THE DARK SIDE OF DG: ADDRESSING THE ENVIRONMENTAL IMPACTS OF DIRTY DISTRIBUTED GENERATION

MATTHEW CHRISTIANSEN* AND ANN JAWORSKI**

* J.D. Yale Law School, 2012. This Article was written while Mr. Christiansen was an Energy Law and Regulation Fellow at the Frank J. Guarini Center on Environmental, Energy, and Land Use Law at New York University School of Law. The Article grew out of a research project conducted along with Elizabeth B. Stein, whose input and many helpful comments were instrumental in shaping the final project. In addition, thanks are due to Danielle Spiegel-Feld, Jim Tripp, and Katrina Wyman. Any errors are, of course, our own.

** J.D. New York University School of Law, 2017. Clerk for Judge Richard Posner and Judge Frank Easterbrook, United States Court of Appeals for the Seventh Circuit, 2017–18.

INTRODUCTION

Distributed generation (DG) is playing an increasingly important role in the United States electricity sector. Although there is no single accepted definition of "distributed generation," the term generally encompasses small generating units that produce power for consumption at or near the facility at which they are located.[1] Depending on the exact definition, DG can include internal combustion engines, gas turbines (a category that includes relatively efficient combined-heat-and-power turbines [CHP], when those are fired by natural gas), wind turbines, photovoltaic panels, and fuel cells, among other technologies.[2]

Several reasons explain the growth of DG. DG can provide a variety of benefits, both to the owner of the DG unit and to the electricity grid. For example, electricity from DG can be significantly less expensive to consume than that from the marginal centralized generating station. Under these circumstances, using DG can decrease the cost of electricity for both the owner of the DG unit and also for the public at large. In addition, because it is distributed, DG can help respond to outages and other failures of the electricity distribution system as a whole.

Government policies in the United States have also helped fuel the growth of DG. These include policies such as demand response programs and tax incentives for certain types of DG, both of which compensate DG for its economic and reliability benefits. Together these policies create an incentive to install new DG units and to run already-installed DG units more frequently. In addition, some states have begun proceedings aimed at further increasing DG's role in their electricity generation mix. New York State's Reforming the Energy Vision proceeding (REV), which seeks to make DG a central component of a reformed electricity

1 *See, e.g.*, Order Adopting Regulatory Policy Framework and Implementation Plan, Case No. 14-M-0101 (N.Y. Pub. Serv. Comm'n Feb. 26, 2015), app. b at 14–15 [hereinafter REV Track One Order] (defining "distributed generation"); Thomas Ackermann, Göran Andersson & Lennart Söder, *Distributed Generation: A Definition*, 57 ELECTRIC POWER SYS. RES. 195 (2001).

2 *See* Guido Pepermans et al., *Distributed Generation: Definition, Benefits and Issues*, 33 ENERGY POL'Y 787, 791 tbl.1 (2005).

distribution model,[3] is the leading example. Although other states may not replicate New York's extensive support for DG, a number of other states desire to increase their use of DG.

DG's potential economic and reliability benefits are substantial, but the health and environmental impacts of DG are less clear. On the one hand, DG that is powered by non-emitting resources produces neither conventional pollutants, such as nitrogen oxides (NO_x) and particulate matter (PM), nor greenhouse gases (GHGs). And some types of fossil-fuel-fired DG can be more efficient than the marginal central generating station. Accordingly, increased reliance on low-emitting forms of DG can reduce the aggregate emissions associated with electricity generation.

On the other hand, many forms of DG, especially older DG that runs on diesel fuel, can emit pollutants at rates per kilowatt hour of electricity generated that far exceed even coal-fired power plants, which are generally the dirtiest form of electricity generation. In addition, unlike central generating stations, DG is often located near, or even within, population centers and most forms of DG lack an effective means of dispersing the pollutants emitted.[4] As a result, even a small increase in high-emitting DG can have significant health and environmental impacts.

Although the economic and reliability benefits of DG have received considerable attention in the legal literature, its environmental implications have gone comparatively unstudied. This Article fills that gap. It examines how current regulations address the environmental and health effects of increased DG as well as potential reforms that states and municipalities can take to mitigate the effects of relatively dirty DG.

In short, current federal, state, and local regulation of DG addresses the environmental and health effects of DG, but only partially. In particular, these regulations generally focus on only the emissions from an individual DG unit. That is, they do not directly regulate the interaction of DG units, leaving open the possibility that a high concentration of poorly controlled DG in a small area could create significant adverse health effects. These

3 *See* REV TRACK ONE ORDER, *supra* note 1, app. b at 14–15.

4 *See* Zheming Tong & K. Max Zhang, *The Near-Source Impacts of Diesel Backup Generators in Urban Environments*, 109 ATMOSPHERIC ENV'T 262, 262 (2015).

concerns are especially acute because a number of state and federal electricity-sector regulations, including, but certainly not limited to New York State's REV proceeding, may encourage the installation of multiple DG units in relatively small geographic areas. In addition, the current suite of regulations largely exempts small DG units from mandatory emissions standards, meaning that there is little regulation of these units. Although DG—especially small DG—generates much less electricity than central generating units, the laxer controls applicable to these units may exacerbate the health and environmental risks of concentrated DG. Moreover, existing regulations generally do not address GHG emissions from DG, and could create unintended incentives for increased use of inefficient DG.

There are, however, a variety of policy approaches available to address these concerns. These range from source-specific emission limits to market-based caps linked to the ambient level of various localized pollutants. This Article identifies a number of different approaches that regulators may consider in deciding how to address an increase in DG emissions. The relative merits of these policies will vary considerably based on the DG profile of different jurisdictions. Accordingly, this Article does not identify a single best approach for addressing the environmental and health impacts of DG. Instead, it lays out a menu of policy options to consider in deciding how to respond to the specific challenges that DG poses within a particular jurisdiction.

This Article proceeds as follows. Section I describes the increasing importance of DG to the U.S. electricity sector. Section II focuses on the environmental costs and benefits of DG. Section III briefly summarizes the current environmental regulations governing DG with an emphasis on the regulation of diesel-fired DG in New York State. Section IV outlines policy options available for addressing the environmental impacts of DG.

I. THE INCREASING IMPORTANCE OF DISTRIBUTED GENERATION

DG is playing an increasingly important role in U.S. electricity markets.[5] The rise of DG is the result of many factors,

5 For a discussion of the rapidly increasing role that DG is playing in the commercial sector, see, for example, DELOITTE, DELOITTE RESOURCES 2015 STUDY: ENERGY MANAGEMENT PASSES THE POINT OF NO RETURN (2015), http://www2.deloitte.com/content/dam/Deloitte/us/Documents/energy-resources/us-er-

including high electricity prices, the decreasing cost of solar panels, and the increasing demand for highly reliable electricity service.[6] By reducing demand for electricity from the grid at peak times, DG can reduce electricity prices—both for DG owners and other consumers who benefit from the reduction in aggregate electricity demand, which results in lower wholesale electricity prices overall.[7] Similarly, because much of the electricity produced by DG is consumed on-site, it reduces grid congestion and minimizes line losses (electricity lost during the transmission and distribution process), both of which can help reduce the total cost of electricity.[8] In addition, DG can help mitigate the effect of blackouts and other grid failures, leading to a more stable and resilient electricity system.[9]

Federal and state policies have also encouraged the growth of DG.[10] At the federal level, these policies include tax credits for certain forms of DG—especially those powered by non-emitting resources—and the promotion of wholesale-market demand response, in which customers receive a payment for reducing their electricity consumption from the grid at times of peak demand.[11] Although demand response programs are not aimed at supporting DG *per se*, a significant share of demand response providers

---

deloitte-resources-study-series.pdf.

6 *See* Pepermans et al., *supra* note 2, at 788–89; REV Track One Order, *supra* note 1, at 12–25.

7 *See* FED. ENERGY REGULATORY COMM'N, THE POTENTIAL BENEFITS OF DISTRIBUTED GENERATION AND RATE-RELATED ISSUES THAT MAY IMPEDE THEIR EXPANSION, at 3–5 (2007), https://www.ferc.gov/legal/fed-sta/exp-study.pdf.

8 *See id.* at 3–8.

9 *See* Pepermans et al., *supra* note 2, at 794.

10 *See* N.Y. INDEP. SYS. OPERATOR, A REVIEW OF DISTRIBUTED ENERGY RESOURCES (2014) (discussing state and federal policies affecting the growth of distributed generation); Severin Borenstein & James Bushnell, *The U.S. Electricity Industry After 20 Years of Restructuring* 23–24 (Nat'l Bureau of Econ. Research, Working Paper No. 21113, 2015), http://www.nber.org/papers/w21113.pdf (discussing the effect of state and federal policies on the growth of photovoltaic solar DG in particular).

