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Investment Gap in the CEE Region: How Much Investment is Needed and Strategies for Delivering It

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Executive Summary

The CEE region faces a multi-billion investment gap. In order to catch up with its western European counterparts, the countries will need to make sizeable investments in their infrastructure, particularly in the transport and energy sectors. The investment pressures are further exacerbated by the increasing need for climate change adaptation and green transformation. Fulfilling these investment needs will be no easy feat and will require utilizing all funds possibly available – including public, private, and EU funds.

This paper assesses the size of the investment gap in the CEE region utilizing both a top-down and a bottom-up approach. Both approaches lead to the conclusion that the region must invest tens of billions every year to narrow the gap to the rest of the EU in the medium- to long-term. The transport and energy sectors, which are crucial factors in the green transformation, will require the greatest proportion of funding. The complexity of projects within these sectors also creates the space for utilizing PPP financing.

The findings of the work below have several policy implications:

- Investments in infrastructure must be increased across the board. The needs are particularly acute in the energy sector, which is vital for preparing the region for green transition.
- Public investments by themselves are unlikely to suffice even accounting for the extensive funding available from the EU. If the region is to fulfill its investment needs, utilizing other financing means will likely be necessary.
- Public-private partnership (PPP) funding is a viable option to fill the gaps in funding, especially at times of high public deficits. However, PPP projects are not risk-free and their suitability to a given investment plan must always be carefully considered. The value-for-money principle should be applied to both cases of public and PPP funding.
- PPP projects are not suitable for outsourcing public funding due to weak institutions. Managing PPP projects requires a well-prepared and capable administration able to carry out professional and transparent tendering processes as well as overseeing the progress of the project.
- PPPs are a good option for highly complex projects that require particular expertise and extensive managerial capabilities. In these cases, the costs of funding the investments publicly might be higher due to lacking capabilities relative to the public sector, which is more flexible and might possess more expertise in the given investment area.
- There are sectors naturally more suited for PPP investments such as transport and energy sectors. Meanwhile some other sectors remain more difficult for running PPP projects and require complex solutions, higher level of management expertise and innovative ideas if a PPP model is to be used.

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Investment gap and why we should care

The mismatch between the world's investment needs and the current levels of investments represents the global investment gap. The current world is facing immense investment pressures. Population growth, urbanization and globalization are all putting continuous pressure on the world's infrastructure and energy. In order to sustain development and fulfill the ambitious Sustainable Development Goals (SDGs) set forward by the UNDP, global investment needs to be ramped up. In this context, investment represents all of the capital funneled towards maintaining and developing a state - including investments across all sectors such as education, healthcare, transport, energy, and others.

Climate change further exacerbates the issue creating additional financing needs to provide for climate change mitigation and adaptation. It is imperative that major investments are made towards green transition, sustainability efforts, and environmental protection. Achieving anything close to the Paris Agreement goals of keeping global warming below 1.5 degrees Celsius will require immense financial resources to transform global energy production and infrastructure.

The estimations of the global investment gap range from $5.5 trillion (**McKinsey 2017**) **to well over $100 trillion** (**IRENA 2023**). The estimations vary depending on the different goals set out. On either side, it is clear the figure is significant and has vast implications for global development and the capability to adapt to climate change. Moreover, it is the less developed and less affluent countries that constitute a large part of this gap. According to **UNCTAD** (2023), emerging markets are underinvesting by as much as $4 trillion annually compared to their SDG needs. A study by **McKinsey** also estimates that 63% of the investment needs will be in emerging economies. Closing the gap would thus have major implications for rectifying the global inequalities.

Europe is estimated to have an infrastructure investment gap of $2 trillion[1] (**Global Infrastructure Outlook**). Here also the experience varies greatly across countries. The central, eastern and south-eastern region tends to lag behind its western counterparts and observes the greatest mismatch between the needs and actual investments. This has implications not only for the individual countries, but hinders the development of the whole Euro Area. Closing these gaps should therefore be of both national and common European interest.

Addressing this investment shortfall requires concerted efforts at various levels. Sticking to long-term plans, empowering local leaders, and implementing consistent infrastructure policies are seen as essential (**NIC**). The importance of cross-sector collaboration, with government and industry working together to mitigate cost escalation and delivery delays, is also emphasized (**Infrastructure Australia**). Several specific strategies have been proposed to help resolve insufficient levels of investment. These include, for example, mobilizing private sector involvement, leveraging pre-packaged financing instruments, risk-sharing, or promoting cooperation among Multilateral Development Banks (MDBs) and insurers (**AIIB**).

1 This estimate does not account for investments needed to fulfill climate goals.

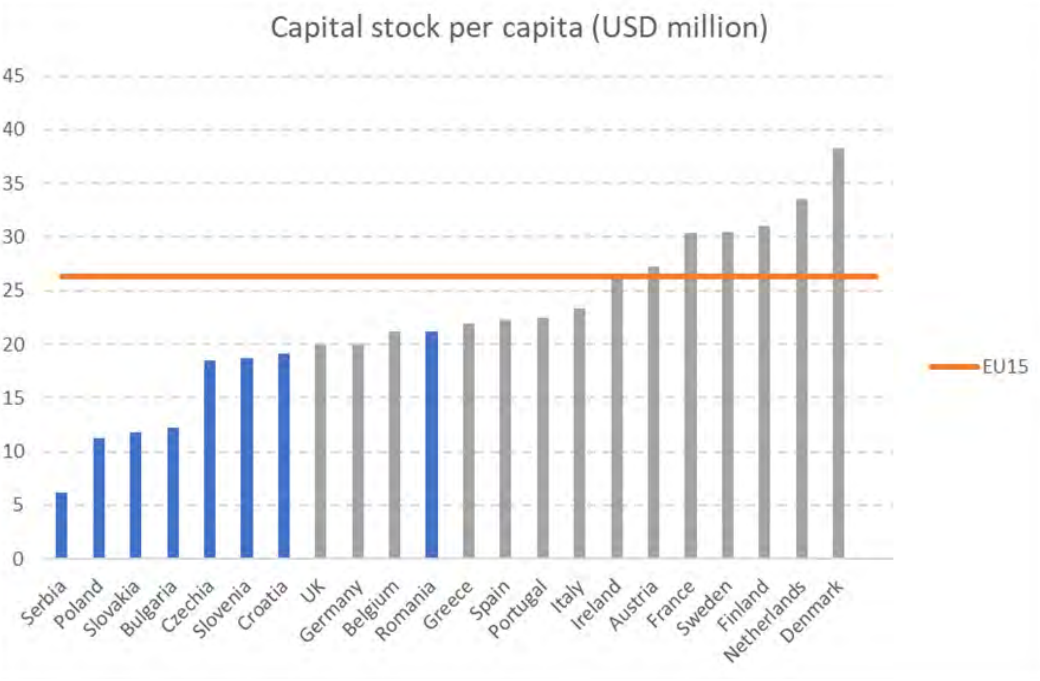
What Does This Mean on the Ground? Bottom-up view of the investment gap in CEE

CEE countries observe the lowest values of capital stock per capita among their European peers. Capital stock is a helpful overall measure of a country's state of infrastructure. It is derived from the value of all public assets, including physical infrastructure such as roads, railways or power plants. The EU15 countries offer themselves as a natural benchmark for the CEE countries. The higher levels of development and incomes provide a reasonable aspiration.

When compared to the average size of capital stock of the EU15[2] countries, it is clear that the CEE region is lagging behind. The average value of capital stock per capita in EU15 is over $26 million. For the CEE region, the average is just shy of $15 million per head. It is a markant difference signaling that a sharp increase in investments will be needed over the next few years if the region wishes to catch up to its western counterparts.

