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Palo Alto Compost and Parks

Harmonizing Conflicting Environmental Interests

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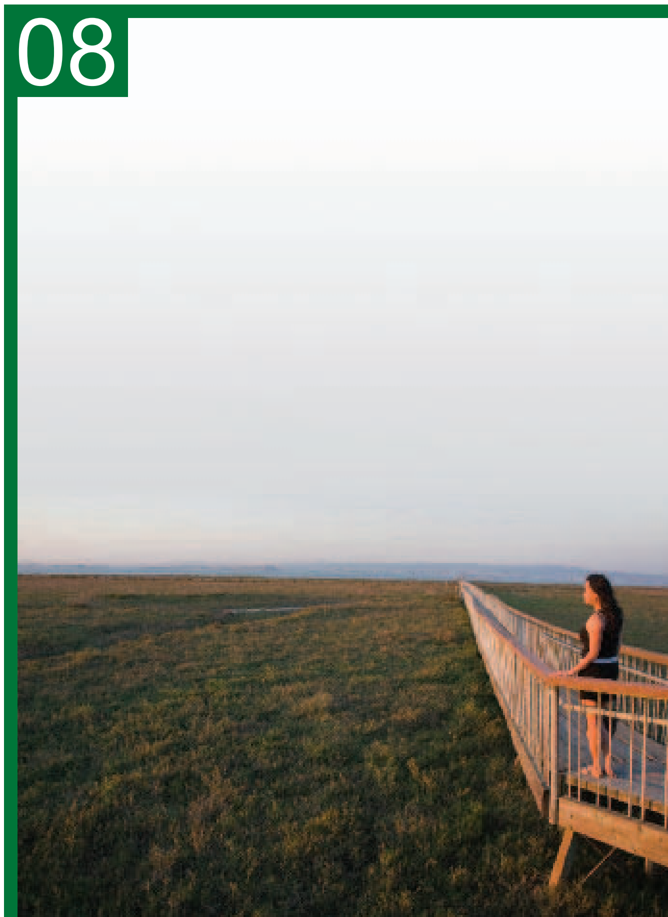

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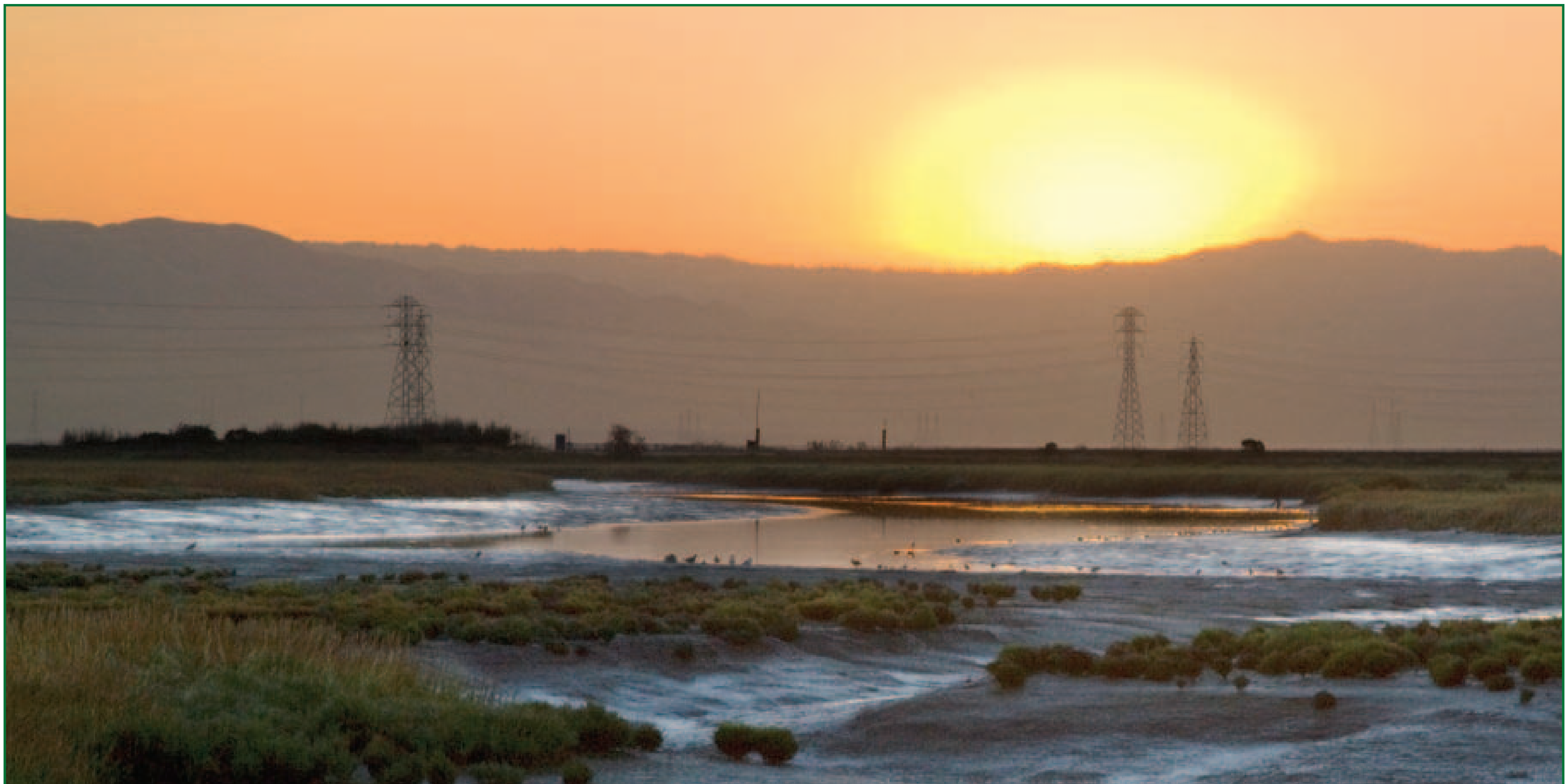


