single-product Understanding Your 8-Year Battery Warranty: What 70% SOH Really Means

Details:

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warranty can cost $20,000–$40,000 AUD depending on market conditions and battery technology costs. ## Understanding State of Health: the technical reality {#understanding-state-of-health-the-technical-reality} State of Health compares your battery's current full charge capacity against its original certified capacity. When your Polestar 4 was manufactured, CATL certified the battery pack's capacity through standardised testing. The vehicle's Battery Management System (BMS) continuously monitors actual capacity through charge and discharge cycles. The calculation works like this: If your battery originally held 94 kWh useable capacity and now holds 65.8 kWh at full charge, your SOH is 70% (65.8 ÷ 94 = 0.70). The BMS tracks this by measuring voltage, current, and temperature across all 110 prismatic cells during charging and discharging, calculating total energy transferred and comparing it against baseline values stored during vehicle production. Your Polestar 4's nickel-manganese-cobalt (NMC) chemistry experiences capacity fade through two mechanisms: calendar aging (time-based degradation regardless of use) and cycle aging (degradation from charge-discharge cycles). Calendar aging happens as the solid electrolyte interphase layer thickens on electrode surfaces, reducing lithium-ion mobility. Cycle aging comes from mechanical stress during lithium insertion and extraction, causing electrode material fracturing and active material loss. Battery testing laboratories show that NMC batteries typically lose 2–3% capacity in the first year, then 1–2% annually after that under moderate use conditions. High-stress factors accelerate degradation rates: frequent DC fast charging above 80%, operating in extreme temperatures, maintaining charge levels above 90% or below 10% for extended periods. ## What 70% SOH means for your real-world driving range {#what-70-soh-means-for-your-real-world-driving-range} At 70% State of Health, your Polestar 4's practical driving range decreases proportionally to capacity loss. For the Long range Single motor variant rated at 620 km WLTP range with a healthy battery, 70% SOH reduces maximum range to approximately 434 km under identical conditions. The Long range Dual motor variant drops from 590 km to approximately 413 km WLTP. WLTP ratings provide realistic expectations for Australian driving conditions. The Single motor's WLTP range of 620 km becomes approximately 434 km at 70% SOH. The Dual motor's 590 km reduces to approximately 413 km. These calculations assume proportional range reduction. Real-world range also depends on driving style, climate control usage, terrain, and speed. The 0.261 drag coefficient and energy consumption figures become more important at reduced capacity. The Single motor's efficiency of 17.8–18.1 kWh/100km means at 70% SOH with 65.8 kWh available, you can theoretically travel 363–370 km before depletion. The Dual motor's higher consumption of 18.7–21.7 kWh/100km yields 303–352 km at 70% SOH. Temperature complicates these calculations. Lithium-ion batteries deliver reduced capacity in cold weather. At 0°C, you might experience 20–30% additional range reduction beyond the SOH-related loss. At 70% SOH in winter conditions, expect 240–280 km practical range depending on cabin heating usage and driving conditions. ## Warranty coverage scope: what qualifies for claims {#warranty-coverage-scope-what-qualifies-for-claims} Polestar's battery warranty covers capacity degradation below 70% SOH within eight years or 160,000 kilometres when the battery has been subjected to normal use and proper maintenance. "Normal use" is defined in the warranty documentation and typically includes regular charging patterns, operating within specified temperature ranges, and following manufacturer guidelines for charging and storage. The warranty explicitly excludes degradation caused by physical damage from accidents or impacts, modifications to the battery system or vehicle electrical architecture, use of non-approved charging equipment, failure to install software updates that affect battery management, exposure to saltwater or corrosive environments, commercial use beyond specified parameters (such as taxi or rideshare service exceeding duty cycle limits), and neglect or failure to follow maintenance schedules. The warranty covers the battery pack as a complete assembly. If your SOH drops below 70% and Polestar validates the claim, they will repair or replace the battery pack to restore capacity above the warranty threshold. This doesn't necessarily mean a brand-new battery. Polestar may replace defective cell modules within the pack, recondition the pack, or install a remanufactured unit meeting warranty specifications. The warranty transfers to subsequent owners during the coverage period, which helps resale value. When purchasing a used Polestar 4, verify remaining warranty coverage and request battery health documentation from the seller. The warranty doesn't extend beyond the original eight-year/160,000 km period regardless of ownership changes. Coverage also includes the Battery Management System

components that monitor and control battery operation, as these are integral to maintaining battery health. Degradation of other high-voltage components like the permanent magnet synchronous motors or power electronics falls under separate powertrain warranty terms. ## How to monitor your battery's State of Health {#how-to-monitor-your-batterys-state-of-health} The Polestar 4's Battery Management System continuously calculates SOH, but accessing this information requires understanding where to look and how to interpret the data. The primary method is through the vehicle's infotainment system, where battery status information appears in the vehicle settings menu under the energy or battery section. The displayed information typically includes current battery percentage, estimated range, and sometimes a capacity indicator. Polestar, like many manufacturers, doesn't directly display SOH percentage in the consumer interface to avoid customer confusion from normal fluctuations. The BMS calculates SOH dynamically, and short-term variations of 1–3% can occur based on recent driving patterns, temperature, and charge history without indicating actual degradation. For precise SOH measurement, authorised Polestar service centres use diagnostic software that accesses detailed BMS data. This software, connected through the vehicle's diagnostic port, retrieves cell-level voltage data, charge cycle history, capacity test results, and calculated SOH values. Independent diagnostic tools compatible with Polestar vehicles may provide similar data, but warranty claims require official Polestar