

US EPA ARCHIVE DOCUMENT

Think Green.® Think Waste Management.



Collection



Transfer



Disposal



Recycling



Renewable Energy

Pacific Southwest Organic Residuals Symposium Closing the Loop: Energy & Fuel From Waste September 15, 2010 Sacramento, California

Chuck White

Director of Regulatory Affairs/West

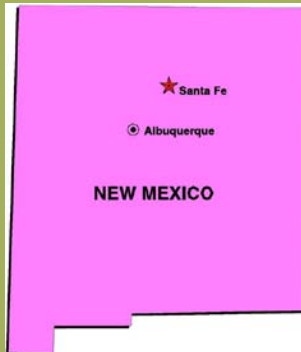
Waste Management



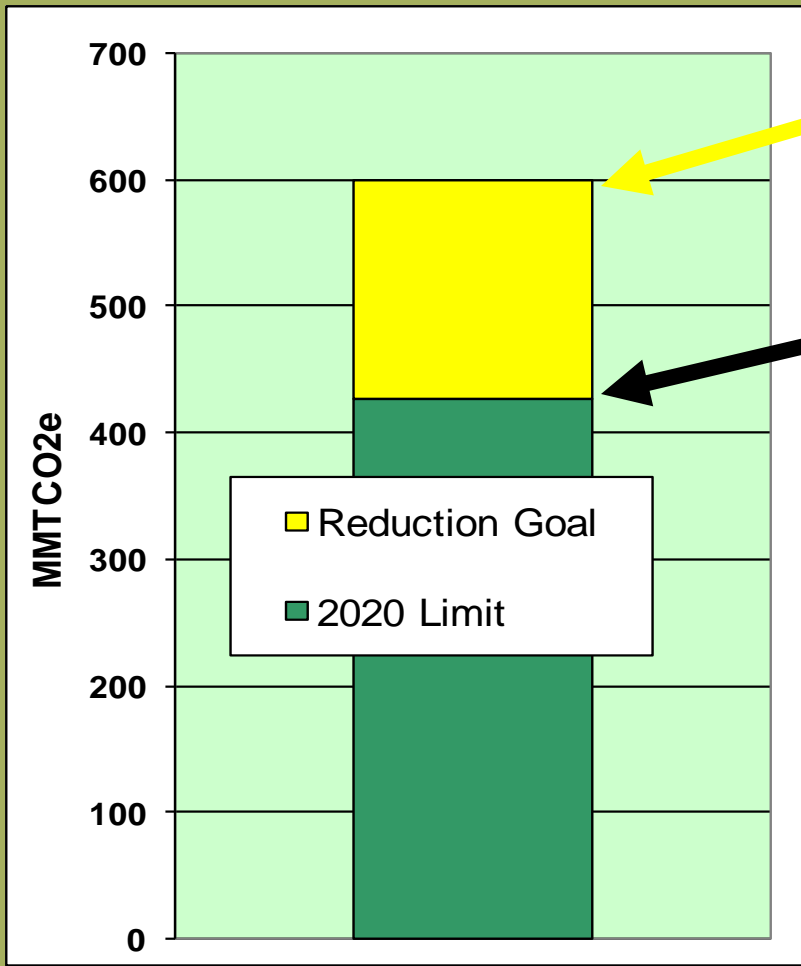
Many Think that This is the Real Cause of Global Warming !!



Maybe so . . . But not on the Left Coast !!!!



CA Statewide 1990 Emissions Level & 2020 Projection



- 2020 Projection – Business as Usual -- 600 MMTCO₂e
- 1990 GHG emissions & 2020 limit is 427 MMTCO₂e
- Difference equals reduction goal
 - Approximately 173 MMTCO₂e
 - Approximately 30% reduction from 2020 level

Greenhouse Gas Regulation

- Cap & Trade Regulations drafted
 - 2012: 600 Power plants & large industry >25k MTCO₂e
 - 2015: Other industry & transportation fuels
 - Revenues from auction of emission allocations?
 - Limitations on Tradable Offsets from Others?
 - Increased fuel & energy costs:
 - Opportunities to produce energy & fuel from waste?



Renewable Electricity Standard

- **Governor EO: ARB to adopt a regulation by July 31, 2010, requiring the state's load serving entities to meet a 33 percent renewable energy target by 2020.**
- **Governor: ARB delay to Sept 2010.**
- **Failed Legislation – SB 722 (Simitian)**
 - **Instate vs. Out of State Renewable Energy Sources**
 - **Not ARB but CPUC for IOUs and CEC for POUs**
 - **20% by 2012; 25% by 2016; and 33% by 2020**
- **Increase Value of Renewable Electricity?**
 - **What about CPUC Market Price Referent?**

