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The Legal Production of Non-Observance: Private Property, Environmental Assessment and the Conversion of Prime Agricultural Soil in Chile's Energy Transition

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Abstract

This article exposes how Chile permits photovoltaic plants on its land of highest agricultural capability, withdrawing the material basis of long-term food security for at least a generation, in full legality. Linking environmental-assessment records, fiscal cadastral microdata and the CIREN capability survey, I document 135 approved plants sited dominantly on Class I–III soil, 5836 declared hectares; elite soil covers 18.2% of the farmed landscape yet hosts 42.8% of the approved plants, 2.35 times its share. That the system processes this tension without friction reveals the socio-legal infrastructure of property, whose dephysicalisation erases the land's food-producing capability from every register of decision. The regime fuses three securities (legal certainty, juridical security and land-tenure security), serving as the foundation of the energy transition. The fusion shields the proprietor and confines all protection to the voluntary, visible in the compensations proponents offer when the Agriculture and Livestock Service (SAG) objects. A documentary census of the permitting files supplies the new evidence. The SAG objects in writing to the loss of productive agricultural land in 64 of 136 approved files, and no objection prevents approval; in 21 a favourable qualification is issued with the objection still standing. The Service refutes, with measurements of its own, proponents who declare their soil poor, up to Class I, and the projects are approved nonetheless. If rural land is to be protected as a public good, voluntariness must yield to obligation.

Keywords: land concentration; energy transition; legal geography; property rights; land-use capability; environmental impact assessment; Chile

1. Introduction

The decarbonisation of electricity has produced a new geography of land conflict. As wind and solar infrastructure scales, it competes for the same flat, well-served, accessible land that agriculture has always valued, and the resulting disputes, over farmland, water, landscape and livelihood, now recur across both the global South and the global North [1–3]. The dominant readings of these conflicts are by now familiar. A political ecology names them as green grabbing or accumulation by dispossession [4,5], and an energy-justice literature distributes their costs and benefits across affected populations [6]. Both have taught the field a great deal. Neither, however, reads the conflict through the legal architecture of property itself, that is, through the specific arrangement of certainty, security and materiality that determines which land moves to energy capital, on what terms and with whose consent.



Academic Editor: Brian D. Fath

Received: 17 July 2026

Revised: 17 August 2026

Accepted: 25 August 2026

Published: 29 August 2026

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This article takes that legal architecture as its object. It does so from Chile, not as a parochial case but as a paradigmatic instance of a neoliberal land regime in which property has been engineered to circulate without friction. The empirical puzzle is precise. Chilean law surrounds agricultural soil with an apparatus of protection (environmental impact assessment, a favourable agricultural report for any change of rural land use, a statutory floor on subdivision); the authorities routinely invoke the irreversibility of farmland loss, and the state's own climate policy undertakes to safeguard the soil for the production of food. And yet the country converts its best soil, and it does so without breaking a single rule; the full legality of the conversion is not the background of the finding but the finding itself. Amongst approved utility-scale solar plants whose soil class can be determined, 135 sit dominantly on Class I–III capability land; the most valuable one per cent of agricultural parcels is concentrated on Class I soil, and the appraised value of rural property ranks amongst the most unequally distributed of any asset in the country. Protection in the books, conversion on the ground, no illegality between them. The gap is not produced by silence. As I shall show, the state sees the soil again and again. It appraises it, classes it and maps it; its own agricultural service objects in writing to the loss; and it converts the soil nonetheless, because at each stage the law furnishes a category of decision that never takes the soil's capability as its object. What presents itself as an absence of protection is a positive legal operation, the production of non-observance.

I argue that this gap is not a failure of regulation but a property of the regime. To see why, the article advances a single analytical move, reading property as infrastructure rather than as a bundle of rights. An infrastructural reading dissolves the apparent unity of "certainty" into three securities of distinct ontological registers, legal certainty (the technical apparatus that identifies, without ambiguity, who may exclude whom from which parcel), juridical security (the ideological–temporal device that renders regressive arrangements irreversible and progressive ones reversible) and land-tenure security (the material conditions under which property can actually be exercised). A neoliberal regime fuses the three and treats the fusion as a single technical fact. The fusion is what gives the regime its strength. It is also what generates, under an exogenous shock such as the energy transition, a contradiction the regime cannot resolve from within, because the very conflation that secured accumulation now blinds the apparatus to the material functions it would need to defend.

This argument allows me to specify a gap that four adjacent bodies of literature circle without closing. The green-grabbing field has shown that securely titled land moves to capital with particular ease, and that law constitutes dispossession rather than merely failing to prevent it [7,8]. This rejoins a longer debate that empirically dismantled the equation of formal title with effective security [9–11]. Yet the field still treats secure title as an anomaly rather than as the mechanism it is, and has only recently begun to measure exposure at scale [3]. The law-and-climate-adaptation literature has shown that property functions as both "a sword and a shield" in territorial conflict [12], whilst its empirical centre of gravity is coastal, doctrinal and qualitative. Legal geography supplies the foundational insight that the cadastre and the survey grid produce landed property rather than record it [13], but the subdiscipline remains largely qualitative and case-based, and has only lately begun to ask what would count as evidence at scale [14,15]. Critical property theory, finally, has given me the concept that names my central finding, Graham's dephysicalisation, the detachment of legal entitlement from the materiality of place [16], but has left it largely unoperationalised. The intersection of the four is empty, and it is precisely where a neoliberal land regime, a measurable cadastre and an accelerating energy transition meet.

The land-management literature offers a further anchorage. Scholarship on land multifunctionality has long held that the same hectare supplies productive, ecological and

cultural functions at once, and that governing land means governing the trade-offs amongst them [17,18]. Read against that tradition, the Chilean case isolates the legal side of the problem, for the apparatus examined here does not weigh functions against one another; it is built so that one function, the food-producing capability of prime soil, cannot enter the weighing at all. The article's contribution to that literature is therefore to specify the legal mechanism by which multifunctionality is reduced, in administrative practice, to a single admissible register.

The article fills that intersection with three contributions. Empirically, it offers a national cross of photovoltaic siting with land-use capability for the Chilean case, read through a sociolegal mechanism and built by linking environmental-assessment records, cadastral microdata and a soil-capability survey. Where comparable national mapping exists, it maps exposure without stratifying it by capability class or supplying a mechanism [3]. To that cross it adds a documentary census of the permitting files. The main permitting document of every plant in the strict universe was read in full, together with every pronouncement of the Agriculture and Livestock Service within those files, so that the mechanism is observed not only in siting but in the written record of the one state organ that objected to the loss. Theoretically, it puts the mechanism of self-generated contradiction to work on the energy transition and shows that the same infrastructure that dephysicalises elite soil makes the proponent who controls it opaque, a differential legibility that renders the parcel hypervisible and the party who decides over it elusive. Methodologically, it releases a reproducible processing pipeline that eases access to public records which are dispersed and laborious to process. The remainder of the article sets out the theoretical framework (Section 2); the apparatus and the juridical mechanism that produces the non-observance of soil (Section 3); the data and methods (Section 4); the national signature of the mechanism, that is, the quantitative evidence that it operates at scale and rules out rival readings (Section 5); its discussion (Section 6); and the implications for theory and land-use policy (Section 7).

2. The Socio-Legal Infrastructure of Rural Property

2.1. *From a Bundle of Rights to an Infrastructure*

Property theory has long debated what ownership is. The familiar candidates are a bundle of entitlements, a relation amongst persons with respect to things, and a form with a social function [19–21]. This article does not adjudicate that debate; rather, it relocates it. I treat property as infrastructure, that is, as a durable, path-dependent assemblage of legal forms, administrative apparatuses and material conditions that distributes, sustains and disputes rights over land, and that, like all infrastructure, becomes visible chiefly when it fails. The move extends to rural property a sensibility that infrastructure studies made canonical, namely that the systems sustaining social life remain invisible until they break down [22,23]. It also converges with the literature that reads law itself as infrastructure, whether because law codes and constitutes capital rather than merely accompanying it [24] or because shared resources demand their own theory of the infrastructural [25]. The move matters because it makes available a distinction the language of rights obscures. What is ordinarily called the “certainty” of property is not one thing but three, of distinct ontological registers, which a neoliberal regime fuses into an apparent technical unity.

The first is legal certainty, the technical-formal apparatus (registry, tax cadastre, agricultural service, courts) that identifies without ambiguity who holds what over which parcel. Legal certainty certifies the power to exclude; it is, in Blomley's [13] sense, the work by which the survey and the grid bring landed property into being rather than recording a property that pre-exists them. The second is juridical security, not a technical device but an ideological–temporal one. It manufactures a fear of redistributive pasts and futures, and

thereby renders regressive arrangements irreversible whilst treating progressive ones as reversible. The third is land-tenure security, the material register, that is, the soil, water and ecological conditions that determine whether property can be exercised in fact. The reverse of this third register is what Graham [16,26] calls dephysicalisation, the process by which modern property law detaches the legal entitlement from the materiality of the place it concerns, so that title certifies the power to exclude whilst remaining blind to what is materially held.

