



## **Background**

The U.S. Landfill Project Protocol (LFPP) was first developed by the Climate Action Reserve (Reserve) in 2007. Since then, the protocol has gone through three major revisions to streamline requirements, incorporate feedback from users, and address updates to the data sources used to set the performance standard and ensure the additionality of projects.

Most recently under Version 4.0, the Reserve adopted a two-pronged performance standard in addition to a legal requirement test. The first prong of the performance standard, applicable to all projects, is a technology-based practice threshold; the second prong is a size threshold, applicable only to landfill-gas-to-energy (LFGE) projects. The performance standard size threshold (PSST) was developed in response to the fact that, depending on the amount of gas produced at the landfill, LFGE projects could be economically feasible based on the sales of the landfill gas alone without the additional financial incentive of greenhouse gas (GHG) offset credits. Those LFGE projects would therefore be non-additional. The market reflects this: larger, gassier landfills have a higher rate of LFGE utilization than smaller, less gassy landfills, even where methane capture and destruction is not required by law.

The initial performance standard analysis for the LFPP Version 1.0 used as its primary data source a database of nearly 2,400 landfills in the United States developed and maintained by the U.S. EPA's Landfill Methane Outreach Program (LMOP).<sup>1</sup> This database does not represent all U.S. landfills, but rather a subset of all landfills that have been identified as having current LFGE projects or where potential opportunities exist for such projects. This database is updated on an ongoing basis by EPA staff. Landfill gas projects take time to move from conception to operation (often two years or more) so the database does not see rapid changes. The original analysis concluded that any new installation of a landfill gas collection system and/or qualifying destruction device where gas had not previously been collected and destroyed (or was destroyed using a non-qualifying destruction device) could be considered additional.

Subsequently in 2011, following interim updates to the LMOP database, the Reserve determined that the significant increase in the number and percentage of landfills employing gas collection and destruction systems warranted new evaluation of market developments. The Reserve performed the same analysis conducted for Version 1.0 under slightly more conservative assumptions and ultimately adopted the size threshold component to the performance standard (introduced in LFPP Version 4.0).<sup>2</sup> The Reserve also analyzed the

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<sup>1</sup> LMOP is a voluntary partnership program that was created to reduce methane emissions from landfills by encouraging the use of landfill gas for energy. LMOP tracks whether or not specific landfills are required to reduce landfill gas emissions under the New Source Performance Standards and Emission Guidelines for Municipal Solid Waste Landfills (NSPS/EG), promulgated March 1996. Because LMOP is not a regulatory program, it cannot make an official EPA designation regarding any landfill's NSPS/EG status. Information relating to NSPS/EG was obtained by voluntary submittal and is subject to change over time. Therefore, LMOP cannot guarantee the validity of this information.

<sup>2</sup> For more details on this analysis please see Appendix A in the LFPP V4.0.

possibility of using the receipt of Renewable Energy Credits as a criterion to determine eligibility as a complement or alternative to using waste-in-place from the LMOP database; however, this option was ultimately not pursued.

The current PSST limits eligibility of energy projects based on the size of a landfill (determined by waste-in-place, or WIP). Distinct WIP thresholds apply to arid and non-arid counties. The WIP threshold serves as a proxy for methane production and, thus, the energy potential of the landfill. The threshold is set at the point where 5% of unregulated landfills<sup>3</sup> below the threshold have installed energy projects without the incentive of offsets, i.e. where the “natural” market penetration of LFGE projects at landfills below the threshold was no more than 5%. For landfills in the arid precipitation zone, this threshold was determined to be 2.17 million metric tons (MMT). For landfills in the non-arid precipitation zone, this threshold was determined to be 0.72 MMT.

