

Community Friction and Cost in High-Speed Rail: An International Comparative Analysis

The international high-speed rail record reveals a strong and consistent relationship between the level of community friction a project generates and its ultimate cost per kilometre. Projects that entered construction with unresolved opposition, litigation, or political controversy have invariably exceeded cost benchmarks; projects that secured genuine community consent and followed sympathetic alignments have not. Figure 1 plots 18 international HSR projects on these two dimensions, applying the reference-class forecasting methodology developed by Bent Flyvbjerg (Saïd Business School, University of Oxford) to situate each project within the empirical distribution of comparable megaproject outcomes (Flyvbjerg et al., 2002; Flyvbjerg, 2014). The two Canadian comparators — ALTO and the High Performance Rail alternative (HPR) — are shown as projected values based on the current documentary and consultation record.

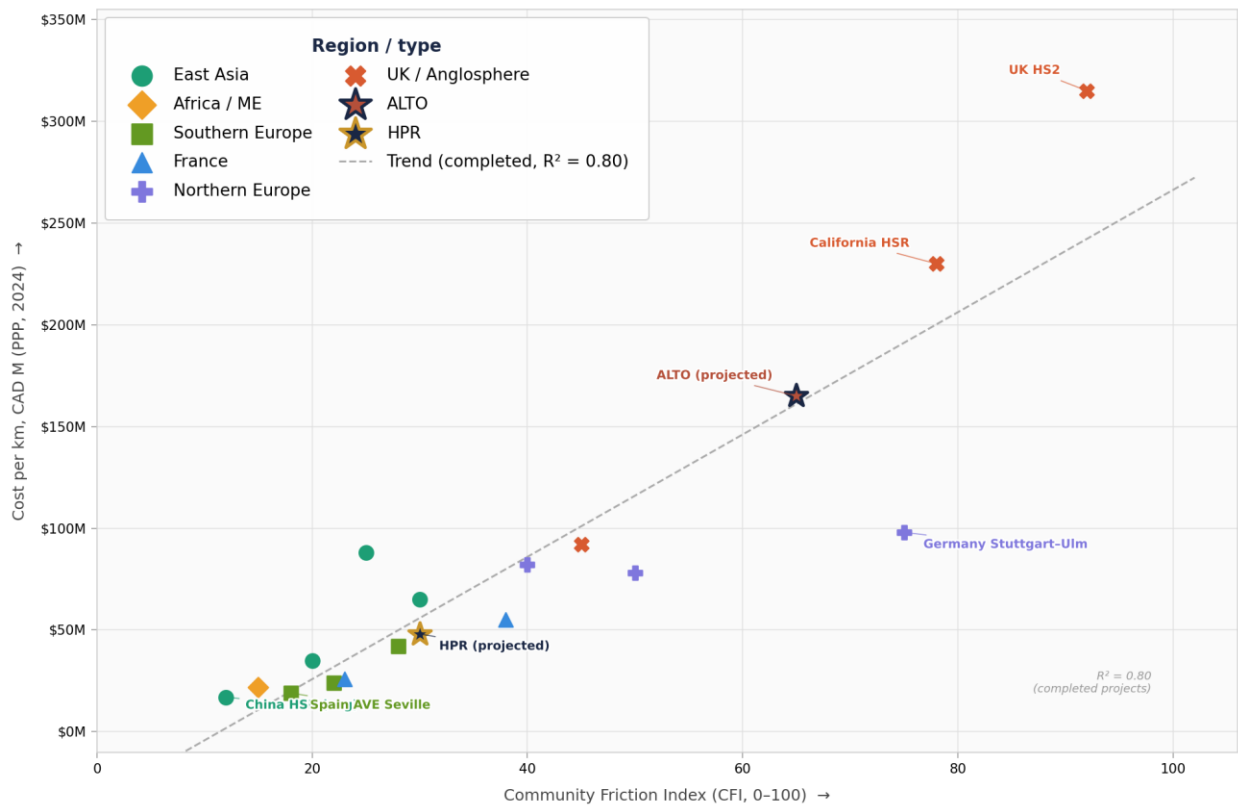


Figure 1. Cost per km (2024 CAD, PPP-adjusted) versus Community Friction Index (CFI, scale 0–100) for 18 international HSR projects. Stars denote CRI projections. Dashed line: linear trend for completed projects (R² = 0.80). CFI is the sum of five equally weighted components each scored 0–20; methodology on page 3.

18 Projects in database	\$17–\$315M/km Cost range (CAD PPP)	R² = 0.80 CFI correlation with cost
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1 Cost Overrun and Community Friction

Figure 2 provides a second line of evidence, replacing absolute cost per kilometre with cost overrun relative to the project’s original published estimate. This metric captures the degree to which proponents were unable to deliver what they promised, rather than simply the absolute cost of construction — a distinction that matters for accountability analysis. Both Canadian comparators are positioned on the regression line at their respective CFI values, making the projection methodology fully transparent: the overrun figure is not an editorial judgment but the direct output of the reference-class regression applied to the documented friction score.

