



**Low Impact
Development with a
New Twist**

**Integrating California
Environmental Goals**



We Need to Demand More Out of Our Landscapes

Carbon Sequestration (Global Warming)

Cooling of the Environment (Heat Islands)

Support Increase in Biodiversity (Stability)

Reduce Urban Run-off (Low Impact Dev.)

Reduce Environmental Contamination (Pollutants)



Complex Problems Require Complicated Solutions



Why Our Thinking Patterns Don't Help When Dealing with Complex Problems (like climate change)



Problem: Greenhouse Gases are Changing the Climate on Earth



How much Atmospheric CO2 are we talking about?

Time of Industrial Revolution = 280 ppm

Currently = 393 ppm

Future Predictions = 550 ppm

We Need to get some of this CO2 out of the atmosphere – Reverse (Store) not just Reduce



A Linear Approach to Solving the Problem (Tony Lovell)

Greenhouse Gases are damaging to life on earth

Need to get rid of greenhouse gases (carbon pollution reduction schemes)

All Greenhouses Gases are Bad

Methane is a Greenhouse Gas

Cattle emit methane

Cattle are Bad



A Paradox

Without Greenhouse gases like Carbon Dioxide and Methane, the over-all temperature of planet earth would decrease rapidly from a positive 15 C (59 F) to a negative -19 C (-2.2 F)

FACT: Greenhouse Gases are essential to life on this planet



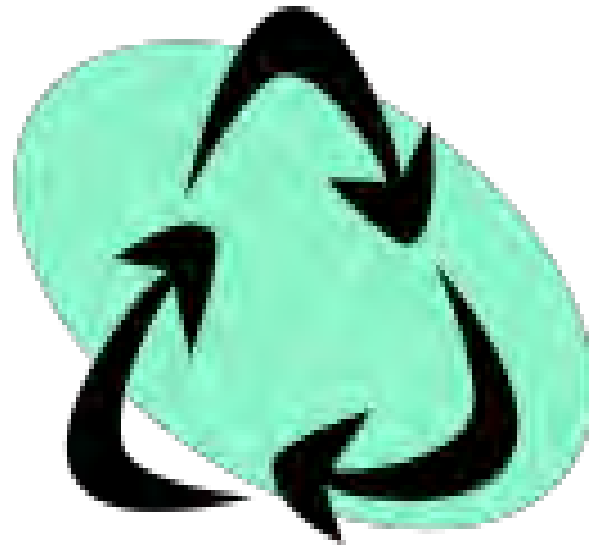
Re-balancing an Overloaded Carbon System

To store Carbon as a solid at room temperature requires Sunlight and Green Leaves. Plants split off Oxygen and store Carbon.



We Need to Mimic Nature To Solve the Problem

Carbon Cycle
Nitrogen Cycle
Water Cycle
Phosphorus Cycle
Nutrient Cycling



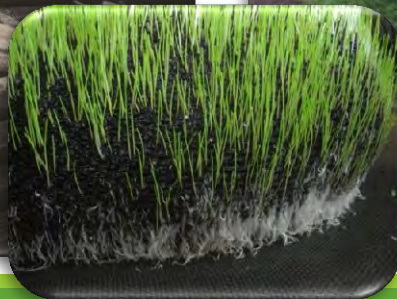
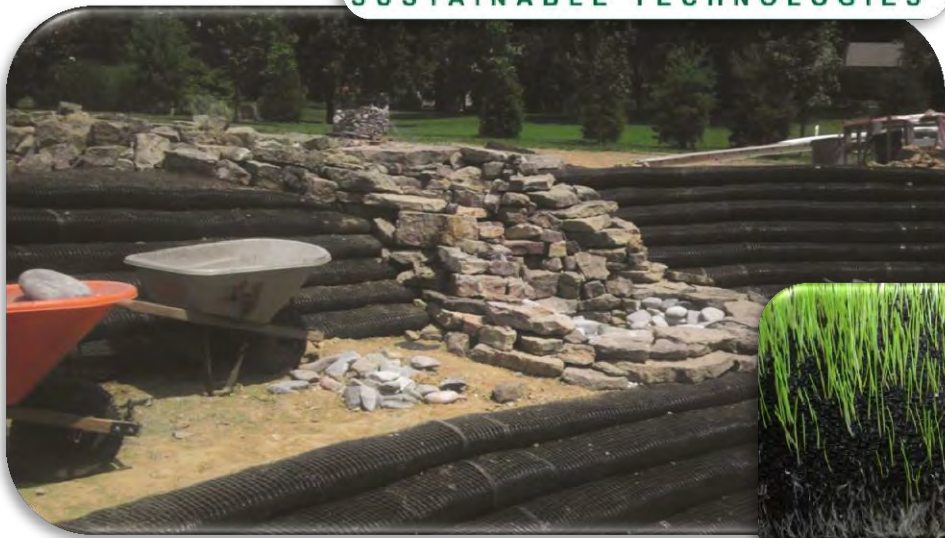
*Living Plants Take Carbon in the Air and Put It Back
Where it Belongs – in the Earth*

