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The Rise of DG:
Options for Addressing the Environmental Consequences of Increased Distributed Generation

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I. Overview

This policy brief addresses the environmental and regulatory implications of increased reliance on distributed generation ("DG") and, in particular, DG that runs on diesel fuel. DG can provide significant economic benefits while also promoting a more reliable and resilient electricity system. Its environmental impact, however, is 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 have considerably lower emissions than the marginal central generating station operating on the grid today. Accordingly, increased reliance on these forms of DG will reduce the aggregate emissions of pollutants 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 generated that are far in excess of even coal-fired power plants. In addition, unlike central generating stations, DG is often located near population centers and lacks a means for dispersing the pollutants emitted. As a result, the health and environmental impact of even a small increase in diesel-fired DG may prove significant.

The current federal, state, and local regulation of DG helps to mitigate these concerns, but only partially. In particular, these regulations generally address only the emissions from an individual DG unit. That is, they do not directly regulate the interaction of DG units, thereby leaving open the possibility of a high concentration of poorly controlled DG in a small area that could create significant adverse health effects. This concern is especially acute because a number of state and federal electricity-sector regulations may encourage the installation of multiple DG units in certain relatively small geographic areas. In addition, existing regulations generally do not address GHG emissions from DG, and could create unintended incentives for increased utilization of inefficient DG unless appropriate complementary policies are adopted.

There are 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 paper identifies a number of different approaches that regulators may consider in deciding how to address an increase in DG emissions, although it does not endorse any particular option.

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

II. The Increasing Importance of Distributed Generation

DG is playing an increasingly important role in U.S. electricity markets.[1] 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.[2] Depending on the exact definition, DG can include internal combustion engines, gas turbines (a category that includes highly efficient combined-heat-and-power turbines ("CHP"), when those are fired by natural gas), wind turbines, photovoltaic panels, and fuel cells, among other technologies.[3]

DG can provide significant economic and reliability benefits. 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 can result in lower wholesale electricity prices.[4] Similarly, because much of the electricity produced by DG is consumed on-site, it does not contribute to 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. In addition, DG can help mitigate the effect of blackouts and other grid failures, leading to a more stable and resilient electricity system.[5]

The rise of DG has been attributed to several factors, including high electricity prices, the decreasing cost of solar panels, and the increasing demand for highly reliable electricity service.[6] In addition, various federal and state polices have provided a further impetus supporting the growth of DG.[7] At the federal level, these policies include tax credits for certain forms of DG—especially those powered by renewable resources—and the promotion of wholesale-market demand response, in which customers receive a payment for reducing

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[1] 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), *available at* http://www2.deloitte.com/content/dam/Deloitte/us/Documents/energy-resources/us-er-deloitte-resources-study-series.pdf.

[2] *See, e.g.*, State of New York Pub. Serv. Comm'n, Order Adopting Regulatory Policy Framework and Implementation Plan, Case No. 14-M-0101 (Feb. 26, 2015), App. B. at 14-15 (defining "distributed generation") ("REV Track One Order").

[3] G. Pepermans, J. Driesen, D. Haeseldonck, R. Belmans, W. D'Haeseleer, *Distributed Generation: Definition, Benefits and Issues*, 33 Energy Policy 787, 791 tbl. 1 (2005).

[4] *See* Federal Energy Regulatory Comm'n, The Potential Benefits of Distributed Generation and Rate-Related Issues That May Impede Their Expansion: A Study Pursuant to Section 1817 of the Energy Policy Act of 2005, at iii (2007), *available at* https://www.ferc.gov/legal/fed-sta/exp-study.pdf.

[5] Pepermans et al., *supra* note 3, at 788.

[6] *Id.*, at 791 tbl. 1; REV Track One Order, *supra* note 2, App. B at 14-15.

[7] N.Y. Indep. Sys. Operator, A review of Distributed Energy Resources (Sep. 2014), *available at* http://www.nyiso.com/public/webdocs/media_room/publications_presentations/Other_Reports/Other_Reports/A_Review_of_Distributed_Energy_Resources_September_2014.pdf (discussing state and federal policies affecting the growth of distributed generation); *see also* Severin Borenstein & James Bushnell, *The U.S. Electricity Industry After 20 Years of Restructuring* (Apr. 2015) (NBER Working Paper 21113), *available at* http://www.nber.org/papers/w21113.pdf at 23-24 (discussing the effect of state and federal policies on the growth of photovoltaic solar DG in particular).

their electricity consumption from the grid at times of peak demand.[8] Although demand response programs are not aimed at supporting DG *per se*, a significant share of demand response providers decrease their consumption of electricity from the grid and replace it with electricity generated from DG.[9] Demand response payments can thus provide a significant source of compensation for DG units.