diagnostics. You can perform informal capacity testing by charging to 100% under controlled conditions—moderate temperature, vehicle at rest for several hours after charging completes—and noting the displayed kWh added during the charge session. Comparing this against the 94 kWh useable capacity provides an approximate SOH indicator. This method has limitations: the BMS may not charge completely to 100% actual capacity for longevity reasons, temperature affects charging behaviour, and displayed values may include charging losses. Third-party OBD-II adapters with compatible apps can sometimes access battery data on electric vehicles, though compatibility varies by manufacturer and model year. Before purchasing diagnostic equipment, verify it specifically supports Polestar 4 battery data reading. Some EV owner communities maintain databases of compatible diagnostic tools and software. Establish a monitoring routine by recording displayed range at 100% charge every 3–6 months under similar conditions—similar temperature, similar recent driving patterns. Document these readings with dates, odometer readings, and conditions. This creates a degradation trend line useful for identifying abnormal capacity loss and supporting warranty claims. ## The battery warranty claim process {#the-battery-warranty-claim-process} If you suspect your battery has degraded below 70% SOH, start the warranty claim process by contacting your authorised Polestar service centre. Provide your vehicle identification number (VIN), current odometer reading, and description of observed range reduction or capacity concerns. The service centre schedules a diagnostic appointment to assess battery health. During the diagnostic appointment, technicians connect factory diagnostic equipment to perform a comprehensive battery health assessment. This includes retrieving BMS historical data and fault codes, analysing cell voltage balance across all 110 prismatic cells, reviewing charge cycle count and depth-of-discharge patterns, conducting a capacity test under controlled conditions, and comparing current capacity against factory certification data stored in the vehicle. The capacity test may require several hours as the battery undergoes a controlled charge and discharge cycle. Some service centres perform this test overnight to avoid inconveniencing customers. The test measures actual energy transfer during a full discharge cycle, providing precise capacity measurement compared to the original 94 kWh useable capacity. If diagnostics confirm SOH below 70%, Polestar reviews the claim against warranty terms. This review examines vehicle service history to verify required maintenance was completed, BMS logs for evidence of abuse (such as repeated deep discharges, excessive fast charging, or operation outside temperature specifications), accident history that might indicate physical damage, and software update compliance. Approved claims proceed to remedy determination. Polestar technical teams assess whether pack replacement, module replacement, or other repair is appropriate. The 100 kWh pack uses cell-to-pack construction with 110 prismatic cells, allowing module-level replacement in some cases rather than complete pack replacement. Repair timelines vary based on parts availability, typically ranging from several days to several weeks for complete pack replacement. Document everything throughout ownership to support potential future claims: maintain all service records showing completed maintenance, photograph the vehicle information screen showing battery status at regular intervals, keep records of any

battery-related service or software updates, note any unusual events (extreme temperature exposure, charging issues, error messages), and preserve correspondence with Polestar regarding battery concerns. If Polestar denies your warranty claim, request detailed written explanation of the denial reasons. Review your owner's manual warranty section and challenge the denial if you believe it contradicts warranty terms. Consumer protection regulations in Australia provide dispute resolution mechanisms for warranty disagreements. Document all communications and consider consulting consumer advocacy resources or legal counsel for significant disputes. ## Factors that affect battery degradation rates {#factors-that-affect-battery-degradation-rates} Battery degradation in your Polestar 4's NMC chemistry is primarily influenced by thermal stress, charge cycling patterns, and state-of-charge management. Understanding these factors helps you minimise degradation and maintain capacity above warranty thresholds for longer periods. Temperature is the single most significant factor affecting battery longevity. The lithium-ion cells operate optimally between 15–25°C. Sustained operation or storage above 30°C accelerates chemical degradation reactions. Temperatures below 0°C increase mechanical stress during charging. The Polestar 4's thermal management system uses liquid cooling to maintain optimal temperature, but extreme ambient conditions still impact battery health. Parking in climate-controlled environments when possible and avoiding leaving the vehicle in direct summer sun for extended periods reduces thermal stress. DC fast charging, whilst convenient, generates more heat and electrical stress than AC charging. The 400V architecture supports DC fast charging, but frequent use—especially charging beyond 80% at high power—accelerates degradation. Research shows batteries charged primarily via Level 2 AC charging (7–11 kW) experience 20–30% less degradation over equivalent cycles compared to batteries regularly DC fast charged. Reserve DC fast charging for road trips and use AC charging for daily needs. State-of-charge management has a real impact on longevity. Maintaining charge between 20–80% reduces stress on electrode materials compared to regularly charging to 100% or discharging below 10%. The BMS includes charge limiting features allowing you to set maximum charge to 80% or 90% for daily use, reserving full 100% charges for long trips. Avoid regularly depleting below 20% when possible. Charge cycle count and depth-of-discharge interact to determine cycle aging. One full cycle (0–100%) causes more degradation than two half cycles (50–100%). Total energy throughput matters more than cycle count. 