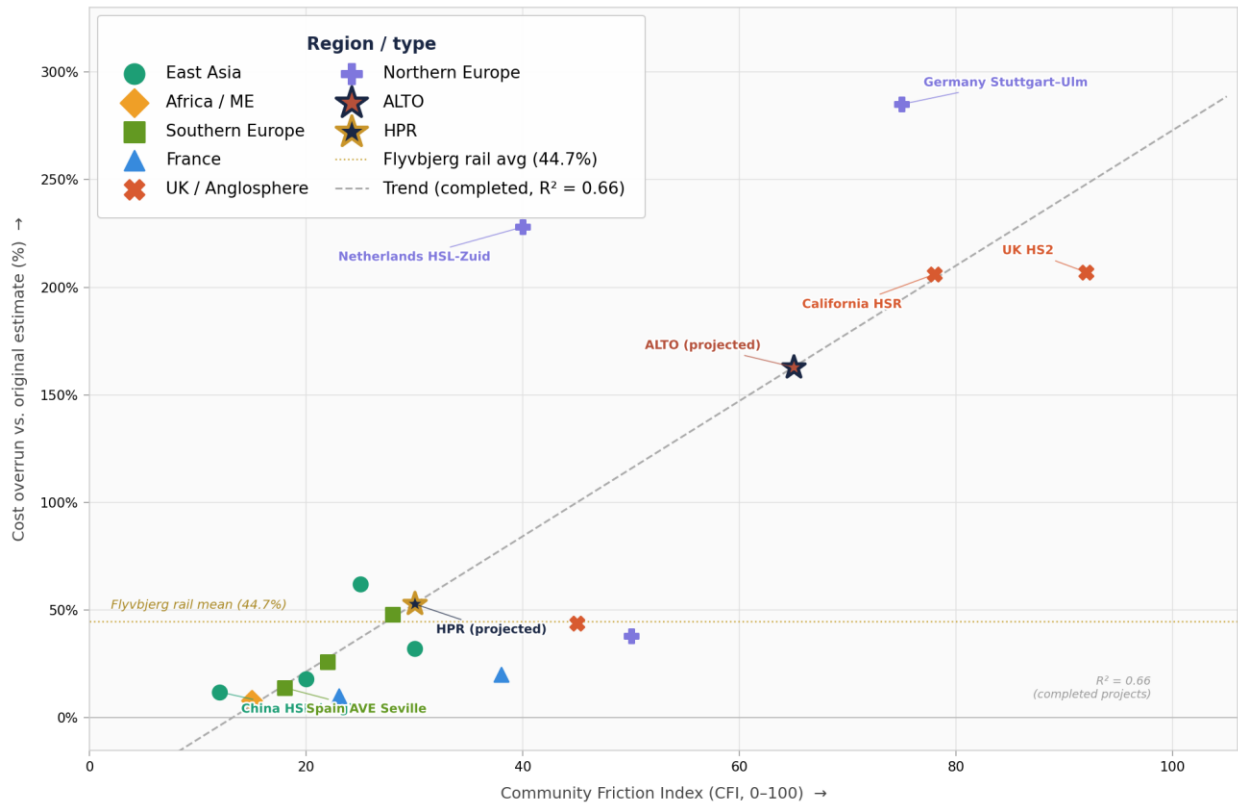


Figure 2. Cost overrun (% above original estimate) versus Community Friction Index (CFI, 0–100) for 18 international HSR projects. Both Canadian projections (stars) are placed on the regression line at their respective CFI values. Dotted gold line: Flyvbjerg rail sector mean overrun of 44.7% (Flyvbjerg et al., 2002). $R^2 = 0.66$ for completed projects.

44.7% Flyvbjerg rail mean overrun	~163% ALTO projected overrun (CFI 65)	~53% HPR projected overrun (CFI 30)
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The regression predicts a cost overrun of approximately 163% for ALTO at its current CFI of 65, meaning the project would deliver at roughly 2.6 times its original 2021 business case estimate. This sits between the California HSR and Netherlands HSL-Zuid outcomes, and well above the Flyvbjerg rail sector mean of 44.7%. One interpretive note on the Netherlands HSL-Zuid outlier (CFI 40, overrun 228%): its overrun was driven substantially by a disastrous P3 tunnelling contract, which is a cost-escalation mechanism partially independent of community friction. Its

position above the trend line reflects this compound risk, and it is not adjusted out of the dataset because P3 structures and contested procurement are themselves friction-associated conditions.

HPR is projected at approximately 53% overrun at CFI 30 — above the sector mean, which correctly reflects that no large infrastructure project in a democratic jurisdiction delivers precisely to its original estimate. This is nonetheless substantially better than the ALTO trajectory, and consistent with the cost experience of comparator projects in the moderate-friction band such as France's TGV SEA and the Germany Cologne–Frankfurt ICE line.

The two plots together establish a consistent picture: ALTO's community friction score, derived independently from the documentary record, places it in a cost position that is without precedent for a Canadian public infrastructure project. The regression-line placement of the Canadian projections means this conclusion is not dependent on any assumption about absolute cost — it follows directly from where ALTO sits in the international distribution.

2 Methodology: The Community Friction Index

The Community Friction Index (CFI) is a composite index scored on a scale of 0 to 100. It aggregates five equally weighted components, each assessed on a 0–20 sub-scale drawn from the documented project record: parliamentary inquiries, court filings, academic literature, government reports, and press archives. The five anchor levels within each sub-scale are defined in Table 1. Component scores are summed to yield a total CFI out of 100.