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.[10] In addition, some states have expressly sought to promote distributed generation as a way of modernizing the electricity grid. New York is one of the leading states in this respect. The New York State Public Service Commission's ("NYSPSC") 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.[11] 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. In addition, states have in place other policies that, while not aimed overtly at promoting DG, could have that effect in practice. For example, policies that encourage customers to manage their peak electricity demand could provide an incentive to install DG or operate DG that is already in place as a means of reducing a building's peak consumption of electricity from the grid.[12]

III. The Environmental Consequences of Distributed Generation

The environmental consequences of DG are less clear. To the extent that DG consists of low- or non-emitting resources, such as CHP 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.[13] In addition, because DG is located at or near the point of consumption, there is little to no loss

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[8] *See* Northeast States for Coordinated Air Use Management, *Air Quality, Electricity, and Back-Up Stationary Diesel Engines in the Northeast* 5-6 (JAN. 2, 2014) ("NESCAUM") (discussing the effect of wholesale-market demand response on behind-the-meter generators), *available at* http://www.nescaum.org/documents/nescaum-aq-electricity-stat-diesel-engines-in-northeast_20140102.pdf/.

[9] *See, e.g.*, *id.* at 26 (discussing the increased use of internal combustion engines in demand response programs).

[10] *See, e.g.*, DSIRE, *Net Metering* (Mar. 2015), *available at* http://ncsolarcen-prod.s3.amazonaws.com/wp-content/uploads/2015/04/Net-Metering-Policies.pdf (listing states with net energy metering).

[11] REV Track One Order, *supra* note 2, at 3 & n.3.

[12] An example of this type of policy is the demand billing program currently operated by Consolidated Edison. *See* Consolidated Edison, Understanding Demand Billing http://www.coned.com/customercentral/demandbilling.asp (last visited Jan. 6, 2016) (discussing demand charges in Con Edison's bills); *see also* Sustainable CUNY, *NYS Net Metering FAQ – Commercial* 2, *available at* http://www.cuny.edu/about/resources/ sustainability/solar-america/installer-resources/ CommercialNYSNetMeteringFAQ.pdf (last visited Jan. 6, 2016) (discussing demand charges more generally).

[13] 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* Envtl. Protect. Agency, *Fuel and Carbon Dioxide Emissions Savings Calculation Methodology for Combined Heat and Power Systems* 3-5, 9-12 (Feb. 2015) (discussing means for calculating emissions GHG emissions reductions based on the use of CHP).

of electricity in the transmission and distribution process, reducing the total amount of electricity that must be generated to serve any given amount of demand.[14] DG can also provide as an alternative to building additional transmission or distribution grid infrastructure, thereby avoiding the environmental impacts associated with these expansions.[15]

But not all DG comes from these relatively clean sources. A significant component of DG—both in terms of number of units in operation and the hours that those units operate—consists of fossil-fuel-fired generators. The mix and quantity of pollutants from fossil-fuel-fired DG varies based on the type of generator, with some 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—which are one of the principal forms of generation used to participate in demand response programs[16]—emit large quantities of NO_x, PM, carbon monoxide ("CO"), and various hazardous air pollutants, including known carcinogens.[17] For example, older diesel generators can emit NO_x at rates ten times greater than that of a well-controlled coal-fired power plant.[18]

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.[19] 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, as noted, fossil-fuel-fired DG units typically lack the extensive 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.[20] Because emissions from DG are not dispersed as effectively as those from central generating stations, they can become concentrated in a

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[14] *See* NYISO, *supra* note 7, at 7. Roughly 6% of all electricity generated is lost via to line losses during the transmission and distribution process. U.S. Energy Info. Admin., *How much electricity is lost in transmission and distribution*, ttps://www.eia.gov/tools/faqs/faq.cfm?id=105&t=3 (July 10, 2015).

[15] 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).