Palo Alto Compost and Parks

Harmonizing Conflicting Environmental Interests

By Bob Wenzlau
Photos by Mike Kahn/Green Stock Media

In Palo Alto, environmental harmony has been disturbed by a debate about the future of the city's compost operation. In short, a heated conflict is underway between open space interest groups with a vision for a bayland park, and sustainability interest groups intent on preserving the local composting operation. Each group is seeking the same land to achieve their environmental goals.

That this debate—whether the use of land for a pastoral park would compete with the responsible management of urban resources—even occurs is indicative of the numerous pressures and difficulties surrounding the matter of land use. The debate is now colored by the constraints created by global warming, which threaten to widen the rift between multiple environmental interest groups trying to determine the magnitude of Palo Alto's greenhouse gas emissions.

How Palo Alto's newly formed Blue Ribbon Compost Task Force is approaching this debate and the myriad options on the table is a complicated matter; however, as one of the participants in the debate, I feel I can shed some light on the matter with a brief overview of the situation. I came to Palo Alto in 1975 as a Stanford student and, rather than study, chose to work on recycling with a host of other students. We helped create Stanford and Palo Alto's then-pioneering recycling programs. We also started the initial municipal composting operation in the Baylands, a thirty-year-old commitment that now has us contending with proponents of parks and open space.

Far from being merely an issue of contention, this debate has fortuitously revealed numerous opportunities for sustainable waste management, energy production, and greenhouse gas reduction. It has framed the complexity of locally focused material resource management, and how it must be balanced with the protection of a sensitive habitat.

The history of the park and the history of the composting operation are the two trajectories that recently collided, and the task force formed as a result has been charged with three major tasks: resolving the conflict between composting and parkland, discovering if and how the organic stream can contribute to new energy sources for the city, and learning if and how any of this can benefit the city's greenhouse gas reduction efforts.

A marsh that became a dump that is destined to be a park

The story of the park starts in the 1920s when Palo Alto began disposing of trash in the baylands and converting the marshlands to disposal sites. The California Lands Commission encouraged the city to buy the marsh and "reclaim" it for development. What better purpose for unbuildable or unusable marshland than a dump? Similarly, since the land was not considered valuable as a natural resource, the sewage flowed to the bay, and the treatment plants were placed at the bay's edge.

By 1939, over 100 acres of marsh had been filled in with dredge spoils from the harbor. By 1960, the city owned approximately 1,880 acres of marshland, much of which had already been diked, filled, or developed. In fact, at that time, there were plans to continue filling and developing.

