SOLID WASTE AND WASTEWATER

INTRODUCTION

Waste-related GHG emissions result from personal consumption and waste disposal patterns, as well as from pre-consumer commercial and industrial processes. In Yolo County, less than 1% of unincorporated communitywide GHG emissions were associated with solid waste generation and disposal in landfills (1,654 MT CO_2e/yr) in 1990. Since then, solid waste emissions have increased to 6,871 MT CO_2e/yr in 2008. These emissions are projected to continue to grow to 12,660 MT CO_2e/yr by 2020 and 18,449 MT CO_2e/yr by 2030. As shown in the graph to the right, waste disposal rates peaked around 2005, and have been dropping since that time. The waste strategy seeks to build on this momentum by increasing waste diversion and reduction.

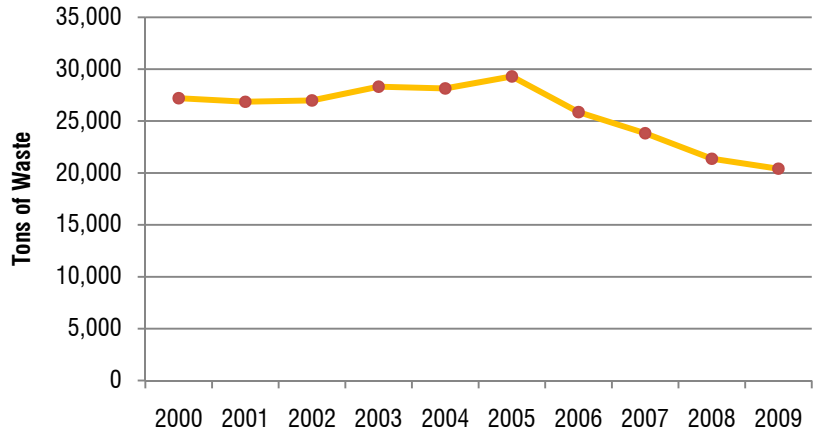
Emissions are created when organic waste (e.g., food scraps, yard clippings, paper, and wood) is buried in landfills and anaerobic digestion takes place, emitting methane, a potent GHG.

The County contracts with two companies, USA Waste and Davis Waste Removal to provide commercial and residential waste collection and recycling. The County recognizes that due to the limited amount of local waste, costs have increased for some waste diversion programs subsidized by waste disposal tip fees, making disposing of solid waste more expensive. Yolo County Central Landfill has approximately 70 to 80 years of space remaining, and other nearby landfills also have many years of space remaining.

Due to limited remaining landfill space in Northern California, disposing of solid waste will become more expensive. Presently, most waste reduction practices focus on diverting waste products from landfills through recycling. However, it is also important to consider programs that reduce waste generation, as well as product and material reuse alternatives. Encouraging consumer choices and waste reuse, reduction, and recycling habits affect overall community waste generation.

The total GHG reduction potential of the Solid Waste and Wastewater strategy is 9,366 MT CO_2e/yr in 2020 and 13,649 MT CO_2e/yr in 2030, or approximately 2% and 1% of the total GHG reductions of the CAP, respectively.

Figure 3-7:
Waste Disposal in Unincorporated Yolo County



Source: Yolo County Planning and Public Works Division of Integrated Waste Management, 2010

MEASURE WR-1:
EXPAND LANDFILL METHANE CAPTURE SYSTEMS

Measure Description

Currently about 25% of solid waste generated in unincorporated Yolo County is deposited in landfills (i.e., approximately 75% of waste is diverted from the landfill), where bacteria decompose organic material. Landfill gas (LFG) is created from both bacterial decomposition and oxidation of organic wastes. The gas is composed of approximately equal concentrations of methane (CH_4) and carbon dioxide (CO_2), as well as smaller amounts of non-methane organic compounds (NMOC), nitrogen (N_2), oxygen (O_2) and other trace gases. If not collected and destroyed, over time, most of this landfill gas is released to the atmosphere. Some of the landfill gas is destroyed as it migrates through the landfill's cover materials before it can escape the landfill. Methane (CH_4) is especially problematic, as the molecule has a global warming potential 23 times more potent than CO_2. The primary focus of mitigation efforts at the Yolo County Central Landfill is to prevent emissions by collecting the landfill gas, destroying the methane component of the landfill gas through combustion, and generating electricity in the process. Measures should be taken to ensure that the LFG is filtered and refined to the point where potentially harmful pollutants are not emitted when the gas is burned.

Captured landfill gas may be combusted or "destroyed" on-site, transported for off-site use (e.g., through gas distribution or transmission pipeline), or used to power vehicles. Landfill gas collection systems typically consist of wells, pipes, blowers, caps and other technologies that enable or enhance the collection of landfill gas and convey it to a destruction facility.

