

A C E N T S L E S S W H I T E P A P E R • J U L Y 2 0 2 6

The Machine Test

Why the cheaper nickel Congress just authorized depends on an evaluation no one can currently perform

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Analytical, non-advocacy. This paper takes no position on whether the composition of the five-cent coin should change or on any pending legislation. The authors are officers of Centsless, which builds per-transaction evidence infrastructure; that interest is disclosed here at the outset and again in the Limitations.

Abstract

Section 2 of the Common Cents Act (H.R. 3074), passed by the United States House of Representatives on July 14, 2026, authorizes the Secretary of the Treasury to change the composition of the five-cent coin to a coin with an inner layer of zinc and an outer layer of nickel, subject to testing and evaluation that the composition reduces production cost and, to the greatest extent practicable, has a minimal adverse impact on machines designed to accept coins [1]. This paper examines whether that second condition can currently be evaluated. To our knowledge, it cannot be evaluated against any public evidence base. No unified inventory of coin validators and their recalibration capability exists in the United States. The machine-population estimates in the federal record diverge by millions of units within single industries, and the conversion-cost estimates that dominate the record, 2.4 billion to 10 billion dollars, were solicited by the United States Mint from the industries that would bear the costs, were never independently validated, and were assessed by the Government Accountability Office in 2015 as likely overstated [4]. The standard the statute borrows, minimal adverse impact to the greatest extent practicable, descends from a 2010 law under which, per GAO, the United States Mint never determined how to quantify either phrase [4][12]. In the one instance we identified in which a government body reported a realized conversion cost after a composition change and compared it to the prior estimate, the United Kingdom after 2012, the reported figure came in approximately 58 percent below the estimate, and even that figure rests on a single Royal Mint memorandum [4].

This paper takes no position on whether the composition should change. The alternatives the Mint has developed toward its own standard of a “seamless” transition may perform exactly as designed. The finding is narrower: Congress has conditioned a policy change on a measurement, and the infrastructure required to perform that measurement does not exist. The pattern mirrors Section 5 of the same bill, which conditions an assessment of rounding harm on transaction evidence no one collects. Section 2 conditions a coinage change on machine-impact evidence no one collects. Statutes that condition action on measured impact require measurement infrastructure. Per-unit evidence infrastructure is buildable. As of this writing, for the machines that accept America’s coins, it has not been built.

1. The question Congress asked

The operative language is short. Section 2 of H.R. 3074, as passed by the House, amends 31 U.S.C. 5112(c) to provide that the five-cent coin may be a coin with an inner layer of zinc and an outer layer of nickel, and that the Secretary may prescribe the composition of zinc and nickel in the coin, subject to testing and evaluation that such composition reduces the cost incurred to produce the coin and, to the greatest extent practicable, has a minimal adverse impact on machines designed to accept coins [1]. The bill also amends the weight specification from a fixed 5 grams to a permitted range between 4 and 6 grams for the zinc-and-nickel coin, directs that one year after enactment the Secretary shall mint no one-cent coins except numismatic pennies, and establishes in Sections 3 and 4 the voluntary cash rounding framework and its safe harbor, which Centsless examined in prior work [1].

Three features of the language matter analytically. First, the authority is permissive: the Secretary “may” prescribe the new composition, and nothing compels the change. Second, the test is two-part and conjunctive: cost reduction alone does not satisfy the statute. Third, the machine-impact standard is qualified twice. The impact must be “minimal,” and the minimization obligation runs only “to the greatest extent practicable.” Neither term is defined in the bill [1].

The machine test was not in the bill the committee of jurisdiction approved. The House Financial Services Committee marked up H.R. 3074 on July 23, 2025, adopting an amendment in the nature of a substitute offered by Representative Lisa McClain, and ordered the bill reported by a recorded vote of 35 yeas to 13 nays (Record Vote No. FC-187). The committee-reported text, filed September 4, 2025 as House Report 119-235, conditioned the new composition on cost reduction alone; the machine-impact clause entered between committee and the July 14, 2026 floor passage [1][2]. The two versions of section 5112(c)(2), side by side, make the change self-verifying:

COMMITTEE-REPORTED TEXT H.REPT 119-235, SEPTEMBER 4, 2025	ENGROSSED HOUSE-PASSED TEXT JULY 14, 2026
“The Secretary may prescribe the composition of zinc and nickel in the 5-cent coin, subject to testing and evaluation that such composition reduces the cost incurred to produce such coin.”	“The Secretary may prescribe the composition of zinc and nickel in the 5-cent coin, subject to testing and evaluation that such composition (A) reduces the cost incurred to produce such coin; and (B) to the greatest extent practicable, has a minimal adverse impact on machines designed to accept coins.”

