPREC in 2003 as a project manager. With his leadership, the company has grown and made significant strides in the recycling industry. Under his guidance, PAPREC has become a prominent player in the field, contributing to environmental sustainability and the circular economy efforts. Sébastien's dedication to driving positive change through recycling has earned him recognition as a key figure in the industry. Sébastien holds degrees from École Normale Supérieure and ENSAE.

ANTOINE PICON

Antoine Picon is the G. Ware Travelstead Professor of the History of Architecture and Technology at the Harvard Graduate School of Design, where he also chairs the PhD program in Architecture, Landscape Architecture, and Urban Planning. His work explores the intersections of architectural and urban space with technology and society. Antoine Picon has published extensively on the impact of digital culture on architecture and urban planning. He has received numerous accolades, including the Georges Sarton Medal. He is also a member of the Académie d'Architecture and a Chevalier des Arts et Lettres. Antoine Picon holds degrees from École Polytechnique, École Nationale des Ponts et Chaussées, and a PhD in history from the École des Hautes Études en Sciences Sociales.

BIOGRAPHIES OF EXPERTS

WILFRIED SAND-ZANTMAN

Wilfried Sand-Zantman is a Professor of Economics at ESSEC Business School and an Associate Researcher at the Toulouse School of Economics. He graduated from ENSAE (Paris) and holds a PhD from the Université of Toulouse. Currently Head of the Economics Department of ESSEC, he was previously the director of the PhD Program at the Toulouse School of Economics and he is a former board member of the French Gambling Commission (ANJ). Wilfried's research interests include industrial economics, market regulation, and, more generally, information economics. His articles have been published in leading international academic journals such as the Journal of Economic and Management Strategy, the Journal of European Economic Association, Management Science, and the Rand Journal of Economics. Wilfried has been working with Altermind on leading competition and regulation cases.

JÉRÔME STUBLER

Jérôme Stubler is CEO of Equans (part of Bouygues Energies & Services). A graduate of École Polytechnique, he started his career at Freyssinet where he was in charge of several infrastructure projects such as the 'Normandy Bridge' before becoming its CEO. Jérôme Stubler also headed Vinci Construction as CEO before joining Engie and Equans as a CEO. His strategy for Equans relies on electrification, decarbonization, digitization and supporting the reindustrialization.

SIMON WHISTLER

Simon Whistler is the Head of Real Assets at Principles for Responsible Investment (PRI). He joined PRI in 2018 and leads their initiatives to help real assets investors integrate responsible investment practices, focusing on issues such as climate change, human rights, and biodiversity. Before joining PRI, he spent over 10 years at Control Risks, where he managed a team providing political and social risk advisory services to investors and corporate clients in Latin America. Simon Whistler holds an MSc in Latin American Politics from the University of London and a Bachelor of Arts in Modern Languages from the University of Bristol.

GLOSSARY

AI	Artificial Intelligence
ADB	Asian Development Bank
CNLE	Conseil National des politiques de Lutte contre la Pauvreté et l'Exclusion sociale
CSR	Corporate Social Responsibility
CBA	Cost-Benefit Analysis
DFIs	Development Finance Institutions
EVs	Electric Vehicles
ESG	Environmental, Social and Corporate Governance
ETS	European Emissions Trading System
EIB	European Investment Bank
EPSR	European Pillar Social Rights
EU	European Union
FEI	Financial and Economic Index
GDP	Gross Domestic Product
GHGs	Greenhouse Gases
GNI	Gross National Income
IADB	Inter-American Development Bank
ICT	Information and Communications Technology
IEA	International Energy Agency
ILO	International Labor Organization
IMF	International Monetary Fund
IPA	Infrastructure and Projects Authority
IBA	Integrated Bilateral Agreements
IPCC	Intergovernmental Panel on Climate Change
IWA	Impact Weighted Accounts
LEZ	Low Emission Zones
MDBs	Multilateral Development Banks
NIC	National Infrastructure Commission
NZIA	Net-Zero Industry Act
OECD	Organisation for Economic Co-operation and Development
PEVs	Plug-in Electric Vehicles
SCBA	Social Cost-Benefit Analysis
SCF	Social Climate Fund
SFDR	Sustainable Finance Disclosure Regulation
SDGs	Sustainable Development Goals
SPP	Sustainable Purchasing Policy
UK	United Kingdom
UN	United Nations
UNESCO	United Nations Educational, Scientific and Cultural Organization
US	United States
USD	United States Dollar

MAIN BIBLIOGRAPHIC REFERENCES

ARTICLES

Alcaide Manthey S.N., "The role of community-led social infrastructure in disadvantaged areas", 2024.

