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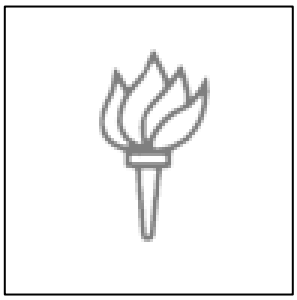

# Propertizing Environmental Attributes

*Katrina Wyman and Adalene Minelli*

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# PROPERTIZING ENVIRONMENTAL ATTRIBUTES

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*Tangible environmental resources such as land and water have been the object of property rights and traded in markets for millennia. In a development largely unnoticed by legal scholars, technology now allows a new class of environmental resources that are much harder to see and touch to be measured, and potentially sold—environmental attributes. Some of these resources have already been partially packaged into property rights for sale by some governments and private actors, such as actual and avoided carbon emissions, and the environmental benefits of renewable power and electric cars. Other resources, such as avoided water use, remain unpropertized. Trading environmental attributes can help to achieve important societal objectives, such as decarbonizing the energy system, although there are also criticisms of using markets for these goals.*

*This article emphasizes that property rights need to be created in environmental attributes if policymakers and private actors wish to enlist markets to achieve societal goals. The article explains the steps involved in creating property rights in environmental attributes. Drawing on the approaches already used to create property rights in some of these attributes, the article identifies a menu of options for establishing property rights in attributes that currently can be measured and those that technology will allow to be isolated in the future. In addition, it applies this menu to recommend a first in time rule for establishing property rights in avoided electricity use from energy efficient appliances and other energy saving measures, a prominent example of the newer class of environmental attributes. A resource that policymakers have been seeking to harness for decades, energy efficiency is currently traded in some*

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*jurisdictions and trading could expand if the rules for initially allocating energy efficiency were clarified.*

## INTRODUCTION

Suppose thousands of homeowners buy the most energy efficient refrigerators available on the same day. With the help of modern technology, the energy use avoided from the installation of these refrigerators can now to be quantified and sold into some wholesale electricity markets.[1] Moreover, as a result of an order that the Federal Energy Regulatory Commission (FERC) issued in 2020, there may be more electricity markets in which avoided energy use could be sold.[2] However, someone has to initially own the avoided energy use to be able to sell it.[3] Complicating matters, there are many parties who might claim to initially own the avoided energy use, including the homeowners, the refrigerator manufacturer, the retailers who sold the refrigerators, the electric utility serving the homeowners that may have programs to promote the purchase of energy efficient appliances, or an aggregator who bundles the avoided consumption and measures and verifies it. How can one or more of these parties acquire rights in the avoided energy use from the refrigerators sufficient to sell it?

This article is about how to initially establish ownership of environmental attributes, such as energy efficiency. Energy efficiency is one example of a general class of environmental resources that are much harder to see and touch than traditional resources such as land, water, and trees, but that advances in technology now allow private and public actors to isolate and measure. Governments and private actors have already packaged some of these environmental attributes into tradeable instruments, some of which are highly valuable. These include credits for the environmental benefits of electric vehicles, credits for actual and avoided greenhouse gas (GHG) emissions, and credits for the production of renewable power.[4] Tesla was profitable in 2020 mostly due to the Zero-Emission Vehicle (ZEV), Low-Emission Vehicle (LEV), and other regulatory credits that it sells other carmakers to comply with federal and state environmental requirements, not the sales of its electric cars.[5] The State of

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[1] *See infra* note 176 and accompanying text.

[2] Participation of Distributed Energy Resource Aggregations in Markets Operated by Regional Transmission Organizations and Independent System Operators, 172 FERC ¶ 61,247 (Oct. 21, 2020) [hereinafter FERC Order No. 2222] (to be codified at 18 C.F.R. pt. 35).

[3] *See infra* note 189.

[4] Part I.B discusses why these instruments can be regarded as property, explaining that they are best regarded as property between private parties, not property as against the government under the Takings Clause.

[5] *Electric Shock and Awe: A Tesla Bull Debates a Tesla Bear,* ECONOMIST (Jan. 23, 2021), https://www.economist.com/business/2021/01/23/a-tesla-bull-debates-a-tesla-bear; Colin Beresford, *Other Automakers Paid Tesla a Record $428 Million Last Quarter*, CAR & DRIVER (July 22, 2020), https://www.caranddriver.com/news/a32346670/other-automakers-paid-tesla-record-354-million/;

California has earned billions auctioning greenhouse gas (GHG) allowances that are bought and sold by private actors.[6] Private actors routinely sell air travelers offsets to compensate for the GHG emissions from plane travel.[7] In some U.S. states and the District of Columbia, individuals earn thousands of dollars a year selling Solar Renewable Energy Credits (SRECs) from installing solar panel systems.[8] Drawing on the experiences of governments and private actors in establishing property rights in some of the new attributes, this article explains the steps involved in establishing ownership of the newly measurable attributes. It also develops a menu of options for initially allocating property rights in unpropertized attributes that technology now allows, and will in the future permit, to be isolated and sold.

Returning to the hypothetical with which we began, we also recommend a first in time rule for initially allocating ownership of energy efficiency under which the first party—or parties—to package energy efficiency into a saleable format would be deemed to own it. A resource that policymakers and private actors have been seeking to harness for decades, energy efficiency is technologically feasible to isolate and market, provided initial ownership of the attribute is clear. While energy efficiency is already traded in some markets, it might be traded more if legal frameworks for initially establishing ownership of it were more widespread.

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Lora Kolodny, *Tesla's Sale of Environmental Credits Help Drive to Profitability,* CNBC (July 23, 2020, 11:22 AM).

[6] *California Cap and Trade*, CTR. FOR CLIMATE & ENERGY SOLS., https://www.c2es.org/content/california-cap-and-trade/#:~:text=Since%20it%20commenced%2C%20the%20program,program%20in%202013%20to%202017 (last visited Mar. 4, 2020).

[7] Umair Irfan, *Can You Really Negate Your Carbon Emissions? Carbon Offsets, Explained*, VOX (Feb. 27, 2020), https://www.vox.com/2020/2/27/20994118/carbon-offset-climate-change-net-zero-neutral-emissions

[8] These are also sometimes referred to as "Solar Renewable Energy Certificates." Luke Richardson, *SREC Prices: Explaining How to Sell Your RECs in the U.S.*, ENERGYSAGE (May 1, 2020), https://news.energysage.com/srec-prices-explaining-u-s-srec-solar-market/. As policymakers take a growing interest in reducing GHG emissions, new markets will likely emerge in emitting and avoiding GHGs. In May 2021, Washington State legislated a cap-and-trade program that will auction allowances for GHG emissions. Alex Brown, *New Environmental Justice Measures Might Revive Cap-and-Trade*, PEW: STATELINE (May 18, 2021), https://www.pewtrusts.org/en/research-andanalysis/blogs/stateline/2021/05/18/new-environmental-justice-measures-might-revive-cap-and-trade. The Biden Administration's proposed clean electricity standard could create a national market for "Clean Energy Credits." Michael Greenstone & Ishan Nath, *Fuelling Technology Deployment with a Clean Electricity Standard* (May 2021), https://epic.uchicago.edu/wp-content/uploads/2021/02/CES-1-pager_-May-2021.pdf. *See also* Kate Abnett, *EU Drafts Plan to Grow 'Carbon Sinks' in Climate Change Fight*, REUTERS (Jul. 6, 2021); Chris Buckley, *China Opened a National Carbon Market. Here's Why It Matters,* N.Y. TIMES (Jul. 16, 2021).

An important starting point for this article is that property rights need to be allocated in environmental attributes so that they can be traded. Trading environmental attributes may further important societal goals, such as reducing GHG emissions or the provision of reliable supplies of electricity. However, clarity about who owns environmental attributes is key to facilitating their market exchange. As economist Ronald Coase argued, markets will only operate efficiently if property rights are well defined.[9] There is a meaningful risk that uncertainty about who owns environmental attributes will slow the emergence of markets in them. Property law thus plays an important, but underappreciated, role in the development of markets for environmental attributes. As technology continues to evolve, it will be technically feasible to isolate and market more environmental attributes provided law and practice follow suit and property rights are created in the newly separable attributes. If property law does not keep up with these technological innovations, many potentially beneficial market transactions could be stifled.

The article proceeds in four parts. Part I calls attention to the emergence of a general category of environmental attributes that, due to technological developments, it is now—or soon will be—possible to isolate, measure, and sell. The creation of this new class of resources is not widely appreciated in legal scholarship; scholars have tended to focus instead on individual attributes—such as actual or avoided GHG emissions—without recognizing that they are instances of a broad class of newly measurable environmental resources. To advance scholarship on this new class of attributes, we offer a novel, generic definition of environmental attributes and explain why these attributes can be made the objects of property rights. This part also discusses some of the benefits and objections to creating tradeable property rights and markets in these new environmental attributes. Part II explains why, as a matter of law and economics, property rights need to be created and allocated in environmental attributes if society wishes to encourage their market exchange. Drawing on the approaches already used to propertize some environmental attributes, Part III identifies a menu of approaches for initially allocating property rights in environmental attributes to facilitate trade. We discuss how property rights can be created from the top by governments, from below by private actors, and through a hybrid of private and government action. Part IV applies the menu of options it identifies for creating and allocating property rights to suggest how property rights should be initially established in the energy savings resulting from energy efficiency measures.

Before we proceed, a brief word about what this article does not address. As explained above, we focus on how property rights can be created and allocated in environmental attributes so that they can be traded. We are not arguing for the creation

[9] Ronald H. Coase, *The Problem of Social Cost*, 3 J.L. & ECON. 1, 19 (1960).

of property rights and markets in all environmental attributes that can be technologically isolated. Whether to use property rights and markets—or other approaches, such as taxes, subsidies, or traditional regulation—to achieve environmental, energy, and other policy objectives is a choice for policymakers and private actors, and ultimately society, to make that is beyond the scope of this article. Rather, this article argues that if policymakers and private actors choose to use markets to achieve their goals, property rights need to be established.

## I. BACKGROUND

Over the past several decades, governments and private actors have increasingly recognized a broad array of environmental attributes and facilitated their sale in both regulated and unregulated markets. The attributes that governments have packaged into transferable instruments include allowances for GHG emissions under the carbon trading programs in California[10] and the Regional Greenhouse Gas Initiative (RGGI);[11] allowances for sulfur dioxide ($SO_2$) emissions under the federal Acid Rain Program;[12] Renewable Energy Credits (RECs) denoting a specified amount of renewable energy generation;[13] and energy savings certificates or credits ("ESCerts," also known as "white certificates" in the European Union) for energy efficiency improvements.[14] The most notable environmental attributes that private actors have packaged into tradable commodities are avoided GHG emissions, which are currently sold in privately created markets to firms, individuals, and institutions that voluntarily choose to offset their GHG emissions.[15]

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[10] CAL. AIR RESOURCE BD., CAP-AND-TRADE PROGRAM, https://ww2.arb.ca.gov/our-work/programs/cap-and-trade-program/about (last visited Mar. 4, 2020).

[11] THE REGIONAL GREENHOUSE GAS INITIATIVE, https://www.rggi.org/ (last visited Mar. 4, 2020).

[12] 42 U.S.C. §§ 7651–7651 (1990).

[13] Thirty-six states and territories recognize that RECs can be used to track and transact renewable electricity on the grid, while 24 states and territories explicitly recognize RECs as representing "attributes" of generation. Todd Jones, Robin Quarrier & Maya Kelty, *The Legal Basis for Renewable Energy Certificates*, CTR. FOR RES. SOLUTIONS (2015). *See also* Nat'l Conference of State Legislatures, *State Renewable Portfolio Standards and Goals* (Jan. 4, 2021), https://www.ncsl.org/research/energy/renewable-portfolio-standards.aspx.

[14] Noah M. Sachs, Comment: *Should the United States Create Trading Markets for Energy Efficiency?*, 46 ELR 10466 (2016); Paolo Bertoldi & Silvia Rezessy, Joint Rsch. Ctr. Eur. Comm'n, Renewable Energy Unit, *Energy Saving Obligations and Tradable White Certificates* (December 2009), https://ec.europa.eu/energy/sites/ener/files/documents/2009_12_jrc_white_certificates.pdf. "ESCerts" is the generic term that Professor Noah Sachs uses to describe the certificates (or credits) issued in different jurisdictions for energy savings. Sachs, *supra*, at 10466.

[15] Irfan, *supra* note 7.

Although legal scholars are familiar with these various instruments, scholarship has not generally recognized that the environmental resources that these instruments package are discrete instances of a broader class of resources that technology now allows to be measured. This Part defines what we mean when we refer to "environmental attributes" and explains why environmental attributes are suitable objects of property. We then discuss some of the benefits of propertizing environmental attributes and identify important criticisms of propertization from moral, effectiveness, and equity perspectives.

### *A. Defining Environmental Attributes*

Tangible environmental resources such as land have been the object of property rights and traded in markets for millennia. In recent decades, environmental resources that are much harder to see and touch also have come to be traded as advances in technology has allowed these resources to be isolated and measured. We refer to these novel environmental resources as environmental attributes.[16]

We define environmental attributes as having three elements. First, environmental attributes have an actual impact on the physical environment. These impacts may benefit the environment, such as avoided GHG emissions which mitigate the effects of climate change, or avoided electricity use, which also may reduce GHG emissions. The impacts also may harm the environment, such as the emission of $SO_2$, which contributes to acid rain, or GHG emissions which contribute to climate change. These impacts may arise from avoiding consumption of physical resources, such as refraining from clearing a forest that would otherwise have been cut and, therefore, avoiding carbon dioxide ($CO_2$) emissions.[17] The impacts also may arise from active

[16] In using the term "environmental attribute" to encompass a broad class of attributes that spans multiple economic sectors, we depart from the tendency to associate environmental attributes with discrete classes of activity, such as electricity generation. For example, the North American Energy Markets Association defines "environmental attribute" as "an aspect, claim, characteristic or benefit associated with the generation of a quantity of electricity by an electricity generation facility." N. AM. ENERGY MKTS. ASS'N, EXAMPLE DEFINITION FOR ENVIRONMENTAL ATTRIBUTES, https://naema.com/download/88/environmental-attributes-definition/4506/naema-env-attributes-dfnt-final.pdf (last visited June 28, 2021).

[17] To use a term popularized by Professor Gretchen Daily and others, the forest provides "ecosystem services" (in this example, carbon storage). "[E]cosystem services [are] … the conditions and processes through which natural systems make up, sustain, and fulfil human life." James Salzman, *What is the Emperor Wearing? The Secret Lives of Ecosystem Services*, 28 PACE ENVTL. L. REV. 591, 593 (2011) (referring to Daily's definition). We think that ecosystem services are a type of environmental attribute, provided they can be measured; environmental attributes are broader than these services, partly because the attributes may come from human activity, not just nature. James Salzman, *Payments for Ecosystem Services: Past, Present and Future*, 6 TEX. A&M L. REV. 199, 225-226 (2018).

consumption, such as by burning coal to generate electricity and introducing $SO_2$ and $CO_2$ into clean air.

Second, environmental attributes can be isolated and distinguished from the object or activity creating the impact—environmental attributes exist *separately* on their own. For example, producing power from natural gas fueled power plants generates GHG emissions as well as electricity, and these GHG emissions are distinct from the power plants and the electricity. Wind turbines generate both wind energy and avoided carbon emissions, and power purchase agreements for wind energy usually stipulate whether the energy is being sold with or without the environmental attributes.[18] Similarly, producing power from solar panel systems avoids carbon emissions, and these avoided carbon emissions are a distinct attribute from the panels and the power, and they are sold separately.[19] As another example, Tesla generates various environmental attributes in manufacturing and selling electric cars, including avoided GHG emissions and avoided fuel use. These attributes are distinct from the vehicles themselves, and, as mentioned above, these attributes are the objects of credits that Tesla sells other carmakers while selling the cars to consumers.[20]

Third, environmental attributes can be measured. The ability to measure the attribute contributes to its economic value and allows it to be bought and sold, or

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[18] STOEL RIVES LLP, THE LAW OF WIND: A GUIDE TO BUSINESS AND LEGAL ISSUES ch. 7, at 2, 7 (8th ed. 2018). Standard language in REC purchase agreements defines the environmental attributes generated by a renewable energy facility as any "aspect, claim, characteristic or benefit associated with the generation of a quantity of electricity . . . *other than the electric energy produced*." RENEWABLE ENERGY RES. COMM. & SPECIAL COMM. ON ENERGY AND ENV'T FIN., A.B.A. SECTION OF ENV'T, ENERGY AND RES., MASTER RENEWABLE ENERGY CERTIFICATE PURCHASE AND SALE AGREEMENT 5 (2016) (emphasis added), https://www.ipa-energyrfp.com/?wpfb_dl=845.

[19] Homeowners can even continue to own and sell the SRECs derived from solar panel systems after selling the house with the panels, just as homeowners can take the living room sofa while leaving the living room floor behind. Kerry Thoubboron, *SRECs: Understanding Solar Renewable Energy Credits*, ENERGYSAGE (June 2, 2021), https://www.energysage.com/solar/cost-benefit/srecs-solar-renewable-energy-certificates/.

