KONRAD ADENAUER STIFTUNG
Bulgarien

# THE BLACK SEA–BALKANS CONNECTIVITY ARCHITECTURE

*Building a Resilient European Gateway to Ukraine, the Caucasus and Central Asia*



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Sofia, 2026

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Within the Bulgarian Chamber of Commerce and Industry, Eng. Yanev serves as Chairman of the Branch Organizations Council and as a member of the Board. He is also Vice-Chairman of the Green Transport Cluster, where he supports initiatives in zero-emission mobility, sustainable rail freight, and green transport development.

Eng. Yanev specializes in Eurasian connectivity and is a recognized expert on the Middle Corridor (Trans-Caspian International Transport Route), with particular focus on the role of the Black Sea, Bulgaria, and South-Eastern Europe in connecting European markets with the Caucasus, Central Asia, and East Asia. His work encompasses multimodal transport, infrastructure development, logistics resilience, and cross-border trade.

He is a PhD candidate in Transport Economics and holds degrees in Logistics of Security and Defence from the “G. S. Rakovski” National Defence Academy, Industrial Management from the University of Ruse “Angel Kanchev,” and Transport Management and Logistics from the Todor Kableshkov University of Transport.

Eng. Martin Yanev’s work in supply chain innovation, regional infrastructure development, and cross-border trade has received international recognition. In 2020/2021, he was named Eastern European Logistician of the Year by Business Elites 40 under 40, and has received further professional distinctions from international organizations, including CorporateLiveWire.

# The Black Sea–Balkans Connectivity Architecture

## Building a Resilient European Gateway to Ukraine, the Caucasus and Central Asia

September 2026

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# Foreword

The architecture of connectivity is, ultimately, the architecture of opportunity. The report *"The Black Sea–Balkans Connectivity Architecture: Building a Resilient European Gateway to Ukraine, the Caucasus and Central Asia"* comes at a particularly important moment for Europe and Bulgaria. The questions addressed in this publication are increasingly moving from the realm of infrastructure planning into the centre of the European strategic debate on resilience, economic security and connectivity. It is about strategical direction and new horizons.

For the Konrad-Adenauer-Stiftung in Bulgaria, strengthening the knowledge base on connectivity has become an important area of our work. Our focus is guided in particular by Bulgaria's strategic positioning and by the role of the Black Sea as a bridge between Europe and Asia. We believe that a better understanding of the emerging connectivity architecture is essential for identifying opportunities and addressing the challenges facing Bulgaria and the wider region.

The timing of this discussion could hardly be more appropriate. On 16 September 2026, in her State of the Union address, European Commission President Ursula von der Leyen announced a new international connectivity initiative intended to directly link the South Caucasus and Central Asia with the European market. Through Global Gateway, the European Commission aims to crowd in up to €12 billion in public and private investment, with the objectives of diversifying trade routes, tripling trade flows and significantly reducing freight transit times by 2030. The growing importance of the Middle Corridor reflects the changing European connectivity agenda and the emergence of new strategic links between Europe, the Black Sea, the South Caucasus and Central Asia.

Connectivity today extends far beyond roads and railways. It encompasses transport and logistics, energy, digital infrastructure, trade and, increasingly, security and resilience. Russia's war against Ukraine has fundamentally changed the way connectivity and interconnectivity are understood across the region. Ukraine's reconstruction cannot be considered separately from the infrastructure and connectivity systems surrounding it. At the same time, the development of stronger links between Europe, the Black Sea, the South Caucasus and Central Asia has the potential to reshape the wider connectivity architecture and create new strategic and economic opportunities.

The region is therefore at a moment of transition. Existing corridors are being expanded, new connections are being planned, and infrastructure once considered peripheral is acquiring new strategic relevance.

I would like to express my particular appreciation to Martin Yanev, the first Kon-

rad-Adenauer-Stiftung Fellow in Bulgaria, for this study. As his first research publication as a KAS Fellow, it represents an important contribution to our efforts to deepen the knowledge base on regional connectivity. His combination of practical knowledge with robust academic methods provides a valuable perspective on the opportunities and challenges facing Bulgaria and the wider region.

Every corridor begins with a connection between people. Roads, railways, ports and digital networks are the physical foundations, but the true purpose of connectivity is to bring societies closer together. Europe's greatest asset is the democratic values at the heart of its project, and our ambition should be to build not only corridors of trade, but corridors of value—creating connections that bring people closer and strengthen the foundations of a shared future.

**Norbert Beckmann-Dierkes**
Director of Konrad-Adenauer-Stiftung Bulgaria

# PART I - INTRODUCTIONARY NOTES

## Executive Summary

This report answers a single question: what regional connectivity architecture should the Black Sea and Balkan region build between 2026 and 2040 to support Ukraine's reconstruction, strengthen European security, and establish reliable connections between the EU, Ukraine, the Western Balkans, the South Caucasus and Central Asia?

The evidence gathered across this research programme — corridor by corridor, node by node, drawing on European Commission, World Bank, EIB, EBRD and national sources current through early September 2026 — supports four headline findings.

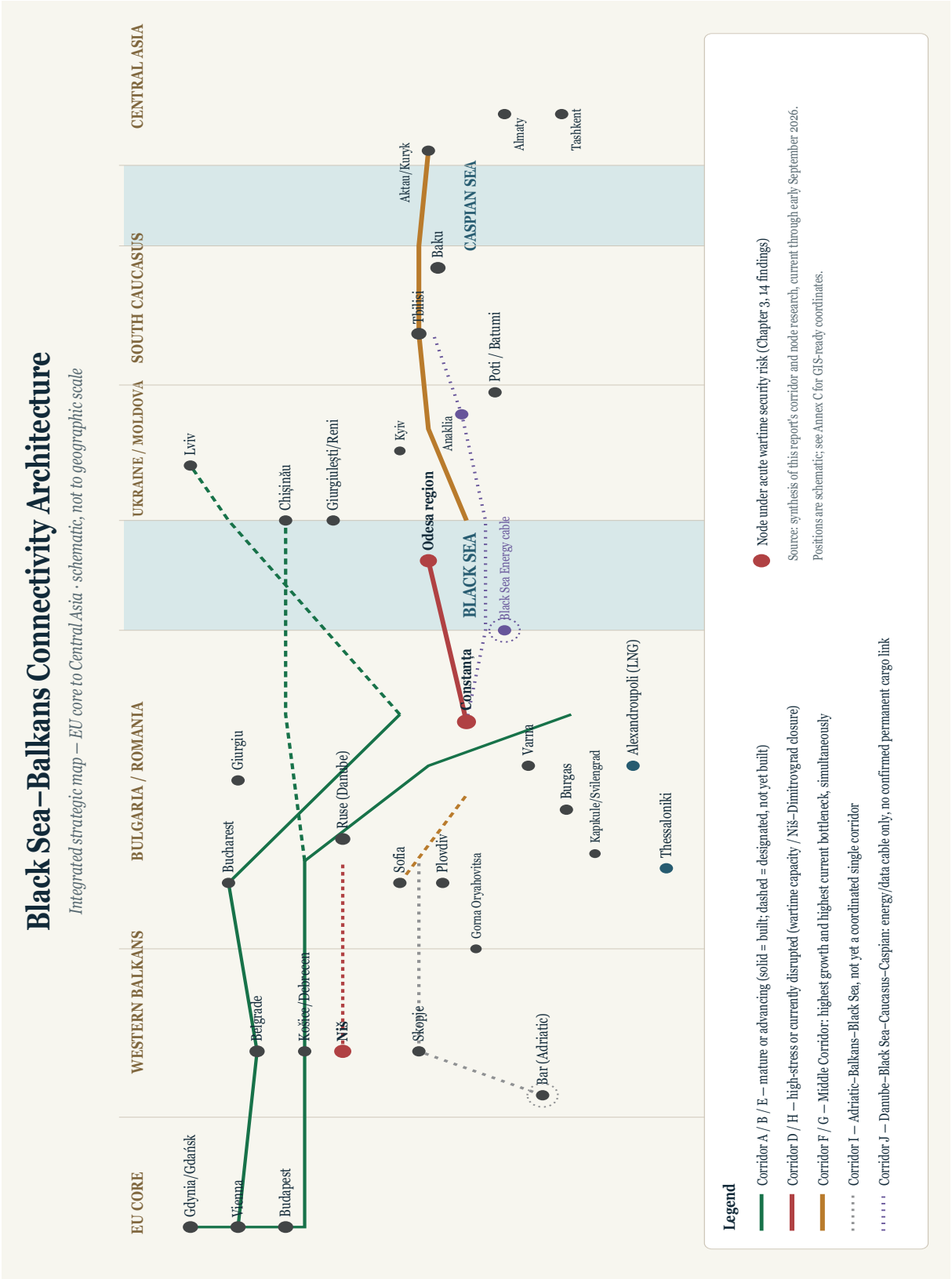
**First, the region is more institutionally built-out than a first reading of any brief on this subject would suggest, but no corridor is close to finished.** Of the ten corridors analysed, four — the Baltic Sea–Black Sea–Aegean Sea corridor, Rhine–Danube, Constanța–Ukraine, and the Türkiye–Black Sea–Caucasus–Central Asia "Middle Corridor" — are real, named, coordinator-led initiatives with dated milestones. A weighted competitiveness model scoring transit time, cost, capacity, reliability, border efficiency, security, multimodality, EU integration and environmental performance found that **no corridor scores above 3.10 out of 5**. Every one carries at least one serious, currently unresolved constraint. This is a structural finding, not a data artefact: the region's connectivity architecture is under construction in the most literal sense, not merely under-optimised.

**Second, a small number of specific, well-evidenced interventions would produce outsized effects relative to their cost.** Six "Regional Missing Links" meet this test directly: the Niš–Dimitrovgrad rail line (Serbia–Bulgaria), currently closed to all passenger service since November 2023 and reopening only at the end of 2027; a second Ruse–Giurgiu Danube bridge, needed because the existing 1954 structure carries two major corridors' traffic simultaneously; the Gyueshevo–Deve Bair rail tunnel connecting Bulgaria to North Macedonia; an air-cargo link for Plovdiv, whose adjacent industrial zone is the largest in Southeast Europe yet trucks freight over 100km for air transport; resolution of the Poland–Ukraine road-border permit dispute, which produces truck queues exceeding a week at zero construction cost to fix; and activation — not construction — of Romania's already-built Cernavodă–Constanța canal, which appears to operate at a small fraction of its designed capacity.

**Third, Ukraine's reconstruction is inseparable from external infrastructure this report's own corridor analysis identifies.** The World Bank, Ukrainian government, European Commission and UN's fifth Rapid Damage and Needs Assessment (RDNA5, February 2026) puts total 10-year reconstruction needs at $587.7 billion, with transport the single largest sectoral need at over $96 billion. None of Ukraine's top-line needs — transport, energy, housing — can be met through domestic investment alone. Each depends on external capacity this report has mapped directly: EU-side border governance, Constanța and Danube port capacity (structurally limited to roughly a third of what Ukraine's own Black Sea ports can handle), EU grid and gas interconnection, and EU digital-customs infrastructure.

**Fourth, the region's central security architecture is more structurally determined than policymakers may appreciate, and Bulgaria sits at its centre.** Three independent lines of evidence — the 1936 Montreux Convention's legal restriction of Black Sea naval access to littoral states, a 2024 trilateral mine-countermeasures task group, and a Turkish-led Maritime Component Command established in 2026 for a prospective post-settlement security mission — all converge on the same trilateral core: Türkiye, Romania and Bulgaria. Any credible governance mechanism for the region has to be built around this constraint, not around it. Encouragingly, the EU's own Black Sea Strategy has already begun constructing such a mechanism under the label "Connectivity Agenda," first surfaced at a October 2025 ministerial-level meeting — the actionable recommendation is to give this existing process a funded action plan, not to invent a new institution from a blank page.

As of the most recent evidence available, the war in Ukraine continues with no lasting ceasefire, placing the region closest to this report's Scenario 1 ("Fragmentation"), albeit with a live diplomatic thread that could shift the picture within this report's own first planning horizon. The report's recommendations are built to remain useful regardless of which way that resolves, organised across three horizons — 2026–2030, 2030–2035 and 2035–2040 — around a five-layer "Black Sea–Balkans Connectivity Architecture 2040" spanning transport, logistics, energy, digital connectivity, and security and resilience.




*Integrated strategic map*

*Figure 1. Integrated strategic map, EU core to Central Asia. Schematic, not to geographic scale. Full legend in Annex C*

## 1. Introduction

The war Russia launched against Ukraine in February 2022 did more than reroute a decade of grain and container traffic. It forced a fundamental re-examination of how Europe connects to Ukraine, the Black Sea basin, the South Caucasus and Central Asia — corridors that had, for the most part, been designed around an assumption of open Russian territory and unconstrained Black Sea shipping that no longer holds and, this report argues, should not be planned back into existence even if a ceasefire is reached.

This report treats that re-examination as an opportunity rather than only a constraint. Its central question, drawn directly from the research brief that commissioned it, is this: **what must Europe and the Black Sea–Balkan region build, connect, reform and protect between 2026 and 2040 to ensure that Ukraine's reconstruction becomes an opportunity for the transformation of the wider regional connectivity system, rather than simply the restoration of the pre-war system?**

Two methodological commitments structure everything that follows, and both depart from how connectivity studies are conventionally written.

**The analytical unit is the corridor, node, bottleneck and flow — not the country.** A country-by-country survey of infrastructure would miss the point of a system whose value is precisely in how its parts connect. Bulgaria, which receives dedicated treatment in Part IV of this report, is analysed throughout as a hub function embedded in multiple corridors, not as a standalone geography to be assessed in isolation.

**Every quantitative or forward-looking claim in this report carries an explicit evidence tag: Observed, Estimated, Assumption, or Strategic projection.** This is not a stylistic choice. A report of this scope — spanning more than twenty countries, five infrastructure layers and three time horizons — cannot responsibly claim uniform certainty across all of it. Where the evidence is strong (Ukraine's port throughput, the Baku–Tbilisi–Kars railway's capacity, the Montreux Convention's legal text), the report says so plainly. Where it rests on informed inference rather than a primary source, it says that too. Where no usable evidence exists at all — and this report is explicit that this happens, including for entire countries within its formal geographic scope — it is flagged as a data gap requiring dedicated further research, not smoothed into false precision.

The report proceeds in four parts. **Part I** sets the context: this introduction, the methodology, and a chapter on the Black Sea's geopolitical transformation since 2022 that the original research brief did not anticipate needing but the evidence made unavoidable. **Part II** maps the region's connectivity system layer by layer —

transport corridors, multimodal logistics, energy, digital infrastructure, and security — sub-region by sub-region. **Part III** applies quantitative and financial discipline to that map: a competitiveness scoring model, an infrastructure gap analysis, a twenty-project investment longlist, and a dedicated treatment of Bulgaria's strategic position and the Gorna Oryahovitsa case study the original brief singled out. **Part IV** synthesises all of it into four scenarios, a SWOT framework, a five-layer "Connectivity Architecture 2040," and an actionable, project-linked roadmap

## 2. Methodology

### 2.1. Research architecture

This report was built in thirteen sequential phases rather than a single undifferentiated research pass, on the view that a study of this breadth — twenty-plus countries, five infrastructure layers, three time horizons, a ten-corridor comparative scoring model — cannot be responsibly produced any other way without inventing the capacities, costs, dates and forecasts the underlying brief explicitly forbade. Each phase produced a citation-backed working document before the next began; those working documents, lightly edited for this final assembly, form the evidentiary backbone of every chapter that follows.