Table 1. CFI component definitions, 0–20 sub-scale anchors, and scored examples

Component (0–20)	Sub-scale anchor levels	Scored examples
Public opposition intensity (sub-score 0–20)	0 = No organised opposition; project accepted 1–5 = Isolated individual objections; no coordination 6–10 = Organised but contained; petitions, community groups, local media 11–15 = Sustained campaigns; regional media, political delegations 16–20 = Mass mobilisation; national coverage, cross-sector coalitions	Spain AVE Seville (2) Japan Tokaido (3) Germany Stuttgart–Ulm (15) HS2 (19)
Legal challenges filed (sub-score 0–20)	0 = No legal proceedings initiated 1–5 = Pre-action letters only; no formal filings 6–10 = Formal applications filed; resolved before construction 11–15 = Multiple proceedings; injunctions sought 16–20 = Sustained multi-front litigation; injunctions unresolved at financial close	France TGV (0–2) Netherlands HSL-Zuid (7) California HSR (18) HS2 (19)
Forced route changes (sub-score 0–20)	0 = Original alignment proceeds unchanged 1–5 = Minor local adjustments; no scope impact 6–10 = Measurable realignments; cost impact below 10% 11–15 = Significant re-routing or station changes; 10–30% cost impact 16–20 = Fundamental corridor revision or scope truncation	Spain AVE (1–2) Germany Cologne–Frankfurt (8) HS2 Phase 2 cancellation (20)
Environmental / NGO opposition (sub-score 0–20)	0 = No environmental or NGO opposition 1–5 = Minor EA submissions; standard mitigation accepted 6–10 = Organised NGO submissions; challenges to EA adequacy 11–15 = Litigation; species-at-risk or ecological triggers activated 16–20 = Injunctions or blockades; federal / provincial regulatory intervention	Morocco Al Boraq (1) France TGV SEA (7) California HSR (17) ALTO (trajectory: 14–16)
Political controversy (sub-score 0–20)	0 = Cross-party consensus at all levels of government 1–5 = Minor criticism; no material impact on project trajectory 6–10 = Significant opposition from one or more parties; parliamentary scrutiny 11–15 = Cabinet-level controversy; election issue in affected constituencies 16–20 = Project becomes defining political liability; governing party distances itself	China HSR (0–1) UK HS1 (8) Germany Stuttgart–Ulm (13) California HSR (17) HS2 (18)

Interpreting the aggregate CFI score

Table 2. CFI band classification and typical project profile (aggregate score out of 100)

CFI (0–100)	Classification	Typical project profile and examples
0–25	Low	State-led projects or those with strong popular mandate. Land acquisition settled efficiently and without litigation. Examples: Spain AVE, China HSR, Morocco Al Boraq.
25–45	Moderate	Typical for large infrastructure in active civil societies. Some delays and alignment adjustments. Project advances within acceptable cost parameters. Examples: France TGV, Japan Shinkansen.
45–65	High	Opposition has materially altered scope, caused multi-year delays, or required significant unplanned mitigation investment. Cost pressure is visible. Example: Germany Stuttgart–Ulm.
65–85	Very high	Project politically contested; subject to sustained litigation; proponent credibility under pressure. Strong risk of scope reduction at or before financial close. Examples: California HSR, ALTO (projected).
85–100	Extreme	Systemic opposition threatens political survival of sponsoring government. No international example of a CFI 85+ project delivered on time and on budget. Example: UK HS2 (CFI 92).

3 Key Findings from the International Comparison

Figures 1 and 2 together reveal a consistent pattern across both dependent variables. The correlation between CFI and cost per kilometre ($R^2 = 0.80$) is stronger than the correlation with cost overrun ($R^2 = 0.66$), which is expected: absolute cost per kilometre reflects both friction and underlying construction complexity, whereas overrun captures primarily the degree to which original estimates were exceeded. Flyvbjerg (2014) identifies optimism bias and strategic misrepresentation as the structural drivers of megaproject cost overrun; the CFI provides a proxy measure for the degree to which both pathologies are present. The two most extreme cases — UK HS2 (CFI 92) and Germany Stuttgart–Ulm (CFI 75) — are outliers on both plots.

Projects in the low-friction cluster (Spain AVE, China HSR, Morocco Al Boraq; CFI 12–25) deliver both the lowest cost per kilometre and the lowest overruns. ALTO is currently projected at CFI 65, placing it in the ‘very high friction’ band. The HPR comparator is projected at CFI 30 and sits in the moderate-friction band consistent with France’s TGV network.

4 Drivers of Friction Intensification

The international record identifies eight repeatable conditions under which community friction escalates from manageable to project-threatening. Each maps directly onto one or more CFI sub-scale components; the presence of multiple conditions simultaneously drives scores into the 'very high' and 'extreme' bands.

- **Tokenistic or premature consultation.** Announcing a preferred corridor before genuine engagement transforms consultation into notification, converting potential stakeholders into adversaries. Both HS2 and California HSR followed this pattern, triggering legal challenges that accumulated costs throughout the project lifecycle.
- **Route selection through working farmland and established communities.** Linear severance of productive agricultural land, rural properties, and ecological systems generates durable, well-organised opposition. Rural communities typically have the cohesion, time, and motivation to sustain multi-year campaigns that urban communities cannot.
- **Opacity in corridor selection methodology.** Where the technical basis for alignment choice is not proactively disclosed, communities and their legal representatives fill the information vacuum with worst-case assumptions. Access to information requests escalate; investigative coverage intensifies; political risk multiplies.
- **Expansive or novel expropriation frameworks.** Legislation that grants proponents exceptional acquisition powers before a project has received environmental approval is experienced as a fundamental inversion of due process, attracting solidarity from civil liberties organisations not otherwise engaged.
- **Business case credibility gaps.** When a benefit-cost ratio falls visibly below standard appraisal thresholds, opponents gain a legitimising narrative that attracts fiscal-conservative allies. Flyvbjerg et al. (2002) document this pattern across 258 infrastructure projects globally: cost underestimation and demand overestimation systematically inflate apparent returns and, when exposed, delegitimise the proponent.
- **Species-at-risk and ecological system conflicts.** Federal or provincial species-at-risk triggers change the legal landscape materially. In Canada, SARA listings confer standing on environmental organisations and generate mandatory consultation obligations with their own statutory timelines, incompatible with standard project schedules.
- **Station location and community bypass decisions.** Remote interchange stations remove potential beneficiaries from the supporter base and create a durable perception that the project serves an economic logic disconnected from local needs.
- **Delay and cost overrun signals.** Each rescaling event increases, not decreases, friction. The successive truncations of HS2 and the repeated rebaselining of California HSR both reset sub-scale scores upward with each announcement, consistent with the reference-class dynamics identified by Flyvbjerg (2014).