[20] The credits generated by the manufacture of a Tesla could include California's Zero-Emissions Vehicle credits, the U.S. Environmental Protection Agency's GHG Emission Standard Performance credits issued under the Clean Air Act, and the U.S. National Highway Transportation and Safety Administration's (NHTSA) Corporate Average Fuel Economy (CAFE) credits issued under the Energy Independence and Security Act. Benjamin Leard & Virginia McConnell, *New Markets for Credit Trading Under US Automobile Greenhouse Gas and Fuel Economy Standards*, 11 REV. ENV'T ECON. & POL'Y 207 (2017).

otherwise qualifies the holder for incentives, remuneration, or compensation.[21] An attribute's economic value also may lead parties to invest in measurement technology to realize that value.[22] Environmental attributes typically derive their value from others' willingness to pay for them to meet a specific environmental or energy target.[23] Of course, an environmental attribute does not have to have economic value presently to be an environmental attribute—but if it can be measured, it can be monetized.[24]

### *B. Environmental Attributes as Objects of Property*

Environmental attributes exist even though they cannot always be seen or touched. They are exchanged in markets across the globe because they have been packaged into property rights, either by laws, norms or social practices.[25] But, why can environmental attributes be owned and therefore be the objects of *property*?

What constitutes property is an age-old question as the concept of property is fluid.[26] There are different definitions of property, and legislatures, courts and scholars

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[21] In some cases, registries allow for the efficient identification and tracking of environmental attributes and the underlying conduct associated with them. *See*, *e.g.,* VERRA REGISTRY, https://registry.verra.org/ (last visited June 27, 2021); AM. CARBON REGISTRY, https://acr2.apx.com/myModule/rpt/myrpt.asp?r=112 (last visited June 27, 2021); CLIMATE ACTION RSRV. REGISTRY, https://thereserve2.apx.com/myModule/rpt/myrpt.asp?r=111 (last visited June 27, 2021); N. AM. RENEWABLES REGISTRY, https://apx.com/about-nar/ (last visited June 27, 2021); W. RENEWABLE ENERGY GENERATION INFO. SYS., https://www.wecc.org/WREGIS/Pages/Default.aspx (last visited June 27, 2021).

[22] Harold Demsetz, *Towards a Theory of Property Rights*, 57 AM. ECON. REV. 347, 350 (1967). For example, to obtain REDD+ payments for avoiding GHG emissions through deforestation and forest degradation, countries must invest in "measurement, reporting and verification" of forest conservation measures. Michael Köhl et al., *REDD+ Measurement, Reporting and Verification – A Cost Trap? Implications for Financing REDD+MRV Cost by Results-Based Payments*, 168 ECOLOGICAL ECON. 106513, 106513 (2020).

[23] Environmental attributes may also be valuable for reasons other than their impact on the environment. For example, while energy efficiency is traded in some markets to meet environmental standards, it is also sold into some power markets as an energy resource. *See* Part IV.

[24] Environmental attributes likely exist long before technology enables them to be isolated. For as long as humans have been using wind energy as a source of power rather than fossil fuels, that energy has avoided carbon emissions. It is changes in technology that have allowed society to discover, measure, and track—and therefore monetize—environmental attributes such as avoided carbon emissions.

[25] Environmental attributes can exist even if they are not packaged into property. For a critical analysis of how different assets—including land, nature, and financial assets—historically have been "coded" into capital by law that argues that this coding has generated wealth and inequality, see KATHARINA PISTOR, THE CODE OF CAPITAL: HOW THE LAW CREATES WEALTH AND INEQUALITY (2019).

[26] *See, e.g.*, JEREMY WALDRON, THE RIGHT TO PRIVATE PROPERTY 26–27 (1990) (referring to "the lack of a generally accepted definition of what private property is"); Katrina M. Wyman, *The New Essentialism in Property*, 9 J. LEGAL ANALYSIS 183 (2017).

often use varying definitions depending on the purpose for which they are defining the term. This article borrows from a recent draft of the American Law Institute's Fourth Restatement of Property, which describes "property" as "legal rights, obligations, and other such relations with respect to things."[27] As this definition of property suggests, the notion of 'thinghood' is critical to property—it is, after all, the *thing* that is the focus of the legal relations which the law of property is concerned with.[28] Thinghood is apparent for physical items—a book, a car, a parcel of land are all easily recognizable as constituting things because we can pick them up, move them, or touch them. But *intangible* items, such as novel inventions, can also be things for property. Thus, having a physical form, while evidence of thinghood, is not a necessary precondition for something to be a legal thing.[29]

For the purposes of property law, two primary conditions give rise to legal thinghood. First, the object must be treated as "a separate whole."[30] Second, the object must be "no more than contingently associated with any particular actor,"[31] meaning it must exist separately from the entity that claims "to possess or own it."[32] Whether an intangible is a thing suitable for property depends largely on the social and economic context in which it exists. As the draft Restatement explains, "Where

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[27] RESTATEMENT (FOURTH) OF PROP., vol. 1, div. 1, § 1, at 2 (AM. L. INST., Preliminary Draft No. 4, 2018) [hereinafter RESTATEMENT (FOURTH) OF PROP., Preliminary Draft No. 4]. The 2018 draft is a partial and preliminary draft. The Restatement's reporters could make changes, and the text that we are drawing on has not been approved by the American Law Institute's council or its members. The American Law Institute's First Restatement of Property also refers to the role of things in property. RESTATEMENT (FIRST) OF PROP., div. 1, ch. 1, introductory note (AM. L. INST. 1936) [hereinafter RESTATEMENT (FIRST) OF PROP.] ("The word 'property' is used in this Restatement to denote legal relations between persons with respect to a thing.").

[28] RESTATEMENT (FOURTH) OF PROP., Preliminary Draft No. 4, *supra* note 27, vol. 1, div. 1, § 1, at 2. *See also* RESTATEMENT (FOURTH) OF PROP., Preliminary Draft No. 4, *supra* note 27, vol. 1, div. 1, § 2 cmt. e, at 7 ("Legal thing as necessary but not sufficient condition of property."); Henry E. Smith, *Property as the Law of Things*, 125 HARV. L. REV. 1691 (2012); Wyman, *supra* note 26, at 194–98.

[29] RESTATEMENT (FOURTH) OF PROP., Preliminary Draft No. 4, *supra* note 27, vol. 1, div. 1, § 2 cmt. d, at 6 ("Intangible items, even under some circumstances rights themselves, can be things for purposes of property law, provided they are regarded as a separate whole that is only contingently related to any particular actor."). The First Restatement of Property also recognized that property could exist in intangibles. RESTATEMENT (FIRST) OF PROP., *supra* note 27, div. 1, ch. 1, introductory note. *See also* Katrina M. Wyman, *Property as Intangible Property*, *in* 1 OXFORD STUDIES IN PRIVATE LAW THEORY 81, 85 n.23 (Paul B. Miller & John Oberdiek eds., 2020) (listing court cases recognizing legal interests in intangibles as property).

[30] RESTATEMENT (FOURTH) OF PROP., Preliminary Draft No. 4, *supra* note 27, vol. 1, div. 1, § 2, at 4. *See also id.* vol. 1, div. 1, § 2 cmt. b, at 4.

[31] *Id.* vol. 1, div. 1, § 2, at 4.

[32] *Id.* vol. 1, div. 1, § 2 cmt. c, at 5.

intangibles are concerned, one cannot draw upon the existence of physical separateness or physical boundaries to help identify things. Consequently, economic and social practice and social norms and customs will play a larger role in delineating things."[33]

Environmental attributes are routinely treated as separate assets from the entity claiming them. They are defined and traded separately from the object generating them, and the practices, norms and customs of the markets in which they are traded dictate that they are only contingently related to the entities which possess them. The fact that environmental attributes have value and can be bought and sold separately from the object or activity generating them, and that they retain that value regardless of the entity possessing them, all point to environmental attributes as proper objects of property.[34]

In addition to requiring a thing, property requires *ownership*. There are many different views about the meaning of ownership in property. Understandings of what

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[33] *Id.* vol. 1, div. 1, § 2 cmt. d, at 6. *See also id.* ("Common elements that point toward whether an intangible right is regarded as a thing include whether it has value if considered apart from any other thing, whether it consists of mutually complementary attributes, whether it has value without regard to the identity of the person who holds it, and whether it is commonly transferred or bought and sold on a stand-alone basis.").

[34] While the activities generating some environmental attributes are ongoing, the tradable instruments into which the attributes are packaged are best considered goods, and not services. For example, a carbon offset credit for a reforestation project is predicated on a guarantee by the seller that the GHG reductions derived from the project are permanent, i.e., that forest will be maintained. While the activity of maintaining the forest is ongoing, the offset credits are nonetheless best regarded as goods because they guarantee a GHG reduction over the lifetime of the reforestation project.

Notably, courts are currently split on the question of whether electricity constitutes a good or service in cases dealing with whether electricity is "movable" for the purposes of the Uniform Commercial Code. *See* Puget Sound Energy, Inc. v. Pac. Gas & Elec. Co. (*In re* Pac. Gas & Elec. Co.), 271 B.R. 626, 640 (N.D. Cal. 2002) (electricity is a "good" under UCC); GFI Wis., Inc. v. Reedsburg Util. Comm'n, 440 B.R. 791, 800 (W.D. Wis. 2010) (holding that electricity is movable, tangible and consumable, that it has physical properties, that it is bought and sold in the marketplace and thus, that it qualifies as a "good" for purposes of the UCC and the Bankruptcy Code); *but see In re* Pilgrim's Pride Corp., 421 B.R. 231, 239 (Bankr. N.D. Tex. 2009) ("UCC requires that 'goods' be movable at the time of identification. This is simply not true of electricity. Once electricity has been 'identified' by measurement at the meter, it has already been consumed by the end user. It is impossible for the consumer to return electricity to the provider after it has passed the meter point. The mere fact that electricity is sold in metered quantities does not bring it within UCC."). On another note, electricity is considered a commodity under the Commodity Exchange Act and "certain electric power . . . transactions, such as futures contracts, swaps, and options . . . fall within the [Commodity Futures Trading Commission's] jurisdiction." Terence J. Healey, Joseph B. Williams & Paul J. Pantano, Jr., *Energy Commodities: The Netherworld Between FERC And CFTC Jurisdiction*, MONDAQ (May 1, 2013).

it means to own something vary depending on the thing, the time and the place, among other factors.[35] Generally speaking, "ownership refers to legal rights to control a thing and everyone else's correlative duties to refrain from interfering with control of the thing."[36] The holders of environmental attributes enjoy a measure of control over these attributes that enables the legal interests in these attributes to be labelled property as between private parties. For example, the holders can—and as we have emphasized, frequently do—transfer these attributes to others. The ability to transfer a resource is often considered an indicium of property.[37]

As mentioned above, courts, legislatures, and scholars use different definitions of property depending on the context and thus whether an interest counts as property will likely be determined by the courts on a case-by-case basis. While there is a strong case for regarding environmental attributes as proper objects of property between private parties because they are things and those who hold them have a measure of control over them, many existing rights in environmental attributes are unlikely to be considered "private property" protected against governmental takings under the Takings Clause.[38] Legislators and regulators often state in the legal frameworks establishing tradable instruments in environmental attributes that the instruments are not property rights. The California[39] and RGGI[40] carbon trading programs, the federal

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[35] *See, e.g.*, WALDRON, *supra* note 26, at 47–53; *see also* Wyman, *supra* note 26, at 198–203.

[36] RESTATEMENT (FOURTH) OF PROP., Preliminary Draft No. 4, *supra* note 27, vol. 1, div. 1, § 3, at 7.

[37] *Id.* ("In the case of intangible things, ownership includes the right to license and transfer to the extent allowed by law."). The Federal Circuit considers the ability to trade a permit as an indication that the permit might constitute private property protected by the Takings Clause. Members of Peanut Quota Holders Ass'n, Inc. v. United States, 421 F.3d 1323, 1331 (Fed. Cir. 2005).

[38] The Takings Clause states "nor shall private property be taken for public use, without just compensation." U.S. CONST. amend. V. *See generally* Michael Pappas, *Disclaiming Property*, 42 HARV. ENVTL. L. REV. 391 (2018). *See also* Cal. Chamber of Com. v. State Air Res. Bd., 10 Cal. App. 5th 604 (2017).

[39] CAL. CODE REGS. tit. 17, § 95820(c) (2021) (stating that a $CO_2$ allowance "does not constitute property or a property right."). *But see Cal. Chamber of Com.*, 10 Cal. App. 5th at 604.

[40] The eleven states participating in RGGI have adopted a provision following the RGGI Model Rule, which states "a CO2 allowance . . . does not constitute a property right." RGGI MODEL RULE (REVISED 2017 UPDATE), § XX-1.5(c)(9), *available at* https://www.rggi.org/sites/default/files/Uploads/Design-Archive/Model-Rule/2017-Program-Review-Update/2017_Model_Rule_revised.pdf. *See* CONN. AGENCIES. REGS. § 22a-174-31(b)(E) (2021); 1147 DEL. ADMIN. CODE § 1.5.3.9 (2021); 06-096 ME. CODE R. ch. 156, §§ 1(B) & 5(C)(9) (LexisNexis 2021); MD. CODE REGS. 26.09.01.02(B)(20) (2021); 310 MASS. CODE. REGS. 7.70(1)(e)(3)(i) (2021); N.H. CODE ADMIN. R. ANN. Env-A 4605.02(g) (2021); N.J. ADMIN. CODE § 7:27C-1.4(m); N.Y. COMP. CODES R. & REGS. tit. 6, §§ 1.2(17), 1.5(c)(9) (2021); R.I. CODE. R. § 46.7(A)(9) (LexisNexis 2021); 16-3 VT. CODE R. § 101(c)(9) (2021); 9 VA. ADMIN. CODE § 5-140-6050(c)(9) (2021).

Acid Rain Program,[41] and EPA's trading program for vehicle $CO_2$ emissions[42] all include "disclaimers"[43] that these programs' allowances are not property, though there are examples of programs without such disclaimers.[44] Property disclaimers are typically included to preserve governmental flexibility to alter the program—including eliminating allowances entirely—free of constitutional claims for compensation under the Takings Clause.[45] The case law on the effects of these property disclaimers "is limited," but it suggests that they influence the courts to find that government-created permits and allowances are not property protected by the Takings Clause.[46] However,

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[41] 42 U.S.C. § 7651b(f) (stating that an $SO_2$ allowance "does not constitute a property right.").

[42] 40 C.F.R. § 86.1865-12 (2021) ("There are no property rights associated with CO2 credits generated under this subpart.").

[43] We borrow the apt term from Pappas, *supra* note 38 (referring to "property disclaimers").

[44] Legislation in a small number of states refers to RECs as property. *See, e.g.*, N.H. REV. STAT. ANN. § 362-A:9 (Westlaw through 2021 Reg. Sess. ch. 76); 52 PA. CODE § 75.1 (2021); P.R. LAWS ANN. tit. 8, § 8129(a) (2021); VT. STAT. ANN. tit. 30, § 8002(26)(B), (26)(C) (West, Westlaw through 2021–2022 Reg. Sess.); TODD JONES, ROBIN QUARRIER & MAYA KELTY, CTR. FOR RES. SOLS., THE LEGAL BASIS FOR RENEWABLE ENERGY CERTIFICATES 3, 5–6 (2015), http://resource-solutions.org/wp-content/uploads/2015/07/The-Legal-Basis-for-RECs.pdf. Courts have also described some jurisdictions' RECs as property. JASON A. SCHWARTZ, MARKETABLE PERMITS: RECOMMENDATIONS ON APPLICATIONS AND MANAGEMENT 25 (2017) (citing *In re* Ownership of Renewable Energy Certificates, 913 A.2d 825 (N.J. Super. Ct. App. Div. 2007); Wheelabrator Lisbon, Inc. v. Conn. Dep't of Pub. Util. Control, 531 F.3d 183, 190 (2d Cir. 2008)). An EPA website also refers to RECs as property. *Renewable Energy Certificates (RECs)*, EPA, https://www.epa.gov/greenpower/renewable-energy-certificates-recs (last visited June 28, 2021). Moreover, there are no property disclaimers in the regulations establishing the trading programs for NHTSA's CAFE credits or California's ZEV credits. 49 C.F.R. subsec. B, ch. V; CAL. CODE REGS. tit. 13 § 1900 *et seq.* (2021).

[45] The California Air Resources Board, which administers the state's carbon trading program, has explained that the disclaimer is rooted in a desire to avoid claims under the Takings Clause. Supplemental Letter Brief of Respondents California Air Resources Board at 2, Cal. Chamber of Com. v. State Air Res. Bd., 10 Cal. App. 5th 604 (2017) (No. C075954) ("This statement [that carbon allowances confer no property rights] is necessary to clarify that, vis-à-vis the state, regulatory and enforcement actions taken by [CARB] in implementing the cap and trade program do not give rise to a constitutional takings claim. . . . [A] decision by [CARB]—for enforcement or regulatory reasons—to terminate, revoke or limit compliance instruments should not [create] a loss to the people of California.") (citing Cal. Admin. Record C-000247 to C-000248) (internal quotations omitted). A similar desire to avoid claims for compensation under the Takings Clause was behind the Acid Rain Program's property disclaimer. Heather Jarvis & Wei Xu, *Comparative Analysis of Air Pollution Trading in the United States and China*, 36 ENV'T L. REP. 10234 (2006); LEIGH RAYMOND, PRIVATE RIGHTS IN PUBLIC RESOURCES: EQUITY AND PROPERTY ALLOCATION IN MARKET-BASED ENVIRONMENTAL POLICY 82 (2014).