Aschauer D.A., "Is Public Expenditure Productive?", *Journal of Monetary Economics*, n° 23, pp. 177-200, 1989.

Avellán L., Galindo A.J., Lotti G., Rodríguez J.P., "Bridging the gap: Mobilization of multilateral Development Banks in Infrastructure, World Development", Volume 176, 2024.

Bajar, S., Rajeev, M., "The Impact of Infrastructure Provisioning on Inequality in India: Does the Level of Development Matter?", *Journal of Comparative Asian Development*, Volume 15, 2016 - Issue 1

Caldéron C., Moral-Benito E., Servén L., "Is Infrastructure Capital Productive? A Dynamic Heterogeneous Approach", WP 5682, 2011.

Cavender K.P., "Predatory Inclusion and the Flint Water Crisis", 2023.

Consoli D., Marin G., Marzocchi A., Vona F., "Do green jobs differ from non-green jobs in terms of skills and human capital ?", 2016.

Gagnepain P., Massoni S., Mayol A., Staropoli C., "The Effect of Public Transport Pricing Policy: Experimental Evidence", 2024.

Ghosh R., Healy A., Prabhune A., Mallavaram A., Raju S., Chockalingam N., "Provision of rehabilitation and assistive technology services in a low resource setting during the COVID-19 pandemic and introduction of telehealth: service users' and providers' perspectives", 2022.

Henisz W., Dorobantu S., Nartey L., "Spinning Gold: The Financial Returns to External Stakeholder Engagement", *Strategic Management Journal*, 2011.

Huang K., Li X., Liu X., Seto K. C., "Projecting global urban land expansion and heat island intensification through 2050", 2019.

Morckel V., "Why the Flint, Michigan, USA water crisis is an urban planning failure", 2017.

Pandey B., Brelsford C., Seto K.C., "Infrastructure inequality is a characteristic of urbanization", 2022.

Rajan R., "Communities, the state, and markets: the case for inclusive localism", *Oxford Review of Economic Policy*, Volume 37, 2021.

Rouhana F., Zhu J., Chacon-Hurtado D., Hertel S., Bagtzoglou A.C., "Ensuring a just transition: The electric vehicle revolution from a human rights perspective", 2024.

Sarmiento L., "The air quality and well-being effects of low emission zones", *Journal of public economics*, 2023.

Zhao R., de Jong M., Edelenbos J., "Will the true inclusive city rise? Mapping the strengths and weaknesses of the city ranking systems", 2023.

Zhou, Y. et al., "Satellite mapping of urban built-up heights reveals extreme infrastructure gaps and inequalities in the Global South", *Proceedings of the National Academy of Sciences*, November 2022.

BOOKS

Amerasinghe P., *Urban Wastewater and Agricultural Reuse Challenges in India*, *International Water Management Institute*, 2013.

Clearfield C., Tilcsik A., *Meltdown: Why Our Systems Fail and What We Can Do About It*, 2018.

REPORTS

ADEME, *Analyse des conditions de reprise d'une valeur équitable du carbone*, 2022.

ADEME, *Rapport d'audit sur les tarifs sociaux de l'énergie*, 2013.

Agence Internationale de l'Énergie, *Subventions aux combustibles fossiles dans les transitions vers les énergies propres: le temps d'une nouvelle approche ?*, 2023.

Banque de France, *To What Extent can Long-Term Investment in Infrastructure Reduce Inequality*, 2017.

Cour des comptes, *Le chèque énergie*, 2022.

European Commission, *Forging a sustainable future together—Cohesion for a competitive and inclusive Europe—Report of the High-Level Group on the Future of Cohesion Policy*, 2024.

European Commission, *Global Gateway Overview*, 2021.

Federal Reserve Bank of Philadelphia, *Getting to Work on Time—Public Transit and Job Access in Northeastern Pennsylvania*, 2018.