5 Current CFI Assessment and Four-Year Trajectory

This section applies the scoring rubric set out in Appendix A1 to ALTO at the date of publication and projects the four-year trajectory against documented project milestones and the prevailing political and legislative context. Section 5.1 derives the current CFI sub-scores; section 5.2 presents three scenario trajectories to April 2030, with the mid-energy trajectory corresponding to the CFI 65 projection used in Figures 1 and 2.

5.1 Current sub-scores (April 2026)

The current CFI of 43 is derived by applying the Appendix A1 rubric to the documentary record for ALTO as of April 2026. The assessment incorporates both project-level evidence (consultation record, community-group activity, media coverage, and legal preparation) and the legislative context introduced by Bill C-15 (the Budget Implementation Act, 2025, No. 1, which received Royal Assent on 26 March 2026 and contains the new High-Speed Rail Network Act, enacted specifically for ALTO).

Table 3. ALTO current CFI sub-scores, April 2026.

Component	Sub-score	Band	Principal evidence
Public opposition intensity	16	Sustained, politically visible (13–16)	Cross-sector coalition active in corridor municipalities; sustained regional-press coverage; provincial-level political engagement; national-outlet coverage begun; formal parliamentary testimony on ALTO-specific provisions via Bill C-15 committee hearings.
Legal challenges filed	5	Emerging coordination (5–8)	Coordinated ATI/FOI programme across HICC, Transport Canada, PSPC, and VIA Rail; pre-action correspondence including senator-level engagement on Bill C-15 expropriation provisions; no formal tribunal or judicial-review filings yet.
Forced route changes	2	Minimal / isolated (1–4)	Pre-consultation stage; possible micro-adjustments in response to early stakeholder input. Bill C-15's s. 98 CTA deeming reduces the proponent's vulnerability to regulatory forced changes.
Environmental / NGO opposition	9	Organised, regionally contested (9–12)	Multiple coordinated NGO objections; expert reports on karst hydrology, SARA species, invasive species, and watershed impacts; federal SARA processes engaged as primary statutory protection following Ontario's Species Conservation Act, 2025.
Political controversy	11	Organised, regionally contested (9–12)	Parliamentary standing committee hearings on Bill C-15 expropriation provisions; Senate pre-study across ten committees; eighty-two motions in amendment at report stage; formal AFN and farm-organisation testimony; MEI and expert legal analyses in the public record.
Aggregate CFI	43	Moderate (upper)	Two points below the High threshold (45).

The aggregate of 43 places ALTO in the upper half of the Moderate band (25–45), two points below the High threshold. This is the baseline from which the trajectory projection in section 5.2 begins. The score reflects a project that has attracted well-organised, regionally coordinated opposition across multiple dimensions and that has been the subject of formal parliamentary and Senate attention through Bill C-15, but that has not yet entered the phases of formal litigation, forced corridor revision, or cabinet-level political crisis.

5.2 Four-year trajectory projection (April 2026 – April 2030)

The trajectory projection covers the period from the April 2026 baseline through April 2030. Three documented project milestones anchor the projection: routes decided in early 2027, expropriation commencement in mid-2027, and construction beginning on the Ottawa–Montréal segment in 2029. A fourth timing constraint — the fixed-date federal election on 15 October 2029 under s. 56.1 of the Canada Elections Act — shapes the political-controversy component materially, particularly in light of the governing Liberal Party's majority status achieved on 13 April 2026 through the combination of sustained floor-crossings from opposition members and three by-election wins in University–Rosedale, Scarborough Southwest, and Terrebonne.

Bill C-15 materially changes the friction dynamics the trajectory must account for. The Act's s. 98 CTA deeming reduces the proponent's vulnerability to regulatory forced changes — the forced route changes component therefore rises more slowly and plateaus at a lower peak than it would under pre-C-15 conditions. Conversely, the expropriation-process amendments (removal of the attempt-to-purchase requirement, bypass of the statutory objection and hearing process) make Bill C-15 itself a standing target for Charter, constitutional, and s. 35 challenges, accelerating the legal challenges component. The AFN's Senate-committee submission signalling s. 35 litigation preparation means Indigenous-rights litigation is likely to materialise earlier and in parallel with NGO action rather than following it.

The Liberal majority status and the fixed October 2029 election date together create a three-and-a-half-year window during which ALTO moves through its most friction-generating steps without electoral accountability. Parliamentary confidence motions cannot force reconsideration of the project; electoral pressure cannot compel mid-course correction. The practical consequence is that the ordinary megaproject friction discipline — electoral accountability forcing scope reduction, delay, or cancellation — is suspended for the duration of this Parliament. Opposition during this window necessarily operates through judicial channels (injunctive relief, constitutional challenge, s. 35 litigation) and budgetary channels (cost-overrun-driven reconsideration by the Treasury Board). The 15 October 2029 election re-introduces electoral discipline precisely at the point when, in the international reference class, projects are typically entering their most politically contested phase.

Three trajectories illustrate the sensitivity of the projection to opposition intensity. All three begin from the common post-Bill C-15 baseline of 43 and evolve through the documented project milestones and the 15 October 2029 election. The high-energy trajectory assumes AFN s. 35 litigation materialises, Charter challenges reach Supreme Court of Canada leave, mass public mobilisation crystallises, and ALTO becomes a central issue in the 2029 election, producing an endpoint of CFI 85. The mid-energy trajectory assumes organised opposition sustained but not explosive, judicial review reached but not SCC, some forced route changes but expropriation proceeds, and election-issue status in affected ridings but not central, producing an endpoint of CFI 65 — the ALTO projection placed in Figures 1 and 2. The low-energy trajectory assumes regional opposition sustained, environmental assessment completing with standard mitigation, and no major escalation in legal or political dimensions, producing an endpoint of CFI 50.

