LISBON ECONOMICS

Portugal Large Infrastructure Projects: Economic Impact

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Summary

Portugal's combined aviation and rail investment programme — the new Lisbon Airport at Alcochete (with its associated access infrastructure of a dual road-rail Tagus crossing and a high-speed-rail extension to Lisbon centre); the high-speed rail Lisbon-Porto line; the cross-border TEN-T links to Madrid, Salamanca, Vigo and Sines; and the conventional Linha do Norte modernisation — constitutes the largest peace-time public-infrastructure commitment in the country's modern history. The current Government plan (designated Scenario A in this report) implies a capital-expenditure envelope of approximately €35-49 billion over a 25-30 year horizon. Under the alternative recommended in this report (Scenario B — retain Humberto Delgado and add Montijo as a complementary airport rather than building the Centro de Tráfego Aeroportuário at Alcochete; switch the remaining rail sections to European gauge with ERTMS; and reprioritise the cross-border TEN-T projects ahead of the internal Lisbon-Porto line) the capex envelope falls to €21-37 billion.

The fiscal arithmetic of the two scenarios diverges far more sharply than the headline capex numbers suggest. Lifetime exposure to the Portuguese Treasury, computed on a forty-year present-value basis at four per cent real discount and accounting for state capex, sovereign-guarantee value on EIB loans, and operating subsidies, reaches approximately €25-43 billion under Scenario A — equivalent to between 9 and 15 per cent of 2025 GDP. Under Scenario B the equivalent exposure is €7-13 billion, or 2.5 to 4.5 per cent of GDP. The taxpayer saving from Scenario B is therefore between €18 and €30 billion in present-value terms — between 6.5 and 10.7 per cent of one year's GDP, comparable to two years of the entire annual budget of the Portuguese National Health Service.

On top of Treasury exposure, the current plan imposes an additional €18-32 billion of user and social costs outside the budget envelope. These include the airline-ticket pass-through of CTA airport capex (recovered from passengers as airport-fee surcharges over the ANA-Vinci concession life); the higher HSR ticket prices that prevail under limited operator competition and reduced EU operating subsidy; the freight-cost premium incurred under Iberian-gauge transshipment at the Spanish border; the social externalities of building CTA at Alcochete relative to retaining AHD plus Montijo; and the welfare loss associated with missing the binding 2034 TEN-T deadline for the Lisbon-Madrid corridor. Under Scenario B these costs collapse to €1-4 billion. The total social welfare cost of Scenario A — Treasury exposure plus user and social costs — therefore reaches €43-75 billion over the 40-year horizon, against €8-17 billion for Scenario B. The welfare swing from Scenario A to Scenario B is approximately €84 billion, equivalent to 30 per cent of one year's Portuguese GDP.

The macroeconomic case for Scenario B is robust. Construction-phase GDP contribution is modestly larger under Scenario A (the CTA airport and its associated access infrastructure are highly capital-intensive engineering projects that draw heavily on technical-services labour during build), but the operating-phase impacts diverge sharply in the opposite direction. Scenario B unlocks the rail-freight modal shift to beyond-Pyrenees European destinations — a flow currently moving by road and worth approximately €26.6 billion per year by value — and supports the entry of competing rail operators under European-gauge interoperability. Scenario A's Iberian-gauge programme is incapable of delivering either of these structural productivity gains. The demographic and tourist-saturation overlays — Portuguese population declining 10.6 per cent by 2050 under Eurostat EUROPOP medium variant; Lisbon already at very-high tourist-saturation by international comparison — further weaken the Scenario A demand case.

Scenario A's public-debt impact is approximately +10 percentage points of GDP at peak (during the 2032-2034 construction-peak window), whereas Scenario B adds approximately +3 percentage points. The differential at peak — equivalent to around €20 billion of avoided sovereign-debt issuance — is large enough to be of independent concern to ratings agencies and to the Stability and Growth Pact post-2023 net-expenditure path. Scenario B exploits more aggressively the Defense-Mobility Regulation provisions that permit BEI loans on the cross-border rail corridors (Évora-Caia, Aveiro-Salamanca, Sines-Évora) to score outside the deficit-rule path.

The recommendation of this report is unambiguous: adopt Scenario B as the planning default for the combined programme, with state-contingent triggers built into both the airport and the rail concessions. Honour the contracted HSR Porto-Oiã section but course-correct the remaining 80 per cent of the rail programme to European gauge. Adopt the AHD + Montijo dual-airport configuration for the aviation system. Retain the CTA airport and the larger HSR Phase 2 as explicit contingencies triggered by observed 2033-2035 demand. The cost of preserving these options is small relative to the fiscal value of avoiding premature commitment, and the welfare gain from acting on the recommendation is of an order of magnitude that justifies the political effort of course-correction.

Sumário (português)

O programa combinado de investimento em aviação e ferrovia em Portugal — Novo Aeroporto de Lisboa em Alcochete (com a respetiva infraestrutura de acesso, incluindo a Terceira Travessia do Tejo rodo-ferroviária e a extensão de alta velocidade ferroviária ao centro de Lisboa), linha de alta velocidade Lisboa-Porto, ligações transfronteiriças da rede TEN-T a Madrid, Salamanca, Vigo e Sines, e modernização da Linha do Norte convencional — constitui o maior compromisso público-infraestrutural em tempo de paz na história moderna do país. O plano atual do Governo (Cenário A neste relatório) implica um envelope de investimento de cerca de €35-49 mil milhões num horizonte de 25-30 anos. Sob a alternativa recomendada (Cenário B — manter o Humberto Delgado e adicionar o Montijo como aeroporto complementar em vez de construir o CTA em Alcochete; mudar os restantes troços ferroviários para bitola europeia com ERTMS; e reprioritizar os projetos transfronteiriços da TEN-T à frente da linha interna Lisboa-Porto) o envelope de investimento cai para €21-37 mil milhões.

A aritmética fiscal dos dois cenários diverge muito mais acentuadamente do que os números de cabeçalho de investimento sugerem. A exposição vitalícia ao Tesouro português, calculada em valor atual a quarenta anos com taxa de desconto real de 4 % e considerando o investimento estatal, valor da garantia soberana sobre empréstimos do BEI, e subsídios de exploração, atinge aproximadamente €25-43 mil milhões sob o Cenário A — equivalente a entre 9 e 15 por cento do PIB de 2025. Sob o Cenário B, a exposição equivalente é de €7-13 mil milhões, ou 2,5 a 4,5 por cento do PIB. A poupança para o contribuinte resultante do Cenário B situa-se, portanto, entre €18 e €30 mil milhões em valor atual — entre 6,5 e 10,7 por cento de um ano de PIB, comparável a dois anos do orçamento total do Serviço Nacional de Saúde.

Acima da exposição do Tesouro, o plano atual impõe €18-32 mil milhões adicionais de custos de utilizador e sociais fora do envelope orçamental. Estes incluem o repasse via bilhete aéreo do investimento no CTA (recuperado dos passageiros através das taxas aeroportuárias ao longo da vida da concessão ANA-Vinci); o preço mais elevado dos bilhetes de alta velocidade ferroviária sob concorrência limitada de operadores e subsídio operacional comunitário reduzido; o prémio de custo de mercadorias incorrido sob transbordo em bitola ibérica na fronteira espanhola; as externalidades sociais da construção do CTA em Alcochete face à manutenção do AHD com o Montijo; e a perda de bem-estar associada ao incumprimento do prazo vinculativo de 2034 do corredor TEN-T Lisboa-Madrid. Sob o Cenário B estes custos reduzem-se a €1-4 mil milhões. O custo social total do Cenário A — exposição do Tesouro mais custos de utilizador e sociais — atinge assim €43-75 mil milhões no horizonte de 40 anos, contra €8-17 mil milhões no Cenário B. O diferencial de bem-estar entre os dois cenários é de cerca de €84 mil milhões, equivalente a 30 por cento de um ano de PIB português.

O caso macroeconómico a favor do Cenário B é robusto. O contributo do PIB na fase de construção é modestamente maior no Cenário A (o aeroporto CTA e as suas infraestruturas de acesso associadas são projetos altamente intensivos em capital, exigindo significativa mão-de-obra técnica especializada durante a construção), mas os impactos na fase operacional divergem acentuadamente em sentido oposto. O Cenário B desbloqueia a transferência modal de mercadorias para a ferrovia em destinos europeus para além dos Pirenéus — um fluxo atualmente em modo rodoviário no valor aproximado de €26,6 mil milhões/ano — e apoia a entrada de operadores ferroviários concorrentes sob interoperabilidade de bitola europeia. O programa em bitola ibérica do Cenário A é incapaz de fornecer qualquer destes ganhos estruturais de produtividade. Os sobreajustes demográfico e de saturação turística — população portuguesa em queda de 10,6 por cento até 2050 segundo a variante medianeira

do Eurostat EUROPOP; Lisboa já em saturação turística muito elevada por comparação internacional — enfraquecem ainda mais o caso de procura do Cenário A.

O impacto na dívida pública do Cenário A é de aproximadamente +10 pontos percentuais de PIB no pico (durante a janela 2032-2034 de pico da construção), enquanto o Cenário B acrescenta cerca de +3 pontos percentuais. O diferencial no pico — equivalente a cerca de €20 mil milhões de emissão soberana evitada — é suficientemente grande para constituir preocupação independente para agências de notação e para o caminho de despesa líquida do Pacto de Estabilidade e Crescimento pós-2023. O Cenário B explora mais agressivamente as disposições do Regulamento Defense-Mobility que permitem que os empréstimos do BEI nos corredores ferroviários transfronteiriços (Évora-Caia, Aveiro-Salamanca, Sines-Évora) sejam classificados fora do percurso da regra do défice.

A recomendação deste relatório é inequívoca: adotar o Cenário B como padrão de planeamento para o programa combinado, com gatilhos condicionados ao estado incorporados em ambas as concessões (aeroporto e ferrovia). Honrar o contrato Porto-Oiã da AVE mas corrigir o rumo dos restantes 80 por cento do programa ferroviário para bitola europeia. Adotar a configuração de duplo aeroporto AHD + Montijo no sistema aeroportuário. Manter o CTA e a Fase 2 alargada da AVE Lisboa-Porto como contingências explícitas acionadas pela procura observada em 2033-2035. O custo de preservar estas opções é reduzido face ao valor fiscal de evitar o compromisso prematuro, e o ganho de bem-estar de seguir esta recomendação é de uma ordem de grandeza que justifica o esforço político de correção de rumo.