let nature do it.





filtr^{re}xx[®]
SUSTAINABLE TECHNOLOGIES





Filtrex[®] Trinity[™] LivingWall

Vegetated Slope Stabilization Technology

PURPOSE & DESCRIPTION

Filtrex[®] Trinity[™] LivingWall system allows for the stabilization of walls and slopes with variable inclinations between 45 degrees and 70 degrees. The system's galvanized wire facing elements allow for mechanical connection and reinforcement while providing structure and containment of Filtrex[®] GroSox[®] and vegetation. Through the use of Filtrex[®] GroSox[®], the Trinity[™] LivingWall system provides superior soil retention and erosion protection while providing an optimum environment for vegetation establishment.

APPLICATION

Constructing a Trinity[™] LivingWall involves stacking GroSox[®] on top of one another inside the wire facing elements in a recessed fashion on steep slopes to near vertical situations. Various strengths of polymer straps are looped through the bottom of the facing elements and pulled taught into the structural backfill giving it added structural support and integrity to meet specific structural and site requirements.

Although the primary objective of the Trinity[™] LivingWall system is to stabilize earth and reduce erosion, the secondary objective is to provide for the establishment and sustainability of vegetation and an aesthetic landscape feature. This goal is evidenced through the design and function of the wall fascia of GroSox[®] as well as the GrowingMedia[™] that fills the wall fascia.

The Trinity[™] LivingWall can be used for a wide variety of structural applications including:

- Wall and steep slope stabilization
- Streambank stabilization
- Pond bank stabilization
- Slip repairs
- Culvert headwalls
- Bridge abutments