11 *See* NE. STATES FOR COORDINATED AIR USE MGMT., AIR QUALITY, ELECTRICITY, AND BACK-UP STATIONARY DIESEL ENGINES IN THE NORTHEAST 5–6 (2014), http://www.nescaum.org/documents/nescaum-aq-electricity-stat-diesel-engines-in-northeast_20140102.pdf/ [hereinafter NESCAUM REPORT] (discussing the effect of wholesale-market demand response on behind-the-meter generators); *see also, e.g.*, *Residential Renewable Energy Tax Credit*, ENERGY.GOV, https://energy.gov/savings/residential-renewable-energy-tax-credit (last visited Oct. 1, 2017) (describing certain federal tax credits for systems that produce renewable energy).

decrease their consumption of electricity from the grid and replace it with electricity generated from DG.[12] Demand response payments thus provide a significant source of compensation for DG units. In 2016, the U.S. Supreme Court upheld the Federal Energy Regulatory Commission's jurisdiction over demand response in wholesale electricity markets—a decision that will likely provide a significant boost to demand response, including demand response backed by DG.[13] In addition, the Federal Energy Regulatory Commission has recently approved proposals filed by wholesale electricity market operators to allow "behind-the-meter" resources (a category that includes DG) to sell electricity and other services in wholesale markets.[14]

Many states have also taken steps that promote DG. These include favorable tax treatment and other economic incentives, such as net energy metering, which is generally available for DG powered by solar energy.[15] In addition, some states have expressly sought to promote distributed generation as a way of modernizing the electricity grid. New York State is the leader of this movement in many respects. The New York State Public Service Commission's (NYPSC) Reforming the Energy Vision proceeding (REV) has sought to make DG a central component of its effort to develop a more resilient and cost-effective electricity distribution network by developing a model for compensating distributed resources, including all types of DG, for the many services that it provides to the grid.[16] REV contemplates that utilities in New York will make distributed resources, including DG, a major component of their strategy for operating and modernizing their systems—a development that could greatly increase both the number of DG units operating within the state as well as the

---

12 *See* NESCAUM REPORT, *supra* note 11, at 26 (discussing the increased use of internal combustion engines in demand response programs).

13 *See* FERC v. Elec. Power Supply Ass'n, 136 S. Ct. 760 (2016); Elta Kolo & Andrew Mulherkar, *SCOTUS Decision Results in $200M Impact on Demand Response in 2016*, GREENTECH MEDIA (Jan. 26, 2016), http://www.greentechmedia.com/articles/read/scotus-decision-to-make-a-200-million-impact-on-a-diversifying-dr-industry (discussing the near-term effect of the EPSA decision on demand response markets).

14 *See, e.g.*, N.Y. Indep. Sys. Operator, Inc., 155 F.E.R.C. ¶ 61,166 (2016).

15 *See, e.g.*, U.S. DEP'T OF ENERGY, NET METERING (2015), http://ncsolarcen-prod.s3.amazonaws.com/wp-content/uploads/2015/04/Net-Metering-Policies.pdf (listing states with net energy metering).

16 *See* REV Track One Order, *supra* note 1, at 3 n.3.

amount of time that each unit operates.[17] Although no other state has proceeded as far down this path with respect to all forms of DG—as opposed to just solar-powered DG—other states have at least contemplated engaging in a similar effort to value the attributes provided by distributed resources, including DG.[18]

II. THE ENVIRONMENTAL CONSEQUENCES OF DISTRIBUTED GENERATION

To the extent that DG consists of relatively low- or non-emitting resources, such as combined-heat-and-power gas turbines or photovoltaic solar panels, it has the potential to reduce the emissions of conventional pollutants, such as NO_x and particulate matter, as well as GHGs from electricity generation.[19] In addition, because DG is located at or near the point of consumption, there is little to no loss of electricity in the transmission and distribution process, reducing the total amount of electricity that must be generated.[20] DG can also provide an alternative to building additional transmission or distribution grid infrastructure, avoiding the environmental impacts associated with these expansions.[21]

But not all DG comes from these relatively clean sources.[22] A

---

17 *See id.* at 2–3.

18 *See, e.g.*, Draft Regulatory Incentives Proposal for Discussion and Comment, R. 14-10-003 (Cal. Pub. Utils. Comm'n Apr. 4, 2016) (proposing reforms to how utilities are compensated for procuring distributed energy resources); Decision Adopting an Expanded Scope, a Definition, and a Goal for the Integration of Distributed Energy Resources, R. 14-10-003 (Cal. Pub. Utils. Comm'n Sept. 22, 2015) (expanding the relevant proceeding to focus on integrating and expanding the use of distributed energy resources).

19 Although CHP burns fossil fuels, it is generally significantly more efficient than the marginal—typically fossil-fuel-based—generator, meaning that, on the whole, it likely leads to a reduction in total GHG emissions. *See generally* U.S. ENVTL. PROT. AGENCY, FUEL AND CARBON DIOXIDE EMISSIONS SAVINGS CALCULATION METHODOLOGY FOR COMBINED HEAT AND POWER SYSTEMS 3–5, 9–12 (2015) (discussing means for calculating emissions GHG emissions reductions based on the use of CHP).

20 *See* N.Y. INDEP. SYS. OPERATOR, *supra* note 10, at 7. Roughly 6% of all electricity generated is due to line losses during the transmission and distribution process. *How Much Electricity Is Lost in Transmission and Distribution in the United States?*, U.S. ENERGY INFO. ADMIN. (Apr. 6, 2016), https://www.eia.gov/tools/faqs/faq.cfm?id=105&t=3.

21 *See* Shelley Welton, *Non-Transmission Alternatives*, 39 HARV. ENVTL. L. REV. 457, 468 (2015) (discussing the potential environmental benefits of using distributed generation in lieu of building additional transmission lines).

22 "Relatively" here refers to other forms of DG. Small CHP gas turbines, while much cleaner than diesel, may nevertheless emit pollutants at a greater rate

significant component of DG consists of fossil-fuel-fired generators.[23] The mix and quantity of pollutants from fossil-fuel-fired DG varies based on the type of generator, with many forms of DG emitting levels of conventional pollutants far in excess of the per-kilowatt-hour emissions of a central generating station. In particular, diesel-fired internal combustion engines—one of the principal forms of DG in demand response programs[24]—emit large quantities of NO_x, PM, carbon monoxide (CO), and various hazardous air pollutants, including known carcinogens.[25] For example, older diesel generators can emit NO_x at rates ten times greater than that of a well-controlled coal-fired power plant.[26]

Several characteristics of fossil-fuel-fired DG can exacerbate the health and environmental impacts of its emissions. First, DG is generally located much closer to population centers than are central generating stations, which are often sited in relatively remote areas.[27] As a result, the emissions of localized pollutants from DG typically have a greater impact on human health than the same level of emissions from a central generator.

Second, fossil-fuel-fired DG units typically lack the extensive

---

per-kilowatt-hour than the much larger gas turbines used in central generating stations. *See* Garvin A. Heath et al., *Quantifying the Air Pollution Exposure Consequences of Distributed Electricity Generation* 7 (Univ. of Cal. Energy Inst., Energy Policy & Econs. Working Paper, 2005) (comparing emissions rates among forms of DG with the average emissions rates of central generating stations in California).

23 *See* Envtl. Prot. Agency, *Distributed Generation of Electricity and its Environmental Impacts*, https://www.epa.gov/energy/distributed-generation-electricity-and-its-environmental-impacts#impacts (last visited Oct. 8, 2017).

24 *See* NESCAUM REPORT, *supra* note 11, at ES-1, 4–6 (discussing how federal demand response programs have incentivized increased use of distributed generation, including through the use of onsite electricity production from diesel generators).

25 *See* Sandip D. Shaha et al., *Emissions of Regulated Pollutants from In-use Diesel Back-up Generators*, 40 ATMOSPHERIC ENV'T 4199, 4199 (2006); NESCAUM REPORT, *supra* note 11, at 7 tbl.1 (listing hazardous air pollutants from reciprocating internal combustion engines); Emission Standards for Stationary Diesel Engines, 73 Fed. Reg. 4136, 4138 (Jan. 24, 2008) (to be codified at 40 C.F.R. pt. 63) (discussing "health-related concerns" regarding hazardous air pollutants from backup generators).

26 *See* NESCAUM REPORT, *supra* note 11, at ES-2.

27 *See* Tong & Zhang, *supra* note 4, at 262 (noting that diesel generators are generally located "closer to customers" and "in populated urban areas"); Heath et al., *supra* note 22, at ix (noting that "the mass of pollutant inhaled per unit electricity delivered can be up to three orders of magnitude greater for DG units," largely because of their closer proximity to population centers).

pollution controls required of central generators. In particular, smaller generators often must meet less stringent emissions standards and rarely possess the tall emissions stacks that help disperse pollutants over large areas.[28] Because emissions from DG are not dispersed as effectively as those from central generating stations, they can become concentrated in a relatively small area, creating "hotspots."[29] This concern is especially acute in urban areas, where the complex topography of buildings creates air circulation patterns that can trap pollutants, rather than dispersing them.[30] Even a relatively small increase in DG units in a particular area, or in the hours in which those units operate, could significantly increase the effect of localized pollutants on people living in the area. Policies that encourage the concentration of DG in relatively small geographic areas—which may include New York's REV proceeding—could exacerbate this effect.

Third, peak DG use is likely to occur on the hottest, most humid days when air quality is generally at its worst—even without the contribution from increased reliance on fossil-fuel-fired DG.[31] That is because the increased demand for air conditioning will typically produce high electricity prices and place a strain on the grid, creating a significant incentive to operate DG. Together, these characteristics of fossil-fuel-fired distributed generation may cause even a relatively small increase in DG utilization to result in an outsized negative effect on air quality and human health.

Finally, even relatively clean forms of fossil-fuel-fired generation (such as CHP gas turbines) emit some pollutants, including GHGs. Because GHG emissions from DG generally are not monitored, increased use of DG may result in additional GHG

28 *See, e.g.*, Qiguo Jing & Akula Venkatram, *The Relative Impacts of Distributed and Centralized Generation of Electricity on Local Air Quality in the South Coast Air Basin of California*, 39 ENERGY POL'Y 4999, 4999 (2011).