The insertion tracks documented industry advocacy. At the National Automatic Merchandising Association’s June 2026 Fly-In, Bill Meierling, the association’s senior vice president of external affairs, described the ask as putting substantive stakeholder feedback into the bill so that it would not be simply a mandate to use one coin or another, with federal agencies required to take into consideration the impact of changing the coin, toward a more price-competitive coin produced with minimal adverse impact to operators and anyone in coin-operated industries [3]. That phrase, minimal adverse impact, is now in the statute.

The minority views filed with the committee report recorded the opposition and the mechanism of concern, verbatim: “Vending machines rely on electromagnetic and weight sensors calibrated to current coin specifications. An abrupt change in the 5-cent coin composition would render many mechanisms inoperable, requiring operators to update or replace equipment at a significant expense” [2]. The minority views name both the National Automatic Merchandising Association and the National Federation of the Blind as opponents of the bill. The record does not state the Federation’s rationale; the blindness-related concern the minority views themselves raise is that blind vending-facility operators under the Randolph-Sheppard program would be required to grapple with the implications of the legislation, a concern about who bears equipment conversion costs rather than about coin design [2].

The qualifier “to the greatest extent practicable” has a documented history, and it is not encouraging for anyone who must now apply it. The Coin Modernization, Oversight, and Continuity Act of 2010 directed that new coins should work without interruption in existing coin acceptance equipment without modification, to the greatest extent practicable [12]. In December 2015, the Government Accountability Office found that the Mint had not yet determined how to quantify what constitutes a significant change or how to operationalize the phrase to the greatest extent practicable [4]. The standard Congress wrote into H.R. 3074 in 2026 is, in substance, the standard a federal audit found unoperationalized in 2015. To our knowledge, no subsequent Mint publication has defined either term quantitatively.

One legislative fact frames everything that follows. H.R. 3074 was received in the Senate on July 15, 2026 and referred to the Committee on Banking, Housing, and Urban Affairs. The Senate companion, S. 1525, introduced April 30, 2025 and pending in the Committee on Banking, Housing, and Urban Affairs without a hearing, contains no composition provision and no machine test [6]. Whether the machine test survives to enactment, is amended, or disappears entirely is an open question. This paper analyzes the test as the House passed it, because that is the version before the Senate and because the analytical problem will attach to any future composition authorization whether or not this one becomes law.

2. The economics of the five-cent coin

The fiscal case for changing the nickel’s composition is real and documented, and fairness to the bill’s drafters requires stating it plainly. Per the United States Mint’s Fiscal Year 2024 Annual Report, the unit cost to produce and distribute the five-cent coin was 13.78 cents against a face value of 5 cents, and fiscal 2024 was the nineteenth consecutive year in which the unit costs of the penny and the nickel exceeded their face values [7]. The coin remains a homogeneous alloy of 75 percent copper and 25 percent nickel weighing 5 grams, essentially unchanged since the denomination’s introduction in 1866, excepting the copper-silver-manganese wartime alloy struck from mid-1942 through 1945 [7].

The Federal Reserve Bank of Richmond states the loss precisely: at 13.8 cents of production cost, the Treasury incurs a seigniorage loss of 1.75 dollars for every 1 dollar issued in nickels. The Mint shipped approximately 202 million nickels in fiscal 2024, producing a seigniorage loss of approximately 17.7 million dollars, down from 78.0 million dollars in fiscal 2022 and 92.6 million dollars in fiscal 2023, when mintages were far higher [8].

The penny’s departure complicates the arithmetic. The Congressional Research Service observed that demand for money presumably would not change with the penny’s elimination, so demand for nickels may increase, and because nickels cost more to produce than pennies, the overall cost of coin production could rise [9]. A February 2025 CNN analysis calculated that a return to nickel volumes near 1.4 billion coins per year would cost approximately 78 million dollars more than the pennies no longer being made [10]. Americans for Common Cents, an advocacy organization funded primarily by Artazn, the supplier of penny blanks, has argued that nickel volumes must rise substantially [10]. To our knowledge, no official Mint projection of post-penny nickel demand has been published; the

volume projections in circulation are industry and press estimates and are presented here as such.