### 2.2. The evidence hierarchy

Every quantitative or forward-looking statement in this report carries one of four tags:

| Tag | Definition |
|---|---|
| **Observed** | Reported by a primary or official source with a retrievable date — an EU institution, international financial institution, national infrastructure manager or statistics office, port or rail operator, or a specifically dated report from a Tier-1 news outlet. |
| **Estimated** | Derived by a recognised third party (an IFI, a research institute) from incomplete underlying data. |
| **Assumption** | A reasonable inference made by this research process to fill an evidentiary gap, explicitly labelled as such rather than presented as fact. |
| **Strategic projection** | A forward-looking analytical judgement about what should happen or is likely to happen, clearly distinguished from a factual claim. |

Materially important or contested figures — reconstruction-needs totals, corridor investment costs, capacity claims that feed the scoring model — were checked against a second independent source wherever one existed. Where sources disagreed materially, or only one source could be found, the report says so in the text rather than silently resolving the discrepancy.

### 2.3. Wartime versus permanent-architecture distinction

Every transport and maritime finding in this report is tagged **[Wartime/emergency]** or **[Post-war/permanent]** where the distinction is material. This matters in practice, not only in principle: Ukraine's use of the Danube Delta's Bystre deep-water route, for instance, was a wartime necessity that declined sharply once Ukraine's own Black Sea ports were substantially unblocked in 2023 — meaning some of what looks like "Danube corridor" traffic in aggregate statistics is not evidence of the corridor's permanent post-war role, and treating it as such would over-state the case for Danube investment relative to direct Black Sea port investment.

### 2.4. Source base and constraints

Research drew primarily on European Commission directorates (DG MOVE, DG REGIO, DG ENER, DG NEAR), EEAS, the TEN-T Regulation and its 2024 revision, the World Bank, EIB, EBRD, national infrastructure managers and port authorities, and Tier-1 news reporting for current operational developments — consistent with the evidentiary hierarchy in §2.2. Three constraints on this base are stated here rather than left implicit:

- **Geographic coverage is uneven.** This research programme generated dedicated, sourced evidence for Bulgaria, Romania, Ukraine, Moldova, Serbia, North Macedonia, Greece and Georgia, and partial evidence for Türkiye and Azerbaijan on specific corridors. It did ***not*** generate dedicated evidence for Croatia, Slovenia, Hungary, Austria, Albania, Montenegro, Bosnia-Herzegovina, Kosovo, Armenia, Kazakhstan, Uzbekistan or Turkmenistan. These twelve countries, all within the brief's formal geographic scope, are flagged throughout as requiring a dedicated follow-on research phase rather than populated with inferred content.
- **Access constraints.** Research was conducted via public web search and direct document retrieval. Subscription logistics and shipping databases (container freight rate indices, specialist port-throughput trackers) were not accessible; claims depending on this class of data are flagged Data unavailable rather than estimated.
- **A live, fast-moving subject.** The war's trajectory, several EU financing decisions, and at least two significant infrastructure-project statuses changed during the research period itself. Every date-stamped claim in this report reflects the most recent evidence found as of early September 2026; the report's own scenario framework (Part IV) exists specifically because that trajectory could shift again before the ink dries.

## 3. The Geopolitical Transformation of the Black Sea

The original brief that commissioned this report did not ask for a dedicated chapter on Black Sea geopolitics. The research made one unavoidable: almost nothing else in this report — NATO's posture, Bulgaria and Romania's role, what a coordinated regional security architecture could even mean institutionally — can be assessed without first understanding a legal framework that predates every other institution discussed in this report by close to a century, and a set of very recent developments that are still unfolding as this report is being written.

### 3.1. The legal bedrock: the Montreux Convention

The 1936 Montreux Convention Regarding the Regime of the Straits governs transit of the Bosphorus and Dardanelles for merchant vessels, warships and aircraft, and has demilitarised the Black Sea's naval balance for close to ninety years — it turned exactly ninety on 20 July 2026, a date that fell within this report's research period. Its mechanics are not a historical footnote; they actively shape what is possible today. Under Article 19, when Türkiye is not itself a belligerent, non-belligerent states' warships retain free transit while belligerent states' warships are barred from the Straits except to return to a home base or under a binding collective-defence obligation; Article 20 gives Türkiye full discretion over warship passage should it become a belligerent itself. Türkiye closed the Straits to both sides' warships on 28 February 2022, at Ukraine's request.

In peacetime, non-riparian states are capped at an aggregate of nine warships with 45,000 tonnes aggregate displacement in the Black Sea at any time, with a maximum 21-day presence and 15 days' advance notice required. Submarines are effectively excluded from non-riparian navies altogether: Montreux only permits coastal states to bring submarines into the Black Sea.

The structural consequence is easy to state and important not to lose sight of in the chapters that follow: **because only Türkiye, Romania and Bulgaria — the three NATO littoral states — can bring naval platforms into the Black Sea in any real volume, any future maritime security architecture in this region is legally required to be trilateral at its core, regardless of how many other countries participate diplomatically.** This is not a policy preference. It is what a 1936 treaty text produces, and it recurs as a finding throughout this report — in the region's existing mine-countermeasures cooperation, in its emerging post-settlement security planning, and in the governance recommendations of Part IV.

### 3.2. The EU's evolving response, 2022–2026

The European Union's institutional response to the war has moved through rec-

ognisable stages, each expanding the scope of what came before rather than replacing it.

The earliest and most immediately consequential was **EU-Ukraine Solidarity Lanes,** launched in May 2022 to route Ukrainian and Moldovan trade around the Black Sea blockade via road, rail and inland waterway. By its two-year mark, Solidarity Lanes had carried more than 136 million tonnes of Ukrainian and Moldovan exports and over 52 million tonnes of imports, generating roughly €50 billion for Ukraine's economy — a wartime emergency measure that, this report's corridor analysis in Part II shows, has left a permanent institutional and infrastructural legacy even as its relative importance shifts with the war's trajectory.

The 2024 revision of the TEN-T Regulation — formally Regulation (EU) 2024/1679, adopted 13 June 2024 — did more than extend the trans-European transport network to Ukraine and Moldova "all the way to the ports of Mariupol and Odesa," in the words of then-Transport Commissioner Adina Vălean. It created an entirely new corridor, the Baltic Sea–Black Sea–Aegean Sea corridor, discussed at length in Part II, giving one of this report's ten analysed corridors a legal foundation and an assigned coordinator that most observers would not expect a wartime-era infrastructure study to already have in place.

**The EU Black Sea Strategy** — a Joint Communication from the European Commission and the High Representative, adopted 28 May 2025 and welcomed by the European Council the following month — represents the most comprehensive single articulation of EU strategic intent for the region found in this research programme. Its one-year progress report, published in mid-2026, shows genuine institutional follow-through rather than a purely declaratory document: a Bulgaria-Romania "Black Sea Maritime Security Hub" concept, a November 2025 EU Military Mobility Package, and a 2025 EU Action Plan on Cable Security are all live, dated initiatives traceable to this strategy.

Most recently, an **October 2025 meeting of EU and partner-country co-chairs** produced conclusions on "Strengthening Cross-Regional Security and Connectivity" that explicitly recognised "a need for an effective coordination framework — anchored in shared priorities and collaborative engagement" — advanced further at a November 2025 Trans-Caspian forum in Tashkent. The EU's own Black Sea Strategy text describes the resulting concept as a "Connectivity Agenda… based on existing partnerships and governance mechanisms in trade, energy, transport and digital sectors." As of the most recent independent assessment found in this research, that agenda "currently lacks a detailed action plan or dedicated funding" — a genuine, honestly-stated limitation this report returns to directly in its governance recommendations (Part III, Chapter 18).

### 3.3. The post-war security architecture already being designed

Perhaps the single most consequential finding of this research programme, in the sense that almost nothing else in the report interacts with it, is that a specific institutional architecture for post-settlement Black Sea security is not a hypothetical for some future negotiation — it is being actively built now, in real time, as this report is being written.

Türkiye has established a Maritime Component Command in Istanbul's Beykoz district, overlooking the Bosphorus, intended to lead the naval component of a prospective security-guarantee mission for Ukraine, with Romania and Bulgaria supporting as the other Black Sea littoral states. Turkish Foreign Minister Hakan Fidan stated in January 2026, following a Coalition of the Willing summit in Paris, that Türkiye would assume this responsibility "if Ukraine and Russia reach a final settlement" to end the war. Thirty-three countries have declared willingness to participate in the broader initiative, with fourteen declaring intent to contribute specifically to the Maritime Component Command — though Turkish officials have stated that naval-platform contributions will only come from the three littoral states, a direct institutional echo of the Montreux-derived constraint set out in §3.1. Planning began in Ankara in spring 2025; a Turkish-only core staff nucleus was established 25 August 2025; the command's formal establishment was announced in early April 2026; and a mid-May 2026 letter from Turkish Defence Minister Yaşar Güler described the command's integration with a Paris-headquartered Multinational Force Ukraine structure. Turkish officials have repeatedly stated the facility remains under Turkish national command, governed by Montreux, and explicitly not "a NATO base under foreign command."

This sits alongside, and is a direct successor to, an existing operational structure: the **MCM Black Sea Task Group**, a trilateral Romania-Bulgaria-Türkiye mine-countermeasures force whose memorandum of understanding was signed 11 January 2024 and which has been operational since 1 July 2024, with command rotating every six months among the three countries. Its mandate was expanded in mid-2026 to include protection of critical underwater infrastructure — directly relevant to the submarine cable findings of Chapter 14. Read together with a Bulgaria-Romania "Black Sea Maritime Security Hub" concept intended as a civilian, early-warning counterpart to this military structure, three independent lines of evidence — a ninety-year-old treaty's legal text, a 2024 operational mine-countermeasures agreement, and 2026 post-settlement security planning — all converge on the identical trilateral core. That convergence is not a coincidence this report is choosing to notice; it is what the underlying legal and operational reality actually produces, and it should discipline every governance recommendation this report makes about Black Sea security.

### 3.4. Where the region actually stands, as of this report's writing

It would be dishonest to present the preceding sections as describing a settled trajectory. As of the most recent evidence available, the war continues with no lasting ceasefire. U.S.-mediated negotiations since early 2025 have produced only limited restraints — around Black Sea navigation and attacks on energy facilities, plus a three-day ceasefire — but no comprehensive settlement; talks in Geneva in February 2026 ended without a breakthrough, and the Kremlin stated in July 2026 that there was no immediate prospect of resuming formal negotiations. A short humanitarian truce held 9–11 May 2026, coinciding with Russia's Victory Day commemorations, but was widely described as a temporary pause rather than a comprehensive settlement, with both sides accusing the other of violations even during it.

A live diplomatic thread exists nonetheless, and is recent enough relative to this report's writing to be worth stating precisely: on 27 August 2026, Ukraine's Presidential Office head indicated that trilateral talks with Russia and the United States could resume as early as September, with proposals reportedly including a ceasefire and security guarantees — though Russia's Foreign Minister stated on 14 August 2026 that Russia would not accept a ceasefire that freezes the current frontline, and prediction-market sentiment showed declining confidence in a near-term agreement as of the same period.

This is precisely why Part IV of this report builds a four-scenario framework rather than a single forecast, and precisely why every recommendation in this report is built to remain useful across more than one of those scenarios rather than betting the whole analysis on an outcome that could shift within days of publication.

## 4. Ukraine's Reconstruction and Connectivity Requirements

### 4.1. The RDNA5 baseline

The fifth Rapid Damage and Needs Assessment (RDNA5) — jointly produced by the World Bank Group, the Government of Ukraine, the European Commission and the United Nations, and released 23 February 2026 — puts Ukraine's total recovery and reconstruction needs over a 2026–2036 horizon at **$587.7 billion**, against direct damage of $195.1 billion (up 10.8% on the prior year's assessment) and socioeconomic losses of $666.7 billion. Housing accounts for 31% of total damage, transport 20.6%, energy 12%, trade and industry 9%, and agriculture 6% — but needs and damage are not proportional across every sector, because reconstruction is being costed to modernise rather than merely replace the pre-war network. Transport needs, at over **$96 billion,** exceed transport's damage share precisely because of

this "build back better" logic, consistent with this report's own operating assumption that the region should not simply restore what existed before 2022.

Energy is the most acute near-term funding gap this research found anywhere in the reconstruction file: restoring Ukraine's power system and heating networks is estimated at $90.6 billion as of 31 December 2025, of which $1.6 billion is needed for heat supply in 2026 alone — and less than 1% of that specific figure had been secured as of RDNA5's release. This is not a ten-year financing gap. It is a months-away, almost entirely unfunded need, heading into a winter.

Ukraine's rail network illustrates a genuine duality this report treats as a finding in its own right, not a contradiction to resolve: roughly 30% of rail infrastructure has sustained damage, yet freight volumes rose 18% in 2024 — corroborating Ukrzaliznytsia's own public claim that the network "cannot be stopped even by the most insidious [cyber]attacks," discussed further in Chapter 15. Both the vulnerability and the resilience are real, evidenced, and belong in the same sentence.

### 4.2. What does reconstruction need from outside Ukraine?

This is the sharpest, most answerable version of the question this report's brief actually asked, and it deserves a direct synthesis rather than a restatement of RDNA5's Ukraine-internal figures. Five categories of external infrastructure are load-bearing for Ukraine's reconstruction, in descending order of how strongly this research evidences each:

**Border-crossing capacity and governance on the EU side** is the single most acute external constraint this entire research programme found. The Poland–Ukraine road border — where trucks have queued a week or more at the busiest single crossing, driven by a bilateral permit dispute rather than physical capacity — sits directly on the path of reconstruction-material imports (machinery, construction inputs) as much as export goods. This is not a Ukrainian infrastructure gap at all; it is EU-side administrative capacity and a bilateral political dispute, and no volume of Ukrainian-side investment resolves it. It has remained unresolved since November 2023, through at least one failed negotiation round in February 2026.

**Constanța and the Danube ports' spare capacity** provides only a partial hedge, not a full substitute, for Ukraine's own Black Sea ports. Combined rail-and-Danube capacity moves only about a third of what Ukraine's own ports can handle when fully open — meaning the alternative route this report documents extensively in Chapter 8 remains structurally insufficient for as long as Ukraine's own ports face intensifying strike risk, which the evidence in Chapter 15 shows is current and rising, not historical.

**EU grid and gas interconnection capacity** is already growing in ways that directly determine how fast Ukraine's most urgent reconstruction category — energy — can be de-risked from renewed strikes. Cross-border electricity exchange capacity from the EU into the Ukraine-Moldova control block has grown to 1,700 MW, and the Vertical Corridor gas system (Chapter 13) already delivers non-Russian gas as far as Ukraine.