Palo Alto's history is marked by heated debates, and in the mid 1960s a recall was held to slow down Palo Alto's growth while protecting and preserving open space. The City Council struggled to halt development momentum and dedicated huge tracts of undeveloped marsh as parkland. This parkland act dedicated the operating landfill as a parkland, meaning the landfill has been operating on borrowed time ever since.

The landfill's design has been configured toward a pastoral park. With the inevitable flow of waste to the landfill, the final shape of the park will not be achieved until late 2010. At that time, receipt of waste will stop and the final closure construction will commence. Over time, all of the raw land will be converted into a park.

A compost operation on a dump that got in the way of a future park

The composting evolved more recently. In the late 1960s, Palo Alto's Ecology Action started a drop-off recycling center. In the early 1970s, Palo Alto took over the recycling effort and began incorporating drop-off recycling as the solid waste management contract. In 1978, Doug McDavid, a city reference librarian, and I gained the City Council's approval to pilot a curbside collection of recyclables. At the time, Berkeley, Davis, and a few other California cities were also experimenting with curbside recycling collection.

In the 1970s, before the advent of the "sustainability ethic," it was readily apparent how much of our "solid waste" was not waste, but rather the target for a "reduce, reuse, and recycle" approach. Given that the recycle center was located by the tollgate to the refuse disposal area, it was easy to observe a river of green flowing into the dump for burial—in this case, the yard waste for potential composting.

Palo Alto's municipal composting operation began with loads delivered by gardeners and city crews. We requisitioned a tub grinder—an eight-foot-wide tub—that shred stumps and branches to make the green mulch that began the compost.

After the compost operation started in the late 1970s, the operation grew in capacity, sophistication, and convenience. Increased convenience had the greatest impact on operations, and when a separate green waste collection augmented the existing curbside recycling, the diversion rates increased and drove increases in capacity and area for the compost operation. A larger operation dictated more development of more sophisticated markets for the compost.

How is the compost made?

So what is the current process? Green material is stockpiled, the materials are ground and formed into rows, then a scarab machine aerates and forms the materials into a well-groomed triangular windrow. The composting process takes about forty-five days and uses large amounts of recycled water supplied by the water pollution control plant. The scarab process is repeated at least five times over forty-five days. The temperature climbs to an optimum 145 degrees Fahrenheit through the duration of the composting.

In the compost process, 30 percent of the mass is reduced through decomposition. Composting is a biological process dependent upon water and oxygen. The bacteria and fungi that affect the transition are prevalent in the environment and go to work once the water and oxygen are supplied. The compost process itself is very complex, biologically speaking. The bacteria are most active at the beginning, digesting the easily degradable materials and rapidly generating heat; it is during this phase that the temperature increases the most quickly. Then the thermofilic fungi join the thermofilic bacteria and begin working on the cellulose—their activity kicks in after the bacteria raise the temperature, their food supply dwindles near the end of the process, the pile cools, and they die out. At that time, the mesophilic (or cooler) bacteria and fungi become dominant, and their contribution is the generation of the humic acids that benefit the soil.

Once the compost is complete, it is prepared for market. Most is sold in bulk to nurseries and commercial landscapers, with a smaller portion given away regularly to Palo Alto residents. Palo Alto sells the compost in several grades, including a raw finished compost, soil conditioner, and potting soil.

The capacity has now grown to the composting of approximately 21,000 tons per year. The site itself occupies about seven acres at the refuse area: about three acres are occupied by the windrows themselves, another two acres are for receiving, and the balance is for the finished product. Composting is a seasonal market, so during the winter months, the volume of finished compost grows, waiting for use in the spring.

The not-so-perfect compost operation

Composting operations are not always benign, especially when conducted at a municipal scale. In July 2008, the incoming green waste at Palo Alto's operation caught fire and burned a 1.5-acre area. The event brought notice and scrutiny to the operations. Though the fire appears to have been caused by smoldering materials left in a load brought to the compost center, the operational personnel failed to detect the embers. In scrutinizing the operations after the fire, a state inspection found that "site personnel were not present at the compost unloading area during the last delivery loads of the day," there was "no water truck at the site of the fire," and "composting material storage and accumulation limits have been exceeded in several areas." These events illustrated the importance of operation controls in addition to having the basic facilities in place. These problems heightened interest in the fate of the operation: proponents asked for improved operational oversight, while opponents viewed the situation as representative of composting's incompatibility with a park setting.