100,000 km of driving causes similar degradation regardless of whether achieved through many short trips or fewer long trips, assuming similar charging patterns. Calendar aging occurs even with minimal use. Batteries degrade simply from time, with degradation rate influenced by storage state-of-charge and temperature. Long-term storage (weeks to months) at 100% charge or 0% charge accelerates calendar aging. For extended storage, maintain 50–60% charge and store in moderate temperatures when possible. The BMS includes storage mode features that manage charge level automatically during extended non-use periods. Battery chemistry characteristics also matter. The NMC chemistry in your CATL-manufactured pack offers high energy density—enabling the 100 kWh capacity in a reasonable package size—but is more temperature-sensitive than some alternatives like lithium-iron-phosphate (LFP). This makes thermal management and temperature-aware usage patterns particularly important for maximising longevity. ## Maximizing battery longevity within warranty parameters {#maximizing-battery-longevity-within-warranty-parameters} Implementing battery-friendly practices extends the period before reaching 70% SOH and may delay or prevent warranty claims. These practices align with manufacturer recommendations and battery science principles. Charging strategy: Set your daily charge limit to 80% unless you need additional range for specific trips. Use the scheduled charging feature to complete charging shortly before departure rather than charging immediately and leaving the battery at high SOH for extended periods. When possible, charge after the battery has cooled from driving rather than immediately upon arrival. Precondition the battery using shore power before winter driving to reduce cold-weather stress. Driving patterns: The permanent magnet synchronous motor configuration—single rear motor or dual front-and-rear motors—delivers strong performance. 400 kW (544 hp) in the Dual motor variant. Aggressive acceleration and high-speed driving increase energy consumption and battery stress. Moderate driving that maximises the vehicle's efficiency ratings (17.8–21.7 kWh/100km depending on variant) reduces charge cycles needed for equivalent mileage, decreasing cycle aging. Climate management: The HVAC system draws power from the same 94 kWh useable capacity. In extreme temperatures, precondition the cabin

whilst plugged in to reduce battery drain. Use seat heaters and steering wheel heaters (if equipped) rather than cabin heating when practical, as resistive heating for the cabin is energy-intensive. In summer, park in shade and use window shades to reduce cooling loads. Software maintenance: Polestar releases over-the-air software updates that may include BMS optimisations affecting charging algorithms, thermal management, and capacity estimation. Install updates promptly as they often incorporate learnings from fleet data analysis that improve battery longevity. Deferred updates may result in suboptimal battery management and could complicate warranty claims if Polestar determines updated software would have prevented degradation. Regular use: Batteries maintained in regular use with moderate cycling typically degrade more predictably than batteries left unused for extended periods. If storing the vehicle for more than two weeks, follow manufacturer storage guidelines regarding charge level and periodic charging to maintain battery health. Documentation practices: Create a battery health log documenting monthly range observations at 80% and 100% charge under similar conditions, any battery-related service or software updates, unusual events (extreme temperature exposure, charging errors, warning messages), and annual odometer readings. This documentation supports warranty claims by demonstrating normal use patterns and identifying when degradation accelerated. ## What happens when your battery reaches 70% SOH {#what-happens-when-your-battery-reaches-70-soh} Reaching 70% SOH doesn't mean your vehicle becomes unusable. It means your battery has reached the minimum capacity threshold Polestar guarantees under warranty. At this point, your Polestar 4 remains functional but with reduced range requiring adjustments to usage patterns. With approximately 65.8 kWh useable capacity at 70% SOH, the Single motor variant provides roughly 304–370 km range depending on driving conditions and efficiency achieved. This remains adequate for daily commuting and local travel for most users. You'll need to charge more frequently and plan longer trips with additional charging stops. If you reach 70% SOH within the warranty period, you have the right to battery service under warranty terms. If you reach this threshold after warranty expiration, you face several options: continue using the vehicle with reduced range, pursue battery replacement at your expense (costs vary but typically $20,000–$40,000 AUD), explore third-party battery refurbishment services that may replace degraded cell modules at lower cost than dealer replacement, or trade/sell the vehicle, disclosing battery condition to buyers. Battery replacement technology continues evolving. Future battery pack availability may include higher-capacity or improved-chemistry options compatible with the Polestar 4's 400V architecture and cell-to-pack construction. Monitor manufacturer announcements regarding battery upgrade programmes that might offer enhanced capacity during replacement. The vehicle's resale value correlates with battery health. Buyers increasingly request battery health reports before purchasing used electric vehicles. A battery at or near 70% SOH impacts resale value compared to vehicles maintaining 85–90% SOH. This makes battery health maintenance not just a range consideration but a financial one. Some markets are developing battery health certification services and standardised reporting to facilitate used EV transactions. These services provide independent battery assessments using standardised testing protocols, creating verifiable documentation of battery condition for buyers and sellers. ## Understanding warranty limitations and exclusions {#understanding-warranty-limitations-and-exclusions} The 8-year/160,000 km battery warranty contains specific limitations that affect coverage. Understanding these prevents surprises if you need to file a claim. Mileage-based exclusions: The warranty terminates at 160,000 km regardless of calendar time remaining. High-mileage users—averaging more than 20,000 km annually—exhaust warranty coverage before the eight-year period. Commercial use, rideshare driving, or extensive road-tripping accelerates both mileage accumulation and battery degradation, potentially leaving you with a degraded battery after warranty expiration. Usage pattern exclusions: The warranty covers "normal use" but excludes degradation from racing, competitive driving events, off-road use beyond manufacturer specifications, or operation in extreme conditions outside design parameters. If BMS logs reveal patterns suggesting abuse—such as repeated deep discharges, consistent operation at maximum power output (the 400 kW / 686 Nm capability in the Dual motor variant), or regular operation outside temperature specifications—Polestar may deny claims. Maintenance requirements: Warranty coverage requires compliance with scheduled maintenance including software updates, cooling system service (the battery thermal management system requires periodic coolant inspection), and any battery-specific