**EU digital-customs and freight infrastructure** — the eFTI regulation and the EU Single Window Environment for Customs, both mid-rollout through 2027–2031 — is the mechanism by which a resolved border dispute would actually translate into faster physical throughput, since paperwork delay and physical queue length are compounding, not identical, problems. Ukraine is building its own side of this integration on a 2030 timeline, running live pilots with non-neighbouring EU states, ahead of the EU's own internal schedule in relative terms.

**Neighbouring-country logistics and processing capacity for critical raw materials** is a newer, currently unquantified demand category this research identified rather than one the original brief anticipated in this form. Ukraine holds deposits of at least 22 of the 50 minerals the United States designates as critical, including some of Europe's largest lithium reserves; a US-Ukraine Reconstruction Investment Fund, established by an economic partnership agreement signed 30 April 2025, is beginning to operationalise this, while a parallel EU track remains comparatively underdeveloped — as of late 2025, no EU-Ukraine joint critical-raw-materials project registry or flagship investment package existed, despite the EU's own Critical Raw Materials Act separately declaring this space strategically important. Developing these exports will draw on the same rail and port capacity already under strain from grain and container traffic, discussed throughout Part II.

**The report's central finding from this exercise:** none of Ukraine's top-line RDNA5 needs — transport, energy, housing — can be fully met through domestic investment alone. Every one carries an external dependency identified above. This is the strongest evidentiary basis this research programme found for its own core thesis: that Ukraine's reconstruction and the region's wider connectivity architecture are the same undertaking, not two adjacent ones.

### 4.3. Industrial production and exports: steel as the clearest case study

Steel is the sector with by far the best current data for the brief's "industrial exports" and "future Ukrainian industrial production" questions, and it surfaces a genuine tension worth stating plainly rather than smoothing over. 2025 was Ukraine's strongest steel-production year since the full-scale invasion began — rolled steel output rose 4.8% and pig iron 11.2% — though the first half of 2026 reversed some

of that progress, with crude steel production down 3.0% year-on-year amid missile and drone strikes, blackouts, staff shortages and some of the highest energy prices in Europe. The EU's own Carbon Border Adjustment Mechanism and new tariff-rate quotas are expected to cut Ukrainian steel exports to the EU by 1.3–1.5 million tonnes per year, with industry warning that two or three of Ukraine's seven operating blast furnaces could close absent a temporary exemption — even as steel is explicitly the material Ukraine's own reconstruction depends on for bridges, roads, energy facilities and housing, with modular steel construction cited as enabling an eight-storey building in nine months. An EU decarbonisation instrument and an EU reconstruction goal are, at present, working against each other for this specific industry.

A concrete, dated financing counterpoint: the fifth Ukraine Recovery Conference, held in Gdańsk 25–26 June 2026, produced over 160 agreements worth more than €12 billion, including the first tranche of an EU Ukraine Support Loan and a new Ukraine Flagship Fund — reconstruction capital that is demonstrably moving, not only being pledged.

### 4.4. The human dimension: displacement and return

IOM's Displacement Tracking Matrix recorded approximately 3.7 million people internally displaced within Ukraine as of December 2025, with 79% displaced for more than a year; UNHCR recorded 5.9 million Ukrainian refugees globally as of February 2026. Nearly 4.4 million people have returned from displacement in total. The finding that ties this most directly to the rest of this report: an estimated 325,000 already-returned Ukrainians risk being displaced again as the winter energy crisis deepens, with more than a third of those surveyed considering leaving the country once more — IOM's own framing is that continued energy disruption "risk[s] forcing families from their homes once more." This is a direct, sourced link between this report's energy-infrastructure findings (Chapter 13) and the human-return outcome the original brief asked about, not an inference this report has made independently. Survey evidence suggests fewer than half of refugees currently plan to return, but that this could rise to 60–70% given a durable peace — a figure the scenario framework in Part IV treats as conditional rather than fixed.

# PART II — MAPPING THE CONNECTIVITY SYSTEM

## 5. Current Black Sea Connectivity

Maritime connectivity in the Black Sea today is defined by a single fact that disciplines almost everything else in this chapter: the region is running two parallel logics simultaneously, a wartime emergency system built since 2022 and a longer-term architecture that is only partially distinguishable from it.

Constanța, Romania's port and the largest on the Black Sea, has become the primary alternative outlet for Ukrainian grain, handling a 2023 eleven-month record of 32.6 million tonnes, of which Ukrainian grain accounted for roughly 40%. Its own logistics capacity is estimated at 40 million tonnes of grain per year. Romania has targeted boosting monthly Ukrainian-grain transit capacity to 4 million tonnes. Grain-terminal operators report a direct, quantified link between Danube water levels and Constanța's realised throughput — the maritime and inland-waterway chapters of this report are not independent variables, and a low-water event on the Danube directly caps what reaches Constanța by barge.

**Ukraine's own Black Sea ports** handled 42.4 million tonnes in the first half of 2026, up 6% year-on-year, but with quarterly volatility directly tracking the intensity of Russian strikes: first-quarter volumes fell 8.3% during a spring strike wave before recovering. Full-year 2026 throughput is now forecast at 83–86 million tonnes, down from an earlier forecast above 90 million. Over 180 documented missile and drone strikes hit Ukrainian port infrastructure between January and early July 2026, and more than 800 drones were launched at the Odesa region in the first four months of 2026 alone — roughly tenfold the same period in 2025. This threat curve is rising, not stabilising, as this report is being finalised.

Maritime security risk is not confined to Ukrainian or contested waters. On 5 June 2026, a Ukrainian naval drone that had lost communications amid suspected Russian electronic-warfare jamming entered Constanța's civilian harbour and self-detonated near a working berth; three further drones from the same incident detonated off the Romanian coast the same day. Separately, debris from a Russian Shahed-type drone struck Galați, Romania — a NATO member's territory — on 29 May 2026, injuring two people, just a week before the Constanța incident. Chapter 15 treats these as part of a single, current security picture rather than isolated events.

Romania's Black Sea gas ambitions are advancing in real time: the Neptun Deep offshore field, roughly 160km off the Romanian coast, holds an estimated 100 billion cubic metres of recoverable gas, with its production platform installed in mid-

2026 and first gas targeted for 2027 — a development covered fully in Chapter 13, but relevant here because it reinforces Constanța's role as a multi-sector node whose strategic importance extends well beyond grain and containers.

## 6. Balkan Connectivity

The Western Balkans' connection to the Black Sea runs through two very different physical assets, and the honest picture is that neither currently functions as a complete corridor.

The **Belgrade–Bar railway** — 454.8km, single-track, electrified, running through Serbia, Montenegro and a short stretch of Bosnia-Herzegovina, with 254 tunnels and roughly 243 bridges — is a genuine, well-built Adriatic-facing asset. But it has no coordinated, designated onward connection to the Black Sea, and the parallel Belgrade–Bar motorway, under construction since 2012 in Serbia and 2015 in Montenegro, remains incomplete more than a decade later. Italy, Montenegro and Serbia are lobbying for Pan-European recognition of a Bari–Bar–Belgrade–Bucharest route, but this is explicitly aspirational, not an achieved designation — the weakest EU-integration standing of any corridor this report analysed.

The more direct Balkans-to-Black-Sea path runs through Bulgaria, and its defining current feature is a rail line with **zero passenger service.** The Niš–Dimitrovgrad line, a roughly 96km core spur of Pan-European Corridor X connecting Serbia to Bulgaria, has been fully closed since November 2023 for reconstruction and electrification, with reopening now expected only at the end of 2027 — four years after closure began, at a cost of roughly €268 million. Once complete, Belgrade–Niš travel time falls to 1 hour 15 minutes at up to 200km/h. This is arguably the single most quantifiable missing link this entire research programme found: a core corridor with zero capacity for over four years, on the only direct rail path between the Western Balkans and Bulgaria's Black Sea coast.

A second, previously under-appreciated missing link closes the Balkans' east-west connectivity rather than its north-south route. Corridor VIII — on Bulgarian territory alone, a 947km, roughly €1.2 billion programme across four sections — is missing one specific physical piece: a 2.4km cross-border rail tunnel between Gyueshevo (Bulgaria) and Deve Bair (North Macedonia). Without it, Sofia–Skopje traffic detours 120km via Niš, Serbia. Financing agreements for the North Macedonian section were signed in mid-2026 after two years of negotiation, and this report's financing chapter (Chapter 18) found a precise cost — €412.3 million total, with €219.7 million in EU grants via the Western Balkans Investment Framework — and an earlier completion date, 2027, than earlier assumptions suggested. Once complete, Corridor VIII would connect the Adriatic, via Durrës, Albania, to the Black

Sea, via Burgas, Bulgaria — a genuine east-west alternative to the region's dominant north-south corridors.

## 7. Black Sea–Danube Connectivity

Two entirely different physical assets are both casually called "Danube–Black Sea Canal," and this report treats the distinction as analytically important rather than a pedantic footnote. **Romania's Cernavodă–Constanța canal** is a 1980s domestic shortcut across the Dobruja peninsula; Ukraine's **Bystre route** through the Danube Delta is a wartime-significant deep-water channel. Confusing the two would misattribute both the physical facts and the strategic implications.

The Cernavodă–Constanța canal turns out to be one of this research programme's most striking findings, and not for the reason initially expected. It is not under-built — it is dramatically under-used. The canal runs 95.6km in total, with locks 310 metres long, 25 metres wide, and a draft of up to 5.5 metres: specifications a Romanian technical source puts at a designed annual capacity above 75 million tonnes. A separate shipping-data aggregator records actual annual cargo handled at roughly 13,400 tonnes — a discrepancy wide enough to require reconciliation in further research, but directionally unambiguous. The canal competes with the Sulina Canal and Serbian and Bulgarian river stretches for traffic, and the sector suffers from a shortage of logistics managers with barge-scheduling expertise and scarce freight brokers — soft-infrastructure constraints, not physical ones. Properly marketed and staffed, this already-built asset could let container flows pivot through Cernavodă and avoid the Bosphorus and its congested straits entirely, a possibility this report returns to directly in its priority-projects chapter (Chapter 17) as potentially the single highest-leverage, lowest-capital item on the entire investment longlist.

Ukraine's Bystre route runs roughly 170km through the Chilia and Bystroe arms of the Danube Delta, designed under original feasibility plans for vessels up to about 4,000 deadweight tonnes and 7.65m draft; current permitted draft is limited to 4.5m, with mandatory pilotage and daylight-only transit following a July 2024 dredger explosion. Its use has declined sharply since Ukraine's own Black Sea ports were substantially unblocked in 2023 — a direct, sourced illustration of the wartime-to-permanent transition this report tracks throughout — though a 2026 shipping-industry view holds that the Danube "can turn from a back-up route to the main one at any moment" should Black Sea shipping be disrupted again.

The wider Rhine-Danube system carries five officially designated priority bottlenecks that remain unresolved for years, not months: the Romania-Bulgaria river stretch, the Palkovicovo-Mohács section, the Vienna-Bratislava cross-border stretch, and Straubing-Vilshofen in Germany, where channel depth has dropped below 1.60 metres at

times. Recurring low-water events are a live constraint, not a historical one — a river cruise ship ran aground on the Danube in northwest Bulgaria during one of the most challenging low-water periods in years in the summer this report was researched.

Across the roughly 600km Romania-Bulgaria river border, only two bridges exist: the 1954 Ruse-Giurgiu "Friendship Bridge" and the 2013 New Europe Bridge at Vidin-Calafat. Everything else runs on ferries. A second Ruse-Giurgiu crossing is now in design phase, with implementation targeted for 2032 — a sharper date than earlier "priority, no timeline" framing suggested, and a project this report's financing chapter treats as removing a single point of failure that currently carries two major corridors' traffic simultaneously.

## 8. Ukraine–EU Connectivity

The single largest, best-quantified bottleneck this entire research programme found on any mode, in any corridor, is not physical infrastructure at all. It is the **Poland–Ukraine road border**, and it is fundamentally a regulatory dispute wearing the appearance of a capacity problem.

Since 6 November 2023, Polish haulier and farmer groups have intermittently blockaded major crossings, originally protesting the wartime EU permit-free regime for Ukrainian carriers after Ukrainian trucks crossed the border roughly 900,000 times in 2023, versus about 180,000 times in prior years. The blockades remain active as this report is written: live monitoring tracking queue data across all Ukraine-EU crossings has recorded thousands of trucks queued, with waits stretching past a week for loaded vehicles at the busiest single crossing. As of a late-February 2026 negotiation round between Ukrainian and Polish infrastructure ministries, with the European Commission's transport directorate mediating, joint proposals were produced that Polish protesters did not accept. The core disagreement is unchanged since the dispute began: Polish hauliers want the wartime permit-free regime reversed; Ukraine has firmly refused. No amount of new tarmac fixes a queue caused by a bilateral permit dispute, and this report's institutional-barriers analysis (Chapter 18) treats this as the clearest illustration in the entire study of why physical and regulatory gaps require fundamentally different remedies.

On rail, the gauge picture is more tractable than the road situation but not yet resolved. The region hosts three gauge regimes meeting within the study area — 1,435mm standard across the EU, Türkiye and most of the Western Balkans; 1,520mm broad across Ukraine, Moldova and the ex-Soviet space; and retired narrow-gauge remnants. The 2024 TEN-T revision mandates standard gauge for new lines, and a standard-gauge "backbone" into Ukraine and Moldova has been proposed as part of a closer rail-integration strategy, but today, gauge transitions are

handled by transshipment or bogie exchange at the border, not continuous standard-gauge track. Moldova and Romania break gauge at Iași; Moldova's own connections to Ukraine remain 1,520mm throughout, meaning the functional break for the whole Ukraine-Moldova bloc sits at its EU-facing edge, not internally. The 2024-designated but not-yet-built Rhine-Danube corridor branch to Lviv (§9.1 in Chapter 9) is a direct, concrete piece of unfinished business on this front.

A key node reconstructed specifically to reduce this kind of friction is the **Giurgiulești (Moldova)–Reni (Ukraine) joint control point,** reopened in May 2024 with EU and US support under the Quint format, introducing dedicated truck and bus lanes and removing the need for passengers to stop twice — a concrete, already-delivered example of exactly the border-efficiency improvement the Poland-Ukraine situation still lacks.

On the digital side, the EU's eFTI (electronic Freight Transport Information) framework and Single Window Environment for Customs are the mechanism by which a resolved political dispute would translate into materially faster crossings — full details in Chapter 14 — while Ukraine's own Ministry of Finance has approved a digital-customs modernisation plan running to 2030, developed with EU experts, explicitly intended to integrate Ukrainian customs into the EU's single digital customs space ahead of the EU's own internal 2027–2031 rollout in relative terms.

## 9. South Caucasus and Caspian Connectivity

Two findings define this chapter, and they sit in tension with each other in a way this report treats as a genuine finding rather than resolving into a single tidy narrative.