Foundation for European progressive studies, *The path toward a socially just Fit for 55 package*, 2023.

Global Infrastructure Hub, *Inclusive infrastructure and social equity*, 2019.

International Energy Agency, *Special Report on Carbon Capture Utilization and Storage*, 2020.

International Energy Agency, *World Energy Employment 2023*, 2023.

International Monetary Fund, *World Economic Outlook, chapter 3: Is it time for an infrastructure push? The macroeconomic effects of public investment*, 2014.

Motability, *The Transport Accessibility Gap*, 2022.

OECD, *Who's fit for the low-carbon transition? Emerging skills and wage gaps in job ad data*, 2022.

OECD, *Brick by Brick (Volume 2): Better Housing Policies in the Post-COVID-19 Era*, 2023.

Overseas Development Institute, *Spatial Inequality and Urban Poverty Traps*, 2010.

UNIDO, *Quality Infrastructure: Good governance in quality policy design*, 2022.

United Nations Department of Economic and Social Affairs, *Inequality in a rapidly changing world: World Social Report*, 2020.

United Nations, *Global Sustainable Development Report chapter 2: The infrastructure—Inequality—Resilience nexus*, 2016.

UNOPS, *Infrastructure for gender equality and the empowerment of women*, 2020.

World Bank, *An Alternative Approach to Project Selection: The Infrastructure Prioritization Framework*, 2016.

World Bank, *Increasing access to technology for inclusion*, 2023.

World Bank, *Mind the gap: Time to rethink infrastructure finance*, 2022.

World Bank, *QII Annual report quality infrastructure investment partnership*, 2021.

LIST OF FIGURES, EXPERT POSITIONS, FOCUS, CASE STUDIES AND TABLES

FIGURES

Figure 1	Income inequality: map of Gini coefficient, 2023	7
Figure 2	Trajectories of income inequalities in high-level countries	8
Figure 3	A framework on capabilities	9
Figure 4	Perception of inequalities in France	11
Figure 5	Highways spending growth rate and Gini indices	15
Figure 6	Guiding principles to build 'quality infrastructure'	17
Figure 7	Quality of living is the result of 'formal' and 'informal' systems	18
Figure 8	Trends to barrier-free facilities at railway stations	22
Figure 9	Affordability of 1GB of data as a percentage of Gross National Income per capita	25
Figure 10	Megatrends impacting the infrastructure sector over the next decades	31
Figure 11	Distribution of per capita urban built-up infrastructure	33
Figure 12	Share of urban built-up infrastructure in the North and South	33
Figure 13	Vulnerability to climate change per country	38
Figure 14	Per capita emissions by group in 2019 (tCO ₂ e per capita)	38
Figure 15	Evidence map of the infrastructure-inequality-resilience nexus	39
Figure 16	Social priorities according to principal groups affected by the net-zero transition	40
Figure 17	Impact of inclusive and climate compatible infrastructure and inequalities	41
Figure 18	Social divides & increasing costs: two main concerns of the green transition	42
Figure 19	Designing green policies embedding social dimensions	42
Figure 20	The three pillars of the Just Transition Mechanism	43
Figure 21	Priorities of public infrastructure policies	45
Figure 22	Priorities of public infrastructure policies by type of infrastructure	45
Figure 23	The European Pillar of Social Rights	46
Figure 24	The Design Vision	52
Figure 25	Number of rentals per subscriber per week	56
Figure 26	Social and environmental measures effectiveness perceptions for transportation	59
Figure 27	Social and environmental measures effectiveness perceptions for energy	59
Figure 28	CSR: Most important expectations	64
Figure 29	Principles of Impact Weighted Accounts (IWA) methodology	65
Figure 30	Application of IWA on 4 enterprises	68
Figure 31	The changing role of PPPs	73
Figure 32	Sequence of the Infrastructure Prioritization Framework	82
Figure 33	Residential Water Lead Levels in Flint, Michigan from 2016 to 2018	83
Figure 34	5 transitions, 26 megatrends	85