maintenance outlined in the owner's manual. Missing scheduled maintenance provides grounds for warranty denial if Polestar determines the missed maintenance contributed to degradation. Modification exclusions: Any modifications to the battery system, high-voltage electrical system, charging system, or thermal management system void battery warranty coverage. This includes aftermarket performance modifications, non-approved charging equipment installations, or third-party battery management software. Even modifications seemingly unrelated to the battery may void coverage if Polestar determines they affected battery operation. Damage exclusions: Physical damage from accidents, flooding, fire, or external impacts is not covered under the battery capacity warranty (though may be covered under comprehensive insurance). Collision damage to the battery pack's protective enclosure can cause internal damage not immediately apparent but leading to accelerated degradation. Always have the battery system inspected after any collision, even minor ones. Geographic limitations: Warranty coverage applies in markets where Polestar officially sells vehicles. If you relocate to a market without Polestar service infrastructure, obtaining warranty service may be impossible or require transporting the vehicle to a supported market at your expense. Polestar currently operates across 28 markets with over 170 sales points and 1,200 service locations globally, with 2025 expansion into France, Czech Republic, Slovakia, Hungary, Poland, Thailand, and Brazil. Prorated coverage: Some manufacturers implement prorated warranty coverage where repair cost-sharing increases as the vehicle ages. Review your specific warranty documentation to determine if Polestar applies prorated coverage or provides full coverage throughout the warranty period. ## Battery technology context: why 70% matters {#battery-technology-context-why-70-matters} The 70% SOH warranty threshold comes from an industry consensus balancing technical reality, consumer expectations, and manufacturer risk. Understanding why this specific threshold exists provides context for your warranty terms. Lithium-ion battery degradation follows a nonlinear pattern. Initial degradation is relatively rapid as the solid electrolyte interphase stabilises and manufacturing variations normalise across cells. Degradation then enters a slower, more linear phase where capacity decreases predictably with cycling and time. At approximately 70–80% remaining capacity, degradation rates often accelerate again as electrode damage accumulates and cell-to-cell imbalances increase within the pack. The 70% threshold typically corresponds to 1,500–2,500 full-equivalent charge cycles for NMC chemistry under moderate conditions. For the Polestar 4 with 94 kWh useable capacity, this translates to approximately 150,000–250,000 km of driving depending on efficiency achieved (using the 17.8–21.7 kWh/100km consumption figures). The 160,000 km warranty limit aligns with expected cycle life for the battery chemistry and usage patterns. From a consumer perspective, 70% capacity retention maintains vehicle utility for most use cases. Range anxiety—the concern about insufficient range—is the primary barrier to EV adoption. Guaranteeing 70% capacity ensures the vehicle maintains approximately 300–430 km range (depending on variant and conditions), which remains adequate for daily driving and most regional travel. From a manufacturer perspective, the 70% threshold balances warranty risk against competitive positioning. Higher thresholds (80–85%) would increase warranty costs through more frequent claims and earlier replacements. Lower thresholds (60–65%) would reduce competitiveness as consumers compare warranty terms across manufacturers. Battery technology improvements continue advancing. Newer NMC formulations, silicon-anode technologies, and solid-state batteries promise improved longevity. Future Polestar models may offer enhanced warranty terms as battery technology matures. Your Polestar 4's CATL-manufactured NMC battery is current production technology with degradation characteristics well-understood from extensive field data. The cell-to-pack construction with 110 prismatic cells provides advantages for longevity and serviceability. This design eliminates module casings, reducing weight and thermal resistance between cells and cooling system. It also allows cell-level monitoring and potentially cell-level service, though complete pack replacement remains the typical warranty remedy. Polestar's commitment to transparency extends to battery technology. The brand publishes detailed Life Cycle Assessments for all vehicles and uses blockchain technology with partners like Circulor to trace risk materials such as cobalt. Through the Polestar 0 project, the brand aims to create a climate-neutral car by 2030 without relying on carbon offsetting—partnering with innovators like SSAB for virtually zero-carbon steel and Stora Enso for bio-based battery anode materials made from sustainably managed Nordic forests. ## Preparing for life after warranty {#preparing-for-life-after-warranty} Planning for battery health beyond the 8-year/160,000

km warranty period helps you maximise vehicle value and utility throughout its lifespan. Extended warranty options: Some manufacturers and third-party providers offer extended warranty coverage for electric vehicle batteries. Investigate these options before your factory warranty expires, as pre-existing degradation may affect eligibility or pricing. Extended warranties typically cost $2,500–$6,500 AUD but may provide value if you plan to keep the vehicle beyond the factory warranty period. Battery health assessment: Schedule a comprehensive battery health assessment at an authorised Polestar service centre near warranty expiration. This establishes documented baseline capacity just before warranty expiration, useful if degradation accelerates shortly after. The assessment also identifies any developing issues that might qualify for warranty coverage if addressed before expiration. Financial planning: If you plan to keep the vehicle beyond warranty, establish a battery replacement fund. Setting aside $150–250 monthly creates a $15,000–$25,000 reserve over several years, covering a significant portion of potential replacement costs. Battery prices continue declining. Current costs of $20,000–$40,000 AUD for 100 kWh packs may decrease to $15,000–$25,000 AUD within 5–10 years as production scales and technology advances. Usage adjustment: As the battery approaches 70% SOH, adjust usage patterns to extend the useful life. Reducing DC fast charging frequency, maintaining