29 *See* Tong & Zhang, *supra* note 4, at 263.

30 *See id.* at 270.

31 *See* NESCAUM REPORT, *supra* note 11, at 26 ("[E]ven if diesel engines operate relatively rarely on only the highest electricity demand days, their emissions on those specific days can be relatively significant and occur at the worst possible times for air pollution."); Xiyue Zhang & K. Max Zhang, *Demand Response, Behind-the-Meter Generation and Air Quality*, 49 ENVTL. SCI. & TECH. 1260, 1265 (2014); Elisabeth A. Gilmore et al., *The Costs, Air Quality, Human Health Effects of Meeting Peak Electricity Demand with Installed Backup Generators*, 40 POL'Y ANALYSIS 6887, 6887 (2006).

emissions that go unaccounted for under efforts to cap electricity-sector emissions, such as the Clean Power Plan (CPP)[32] and the Regional Greenhouse Gas Initiative (RGGI).[33] Indeed, these programs may decrease the cost of DG relative to central generators, creating an incentive to shift generation from large central generators to smaller, distributed sources.

In general, it should be noted that there is currently a lack of information about emission levels and their effects from existing DG. These information gaps complicate the assessment of the environmental consequences of DG.

III. CURRENT REGULATION OF DISTRIBUTED GENERATION EMISSIONS

This Part presents a general overview of the basic regulatory framework applicable to fossil-fuel-fired DG. These regulations are complex, and they vary based on the type of generator and the jurisdiction in which it is located. For simplicity, this Part focuses primarily on the regulation of stationary internal combustion engines in New York State, and on diesel engines in particular. These engines are a common form of distributed generation and they emit relatively high levels of pollutants, including PM, NO_x, and SO_2, as well as GHGs. Throughout this Part, we provide examples from other jurisdictions in order to highlight the heterogeneity among approaches to regulating DG.

As discussed below, the applicable federal regulations establish emissions limits for many DG units, with larger and newer generators facing more stringent limitations. Smaller generators usually must comply only with operational standards, although newly built small engines must comply with certain emissions thresholds. State and local registration and permitting requirements follow a similar pattern. Larger engines must secure operating permits, which require them to demonstrate that they meet certain emissions standards, while smaller engines must only

32 *See* Standards of Performance for Greenhouse Gas Emissions from New, Modified, and Reconstructed Stationary Sources: Electric Utility Generating Units, 80 Fed. Reg. 64,510 (Oct. 23, 2015) (to be codified at 40 C.F.R. pts. 60, 70, 71, 98); Carbon Pollution Emission Guidelines for Existing Stationary Sources: Electric Utility Generating Units, 80 Fed. Reg. 64,662 (Oct. 23, 2015) (to be codified at 40 C.F.R. pt. 60).

33 *See The RGGI CO_2 Cap*, REG'L GREENHOUSE GAS INITIATIVE, https://www.rggi.org/design/overview/cap (last visited Nov. 17, 2016).

register with the appropriate regulatory body, if they are required to take any action at all.

In general, these regulations are source-specific. That is, they typically address the emissions of an individual source and do not attempt to regulate aggregate emissions levels or address the effects of concentrating fossil-fuel-fired DG resources in a particular area or concentrating their operation during a particular period of time.

A. *Regulation of Conventional Pollutants*

1. *Federal Regulation*

The U.S. Environmental Protection Agency (EPA) administers the primary federal regulations for fossil-fuel-based DG. Chief among these regulations are the National Emissions Standards for Hazardous Air Pollutants (NESHAP) and New Source Performance Standards (NSPS) for stationary reciprocating internal combustion engines (RICE).[34] As noted, electric generators powered by these engines are one of the principal forms of fossil-fuel-based DG,[35] and a major participant in demand response programs.[36]

The RICE NESHAP sets generally applicable emissions-control standards for diesel and gasoline generators.[37] Under this rule, EPA imposes limits on certain hazardous emissions from new and existing diesel engines with those limits becoming progressively more stringent as the size of the engine increases (the least stringent standard applies to the covered engines with the lowest horsepower).[38] Diesel engines under 300 horsepower—

34 EPA has also issued regulations addressing other forms of small fossil-fuel-based DG, including, for example, NSPS for certain forms of gas turbines. *See* 40 C.F.R. § 60.4300 (2015).

35 *See supra* note 24 and accompanying text.

36 *See* Tong & Zhang, *supra* note 4, at 263.

37 The RICE NESHAP addresses a variety of hazardous air pollutants, including known carcinogens, such as diesel exhaust. World Health Org., Press Release, Iarc: Diesel Engine Exhaust Carcinogenic (June 22, 2012), available at https://www.iarc.fr/en/media-centre/pr/2012/pdfs/pr213_E.pdf. And although many of the emissions discussed above, including NO_x and PM, do not fall on this list, the emissions controls used to meet the NESHAP limits have the potential to also reduce the emissions of these pollutants as well. *See* 40 CFR § 63.6580 (2015).

38 *See* Compliance Requirements for Stationary Engines, U.S. ENVTL. PROT. AGENCY REGION 1, https://www.epa.gov/stationary-engines/compliance

about twice that of a 2015 diesel Volkswagen Jetta[39]—and comparably sized engines that burn gasoline generally are not subject to emissions limits.[40] Instead, they must adhere to operational "work practice" standards, such as regular oil changes and inspections, to ensure that the engine is running efficiently.[41]

In addition, EPA regulates new and significantly modified engines under the NSPS. These regulations require that engines produced after a particular point in time meet emissions standards for pollutants including NO_x, PM, and CO, with those standards varying based on the size and other characteristics of the engine, including whether it runs on gasoline or diesel fuel.[42] EPA has implemented these standards in time-specific "tiers," with each tier applying progressively more stringent emissions limitations to engines built after the tier goes into effect.[43] These tiers, however, are not retroactive. That is, the NSPS generally do not require an engine that was completed before a particular tier goes into effect to comply with a subsequent, more stringent tier.[44]

requirements-stationary-engines (last visited Oct. 8, 2017). For example, a diesel engine with more than 300 horsepower cannot emit more than 49 parts per million of carbon monoxide while one larger than 500 horsepower cannot emit more than 23 parts per million. *See id.* Alternatively, an engine's operator can comply by installing controls that create a more than 70% reduction in CO emissions. *See id.* Although the NESHAP sets limits for multiple hazardous pollutants, CO emissions are used for compliance purposes because the level of CO emissions is, based on the control methods generally used, a good proxy for emissions of the relevant hazardous pollutants. *See id.* EPA's limits on smaller diesel engines are more stringent if the engine is located at a facility that is a major source of hazardous pollutants—that is, if it has the potential to emit more than 10 tons per year of any pollutant or more than 25 tons of all pollutants designated as hazardous. *See id.*

39 *See 2015 Volkswagen Jetta Diesel: Features & Specs*, EDMUNDS, http://www.edmunds.com/volkswagen/jetta/2015/diesel/features-specs/ (last visited Nov. 17, 2016) (listing the characteristics of 2015 diesel Jetta).

40 *See* Melanie King, *EPA's Air Quality Regulations for Stationary Engines*, ENVTL. PROT. AGENCY 18–20 (May 2, 2013), https://www.epa.gov/sites/production/files/2014-03/documents/6_2012_webinaroverview_rice.pdf.

41 *Id.*

42 *See id.* at 24, 32 (describing different standards applicable to spark and compression engines); Standards of Performance for Stationary Compression Ignition Internal Combustion Engines, 40 C.F.R. § 60.4200 (2015).

43 Generally, operators demonstrate compliance with the NSPS by purchasing a qualifying engine and operating it consistently with the manufacturer's guidelines. Only relatively large engines—*i.e.*, those in excess of 30 liters per cylinder—must undergo regular emissions testing. *See* 40 CFR § 60.4211; King, *supra* note 40, at 23–24.

44 *See* 40 CFR § 60.4211; King, *supra* note 40, at 23–24.

In 2013, EPA significantly expanded an exemption from the RICE NESHAP and NSPS in order to make it easier for DG to participate in demand response programs without incurring potentially insurmountable emissions-control costs.[45] The exemption applied to engines that operate for fewer than 100 hours per year and only for certain purposes, such as regular maintenance or reliability-based demand response.[46] In addition, the rule provided that up to 50 of the 100 hours could be in non-emergency conditions if the owner did not receive financial compensation in exchange for running the engine or if any financial compensation was pursuant to an agreement with a local distribution grid operator for the purposes of ensuring reliability.[47]

In 2015, the D.C. Circuit Court of Appeals invalidated this exemption. The court concluded that EPA failed to adequately respond to concerns about the effects of the 100-hour exemption.[48] Although EPA successfully sought a stay of the court's mandate, it elected not to promulgate new regulations and, as a result, engines that support demand response generally do not qualify as "emergency" engines and must meet the emission standards described above.[49]

In addition, many of the emissions from fossil-fuel-based DG are "criteria" pollutants subject to EPA regulation under the National Ambient Air Quality Standards (NAAQS).[50] States are primarily responsible for bringing into compliance areas where

45 *See* National Emission Standards for Hazardous Air Pollutants for Reciprocating Internal Combustion Engines; New Source Performance Standards for Stationary Internal Combustion Engines, 78 Fed. Reg. 6674, 6679 (Jan. 30, 2013) (to be codified at 40 C.F.R. pts. 60, 63) ("The EPA believes that the emergency demand response programs that exist across the country are important programs that protect the reliability and stability of the national electric service grid. The use of stationary emergency engines as part of emergency demand response programs can help prevent grid failure or blackouts, by allowing these engines to be used for limited hours in specific circumstances of grid instability prior to the occurrence of blackouts.").