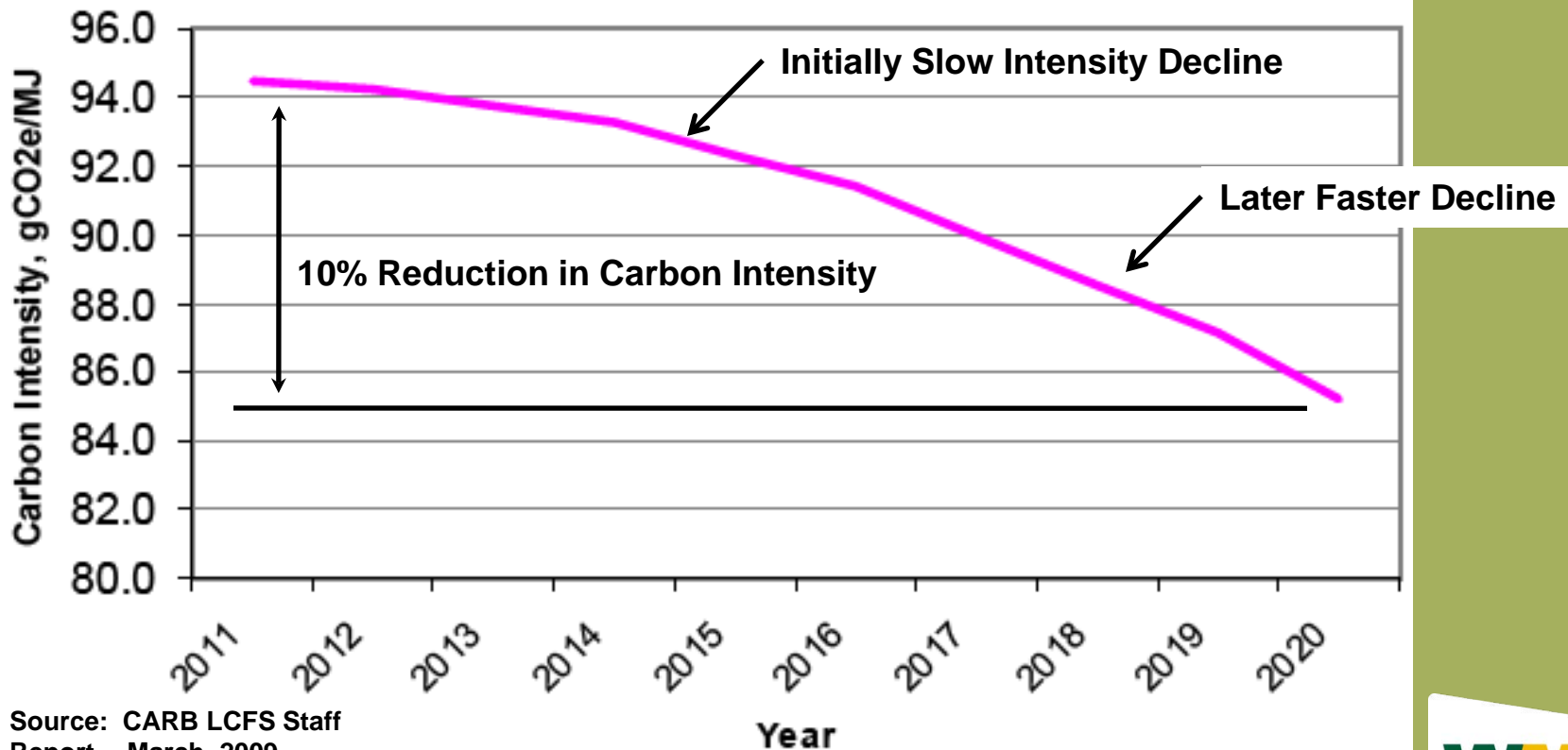
California Low Carbon Fuel Standard

- 10 % Reduction in CA fuel carbon intensity by 2020
 - 2010 is baseline
 - All fuel producers
 - Reduction gradual and weighted to later years
- 16 MMTCO₂e reductions expected by 2020
 - 10 % of AB 32 target
- Increase use of biofuels electricity & biodiesel