narrower state-of-charge windows (30–70% rather than 20–80%), and minimising extreme temperature exposure can slow degradation rates after warranty expiration. Market monitoring: Track developments in battery replacement technology and pricing. Third-party refurbishment services, remanufactured packs, and aftermarket upgrades may provide alternatives to dealer replacement. EV owner communities often share information about cost-effective battery service options. Resale timing: If you plan to sell rather than replace the battery, consider resale timing relative to battery health. Selling whilst SOH remains above 75–80% maximises resale value. Once SOH approaches or falls below 70%, resale value drops as buyers factor in imminent battery replacement costs. ## Polestar's sustainability commitment and battery innovation {#polestars-sustainability-commitment-and-battery-innovation} Polestar's approach to battery technology extends beyond warranty coverage to encompass the brand's broader mission of accelerating the shift to sustainable mobility. The Swedish electric performance brand refuses to compromise on design, driving experience, or environmental responsibility—a philosophy that directly influences battery development and lifecycle management. Through the Polestar 0 project, the brand has set an audacious goal: creating a climate-neutral car by 2030 without relying on carbon offsets. This objective requires fundamental reimagining of battery supply chains and manufacturing processes. Polestar partners with innovators developing breakthrough materials—SSAB for fossil-free steel and Stora Enso for bio-based battery anode materials made from sustainably managed Nordic forests. The brand's commitment to transparency sets it apart in the automotive industry. Polestar publishes comprehensive Life Cycle Assessments for all vehicles, providing customers with detailed information about the true environmental impact of their purchase. Through blockchain technology partnerships with companies like Circulor, Polestar traces risk materials such as cobalt throughout the supply chain, ensuring accountability from mine to vehicle. This transparency extends to battery health and warranty practices. Rather than obscuring degradation data or setting minimal warranty standards, Polestar provides clear information about expected battery performance and commits to meaningful capacity retention thresholds. The 70% SOH guarantee over eight years or 160,000 km is not just a legal obligation but a reflection of the brand's confidence in its battery technology and thermal management systems. Already, Polestar has achieved measurable progress towards its climate goals. In 2023, the brand reduced relative greenhouse gas emissions per sold car by 9%, equating to 3.4 tCO2e compared to 2022. These reductions stem from improvements across the entire value chain—from battery production to vehicle manufacturing to end-of-life recycling. As battery technology evolves, Polestar continues exploring circular design principles that extend battery life beyond initial automotive use. End-of-life battery packs can be repurposed for stationary energy storage applications, providing grid stabilisation and renewable energy integration. This second-life usage maximises the environmental value of each battery pack whilst creating pathways for responsible material recovery and recycling. For Polestar 4 owners, this commitment to sustainability means your vehicle is more than personal transportation. It's part of a broader movement towards climate-neutral mobility. The battery warranty protects your investment whilst Polestar's ongoing innovation ensures that future battery technologies

will offer even greater longevity, performance, and environmental responsibility. ## Material innovation and the pursuit of circularity {#material-innovation-and-the-pursuit-of-circularity} The battery in your Polestar 4 is not just an energy storage device. It's a statement about material innovation and the future of resource management. Every component—from the prismatic cell casings to the thermal management fluids—has been evaluated through the lens of circular design principles. Polestar's mono-material approach simplifies end-of-life recycling. Rather than using multiple plastics, composites, and adhesives that require complex separation processes, the brand prioritises single-material solutions wherever possible. This design philosophy extends to the battery pack, where standardised cell formats and modular construction facilitate disassembly and material recovery. The 110 prismatic cells in your battery pack contain critical materials—lithium, nickel, manganese, cobalt—that must be recovered and reused to create a sustainable electric vehicle ecosystem. Current recycling processes can recover 90–95% of these materials, but the economics and infrastructure for large-scale battery recycling are still developing. Polestar actively participates in industry consortiums developing closed-loop material flows where recovered battery materials directly feed new battery production. This commitment to circularity informs every design decision. The cell-to-pack construction that eliminates unnecessary module casings isn't just about weight reduction and thermal efficiency. It's about reducing material complexity and facilitating future disassembly. Every kilogram of material eliminated is a kilogram that doesn't need to be mined, processed, transported, and eventually recycled. ## The role of software in battery longevity {#the-role-of-software-in-battery-longevity} Your Polestar 4's battery longevity depends as much on software as hardware. The Battery Management System is years of accumulated data from millions of charge cycles across Polestar's global fleet, translated into algorithms that optimise every aspect of battery operation. These algorithms continuously balance competing priorities: maximising available range for the driver whilst minimising long-term degradation, providing rapid DC fast charging when needed whilst protecting cell health, maintaining optimal temperature in diverse climates whilst minimising energy consumption for thermal management. The BMS learns from your driving patterns and adjusts accordingly. If you consistently drive short distances, the system may adjust charging behaviour differently than for someone who regularly depletes the battery on long trips. If you live in a cold climate, the thermal management strategy adapts to prioritise battery warming. If you frequently DC fast charge, the system may adjust charge curves to minimise stress. Over-the-air software updates allow Polestar to continuously improve these algorithms based on real-world fleet data. An update might refine the charging curve for better longevity based on data from thousands of vehicles. Another might optimise