At some landfills, a flare is the only device where the gas is destroyed. Other projects use landfill gas to generate electricity or process heat using technologies such as turbines, reciprocating engines, fuel cells, boilers, heaters, or kilns. Most projects that produce electricity or process heat also include a flare to destroy gas during periods when the gas utilization project is down for repair or maintenance. Piping landfill gas to be destroyed by an industrial end user at an off-site location is also an eligible approach to destroy the landfill gas.

CalRecycle has identified a Climate Action Team strategy to increase landfill methane capture and reduce methane emissions. The *Landfill Methane Capture Strategy* includes three core components:

- Install new methane control systems at landfills currently lacking them.
- Maximize landfill methane capture efficiencies by optimizing landfill design, operation, and closure/post-closure practices.
- Increase recovery of landfill gas for use as a biomass renewable energy source to replace energy from nonrenewable fossil fuel sources.

The Yolo County Central Landfill already has a landfill gas system installed to capture LFG and use the gas to generate electricity. The opportunity for improvement is the potential to increase the capture rates or control efficiency of the system. The current control efficiency, or the ratio of the amount of LFG collected versus

generated, achieved at the Central Landfill is approximately 75%. Implementation of best practices could increase the control efficiency to around 90%.

These best practices could consist of closing the landfill's older open waste management units by replacing the intermediate soil caps with a multi-layer cap designed to minimize emissions, a process not likely to occur until each unit is filled to capacity around 2020. The current number of landfill gas collection wells and piping within these units will not be expanded significantly.

2020 GHG Reduction Potential:
9,366 MT CO_2e (4%)

2030 GHG Reduction Potential:
13,649 MT CO_2e (3%)

Community Co-Benefits:
Improve Air Quality
Expand Renewable Energy

Applicability:
Existing Landfills

ACTION		RESPONSIBILITY	TIMEFRAME
A	Enhance and expand existing landfill gas collection and destruction systems (90% control efficiency) at the Yolo County Central Landfill.	Planning & Public Works Central Landfill Operator	2020

PROGRESS INDICATORS		TARGET YEAR
A	Achieve 90% methane capture (control efficiency) at the Yolo County Central Landfill.	2020 & 2030

SUPPORTING MEASURES FOR SOLID WASTE AND WASTEWATER

The County also considered the following measures as part of the Solid Waste and Wastewater Strategy. The County will continue to monitor the feasibility of these supporting measures, and may employ one or more of these measures to achieve the 2030 GHG reduction goal.

Reduce Waste Emissions from Organic Materials

Organic waste comprises more than half of the waste stream in unincorporated Yolo County. Composting, nature's own way of recycling, is the controlled decomposition of organic waste and material such as leaves, twigs, grass clippings, and vegetable food waste. Compost is the soil amendment product that results from composting. Whether done on-site, at the point of waste generation, or in a centralized facility, composting helps to keep organic material out of landfills and turns it into a useful product. Though not a carbon-neutral activity due to small amount of methane and nitrous oxide that are released in the process, on-site composting reduces the cost of hauling material and is generally exempted from solid waste regulations. Centralized facilities can handle more material and potentially produce a more consistent product, but may face regulatory issues in appropriately processing organic waste.

Anaerobic Organic Waste Digestion

Anaerobic digestion involves the use of microorganisms to break down wet organic waste, such as food scraps. This is not a new process; it has been used in the County landfill for more than a decade. However, new applications are being developed that would allow wet organic waste to be extracted from landfills and taken to central processing facilities. This resulting methane is converted into energy, instead of allowing it to be released into the atmosphere. This new technology processes the wet waste in a more efficient manner than traditional methods of grinding and pulping. Pilot programs are currently being developed by East Bay Municipal Utility District and UC Davis, with the expectation that it will become commercially feasible.

Food Scraps
Food scraps that cannot be donated, such as spoiled fruits and vegetables, stale bakery items, kitchen prep trimmings, and leftover plate scrapings, can be composted into a soil amendment, reducing the amount of organic material going into landfills. Restaurants, grocery stores, and schools can benefit from composting food scraps either on-site or at a compost facility. For areas that are served by waste management companies, composting food scraps could decrease refuse collection costs over the long-term, by reducing demand for landfill space and the volume of waste hauled.

Yard Waste
Yards produce waste from pruning, lawn mowing and other routine plant care. Composting reduces organic waste volume by approximately 50% to 75% and returns valuable nutrients to the soil that benefit growing plants. Organic matter improves drainage and aeration in clay soils. Compost acts as a separator that dissolves tightly packed clay particles to allow water and air to enter. Composting helps sandy soil hold water and nutrients. Compost retains moisture and releases fertilizer nutrients slowly. It also increases the activity of earthworms and other natural soil organisms beneficial to plant growth.