[46] Pappas, *supra* note 38, at 402. *See also Cal. Chamber of Comm.*, 10 Cal. App. 5th at 604; Jarvis & Xu, *supra* note 45, at 10241 ("The legal status of SO2 pollution trading allowances has never been litigated, and so it remains unclear as to whether the non-property right proclamation would withstand challenge."). A recent review of the case law confirms this statement.

the courts retain the authority to define property for constitutional purposes,[47] and therefore such disclaimers are neither sufficient nor necessary to avoid government created interests being deemed property protected by the Takings Clause.[48]

Importantly, regardless of whether the legal rights that holders enjoy in environmental attributes are considered property protected against governmental takings under the Takings Clause, they are still often considered property as between private parties.[49] Indeed, in 2017, the Third District Court of Appeal in California expressly stated that the allowances that California created authorizing the release of GHG emissions are "valuable, tradable, private property rights" as between private parties,[50] even though California regulations state that the $CO_2$ allowances "do not constitute property or a property right."[51] The Court stated that this disclaimer prevented the rights from being property as against the state for Takings purposes, but that they are property as between private parties—and, notably, as against the state for

[47] *See, e.g.*, Cedar Point Nursery v. Hassid, No. 20-107, 2021 WL 2557070 at *8 (June 23, 2021); Webb's Fabulous Pharmacies, Inc. v. Beckwith, 449 U.S. 155, 164 (1980).

[48] *See, e.g.*, Checker Cab Phila. v. Phila. Parking Auth., 306 F. Supp. 3d 710, 744-45 (E.D. Pa. 2018) (no protected right to the market value of taxicab licenses although they are described in state law as property); Joe Sanfelippo Cabs, Inc. v. City of Milwaukee, 839 F.3d 613, 615 (7th Cir. 2016); Ill. Transp. Trade Ass'n v. City of Chicago, 839 F.3d 594, 597 (7th Cir. 2016); Checker Cab Operators, Inc. v. Miami-Dade County, 899 F.3d 908, 918–21 (11th Cir. 2018) (although taxicab licenses are described as intangible property in County law, the property interest does not include the right to exclude new competitors).

[49] Pappas, *supra* note 38, at 394 ("Disclaimed property is treated as ordinary private property between private individuals, but it is treated as an unprotected interest between individuals and the government. . . . Disclaimed property looks like property, acts like property, and appears to be property, except where the government is concerned.").

[50] *Cal. Chamber of Comm.*, 10 Cal. App. 5th at 646–49 ("Although, when read in isolation, these regulations [disclaiming property] could be interpreted to mean that emissions allowances do not constitute property or a property right, when examined in context it becomes clear that this passage refers only to property rights as against the state, not rights as between private parties. A 'property right' can mean different things in different contexts . . . [T]he regulations declaring that the allowances confer no property rights preclude an allowance holder from asserting a takings claim *against the State*, but the free alienability of the allowances means they are of value to the *holder*. Indeed, that is the whole point of the 'trade' part of the cap-and-trade system, the free alienability of the allowances as between private parties . . . That makes them property for due process purposes, because '[t]he right to exclude others, and to sell, assign or otherwise transfer ownership are traditional hallmarks of property.' . . . As the trial court found, emissions allowances consist of valuable, tradable, private property rights.").

[51] CAL. CODE REGS., tit. 17, § 95820(c) (2021).

Due Process purposes.[52] Many commentators refer to the allowances and credits that governments have created in environmental attributes as property.[53]

### *C. The Benefits of Propertizing Environmental Attributes*

There are several policy reasons for propertizing environmental attributes. Commodifying environmental attributes allows society to internalize negative externalities through the development of markets for them, which may reduce pollution more efficiently than traditional forms of command-and-control regulation. For this reason, economists have recommended cap-and-trade programs and other market-based approaches that are premised on the creation of permits to emit a certain quantity of pollution. Under cap-and-trade, the government establishes a cap on the allowable amount of pollution and then allocates permits to emit a certain amount of pollution (such as one ton of $SO_2$) that parties can trade to reallocate responsibility for

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[52] *Cal. Chamber of Comm.*, 10 Cal. App. 5th at 648-49. The definition of property receiving procedural protection under the Due Process Clause is broader than the test for private property protected by the Takings Clause, and thus more legal interests receive procedural due process than takings protection. *See* Thomas W. Merrill, *The Landscape of Constitutional Property*, 86 VA. L. REV. 885 (2000).

[53] *See, e.g.*, Carol M. Rose, *Rethinking Environmental Controls: Management Strategies for Common Resources*, 1991 DUKE L.J. 1, 27; Daniel Cole, *New Forms of Private Property: Property Rights in Environmental Goods*, *in* ENCYCLOPEDIA OF LAW AND ECONOMICS 291 (Gerit De Geest ed.,1994), https://reference.findlaw.com/lawandeconomics/1910-new-forms-of-private-property-property-rights-in-enviornmental-goods.pdf; Michael Pappas & Victor B. Flatt, *The Costs of Creating Environmental Markets: A Commodification Primer*, 9 U.C. IRVINE L. REV. 731, 741, 757 (2019); A. DENNY ELLERMAN & DAVID HARRISON, JR., PEW CTR. FOR GLOB. CLIMATE CHANGE, EMISSIONS TRADING IN THE U.S.: EXPERIENCE, LESSONS AND CONSIDERATIONS FOR GREENHOUSE GAS EMISSIONS 38 (2003); TERRY L. ANDERSON & GARY D. LIBECAP, ENVIRONMENTAL MARKETS: A PROPERTY RIGHTS APPROACH 179. *See also* SCHWARTZ, *supra* note 44, at 25 & n.197 (citing H.R. REP. NO. 101-490, pt. 1, at 366 (1990)) ("Congress also characterized acid rain credits as 'quasi-property,' and durable, subject only to limitations or revocations by new legislation passed by Congress and signed by the President."). However, there are some commentators who might resist the idea that credits and allowances are property rights, perhaps because they take a more essentialist view of what constitutes property. *See, e.g.,* Troy A. Rule, *Entitlement-Shifting Rules*, 62 B.C. L. REV. 1193, 1215-1219 (2021) (distinguishing "entitlements" and "property entitlements").

For non-US perspectives on the status of allowances and credits, *see, e.g.*, Armstrong v. Winnington [2012] EWHC 10 (Ch), [2013] ch. 156 at paras. 50 & 58 (describing EU carbon allowances as property in dispute between two private parties); Deutsche Bank v. Total Global Steel, [2012] EWHC 1201 (Comm) (describing "Certified Emissions Reductions" as "some species of intangible property" in dispute between two private parties (citing Armstrong v. Winnington)); Kelvin F.K. Low & Jolene Lin, *Carbon credits as EU like it: Property, immunity, tragiCO2medy?*, 27 JOURNAL OF ENVIRONMENTAL LAW 377 (2015); Ben France-Hudson, *Statutory Property: Is It a Thing?*, 47 VICT. U. WELLINGTON L. REV. 411, 418 (2016) ("emissions units" in New Zealand Emissions Trading Scheme "are private property because they confer on their holder an exclusive right to deal with the units as they see fit").

reducing pollution to lower-cost abaters. Several decades of experience with cap-and-trade programs suggest that "well designed" programs are capable of "cost-effectively" reducing pollution, although there are criticisms of these programs as we discuss below.[54]

Creating property rights in environmental attributes also may help to incorporate renewable energy resources (such as solar and wind energy) into the electric grid and to displace fossil fuel sources. Thirty states, as well as Washington, D.C. and three U.S. territories, have legally binding Renewable Portfolio Standards (RPSs) requiring that a certain share of the electricity sold by utilities be generated from renewable energy resources; another seven states have "renewable energy goals."[55] In these jurisdictions, the production of renewable power generates RECs that utilities can buy to satisfy their obligations to deliver renewable energy to the grid. The ability to sell RECs thus acts as a financial incentive to producers of renewable energy, such as solar developers, because these producers can profit from selling RECs in addition to electricity.

In addition to promoting the addition of renewable sources to the grid that reduce GHG emissions, RECs also may help to lower electricity prices insofar as RECs increase the number of electricity suppliers. The ability of individual households to generate environmental attributes that they can sell, such as SRECs by installing solar panels, also may promote democratization of the power sector by enabling individuals to participate in producing energy resources.[56]

### *D. Objections to Propertizing Environmental Attributes*

Despite the efficiency benefits of market-based environmental policies, the commoditization of environmental attributes has nonetheless raised its fair share of controversy. In particular, cap-and-trade programs have been the subject of a number of critiques.

From the perspective of moral philosophy, pollution markets have been criticized on the basis that it is immoral to allow countries or individuals to buy and

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[54] Richard Schmalensee & Robert Stavins, *Learning from Thirty Years of Cap and Trade*, RESOURCES (May 16, 2019), https://www.resources.org/archives/learning-thirty-years-cap-trade/. *See also* Richard Schmalensee & Robert Stavins, *Lessons Learned from Three Decades of Experience with Cap and Trade*, 11:1 REV. ENV'T ECON. & POL'Y 59 (2017).

[55] NAT'L CONF. OF STATE LEGISLATURES, *State Renewable Portfolio Standards and Goals*, https://www.ncsl.org/research/energy/renewable-portfolio-standards.aspx.

[56] Yael R. Lifshitz, *Private Energy*, 38 STAN. ENVTL. L.J. 119, 163 (2019).

sell the right to pollute. Philosopher Michael J. Sandel has challenged the use of markets to regulate environmental harms on the grounds that "turning pollution into a commodity to be bought and sold removes the moral stigma that is properly associated with it."[57] To this end, a "market in the right to pollute may make it harder to cultivate the habits of restraint and shared sacrifice that a responsible environmental ethic requires."[58] Permitting individuals to commoditize and trade in the right to cause environmental harm, it is argued, effectively removes the moral stigma associated with pollution and undermines the environmental ethic that society should be trying to foster.[59]

The moral rebuke of emissions markets stems in part from the fact that these markets traditionally are centered around a distinct kind of environmental attribute—one that, by definition, harms the environment. Carbon allowances in California and in RGGI states, for example, permit their holders to emit $CO_2$ and other GHGs into the atmosphere, contributing to climate change. Similarly, allowances auctioned and traded under the federal Clean Air Act permit their holders to emit $SO_2$, a major contributor to acid rain.

However, not all environmental attributes damage the environment. For example, ESCerts or white certificates represent benefits to the environment, insofar as they are generated by measures that reduce the demand for electricity from fossil fuel fired power plants. RECs represent the environmental benefits of producing power from renewable, rather than fossil fuel, sources.[60] Even in the case of carbon markets, some jurisdictions have in recent years adopted a variation of the traditional carbon trading program which is centered on "credits" rather than "allowances." In Tokyo's Cap-and-Trade Program, for example, credits are issued to facilities for verified, actual emissions reductions that go below a facility's regulatory cap, only after which those attributes may be sold on the market.[61] Rather than "allowing" a facility to emit,

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[57] Michael J. Sandel, Opinion, *It's Immoral to Buy the Right to Pollute*, N.Y. TIMES (Dec. 15, 1997).

[58] MICHAEL J. SANDEL, WHAT MONEY CAN'T BUY: THE MORAL LIMITS OF MARKETS (2012).

[59] Sandel, *supra* note 57. For related critiques, see Margaret Radin, *Market-Inalienability*, 100 HARV. L. REV. 1849 (1987); Douglas A. Kysar, *Climate Change and the Neoliberal Imagination*, *in* MULTIPLE CARBONS: HISTORICAL AND CONTEMPORARY APPROACHES TO GOVERNANCE (Sheila Jasanoff ed., forthcoming 2021).

[60] NAT'L CONF. OF STATE LEGISLATURES, *supra* note 55 ("[RECs] represent the environmental benefits of one megawatt-hour of renewable energy generation.").

[61] INT'L CARBON ACTION P'SHIP, JAPAN: TOKYO CAP-AND-TRADE PROGRAM (last updated May 18, 2021), https://icapcarbonaction.com/en/?option=com_etsmap&task=export&format=pdf&layout=list&systems%5B%5D=51; TOKYO METRO. GOV'T, TOKYO CAP-AND-TRADE PROGRAM FOR LARGE FACILITIES (2015), https://www.kankyo.metro.tokyo.lg.jp/en/climate/cap_and_trade/index.files/Tokyo CaT_detailed_documents.pdf.

facilities are instead given "credit" for emissions savings. From a moral perspective, compliance schemes centered around marketable "beneficial" attributes reward those that create environmental goods and penalize those that cause excess harm by requiring them to purchase others' credits to make up for compliance shortfalls.

A second critique of market-based approaches to reducing pollution is that they have not been effective at addressing the environmental problem they seek to remedy. This critique suggests that certain environmental objectives, such as reducing GHG emissions, might be better achieved through traditional forms of regulation that require polluters to reduce their emissions onsite or through industrial policy.[62] For example, several carbon trading programs (including RGGI and the European Union's Emissions Trading System) have been criticized for not driving down GHG emissions, particularly in the programs' early years.[63] However, the failure of these programs to meaningfully reduce GHG emissions (at least early on) is likely due to emissions caps in early compliance periods being set too low to incentivize action.[64] Also, other complementary policies might have actually driven action at such a low cost that firms did not need to rely on trading to meet their compliance obligations.[65] Thus, the failure of some trading programs to achieve their environmental objectives can explained by regulators' design choices, not the choice of mechanism.

Perhaps the most pressing contemporary criticism of the commoditization of environmental attributes concerns the distribution of resulting benefits and harms. In other words, who wins and who loses when environmental attributes are propertized? Environmental justice groups have challenged recent efforts to develop cap-and-trade programs on the basis that they could allow polluters in low-income communities and communities of color to meet their obligations by purchasing credits from elsewhere instead of reducing emissions onsite, thereby generating pollution hot spots in

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[62] DANIEL COLE, POLLUTION AND PROPERTY: COMPARING OWNERSHIP INSTITUTIONS FOR ENVIRONMENTAL PROTECTION 83 (2002); DANNY CULLENWALD & DAVID G. VICTOR, MAKING CLIMATE POLICY WORK (2021).

[63] Schmalensee & Stavins, *Lessons Learned from Three Decades*, *supra* note 54; *Report from the Commission to the European Parliament and the Council: The State of the European Carbon Market in 2012*, (Nov. 14, 2012), https://ec.europa.eu/clima/sites/clima/files/ets/reform/docs/com_2012_652_en.pdf.

[64] JUDY W. CHANG ET AL., BRATTLE GRP., CO2 ALLOWANCE ALLOCATIONS OPTIONS: CONSIDERATIONS FOR STATE POLICYMAKERS WHEN DEVELOPING MASS-BASED COMPLIANCE STRATEGIES UNDER THE CLEAN POWER PLAN (2016), https://brattlefiles.blob.core.windows.net/files/7447_co2_allowance_allocation_options.pdf. *See also* Schmalensee & Stavins, *supra* note 54.

[65] *See, e.g.*, Severin Borenstein et al., *Expecting the Unexpected: Emissions Uncertainty and Environmental Market Design*, 109 AM. ECON. REV. 3953 (2019).

disadvantaged communities.[66] The government always retains the authority to regulate to address distributional concerns to protect vulnerable communities[67] and some governments have sought to do so. For example new legislation in Washington State establishing a cap-and-trade program to reduce GHGs includes specific design elements to further environmental justice.[68] However, in the absence of concerted efforts to center environmental justice in designing and implementing programs, concerns likely will remain about whether markets for environmental attributes will inequitably reallocate environmental goods and bads, and disadvantage environmental justice communities.[69]

## II. THE NEED TO INITIALLY ALLOCATE RIGHTS

Well-designed markets for environmental attributes may offer a valuable tool for generating societal benefits. However, a lack of clarity about who initially owns environmental attributes may stifle the emergence or expansion of markets in these attributes.

There are at least two reasons why it is important to initially allocate property rights to stimulate markets. First, as a legal matter, it is a basic principle of property

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[66] For example, environmental justice groups have criticized California's GHG cap-and-trade program as harming low-income communities and communities of color. Nathanael Johnson, *Cap and Trade-Offs: Did California's Landmark Legislation Help or Hurt the State's Most Vulnerable?*, GRIST (Oct. 19, 2020), https://grist.org/climate/the-biggest-fight-over-cap-and-trade-isnt-about-what-you-think-it-is/. Advocates have pointed to a study of the California program that found that in the first three years of the trading program, localized GHG emissions increased in disadvantaged neighborhoods. LARA J. CUSHING ET AL., UNIV. OF CAL., BERKELEY, A PRELIMINARY ENVIRONMENTAL EQUITY ASSESSMENT OF CALIFORNIA'S CAP-AND-TRADE PROGRAM (2016), https://dornsife.usc.edu/PERE/enviro-equity-CA-cap-trade; Lara J. Cushing et al., *Carbon Trading, Co-pollutants, and Environmental Equity: Evidence from California's Cap-and-trade Program (2011–2015)*, PLOS MEDICINE (July 10, 2018). However, there are subsequent studies that find no adverse impacts on disadvantaged communities. Danae Hernandez-Cortes & Kyle C. Meng, *Do Environmental Markets Cause Environmental Injustice?* (Nat'l Bureau of Econ. Rsch., Working Paper No. 27205, 2021), https://www.nber.org/papers/w27205; Kyle C. Meng, *Is Cap-and-Trade Causing More Greenhouse Gas Emissions in Disadvantaged Communities?*, *in* DISTRIBUTIONAL EFFECTS OF ENVIRONMENTAL MARKET DESIGN: INSIGHTS AND SOLUTIONS FROM ECONOMICS 27–32 (C. Costello ed., 2018); Ryan Walch, The Effect of California's Carbon Cap and Trade Program on Co-pollutants and Environmental Justice: Evidence from the Electricity Sector (Nov. 1, 2018) (unpublished manuscript).

[67] Daniel A. Farber, *Pollution Markets and Social Equity: Analyzing the Fairness of Cap and Trade*, 39 ECOLOGY L.Q. 1 (2012), https://www.jstor.org/stable/24113488.

[68] Brown, *supra* note 8.