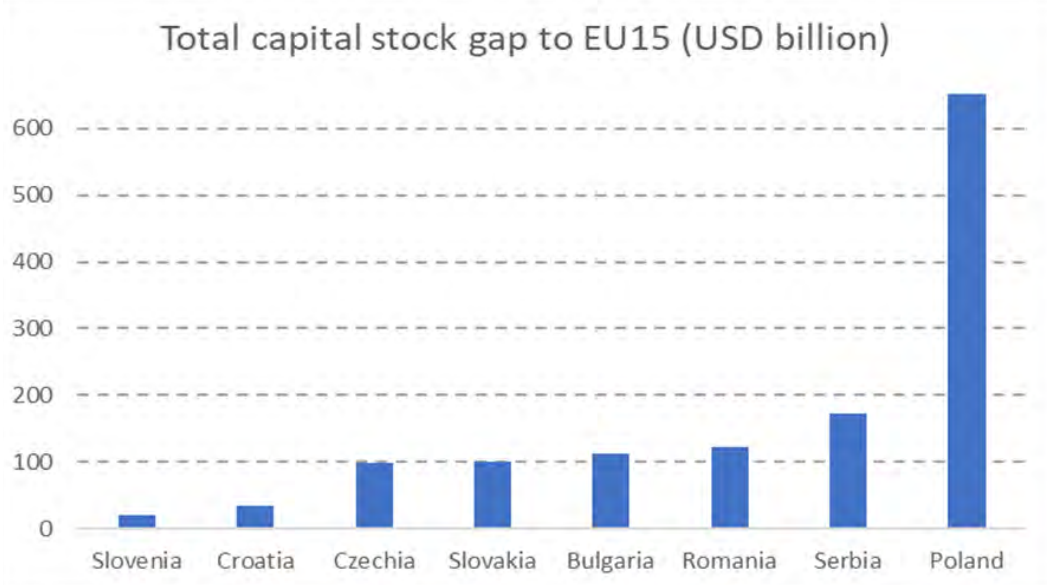
This makes the average gap of CEE capital stock to that of EU15 almost $15 million per capita when adjusted for inflation. In total numbers it represents gaps ranging from $19 billion to well over $100 billion. Poland and Serbia observe the greatest gaps to EU countries. Slovenia and Croatia, on the other hand, have a relatively high per capita stock value.

The capital stock approach allows for assessing the investments needed in the CEE region to reach similar levels of infrastructure development as the EU15. Capital stock values do not consist solely of the physical infrastructure, which explains why some of the gaps appear much larger than the literature on investment gaps estimates. It must be



Source: IMF, Investment and Capital Stock Dataset, 1960-2017; GLOBSEC calculations

2 Luxembourg is excluded in the calculation due to its capital stock being exceptionally high on a per capita basis (55 billion per head).



Source: IMF, Investment and Capital Stock Dataset, 1960-2017; GLOBSEC calculations

noted that it is unlikely Poland's gap would be this exceptionally greater than the rest of the region. The numbers do not provide a full account of investment gaps or reveal the specific investment needs by country. Nonetheless, they can serve as a starting point for assessing the state of CEE investments and future financing needs.

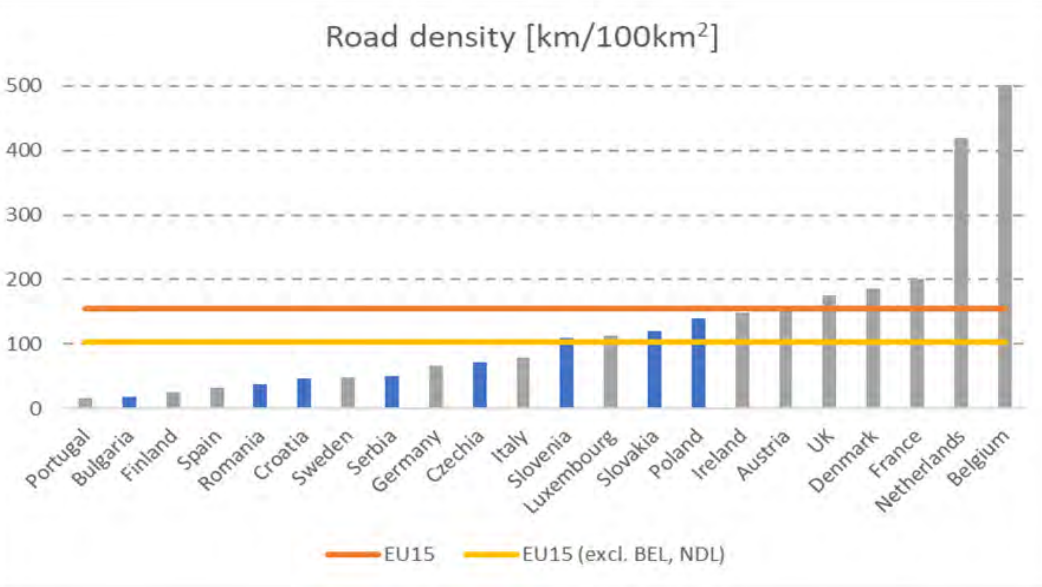
This measure provides only a narrow interpretation of the investment gap. It does not account for the additional investment needs of fulfilling climate goals and reducing global emissions. Nor does it take into account the investment plans of respective countries and the rate of growth of these investments. Such considerations are beyond the scope of this paper, however, we can say with confidence that if climate factors are accounted for, the investment gaps would prove even larger. Capital stock also does not capture the efficiency of the investments in respective countries. As an example, there might be a vast network of roads that increases the country's capital stock even when these are underused and possibly redundant.

Having established that there is a significant gap between the CEE region and the EU15 countries, we now adopt a bottom-up approach and look at indicators in specific industries to assess where the biggest needs in providing effective infrastructure are. Note that only a fraction of what constitutes the investment gaps is covered. A total investment gap is cross-sectoral including sectors such as education, healthcare, energy and others. Here we have chosen to focus on transport and energy infrastructure and the issue of green transition to illustrate the gap. This approach does not attempt to calculate the entirety of the investment gap, but rather showcase how it translates into the realities on the ground and in doing so emphasize the importance of closing it.

Transportation Infrastructure

Data on the size and composition of road infrastructure reveals a sizable investment room. Transport infrastructure is an essential part of economic activity, facilitating the movement of goods and labor. Building and maintaining a quality infrastructure is key for the region's development.

Equaling the EU15 average of road density would require individual countries to invest huge amounts of resources. The data shows vast differences even among the EU15 countries and so matching the average benchmark does not necessarily need to be the ultimate goal. Belgium and the Netherlands, for example, have extremely dense road networks even compared to other western European countries. When these are excluded in the benchmarking, the CEE region is not as far behind. Nonetheless, the required investments into road infrastructure will remain sizable for many countries.