ALTO Community Friction Index: Three-Scenario Trajectory

April 2026 – April 2030 · Common post-Bill C-15 baseline; scenarios diverge by opposition intensity

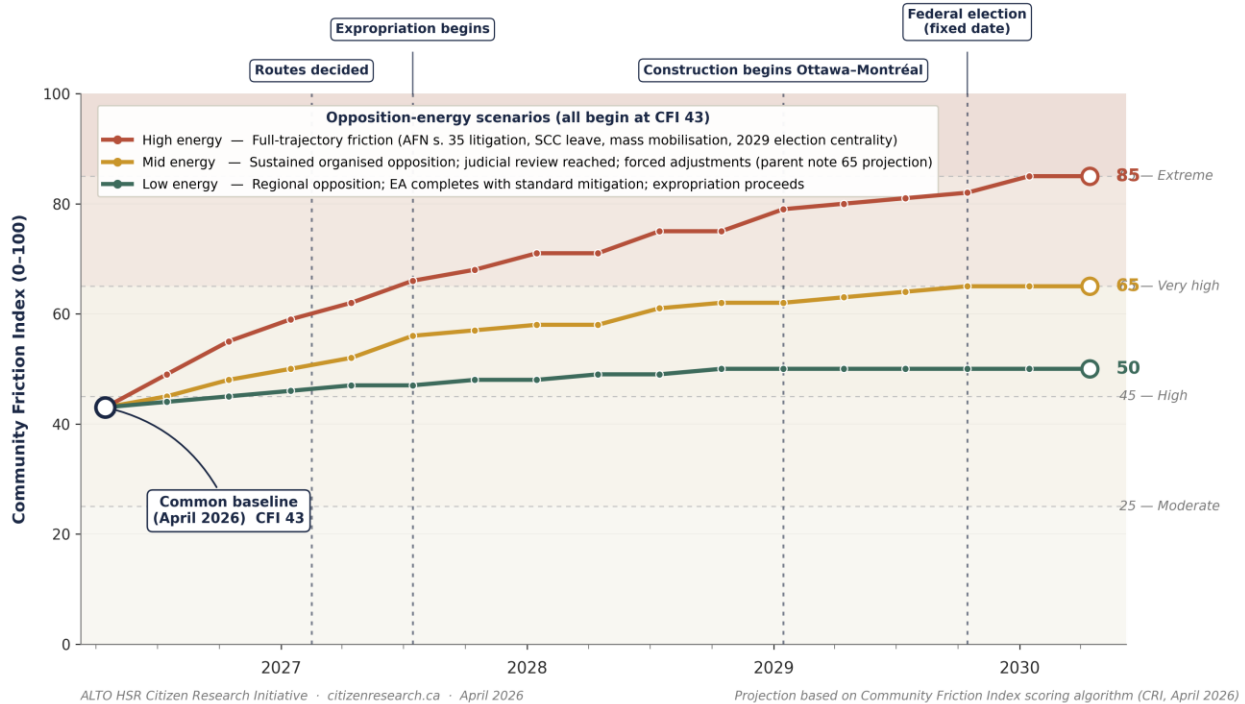


Figure 3. ALTO CFI three-scenario trajectory, April 2026 – April 2030. All three scenarios begin at the common post-Bill C-15 baseline of 43. Dashed horizontal lines mark band thresholds; vertical dotted lines mark project milestones and the 15 October 2029 fixed-date federal election. The mid-energy endpoint (CFI 65) corresponds to the ALTO projection placed in Figures 1 and 2.

The mid-energy trajectory (CFI 65 at Q2 2030) matches the ~163% projected overrun shown in Figure 2 and the CFI 65 point placed on the regression line in Figure 1. It represents the honest reference-class expectation for a project subject to sustained but contained organised opposition — the modal outcome in the international distribution for megaprojects entering construction at this friction level.

Figure 4 decomposes the mid-energy trajectory into its five component sub-scores. The aggregate rise from 43 to 65 over the four-year window is not evenly distributed across components: the legal-challenges component does most of the work of aggregate escalation (rising eight points from 5 to 13), reflecting that under Bill C-15 — with parliamentary and electoral channels effectively closed until the October 2029 fixed election — litigation is the primary remaining channel for effective contestation. Forced route changes is the slowest-rising component (two points from 2 to 7), reflecting the suppressive effect of s. 98 CTA deeming on the proponent's exposure to regulatory forced changes. Political controversy climbs modestly through 2026–2028 (11 to 14) under conditions of majority-government insulation, then bumps to 15 at the fixed-date election. Environmental / NGO opposition plateaus at 13, below the indicators (14–16) that require statutory ecological triggers, stop-work orders, or First Nations-led environmental litigation in parallel — those are features of the high-energy scenario. Public opposition intensity holds flat at 16–17, reflecting the mid-energy assumption of organised but non-mass-mobilisation opposition throughout the window.