The first is that the **Middle Corridor — formally the Trans-Caspian International Transport Route, running Türkiye through the Black Sea, the Caucasus and Central Asia — is simultaneously the best growth story and the clearest current bottleneck in this entire study.** The Baku–Tbilisi–Kars railway, 826km end to end, reached full commercial operation on 2 June 2026, with capacity jumping roughly fivefold from about 1 million to 5 million tonnes annually after Georgian-section modernisation funded in part by $745.9 million from Azerbaijan's State Oil Fund; the eventual target is 17 million tonnes and 3 million passengers by 2034. Within months of that capacity increase, the line was reported to have "effectively reached its physical capacity" again, with weekly traffic up 35% and border-crossing queues stretching several kilometres. The corridor's own governance body identifies the Caspian Sea crossing itself — a genuinely maritime bottleneck sitting in the middle of what is otherwise a land corridor — as its most significant structural constraint. International financing has been extraordinary:

€10 billion pledged at a January 2025 Brussels forum against 33 identified physical investment needs, a further €12 billion announced at an April 2025 EU-Central Asia summit in Samarkand, and concrete follow-through agreements at a November 2025 forum in Tashkent.

The second finding is that the **Black Sea-to-Caucasus link this report's own brief anticipated as a gap has turned out to have more substance than expected, though still not in the form the brief implied.** No confirmed permanent cargo-shipping connection between Romanian or Bulgarian and Georgian Black Sea ports exists — though this report's investment chapter (Chapter 17) found that three separate operator consortia have launched broadly similar Batumi/Poti-Constanța services since 2019, suggesting the binding constraint is commercial durability, not technical feasibility. What does exist, and is significantly more advanced than a cargo-transport reading of the corridor would suggest, is energy and digital infrastructure: a planned high-voltage submarine cable running roughly 1,195km from Anaklia, Georgia, to Constanța, Romania, carrying 1,000 megawatts of capacity alongside a parallel fibre-optic line, backed by a $2.3 billion initial budget and targeted for 2029 operation, which entered marine-survey preparation in July 2026 — full detail in Chapter 13. Two existing digital cables — the Caucasus Cable System, linking Poti to Bulgaria's Balchik since 2008, and the older KAFOS system connecting Romania, Bulgaria and Türkiye since 1997 — mean Georgia has in fact been digitally connected to the EU by undersea cable for close to two decades, a corrective to any assumption that this is a blank slate (Chapter 14).

Georgia's own node network — Poti and Batumi ports, plus a planned Tbilisi dry port — and its position at the crossing point of both the physical Middle Corridor and the emerging digital/energy cable system position it as a genuinely multi-layered hub, even as the single most consequential open question in this entire research programme — whether a permanent Black Sea-Caucasus cargo shipping link exists — remains, after repeated attempts across this research programme to resolve it, an open one.

## 10. Transport Corridors

This chapter presents the ten corridors named in the original brief as a single comparative set. One methodological note governs how they should be read side by side: **they are not at the same stage of institutional maturity, and that gradient is itself a finding, not a data-availability problem.** Corridors A, B, D and G are real, named, coordinator-led or ministerially-governed initiatives with dated milestones. Corridors C, E, F and H are functionally real — traffic moves, agreements exist — but institutionally thinner. Corridors I and J are the weakest: I is two well-built national assets not yet coordinated as a single corridor, and J is more a

synthesis of other corridors' endpoints than a corridor with its own institutional identity. This should inform how later chapters prioritise interventions: completing the institutional architecture on I and J may be as urgent as building physical infrastructure on corridors that already have one.

### 10.1. Corridor A — Baltic Sea–Black Sea–Aegean Sea

The most institutionally mature of the ten. Created in the 2024 TEN-T revision as the formally-designated "Baltic Sea–Black Sea–Aegean Sea" European Transport Corridor, crossing eleven EU member states — Finland, Estonia, Latvia, Lithuania, Poland, Slovakia, Hungary, Romania, Bulgaria, Greece and Cyprus — plus Ukraine and Moldova as neighbouring countries. Mario Mauro was appointed coordinator on 9 September 2024 for a four-year mandate, with the first stakeholder forum held that November in Brussels. A key sub-initiative, the Black Sea–Aegean Sea Corridor Platform, was established by a trilateral memorandum between Bulgaria, Greece and Romania signed in December 2025, governed by a High-Level Platform of transport ministers, with practical work beginning in Sofia in January 2026 and a new Ruse-Giurgiu Danube bridge named a top priority by Bulgaria's outgoing transport minister.

The corridor's principal bottleneck is that its north-south spine through Bulgaria is the least-built section of the whole route, and the Ruse-Giurgiu crossing — a single 1954-era bridge — simultaneously carries this corridor's emerging north-south traffic and the historic east-west Rhine-Danube traffic. The corridor holds the single strongest score of any corridor on any criterion in this report's competitiveness model (Chapter 16): a formally legislated designation with an assigned coordinator and active sub-platform. That institutional strength does not translate into the top overall rank, precisely because §13's weighting places six times more weight on physical performance than on institutional status — a finding this report treats as a caution against letting legal designation stand in for infrastructure that is still being built.

### 10.2. Corridor B — Rhine–Danube

Following the 2024 revision, this corridor spans nine EU member states — Austria, Bulgaria, Croatia, Czechia, France, Germany, Hungary, Romania and Slovakia — plus Serbia and Ukraine as neighbouring countries, running 5,910km including CEF2 extensions. A newly designated northern branch connects the German Baltic ports of Wilhelmshaven, Bremen, Hamburg and Rostock through Hannover, Berlin, Dresden, Prague, Žilina and Košice to Lviv, Ukraine — legally designated but largely unbuilt to TEN-T standard along its eastern reaches. Five officially designated priority bottlenecks — detailed in Chapter 7 — remain unresolved despite the corridor's overall institutional maturity, and pre-war 2018 baseline data (550 million tonnes moved on all European inland waterways that year, with this corridor

alone accounting for 135 billion tonne-kilometres) should not be read as current capacity.

### 10.3. Corridor C — Black Sea–Danube–Central Europe

Functionally the Black Sea-facing half of Corridor B rather than a genuinely separate physical asset, and this report states that plainly rather than double-counting the same infrastructure under two names. Its distinct analytical value lies in the interface points detailed in Chapter 7 — Romania's Cernavodă-Constanța canal and the Sulina Canal, whose round-the-clock navigation upgrade, reported finalised pending staff training in late 2023, has not been reconfirmed since.

### 10.4. Corridor D — Constanța–Ukraine

The best-quantified corridor in this entire research programme, because it has operated under war-driven stress-testing for four years and generates constant reporting. Ukrainian grain moved via Constanța reached 13 million tonnes in the 2023 eleven-month record — roughly 40% of the port's total grain traffic that year — while railway grain-checkpoint throughput peaked at 1.15 million tonnes per month in December 2022, averaging 0.78 million tonnes monthly from March 2022 to August 2024, roughly one-fifth of pre-war capacity. Combined rail and Danube-river capacity can move only about a third of what Ukraine's own Black Sea ports can handle, per Ukraine's own Agrarian Ministry — meaning this corridor is a genuine alternative, not a full substitute, for Odesa-region ports. This corridor's entire reason for its current scale is the war; its post-war role remains a live, first-order question this report's scenario chapter addresses directly rather than assumes settled.

In the competitiveness model (Chapter 16), Corridor D would score considerably higher on capacity and multimodality alone. It is the security score — the single most severely and currently evidenced risk factor found anywhere in this research programme, discussed in full in Chapter 15 — that holds it out of the top three, exactly the kind of result a properly weighted model should produce when the underlying evidence genuinely demands it.

### 10.5. Corridor E — Bulgaria–Romania–Moldova–Ukraine

The Giurgiulești-Reni joint control point, reconstructed and reopened in May 2024, is this corridor's clearest concrete achievement (detailed in Chapter 9). No gauge break exists between Moldova and Ukraine; the break sits at Moldova's western, EU-facing edge at Iași. A genuine nuance rather than a contradiction: in May 2024, the European Commission's then-Transport Commissioner described this corridor as carrying the largest share of Ukraine's trade for the prior two years, at logistics

costs comparable to the Black Sea route — while later reporting shows usage declining once Odesa-area shipping scaled back up. Read together, this shows the corridor's importance is state-dependent on how open the Black Sea route is at any given time, not a fixed ranking, a distinction this report's scoring model handles by valuing redundancy separately from current-moment volume. Bulgaria's own role within this corridor is the thinnest-evidenced part of the whole study — most of what this research found routes through Romania and Moldova specifically.

### 10.6. Corridor F — Bulgaria–Türkiye–Georgia–Azerbaijan–Caspian–Central Asia

Functions as the western feeder into Corridor G's Middle Corridor system via the Gorna Oryahovitsa-Stara Zagora-Dimitrovgrad-Svilengrad rail axis, meeting the Turkish network toward the Bosphorus. Its Bulgaria-Türkiye segment turned out, on closer research, to be one of the best-quantified and worst-performing border crossings in this entire study: Kapıkule/Kapitan Andreevo is the busiest land freight crossing in Europe and second-busiest in the world, with roughly 4 million vehicles crossing in 2025, over a million of them heavy goods vehicles. Current truck waiting times, per Bulgarian customs' own figures, run 24 to 72 hours — worse than the 12-to-48-hour range the crossing previously operated at, a documented worsening trend rather than a static problem. Turkish trucks additionally require permits to enter EU destination countries, with quotas imposed by some European states creating friction independent of physical capacity — structurally identical to the Poland-Ukraine dynamic detailed in Chapter 9, on an entirely separate frontier. Food items require laboratory testing in Sofia before crossing, adding three to four days to clearance in some cases.

### 10.7. Corridor G — Türkiye–Black Sea–Caucasus–Central Asia (the "Middle Corridor")

The most dynamic corridor in the entire study — both the best growth story and the clearest current bottleneck, simultaneously, as detailed in Chapter 9. Its top position in this report's competitiveness model is a genuine result of the weighting rather than a rounding artefact: its strengths — multimodality, financing signal, comparative security given its Russia-avoiding routing — sit on higher-weighted or more numerous favourable criteria, while its weaknesses, reliability and border efficiency, are real but concentrated. This corridor is best read as highest-momentum, not lowest-risk.

### 10.8. Corridor H — Western Balkans–Bulgaria/Romania–Black Sea

The defining finding is the one already stated in Chapter 6: zero passenger rail service currently exists between Serbia and Bulgaria, on the shortest rail path between the Western Balkans and the Black Sea. This is the clearest illustration in

the whole competitiveness model of how a single, severe, well-documented physical gap can dominate a corridor's score even when other criteria are neutral to favourable — four of nine scoring criteria are all driven by essentially the same underlying fact, a genuine methodological tension this report flags rather than lets the model's numerical precision paper over. The corridor's security risk is, by contrast, genuinely low: this is explicitly a peacetime infrastructure gap, not a war-caused one, and won't resolve on its own once any ceasefire is reached.

### 10.9. Corridor I — Adriatic–Balkans–Black Sea

The least institutionally coherent of the ten, and this report states that plainly rather than papering over it, per §6.1 above. What exists — the Belgrade-Bar railway — is real and well-built. What's proposed — Pan-European corridor recognition for a Bari-Bar-Belgrade-Bucharest route — is explicitly aspirational, the weakest EU-integration standing of any corridor analysed. "Corridor I" today is better described as an aspiration for linking two separately-governed halves than a single functioning corridor.

### 10.10. Corridor J — Danube–Black Sea–South Caucasus–Caspian

The weakest-evidenced corridor at the outset of this research, though subsequent phases substantially improved its evidence base — with *energy and digital infrastructure*, not the cargo-transport infrastructure the other nine corridors are compared on. The Black Sea Energy submarine cable (Chapter 13) is the first confirmed, funded, currently-under-construction physical link between the Black Sea and South Caucasus systems found anywhere in this research programme, and two existing digital cables (Chapter 14) mean the region is not the blank slate initially assumed. This corridor's scores in Chapter 16 should be read as "connectivity broadly defined," not a like-for-like cargo-corridor comparison — a caveat this report carries through its prose, not only its data tables. Until a scheduled shipping connection between Romanian/Bulgarian and Georgian ports is confirmed as permanent or ruled out entirely, this corridor's transport-corridor standing cannot rise much further regardless of how much energy and digital infrastructure gets built alongside it.

## 11. Multimodal Logistics

A pattern recurs across every multimodal node this research identified: dry ports and intermodal terminals in this region sit on, or explicitly market themselves against, a named TEN-T corridor or the Middle Corridor — none were found operating as genuinely stand-alone facilities. This supports a corridor-first analytical approach better than a country-by-country node survey would.

The BMF Dry Port Sofia connects Burgas Port to Sofia via the Sofia-Bankya line on the Orient/East-Med corridor, operating at 27,000 square metres with 500 TEU ground slots; the newer Bozhurishte terminal near Sofia opened in 2023. In Hungary, the Fényeslitke dry port sits on both the TEN-T network and the Middle Corridor, with its first Maersk export train running in February 2026. Rijeka's Gateway Terminal, opened October 2025, represents Maersk's first Central European investment but still lacks the rail link to the Hungarian border needed to compete fully with Koper and Trieste. In Greece, the Thriasio Freight Center near Piraeus, under development at roughly 240,000 square metres, will connect Piraeus port, Elefsina port, Athens airport and the national rail network. Belgrade's Dry Port Terminals connect the Danube port of Luka Dunav with road and rail at 3,000 TEU capacity, and a Tbilisi dry port is planned to connect Georgia's Poti and Batumi ports with the Baku-Tbilisi-Kars railway.

A newly identified addition to this network, previously unflagged in earlier assessments of the region, is the "Sea2Sea" corridor — a planned rail link between Thessaloniki, Greece, and Ruse, Bulgaria, connecting Greece's Thessaloniki, Kavala and Alexandroupoli with Bulgaria's Burgas, Varna and Ruse, with Greece investing roughly €3 billion in the necessary infrastructure on its own side. This is a substantial, real, under-construction Aegean-to-Danube rail corridor, not merely a proposal, and it is detailed further in the Bulgaria chapter (Part III, Chapter 19).

## 12. Energy Connectivity

### 12.1. The flagship project: the Black Sea Energy submarine cable

The single most important physical finding across this report's energy research is a proposed high-voltage direct current cable running approximately 1,195 kilometres — some 1,100 of them underwater — from Anaklia, Georgia, to Constanța, Romania, with a transmission capacity of 1,000 megawatts, enough to supply roughly one million European households. A parallel fibre-optic telecom cable runs alongside it, making this a combined energy-and-data asset rather than two separate projects. Its legal basis is a Strategic Partnership Agreement on green energy signed in Bucharest in December 2022 by Azerbaijan, Georgia, Romania and Hungary, operationalised through a "Green Energy Corridor" joint venture between Romania's Transelectrica, Georgia's GSE, Azerbaijan's AzerEnerji and Hungary's MVM. The project carries an initial budget of $2.3 billion, is included in ENTSO-E's Ten-Year Network Development Plan and, as of December 2025, the EU's list of Projects of Mutual Interest. The World Bank approved a $35 million loan in May 2024 under its ESPIRE programme, structured toward a total envelope of up to $500 million; as of 29 July 2026, roughly three weeks before this report's

core research window closed, the project had formally entered its marine survey preparation stage, targeting operation by 2029.