46 *See id*.

47 *See id.*

48 *See* Del. Dep't of Nat. Res. & Envtl. Control v. EPA, 785 F.3d 1, 18 (D.C. Cir. 2015).

49 *See* U.S. ENVTL. PROT. AGENCY, GUIDANCE ON VACATUR OF RICE NESHAP AND NSPS PROVISIONS FOR EMERGENCY ENGINES (2016), https://www.epa.gov/sites/production/files/2016-06/documents/ricevacaturguidance041516. pdf.

50 *See NAAQS Table*, U.S. ENVTL. PROT. AGENCY, https://www.epa.gov/criteria-air-pollutants/naaqs-table (last visited Nov. 17, 2016).

pollution exceeds the NAAQS, as parts of New York do for ozone and certain forms of particulate matter (primarily New York City and the surrounding counties).[51]

2. *State Environmental Protection Agencies*

a. *New York State Department of Environmental Conservation*

New York State's primary regulation of smaller generators occurs through a registration and permitting regime administered by the New York State Department of Environmental Conservation (NYSDEC). As a general matter, New York State has established permitting requirements for significant emissions sources. Significant sources covered by these requirements include sources that emit 50 percent or more of the threshold for qualifying as a "major source" under Title V of the Clean Air Act.[52] This level of emissions, however, is above what most individual DG resources are likely to emit.

Instead, it is more likely that DG will participate in New York's minor facility registration program, which applies to sources too small to require a permit, unless those sources qualify as exempt or trivial.[53] The registration requirements include a list of all state and federal limits applicable to the source[54]—for example, the NSPS and NESHAP regulations discussed in the previous section. Many smaller fossil-fuel-fired generators may qualify as exempt generators, which excuses them from the registration requirement, although larger ones will be required to participate in the minor source registration program.

NYSDEC has recently enacted new regulations to address emissions from fossil-fuel-fired DG. These regulations, known as

---

51 *See Current Nonattainment Counties for All Criteria Pollutants*, U.S. ENVTL. PROT. AGENCY (Sep. 22, 2016), http://www3.epa.gov/airquality/greenbook/ancl.html (listing non-attainment counties).

52 *See* N.Y. COMP. CODES R. & REGS. tit. 6, § 201-5.1 (2013) (describing the applicability of state permit requirements); N.Y. COMP. CODES R. & REGS. tit. 6, § 201-6.1 (2013) (describing the applicability of the Title V permit requirements).

53 *See* N.Y. COMP. CODES R. & REGS. tit. 6, § 201-4.1 (2013). Exempt or trivial sources include small liquid or gaseous fueled generators—i.e., those under 200 horsepower in the greater New York City metropolitan area and certain parts of Orange County and those under 400 horsepower in the rest of the state. N.Y. COMP. CODES R. & REGS. tit. 6, § 201-3.2. The operators of these sources must maintain records demonstrating that they qualify as exempt or trivial. *Id.*

54 *See* N.Y. COMP. CODES R. & REGS. tit. 6, § 201-4.3 (2013).

Part 222, establish emissions limits for a range of pollutants from relatively large distributed generation—as the NYSDEC puts it, these regulations generally apply to DG in commercial and institutional settings, but not to those units in residential ones.[55] The new regulations are intended, at least in part, to address the effects of REV on demand for and operation of distributed energy resources.[56] Part 222 applies to all eligible units, except those that operate only in emergency conditions—i.e., when electricity is not available from the grid.[57] In this respect, it is similar in design to the federal regulation under the NSPS and NESHAP regulations, but Part 222 applies to already-installed units unlike the NSPS.[58]

Part 222 also includes some novel regulatory approaches. For example, it contemplates that many owners of diesel-fired DG will convert their generators to natural gas, and it provides a one-year extension of the compliance deadline for those that intend to do so.[59] It also provides a one-year extension for owners that intend to shut down their DG units rather than comply with the new emissions limits.[60] Although an estimate of the combined effect of these incentives is outside the scope of this Article, these one-year extensions should provide an incentive to improve or remove relatively dirty DG, although perhaps at a near-term cost of slightly greater emissions.

b. *Other State Models*

A number of other states have developed different approaches for addressing emissions from DG. This Section discusses some of the leading examples, and notes instances in which they differ from the New York regulations discussed in the previous section. Perhaps the most aggressive such program has been California's, in which the California Air Resources Board (CARB) promulgated a series of stringent regulations applicable to all new and existing diesel generators greater than 50 horsepower.[61] These include

55 *See Fact Sheet Part – 222*, N. Y. STATE DEP'T OF ENVTL. CONSERVATION, http://www.dec.ny.gov/regulations/104280.html (last visited Nov. 17, 2016).

56 *See id*.

57 *See* N.Y. COMP. CODES R. & REGS. tit. 6, § 200.1 (2016).

58 *See* N.Y. COMP. CODES R. & REGS. tit. 6, § 222.1(a) (2016).

59 *See* N.Y. COMP. CODES R. & REGS. tit. 6, §§ 222.2(b)(2), 222.5(d).

60 *See id*.

61 *See* CAL. CODE REGS. tit. 17, §§ 93115.6 (establishing emissions standards for emergency generators), 93115.7 (establishing emissions standards for prime generators), 93115.9 (describing emissions limitations for generators

emissions limits for PM, CO, non-methane hydrocarbon (NMHC), and NO_x, with more lenient standards for engines that operate only during emergencies.[62] In addition, California limits emissions of these same pollutants from smaller engines—i.e., those under 50 horsepower—but only if they were installed after 2005.[63] California allows local government agencies—local pollution control districts or air quality management districts—to take an even more aggressive approach by establishing more stringent limits for any or all of these pollutants.[64] In short, California provides one of the closest parallels to New York's Part 222 environmental regulations, although it is more comprehensive because it applies to all generators within the state, including smaller generators and generators used only during emergencies.

Most other states that address emissions from DG do so through a series of emissions limits on some or all types of DG. These state regulations, however, exhibit a number of other notable differences from New York and California. Delaware, for example, establishes emissions limits applicable to most DG with the specific limits varying based on the unit's fuel type and installation date.[65] As discussed further below, Delaware also limits CO_2 emissions[66] and establishes restrictions on when DG

installed after 2005 and stricter limitations for generators installed after 2011).

62 The exact emissions limit for each pollutant varies based on a generator's date of installation and horsepower. For newer prime generators of higher horsepower, there are separate NO_x and NMHC limits. For emergency generators and older or lower horsepower prime generators, there is a single cap for combined NO_x and NMHC emissions. *See supra* note 61.

63 *See* CAL. CODE REGS. tit. 17, § 93115.9 (describing emissions limitations for generators installed after 2005 and stricter limitations for generators installed after 2011). Portable diesel generators greater than 50 horsepower are subject to PM limits. *See* CAL. CODE REGS. tit. 17, § 93116.3(b) (2016).

64 *See* CAL. CODE REGS. tit. 17, §§ 93115.7(a)(5) (stating that districts can create stricter cite-specific emissions limitations for prime generators), 93115.6(a)(3)(B) (stating that districts can create stricter emissions limitations for emergency generators); CAL. CODE REGS. tit. 17, § 93115.7(a)(4) (2016) (stating that districts can create "additional emissions limitations" for prime generators operated for the purpose of DG).

65 *See* 7 DEL. ADMIN. CODE § 1144-3 (2006). The exceptions to this rule include generators with a standby capacity of less than 10 KW, generators serving a residential property for three or fewer families, mobile generators, and "a generator covered by a permit which imposes a NO_x emission limitation established to meet Best Available Control Technology (BACT) or Lowest Achievable Emission Rate (LAER)." 7 DEL. ADMIN. Code § 1144-1.2.1.1 (2006).

66 *See* 7 DEL. ADMIN. CODE § 1144-3.2.1.1 (2006).

can operate for certain purposes—prohibiting DG from operating for testing or maintenance before 5:00 p.m. when the state is experiencing high levels of ozone or particulate pollution.[67]

New Jersey bans the operation of certain generators for testing and maintenance on days designated by the state's Department of Environmental Conservation as having poor air quality.[68] In addition, New Jersey creates incentives for achieving low emissions rates of pollutants that are not subject to a mandatory emissions limit. That is, although any non-emergency generator greater than 37kW also counts as "a significant source (and, therefore, requires a preconstruction permit and an operating certificate) . . . ."[69] New Jersey will waive this requirement for generators under 500 kW if they can show that their per-megawatt-hour emissions of NO_x, CO, PM, and SO_2 are below specified levels, even though the only binding emissions limits for DG in the state are for NO_x.[70]

In Massachusetts, non-emergency generators with a capacity greater than 50kW are subject to NO_x, PM, CO, and CO_2 emissions limits.[71] But as an alternative to complying with these emissions requirements, the operator of certain DG units can use a streamlined process[72] under which a source will be approved if it is shown to comply with the most stringent of a set of federal emissions standards.[73]

3. *State Public Utility Commission Regulation*

In New York, the New York Public Service Commission has enacted regulations addressing DG on a case-by-case basis. Whereas the NYSDEC regulations focused on the emissions levels of a particular generator, the NYPSC has focused on limiting the amount of demand response that the grid operator can take from certain types of fossil-fuel-based DG. For example, in approving

67 *See* 7 DEL. ADMIN. CODE § 1144-4.4 (2006).
68 *See* N.J. ADMIN. CODE § 7:27-19.2(d) (2016).
69 N.J. ADMIN. CODE § 7:27-8.2(c) (2016).
70 *See* N.J. ADMIN. CODE § 7:27-8.2(f) (2016).
71 *See* 310 MASS. CODE REGS. 7.26(43)(b) (2016).
72 *See* 310 MASS. CODE REGS. 7.26(43)(a) (2016).
73 The federal standards include LAER, BACT, NSPS, NESHAP, and Maximum Achievable Control Technology (MACT). *See* 310 MASS. CODE REGS. § 7.02(8) (2016). This program is applicable to a generator that is "a peaking power production unit, load shaving unit [or] a unit in an energy assistance program." 310 MASS. CODE REGS. § 7.26(43)(a) (2016).