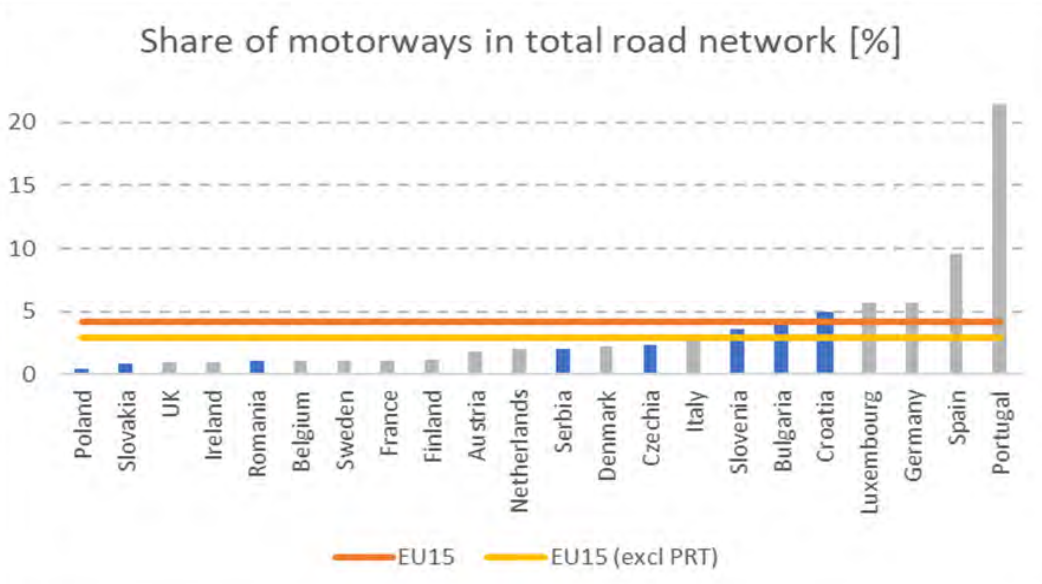


Source: OECD 2021

Table 1: Investment needs in road infrastructure

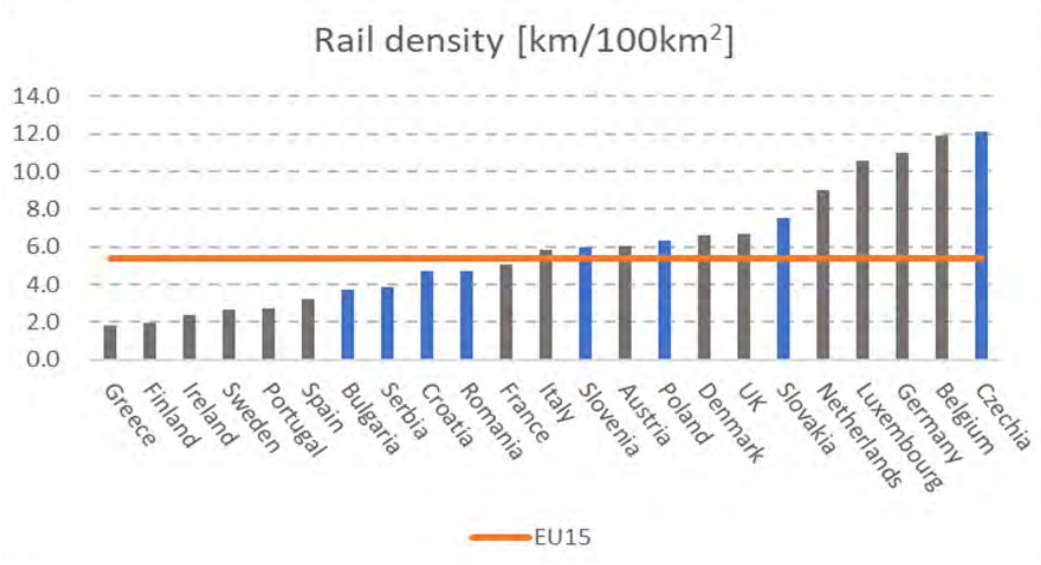
	Current road length (km)	New roads needed (km)	Investment needed (USD billion[3])
Slovenia	38,601.00	N/A	N/A
Croatia	26,690.00	32,209.00	23.34
Czechia	130,663.00	57,760.00	41.85
Slovakia	44,498.00	N/A	N/A
Bulgaria	19,876.00	92,937.00	67.33
Romania	86,234.00	153,546.00	111.24
Serbia	44,239.00	45,514.00	32.97
Poland	426,201.00	N/A	N/A

Statistics on the share of motorways in the road system suggests huge disparities in the quality of road infrastructure. Poland and Slovakia have a dense road network, but they exhibit the lowest shares of motorways among their peers. Despite investment needs for increasing road density being low, they will need to invest in improving their road network quality, increasing the share of motorways in their overall infrastructure. For Poland, matching the EU15 in motorways would mean building over 10-thousand kilometers of highways - easily a cost of over $10 billion. For Slovakia, it similarly represents a multi-billion investment need.



Source: OECD 2021

3 Based on IMF (2020) data on unit costs, adjusted to inflation.

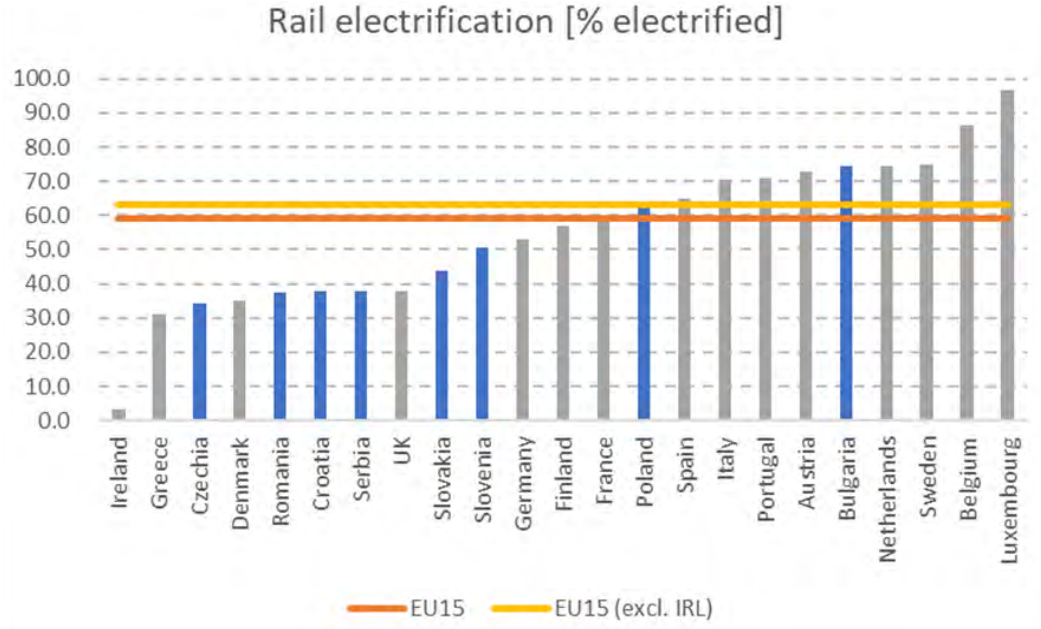


Source: OECD 2021

Rail infrastructure is lacking more in quality than in size. Despite differences across countries, overall the CEE region does not perform poorly in rail density indicators. Half of the countries concerned have rail networks denser than the EU15 average, with Czechia leading also ahead of EU15. Some CEE countries, mainly Bulgaria and Serbia, do need to also invest in increasing their overall rail length, but the gap is not monumental.

Considering rail electrification offers a better insight into the quality of the networks. Electrifying the rail network is costly but results in a more energy efficient railroad with lower operating costs. Rail electrification also plays an important role in achieving climate goals as it significantly reduces carbon emissions.

Ultimately, the goal should be full electrification, but for now matching the EU15 benchmark is a reasonable goal for the CEE countries. While Poland and Bulgaria have already achieved this (albeit for Bulgaria its low-density network will require investment in expansion), the rest of the region is in need of multi-billion investments in rail. Czechia and Romania, in particular, require investments of around $4 billion each to modernize their rail system.