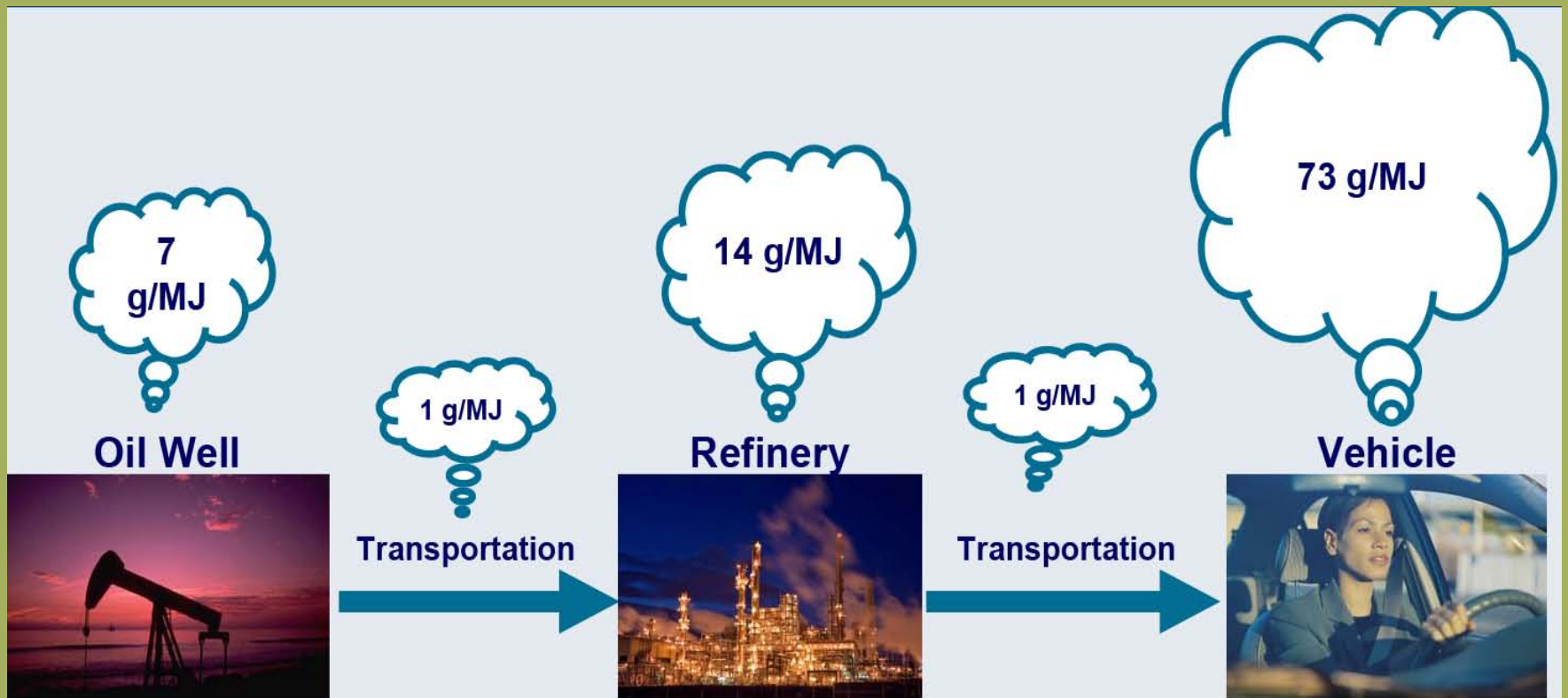
LCFS Carbon Intensity Standard

Compliance Schedule from 2011 to 2020 for Diesel Fuel or Diesel Fuel Substitutes



Source: CARB LCFS Staff
Report -- March, 2009

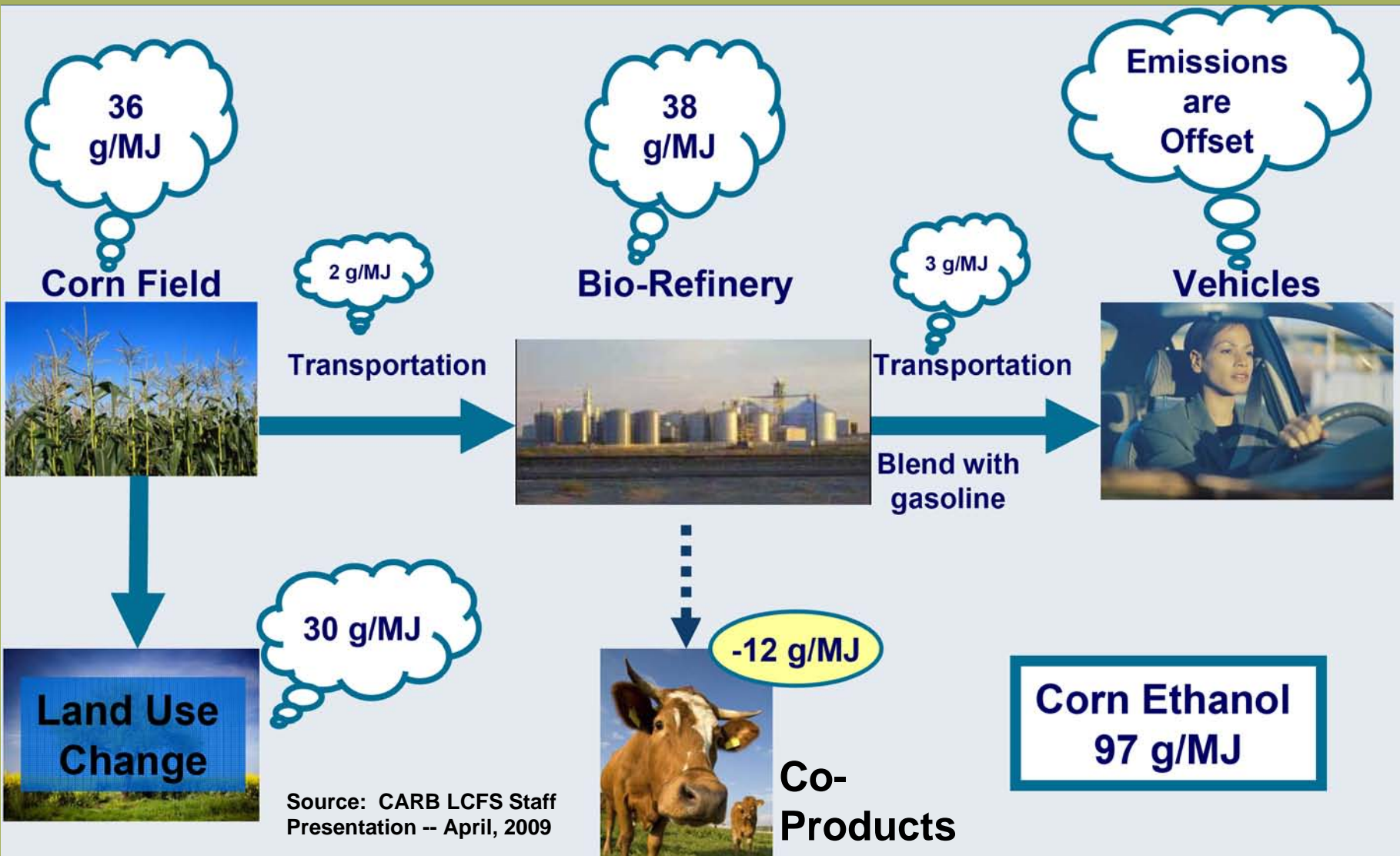
Fuel "Well to Wheels" LifeCycle -- Diesel



