Zero Waste:
How does San Francisco do it?
and, What's next?

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Kevin Drew
Residential Zero Waste Coordinator
San Francisco Department of the Environment

SF Environment
Our home. Our city. Our planet.
A Department of the City and County of San Francisco

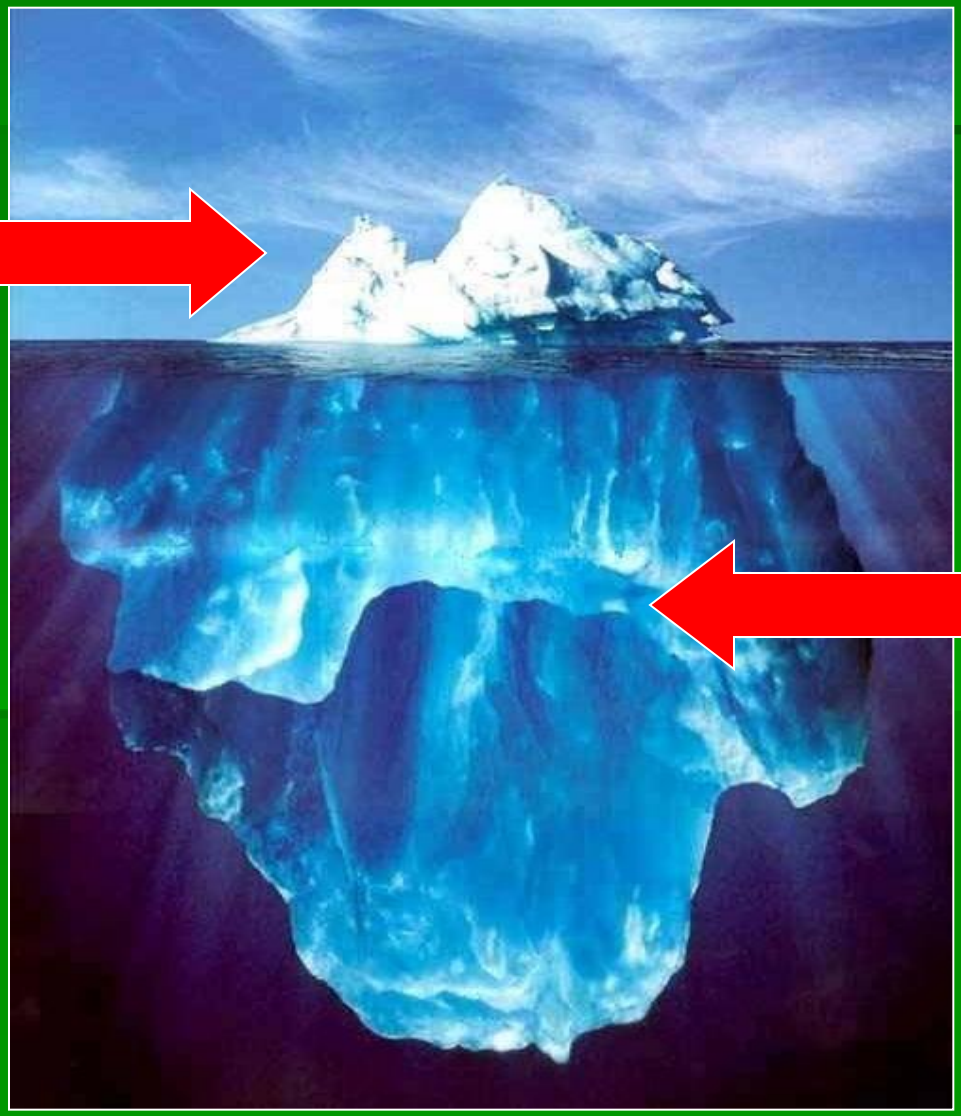
2 Overarching Points

- Upstream processes create 71 times more impact than what ends up in cities

- Comprehensive Zero Waste in our cities can dramatically reduce GHG

Tip of the “Wasteberg” Impact

Municipal waste tip of the “wasteberg”