Source: OECD 2021

Table 2: Rail electrification investment needs

	Current rail length (km)	Needs electrification (km)	Investment needed (USD million)[4]
Slovakia	3,627.00	565.02	565.02
Romania	20,104.00	4,386.39	4,386.39
Slovenia	2,178.00	192.16	192.16
Serbia	5,374.00	1,141.26	1,141.26
Czechia	15,488.00	3,859.39	3,859.39
Croatia	3,940.00	839.04	839.04

Source: OECD 2021; RIA 2019

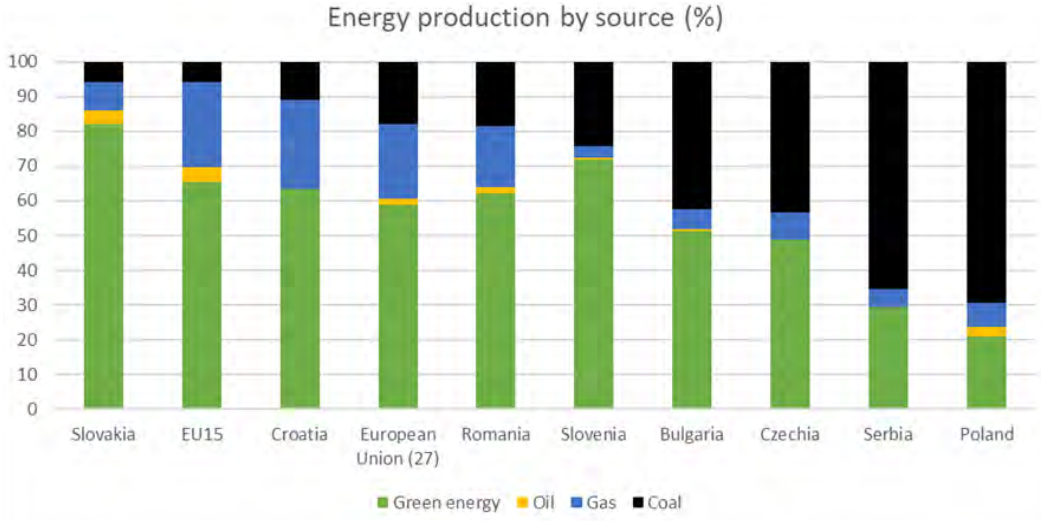
Energy Infrastructure and Green Transition

With the increasingly urgent need for action to mitigate global warming and climate change, innovation in the energy section is of utmost importance. The World Economic Forum estimates that by 2030, the world will require annual investments into clean energy of $4-5 trillion, which is over 3-times the current investment rate (**WEF, 2021**). The International Energy Agency (**IEA, 2021**) estimated that to reach net-zero by 2050, emerging and developing economies could be facing up to $1 trillion annual investment needs in just the clean energy sector alone. Similarly, **UNCTAD (2023)** finds that developing countries need to be investing around $1.7 trillion yearly in renewable energy.

The CEE region is much less green transition-ready than the rest of Europe. The WEF's Energy Transition Index (ETI) ranks countries based on their current energy system performance and preparedness for a green transition. The ranking's top 10 consists entirely of Western and Northern European countries. The CEE region countries rank far lower - from Croatia in 33rd to Serbia in 77th place. This suggests a much greater investment is needed in the energy sector in those countries.

This is also clear when comparing energy production by source. All CEE countries rely more heavily on coal as an energy source than the EU15 countries. There are significant differences also among the CEE region with Poland and Serbia seriously lacking green energy sources in their production. Meanwhile, Slovakia and Slovenia produce high levels of clean energy.

Reducing the use of coal in energy production is a key step in achieving climate goals. The energy investment gap between CEE countries and the EU15 can thus be calculated in terms of the costs of replacing coal with low-carbon energy sources. Using the EU15 share of coal in energy production (<6%) as a benchmark, we can calculate how much reduction is needed across the CEE countries. New, greener energy production capabilities would need to be built as a replacement. Many CEE countries like Poland, Slovakia or Czechia are planning to do so via relying more on nuclear power. The cost of building an additional green energy production capability (measured at per kW basis) then offers insight into the extent of investment needed.



Source: OECD 2021

4 Unit costs based on lower estimates of the Railway Industry Association (RIA 2019) also used by the UK government. Adjusted to USD and inflation.

5 Nuclear power is counted as green energy. From an emission-reduction point of view nuclear energy is clean despite concerns surrounding nuclear waste.

Table 3: Green energy investment needs

	Electricity generation (TWh)	Coal production to replace (TWh)	Additional nuclear power plants needed[6]	Investment needed[7] (USD billion, inflation adjusted)
Slovenia	13.27	2.43	0.51	2.53
Bulgaria	50.58	18.4	3.89	19.22
Romania	56.3	7.11	1.50	7.43
Serbia	34.18	21.57	4.56	22.53
Croatia	14.12	0.7	0.15	0.74
Czechia	85.11	31.94	6.75	33.36
Poland	179.3	113.49	23.99	118.54

Source: Our World in Data 2022; International Energy Agency 2020

Replacing coal power production would require an average investment of almost $30 billion into nuclear power. The International Energy Agency has estimated this cost at $6,920 per kW. Adjusted to inflation, a new nuclear plant with a capability of 600 MW (or almost 5 million MWh annually) would cost an average of around $5 billion. To reduce coal production to the EU15 levels would for many CEE countries mean investing tens of billions into building nuclear power plants. The investment needs are reaching huge amounts, especially for Poland and Czechia. It must be noted here that some countries might, and some definitely will, choose to replace portions of coal production with other green energy sources, which would affect the cost calculations. Regardless, the resulting costs of reducing coal reliance would remain considerable.

These numbers will be offset by the massive operating cost savings that nuclear power enables. The overall operating costs of nuclear power generation are significantly lower compared to coal equivalents. Considering the levelized cost of electricity (LCOE), nuclear power is considerably cheaper over its lifetime – the difference can be as much as $50 USD less per each MWh (**IEA 2020**). Therefore, despite higher initial investments needed, nuclear energy is more cost-efficient in the long term. Moreover, coal increasingly incurs additional costs in the form of carbon permits within the EU. In the effort to curb emissions, the EU employs a 'cap and trade' system, where the more carbon-heavy production has to pay a premium in carbon permits. A more carbon-heavy energy production therefore costs the economy more compared to its greener alternatives. This also serves to highlight the importance of closing the investment gap - not just for environmental but also economic reasons.

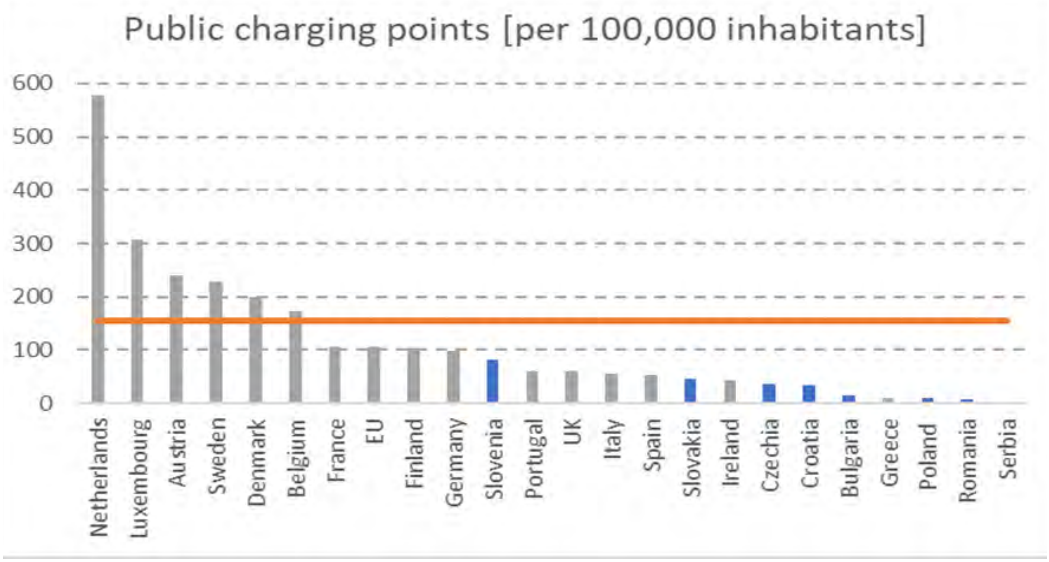
Another important aspect of the green transition will be the electrification of transportation. Trains are widely recognized as the most environmentally-friendly mode of transport and even more so when electrified (**European Environment Agency 2021**). This issue has been explored above but to reiterate - the CEE region faces an investment gap in railway electrification of over $10 billion. On top of that, countries must also invest in the electrification of road transport, with cars as by far the most common mode of transport.

The share of electric vehicles (EVs) in CEE is low but growing. Currently, CEE countries have among the lowest shares of fully electric vehicles. The shares of EVs among newly registered cars in 2022 ranged from 9% in Romania to mere 2% in Slovakia and Czechia. This is compared to the EU average of over 12% and EU15 average of 14% (**Euronews 2023**). Nonetheless, the shares are growing steadily and are expected to do so at a further increasing rate with the approaching EU ban on petrol and diesel cars.