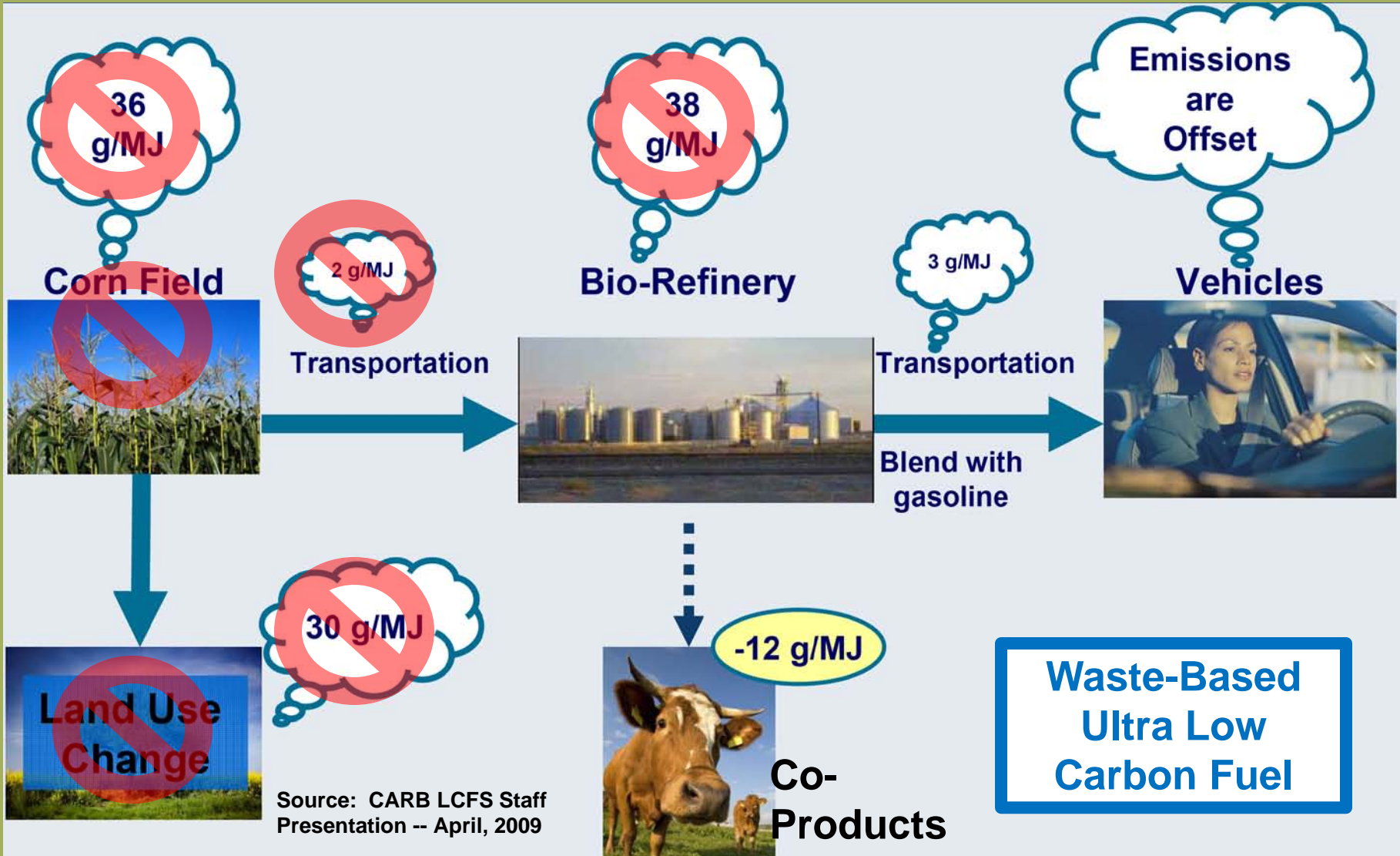
Source: CARB LCFS Staff
Presentation -- April, 2009