[16] NESCAUM, *supra* note 8, 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).

[17] Sandip D. Shaha, David R. Cocker III, Kent C. Johnson, John M. Lee, Bonnie L. Soriano , J. Wayne Miller, *Emissions of regulated pollutants from in-use diesel back-up generators*, 40 Atmospheric Env't 4199, 4199 (2006); NESCAUM Report 7, tbl. 1 (2012) (listing hazardous air pollutants from reciprocating internal combustion engines); Emission Standards for Stationary Diesel Engines, 73 Fed Reg. 4136, 4138 (Jan. 24, 2008) (discussing "health-related concerns" regarding hazardous air pollutants from backup generators).

[18] NESCAUM, *supra* note 8, ES-2.

[19] Zheming Tong & K. Max Zhang, *The Near-Source Impacts of Diesel Backup Generators in Urban Environments*, 109 Atmosphere Env't 262, 262 (2015) (noting that diesel generators are generally located "closer to customers" and "in populated urban areas").

[20] *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 Policy 4999, 4999 (2011).

relatively small area, creating "hotspots." This concern is especially acute in urban areas, where the complex topography of buildings can create air circulation patterns that trap pollutants, rather than dispersing them.[21] Even a relatively small increase in DG units in a particular area, or the hours in which those units are operated, 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—potentially including 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.[22] That is because the increased demand for air conditioning will typically produce high electricity prices and a place a strain on the grid, thereby creating a significant incentive to operate DG, including as part of demand response programs. Together, these characteristics of fossil-fuel-fired distributed generation may cause even a relatively small increase in DG utilization to result in an outsize 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 emissions that go unaccounted for under efforts to cap electricity-sector emissions, such as the Clean Power Plan and the Regional Greenhouse Gas Initiative ("RGGI"). Indeed, these programs may decrease the cost of DG relative to central generators, thereby creating an incentive to shift generation from large central generators to smaller, distributed sources.

In general, it should be noted that there currently is a lack of information about emission levels and their effects from existing in DG in many jurisdictions, including New York State. We also are not aware of any ongoing efforts to estimate the emission levels and their effects from DG going forward under various scenarios, at least in New York State. These information gaps complicate the assessment of the environmental consequences of DG.

IV. Current Regulation of DG Emissions

This section 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 section focuses 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.

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[21] Zheming Tong & K. Max Zhang, *The Near-Source Impacts of Diesel Backup Generators in Urban Environments*, 109 Atmosphere Env't 262, 270 (2015).

[22] *See* NESCAUM, *supra* note 8, 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 Environ. Sci. Tech 1260, 1265 (2014); Elisabeth A. Gilmore, Lester B. Lave & Peter J. Adams, *The Costs, Air Quality, and Human Health Effects of Meeting Peak Electricity Demand with Installed Backup Generators*, 40 Envtl. Sci. Tech. 6887, 6887 (2006).

As the following sections explain, 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 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 EPA administers the primary federal regulations of 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").[23] As noted, electric generators powered by these engines are one of the principal forms of fossil-fuel-based DG, and a major participant in demand response programs.[24]

The RICE NESHAP sets generally applicable emissions-control standards for stationary RICE.[25] Under this rule, EPA imposes limits on 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).[26] Diesel engines under 300 horsepower— about twice that of a 2015 diesel

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[23] 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 CFR Part 60, Subpart KKKK. Gas turbines are frequently deployed to generate heat and electricity in large facilities, such as commercial office buildings.

[24] Tong & Zhang, *supra* note 19, at 263.

[25] The RICE NESHAP addresses a variety of hazardous air pollutants, including known carcinogens, such as diesel exhaust. And although many of the emissions discussed above, including NO_x and PM, do not fall on this list, the controls necessary to meet the NESHAP limits will generally reduce the emissions of these pollutants as well.

[26] EPA Region 1, Reciprocating Internal Combustion Engines (RICE) http://www3.epa.gov/region1/rice/ (last visited Jan. 6, 2016). 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* EPA Region 1, Reciprocating Internal Combustion Engines (RICE) http://www3.epa.gov/region1/rice/. Alternatively, an engine's operator can comply by installing controls that create a more than 70% reduction in CO emissions. *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.