Consolidated Edison's (Con Edison) demand response program in New York City in 2009, the NYPSC established three restrictions to address environmental justice concerns associated with diesel generators. First, it prohibited non-renewable fossil-fuel generators located within half a mile of certain gas turbines in the city from participating in the program.[74] Second, it capped diesel generators' participation in the program at 20 percent of the total megawatt enrollment.[75] Third, it limited the participation of diesel and certain natural gas engines to model year 2000 and newer engines.[76] The NYPSC incorporated these same limitations into Con Edison's more recent Brooklyn Queens Demand Management program (BQDM program),[77] in which Con Edison is seeking to use demand-side resources to help defer or avoid the need to build a new distribution substation.[78]

Once again, California provides an interesting counterpoint to the initiatives in New York. In 2013, as part of a major proceeding on demand response, the California Public Utilities Commission (CPUC) considered instituting an outright ban on fossil-fuel-fired DG in demand response programs within the state.[79] Although the CPUC believed that it possessed jurisdiction to institute such a ban, it stopped short of doing so, instead requiring utilities to begin collecting information on the utilization of fossil-fuel-fired backup generators as part of demand response programs.[80] That

74 *See* Order Adopting in Part and Modifying in Part Con Edison's Proposed Demand Response Programs, Case No. 09-E-0115 (N.Y. Pub. Serv. Comm'n Oct. 23, 2009) [hereinafter Order Establishing Con Edison Demand Response Program].

75 *See id.* at 21.

76 *See id.* Con Edison's most recent update on demand response programs to the NYPSC also states that it limits participating generators based on model year, emissions-control technology, or NOx emissions rate. *See* Consolidated Edison Company of New York, Inc. Report on Program Performance and Cost Effectiveness of Demand Response Programs at 18, Case No. 09-00115 (N.Y. Pub. Serv. Comm'n Dec. 1, 2014).

77 *See* Order Establishing Brooklyn/Queens Demand Management Program at 17, Case No. 14-E-0302 (N.Y. Pub. Serv. Comm'n Dec. 12, 2014) [hereinafter Order Establishing BQDM Program].

78 *See id.* at 2–3.

79 *See* Decision Resolving Several Phase Two Issues and Addressing the Motion for Adoption of Settlement Agreement on Phase Three Issues at 51–52, Case No. R. 13-09-011 (Cal. Pub. Utils. Comm'n Sept. 19, 2013), http://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M143/K552/143552239.pdf.

80 *See id.* at 60–61. The CPUC also expressed its belief that it possessed the jurisdiction to ban all fossil-fuel-fired backup generators from participating in

information was submitted in November 2015, but the CPUC has yet to decide whether to permit these fossil-fuel-fired generators to participate in demand response going forward.

In addition, California's major investor-owned utilities recently completed their first auction, known as the Demand Response Auction Mechanism (DRAM), to procure grid-scale distributed resources.[81] As with New York's BQDM project, the purpose of this auction is, at least in part, to use distributed resources to forestall the need for additional grid upgrades or generation. DG is one of the principal resources available to meet that goal. In setting its final rules for the auction, however, the CPUC established a complete ban on fossil-fuel-fired backup generators, after concluding that they were inconsistent with the state's environmental goals.[82] In essence, California has taken the ban that New York applied to fossil-fuel-fired DG operating near a power plant and extended it to the entire state, at least for the DRAM. The CPUC also indicated that it would use the DRAM experience as evidence when deciding whether to expand the ban on fossil-fuel-fired backup generators to its larger demand response program, discussed above.[83] The CPUC's approach to DG is thus similar to the NYPSC's, although it may ultimately go much further by barring the participation of certain classes of fossil-fuel-fired DG throughout the state—something that New York does not appear to have contemplated to date.

4. *Local Regulation*

The New York City Department of Environmental Protection (NYCDEP), which promulgates its own environmental

demand response within the state, not just those administered by a utility. *See id.* at 57–58.

81 *See* Resolution E-4728 (Cal. Pub. Utils. Comm'n July 23, 2015), http://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M153/K436/153436367.pdf.

82 *See id.* at 14.

83 *See id.* at 15 ("Disallowing fossil-fueled BUGs [backup generators] in this pilot program could provide additional insight for the Commission when it decides the overall policy on fossil-fueled BUGs."). A recent proposed decision adopted the position that the state should expand this ban on most forms of fossil-fuel backed DG throughout the CPUC's demand response programs. *See* Decision Adopting Guidance for Future Demand Response Portfolios and Modifying Decision 14-12-024, at 2, Case No. R. 13-09-011 (Cal. Pub. Utils. Comm'n Aug. 30, 2016), http://docs.cpuc.ca.gov/PublishedDocs/Efile/G000/M166/K460/166460832.PDF.

requirements under the New York City Air Code, is the leading local regulator for DG within New York. As with the federal and state regulations, the NYCDEP regulations increase in stringency with the size of the generator. Relatively large generators—those with maximum input in excess of 4.2 million British Thermal Units (BTUs), depending on their fuel type—are required to register with the city and obtain an operating permit for the engine.[84] Notably, the City's recent amendments to its Air Code will soon utilize EPA's forward-looking NSPS requirements as a baseline for retrofits. Beginning in 2025, the city will no longer renew operating permits for diesel generators unless those generators meet EPA's Tier 4 emission standards, even though the EPA makes the Tier 4 standards applicable only to new engines.[85]

Smaller engines are not required to obtain operating permits. Engines below the 4.2-million-BTU thresholds need only register with the City, and very small engines—those with a maximum input less than 350,000 BTUs—are neither required to register nor to obtain an operating permit.[86] In addition, engines that are used only in emergency circumstances are not required to obtain an operating permit, regardless of size, although they must be registered with NYCDEP.[87] Unlike EPA's emergency generator exception, however, New York City limits emergency generators to operating only when their facility cannot receive power from the grid.[88] That is, in order to qualify as an emergency generator under the New York City code, a source cannot participate in peak shaving or even reliability-based demand response.[89]

The City of Chicago also relies primarily on a permitting approach for addressing emissions from DG. It requires that individuals obtain a permit in order to "install . . . operate . . . replace or relocate"[90] equipment, including "combustion equipment" such as fossil-fuel-fired DG.[91] A permit is also

84 *See* N.Y.C. ADMIN. CODE § 24-109 (2017).

85 *See* N.Y.C. ADMIN. CODE § 24-149.6(b) (2016) (citing the tier 4 requirement).

86 *See id.*

87 *See* N.Y.C. ADMIN. CODE §§ 24-104, -109, -122(c) (2016).

88 *See* § 24-109 (defining an emergency generator as "an internal combustion engine that operates as a mechanical or electrical power source only when the usual source of power is unavailable.").

89 *See id.*

90 CHI., ILL., MUN. CODE tit. 11, § 11-4-620 (2016).

91 The § 11-4-620 permitting requirements apply to, among other equipment,

required in order to "repair or modify" the equipment in a way that would "increase the quantity or change the nature of air contaminants emitted."[92] Guidance from the City indicates that the permitting requirement applies even to equipment that generates very small amounts of pollution.[93] The City will grant a permit only if the "control equipment or technology to be utilized to control the emission of air contaminants is appropriate for the facility's operations and throughput."[94] Control technology permitted by state or federal law will be considered appropriate.[95]

San Francisco, by contrast, establishes more affirmative limitations on fossil-fuel-fired DG under its jurisdiction. It requires annual renewals of certificates of operation for diesel backup generators greater than 50 horsepower.[96] In addition, these generators are limited to 50 hours of non-emergency operation per year, must have "best available control technology" (as determined by either the California Air Resource Board or the Bay Area Air Quality Management District) installed, and must be fitted with a meter that measures fuel use or hours of operation.[97]

***

In summary, fossil-fuel-fired DG is generally subject to a suite of federal, state, and, in some cases, local regulations. These regulations are largely source-specific. Although they regulate

"'[c]ombustion equipment' [which] means any equipment or device which generates heat or energy by burning solid, liquid, or gaseous fuel or other material, and which emits or has the potential to emit air contaminants"—a category that specifically includes "generators." CHI., ILL., MUN. CODE tit. 11, § 11-4-610 (2016).

92 § 11-4-620.

93 A guide on the City of Chicago's website indicates that "[n]either the size of the facility nor the amount of the air contaminant has any bearing on whether or not you need a permit." CITY OF CHI. DEP'T OF ENV'T, A GUIDE TO OBTAINING AIR POLLUTION CONTROL PERMITS 3 (2011), http://www.cityofchicago.org/content/dam/city/depts/doe/general/PermittingAndEnforcement_PDFs/AirQualityPermits/AirPollutionControlGuidev3.pdf.