ALTO CFI Mid-Energy Scenario: Component Trajectories

April 2026 – April 2030 · Five component sub-scores sum to the mid-energy aggregate (43 → 65)

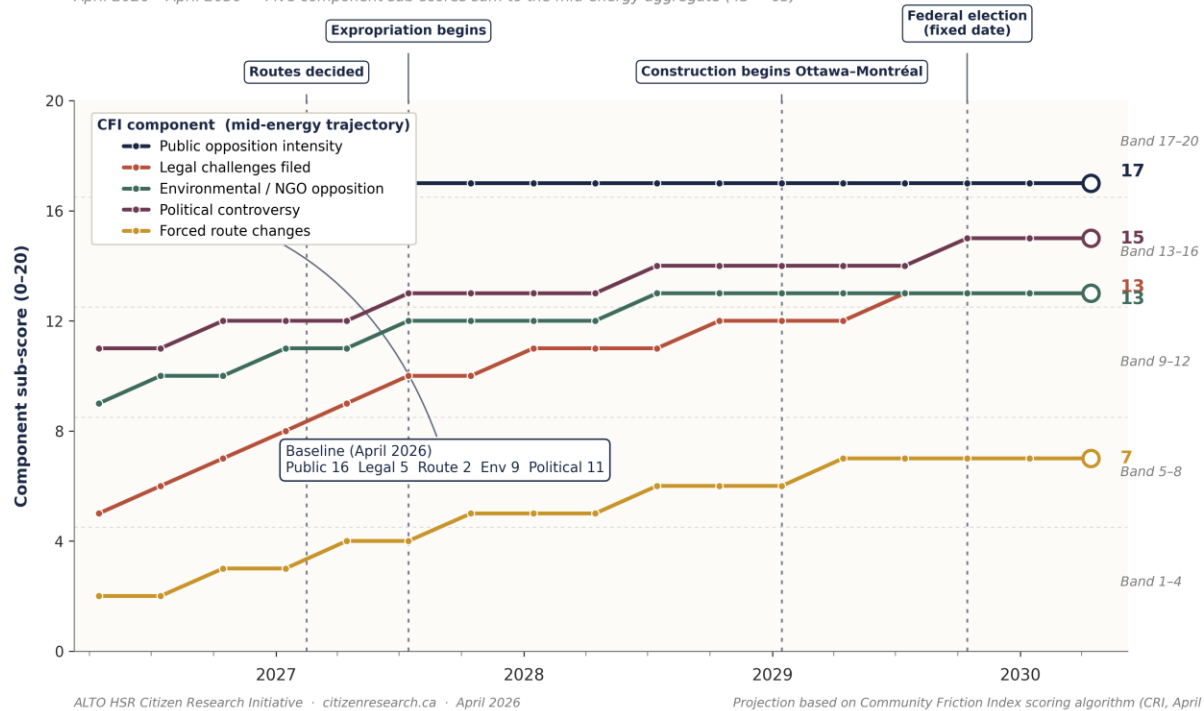


Figure 4. Mid-energy scenario component trajectories, April 2026 – April 2030. The five CFI sub-scores (0–20 each) sum to the aggregate mid-energy CFI at every quarter (43 → 65, per Figure 3). Endpoint values at Q2 2030: Public 17, Political 15, Legal 13, Environmental 13, Route 7.

The low-energy trajectory (CFI 50) is notable because, even under assumptions most favourable to the proponent, ALTO does not return to the Moderate band that characterises the international reference class’s successfully delivered projects. CFI 50 sits in the lower half of the High band (45–65), associated in the comparative dataset with projects that have experienced material delays and unplanned mitigation costs. The Moderate band is not reachable from the post-Bill C-15 baseline within the four-year window under any plausible assumption.

The high-energy trajectory (CFI 85) crosses into the Extreme band in the quarter immediately following the fixed-date federal election. This matches the position of the two most friction-intensive projects in the international dataset — HS2 (CFI 92) and California HSR (CFI 78) — both of which experienced sustained multi-front litigation, scope reduction, and political crisis in their construction phases. The Extreme band is not reachable under the pre-Bill C-15 projection within the four-year window; the Act’s expropriation and deeming provisions are what make that band accessible.

The three trajectories together establish a sensitivity envelope around the CFI 65 projection used in Figures 1 and 2. A reviewer who regards CFI 65 as overstated is effectively arguing for the low-energy trajectory, which has specific and auditable implications: no SCC leave, no mass mobilisation, environmental assessment completes without major challenge, AFN s. 35 litigation does not materialise, and expropriation proceeds with compensation accepted. A reviewer who regards CFI 65 as understated is arguing for the high-energy trajectory, which likewise has specific and auditable implications. The mid-energy trajectory is the modal projection in the international reference class and is the basis for the cost-per-kilometre and cost-overrun regressions in this report.

6 Implications for ALTO

ALTO enters public consultation in April 2026 at a projected CFI of 65 — already in the ‘very high friction’ band before environmental assessment has commenced. Most projects in the comparative database did not accumulate equivalent friction scores until construction had physically begun. The all-eight-drivers condition documented for ALTO is without precedent in the comparative record, including in the HS2 (CFI 92) and California (CFI 78) cases.

By contrast, HPR is projected at CFI 30 and sits within the moderate-friction band. A Highway 401 corridor alignment reduces rural severance impacts; freight displacement creates a constructive economic narrative for existing rail communities; and a phased construction model concentrates disruption in a lower-resistance zone. On the overrun plot, HPR’s regression-line position of ~53% represents the honest reference-class expectation for a well-managed project at that friction level — above the Flyvbjerg mean but within the range of successfully delivered European comparators.

The two plots together establish a consistent picture: ALTO’s CFI of 65, derived independently from the documentary record, places it on a cost and overrun trajectory without precedent for a Canadian public infrastructure project. The regression-line placement means this conclusion does not rest on any assumption about absolute construction cost — it follows directly from ALTO’s position in the international friction distribution.