Volkswagen Jetta[27]—and comparably sized engines that burn gasoline generally are not subject to emissions limits. Instead, they must adhere to operational "work practice" standards, such as regular oil changes and inspections, to ensure that the engine is running efficiently.[28]

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.[29] EPA has implemented these standards in "tiers," with each tier applying progressively more stringent emissions limitations to engines built after the tier goes into effect.[30] These tiers, however, are not retroactive. That is, the NSPS generally do not require an engine completed before a particular tier goes into effect to comply with a subsequent, more stringent tier.

In 2013, EPA significantly expanded an exemption from the RICE NESHAP and NSPS for engines that operate only on an "emergency" basis. 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. 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.[31] A major purpose behind EPA's revision of this exemption was to increase the amount of DG that could participate in demand response programs without incurring potentially insurmountable emissions-control costs.[32]

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. *Id.*

[27] *See* Edmunds.com, 2015 Volkswagen Jetta Diesel - Features & Specs, http://www.edmunds.com/volkswagen/jetta/2015/diesel/features-specs/ (last visited Jan. 6, 2016) (listing the characteristics of 2015 diesel Jetta).

[28] Melanie King, Envtl. Protect. Agency, *EPA's Air Quality Regulations for Stationary Engines* 18-20 (May 2, 2013), http://www3.epa.gov/region1/rice/pdfs/ EPAsAirQualityRegulations4RICEAreaSources.pdf.

[29] *Id.* at 24, 32 (describing different standards applicable to spark and compression engines); *see* Standards of Performance for Stationary Compression Ignition Internal Combustion Engines; Final Rule, 71 Fed. Reg. 39,154, 39,155; 40 CFR part 60, subparts IIII & JJJJ.

[30] Generally, operators demonstrate compliance with the NSPS by purchasing a qualifying engine and operating it consistent 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 28, at 23-24.

[31] 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, 6679-6680 (Jan. 30, 2013) ("RICE Emergency Exemption").

[32] *Id.* ("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.").

Last year, 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.[33] Although EPA has indicated that it will revisit the issue on remand from the D.C. Circuit, the future scope of this emergency exemption is unclear.[34]

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 ("NAAQSs").[35] States are primarily responsible for ensuring compliance with these standards, including by bringing into compliance areas where the criteria pollutants exceed the federal limits, as parts of New York do for ozone and certain forms of particulate matter (primarily New York City and the surrounding counties).[36]

2. *State and Local Regulation*

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 major sources under Title V of the Clean Air Act and sources that actually emit 50% of the emissions required to qualify as a major source.[37] The thresholds that trigger these requirements, however, are far in excess of 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.[38] The registration requirements include a list of all state and federal limits applicable to the source—*e.g.*, the NSPS and NESHAP regulations discussed in the previous section. Many smaller fossil-fuel-fired generators may

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[33] *Delaware Dep't of Natural Res. & Envtl. Control v. EPA*, 785 F.3d 1, 18 (D.C. Cir. 2015).

[34] In vacating the EPA rule, the D.C. Circuit decision eliminated any exemption for emergency engines. The Court, however, granted EPA a one-year stay of its decision and EPA is currently considering how to respond. *See* Order, *Delaware Dep't of Natural Res. & Envtl. Control v. EPA*, No. 13-1093 (D.C. Cir. Aug. 14, 2015). In addition, the Court granted EPA's request for a voluntary remand to reconsider the 50-hour exemption, which was not effected by the D.C. Circuit decision. *See* Order, *Conversation Law Found. v. EPA*, No. 13-1233 (D.C Cir. Sep. 23 2015).

[35] EPA, NAAQS, http://www3.epa.gov/ttn/naaqs/criteria.html (last visited Jan. 6, 2016).

[36] *See* EPA, Current Nonattainment Counties for All Criteria Pollutants http://www3.epa.gov/airquality/greenbook/ancl.html (Oct. 1, 2015) (listing non-attainment counties).

[37] N.Y. Comp. Codes R. & Regs. tit. 6, § 201-5.1 (describing the applicability of state permit requirements); N.Y. Comp. Codes R. & Regs. tit. 6, § 201-6.1(describing the applicability of the Title V permit requirements).

[38] N.Y. Comp. Codes R. & Regs. tit. 6, § 201-4.1. 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. The operators of these sources must maintain records demonstrating that they qualify as exempt or trivial.