This is the first confirmed, funded, currently-under-construction physical link between the Black Sea and South Caucasus systems identified anywhere in this research — directly answering a gap this report's corridor analysis (Chapter 10.10) could not otherwise close. It is not without risk: roughly 700 kilometres of the route runs at approximately 2,000 metres depth, complicating any future repair, and the physical-vulnerability concerns raised by Georgian commentators sit alongside the documented pattern of Black Sea maritime incidents detailed in Chapter 14.

### 12.2. Offshore hydrocarbons: Neptun Deep

Romania's Neptun Deep gas field, developed by OMV Petrom and Romgaz at a cost of roughly €4 billion, holds an estimated 100 billion cubic metres of recoverable gas roughly 160 kilometres offshore in the Black Sea. Its production platform — over 16,500 tonnes, more than 225 metres tall — was installed roughly one month before this report's research window closed, with first gas targeted for 2027 at approximately 8 billion cubic metres a year, a volume that will roughly double Romania's total gas output and position the country as a likely net exporter to Germany and Moldova, with Slovakia expressing interest. The project's flowlines are continuously electrically heated and designed for a carbon footprint roughly eight times below the industry average — an unusually well-documented emissions figure for an offshore gas project, relevant to this report's environmental-performance assessment in Chapter 16.

### 12.3. LNG and the Vertical Corridor

The Alexandroupolis floating storage and regasification unit in Greece began commercial operations on 1 October 2024, with a regasification capacity of 5.5 billion cubic metres a year, connected onward via the Interconnector Greece–Bulgaria, whose capacity is being expanded from 3 to 5 billion cubic metres following an August 2025 authorisation. Bulgaria's state gas company Bulgartransgaz holds a 20% stake in the terminal. This system — branded the Vertical Corridor — already reaches Bulgaria, Romania, North Macedonia, Serbia, Moldova and Ukraine to the east and Hungary and Slovakia to the west, making it the clearest existing example of the Black Sea-to-Central-Europe energy integration this report's founding brief asks about: substantially functioning already, not merely proposed. A reliability caveat worth carrying forward: the terminal suffered a six-month unplanned outage beginning January 2025 after a booster-pump failure, only resuming full operation and its first post-restart cargo around October 2025 — a genuine data point for any assessment of this corridor's resilience, not an incidental footnote.

### 12.4. Grid integration: Ukraine and Moldova's emergency synchronisation

Ukraine's grid operator requested emergency synchronisation with the Continental European grid on 24 February 2022, three days after what had been planned as a routine 72-hour islanding test; European transmission operators completed the technical work in under three weeks, against an original estimate of more than a year. Ukraine achieved full compliance with permanent-synchronisation requirements by the end of 2023 and became a full ENTSO-E member on 1 January 2024; Moldova's own permanent-synchronisation work was, per the most recent reporting found, targeted for completion in 2025, with current 2026 status not independently confirmed in this research. Commercial cross-border exchange capacity between the EU and the Ukraine-Moldova block has grown to 1,700 megawatts from the EU side and 650 megawatts in reverse. A useful comparative case: the Baltic states completed their own long-planned desynchronisation from the Russian/Belarusian grid and synchronisation with Continental Europe via Poland in February 2025 — a second, independently documented instance of exactly the kind of grid de-risking this chapter analyses for the Black Sea region.

### 12.5. Offshore wind and green hydrogen: real potential, early-stage policy

Black Sea offshore wind potential is substantial — conservatively estimated at 11 gigawatts for Türkiye, 94 for Romania, and over 100 for Ukraine — though these figures represent technical ceilings, not near-term forecasts. A joint European Commission/World Bank roadmap published in September 2024 put realistic Romanian capacity at 3 to 7 gigawatts by 2035; Romania's Ministry of Energy published draft concession legislation only in mid-2026, roughly four weeks before this report's research window closed, with first Contract-for-Difference auctions still targeted for 2027 as of an April 2026 industry conference — legislation visibly catching up to a roadmap published nearly two years earlier. Romania's Dobrogea region, where Constanța sits, is separately identified as having strong potential to become a green hydrogen hub, combining wind resources with existing industrial demand from refining, steel-making and port operations.

### 12.6. The complication: Bulgaria, Chiren and TurkStream

This report's evidentiary discipline requires naming a genuine tension in the Bulgaria energy-hub narrative rather than smoothing it into a cleaner story than the evidence supports. Chiren, Bulgaria's only underground gas storage facility, currently holds volumes of Russian-origin gas delivered via TurkStream, even as an EU-funded expansion project aimed explicitly at strengthening regional energy security remains under active investigation by the European Public Prosecutor's Office over its drilling procurement contract. TurkStream itself — now the sole active

pipeline route for Russian gas into Eastern Europe following Ukraine's 2025 decision not to renew its own transit contract — is expanding its capacity through Bulgarian territory, not shrinking, even as the European Commission has announced plans to eliminate Russian gas imports entirely after 2027. Separately, two US-based financiers, one reportedly linked to a former Trump campaign manager, have opened talks with Bulgarian officials both about the Chiren expansion and about acquiring a stake in Bulgaria's TurkStream section — a proposal opposition politicians characterise as an attempt to keep Russian-origin gas flowing under different ownership rather than genuinely diversify away from it. This is a contested, unresolved case, not a settled success, and this report's Bulgaria chapter (Part III) treats it accordingly.

### 12.7. Synthesis

Read together, the evidence shows a system running two logics simultaneously rather than one. Neptun Deep, the Black Sea Energy cable, the Vertical Corridor's expansion, and Ukraine's grid integration together represent a genuine, well-financed diversification push with real 2026–2029 milestones. TurkStream's continued and expanding role, and the contested Chiren case, show that Russian energy dependence is not being wound down on a single clean timeline everywhere at once. Both are true at the same time, and this report presents them that way rather than choosing a single narrative.

## 13. Digital Connectivity

### 13.1. Not a blank slate: existing submarine cable infrastructure

The Black Sea already carries digital infrastructure considerably older than most of the physical assets discussed elsewhere in this report. The Caucasus Cable System — also called the Bulgaria–Georgia cable — is a 1,182-kilometre subsea cable linking Poti, Georgia, to Balchik, Bulgaria, completed in 2008 and currently lit to 12.6 terabits per second, originally built to 1.92. Its owner, Caucasus Online, frames it as part of a "Digital Silk Way" intended to connect Central Asia to Europe via cables beneath the Caspian and Black Seas. KAFOS, a separate 504-kilometre cable linking Romania, Bulgaria and Türkiye, has operated since 1997 at 8 terabits per second. In 2026, NEQSOL Holding and Vodafone Group jointly announced development of a further system, Kardesa, connecting Bulgaria, Georgia, Türkiye and Ukraine — the first cable project found in this research naming Ukraine directly as a landing point. A separate, EIB-linked project connects Europe to Georgia and onward to Armenia via upgraded terrestrial infrastructure over 1,163 kilometres, on an open-access basis, though whether this is the same initiative as the Black

Sea Energy cable's fibre line or a genuinely distinct project was not resolved in this research.

At least four separate Black Sea digital-cable initiatives, developed by at least three distinct commercial or state actors, were identified without evidence of a single coordinating body — mirroring the institutional fragmentation this report's corridor analysis (Chapter 10) found in physical transport infrastructure. The region has real digital assets; what it lacks is coordination, a finding with direct implications for the governance recommendations in Chapter 23.

### 13.2. Satellite connectivity: sovereignty as the sharpest illustration of this report's central thesis

No other finding in this research illustrates the founding brief's own framing — reducing dependence on vulnerable or geopolitically controlled routes — as directly as satellite connectivity, and it applies to a private company's decisions rather than a state's. Roughly 38,000 Starlink terminals were deployed across Ukraine within weeks of the 2022 invasion, and by 2024–2025 the network had shifted from emergency backup to routine military and civilian infrastructure. A global Starlink outage in September 2025 knocked out Ukrainian front-line communications entirely before recovering; Russian use of Starlink in and around Ukraine was separately cut off in February 2026, after which Ukrainian commanders reported reduced effectiveness of Russian drone operations. Three sovereignty responses are now running in parallel as a direct consequence: Ukraine's own $1.1 billion, 360-satellite constellation under development by Stetman and Danish manufacturer GomSpace, targeting 2027; Russia's competing "Rassvet" constellation, launching its first satellites in March 2026; and the EU's own IRIS² programme, which concluded implementation negotiations and moved to full-scale deployment on 7 August 2026 — twelve days before this report's core research window closed — expanding to 348 satellites and explicitly designed to extend EU-sovereign connectivity beyond its own borders into "geographical areas of strategic interest," though no region-specific service commitment for Ukraine, the Balkans or the Caucasus was found confirmed as of this report's research.

### 13.3. Data centres and cloud: Romania and Bulgaria's asymmetric emergence

Romania is developing a "Black Sea AI Gigafactory" project worth up to €5 billion, part of a data-centre market projected to grow from roughly 93 to 232 megawatts of capacity between 2026 and 2031 — positioning the country, on industry analysis, as a digital bridge between Western Europe and the Balkans, constrained in practice by some of the EU's highest electricity prices and scarce carrier-neutral fibre outside Bucharest. Bulgaria's entry is smaller but concrete and recent: Digi-

tal Realty, the world's largest cloud- and carrier-neutral data-centre platform, acquired Telepoint in March 2026, gaining two Sofia facilities including one of Southeast Europe's most interconnected sites, with over 110 network service providers.

### 13.4. Paperless freight and digital customs: the regulatory counterpart to this report's worst physical bottleneck

The EU's electronic Freight Transport Information framework began its phased rollout in January 2025, with certified digital platforms permitted from January 2026 and full mandatory acceptance of electronic consignment notes across all member states from July 2027 — an estimated €1 billion in annual savings once complete. The parallel Single Window Environment for Customs entered EU law in December 2022 after nearly a decade of pilots, phasing in through 2031. Ukraine is building a parallel, EU-aligned system in real time rather than waiting for accession: its Ministry of Finance approved a digital-customs modernisation plan running to 2030, developed with EU experts and the EU4PFM programme, and a live EU4Digital customs pilot between Ukraine and non-neighbouring Lithuania has run since September 2024. None of this eliminates the underlying Poland–Ukraine permit dispute detailed in Chapter 8 — that is a political question, not a technical one — but it is the concrete mechanism by which a resolved dispute would translate into materially faster crossings once resolved.

### 13.5. Does a "Black Sea Digital Connectivity Corridor" exist?

Applying the same honesty standard this report applies to the physical corridors: not yet as a named, coordinated institution, but the pieces are considerably more advanced than a first reading of the brief implies. Two working fibre systems have connected Bulgaria to Georgia and to Türkiye since 1997 and 2008 respectively; a third, Ukraine-inclusive system was announced in 2026; the Black Sea Energy cable's fibre line will add a fourth by 2029; and IRIS$^2$ and Ukraine's own satellite programme add a fifth, non-cable layer. What is missing is not infrastructure but a single coordinating mechanism — this report's most actionable digital-chapter finding, carried into the governance recommendations of Chapter 23.

## 14. Security and Resilience

### 14.1. The operational threat picture

Mine risk, drone incidents and missile strikes are not separate categories of Black Sea maritime risk; the evidence shows they compound. The trilateral Romania-Bulgaria-Türkiye mine-countermeasures task group, operating since July 2024 on a rotating six-month command basis, describes mine risk as having proliferated

continuously since the war's outbreak and now requiring permanent, not one-off, surveillance. The 5 June 2026 Constanța incident (Chapter 3) illustrates the drone dimension in concrete detail: four Ukrainian naval drones lost communications near Sevastopol, likely to Russian electronic warfare, with one drifting roughly 250 kilometres to detonate inside a working commercial harbour — a response that saw the threatened area evacuated within roughly 45 minutes of detection, itself a data point on the region's genuine emergency-response competence. Missile and drone strikes on Ukraine's own port infrastructure exceeded 180 documented incidents between January and early July 2026, with drone launches against the Odesa region roughly tenfold their 2025 level in the first four months of 2026 alone.

### 14.2. Navigation resilience: an underappreciated, quantifiable risk

The Black Sea accounted for nearly 20% of all global GPS jamming events in the final quarter of 2025, second only to the Middle East Gulf theatre. The interference — persistent GNSS spoofing and jamming originating predominantly from Russian-controlled Crimea — affects the southeast Romanian flight information region, the Constanța coast, the Danube Delta and the Snake Island shipping corridor, disrupting civil aviation and commercial shipping alongside military assets. A Romanian firm has been launching high-altitude balloons from Constanța since August 2024 specifically to monitor GNSS spectrum quality — a concrete, low-cost, nationally-led model worth scaling. Thirteen European coastal states plus Iceland issued a joint warning about equivalent Baltic and North Sea interference in January 2026, offering a multilateral coordination template the Black Sea region has not yet replicated.

### 14.3. Submarine cable and critical infrastructure protection

The EU's Action Plan on Cable Security, adopted 21 February 2025, is structured around a full resilience cycle of prevention, detection, response and deterrence, backed by €420 million already committed under CEF Digital and a further €540 million for 2025–2027. The plan aims to fund one coordination hub per sea basin; member states had until 31 March 2026 to form a Black Sea-basin consortium and submit a proposal, and confirming that outcome remains an open item for this report's future updates. NATO's parallel track — a Critical Undersea Infrastructure Coordination Cell established January 2023 and a Maritime Centre for the Security of Critical Undersea Infrastructure agreed at the 2023 Vilnius Summit, both following the September 2022 Nord Stream sabotage — is the framework the Bulgaria-Romania Maritime Security Hub concept and the mine-countermeasures group's expanded critical-infrastructure mandate both plug into.

### 14.4. Cybersecurity

A large-scale cyberattack on 24 March 2025 disrupted Ukrainian Railways' online

ticketing systems, though physical train operations continued throughout — described by a Ukrainian official as apparently purpose-built malware implying substantial pre-attack preparation, and by the railway itself as an attack that "cannot be stopped even by the most insidious cyberattacks." The EU's biennial Cyber Europe exercise in 2026 specifically simulated coordinated attacks on European rail and maritime sectors, operationally testing the EU Cyber Blueprint and Cybersecurity Reserve for the first time; alongside it, the EU launched a $11.5 million, four-year programme (EU4CyberUA) to align Ukraine's cybersecurity capabilities with EU accession requirements. Ukraine's rail network — central to this report's reconstruction analysis in Chapter 4 — is targeted through physical strikes, direct cyberattacks and unrelated political border disruption simultaneously; resilience planning cannot treat these as separate problems with separate owners.

### 14.5. Military mobility and dual-use infrastructure

The EU Military Mobility Package, adopted 19 November 2025, aims to create an EU-wide "military Schengen" by 2027: a maximum three-day authorisation window for cross-border military transport, simplified customs, and a new European Military Mobility Enhanced Response System for crisis conditions. It earmarks €100 billion from EU and national funds for road, bridge, port and airport upgrades on four priority corridors sized for oversized military cargo — whether the corridors this report analyses are among those four was not confirmed in this research and remains a priority item for further work, given its direct bearing on this report's own investment case. The European Economic and Social Committee's formal opinion on the package raised genuine, documented concerns about the proportionality of emergency derogations and the standards applied when military transport is subcontracted to civilian operators — a real institutional tension, not a hypothetical one, relevant to Chapter 17's governance analysis.