[69] For example, might the commoditization of water savings attributes lead to reduced efforts to conserve water resources in certain drought-prone regions if offenders can simply purchase offsets created in other regions?

law that one cannot transfer what one does not own.[70] This principle is known as *nemo dat quod non habet*, meaning "one cannot give that which one does not have."[71] While there are exceptions to this principle, it is the "baseline" in "all [legal] systems."[72] Once there is an initial owner with title, that owner can then contract with others to sell the resource. The requirement to own energy efficiency to sell it in electricity markets instantiates the *nemo dat* principle.

Second, as a matter of economics, initially allocating property rights is likely to increase interest in selling and buying resources. As Coase explained, "[o]ne of the purposes of the legal system is to establish that clear delimitation of rights on the basis of which the transfer and recombination of rights can take place through the market."[73] Private actors are less likely to buy assets that they are not certain that they will own upon purchase because the prior seller's claim is uncertain. If private actors are willing to buy the resource notwithstanding the lack of the clarity about the seller's title, buyers are likely to insist on a discounted price. In the face of diminished demand for the resource (or lower prices), the incentive to supply the resource is reduced, and actors will limit the investments that they make in creating or capturing the resource. Thus, initially allocating property rights in resources may increase the demand for, and supply of, a resource and stimulate markets for it.

Property rights have been initially established in a number of environmental attributes, including GHG emissions (in allowances issued in the California and RGGI cap-and-trade programs), avoided GHG emissions (through offset credits created by private actors), the environmental benefits of renewable power (in RECs in 36 states and territories),[74] and avoided electricity use in white certificates and ESCerts (in France and Italy and in five U.S. states).[75] However, as this list illustrates, the

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[70] THOMAS W. MERRILL & HENRY E. SMITH, PROPERTY: PRINCIPLES AND POLICIES 882–83 (3d ed. 2017) (discussing the *nemo dat quod non habet* principle).

[71] *Id.* at 882.

[72] Henry E. Smith, *On the Economy of Concepts in Property*, 160 U. PA. L. REV. 2097, 2120–23 (2012); *see also* Yun-Chien Chang, *247 Jurisdictions in the World Get the Good-Faith Purchase Problem Wrong: A New Economic Framework* 14 (N.Y.U Sch. of L., Working Paper No. 19-25, 2019). While emphasizing that *nemo dat* is the baseline legal principle, Smith underscores the exceptions that apply under certain circumstances involving land and personal property. Smith, *supra*, at 2120–23.

[73] Ronald Coase, *The Federal Communications Commission*, 2 J.L. & ECON. 1, 25 (1959). *See also id.* at 14 ("A private-enterprise system cannot function properly unless property rights are created in resources.").

[74] *See supra* note 13.

[75] *See infra* notes 161 and 162.

allocation of property rights in even these well-established environmental attributes remains incomplete, with many jurisdictions not having allocated rights in them.

In addition, there are likely many other environmental attributes that have not yet been propertized that could be in the future as technology evolves to enable their measurement and demand emerges for them.[76] For example, more efficient dishwashers avoid not only electricity use and GHG emissions, but also water use. The water savings likely could be quantified and sold if there were demand for them due to water scarcity in an era of climate change. When cows burp, they emit large amounts of methane, a potent GHG that is an important contributor to climate change. The methane emissions of cow herds can now be quantified, creating the potential to allocate ownership of allowances for methane emissions from cattle.[77] The idea of allocating ownership of water savings from dishwashers and avoided methane emissions from cow burps, to facilitate their sale might sound fanciful, but it would have been unimaginable a hundred years ago that people would be selling allowances authorizing the release of a ton of GHG emissions.

New technology also may enable new players to claim rights to own environmental attributes, raising questions about whether to revise the rules for allocating attributes that are already packaged into property. For example, the proliferation of products equipped with smart and other internet-connected technologies enables households to measure and control their energy and water use remotely.[78] Households could potentially contract with companies to remotely

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[76] *See generally* Pappas & Flatt, *supra* note 53, at 771–72 (technological changes may reduce the cost of severing resources and facilitate the development of markets in new resources).

[77] Michael Allen, *Battling Bovine Belching: Measuring Methane Emissions from Cows*, 34 PHYSICS WORLD (April 2021), https://physicsworld.com/a/battling-bovine-belching-measuring-methane-emissions-from-cows/#:~:text=In%20his%20research%2C%20Kebreab%20measures,out%20while%20they%20are%20eating.

As an alternative to creating property rights in actual cow methane emissions, rights might be established in avoided cow methane emissions. For example, if the diets of cows were changed to reduce their burping, and the avoided emissions could be quantified, private actors might be able to create credits in the attribute of avoided cow methane emissions that could be privately sold.

[78] These products include smart temperature control in home thermostats and AC units, automated lighting and window treatments, smart irrigation and security systems, and smart power outlets. Lucas Bergman, *Six Things to Know About Using Sustainable Smart Technology*, BIOFRIENDLY PLANET (Dec. 27, 2019), https://biofriendlyplanet.com/green-alternatives/sustainable/6-things-to-know-about-using-sustainable-smart-technology/. Smart meters, which record and transmit information about energy consumption in real-time to consumers and utilities through a wireless network, are prominent example of the potential of internet-connected technologies to transform the energy system. As of 2017, half of all electricity customers had smart meters. Miriam Aczel, *Measuring Up: Smart Meter Lessons from*

measure and dispatch smart appliances and systems—if the households are recognized as the owners of the attributes that the new technology allows to be measured and dispatched.

Drawing on approaches that have been used to establish property rights in environmental attributes that are already traded, the next part of this article identifies a menu of principles and techniques for establishing property rights in unpropertized attributes. The principles and techniques outlined here may assist policymakers and private actors seeking to facilitate the marketability of environmental attributes, and judges and other adjudicators resolving ownership disputes.

## III. PRINCIPLES AND TECHNIQUES FOR INITIALLY ALLOCATING OWNERSHIP

How does something that has never been owned, such as the avoided electricity use from the energy efficient refrigerators in our introductory example, come to be owned for the first time? We posit that there are two key steps in the emergence of ownership: First, the resource must be assigned to a unique owner based on a principle such as first in time, accession, the highest bidder, or labor. [79] The New York Supreme Court took this first step in the famous case of *Pierson v. Post* when it declared that Pierson owned the fox that he killed, not Post, because Pierson was the first to possess the fox.[80] Second, the choice of a unique owner must come to bind the community at large so that owners such as Pierson have an *in rem* right that is good against the world, not merely an *in personam* right to an object good only against another individual, such as Post.[81] With a right that is good against the world, a property owner has a "bundle of sticks," whose content varies, but typically includes the right to sell the

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*the United Kingdom*, ENV'T. L. INST. (Feb. 12, 2018), https://www.eli.org/vibrant-environment-blog/measuring-smart-meter-lessons-united-kingdom. *See also Do Smart Meters Help the Environment?*, SMART ENERGY CONSUMER COLLABORATIVE, https://www.whatissmartenergy.org/faqs/do-smart-meters-help-the-environment#:~:text=Smart%20meters%20will%20also%20reduce,meters%20without%20sending%20out%20a; *Energy efficiency and Digitalisation*, INT'L ENERGY AGENCY, https://www.iea.org/articles/energy-efficiency-and-digitalisation.

[79] *See also* Thomas W. Merrill, *Accession and Original Ownership*, 1 J. LEGAL ANALYSIS 459, 474 (2009) (referring to first possession and accession as "operat[ing] . . . to identify unique persons as owners of particular resources").

[80] Pierson v. Post, 3 Cai. R. 175 (N.Y. Sup. Ct. 1805).

[81] MERRILL & SMITH, *supra* note 7070, at 19–20 (distinguishing *in rem* and *in personam* rights, and identifying property as *in rem* right and contract as creating *in personam* rights).

resource.[82] Contemporary property theorists usually think of others—such as the people on Long Island, where Pierson and Post lived—coming to be bound by an allocation as a result of top-down government decision embodied in legislation or regulation. Some also recognize the potential for an allocation to be ratified within society, without state involvement, through the emergence of a societal norm affirming the allocation.[83] In a distinct contribution, we highlight the potential for an allocation to come to be accepted through a combination of private and government action, drawing on our review of how some novel environmental attributes have recently been packaged into property.[84]

This part begins by identifying various *principles* that governments, private actors, and the courts, in the case of disputes, have used to identify unique owners of a novel environmental attribute. Then it discusses different *techniques* that have been used to the community at large to the choice of the unique owner of an environmental attribute.

The principles and techniques identified below for initially allocating property rights might be thought of as approaches that legislatures, regulators, courts, and private actors have considered means of promoting efficiency, distributive justice, and other goals. [85] In any given context, which principles and techniques are best suited to initially allocating a particular resource are likely to vary depending on the characteristics of the resource, the state of technology, the policymaker's goals for the resource, and other factors. The optimal approach for initially allocating rights to the

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[82] The precise content of the owner's bundle varies depending on many factors, including the nature of the resource, and the time and place, and modern property rights are often subject to many regulatory restrictions.

[83] Many scholars distinguish between top-down and bottom-up explanations for how property rights emerge. *See, e.g.*, STUART BANNER, WHO OWNS THE SKY 243–47 (2008); Richard A. Epstein, *The Allocation of the Commons: Parking on the Public Roads*, 31 J. LEGAL STUD. 515–44 (2002).

[84] While we divide the creation of private rights into two steps for analytical purposes, the creation could be, and often is, discussed as occurring in one step. When considered as a single step, the resource is allocated to one actor and that allocation is simultaneously assumed to bind the world. *See, e.g.*, Richard A. Epstein, *Possession as the Root of Title*, 13 GA. L. REV. 1221, 1228 (1979). An issue in the creation of a property right that we do not discuss is the delineation of the scope of the right; we set to the side this important issue in this article because we are concerned with how to allocate environmental attributes that we assume technology allows to be measured.

[85] *See generally* Guido Calabresi & A. Douglas Melamed, *Property Rules, Liability Rules, and Inalienability: One View of the Cathedral*, 85 HARV. L. REV. 1089 (1972); Epstein, *supra* note 84, at 1242. There could be other goals motivating the establishment of rights depending on the context. For example, as discussed in Part IV, policymakers might seek to create or recognize rights to energy resources to promote reliable and resilient access to energy.

same resource also might change over time, as understandings of the resource, the state of technology and policy goals evolve.[86]

A word about the potential to mix and match principles and techniques. In theory, any of the principles discussed below for identifying a unique owner of a novel environmental attribute might be coupled with any of the techniques for binding third parties to that allocation. However, some pairings of principles and techniques might be more effective than others in creating property rights. For example, if private actors are seeking to bind strangers to a particular allocation without the assistance of the government, it may be easier to use a principle that is intuitively easy to understand, such as a first in time rule like first possession. It may be easy for people generally—not only the hunters such as Pierson and Post, but also the other people living on Long Island—to accept that a resource is owned by the person who first possesses it, and respect that claim. Conversely, when more complex, less intuitive, principles are used to allocate a resource, such as investment in capturing it, then a technique, such as regulation, that provides people with transparent notice of who the initial owner is may be advantageous in binding strangers.[87]

### *A. Step One: Principles for Identifying a Unique Initial Owner*

As mentioned in Part II, it is now feasible to measure the methane emissions from cows burping, and these emissions are a significant source of methane. Suppose these emissions become valuable because governments decide to cap societal emissions of methane, and private actors want to sell and buy the limited amounts of methane that governments allow to be emitted. Several parties might claim to initially own the emissions, and have the right to sell them: the farmers who currently own the cows, the farmers who bred the cows, or the actors who figure out how to measure and bundle the emissions. How should private parties (or policymakers) determine who initially owns the cows' methane emissions? We analyze four principles that have been used to identify an original owner for environmental attributes that have already been allocated.[88]

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[86] *See, e.g.,* Merrill, s*upra* note 79, at 487 n.21 (referring to the evolution in approaches for allocating broadcast frequencies) (citing Thomas W. Hazlett, *Assigning Property Rights to Radio Spectrum Users: Why Did FCC License Auctions Take 67 Years?*, 41 J.L. & ECON. 529 (1998)); Troy A. Rule, *Property Rights and Modern Energy*, 20 GEO. MASON L. REV. 803 (2013) (discussing the evolution of property law in response to technological innovations in energy).

[87] *See generally* Henry E. Smith, *The Language of Property: Form, Context and Audience*, 55 STAN. L. REV. 1105 (2003).

[88] There are many other principles—or combinations of principles—that might be used to choose a unique owner, including need or random selection through a lottery. Hazlett, *supra* note 86, at 533;

1. First in Time

One option might be to award the methane emissions to the first party to measure the methane emissions consistent with the measurement and verification protocols established by the people interested in buying the emissions. The law pervasively recognizes the first actor to do something with an unowned resource as the initial owner of that resource.[89] Historically, the first person to possess tangible things such as wild animals,[90] water (in the U.S. states that apply the rule of prior appropriation), [91] and onshore oil and gas[92] have been deemed the initial owner of these resources. Variations of the first in time principle are used to allocate initial ownership of intangibles. The first to file a patent application with the Patent and Trademark Office obtains the patent,[93] and first in time is used to initially allocate trademarks[94] and security interests.[95] Some emissions trading programs, such as the federal Acid Rain Program, initially allocate permits using prior appropriation, which is a variation of a first in time rule; the Acid Rain Program gave allowances to emit

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Matthew Haag, *25 Million Applications: The Scramble for N.Y.C. Affordable Housing*, N.Y. TIMES (June 15, 2020); Julie Satow, *Better Than the Powerball*, N.Y. TIMES (Jan. 11, 2019).

[89] Epstein, *supra* note 84, at 1221. For an accessible discussion of the benefits of using first in time to allocate initial ownership, see MICHAEL HELLER & JAMES SALZMAN, MINE! 24–30 (2021).

[90] Pierson v. Post, 3 Cai. R. 175 (N.Y. Sup. Ct. 1805).

[91] Epstein, *supra* note 84, at 1236. First in time was also used to allocate access to the spectrum before 1927. Hazlett, *supra* note 86, at 530, 532; Dean Lueck, *The Rule of First Possession and the Design of the Law*, 38 J.L. & ECON. 393, 419 (1995).

[92] Lueck, *supra* note 91, at 425–26. On the evolution of the application of the rule of capture to oil and gas, see Bruce M. Kramer & Owen L. Anderson, *The Rule of Capture – An Oil and Gas Perspective*, 35 ENV'T LAW 899 (2005).

[93] PETER S. MENELL ET AL., INTELLECTUAL PROPERTY IN THE NEW TECHNOLOGICAL AGE: 2019, VOLUME I: PERSPECTIVES, TRADE SECRETS AND PATENTS 161 (2019). *See also id*. at 200–05; HELLER & SALZMAN, *supra* note 89, at 28; Merrill, *supra* note 79, at 485. To be sure, there are other elements that need to be satisfied in addition to being the first to file to obtain a patent. MENELL ET AL., *supra*, at 168–317.

[94] JESSE DUKEMINIER ET AL., PROPERTY 83 (8th ed. 2014); Merrill, *supra* note 79, at 469.

[95] U.C.C. § 9-322(a)(1)–(3) (AM. L. INS. & UNIF. L. COMM'N 1977). *See also* LYNN M. LOPUCKI, ELIZABETH WARREN & ROBERT M. LAWLESS, SECURED TRANSACTIONS: A SYSTEMS APPROACH (9th ed. 2019). However, there are exceptions to the first in time to file or perfect rules. U.C.C. § 9-322(f).

$SO_2$ to electric utilities that were emitting sulfur dioxide prior to the passage of the program.[96]

First in time is an attractive rule for choosing "a unique owner"[97] if the societal goal is to encourage private actors to capture an existing resource or create a new technology. It sets up a race, with the private actor who wins the race allocated a property right as a prize. It encourages people to race to secure the resource as quickly as possible because it provides people with property rights only after they have been the first to possess or create the resource. It also encourages investment in technology to better capture the resource, and thus innovation.[98] Using a first in time rule also makes it theoretically possible for anyone to secure the property right and thus encourages actors with no prior connection to the resource to enter the race, which also may promote innovation.[99] Unlike some of the principles discussed below, such as accession, it does not expressly favor incumbents, although in practice more financial means may help a party win the race.[100] Another attraction of first in time is that it should be straightforward to apply,[101] at least after there is a clear definition of what must be done first to win the race.[102]

However, first in time is not an attractive rule in all circumstances. It may induce wasteful racing behavior to capture a resource,[103] particularly if there is not a clear definition of what it takes to win the resource that enables a quick resolution of

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[96] Jonathan Remy Nash, *Allocation and Uncertainty: Strategic Responses to Environmental Grandfathering*, 36 ECOLOGY L.Q. 809, 820 (2009); Paul L. Joskow & Richard Schmalensee, *The Political Economy of Market-Based Environmental Policy: the U.S. Acid Rain Program*, 41 JOURNAL OF LAW & ECONOMICS 37 (1998); Nathaniel Keohane et al., *The Choice of Regulatory Instruments in Environmental Policy*, 22 HARV. ENVTL. L. REV. 313 (1998; Jeremy Waldron, *Indigeneity? First Peoples and Last Occupancy*, 1 NEW ZEALAND J. PUB. & INT'L L. 55 (2003).

[97] Merrill, *supra* note 79.

[98] *Id.*

[99] *Id.* at 497–98.

[100] *See also* HELLER & SALZMAN, *supra* note 89, at 29.

[101] Epstein, *supra* note 84, at 1222; Merrill, *supra* note 79, at 477.

[102] Scholars such as Professor Carol Rose emphasize that first possession requires a "statement," or "notice" that is intelligible to the relevant audience to "facilitate trade and minimize resource-wasting conflict." Rose, *supra* note 53, at 78–79, 81. *See also* Smith, *supra* note 87.