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.[39]

B. New York State Public Service Commission

The NYSPSC has also enacted regulations addressing DG, although it has done so only on a case-by-case basis. Whereas the NYSDEC regulations focused on the emissions levels of a particular generator, the NYSPSC 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 Consolidated Edison's ("Con Edison") demand response program in New York City in 2009, the NYSPSC established three restrictions to address environmental justice concerns associated with diesel generators. First, it prohibited fossil-fuel generators located within half a mile from certain gas turbines in city from participating in the program.[40] Second, it capped diesel generators' participation in the program at 20% of the total megawatt enrollment.[41] Third, it limited the participation of diesel and certain natural gas engines to model year 2000 and newer engines.[42] The NYSPSC incorporated these same limitations into Con Edison's more recent Brooklyn Queens Demand Management program ("BQDM program"),[43] in which Con Edison is seeking to use demand-side resources to help defer or avoid the need to build a new distribution substation.[44]

C. Local Regulation

The New York City Department of Environmental Protection ("NYCDEP"), which promulgates its own environmental requirements under the New York City Air Code, is to our knowledge the local agency most involved with these issues in New York State. 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 2.8 million British Thermal Units ("BTUs"), depending on their fuel type—are

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[39] At the time of writing, NYSDEC has proposed emissions standards that would apply to certain forms of the DG. *See* Proposed 6 NYCRR Part 222, *available at* http://www.dec.ny.gov/regulations/104274.html. The proposed regulations would establish emissions limits for certain internal combustion engines that are operated for the purpose of reducing energy costs or ensuring a reliable supply of electricity—*i.e.*, engines that operate in more than just emergency situations. Because these proposals have not yet been enacted into law, they have generally not been included in the discussion of New York's current regulation of DG emissions.

[40] Order Adopting with Modifications a New Demand Side Management Program for Consolidated Edison Company of New York, Inc., Case No. 09-E-0115, at 20-21 (June 1, 2011) ("Order Establishing Con Ed DR Program").

[41] *Id.* at 21.

[42] *Id.* The order also limited certain types of engines to model year 2000 and newer engines. Con Edison's most recent update on Demand Response programs to the NYSPSC 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, Case No. 09-E-0115 (Dec. 1, 2014), at 18.

[43] NYSPSC, Order Establishing Brooklyn/Queens Demand Management Program, Case No. 14-E-0302, at 17 (Dec. 12, 2014) ("Order Establishing BQDM Program").

[44] *Id.* at 2-3.

required to register with the City and obtain an operating permit for the engine.[45] Notably, the City's recent amendments to its Air Code will soon utilize EPA's otherwise 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.[46]

Smaller engines are not required to obtain operating permits. Engines below the 2.8-million-BTU thresholds need only register with the City, and very small engines—those with a maximum input less than 350,000 BTUs—are not required either to register or to obtain an operating permit.[47] In addition, engines that are used only in emergency circumstances are not required to obtain an operating permit, regardless of size.[48] Unlike EPA's emergency generator exception, however, New York City limits emergency generators to operating only when the facility to which they are connected cannot receive power from the grid.[49] 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.[50]

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In summary, fossil-fuel-fired DG in New York is subject to a suite of federal, state, and local regulations. These regulations are largely source-specific. Although they regulate emissions for certain types of DG, thereby reducing 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 NYSPSC has implemented with respect to Con Edison's demand response programs.[51] In addition, some of the most stringent regulations, EPA's NSPS, are only forward-looking. Accordingly, the most current standards do not apply to the large percentage of engines that were installed pursuant to more lenient NSPS rules.[52]

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

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[45] N.Y.C. Admin. Code §§ 24-109, 122. Beginning in 2016, the threshold at which an operating permit becomes necessary will rise to 4.2 million BTUs. *See* N.Y. Local L. No. 38, subchapter 4, § 24-122.

[46] N.Y.C. Admin. Code § 24-149.6(b) (tier 4 requirement).

[47] *Id.* § 24-109. Beginning in 2016, the threshold below which registration is required becomes necessary will rise to 4.2 million BTUs. *See* N.Y. Local L. No. 38, subchapter 2, § 24-109.

[48] 15 R.C.N.Y. § 40-1.