- Dikes/berms
- Sound barriers

ADVANTAGES AND DISADVANTAGES

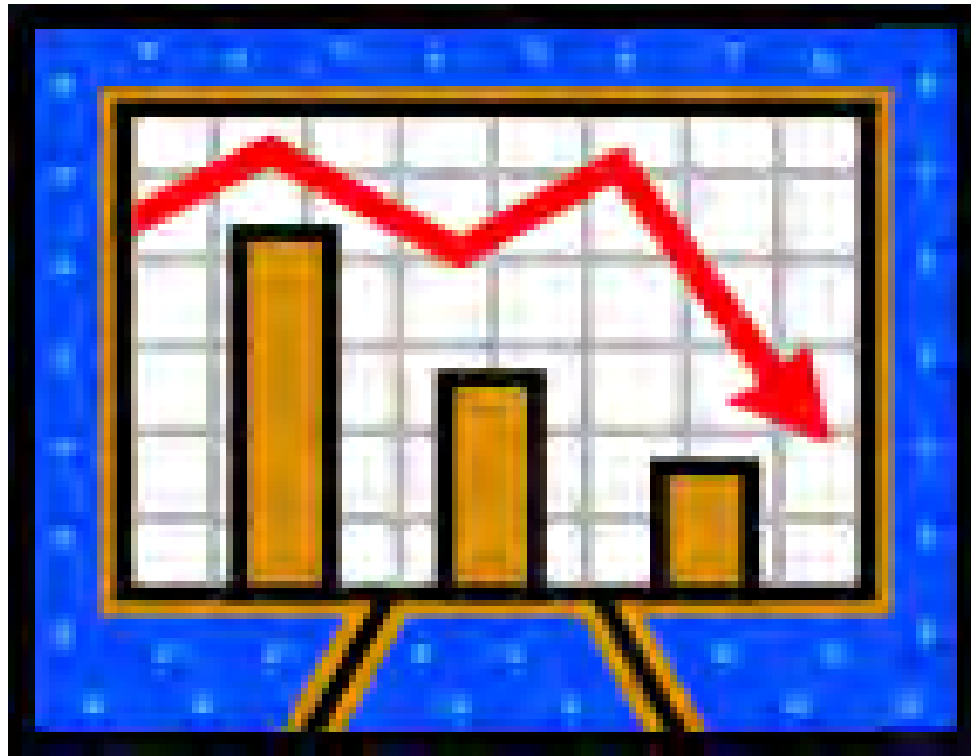
Advantages

- Trinity[™] LivingWall has greater surface contact with soil and bank slopes, relative to block or other wire systems, thereby providing greater protection from erosion
- Easily reinforced for severe slope applications
- Lightweight components
- Highly efficient, certified installation available
- Improved drainage/reduction of hydrostatic pressure
- Trinity[™] LivingWall system includes GrowingMedia[™] which establishes, sustains, and provides reinforcement for vegetation, unlike rip rap and other hard armoring devices
- Trinity[™] LivingWall is comprised of GrowingMedia[™] which is organic, all natural and locally manufactured
- Customizable vegetation with seed injection into GroSox[®], plants, plugs, or live stakes
- Trinity[™] LivingWall can be direct seeded at the time of installation
- Ability to irrigate with low flow, low pressure drip tape
- Trinity[™] LivingWall stability and bank protection/erosion prevention are increased by vegetation establishment
- Vegetated Trinity[™] LivingWall filters sediment, soluble nutrients, heavy metals, petroleum hydrocarbons, pesticides, and pathogens from storm runoff flowing toward surface waters
- GrowingMedia[™] in Trinity[™] LivingWall has the ability to bind and adsorb soluble nutrients, metals, and hydrocarbons that may be in storm water runoff, thereby reducing loading to adjacent receiving waters

Full Specification
Documentation and
Related Testing Data
is Available from
Filtrex



What Happens to Plant and Soil Health When You Disrupt the Cycles?



Who was Justus Von Liebig and Why Is He Important?



Father of Modern Agricultural N-P-K Science

Plant growth is limited by the least abundant mineral no matter how abundant the other minerals happen to be.

First “mineral-based” fertilizer was sold in 1845 prior to that, it was all about animal manures.

So What’s the Problem?



Inorganic Fertilizers Can Disrupt Soil Biology Which Sustains Healthy Soils

Soil Microorganisms are Nature's Chemical Factories

Organic Matter Feeds Soil Biology Which Then Feeds the Plant

Healthy Plants Require Both Inorganics + Organics to Sustain a Balanced Ecosystem

Von Liebig acknowledged this at the end of his life but no one listened – **Linear Thinking**