2.2. *The Conflation and Its Self-Generated Contradiction*

A neoliberal land regime does not merely possess these three securities. It conflates them, asserting that legal certainty automatically guarantees land-tenure security, and that the temporal asymmetry of juridical security is simply how stability works. The conflation is productive. It allows land to circulate without friction, because a buyer need attend only to the registry, not to the soil or to the history of the title. But the conflation is also the regime's vulnerability. Under an exogenous shock, here the imperative to decarbonise flat, well-serviced farmland becomes the most valuable substrate for generation, and the apparatus is asked to defend the material function of soil against a legally certain, frictionless transfer, exactly what the conflation forbids. It cannot. The very fusion that secured accumulation has rendered the material register illegible to the apparatus that would need to read it. This is what I mean by a self-generated contradiction, a crisis the regime manufactures from within, because the arrangement that gave it strength vetoes the functions it now needs [27]. This contradiction is not confined to any single apparatus. It recurs wherever the regime is asked to bind the proprietor in the name of a collective interest, as much in the environmental stage that evaluates a conversion as in the climate policy that would protect the soil that conversion consumes. The device that forbids the binding, the juridical security that renders redistributive futures unthinkable, is common to them all.

This reading is consonant with two adjacent diagnoses, though sharper than either. Critical property theory has argued that the liberal-absolutist conception of ownership counts amongst the juridico-cultural conditions of possibility of environmental harm, and not as a neutral bystander to it [28–30]. It has argued, further, that property law for the Anthropocene must be redesigned around obligation rather than choice [31,32]. The form/function distinction in particular supplies the instrument I need, for the juridical form of protection can persist intact whilst the material function it names is hollowed out [20]. What this literature has not done is measure the hollowing. My contribution is to specify the mechanism precisely enough that its territorial signature becomes observable.

The mechanism thus described, finally, is not only about Chile. Chile is where the coupling of the three securities is most visible, but the infrastructure is universal to property regimes, and what is specific to the neoliberal case is the ideological tightness of the fusion [27]. The portable claim holds that any property infrastructure that fuses certainty, security and materiality in the service of accumulation will generate, under an exogenous shock that revalues the material register, a contradiction it cannot resolve from within. The energy transition is one such shock; climate adaptation on retreating coasts is plausibly another [33].

2.3. *Differential Legibility, or the Parcel and Its Proponent*

The infrastructural reading carries a corollary that organises my qualitative evidence. If legal certainty renders the parcel hypervisible whilst saying nothing about the controller behind it, then the regime produces differential legibility. It renders some things, the bounded parcel and the registered transfer, exhaustively visible to the state, and others, the

actual proponent and the material capacity of the soil, opaque [34–36]. The same apparatus that registers the parcel without ambiguity leaves whoever controls it in shadow, so that a special-purpose vehicle can convert the soil without the registry revealing who decides. Property, read as infrastructure, is a relational technology that distributes security, and visibility, unevenly [37].

3. The Evaluation Process and the Conversion of Agricultural Soil

3.1. *The Transition and the Ground It Seeks*

Chile ranks amongst the fastest decarbonising electricity systems in the global South [38]. Its solar build-out, having saturated the northern desert, has descended into the central valley, the historic core of the country's fruit, wine and dairy economy and the location of its highest-capability soils. The coincidence is not incidental. The engineering optimum for generation, a flat, drained, well-serviced terrain within reach of the grid, is very nearly a description of prime arable land; photovoltaic potential is, in fact, greatest over cropland [39]. The transition therefore seeks the very terrain that agriculture has always valued most, and it meets there an apparatus that the state presents as its principal defence.

3.2. *The Evaluation Process, Stage by Stage*

On paper the regime surrounds agricultural soil with protection. That protection is invoked in those very terms in the controversy that motivates this article, where a neighbour of the affected properties attributes to the Minister of Agriculture the orthodoxy that “one agricultural hectare lost is never recovered” [40]. Read as a procedure rather than a slogan, however, the safeguard resolves into a sequence of stages, each oriented towards something other than the loss it is supposed to prevent. I examine the process stage by stage, because the mechanism this article isolates is not a barrier that fails but a set of stages never arranged to stop what now passes through them.

The first stage is entry. Every utility-scale generation project must pass through the Environmental Impact Assessment System (SEIA), entering either by an Environmental Impact Declaration (DIA) or, for larger or more sensitive projects, by an Environmental Impact Study (EIA). Which route a project takes is not decided by the soil it will occupy. The typologies that oblige a project to enter, and that within the system trigger the deeper Study, are set by Article 3 of the SEIA Regulation (Supreme Decree 40/2012) and turn on electrical infrastructure and installed capacity, that is, high-voltage transmission lines and their substations, and generating stations above three megawatts. The capability class of the soil is not amongst them. Agricultural soil is not a typology of entry; there is no route through which the loss of prime land, as such, compels evaluation. The consequence surfaces downstream in the data, where the great majority of plants on elite soil enter by the lighter route of the Declaration, self-classified by the proponent, and the minority that face a Study are drawn there by their power lines, not by their fields.

The second stage is the significance test, the criterion that separates a Declaration from a Study, and the one place where the loss of soil might be named. It is named, and here sits the pivot of the whole mechanism, for the object it protects is not the one the apparatus advertises. Article 11(b) of Law 19.300 requires a Study wherever a project generates “significant adverse effects on the quantity and quality of renewable natural resources, including soil”. Article 6 of the Regulation, and the Agriculture and Livestock Service's own evaluation guide, define that effect as “the loss of soil, or of its capacity to sustain biodiversity, through degradation, erosion, sealing, compaction or the presence of contaminants”. Read the protected object closely. The soil is defended as an ecological substrate, against erosion, sealing and contamination, and for its capacity to sustain vegetation

and fauna, and not as agricultural capability, not as the food-producing vocation that its use-capability class measures. A photovoltaic plant, which the proponent characterises as reversible, non-sealing and non-contaminating, mounts its panels on piles and declares that it neither loses the soil nor degrades its capacity to sustain biodiversity; on that characterisation it generates no significant effect, and a Declaration suffices. What is actually lost, the withdrawal of the country's best arable land from food production for an entire generation, is not the object the test is built to weigh. Under this criterion a Class I soil and a Class VI soil are equivalent so long as neither is physically degraded.

The third stage is the change of land use. Any construction on rural land outside the urban limit requires a change-of-land-use authorisation under Article 55 of the General Law of Urbanism and Construction, which enters the procedure as Sectoral Environmental Permit 160. The Service that knows the soil best, the one that opens soil pits, classifies the profile and issues the Favourable Construction Report on which the permit rests, feeds its agrological knowledge into that permit. It feeds it as an input, not as a veto, for the requirements the permit itself states are that the project not give rise to new urban nuclei and not generate "loss or degradation of the soil resource" (Supreme Decree 40/2012, Article 160), once again the ecological register rather than the agricultural one. In the permitting files the permit surfaces as a checkbox marked "mixed", and in several of them the proponent simply declares that the change-of-land-use certificate "does not apply".

The fourth stage neutralises the knowledge the state itself produced, and within it the sequence of approval matters. The environmental qualification is issued not by the environmental service but by a regional Commission of Evaluation, composed of the presidential delegate and the regional secretaries of the ministries with environmental competence, Agriculture amongst them; that Commission evaluates the project and, if it approves it, issues the Environmental Qualification Resolution (RCA). Only then, and under Article 24 of Law 19.300, does the decisive effect unfold. Once the qualification is favourable, no organ of the state may deny the environmental authorisations that depend on it, and for a mixed permit such as Permit 160 the sectoral organ must grant it "without further procedure". The Agriculture and Livestock Service then sees the soil, measures it and reports on it; yet, once the qualification is favourable, it cannot refuse a project on the ground that it consumes Class I land. Its knowledge is present at the table, for the regional secretary of Agriculture sits on the Commission itself, and disarmed at it. This is not the silence of the law but the law positively organising its own non-observance, with the organ that can see barred from acting on what it sees.

The regime adds, finally, a legal floor to the subdivision of rural parcels (Decree-Law 3.516 of 1980), routinely worked around. The deeper point, however, is that none of these pieces orders the territory. Comparative work on the regulatory architecture of rural property in Latin America shows why the design holds. No jurisdiction in the region, Chile included, couples this process to a binding instrument of rural land-use planning that would designate the highest-capability soil as such and defend it territorially [27]. The safeguard proceeds parcel by parcel, not as an ordering of the territory, and a staged process can be traversed one stage at a time, as Section 3.4 shows.

3.3. Two Projects at Human Scale

The two projects that crystallised the public conflict illustrate the point and serve as the qualitative anchors for the analysis that follows. The first, "Parque Solar Platero" (SEIA file 2162737178), is promoted by Platero SpA, a local special-purpose vehicle with no identified ultimate controller, and would convert 11.4 ha of walnut groves in San Juan de Pirque, in the Metropolitan Region, entering by Declaration. The second, "Parque Fotovoltaico y Sistema BESS Chanqueahue" (SEIA file 2167734150), is promoted by the Spanish multinational

Grenergy, a named and visible controller, and would occupy 278.7 ha with 271,040 panels, a battery system and a 220 kV line in Tipaume, commune of Rengo, in the O'Higgins Region, entering by Study with a thirty-five-year operating horizon. One controller opaque, the other visible; one small and peri-urban, the other large and rural; both on productive ground. The contrast is not incidental to the argument; it is the argument, made visible at human scale.