### 14.6. Operationalising "Resilience by Design"

No pre-existing framework matching this exact phrase was found in this research. What exists, and what this report grounds the principle in instead, is the NATO-EU Task Force on the Resilience of Critical Infrastructure, whose June 2023 Final Assessment Report identified energy, transport, digital infrastructure and space as priority sectors and explicitly recommended "security by design" among allies, member states and the private sector. Applied concretely to this report's recommendations: new port terminals should specify blast and evacuation zoning at the design stage, as Constanța's emergency response demonstrated works when present; new submarine cable routes should be planned with basin-hub monitoring and redundancy from inception rather than retrofitted after a fault; new rail electrification and signalling should include GNSS-independent backup posi-

tioning given the jamming data in §14.2; and new dual-use road and rail corridors should meet Military Mobility Package standards at construction, not upgraded later at additional cost. Each of these principles is attached to specific projects in Chapter 22, not left as general aspiration.

# PART III — MODELLING AND PRIORITISATION

## 15. Infrastructure Gaps

### 15.1. Scope, stated honestly

This chapter identifies gaps for the eight countries this research generated independently verified evidence for — Bulgaria, Romania, Ukraine, Moldova, Serbia, North Macedonia, Greece and Georgia. It does not attempt gap analysis for Croatia, Slovenia, Hungary, Austria, Albania, Montenegro, Bosnia-Herzegovina, Kosovo, Armenia, Kazakhstan, Uzbekistan or Turkmenistan, since doing so credibly would require research this programme did not conduct. This is named here as the largest structural gap in the report as a whole, and a defined requirement for a follow-up research phase — not an oversight to paper over.

### 15.2. Three findings that reframe rather than merely fill gaps

Three of this report's most-repeated open questions resolved during gap analysis, in each case reframing the question rather than simply answering it. First, the Cernavodă–Constanța canal — a fully built 95.6-kilometre waterway completed in 1984–87, with locks rated for vessels up to 296 metres and 5.5 metres of draft — appears to carry a small fraction of a design capacity Romanian technical sources put at over 75 million tonnes annually; the constraint is a shortage of barge-scheduling expertise and freight brokers, not physical capacity. Second, a Constanța–Georgia shipping connection is not, as earlier research assumed, unconfirmed to exist: three separate operator consortia have launched broadly similar container or Ro-Ro services on this route since 2019, one explicitly replacing an earlier route suspended by the war — the real open question is durability, not existence. Third, the Poland–Ukraine border dispute remains unresolved as of the most recent evidence found (26 February 2026), with Polish hauliers still demanding reversal of the wartime permit-free regime and Ukraine firmly refusing.

### 15.3. Country and system summaries

**Bulgaria.** Existing strengths span Sofia's dry ports and 8.4-million-passenger air-

port, the Trakia Economic Zone at Plovdiv, the Varna and Burgas ports, Ruse's Danube terminal, and membership in the Black Sea–Aegean Sea Corridor Platform. Critical bottlenecks: Kapıkule's worsening waits, the single Ruse-Giurgiu bridge, the Niš-Dimitrovgrad closure on the Serbian side of Bulgaria's main Balkan link, and Plovdiv's near-absent air-cargo capacity beside Southeast Europe's largest industrial zone. Missing infrastructure: a second Ruse-Giurgiu bridge and the Corridor VIII tunnel to North Macedonia. Requiring acceleration: the Gorna Oryahovitsa intermodal terminal, which lost its national Recovery and Resilience Plan funding competition to Ruse.

**Romania.** Strengths: Constanța, the Cernavodă-Constanța canal, Neptun Deep, and the Black Sea Energy cable's landing point. Critical bottlenecks: rail and road border capacity with Ukraine running at roughly a fifth of pre-war levels, and the canal's dramatic under-utilisation. The highest-leverage Regional Missing Link in this entire study — canal activation — sits here, at near-zero marginal construction cost.

**Ukraine.** Strengths: demonstrated rail-network resilience (30% damaged, freight volumes up 18% in 2024), full ENTSO-E membership, and a rebounding steel sector. Critical bottlenecks: an energy system needing $90.6 billion in restoration with 2026 heat-supply needs under 1% funded, and own-port capacity under intensifying, not stabilising, attack. No project meeting the "small investment, large effect" Regional Missing Link test was identified here — Ukraine's needs are large-scale by nature, not missing-link-scale.

**Moldova.** The Giurgiulești-Reni crossing's 2024 reconstruction is this report's clearest example of a concrete border-friction reduction achieved through negotiated infrastructure investment. The gauge break at Iași remains the system's binding constraint on deeper EU rail integration.

**Serbia and North Macedonia.** The Niš-Dimitrovgrad closure and Corridor VIII's own unbuilt tunnel are both flagged as Regional Missing Links, given both close a specific, quantified detour (respectively, restoring the only direct Balkans-Bulgaria rail link, and eliminating a 120-kilometre detour via Serbia for all Sofia-Skopje traffic).

**Greece and Georgia.** Alexandroupolis's six-month 2025 outage and the Baku-Tbilisi-Kars railway's re-congestion within months of a fivefold capacity expansion both illustrate that recent, real investment has not yet produced reliable capacity — a distinction this report's scoring model (Chapter 16) treats as materially different from having built nothing at all.

## 16. Corridor Competitiveness

## 16.1. Method and an honesty requirement

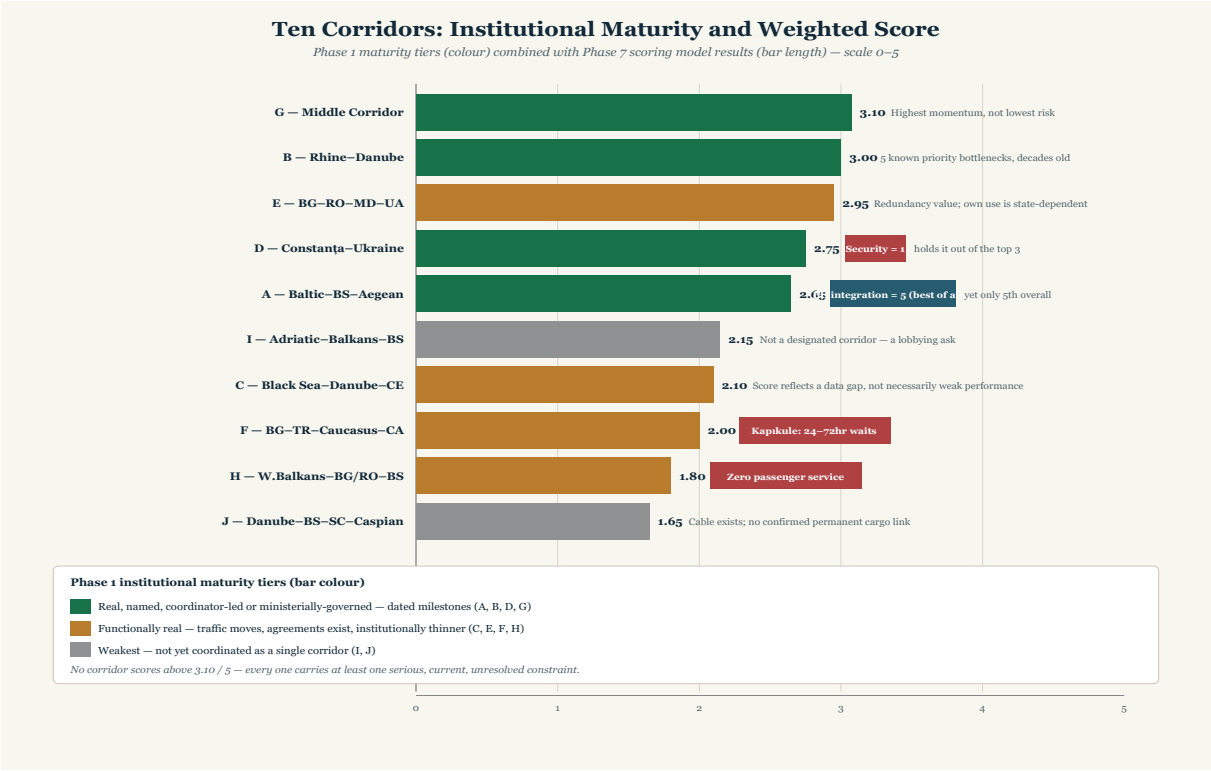
This report's founding brief is explicit: numerical scores must not be created without identifying the underlying data or assumptions. Two consequences follow, stated before any numbers appear. First, evidence density is not equal across the ten corridors, and the scores below reflect that rather than smoothing it away — Corridors D and G generated this research's richest primary evidence; Corridors I and J were, from the outset, its weakest-evidenced. Every score is tagged Observed, Estimated, Assumption, or Data unavailable, with the full per-criterion rationale reproduced in Annex B. Second, Corridor J is scored on a materially different basis than the other nine — energy and digital connectivity rather than cargo-transport capacity — and its scores should be read as "connectivity broadly defined," not a like-for-like comparison.

Scoring uses this report's founding weighting: Transit time, Cost, Infrastructure capacity and Reliability/resilience each 15%; Border efficiency, Security and Multimodality each 10%; EU integration/interoperability and Environmental performance each 5%. Scale: 1 (very weak) to 5 (very strong).

## 16.2. Results

| Corridor | Weighted score |
|---|---|
| G — Middle Corridor | **3.10** |
| B — Rhine-Danube | **3.00** |
| E — Bulgaria-Romania-Moldova-Ukraine | **2.95** |
| D — Constanța-Ukraine | **2.75** |
| A — Baltic-Black Sea-Aegean | **2.65** |
| I — Adriatic-Balkans-Black Sea | **2.15** |
| C — Black Sea-Danube-Central Europe | **2.10** |
| F — Bulgaria-Türkiye-Caucasus-Central Asia | **2.00** |
| H — Western Balkans-Bulgaria/Romania-Black Sea | **1.80** |
| J — Danube-Black Sea-South Caucasus-Caspian | **1.65** |

*No corridor exceeds 3.10 out of 5. This is itself a finding: every named corridor in this study carries at least one serious, current, well-evidenced constraint, and a report that presented any single one as fully "ready" would not be reading its own evidence correctly.*




*Corridor maturity and weighted score*

*Figure 2. Corridor institutional maturity tiers combined with the weighted scoring results above.*

### 16.3. What the ranking shows

Institutional maturity and physical performance diverge sharply, in both directions. Corridor A holds the single highest score awarded on any criterion in this entire model — a 5, for EU integration, reflecting its 2024 legal designation and active coordination platform — yet finishes fifth overall, because the founding weighting deliberately places six times the combined weight on physical performance (transit time, cost, capacity, reliability) as on institutional status. Corridor H, conversely, carries a genuinely low security risk (4 out of 5, since its core weakness is explicitly a peacetime construction delay, not a war-caused disruption) yet finishes second-to-last, because one severe, well-documented physical gap — the Niš-Dimitrovgrad closure — drives three of its nine criteria simultaneously. This last point is a genuine methodological tension worth naming directly: where a single finding touches multiple correlated criteria, the model's numerical precision may somewhat overstate how independent those criteria really are, and this report flags that rather than letting the table's apparent precision imply more than the underlying evidence supports.

Security is the criterion doing the most rank-changing work in the model. Corridor D would plausibly rank second or third on physical performance and multimodali-

ty alone; a security score of 1 — the only 1 awarded on that criterion across all ten corridors, driven by the documented drone, jamming and missile-strike evidence in Chapter 14 — pulls it to fourth. This is the weighting functioning exactly as the founding brief's own instruction intends.

## 17. Investment Requirements

### 17.1. The financing landscape

Beyond the war-specific instruments already discussed in Chapter 4 — the €50 billion Ukraine Facility and its €9.5 billion Ukraine Investment Framework — this report finds a substantial, largely EU-institutional financing architecture already in place. The EU's Cohesion Fund (2021–2027) totals €48.03 billion, of which €11.29 billion has been transferred into the Connecting Europe Facility; CEF as a whole totals roughly €33.7 billion across transport, energy and digital, with co-funding rates typically capped at 30% of eligible transport costs, rising to 85% for Cohesion Fund transfers specifically. EFTA/EEA states and EU accession-track countries — a category covering Ukraine, Moldova and the Western Balkans — can participate under certain conditions, meaning this instrument is not categorically closed to the region's non-member states. Romania's own Cohesion Policy allocation for 2021–2027 stands at €31.5 billion, of which €7.2 billion is earmarked for transport, against an absorption rate of only around 17% as of mid-2025 — an administrative-capacity constraint, not a funding-availability one. Bulgaria's principal transport vehicle, the "Transport Connectivity" Programme adopted in October 2022, carries a €1.61 billion allocation and is the specific fund behind both the Gorna Oryahovitsa and Varna/Burgas financing detailed in Part III.

The Western Balkans Investment Framework, secretariat-hosted by the EIB, has supported over 260 projects with more than €3 billion in EU grants mobilising over €24 billion in total investment — an eight-to-one ratio, and a working template rather than a proposal. Its financing of the Corridor VIII rail link (€412.3 million total, €219.7 million in WBIF grants, targeting 2027 completion) resolves what earlier stages of this research had flagged as an unquantified cost. Global Gateway's Trans-Caspian push has now produced €10 billion pledged at a January 2025 Brussels forum, a further €12 billion announced at the April 2025 EU-Central Asia Summit, and concrete follow-through agreements at a November 2025 Tashkent forum. The International Finance Corporation — named explicitly in this report's founding financing-instrument list — was not found attached to any specific project in this region during this research, a genuine absence worth noting rather than an unresearched gap.

### 17.2. Three different financing situations, not one

Mapping this report's twenty-project longlist (Chapter 22) against the instruments above produces three genuinely distinct categories that should not be treated identically. Some projects — Neptun Deep, the Black Sea Energy cable, the Corridor VIII tunnel — are already capitalised, and the task is delivery discipline, not financing identification. Others — Niš-Dimitrovgrad, the Ruse intermodal terminal, the Gorna Oryahovitsa terminal — have an existing, applicable financing channel and need continued disbursement, where Romania's 17% absorption problem is the genuine risk to watch, not fund availability. A third category — the Poland-Ukraine border governance fix, the Kapıkule capacity-and-governance package, the Cernavodă-Constanța canal activation — needs essentially no capital at all, only negotiated agreement and institutional capacity-building. Private investment is realistic where a clear commercial off-take exists (Neptun Deep's gas sales, Digital Realty's Sofia data centres, port-terminal concessions); public financing remains necessary for cross-border rail, which structurally lacks a single revenue-capturing entity, and for anything with a diffuse-beneficiary resilience dimension such as GNSS backup or cable protection.