The direction of the incentive is clear regardless of the exact volume. Every marginal nickel minted at current composition loses money, penny elimination points toward more marginal nickels, and a cheaper nickel is therefore worth more after the penny than before it. That is the fiscal logic of Section 2. The question is what stands between that logic and the coin slot of every machine that must recognize the new coin.

3. What the Mint already knows

The Mint has been preparing for this moment for fifteen years, and its research program is the strongest part of the record. Under the 2010 Act’s mandate, the Mint, working with contractor Concurrent Technologies Corporation, evaluated 29 metallic formulations, narrowing the field through biennial reports to Congress in 2012, 2014, 2016, 2018, 2020, 2022, and 2024 [4][5][6]. Out of that work the Mint developed a two-category framework that maps directly onto the statutory question. The Mint’s term of art for the first category is “seamless”: an alternative that matches the incumbent coin’s weight, dimensions, and electromagnetic signature closely enough that machines accept it without modification. The second category, co-circulate, covers compositions, principally plated-steel constructions, that change weight or electromagnetic signature and therefore require the installed machine base to be recalibrated or replaced, with old and new coins circulating together for decades [5][11].

For the five-cent coin, the Mint’s published record identifies two candidates tested toward the seamless standard. The 2022 Biennial Report stated that testing of 80/20 cupronickel was complete and the composition ready pending congressional authorization [11]. The 2024 Biennial Report states that internal testing of C99750TM Low Mn, a copper-nickel-zinc-manganese alloy containing approximately 33 percent zinc, is complete, with results indicating it is a seamless alternative to incumbent cupronickel. External validation is not complete: confirmation by coin acceptor and validator manufacturers, using proprietary software, frequencies, and methods, was underway at the time of the report and is scheduled to complete for the 2026 Biennial Report, with test pieces sent in September 2024 to at least three manufacturers [5].

The savings figures are volume-dependent and should be read together. On 2024 production quantities, with Federal Reserve coin orders down more than 50 percent from the prior year, the 2024 report estimates the 80/20 alternative could have generated approximately 2.5 million dollars in 2024, C99750TM Low Mn approximately 3.9 million dollars, and C99750TM High Mn approximately 6.4 million dollars [5]. The 2022 report, at that year’s higher production levels, estimated that C99750TM Low Mn could improve seigniorage by approximately 12.9 million dollars per year [11]. Both vintages are presented because either alone would mislead: savings from any composition change scale with how many coins the Federal Reserve actually orders.

One construction question sharpens everything that follows. The bill authorizes “an inner layer of zinc and an outer layer of nickel,” which on its face describes a clad or plated construction: a zinc core

wearing a nickel skin. The Mint's candidates tested toward the seamless standard are not that construction; they are homogeneous alloys that contain zinc. The Mint's record on the plated construction points the other way: the 2016 Biennial Report states that nickel-plated copper-plated zinc was tested and not found to be feasible for United States coinage, and the Mint's plated five-cent candidate, nickel-plated steel, is explicitly a co-circulate option requiring machine modification [13][4]. On the current public record, the composition the statute literally authorizes has no validated machine-impact record, while the compositions with favorable results are ones the statutory text does not naturally describe. House Report 119-235 refers to a zinc-based nickel alloy, which suggests the drafters may have intended the alloy family, and a reader could take subsection (c)(2)'s phrase, the composition of zinc and nickel, as loose enough to cover a homogeneous alloy rather than a strict clad mandate [2]. Even on that flexible reading, the narrower point stands: the construction the text most naturally describes, a zinc core clad in nickel, has no validated machine-impact record, and intent and text are not the same thing.

This is also the strongest fact in the bill's favor, stated without reservation: if the Secretary prescribes a composition that performs to the Mint's seamless standard in the field, across the full diversity of the installed base, the machine impact should approach zero by design. The difficulty is the word if, and who verifies it. The statute's test will in practice be answered by the attestations of the companies that manufacture the acceptors, measured against a machine population no one has inventoried, under a standard no agency has quantified. The engineering may be excellent. The public evidence base against which anyone, Congress, the industries, or a court, could verify the statutory finding does not exist. The next three sections document that absence.