Upstream waste produced is 70 times greater than at municipal level

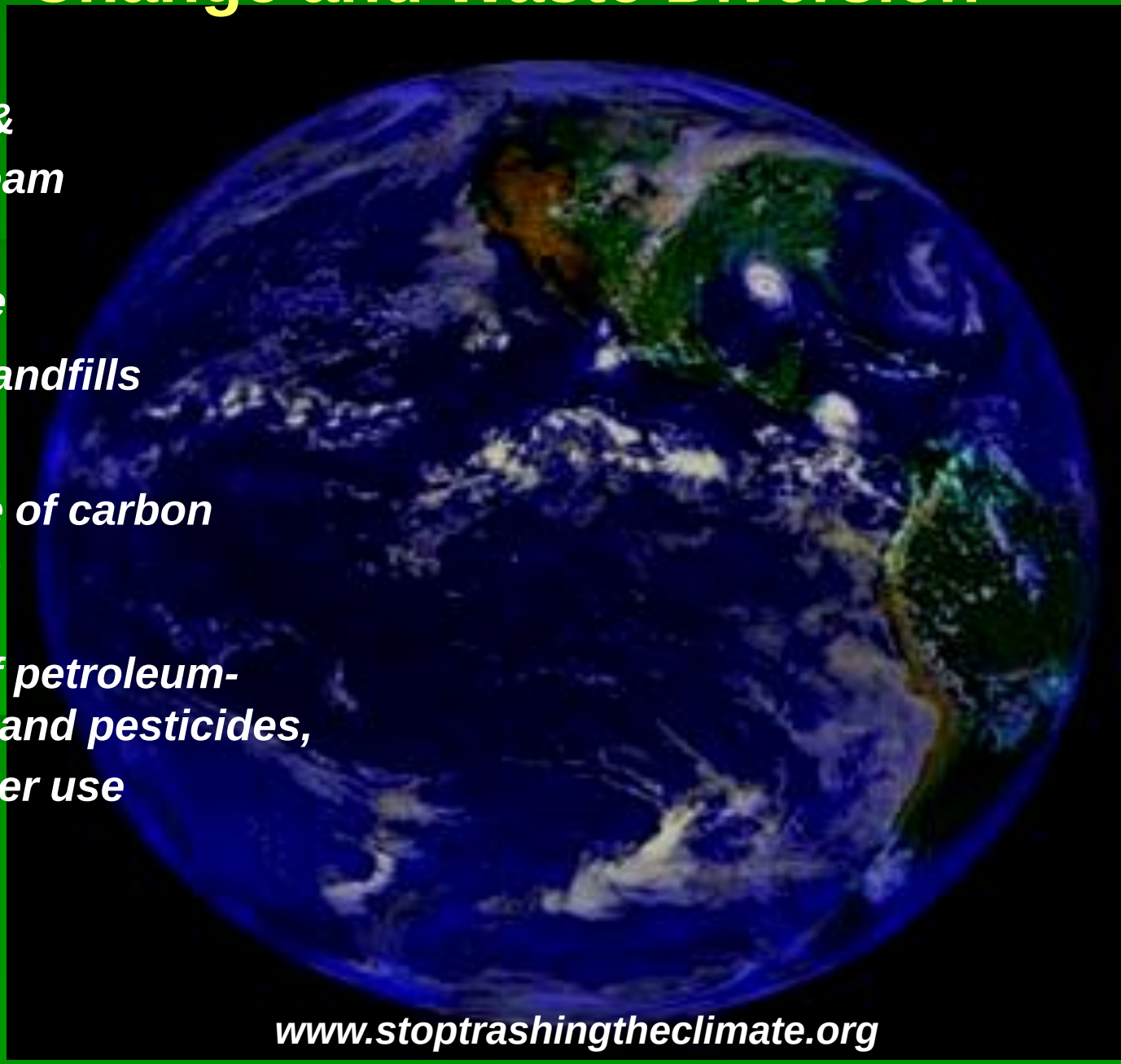
Climate Change and Waste Diversion

Reduces energy & emissions upstream

Reduces methane emissions from landfills

Increases storage of carbon in soil & biomass

Decreases use of petroleum-based fertilizers and pesticides, and reduces water use



www.stoptrashingtheclimate.org

Unique San Francisco Aspects: Every city has its own

- History matters:

  The same company, Recology, has exclusive right to haul refuse for over 80 years

- Pay As You Throw (PAYT) has been in place for almost 90 years

SF Zero Waste Toolbox

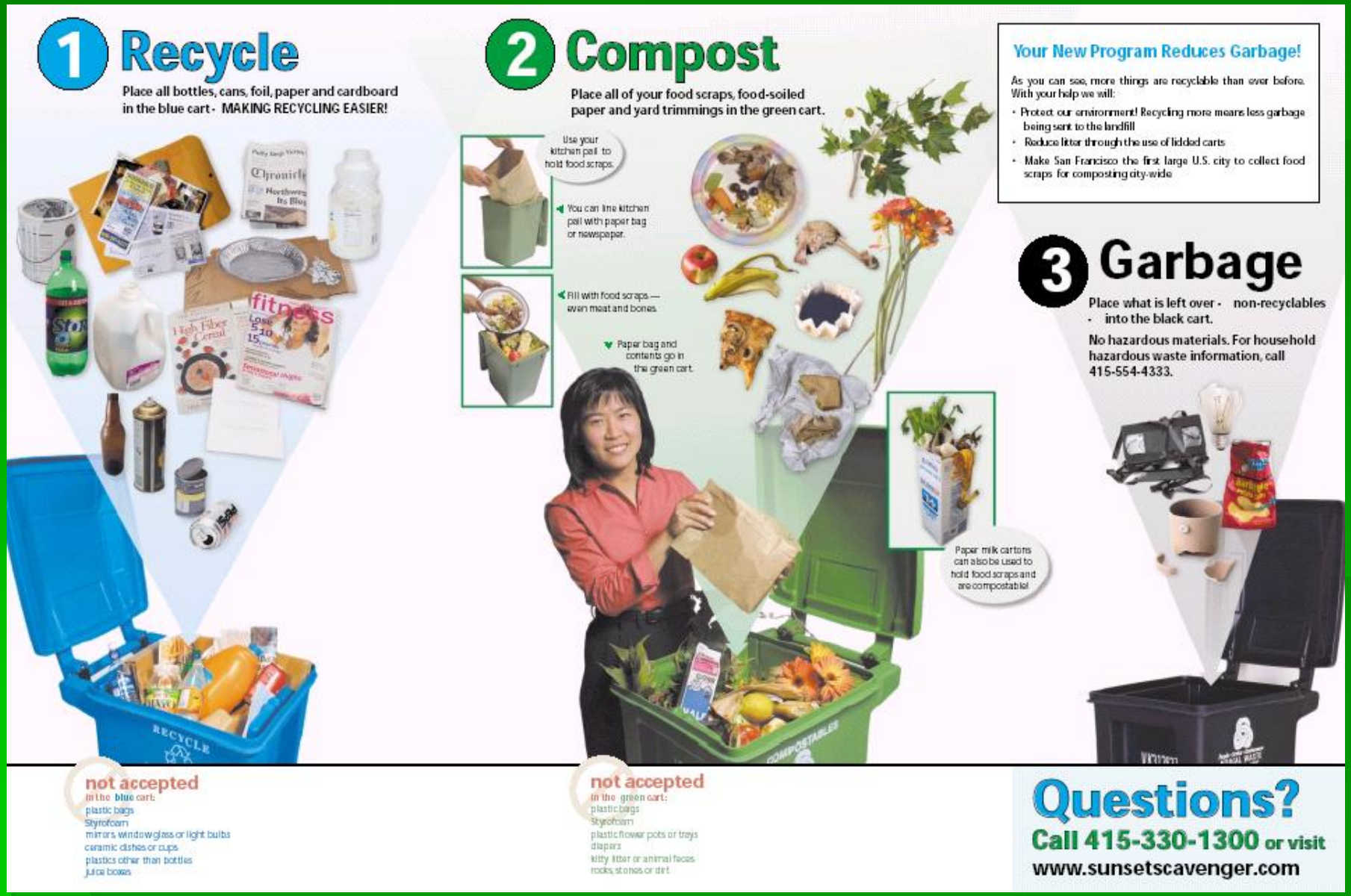
- Policy
- Programs
- Equipment, facilities
- People
- Technology

San Francisco's Zero Waste Goals and Policies to Support Them

- 50% Diversion by 2000 – AB939 State Mandate in 1989
- 75% Landfill Diversion by 2010 SF Goal – at 80% in 2010
- Zero Waste by 2020
- Promote Highest and Best Use of Materials and Require Consumer and Producer Responsibility (EPR)
- Banned Styrofoam & Plastic Bags
- Mandatory Recycling and Composting Ordinance and C&D