## 18. Governance

### 18.1. Institutional barriers, evidenced rather than generic

Rather than list barrier categories abstractly, this report names the specific, evidenced instance this research found of each: different technical standards (the region's three-gauge rail problem, and ERTMS deployment at just 7% on the Rhine-Danube corridor and 13% on Orient/East-Med, against a nominal 2030 EU-wide target already slipping to 2034–2037 in places); border and customs procedures (the structurally identical Poland-Ukraine and Kapıkule permit-quota disputes, and a documented three-to-four-day Sofia food-safety testing requirement); fragmented governance (at least four uncoordinated Black Sea digital-cable initiatives, and the open question of whether the mine-countermeasures group and the new Maritime Component Command will formally merge); and administrative absorption capacity — a category this report adds explicitly to the founding brief's list, evidenced by Romania's 17% cohesion-fund uptake and Ruse's own logistics-labour brain drain constraining a port whose physical capacity is expanding faster than its workforce.

### 18.2. Does a Black Sea Connectivity Platform already exist?

This is the single finding in this research most likely to change what the report recommends rather than merely adding to its evidence base. On 20 October 2025, EU and partner-country co-chairs issued conclusions explicitly recognising "a need for an effective coordination framework" for this exact region, advanced further at the

November 2025 Tashkent forum; the EU's own Black Sea Strategy describes this as a "Connectivity Agenda," channelled through the Eastern Partnership framework. Independent analysis found, as of October 2025, that this concept "currently lacks a detailed action plan or dedicated funding." A working proof of concept already exists at smaller scale: the Black Sea-Aegean Sea Corridor Platform, whose founding memorandum explicitly commits Bulgaria, Greece and Romania to "a structured, transparent, and inclusive approach to regional connectivity."

This report's recommendation follows directly: not to invent a new platform, but to give the EU's own Connectivity Agenda concept the action plan and budget line it currently lacks, using the BACP's working three-country model as the template to scale up — and to build any resulting mechanism around the trilateral Bulgaria-Romania-Türkiye core that the Montreux Convention (Chapter 3) structurally requires regardless of how the civilian coordination body is designed. Three independent lines of evidence — a 1936 treaty's text, a working mine-countermeasures rotation, and two 2025 think-tank analyses reaching the same conclusion independently — converge on this same institutional design.

# PART IV — BULGARIA AS A BLACK SEA–BALKANS CONNECTIVITY HUB

## 19. Bulgaria's Strategic Position

### 19.1. The node network

**Sofia** functions as the system's most complete hub already: over 8 million airport passengers in 2025 for the first time, 21,887 tonnes of air cargo, a new dedicated cold-chain cargo warehouse opened by Swissport in March 2026, and a planned 65,000 square-metre Terminal 3 by 2030. Digital Realty's March 2026 acquisition gives it two interconnected data centres with over 110 network service providers.

**Plovdiv** presents this report's clearest example of industrial capacity outrunning its supporting logistics infrastructure. The Trakia Economic Zone, at 10.7 million square metres the largest industrial zone in Southeast Europe, hosts Schneider Electric, ABB and Johnson & Johnson's Janssen subsidiary — yet the adjacent airport handled zero scheduled cargo routes through 2024 and under 600 tonnes annually by charter, forcing manufacturers to truck freight 120 kilometres to Sofia or 280 to Thessaloniki at a documented cost of €0.15–0.22 per kilogram.

**Varna and Burgas** are mid-transition: a port masterplan and concession tender in progress at Varna, a proposed Beloslav grain terminal, and a genuine, currently functioning energy-hub role via Bulgartransgaz's 20% Alexandroupolis stake and the Vertical Corridor's transit through Bulgarian territory.

**Ruse** combines Bulgaria's strongest Danube asset with this report's most striking soft-infrastructure finding. Sitting at the intersection of the Rhine-Danube corridor, the Sea2Sea corridor and the TRACECA route, its terminal capacity is expanding under a €12.4 million CEF-funded programme toward a 2026 throughput forecast not reached since before the pandemic, and a further roughly €60 million intermodal terminal is EU-funded as the Bulgarian node of the €3 billion Thessaloniki-Ruse Sea2Sea corridor. Yet between 2022 and 2024, 15 to 20% of Ruse's Romanian-speaking senior logistics managers relocated to Bucharest or Giurgiu, and Class-A warehouse vacancy sits at just 3.2% with no new speculative development planned — physical capacity expanding faster than the workforce needed to operate it, a genuine constraint this report's investment recommendations (Chapter 22) account for explicitly rather than assume away.

## 19.2. Bulgaria's six external connections

Every one of Bulgaria's road connections to its six neighbours is currently mid-construction; none is complete. To Greece, the Struma Motorway's difficult Kresna Gorge section is targeted for 2029. To Türkiye, the Maritsa Motorway remains only partially built. To Serbia, the Sofia-Kalotina "Evropa" Motorway's final stretch completed in 2023. To North Macedonia, the Dupnitsa-Kyustendil expressway remains in the design-procurement stage. To Romania, road capacity lags the furthest, with the Botevgrad-Vidin and Veliko Tarnovo-Ruse expressways still in planning. The Sofia-Varna spine itself, the Hemus Motorway, dates to the early 2010s and is now forecast for completion in 2030.

The rail connection to North Macedonia — Corridor VIII — is the one Western Balkans link this report found without a Serbian-side equivalent already documented: a 947-kilometre, roughly €1.2 billion Bulgarian-side programme whose missing link, a 2.4-kilometre tunnel between Gyueshevo and Deve Bair, currently forces all Sofia-Skopje traffic through a 120-kilometre detour via Niš. Financing agreements for the North Macedonian side were signed roughly three months before this report's core research window closed.

The Bulgaria-Türkiye connection, at Kapıkule and Kapitan Andreevo, is the single most severe border bottleneck this research identified anywhere in the study: the busiest land freight crossing in Europe and second-busiest in the world, with current truck waits of 24 to 72 hours per Bulgarian customs' own figures — a docu-

mented worsening trend, not a static problem — compounded by a Turkish-truck permit-quota system structurally identical to the Poland-Ukraine dispute detailed in Chapter 8, on an entirely separate frontier.

### 19.3. Assessing the seven hub roles

Bulgaria's evidence against the founding brief's seven named hub functions is genuinely mixed. As a **logistics hub**, strong node assets sit alongside road connectivity still mid-construction on every external axis and Ruse's emerging labour constraint. As a **Black Sea gateway**, Bulgaria's ports trail Constanța in scale but hold a real, functioning energy-transit role. As a **transit country**, Bulgaria is stronger and better-evidenced than the brief's own framing suggests — Kapıkule's sheer volume and the Black Sea-Aegean Sea Corridor Platform's active work both point to a de facto primary-EU-gateway-to-Türkiye role the founding brief's list does not name explicitly. As a **reconstruction logistics platform**, Bulgaria's specific role relative to Romania's was not independently quantified in this research and remains an open item. As a **digital logistics hub**, the Digital Realty acquisition is concrete and market-validated, not aspirational. As an **energy hub**, two logics run in parallel — genuine strength via Alexandroupolis and offshore wind/hydrogen cooperation, alongside the unresolved Chiren/TurkStream complication detailed in Chapter 12. As a r**egional multimodal hub**, Plovdiv's industrial-versus-air-cargo mismatch is this report's clearest evidence of unrealised potential specifically waiting on a modest, targeted investment.

## 20. The Gorna Oryahovitsa Case Study

Gorna Oryahovitsa presents a sharper analytical question than "should Bulgaria build a hub here." Bulgaria's National Railway Infrastructure Company is currently doing conceptual and design groundwork for three intermodal terminals — Sofia, Vidin and Gorna Oryahovitsa — but Gorna Oryahovitsa's own terminal was included in the first draft of Bulgaria's Recovery and Resilience Plan and subsequently dropped in favour of Ruse, with construction now expected through the slower 2021–2027 "Transport Connectivity" programme instead. The real question this case study answers is what the strategic case is for accelerating a project that has already lost one national funding competition to a neighbouring city.

The locational case is genuinely strong. Gorna Oryahovitsa remains, on evidence spanning this entire research programme, the largest and most important railway junction in Northern Bulgaria, sitting on the line toward the Turkish and Greek borders that forms Corridor F's western feeder — independently named, alongside Ruse, Plovdiv and Varna, as a priority TEN-T modernisation junction in at least one

Bulgarian party's rail platform. Its airport, opened in 1925, holds full international status with on-site customs infrastructure and sits beneath five international air corridors connecting Europe with the Middle East and Asia — yet recorded just 196 passengers and zero registered cargo tonnes in 2023, a private concession since 2016 having so far produced ambition rather than throughput. Road accessibility improves directly as the Hemus Motorway approaches its 2030 completion, since the town sits roughly three hours from Sofia along that same corridor.

The institutional case is weaker, having already lost the RRP funding competition and now depending on a slower financing track. This report's judgement — offered explicitly as a strategic projection rather than an observed conclusion — is that the case for acceleration rests on complementarity rather than substitution: Ruse serves the Danube-Romania axis, and Gorna Oryahovitsa's underused airport and rail-junction status make it a more plausible candidate for a Türkiye/Greece-facing air-and-rail node than a second Danube-facing hub would be.

# PART V — SCENARIOS, PROJECTS AND THE PATH TO 2040

## 21. Regional Scenarios

### 21.1. Where the region stands as this report is written

As of the most recent evidence available, the war continues without a lasting ceasefire. US-mediated talks since early 2025 have produced only limited restraints — around Black Sea navigation and energy-facility strikes, plus a three-day ceasefire — and February 2026 talks in Geneva ended without breakthrough; Russia's foreign minister stated in mid-August 2026 that Moscow would not accept a ceasefire freezing the current frontline. A live diplomatic thread exists nonetheless: on 27 August 2026, Ukraine's presidential office indicated trilateral talks could resume as early as September, with proposals including a ceasefire and security guarantees. This report's four scenarios are built to remain useful regardless of how that thread resolves, but the reader should understand that **Fragmentation**, not Stabilisation or Integration, most closely describes the region's position today.

### 21.2. The four scenarios

**Scenario 1 — Fragmentation.** War-related risk remains high; regional connectivity develops through disconnected national projects rather than a coordinated system.

Already-funded, already-dated fixes such as Niš-Dimitrovgrad proceed on schedule since their financing is locked in, but broader integration slips as national priorities dominate; the Maritime Component Command remains in pre-settlement planning without full activation; Ukraine's energy-reconstruction needs stay chronically underfunded. This is the closest scenario to the region's current trajectory.

**Scenario 2 — Stabilisation.** A negotiated ceasefire is reached — plausibly building on the live September 2026 thread — though full peace and EU accession remain distant. Ukraine's own Black Sea ports regain shipper confidence, reducing reliance on the Constanța/Danube workaround; reconstruction financing scales sharply; the Maritime Component Command formally activates per its own stated contingency; mine clearance becomes the dominant Black Sea security task as active-strike risk recedes.

**Scenario 3 — Integration.** Ukraine achieves deep TEN-T integration and meaningful EU accession progress. The 2024-designated but currently unbuilt Rhine-Danube branch to Lviv gets built; the EU-wide ERTMS gap narrows meaningfully; CEF and Cohesion eligibility formally extends to Ukraine and Moldova as accession-track countries; Bulgaria's seven hub roles shift from partial to comprehensive as its road network finally completes.

**Scenario 4 — Strategic corridor transformation.** The Black Sea-Balkans-Caucasus-Central Asia system matures into one of Europe's principal alternative east-west connectivity systems. The Middle Corridor exceeds its 2034 target; Corridor J transitions from an unscoreable cargo corridor to a functioning multimodal system, plausibly via the Cernavodă-Constanța canal's activation as a genuine Bosphorus-bypass route; a genuine Black Sea-wide security architecture operates at full capacity around the Bulgaria-Romania-Türkiye trilateral core Chapter 3 identifies as structurally required.

## 22. Priority Projects

Twenty projects, drawn directly from evidence gathered across this research rather than assembled as a generic wishlist. Full sourcing for each, including specific cost and timeline figures where found, appears in Annex A.

### 22.1. Priority 1 — Critical / Immediate (Horizon I, 2026–2030)

Reopening the **Niš-Dimitrovgrad rail line** (€268 million, already funded, targeting end-2027) restores the only direct rail link between the Western Balkans and Bulgaria's Black Sea coast. Resolving the **Poland-Ukraine border dispute** requires no capital investment at all — only negotiated agreement — yet may be the single

highest-leverage intervention in this entire report, given it sits directly on reconstruction-import as well as export flows. A **Kapıkule capacity-and-governance package** addresses Europe's busiest land freight crossing. Activating the **Cernavodă-Constanța canal** through barge-scheduling training, broker development and coordinated marketing could unlock tens of millions of tonnes of latent capacity at a fraction of the cost of new construction. Completing the **Chop-Uzhhorod gauge conversion** enables the 2024-designated Rhine-Danube branch into Ukraine to function as intended. Converting the **Constanța-Georgia shipping connection** from repeatedly-relaunched to permanent would resolve this study's most persistent open question through a modest demand-guarantee instrument rather than large capital.

### 22.2. Priority 2 — Strategic (Horizon I–II, 2030–2035)

A **second Ruse-Giurgiu Danube bridge** (design phase, targeting 2032) relieves a single point of failure currently carrying two corridors' traffic. The **Corridor VIII tunnel** (€412.3 million, €219.7 million EU-funded, targeting 2027) closes the last major unbuilt Western Balkans-Bulgaria rail gap. The **Ruse intermodal terminal and Sea2Sea corridor** (roughly €60 million plus €3 billion on the Greek side) build a full Aegean-to-Danube rail link. **Plovdiv air-cargo development** addresses the clearest small-investment, large-effect mismatch this research identified. Completing the **Hemus and Struma motorways** (2030 and 2029 respectively) closes Bulgaria's two principal domestic gaps. The **Gorna Oryahovitsa intermodal terminal** activates dormant, fully-licensed capacity. **Neptun Deep** (€4 billion, first gas 2027) roughly doubles Romanian gas output. **Alexandroupolis reliability upgrades and IGB expansion** address a documented six-month outage alongside raw capacity growth. **Moldova rail modernisation** (€41.2 million EIB plus €12 million EU grant, first tranche) builds the standard-gauge backbone concept.

### 22.3. Priority 3 — Transformational (Horizon II–III, 2035–2040)

The **Black Sea Energy submarine cable** ($2.3 billion, targeting 2029) is the first confirmed physical Black Sea-Caucasus link this research found. Further **Baku-Tbilisi-Kars capacity expansion** addresses a corridor already re-congested within months of its last fivefold increase. A **Black Sea digital coordinating mechanism** could unlock more value than any single new cable, per this report's own digital-chapter finding. **Full ERTMS deployment** across the corridors this report analyses addresses the single largest EU-integration gap in the entire scoring model.

### 22.4. The Regional Missing Links

Six of the twenty projects above meet the founding brief's specific test — a relatively small investment producing an outsized corridor-wide effect — clearly enough to headline this report's roadmap**: Niš-Dimitrovgrad, the Cernavodă-Constanța canal activation, the Corridor VIII tunnel, Plovdiv's air-cargo link, the Poland-Ukraine border governance fix, and the second Ruse-Giurgiu bridge**. These six should anchor near-term political and financial attention ahead of the remaining fourteen.