4. The two classes of numbers that never meet

The public record on coin composition change contains two classes of numbers. They have circulated for a decade, and they never meet, because they describe different parties' ledgers and different qualities of evidence. The large numbers originate in an April 2014 Federal Register notice in which the Mint solicited comment from coin-machine industries on the costs of adapting to composition changes. The responses, reprinted in the Mint's 2014 Biennial Report and analyzed in GAO-16-177, produced the following estimates for adapting to coins with changed weight or electromagnetic signature [4][14]:

INDUSTRY	ESTIMATED MACHINES	ESTIMATED CONVERSION COST
Amusement parks	approx. 10 million	1 billion to 5 billion dollars
Vending	approx. 7 million	700 million to 3.5 billion dollars
Amusement machines	approx. 1 million	100 million to 500 million dollars
Coin laundry	approx. 1.6 million	156 million to 470 million dollars
Parking	approx. 2 million	400 million to 600 million dollars
Armored carriers	approx. 5,800	410 thousand to 1.65 million dollars
Total (GAO Table 2)	approx. 21.9 million	2.4 billion to 10 billion dollars

The vending floor estimate assumed at least 100 dollars per machine, consistent with a software recalibration service call, and GAO flagged that the amusement-park figure may have double-counted machines from the broader amusement sector [4].

GAO examined these estimates in 2015 and concluded they were likely overstated. The Mint had committed to preserving coin dimensions, which removed the mechanical-modification scenarios underlying the highest figures. The Mint determined that a steel quarter was not viable, in part for counterfeiting and foreign-coin substitution risk, so machines that accept only quarters, which describes much of the coin laundry base, would require no modification under the compositions actually contemplated. The counts themselves moved: the vending industry's count fell from 7 million machines in its 2014 response to 4.5 million in a 2015 industry study, a decrease of about 36 percent that alone cuts the vending floor estimate from roughly 700 million to roughly 450 million dollars. The parking figure rested on an informal telephone survey conducted in 2007, in an industry visibly migrating to coinless meters [4].

The critique ran in both directions. Evaluating the Mint's own savings estimates against the twelve-step GAO Cost Estimating and Assessment Guide, GAO found the Mint fully met one step, partially met seven, minimally met three, and did not meet one, lacking, among other elements, a sensitivity analysis and a risk and uncertainty analysis [4]. Neither side of the ledger met audit standards.

Against the billions on the industry side, the government's side is measured in tens of millions. Per GAO's October 2015 analysis, the change GAO evaluated as free of industry cost, a seamless increase of copper content across the nickel, dime, and quarter, would save approximately 8 million dollars per year, while the change with the largest evaluated savings, converting the nickel and dime to plated steel, would save approximately 39 million dollars per year at significant industry cost, with intermediate options between those endpoints per GAO's denomination-by-alternative breakdown [4]. A 2012 study by Navigant Consulting, commissioned by a supplier of coin material per GAO's description, projected savings of up to 207.5 million dollars per year from multi-ply plated steel across three denominations; GAO found the study narrow in scope because it excluded production, processing, transportation, new-equipment, and licensing costs [4].

It is tempting to read this record as a verdict: billions in industry costs against tens of millions in savings, therefore the change fails any rational test. This paper declines that reading, because the evidence does not support it any more than it supports the opposite conclusion. Virtually every number on the industry side is a pre-change estimate, solicited from the parties that would bear the cost, produced without independent validation, resting on counts that shifted by a third within a year, and assessed by the federal auditor as likely overstated. Virtually every number on the government side failed most steps of the government's own estimating guide. The honest characterization is not that conversion costs exceed savings by two orders of magnitude. It is that no one knows the ratio, because one side has never been measured and the other has never been audited to standard. Section 2 of H.R. 3074 now requires the Secretary to make a finding, minimal adverse impact, against precisely this record.

5. The one time anyone measured

International experience is the natural place to look for realized numbers, because other governments have done what the United States is contemplating. In the record we reviewed, we identified exactly one instance in which a government body reported a realized conversion cost after a composition change and compared it to the prior estimate. It deserves close reading, including its weaknesses.