The EV charging stations network requires major investments across CEE. To accommodate for the growing demand and further incentivize the switch to EVs, countries must ensure preparedness of

6 Based on a nuclear plant with 600 MW production capacity, which at average 90% efficiency would generate 4,730,400 MWh. Source: International Energy Agency 2020

7 Based on the overnight costs of building a nuclear power plant in Slovakia, defined as $6920 USD/kW, adjusted to inflation. Source: International Energy Agency 2020



Source: OECD 2022

their EV infrastructure - namely the accessibility of charging stations. In a **McKinsey** consumer survey, charging infrastructure accessibility was ranked as the third biggest barrier to EV purchases. As EVs become more reliable and cheap, access to charging stations is likely to become the most serious concern for prospective buyers. Looking at the number of publicly accessible charging points (measured per 100,000 inhabitants), the CEE countries rank among the worst in Europe. Partially, this is a consequence of the share of EVs being low. However, this is a self-reinforcing issue and to promote faster EV uptake, the countries must invest in improving the charging point network.

On average, the CEE countries are lacking over 15 thousand charging points compared to EU15. Closing this gap would require individual investments of between $8 million (Slovenia) to $300 million in Poland. This number is even higher if the stations were to be fast-charging. It must be noted that this infrastructure network is fast-changing and countries are making strides in providing charging stations. Nonetheless, significant amounts will need to be invested in the medium-term horizon.

Table 4: Investment needed in EV charging station networks

	Public charging points (per 100,000 inhabitants)	Gap (total)	Investment needed (USD million)[8]	Investment needed (fast-charging, USD million)
Slovenia	81	1,554	7.59	94.82
Slovakia	46	6,278	30.64	382.97
Czechia	37	12,314	60.09	751.18
Croatia	34	4,824	23.54	294.25
Bulgaria	14	9,385	45.80	572.49
Poland	9	59,625	290.97	3637.10
Romania	8	29,110	142.06	1775.70
Serbia	2	10,916	53.27	665.90

Source: Euronews 2022, McKinsey 2018

8 Based on the average cost of type 2 charger as $4000 and a fast-charger as $50,000 in 2018, adjusted to inflation. Source: **McKinsey 2018**

Investment gap in the CEE region: Top-down estimations and comparison

Estimating the investment gap or shortfall for infrastructure investments involves a comprehensive approach that considers current trends, projected needs, and the impact of various factors, such as geopolitical and socio-economic changes, environmental considerations, and policy shifts.

Infrastructure investment demands in emerging markets and developing economies (EMDEs) are driven by a variety of factors, and they play a crucial role in the economic development and growth of these regions. These factors and their relative importance vary across countries, but some examples include population growth, urbanization, industrialization, changing energy needs, current size and quality of infrastructure, environmental concerns, and many more.

To forecast infrastructure investment under current trends and assess future investment needs, the Global Infrastructure Outlook, for example, uses a top-down econometric approach (**GI Hub**). The forecast includes sector-wise estimates for meeting the UN Sustainable Development Goals related to electricity, water, and sanitation. It provides an annual insight into infrastructure trends, needs, and gaps until 2040 across different sectors, countries, and regions. The data is analyzed by Oxford Economics with input from various organizations.

Maintenance investment needs

Beyond the initial investments in construction of additional infrastructure, countries must invest heavily in maintenance of existing infrastructure. **The World Economic Forum recommends that to maintain a country's infrastructure, it should invest approximately 3.5% to 4% of its Gross Domestic Product (GDP) annually.** However, this figure could vary widely depending on the current status of the country's infrastructure, its development level, and specific goals and needs.

The actual distribution of this spending may be guided by several factors including the current state of infrastructure, growth projections, strategic national interests, and socio-economic needs. Below is a rough breakdown of infrastructure spending based on sector-specific needs and priorities of developed countries:

1. **Transportation Infrastructure (Roads, Rails, Ports, Airports)** - 25-35%
2. **Energy Infrastructure (Power Generation and Distribution)** - 20-30%
3. **Water and Sanitation Infrastructure** - 15-20%
4. **Telecommunications and Digital Infrastructure** - 10-20%
5. **Social Infrastructure (Education, Health, Housing)** - 15-25%

Please note that the above distribution can vary widely from country to country. Some nations may need to invest more heavily in certain areas due to their unique circumstances. For example, countries with aging infrastructure might need to allocate a larger percentage towards maintenance and upgrades. Similarly, nations with a rapidly expanding digital economy may need to invest more in telecommunications and digital infrastructure.

Moreover, these figures are only approximations and are subject to change over time due to technological advancements, changing climate conditions, demographic changes, and other factors. A comprehensive assessment of infrastructure needs should be made regularly to adjust investment strategies.

Lastly, it's also important to consider the balance between public and private investment in infrastructure. Public-Private Partnerships (PPPs) can sometimes provide an effective way to fund infrastructure projects, allowing for risk-sharing and leveraging private sector efficiencies.

Countries should consult with a range of stakeholders including policymakers, civil society, industry experts, and development institutions to ensure that infrastructure investment is efficient, effective, sustainable, and meets the needs of their citizens.

Estimates for the CEE region

Applying the WEF methodology reveals an **annual investment need of around 65-75 billion EUR across the entire CEE region.** Breaking the numbers further down, the biggest portions of investment should be dedicated to the transport and energy sectors as well as the social services sector, including investments in education and healthcare infrastructure. The investment estimates vary greatly across individual countries, with Poland, Romania, and Czechia estimated to have to invest the largest sums of capital in absolute numbers.

In addition, the region will need to devote over 50 billion EUR annually to maintaining its infrastructure. As the WEF stipulates, most of these investments will be spent on the maintenance of energy and transport infrastructure, but maintaining telecommunication systems will also require sizeable investments.

These numbers align rather well with the bottom-up calculations provided above. The capital stock approach revealed an investment gap of just over $1 trillion (in EUR this would represent roughly 950 billion). However, we do not presume this gap could be closed in a short time-frame. Narrowing the investment gap would require a horizon of over 10 years. Scaling the top-down numbers to a 15-year horizon (multiplying by fifteen) would also bring us to an investment gap of roughly 1 trillion EUR.

In the specific sectors, the bottom-up approach appears slightly more pessimistic about the size of the gap. Looking at just the road and rail infrastructure revealed a gap of over 250 billion EUR, even though these represent just a portion of the total transport infrastructure investment needs. The top-down approach finds an average annual need of around 21 billion EUR. However, we need to remember that the bottom-up approach does not suggest the gap should be closed in any immediate timeframe, but rather outlines the long-term investment goals for CEE countries. If we assume closing the gap vis-à-vis the EU15 would be an aim for 2050, then the investments need for rail and road infrastructure seem realistic, representing around 50% of the overall transportation investment needs.

We observe a similar situation in regard to the energy sector; the bottom-up approach finds that transitioning away from coal would require an overall investment of over around 200 billion EUR, without accounting for the rising energy demands. Phasing out coal will necessarily be a gradual process, as building new energy generation capacities requires some time. We can assume that such investments will constitute a large part of the overall investment needs in the energy sector. Comparing this to the top-down finding of around 17 billion EUR needed every year for the energy sector, the numbers are not far off. The energy transition will likely take well over 10 years. Assuming it would be achieved in 15 years, it would account for around three-quarters of the investments needed in the energy sector.

The bottom-up approach focused on only a narrow section of the investment gap. Nonetheless, the two approaches tend to converge to similar numbers. Both suggest that the investment gap is significant and tens of billions will need to be dedicated to funding the efforts to narrow it. From the two viewpoints we can also infer that for the CEE region to brings its infrastructure levels to those of the EU15 will require a time horizon of at least 10-20 years. However, if clearly prioritized, it appears to be a realistic goal.