LIST OF FIGURES, EXPERT POSITIONS, FOCUS, CASE STUDIES AND TABLES

EXPERT POSITIONS

Expert position 1	Zoi Christoforou: transport and inequalities	15
Expert position 2	Sara Fisher Ellison: transport and the role of public sector	16
Expert position 3	Elisabeth Kotthaus: gender equality initiatives benefit all!	16
Expert position 4	Inclusive infrastructure: experts' insights from the workshops	20
Expert position 5	Sébastien Petithuguenin: the role of waste management to build more equitable societies	23
Expert position 6	Jérôme Stubler: EV, a critical social issue in the energy transition	35
Expert position 7	Sébastien Fraisse: low emission zones, high social costs on the line	36
Expert position 8	László Andor: Europe needs, right now, a socially just transition	40
Expert position 9	Gwenola Chambon: the Five-A compliance compass	51
Expert position 10	Sadie Morgan: universal design for more acceptability	51
Expert position 11	Bryan Adey: "data for infrastructure", stay up to date with users' behaviors and expectations	58
Expert position 12	Wilfried Sand-Zantman: social and environmental pricing, theories and applications	71
Expert position 13	Philippe Gagnepain: rethink contract design	72
Expert position 14	Simon Whistler: the UN supporting the just transition of the financial community	75
Expert position 15	Xavier Girre: the role of multilateral institutions for the just transition in emerging countries	76
Expert position 16	Antoine Picon: "People are the new infrastructure" of the green transition	79

FOCUS

Focus 1	Perceptions: more important than ever?	11
Focus 2	The equity-efficiency trade-off: Okun's 'leaky bucket'	12
Focus 3	Assessing the impact of transport infrastructure investment on GDP	13
Focus 4	Japan policy for transport accessibility: Building 'barrier-free' infrastructure	22
Focus 5	India's Saubhagya Scheme: making the grid accessible everywhere	23
Focus 6	Integrated waste management in Belo Horizonte, Brazil	25
Focus 7	The National Strategy for Digital Inclusion in France	26
Focus 8	Electric vehicles: too expensive to be fair	35
Focus 9	Low emission zones: major social risks ahead	36
Focus 10	Reskilling workers in the EU	44
Focus 11	The 'Design Vision' of the High Speed Two project in the UK	52
Focus 12	Generating financial value with stakeholder engagement	53
Focus 13	Autolib': a pricing failure	56
Focus 14	More and more constraining regulatory requirements for investors: the Sustainable Finance Disclosure Regulation (SFDR)	64
Focus 15	Price discrimination in the water supply: dealing with asymmetric information	69
Focus 16	Consumer energy subsidies instead of inclusive-driven tariffication	69
Focus 17	Set the pricing strategy of the 'just transition': an intricate challenge	70
Focus 18	Social procurement in Victoria, Australia	72
Focus 19	The Social Climate Fund: turning revenues into financial support for vulnerable groups	77

Focus 20	National infrastructure planning authorities in the UK	78
Focus 21	The Investing in Canada Plan: the use of integrated bilateral agreements (IBAs)	79
Focus 22	Eurocities: the network of European cities committed to more inclusive urban areas	80
Focus 23	Use evidence-based analysis for project prioritization	82
Focus 24	Flint water crisis in the United States: the social costs of non-inclusive governance	83

CASE STUDIES

Case Study 1	The Paris Philharmonic: an 'inclusive institution'	21
Case Study 2	Paprec incineration plant in Mumbai	24
Case Study 3	Telefónica: partnering for more digital inclusion	28
Case Study 4	Sodexo: "La Passerelle", designed for impact and inclusion	54
Case Study 5	EDF: the just transition as the core of EDF's raison d'être	62
Case Study 6	Coriance: committed to better clean energy access in vulnerable areas	63
Case Study 7	ALiS: building on the inclusive nature of highways	66
Case Study 8	Telefónica: using the IWA framework to link ESG impact with financial performance	67
Case Study 9	Equans and Rotterdam Municipality: taking up the challenge of EV charging for all	74
Case Study 10	Indigo: partnering with cities to ensure more viable urban areas in the future	81

TABLES

Table 1	Infrastructure's potential impact on key development areas	13
Table 2	Category description of the main beneficiaries	26
Table 3	Price evolution 2011-2017	56
Table 4	Leveraging finance for common good on the debt and equity sides	76