Methodological notes

Cost figures are normalised to 2024 CAD using World Bank PPP conversion factors and represent construction cost per route-kilometre, excluding rolling stock. Cost overrun figures represent $(\text{final or current estimate} - \text{original published estimate}) \div \text{original published estimate} \times 100$, drawn from parliamentary inquiries, government audits, and academic literature. CFI sub-scale scores (0–20 per component; 0–100 aggregate) are assessed by the CRI research team. ALTO and HPR values are CRI projections placed on the regression line at their respective CFI values; they are not independently derived cost estimates. The CFI is an analytical instrument developed for this comparative study and has not been externally peer-reviewed. Trend-line R^2 values are computed on completed projects only ($n = 16$), excluding the two Canadian projections.

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Appendix A1

Component-Level Scoring Rubric

Table 1 (section 2) sets out the five CFI components and the high-level anchor levels for each 0–20 sub-scale. This appendix provides the granular rubric against which sub-scores are determined by the algorithm described in section 2. Each component is scored by identifying the twenty progressive indicators in ascending order of severity, grouped into five bands of four (1–4, 5–8, 9–12, 13–16, 17–20); the sub-score is the highest indicator number *n* such that indicator *n* and every preceding indicator is supported by the documentary record. Where evidence is equivocal, the lower sub-score is used. A sub-score of 0 is reserved for cases where the phenomenon is wholly absent from the record.

Tables A1.1 through A1.5 present the rubric for each component. Indicators should be read cumulatively: reaching a higher indicator presupposes that lower indicators have also been met.

Table A1.1. Scoring rubric for public opposition intensity.

Captures the scale, organisation, and reach of grassroots opposition as evidenced in the consultation record, community-group activity, media coverage, and public-mobilisation events.

Score	Indicator (must be supported by the documentary record)
1–4 · Minimal / isolated	
1	Fewer than 25 individual objections logged in the consultation record; no group formation.
2	25–100 individual objections; correspondence is individual, not coordinated.
3	Informal local networks visible (shared email threads, small Facebook or Signal groups); no constituted group.
4	A single community group is constituted (named spokespersons, published positions) but is not yet active in the press.
5–8 · Emerging coordination	
5	Community group holds regular meetings; website or equivalent public presence; isolated local-press mentions.
6	Petition with regional reach (>1,000 signatures) in circulation; municipal-council deputations begin.
7	Multiple community groups active in different affected municipalities along the corridor.
8	Sustained local-press coverage (monthly or more frequent); first municipal-council resolutions critical of the project.
9–12 · Organised, regionally contested	
9	Coalition structure links multiple affected municipalities under a shared spokesperson or steering committee.
10	Regional-press long-form features (broadsheet or regional-CBC equivalent); multiple municipal resolutions on record.
11	Provincial-level elected officials engage publicly (MPPs, provincial ministers respond on the record).
12	Independent citizen research or evidence work enters the consultation record.
13–16 · Sustained, politically visible	
13	National-outlet coverage begins (national newspaper features, broadcast national news segments).

Score	Indicator (must be supported by the documentary record)
14	Cross-sector coalition visible (agricultural, environmental, municipal, Indigenous, heritage or labour organisations coordinating).
15	Sustained national coverage; the project is a named political issue in affected federal ridings.
16	Formal parliamentary attention recorded (committee testimony, Order Paper questions, private members' interventions).
17–20 · Systemic / existential	
17	Repeat national-television and front-page coverage; public meetings exceeding 500 attendees.
18	Polling shows majority opposition within affected jurisdictions.
19	Sustained mobilisation events (rallies, occupations, coordinated action weeks); project enters national cultural discourse.
20	Multi-year, multi-phase opposition movement exerts cross-partisan political pressure; party lines on the project are visibly unstable.

Table A1.2. Scoring rubric for legal challenges filed.

Captures formal legal and quasi-legal activity directed at the project or its statutory approvals, from pre-action correspondence through to substantive litigation at superior courts.

Score	Indicator (must be supported by the documentary record)
1–4 · Minimal / isolated	
1	Inquiries from law firms representing affected landowners or groups; no correspondence to proponent or regulators.
2	Individual pre-action letters sent to the proponent or the consenting authority.
3	Multiple pre-action letters on record; freedom-of-information or access-to-information applications filed.
4	Coordinated ATI/FOI programme running across multiple federal or provincial institutions.
5–8 · Emerging coordination	
5	A single formal application filed before a regulatory or administrative tribunal.
6	Multiple discrete formal applications before tribunals; no injunction yet sought.
7	Tribunal application heard and decided (either way) before construction begins.
8	Application for judicial review filed at superior court.
9–12 · Organised, regionally contested	
9	Judicial-review proceedings underway; federal court docket active on project matters.
10	Multiple parallel tribunal and court proceedings (more than one forum simultaneously).
11	First application for an interlocutory injunction made, whether granted or denied.
12	Leave to appeal granted on at least one substantive ground.
13–16 · Sustained, politically visible	
13	Multi-front litigation running in parallel: regulatory, judicial-review, and constitutional arguments simultaneously.
14	An injunction granted at some phase, pausing works or a procedural step.
15	Indigenous-rights litigation engaged (s. 35 Constitution Act 1982 or equivalent duty-to-consult challenge).
16	Supreme Court of Canada leave application filed on a project-threatening issue.

Score	Indicator (must be supported by the documentary record)
17–20 · Systemic / existential	
17	Supreme Court of Canada grants leave on a project-threatening issue.
18	Construction phase paused by court order for more than 30 days.
19	Adverse ruling at senior level requiring a scope revision, corridor change, or re-approval.
20	Litigation unresolved at financial close; lenders withdraw, price in risk, or require additional guarantees.

Table A1.3. Scoring rubric for forced route changes.

Captures the cumulative scope and cost impact of alignment, station, or category changes made in response to community, regulatory, or political pressure.