Top-Down: Infrastructure Investment Need per CEE Countries

Country	GDP in EURbn (2022)	Proposed annual Investment in Infrastructure (in Mil)		Transportation		Energy		Water and Sanitation		Telecommunications & Digital		Social (Education, Health, Housing)	
		From (in mil)	To (in mil)	From (in mil)	To (in mil)	From (in mil)	To (in mil)	From (in mil)	To (in mil)	From (in mil)	To (in mil)	From (in mil)	To (in mil)
Bulgaria	83.6	2,926	3,344	731	1,170	585	1,003	439	669	293	669	439	836
Czechia	276.0	9,660	11,040	2,415	3,864	1,932	3,312	1,449	2,208	966	2,208	1,449	2,760
Hungary	**157.9**	**5,526**	**6,315**	**1,381**	**2,210**	**1,105**	**1,894**	**829**	**1,263**	**553**	**1,263**	**829**	**1,579**
Poland	**645.7**	**22,599**	**25,827**	**5,650**	**9,040**	**4,520**	**7,748**	**3,390**	**5,165**	**2,260**	**5,165**	**3,390**	**6,457**
Romania	283.2	9,910	11,326	2,478	3,964	1,982	3,398	1,487	2,265	991	2,265	1,487	2,832
Serbia	66.5	2,328	2,661	582	931	466	798	349	532	233	532	349	665
Croatia	66.6	2,332	2,665	583	933	466	799	350	533	233	533	350	666
Estonia	35.8	1,252	1,431	313	501	250	429	188	286	125	286	188	358
Latvia	39.6	1,386	1,584	347	555	277	475	208	317	139	317	208	396
Lithuania	66.2	2,315	2,646	579	926	463	794	347	529	232	529	347	662
Slovak Republic	**106.5**	**3,728**	**4,260**	**932**	**1,491**	**746**	**1,278**	**559**	**852**	**373**	**852**	**559**	**1,065**
Slovenia	58.3	2,041	2,333	510	816	408	700	306	467	204	467	306	583
Total		***66,003***	***75,432***	***16,501***	***26,401***	***13,201***	***22,630***	***9,901***	***15,086***	***6,600***	***15,086***	***9,901***	***18,858***

Source: WEO Database, WEF Methodology

Top-Down: Infrastructure Investment Need per Capital and Maintenance

Country	GDP in EURbn (2022)	Transportation (in mil EUR)		Energy (in mil EUR)		Water Supply and WW (in mil EUR)		Telecommunications & Digital (in mil EUR)		Total (in mil EUR)	
		Capital	Maintenance	Capital	Maintenance	Capital	Maintenance	Capital	Maintenance	Capital	Maintenance
Bulgaria	83.6	502	1,087	920	1,003	84	251	752	418	2,257	2,759
Czechia	276.0	1,656	3,588	3,036	3,312	276	828	2,484	1,380	7,452	9,108
Hungary	**157.9**	947	2,052	1,737	1,894	158	474	1,421	789	4,263	5,210
Poland	**645.7**	3,874	8,394	7,103	7,748	646	1,937	5,811	3,228	17,434	21,308
Romania	283.2	1,699	3,681	3,115	3,398	283	849	2,548	1,416	7,645	9,344
Serbia	66.5	399	865	732	798	67	200	599	333	1,796	2,195
Croatia	66.6	400	866	733	799	67	200	600	333	1,799	2,199
Estonia	35.8	215	465	393	429	36	107	322	179	966	1,180
Latvia	39.6	238	515	436	475	40	119	356	198	1,069	1,307
Lithuania	66.2	397	860	728	794	66	198	595	331	1,786	2,183
Slovak Republic	**106.5**	639	1,385	1,172	1,278	107	320	959	533	2,876	3,515
Slovenia	58.3	350	758	641	700	58	175	525	292	1,575	1,924
Total	**1885.8**	**11,315**	**24,516**	**20,744**	**22,630**	**1,886**	**5,657**	**16,972**	**9,429**	**50,917**	**62,232**
Source: WEO Database, WB Methodology										*2.7%*	*3.3%*

Financing the Gap

The previous sections have shown that the need for investment across the CEE region is huge. Countries will need to devote billions to catching up to their western counterparts. While governments invest extensively in the economy, to start closing the gap, they must do so at a rate greater than the EU15 countries. Moreover, it is imperative that the right investment decisions are made, and the money is invested in the most efficient way possible so as to really improve the state of things.

States will remain the biggest investors in public infrastructure but relying entirely on debt financing to close the investment gap is not a sustainable strategy. This rings especially true in the wake of the Covid-19 crisis, which increased the indebtedness of many European states (**Reuters 2023**). Raising the public debts further by significant amounts would not only be a transgression of the EU-set levels, but importantly would threaten the economic stability of those countries. Governments will have to focus on improving the efficiency of their investments. Additionally, partnering with the private sector opens further possibilities for financing the investment gap. Successful endeavors in PPP projects also support that this financing option is increasingly worth exploring.

Public Investment: Emphasizing Efficiency

The EU recovery plan aimed at helping countries recover after the Covid-19 pandemic, will help boost public investments in the CEE region (with the exception of Serbia, which is not a part of the EU). These funds will play a particularly important role in the support of green transition, with large portions earmarked specifically for climate change mitigation and preparedness. Countries must ensure efficient use of the available EU funds as these can greatly help narrow their investment gaps. Historically, some countries have struggled with allocating the funds to projects and using the resources. This must be remedied for the CEE to reach the proposed investment goals.

It must be noted, however, that EU funds by themselves will be insufficient to cover the investment gaps fully because of the overall value but also due to allocation mismatches. For example, Poland can benefit from receiving up to 78.3 billion EUR of cohesion policy funding in the 2021-2027 period. This will not be sufficient to cover the gap size estimated in this work. Moreover, the earmarking to specific objectives of these funds also limits how much can be spent on what projects. Not all of the funding will be available for spending on the investment areas in the proposed allocation proportions. EU funding remains a great opportunity to improve infrastructure across the CEE, but will by itself not resolve the investment gap issue.

Beyond access to EU funding, some investments will be debt funded. It is, however, unlikely that national governments would be able to increase expenditures as significantly as the investment gap requires due to the aforementioned issue of already overstretched deficits. Budget spending must therefore focus on clear prioritization of investments and spending efficiency. It is crucial that the value-for-money principles are being upheld across public investments to ensure funds are being used effectively. For instance, in Slovakia, the Value for Money unit under the Ministry of Finance - which evaluates government investments and their added value - has identified several EUR billions in potential savings on these investments. Ensuring high standards and efficiency of public investments could enable savings that can be repurposed into further investments making it an important aspect of closing the investment gap.

Albeit politically contentious, government revenue optimization may unlock additional financing opportunities. Especially in infrastructure and green transition issues, governments might choose to introduce revenue-generating policies. These can be in the form of increased road tolls, congestion

pricing in urban areas, or measures like carbon taxes (**McKinsey 2016**). While highly unpopular among voters, these measures bring additional revenue that can be re-directed into investments. Additionally, the policies may also act as corrections for market failures and contribute to overarching climate change strategy. Still, funding the investment gaps in their entirety is likely to require use of other sources of funding including cooperation with the private sector. This might be especially useful in the case of highly complex projects, for which governments do not possess sufficient expertise and suffer from the lengthy processes of the bureaucratic rigidity.

Unleashing Infrastructure Investment through Public-Private Partnerships

Private Public Partnerships (PPP) have recently gained popularity as a mechanism for financing and developing infrastructure investments around the world. The concept of PPP involves collaboration between the public and private sectors to design, finance, construct, and operate infrastructure projects. The importance of such arrangements for bridging the investment gap is increasingly recognized among experts (e.g., **OECD 2019**, **IMF 2021**, **Asian Development Bank 2023**).

