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Prioritize what is possible--ZNW development and redevelopment of apartment complexes

Dear WET team,

As America's leading Zero Net Energy designer I have made efforts to also become an expert in Zero Net Water, and I suggest:

1. adopting a Zero Net Water standard for funding applications--sites use no more water than falls over a year, but like Zero Net Energy there is no on-site storage. See a project proposal I completed recently that meets that standard.
2. The Nexus Reuse is a very promising product due to its high treatment standard for re-use and simultaneous energy recovery. However, it is worth noting that on two projects I have done a ZNW standard we found that the landscape's existing needs were too great--the laundromat only produced 7% of demand, and the real solution was to replace the existing landscape with a no-irrigation landscape.
3. An example below is of a very low-irrigation landscape planted with fruit trees in rolled gravel with a soaker hose beneath the 6" of gravel. It is a playable surface that does not lose water to evaporation, but is still permeable to rain.

Hope these are helpful,
Sean Armstrong

Additional submitted attachment is included below.

“Zero Net Water” Design at Riverview Terrace Homesteads Using Best Practices in Drought Responsiveness

Overview

California’s historic drought has triggered water rationing for all users in California, from farmers to home owners. Fortuna water costumers are mandated to reduce water consumption by 24% immediately as the mighty Eel River is running dry. After succeeding in developing the first Zero Net Energy apartments, Danco Communities’ is ready to pioneer a new housing type at Riverview Terrace Homesteads—Zero Net Water homes, whereby a household uses no more water than falls on the site in a year.

In Fortuna on a 7000 square foot lot there is an average 478 gallons of rainfall of per day, albeit concentrated during a rainy seven month winter that releases 40” of rain from the sky. Using the Best Practices described in this report the two, three and four bedroom Riverview Terrace Homesteads will use 75, 100 and 125 gallons per day respectively, less than 1/4th the 478 gallons per day of a Zero Net Water budget. For comparison, the historic drought in Los Angeles provided only 6” of rain in 2014, or 75 gallons/day on average for the same 7000 square foot lot. While very low, 75 gallons/day is still enough for a two bedroom house to live Zero Net Water during a historic drought in Los Angeles. Danco Communities intends to use Riverview Terrace Homesteads to showcase the Best Practices that allow for Zero Net Water households throughout the State of California:

1. Reuse of the laundromat greywater in the nectar-rich flower gardens around the community building to make an oasis of year round flowers to support backyard bee-keeping.

2. Dense plantings of no-irrigation, kid-friendly fruits and perennial vegetables in the front and back yards. The design strategy, known popularly as “food forest” gardening, illustrates no-irrigation farming strategies for use in orchards and vegetable farms while providing healthy food to low-income tenants.

3. Reducing indoor water consumption by 50% of the National Average to 36 gallons/day/person with well-regarded lowest flow WaterSense fixtures and Canary Instruments tenant education water meters

1. Using Laundromat Greywater to Grow Flower Gardens at the Community Building

In January 2010, the California Building Standards Commission adopted greywater guidelines into the California Plumbing Code allowing greywater discharge from laundry machines, bathroom sinks, showers, and bathtubs into mulch beds with no direct contact with people. To meet this standard, greywater from the community building will released into deep beds of native flowers that support butterflies, bees and hummingbirds with nectar for the adults and edible leaves for caterpillars that mature into butterflies.

Native Pollinators on Native Flowers in Humboldt County, CA

Greywater System Requirements **(courtesy of the California Central Coast Greywater Alliance)**

Chapter 16 classifies greywater systems as clothes washer systems, simple systems producing 250 gallons a day or less, and complex systems that produce 250 gallons per day or more. All greywater irrigation systems must comply with the following guidelines to protect the environment and avoid system failure:

- Any greywater system that includes a connection to a potable or municipal water supply must have an approved, backflow prevention device. Laundry to landscape greywater irrigation systems that are exempt from permitting must have no connection to the potable water supply or an external pump.
- The greywater system design must include an accessible, clearly labeled, three-way valve that diverts the greywater back to the building sewer. Greywater should be diverted to the building sewer during the rainy season between November and April.

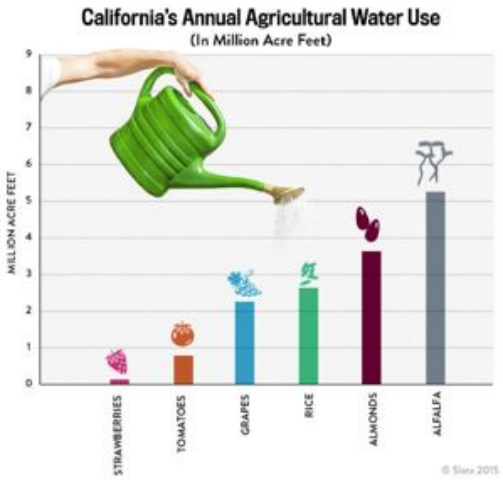
A greywater diverter valve and examples of greywater irrigated garden beds

- The greywater must not leave the property where it came from or come within 100 feet of any creek, wetland, or waterway.
- The groundwater table must be lower than 3 feet from the lowest greywater irrigation or disposal point.
- Each release point of the greywater irrigation system must be covered with at least 2¨of mulch, rock, soil, or a soil shield.
- Water used to wash diapers or other infectious garments must be diverted to the building sewer, and Riverview Terrace will have a dedicated sewer-connected laundry machine.
- Greywater may not contain hazardous chemicals.
- Greywater may not be used to irrigate root crops or other edible crops that touch the soil.
- An operations and maintenance manual for the greywater system must be provided by the installer and must be transferred to the new tenant or owner for the life of the greywater system.