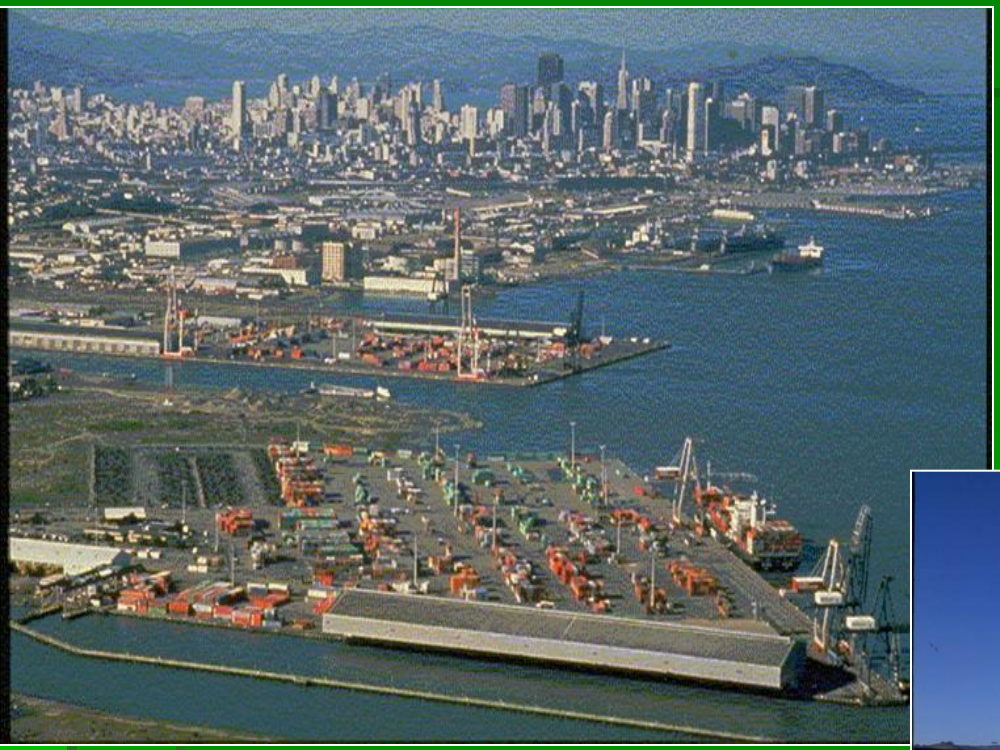
Three Stream Collection Program for Residents and Businesses

Easy to Understand Program & Outreach



Recyclables & Trash Collected Using Dual Compactors Weekly for Residents

Material Recovery Facility (MRF) Sited in SF w/ Access to International Markets



Maintain local processing jobs for union waste collection workers

Environmental stewards from the community for every neighborhood

Nutrient Rich Compostable Food

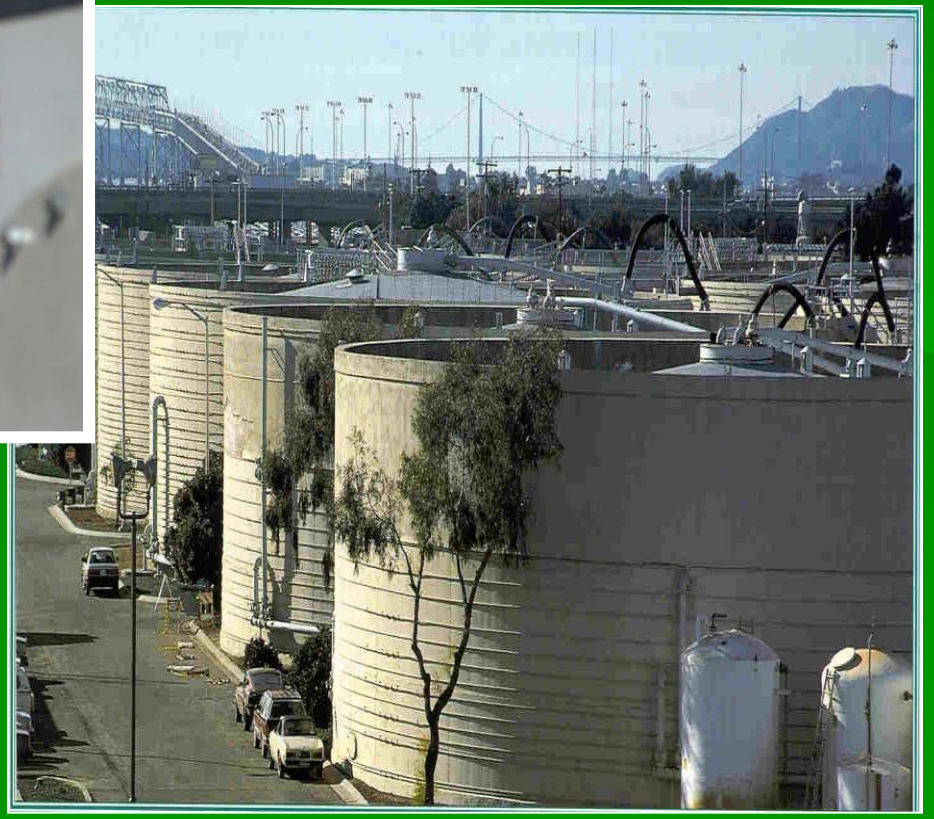
Diverting Food and Other Compostables From Landfill Sustains Soils and Closes Organics & Nutrient Loop