PPPs actively engage the private sector in public infrastructure projects, enhancing efficiency and cost-effectiveness (**McKinsey**). This collaboration allows the private sector's risk-management capabilities to be leveraged, which can result in more timely and budget-friendly project completion. For optimal risk management, an equitable division of ownership and the meaningful transfer of risk is crucial, with project finance in PPPs necessitating a life-cycle risk-management approach. This allows for an understanding of commercial and financial impacts throughout the project's life cycle. Aligning policymakers and private developers on the risk considerations and pricing is vital for effective project procurement and service delivery.

Moreover, PPPs can increase infrastructure efficiency and spur innovation, as suggested inter alia by Stéphane Straub, Professor at Toulouse School of Economics (**World Bank)**. Although PPPs come with their set of challenges, their success is largely contingent on elements such as competition, government capacity, and sector characteristics. Notably, the role of the climate change and big data are highlighted as significant influencers of future PPP endeavours. The **importance of contract enforcement, stability, and public sector efficiency** can't be overstated in determining PPP performance.

The International Finance Corporation (IFC) further emphasizes that well-structured PPPs, through private sector involvement, can lead to improvements in sectors such as education, energy, transport, healthcare, and sanitation (**IFC**). They foster future economic growth and enhance access to services, addressing key issues in power, tourism, transport, waste management, and water supply.

It must be emphasized though, that an important feature of successful PPPs is a strong institutional framework, transparent procurement, and risk management. This approach is particularly underscored in the context of Western Balkans' adoption of PPPs (**IMF**). Therefore, the PPP governance gaps must be addressed to maximize benefits and manage risks. For this purpose, the PPP Fiscal Risk Assessment Model (PFRAM) is a tool that helps in quantifying fiscal costs and risks associated with PPPs, thereby aiding in the formulation of sound fiscal policies.

The role of PPP in infrastructure development

The role of public-private partnerships (PPPs) in infrastructure development has been widely discussed in the recent literature. Various studies have highlighted the potential of PPPs to reduce fiscal risks, enhance transparency, and improve efficiency in infrastructure development, while also noting the importance of careful management to control project risks and safeguard public finances (**IMF**).

One of the key aspects of PPPs is their role in risk management, with different studies pointing out that the successful implementation of PPP projects hinges on effective management of various risks. Such risks can relate to finance, governance, project implementation, among others (**ResearchGate**,

Springer). Effective knowledge management has been underscored as a necessity for improved project development (**ResearchGate**).

A study examining the factors driving high-investment infrastructure PPP projects identified that such projects typically benefited from factors like reduced private partner risks, competitive awards, strong government support, robust economic and institutional frameworks, and backing from multilateral development banks. This study involved an analysis of 9121 PPPs in 107 emerging market countries, carried out between 1997 and 2017 (**ScienceDirect**).

One aspect that several academic sources have discussed is the variation in the applicability and success of PPPs across different sectors. For instance, the transport and energy sectors have been identified as being more amenable to private participation, while challenges persist in sectors like water management. In some cases, such as the ICT sector, full privatization is often observed (**World Bank**).

Government support has been identified as a key determinant of the success of PPPs. In particular, it has been noted that compliant support can enhance the profitability of private partners in PPP projects (**Nature**). A World Bank podcast has also highlighted the role of institutional features in impacting PPP performance, emphasizing that government capacity is key (**World Bank**).

Furthermore, it is important to note though, that PPPs may not always serve all segments of the population effectively. There is evidence to suggest that PPPs might exclude the poor, thus requiring some subsidies to ensure broader reach (**World Bank**). The challenges of renegotiation and competition, as well as the verifiability of service and remuneration, are crucial aspects that need further investigation (**World Bank**).

Finally, there are emerging areas that require further study, such as the impact of the climate change and big data on the dynamics and effectiveness of PPPs (**7**). These aspects highlight the ongoing need for research to continually refine and improve our understanding and implementation of PPPs in infrastructure development.

Some examples of the key roles of PPP models in infrastructure development may be as follows:

1. **Bridging the Funding Gap:** Infrastructure projects often require substantial upfront investments, which may strain public budgets. PPPs allow private investors and companies to contribute capital and share the financial risks associated with the project, reducing the burden on the public sector and diversifying the funding sources.
2. **Project Efficiency and Innovation:** Private sector companies often bring expertise in project management, technology, and innovation. This can lead to increased efficiency in project delivery and the introduction of cutting-edge technologies that may not have been readily available under public-sector management.
3. **Risk Transfer:** PPPs enable the transfer of certain risks, such as construction delays or cost overruns, from the public to the private sector. This risk-sharing arrangement incentivizes the private partner to perform well and deliver the project on time and within budget.
4. **Lifecycle Approach:** Traditional public procurement often focuses on the construction phase of a project, neglecting long-term operation and maintenance considerations. PPP models typically incorporate the entire lifecycle of the asset, encouraging private partners to maintain the infrastructure's quality and performance over the concession period.
5. **Value for Money (VfM):** PPPs aim to achieve better value for money by optimizing the allocation of resources and ensuring that projects deliver the best possible outcomes at the lowest cost. Through competition and performance-based contracts, PPPs incentivize private partners to find cost-effective solutions.
6. **Transfer of Expertise:** PPPs provide an opportunity for knowledge and technology transfer from the private sector to the public sector. This can enhance the capacity and skills of the public administration in managing complex infrastructure projects.

7. **Faster Project Delivery:** PPPs can expedite the development and implementation of infrastructure projects. Private partners' ability to mobilize resources quickly and their experience in project execution can help accelerate the delivery timeline.

8. **Innovation and Flexibility:** The involvement of private companies often allows for more innovative and flexible approaches to infrastructure development. This can lead to creative solutions that address the specific needs of the project and the community it serves.

Despite their advantages, PPPs are not a one-size-fits-all solution, and the success of these partnerships depends on careful project selection, transparent procurement processes, and effective risk management. Governments must also strike a balance between the public interest and protecting private investors' rights when structuring PPP contracts. When appropriately implemented, PPP models can be a valuable tool to drive infrastructure development and address the growing demand for critical public services.

The power of PPP in practice

As discussed, PPPs have numerous benefits for public infrastructure projects and could fill an important part of the current investment gap. PPPs also carry some risks and it is imperative that such projects are accompanied with a highly capable administration that is able to oversee the projects and ensure the highest benefits for the public and value-for-money principles. That this is possible is demonstrated through various successful PPP endeavors across Europe. Below are only a few examples of such successes, from which inspiration can be taken also in the CEE region.

- **Renewable Energy Projects in Germany:** Germany's transition to renewable energy, known as the "Energiewende," has seen successful PPPs in the renewable energy sector. The government provided policy support and incentives, and private companies invested in and operated renewable energy projects such as wind farms and solar power plants. These partnerships contributed significantly to Germany's increased share of renewable energy in its electricity mix, reducing greenhouse gas emissions and promoting sustainable development. The PPP approach allowed for a faster expansion of renewable energy capacity and showcased how public and private cooperation can drive the energy transition.

- **Channel Tunnel (Eurotunnel):** The Channel Tunnel, also known as Eurotunnel, is a prime example of a successful PPP infrastructure project. Completed in 1994, it connects the United Kingdom and France through an underwater rail tunnel. The project involved a partnership between governments, Eurotunnel (private consortium), and other private investors. The PPP allowed for the construction of the tunnel, reducing travel time between the two countries and promoting cross-border trade and tourism. The successful collaboration between public and private stakeholders led to the creation of a vital transportation link between the UK and mainland Europe.

- **Glasgow Subway Modernization:** The Glasgow Subway modernization project in Scotland is another notable PPP success story. In 2012, the Strathclyde Partnership for Transport (SPT) entered into a PPP with the private consortium, Stadler Bussnang AG and Ansaldo STS, to upgrade the city's subway system. The PPP aimed to enhance passenger experience, improve safety, and increase capacity. The project's success was attributed to the efficient allocation of resources and expertise between the public and private sectors, resulting in a modernized and reliable subway system for Glasgow residents.