94 CHI., ILL., MUN. CODE tit. 11, § 11-4-630 (2016).

95 The municipal code contains a provision stating that "any control equipment or technology permitted by state or federal law or regulation shall be considered appropriate," *id.*, but the definition of "air pollution," CHI., ILL. MUN. CODE tit. 11, § 11-4-610, is broad enough to potentially sweep in pollutants for which there is no state or federal standard.

96 *See* S.F., CAL., HEALTH CODE, art. 30, §§ 2003 (requiring certificates for both new and existing diesel backup generators), 2002(d) (defining "diesel backup generator" to include only generators greater than 50 horsepower), 2008 (indicating that a certificate is valid for one year) (2016).

97 S.F., CAL., HEALTH CODE, art. 30, § 2006 (2016).

emissions for certain types of DG, which reduces the overall emissions potential of DG sources, they generally do not address concerns about geographic or temporal concentration of DG emissions. The principal exception to this rule is the set of restrictions that the NYPSC has implemented with respect to Con Edison's demand response programs.[98] In addition, some of the most stringent regulations, EPA's NSPS, are only forward-looking. As a result, the current NSPS limits do not apply to the large percentage of engines that were installed pursuant to previous, more lenient NSPS rules.[99] Many relatively small sources of DG are exempted from emissions monitoring entirely. Although these smaller DG units may operate less frequently (and produce lower total emissions) than larger units, a sufficient concentration could nevertheless lead to significant adverse health impacts. Emergency generators may also receive relaxed treatment, such as less stringent emissions standards.[100]

B. *Regulation of GHGs*

Efforts to regulate GHG emissions from the power sector—on both the state and federal level—overwhelmingly focus on sources with a capacity of 25 Megawatts (MW) or more. To the extent that these efforts, such as the EPA's Clean Power Plan (CPP)[101] or the Northeast's Regional Greenhouse Gas Initiative (RGGI),[102] increase the cost of operating larger sources without imposing similar costs on small sources, they will make DG into a cheaper means of generating electricity. A shift of generation from centralized stations to relatively inefficient fossil-fuel-fired DG could erode the emission-reduction benefits of GHG policies. Such "leakage" would be most problematic if the incremental generation

98 *See* Order Establishing BQDM Program, *supra* note 77, at 17; Order Establishing Con Edison Demand Response Program, *supra* note 74, at 20–21.

99 *See* Tong & Zhang, *supra* note 4, at 263 ("[A] large percentage of diesel backup generators that are in use are Tier 1, Tier 2 or older, which have considerably higher emission rates than those of the latest models.").

100 *See* N.Y. COMP. CODES R. & REGS. tit. 6, § 222.1(b) (2016).

101 *See* Standards of Performance for Greenhouse Gas Emissions from New, Modified, and Reconstructed Stationary Sources: Electric Utility Generating Units, 80 Fed. Reg. 64,510 (Oct. 23, 2015) (to be codified at 40 C.F.R. pts. 60, 70, 71, 98); Carbon Pollution Emission Guidelines for Existing Stationary Sources: Electric Utility Generating Units, 80 Fed. Reg. 64,662 (Oct. 23, 2015) (to be codified at 40 C.F.R. pt. 60).

102 *See The RGGI CO_2 Cap*, *supra* note 33.

was supplied by diesel generators, which, in addition to GHGs, also emit significant levels of black carbon—a form of PM that is a potent heat-trapping compound.[103] As explained below, under the CPP, states can deploy the regulatory tools at their disposal—which are discussed at the end of this paper—to mitigate any increases in GHG emissions from DG.

1. *Federal Regulation*

EPA's Clean Power Plan is, at the time of writing, the primary federal regulation of GHG emissions from electric generating units.[104] The Clean Power Plan, however, applies only to sources with a generation capacity greater than 25 MW—far in excess of the vast majority of DG units.[105] States may comply with the CPP by enacting either rate- or mass-based limits on their GHG emissions.[106] Although the CPP requires states to address the issue of generation shifts to new, relatively large sources, and provides presumptively acceptable means of doing so,[107] it leaves the

103 *See Basic Information: Black Carbon*, U.S. ENVTL. PROT. AGENCY, https://www3.epa.gov/airquality/blackcarbon/basic.html#where (last visited Mar. 10, 2017).

104 *See* Standards of Performance for Greenhouse Gas Emissions from New, Modified, and Reconstructed Stationary Sources: Electric Utility Generating Units, 80 Fed. Reg. 64,510; Carbon Pollution Emission Guidelines for Existing Stationary Sources: Electric Utility Generating Units, 80 Fed. Reg. 64,662. Needless to say, the election of President Donald Trump has cast serious doubt on the CPP's fate. However, the CPP remains in effect for the time being and this Article will treat the regulation accordingly.

105 *See* Carbon Pollution Emission Guidelines for Existing Stationary Sources: Electric Utility Generating Units, 80 Fed. Reg. 64,662, 64,715–16.

106 *See id.* at 64,664.

107 *See id.* at 64,888 (stating that states can regulate additional sources if they choose).

The options for a mass-based program are as follows. First, a state may enact an overall cap on GHG emissions that includes an allowance both for large existing sources subject to Section 111(d) and for large new sources subject to Section 111(b). *See id.* at 64,888–89. An overall cap reduces the incentive to shift generation between sources subject to Sections 111(b) and 111(d). As the final rule observes, this model is similar to RGGI and there is thus every reason to believe that New York will elect this method of compliance. *See id.* at 64,888.

Second, a state may carve out a portion of its mass-based limit to create a pair of allowances that would counteract the incentive to shift generation to new sources subject to Section 111(b). The first allowance would go to existing sources regulated under Section 111(d) based on the amount they generate, giving an incentive for them to run rather than shifting production to Section 111(b) units. In so doing, the allowance gives the mass-based limit a rate-like quality. *See id.* at 64,889–90. A second allowance would be for renewable question of whether to address shifts to smaller generators entirely to the states.[108] Absent effective state action, there is a risk that either a rate- or mass-based approach could encourage shifts in electricity production from large power plants, which are subject to the mass-based cap or included in the calculations of emissions rates, to sources that fall under the 25 MW threshold and are outside the scope of the CPP.

2. *State Regulation*

New York regulates carbon dioxide emissions as part of RGGI.[109] New York's regulations implementing RGGI, however, exempt sources smaller than 25 MW from reporting and compliance requirements.[110] As most DG falls well below that threshold, it appears that RGGI would not directly address the issue of GHG leakage to small fossil-fuel-based generators.

Some states have established source-specific CO_2 emissions limits for fossil fuel generators, although, unlike RGGI, they do not cap the total amount of CO_2 that may be emitted from DG. Delaware,[111] Rhode Island,[112] and Massachusetts[113] all set a CO_2 emissions limit of 1,650 lbs./Megawatt-hour (MWh) for non-emergency generators installed on or after January 1, 2012. Additionally, Rhode Island limits CO_2 from emergency generators to 1,900 lbs/MWh.[114] California does not have source-specific standards for GHG emissions from DG, but may capture some of

energy, creating an incentive to shift production to renewable sources rather than to sources regulated under 111(b). *See id.*

Finally, a state may address the leakage concern by providing EPA with credible analysis that, based on other state regulations or the particular characteristics of that state, leakage is not a significant concern. *See id.* at 64,890. EPA has provided little guidance on what will suffice to make this showing.

108 *See id.* at 64,888.

109 *See* N.Y. COMP. CODES R. & REGS. tit. 6, § 242-1.4(a) (2015).

110 *See id.*

111 In addition to this standard for new generators, Delaware limits CO_2 emissions from existing non-emergency generators to 1,900 lbs/MWh. *See* 7 DEL. ADMIN. CODE § 1144-3 (2015).

112 Generators installed between May 15, 2007, and December 31, 2011 are limited to CO_2 emissions of 1,900 lbs/MWh. *See* 12-031 R.I. CODE R. § 43.4 (LexisNexis 2016).

113 Generators installed between March 23, 2006 and December 31, 2011 are limited to CO_2 emissions of 1,900 lbs/MWh. *See* 310 MASS. CODE REGS. 7.26 (2016).

114 *See* 12-031 R.I. CODE R. § 43.4.

these emissions through the state's cap-and-trade program. Starting in 2015, fuel suppliers—including suppliers of gasoline and diesel fuels[115]—are required to obtain trading permits if the amount of fuel they sell or import in California would produce 25,000 metric tons or more of CO_2 equivalent per year.[116] The emissions from DG that runs on fuel purchased from one of these suppliers would therefore be covered by California's emissions cap, which imposes a price on these emissions.

***

In general, most states do not address GHGs from DG, although the CPP raises the possibility that states could begin regulating these emissions in order to avoid "leakage" to sources below 25 MW.

IV. POLICY OPTIONS

This Part outlines a variety of potential policy approaches for reducing the emissions from fossil-fuel-fired DG. It does not, however advocate for a particular approach. Whether one or more of these approaches makes sense is a question that will depend heavily on the characteristics of a particular jurisdiction (state, city, or other local government). For example, jurisdictions should determine whether any human health impacts from increased DG would be felt throughout the state or municipality, or only felt in a handful of relatively small areas. That determination will be important for assessing whether it would be more cost-effective to pursue broadly applicable emissions limits or, instead, a program intended to eliminate a few specific hotspots. Similarly, jurisdictions should assess the causes for increased fossil-fuel-fired DG. These factors are important to analyzing whether it is more effective to address the effects of fossil-fuel-fired DG through individual programs, such as the NYPSC's approach to demand response, or broadly applicable measures, such as NYSDEC's Part 222.