[103] Private parties will invest in technology and labor to win the race; while the winners will capture a prize that should offset their racing costs, those who fail to capture the resource will have needlessly invested in winning, and, collectively, their racing costs may exceed the value of capturing the resource from a societal perspective. Lueck, *supra* note 91, at 394; Merrill, *supra* note 79, at 482–83.

the race.[104] First in time may also lead to over- or premature consumption of a resource, as parties race to capture it before others, even if it would be preferable from a societal perspective to delay capture until the resource is more valuable.[105] The risk of over-consumption is particularly problematic if the resource is finite, or renewable only over a long period of time. For example, for hundreds of years ocean fisheries were allocated under a rule of first possession, with fishers acquiring property rights in the fish only after they had captured them. In the latter half of the twentieth century, incentivized by the rule of first possession, fishers invested in new aggressive capture technologies and used them to overfish ocean fisheries around the world.[106]

If private actors and policymakers wanted to quickly allocate ownership of cows' methane emissions, they might assign the emissions of cow herds to the first party to measure these emissions because this might encourage parties to race to quantify these emissions. However, awarding methane emissions to the first to measure them might have the undesirable consequence (from a climate change perspective) of incentivizing the people measuring these emissions to find more emissions, which they might do by breeding more cows to emit more methane. This suggests it might be better to use a different principle to choose a unique owner, or a carefully designed first in time rule. For example, the Acid Rain Program freely allocated allowances to utilities that had emitted $SO_2$ in the 1980s, before the program was legislated. This meant that the program did not create an incentive to emit $SO_2$ in order to acquire free allowances.[107]

2. Accession

A first in time rule allocates property rights to the party whose actions enable them to win a race. Accession is a competing principle that allocates initial ownership

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[104] Lueck, *supra* note 9191, at 401–02. First possession is not self-applying. Policy, ideology, and prejudice have influenced what counts as possessing land and other resources. For hundreds of years, as European settlers sought to provide a legal basis for their settlement of North America, indigenous peoples were not considered by Europeans to have sufficiently possessed land to own it. *See* Johnson v. M'Intosh, 21 U.S. 543 (1823); Cheryl I. Harris, *Whiteness as Property*, 106 HARV. L. REV. 1709, 1721 (1993); K-Sue Park, *Conquest and Slavery as Foundational to Property Law*, 2021 GEO. L. FAC. PUBL'NS & OTHER WORKS 2361 at 49.

[105] Lueck, *supra* note 91, at 394; Merrill, *supra* note 79, at 483–84. *See also* Merrill, *supra* note 79, at 482 (discussing "four pathologies" of first possession, including "wasteful races" and "premature exploitation or overconsumption of resources").

[106] Katrina M. Wyman, *From Fur to Fish: Reconsidering the Evolution of Private Property*, 80 N.Y.U. L. REV. 117, 157–59 (2005). n

[107] Nash, *supra* note 96.

based on the "status" of already owning something else.[108] According to Thomas Merrill, its best-known contemporary exponent, accession works by initially allocating property to a "newly discovered or newly salient resource . . . to the person who owns as property some other resource prominently connected with the newly discovered or salient thing. The factors that establish prominent connection, in a fashion analogous to those that establish first possession, also vary according to social context."[109]

Accession is sometimes used to establish property rights in environmental attributes. Landowners routinely believe that they own the right to extract energy from the wind blowing over their land based on their underlying landownership. Wind farm developers lease land to secure access to the energy from the wind, assuming that the landowners own the right to extract the energy.[110] If cows' methane emissions became valuable, the owners of the cows might claim to own the cows' emissions on the basis that the emissions are closely connected to the cows that the owners already own.

Accession is a useful principle for initially allocating ownership to resources when property rights are already pervasively allocated to resources, and so there are pre-existing rights on which to piggyback new rights.[111] It also is useful when many people share an intuition that a newly discovered or valuable resource is closely connected to an existing resource that is already propertized, and so there are unlikely to be competing property owners arguing that their property is closely connected to a new resource.[112]

Accession also is useful when the owner of the existing resource is likely to be well-positioned to use the newly discovered or valuable resource to advance societal goals.[113] This might be the case because it is easier to exploit the new resource if one controls the pre-existing property. For example, one reason for initially allocating to landowners the right to extract energy from the wind blowing over their land is that landowner involvement currently is necessary to exploit wind energy because wind turbines must be placed on land. The close connection between controlling the land and extracting wind energy may help to generate the intuition shared by landowners and wind farm developers that landowners own the right to extract wind energy.[114]

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[108] Merrill, *supra* note 79, at 480–81.

[109] *Id.* at 463. *See also* HELLER & SALZMAN, *supra* note 89, at 120–60.

[110] Yael R. Lifshitz, *Rethinking Original Ownership*, 66 U.T. L.J. 513, 543–48 (2016).

[111] Merrill, *supra* note 79.

[112] *Id.* at 477 and 488.

[113] *Id.*

[114] Lifshitz, *supra* note 110, at 547.

However, accession also has clear downsides as a rule for initially allocating ownership. For one, it rewards existing property owners with rights in new resources for free, without them having done anything to find or create the resource, and thereby enables the "rich to get richer"[115] based merely on their existing riches. In doing so, accession may enable existing property owners to make it difficult for others to enter an industry, especially if the newcomers have to acquire a property right in the new resource from an existing owner who obtained it for free.[116] Accession also will be complicated to implement if there is no widely shared intuition that a new resource is closely connected to a particular existing resource.[117] Were it to become feasible to sell the water saved from water efficient dishwashers, dishwasher manufacturers, homeowners, and water utilities, among others, might have a claim to own property closely connected to the water savings. Delays in resolving disputes between potential claimants might delay the use of the water savings.

It might be intuitive to allocate cows' methane emissions to the owner of the cows. In a similar instantiation of the principle of accession, calves are routinely initially allocated to the owner of the mother cow under the doctrine of increase.[118] However, allocating emission ownership based on ownership of the cow could be seen as providing an undeserved windfall to cow owners, who might have done nothing to develop the technology to measure and monitor the cow emissions.

3. The Highest Bidder

Economists and economically oriented legal scholars often recommend government-run auctions to allocate initial ownership of new or newly valuable resources to the highest bidder.[119] Government-sanctioned auctions are used to initially allocate a number of the environmental attributes that have been propertized

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[115] Merrill, *supra* note 79, at 499.

[116] The free allocation of fisheries catch shares based on prior fish harvests has been criticized as favoring incumbents by providing them with a windfall. SCHWARTZ, *supra* note 44.

[117] Merrill, *supra* note 79, at 492.

[118] MERRILL & SMITH, *supra* note 70.

[119] *See, e.g.*, Lueck, *supra* note 91, at 403; SCHWARTZ, *supra* note 44; Merrill, *supra* note 79, at 486–87. Coase famously argued that the federal government should auction off spectrum frequencies, which it started doing in1994. Coase, *supra* note 73; Hazlett, *supra* note 86, at 530.

to date, including allowances to emit GHGs in the carbon trading programs in California, RGGI, and the European Union.[120]

There are several reasons for initially allocating property rights in previously unallocated attributes to the highest bidders in an auction. Auctions ensure that property owners pay for the value that they acquire through their new property rights, something which, the principle of accession, for example, grants to property owners for free. The property holder stands to benefit from any increases in the value of the resource, and so arguably should pay for the right, especially if no investment is necessary by the property holder to find or create the resource.[121]

Initially allocating environmental attributes that harm the environment, such as $CO_2$ emissions, through auctions also instantiates the polluter pays principle by requiring polluters to pay some of the costs of their pollution.[122] To limit the number of permits that they must purchase in auctions, polluters are incentivized to reduce their emissions. Furthermore, the revenues that the government raises from auctions can be used for many purposes, including compensating those harmed by the pollution that occurs, subsidizing investments to reduce the pollution, reducing the government's reliance on inefficient taxes to pay for other programs and services, reducing the deficit,[123] or refunds to taxpayers.

However, there also are downsides to using auctions to allocate initial ownership, for example if the environmental attribute that will be propertized needs to be created or discovered. The requirement to purchase a property right to initially own it may discourage the creation or the identification of new resources, which itself may be costly.[124] Such a requirement might function similar to a tax, which can discourage

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[120] EMISSIONS TRADING IN PRACTICE: A HANDBOOK ON DESIGN AND IMPLEMENTATION, PARTNERSHIP FOR MARKET READINESS & INT'L CARBON ACTION PARTNERSHIP, WORLD BANK GROUP, 101–02 (2021).

[121] Coase argued for auctioning access to the electromagnetic spectrum partly because he saw the free issuance of licenses to radio and television stations as giving station owners a windfall, as their FCC licenses enhanced the value of their stations. Coase, *supra* note 73, at 22–23.

[122] The government could establish a minimum bid price for permits that reflects the harm caused by each unit of pollution authorized by a permit, and so therefore ensure that polluters purchasing permits pay at least the harms of their pollution.

[123] Hazlett, *supra* note 86, at 568 (Congress allowed the FCC to auction broadcast licenses partly to help reduce the federal deficit).

[124] *See* Michael Abramowicz, *The Uneasy Case for Patent Races Over Auctions*, 60 STAN. L. REV. 803, 828 (2007) (contemplating government auctions of patents to drugs, in which successful bidders would acquire "an exclusive right to use any inventions subsequently developed falling within the scope of the patent right").

activity. As discussed above, patents, which are awarded to encourage novel inventions, are allocated using a first in time rule according to which the first party to file a qualifying patent application wins the patent; parties are not required to buy the right to an invention before they invent it.[125] Patent law's reliance on first in time fits with the hypothesis that auctions are less desirable compared to first in time rules, which set in motion a race, "when important resources are yet to be discovered."[126]

Allocating property rights to the highest bidder through an auction also might be administratively costlier than using a first in time rule or accession.[127] The government needs to be able to precisely define the resource that it is auctioning,[128] and to administer the auction or delegate auction administration to a third party. While the government might charge the parties acquiring property rights a fee that covers the cost of running the auction, the complexity of creating the rules governing the auction might discourage governmental use of auctions, especially when the resources being propertized are not valuable or not yet in existence, which complicates delineating them for sale in an auction.[129] Were a government to auction rights to own cows' methane emissions, the government would likely need to be able to delineate rights to the emissions of groups of cows, in a defined geography, over a defined period of time, accounting for uncertainty and differences among cows. Moreover, allocating cow emissions through an auction also might have the undesirable distributional consequence of leading well-heeled farmers or industrial agricultural firms to acquire the rights to cows' methane emissions, [130] absent a mechanism to help less-endowed

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[125] Lueck, *supra* note 91, at 403; Abramowicz, *supra* note 124, at 835.

[126] Lueck, *supra* note 91, at 410. *See also id.* at 471; Abramowicz, *supra* note 124, at 835. In 1920-26, the radio spectrum was claimed using first possession, a rule that commentators have argued was justified in this period when the spectrum was initially discovered. Lueck, *supra* note 91, at 419; Hazlett, *supra* note 86, at 543; THOMAS WINSLOW HAZLETT, THE POLITICAL SPECTRUM: THE TUMULTUOUS LIBERATION OF WIRELESS TECHNOLOGY, FROM HERBERT HOOVER TO THE SMARTPHONE 38-46 (2017).

[127] Lueck, *supra* note 91, at 403; Merrill, *supra* note 79, at 486–88; *see also* Coase, *supra* note 73, at 18 (referring to "the costs of operating the market"); Abramowicz, *supra* note 124, at 854–55 (referring to "technical challenges" of administering patent auctions).

[128]Abramowicz, *supra* note 124, at 829–30 (cautioning that the government might allocate excessively broad property rights if precise definition is not possible).

[129] Abramowicz, *supra* note 124, at 835 ("As Aditya Bamzai has pointed out, '[a]uctions are . . . less useful when government policy aims to induce private investment in the discovery of new goods, and more useful when the government has already identified the good in question.' Bamzai cites intellectual property as an example of this general point, noting that 'the auction method requires that the government know what it is auctioning off.'") (citing Aditya Bamzai, Comment, *The Wasteful Duplication Thesis in Natural Monopoly Regulation*, 71 U. CHI. L. REV. 1525, 1546 (2004)).

[130] Abramowicz, *supra* note 124, at 843–44.

farmers with credit to buy the emissions, or to freely allocate such emissions to these farmers.

4. Labor

John Locke famously argued that people acquire initial ownership of resources based on laboring on them. Thus he argued that people acquire the acorns and apples that they pick based on appropriating them.[131]

Closely related to the idea that ownership should be allocated based on labor is that it should be awarded based on creating the resource (or paying for the creation of the resource). Under this approach, creating the resource (or paying for its creation) generates the claim of ownership, rather than the physical act of laboring on the resource. Something like a "pay to create" principle has been used to allocate ownership of environmental attributes. When states first created RECs, public utility commissions and courts had to decide how to allocate ownership of these credits for renewable energy sold by power producers to utilities under long-term contracts that that predated RECs. Decision-makers allocated ownership of the RECs to the utilities that bought the power, not the renewable power generators.[132] This could be seen as an instantiating the principle of accession: the RECs were closely associated with the renewable power that the utilities were buying from the generators, and so it is logical to have the RECs flow with the power to the utilities. The fact that the utilities paid a premium for the renewable power that generated the RECs also seems to have helped the utilities, at least in one court. In upholding the decision of the New Jersey Board of Public Utilities to allocate the unassigned RECs to the utilities rather than the renewable power generators, a New Jersey court identified the fact that the utilities had paid above market price for the power to subsidize the spread of renewable power as a factor weighing in favor of the utilities' claim to the RECs.[133]

Allocating ownership to the person who labored to capture an existing resource or create a new one is often justified as a way of encouraging innovation.[134] It also satisfies a common moral intuition that people should be rewarded for their efforts. Rewarding effort may seem especially morally compelling when it produces something that benefits not only the laborer, but also society at large.

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[131] JOHN LOCKE, TWO TREATISES OF GOVERNMENT, bk. II, ch. V, para. 27.

[132] *In re* Ownership of Renewable Energy Certificates, 913 A.2d 825, 828 (N.J. Super. Ct. App. Div. 2007).

[133] *Id.* at 830.

[134] HELLER & SALZMAN, *supra* note 89, at 102.

However, labor and the principles related to it will often provide an indeterminate basis for allocating initial ownership. It is necessary to define what counts as labor that will give rise to ownership, similar to the way it is necessary to define what acts count as winning the race to be first in time.[135] Is touching the apple enough, or must a person actually pick the apple to own it?[136] Another problem with trying to use labor to allocate initial ownership is that resources will often be captured, or come into being, due to the efforts of a number of actors. Value is often socially created; the actions of multiple people are often necessary to create or capture things. For example, the renewable energy attributes propertized in RECs are the product of the efforts of the manufacturers that make the solar panels, the installers who put them on rooftops, the consumers who buy or lease them, and the companies that finance the production, sale and installation of the panels. If initial ownership were to be allocated based on labor, then all of these parties should be assigned some share. But having multiple initial owners would complicate the use of the resource, as the consents of multiple parties would be necessary to govern and transfer it.

### *B. Step Two: Techniques for Binding "the World"*

Assuming a newly identifiable resource, such as cow methane emissions or water savings from an efficient appliance, has been assigned to one of the actors with a plausible claim to it, how does that assignment come to bind strangers not a party to the initial assignment? There are three options: top-down through the state acting through law, backed up by force if necessary; bottom-up through the development of a societal norm or custom that people feel bound to respect; or through a hybrid of private and state actions.

Absent from this list of options is the potential to bind strangers to an initial allocation through contracts. Although small numbers of people can allocate resources among themselves through contracts, it would be too costly to negotiate the many contracts that would be necessary to secure an *in rem* right good against the world through contracting. Moreover, even if it were possible to negotiate a series of contracts in which everyone in the world agreed to an initial allocation, those contracts

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[135] *Id.* at 84 ("Labor—like *first-in-time* and *possession*—is not self-defining."). Policy, ideology and prejudice have influenced whose labor is considered sufficient to acquire property. *See, e.g.,* Park, *supra* note 104, at 33–34, 36–37 (discussing the disregard of the labor of Native Americans by Locke and colonists).

[136] LOCKE, *supra* note 131, at bk. II, ch. V, para. 27. Robert Nozick famously asked rhetorically whether one could own the ocean based on dumping a can of tomato juice into it. ROBERT NOZICK, ANARCHY, STATE AND UTOPIA (1974).

would need to be updated each time the resource was transferred to enable the new owner to similarly enjoy an *in rem* right good against the world.[137]

1. Top-down Approaches

Modern property theorists usually assume that private property comes into being in a top-down fashion, through the state acting through legislation or regulation.[138] Consistent with the standard view, many recently propertized environmental attributes were initially allocated in a top-down fashion by state actors, such as legislatures and administrative agencies. California's GHG trading program was established by regulation by the California Air Resources Board (CARB) pursuant to the Global Warming Solutions Act of 2006.[139] Under these regulations, CARB distributes GHG allowances—each of which authorizes the emission of a ton of GHGs—through a combination of auctions and free allocations.[140] There are other types of environmental property rights that private actors create pursuant to statutorily authorized rules. To promote the sale of electric vehicles, California's ZEV regulation requires vehicle manufacturers to sell a certain number of zero-emission vehicles in state, based on their overall sales within the state, or to supply ZEV credits instead.[141] Car manufacturers generate these ZEV credits by manufacturing certain types of

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[137] The practical obstacles to establishing in rem property rights through contracts were recognized hundreds of years ago, and continue to be a theme in modern property theory. LOCKE, *supra* note 131, at bk. II, ch. V, para. 27; Matt Schrage, *Rousseau and Locke on Property and the State*, MATT SCHRAGE (Apr. 26, 2018, 4:39 PM), https://blogs.harvard.edu/mattschrage/2018/04/26/rousseau-and-locke-on-property-and-the-state/#:~:text=Locke%20asserts%20that%20private%20property,instead%20from%20a%20natural%20right.&text=By%20mixing%20his%20labor%20with,V%2C%20288; BANNER, *supra* note 83, at 293; Carol M. Rose, *Possession as the Origin of Property*, 52 U. CHI. L. REV. 73, 74 n.8 (1985); J.E. PENNER, PROPERTY RIGHTS: A RE-EXAMINATION (2020) (property is not a series of bilateral relationships).