The compost debate

The fire in July 2008 foreshadowed a City Council debate in December 2008. The city staff came requesting that a decision be made about the future of the compost operation. Prior to December 2008, the future of the compost operation had been a football that council had struggled to contend with. The question returned to council after circulating through the city's Park and Planning commissions. The question the City Council asked repeatedly was whether or not the composting operation was consistent with pastoral park use. Without surprise, all of the findings pointed consistently to the incompatibility of a large-scale compost operation and park use. Despite these findings, the city staff recommended that local composting be maintained, placing greater weight on zero waste, economic factors, and global warming considerations than the parkland compatibility issue. Their report changed the focus of the debate, making it so the relative weight of each argument had to be considered alongside the underlying greenhouse gas and economic calculations. The December 2008 council meeting ended after a four-hour stalemate and returned to council discussion in January 2009.

The phase-out of composting at the Palo Alto refuse disposal facility had been forced by the closure of the disposal site, an eventuality that was not explicit and therefore generally unnoticed by local composting proponents. The current plan is to transfer the composting operations to Gilroy, approximately fifty-five miles south of Palo Alto. This solution, which will be limited to yard waste and commercial food waste, is scheduled to begin in 2012 when the local compost operation at the landfill closes.

This was a victory for proponents of open space, but for proponents of sustainability, localism, and greenhouse gas reduction, the decision was a step in the wrong direction. For example, trucking green waste fifty-five miles for composting hurts sustainability by moving a locally used soil amendment away from town, conflicts with localism by moving a local reuse solution to a remote location, and practically negates successful greenhouse gas reductions by generating more greenhouse gas emissions during the transportation of materials.

A few short days before the council's action in January 2009, Palo Alto held a community teach-in on this issue. The goal was to introduce unbiased information on the problem and the available technologies. The teach-in proved successful, as it clarified the challenges facing Palo Alto and also revealed the opportunity to contribute to Palo Alto's zero-waste and greenhouse gas reduction goals.

The City Council used this intervening time, coupled with the success of the community teach-in, to construct the framework of a community task force charged with examining the numerous questions surrounding the land use issue. With its formation completed in February 2009, the Blue Ribbon Composting Task Force was set to work.

The Blue Ribbon Task Force

The Blue Ribbon Task Force has the potential to develop a balanced and innovative approach to satisfy the now-disparate interests. Its members bring technology, waste management, environmental, and finance skills to bear on the problem. The City Council requested that the task force address the following topics in a report to be returned in the summer of 2009: How might the city reduce the impacts of and otherwise improve the existing composting operation, the operation that suffered the fire in 2008? What new technologies can be applied to the organic waste, and what would be the environmental impacts of the alternative technologies? Can the organic waste produce renewable energy and limit greenhouse gas impacts? What are the economic impacts associated with the alternative technologies? What viable locations for long term composting exist in or adjacent to Palo Alto? What amount of energy might be produced through certain composting technologies?

Already the task force has learned how many of the current operational problems have been resolved. It appears as the smoke cleared from the fire at the compost operation, the new sunlight inspired the city to upgrade the operations. While the operation had once been plagued by understaffing, management oversight, and inadequate equipment, the deficiencies mostly have been resolved and validated by the recent state inspections. Unfortunately, these short-term operational improvements do not solve the other problems the task force was formed to address.

Two new elements recently have been added to the already volatile debate: food waste and sewage sludge. From advanced composting methods to conversion technologies, these new elements give the task force a number of new options to consider and decisions to make.

Food waste and sewage sludge

Food waste became a target of the composting debate through the city's zero-waste program. Palo Alto adopted a zero-waste strategy in 2005, committing the city to building programs that nearly eliminate waste from entering landfill disposal. A zero-waste strategy embodies a "reduce, reuse, and recycle" approach, but the starting point is more difficult than typical recycling approaches. In a typical recycling approach, the easily recovered material is the target. On the other hand, a zero-waste program considers what remains after recycling and targets their elimination. Since about 13,000 tons of food waste is generated in Palo Alto yearly, it is a key target in the zero-waste program. The primary zero-waste strategy is to minimize the generation of food waste; however, any food residuals can be an additional target for composting.