# PART VI — SYNTHESIS

## 23. The Integrated Regional Picture

Before proposing a framework for the period to 2040, the evidence gathered across this report resolves into a single integrated assessment, in the brief's own requested form.

**Strengths.** Real, funded, dated flagship assets now exist on every layer this report examines — transport (the Corridor VIII tunnel), energy (Neptun Deep), digital and energy combined (the Black Sea Energy cable), and security (the mine-countermeasures rotation). A working three-country coordination model, the Black Sea-Aegean Sea Corridor Platform, already exists and could be scaled rather than invented from nothing.

**Weaknesses.** No corridor in this report's scoring model exceeds 3.10 out of 5; every one carries at least one serious, unresolved constraint. The single most consequential open question this research pursued — whether a permanent Black Sea-Caucasus cargo link exists — remains unresolved after repeated investigation across multiple chapters.

**Opportunities.** Six Regional Missing Links (Chapter 22.4) offer small, targeted investments with outsized corridor-wide effect. The EU's own "Connectivity Agenda" concept needs an action plan and budget line, not invention from scratch — a materially lower bar to clear than building new governance from a blank page.

**Threats.** The war's trajectory remains the largest single variable, and as of this report's writing sits closer to Fragmentation than any more favourable scenario. Administrative absorption capacity — Romania's 17% cohesion-fund uptake being the clearest evidenced instance — may bind at least as tightly as available financing on how fast any of this can actually be delivered.

## 24. The Black Sea–Balkans Connectivity Architecture 2040

This report proposes a five-layer framework for the region's connectivity system to 2040, each layer anchored directly in the evidence developed across the preceding chapters rather than proposed in the abstract.

**Layer 1 — Transport** (road, rail, maritime, inland waterway, air) is anchored by the Baltic-Black Sea-Aegean corridor's institutional maturity and the specific physical fixes — Niš-Dimitrovgrad, the Corridor VIII tunnel — that close its most severe gaps.

**Layer 2 — Logistics** (ports, terminals, dry ports, customs) is anchored by the Cernavodă-Constanța canal's latent capacity and the Sea2Sea/WBIF node network — the layer where activating existing assets matters as much as building new ones.

**Layer 3 — Energy** (electricity, gas, LNG, renewables, hydrogen) is anchored by Neptun Deep and the Black Sea Energy cable — the best-evidenced, most currently active layer in this entire study, though not without the Chiren/TurkStream complication this report has been explicit about rather than smoothing over.

**Layer 4 — Digital** (fibre, submarine cables, data, intelligent transport systems) is anchored by an existing-but-uncoordinated cable ecosystem and an accelerating satellite-sovereignty race — the layer where coordination, not construction, is the binding constraint.

**Layer 5 — Security and resilience** (military mobility, critical infrastructure protection, cybersecurity, maritime security, emergency logistics) is anchored by the Montreux-derived Bulgaria-Romania-Türkiye trilateral core and the emerging Connectivity Agenda — the layer that structurally determines what is possible on all four of the others, and therefore the layer this report treats as foundational rather than final.

## 25. Roadmap 2026–2040

**Horizon I (2026–2030) — Immediate reconstruction, resilience, and bottleneck removal.** Priority falls on the six Regional Missing Links (Chapter 22.4), the Chop-Uzhhorod gauge conversion, and giving the EU's Connectivity Agenda concept an actual action plan and budget line. Success by 2030 looks like: Niš-Dimitrovgrad and the Corridor VIII tunnel both operating, the Poland-Ukraine and Kapıkule disputes resolved or materially eased, and the canal-activation programme showing measurable throughput growth.

**Horizon II (2030–2035) — Integration of regional transport, energy and digital networks.** The second Ruse-Giurgiu bridge, the Sea2Sea corridor, Hemus and

Struma motorway completion, and Neptun Deep's full production ramp fall in this window, alongside continued Middle Corridor capacity expansion to keep pace with demand that has twice already outrun fresh investment.

**Horizon III (2035–2040) — An integrated Black Sea-Balkans-Caucasus-Central Asia connectivity system.** The Black Sea Energy cable's follow-on capacity, full ERTMS deployment, and a mature Black Sea digital coordinating mechanism represent this horizon's transformational core — contingent, throughout, on the security architecture in Layer 5 having matured enough to make this level of integration possible at all.

## 26. Conclusions

This report set out to answer what regional connectivity architecture the Black Sea and Balkans should develop after the war in Ukraine. The evidence gathered points to an answer more specific than the founding brief's own language: not a single new architecture built from nothing, but the completion, coordination and protection of an architecture that is already, visibly, under construction — a newly-designated EU transport corridor, a submarine cable linking the Black Sea to the Caucasus, a mine-countermeasures rotation and a nascent post-settlement security command, an EU coordination concept still waiting for its budget line. The task this report identifies for the period to 2040 is less about invention than about follow-through: closing six specific, identifiable missing links; resolving two governance disputes that cost the region more in delay than either side gains from persisting; and building the region's emerging security architecture around the three countries a ninety-year-old treaty already requires to be at its centre.

Ukraine's reconstruction, on the evidence in Chapter 4, cannot proceed as a project separate from this wider system — every external dependency this report identified, from Constanța's spare capacity to EU grid interconnection to digital-customs infrastructure, ties Ukraine's recovery directly to decisions made in Sofia, Bucharest, Brussels and beyond. Whether that reconstruction becomes the occasion for transforming the region's wider connectivity, as this report's founding brief asks, or simply the restoration of a fragmented pre-war system, will depend less on any single infrastructure project than on whether the institutional follow-through this report identifies — the Connectivity Agenda's action plan, the border governance fixes, the trilateral security core — actually happens during the narrow window a still-uncertain peace may open.

# 27. Annexes

## Annex A — Priority Project Longlist (Full Detail)

*Priority 1 — Critical / Immediate*

| # | Project | Corridor | Investment | Timeline | Institution |
|---|---|---|---|---|---|
| 1 | Niš-Dimitrovgrad rail reopening | H | €268m (Observed) | Reopening end-2027 | Serbian/Bulgarian rail infrastructure managers |
| 2 | Poland-Ukraine border governance fix | D/E/A | N/A — negotiated agreement | Unresolved as of Feb 2026 | Polish/Ukrainian ministries, DG MOVE mediating |
| 3 | Kapıkule capacity & governance package | F | Data unavailable | Ongoing | Bulgarian/Turkish customs authorities |
| 4 | Cernavodă-Constanța canal activation | C | Low (training/ marketing, not construction) | Immediate | Romanian transport ministry, port authority |
| 5 | Chop-Uzhhorod gauge conversion | B | Data unavailable | Advancing | Ukrainian rail authorities, EU CEF |
| 6 | Constanța-Georgia shipping permanence | J | Data unavailable (demand-guarantee scale) | Immediate | RO/GE/AZ operator consortium, EU/ Global Gateway |

*Priority 2 — Strategic*

| # | Project | Corridor | Investment | Timeline | Institution |
|---|---|---|---|---|---|
| 7 | Second Ruse-Giurgiu Danube bridge | A/B | Data unavailable | Design phase; 2032 target | BG/RO transport ministries, BACP |
| 8 | Corridor VIII Gyueshevo-Deve Bair tunnel | H-adjacent | €412.3m (€219.7m WBIF grants) | 2027 | EIB (lead), EBRD, BG/MK rail managers |
| 9 | Ruse intermodal terminal + Sea2Sea corridor | A | ~€60m (Ruse) + ~€3bn (Greek side) | Under construction | Greek/Bulgarian transport ministries |
| 10 | Plovdiv air-cargo development | A/F feeder | Data unavailable | — | Bulgarian aviation authority, private carriers |
| 11 | Hemus Motorway completion | A | ~€560m (latest tranche) | 2030 | Bulgarian national roads agency |
| 12 | Struma Motorway, Kresna Gorge | A | ~€292m | 2029 | Bulgarian national roads agency |
| 13 | Gorna Oryahovitsa intermodal terminal | F feeder | Data unavailable | Transport Connectivity 2021-27 | NRIC/NKZI |
| 14 | Neptun Deep offshore gas field | D/A-adj. | ~€4bn | First gas 2027 | OMV Petrom, Romgaz |
| 15 | Alexandroupolis reliability + IGB expansion | Vertical Corridor | IGB expansion authorised Aug 2025 | Ongoing | Greek/Bulgarian gas operators |
| 16 | Moldova rail modernisation | E | €41.2m EIB + €12m EU (1st line) | Ongoing | Moldovan rail authority, EIB |

*Priority 3 — Transformational*

| # | Project | Corridor | Investment | Timeline | Institution |
|---|---|---|---|---|---|
| 17 | Black Sea Energy submarine cable | J | $2.3bn+ | Marine survey 2026; target 2029 | Green Energy Corridor JV (Transelectrica, GSE, AzerEnerji, MVM) |
| 18 | BTK further capacity expansion | G | Data unavailable | 17Mt/yr, 3m passengers by 2034 | AZ/GE/TR rail authorities |
| 19 | Black Sea digital coordinating mechanism | Cross-corridor | Institutional | — | Extension of Connectivity Agenda |
| 20 | Full ERTMS deployment, Corridors A/B/H | Cross-corridor | Not comprehensively costed | EU target 2030, slipping to 2034-37 | ERA, national infrastructure managers |

## Annex B — Corridor Scoring Model: Full Criterion Detail

| Corri-dor | Tran-sit time | Cost | Infra. capac-ity | Relia-bility | Border eff. | Secu-rity | Multi-moda-lity | EU inte-gration | Environ-ment | **Score** |
|---|---|---|---|---|---|---|---|---|---|---|
| A | 2 | 2 | 2 | 3 | 2 | 3 | 4 | 5 | 3 | **2.65** |
| B | 3 | 3 | 2 | 2 | 3 | 4 | 4 | 4 | 4 | **3.00** |
| C | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 3 | 3 | **2.10** |
| D | 3 | 3 | 3 | 3 | 2 | 1 | 4 | 3 | 2 | **2.75** |
| E | 2 | 3 | 3 | 3 | 4 | 3 | 3 | 3 | 3 | **2.95** |
| F | 2 | 2 | 3 | 1 | 1 | 3 | 2 | 2 | 2 | **2.00** |
| G | 3 | 4 | 3 | 2 | 2 | 4 | 4 | 3 | 3 | **3.10** |
| H | 1 | 2 | 1 | 1 | 2 | 4 | 2 | 3 | 2 | **1.80** |
| I | 2 | 2 | 2 | 2 | 2 | 4 | 2 | 1 | 2 | **2.15** |
| J | 1 | 1 | 2 | 2 | 1 | 2 | 1 | 3 | 4 | **1.65** |

*Scale 1 (very weak) to 5 (very strong); weights per §16.1. Evidence tags (Observed / Estimated / assumption / Data unavailable) for every individual score are documented in the phase-level working papers underlying this report and are available on request; transit time and cost are the two weakest-evidenced criteria overall, with only four of twenty scores across these criteria resting on genuine primary data.*

## Annex C — Cartographic Materials

Two schematic diagrams accompany this report: an integrated strategic map showing the full EU-to-Central-Asia connectivity chain with all ten corridors, and a corridor maturity/scoring diagram rendering Annex B as a ranked visual. A structured node-coordinate dataset (approximately 60 nodes, coordinates approximate to city/facility level) underlies both and is designed for direct use in GIS rendering of the ten geographically-literal map categories this report's founding brief requested but which require survey-grade cartography beyond this research programme's scope — namely TEN-T, Black Sea ports, Danube-Black Sea connectivity, Ukraine reconstruction logistics, Black Sea-Caucasus-Caspian, Balkans connectivity, railway network, road network, energy connectivity, digital connectivity and priority-projects maps. For four of these (TEN-T, ports, railway, road networks), this report recommends citing the relevant authoritative existing map — DG MOVE's TEN-T viewer, national infrastructure managers' own network maps — rather than an independently redrawn version.

## Annex D — Individual SWOT Summaries

Condensed strengths/weaknesses/opportunities/threats for each entity are as follows; full evidence citations for each point are documented in the phase-level working papers.

- **Black Sea region:** S — Neptun Deep, 11–100+GW offshore wind potential, multiple active IFI financing streams. W — bottom-of-EU logistics performance in the two countries carrying most corridor traffic; 4+ uncoordinated digital-cable initiatives. O — Black Sea Energy cable + Connectivity Agenda combining into a genuinely integrated system. T — highest GNSS-jamming concentration outside the Middle East Gulf; Montreux limits any non-littoral security response.
- **Balkans:** S — WBIF's proven delivery model (260+ projects, €24bn+ mobilised). W — every external Bulgarian road connection mid-construction; Niš-Dimitrovgrad closure. O — Corridor VIII closing the Adriatic-Black Sea gap. T — Corridor I remains the weakest EU-integration score of all ten corridors.
- **Bulgaria, Romania, Ukraine, Moldova, South Caucasus, Black Sea-Caspian system:** see Chapters 19–20 (Bulgaria, Romania), Chapter 4 (Ukraine), Chapter 8 (Moldova), Chapter 9 (South Caucasus) and Chapter 10.10 (Black Sea-Caspian) for the full evidenced treatment underlying each entity's SWOT.

## Annex E — Consolidated Source Library

This report draws on primary and authoritative secondary sources across the following categories: EU institutional documentation (European Commission Joint Communications and regulatory texts, including the Black Sea Strategy and its 2026 progress report, the TEN-T Regulation (EU) 2024/1679, the EU Action Plan on Cable Security, the Military Mobility Package, and CEF/Cohesion Fund regulatory summaries); international financial institutions (World Bank, including the RDNA5 joint assessment; EIB; EBRD; the Western Balkans Investment Framework); national and operational sources (Ukrzaliznytsia, Bulgartransgaz, Transelectrica, Georgian State Electrosystem, national transport ministries and infrastructure managers across the study's core countries); and recognised research institutions and Tier-1 media for current operational developments. A complete, dated bibliography with retrieval dates for every cited figure is maintained in the phase-level working papers underlying this report.

## Annex F — Data Gaps Requiring Further Research

The following are named explicitly rather than filled with invented detail: independent, verified infrastructure gap analysis for Croatia, Slovenia, Hungary, Austria, Albania, Montenegro, Bosnia-Herzegovina, Kosovo, Armenia, Kazakhstan, Uzbekistan and Turkmenistan; a reconciled current-throughput figure for the Cernavodă-Constanța canal (sources range from roughly 13,400 tonnes to a design capacity above 75 million tonnes annually); confirmation of which specific shipping operator, if any, currently serves the Constanța-Georgia route on a permanent basis; comprehensive investment figures for roughly a third of this report's twenty priority projects; identification of which four corridors the EU Military Mobility Package's €100 billion dual-use fund actually prioritises; the outcome of the EU's Black Sea-basin submarine cable coordination-hub consortium process; Moldova's confirmed 2026 permanent-synchronisation status with ENTSO-E; and — the largest single variable in this entire report — the outcome of the live diplomatic thread referenced in Chapter 21, unknown and unknowable at the time of writing.

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