

Zero Waste 2020 versus Incineration or Gasification

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www.no-burn.org

www.grrn.org

My thanks to

- Rosa Rinaldi and the Rome provincial government for financing my trip - and congratulations on the launch of your new source separation and collection program (the first step towards Zero Waste).
- Rete Regionale Rifiuti del Lazio for also supporting my visit and organizing at the grass roots level.
- We need this kind of cooperation between local government and local non-governmental organizations to get the best solutions.

Outline

- Gasification: what are the differences and similarities with incineration (video)?
- Arguments against incineration
- The better strategy: Zero Waste 2020 (video excerpts)

Hiding the name!

- **Waste Incineration** is so unpopular with the public that incinerator promoters have used a variety of names for plants that burn trash:
- In US, they were called **Resource Recovery Facilities** and **Waste to Energy** plants.
- In UK they were called **Energy from Waste (EfW)** facilities.
- In Italy they are called “**Thermal Valorization**” and “**Thermal Optimization**” and **RDF** (refuse derived fuel) facilities.
- Now all the rage are the descriptions: **gasification**, and **pyrolysis** facilities.

Video

- A fluidized bed gasification facility in Kawaguchi, Japan - video shot in 2003.

Gasification

- It is not true to say that gasification is different from incineration
- It is true that these facilities have a gasifying step (trash is heated with only a little air)
- But the gases produced are then burned!
- Thus, a more accurate description is “gasifying incinerators”
- Gasification, like incineration, is a sophisticated answer to the wrong question!
- Gasifying incinerators are trying to perfect a bad idea.

Perfecting a bad idea

- Our task in the 21st Century is not to find better ways to destroy discarded materials
- But to stop making packaging and products that have to be destroyed!

**MUNICIPAL WASTE INCINERATION:
A POOR SOLUTION FOR THE TWENTY
FIRST CENTURY**

www.no-burn.org

Arguments against incineration

- Toxic air emissions (no accountability)
- Toxic ash
- Extremely expensive
- Extremely unpopular and undemocratic
- A waste of energy!
- There are better alternatives
- Incineration is not sustainable

TOXIC AIR EMISSIONS

**MODERN
ARCHITECTS
DO THEIR
BEST TO
DISGUISE
“SMOKE STACK”**

- CO₂ + H₂O
- ACID GASES:
HCl, HF, SO₂
NO_x
- TOXIC METALS:
Pb, Cd, Hg, As, Cr etc
- NEW COMPOUNDS:
PCB's
PCDDs (DIOXINS)
PCDFs (FURANS)
CHLORINATED BENZENES,
PHENOLS, NAPHTHALENES
ETC