Effective January 2012, the United Kingdom converted its 5 pence and 10 pence coins from cupronickel to nickel-plated steel, a change that was not seamless by design. Before the change, per GAO-16-177 citing a Royal Mint memorandum, initial vending industry estimates to accept the new coins were about 40 million pounds, roughly 60 million dollars. After the transition, per the same memorandum as reported by GAO, studies showed actual conversion costs of about 17 million pounds, roughly 26 million dollars, about 58 percent less than estimated [4]. Transparency requires stating the provenance plainly. The realized figure rests on GAO's citation of a single Royal Mint memorandum that is not, to our knowledge, publicly available, and no independent confirmation from HM Treasury or the Automatic Vending Association was located in this research. A competing figure exists: United Kingdom trade sources attribute to the Automatic Vending Association a realized industry cost of approximately 28.9 million pounds for the same transition [15]. The two figures cannot both be right, and this paper adopts neither. What the pair establishes jointly is the narrower point this paper needs: a realized measurement was possible, someone made one, and the pre-change estimate did not survive contact with it. The Royal Mint subsequently operated a reclamation program that removed a majority of the old cupronickel coins from circulation, recovering metal value that partially offset transition costs [4].

An earlier British data point brackets the experience: the 1992 conversion of the 1 penny and 2 pence coins to copper-plated steel was reported by the vending industry as effectively costless, because machines largely did not accept those low denominations [4]. Conversion cost is a function of machine acceptance, not of the coin itself. The United Kingdom's 2017 twelve-sided pound transition generated widely cited pre-change industry estimates of roughly 15 to 32 million pounds but, to our

knowledge, no published realized figure, so it does not add a second measurement to the record.

Canada ran the experiment and did not measure the result. The Royal Canadian Mint began converting circulating denominations to its patented multi-ply plated steel in the early 2000s, operating an Alloy Recovery Program to reclaim withdrawn cupronickel. For the conversion of the 1 and 2 dollar coins, the Canada Gazette of January 4, 2012 estimated a one-time vending recalibration cost of approximately 40 million dollars, at approximately 100 dollars per newer machine and up to 300 dollars per older machine, against approximately 16 million dollars per year in government savings, a present value the filings put at approximately 107.5 million dollars over ten years [16]. Per GAO, the Royal Canadian Mint did not compare the industry's estimated costs to the costs actually incurred [4]. The euro changeover of 2002 stands as the extreme case of machine conversion, and to our knowledge no post-hoc, primary-source quantification of realized equipment conversion costs across the euro transition has been published; the figures in circulation are pre-change estimates and should be treated as such.

Across the transitions we reviewed, one realized measurement was identified, and where measurement happened, the pre-change estimate proved substantially too high by the measuring party's own account. Where governments did not measure, the estimates hardened into the historical record unchallenged. The United States has never changed the composition of a major machine-accepted coin in the validator era, has never measured such a transition, and now proposes to make a statutory finding about one.

6. The machine base nobody has inventoried

The statutory test asks about impact on machines designed to accept coins. Evaluating impact on a population requires knowing the population. A coin validator authenticates a coin against some combination of diameter, thickness, weight, and electromagnetic signature, which GAO defines as “an electronic reading by a sensor, which is directly influenced by the materials and thickness of a coin” [4]. In practice, validators induce eddy currents in the coin and read its conductivity profile, a function of alloy composition. The incumbent nickel's homogeneous cupronickel produces a specific signature that validators have been calibrated against, in some cases for decades. A coin with a zinc core and nickel cladding is, by construction, a different electromagnetic object than a homogeneous alloy, unless it is engineered to reproduce the incumbent signature and weight, which is what the Mint's program toward the seamless standard exists to do. The machine question therefore collapses into a single engineering claim: that the prescribed composition performs to that standard in the field, across the full diversity of the installed base, including its oldest and least sophisticated validators. The statutory test is, in substance, a demand that this claim be verified. Verification requires knowing what the installed base is.

The honest answer is: remarkably little is known, and what is known is old, inconsistent, and in places demonstrably unreliable. The aggregate figure in the federal record, approximately 21.9 million coin-accepting machines across six industries per GAO Table 2, is the sum of the 2014 industry responses, with the count weaknesses documented in Section 4 [4]. Partial counts exist and should be

acknowledged: the Census Bureau's Economic Census counts vending machine operator establishments, and a number of states license or decal vending machines for tax purposes. What these partial datasets share is that none identifies the validator inside the machine or its recalibration capability, which are the properties the statutory test turns on. To our knowledge, no unified inventory of coin validators, their makes, models, firmware versions, and recalibration capability, exists anywhere in the public record.