Score	Indicator (must be supported by the documentary record)
1–4 · Minimal / isolated	
1	Original alignment proceeds with only micro-adjustments (property-line tweaks, access arrangements).
2	One to three discrete local realignments; aggregate corridor change below 1 per cent.
3	Three to six local realignments; aggregate corridor change below 2 per cent; no station changes.
4	Isolated curve-radius or grade-easing alteration made to blend engineering and community concerns.
5–8 · Emerging coordination	
5	Spot realignments aggregating 2-5 per cent of the corridor length.
6	Minor station-location adjustments made within the same municipality.
7	Five to ten per cent of the corridor realigned; additional grade separations requested and adopted.
8	Tunnelled or cut-and-cover sections extended over short lengths (under 3 km) to accommodate communities.
9–12 · Organised, regionally contested	
9	Ten to fifteen per cent of the corridor realigned; one new long tunnel or viaduct section added.
10	A station relocated across a municipal boundary in response to opposition or political pressure.
11	Corridor shifted onto a different transport easement (for example from greenfield to an existing rail right-of-way).
12	Alignment or scope change producing a 15-25 per cent cost increase against the original published estimate.
13–16 · Sustained, politically visible	
13	Major corridor revision: abandonment of a segment and replacement with a materially different route.
14	Deletion of one or more stations originally in the business case.
15	Speed or category downgrade on a segment (for example a designed HSR section rebuilt to HPR standards).
16	Alignment or scope change producing a 25-40 per cent cost increase against the original published estimate.
17–20 · Systemic / existential	
17	Cancellation of a phase or branch originally within scope (analogous to HS2 Phase 2a).
18	Fundamental corridor revision: not an adjustment of the existing concept but adoption of a different route concept.
19	Cancellation of an entire leg of the network (analogous to HS2 Birmingham-Manchester).

Score	Indicator (must be supported by the documentary record)
20	Project descope to a fraction of original scope (under 50 per cent of original route-kilometres delivered).

Table A1.4. Scoring rubric for environmental / ngo opposition.

Captures the intensity of environmental and non-governmental-organisation engagement with the project, from routine assessment submissions through to regulatory intervention and injunctive relief.

Score	Indicator (must be supported by the documentary record)
1–4 · Minimal / isolated	
1	Standard environmental-assessment submissions only; no substantive objection on record.
2	Routine NGO acknowledgement of the assessment process; no concerns raised.
3	Proponent-initiated NGO engagement accepted; mitigation measures agreed without dispute.
4	Individual NGO submissions request additional information but do not contest the assessment.
5–8 · Emerging coordination	
5	NGO submissions critique the adequacy of the environmental assessment; no legal action.
6	Multiple NGOs file coordinated objections to the environmental assessment.
7	Expert reports commissioned by NGOs identify risks or impacts not addressed by the proponent.
8	Species-at-risk concerns formally raised in the consultation record.
9–12 · Organised, regionally contested	
9	Species-at-risk triggers activated under federal SARA or provincial equivalents; s. 73 or s. 79 SARA processes engaged.
10	Formal environmental-assessment challenge lodged (request for ministerial review, referral to panel).
11	Federal regulatory intervention required (supplementary impact assessment, panel review, or additional study orders).
12	NGO litigation filed (judicial review of an environmental-assessment or permitting decision).
13–16 · Sustained, politically visible	
13	NGO litigation on species-at-risk grounds sustained through the interlocutory stage.
14	Designated critical habitat or equivalent statutory ecological trigger engaged.
15	Federal or provincial regulator issues a stop-work or additional-study order affecting project timelines.
16	Indigenous-led environmental litigation proceeds in parallel to NGO action.
17–20 · Systemic / existential	
17	Injunction on environmental grounds granted at any phase of the project.
18	Federal or provincial regulator refuses a permit required for construction to proceed.
19	Blockades or sustained direct action recorded over multiple weeks at project sites.
20	Environmental ruling forces a fundamental corridor or technology change.

Table A1.5. Scoring rubric for political controversy.

Captures the degree to which the project has become a matter of inter-party, inter-governmental, or intra-caucus political contest, measured through the parliamentary and electoral record.

Score	Indicator (must be supported by the documentary record)
1–4 · Minimal / isolated	
1	Cross-party consensus at federal and provincial levels; no material media controversy.
2	Isolated individual-legislator criticism; party whips hold across the parliamentary cycle.
3	Occasional opposition-party questions in Question Period; no sustained critique.
4	Low-level media criticism of the project; no legislative or electoral consequence.
5–8 · Emerging coordination	
5	Official opposition raises substantive questions in the House; no formal parliamentary mechanism yet engaged.
6	Sustained opposition-party critique; caucus-level attention on the project.
7	Parliamentary standing committee briefly examines the project.
8	Opposition-party motion or private member's bill engaging the project formally tabled.
9–12 · Organised, regionally contested	
9	Parliamentary standing committee conducts hearings on the project.
10	Parliamentary Budget Officer, Auditor General, or equivalent independent officer examines the project.
11	Senate study or inquiry initiated.
12	Governing-party backbench unease visible in the public record (constituency letters, published dissent).
13–16 · Sustained, politically visible	
13	Cabinet-level public disagreement or partial distancing of individual ministers.
14	Project attains named election-issue status in affected ridings; candidates pledge reconsideration.
15	Governing-party incumbents publicly diverge from the cabinet line on the project.
16	Formal intergovernmental dispute recorded (federal-provincial, or vice versa).
17–20 · Systemic / existential	
17	Project becomes a central issue in a general election campaign.
18	Governing party pledges review or cancellation during the campaign.
19	Incoming government commits to major scope change, delay, or corridor revision.
20	Project survival depends on the political fortunes of one or two individuals; sponsoring government begins to distance itself publicly.