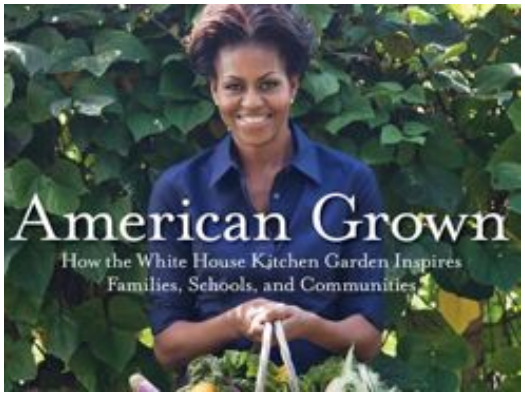
2. "American Grown" Gardening with No Irrigation Perennial Plantings

Farming uses 80% of California's water due to wasteful irrigation practices and inappropriately water intensive crops grown in a near-desert, with historic dewatering of streams and creeks leading to the extinction of 57% of the Central Valley populations of salmon species, including coho, chum and pink, most of the chinook and half of the steelhead.

By contrast "dry farming" strategies have been developed Humboldt County since American colonization in the 1850s, with peaches, grapes, strawberries, tomatoes, potatoes, beans and grains grown without irrigation in the farm fields around Fortuna during the annual five month summer drought. It is these cultivation strategies that will be showcased at Riverview Terrace Homesteads, demonstrating how climate-appropriate crop varieties, 6" deep dust or bark mulches, and deep planting of fruit trees can preclude the need for irrigation while producing abundant and flavor-rich crops.



At the same time California is suffering from too much food production of water wasteful crops, there is a national health crisis among low-income households eating too much sugary processed foods. The consequences are obesity-related diseases from childhood-onset diabetes to adult-onset heart attacks and cancer.



Diets rich in sugars but poor in pricey fresh fruit have led the Obama Administration to change policies to make school lunches healthier and expand food stamps to farmers' markets, while First Lady Michelle Obama wrote "American Grown," and planted a large garden at the White House. The White House Kitchen Garden works to publicize the need for all Americans to grown fresh food for their health, but particularly the nutritional needs of low-income children who are regularly invited to garden with the First Lady. Low income children frequently do not live in households that own a yard to garden in, and rental housing rarely allows personal gardens for tenants, preventing low-income households from feeding their families the freshest and healthiest food.

The children and adults living at the Riverview Terrace Homesteads will have a very different experience, with abundant fruits and perennial vegetables permanently planted around their homes, as well as gardening in supplied raised beds in the backyards. Backyard bee keeping and chicken coops for laying hens will be allowed, and the Community Building will host cooking and food preservation classes taught through the Northcoast Coop, which has been a huge success in Arcata's USDA 515 funded and 103% ZNE "Plaza Point" apartments for low-income seniors.

3. Indoor Water Conservation Measures

The average individual American is consuming 75 gallons of water a day at home, most of it for indoor use (57.6 gallons) and less for landscaping (19.4 gallons). With the installation of optimum off-the-shelf plumbing fixtures, daily individual water use can drop 40% compared to about 36 gallons of total water, as seen in Oakland and San Francisco, CA where water conservation retrofit efforts have been in place for decades. A 36 gallon/person/day water budget is created by installing:

1. Evolve brand showerheads with pressure compensating 1.5gpm flow rates and heat sensitive shut-off valves which prevent the 1 minute of "behavioral waste" in the average 8 minute shower, when the water has gotten hot but the person has not yet entered the shower.

2. Toto brand, "Drake II" variety 1.0 gallon/flush variety toilets designed in response to the Australian drought of 1995-2012 that are designed to use the limited amount of water push, rather than pull, effluent down the drain and ensure effective flushing

3. Niagara faucet pressure compensating aerators with 1.0 gpm flow, sufficient to match the .9gpm average sink flow rate people operate sinks at when using low flow faucets (DeOreo, 2011). The kitchen sink aerator comes with a one-touch pause function to make it easy to turn off the water when washing dishes, and the bathroom aerator comes with a tamper proof pressure-compensating bubble spray to ensure a high quality lavatory experience and lasting benefits.

4. An efficient plumbing layout with a manifold next to the tank and ½" piping dedicated to each fixture. These measures are to ensure delivery of hot water to showers and faucets with no more than ½ a gallon of cold water to purge before hot water arrives, rather than the average of 1 gallon found in nation-wide.

5. Instantaneous consumption feedback and a water budget to work within are two missing elements to everyone's lives that can make a large difference in whether a household succeeds in saving water. Each house will have an in-line flow meter connected to a Canary Instrument that is programmed with an average CALGreen water budget for that household.

Conclusion

Danco Communities built the nation's first Zero Net Energy apartment complexes with USDA 515 financing (Courtyards of Arcata, Eureka's Aster Place, Plaza Point and Fortuna's Churchill), as well as the world's largest development of ZNE houses at the Cottages at Cypress in Fort Bragg. California's historic drought requires rapid implementation of best practices in water conservation, and the Riverview Terrace Homesteads are an opportunity to show how to implement multiple Best Practices in water conservation strategies that can apply throughout the State while providing tenants a better quality of life.

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