California Laws Driving the Adoption of Compost-based Low Impact Development

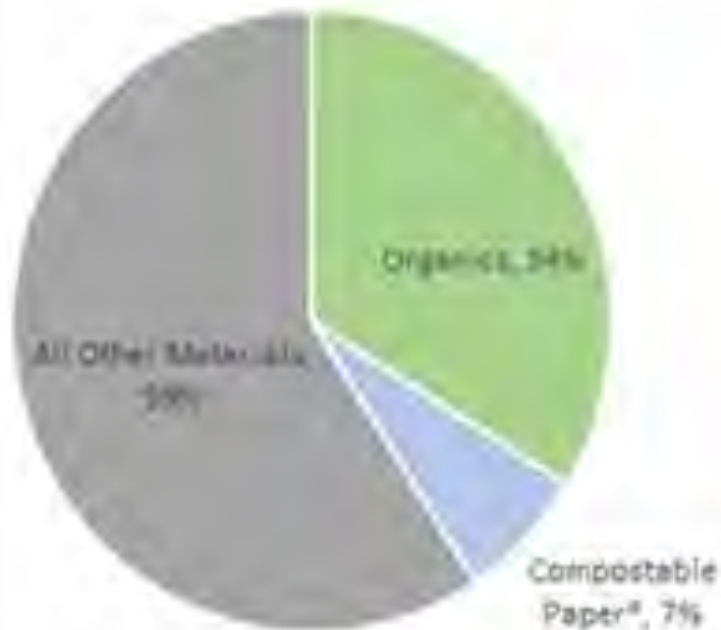
40 % GHG Reduction below 1990 by 2030
Governor Brown's FIVE PILLARS

Pillar	Target	Key Initiative	Programs/Standards	2020 Milestones
1	50% LESS OIL by 2030	Convert Organics to Carbon Negative Fuel	Low Carbon Fuel Standard, RNG, LCFS	10% LESS CARBON INTENSITY by 2020
2	50% RPS RENEWABLE ENERGY by 2030	NET ZERO	Renewable Portfolio Standard, RPS	33% RPS RENEWABLE ENERGY by 2020
3	DOUBLE ENERGY EFFICIENCY by 2030	Decarbonize Economy	LEED Certification, Cal-Green	3 MILLION METRIC TONS GHG REDUCTIONS by 2020
4	90% ORGANICS RECYCLING by 2025	MITIGATE METHANE	Reduce Short-Lived Climate Pollutants, SLCP	50% ORGANICS RECYCLING by 2020
5	15 MILLION TONS OF COMPOST USE by 2025	Sequester Carbon Into Soil	Healthy Soils Initiative, HSI	7.5 MILLION TONS OF COMPOST USE by 2020

2015 - Executive Order B-30-15, SB 350, SB 32
2006 - California Global Warming Solutions Act - AB 32

California Laws Driving the Adoption of Compost-based Low Impact Development

Organics in California's Overall Disposed Waste Stream, 2014



Organics are:

- Food
- Green - leaves, grass
- Landscaping - prunings, trimmings, branches, stumps
- Non-hazardous Wood Waste

* Compostable Paper includes food-soiled paper and other compostable paper

Data from CalRecycle's 2014 Disposal-Facility-Based Characterization of Solid Waste in California

California Laws Driving the Adoption of Compost-based Low Impact Development

AB 939

- 50% diversion requirement for jurisdictions

AB 341

- 75% reduction, recycling, composting statewide goal by 2020
- Not transformation or disposal-related activities, etc.
- Doesn't change AB 939 mandate on jurisdictions or how CalRecycle evaluates compliance



California Laws Driving the Adoption of Compost-based Low Impact Development

What Will 75% Take?

- * Moving > 20 million tons/year out of landfills
- * 1/3 or more organic, plus many traditional recyclables
- * Either overseas or other states OR more infrastructure here in California
- * CalRecycle preference to handle waste in CA
- * 100s of new or expanded facilities



California Laws Driving the Adoption of Compost-based Low Impact Development

Why Organics?

- * >>30% of total disposal compostable/digestible
- * No way to 75% without it
- * Scoping Plan identifies organics as key player to help meet GHG goals
- * If divert ½ : 3-4 MMTCO₂e reduction/year



California Laws Driving the Adoption of Compost-based Low Impact Development

Sticks

Reduce organics disposal through:

- Legislation: AB 1826 (statutorily mandated commercial recycling of organics) + AB 1594
AND/OR
- Regulation: Air Resources Board could implement through direct regulations



Industrial Permit Driving the Adoption of Compost-based Low Impact Development





Construction Permit Driving the Adoption of Compost-based Low Impact Development





Compost-based Low Impact Development = Sustainable Management Practices (SMP's)