The recalibration economics are fragmentary but directionally consistent. GAO reported that a software recalibration is a service call of less than an hour costing up to approximately 100 dollars, performed by a certified technician; the Canada Gazette used 100 dollars for newer machines and 300 dollars for older ones [4][16]. The hard cases are machines that cannot be recalibrated in software: older mechanical acceptors may require hardware replacement, and amusement and laundry operators told GAO their machines commonly operate 12 to 15 years or longer without routine service visits, meaning conversion would require dedicated service calls across a dispersed installed base rather than piggybacking on maintenance cycles [4].

The cash context is shrinking the exposed base, with an important caveat. Per Cantaloupe's 2025 Micropayment Trends Report, 77 percent of United States vending transactions were made by card or mobile payment in 2024, based on data from more than 625,000 of Cantaloupe's own card readers [17]. Because that dataset comes from machines already equipped with cashless readers, it overstates cashless penetration across the full installed base, which includes older cash-only machines. The exposed base is smaller than a decade ago and concentrated in exactly the operators, older equipment, and cash-reliant customer bases where conversion is hardest, the same distributional pattern Centsless documented for rounding itself in The Measurement Gap.

The stakeholders on the record complete the picture. The National Automatic Merchandising Association's standing policy position opposes any changes in coins that would place a financial burden on the vending industry or interrupt service to existing coin acceptance equipment without modification, supports the conclusions of the Mint's 2014 Biennial Report, and urges the Mint and Congress to consider government assistance to ease the burden of any compliance costs [18]. The National Federation of the Blind is named in the minority views as an opponent of the bill, without a stated rationale, and this paper does not attribute one; the committee record's own blindness-related concern is the Randolph-Sheppard cost-incidence question described in Section 1 [2]. For completeness on the legal backdrop often raised in coin-change discussions: American Council of the Blind v. Paulson, which held that indistinguishable paper currency violates Section 504 of the Rehabilitation Act, applies to paper currency; no source located in this research identifies a general statutory requirement that circulating coins be tactilely distinguishable, and the narrow exception, the edge-incusing requirement of the Presidential 1 Dollar Coin Act, is denomination-specific [19][20]. A composition meeting the seamless standard preserves diameter, thickness, and weight by design, leaving the tactile profile unchanged.

7. Who bears the cost, who runs the test, and what would make it answerable

The engrossed text of H.R. 3074 contains, to our knowledge, no compensation, cost-sharing, or transition-assistance provision for the owners of coin-accepting machines [1]. If the Secretary prescribes a new composition and any portion of the installed base requires recalibration or replacement, the cost falls where it lands: on vending operators, laundromat owners, transit agencies, parking authorities, amusement operators, Randolph-Sheppard blind vendors, and the service ecosystems around them. The association's request that Congress consider assistance with compliance costs remains, as of this writing, a request [18].

This produces a structural asymmetry worth stating precisely, because it is the same asymmetry The Measurement Gap identified in Section 5 of the same bill. The party that runs the test is the Treasury. The party that bears the cost if the test is wrong is the machine-owning economy. The standard the Treasury must apply has never been quantified by the agency applying it, per the federal auditor's finding [4]. And the evidence the Treasury will rely on, the validation of candidate alloys against the seamless standard, is generated by coin acceptor manufacturers using methods the Mint's own report describes as proprietary software, frequencies, and methods [5]. The finding, when it comes, will not be verifiable against any public dataset, because the public dataset does not exist.

None of this implies bad faith anywhere in the system, and one concession should be made explicitly: if the Secretary in fact prescribes a composition that has cleared the Mint's internal testing and the external manufacturer validation now underway, the realistic machine impact may prove small, and the statute's permissive structure allows exactly that outcome. The point is narrower. The statute does not bind the Secretary to that path; its literal language authorizes a construction with no validated machine-impact record; and a statutory finding that cannot be verified is a finding the affected parties must take on faith. When the estimated stakes span from roughly zero, if the seamless standard holds in the field, to the billions in the industry record if it does not, the absence of verification infrastructure is not a technicality. It is the difference between a measured transition and a wager.