A large, unquantified amount of food waste is also discarded through garbage disposals, which are convenient but bring with them a large environmental footprint. First, water and energy are used at home to grind and entrain the food into the sewage. The food carries a high organic load, which requires a proportionate amount of energy to treat. Finally, in Palo Alto the biologic solids left over from food treatment in the wastewater plant are burned, using even more energy. The convenience of this method of food disposal masks its true environmental impact.

The composting of food waste, another goal of Palo Alto's, introduces new complexities to the situation due to the strong odors created as food waste decomposes. Palo Alto had planned to compost both residential and commercial food waste, but the residential plan was dropped. A major challenge with food waste composting is collection, which is much easier from restaurants where the volumes are concentrated. Still, the decision to cancel the residential program left a considerable shortfall in their zero-waste commitment.

San Francisco demonstrates an inventive approach to residential food waste collection: compostable food liners. Food waste still goes into the familiar green compost bin, but specifically into a biodegradable food liner inside the bin that limits odors until the food is collected. The energy and water saved by disposing of food this way rather than washing it down the drain more than offsets the energy and water used in the production of the bio-bag.

Wastewater sewage sludge also became an additional target of the compost debate, mainly due to the antiquated methods currently applied to its disposal. Palo

Alto's sewage treatment system currently generates about 16,000 tons of sewage sludge per year. Currently, the sewage sludge is incinerated in facilities adjacent to the baylands park, which results in about twenty-one tons of an ash that must be disposed of as hazardous waste every week. The sludge is made up of the biologic solids generated during the treatment process. This raw sludge still contains pathogenic organisms, which is one reason it poses such a challenge for water pollution control systems. Many communities use anaerobic digestion to generate methane gas, a process that also inactivates the pathogens. The digester sludge remains but can be incorporated into a composting operation.

A choice of technologies

Technologies will be considered first based on their ability to treat the existing 21,000 tons of green waste per year, secondly by their ability to manage an additional 22,000 tons per year of food waste and other disposed organics, and thirdly on their ability to incorporate an additional 16,000 tons per year of sewage sludge.

The technologies that will be reviewed fall into three basic categories: advanced aerated composting, advanced anaerobic processes, and thermal processes. Many of these technologies, the later two categories in particular, have been used primarily in Europe.

Advanced composting technologies

Palo Alto's operation is the most conventional form of composting. A windrow-based operation utilizes large swaths of land and does little to control odors and dust beyond spraying water as materials are ground and mixed. A more advanced form of composting is called aerated-static pile composting, and it may occur in large covered windrows or with a closed vessel. The static pile approach, be it in-vessel or covered, offers several benefits. First, odors are better managed because the air is introduced by applying a vacuum rather than the mechanical aeration applied in Palo Alto's current windrow operation. Since the aeration air is captured in pipes, it can be treated to minimize odors further. Secondly, the operation can be more compact because space does not need to be dedicated to the mechanical scarabs that turn the compost pile. The application of an in-vessel approach reduces the scale of an operation even further, as the vessel supports very compact compost operations.

Anaerobic or fermentation technologies

Organic waste will degrade in an oxygen-starved or anaerobic environment. The most common anaerobic process is the methane digester. Anaerobic bacteria take the cream of the crop, in biological terms, and convert the carbon entrained in the waste to methane and carbon dioxide (1.5 to 1 ratio). The methane produced through this process can be used as a biogas and replace methane that is otherwise mined from the earth, which is another incentive when considering this option. The digestion process occurs in large, sealed vessels where the sludge is mixed and heated to the optimum temperature. From the outside, it would appear to be part of a normal wastewater treatment plant.

Methane digestion is commonly applied to wastewater sludges but more recently been introduced to digest food waste. Food waste rather than yard waste is considered for digestion, because food waste is full of sugars and fatty acids that will produce methane, whereas yard waste is predominantly lignins, which resist anaerobic bacteria. Food waste, in fact, produces three times more methane than the equivalent amount of sewage sludge. The East Bay Municipal Utility District (EBMUD) already has a pilot food waste digestion effort due to their dwindling industrial load.