Diesel
95 g/MJ

Fuel “Field to Wheels” LifeCycle – Corn Ethanol

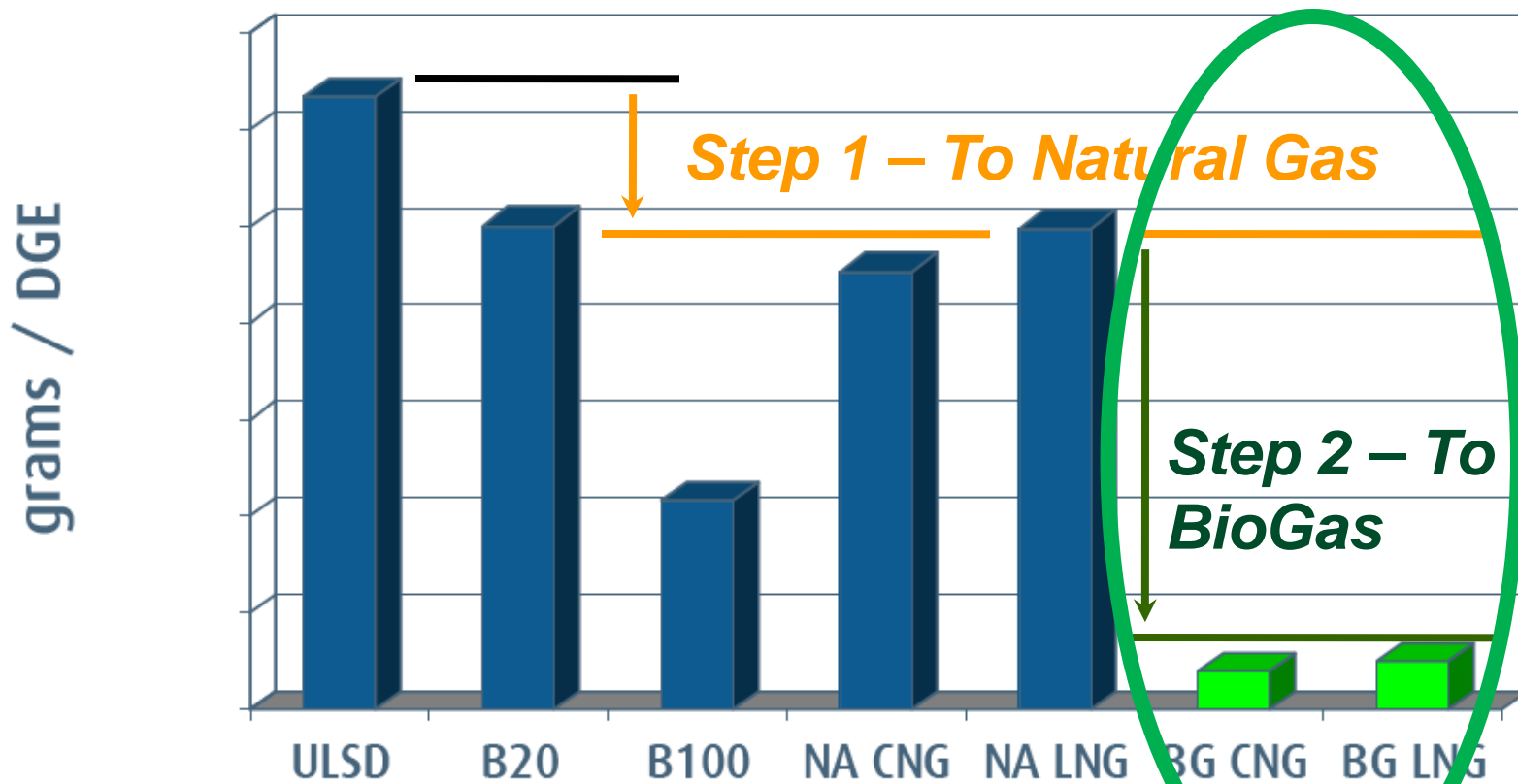


Fuel “Waste to Wheels” LifeCycle – Waste Biomass



Carbon Intensity of Alternative Fuels

WTW GHG Emissions



WOW !! Look At Biogas !!

Think Green.® Think Waste Management.



Collection



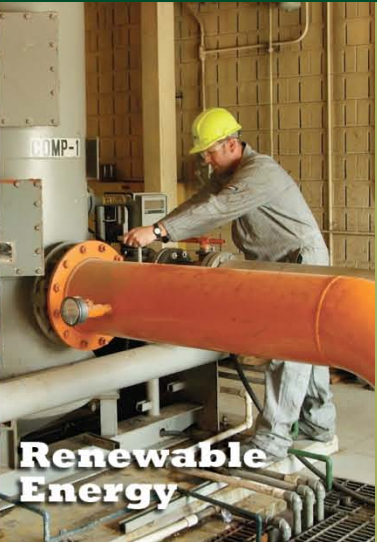
Transfer



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Renewable Energy

So What is WM
Doing About All This

??????????



Making Environmental Stewardship our Business

Company-wide Sustainability Goals – By 2020

- Double the amount of waste-derived energy we produce – power for 2 million homes
- Triple the volume of recyclable materials we process – 25 million tons
- Invest \$5 billion to increase fleet fuel efficiency by 15% and reduce emissions by at least 15%
- Quadruple the number of sites certified by Wildlife Habitat Council – 100 sites and 25,000 acres of protected habitat

Annual Reporting of Our Progress !!



WM's Natural Gas Fleet (20% and growing!)



WM's California Truck Fleet:

- *Diesel – 2800*
- *LNG/CNG – 700*
- *Total -- 3500*

Gee . . . Where Can We Find BioGas ?

Landfill Gas Collection System

- Landfill Anaerobic Decomposition of Organic Waste = Biogenic
- About half METHANE and half CARBON DIOXIDE as produced in the waste
- Nitrogen and Oxygen introduced by air intrusion
- 450 to 550 BTU per cubic foot of landfill gas
- Flow will increase while landfill is still open, and decrease when landfill closes



LFG to LNG

WM
WASTE MANAGEMENT

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- Recovery and Utilization of Biomethane Landfill Gas for Transportation Fuel
- Altamont Landfill & Recycling Center, Fall 2009
- \$15.5 million capital investment
- 13,000 Bio-LNG Gallons/day
- “Super Ultra Low Carbon Fuel” – lowest in CA
- Largest effort to introduce onsite liquefaction for landfill gas recovery in North America
- Utilize biogas resources and displace fossil fuels
- 2nd Plant planned for SoCal
- LFG to Pipeline CNG?

