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Tracking Indirect Emissions in the Electric Power Industry

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The generation of electricity or other forms of useful power on a utility-scale is one of the largest sources of greenhouse gas emissions nationally and globally. Accounting for emissions from the entities that generate and sell power can involve a number of complications due to the layers of contractual and financial arrangements between entities involved in the energy business.

There are several useful purposes for tracking greenhouse gas emissions over time in the electric power industry. The logical definition and boundaries of an entity within that industry will depend upon the purpose for which emissions are being tracked. Three general categories of emissions tracking objectives are: 1) for a regulatory based capped emissions trading system, 2) for voluntary corporate reporting and target setting, and 3) for public disclosure to retail customers of emissions associated with their power purchases.

For a cap and trade system, the logical and legally practical level to track emissions is the facility or individual boiler unit. Regulatory structures already exist for environmental permitting at this level. Only direct emissions of greenhouse gases to the atmosphere by that facility or unit should fall within the accounting boundaries. In the case of the electric power industry, indirect emissions occurring upstream or downstream from the products or services (e.g., electricity) purchased or sold should be excluded from a cap and trade system due to the quantification uncertainties and ownership issues (e.g., potential for double counting). This model of emissions accounting is what has been used in existing emission markets, such as the U.S. Acid Rain SO₂ and NO_x trading programs and the European Union Emissions Trading Scheme.

However, in the context of voluntary programs, corporate target setting, and public disclosure initiatives it is common practice to include indirect emissions that are physically occurring at offsite facilities that are neither owned nor operated by the reporting entity. Attempting to apply this approach and include indirect emissions in the baseline of a company in the electric power industry raises some challenges that are dealt with in the following discussion.

Indirect Emissions

For companies in the electric power industry, three types of indirect emissions associated with electricity can be identified. The first type is associated with electricity that is purchased from outside the company's direct emission boundaries and is consumed for its own use (e.g., for lighting its offices). The second type is associated with electricity that is purchased by a load serving entity to meet its retail customer load. The third type is associated with electricity that is purchased from generators or wholesalers and then resold to other wholesalers or load serving

entities (i.e., “pass through electricity”). The accounting rules for dealing with greenhouse gases must be able to distinguish between these types of indirect emissions.

For a public disclosure program, the main focus is to indicate to retail customers the emissions or emissions intensity associated with the electricity they are buying. Therefore, only the emissions associated with electricity sold to retail customers are at issue, which will include a load serving entity’s direct emissions (except that portion that may be sold on the wholesale market) and indirect emissions associated with electricity purchased to meet their load.

For corporate targets and baselines, however, the boundaries are generally set so as provide an incentive for companies to take actions that reduce emissions—wherever those emissions may occur—balanced against the feasibility of quantifying and tracking emissions. (See Table 1)

Table 1: Applications for indirect electricity emissions data

Characteristic	Cap & trade	Corporate target	Public disclosure
Definition of entity	Facility or boiler unit	Entire corporate entity or portion within a jurisdiction	Load serving entity
Boundaries			
○ Direct emissions	✓	✓	✓
○ Indirect for own use		?	✓
○ Indirect used to meet load		?	✓
○ Indirect resold to wholesalers or other LSEs		?	

Approaches to corporate baseline and target setting

The simplest approach to setting a baseline for a company in the electric power industry is to include only direct emissions from facilities that the company has an equity share in or financial or operational control over (see example in Table 2). With this approach, all issues with double counting are avoided and the difficulties of quantifying emissions are minimized.

However, many energy companies purchase (i.e., import) a significant amount of electricity from wholesalers. Including indirect emissions associated with these electricity purchases in a company’s baseline and/or target would provide an incentive is to be provided for them to purchase electricity with a lower emissions intensity. Under this approach both the baseline and the target year emissions include direct emissions as well as indirect emissions from purchased electricity (see Table 3). If the company’s baseline and inventory includes only those indirect emissions associated with electricity sold to retail customers (i.e., the load), then double counting of indirect emissions with other electric power industry companies can be avoided. However, this approach can still lead to the double counting of emissions with the owners of the direct emissions (i.e., the generators) and the ultimate electricity consumers unless measures are taken to coordinate with these upstream and downstream parties to avoid double counting.

A hybrid approach is possible that addresses some of the leakage¹ issues with the purely direct approach, but eliminates the need to include indirect emissions in the baseline. Excluding indirect emissions from the baseline avoids potential problems with obtaining historical data on electricity purchases and emission rates associated with those purchases. With a hybrid approach, target year emissions are adjusted based on the difference between the actual emissions rate of the electricity purchased and a target emissions rate (see Table 4).

The hybrid approach can be further modified to reduce the data collection burden on companies by structuring the target emissions rate as a trigger. In other words, only electricity purchases with an associated emissions rate above the trigger rate will lead to an emissions adjustment in the target year. Electricity purchases that can be demonstrated to have an emissions rate at or below the trigger rate can be ignored (see Table 5).² Although this approach lessens some of the data collection burden, it does not give credit for renewable or other low emission intensity electricity purchases.

Table 2: Direct emissions approach (example)

Category	Baseline	Target year
Direct emissions	60 tons	50 tons
Total Emissions	60 tons	50 tons
Change		-16.7%

Note: Units are in metric tons

Table 3: Indirect emissions approach (example)

Category	Baseline	Target year
Direct emissions	60 tons	50 tons
Indirect CO ₂ emissions rate	0.6 tons/MWh	0.9 tons/MWh
Electricity purchases to meet load	10 MWh	10 MWh
Indirect emissions	6 tons	9 tons
Total Emissions	66 tons	59 tons
Change		-10.6%

Note: Units are in metric tons

¹ Leakage in this context refers to the purchase of “dirty” electricity by a company while maintaining a “clean” direct emissions profile. In other words, a company can outsource its emissions when indirect emissions are excluded from its inventory.