Norcal's "Jepsen Prairie Organics" Regional Composting Facility
300 TPD using 15 acres

New technology allows 600 tpd within strict CA Air Resources Board VOC emissions level on the same site

Engineered Compost System (ECS)

Food Scrap Digestion to Energy Process



Renewable Natural Gas: Enough for MUNI and Recology

- 2010 - Organics collected, but not yet digested
- 130,000 tons Organics recovered yields
- 391,213,370 scf natural gas =
- 3,228,044 gallons of vehicle fuel =
- 200 Recology trucks and 30% MUNI

- 2015 -
- 200,000 tons Organics recovered yields
- 200 Recology trucks and 60% MUNI

Future Zero Waste, Green Energy and Employment Facility

SF Zero Waste Grant Program

- 20+ years
- 0ver $12 million granted
- 40+ different organizations
- Innovative diversion
- About 50 % reuse
- Incredible people
- New programs & technology

Disposal: lowest in 40 years

Year	Disposal to landfill	Compostables collected	Diversion
2000	872,731	21,072	46%
2002	751,180	56,530	62%
2005	664,033	85,395	69%
2007	617,883	91,505	72%
2008	560,330	103,749	77%
2009 .	475,800	>120,000	78%
2010	434,398	>130,000	80%

Compost Used On Organic Farms And Vineyards To Build Healthy Soils

This is soothing to the climate

Thank You

Kevin Drew
San Francisco
Department of the Environment

www.sfenvironment.org
kevin.drew@sfgov.org
415-355-3732

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Websites and links

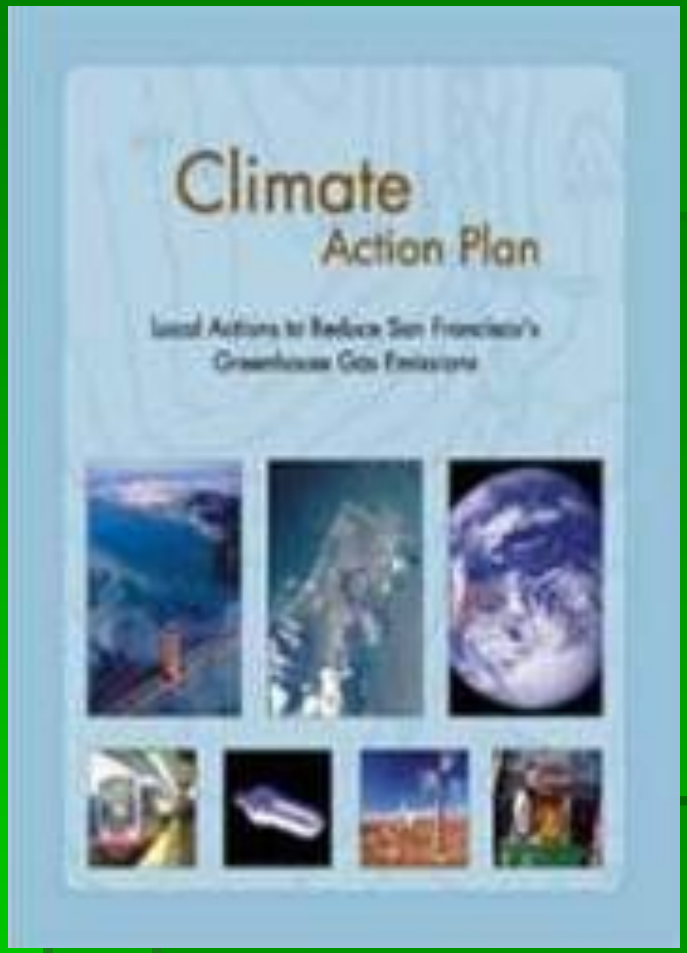
www.sfenvironment.org/zerowaste

www.recology.com/compost

www.sfzerowasterates.com/why/

www.stoptrashingtheclimate.org

www.no-burn.org

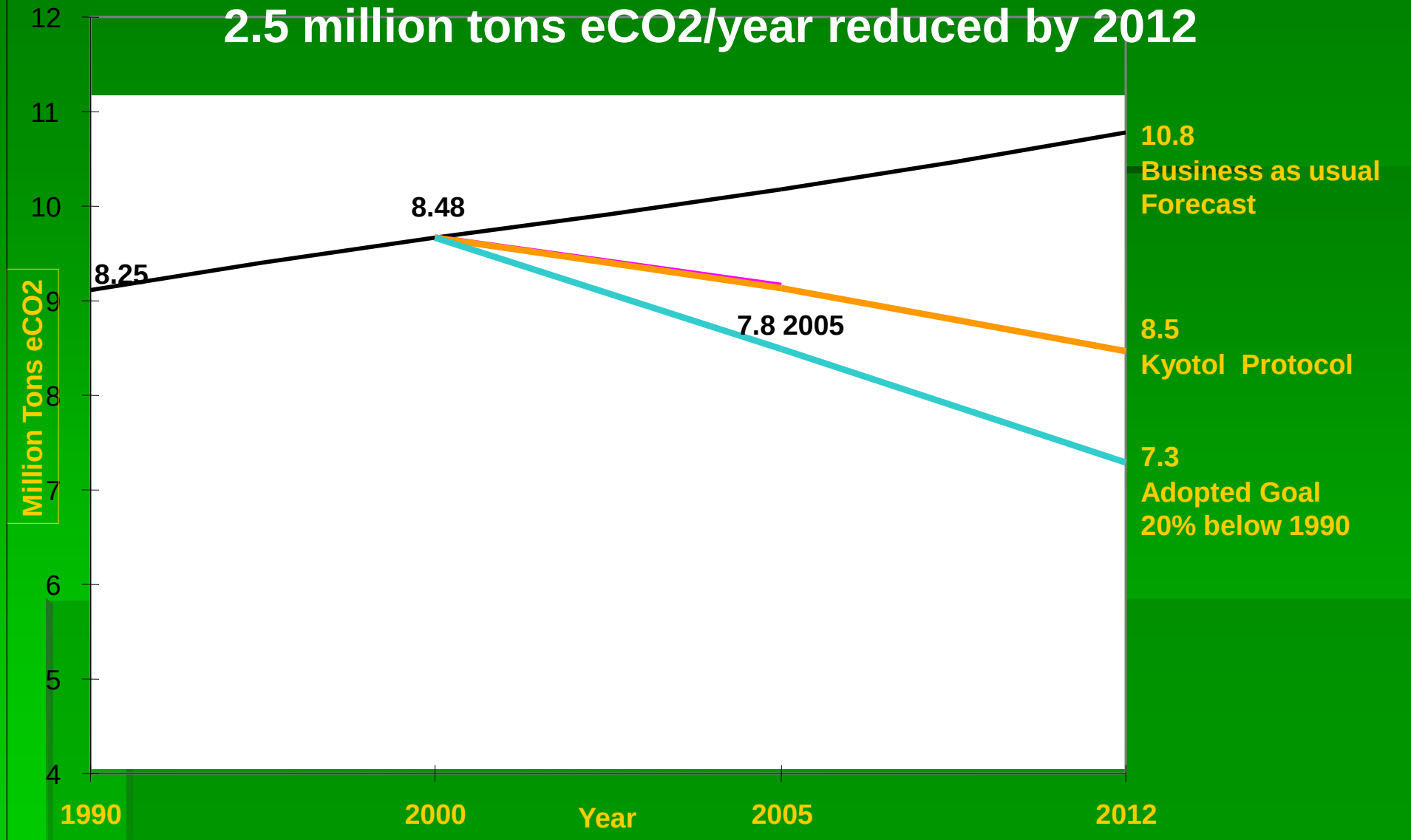


In 2002 we projected Zero Waste programs to reduce 302,000 tons/year of the 2,500,000 ton goal by 2012