Other technologies being considered utilize fermentation. Fermentation differs in that yeast is the primary organism involved as opposed to bacteria. In this process, the end product is energy in the form of alcohols rather than methane.

Anaerobic digestion is not a replacement for composting in because it does not degrade wood waste (or lignin); however, lignins can be degraded by aerobic bacteria and fungi in a composting operation. Aerobic composting, therefore, is typically applied as a final stage in any anaerobic digestion process. The relevance of anaerobic processes is to recover the methane that otherwise would be converted into carbon dioxide.

Thermal processes

There are two types of thermal process: those that combust with oxygen and those that do not use oxygen. Combustion with oxygen—or burning—is not a likely option, given the immediate release of carbon dioxide through the combustion process and the resultant ash requiring landfill disposal. Oxygen-starved combustion, or pyrolysis, on the other hand, has intrigued many members of the task force.

Pyrolysis decomposes organic materials by heating. The process produces a fuel, like methane, that can be used to replace natural gas from other sources. The process also converts the organics into a char. The char can be used as a soil amendment, though it has considerably different attributes than compost. Whereas compost continues to degrade in the soil, char is relatively persistent. Char offers benefits of durable improvement to soil texture; however, char does not offer the humic acids present in compost.

Where to put the composting operation

The current compost operation occupies about eight acres of land. The actual footprint is likely greater, as the current compost operation enjoys a large buffer within the confines of the 126-acre landfill. After 2010, the site will have started its final conversion from an active landfill to parkland. It will always be unusual parkland, however, because it will always be a landfill. The site itself will require maintenance indefinitely: methane will be generated and require recovery, settlement will occur and require repair, and unforeseen structural failures will need responses. Yet, at face value, the site will be a hill with a bayland view, offering trails for walkers to enjoy.

Palo Alto's Parks and Planning commissions found that the current composting operation would not be consistent with a pastoral park experience. This finding crystallized the land use question: where to put the compost operations?

When the council made the choice to dedicate the refuse area as parkland in 1968, they did not choose to dedicate the land occupied by the sewage treatment plant as well. Sewage treatment was recognized as a permanent infrastructure that could not be eliminated by a parkland dedication. The council did not anticipate a composting operation that, similar to a sewage treatment plant, could become a necessary environmental infrastructure. If they had, they simply could have set aside a composting area outside of the parkland, preventing this debate from occurring at all. Unfortunately, even if improvements to control odor and fire were implemented to make the compost operation completely parkland friendly, undoing a park dedication is not routine and would require a Palo Alto general election.

The Palo Alto City Council stressed to the task force members that the use of parkland is the lowest priority in the land use choices; however, finding a suitable site outside the boundaries of the refuse disposal area may not be feasible. Palo Alto has no other large, undeveloped sites waiting for a land use decision.

Palo Alto's regional alternative is the Z-Best compost operation, located fifty-five miles away in Gilroy, California. This potential solution introduced the impact of transportation into the discussion. According to Palo Alto city staff, to haul the yard waste and return the finished compost would require 20,000 truck trips per year, the equivalent of 560,000 truck miles. While these staff estimates are subject to debate, the reality of the situation is unavoidable: transporting compost materials has a large greenhouse gas impact and poses an additional traffic impact on the freeways.

Having the compost operation conducted at Z-Best has numerous incentives. The site is not a parkland, nor does it have as many nearby residents. The operation is regional and enjoys efficiency as well as operational competency that comes from a larger operation. The facility is favorable economically when compared to Palo Alto's operation conducted by city employees. The regional choice is attractive, but to many Palo Altans, the enormous transportation impact voids the benefits offered by this option.

Due to the inherent disadvantages of a distant regional facility, the City Council is encouraging the exploration of feasible local solutions. To facilitate a local approach, the task force will examine the use of advanced composting technologies to reduce

Photos courtesy of the City of Palo Alto the amount of land required. Even with a smaller footprint, finding a new location is unlikely. In Palo Alto, even sites half as large as the currently disputed area are scarce, likely environmentally sensitive, or have competing uses. Palo Alto could look to adjoining communities for available land, but these same land use issues are common.

Vetting all of the available options, the task force will likely consider the future of the land currently occupied by the Palo Alto Airport. Swapping the boundaries of the parklands is another possible consideration, since already seventeen property transfers have occurred to build the park. It is too early to forecast how the discovery and evaluation of sites for a local compost operation will unfold, but given the current congested landscape, it will entail compromise to create the accommodation.