[138] Thomas W. Merrill & Henry E. Smith, *Optimal Standardization in the Law of Property: The Numerus Clausus Principle*, 110 YALE L.J. 1 (2000). The idea that property rights are created from above by the state acting through law has a long lineage. *See, e.g,* JEREMY BENTHAM, PRINCIPLES OF THE CIVIL CODE (1843), https://oll.libertyfund.org/title/bowring-the-works-of-jeremy-bentham-vol-1#lf0872-01_head_161.

[139] CAL. HEALTH & SAFETY CODE § 38562(b)(1), § 38570(a), § 38505(k) (West, Westlaw through 2021 Reg. Sess. ch. 19); CAL. CODE REGS. tit. 17, § 95801 *et seq*. (2021).

[140] *Allowance Auction*, CAL. AIR RES. BD., https://ww2.arb.ca.gov/our-work/programs/cap-and-trade-program/allowance-allocation (last visited June 29, 2021); *see also* CAL. CODE REGS. tit. 17, § 95820(a) (2021); *id.* § 95802 ("Allowance").

[141] CAL. CODE REGS. tit. 13, § 1962.2 (2021). For background on the ZEV regulation, and its adoption by other U.S. states, see Alexandra B. Klass, *Public Utilities and Transportation Electrification*, 104 IOWA L. REV. 545, 579–81 (2018).

vehicles—such as electric cars—under terms set by the California ZEV regulation promulgated under the authority of the state's Health and Safety Code.[142]

RECs, which exist in over half of U.S. states, are another example of property rights created pursuant to legislation and regulation. Although the legal framework varies depending on the state, the standard practice at the state level seems to be to assign initial ownership of the REC by regulation to the generator of the renewable power, with the power generation providing the basis for the credit.[143] State law usually provides a mechanism for certifying the validity of the credit through a state certification agency. The generator is free to transfer the credit by contract to utilities or others who may use the credit to comply with regulatory requirements.

There are at least two reasons why environmental property rights such as the California GHG allowances, ZEV credits, and RECs have been created pursuant to legislation. One is that these property rights were established by governments as part of policies to achieve environmental regulatory objectives (such as reducing GHG and local co-pollutant emissions or increasing demand for, and the supply of, renewable power). The rights for which these property rights provide (such as the right to emit GHGs) would not have value in the absence of the broad regulatory programs of which they are a part, and these property rights are the instruments by which regulated parties comply with these regulatory programs. Second, creating these rights pursuant to publicly available legislation has the benefit of making it easier for third parties to learn of the rights and their limits, and therefore of reducing the cost of enlisting third parties to respect the rights.[144] Because the rights are defined by written legislation or regulation, the scope of the rights can be readily discerned by regulated parties and third parties. The authoritative definition of the scope of the property rights in

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[142] Carmakers can also generate credits under federal law. Leard & McConnell, *supra* note 20.

[143] *See, e.g.*, N.H. REV. STAT. ANN. § 362-A:9 (Westlaw through 2021 Reg. Sess. ch. 76) ("Renewable energy credits shall remain the property of the customer-generator until such credits are sold or transferred. If an electric distribution utility acquires renewable energy credits from a customer-generator in conjunction with purchasing excess generation, it may apply such generation and credits to its renewable energy source default service option under RSA 374-F:3, V(f)."). Thus, the principle of accession seems to govern the initial allocation, with the credit being initially assigned to the party that generated the power that generates the credit.

[144] In suggesting that the delineation of environmental property rights in legislation and regulation lowers the costs for third parties to understand the rights, we draw on the work of Merrill and Smith arguing that legislatures are superior institutions to courts for establishing new forms of property rights. Merrill & Smith, *supra* note 138. They argue that legislation is more likely than court decisions to delineate new rights in a clear, comprehensive and accessible format. *Id.* at 58–68 (identifying six reasons why legislative creation of new property rights reduces information costs for private third parties compared with judicial creation).

legislation or regulation is likely particularly valuable when the rights concern intangibles or other things that are not observable to the naked eye —such as the right to emit a ton of GHGs. Notably, property rights in other intangibles, such as copyrights and patents, also are established pursuant to legislation.

2. Bottom-up Approaches

Although there are advantages to creating new property rights through legislation and regulation, the state may be slow to act. Thus, private parties seeking to realize the value of a newly discovered resource may attempt to create private rights in the resource on their own, without appealing to state actors. An important question is how private parties can select a unique owner and bind third parties to respect the rights of that owner without the involvement of the state.

Some scholars have elaborated theories about the conditions under which private actors can create property rights independent of the state. For example, Professor Robert Ellickson argues that "close-knit groups" of people can evolve efficient property rights.[145] Ellickson argues that small numbers of people who engage regularly with each other may be able to use informal techniques, such as gossip or shaming, to punish people who do not respect each other's rights, and therefore encourage compliance with those rights.[146] Ellickson describes nineteenth century whalers as a close-knit group that evolved norms that allocated ownership of whales that were efficient, at least for the whalers, if not for the whales (which the whalers overfished) and people outside the whaling community (whose interests the norms did not seek to promote).[147]

A prominent contemporary example of private parties allocating rights to environmental attributes without the state is carbon offset credits that private parties create and sell to other private actors who are not required by government regulation

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[145] Robert C. Ellickson, *Property in Land*, 102 YALE L.J. 1315, 1320 (1993). Ellickson's theory "is an application of" his general theory that close-knit groups evolve efficient social norms. *Id.* at 1320 n.15. Like top-down theories, bottom-up theories, such as Ellickson's, of how property rights emerge also have a long lineage. For example, David Hume argued that property emerge through an implicit convention, as people come to respect others' holdings because that produces a "peace dividend." Jeremy Waldron, '*To Bestow Stability Upon Possession': Hume's Alternative to Locke*, *in* PHILOSOPHICAL FOUNDATIONS OF PROPERTY LAW 1 (James Penner & Henry E. Smith eds., 2013).

[146] Ellickson, *supra* note 145, at 1320–21.

[147] ROBERT ELLICKSON, ORDER WITHOUT LAW: HOW NEIGHBORS SETTLE DISPUTES 191–206 (1994). *See also* JAMES M. ACHESON, THE LOBSTER GANGS OF MAINE (1988); Epstein, *supra* note 83, at 531 (car drivers in Chicago informally allocate street parking spaces using first possession); HELLER & SALZMAN, *supra* note 89, at 43-46, 70–71.

to purchase such credits. As private companies and institutions are making voluntary pledges to reduce their own GHG emissions to address climate change, many are increasingly purchasing carbon credits from private markets to offset emissions they cannot reduce or eliminate on their own.[148] Recently, experts have estimated that the global demand for voluntary carbon credits could increase by a factor of fifteen in the next ten years, and a factor of one hundred in the next thirty.[149]

Growing voluntary markets also exist for renewable electricity, "driven by consumer preference for certain types of renewable energy" rather than state mandates—known colloquially as "green power markets."[150] In 2019, the attributes sold on these green power markets, which are distinct from mandatory markets for renewables used to meet state RPS requirements, constituted 164 million megawatt-hours of renewable energy, representing about four percent "of U.S. retail electricity sales."[151] Voluntary markets for new environmental attributes also could arise even in the absence of a parallel regulatory market. As many parts of the world face increasing water scarcity and droughts, for example, voluntary markets could help private actors meet commitments for water resource conservation.

The emergence of privately created carbon credits appears to be an instance where nonstate actors have been able to set and enforce standards that are respected by third parties,[152] although there are questions about whether the privately created credits are for truly additional reductions in GHG emissions.[153] Verifiers and registries in carbon offset markets play an important role in the process of allocating ownership by cutting off rival claims to particular carbon offsets. In certifying the offset, the verifier signals to the market that ownership over the attribute created by a particular

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[148] Christopher Blaufelder, Cindy Levy, Peter Mannion & Dickon Pinner, *A Blueprint for Scaling Voluntary Carbon Markets to Meet the Climate Challenge*, MCKINSEY & COMPANY (Jan. 29, 2021), https://www.mckinsey.com/business-functions/sustainability/our-insights/a-blueprint-for-scaling-voluntary-carbon-markets-to-meet-the-climate-challenge.

[149] *Id.*

[150] *U.S. Renewable Electricity Market*, EPA, https://www.epa.gov/greenpower/us-renewable-electricity-market#:~:text=Voluntary%20markets%2just (last visited June 29, 2021).

[151] JENNY HEETER & ERIC O'SHAUGHNESSY, NAT'L RENEWABLE ENERGY LAB'Y, STATUS AND TRENDS IN THE VOLUNTARY MARKET (2019 DATA) (2020), https://www.nrel.gov/docs/fy21osti/77915.pdf.

[152] Silvia Favasuli & Vandana Sebastian, *Voluntary Carbon Markets: How They Work, How They're Priced, and Who's Involved*, S&P GLOBAL PLATTS (June 10, 2021), https://www.spglobal.com/platts/en/market-insights/blogs/energy-transition/061021-voluntary-carbon-markets-pricing-participants-trading-corsia-credits.

[153] Ben Elgin, *A Top U.S. Seller of Carbon Offsets Starts Investigating Its Own Projects*, BLOOMBERG GREEN (Apr. 5, 2021), https://www.bloomberg.com/news/features/2021-04-05/a-top-u-s-seller-of-carbon-offsets-starts-investigating-its-own-projects

activity, in a particular geography, during a particular time, has been claimed.[154] By entering the attribute into a registry, the market provides notice to the public of that ownership.[155] In this sense, private parties have assumed the role of the state in allocating ownership of attributes. However, in the event of a dispute, parties could ultimately go to the courts (a state agent) to settle who owns the resource. Underscoring the significance of private efforts, the courts might choose to apply rules initially developed by private actors.[156]

3. Hybrid Approaches

While scholars tend to think of property rights emerging in either a top-down or a bottom-up fashion, our review of how some environmental attributes have been packaged into tradable instruments suggests the potential for a third possibility: property rights might emerge through a hybrid of bottom-up and top-down activity. After identifying a new resource, private actors might use contracts to claim rights to it from a small number of plausible competing claimants. To bind the many others who it is too costly to contract directly with, the entrepreneurs who defined the resource and sought to claim it through contracts might then appeal to a legislature or administrative agency to ratify their property rights and cut off third party claims.[157]

The process by which property rights are created in energy efficiency in France provides an intriguing example of rights emerging through a combination of bottom-up contracting and top-down state activity. Several European countries[158] and 22 U.S.

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[154] The Verified Carbon Standard (VCS), "the world's most widely used voluntary" carbon offset program, has certified almost 1,700 different projects. Under the VCS program, auditors assess projects against VCS rules. *Validation and Verification*, VERRA, https://verra.org/project/vcs-program/validation-verification/.

[155] VCS certified projects are transparently registered in the Verra registry. *Registry System*, VERRA, https://verra.org/project/vcs-program/registry-system/.

[156] There are precedents for courts using norms developed by private parties to allocate property rights. In the classic case of *Ghen v. Rich*, the court held that a third party was bound by the customary rules that whalers had developed for allocating whales. Ghen v. Rich, 8 F. 159 (D. Mass., 1881).

[157] Although usually thought of as a bottom-up theory of how property emerges, Locke's "labor theory" might actually be a hybrid theory. Locke suggests that people acquire property rights in unowned things by laboring on them (e.g. by picking the apples), but he also envisages people entering into a social contract to form the state to protect their rights. LOCKE, *supra* note 131, bk II, para. 138; s*ee also* Waldron, *supra* note 151, at 2. The state is the mechanism that secures people's holdings, by ratifying and then protecting against incursions claims that people obtained based on labor.

[158] SILVIA REZESSY & PAOLO BERTOLDI, EUR. COMM'N, INST. FOR ENERGY JOINT RSCH CTR, ENERGY SUPPLIER OBLIGATIONS AND WHITE CERTIFICATE SCHEMES: COMPARATIVE ANALYSIS OF RESULTS IN THE EUROPEAN UNION 8-300 (2010).

states[159] obligate energy companies, such as electrical and gas utilities, to increase energy efficiency for various reasons, including reducing GHG emissions and facilitating the reliability and security of electricity supply.[160] In France and Italy, regulated parties can meet their obligations by supplying "white certificates," which they can generate through programs to reduce energy consumption or purchase from other parties that have reduced energy consumption.[161] Five of the 22 U.S. states with mandatory energy efficiency resource standards also formally allow obligated entities to comply by trading ESCerts.[162]

Multiple parties could have claims to the avoided energy use from an energy efficiency improvement. For example, if a boiler is replaced in an apartment building, the claimants might include: the manufacturer of the more energy efficient boiler, the actor installing the new boiler, the lender financing the new boiler, the energy supplier that might have informed the building owner of the potential benefits of the project and incentivized it, and the building owner.[163] In France, "all parties in [a] position to claim the certificates" must agree in a contract about who will own the white certificate (which can be divided up among the parties).[164] "This contract is then submitted at the time when the certificates are actually claimed"; certification is undertaken by a

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[159] Sachs, *supra* note 14, at 10468. In addition to the 22 U.S. states with a mandatory energy efficiency resource standards (EERS), four have voluntary (non-binding) EERS. *Energy Efficiency Standards and Targets*, CTR. FOR CLIMATE & ENERGY SOLS., https://www.c2es.org/document/energy-efficiency-standards-and-targets/ (last updated Mar. 2019).

[160] Bertoldi & Rezessy, *supra* note 14. *See also* Sachs, *supra* note 14.

[161] REZESSY & BERTOLDI, *supra* note 158, at 8-301; see also Noah M. Sachs, *The Limits of Energy Efficiency Markets in Climate-Change Law*, 2016 U. ILL. L. REV. 2237, 2253 n. 77 (suggesting minimal trading in France, but more trading in Italy). On the Italian white certificate program, *see* CATAPULT ENERGY SYS., ENERGY TECH. INST., RICARDO ENERGY & ENV'T, ITALIAN ENERGY EFFICIENCY WHITE CERTIFICATE SCHEME (2018); D. DI SANTO & E. BIELE, EVALUATION INTO PRACTICE TO ACHIEVE TARGETS FOR ENERGY EFFICIENCY (EPATEE), THE ITALIAN WHITE CERTIFICATES SCHEME (2017).

[162] The five are Connecticut, Massachusetts, Michigan, Nevada and Pennsylvania. Sachs, *supra* note 14, at 10469. However, there may not be any trading occurring in any of these states. In a 2016 article, Professor Sachs indicated that trading was actively occurring only in Connecticut. *Id.* While energy efficiency can be used to generate Class III credits under Connecticut's Renewable Portfolio Standard, projects supported by ratepayers are no longer eligible to receive credits as of 2014, and energy efficiency is not currently being used to generate Class III credits. CONN. GEN. STAT. ANN. § 16-243q(a)–(c), § 16-1(38), § 16-243t(a) (2021). *See also Connecticut Renewable Portfolio Standard*, CONN. DEP'T OF ENERGY & ENV'T PROT., PUB. UTIL. REGUL. AUTH., https://portal.ct.gov/PURA/RPS/Renewable-Portfolio-Standards-Overview (last visited June 29, 2021). Sachs opposed the development of ESCert markets, based partly on his critique of existing markets. Sachs, *supra* note 161.

[163] The example is drawn from Bertoldi & Rezessy, *supra* note 14, at 20 n.25.

[164] *Id.*

government agency in France.[165] In other words, the French regime for initially allocating white certificates involves (bottom-up) contracting among the plausible potential claimants to the energy efficiency to allocate ownership, and (top-down) certification that seems to implicitly approve the parties' contractual allocation.

There are at least two reasons why a hybrid approach for initially allocating property might be desirable under certain conditions. For one, private actors might be better positioned to initially define some resources and identify the most suitable unique owner than the legislature or a regulatory agency. Legislators or regulators might have difficulty establishing a universal rule in legislation or regulation about which party should be assigned the right to profit from the electricity consumption avoided through the energy efficiency initiative. Who finances the energy efficiency measure, or who is best positioned to profit from the avoided electricity use, might vary greatly depending on the circumstances.

Second, the state might play useful roles in validating or confirming the private parties' initial definition of the resource and assignment of it to a unique party (or parties). Through the validation process, the state might confirm that the resource that the private parties are claiming has not already been claimed by other parties. If there is no public registry of the property rights that have already been claimed in the resource, the state validation process might be the mechanism for verifying that two or more parties are not claiming the same resource. If there is such a registry, the state validation process might be the means of ensuring that registry is kept up to date for the benefit of others who need to respect the existing rights.

The state validation of the parties' definition and allocation of the resource also might be the means by which the parties' arrangements come to bind strangers with whom they have not contracted who also might have a claim to the resource. As discussed above, it will not be practical for a party to establish an *in rem* right by literally contracting with all the parties who might claim the resource; such a web of contracts would be costly to negotiate. For example, the tenants of the apartment building also might have a claim to the energy use avoided through the installation of the new boiler, as they may have contributed to the cost of the boiler through a rent increase. Yet it might be too costly to negotiate with the tenants to disclaim their claims to the avoided energy consumption, especially if there are many tenants, they turn over frequently, and the value of the avoided consumption is small relative to the transaction costs of negotiating with the tenants. By lending its imprimatur to the parties' initial definition and assignment of the rights, the state validation process gives them the force of law, and binds third parties to the assignment.