3.4. The Legal Production of Non-Observance in the Permitting Files

The process described in Section 3.2 fixes the stages; the permitting files show how proponents traverse them. I read the main permitting document of every plant in the strict universe, the Declaration or Study itself as submitted, for 135 of 135 plants, and coded each in full. The corpus totals 166 principal documents, its core being that census of the 135, joined by the files of the two anchor cases and twelve non-approved contrast applications (Table 1). The reading level should be declared at the outset. The census reads the principal document of each file; annexes were consulted where that document remits the soil to them, and the pronouncements of the Agriculture and Livestock Service within the same files are examined separately in Section 3.5. The pattern recurs, for at each stage the soil is reframed out of the object of decision and the project advances. This is not evasion of the law but performance of it, an analysis of actor behaviour within the procedure, for the coding registers how proponents frame the soil, how the evaluating organs receive that framing, and what each stage allows to count as a reason.

Table 1. From the national project pool to the documentary census, step by step.

Step	Operation	Criterion	n
1	All photovoltaic projects ever entered into Chile's environmental assessment system (SEIA), geolocated	Census, no selection	1705
2	Soil class determined for every project by point-in-polygon join to the public CIREN capability layer	Computation, no selection	1705
3	Approved generation plants sited on Class I–III soil at their representative point	Approved; generation typology; point on Class I–III	250
4	Plants whose terrain is dominantly Class I–III (majority of the siting buffer)	Stricter, area-weighted criterion	135
5	Main permitting document (DIA or EIA) of every plant in step 4, read in full and coded	Documentary census of the strict universe; one 1997 file excluded as a false keyword match	135 of 135 read
6	Every pronouncement of the Agriculture and Livestock Service (SAG) in those files, read and typologised	241 substantive SAG documents; 128 of 136 files contain SAG interventions	241 documents
7	Contrast group of non-approved applications on Class I–III, read in full	Rejected, withdrawn or not admitted; grounds of failure coded	12

Note. Steps 1–4 involve no researcher selection; steps 5–7 are censuses of the sets defined in steps 4 and 7, not samples.

The first regularity lies in the route of entry. Of the 135 plants, 132 (98%) entered by Declaration, the lighter track self-classified by the proponent; the Study, where it occurs, is triggered by something else. Chanqueahue entered by Study not for converting 278 ha

of fertile ground but for its 220 kV line and substation, the electrical typology of Article 3. Several projects are dimensioned just below the nine-megawatt threshold of the Small Means of Distributed Generation, a category with simplified processing. Deep scrutiny attaches to the wire and to the installed capacity, never to the field.

The second regularity, the most revealing, is how the soil enters when it enters at all. In the 136 approved files, the strict universe of 135 plus the approved anchor of Platero, the soil enters as a technical and compensable matter in 84 (61%), remitted to an edaphological study or to a soil compensation plan processed as an annex, outside the body that decides; in 32 (23%) the document does not mention the soil at all; in 17 (12%) the proponent denies the aptitude of the very soil the state has classified; and in 3 (2%) the property is reframed as a compatible agrivoltaic use. In 11 files the capability class the proponent declares contradicts the CIREN survey frontally, two on Class II land, eight on Class III and one on Class IV. And 88 of the 137 files read with both anchors, 64%, omit the current agricultural use of the property altogether, so that a reader of the principal document cannot learn that the parcel is farmed. The soil is admitted, then, as a technical and compensable matter, not as a good whose loss could stop the project. Table 2 preserves the exemplar subset coded in the first reading round, whose categories the census confirms at scale.

Gran Teno offers the extreme case. Its proponent cites CIREN's own classification only to dismiss it, asserting that "capabilities also described in the CIREN survey of the sector; this does not represent reality owing to the presence of drumlins. . . the soil of the Northern Polygon possesses no agricultural aptitude". The census shows that the gesture is not an eccentricity but a practice, for seventeen files deny the aptitude of the soil and eleven declare a class that frontally contradicts the public survey. The procedure, moreover, has nowhere to receive the objection that the proponent is disputing, before the state, the aptitude of a soil the state itself has classified. At the other extreme, Platero and Ayla Solar reframe the property as an agro-photovoltaic park, with "artificial pastures and apiculture" or an "alfalfa pasture beneath the panels" that would give "an efficient use to the soil resource", whereby agriculture is staged to dissolve the loss.

The authorship of the framing is itself concentrated. Two consultancy templates recur word for word across files in different regions, one assuring that "care has been taken to intervene soils of low agricultural productivity" ("Se ha procurado intervenir suelos con baja productividad agrícola"), the other describing the property as "intervened, with vestiges of agricultural activity" ("intervenido con vestigios de actividad agrícola"). The same sentences characterise different soils hundreds of kilometres apart, as one would expect where the characterisation is not a finding about a parcel but a formula for traversing a stage.

The same framing work can be read beyond the coded sample. The description with which the El Paular plant (SEIA file 2131347940, Talca, approved in 2016) presents its property converts the attribute that defines the best agricultural soil into a construction advantage. It declares that "given the flat topography of the terrain and the characteristics of the construction system on which the panels are installed, no levelling is required", and that, should material be removed, "it will be deposited on the same property". The topography that the capability class records as agricultural aptitude enters the permitting file as a building convenience, and the removed soil as material to be disposed of.

Table 2. Exemplar subset of permitting files coded in the first reading round (n = 23) and the framing of soil in each.

Project	Region	CIREN Class	Area (ha)	Framing of Soil
Barrancón	Metropolitan	I	21.9	Technical compensation
Purranque	Los Lagos	I	18.1	Technical compensation
Don Simón	O'Higgins	I	14.3	Technical compensation
El Capitán	Metropolitan	I	13.6	Technical compensation
Graneros	O'Higgins	I	11.4	Technical compensation
El Castaño	O'Higgins	I	16.2	Technical compensation
Ovejería	Metropolitan	I	18.0	Technical compensation
Chacabuco	Metropolitan	I	30.1	Technical compensation
Alameda	O'Higgins	I	15.7	Technical compensation
Malloa Solar	O'Higgins	I	16.2	Technical compensation
Don Darío	Metropolitan	II	329.0	Technical compensation
Chanqueahue (with BESS)	O'Higgins	VII *	278.7	Technical compensation
Polpaico Solar	Metropolitan	I	28.0	No mention
Coihue	Maule	I	23.0	No mention
Sol del Cobre	O'Higgins	I	24.0	No mention
Encon Solar	Valparaíso	I	26.4	No mention
Rengo Solar	O'Higgins	I	25.0	No mention
Alto Bellavista	O'Higgins	I	18.6	No mention
Santa Ines	O'Higgins	I	15.1	No mention
La Mocha Solar	Ñuble	III	349.8	No mention
Platero	Metropolitan	III	11.4	Agrivoltaic reframing
Ayla Solar	O'Higgins	I	24.3	Agrivoltaic reframing
Gran Teno	Maule	IV *	381.7	Denial of capability

Note. The framing records how the Declaration or the Study characterises the soil of the property. Gran Teno (Class IV) and Chanqueahue (Class VII at the reference point of the CIREN layer, on agricultural soil in use according to the permitting file itself) are included as contrast cases, marked with an asterisk (*); the remainder of the subset sits on Classes I–III.

The change-of-land-use permit confirms the pattern. In file after file the proponent records that the Article 160 certificate “does not apply”, and where the permit appears it is processed as a checkbox marked “mixed”. No permit, and no protected legal interest, of “use capability” or “food security” exists for the soil to invoke.

What is lost has a name when one reads the permitting file itself. Barrancón sits on the “Propiedad Viña San Juan”, a vineyard, within an “Area of Exclusive Agricultural Interest”; Don Darío, on soil that the land-use plan designates as of “exclusive agricultural interest”; the Purranque project, on an “agricultural property of 37.7 hectares” of the Dollinco estate. The cross-reference with land cover confirms at scale what the permitting files name case by case, that most of the converted parcels were in agricultural use (Section 5.2).

Taken together, these are not failures of enforcement but operations of a single legal production. The state sees the soil three times, when the Internal Revenue Service appraises it, when the Agriculture and Livestock Service opens soil pits and classifies it, and when CIREN maps it. What the apparatus lacks is not sight but a category of decision in which that sight could count against conversion. Non-observance is produced, stage by

stage, from knowledge the state demonstrably holds. Yet the files record more than the proponent's framing; they record an organ of the state objecting to that framing, in writing and repeatedly. That voice is the subject of Section 3.5.

3.5. *The Guardian Objects; The SAG in the Permitting Files*

The organ charged with defending agricultural land is not silent in these files; it objects, and the census measures how often and to what effect. I read every pronouncement of the Agriculture and Livestock Service in the files of the universe, 241 substantive documents across the 128 of the 136 approved files in which the Service intervenes. In 64 of the 136, the Service states in writing the objection this article is about, the loss of productive agricultural land. In 43 of those 64 the sequence ends with the Service declaring itself satisfied after the proponent offers compensations; in 21 the favourable qualification arrives with the objection still standing, for the last SAG document on record maintains its observations. All 21 of these files were re-verified against the original dockets, including a search of each for any later SAG pronouncement; one further candidate was removed from the count when a later conforming pronouncement was found in its docket.

The objection has a grammar, and it is technical rather than rhetorical. In 79 files the Service impugns the proponent's characterisation of the soil, opposing its own soil pits and measurements to the consultant's; in 87 it exercises documentary control over Sectoral Permit 160; in 69 it criticises the voluntary environmental commitment (CAV) through which compensation is offered; and in 42 it demands a full Study or a reanalysis of significance. This is the guardian using precisely the agricultural category the significance test withholds, class by class and hectare by hectare.