The purpose of this Part is to outline a number of different approaches that jurisdictions might consider as they evaluate these

115 *See* CAL. CODE REGS. tit. 17, § 95811(d) (2016); *Information for Entities that Take Delivery of Fuel for Fuels Phased into the Cap-and-Trade Program Beginning on January 1, 2015*, CAL. AIR RES. BOARD, https://www.arb.ca.gov/cc/capandtrade/guidance/faq_fuel_purchasers.pdf (last visited Oct. 8, 2017).

116 *See* CAL. CODE REGS. tit. 17, § 95812(d) (2016).

local considerations. In doing so, it focuses overwhelmingly on options available within New York. Several factors in New York State, including the REV proceeding and the high electricity prices experienced in New York City and Long Island, may promote increased DG. As a result, many of these policies could be relevant as New York State responds to the possible effects of this increase.

All of the options discussed below would benefit from better information regarding the number, type, location, and hours of operation of fossil-fuel-fired DG units already in use—i.e., the sort of information that California has ordered its utilities to compile as part of the demand response programs.[117] In the case of New York, some (but not all) of this information could likely be compiled from the registration and permitting requirements administered by the NYSDEC and NYCDEP. Nevertheless, additional efforts to identify and monitor the emissions from fossil-fuel-fired DG are important in order to assess their environmental and human-health impacts. Efforts to develop this information will help to identify both the magnitude of the potential health and environmental impacts of increased DG emissions and what steps can cost-effectively be deployed to address these emissions.

A. *Options for Addressing Conventional Pollutants*

There are two general approaches to regulating DG emissions of conventional pollutants. First, regulators may limit the emissions from any particular source. This source-specific approach is, by and large, the approach embodied in the current suite of environmental regulations described above in Part III. Second, regulators may attempt to reduce or limit the aggregate level of conventional pollutants in a particular area, including emissions from DG. The following subsections describe a number of ways in which regulators might deploy these approaches to address concerns about increased emissions from DG.

1. *Source-Specific Standards*

Source-specific standards set a generally applicable rule—or series of rules—for every source in a particular category. Thus, all else equal, they reduce the total emissions from fossil-fuel-fired DG, which in turn reduces the likelihood that emissions from DG will reach harmful levels in any particular area. One of the primary

117 *See supra* note 79 and accompanying text.

virtues of the source-specific approach is its administrative simplicity. Because these rules apply to an entire category of units, it is relatively straightforward to determine whether a source is in compliance with these limits. Examples of this approach include the EPA regulations discussed above as well as the regulations imposed by California, Delaware, New Jersey, and Massachusetts.[118] New York State's new Part 222 regulations, as noted, establish source-specific emissions standards for certain forms of DG.[119]

In addition, given the especially serious concerns associated with diesel generators—as opposed to relatively clean sources of fossil-fuel-fired DG[120] such as natural gas-fired CHP—regulators might also consider imposing significantly stronger emissions thresholds on diesel generators in particular. As noted, NYCDEP has taken action along these lines by requiring, beginning in 2025, that diesel generators meet EPA's NSPS Tier 4 standards in order to renew an operating permit.[121] New York State's Part 222 regulations also incorporate this principle through, for example, providing an extension of the compliance date if a generator switches from diesel to natural gas.[122] Strengthening the regulation of a particularly dirty class of generators, such as diesel-fired DG, may reduce emissions in multiple ways. For example, more stringent emissions limits on diesel-fired DG would not only reduce the emissions from the covered units, but would also create an incentive to shift investment toward other forms of DG, which will almost certainly prove cleaner than the displaced diesel-fired units.

Source-specific regulations, however, are generally not well tailored to the problem of hotspots. Although reducing emissions from particular DG units will reduce the likelihood that a hotspot will develop, it does not guarantee it. If enough DG units—even relatively well-controlled units—are installed in a particular area or operated at a particular time, they may still cause a hotspot, especially if the area is experiencing elevated background levels of the relevant pollutants—e.g., if it is downwind from a central

118 *See supra* Section III.A.
119 *See* N.Y. COMP. CODES R. & REGS. tit. 6, §§ 222.2(b)(2), 222.4 (2016).
120 Once again, "relatively" refers other forms of DG. *See supra* note 22.
121 *See* N.Y.C. ADMIN. CODE § 24-149.6(b) (2016).
122 *See* N.Y. COMP. CODES R. & REGS. tit. 6, §§ 222.3(a)(1), 222.5(e)(1) (2016).

generating station.[123]

2. *Aggregate Emissions-Level Regulation*

Approaches aimed at reducing or limiting the aggregate level emissions within a certain geographic area or time period may prove more effective at limiting hotspots, but they may prove harder and costlier to administer. This section outlines a few possible approaches by which regulators might attempt to regulate the aggregate emissions of DG in a particular area, beginning with options available to environmental regulators before turning to those available to electricity regulators. This is another area that would benefit considerably from better information, including information regarding where and with what frequency hotspots appear.

3. *Potential Environmental Regulation Approaches*

Environmental regulation offers a number of approaches for addressing an increase in DG emissions. One option is to establish a cap on emissions of conventional pollutants applicable to all sources that contribute to a particular hotspot—*i.e.*, including both centralized generators and DG units. Sources covered by the cap then could be allocated tradable permits to emit that add up to the cap. The principal advantage of using a cap-and-trade program would be to let the relevant sources determine among themselves the cheapest way of reducing emissions to an acceptable level, which helps to ensure that the necessary emissions reductions are taken by the entities with the lowest cost to reduce, it provides an economically efficient means of reducing pollutant concentrations. The downside of this approach, however, is that developing and enforcing these hotspot-level caps could prove complicated and administratively costly. Accordingly, the efficiency gains from this approach would likely have to be significant in order to justify these costs.

Another approach, which would likely have lower administrative costs, is to enact more stringent source-specific regulations for sources at or near a hotspot. For example, NYSDEC could tighten the emissions limits for all sources within a certain distance of an identified hotspot. There is already some precedent for this in New York State: as noted, it is more difficult

123 *See* Tong & Zhang, *supra* note 4, at 263.

to qualify as an exempt or trivial generator under the NYSDEC registration requirements in the greater New York City area and parts of Orange County than in the rest of the state.[124] And the Part 222 regulations enacted by the NYSDEC also adopt this approach by making it more difficult to qualify as an exempt generator in certain densely populated areas.[125] Regulators might consider making it even more difficult—or impossible—to qualify as exempt generator in an area where emissions could cause or contribute to a hotspot. In addition, regulators might also employ additional measures to reduce the aggregate emissions of fossil-fuel-fired DG units, such as limiting the number of hours that units can operate near a hotspot or banning their use outright, at least during hot and humid days, when air quality is likely to be at its worst. Delaware and New Jersey, as discussed above, utilize this approach in restricting the operation of at least some units during days of poor air quality.[126]

4. *Potential Electricity-Regulation Approaches*

Electricity-sector regulation also presents several options for addressing emissions from DG. The electricity sector relies on several markets or market-like mechanisms that can incentivize DG. These include demand response programs at both the wholesale and retail levels, as well as demand-side management programs such as Con Edison's BQDM project and California's DRAM, and, potentially, time-variant pricing. Eventually, these market mechanisms may encompass other programs that seek to procure energy services more generally, including the Distributed Service Platforms (DSP) envisioned in the REV proceeding.[127]

Because market mechanisms are an important reason for the growth of DG, regulating these markets directly can provide a straightforward means of addressing DG emissions. Such regulation is likely to prove especially desirable when particular programs cause or contribute to a significant number of the hotspots in a particular state. This sort of market regulation can take several forms. As noted, the NYPSC has established a

124 *See* N.Y. COMP. CODES R. & REGS. tit. 6, § 201-3.2 (2016).

125 *See* N.Y. COMP. CODES R. & REGS. tit. 6, § 222.1 (2016).

126 *See supra* notes 65–70 and accompanying text.

127 *See* REV Track One Order, *supra* note 1, at 11. The REV envisions that the DSP will operate a market for a variety of services, although not, at the time being, for the purchase of electricity from DG. *See id.* at 33–35.

precedent of regulating the number and type of fossil-fuel-fired DG units that can participate in demand response programs.[128] These limits include prohibiting the participation of fossil-fuel-fired DG near certain centralized generators and, elsewhere, capping the number of fossil-fuel-fired generators that could participate in the program.[129]

As part of the REV proceeding—as well as other proceedings involving DG—the NYPSC could push these rules further, including by using more sophisticated methodologies for regulating the amount of fossil-fuel-fired DG that can participate in demand response programs or that can be installed to help address grid constraints pursuant to a utility's Distributed System Implementation Plan. For example, the Environmental Impact Statement prepared for the REV proceeding envisioned limiting the number of fossil-fuel-fired DG resources that could sell electricity services at any particular electricity feeder[130]—an approach that would help prevent DG from becoming concentrated within a particular area.