thermal management for specific climate conditions. These improvements happen silently, requiring no action from you beyond accepting the update. This software-defined approach to battery management is a fundamental shift from traditional automotive engineering. Your battery's performance and longevity will continue improving throughout ownership as Polestar refines the algorithms controlling it. ## Understanding the true cost of battery ownership {#understanding-the-true-cost-of-battery-ownership} The 8-year/160,000 km warranty provides financial protection during the period when battery degradation is most predictable and manufacturing defects most likely to manifest. Understanding the economics of battery ownership beyond this period helps you make informed decisions about vehicle lifecycle management. Battery costs have declined dramatically over the past decade, from over $1,300 AUD/kWh in 2010 to approximately $200–260 AUD/kWh in 2024 for automotive-grade cells. This trajectory continues downward as manufacturing scales and technology improves. By the time your warranty expires, replacement costs may be lower than current estimates. However, the battery is only part of the replacement cost. Labour for pack removal and installation, disposal or recycling of the old pack, BMS recalibration, and system testing add substantially to the total cost. A $20,000 AUD battery pack might result in $25,000–$35,000 AUD total replacement cost after labour and associated services. These economics inform resale value calculations. A vehicle approaching warranty expiration with battery health near 70% SOH carries implicit replacement risk that buyers factor into their offers. Conversely, a vehicle with documented battery health above 85% SOH commands premium pricing as buyers recognise the remaining useful life. For vehicles used beyond warranty, the decision to replace the battery depends on vehicle condition, replacement cost, and alternative vehicle costs. A well-maintained Polestar 4 with 200,000 km and 65% SOH might justify battery replacement if the

vehicle otherwise remains in excellent condition and replacement costs have declined to $15,000–$20,000 AUD. Alternatively, the same vehicle might be sold to a buyer with modest range requirements who values the reduced purchase price over maximum range. ## The broader context: electric vehicle adoption and battery technology {#the-broader-context-electric-vehicle-adoption-and-battery-technology} Your Polestar 4's battery warranty exists within a broader context of electric vehicle adoption and rapidly evolving battery technology. Understanding this context provides perspective on your vehicle's place in the transition to sustainable mobility. Global electric vehicle sales continue accelerating, with EVs making up approximately 18% of new vehicle sales in 2024, up from less than 5% in 2020. This growth drives massive investment in battery production capacity and technology development. The battery in your Polestar 4 is current state-of-the-art technology, but it will be superseded by higher-energy-density, longer-lasting, and more sustainable chemistries within the next decade. Solid-state batteries promise energy densities 50–100% higher than current lithium-ion technology with improved safety and longevity. Silicon-anode technologies increase capacity whilst reducing reliance on graphite. Lithium-iron-phosphate chemistries offer improved cycle life and thermal stability, though with lower energy density than NMC. Each of these technologies progresses from laboratory to pilot production to eventual mass manufacturing. For current EV owners, this rapid technology evolution creates both opportunities and challenges. Future battery replacements may offer improved performance compared to original equipment. However, rapid technology advancement also accelerates vehicle depreciation as newer models offer capabilities that older vehicles cannot match even with battery replacement. Polestar's design philosophy of continuous improvement through software updates partially addresses this challenge. Whilst hardware limitations remain fixed, software optimisation can extract additional value from existing hardware throughout the vehicle's life. Your Polestar 4 in 2030 will perform better than it does today, not through hardware changes but through accumulated software refinements. ## The warranty as a reflection of brand confidence {#the-warranty-as-a-reflection-of-brand-confidence} The 8-year/160,000 km battery warranty is more than a legal obligation or competitive necessity. It reflects Polestar's confidence in its engineering, manufacturing quality, and supplier partnerships. Every warranty claim costs the manufacturer directly—in replacement parts, labour, logistics, and customer service. Manufacturers carefully calculate warranty terms to balance customer expectations against projected claim rates and costs. A generous warranty signals confidence in product reliability. A limited warranty suggests uncertainty about long-term performance. Polestar's battery warranty aligns with industry standards, neither exceptionally generous nor restrictive. This positioning reflects realistic assessment of NMC battery longevity under diverse operating conditions. The 70% capacity threshold is the point where most users begin experiencing meaningful range limitations, whilst the 8-year/160,000 km duration covers the period when manufacturing defects typically manifest. The warranty's transferability to subsequent owners demonstrates additional confidence. Non-transferable warranties protect manufacturers from claim costs on older, higher-mileage vehicles but reduce resale value for original owners. Transferable warranties support stronger resale values but increase manufacturer warranty exposure. Polestar's choice of transferable coverage reflects commitment to long-term value retention. ## Practical scenarios: battery warranty in real-world use {#practical-scenarios-battery-warranty-in-real-world-use} Understanding how the warranty applies in specific scenarios helps clarify coverage and limitations. Scenario 1—Daily commuter, moderate climate: You drive 60 km daily in a temperate climate, charging to 80% nightly on Level 2 AC. After five years and 110,000 km, your battery maintains 88% SOH. You remain well within warranty parameters with excellent battery health. This usage pattern—moderate mileage, limited DC fast charging, narrow SOH window—is optimal for battery longevity. Scenario 2—Road warrior, extreme climate: You drive 80,000 km annually in a region with hot summers and cold winters, frequently DC fast charging on highway trips. After two years and 160,000 km, your battery shows 76% SOH. You've reached the mileage limit, and warranty coverage expires. Whilst SOH remains above 70%, the high-stress usage pattern accelerated degradation. This scenario shows how aggressive usage can exhaust warranty coverage quickly. Scenario 3—Weekend vehicle, garage stored: You drive 8,000 km annually, storing the vehicle in a climate-controlled garage and maintaining 50–60% charge. After eight years and 64,000 km, your battery shows 82% SOH. Warranty expires due to time, but battery health remains