² The degree to which this modified hybrid approach would lessen the data collection burden depends on the structure of the existing financial settlement system that the load serving entity operates in and the degree of verification required of claims that certain electricity purchases are below the emissions intensity threshold.

Table 4: Hybrid indirect approach (example)

Category	Baseline	Target year
Direct emissions	60 tons	50 tons
Indirect target CO ₂ emissions rate	NA	0.6 tons/MWh
Indirect CO ₂ emissions rate	NA	0.9 tons/MWh
Electricity purchases to meet load	NA	10 MWh
Indirect adjustment emissions rate	NA	0.3 tons/MWh
Indirect adjustment	NA	3 tons
Total Emissions	60 tons	53 tons
Change		-11.7%

Note: Units are in metric tons

Table 5: Hybrid indirect approach including trigger (example)

Category	Baseline	Target year
Direct emissions	60 tons	50 tons
Indirect trigger CO ₂ emissions rate	NA	0.6 tons/MWh
Electricity purchases to meet load	NA	10 MWh
○ Block 1 Emissions rate		0.5 tons/MWh
Quantity		5 MWh
Adjustment rate		(below trigger)
Adjustment		none
○ Block 2 Emissions rate		0.9 tons/MWh
Quantity		5 MWh
Adjustment rate		0.3 tons/MWh
Adjustment		1.5 tons
Total indirect adjustment	NA	1.5 tons
Total Emissions	60 tons	51.5 tons
Change		-14.2%

Note: Units are in metric tons

For all approaches, any change in direct emissions that is associated with additions or divestitures of capital equipment would require adjustments to be made to the baseline emissions to reflect those changes. These types of baseline adjustments are common to all major corporate inventory protocols.

Practical issues with tracking indirect emissions

The primary difficulty in using an approach that incorporates indirect emissions with corporate reporting is in collecting the emissions data associated with electricity purchases and sales within the electric power industry. Any approach that accounts for indirect emissions from electricity generation must be based upon a practical system for tracking and reporting information associated with transactions of each MWh of electricity from the point of generation to the point of delivery to end use customers.

There are two general options for tracking the environmental attributes associated with electricity transactions: 1) a settlement or contract based system and 2) a tagging system. The settlement

based system focuses on the chain of financial/contractual transactions between electricity generators and load serving entities. Ideally, each financial settlement in the chain will record and track the environmental attributes associated with the associated electricity. In effect, the environmental attributes of the electricity are bundled with the electricity itself.

A tagging system offers the possibility of unbundling the non-price characteristics of the electricity sold from the electricity itself by creating a secondary market for electricity tags. In such a secondary market, generators create tags for each MWh they produce and then load serving entities are required to hold certificates for each MWh they sell to retail customers. Although the unbundled nature of tags provides many benefits (e.g., increased liquidity, etc.), such a system requires a coordination between all or most generators, wholesalers, and load serving entities within a power pool, independent system operator (ISO), or other regional transmission organization (RTOs) region.³ In the absence of an existing tagging system, an individual energy company will necessarily have to rely on a settlement system for its own tracking of indirect emissions.

For load serving entities operating within a regional ISO, they will obtain bilateral contracts with wholesalers and purchase electricity on the spot market. For spot market purchases, it is not possible—due to confidentiality reasons—to track the non-price attributes of the electricity, therefore some type of spot market average emissions rate will have to be assigned to those purchases.⁴

For load serving entities operating outside of a regional ISO, it should be feasible to track emission rates with all bilateral financial settlements for both electricity purchases and sales. However, because of the multiple layers of contractual transactions between wholesalers—up to eight or more is not unheard of—environmental attribute information may have been lost in one of the transactions. In such cases, it may be necessary to assign a default emissions rate value to the purchase based on some type of power pool average.

There will also be an incentive by an energy company to claim that the electricity it sells on the wholesale market has a high emissions rate, while all the electricity it sells to its retail customers (i.e., is included in its inventory) is from low emitting sources. Such gaming can be avoided by a company requiring that its bilateral contracts and/or financial settlements for electricity sales to other wholesalers include the environmental attributes of the generator associated with that electricity sale. Alternatively, a company-wide average emissions rate should be applied to the transaction for inventorying purposes.

The tracking of non-price information within electricity market transactions is likely to be met with resistance and claims of confidentiality by some electricity market participants. Some of this resistance can be avoided by adjusting the timeliness of the system's transparency and

³ A few regional ISOs are working on developing a tagging system.

⁴ New York State operates a hybrid settlement and tagging based system. Most emissions tracking is based on tracking bilateral contracts. However, tags can be created for electricity entering the spot market that are unbundled from the actual electricity. All electricity sales from the spot market that are not purchased with unbundled tags are assigned the residual emissions rate of the electricity entering the market that quarter. Such a system allows low emission electricity to be sold at a premium even through the spot market.

verification requirements such that confidential information can be protected during the period it is most sensitive to market manipulation.

The tracking of emission rates can be: 1) based on specific information reported by individual generators, 2) based on the unit's EPA ID number and EGRID emissions rate data from earlier years, or 3) simply based on fuel type information reported by the generator and default emission factors. Measures will also need to be implemented verify the information reported in any settlement or tagging system to ensure the systems credibility and prevent double counting.

References

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