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[165] *Id.* at 20; *see also id.* at 19. *See also* Sachs, *supra* note 14, at 10467.

## IV. APPLICATION TO ENERGY EFFICIENCY RESOURCES

This Part applies the menu of approaches for propertizing environmental attributes outlined in Part III to a question with which this article began: who initially owns the environmental attributes derived from measures to improve energy efficiency? Already traded in some jurisdictions, energy efficiency is an attribute that might be traded more if there were clearer legal rules for initially assigning ownership to it.

Energy efficiency involves reducing the energy required for a given activity. For example, switching from incandescent to LED bulbs reduces the electricity required to light a lamp by "75 to 80 percent."[166] Improving energy efficiency has a number of benefits.[167] Insofar as electricity is generated from fossil fuels, reducing the electricity required to accomplish a task reduces the use of fossil fuels and the accompanying emissions of GHGs[168] and co-pollutants harmful to human health, such as particulate matter.[169] Improving energy efficiency also benefits the power system. Because there are still limits on the extent to which electricity can be stored, the supply of power must always match the demand for power. Energy efficiency improvements reduce demand for power, thereby reducing the need to expand generation, transmission, and distribution capacity.[170] Improving energy efficiency also lowers electricity bills for consumers, businesses, and governments because they consume less power.[171]

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[166] *Energy Efficiency 101,* RES. FOR THE FUTURE (June 17, 2020), https://www.rff.org/publications/explainers/energy-efficiency-101/.

[167] *See* EPA, QUANTIFYING THE MULTIPLE BENEFITS OF ENERGY EFFICIENCY AND RENEWABLE ENERGY: A GUIDE FOR STATE AND LOCAL GOVERNMENTS, PART ONE: THE MULTIPLE BENEFITS OF ENERGY EFFICIENCY AND RENEWABLE ENERGY (2018), https://www.epa.gov/sites/production/files/2018-07/documents/mbg_1_multiplebenefits.pdf; INT'L ENERGY AGENCY, MULTIPLE BENEFITS OF ENERGY EFFICIENCY (2019), https://www.iea.org/reports/multiple-benefits-of-energy-efficiency.

[168] INT'L ENERGY AGENCY, MULTIPLE BENEFITS OF ENERGY EFFICIENCY EXTRACT: EMISSIONS SAVINGS (2019), https://www.iea.org/reports/multiple-benefits-of-energy-efficiency/emissions-savings.

[169] INT'L ENERGY AGENCY, MULTIPLE BENEFITS OF ENERGY EFFICIENCY EXTRACT: AIR QUALITY (2019), https://www.iea.org/reports/multiple-benefits-of-energy-efficiency/air-quality.

[170] INT'L ENERGY AGENCY, MULTIPLE BENEFITS OF ENERGY EFFICIENCY EXTRACT: ENERGY PRICES (2019), https://www.iea.org/reports/multiple-benefits-of-energy-efficiency/energy-prices.

[171] INT'L ENERGY AGENCY, MULTIPLE BENEFITS OF ENERGY EFFICIENCY EXTRACT: HOUSEHOLD SAVINGS, (2019), https://www.iea.org/reports/multiple-benefits-of-energy-efficiency/household-savings.

As a result of technological innovations over the last few decades, it is feasible to estimate and verify the energy use avoided through efficiency measures, such as switching to LED lightbulbs, installing energy efficient appliances such as refrigerators and washing machines, and weatherizing buildings by sealing leaks.[172] An important step in doing so is establishing a baseline of what energy use would have been absent the energy efficiency measures.[173] The proliferation of smart and internet-connected devices makes it increasingly possible to obtain reliable real-time data on consumer energy use, which can improve the accuracy of estimation techniques and potentially reduce the need to rely on these techniques. All of this technological change means that avoided energy consumption from efficiency improvements and appliances can be isolated and transferred as a distinct and separate product.

Indeed, several types of markets for energy efficiency attributes already exist. As mentioned in Part III, electric and gas utilities are eligible to trade ESCerts (or "white certificates" as they are known in European countries such as France) denoting specific quantities of avoided energy use to comply with government requirements to improve energy efficiency.[174] Energy efficiency is also eligible to participate in some of the wholesale electricity markets that FERC oversees, in particular PJM Interconnection, L.L.C. (PJM),[175] the New England Independent System Operator (ISO-NE), and the Midcontinent Independent System Operator (MISO) capacity markets.[176] In capacity markets, utilities purchase electricity supply obligations to ensure that sufficient electricity will be available in the years ahead to reliably meet demand.[177] The amount of energy efficiency sold into wholesale markets has varied

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[172] RES. FOR THE FUTURE, *supra* note 166. *See, e.g.,* PJM FORWARD MARKET OPERATIONS, PJM MANUAL 18B: ENERGY EFFICIENCY MEASUREMENT AND VERIFICATION, REVISION: 04 (2019); EPA, GUIDEBOOK FOR ENERGY EFFICIENCY EVALUATION, MEASUREMENT AND VERIFICATION (2019).

[173] EPA, GUIDEBOOK, *supra* note 172, at 10.

[174] Sachs, *supra* note 14, at 10469.

[175] PJM is the Regional Transmission Organization for all or parts of 13 states and the District of Columbia.

[176] PJM, ISO-NE, and MISO have tariff provisions permitting energy efficiency resources to participate in wholesale electricity capacity markets. OATT Attachment DD-1.L [PJM]; OATT Market Rule 1, § III.13 [ISO-NE]; OATT § 69A.3.2 [MISO]; KATHLEEN SPEES ET AL., BRATTLE GRP., THE BENEFITS OF ENERGY EFFICIENCY PARTICIPATION IN CAPACITY MARKETS (2021), https://info.aee.net/hubfs/The%20Benefits%20of%20Energy%20Efficiency%20Participation%20in%20Capacity%20Markets1.pdf. While most U.S. capacity markets allow energy efficiency to participate as supply-side resources, markets have experienced different rates of participation due to differences in market design and participation rules. SPEES ET AL., *supra*, at 2.

[177] *See, e.g.*, Shelley Welton, *Rethinking Grid Governance for the Climate Change Era*, 109 CALIF. L. REV. 209, 236 (2021). *See also* Joseph E. Bowring, *The Evolution of the PJM Capacity Market: Does*

over time.[178] FERC's Order 2222 could further increase the quantity of energy efficiency sold into the wholesale electricity markets as the order requires the regional electricity markets to revise their tariffs to make it easier for distributed energy resources, including energy efficiency, to be sold in these markets. For example, FERC ordered the wholesale electricity market operators to revise their market rules to allow aggregators of energy efficiency and other distributed energy resources to bid in these resources, with some exceptions.[179] Allowing in aggregators enables private actors to bundle the electricity use avoided through many small energy efficiency initiatives—such as installing efficient lighting and appliances in residential homes—that would be too insignificant individually to sell into the wholesale electricity markets, given the minimum size requirements for participating in these markets. There is, however, some opposition to the sale of energy efficiency in the wholesale capacity markets.[180]

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*It Address the Revenue Sufficiency Problem?*, *in* FEREIDOON P. SIOSHANSI, THE EVOLUTION GLOBAL ELECTRICITY MARKETS: NEW PARADIGMS, NEW CHALLENGES, NEW APPROACHES 227 (2013).

[178] *See* SPEES ET AL., *supra* note 176, at 3 ("Regardless of market differences, trends in [PJM, ISO-NE, and MISO] point to the growing penetration of [energy efficiency]. Cleared [energy efficiency] supply has increased by 170% in ISO-NE and by more than 300% in PJM in the last ten years. In MISO, it has increased from zero supply in the 2016–17 planning year to its present level."); MKT. ANALYTICS, LLC, STATE OF THE MARKET REPORT FOR PJM 340 (2021) ("Energy efficiency resources are included in the PJM Capacity Market. . . . The total MW of energy efficiency resources committed increased by 10.1 percent from 2,296.3 MW in the 2019/2020 Delivery Year to 2,528.5 MW in the 2020/2021 Delivery Year."); POTOMAC ECON., 2020 STATE OF THE MARKET REPORT FOR THE MISO ELECTRICITY MARKET XVIII (2021) ("The quantity of EE participating in the PRA has been growing rapidly and is playing a more pivotal role in satisfying MISO's resource adequacy needs."). In 2021, a record amount of energy efficiency cleared for sale into PJM's capacity market. PJM, 2022/2023 RPM BASE RESIDUAL AUCTION RESULTS (PJM #5154776) (2021) (noting that "[o]f the 5,056.8 MW of energy efficiency that offered into the 2022/2023 [Base Residual Auction], 4,810.6 MW cleared in the auction"). Energy efficiency resources are expected to continue to participate in the ISO-NE capacity market. *See The Role of ISO New England and the Region's Rapidly Changing Energy Resource Mix*, ISO-NE, slide 7, 18, https://www.mass.gov/doc/iso-ne-plymouth/download (noting that ISO-NE currently has 2,630 MW of energy efficiency resources with obligations in the Forward Capacity Market).

[179] FERC Order No. 2222, *supra* note 2. The order "define[s] a distributed energy resource as any resource located on the distribution system, any subsystem thereof or behind a customer meter. These resources may include, but are not limited to, electric storage resources, distributed generation, demand response, energy efficiency, thermal storage, and electric vehicles and their supply equipment." *Id.* at ¶ 67,095 n.1.

[180] In PJM, MISO and ISO-NE, market monitors have recommended eliminating the participation of energy efficiency as a supply resource in the capacity market. MKT. ANALYTICS, LLC, *supra* note 178, at 339 ("The MMU recommends that energy efficiency MW not be included in the PJM Capacity Market. The measurement and verification protocols for energy efficiency are too imprecise to rely on as a source of capacity. Effective energy efficiency measures reduce energy usage and capacity usage directly. The reduced market payments are the appropriate compensation."); POTOMAC ECON., *supra* note 178, at ix, xxi (2021) (recommending that MISO "[r]emove eligibility for energy efficiency to sell

This opposition is related, in part, to a debate about whether energy efficiency is best accounted for in electricity markets as reducing demand or as a source of supply; sales of energy efficiency into the markets assume that it is a source of supply that can be quantified. When sold into a capacity market, energy efficiency provides another way, in addition to traditional power generation, to ensure that demand and supply for electricity match in the future. In so doing, the participation of energy efficiency in the capacity markets may reduce the need to build new power generation and transmission facilities and lower the cost of power.[181]

We are not aware of any voluntary markets for energy efficiency, but such markets could emerge given the growth forecasts for other voluntary markets, including the carbon offset and green power markets.[182] Voluntary markets for energy efficiency would likely emerge in a decentralized manner in response to demand from private actors interested in purchasing energy efficiency resources to meet voluntary pledges that they cannot achieve through their own energy savings measures, rather than government mandates to increase energy efficiency. There is also the potential that utilities subject to regulatory requirements to improve energy efficiency could be permitted to purchase offsets from voluntary markets to meet their compliance

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capacity" and "[disqualify] energy efficiency from selling capacity in the [Planning Resource Auction]"); POTOMAC ECON., 2020 ASSESSMENT OF THE ISO NEW ENGLAND ELECTRICITY MARKETS 16 (2021) (recommending that ISO-NE account for energy efficiency in its Forward Capacity Market "as a reduction in load instead of as a supply resource"). For reasons for allowing the sale of energy efficiency as a source of electricity supply into the wholesale capacity markets, see SPEES ET AL., supra note 176.

[181] *See* SPEES ET AL., *supra* note 176. FERC has previously recognized benefits from the sale of energy efficiency into capacity markets. *See, e.g., PJM Interconnection, L.L.C.*, 126 FERC ¶ 61,275, p. 131 (2009) ("The Commission finds PJM's proposal [to enable] EE resources [to participate in the capacity market] reasonable and will accept it. Under PJM's current wholesale market structure, many retail customers who install energy efficiency measures do not capture the capacity benefit of the resources they install.")

Energy efficiency is one type of distributed energy resource (DER). In *FERC v. Electric Power Supply Ass'n*, 577 U.S. 260 (2016), the Supreme Court upheld a FERC rule that sought to boost wholesale market participation of demand response, another type of DER, by requiring that the markets compensate demand response at the same level as traditional sources of electricity supply. Energy efficiency might be regarded as a permanent and passive form of demand response; while demand response programs reduce electricity consumption in peak periods, energy efficiency permanently reduces demand for electricity. On *FERC v. Electric Power Supply Ass'n*, see Matthew R. Christiansen, *FERC v. EPSA: Functionalism and the Electricity Industry of the Future*, 68 STAN. L. REV. 100 (2016).

[182] BARRY FRIEDMAN ET AL., NAT'L RENEWABLE ENERGY LAB'Y, CONSIDERATIONS FOR EMERGING MARKETS FOR ENERGY SAVINGS CERTIFICATES 2, 22–23, (2008), https://www.nrel.gov/docs/fy09osti/44072.pdf; MCKINSEY & COMPANY, *supra*, note 148; HEETER & O'SHAUGHNESSY, *supra* note 151.

obligations.[183] A lack of clarity about who initially owns energy efficiency might stifle the development of voluntary markets for energy efficiency attributes, and uniformity in rules across regulated and unregulated markets would likely help to stimulate greater participation on both fronts.

We argue that energy efficiency attributes should be allocated using a first in time rule. The desirability of a first in time rule for energy efficiency is suggested by the fact that the parties selling energy efficiency into FERC-regulated wholesale capacity markets appear to accept it as a means of initially allocating rights among themselves. Thus, this article might be regarded as explaining the logic of a first in time rule in contexts where it is already used and providing an argument for extending a first in time rule to other contexts where markets in energy efficiency are deemed socially desirable. We begin by explaining why we support a first in time rule, and then discuss how the allocation resulting from that rule might bind third parties in different types of markets where energy efficiency is, and could be, sold.

### *A. Identifying an Initial Owner*

As mentioned in the introduction to this article, multiple parties might theoretically claim the avoided electricity use when a refrigerator in a home is replaced with a more energy efficient model. For example:

- The manufacturer of the more energy efficient fridge might argue that it owns the energy efficiency attribute. It might appeal to the principle of accession, arguing that the avoided energy is closely connected to the refrigerator that it made, and that it sold only the fridge and not the distinct asset of the energy efficiency when it sold the refrigerator to the distributor or retailer who then sold it to the homeowner. The manufacturer also might invoke the labor theory, arguing that it was the manufacturer's "labor" in manufacturing the refrigerator that made the efficiency.

- The homeowner might claim the avoided energy use based on the time that the homeowner invested in choosing the more energy efficient appliance, paying for the appliance, and installing and using it. In making this argument, the homeowner might also seem to be appealing to the "labor" principle. The homeowner would be arguing that he or she created the energy efficiency through the time they took to buy and install the appliance, the funds they used

[183] Given the regulatory diversity of states with EERS, future voluntary trading programs could arise in different ways: parallel to regulatory markets in states with mandatory EERS; for states with non-binding EERS, in state-operated voluntary markets; or even in the absence of state EERS altogether.

to pay for the appliance, and their actual use of the energy efficient appliance rather than a more energy-consuming one. The homeowner also might appeal to accession, arguing that they own the energy efficiency because they own the fridge.

- The retailer might argue that it created the efficiency by promoting the more energy efficient refrigerator to the homeowner.

- The installer might argue that its labor is responsible for the avoided energy use because it hauled away the old inefficient fridge and plugged in the new one.

- If the homeowner borrowed money to finance the purchase of the refrigerator, the lender might argue that it owns the avoided energy use because it provided the funds that enabled the homeowner to purchase the new refrigerator and have the old one carted away.

- The avoided energy use also might be claimed by an aggregator that bundles the energy efficiency attributes from this refrigerator and many others into a package that is sufficiently large and reliable to meet the minimum size and performance standards of the market covering the territory where the fridges are located. This aggregator might appeal to a first in time principle, arguing that it is the first party to have assembled the energy efficiency attributes from the fridge into a marketable format.

- The electric utility[184] serving the home with the new refrigerator might argue that the utility owns the energy efficiency because it ran a public service campaign to raise consumer awareness of the benefits of buying energy efficiency appliances and perhaps has a rebate program that refunds to consumers a small part of the cost of purchasing energy efficient appliances. The utility's argument might be analogized to an argument rooted in labor, with the utility claiming the property right based on its labor (or investment) in the public service campaign and rebate program.[185]

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[184] Although there are various types of electric utilities, the utility's argument likely would not vary based on whether it is owned by investors or the public, for example.

[185] Electric utility programs to reduce customer energy started in the 1970s. Dan York et al., *Three Decades and Counting: A Historical Review and Current Assessment of Electric Utility Energy Efficiency Activity in the States*, AM. COUN. FOR AN ENERGY EFFICIENT ECON., https://www.aceee.org/sites/default/files/publications/researchreports/u123.pdf. Notably, in a 2015 order, FERC

1. Allocating Ownership based on a First in Time Rule

We propose that the energy efficiency attribute be initially allocated to the first party to present the attribute for sale in a format that can be sold into the market. Under this first in time rule, the party awarded ownership could be anyone—a manufacturer, an aggregator, a collective of homeowners, a utility, a nonprofit, etc.—provided the party appropriately presents the market with the energy efficiency in a useable format that meets the minimum size, performance and other standards of the market.[186] Once the attribute is initially allocated to a unique party under a first in time rule, the scope of the bundle of sticks that ownership conveys could be defined. For example, the bundle might entitle the owner to sell the attribute, but not allow the owner to require others to achieve the energy efficiency.[187] The content of the bundle of sticks comprising ownership is a distinct issue from the question of how the bundle is initially acquired on which this article focuses.