The verbatim record leaves no doubt about what the Service sees. In Coihue (SEIA file 2140811317) it warns of a "significant impact" through the "loss of 23 hectares of Use Capability Class I". In Barrancón (2149399396) the proponent reclassifies Class I soil as Class IV and the Service answers that the reclassification "is not valid". In Salamanca (2145725912) it opposes to the consultant's characterisation the "prominent agricultural activity" of the sector, "maize, tobacco and horticultural crops", and reclassifies the soil to Classes II and III on the strength of its own fieldwork. In San Vicente (2138977924) the proponent declares the property "in its entirety Use Capability Class IV" on land the CIREN survey maps as Class II, and the project is approved with the Service's report on the soil permit unfavourable. In Oro y Cielo (2157933409) the Service twice demanded entry by full Study; its last pronouncement, ORD 773 of 15 May 2024, maintains the objection over 167 hectares of Class III soil, and the project was approved by Declaration.

What the proponents offer against these objections, and what the Service does with the offers, is the clearest window into the regime (Table 3). Beehives and artificial pastures, soil ridging, monetary contributions, improvement works on third-party parcels offered twice over to two different projects: the Service rejects most of these as no compensation at all, accepts some against measurable indicators, and in one case imposes a replacement ratio. Yet everything in the exchange is voluntary. In three files (Ayla, Don Simón and Rengo) the Service states, in identical wording, that once the assessment ends it holds no legal tools to enforce these commitments or to punish their breach. It bargains during the procedure because that is the only moment at which it holds any bargaining power at all.

Table 3. What proponents offered and how the SAG responded. Selected compensation exchanges.

Project	What the Proponent Offered	The SAG's Written Response	Final Outcome
Platero	Agrivoltaic staging, artificial pastures (1.07 ha) and beehives on-site	The commitment 'does not take charge of the temporary loss of use of Class II soil'	In evaluation; SAG withheld the PAS 160
Chacabuco	Soil ridging (camellones) as improvement measure	'Not valid as a soil improvement measure, since it does not change the physical properties of the soil'	Approved
Saint George/Viñedo del Verano	Monetary contribution (aporte de fondos, incl. to INDAP)	'The contribution of funds is not in itself a CAV measure'	Approved
Chicha Solar	Soil improvement on 18 third-party parcels	The 18 parcels 'are the same ones proposed' for another project (Valentina Solar); double-counted compensation detected	Approved
Quilapilún	Soil improvement plan	Accepted with measurable indicators; effective depth over 40 cm, surface stoniness under 15%	Approved
Cañal Bajo	Compensation on equivalent land	SAG imposed a 1:1.5 replacement ratio for Class II soil	Approved
El Almud, Los Arrayanes, Traiguén	Technified irrigation, subsoiling, grazing plans	Accepted subject to indicators (sheep per hectare, dry-matter yield)	Approved
Coihue	None initially; EIA demanded by SAG	SAG abandoned the EIA demand and 'recommends voluntary commitments for the sectoral IFC application'	Approved

Note. Compensation is voluntary throughout; the SAG itself records that outside the assessment procedure it lacks 'the administrative and legal tools needed to demand compliance or to sanction non-observance'.

What the objection never does is stop a project, and the claim must be stated with care. Across the 136 approved files, the Service's written objection to the loss of productive agricultural land (64 files) never operated as a condition of approval; in 21 cases the final SAG pronouncement on record still maintained its observations when the favourable qualification was issued. Amongst the rejected photovoltaic projects on Class I–III soils whose resolutions I reviewed, none was refused primarily on the ground of the soil's agricultural capacity. The sole rejection that lists the soil permit (PAS 160) amongst its grounds, the Mingorria solar plant (qualified in 2022), does so as one of six sectoral permits left unsubstantiated after the proponent ceased responding to the evaluating agencies. The decisive grounds in the remaining rejections concerned archaeological heritage, watercourse works and native forest. The contrast is instructive, for the only two rejections on Class I soil fell for archaeology; the patrimonial subsoil has, in practice, more power of veto than the agricultural topsoil. Because the universe is defined by approval, the observation that no objection prevented approval within it is definitional rather than empirical; the empirical findings are the frequency of the objection, its persistence at the moment of qualification and the absence of soil-capacity grounds in the reviewed rejection resolutions. The design cannot observe whatever deterrent effect the Service's objections may exert on projects that are withdrawn or never admitted (Section 6.5).

Soil capability never operates, then, as an autonomous ground of refusal, and the procedure shows how the objection is spent without ever being answered. It is re-directed, folded into the consolidated request for clarifications (ICSARA) where it becomes one more petition for paper amongst dozens. It is re-framed, as the loss of a generation of cultivation

becomes a “temporary impediment of use” that a future decommissioning will cure. It is re-located, from the significance test, where it could stop a project, into Sectoral Permit 160 and the Favourable Construction Report, where it can only condition one. And it is extinguished, because once the qualification is issued, Article 24 obliges the sectoral grant “without further procedure”, and whatever compensation survives does so as a voluntary commitment the Service has no tools to enforce. The guardian objects; the procedure metabolises the objection.

4. Materials and Methods

4.1. Design

The study adopts a sequential explanatory mixed design. A quantitative core establishes the pattern at national scale, and a qualitative layer, anchored in the reading of the permitting files, explains the mechanism through which that pattern is produced. The two are joined at the parcel, the unit that the cadastre renders hypervisible and on which soil use capability, project siting and market value are measured. Figure 1 summarises the workflow, from data sources through linkage operations to the analytical outputs reported in Sections 3.4, 3.5 and 5.

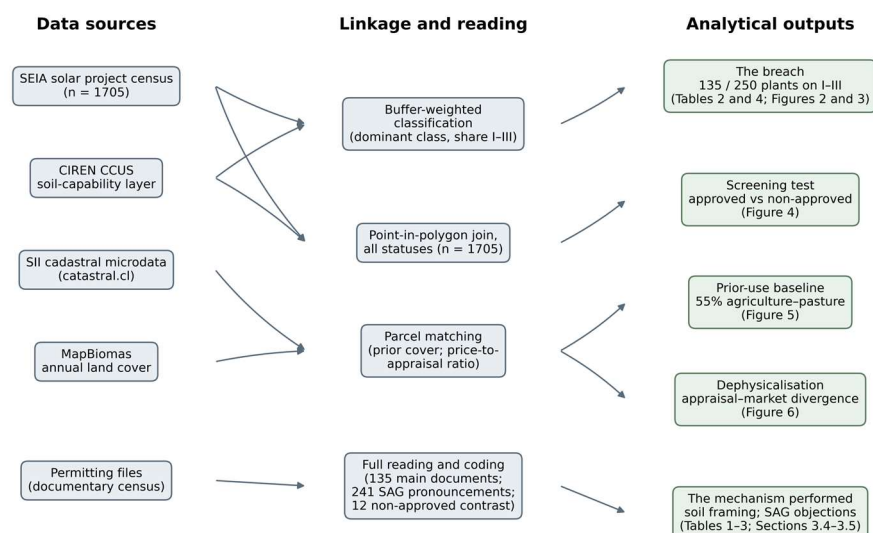


Figure 1. Research workflow of the sequential explanatory design. Data sources, linkage operations and analytical outputs.

4.2. Data Sources

The analysis links five sources. The first is the solar project census, the full set of photovoltaic projects entered into the SEIA ($n = 1705$), with proponent, legal personality, commune, region, processing status, entry date, declared capacity and permitting file identifier, geolocated to a representative point. The second is the CCUS land-capability layer, the Use Capability Classes of the Soil (CCUS) from the agrological surveys of the Natural Resources Information Centre (CIREN), a public-domain vector layer that covers the agricultural macrozone and orders land from Class I, with few limitations and prime arable, to Class VIII, unsuited to cultivation. The third is the cadastral microdata, the parcel records of the Internal Revenue Service (SII), vectorised and distributed without access restriction by the open cadastral repository *catastral.cl* [41], comprising parcel geometry, fiscal appraisal, land use and, for a national agricultural–rural universe of between 527,000 and 579,000 parcels per year over 2018–2025, a longitudinal panel of appraised value. The fourth is a local extraction of market prices, a targeted query to the *catastral.cl* API for the parcels of the conflict sectors of Pirque and Rengo ($n = 93$), which

pairs the fiscal appraisal of each parcel with the transaction price recorded by the property registrar (Conservador de Bienes Raíces, CBR). The fifth is a corpus of permitting files, read as a documentary census rather than a sample. The analysis rests on the main permitting document (DIA or EIA) of every plant in the strict universe (135 of 135; Section 4.2), together with the files of the two anchor cases and a contrast group of twelve non-approved applications, a corpus of 166 principal documents in all. Within the universe files, every pronouncement of the Agriculture and Livestock Service was also read (241 substantive documents across the 128 of the 136 approved files in which the Service intervenes). From each permitting file, the coding registered the route of entry, the typology that triggered evaluation, how the proponent characterises the soil, the change-of-land-use permit, the agricultural use of the property and the ground on which the project was approved or not; from each SAG pronouncement, its typology, its outcome and its verbatim content. The legal architecture of Section 3.2 was reconstructed from these permitting files and verified article by article against its primary sources, the statute, the regulation and the Service's evaluation guide, under a strict rule, for no provision is asserted from memory and any passage not located is marked as such. This corpus is the evidentiary base of Sections 3.4 and 3.5.