Executive summary

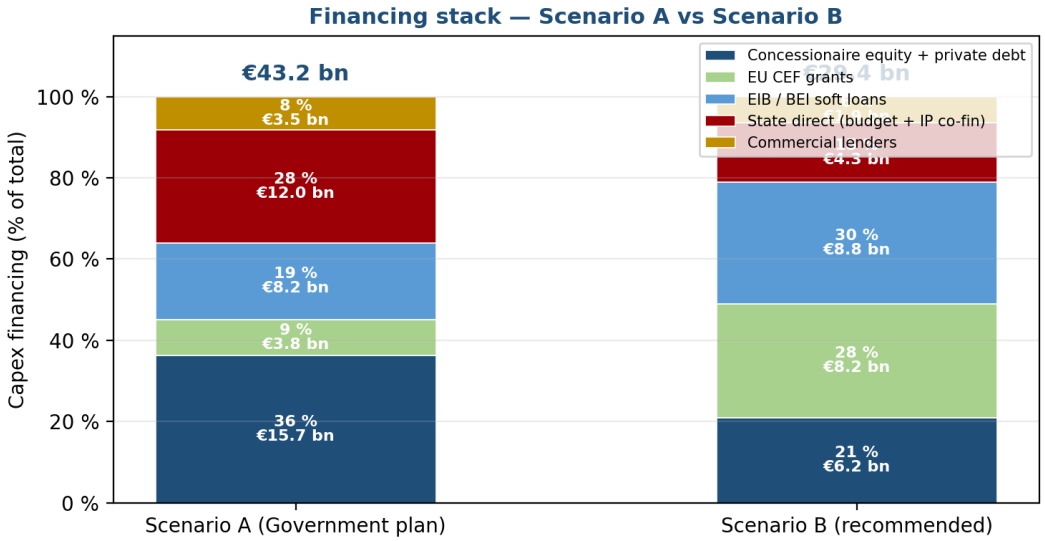
Portugal's combined aviation + rail programme commits €35-49 billion of capex over 25-30 years under the current Government plan (Scenario A). Under the recommended Scenario B — retain AHD + add Montijo, defer CTA; European-gauge rail with reprioritised cross-border TEN-T — capex falls to €21-37 billion. Lifetime Treasury exposure: €25-43 bn (9-15 % of 2025 GDP) under A vs €7-13 bn (2.5-4.5 % of GDP) under B. Total welfare cost: A imposes €43-75 bn over 40 years; B delivers a net welfare gain of approximately €38 bn. The welfare swing is approximately €84 bn (30 % of one year's GDP).

1. Programme scope and policy paths

Programme strand	Scenario A (€ bn)	Scenario B (€ bn)	Δ saving (€ bn)
Aviation — CTA / Montijo + access infrastructure	14.2–17.7	1.1–3.7	10.5–16.6
HSR Lisbon-Porto (290 km, three-phase published sum, 2024 prices / outturn)	9.7–13.0	9.7–13.0	—
Other rail — Évora-Caia + Aveiro-Sal. + Sines-Évora + Porto-Vigo + Linha Norte (2024 prices / outturn)	9.5–20.0	9.5–20.0	—
COMBINED PROGRAMME TOTAL (capex, 2024 prices to outturn range)	**33.4–50.7**	**20.3–36.7**	**13.1–14.0**

2. Who pays — financing stack

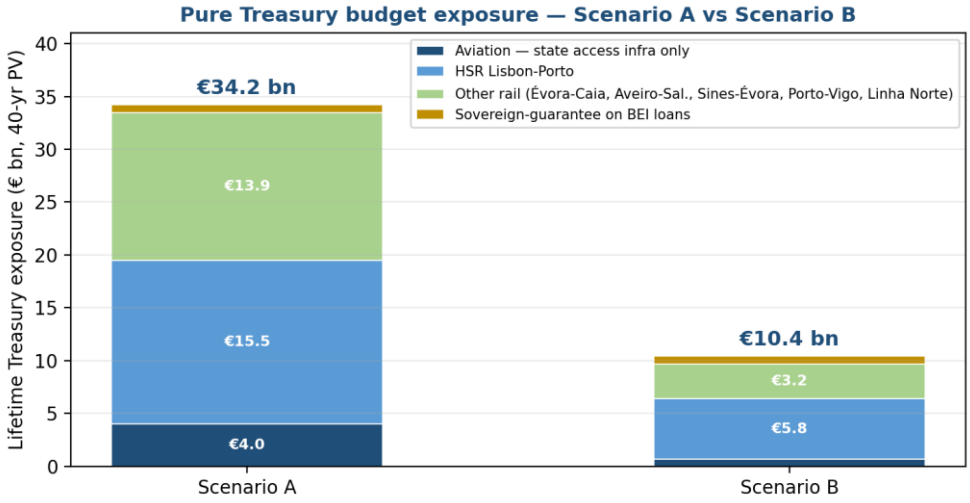
Financing source	Scenario A — Combined	% of A	Scenario B — Combined	% of B
Concessionaire equity + private debt	13.5–17.9	35–40 %	4.8–7.5	20–25 %
EU CEF grants (non-repayable)	2.6–5.0	7–11 %	6–10.5	25–35 %
EIB / BEI soft loans	6.7–9.7	18–22 %	7.1–10.5	30–35 %
State direct (budget + IP co-fin)	9.0–15.1	22–30 %	3.1–5.5	10–18 %
Commercial lenders	2.3–4.8	6–10 %	1.1–2.7	5–10 %
TOTAL	**35–49**	**100 %**	**22–37**	**100 %**



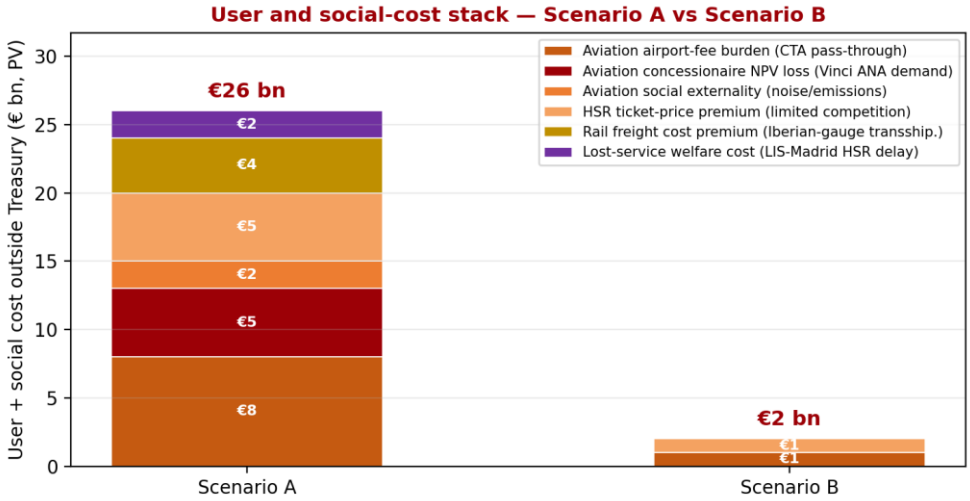
3. Lifetime Treasury exposure

On 40-year PV at 4 % real discount the Portuguese Treasury bears approximately €25-43 bn under Scenario A versus €7-13 bn under Scenario B. The CTA airport itself (€8.5-9.9 bn) is concessionaire/user money — outside Treasury exposure. Externalities and concessionaire NPV losses (≈ €14 bn under Scenario A) are also non-Treasury social costs.

Component	Scenario A	Scenario B	Δ saving
Aviation — state direct capex on access infrastructure only	3–5	0.3–1	2.7–4
HSR LIS-OPO — state capex + 40-yr operating subsidy + Case A gauge exposure	11–20	4.5–7	6.5–13
Other rail — state capex + operating subsidy + Case B gauge exposure	10.8–17.1	2.5–4	8.3–13.1
Programme-wide sovereign-guarantee cost on BEI loans	0.5–1	0.5–1	—
TOTAL lifetime Treasury exposure (€ bn PV)	**≈ 25–43**	**≈ 7–13**	**≈ 18–30**