excellent. This scenario demonstrates how low-stress usage extends battery life, though warranty coverage still terminates at eight years regardless of mileage. Scenario 4—Rideshare service: You use your Polestar 4 for rideshare service, accumulating 50,000 km annually with frequent DC fast charging. After three years and 150,000 km, battery SOH drops to 68%. You file a warranty claim, but Polestar denies it due to commercial use exceeding specified duty cycles. This scenario shows usage pattern exclusions that void warranty coverage. Scenario 5—Accident damage: Your Polestar 4 is involved in a side-impact collision. The battery enclosure shows no visible damage, and the vehicle continues operating normally. After six months, you notice accelerated range loss. Diagnostics reveal 72% SOH. Polestar determines internal cell damage from the collision contributed to degradation and denies the warranty claim. This scenario demonstrates how accident damage can affect warranty coverage even without immediate visible battery damage. ## The intersection of warranty, insurance, and resale value {#the-intersection-of-warranty-insurance-and-resale-value} Battery warranty coverage intersects with insurance policies and resale value in ways that affect total ownership costs and financial planning. Insurance policies for electric vehicles increasingly include battery-specific coverage. Comprehensive policies may cover battery damage from accidents, flooding, fire, or vandalism that falls outside warranty coverage. Some insurers offer battery degradation insurance that provides coverage if SOH drops below specified thresholds, though these policies remain rare and expensive. When filing insurance claims for accident damage, ensure the insurer evaluates battery health even if no immediate battery damage is apparent. Internal cell damage may not manifest immediately but can lead to accelerated degradation. Document battery SOH before and after accidents to establish any degradation correlation. Resale value correlates strongly with remaining warranty coverage and documented battery health. A vehicle with three years and 80,000 km remaining warranty coverage and 90% SOH commands a premium over an identical vehicle with one year and 20,000 km remaining coverage and 75% SOH. When selling, provide buyers with official battery health documentation from Polestar service centres rather than relying on vehicle display estimates. Some dealers and private buyers request independent battery health assessments before purchase. Third-party services offering standardised battery testing are emerging in mature EV markets. These assessments cost $250–$650 AUD but provide verifiable documentation of battery condition that facilitates transactions and supports appropriate pricing. ## Looking forward: the future of battery warranties {#looking-forward-the-future-of-battery-warranties} Battery warranty terms continue evolving as manufacturers gain confidence in battery longevity and competition intensifies. Understanding emerging trends helps contextualise your current warranty coverage. Some manufacturers now offer lifetime battery warranties on specific models, guaranteeing minimum capacity retention for the vehicle's entire operational life. These warranties typically include higher capacity thresholds (75–80%) and may include prorated coverage where cost-sharing increases over time. Whilst Polestar has not announced lifetime battery warranties, competitive pressure may drive warranty enhancements on future models. Battery health monitoring technology continues improving. Future vehicles may include more sophisticated diagnostic capabilities that predict degradation trends and alert owners to developing issues before they cause significant capacity loss. These predictive systems could identify cell imbalances, cooling system inefficiencies, or charging anomalies that accelerate degradation, allowing corrective action before warranty claims become necessary. Regulatory requirements for battery warranties are increasing in some jurisdictions. California requires minimum 8-year/100,000-mile battery warranties on all EVs sold in the state. The European Union is considering regulations mandating minimum battery longevity standards and requiring manufacturers to provide battery health information to consumers. These regulatory trends may drive warranty improvements beyond competitive pressures alone. Battery-as-a-service business models separate battery ownership from vehicle ownership. Under these models, you lease the battery separately from the vehicle, with the lessor responsible for battery replacement when capacity drops below specified thresholds. Whilst not currently offered by Polestar, these models exist in some markets and may become more common as battery costs decline and circular economy principles gain traction. ## Final considerations: maximizing value from your warranty {#final-considerations-maximizing-value-from-your-warranty} Your Polestar 4's battery warranty provides valuable protection during the period when battery degradation is most uncertain and replacement costs most burdensome. Maximising value from this coverage requires

understanding the terms, maintaining documentation, and using the vehicle in ways that support long-term battery health. The warranty is not insurance against all battery degradation—it's protection against degradation exceeding specified thresholds under normal use conditions. Your usage patterns, charging habits, and environmental conditions impact whether you approach or exceed the 70% SOH threshold during the warranty period. View the warranty as a baseline guarantee, not a target. The goal is not to degrade to 70% and receive warranty service, but to maintain battery health well above 70% throughout ownership. This maximises vehicle utility, preserves resale value, and ensures the battery remains healthy beyond warranty expiration. Document everything. Maintain service records, photograph battery status displays, note unusual events, and keep correspondence with Polestar. This documentation supports warranty claims if needed and demonstrates responsible ownership when selling the vehicle. Understand the limitations. The warranty doesn't cover all degradation scenarios, and exclusions for abuse, modifications, and commercial use are enforced. Use the vehicle within manufacturer specifications and follow all maintenance requirements to preserve coverage. Plan beyond the