Public or Private: There Is a Time and Place for Both

As has been discussed, both public (national or EU-sourced) and PPP investments have benefits as well as drawbacks. To successfully eliminate the investment gap, the CEE region will have to deploy every investment source available and so a combination of both approaches is necessary. The unique characteristics of the different investment sources mean the approach should be determined based

on specific project needs. Below are some general guidelines for project investments.

Governments often have access to sources of low-cost financing and are thus able to carry out projects cheaper. However, the state is often limited in its expertise and managerial capacities, which can actually increase the overall costs of investments (**IMF 2021**). This is especially the case with complex projects, new endeavors and highly technical investments. Additionally, public investments suffer from the public sector rigidity, which is again a problem for complex projects that often require flexible management. In these cases, the state can therefore benefit from cooperation with the public sector, which is managerially stronger and might offer more expertise for the project at hand. The rigidity also often prolongs projects and so when time is of concern, partnering with private actors can be helpful.

Conversely, the state may be well-suited for projects it has carried out numerous times before and are of lower managerial complexity, such as straightforward road construction. Moreover, the state may want to retain absolute control over projects that are of very high national importance, such as defence-related projects. Concerning the use of EU funding, this is constrained by the specific objective of the respective funds. Many EU funds are aimed at resolving specific issues and cannot therefore cover the entirety of the investment gap. Nonetheless, they are a great source of funding especially for projects in the green transition area, for which the EU provides considerable funding.

PPP financing is, as mentioned, a good fit for complex investment projects, where the managerial capacities of the private sector can greatly reduce costs and delivery time. It is also an important funding tool at a time of high public deficits. Albeit not free, PPP financing delays the payment for the investment and in this way unburdens the budget in the short run. However, PPP projects themselves require preparedness of the administration – it must be capable of carrying out the tendering process well, drafting good contracts, and overseeing the execution. A strong institutional environment is therefore vital (**IMF 2021**).

Annex A: Biggest Players in PPP Projects

Here are some of the major global players in the field of Public-Private Partnerships (PPPs) in financing and developing infrastructure investments based on total value bided:

1. **John Laing:** a British investor, developer and operator of privately financed public sector infrastructure projects such as roads, railways, hospitals and schools
2. **VINCI:** A French concessions and construction company
3. **Macquarie Group:** An Australian multinational independent investment bank and financial services company
4. **Acciona:** a Spanish multinational conglomerate dedicated to the development and management of infrastructure
5. **Meridiam Infrastructure Managers:** A leading global investor and asset manager based in France, specializing in public and community infrastructure.
6. **Ferrovial:** a Spanish multinational company that operates in the infrastructure sector for transportation and mobility.
7. **Bouygues:** a French engineering group
8. **Grupo ACS:** a Spanish company dedicated to civil and engineering construction, all types of services and telecommunications
9. **Webuild (formerly Salini Impregilo):** an Italian industrial group specialised in the construction and civil engineering
10. **Dragados SA:** a Spanish construction company

Annex B: Success Case Studies by Meridiam

List of the prominent projects the group has been involved grouped according to the strategic focus:

SUSTAINABLE MOBILITY:

Sofia Airport: The 6th largest international airport (2020) in the Central and Eastern Europe region, located 10 km east of the centre of the city of Sofia. Serving 75 destinations in Europe and the Middle East, delivered by 24 airlines, the airport is the main hub for Air Bulgaria. The project consists in the handover of the existing airport, including all operations and maintenance services, supporting the long-term development strategy of the airport during the 35-year contract.

The Purple Line Project, USA: A 16-mile light railway line in the suburbs of Washington, D.C. that will connect Montgomery and Prince George's counties taking 17,000 cars off the road each day, reducing fuel use by a projected 1m gallons annually. The project with a duration of 36-years will provide a link to commuter rail systems and local bus services, aiming to provide reliable and fast alternative to vehicle travel.

R1 Expressway, Slovakia: R1 is the first ever PPP project in Slovakia with a 32-year concession period consisting of 52km motorway in the southwest of Slovakia. The R1 project was developed to improve an important transport corridor for western Slovakia, to improve the road's safety (number of fatalities is down by more than 90% since opening). Other key objectives of the Project were to minimise the environmental impact of the infrastructure and to promote employment and better quality of life for local communities, by improving connectivity with a modern highway.

CRITICAL PUBLIC SERVICES:

Welsh Education Partnership (WEPCo): WEPCo is a platform to efficiently plan, design, procure, build, finance and maintain schools and other community-based facilities in Wales. It allows local authorities (the Participants) to develop and deliver schools projects through the Mutual Investment Model schemes (MIM). MIM is a Welsh variation of Private Finance Initiatives, with a particular focus on community benefits. The schools developed under the Partnership are part of the Welsh Governments objectives to improve educational attainment in Wales (lower than in other regions of the UK) while targeting to have all new buildings delivered by WEPCo net zero carbon.

Espoo Schools and Day Care Centers, Finland: The project is the first social PPP in the country, consists of a 22-year contract to design, build, finance and maintain 5 schools and 3 daycare centres for over 4,000 pupils. Espoo is Finland's 2nd largest city located close to Helsinki. The project is part of city of Espoo's investment program called "Schools in shape" and will contribute to approximately 15% of the identified needs to guarantee healthy and functional premises for schools and day care centres in the city. It intends to enhance the learning environment by providing safe and healthy spaces for students and school staff and by improving air quality in the premises.

NetCity, Romania: Following the liberalization of the Romanian economy, telecommunications operators expanded rapidly by rolling out aerial fibre optics spanning from buildings to electric posts, to lamp posts across Bucharest. The result was a significant fibre coverage but at the cost if a fire hazard, interference with transportation networks, and visually very unappealing. To reduce the incidence of these aerial cables and improve the cityscape, the city of Bucharest awarded in 2008 a 49-year concession

agreement, granting an exclusivity to build a network of underground ducts. As a part of this concession, the concessionaire, Netcity has built a network of 1,725 km of underground ducts in Bucharest, which can be increased up to 5,500km. Through deployment of 5,500 km of telecommunications infrastructure to cover the entirety of the city and removing dangerous overhead lines, the project is contributing to the overall resiliency of Bucharest.

INNOVATIVE LOW CARBON SOLUTIONS:

NeuConnect: The £2.4bn/€2.8bn NeuConnect project once construction is finished, will be the first ever UK-German new energy link between two of Europe's largest energy markets. It will become one of the world's largest interconnector projects at 725km in length which will form an 'invisible energy highway' with subsea cables allowing up to 1.4GW of electricity to flow in either direction between the UK and Germany, enough to power up to 1.5 million homes over the life of the project. By integrating renewable energy sources in the UK and Germany, independent analysis shows that the project could deliver a net reduction in carbon emissions of over 13MtCO2 over 25 years.

Hydrogen Storage Plant (CEOG), French Guayna: The project consists of the development, construction, financing, operation and maintenance of a power plant combining a photovoltaic (PV) plant with battery and hydrogen storage. The power plant will deliver a firm capacity of 10MW from 8AM to 8PM and 3MW between 8PM and 8AM. The plant will therefore generate non-intermittent renewable electricity in the North-West region of French Guiana, which faces an important increase in electricity demand on a geographically constrained territory.

Gipuzkoa Waste Treatment Plant, Spain: The Project consists of the development, financing, construction, operation, and maintenance of an Environmental Complex, situated near the city of Donastia-San Sebastian, in the province of Gipuzkoa. The Project Company has the exclusive right to receive the solid municipal waste collected by municipalities of the area, for a concession period of 35 years. This asset is essential for Gipuzkoa as there are no available landfills in the whole territory. The complex consists of a Mechanical Biological Treatment (MBT) plant and a Waste to Energy (WtE) plant. It has an annual capacity of 200,000 tonnes of municipal waste. In the MBT plant, waste is pre-treated by separating recyclable material from unsorted residual waste. The remainder is then dried and mixed with residual waste from other facilities, before being incinerated. As a result of the incineration, electricity is produced for self-consumption by the Project Company or sale to the grid, generating sufficient electrical power for more than 45,000 households.

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