[49] *Id.* § 40-01 (listing as one of the requirements for emergency generator status that generator operate "only when the usual supply of power is unavailable"); see *id.* ("An internal combustion engine used for peak shaving generation is not an emergency generator.').

[50] *Id.*

[51] Order Establishing BQDM Program, *supra* note 43, at 17; Order Establishing Con Ed DR Program, *supra* note 40, at 21.

[52] Tong & Zhang, *supra* note 19, 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.").

sufficient concentration could nevertheless lead to significant adverse health impacts. Emergency generators also receive relaxed treatment. In New York, state and local regulations generally require that emergency generators be used only in true emergencies—where the flow of electricity from the grid is interrupted. EPA provided a broader emergency exemption, which permitted some participation in demand response, but that exemption was invalidated last year and the future of any similar regulation is in doubt.

b. Regulation of GHGs

Efforts to regulate GHG emissions from the power sector—on both the state and federal level—overwhelmingly focus on sources 25MW and larger. To the extent that these efforts, such as the EPA's Clean Power Plan or RGGI, increase the cost of operating larger sources without imposing similar costs on small sources, they will make DG a more economically attractive 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 were 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.[53] Nevertheless, nothing in the CPP prevents states from addressing GHG emissions from DG under state law, as further discussed below, should they so choose.

1. Federal Regulation

EPA's Clean Power Plan is the primary federal regulation of GHG emissions from electric generating units.[54] The Clean Power Plan, however, applies only to sources with a generation capacity greater than 25MW—far in excess of the vast majority of DG units.[55] States may comply with the CPP by enacting either rate- or mass-based limits on their GHG emissions.[56] 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,[57]

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[53] EPA, *Basic Information: Black Carbon*, http://www3.epa.gov/blackcarbon/basic.html (last visited Jan. 6, 2016).

[54] 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); Carbon Pollution Emission Guidelines for Existing Stationary Sources: Electric Utility Generating Units, 80 Fed. Reg. 64,662 (Oct. 23, 2015).

[55] 80 Fed. Reg. at 64,715-16.

[56] *Id.* at 64,664. Most observers suggest that states that already have cap-and-trade programs, including RGGI states, such as New York, will elect the mass-based option.

[57] *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). *Id.* At 64,888-89, 1175-1183. An overall cap reduces the incentive to shift generation between sources subject to 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. *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 111(d) based on the amount they generate, thereby it leaves the question of whether to address shifts to smaller generators entirely to the states.[58] 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 25MW threshold and are outside the scope of the CPP.

2. RGGI Regulation

As noted, New York also regulates carbon dioxide emissions as part of RGGI.[59] New York's regulations implementing RGGI, however, exempt sources smaller than 25MW from reporting and compliance requirements.[60] 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.

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In short, the current regulation of GHGs in New York does not address the GHG emissions from fossil-fuel-fired DG, although the CPP raises the idea that states could begin regulating these emissions.

V. Policy Options

This section outlines a suite of potential policy approaches for reducing the emissions from fossil-fuel-fired DG. It does not, however, advocate a particular approach. Deciding on an approach will require a more rigorous assessment of the costs and benefits—including considerations specific to the jurisdiction in question—than is within the scope of this paper. Nor is this discussion intended to be exhaustive. Instead, the purpose of this section is to identify a handful of archetypal approaches that regulators might consider in deciding how best to address a potential increase in emissions from DG.

As a general matter, all of the options discussed below would benefit from an effort by regulators to develop better information regarding the number, type, location, and hours of operation of fossil-fuel-fired DG units already in operation. 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. 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.

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giving an incentive for them to run rather than shifting production to 111(b) units. In so doing, the allowance gives the mass-based limit a rate-like quality. *Id.* at 64,889-90. A second allowance would be for renewable energy, thereby creating an incentive to shift production to renewable sources rather than to sources regulated under 111(b). *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. *Id.* at 64,890. EPA has provided little guidance on what will suffice to make this showing.

[58] *Id.* at 64,888.

[59] N.Y. Comp. Codes R. & Regs. tit. 6, § 242-1.4(a) (2015).

[60] *Id.*

a. Options for Addressing Conventional Pollutants

There are two general approaches to regulating DG emissions of conventional and hazardous pollutants. First, regulators may attempt to limit the emissions from any particular source. This is, by and large, the approach embodied in the current suite of environmental regulations described in the previous sections. Second, regulators may attempt to limit the aggregate level of emissions from DG in a particular area. The following subsections describe a number of ways in which regulators might use these approaches to address concerns about increased emissions from DG, once again using New York as an example.

