

Cedar Hills Regional Landfill FAQ- Landfill Gas and Climate Change

Questions? Email: climatechange@kingcounty.gov

1. How are greenhouse gases generated at the Cedar Hills Regional Landfill?

When organic material in the landfill decomposes, carbon dioxide and methane gases are formed. Methane is a potent greenhouse gas (GHG), ~23 times more potent than carbon dioxide. Landfill gas (LFG) generation begins shortly after waste is deposited and peaks approximately five years later. LFG generation gradually declines, but continues to be generated for many years after closure. Current programs to reduce landfilling of organic materials will reduce LFG generation in the future. Current quantities of waste will generate significant LFG for decades to come.

2. What are landfill fugitive emissions?

Landfill gases that are not captured by the collection system are called fugitive emissions.

3. How do we minimize fugitive emissions from the landfill?

New areas where waste is placed are constructed with a bottom liner to prevent LFG and leachate from escaping. As waste is placed collection pipes are also installed. These pipes are put under a vacuum to catch any LFG which is generated – the captured LFG is transmitted to either the biogas energy recovery plant or to flares. As sections of the landfill are completed, a cover is placed over waste to further prevent the escape of LFG. For older, unlined areas of the landfill where waste was placed before current practices, the King County Solid Waste Division (SWD) has installed cover systems and vertical wells to extract LFG and control emissions.

4. How do we monitor system performance to ensure we are minimizing fugitive emissions?

The SWD monitors at 1,140 points in the collection system to ensure it is maintaining proper vacuum and to ensure LFG quality. The SWD monitors for surface emissions quarterly, covering approximately 40 linear miles of the landfill surface looking for emissions. While the regulatory standard is 500 parts per million methane (PPM, or .05%), the SWD measures at 100 PPM. Detections have rarely been observed, and when they have, it has been due to minor leakage around pipe penetrations which are quickly repaired. An extensive network of monitoring wells around the perimeter of the landfill are checked monthly to ensure no LFG is escaping.

5. What do we think is our landfill capture rate, and why?

The SWD believes the LFG capture rate is above 90 percent and there is no indication of any significant fugitive emissions. Based on the Environmental Protection Agency's (EPA) recommended LandGem model, projected LFG generation in 2012 was about 10,227 scfm and the actual capture rate was about 10,040 scfm which measures as a 98.17 percent capture rate. If a conservative 90 percent capture rate is used, fugitive emissions were equivalent to 111,000 metric tons of carbon dioxide equivalent (MTCO_{2e}) in 2008.

6. How does this compare to industry standards?

The SWD's practices exceed industry standards. LFG collection pipes are installed when garbage is placed. Collection starts once monitoring shows that the lift is anaerobic and capable of producing LFG. Interim covers are placed over completed slopes. These actions are not required and enhance the LFG collection during the operation of open areas.

7. What happens to the landfill gas that is captured?

Captured LFG is conveyed to the North Flare Station for further transmission to the BioEnergy Washington (BEW) energy recovery plant for processing into pipeline quality biogas and electric power generation. If that facility is not fully operational, the LFG is destroyed through flaring. When

the LFG is flared, methane is converted into carbon dioxide and water, reducing the GHG impact of LFG.

8. What is the status of the BEW renewable energy facility?

The energy recovery plant biogas plant produced and delivered pipeline quality gas over 94 percent of available hours December 2012. It has been operating at or above expectations since it was brought back on line in October 2012. BEW processes all the LFG provided by King County. Some is used for internal power to power their facility, some is used to oxidize LFG contaminants, and the majority is processed to pipeline quality biogas and sold to Puget Sound Energy.

9. What has BEW's recent output been? How long will the renewable energy facility operate?

BEW has been operating consistently since October 2012 after an extended shutdown to address design and operational problems. Normal operations generate approximately 5,000 MMBTU/day. The King County contract with BEW is for 20 years with a five year extension option. The SWD expects the landfill to generate significant quantities of LFG throughout the contract period.

10. What are the environmental and climate change benefits of this project?

In flaring or combusting the LFG, methane and other volatile organic compounds are destroyed. The combustion process reduces the climate change impact of the landfill because methane is a more potent greenhouse gas compared to the byproducts (which include carbon dioxide and water) of combustion.

The renewable energy project has an additional important GHG benefit: by converting the previously wasted LFG resource into renewable energy, an equivalent amount of non-renewable energy is offset. Converting LFG to pipeline quality biogas offsets the need for non-renewable resources such as fossil fuel natural gas (which is primarily methane), coal and oil, while also reducing emissions of air pollutants that contribute to local smog and acid rain. If you assume the processed biogas directly displaces fossil fuel natural gas usage, at current operational levels, the renewable energy component of the project is delivering about an 85,000 MTCO₂e annual offset or benefit.

11. What about the other King County landfills?

King County has ongoing responsibility for seven other closed landfills. These sites are small and are dispersed throughout the county. Past evaluations of LFG production have indicated that they are minor sources generating methane at levels too low to support sustained combustion or economic recovery. For 2009, the SWD estimated that the combined GHG emissions from the four largest closed landfills (Cedar Falls, Enumclaw, Hobart and Vashon) were approximately 20,000 MTCO₂e. Alternatives, such as providing supplemental fuel to allow combustion could increase GHG emissions. Hobart, Enumclaw, and Vashon could be re-visited to determine the use of the LFG.

12. What are potential next steps related to the landfills and GHGs?

The SWD division continues to seek alternatives for LFG management at the other landfills. It continues to seek ways to improve the effectiveness of LFG collection at Cedar Hills. The SWD is also working with BEW to improve the coordination of the King County system and theirs for optimizing the operational efficiency. Hobart, Enumclaw, and Vashon could be re-visited to determine the use of the LFG.

13. What are the projected revenues for the BEW project?

Revenues are generated from three sources: rent of the property to BEW, sale of the LFG to BEW and sale of renewable energy credits to PSE. Rent generates \$1000 per month. Fourth quarter 2012 LFG sale revenue was \$264,000. Forecasted revenue from the renewable energy credits for that period was \$123,000.