Stated analytically, the Section 2 finding becomes verifiable rather than attested when five conditions hold, each framed in vendor-neutral terms that any party, including the Mint, GAO, or the affected industries jointly, could execute. First, a census of coin-accepting machines by industry category, replacing the 2014 self-reported figures whose internal revisions moved by millions of units. Second, an inventory of the validator layer: the makes, models, and firmware versions actually deployed, because impact is a property of validators, not of machines in the abstract. Third, a classification of recalibration capability across that inventory, field-updatable, component swap, or replacement, which converts the machine count into a cost structure. Fourth, a standardized per-machine cost methodology distinguishing software service calls from hardware replacement, so that estimates are auditable rather than solicited. Fifth, and most important given the historical record, a mechanism to measure realized costs after any change, which no United States coin transition has done and which, in the record we reviewed, has been done once anywhere [4].

The principle beneath the five conditions connects this paper to its predecessor. Section 5 of the Common Cents Act asks a question about rounding harm that cannot be answered because no one keeps per-transaction evidence of what registers actually do. Section 2 asks a question about machine impact that cannot be answered because no one keeps per-unit evidence of what the machines are and what changing them costs. In both cases Congress has done something reasonable, conditioning action on demonstrated impact, atop something missing, the infrastructure that demonstration requires. Centsless operates per-transaction evidence infrastructure in production for the cash rounding case [21]; we cite it here not as a policy proposal but as an existence proof that per-unit evidence infrastructure of this class is buildable. The machine base awaits its equivalent, from whoever builds it.

8. Conclusion

Congress wrote a reasonable condition. A cheaper nickel should not degrade the machines that accept it, and the statute says so. But the condition is a measurement, and the measurement has no instrument. The machine counts in the federal record are self-reported, a decade old, and internally inconsistent by millions of units. The conversion costs are unvalidated estimates the federal auditor judged likely overstated, and the savings estimates failed most steps of the government's own estimating guide. The standard has never been operationalized by the agency that must apply it, the validation runs on proprietary methods, and the one realized measurement in the international record, itself single-sourced and contested, came in far below the estimate it tested. The statute's literal construction, a zinc core clad in nickel, has no validated machine-impact record at all. None of this says the change is wrong. It says the finding the statute requires cannot currently be checked by anyone outside the process that produces it. Questions get answered when the things they ask about leave records. The nickel's redesign is a decision about the roughly twenty million machines in the federal record, a count this paper itself shows is unreliable, and making them visible is an engineering fact before it is a policy choice.

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- [21] Centsless platform documentation, docs.centsless.org. United States provisional patent application, 31 claims, filed November 2025.

Limitations

The central claims of this paper include negative existence claims: that no unified inventory of coin validators and their recalibration capability exists in the public record, and that the record we reviewed contains one realized post-change conversion-cost measurement. Such claims are supported by the audit of the sources named above, but a proprietary or unpublished dataset cannot be categorically ruled out, and we would welcome correction. Nearly every cost figure cited is a pre-change estimate rather than a measured outcome, and the paper's central argument is precisely that such estimates are unvalidated; the figures characterize the state of the record, not what conversion would actually cost. The United Kingdom's realized figure rests on GAO's citation of a single Royal Mint memorandum that is not publicly available, a competing industry figure of approximately 28.9 million pounds exists, and this paper adopts neither. The machine population figures are of uncertain and in places demonstrably poor quality, and no conclusion here depends on any particular count being correct. The Mint's savings estimates are volume-dependent, and both the 2022 and 2024 vintages are presented for that reason.

The legislative situation is unsettled. S. 1525 contains no composition provision, and the Senate may strike, amend, or preserve Section 2; the analytical problem attaches to any future composition authorization, but the specific text analyzed here may not be the text enacted. Legislative facts are stated as of July 27, 2026 and will change; the current status of every framework Centsless tracks is maintained at www.centsless.org/intelligence/legislation-tracker. The authors are officers of Centsless, which builds the class of per-unit evidence infrastructure discussed in Section 7; readers should weigh that interest, which is disclosed on the title page and here precisely so the analysis can be evaluated on its sources, all of which are public. Adjacent questions remain outside scope, including the rounding of cash wage and tip disbursements, accessibility policy beyond the legal backdrop summarized in Section 6, and coin demand in a declining-cash economy.