4.3. Linkage and Measures

Each project's siting was related to soil use capability. Its representative location was intersected with the CCUS land-capability layer, recording the dominant class within a fixed buffer and the share of that buffer in Classes I–III. The analysis was restricted to generation plants, and counts were converted into hectares with the area declared in the SEIA. Soil class could be determined chiefly for approved projects and those in evaluation, so the area figures describe the realised footprint rather than an approval rate. To separate the property regime from mere engineering necessity, all geolocated projects ($n = 1705$) were additionally classified through a point-in-polygon join against the national CIREN layer, irrespective of their status. This step allows approved and non-approved projects to be compared on an equal footing, and thus tests whether soil class bears on the outcome. The availability of each class was computed as its share by area of the agricultural macrozone (equal-area projection, EPSG 6933). The affected parcels were cross-referenced with annual land cover (MapBiomass) [42] to establish prior use. Dephysicalisation was measured by the ratio of registered transaction price to fiscal appraisal in Pirque and Rengo, later extended to a sample of 33 centre-south communes, after purging deed amounts shared across parcels of a single subdivision and the nominal tail (ratio below 0.30) that indexes non-market transfers. The full pipeline of extraction, spatial joins and figures is available from the author on request.

4.4. Reproducibility, Software and Limitations

The processing chain is implemented in Python 3.10 with GeoPandas 1.1, with EPSG 32719 (UTM 19S) as the default reference system for spatial joins, and is designed to be re-executable from end to end. Three cautions should accompany the reading. The first is that soil class could be determined mainly for projects approved or in evaluation, so the area figures describe the realised footprint and should be read as a conservative floor for the conversion of elite soil. The second is that the cadastral microdata derive from an SII export whose cut-off date and communal coverage are documented in the reproducibility package available from the author. The third is that the price extraction is a spatial sample and not a census, and that the amount recorded by the CBR may cover more than one parcel, so the divergence is reported after cleaning and with those caveats retained.

5. The National Signature of the Mechanism

The mechanism of Section 3 operates stage by stage in each case file. It remains to show that it operates at national scale, neither as an anecdote of two cases nor as mere engineering necessity. This section assembles that evidence, in which the quantitative is not the argument but its proof. The breach is systematic (5.1), the apparatus does not screen by capability even where capability is highest (5.2), and the market value of that land detaches from its material capacity (5.3).

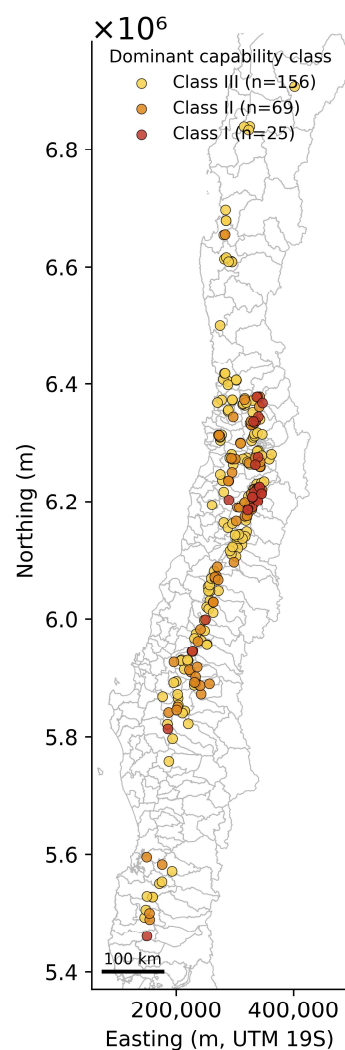
5.1. The Breach: Solar Infrastructure on Elite Soil

The record of practice contradicts the law on paper. Approved plants sit systematically on the best soil. Amongst approved utility-scale generation plants whose soil class is determinable, 135 are sited dominantly on Class I–III capability land, with 92 on Class III, 32 on Class II and 11 on Class I, for a combined declared area of approximately 5836 ha, of which an estimated 4282 ha lie on Class I–III soil (Table 4; Figures 2 and 3). The area is strongly concentrated in the central valley, where 111 of the 135 plants, some 4955 ha of declared area, fall in the six regions running from Valparaíso to Biobío, led by O'Higgins (26 plants), the Metropolitan Region (25) and Maule (21). Two complementary measures bracket the phenomenon. By the stricter, area-weighted criterion (the majority of a project's buffer on Classes I–III), 135 plants qualify; by a point-in-polygon join to the national soil layer, 250 approved generation plants fall on Class I–III (Figure 2). These are not marginal installations. The set includes approved plants such as Gran Teno (Maule, ~382 ha, 58% of its buffer in Classes I–III), La Mocha Solar (Ñuble, ~350 ha), Don Darío (Metropolitan Region, ~329 ha, 84% on Class II), Don Humberto and Peldehue Solar (Metropolitan Region, ~187 and ~165 ha, on Class I), Oro y Cielo (Metropolitan Region, ~167 ha, 93% on Class II) and Planchón (Maule, ~161 ha, 78% in Classes I–III). The interpretive caution stated in Section 4 holds. Because soil class is determinable principally for approved and in-evaluation projects, these figures describe the realised and approved footprint and stand as a conservative floor on elite-soil conversion. Even as a conservative floor, they document a breach the apparatus is supposed to prevent, and they locate its first axis at the entry stage itself. Of the elite-soil plants, 132 of 135 (98%) entered environmental review by Declaration of Environmental Impact (DIA), the lighter track self-classified by the developer, and not by full Environmental Impact Study (EIA); the anchor case of Platero is itself a DIA. Elite agricultural soil is thus converted, overwhelmingly, through the pathway that never triggers a baseline or a deep impact study, so that capability class is not so much overruled as never admitted to the frame that could weigh it. This is the first of the legal devices through which non-observance is produced. I do not read this as evidence that property law draws solar plants onto good soil; the engineering optimum for generation, flat, drained and serviced terrain coincides substantially with high capability by construction. The finding is not blindness but displacement. An apparatus built around legal certainty registers the transfer and the appraisal, and admits the capability class it is statutorily charged to protect only through a category that never asks after it. This is material illegibility, produced and not innate, and it lets the engineering optimum override the agricultural one without friction. The prior land use of the affected parcels, the baseline against which the conversion must be read, is established from annual land-cover data in Section 5.2.

Table 4. Approved solar generation plants sited dominantly on Class I–III soil, by region.

Region	Plants	Area (ha)
Metropolitana	25	1539
Maule	21	920
Valparaíso	18	797
O'Higgins	26	719
Ñuble	14	651
Coquimbo	8	513
Biobío	7	329
Los Ríos	5	132
Los Lagos	5	99
Araucanía	3	75
Atacama	3	63
Total	135	5836

Note: Areas are rounded to the nearest hectare; the total is computed on unrounded values. Bold marks the column totals.

**Figure 2.** Approved utility-scale solar generation plants on Class I–III capability soil (n = 250; point-in-polygon on the CIREN CCUS layer), over regional boundaries (UTM 19S). Colour denotes capability class.

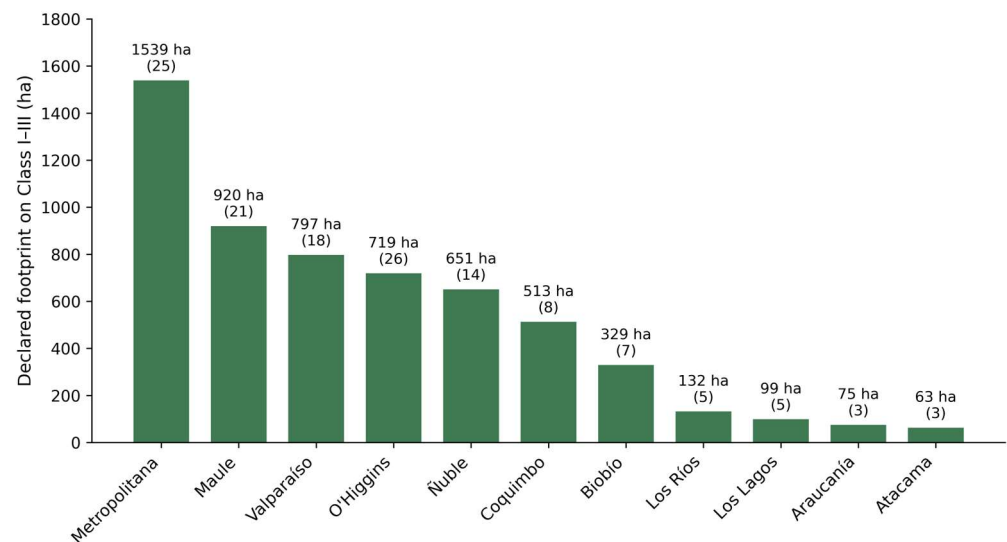


Figure 3. Declared area of the elite-soil solar plants by region (plant count in parentheses). Regions are identified by their official Chilean names.

5.2. The Apparatus Does Not Screen by Capability Class

Two analyses, built directly on the public soil layer and released with this article, answer the objection that siting on good soil would merely reflect the engineering optimum. The first concerns availability. Class I–III soil accounts for only 18.2% of the mapped agricultural macro-zone by area (20.4% in the central valley), yet approved solar generation plants occupy it at 42.8%, an over-representation of about 2.35 times its landscape share (Figure 4). Elite soil is not simply where solar happens to land; it is selected well above its availability. The second concerns screening. When the full project pool is classified by soil class, independent of outcome, the share sited on Class I–III is 42.8% amongst approved plants and 45.3% amongst those rejected, desisted or not admitted, a difference of about two and a half points, in the direction opposite to protection (Figure 4). Soil use-capability plays no discernible part in whether a project is approved. The apparatus does not fail to see it; it fails to admit it as a reason. The material illegibility of Section 6.3 is, on this evidence, a measured property of the regime and not an inference from siting alone.