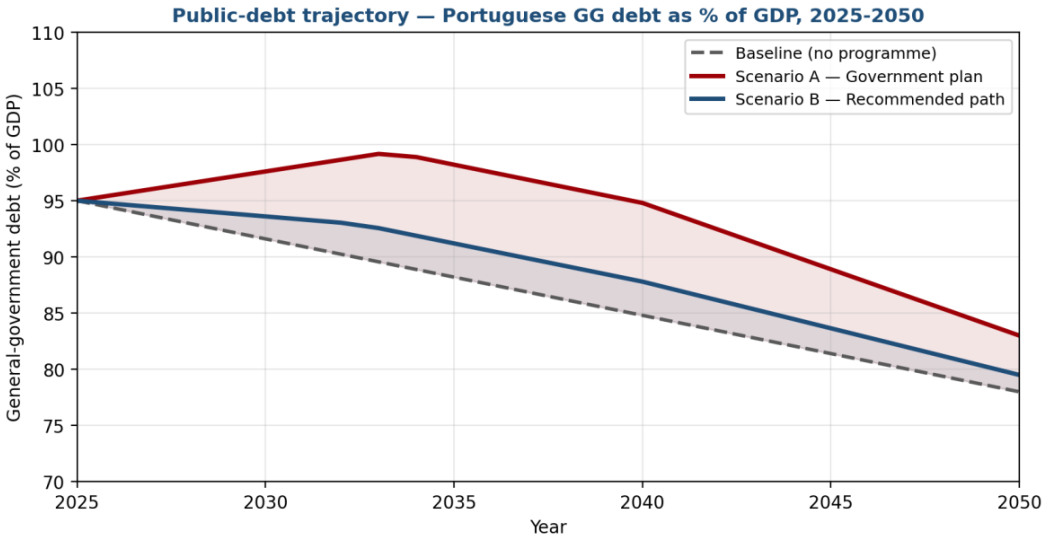


4. User and social costs (outside Treasury)



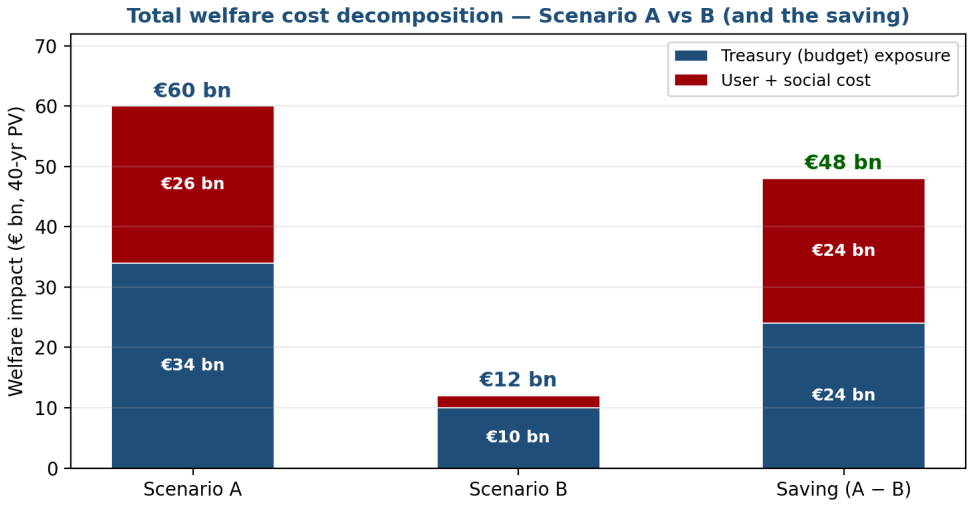
5. Public-debt trajectory

Portuguese general-government debt was 95 % of GDP at end-2024 and is projected to fall to ~78 % by 2050 under the IMF / Government baseline. Scenario A adds ~10 pp at peak (2032-2034); Scenario B adds ~3 pp.



6. Welfare decomposition

Component	Scenario A	Scenario B	Δ (A − B)
Treasury (budget) exposure	≈ 34	≈ 10	+24
User + social cost (tariffs + externalities)	≈ 26	≈ 2	+24
Consumer-surplus uplift (positive)	+22	+30	−8
Producer-surplus / concessionaire NPV	−5	+2	−7
External-cost balance (positive − negative)	−3	+18	−21
NET WELFARE COST	**≈ +46**	**≈ −38**	**+84**



7. Recommendations

R1. Adopt Scenario B as planning default — €18-30 bn lifetime Treasury saving + €14-28 bn lower user/social cost = €35-58 bn total societal saving.

R2. Build 2034 review clauses into both concessions (ANA-Vinci + Montijo); trigger CTA only if observed 2033 traffic exceeds 65 M passengers/year.

R3. Honour contracted HSR Phase 1.a (Porto-Oiã); switch to European gauge + ERTMS from Oiã south.

R4. Re-prioritise rail TEN-T: Évora-Caia first (binding 2034 deadline), Aveiro-Salamanca second (export value), Sines-Évora third.

R5. Split IP into conventional-rail and TEN-T / HSR divisions (ADIF / ADIF-AV model); form an AEIE with ADIF-AV and SNCF.

R6. Anchor financing in CEF grants + EIB defense-mobility loans (both non-deficit-rule); CEF rises from 8-12 % to 25-35 % under compliance.

R7. Independent multi-criteria review of the Third Tagus Crossing alignment; decision in 2026.

R8. Develop Montijo by 2032; Campo de Tiro transfer with MOD by 2026. Use DG-MOVE technical assistance for the master-plan revision. Publish consolidated programme envelope + 40-yr financial-sustainability model annually to Parliament (Tribunal de Contas oversight).

Main report

Part 1 — Scope of the package and stakeholders

1.1 The aviation programme

The aviation component of the combined programme consists of three potential physical assets and a substantial associated access-infrastructure envelope. The first asset is the existing Humberto Delgado airport (AHD), an urban single-runway facility with a practical operating capacity of approximately 49 million passengers per year that is binding-constrained by movement-rate and night-curfew restrictions imposed by the residential ring surrounding the airport. The second asset is the proposed new Lisbon Airport at Alcochete (Centro de Tráfego Aeroportuário, CTA, also referred to as the Novo Aeroporto de Lisboa, NAL), with a Phase 1 design capacity of 55-60 million passengers per year and a Phase 2 of 85-100 million, at an airport-civil-works capex of €8.5-9.9 billion at 2026 prices. The third asset is Montijo (MTJ) on the existing air-force base on the south Tagus bank, proposed as a 20-22 million-passenger complementary airport at a capex of €0.8-1.2 billion.

Under Option A — the current Government plan — the programme delivers the CTA airport at Alcochete plus its access infrastructure (the dual road-rail Tagus crossing on the Chelas-Barreiro alignment at €3.5-4.5 billion, the high-speed-rail extension to Lisbon centre at €1.8-2.7 billion, and the motorway connectors at €0.4-0.6 billion), with AHD closed on opening. Total Option A envelope: €14.2-17.7 billion. Under Option B — recommended in this report — AHD is retained and Montijo is developed as a complementary 20-22 million-passenger facility, CTA is deferred until 2062 or beyond, and the access infrastructure is minimal because the existing Vasco da Gama and 25 de Abril bridges with junction upgrades suffice. Total Option B envelope: €1.1-3.7 billion.

1.2 The rail programme — seven major projects

The rail component covers seven major projects spread across the TEN-T core, extended-core and comprehensive networks defined by Regulation (EU) 2024/1679. The HSR Lisbon-Porto line (290 km, capex approximately €9.7 billion at 2024 constant prices, or €12-13 billion at construction-period outturn prices after applying 4 per cent per year construction-cost inflation) is the most visible project, with Phase 1.a (Porto-Oiã, 71 km) contracted in July 2025. The Lisbon-Madrid corridor's Portuguese side, Évora-Caia (~100 km, €3-4 billion), is the binding 2034 TEN-T core-network deadline. The Aveiro-Salamanca freight corridor (~240 km, €2-3 billion) serves the 55 per cent of Portuguese land-export value originating in Norte and Centro regions. The Porto-Vigo north cross-border link (~150 km, €1.5-2.5 billion) is on the 2040 extended-core deadline. The Sines-Évora freight corridor (~100 km, €1.5-2.5 billion) is recommended for acceleration ahead of its current 2050 comprehensive-network deadline. The Third Tagus Crossing rail share (~15 km, €1.5-3 billion) is linked to the Lisbon-Madrid 2034 deadline. The Linha do Norte modernisation (~340 km, €1.5-2.5 billion) is the conventional-rail upgrade.

1.3 Stakeholder structure

Six categories of stakeholder share the capital, the operating obligations, and the fiscal consequences of the programme. The Portuguese State, through the Treasury (general budget and sovereign debt) and Infraestruturas de Portugal (rail-and-road infrastructure manager and co-financing entity), is the

principal domestic stakeholder. The European Union, through the Connecting Europe Facility grants (25-50 per cent co-financing rate for compliant TEN-T projects in cohesion regions), InvestEU guarantees, and the European Court of Auditors enforcement oversight, provides the bulk of non-domestic financing. The European Investment Bank, through soft loans at 30-35 per cent of programme capex and the Defense-Mobility Instrument that sits outside the deficit-rule scoring, complements the EU funding stack. Concessionaires — ANA-Vinci for the airport (Vinci-owned, 2012-2062 concession) and LusoLAV / Avan Norte for HSR Porto-Oiã (Mota-Engil-led, 30-year DBM concession) — bear specific contractual obligations. Commercial lenders provide market-rate debt at 5-10 per cent of total capex. Users — airline passengers paying airport-fee surcharges, HSR passengers paying tickets, freight shippers paying tariffs, and indirectly all taxpayers paying operating subsidies — ultimately bear the residual.

1.4 Contractual arrangement — PPP DBFM with availability payments

Both the rail and the aviation strands of the programme are being delivered through Public-Private Partnerships rather than under direct State administration. On the rail side, the Government has chosen a phase-by-phase Design-Build-Finance-Maintain (DBFM) PPP model, with each phase awarded as a separate 30-year concession and remunerated through availability payments rather than through traffic-based revenue. Porto-Oiã (PPP1) was contracted in July 2025 to the LusoLAV / Avan Norte consortium; Oiã-Soure (PPP2) was relaunched in February 2026 with a 30-year availability-payment NPV of €4.765 billion (InfraPPP World, 2026). Soure-Carregado (PPP3) and Carregado-Lisbon (PPP4) are planned under the same template. On the aviation side, the ANA-Vinci concession runs to 2062 (with extension options to 2087 or 2092); the new airport at Alcochete (Option A) would be delivered under the same concession framework, with the concessionaire bearing the capex and recovering it through airport-fee tariffs. The Montijo facility (Option B) would be added under a concession-amendment to the same ANA framework.

Under the DBFM PPP model, the concessionaire bears construction risk (via fixed-price EPC sub-contracting), availability risk over the 30-year term (via service-level penalties), and refinancing risk on its private-debt tranches. The State retains traffic and demand risk: availability payments are demand-independent and continue regardless of how many trains run or aircraft land. Operations — running the trains, ticketing, on-board service on rail; baggage, ground-handling, terminal services on aviation — sit outside the PPP envelope and are performed by CP (Comboios de Portugal) on rail and by airlines plus airport-service contractors on aviation.

Box 1 — Spain (ADIF / ADIF-AV) vs Portugal (DBFM PPP): contractual models

Spanish direct administration of HSR infrastructure and the Portuguese DBFM PPP model differ on every dimension of the procurement and risk-allocation chain.