Current Efforts
Currently, the County offers backyard composting workshops and compost bins to unincorporated county residents upon request. Curbside greenwaste collection is also available in Willowbank and El Macero. Greenwaste collected in these areas is usually brought to a greenwaste facility adjacent to the county, where it is processed and used as a soil amendment for farming.

To support and augment these efforts, the County will expand the current residential and commercial organic material diversion outreach program. Through this program,

the County could provide instruction regarding how to separate organic materials prior to collection in new and existing unincorporated communities, and provide composting instructions and workshops for rural residents and businesses. The County may also consider an organic materials waste diversion ordinance requiring all household and commercial yard waste, food scraps, and food-soiled paper to be placed in organics carts or composted, where organic material collection and/or on-site composting is feasible or appropriate. The County may also consider an anaerobic digestion facility to compost organic and green waste at an industrial scale.

Reduce Disposal of Non-Organic Materials through Increased Recycling

Building on Ordinance No. 1378 (Ordinance Mandating Solid Waste Removal), Yolo County will consider establishing a per capita waste diversion target of 25% below 2003-2006 average waste disposal rates, which were approximately 1.22 tons of waste per capita per year, by 2020. This target translates to 0.92 tons of waste per capita per year in 2020 (the 2009 per capita waste disposal rate was 0.95 tons). Achieving this target will require full participation from residents and businesses, and collaboration with the cities. To achieve this target, the County and cities will update, as necessary, the Countywide Integrated Waste Management Plan that identifies strategies and actions that minimize waste in the unincorporated county over the next 10 years.

In the short-term, the County will review existing waste diversion programs, and the feasibility of continuing or expanding targeted outreach programs to increase participation in waste reduction and recycling programs. It may be necessary to adopt mandatory requirements, such as mandatory recycling for residences and businesses to ensure achievement of this important goal.

Increase Construction and Demolition Waste Diversion Standards

In 2008, the Yolo County Board of Supervisors adopted a Construction and Demolition (C&D) Ordinance (Ordinance No. 1375; Chapter 16, Title 6) that describes how construction, demolition, and renovation projects should dispose of their job site waste. This ordinance implements AB 939, which requires each local jurisdiction to divert 50% of discarded materials from the landfill. California Integrated Waste Management Board studies show that nearly 22% of waste disposed of in California is C&D debris. The County considers the reuse and recycling of C&D debris essential to further compliance with AB 939.

Projects that must comply with the ordinance include: (i) all construction of new buildings equal to or greater than 5,000 sq. ft.; (ii) multi-family dwellings; (iii) residential dwellings greater than 2,000 sq. ft. in a subdivision; (iv) all demolition projects equal to or greater than 1,500 sq. ft.; and (v) renovation of buildings that are equal to or greater than 1,000 sq. ft. The County will consider expanding the types of construction and demolition projects that must comply and increasing the minimum diversion rate from 50% to 65% for construction and demolition waste.

The increased diversion rate will increase recycling or reuse of wood, inert and vegetative materials, and metals. The County will also look at requiring construction and demolition projects to submit a plan to maximize reuse of building materials at the time of permit application. To ensure compliance, the County may conduct periodic construction and demolition waste audits.

Reduce Wastewater Treatment Emissions

Wastewater from domestic (municipal sewage) and industrial sources is treated to remove soluble organic matter, suspended solids, pathogenic organisms, and chemical contaminants. These treatment processes can produce methane emissions if organic constituents in the wastewater are treated anaerobically (i.e., without oxygen) and if the methane produced is released to the atmosphere. In addition, the sludge produced from some treatment processes may be further biodegraded under anaerobic conditions, resulting in methane emissions. These emissions can be avoided, however, by treating the wastewater and the associated sludge under aerobic conditions (i.e., with oxygen) or by capturing methane released under anaerobic conditions. Captured methane can be used to produce either hot water or electricity. The County will work with the special districts, cities, and tribal government that operate wastewater treatment facilities to obtain funding for and implement these improvements.

Increase Natural Stormwater Retention through Low Impact Development

Low Impact Development (LID) is an approach to land development (or re-development) that works with nature to manage stormwater as close to its source as possible. LID employs principles such as preserving and recreating natural landscape features, minimizing effective impervious areas to create functional and appealing site drainage that treats stormwater as a resource rather than a waste product. There are many methods to realize these principles, such as bioretention facilities, rain gardens, vegetated rooftops, rain barrels, and permeable pavements. By implementing

LID principles and practices, water can be managed in a way that reduces the impact of built areas and promotes the natural movement of water within an ecosystem or watershed. Applied on a broad scale, LID can maintain or restore a watershed's hydrologic and ecological functions. The County will review its Development Standards to incorporate LID standards as appropriate.