WM
WASTE MANAGEMENT

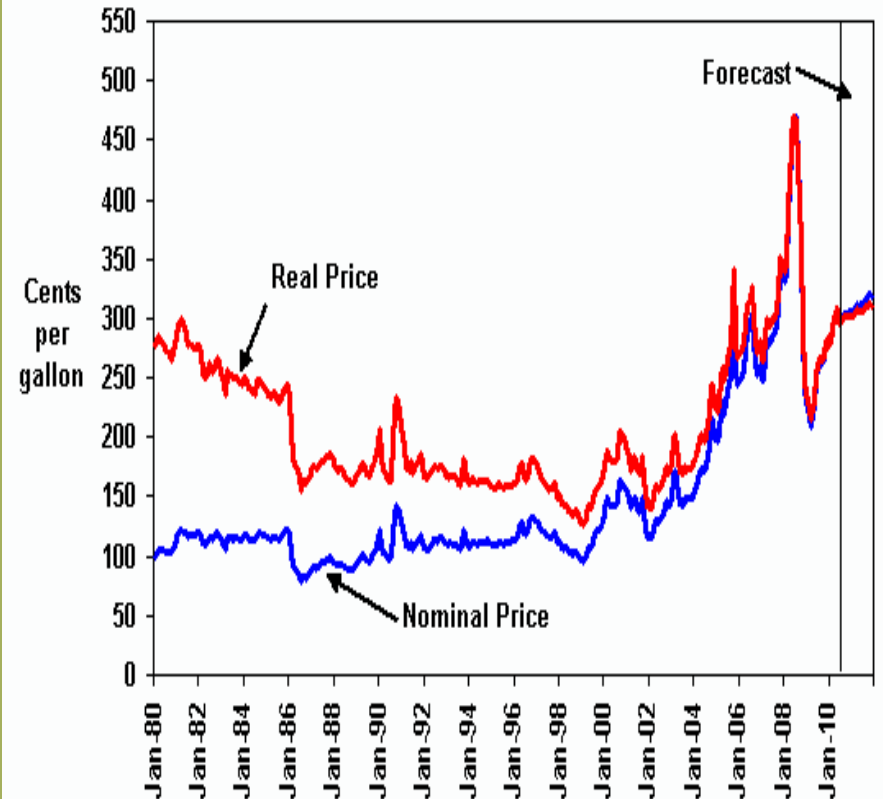
Challenge: Price of Fossil Fuel

Natural Gas
Spot 5 Years - \$/mmBTU



13 Sep, 2005 - 13 Sep, 2010

Diesel Fuel Prices: Nominal and Real



Short Term Energy Outlook-July 2010

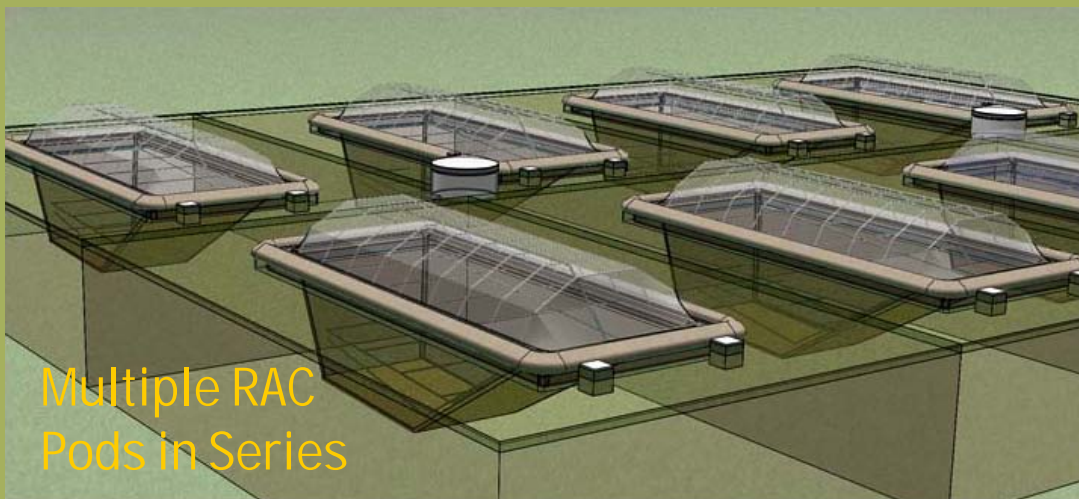
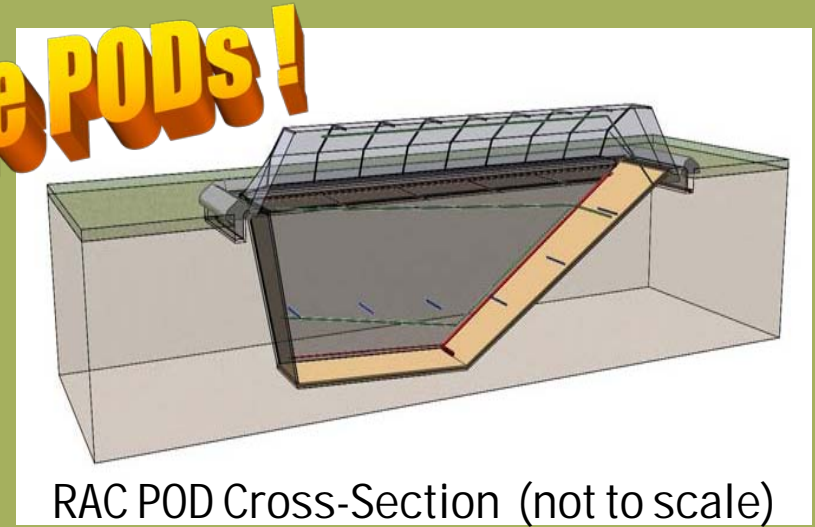


WM Gas-to-Liquids (GTL)



- Purchased patent rights and assets from Alchem in 2007 to convert landfill gas to commercial grade bio-diesel
- Modified pilot 25 GPD unit to allow testing of various catalyst batches and new reformer design
- Beginning operation of 250 gallons per day LFG to hydrocarbon unit to replace 25 GPD unit
- Fabrication of 1,000 GPD unit expected pending positive results from 250 GPD unit

Renewable Anaerobic Composter (RAC)



Pilot Projects in:

- Ohio
- Kentucky
- California

Garick – WM Majority Interest

- Leading “waste-to-market’ (W2M) company focused on managing and converting organic waste (primarily food, manure, green waste and wood waste) into renewable energy and other products with commercial value.
 - Collect, process materials and distribute organic soils, composts and mulches;
 - Wood waste and green waste as a source of alternative energy;
 - Biomass conversion facilities using technologies such as pelletizing, anaerobic digestion, gasification and pyrolysis.