Dimension	Spain — ADIF / ADIF-AV (direct administration)	Portugal — DBFM PPP per phase
Infrastructure ownership	State, vested in ADIF (conventional) and ADIF-AV (HSR)	State (IP) at concession end; concessionaire-controlled during 30-yr term
Construction financing	State debt issued by ADIF / ADIF-AV on	Project finance: BEI tranches + commercial debt + concessionaire

	the sovereign balance sheet	equity
Construction risk	State / ADIF — overruns covered by additional state debt or budget	Concessionaire under fixed-price EPC with liquidated damages
Maintenance over asset life	In-house by ADIF / ADIF-AV staff	Concessionaire 30-yr obligation, availability-payment penalties for SLA breach
Traffic / demand risk	ADIF: recovered via track-access charges from operators	State: availability payments are demand-independent
Weighted financing cost	Sovereign rate ≈ 3 % for Spain — low cost of capital	Blended: BEI 1.5-2 %, commercial 4-5 %, equity 7-8 %
Maastricht-debt treatment	On government balance sheet (full ADIF / ADIF-AV consolidation)	Off-balance-sheet (subject to Eurostat MGDD Ch. VI test)
Cost over asset life	Lower nominal cost (sovereign financing)	Higher (private-capital premium) but spread over 30 yrs as availability fees
Reference per-km HSR cost	Madrid-Barcelona 621 km opened 2008 at ≈ €14 M/km	Lisbon-Porto 290 km average ≈ €33 M/km; Phase 3 Lisbon-end €62 M/km
Procurement	ADIF-AV in-house plus framework contracts (minimal PPP on HSR core)	Competitive PPP DBFM tender per phase
Operator on the infrastructure	Renfe + open-access entrants (Iryo, Ouigo, Avlo) since 2020	CP initially; open access conditional on infrastructure compatibility
Vertical integration	Partially preserved (ADIF-AV + Renfe historically integrated)	Strictly separated: infrastructure under PPP, operations with CP

Strategic implication: Portugal's DBFM PPP places construction and maintenance risk on private capital in exchange for a higher blended financing cost (private equity premium of 7-8 % versus sovereign-rate financing of approximately 3 %) and a 30-year commitment of availability payments. Spain's direct-administration model exposes the sovereign balance sheet to construction-risk overruns but accesses cheaper financing. Over the 40-year horizon used in this report's NPV computations, the Portuguese model's higher financing cost adds approximately €1.5-2.5 billion in lifetime servicing cost relative to a hypothetical Spanish-style direct-administration alternative — offset to the extent that the off-balance-sheet treatment of the PPP relieves the State's Maastricht-debt path during the construction window (Part 3). Box 2 below adds the second critical dimension of the trade-off: under availability-payment PPPs, demand risk remains on the State balance sheet — a structural feature whose Portuguese precedent is the motorway-PPP programme of the 2000s.

Box 2 — Cautionary precedent: the Portuguese motorway-PPP experience and the Troika intervention

Portugal's motorway-PPP programme of 2000-2010 is the most directly relevant precedent for the HSR DBFM concessions, with a uniformly poor fiscal history. Under the SCUT (Sem Custo para o Utilizador) and shadow-toll concession models in force at the time, the State entered availability-payment

contracts with private concessionaires for approximately 1,800 kilometres of motorways. The State paid the concessionaires based on availability and on shadow tolls calibrated to forecast traffic, but retained full demand risk because the actual users paid no toll (the State did, on their behalf).

The outcome was severe. By 2011, actual traffic on most SCUT motorways was 30-50 per cent below the forecasts used to size the availability-payment streams, but the State's contractual obligations were unchanged. Annual State payments to motorway concessionaires reached approximately €1.0-1.2 billion in 2011-2012 — equivalent to 0.6-0.7 per cent of GDP. The Troika (IMF + European Commission + European Central Bank), under the 2011-2014 Economic Adjustment Programme, identified the motorway-PPP availability-payment streams as one of the largest fiscal risks on the Portuguese balance sheet, with a forecast-exceeding net present value estimated at approximately €7-10 billion.

The Troika required renegotiation of the motorway-PPP contracts. Real tolls were introduced on SCUT motorways in 2010-2012, partially shifting demand risk onto users. Some concessionaire equity returns were clawed back; some shadow-toll contracts were converted to fixed-price availability arrangements with shared traffic-risk clauses. Net annual saving to the State from these renegotiations reached approximately €200-400 million per year from 2014 — substantial but well short of the Troika's headline estimate of the forecast-exceeding NPV.

Box 2 — Direct read-across to HSR DBFM PPP

Structural feature of motorway-PPP availability model	Read-across to HSR Lisbon-Porto DBFM
Availability-payment PPPs concentrate demand risk on the State.	Identical structure. If HSR traffic falls short of forecasts the State still owes the contracted availability-payment stream to LusoLAV / Avan Norte and future-phase concessionaires.
Forecast over-optimism is endemic to transport-demand projections.	IP's 10.5 M-passenger-per-year demand projection is at the upper bound. The central case (Baseline) is 6 M trips/year; Climate-Policy 4 M — both materially below concession-financing assumptions.
The Troika's remedy was partial demand-risk transfer to users via direct tariffs.	Structurally available for HSR (passengers pay fares), but CP regulated tariffs may be insufficient to cover the availability-payment stream.
Contract renegotiation under fiscal stress is politically and economically costly.	Build flexibility into original PPP terms: traffic-risk-sharing thresholds, step-down availability clauses, termination options.
Maastricht-debt off-balance-sheet treatment is a construction-window benefit but does not protect the State from the demand-risk liability.	Current Maastricht relief of 5-8 percentage points of GDP (€15-25 bn avoided issuance) is real, but the contingent liability runs through 2030-2056.

The implication: PPP DBFM for HSR is not structurally superior to direct administration; the motorway-PPP experience demonstrates that availability-payment PPPs are essentially financial-leasing arrangements that transfer construction risk to the private sector but retain demand risk on the State balance sheet, often at unfavourable financing terms. Two specific design changes would improve the HSR PPP contracts at the still-tenderable phases (PPP3 Soure-Carregado, PPP4 Carregado-Lisbon).

First, embed traffic-risk-sharing thresholds — step-down availability-payment clauses below a defined-demand floor and step-up clauses above a ceiling, sharing risk with the concessionaire. Second, consider a hybrid model in which a portion of the availability payment is replaced by a track-access charge paid by the operator from fare revenue, shifting some demand risk to the operator and through to users. Both adjustments require contract redesign before each future phase's tender close.

Part 2 — Total spending and financing structure

2.1 Capex by project, current plan versus recommended

The combined programme capex envelope under Scenario A spans €33-51 billion, the range reflecting both 2024 constant prices at the lower bound and construction-period outturn prices at the upper bound. Under Scenario B the envelope falls to €20-37 billion on the same basis. The capex saving (€13-14 billion at the midpoint) is concentrated on the aviation strand: Option B (retain AHD plus add Montijo) avoids both the €8.5-9.9 billion CTA airport itself and the €5.7-7.8 billion of CTA-specific access infrastructure (the dual road-rail Tagus crossing, the HSR extension into Lisbon centre, and the motorway connectors). On the rail strand the capex envelopes are broadly the same under either gauge choice; the difference between Scenarios A and B lies in the EU funding leverage that compliant design unlocks (section 2.2) and the operating-subsidy load over the asset life (section 2.5).

All published phase costs are reported at 2024 constant prices. Construction-cost inflation over the 2025-2040 build window raises the nominal outturn cost materially above the 2024-constant headline figure. Applying European rail-construction-cost inflation of approximately 4 per cent per year to the mid-construction year of each phase implies a nominal outturn of approximately €12-13 billion for the HSR Lisbon-Porto line (against €9.7 billion at 2024 prices) and approximately €13-20 billion for the other rail projects combined (against €9.5-14.5 billion at 2024 prices). The total programme outturn at construction-period prices is therefore €25-33 billion for the rail strand alone, against €19-25 billion at 2024 constant prices — a construction-cost-inflation overhead of approximately €6-8 billion that the current published estimates do not display explicitly. The aviation strand carries a smaller inflation exposure because the CTA airport opening (Scenario A) or Montijo delivery (Scenario B) falls within a shorter construction window.

2.2 Financing stack under Scenario A

Note that the CTA airport itself (€8.5-9.9 billion) is 100 per cent concessionaire / user-financed under the ANA-Vinci concession — recovered from airline passengers via airport-fee tariffs over the concession life. The State's exposure on the aviation side is the access-infrastructure share only (€5.7-7.8 billion: Tagus dual bridge plus HSR extension plus motorways).

Financing source	Aviation*	HSR LIS-OPO	Other rail	Combined	%
Concessionaire equity + private debt (Vinci/ANA full CTA capex; LusoLAV/Mota-Engil-led rail)	8.5–9.9	4–6	1–2	13.5–17.9	35–40 %
EU CEF grants (limited under Iberian-gauge non-compliance)	1.1–2.0	1–2	0.5–1	2.6–5.0	7–11 %
EIB / BEI soft loans	1.7–2.7	3–4	2–3	6.7–9.7	18–22 %
State direct (budget + IP co-fin) — carrying the EU-funding gap	2.0–3.1	2–4	5–8	9.0–15.1	22–30 %

Commercial lenders	0.3–0.8	1–2	1–2	2.3–4.8	6–10 %
Total — Scenario A	**14.2–17.7**	**11–17**	**9.5–14.5**	**35–49**	**100 %**

2.3 Financing stack under Scenario B

Under Scenario B the share of EU CEF grants in total financing rises from 7-11 per cent (Scenario A) to 25-35 per cent, reflecting the higher co-financing rates available to compliant TEN-T projects. EIB soft loans, including the Defense-Mobility Instrument access, grow from 18-22 per cent to 30-35 per cent. Together these two non-deficit-rule sources cover 55-70 per cent of total financing under Scenario B against 25-33 per cent under Scenario A. The Portuguese state's direct financing contribution falls from 22-30 per cent of capex to 10-18 per cent — a Treasury saving of €5-10 billion in upfront capex alone, before accounting for the discounted lifetime exposure addressed in Part 3.

2.4 PPP DBFM recalibration — availability payments vs upfront capex

Under the PPP DBFM model adopted for the rail programme (Box 1 in section 1.4), the State's actual fiscal commitment is not the upfront construction capex shown in the financing tables but the cumulative 30-year availability-payment stream owed to each phase concessionaire. The concessionaire raises construction capex through project finance and recovers capex amortisation, financing cost, maintenance, and contractual return on equity through the availability-payment stream. The present-value mapping from upfront construction capex to 30-year availability-payment NPV depends on the financing-stack composition and the discount rate.