Composting and global warming

In nature, the biologic cycle is considered a carbon-neutral process. Photosynthesis collects carbon dioxide from the atmosphere to build plant matter, and aerobic degradation returns that same carbon dioxide to the atmosphere. Because the municipal composting operation mimics the natural process, it too could be presented as a carbon-neutral process.

As a biologic process, composting actually produces carbon dioxide through the degradation of organic materials. One-third of the carbon by mass is returned to the atmosphere as carbon dioxide, and the remainder is retained as organic carbon that might persist in soil several more years before it too returns to the atmosphere. Therefore, the degradation process of the current yard waste composting operation releases 7,000 tons of carbon dioxide per year.

A composting operation requires supplemental energy for transportation, processing, and additional materials. This supplemental energy use adds more carbon dioxide to the equation, weakening—or at least complicating—the argument that composting is carbon neutral.

The task force can approach choices by considering whether composting is better for the environment than the alternatives. A comprehensive municipal composting program would replace landfilling of food waste and the incineration of sewage sludge. Landfills, depending upon their management, either sequester the carbon entrained in food waste or allow the food waste to anaerobically degrade into methane. Methane in landfills either escapes into the atmosphere or is collected as a biofuel at landfills. When methane is released into the atmosphere, its greenhouse gas impact is twenty-three times greater than if it were released as carbon dioxide. Because food waste degrades relatively quickly, it is unlikely that its methane production would ever be captured in the landfill. Assuming one-third of the food waste is converted to methane, and given the extra potency of methane as a greenhouse gas, Palo Alto's food waste could represent upwards of 130,000 metric tons of carbon dioxide per year. This provides a very strong incentive to get food waste out of landfills and into composting operations.

Sewage sludge presents a parallel calculation. Currently, all the sewage sludge is incinerated, converting the organics to carbon dioxide, which is then released into the atmosphere. Given that supplemental fuel is required to incinerate the sludge, this process produces approximately 17,000 metric tons of carbon dioxide. If the material were composted, only one-third of the carbon would be converted to carbon dioxide, while the remainder would become a part of the compost product. If the sewage sludge were digested, a portion would be converted to recoverable methane, which would gain further carbon dioxide reductions by offsetting the use of fossil fuels.

At a first take, composting with augmentation by anaerobic digestion is an improvement over the current practices of landfilling and incineration. The policy questions in front of the task force are more complex still. Would conversion technologies like pyrolysis make a wiser selection because they offer greater sequestration potential? What effect does location, either local or remote, have on the impacts of global warming?

Pyrolysis offers the chance to sequester a significant portion of the carbon contained in the organic stream for decades. As composting facilitates a natural return of the carbon dioxide to the atmosphere within several years, pyrolysis and its production of mineralized carbon such as charcoal offers to remove this carbon dioxide almost permanently. Many environmental groups are in opposition to systems like pyrolysis because it destroys biologic materials—the humic acids that would have been returned to the soil otherwise are lost, for example. Converting the organics to a form of charcoal offers a community a viable tool to sequester carbon dioxide and help balance the carbon dioxide generated through energy consumption. If pyrolysis were implemented, upwards of 45,000 tons of carbon dioxide could be removed from the atmosphere each year in one community alone. The potential yearly greenhouse gas savings climb to nearly 200,000 tons when pyrolysis is coupled with steps to eliminate incinerator use and the landfill disposal of food waste. This is equivalent to the greenhouse gas produced annually by the energy consumed in all of Palo Alto's homes.

Deciding whether to use pyrolysis or not is a difficult choice to make. If global warming is ranked as the top environmental threat, taking any reasonable and achievable step to sequester carbon becomes the priority. On the other hand, the choice of pyrolyisis seems in conflict with the natural processes that composting facilitates. Fortunately, the pyrolysis decision may be years in the future. While there are numerous examples of advanced composting or anaerobic digestion, there are few examples yet of pyrolysis being applied to organic waste streams.