warranty. Eight years or 160,000 km is a portion of the vehicle's potential lifespan. Consider how you will manage battery health after warranty expiration, whether through continued ownership with reduced range, battery replacement, or vehicle sale. Your Polestar 4's battery warranty is Polestar's commitment to quality, transparency, and customer confidence. Understanding this warranty empowers you to make informed decisions throughout ownership and maximise the value of your investment in sustainable mobility. ## References {#references} - [Polestar 4 Official Specifications](https://www.polestar.com/us/polestar-4/) - [CATL Battery Technology Overview](https://www.catl.com/en/) - [Battery University: Lithium-ion Battery Degradation](https://batteryuniversity.com/article/bu-808-how-to-prolong-lithium-based-batteries) - [SAE International: Electric Vehicle Battery Warranty Standards](https://www.sae.org/standards/) - [Australian Department of Climate Change, Energy, Environment and Water: EV Battery Information](https://www.dcceew.gov.au/) --- ## Frequently Asked Questions {#frequently-asked-questions} What is the Polestar 4 battery warranty duration: Eight years or 160,000 kilometres Which condition ends the warranty first: Whichever arrives first What is the minimum guaranteed State of Health: 70% SOH What is the nominal battery capacity: 100 kWh What is the useable battery capacity: 94 kWh Who manufactures the Polestar 4 battery: CATL What battery chemistry does the Polestar 4 use: Nickel-manganese-cobalt (NMC) How many prismatic cells are in the battery pack: 110 prismatic cells What does State of Health represent: Current maximum capacity compared to original factory capacity What capacity does 70% SOH translate to: At least 65.8 kWh useable capacity What does the warranty cover: Defects in materials and workmanship affecting battery capacity Does the warranty cover abuse: No Does the warranty cover modifications: No Does the warranty cover accidents: No What is the estimated cost of battery replacement outside warranty: $20,000–$40,000 AUD How is State of Health calculated: Current full charge capacity divided by original certified capacity What does the BMS monitor: Voltage, current, and temperature across all cells What are the two primary degradation mechanisms: Calendar aging and cycle aging What is calendar aging: Time-based degradation regardless of use What is cycle aging: Degradation from charge-discharge cycles What is typical first-year capacity loss for NMC batteries: 2–3% capacity What is typical annual capacity loss after first year: 1–2% annually What accelerates degradation: Frequent DC fast charging above 80% Does extreme temperature accelerate degradation: Yes Does maintaining charge above 90% accelerate degradation: Yes Does maintaining charge below 10% accelerate degradation: Yes What is the Single motor WLTP range at 100% SOH: 620 km What is the Single motor WLTP range at 70% SOH: Approximately 434 km What is the Dual motor WLTP range at 100% SOH: 590 km What is the Dual motor WLTP range at 70% SOH: Approximately 413 km What is the Single motor energy consumption: 17.8–18.1 kWh/100km What is the Dual motor energy consumption: 18.7–21.7 kWh/100km What is the Polestar 4 drag coefficient: 0.261 How much does cold weather reduce range: 20–30% additional reduction What is expected winter range at 70% SOH: 240–280 km practical range What is the Dual motor power output: 400 kW (544 hp) What is the Dual motor torque output: 686 Nm What architecture does the Polestar 4 use: 400V architecture What type of motors does the Polestar 4 use: Permanent magnet synchronous motors What does normal use include: Regular charging patterns within specified temperature ranges Does the warranty cover commercial use: No,

excludes commercial use beyond specified parameters Is the warranty transferable to subsequent owners: Yes Does warranty extend beyond original period for new owners: No What components does the warranty cover: Battery pack and Battery Management System components Where is SOH information displayed: Vehicle settings menu under energy or battery section Does Polestar directly display SOH percentage: No Can service centres measure precise SOH: Yes, using diagnostic software How often should you monitor battery health: Every 3–6 months What is the first step in filing a warranty claim: Contact authorised Polestar service centre How long does a capacity test take: Several hours What does Polestar review during claims: Service history, BMS logs, accident history, software compliance Can Polestar replace individual modules: Yes, cell-to-pack construction allows module-level replacement What is the typical repair timeline: Several days to several weeks What is the optimal operating temperature for batteries: 15–25°C At what temperature does degradation accelerate: Above 30°C sustained operation What type of cooling does the Polestar 4 use: Liquid cooling Does DC fast charging accelerate degradation: Yes How much less degradation occurs with AC charging: 20–30% less degradation over equivalent cycles What is the recommended daily charge limit: 80% What is the recommended charge range for longevity: 20–80% What charge level is recommended for long-term storage: 50–60% Does Polestar release over-the-air updates: Yes What do software updates improve: Charging algorithms, thermal management, capacity estimation Is the vehicle usable at 70% SOH: Yes, with reduced range What options exist after warranty expiration at 70% SOH: Continue use, battery replacement, third-party refurbishment, or sell Does battery health affect resale value: Yes, significantly What is the warranty mileage termination point: 160,000 km regardless of time Does racing void the warranty: Yes Do modifications void the warranty: Yes Is collision damage covered: No, not under battery capacity warranty How many markets does Polestar operate in: 28 markets globally How many service locations does Polestar have: Over 1,200 service locations What percentage of battery materials can be recovered: 90–95% What is Polestar's climate goal: Climate-neutral car by 2030 without carbon offsets What was Polestar's 2023 emissions reduction: 9% reduction per sold car What is the current battery cost per kWh: Approximately $200–260 AUD/kWh in 2024 What was battery cost per kWh in 2010: Over $1,300 AUD/kWh What is the total replacement cost including labour: $25,000–$35,000 AUD estimated What percentage of new vehicle sales were EVs in 2024: Approximately 18% What percentage of new vehicle sales were EVs in 2020: Less than 5% What is the expected cycle life at 70% threshold: 1,500–2,500 full-equivalent charge cycles What is the expected driving distance at 70% threshold: 150,000–250,000 km Does the warranty reflect manufacturer confidence: Yes

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