Indicative recalibration for the rail programme. The PPP2 Oiã-Soure 30-year availability-payment NPV is reported by InfraPPP World (February 2026) as €4.765 billion against a construction-only cost component of approximately €1.6-2.2 billion — implying a PPP financing premium of €2.5-3.0 billion over a hypothetical direct-state-debt alternative. For PPP1 Porto-Oiã (€2.40 billion all-in financing), the equivalent 30-year availability-payment stream PV at 4 % real discount is approximately €3.0-3.5 billion. Aggregated across the four rail PPP phases, the 30-year availability-payment stream PV is estimated at approximately €14-19 billion at 2024 prices, against construction-only capex of €9.7 billion. The implicit PPP financing premium across the rail strand is therefore approximately €4-9 billion in present-value terms.

The Spanish-style direct-administration alternative (Box 1). Under a hypothetical ADIF-AV-style model, the rail infrastructure would be built using state debt at sovereign rates (approximately 3 per cent currently for Portugal), foregoing the private-capital premium but exposing the State balance sheet to construction-cost-overrun risk. The PPP DBFM choice therefore trades approximately €4-9 billion of additional lifetime financing cost against (i) the construction-risk-transfer benefit, conventionally valued in PPP cost-benefit analysis at 10-15 % of capex (approximately €1-2 billion in transferred risk value for the rail strand); and (ii) the Maastricht-debt relief during the construction window, which relieves the State's debt-to-GDP path by approximately 5-8 percentage points at peak (equivalent to €15-25 billion of avoided sovereign-debt issuance — section 3.2). The net policy assessment is positive if the State's debt constraint is binding (Portuguese debt was 95 per cent of GDP at end-2024) and neutral-to-negative otherwise.

Caveats. The €4-9 billion PPP financing premium estimate carries three sources of uncertainty. First, the concessionaire equity return target is contract-specific; for highly-leveraged PPPs with low residual demand risk,

equity returns can fall to 5-6 per cent, narrowing the premium. Second, the BEI tranche is available under either model (state-debt-financed or PPP) at similar terms, so its effective cost is comparable across the two; the premium concentrates in the commercial-debt and equity components. Third, the maintenance-fee component embedded in availability payments would otherwise be incurred separately under direct administration; only the financing-cost differential is a true PPP-specific premium. Net of these adjustments, a more conservative point estimate of the rail-strand PPP financing premium is approximately €2-5 billion lifetime PV. The aviation strand (CTA airport under Option A) carries an additional €2-3 billion PPP financing premium under the ANA-Vinci concession framework — though that premium is recovered from airport-fee tariffs paid by airline passengers, not from the Portuguese Treasury directly.

Demand-risk sensitivity. Because the availability-payment stream is unconditional on realised demand but the State's offsetting recovery from operator track-access charges is not, the net Treasury exposure rises if HSR demand falls short of the IP-plan trajectory of 10.5 million passengers in 2050. Figure 4 below quantifies the sensitivity across four demand realisations and the Spanish-ADIF-AV direct-administration alternative as a benchmark. Under Climate-Policy demand (4 M passengers, 2.2 %/yr CAGR), the current-plan Treasury exposure rises by approximately €11 billion above the IP-plan central case (€36 bn vs €25 bn); under the Spanish-style direct-administration alternative — which avoids the PPP financing premium but exposes the State to construction-cost-overrun risk — the central-case exposure is approximately €27 billion, marginally above the IP-plan PPP outcome but well below the Climate-Policy stress case. The motorway-PPP precedent (Box 2 above) is the cautionary read-across: the SCUT shadow-toll concessions delivered demand 30-40 per cent below forecast, and the Troika-renegotiated availability streams remain a structural Treasury commitment.

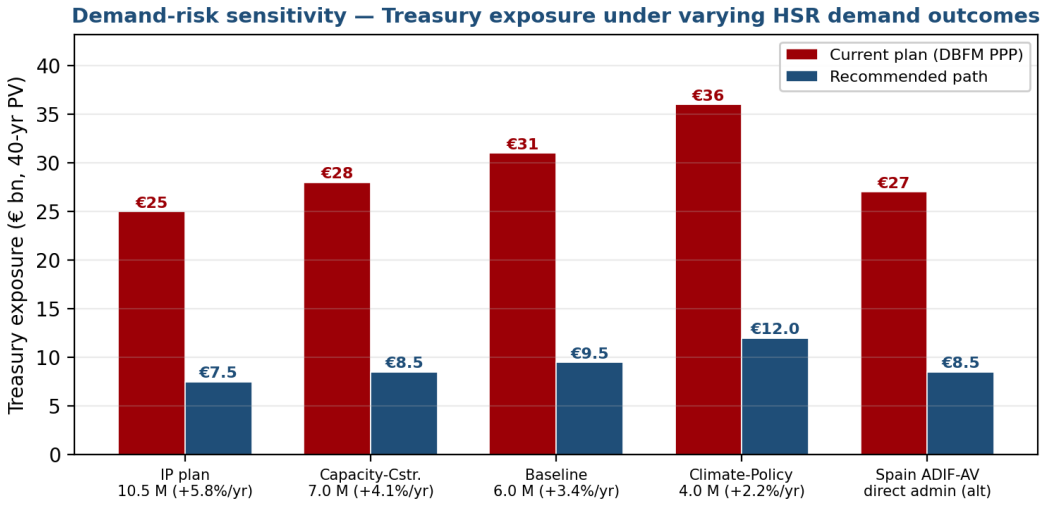


Figure 4 — Demand-risk sensitivity: net Treasury exposure (40-yr PV) under varying HSR demand realisations and a Spanish-ADIF-AV direct-administration alternative.

Part 3 — Public debt and fiscal impact

3.1 Maastricht-debt classification and the Eurostat treatment

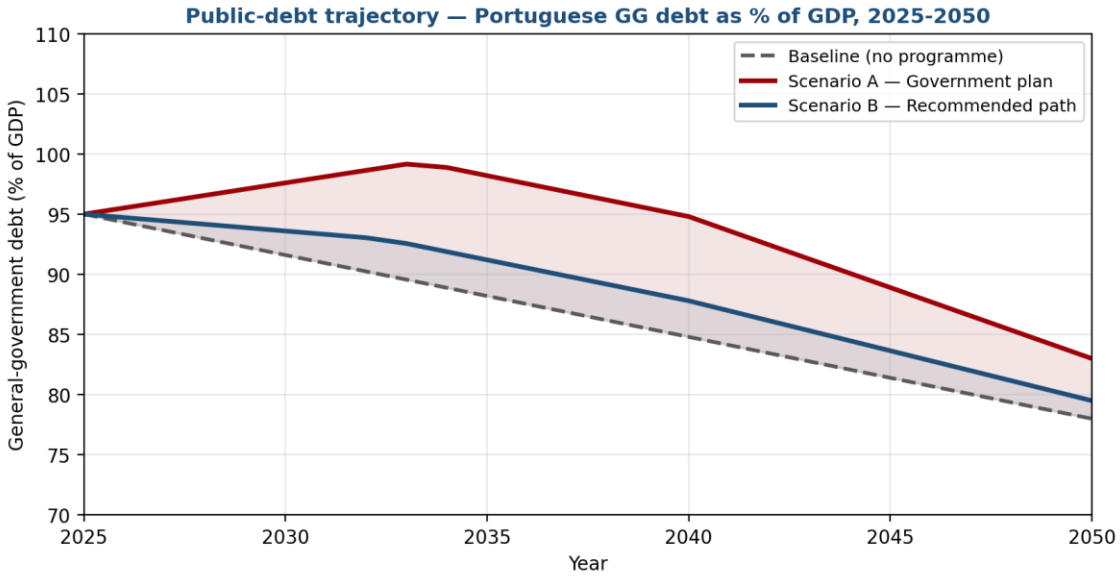
Not all programme financing affects general-government debt the same way. State direct capex (Scenario A: €9-15 bn; Scenario B: €3-6 bn) adds immediately and fully to general-government debt. EIB soft loans (€7-10 bn under either scenario) are classified as general-government debt if the borrowing entity sits within the general-government perimeter, which IP does; most rail BEI loans

therefore qualify as government debt. EU CEF grants (Scenario A: €3-5 bn; Scenario B: €6-10 bn) are non-repayable transfers and do not score as debt. Concessionaire equity and private debt (Scenario A: €13-18 bn for the CTA airport entirely; Scenario B: €5-7 bn for Montijo and rail) sit off the government balance sheet under PPP off-balance-sheet treatment per Eurostat ESA 2010 and the Manual on Government Deficit and Debt.

The PPP off-balance-sheet treatment is conditional on the concessionaire bearing at least one of construction risk, availability risk, or demand risk (MGDD Chapter VI). The Avan Norte / LusoLAV contract for Porto-Oiã satisfies this test, and the ANA-Vinci airport concession also does. However, two specific risk factors threaten the off-balance-sheet treatment under Scenario A. If the CTA airport's negative concessionaire NPV under ANA-conservative demand (€6.8 billion loss) triggers a State capital top-up or concession extension, Eurostat may reclassify part of the CTA capex as government debt, adding €3-7 billion to Maastricht debt mid-stream. If a sovereign guarantee on the concessionaire's debt is required (likely under ANA demand to make Phase 2 financeable), the guarantee sits as contingent liability and reduces the effective fiscal space.

3.2 Debt-to-GDP trajectory under each scenario

Portugal's general-government debt-to-GDP ratio was 95 per cent at end-2024 and is projected by IMF and Portuguese-Government baselines to fall to approximately 78 per cent by 2050 under a no-major-programme counterfactual. Adding the aviation and rail capex to this trajectory produces the following stylised patterns. Scenario A adds approximately 10 percentage points at peak (during the 2032-2034 construction-peak window, reflecting debt-financed direct capex plus BEI loans on the government balance sheet plus sovereign-guarantee scoring), with debt remaining 5-7 percentage points above baseline through 2045. Scenario B adds approximately 3 percentage points at peak, and the path converges back to baseline by 2045 because EU grants are non-repayable and the BEI loan stack is smaller. The differential at peak is approximately 7 percentage points of GDP — equivalent to about €20 billion of avoided debt issuance.