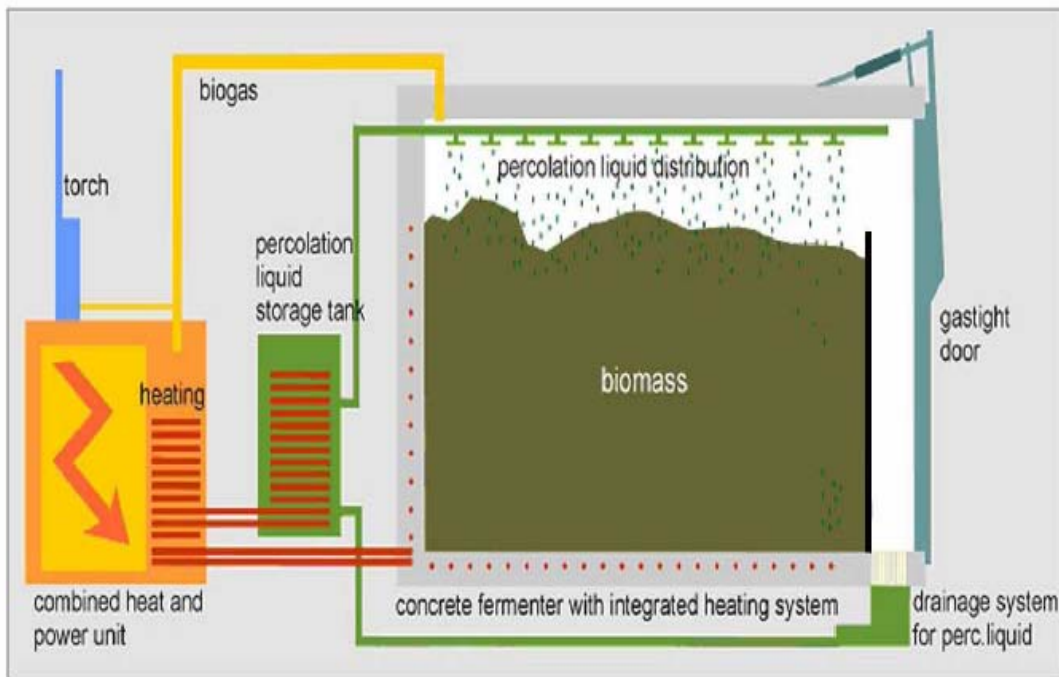


Anaerobic Digestion

Harvest Power

The dry fermentation process anaerobically (without oxygen) digests waste material to produce methane over a 28-day period.

The Process



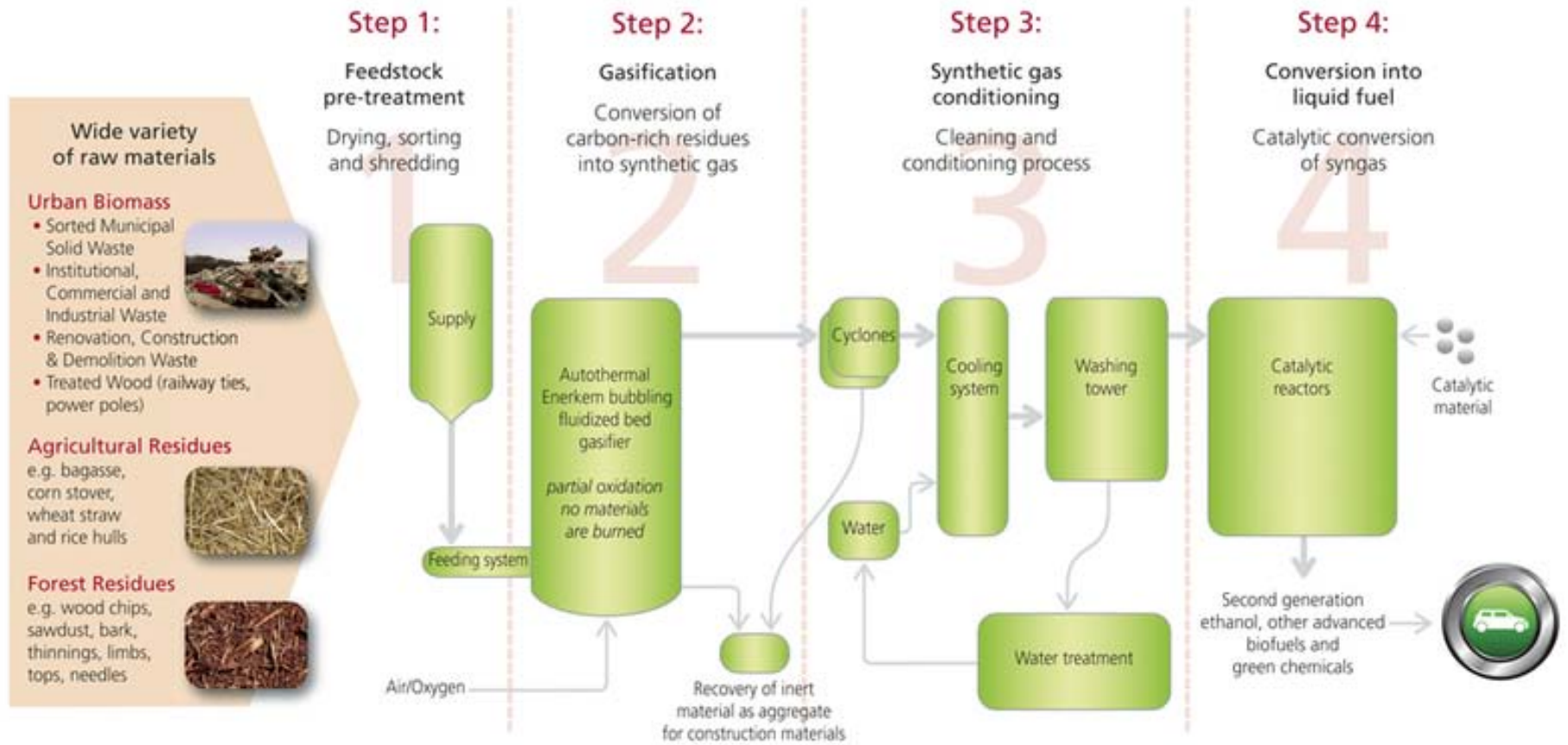
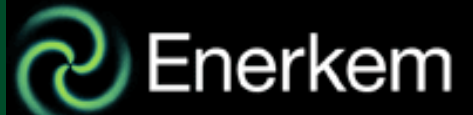
- 1) Waste material placed in an air-tight building for 28 days (typically 50/50 mix of yard/food waste)
- 2) Percolate and bacteria recirculated during digestion
- 3) Biogas collected and extracted at top of building,
- 4) Methane Gas cleaned and sold or burned for electricity