We believe the Zero Waste reduction will be significantly greater

San Francisco Greenhouse Gas Emissions Target

2.5 million tons eCO2/year reduced by 2012



History Matters:

Same local hauler for over 80 years – Recology Waste Zero

M. King Hubbert's Bicenntenial Speech on the End of Oil

EXPONENTIAL GROWTH AS A TRANSIENT PHENOMENON IN HUMAN HISTORY

M. King Hubbert

In this Bicentennial Year of American history, it is useful for us to reflect that the two-hundred year period from 1776 to 1976 marks the emergence of an entirely new phase in human history. This is the period during which our industrial civilization has arisen and developed. It is also the period during which there has occurred a transition from a social state whose material and energy requirements were satisfied mainly from renewable resources to our present state that is overwhelmingly dependent upon nonrenewable resources. In 1776 our material requirements for food, housing, clothing, and industrial equipment were principally satisfied by renewable vegetable and animal products. Nonrenewable mineral products, clay products, lime, sand, and metals, were used in such small amounts that the available supplies, at that rate of consumption, seemed almost inexhaustible.

The energy requirements two centuries ago were likewise met principally by renewable resources. Vegetable and animal products were used for food and warmth; human and animal labor and wind and water power for mechanical work. The only nonrenewable energy source then used was coal, which was consumed in such small amounts per year that the total supply at this rate would likewise have seemed almost inexhaustible.

During the ensuing two centuries, the development of the world's present highly industrialized society has occurred. The magnitude and significance of this transition can most readily be appreciated if we consider the graphs showing the growth in the world's annual production of the principal sources of industrial energy, coal and petroleum.

Figure 1 shows the annual world production of coal and lignite from 1860 to 1970; Fig. 2 shows the corresponding growth in the annual world production of crude oil from 1880 and 1970.

M. King Hubbert received his Ph.D. from the University of Chicago in 1927. About half of his subsequent career has been in the oil industry, and the other half divided between universities, the Illinois and U.S. Geological Surveys, and private research, lecturing, and writing. In December 1981 he received the Vetlesen Prize, the highest honor in the earth sciences, from Columbia University.

Paper presented before World Wildlife Fund, Fourth International Congress, The Fragile Earth: Toward Strategies for Survival, San Francisco, 1976.

The mining of coal as a continuous industrial enterprise began nine centuries ago near the town of Newcastle upon Tyne in northeast England. Annual statistics of world coal production are difficult to assemble before 1860, but, by that time, the annual production rate had reached 138 million metric tons per year. From the earlier history of coal mining and from scattered statistics it can be estimated that during the eight centuries from 1060 to 1860, the average growth rate in annual coal production was about 2.3% per year with an average doubling period of about 30 years. From this it can be estimated that the production of coal in 1776 was about 20 million metric tons. As of this year, the annual coal-production rate has reached about 3.3 billion metric tons—a 165-fold increase during the two centuries since 1776. This has been at an average growth rate of about 2.55% per year, or an average period of doubling of 27 years.

Although very small amounts of oil were produced in China and Burma at earlier times, the world's production of crude oil as a continuous industrial enterprise was begun in Romania in 1857 and in the United States two years later. As Fig. 2 shows, from 1880 until 1970 the growth in annual crude-oil production increased smoothly and spectacularly. During this period the growth rate averaged 7.04% per year and the production rate doubled, on the average, every 9.8 years. The cumulative production also doubled about every 10 years. For example, the amount of oil produced during the decade 1960–1970 was almost exactly equal to all the oil produced from 1857 to 1960.

The increase in the consumption of and dependence upon the industrial metals during the last two centuries is comparable to the increased consumption of energy from the fossil fuels. Consider iron. In 1776 the amount of pig iron produced in the world was about 360,000 metric tons. By 1976 this had increased by a factor of 1556 times to a present annual production of about 560 million metric tons. This corresponds to an average growth rate in the annual production to 3.67% per year, with the production rate doubling, on the average, every 18.9 years.

In 1776 the world's human population was approximately 790 million. It has increased to 4.24 billion. The per capita consumption of iron in 1776 amounted to only 0.46 kilogram. This has increased to 132 kilograms, a 287-fold increase during these two centuries.