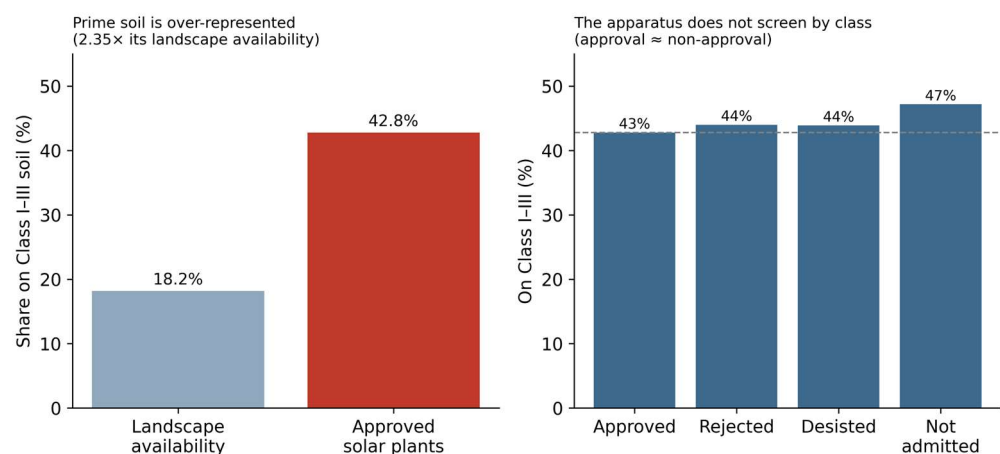


Figure 4. On the left, the share of Class I–III soil in the mapped landscape (18.2%) against the share of approved solar plants on Class I–III (42.8%). On the right, the share of plants on Class I–III by processing status; approval and non-approval are statistically indistinguishable, indicating that soil use-capability does not screen the outcome. The dashed line in the right panel marks the approved-projects share (42.8%), the reference for the comparison.

A final cross-check confirms that what is converted is land in use, not merely land that is capable, and it supplies the baseline of prior land use for the affected parcels. Matching the solar-affected parcels to annual land cover (MapBiomas), 537 of the 975 parcels with cover data (55%) were agriculture–pasture mosaic before the project, 126 (13%) other non-vegetated ground, 112 (11%) inland water, 79 (8%) urban or built land, 55 (6%) beaches or dunes, 35 (4%) xerophytic vegetation, 18 (2%) forest plantation and 13 (1%) native forest (Figure 5). Previously urbanised or otherwise developed land thus accounts for a small fraction of the converted stock, and forest of either kind for a marginal one. The apparatus is therefore not steering generation onto idle or already-developed ground; a majority of the converted parcels were being farmed.

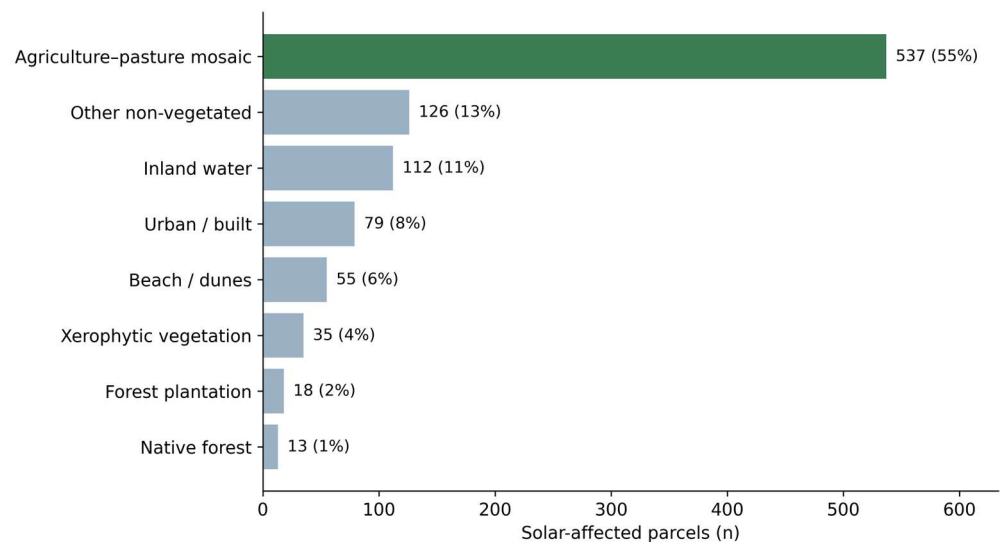


Figure 5. Prior land cover of the solar-affected parcels (MapBiomas dominant class; $n = 975$ with cover). A majority were agriculture–pasture mosaic, indicating conversion of land in agricultural use rather than siting on merely capable ground. The agriculture–pasture mosaic is shown in green; all other cover classes in grey.

5.3. The Dephysicalisation of Elite Soil

The conversion falls, moreover, on land whose market value has already detached from its material capacity, and that detachment is the measurable face of dephysicalisation. In the conflict sectors of Pirque and Rengo, once shared-escritura duplicates and the nominal tail are purged, the market set retains a median price-to-appraisal ratio near unity (a median ratio of 1.15 in Pirque, $n = 24$, and of 1.00 in Rengo, $n = 33$), but with an agricultural tail that runs far higher. In the Tipaume sector of Rengo, six of eighteen market-priced agricultural parcels transact at twice the appraisal or more, with a maximum near sixteen times. In San Juan de Pirque, the agricultural parcel adjacent to the contested Platero site records a fiscal appraisal of some 29 million pesos against a registered transaction of 300 million, a ten-fold gap (Figure 6). Scaling the extraction to a 33-commune centre-south sample (730 market parcels) leaves the signature intact and, if anything, sharper, for agricultural parcels transact at a median of 1.6 times the appraisal and two in five do so at twice the appraisal or more. A fiscal apparatus calibrated to the productive value of the soil no longer tracks the price the market assigns to it, because the value has migrated from what the soil can grow to what its position can command. This is dephysicalisation [16] made measurable, for the legal-fiscal form continues to name an agricultural parcel whilst the material function the name presupposes has been hollowed out.

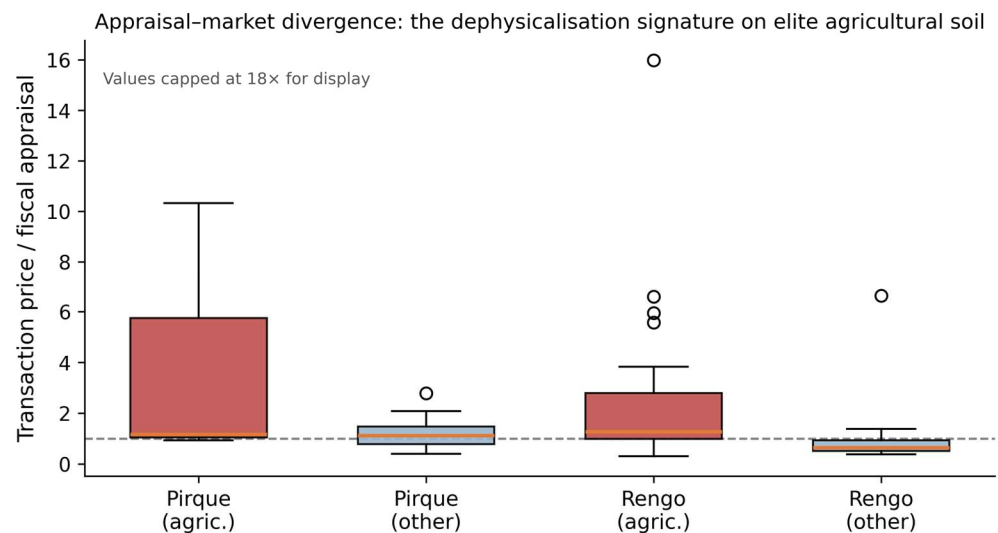


Figure 6. Appraisal–market divergence in the contested sectors of Pirque and Rengo. Ratio of registered transaction price to fiscal appraisal, by commune and land use (market set, ratio ≥ 0.30 ; values capped at 18 times for display). Boxes span the interquartile range, the orange line marks the median, and the dashed line marks parity between price and appraisal (ratio = 1).

6. Discussion

6.1. The Legal Production of Non-Observance

The mechanism traced in Sections 3.2, 3.4 and 3.5 explains precisely what a purely institutional–locational account leaves unexplained. It is not that the regulator lacks soil class as a ground of refusal; what demands explanation is how the law manufactures that lack whilst the state holds the knowledge in hand. Stated in the vocabulary of interests and behaviour, the mechanism aligns three rational actors, the proponent who frames the soil out of significance because the categories invite exactly that framing, the sectoral organ whose written objections the procedure receives, processes and dissolves without ever being bound by them, and an evaluating commission for which soil capability is never a lawful ground of refusal. The outcome is produced without any actor breaching a rule. Two operations carry the weight.