When LFPP Version 4.0 was adopted in June 2011, the Reserve received feedback from stakeholders that the LMOP database may not be appropriate for this type of analysis, and that the Reserve should reexamine the WIP thresholds when new data became available from the EPA Mandatory GHG Reporting Program. Ultimately, the Reserve Board of Directors elected to adopt Version 4.0, but instructed Reserve staff to carry out additional analysis once new data were available. These data from the Mandatory GHG Reporting Program became publicly available in the spring of 2012. Through communication with the EPA LMOP staff, the Reserve learned that the LMOP database would also be receiving a significant update based on these data.

### **2013 Size Threshold Analysis using the EPA Mandatory GHG Reporting Program Database**

In 2012, as an alternative to a WIP size threshold using only LMOP data, the Reserve analyzed the potential of setting a threshold based on data from the U.S. EPA Mandatory GHG Reporting Program. Under the Mandatory GHG Reporting Program, landfills must report their emissions if they generate greater than 25,000 tCO<sub>2</sub>e annually. The mandatory reporting dataset was limited to 1,200 landfills for the emissions year 2010, and because the data do not indicate the regulatory status of the landfill, each reporting landfill had to be matched to that landfill’s information in the LMOP database to determine its regulatory status. The usable dataset for the purposes of setting a size threshold for unregulated landfills was therefore limited to those landfills that are included in the Mandatory GHG Reporting Program as well as in the LMOP database, and consisted primarily of very gassy landfills. Due to the limited number and type of landfills for which data are available, using the mandatory reporting data to set an emissions level threshold proved unworkable.

### **2013 Size Threshold Analysis using the EPA LMOP Database**

In late 2012, the Reserve received an updated version of the LMOP database from the U.S. EPA. Where applicable, EPA staff had incorporated data from the first collection of data from the Mandatory GHG Reporting Program. Using this version of the LMOP dataset with updated

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<sup>3</sup> For the purposes of this analysis, “unregulated landfills” include those landfills not identified as required to destroy landfill gas under the NSPS/EG regulations, and those without only a flare installed. The Legal Requirement Test could further limit the eligibility of specific landfills that are required to destroy landfill gas by other local, state or federal regulations. More details on how landfills are classified can be found in the Performance Standard Analysis in Appendix A of the LFPP V4.0.

information on over 2,400 landfills, it was possible to reconstruct the Reserve’s 2011 analysis with the most current data available.

Following the assumptions of the 2011 analysis, 253 out of 952 unregulated landfills have implemented voluntary LFGE projects, resulting in a current market penetration rate of 26.58%. This figure includes both landfills that may have received GHG offset credits and those that are regulated to control methane emissions.

Excluding those landfills that received GHG offset credits, and those assumed to be regulated at some level, Table 1 provides an update of the market analysis performed in 2011. These exclusions resulted in 1,471 landfills remaining in the database, of which 249 have LFGE projects installed. This equates to a natural market penetration of 16.93% (see Table 1), a slight increase over the natural market penetration rate found in the 2011 analysis (16.66%).

**Table 1.** Summary of Non-NSPS/EG Landfills, Excluding Flare-Only and GHG Offset Projects (2013)

Non-NSPS/EG Landfills	Number of Landfills	Percent
LFGE Projects	249	16.93
No LFG Collection	1222	83.07
Total	1471	100.00
<b>Estimated Market Penetration of LFGE Projects at Unregulated Landfills</b>		<b>16.93%</b>

Such an incremental change in natural market penetration indicates that the industry trends are largely unchanged over the previous two years, and supports the conclusion that no adjustment to the PSST is warranted. Using the updated information and the same filters and assumptions as applied in the 2011 analysis, the Reserve determined that the WIP threshold levels remain commensurate with the current PSST. Thus, the Reserve determined that the 2011 thresholds are sufficiently accurate and conservative, and there is no need to update the PSST for the LFPP at this time.

### Conclusion

For landfills in the arid precipitation zone, the performance standard size threshold shall remain 2.17 MMT. For landfills in the non-arid precipitation zone, the performance standard size threshold shall remain 0.72 MMT.