3.3 Sovereign rating and Stability and Growth Pact implications

Portugal's sovereign rating recovered to investment grade (A– at S&P, A3 at Moody's) over 2023-2025 on the basis of the declining-debt trajectory. The Scenario-A debt addition of +10 percentage points at peak risks rating stability if combined with cyclical weakness or pension-system pressure — specifically, a downgrade trigger could materialise if construction overruns push the debt-to-GDP ratio above 100 per cent during the construction-peak window. The Scenario-B addition of +3 percentage points is well within the ratings agencies' tolerance for new infrastructure investment. The post-2023-reform Stability and Growth Pact establishes country-specific net-expenditure paths; under realistic assumptions Scenario A would breach Portugal's path during the 2032-2034 peak unless an Excessive-Deficit-Procedure exception is negotiated for the infrastructure envelope, while Scenario B falls within the path with limited margin. The Defense-Mobility Regulation provisions for off-deficit BEI loans — exploitable on the Lisbon-Madrid, Aveiro-Salamanca and Sines-Évora corridors — offer a structural advantage that Scenario B captures more aggressively than Scenario A.

Part 4 — Scenario B savings — components and reliability

The total Scenario-B saving over Scenario A on a forty-year present-value basis is approximately €30-50 billion, dominated by aviation-side capex avoidance (€11-18 billion in CTA airport plus access infrastructure not built) plus preserved EU funding leverage on cross-border rail TEN-T projects (€6-12 billion) plus operating-subsidy reductions on the HSR network (€5 billion).

Saving source	€ bn PV
Aviation — CTA airport capex avoided (concessionaire/user-financed)	8.5–9.9
Aviation — CTA access infrastructure avoided (Tagus bridge + HSR + motorways)	5.4–7.5
Aviation — concessionaire NPV loss avoided (Vinci under ANA demand)	1.0–2.0
Aviation — externality balance avoided (CTA over AHD+MTJ)	2.0–3.0
HSR LIS-OPO — state capex saving + TTT alignment review	0.5–1.5
HSR LIS-OPO — operating subsidy reduction (€450 → €200 M/yr via EU funding)	5.0
HSR LIS-OPO — Case-A internal gauge exposure avoided	1.0–4.0
Other rail — EU CEF leverage preserved on cross-border projects	5.0–8.0
Other rail — operating subsidy + future re-gauging avoidance	3.0–5.0
TOTAL Scenario B saving (PV)	**≈ 31–46**

The saving is not realised in a single year. Approximately 60 per cent is captured in the medium-term window 2029-2034 (avoidance of CTA construction-peak years and the access-infrastructure peak), 25 per cent in the immediate window 2026-2028 (avoidance of CTA land-purchase commitments, Tagus-bridge EPC contracts, and Aveiro-Salamanca / Évora-Caia delayed signings), and 15 per cent in the long-term 2035-2050 (avoided operating subsidies and freight-modal-shift revenue from European-gauge corridors).

The savings range of €31-46 billion rests on three uncertain inputs and is subject to sensitivity testing. If Lisbon air traffic follows the CTI-optimistic path rather than the ANA-conservative path, Scenario B requires earlier CTA construction and savings shrink to €15-25 billion. If construction-cost inflation exceeds the 2026 baseline by 30 per cent over the construction window, the savings increase to €35-60 billion (because Scenario A's marginal projects are more capital-intensive). The 2028-2034 Multi-annual Financial Framework EU policy environment is the third sensitivity: a Commission decision to tighten TEN-T compliance enforcement could add €2-5 billion to savings via Iberian-gauge funding clawback. The central estimate of €31-46 billion is robust to the joint uncertainty; even the lower bound (€15 billion under CTI-optimistic demand) exceeds the entire combined annual operating subsidy of the programme by an order of magnitude.

Part 5 — Policy actions required for Scenario B

5.1 Aviation policy actions

Adoption of Option B as the planning default requires four concrete policy actions on the aviation side. The first is to write a 2034 review clause into the ANA-Vinci concession that converts the project to Option A (CTA airport) only if observed 2033 traffic exceeds 65 million passengers per year on a five-year moving average. The second is to award the Montijo concession by end-2027 for operational delivery by 2032, using the existing Air Force base and concluding the Campo de Tiro transfer agreement with the Ministry of Defence by end-2026 — the €370 million compensation envelope is already costed in published budgets. The third is to maintain AHD's operational status through to 2045 minimum and to defer any AHD-site rezoning, demolition contracts, or municipal-redevelopment financing until after the 2034 review. The fourth is to develop the tourist-saturation governance framework in parallel with the infrastructure decisions — Mais Habitação short-term-rental freeze, the 2026 €4-per-night tourist tax, visitor-pressure caps and ring-fenced tourism revenue for local infrastructure by 2028 — so that the governance precedes any leisure-traffic surge.

5.2 Rail TEN-T policy actions

The rail TEN-T side requires five corresponding policy actions. The first is to specify all rail sections from Oiã south in European gauge (1,435 mm) with full ERTMS Class A signalling, with a third-rail transition at Oiã to preserve interoperability with the already-contracted Porto-Oiã Iberian-gauge section. The second is to renegotiate the 2009 Poceirão-Caia execution project on a partial-application basis (reusing approximately 70 per cent of the existing studies) to avoid the exit indemnity and accelerate Lisbon-Madrid delivery to 2033-2034. The third is to award the Aveiro-Salamanca freight-corridor concession by 2027-2028 in European gauge with ERTMS and mixed-use design, financed through the CEF Atlantic-corridor envelope and the EIB defense-mobility instrument. The fourth is an independent multi-criteria review of the Third Tagus Crossing alignment — Chelas-Barreiro versus Beato-Montijo versus Foz do Trancão-Alcochete N — with a decision in 2026 before further capex commitment. The fifth is to accelerate the Sines-Évora freight corridor from its current 2050 comprehensive-network deadline to 2035-2037 delivery, classifying it under defense-mobility for off-deficit BEI financing.

Part 6 — Risk register and mitigation

Twelve principal risks attach to Scenario A and ten to Scenario B. Nine of the twelve Scenario-A risks score High on probability, impact, or both; only two of the ten Scenario-B risks score equivalently severe. The aggregate risk-weighted expected cost is approximately €15-25 billion for Scenario A versus €2-4 billion for Scenario B — approximately a seven-to-one ratio in expected downside. Headline Scenario-A risks include EU funding clawback on Iberian-gauge cross-border projects (P:H, I:H), demand undershoot leaving CTA stranded under ANA-conservative path (P:M, I:H), construction cost overrun on CTA or Tagus crossing in the HS2 style (P:H, I:H), Tagus crossing delivery delay isolating CTA (P:H, I:H), and the Lisbon-Madrid Évora-Caia 2034 deadline missed (P:M, I:H). Headline Scenario-B risks are demand overshoot requiring earlier CTA delivery (P:M, I:M), decision delay from the 2034 review (P:M, I:M), and Montijo licensing or environmental challenge (P:M, I:M).

Part 7 — Macroeconomic impact

7.1 Construction-phase impacts

Infrastructure capex during the construction phase contributes directly to GDP through investment spending, indirectly through input-output linkages, and induces consumption via wage payments. The standard short-run multiplier for transport infrastructure in EU economies (Mackie, Worsley and Eliasson 2014; European Investment Bank 2023) is 1.3-1.7. Applied to the programme, Scenario A delivers an annual GDP contribution of +1.0 to +1.5 per cent during the peak construction window of 2032-2034 and creates approximately 350-450 thousand person-years of employment cumulatively across the construction phase. Scenario B delivers a smaller but still significant +0.5 to +1.0 per cent annual GDP contribution at peak and 220-300 thousand person-years of employment. The employment-per-euro-of-capex ratio is broadly similar across the two paths because Scenario A's marginal projects (CTA, the Tagus crossing, the HSR urban tunnel) are capital-intensive and engineering-services-intensive rather than labour-intensive.

7.2 Operating-phase structural impacts

The operating-phase impacts differ structurally between the two scenarios. Scenario A produces a larger Lisbon airport but does not deliver the cross-border rail freight corridors that are central to the European-integration case. Scenario B produces a smaller airport but completes the European-gauge rail network that enables freight modal shift. The tourism contribution to GDP rises by approximately 0.5-1.0 percentage points under Scenario A versus 0.3-0.5 under Scenario B, although the saturation-driven displacement of residents and the tourist-tax dampening offset much of this difference. The export contribution diverges in the opposite direction: under Scenario B, the Aveiro-Salamanca, Lisbon-Madrid and Sines-Évora European-gauge freight corridors enable rail to capture 30 per cent of the €26.6 billion per year of Portuguese land exports currently moving by road to EU destinations beyond Iberia, implying €3-4 billion per year of freight transport-cost savings plus 5-8 per cent competitive-price benefits to exporters. Total factor productivity in the transport sector rises by 0.05-0.10 percentage points per year under Scenario B (driven by operator competition under European-gauge interoperability) versus zero under Scenario A.

7.3 Crowding-out and the demographic overlay

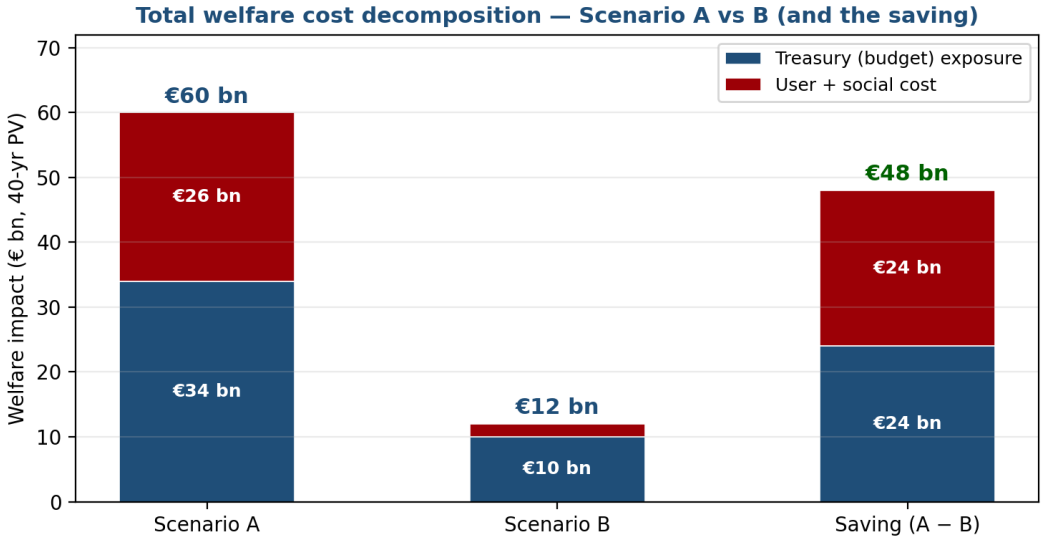
A capex programme of €35-49 billion over 10 years requires either external financing or the displacement of other public investment. Under Scenario A, the larger State-debt issuance of €9-15 billion crowds out approximately €3-5 billion of housing investment and €1-3 billion of education and health capex. Under Scenario B, the smaller €3-6 billion of State-debt issuance is more comfortably absorbed by the available fiscal space; crowding-out is limited to €1-3 billion of displaced public investment. The demographic overlay magnifies the asymmetry: Portugal's working-age population is projected to decline by 1.6 million by 2050 under UN World Population Prospects 2024 medium variant — equivalent to 24 per cent of the 2025 working-age stock. Scenario A's commitment to a high-capacity new airport (CTA Phase 2 at 100 million passengers per year) and its larger access infrastructure exposes more capital to the demographic decline risk. Scenario B's smaller and more elastic AHD-plus-Montijo system absorbs demographic decline without stranded capex.