The first is a substitution at the significance test. The category through which environmental law could see the soil, Article 11(b) of Law 19.300, developed by Article 6 of the Regulation and by the Agriculture and Livestock Service’s own evaluation guide, protects the soil as an ecological substrate and not as agricultural capability. Its protected object is “the loss of soil, or of its capacity to sustain biodiversity, through degradation, erosion, sealing, compaction or the presence of contaminants”, that is, a physical–ecological body and not a food-producing vocation. The use-capability class that the Service measures with its soil pits enters the file, but only as a tool of characterisation and, should a physical impact be found, as a metric for compensation, never as the interest whose loss makes an impact significant. The agrarian meaning of the soil is present in the record and absent from the test. That this substitution is written into the guide of the Agriculture and Livestock Service itself, the very organ charged with defending agricultural land, is the sharpest evidence that non-observance is produced rather than suffered. It would be wrong, however, to conclude that the guardian is left without the agricultural category, for Section 3.5 shows the Service deploying it with full technical precision, opposing its own measurements to the proponent’s and naming the loss class by class and hectare by hectare. What the substitution accomplishes is not to deprive the Service of the category but to deprive the category of consequence, because an objection phrased in the register of capability can be answered, and discharged, entirely in the register of physical degradation

and compensation. The guardian speaks the language of prime land, and the procedure translates everything it says into something else.

The second operation is a procedural quarantine, and Section 3.5 measures its work. The Service objected in writing to the loss of productive agricultural land in 64 of the 136 approved files, and the objection prevailed in none. Where the proponent offered compensation, the exchange remained voluntary; where the Service maintained its observations to the end, in 21 files, the qualification was issued over them. Under Article 24, a favourable qualification bars every organ of the state from denying the authorisations that depend on it, and a mixed permit must then be granted “without further procedure”; the Service itself records that outside the procedure it lacks the administrative and legal tools to demand compliance or to sanction non-observance. The organ that can see the soil is not prevented from speaking about what it sees; it is prevented from acting on it, its speech routed into a cycle of clarifications and voluntary commitments that ends, at the decisive moment, in a permit it cannot withhold. Sight is severed from decision by the very design of the procedure.

These two operations convert an abstract claim into an observable mechanism, and they answer the objection that an infrastructural theory of property would merely redescribe the outcome it names. The self-generated contradiction is not a metaphor for regulatory failure; it is the convergence of specific legal devices, an entry typology fixed on electrical infrastructure, a significance test keyed to biodiversity, a sectoral permit reduced to a checkbox, a one-stop-shop rule that quarantines sectoral knowledge. Each device, on its own, is a defensible technical arrangement; together they ensure that the capability of the soil never becomes a reason the apparatus can act upon. The contradiction is self-generated because the same conflation that makes the parcel frictionlessly transferable, with legal certainty standing in for the material register, is what forbids the apparatus from defending that register when the transition revalues it. To call this “silence” would be to miss it. The law is not silent; it speaks continuously, and everything it says about the soil is keyed to something other than the food that soil grows.

6.2. *The Climate Contradiction and the Ghost of Individual Property*

The contradiction does not halt at the boundary of the environmental system; it runs through the state’s own climate agenda, and there it acquires its sharpest edge. The same state that, through the SEIA, affords the soil no agricultural category commits itself, in its climate policy, to defending exactly that category. The Climate Change Adaptation Plan for the Forestry-Agricultural Sector 2024–2028 undertakes to “prevent and control the degradation of the soil” so as to “maintain or improve its silvo-agricultural productive potential” [43]; the National Strategy for Sovereignty and Food Security undertakes to “define preferential areas . . . that safeguard the soil for the production of food for national consumption” and to “promote regulation of the sustainable use of the soil, safeguarding the production of food” [44]. The register the significance test refuses, the soil as food-producing capability and as the ground of food sovereignty, is in these instruments the express object of protection. The state possesses the concept; it has merely lodged it where it does not bind.

For the protection is aspirational where the conversion is operative. The adaptation plan’s measures descend into “enabling conditions” and instruments of fomento, and their fulfilment remains “subject to the application of beneficiaries to the competitive funds” of the irrigation law. The food-sovereignty strategy phrases two of every five of its action lines with the verbs “promote” and “encourage”, and contains not one instrument that is binding, enforceable or addressed to the individual proprietor. The plan even names “property-level planning” as an essential enabling condition, yet none of its measures

links to any planning instrument, so that the enabling condition enables nothing [27]. The soil-protective register exists, and it is confined to the voluntary.

What confines it is what I term the ghost of individual property [27]. The term is shorthand for the historically sedimented fear of redistributive intervention that Chilean property law has carried since the Agrarian Reform and its reversal. That fear renders any binding designation of private rural land politically unspeakable. To bind the proprietor, that is, to designate prime soil as prime and defend it territorially against its owner's decision to lease it to generation, is precisely the intervention that Chilean rural property was engineered to foreclose. Here the second of the three securities does its work, juridical security, the ideological-temporal device that manufactures a fear of redistributive pasts and renders regressive arrangements irreversible whilst treating progressive ones as reversible. In the Chilean countryside that fear has a name and a history. "The spectre of the Agrarian Reform", as I have put it elsewhere, "haunts and drives away any presence that is not that of the individual landowner" [27]. This spectre makes any binding designation of land use appear as expropriation-in-waiting, and therefore confines the state's protective commitments to incentive and exhortation. The climate contradiction and the energy-transition breach are, at bottom, one operation seen from two sides. The apparatus cannot defend the soil at the environmental stage because its categories are keyed to something else; the state cannot defend it through its climate policy because binding the proprietor would resurrect the ghost the whole infrastructure exists to lay. Individual, absolute and exclusive dominion is the sovereign the apparatus truly serves, and the capability of the soil to produce food, seen everywhere and defended nowhere, is what that sovereignty costs.

The voluntariness that Section 3.5 documents is, on this reading, not a gap in the regime but its purest expression. Babie [28] reads private property as a delegation of sovereignty, the choice over what shall become of a thing lodged in its owner and thereby withdrawn from collective determination. Exactly that sovereignty surfaces in administrative form in the compensation exchanges, for every protective device the record contains, the voluntary commitment, the compensation plan, the agrivoltaic staging, is an offer the proprietor makes and may decline to make. Whether prime soil keeps producing food is decided, in the last instance, by whoever holds the title, and the Service can weigh the offer but never exact it. What the exchange erases is the long term. The soil is the material element of food security, a capability that accumulates over centuries and is spent in a single change of use, and a regime that admits it only as a compensable input converts a permanent endowment into a negotiable externality. The dephysicalisation this article measures in the price of land reappears here in temporal form, as the disappearance of food security from the horizon within which the decision is taken.

6.3. What the Evidence Establishes, and What It Does Not

Read together, the results describe a regime that converts the soil it claims to protect. Approved solar generation is sited dominantly on the best capability classes (5.1), classes on which the apparatus does not screen (5.2), and the market value of that land detaches from its material capacity where it can be observed (5.3). The inferential status of this picture must be stated exactly. What the evidence establishes is material illegibility, and not as blindness but as a produced condition, for an apparatus organised around legal certainty screens neither siting nor value by the material capacity of the soil. This is not because the state cannot see that capacity but because it affords it no category of decision. The state sees the soil three times over, in the fiscal appraisal, in the agricultural service's soil pits and in the CIREN survey, and Sections 3.4 and 3.5 trace the legal operations through which that knowledge is, at each stage, reframed out of the object of decision. The stronger claim, that the regime produces this outcome as a self-generated contradiction in which

the conflation of the three securities vetoes the protection the moment demands, is the theoretical hypothesis the article advances. Its decisive test is that the apparatus does not screen siting even where capability is highest, as Section 5.2 shows.

This invites an obvious objection. A simpler institutional–locational account would seem to suffice, on which plants sit on flat, serviced land because generation is cheapest there and the regulator lacks soil class as a ground of refusal. The answer is that this account explains the siting but not the mechanism. It does not explain why the same regime that fails to screen siting admits the soil only as a technical and compensable matter (Section 3.4), nor why the value the state itself measures by appraisal decouples from the market price (5.3). The infrastructural reading derives both from a single source, the conflation of legal certainty, juridical security and land-tenure security. That this process was never coupled to a territorial instrument capable of seeing capability [27] is, on this reading, not an incidental omission but the very signature of the conflation.

6.4. What the Finding Adds to Four Conversations

The result converges with, and sharpens, Esteve-Jordà and Scheidel’s [8] conclusion that law tends to constitute green grabbing rather than merely fail to prevent it. Where their systematic review establishes the pattern, my analysis specifies the internal operation that produces it, in which a single apparatus secures the parcel and de-secures the soil because it fuses three securities into one. It also answers the untheorised observation of the green-grabbing field that securely titled land moves to capital with particular ease [7,45]. Secure title is not an anomaly but the mechanism, because legal certainty is exactly the security the regime has decoupled from material tenure. In this the argument rejoins, from a new direction, the empirical demolition of the equation between title and security. Where De Soto’s [9] formalisation thesis promised that title would manufacture security, and its critics showed that it frequently did not [10,11], I show that secure title need not manufacture protection for the soil, the same decoupling read from the side of the asset rather than the holder. Against the most directly comparable quantitative study, Klingler et al.’s national mapping of wind and solar grabbing in Brazil [3], the contribution is the cross with use-capability class and the sociolegal mechanism. Measuring exposure is necessary but not sufficient; stratifying it by the material capacity of the soil is what turns a map of sitings into evidence of dephysicalisation. For the literature on law and climate adaptation, the analysis carries O’Donnell’s [12] insight that property is wielded as “a sword and a shield” from the retreating coast onto productive agricultural land, and replaces qualitative reconstruction with parcel-scale measurement. And it does for legal geography what the subdiscipline has been slow to do for itself, for it takes Blomley’s [13] constitutive claim that the grid produces dominion and renders it measurable at national scale, contributing to the field’s recent and overdue turn towards the question of evidence [15]. Finally, it operationalises what critical property theory had left conceptual. Graham’s [16,26] dephysicalisation is here not merely illustrated but substantiated and measured. The detachment of value from material capacity has a spatial signature, and that signature can be measured, mapped and, in principle, falsified.