What does it mean to be the first to present the market with energy efficiency for sale in a useable format? In broad terms, we propose that it means being the first to offer for sale an energy efficiency resource that meets the market's standards for sale, with proof of having contracted for the resource from the other immediately identifiable parties that might plausibly claim the resource.[188] The offer presumably

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expressly stated that other entities, not just utilities, can own energy efficiency attributes and participate in wholesale electricity markets. Midwest Independent Transmission System Operator, Inc., 153 FERC ¶ 61,229 (2015) at 255, https://www.ferc.gov/sites/default/files/2020-05/E-11_29.pdf ("We do not consider it reasonable to restrict the ownership or contractual rights to Energy Efficiency Resources to the LSE [Load Serving Entity] making the peak demand forecast. Entities other than LSEs, such as industrial customers, can own Energy Efficiency Resources and we see no reason to foreclose these entities from participation in MISO's resource adequacy plan. For this reason, we consider it to be unreasonable to bar market participants from offering Energy Efficiency Resources into MISO's resource adequacy plan.")

[186] For example, there are minimum size thresholds for bidding in distributed energy resources, including energy efficiency, into the wholesale electricity markets. FERC Order No. 2222 at ¶ 171 ("require[ing] each RTO/ISO to implement a minimum size requirement not to exceed 100 kW for all distributed energy resource aggregations").

[187] Also, the bundle might only contain rights that may be asserted against private parties, not against the government under the Takings Clause as is likely the case with many property rights in environmental attributes.

[188] We see the contracts as defining the resource and enabling the party that wants to sell it to get the agreement of others it is contracting with that it owns the resource, not as transferring the resource to the party that wants to sell it. In other words, the contracts serve as a form of notice to the other parties that a particular resource is being claimed. We suggest that a party be expected to have contracted with the immediately identifiable parties with plausible claims because it would likely be impractical for a party to contract with everyone who might claim ownership of a resource due to transaction costs. As

would need to define such factors as: (i) how the party contracted with other plausible claimants to the resource; (ii) the bounds of the resource, including the sources of the energy efficiency (e.g., lightbulbs or refrigerators); (iii) the geography where the energy efficiency will be achieved; (iv) the time period over which the efficiency will be achieved; and (v) measurement and verification protocols for the resource. Moreover, as just mentioned, the offer would have to satisfy the minimum size and other performance standards of the market (or the buyer if the exchange is bilateral).

The exact form in which the party presents its claim will likely differ depending on the market. In some of the FERC-regulated wholesale capacity markets in the U.S. into which energy efficiency is sold, parties bidding in energy efficiency from a source and geography must confirm to the market operators that the parties own that energy efficiency when bidding it in.[189] To help establish ownership, parties in practice presumably contract with other immediately plausible claimants. In the regulated French market for white certificates described in Part III, it seems that the parties claiming the certificates must present contracts delineating ownership of the energy efficiency among potential claimants to a regulator who then authenticates the certificate. If private actors were to begin selling energy efficiency voluntarily to other private actors outside of regulated markets, the potential buyers likely would dictate the form in which sellers would assert their claims.

Evolving technology also might influence what should be required to be the first to claim energy efficiency. The spread of smart and internet-connected devices might create new mechanisms for securing energy efficiency. For example, these devices might open up the possibility of contracting cost-effectively with households to buy and aggregate their individually small energy savings for sale at the larger scale that markets demand.

There are three reasons to favor a first in time rule for allocating ownership of energy efficiency. First, such a rule is likely to lead to more energy efficiency being

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technology evolves, the number of people who might be considered plausible claimants with whom the party should contract might change.

[189] PJM requires that a seller of energy efficiency resources "owns, or has the contractual authority to control" the resources. OATT, Definitions C-D. *See also* CAPACITY EXCHANGE USER GUIDE, PJM 26–27, 29 (2021), https://www.pjm.com/-/media/etools/capacity-exchange/capacity-exchange-user-guide.ashx?la=en. ISO-NE requires that a seller have an "Ownership Share." Market Rule 1 § III.9.5.1(b). MISO requires that sellers have "ownership or equivalent contractual rights." OATT § 69A.3.2. PJM and ISO-NE require that sellers of energy efficiency resources confirm their ownership of the resource. CAPACITY EXCHANGE USER GUIDE, *supra*; ENERGY EFFICIENCY MEASURE DATABASE (EEM) USER GUIDE, ISO-NE (2017), https://www.iso-ne.com/static-assets/documents/2015/01/eem_database_user_guide.pdf.

sold. The rule creates a race to capture non-energy use in a format that will enable the non-energy use to be sold in markets. It should incentivize private parties to find innovative ways to identify and package energy efficiency measures from households and other sources for market use because it assigns ownership based on packaging the energy efficiency in a useable format. Because the first in time rule awards ownership based on the act of winning the race—not the status of being a manufacturer, an installer, a homeowner, utility etc.—the first in time rule also opens the race to new entrants with no prior connection to energy efficiency, who may have new ideas and financing for assembling energy efficiency.

Related to the point that anyone could be awarded ownership to energy efficiency, a first in time rule treats all parties that might have a claim to the energy efficiency on an equal footing. It avoids choosing a "winner" up front and promotes competition to realize the goal of identifying and packaging novel resources for different markets.

Second, a first in time rule is reasonably straightforward to apply. To be sure, we are only sketching the bare outlines of what a party would be required to do to be deemed the first to have claimed the resource, and more work would have to be done to elaborate the rule for the novel contexts in which it would be applied. Nonetheless, by assigning ownership to the first party to claim the resource in a format that satisfies the market's size and other requirements, the first in time rule establishes an endpoint for the race. Assuming there is a means of informing other actors that energy efficiency for a set of energy efficiency measures in a territory is claimed, the rule should inform other private actors when the race is over and avoid wasteful duplication of effort to propertize the same energy efficiency.[190]

Third, although there are risks in allocating some resources using a first in time rule, energy efficiency is not a resource prone to the "pathologies of first possession,"[191] such as the tragedy of the commons. Energy efficiency is not a finite (or slowly renewable) resource, such as ocean fish, at risk of being over-used by encouraging a race to capture. On the contrary, energy efficiency is widely considered to be a plentiful resource that private and public actors have been slow to realize the potential of, even though their energy costs would be reduced if they reduce their

[190] Supplementary rules might be developed to deal with a (likely rare) scenario where two or more parties have equally valid claims to be the first to claim an energy efficiency resource.

[191] We borrow the phrase from Merrill, *supra* note 79.

energy consumption.[192] A race to spur improvements in energy efficiency would help to realize the long-heralded potential to reduce GHG emissions through reducing electricity consumption, benefit the electricity system by reducing the need to build new power generation and transmission facilities, and lower energy costs for consumers.

2. Alternatives Rules for Allocating Ownership

Analysis of some of the alternatives to a first in time rule helps to strengthen the case for using such a rule for energy efficiency.

As described above, the principle of accession might be used to allocate ownership to energy efficiency. The principle seems most likely to be invoked by the manufacturers of energy efficient appliances, on the basis that the efficiency is closely connected to the appliances, which the manufacturer is the first to own.[193] The generic concerns with the principle of accession mentioned above seem applicable in this context. For example, it is not clear why the value of the energy efficiency should accrue to appliance manufacturers for free (as accession provides), even if there is a widespread intuition that the efficiency is closely connected to the appliances. If the manufacturer is motivated and well-positioned to bring the efficiency to market, the first in time rule would allow the manufacturer to do so and obtain initial ownership of the resource. The difference between the first in time and accession rules is that the former would reward the manufacturer with ownership based on contributing to the policy goal of bringing the resource to the market, not automatically based on the manufacturer's status as the initial owner of the appliances. Thus, the first in time rule seems more aligned with the societal goal of enhancing energy efficiency.

The labor theory and the closely related principles that ownership should be initially allocated to the party that created the resource or paid for it could be invoked by several actors, such as the installer, the retailer, the homeowner, the lender, or the electric utility. One difficulty with this "labor" family of principles is that they are

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[192] Ralph Cavanagh, *Ending Carbon Pollution: The Energy Efficiency Imperative*, NRDC (Feb. 16, 2021), https://www.nrdc.org/experts/ralph-cavanagh/ending-carbon-pollution-energy-efficiency-imperative; Steven Nadel and Lowell Ungar, *Halfway There: Energy Efficiency Can Cut Energy Use and Greenhouse Gas Emissions in Half by 2050*, AM. COUN. FOR AN ENERGY EFFICIENT ECON., https://www.aceee.org/sites/default/files/publications/researchreports/u1907.pdf.

[193] A homeowner also might invoke accession, arguing that the energy efficiency is created once they install the fridge, and since they own the fridge, they also own the energy efficiency it generates. Under the first in time rule we recommend, homeowners would in theory be able to claim the energy efficiency if they met the market's requirements for selling it, including having a sufficient amount of energy efficiency and measurement and verification protocols.

indeterminate. Energy efficiency is likely best viewed as a socially created resource, created by all of the listed parties and others: the homeowner contributes by buying the appliance, the manufacturer by making it, the retailer by selling it, the lender by financing it, the utility to the extent it has raised awareness of the benefits of reducing electricity consumption or sought to incentivize energy efficiency, etc. Relying on the labor family of principles would require dividing ownership interests among the multiple actors who contributed to the creation of the resource in proportion to their contributions. Introducing multiple initial owners likely would complicate getting the resource to market, as consent from all of multiple orders would be necessary. Moreover, as already mentioned, the first in time rule would allow any of the parties with a claim based on labor or a related principle, either singly or in combination, to obtain initial ownership by being the first to lay claim to the resource.

Ownership of energy efficiency attributes also might be initially assigned through auctions that award it to the highest bidder, similar to the FCC auctions of spectrum. To allocate the resource by auction there would need to be an entity that could design and implement the auctions, such as a regulatory body akin to the FCC. Since they already operate sophisticated markets, the Regional Transmission Organizations (RTOs) and Independent Systems Operators (ISOs) might in theory auction rights to bundle household energy efficiency in the geographic area they serve and sell these bundles into their wholesale markets, assuming that the RTOs/ISOs were capable of identifying, measuring, and quantifying such resources.[194] Auctions would require that claimants pay some of the value they could be expected to realize from household efficiency measures to the wholesale electricity markets, which might be justified on the basis that household energy efficiency is a socially created resource whose value should not be solely appropriable by a single initial owner.

However, there are important grounds for skepticism about the desirability of using auctions to allocate initial ownership to energy efficiency for the purpose of getting it into the wholesale electricity markets. Using auctions likely would be inconsistent with FERC's goal of encouraging private actors to develop innovative approaches to capturing energy efficiency and other distributed energy resources for participation in the wholesale electricity markets.[195] Requiring parties to buy the right

[194] Financial transmission rights are currently auctioned in several RTO/ISO markets. Elise Caplan, *Understanding—and Reimagining—Financial Transmission Rights*, AMERICAN PUBLIC POWER ASSOCIATION (Jul. 15, 2020), https://www.publicpower.org/periodical/article/understanding-and-reimagining-financial-transmission-rights.

[195] For evidence that FERC is promoting the introduction of distributed energy resources to encourage innovations that will "enhance competition and ensure just and reasonable rates," see FERC Order No. 2222 at ¶ 141 (prohibiting RTOs/ISOs from prohibiting "any particular type of distributed energy

to bundle household energy efficiency in a territory would establish a costly barrier that might discourage new entrants from trying their hand at packaging energy efficiency for sale in the wholesale markets. The parties most likely to bid in an auction for the right to package energy efficiency might be existing deep-pocketed electricity industry incumbents with the financial means to lock up rights to package household energy efficiency; the small players that might enter a race set up under a first in time rule might be discouraged by the price that auctions would impose. While a party would have to compete with others in the auction, the parties that purchased the auctioned off rights presumably would then have exclusive rights to harness efficiency within a specified territory, and thus not have to race to capture the efficiency within that territory.

Auctions for the right to harness household energy efficiency for sale in the wholesale markets also might be impractical for these markets to administer. Market operators might have difficulty defining the scope of the rights that would be auctioned to provide bidders with certainty about the rights they would acquire while still incentivizing entities to innovate to capture novel forms of energy efficiency. There is a tension with relying on a centralized allocation system, such as an auction, to allocate rights to a novel attribute that is subject to unpredictable expansion.[196] A first in time rule maintains the incentive to innovate. It is instructive that some of the supporters of the FCC's current use of auctions to allocate spectrum nonetheless defend the historical use of a first in time rule to allocate the spectrum in the early twentieth century at the formative stage of radio broadcasting, when less was known about the spectrum.[197]

### *B. Binding Third Parties to the Initial Allocation*

Once energy efficiency resources are initially allocated to a unique owner, it is necessary to bind third parties to that allocation to establish an *in rem* property right.

In the regulated markets where energy efficiency is currently traded, a hybrid approach, combining top-down and bottom-up elements, currently seems to be used to bind the broader community to the choice of an initial owner. As explained in Part IV.A., when parties bid energy efficiency into the wholesale capacity markets, the parties define the resource that they are bidding in and, in some markets, confirm their

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resource technology from participating in distributed energy resource aggregations" to avoid establishing "a barrier to entry for emerging or future technologies").

[196] *Supra* note 129.

[197] *See, e.g*, Hazlett, *supra* note 86.

ownership, presumably relying on contracts they have negotiated with other immediately identifiable and plausible claimants. While the market operators may not see themselves as doing this, by accepting a party's bid, the market operators implicitly confirm the bidder's ownership of the energy efficiency and bind others to it, by eliminating the ability of others to bid the same resource into the market.

In the French market for white certificates described in Part III.B, private parties similarly appear to define the energy efficiency resource, and contract with other immediately plausible claimants to allocate it among themselves. Then, private parties have their energy efficiency certified by a government regulatory agency. In certifying the energy efficiency, the agency is in practice validating the private party's claim to the energy efficiency, cutting off other claims for that resource, and therefore binding the broader community to the allocation the parties initially agreed as a matter of contract.

There are sound reasons for relying on a hybrid approach to bind third parties to the initial allocation of ownership that is sold into regulated markets, such as the wholesale electricity markets and the markets for white certificates. For one, private parties are likely to be better at defining a relatively novel resource such as energy efficiency than the regulators who are seeking to spur private parties to expand the resource. The private parties are the actors finding the resource, and they are therefore better informed about its contours. Private parties also are well-positioned to contract with other private parties to delineate the geographic scope of the energy non-use, and the sources of the non-use, that the private parties have found and would like to sell.

However, private parties are unlikely to be able to bind the community as a whole to an allocation of energy efficiency through contracts alone. As Locke recognized hundreds of years ago, and modern property scholars continue to emphasize, it is practically difficult to create an *in rem* property right through contracts.[198] The number of people with whom it is necessary to contract to secure a right that binds the "whole world" is too large. Market operators, such as the actors that certify white certificates or operate the wholesale electricity markets, thus play a valuable role in binding third parties with whom it is too costly to contract. By accepting a bid, or issuing a certification, the market operators cut off the potential for other parties to claim the energy efficiency.

Furthermore, in regulated markets, the market operators are likely to be well-positioned to provide third parties of notice of the claims that the operators have accepted. Subject to protections for confidential business information, market

[198] LOCKE, *supra* note 131.

operators might choose to provide this information to third parties informally, for example by responding to questions about whether a resource is already participating in a market. Alternatively, market operators might choose to develop a registry to efficiently make available high-level information about the energy efficiency that has already been propertized and sold.[199] The design of a registry would need to respect practical constraints on collecting information about the measures generating energy efficiency and legal protections for confidential business information. The provision of information would reduce the costs to third parties of respecting existing property rights, and channel efforts to identify new energy efficiency to unclaimed resources. By making information available about existing claims, market operators also avoid the need to deal with duplicative claims to the same resource. In sum, in regulated markets, it makes sense to bind third parties to an initial allocation of energy efficiency through a combination of resource definition by the private actors claiming the energy efficiency and confirmation of their claims by market operators.

As mentioned above, we are not aware of any voluntary, unregulated markets in energy efficiency. If such markets were to emerge, they by definition would not be overseen by regulators with the authority to bind third parties to an initial allocation of energy efficiency. Property rights would have to be allocated in a decentralized, bottom-up fashion relying on private rules and norms. As discussed in Part III, there are voluntary markets in some environmental attributes, such as carbon credits. The existence of these markets suggests the potential for private parties to package other attributes into binding property rights, using intermediaries such as verifiers to build norms that lead people to respect the rights.

## V. CONCLUSION

Historically, changes in technology have spurred changes to property rights. The invention of the airplane,[200] the development of radio broadcasting, and new fishing technologies[201] all prompted the alteration of old understandings of property rights and the creation of new ones. As technology advances, it is becoming increasingly possible to isolate environmental resources that are hard to see and touch, such as actual and avoided carbon emissions, methane emissions from cows burping, and reductions in energy use. Establishing property rights in these attributes would

[199] On the functions of registries, see Benito Arruñada, *Institutional Foundations of Impersonal Exchange: Theory and Policy of Contractual Registries*, *in* MERRILL & SMITH, *supra* note 70, at 903–08.

[200] BANNER, *supra* note 83, at 30, 69, 260, 292–93.

[201] Wyman, *supra* note 106.

encourage private parties to trade them and, in so doing, help achieve societal goals such as transitioning away from fossil fuels to avoid catastrophic climate change.

Although often caricatured as static and slow to change, property is continually evolving.[202] This article has provided a menu of options for allocating new rights in environmental attributes that governments and private actors can use if they wish to realize the benefits afforded by technological innovation. Applying this menu of options, this article has attempted to develop a rule for initially allocating the rights to energy efficiency attributes. As technology continues to evolve, options identified in the menu might be used to initially allocate rights to other newly measurable environmental attributes.

[202] STUART BANNER, AMERICAN PROPERTY: A HISTORY OF HOW, WHY, AND WHAT WE OWN (2011).