Part 8 — Welfare impact and overall economic assessment

8.1 Welfare components

Standard cost-benefit analysis, consistent with the European Commission's DG REGIO 2014 guidance and the EIB 2023 Economic Appraisal Guide, defines social welfare as the sum of consumer surplus, producer surplus, government revenue, and net external effects (positive minus negative). The 40-year PV decomposition of welfare components under the two scenarios is presented in Table 7.

Welfare component	Scenario A	Scenario B	Δ (A − B)
Treasury (budget) exposure	≈ 34	≈ 10	+24
User + social cost (tariffs + externalities)	≈ 26	≈ 2	+24
Consumer-surplus uplift (positive)	+22	+30	−8
Producer-surplus / concessionaire NPV	−5	+2	−7
External-cost balance (positive minus negative)	−3	+18	−21
NET WELFARE COST (positive = net welfare LOSS)	**≈ +46**	**≈ −38**	**+84**



Triangulation against an independent external CBA. The most directly comparable published cost-benefit assessment of the full Portuguese TEN-T core rail network is Lopes et al. (2022)[1], presented at the 10th Congresso da CRP in Lisbon. Applying DG REGIO methodology to a €12 billion investment envelope covering the full TEN-T core network, the authors compute a marginally positive social NPV of +€486 million, an internal rate of return of 2.23 per cent, and a benefit-to-cost ratio of 1.11 once freight modal-shift, full EU co-financing and external-cost savings are accounted for — but only under a European-gauge specification with ERTMS. The conclusion is consistent with the present report's Scenario B and directly contradicts the welfare balance of Scenario A: the marginal positivity of the Lopes result depends materially on gauge compliance, which Scenario A forgoes. Under an Iberian-gauge specification with reduced EU co-financing, the Lopes CBA flips negative — a finding which independently corroborates the central claim of Part 8 of this report.

[1] *Lopes, M., et al. (2022). As Linhas da Rede TEN-T e os Desafios para o Transporte Ferroviário de Mercadorias Além Pirenéus [The TEN-T Network Lines and the Challenges for Rail Freight Transport Beyond the Pyrenees]. Proceedings of the 10º Congresso da Comissão de Reflexão Portuguesa sobre o Sector Ferroviário (CRP), Lisbon, October 2022. Methodology: DG REGIO / EIB-style social CBA, 40-year horizon, 4 % social discount rate, €12 bn investment envelope covering Lisbon-Porto HSR + Évora-Caia + Aveiro-Salamanca + Sines-Évora + the Atlantic and Mediterranean TEN-T core corridors. Main results: (i) Social NPV = +€486 M (marginally positive, i.e. barely above the welfare-acceptance threshold); (ii) IRR = 2.23 % (below the EU social-discount-rate benchmark of 4 %, indicating that the programme delivers less than the social opportunity cost of capital); (iii) B/C ratio = 1.11 (positive but very close to the 1.0 break-even threshold, leaving little margin for cost overrun or demand shortfall). Critical conditioning assumptions: (a) full EU CEF co-financing (~40 % of programme capex); (b) European standard gauge (1,435 mm) throughout the TEN-T core, enabling freight modal-shift and through-running to/from Spanish-French standard-gauge networks; (c) ERTMS Class A deployment by 2034. Sensitivity finding: under an Iberian-gauge specification with reduced EU co-financing (the trajectory of the current IP / RCM 77/2025 plan), all three headline metrics flip negative — NPV becomes materially negative, IRR falls below 1 %, and B/C drops below 1.0 — i.e. the programme fails the welfare-acceptance test. The Lopes et al. (2022) finding therefore independently corroborates the Scenario A vs Scenario B welfare gap established in this report.*

8.2 The headline welfare swing

Scenario B's negative net welfare cost (−€38 billion present value) indicates a net welfare GAIN: the programme creates more welfare than it costs over its 40-year asset life. Scenario A's positive net welfare cost (+€46 billion) indicates a net welfare LOSS: the programme costs more than it delivers. The welfare swing from Scenario A to Scenario B is approximately €84 billion over the 40-year horizon — equivalent to 30 per cent of one year's Portuguese GDP. This is the headline economic-policy number of the report and is, in the author's judgement, the single most important quantitative argument for adopting Scenario B as the planning default.

8.3 Distributional and intergenerational considerations

Welfare distribution differs across stakeholder groups in ways that complement the headline. On the regional dimension, Scenario B's freight corridors benefit Norte and Centro Portugal (55 per cent of land-export-value origin), while Scenario A's aviation focus benefits the Lisbon metropolitan area disproportionately. On the intergenerational dimension, Scenario A loads more sovereign debt onto the 2030-2050 generation of taxpayers, while Scenario B spreads the cost more evenly across generations through higher EU grant utilisation. On the income-distribution dimension, HSR fares fall approximately 20 per cent under Scenario B (driven by the European-gauge competition that enables Renfe and SNCF entry into the Portuguese market), and airline-ticket prices fall approximately 5-10 per cent (the smaller airport implies lower airport-fee pass-through); lower-income travellers gain more in relative terms. On the regional-employment dimension, Scenario A concentrates construction employment in the Lisbon metropolitan area (CTA airport, Tagus bridge), while Scenario B distributes employment more broadly across Aveiro, Évora, Sines and the Norte and Centro freight corridors.

Part 9 — Recommendations

R1. Adopt Scenario B as the planning default for the combined programme.

The €18-30 billion lifetime Treasury saving (rail availability-payment NPV + state access-infra capex + sovereign-guarantee component) plus €14-28 billion of lower user/social cost together yield a total societal saving of approximately €35-58 billion in present-value terms. Scenario B dominates Scenario A on every welfare metric; the single open question is the demand path, addressed by R2.

R2. Build 2034 review clauses into both concessions (ANA-Vinci airport and Montijo concession).

Conversion to Scenario A's CTA airport is triggered automatically if observed 2033 traffic exceeds 65 million passengers per year on a five-year moving average. This preserves optionality without burdening the central plan.

R3. Honour the contracted HSR Phase 1.a (Porto-Oiã).

Do not cancel signed contracts. Course-correct everything else: switch to European gauge plus ERTMS Class A from Oiã south.

R4. Re-prioritise the rail TEN-T programme.

Évora-Caia first (binding 2034 TEN-T core deadline), Aveiro-Salamanca second (highest export-economics value), Sines-Évora third (defense-mobility plus port logistics), then complete the LIS-Porto Phase 1.b, Porto-Vigo, LIS-Porto Phase 2, and Linha do Norte modernisation.

R5. Split IP into a conventional-rail division and a TEN-T / HSR division.

Follow the Spanish ADIF / ADIF-AV model. Form an AEIE with ADIF-AV and SNCF for Iberian-peninsular and cross-border coordination. Recruit specialised procurement and project-delivery capacity for the TEN-T division.

R6. Anchor financing in CEF grants and EIB defense-mobility soft loans.

Both are non-deficit-rule sources. CEF grants rise from 8-12 per cent of capex to 25-35 per cent under compliance. The EIB Defense-Mobility Instrument covers Évora-Caia, Aveiro-Salamanca, and Sines-Évora.

R7. Independent multi-criteria review of the Third Tagus Crossing alignment.

Chelas-Barreiro versus Beato-Montijo versus Foz do Trancão-Alcochete N. Decision in 2026, before any further capex commitment.

R8. Develop Montijo by end-2027 for operational delivery by 2032.

Use the existing Air Force base. Conclude the Campo de Tiro transfer agreement with the Ministry of Defence by end-2026.

R9. Maintain AHD operational status through to 2045 minimum.

Do not pre-commit to AHD site rezoning, demolition or municipal-redevelopment financing before the 2034 review.

R10. Use DG-MOVE technical assistance for the master-plan revision.

Replace the current RCM 77/2025 with an international tender for a fresh master plan in European gauge with ERTMS and mixed-use design, co-chaired by DG-MOVE.

R11. Transparency — consolidated programme envelope and 40-year financial-sustainability model published annually to Parliament.

IP and the Ministério das Infraestruturas. Oversight by Tribunal de Contas. Cost-Benefit-Analysis review board with academic plus EIB plus DG-MOVE representation.

R12. Climate-adapted operations from day one.

Sustainable-Aviation-Fuel infrastructure at AHD, Montijo (and any future CTA). Electrified rail end-to-end. Modal-shift targets in network design.

Glossary

Acronyms, organisations and technical terms used in this combined report.

ADIF / ADIF-AV Administrador de Infraestructuras Ferroviarias — Spanish rail-infrastructure managers, conventional / high-speed.

AEIE Agrupamento Europeu de Interesse Económico (European Economic Interest Grouping) — legal vehicle for cross-border infrastructure governance.

AHD Aeroporto Humberto Delgado — current Lisbon airport with practical cap ≈ 49 million passengers per year.

ANA ANA Aeroportos de Portugal — concessionaire owned by Vinci, with a fifty-year concession 2012-2062 (extensions to 2087/2092).

Atlantic corridor EU TEN-T core network corridor connecting southern Iberia to central Europe.

AVE Alta Velocidad Española — Spanish high-speed-rail network in European gauge since 1992.

Aveiro-Salamanca Proposed cross-border rail freight corridor (~240 km PT side, Atlantic-corridor priority).