1. Source-Specific Standards

Source-specific standards set a generally applicable rule, or series of rules, for all sources in a particular category. In so doing, they reduce the total emissions from fossil-fuel-fired DG, which in turn reduces the likelihood that an increase in DG will cause any particular area to experience harmful levels of the pollutants emitted by fossil-fuel-fired DG. The primary virtue of the source-specific approach is its administrative simplicity. That is, 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.

As noted, New York State and City regulators already impose a variety of source-specific regulations on fossil-fuel-fired DG. As such, the most straightforward means of addressing concerns about the concentration of DG emissions through a source-specific approach may be to tighten these regulations. For example, the Part 222 regulations proposed by NYSDEC last year would establish source-specific emissions standards for DG powered by stationary reciprocating engines.[61]

In addition, given the especially serious concerns associated with diesel generators—as opposed to cleaner sources of fossil-fuel-fired DG, such as natural gas-fired CHP—these agencies might also consider imposing significantly stronger emissions thresholds on diesel generators in particular. As noted, NYCDEP has already 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.[62] Enhancing 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.

2. Aggregate Emissions-Level Regulation

As discussed, the regulations applicable to DG in New York generally do not specifically address the aggregate impact of locating multiple fossil-fuel-fired DG units in a particular area. 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-sector regulators.

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[61] *See* Proposed 6 NYCRR Part 222, §§ 222.2(b)(2), 222.4, *available at* http://www.dec.ny.gov/regulations/104274.html.

[62] N.Y.C. Admin. Code § 24-149.6(b).

Before comprehensively regulating to address aggregate impacts, a critical first step is to develop information about existing and potential hotspots that should be the object of regulatory attention. Regulators also might benefit from developing a process that could be used in an ongoing manner to identify new hotspots, or changes in emission levels in existing hotspots, such as areas that are downwind from central generating stations.[63]

A. 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 and 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. Because this approach should ensure that the necessary emissions reductions are taken by the entities with lowest cost to reduce, it provides an economically efficient means of reducing pollutant concentrations. Nevertheless, a downside of this approach is that developing and enforcing these hotspot-level caps could prove complicated and administratively costly.

Another approach, which is likely to 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 proximity of an identified hotspot. There is already some precedent for this in New York State: as noted, it is more difficult 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.[64] NYSDEC or NYCDEP could follow a similar approach to emissions from fossil-fuel-fired DG, imposing more stringent emissions standards for the relevant pollutants in areas that suffer from elevated concentrations of localized pollutants. Indeed, the Part 222 regulations proposed by the NYSDEC adopt this approach by making it more difficult to qualify as an exempt generator in certain densely populated areas.[65] In addition, regulators might also employ various measures to reduce the aggregate emissions of fossil-fuel-fired DG units, such as limiting the number of hours when 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.

B. 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 more broadly, including Con Edison's BQDM project, and, potentially, time-variant pricing. Eventually, these market mechanisms may encompass other programs that seek to procure energy services more

[63] *Cf.* Order Establishing Con Ed DR Program, *supra* note 40, at 20-21.
[64] N.Y. Comp. Codes R. & Regs. tit. 6, § 201-3.2.
[65] *See* Proposed 6 NYCRR Part 222, § 222.1, *available at* http://www.dec.ny.gov/regulations/104274.html.

generally, including the Distributed Service Platform Providers ("DSP") envisioned in the REV proceeding.[66] As market mechanisms are an important reason for the growth of DG, regulating these markets directly can provide a straightforward means of addressing DG emissions.

This type of market regulation can take several forms. As noted, the NYSPSC has established a precedent of regulating the number and type of fossil-fuel-fired DG units that can participate in demand response programs.[67] 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.[68]

As part of the REV proceeding—as well as other proceedings involving DG—the NYSPSC 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 ("DSIP"). 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.[69]

A more sophisticated 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 NYSPSC 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 or system operator, which 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.[70] Under this model, demand response resources that reduce consumption without using DG would have an emissions rate of zero. The grid operator would not be able to accept any services that would cause the aggregate emissions from distributed 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 aggregate 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 NYSPSC's statements in the REV proceeding and the NYSPSC's

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[66] Track One Order *supra* note 2, at 11. The REV envisions that the DSP will operate a market for a variety services, although not, at the time being, for the purchase of electricity from DG. *Id.* at 33-35.