Another choice is where to place the compost operation—local or remote? This choice is driven by where the compost ultimately is used. We can only recycle organic materials locally; paper, metals, and glass require industrial facilities that are generally located far away. If organic materials are used locally, then the greenhouse gas contributions from transportation are much less significant. Finished compost can either be sold or be returned to the properties that generated the organics. For economic reasons, compost operations are burdened with selling the compost, but a community like Palo Alto can resolve that by returning the organics to the land. The challenge then becomes effectively distributing the finished compost locally.

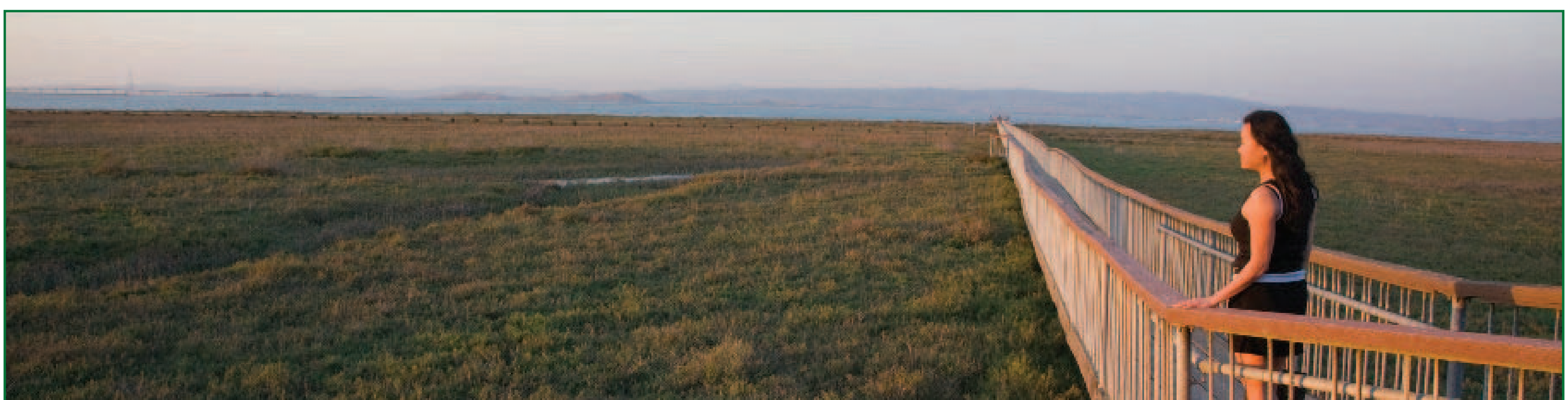
Composting: a choice now or for the future

In this community-wide debate, the insight was offered that if we do not confront global warming, the bay will rise, rendering all of the land-use questions immaterial—all of the park will be submerged except for the hills containing the refuse. Advocates for the park have opined that China's coal-powered plants present the real environmental challenge, and Palo Alto's greenhouse gas impacts are minimal by comparison.

At about the time Palo Alto started its recycle center and the commitment to a Bayland Park was made, Garrett Hardin published the "The Tragedy of the Commons." The article described herders sharing a common parcel of land (the commons) where they were all entitled to let their cows graze. Each herder, naturally, wanted to put as many cows as possible on the land for his own family's benefit. In the end, each herder added more and more cows, the sustainable capacity of the field reached a tipping point, and the field was destroyed to the detriment of all herders.

Our land use debate in Palo Alto echoes back to the dilemma Hardin raised in his article. If the bay does flood, it will not be due only to Palo Alto's failure to act, but by a failure of local and global communities to recognize that their individual stakes are important. Who, precisely, was responsible for the greenhouse gas emissions that pushed the environment to the breaking point will be an irrelevant fact once that point is reached. As the task force conducts its work and examines the global warming impacts of various organic waste disposal technologies, the weight of Hardin's article should influence the debate. Perhaps Palo Alto should be like the responsible herder who elected not to place another cow on the field. Such a conscientious decision may create short-term difficulties, but exercising prudence in land use rulings could prove to be the best solution for the environment and area residents in the long run. Palo Alto's task force will provide their recommendation in September 2009.

Terradex, Inc. CEO Bob Wenzlau is an environmental engineer and a member of the recently formed Palo Alto Blue Ribbon Compost Task Force.



The opinions expressed are solely those of the author and do not reflect the opinions or findings of the Palo Alto Blue Ribbon Compost Task Force or the staff that serves it.