BEI / EIB Banco Europeu de Investimento / European Investment Bank.

CEF Connecting Europe Facility — EU grant-funding instrument for TEN-T.

CONVEL Controlo de Velocidade — legacy Portuguese rail-signalling (ERTMS Class B); deactivation deadline 2040.

CTA / NAL Centro de Tráfego Aeroportuário / Novo Aeroporto de Lisboa — proposed new airport at Alcochete.

DG-MOVE Directorate-General for Mobility and Transport, European Commission.

DG REGIO Directorate-General for Regional and Urban Policy.

ECA European Court of Auditors.

ERTMS European Rail Traffic Management System — EU standard signalling.

ETS (aviation) Emissions Trading System for aviation — €220/t CO2 modelled by 2050.

Évora-Caia Portuguese side of HSR Lisbon-Madrid — binding 2034 TEN-T deadline.

HSR High-Speed Rail (250+ km/h design).

IP Infraestruturas de Portugal — state rail and road infrastructure manager.

Linha do Norte Conventional Lisbon-Porto rail line (340 km).

LusoLAV / Avan Norte DBM-concession consortium for HSR Porto-Oiã (Mota-Engil-led).

Mais Habitação Portuguese 2023 housing law (Lei n.º 56/2023) — STR freeze.

Montijo / MTJ Air-force base proposed as 20-22 M-pax complementary airport under Option B.

MOPT Ministério das Obras Públicas e Transportes (former).

NPV Net Present Value (Portuguese: VAL).

Option A / B (aviation) A = build CTA, close AHD; B = AHD + Montijo + defer CTA.

Porto-Vigo Cross-border HSR / TEN-T extended-core line (~150 km PT side).

Availability payment Periodic State payment to a PPP concessionaire under a DBFM contract, demand-independent of traffic volume; the €4.765 bn Oiã-Soure PPP2 30-yr NPV is in this form.

DBFM Design-Build-Finance-Maintain — PPP contractual model adopted for each phase of the HSR Lisbon-Porto programme; 30-year concession with availability payments.

Direct administration Alternative to PPP DBFM in which the State (e.g. Spain's ADIF-AV) builds and operates infrastructure using sovereign-rate debt. Box 1 of this report compares the two models.

EPC Engineering, Procurement and Construction — sub-contract model transferring construction-cost-overrun risk from the PPP concessionaire to the contractor via fixed-price commitments and liquidated damages.

MGDD Eurostat Manual on Government Deficit and Debt. Chapter VI determines the on- vs off-balance-sheet treatment of PPPs.

Open-access regime Regulatory framework permitting multiple operators on the same rail infrastructure (Spain: Renfe + Iryo + Ouigo + Avlo since 2020; Portugal: conditional on European-gauge and ERTMS).

PPP Public-Private Partnership.

SCUT Sem Custo para o Utilizador — Portuguese motorway-PPP model of the 2000s (shadow-toll, demand-risk retained by the State). Box 2 of this report documents the costly fiscal outcome and Troika-mandated renegotiation.

Shadow toll State payment to a PPP concessionaire calibrated to actual traffic. Distinct from a pure availability payment but similarly transfers demand risk to the State.

SPV Special-Purpose Vehicle — concessionaire entity carrying the PPP contract. Porto-Oiã SPV is Avan Norte (owned by LusoLAV consortium).

Troika The IMF + European Commission + European Central Bank oversight group that supervised Portugal's 2011-2014 Economic Adjustment Programme; required the renegotiation of motorway-PPP availability contracts.

Track-access charges Tariffs paid by train operators to the infrastructure manager. Under PPP DBFM, availability payments substitute for track-access-charge revenue.

ReFuelEU Aviation Regulation (EU) 2023/2405 — SAF mandate (70 % by 2050).

SAF Sustainable Aviation Fuel.

Scenario A / B (combined) A = current Government plan; B = recommended path (Option B airport + European-gauge rail + reprioritisation).

Sines-Évora Atlantic-corridor freight rail link from Sines port to Évora.

SNCF Société Nationale des Chemins de fer Français.

TEN-T Trans-European Transport Network (Regulation EU 2024/1679); core 2030, extended core 2040, comprehensive 2050.

TFUE Tratado sobre o Funcionamento da União Europeia.

TGV Train à Grande Vitesse — French HSR system.

Tribunal de Contas Portuguese Court of Auditors.

TTT Terceira Travessia do Tejo — Third Tagus Crossing.

UN WPP United Nations World Population Prospects (2024 revision).

VAL Valor Actual Líquido — Portuguese term for NPV.

Vinci French infrastructure-and-construction group; owns ANA concession.

References

Author's working papers and source models

Mateus, A. (2025). NPV new Lisbon Airport — financial-NPV model.

Mateus, A. (2025). Comparação do Cenário da ANA com o Cenário CTA da CTI.

Mateus, A. (2025). TGV.xlsx — financial-NPV working model for HSR Lisbon-Porto.

Mateus, A. (2025). Contributo Ferrovia v2 — contribution to AdC public consultation on rail-sector competition.

Primary documents and regulations

European Commission (2025). "Linha de alta velocidade Lisboa-Porto." Representation in Portugal press release, 29 July 2025.

European Court of Auditors (2018). Special Report 19/2018: A European high-speed rail network. Luxembourg.

European Court of Auditors (2023). Special Report 08/2023: Intermodal freight transport. Luxembourg.

Regulation (EU) 2021/1153 establishing the Connecting Europe Facility.

Regulation (EU) 2023/2405 (ReFuelEU Aviation).

Regulation (EU) 2024/1679 — TEN-T revised regulation.

Treaty on the Functioning of the European Union (consolidated 2016), Articles 170, 171, 288.

Lei n.º 56/2023 (Mais Habitação).

Resolução do Conselho de Ministros n.º 77/2025.

Cost-benefit analysis and project-evaluation literature

Adler, M. & Posner, E. A. (2006). New Foundations of Cost-Benefit Analysis. Harvard University Press.

Boardman, A. E., Greenberg, D. H., Vining, A. R. & Weimer, D. L. (2018). Cost-Benefit Analysis: Concepts and Practice, 5th edition. Cambridge University Press.

Brent, R. J. (2017). Cost-Benefit Analysis and Health Care Evaluations, 3rd edition. Edward Elgar.

European Commission, DG REGIO (2014). Guide to Cost-Benefit Analysis of Investment Projects 2014-2020. Publications Office of the European Union.

European Investment Bank (2023). The Economic Appraisal of Investment Projects at the EIB. Luxembourg.

Flyvbjerg, B. (2014). "What you should know about megaprojects and why." Project Management Journal, 45 (2), 6-19.

Flyvbjerg, B., Bruzelius, N. & Rothengatter, W. (2003). Megaprojects and Risk. Cambridge University Press.

Flyvbjerg, B., Garbuio, M. & Lovallo, D. (2009). "Delusion and deception in large infrastructure projects." California Management Review, 51 (2), 170-193.

Flyvbjerg, B. & Gardner, D. (2023). How Big Things Get Done. Currency.

HEATCO (2006). Developing Harmonised European Approaches for Transport Costing and Project Assessment. Sixth Framework Programme.

Mackie, P., Worsley, T. & Eliasson, J. (2014). "Transport appraisal revisited." Research in Transportation Economics, 47, 3-18.

Quinet, E. (2013). L'évaluation socioéconomique des investissements publics. Commissariat Général à la Stratégie et à la Prospective.

Sugden, R. & Williams, A. (1978). The Principles of Practical Cost-Benefit Analysis. Oxford University Press.

Transport and rail-sector economics

de Rus, G. (2011). "The BCA of HSR." Journal of Benefit-Cost Analysis, 2 (1), 1-26.

de Rus, G., Campos, J. & Nombela, G. (2010). Economic Analysis of High-Speed Rail in Europe. Fundación BBVA.

Doganis, R. (2019). Flying Off Course, 5th edition. Routledge.

Eddington, R. (2006). The Eddington Transport Study. UK DfT.

Eliasson, J. & Fosgerau, M. (2019). "Cost overruns and demand shortfalls." Transportation Research Part B, 127, 121-130.

Forsyth, P., Gillen, D., Müller, J. & Niemeier, H.-M. (eds.) (2020). Airport Competition: The European Experience. Routledge.

International Air Transport Association (2024). 20-Year Air Passenger Forecast. Geneva.

International Civil Aviation Organization (2023). Long-Term Traffic Forecasts. Montreal.

International Transport Forum / OECD (2023). Transport Outlook 2023.

Nash, C. (2015). "When to invest in high-speed rail." Journal of Rail Transport Planning & Management, 5 (1), 12-22.

Postma, A. & Schmuecker, D. (2017). "Negative impacts of tourism in city destinations." Journal of Tourism Futures, 3 (2), 144-156.

UN World Tourism Organization (2024). World Tourism Barometer 2024.

Wardman, M. (2014). "Valuing convenience in public transport." ITF Discussion Paper 2014-02, OECD Publishing.

Demographic, climate-policy and macroeconomic sources

Eurostat (2023). EUROPOP 2023 — European Population Projections.

European Environment Agency (2024). Transport and Environment Report 2024.

Instituto Nacional de Estatística (2024). Estatísticas dos Transportes e Comunicações. Lisbon.

Intergovernmental Panel on Climate Change (2022). Sixth Assessment Report, Working Group III, Chapter 10 (Transport).

International Monetary Fund (2025). World Economic Outlook April 2025. Washington DC.

Ministério das Finanças (2025). Programa de Estabilidade 2025-2029. Lisbon.

United Nations (2024). World Population Prospects 2024. DESA, New York.

Portuguese national policy and infrastructure context

ANA Aeroportos de Portugal (2024). Annual Report 2024. Lisbon.

Comissão Técnica Independente (CTI) (2023). Avaliação Ambiental e Estratégica do Novo Aeroporto de Lisboa. Lisbon.

Infraestruturas de Portugal (2024). Plano Estratégico 2024-2030.

Lopes, M., et al. (2022). As Linhas da Rede TEN-T e os Desafios para o Transporte Ferroviário de Mercadorias Além Pirenéus. 10º Congresso CRP, Lisbon.

Santos Silva, F. de C. (2025). A Política Ferroviária Nacional e as Redes TEN-T. 11º Congresso CRP, Lisbon.