These figures are illustrative of the profound changes in human affairs that have occurred during the last two

Epoch of Fossil Fuel exploitation over human history

Shown over 10,000 years from 3,300BC to 6,700AD

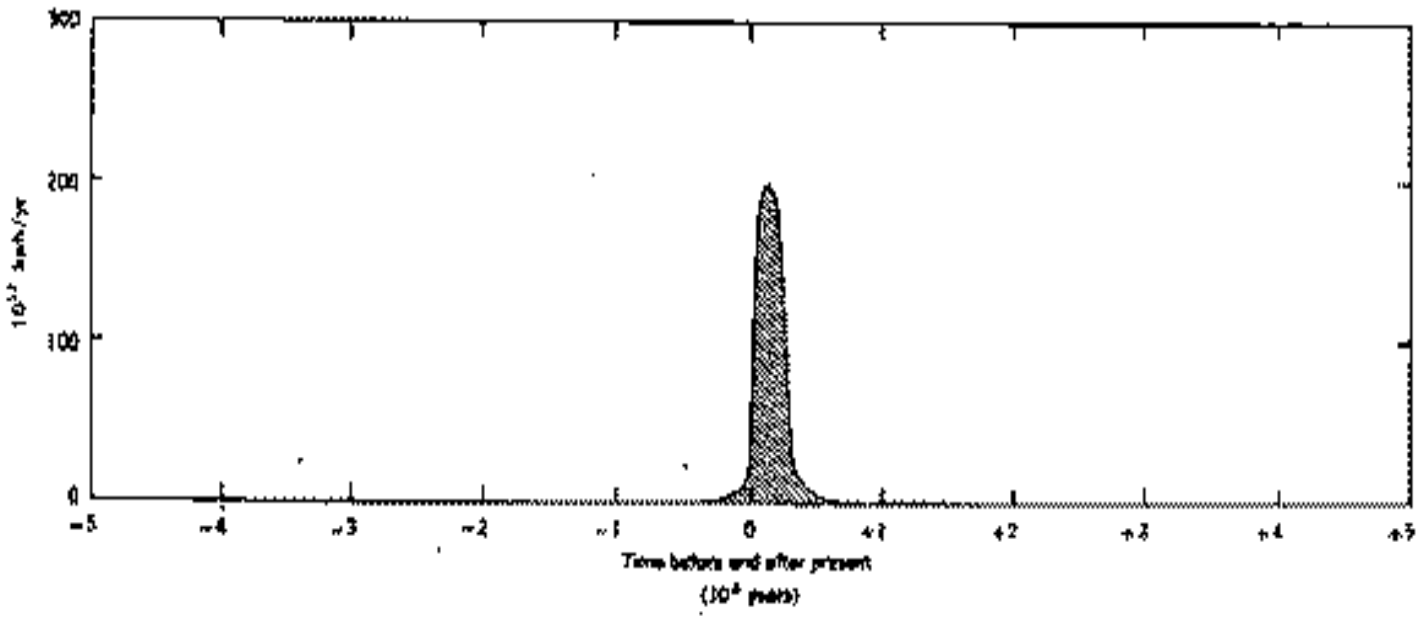


Fig. 10 - Epoch of fossil-fuel exploitation in human history during the period from 5,000 years ago to 5,000 years in the future (Hubbert, 1974a, fig. 59).

Hubbert's conclusion and challenge

- "Since the problems confronting us are not intrinisically insoluble, it behooves us, while there is yet time, to begin a serious examination of the nature of our cultural constraints and the cultural adjustments necessary to permit to deal effectively with the problems rapidly arising.

- Provided this can be done before unmanageable crises arise, there is promise that we could be on the threshold of achieving one of the greatest intellectual and cultural advances in human history.

Residential Sector

- 350,000 residential households in SF
- 99% have access to recycling
- 89% access to composting

Mandatory Recycling and Composting Ordinance (October 2009)

- Everyone must separate compostables and recyclables
- All properties must have refuse service
- Properties must educate tenants and employees
- DPW fines or DPH liens
- Great press, as well as lots of prepartory work with stakeholders

Commercial Sector (2/3 of total)

- 16,000 accounts
- 90% recycle
- 60% compost, doubling since mandatory
- Need to decrease disposal by 25K tpy
- Need 800/yr new recycling accounts
- Need 2,200/yr new composting accounts

Regional WWTP Food AD Pilot

- electricity to power the WW plant
- Provides a CO2 & Energy compliment to composting food rich organics
- Expanding role of digestion biogas

Future Zero Waste, Green Energy and Employment Facility

By 2020 - Fuel all Recology & Muni vehicles, create 200+ new green jobs