Terrabon



- Terrabon acid fermentation technology converts bio-organic waste into “green gasoline” and other non-fuel chemicals
- Flexible plant size placed strategically near available waste streams
- Completed a 5 ton per day pretreatment green gasoline processing plant
- Site engineering on a 55 ton per day pilot facility in Port Arthur, Texas
- WM has a right of first offer to supply organic waste streams and also has the right to invest in future projects
- Waste Management initially owns 10% of Terrabon

WM Organics: chemical conversion

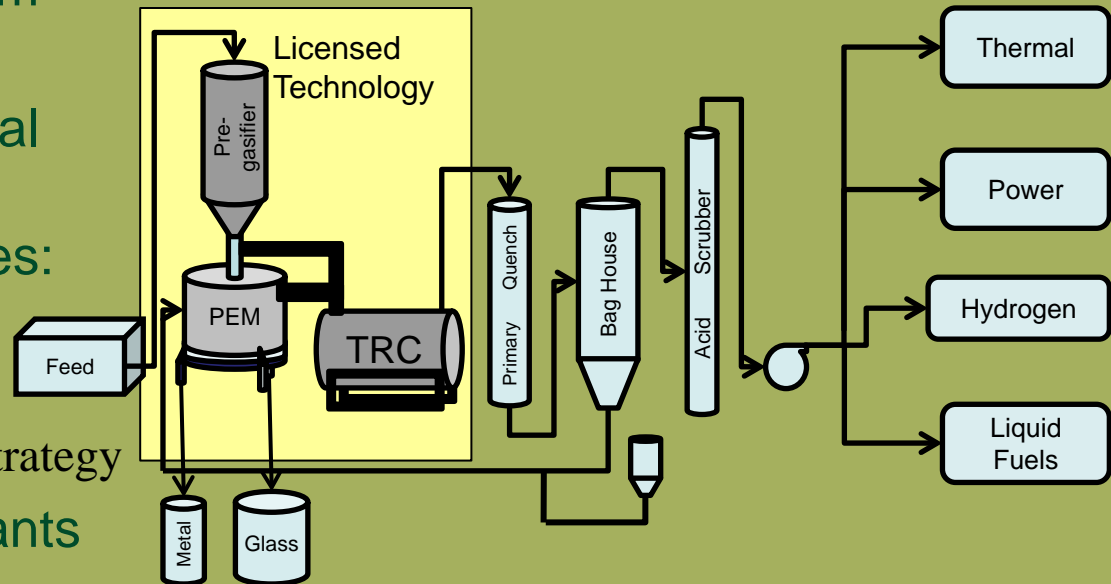


Thermo-chemical gasification to produce syngas which converts into liquid fuels such as ethanol & biochemicals.



S4 Energy Solutions, LLC

- S4 Energy Solutions uses advanced plasma gasification technology to recover energy and useful by-products from waste.
- 25 tons-per-day commercial design at Columbia Ridge Landfill, OR; Project phases:
 - Small scale plant design and construction
 - Scale up and commercial strategy
- Goal of 125 – 250 TPD plants in a distributed model that process MSW and other waste materials.



California Incentive Programs

- AB 118 – Alternative and Renewable Fuel and Vehicle Technology
 - To develop and deploy innovative transportation fuels and technologies
 - CEC Funding ~ \$110 million per year
 - Also Hybrid Technology program at CARB
 - \$25 million/year
- Low Carbon Fuel Standard – January, 2011.
- Renewable Portfolio Standard & Renewable Electricity Standard
 - But, Market Price Referent Cap
- CAEATFA: SB 71 -- Sales and Use Tax Exclusion for Fuel Production
 - Possible New Program for Equipment to Generate Renewable Electricity
- Pending Cap and Trade Regulations
 - Potential Revenues for BioFuels & BioEnergy



In Summary . . .

- **What are drivers for energy/fuel from waste?**
 - Fossil Fuel Prices
 - GHG Regulations (LCFS, C&T, RES)
 - Fiscal Incentives (AB 118, CAEATFA)
 - Public Concerns (Criteria/Toxic Pollutants, Facility Siting)
- **What is WM currently doing?**
 - Expanding LFG to Energy/Fuels
 - Investing in State of the Art Technologies
- **What are the technologies of the future?**
 - Anaerobic Digestion & Compost (Harvest Power, Garick)
 - Cellulosic Processes (Terrabon)
 - Gasification (Enerkem, S4)

Any Questions?