Another approach would be to adjust the amount of DG that can receive market compensation based on the emissions impact of each participating DG unit. For example, the NYPSC could establish a daily, or even hourly, feeder-level "emissions cap" for certain localized pollutants. Distributed energy resource owners that use DG to reduce their electricity consumption from the grid would have to certify their emissions rate to the grid operator. The grid operator would then impute the emissions impact of demand response from that source based on the quantity of services that the unit provides to the grid.[131] Under this model, demand response resources that reduce consumption without using DG would have an emissions rate of zero. The grid operator could not accept any services that would cause the aggregate emissions from distributed

128 *See* Order Establishing Con Edison Demand Response Program, *supra* note 74.

129 *See id.*

130 *See* Final Generic Environmental Impact Statement, Case Nos. 14-M-0101, 14-M-0094, at 5–7, & Ex. 5-2 (N.Y. Pub. Serv. Comm'n Feb. 6, 2015).

131 A significant amount of demand response currently occurs through "aggregators"—entities that aggregate many small demand response providers into a large unit capable of providing a significant level of demand response. The involvement of aggregators would likely facilitate this approach, because they would be able to develop experience measuring and maintaining emissions levels for fossil-fuel-fired DG.

energy resources participating in a market in the relevant area to exceed the specified cap. By permitting cleaner generators to provide a greater share of electric services, this approach would create an incentive to install relatively clean DG, thereby reducing emissions from DG even on the days when the total DG emissions do not reach the feeder-level cap.

This approach to capping emissions from participation in market-based programs is not necessarily limited to the local grid operator. Although the NYPSC's statements in the REV proceeding and its proposal of the Part 222 regulations suggest that the NYPSC may be receptive to these policies, a similar approach could also be applied to demand response or any other services for which DG participates in the wholesale markets operated by the New York Independent System Operator (NYISO).[132] Indeed, to the extent that a significant amount of DG participates in the NYISO wholesale market, an ideal electricity-market-based approach would require some coordination between New York State and the NYISO.[133] One possible approach might be for the NYISO and the NYPSC to coordinate on an overall set of limits for a particular area. The NYSIO and the NYPSC could then each establish a cap equal to a subset of that limit for demand response programs likely to involve DG that it operates or oversees.

Neither the NYISO nor the NYPSC is a traditional environmental regulator with much experience with environmental concerns. As a result, it may make sense to implement the market

132 Because the NYISO regulates at a different level of granularity then the NYPSC, any approach along these lines would necessarily look at a different regulatory increment than the feeder level. The nodal level, at which the NYISO currently regulates prices, would appear to be the natural substitute. *See TCC Reports*, N.Y. INDEP. SYS. OPERATOR, http://tcc.nyiso.com/tcc/public/view_nodal_prices.do (last visited Jan. 6, 2016) (listing nodal prices).

133 As discussed in the next paragraph of the text, NYISO is not an environmental regulator and thus any such effort is beyond its typical purview. NYISO, however, generally requires DR participating in its markets to comply with applicable environmental regulations and so some variant of this proposal could be more appealing if implemented as a means of facilitating, or enforcing compliance with, state or local environmental rules and regulations. *See, e.g.*, N.Y. INDEP. SYS. OPERATOR, EMERGENCY DEMAND RESPONSE PROGRAM MANUAL (2013), http://www.nyiso.com/public/ webdocs/markets_operations/documents/Manuals_and_Guides/Manuals/Operations/edrp_mnl.pdf. *See also Environmental Advisory Council*, N.Y. INDEP. SYS. OPERATOR, http://www.nyiso.com/public/markets_operations/committees/eac/index.jsp (last visited Nov. 17, 2016) (discussing NYISO's consideration of environmental factors in carrying out its responsibilities).

rules described above through a cooperative program involving the NYSDEC and either the NYPSC or the NYISO, as appropriate. Under this approach the NYSDEC would use its environmental expertise and authority to set the limits on the amount of fossil-fuel-fired DG that can participate in programs, but then implement these limits through rules set and administered by the NYPSC or the NYISO, respectively.

The main drawback of this approach is that it would not address emissions from diesel generators that are merely responding to high prices—*i.e.*, operating whenever prices are high, in order to reduce demand from the grid, rather than participating in a particular program or tariff directly providing compensation for the use of the DG. It may prove more effective to address emissions from DG through the source-specific approaches discussed above in Section IV.A.1 that environmental regulators could implement.

B. *Options for Addressing GHG Emissions*

To the extent that GHG emissions from DG are a concern, their regulation should require a different approach. Unlike the emissions of conventional pollutants, the effects of GHGs are global, so there is no reason to focus on the emissions of GHGs in a particular area. Instead, the focus should be on limiting the total amount of GHG emissions, rather than limiting their emission in certain areas. Nevertheless, many of the policies discussed in the prior section would likely reduce the GHG emissions from increased use of DG, since those policies reduce or deter the use of relatively inefficient generators.[134] Accordingly, adopting one or more of the approaches listed above might reduce—or eliminate—the benefit of directly addressing GHG emissions from DG. Any jurisdiction that enacts regulations of conventional pollutants may want to carefully evaluate whether supplemental regulation of GHGs is worthwhile, especially if it appears that DG displaces relatively GHG-intensive methods of generation.

One option for addressing GHGs from fossil-fuel-fired DG is to extend any carbon-pricing scheme to smaller generators. In New York, this would likely mean extending the obligation to hold

134 The dynamic may work both ways—i.e., addressing GHG emissions from fossil-fuel-fired DG may also help to reduce their emissions of conventional pollutants.

RGGI permits below the current 25 MW threshold. This could take several forms. A relatively straightforward means for New York to do so would be to lower the threshold at which generators must acquire RGGI permits from the current 25 MW limit to 5 MW or even 1 MW.[135] New York might also consider requiring utilities or aggregators that rely on distributed generation to obtain RGGI permits roughly equivalent to the emissions that result from the activities on which the utility or the aggregator is relying, at least where the aggregate amount of demand response provided by fossil-fuel-fired DG exceeds some lowered threshold.[136] Both approaches have the advantage of piggybacking on the established RGGI market, likely reducing the start-up and administrative costs relative to pursuing an entirely new approach. Of course, any effort to modify RGGI itself—especially if it increases the number of sources that must hold permits—could prove politically challenging as it could require coordination with and assent from the other RGGI states.

Another option is to use the carbon price determined in the RGGI market, but without requiring small generators (or the utilities or DSPs on these small generators' behalf) to hold actual permits. This could take several forms. One option would be to use the cost of an RGGI permit as a shadow price in the DSP markets to be established under REV. The DSP could add the shadow price to any product or service offered into the DSP market that required the operation of fossil-fuel-fired DG. This approach would decrease the relative cost of less GHG-intensive products and, therefore, enable these services to clear the market, even if these services were more expensive than more GHG-intensive options absent the shadow price.[137]

135 Alternatively, New York might also enact a separate permitting scheme that requires DG with a maximum output below the 25 MW limit, but above this new threshold, to secure permits that are priced at the same level as RGGI permits. This would incorporate the RGGI price signal, but without further reducing the number of available permits.

136 A challenge with this approach would be determining what demand response is provided by substituting fossil-fuel-fired DG versus simply a reduction in consumption. In practice, this approach would likely require utilities or aggregators to rely on certifications from the operators of these sources.

137 At the time of writing, NYPSC staff had issued a white paper proposing a Clean Energy Standard that would require utilities to secure a certain percentage of their electricity from renewable resources. Staff White Paper on Clean Energy Standard, Case No. 15-E-0302 (N.Y. Pub. Serv. Comm'n Jan. 25, 2016). To the extent that this proposal would create an implied price on electricity from GHG-

A third option is to adopt GHG-intensity standards—*i.e.*, standards that are tied to the rate of GHG emissions per unit of electricity produced. This could be similar to the CO_2 limits that Delaware imposes on eligible DG units.[138] Additionally, this approach might include a prohibition on the operation of certain classes of especially GHG-intensive DG or require that new DG installed within the state achieve a certain minimum level of efficiency. This approach would parallel NYCDEP's future requirement that diesel engines meet EPA's NSPS Tier 4 standards in order to secure a renewed operating permit. In considering this approach, however, it is important to consider the carbon-intensity of the potentially prohibited units to ensure that they are, in fact, more carbon intensive than the marginal central generator that they are likely to displace.[139] Otherwise, this approach could have the perverse effect of increasing aggregate GHG emissions.

CONCLUSION

Increased use of DG offers a number of potential advantages to grid operators and consumers of electricity, including economic, reliability, and environmental benefits. But significant increases in the amount of fossil-fuel-fired DG, especially DG that runs on diesel fuel, could negatively impact human health and the environment. Those concerns are particularly acute in urban areas, where heavy use of fossil-fuel-fired DG could contribute to "hotspots" for particular pollutants. Current regulations at the federal, state, and local levels only partially address these concerns. This Article has presented a variety of policy approaches that regulators might consider adopting to address these concerns more fully, but does not advocate for a particular approach. Given the relative lack of information about DG and the associated emissions, additional information about the fossil-fuel-fired DG units currently in operation and their emission impacts would be helpful in developing a comprehensive approach to this issue. In selecting among policy options, regulators should choose the

---

emitting resources, it may supplant any reason for including a shadow price derived from RGGI.

138 *See* 7 DEL. ADMIN. CODE § 1144-3.2 (2016).

139 As noted, because it avoids certain inefficiencies, such as line losses, electricity from fossil-fuel-fired DG can emit lower total levels of pollutants than centralized generation, even if the DG unit is less efficient per kilowatt-hour generated. *See supra* note 22 and accompanying text.

approach that makes the most sense based on the costs and benefits specific to the activities over which they have jurisdiction, mindful of the need to create a coherent approach to regulating emissions from DG.