6.5. Limitations and Future Research

The limitations are those stated in Section 4 and respected throughout the text. The breach figures describe the approved and realised footprint and constitute a conservative floor; the cadastral provenance requires documentation of its cut-off date and coverage; and the price extraction is a cleaned spatial sample rather than a census. Three further cautions attach to the documentary census. Because the core universe is defined by approval, the finding that no SAG objection prevented approval within it is definitional rather than

empirical; the empirical claims are the frequency of the objection (64 of 136), its persistence at the moment of qualification (21 of 64) and the absence of soil-capacity grounds in the reviewed rejection resolutions. Attrition through withdrawal, 94 desisted projects on Class I–III soils whose files were not reviewed in full, may conceal a deterrent effect that this design cannot observe. And the census reads the principal documents and pronouncements of the electronic file rather than the totality of its annexes. Four extensions follow directly. The first is to carry the divergence analysis, already sustained across a 33-commune sample (Section 5.3), to a national panel of transaction prices with a formal test of spatial structure. The second is the beneficial-ownership question opened in Sections 2.3 and 3.4, which invites a network analysis of the vehicle companies behind solar siting, for which the cadastral titleholder field is a point of entry. The third is the characterisation of the soil as a compensable matter, which Sections 3.4 and 3.5 document at the level of the principal documents and which admits a systematic study of the edaphological annexes and soil-compensation plans themselves. The fourth follows from the cover baseline, whose breakdown shows only eight per cent of affected parcels on previously urbanised ground and a marginal share on forest. The pressure documented here bears on working rural land at large, and the fate of secondary agricultural and forest land under the same apparatus deserves an account of its own. None of these extensions displaces the present finding, and each deepens it.

7. Conclusions and Implications for Land-Use Policy

I have argued that the conversion of Chile’s best agricultural soil to solar infrastructure is not a regulatory failure to be patched. It is a property of a regime that fuses three securities into one. Under the shock of the energy transition, that regime cannot defend the material function it has taught itself to ignore. The mechanism is not silence but the legal production of non-observance, for the state sees the soil at every stage, its guardian organ objects to the loss in writing, and at each stage the decision is taken through a category keyed to something the soil is not. The production reaches from the environmental permit to the climate policy that promises, without the power to bind, to protect the very land the permit converts. The evidence is national in scope. One hundred and thirty-five approved utility-scale solar plants sit dominantly on Class I–III soil, 5836 declared hectares, most of them in the central valley; the apparatus does not screen by capability even where capability is highest; the Agriculture and Livestock Service objected to the loss of productive land in 64 of 136 approved files and no objection prevented an approval; and the market value of that land, where it can be observed, has detached from its material capacity. The contribution is a portable mechanism, the self-generated contradiction of the property infrastructure, and its first measurement.

Two implications for land-use policy follow from the diagnosis rather than around it. The first is that the discussion Chilean law has avoided, the limitation of the exercise of rural property, can and should be opened on the Constitution’s own terms. Article 19 No. 24 of the Constitution, in its second paragraph, already authorises the legislator to impose limitations and obligations on property deriving from its social function, and that function expressly comprehends ‘the conservation of the environmental patrimony’. A statutory designation of Class I–II soil as protected for food production would therefore not require constitutional reform; it would require the legislator to use a power the constitutional text already confers. The voluntariness this article has documented, from the climate instruments that only promote and encourage to the compensations the SAG may weigh but never exact, is a choice of regime, not a constitutional mandate. The ghost that presents every binding designation as expropriation-in-waiting is doing ideological work, not doctrinal work. Where exactly a binding designation would sit between a limitation the

proprietor must bear and a taking that must be compensated is a question for constitutional practice, and this article does not attempt to settle it. On that line, not on an imagined constitutional prohibition, the design of any soil protection will be decided. Opening the discussion where it actually lies is the first policy consequence of reading the regime as this article has read it.

The second implication is a concrete rule. Installation on Class I–II soil should be prohibited unless the project carries a mandatory compensation for the productive capability it withdraws and a verifiable agrivoltaic coexistence with continuing agricultural yield. Neither element exists in Chilean law today, for compensation is voluntary, structured by the SAG's own Circular 296 as a commitment the Service may assess but cannot demand, and the framework soils bill before Congress (Boletín 14.714-01) does not contemplate compensation for photovoltaic conversion at all. The models exist and are in force elsewhere. Since the agrivoltaic idea was first formalised [46], Germany has codified it in the pre-standard DIN SPEC 91434 [47], which defines agrivoltaic categories by elevated panel mounting and requires that the parcel retain at least 66% of its reference agricultural yield. The agronomic basis was established for arable and vegetable systems by Trommsdorff et al. [48] and consolidated in the Fraunhofer guideline for Germany [49]. France has taken the statutory route, for the APER law [50] admits solar installation on agricultural land only as agrivoltaics rendering a service to the agricultural activity. Its implementing decree [51] fixes a maximum ground coverage of 40% and a minimum of 90% of the reference yield. Nor is the agronomy foreign to Chile, where the Institute for Agricultural Research and the Universidad Adventista de Chile are piloting agrivoltaic systems in cherry and strawberry production at INIA Quilamapu [52]. What separates Chile from these regimes is not technique but obligation. Two amendments would close the distance, a listing typology in Article 3 of Supreme Decree 40/2012 that sends any project on Class I–II soil into evaluation by full Study, and a compensation and coexistence requirement of statutory rank, written into the soils framework law, that converts the Service's current pleas into conditions of lawfulness. Subsidiary measures follow, amongst them a beneficial-ownership standard linking the corporate registry to the cadastre, to close the legibility gap that lets the controller of elite soil remain opaque, and the recoupling of water, soil and planning that the regime treats as three separate matters [53,54].

Each of these measures confronts an obstacle that intellectual honesty requires naming rather than eluding. A binding designation will certainly be contested on constitutional grounds, and its drafting should anticipate that contest. The Chilean debate over expropriatory clauses has already mapped that terrain. Guilloff [55] shows that the regulatory-takings thesis is invoked in Chile precisely to confine the legislator's power to impose social-function limitations, so that any binding designation of rural land can be presented as a taking in waiting; the distributive counterpart of that strategy has been examined by Guilloff and Ponce de León [56]. The proposal advanced here engages that debate on its own terrain rather than around it. A yield requirement can become a licence for conversion under another name unless its thresholds are measured and enforced, which is why the German and French figures matter more than the agrivoltaic label. A distributive caution applies in equal measure. This article has documented a conflict in which the audible objection is the propertied one, and the soil it defends deserves, on the merits, to be defended; yet a policy that protected prime soil only to preserve elite landscapes would reproduce the very differential legibility the article diagnoses. Measures to defend the material capacity of land must therefore be designed so that their beneficiaries include the campesino communities whose tenure, water and labour the transition displaces, and not only the owners whose view it disturbs. These measures align with the spirit of the Voluntary Guidelines on the Responsible Governance of Tenure and with the renewed agrarian-reform agenda of

ICARRD+20, which ask states to govern tenure as a material and social relation rather than as a registry entry. The deeper implication is theoretical. As long as property is administered as legal certainty standing in for land-tenure security, the energy transition will keep converting the soil that the climate it serves most needs, and every protection will remain, like the compensations in these files, an offer the proprietor is free not to make. Naming the infrastructure is the precondition for governing it; binding the proprietor, within the limits the Constitution already allows, is the beginning of that government.

Funding: This research received no external funding.

Data Availability Statement: The environmental-assessment records are publicly available through the SEIA (<https://seia.sea.gob.cl>); the CIREN soil use-capability layer is in the public domain; the cadastral microdata are distributed by catastral.cl under its terms of use. A reproducibility package, comprising derived datasets, analysis code, the figures and a data-source guide, is available from the author on request. The raw SII cadastral microdata are governed by the catastral.cl terms of use and are represented only through derived aggregates, from which the microdata cannot be reconstructed.

Acknowledgments: The author used Claude Opus 4.6 (Anthropic) as a writing and research assistant, under his direct supervision, for the following tasks: (1) translation of the author-written Spanish manuscript into English and subsequent language editing; (2) formatting of the manuscript to the journal template and conversion of author-year citations to the numbered reference style, with programmatic cross-checking; (3) preparation and layout correction of figures generated from the author's data; (4) verification of bibliographic metadata against CrossRef and OpenAlex; (5) assistance in writing the Python/GeoPandas data-processing code and in the systematic reading and coding of public environmental-assessment records (SEIA), whose outputs were reviewed and verified by the author against the primary sources. The theoretical framework, research design, argument, analysis and conclusions are entirely the author's own. The author critically reviewed all AI-assisted output and takes full responsibility for the content of the manuscript.

Conflicts of Interest: The author declares no conflicts of interest.

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