[67] Order Adopting with Modifications a New Demand Side Management Program for Consolidated Edison Company of New York, Inc., Case No. 09-E-0115, at 19-21 (June 1, 2011).

[68] *Id.*

[69] New York State Department of Public Service, *Final Generic Environmental Impact Statement*, Case Nos. 14-M-0101, 14-M-0094, at 5-7 & Ex. 5-2 (Feb. 6, 2015).

[70] A significant amount of demand response currently occurs through "aggregators"—entities that, as the name suggests, 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 in that they would be able to develop experience measuring and maintaining emissions levels for fossil-fuel-fired DG.

previous concern about DG emissions suggest that it 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").[71] 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.[72] One possible approach might be for the NYISO and the NYSPSC to coordinate on an overall set of limits for a particular area. The NYISO and the NYSPSC 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 NYSPSC is a traditional environmental regulator with extensive experience with environmental concerns. As such it may make sense to implement the market rules described above through a cooperative program involving the NYSDEC and either the NYSPSC 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 operationalize these limits through rules set and administered by the NYSPSC or the NYISO, respectively.

The principal limitation of this focus on regulating participation in markets or programs (through demand response or otherwise) is that they would not address emissions from fossil-fuel-fired 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 that environmental regulators could implement.

b. Options for Addressing GHG Emissions

Addressing GHG emissions from fossil-fuel-fired DG requires a different approach. Unlike the emissions of conventional pollutants, the effects of GHGs are global and there is thus 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. Nevertheless, it is likely that some of the policies discussed in the prior section could reduce the GHG impact of increased use of DG, insofar as those policies reduce or deter the use of relatively high-emitting

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[71] Because the NYISO regulates at a different level of granularity then the NYSPSC, 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* N.Y. Indep. Sys. Operator, TCC Reports, http://tcc.nyiso.com/tcc/public/view_nodal_prices.do (last visited Jan. 6, 2016) (listing nodal prices).

[72] As discussed in the next paragraph, 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* (Oct. 2013), *available at* http://www.nyiso.com/public/ webdocs/markets_operations/documents/ Manuals_and_Guides/Manuals/Operations/edrp_mnl.pdf; *see also* N.Y. Indep. Sys. Operator, *Environmental Advisory Council*, http://www.nyiso.com/public/markets_operations/ committees/eac/index.jsp (last visited Jan. 6, 2016) (discussing NYISO's consideration of environmental factors in carrying out its responsibilities).

generators.[73] Accordingly, adopting one or more of the approaches listed above might reduce the need to directly address GHG emissions from DG.

One option for addressing GHGs from fossil-fuel-fired DG in New York is to extend the obligation to hold RGGI permits so that it applies to smaller sources in New York in addition to central generators. 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 25MW limit to 5MW or even 1MW.[74] 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.[75] 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, potentially, the assent of 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 a 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

Alternatively, a state could address GHG emissions from DG without relying on the RGGI market. For example, a state could adopt GHG-intensity standards—*i.e.*, standards that are tied to the level GHG emissions per unit of electricity produced. This 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

[73] The converse may also be the case—i.e., addressing GHG emissions from fossil-fuel-fired DG may also help to reduce their emissions of conventional pollutants.

[74] Alternatively, New York might also enact a separate permitting scheme that requires DG with a maximum output below the 25MW 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.

[75] 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.

ensure that they are, in fact, more carbon intensive than the marginal central generator that they are likely to displace.[76] Otherwise, this approach could have the perverse effect of increasing aggregate GHG emissions.

VI. Conclusion

Increased use of DG offers a number of potential advantages, 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 paper has presented a variety of policy approaches that regulators might consider adopting to address these concerns more fully. The paper does not, however, advocate for a particular approach. Given the relative lack 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 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.

[76] As noted, because they avoid certain inefficiencies, such as line losses, fossil-fuel-fired DG can potentially satisfy demand while emitting lower total levels of pollutants than centralized generation, even if the DG unit is less efficient per kilowatt-hour generated. *See supra* note 14 and accompanying text.