**FINE
PARTICULATE
(SUB
MICRON
PARTICLES)**

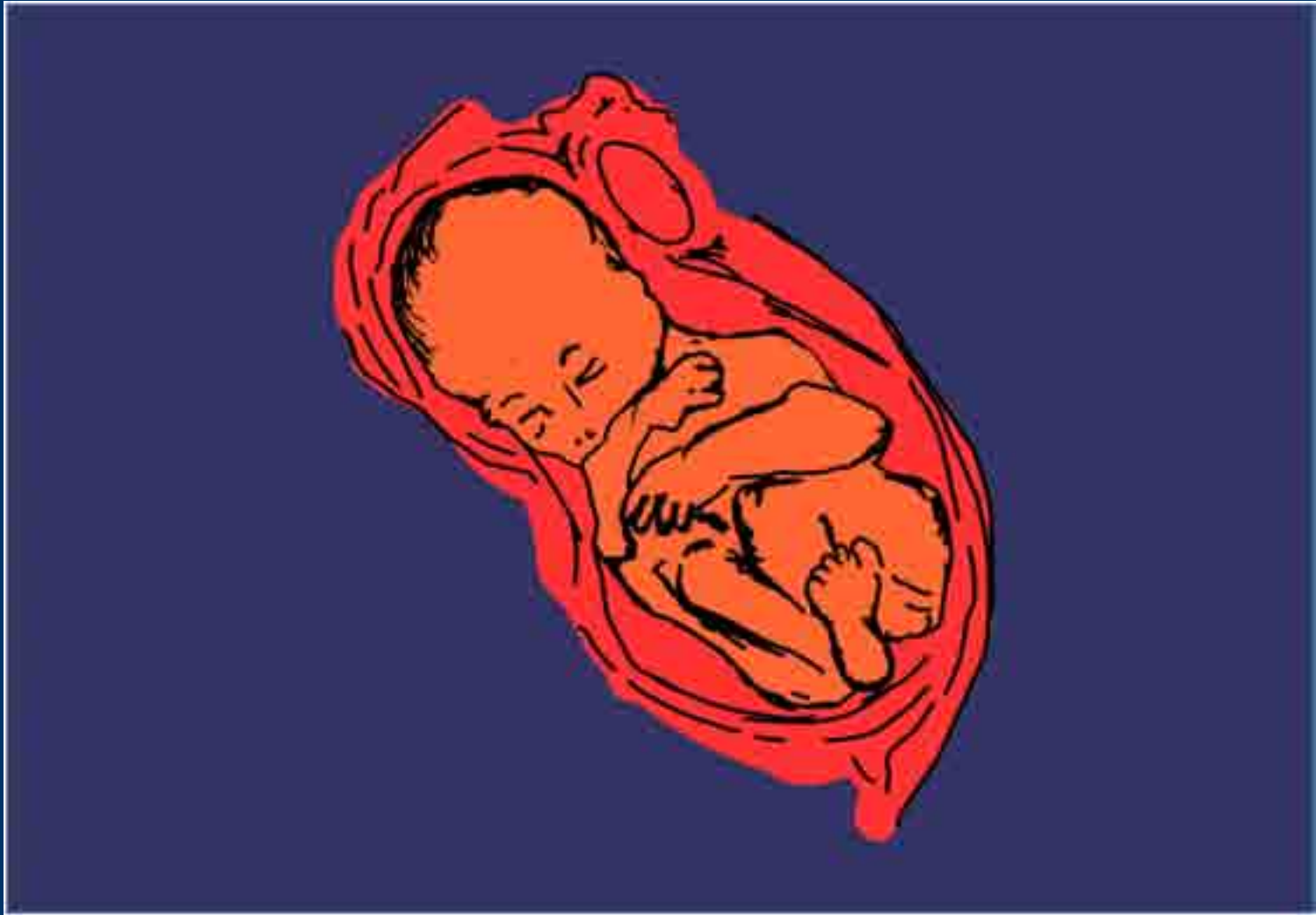
Dioxins - Major Concerns

- **One liter** of cows' milk gives the same dose of dioxin as breathing air next to a grazing cow for **EIGHT MONTHS** (Connett and Webster, 1987).
- The liver cannot convert dioxins to water soluble products thus **they steadily accumulate in human body fat.**
- Men cannot get rid of dioxins **BUT** women can...
- **By having a baby!**
- The highest doses of dioxin go to the fetus and can disrupt fetal development **which is under hormonal control.**

For more discussion on dioxins

- See Dioxin 101 a power point presentation by Paul Connett (this afternoon???)

WE WANT DIOXIN



OUT OF OUR BABIES!

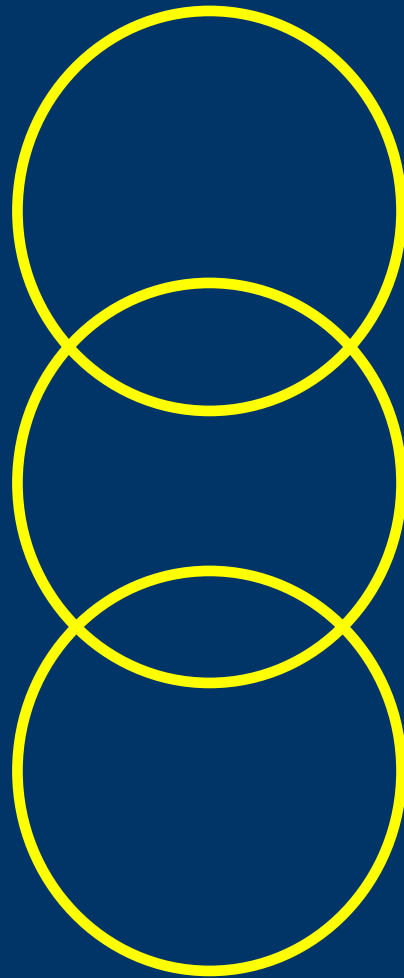
Institute of Medicine, 2003

- Fetuses and breastfeeding infants may be at particular risk from exposure to dioxins due to their potential to cause adverse neurodevelopmental... and immune system effects...

Institute of Medicine, 2003

- ...The committee recommends:
- 1) the government place a **high public health priority** on reducing dioxin intakes by girls and young women **in the years well before pregnancy is likely to occur**
- 2) (By) substituting low-fat or skim milk, for whole milk...and other foods **lower in animal fat**

YOU NEED THREE THINGS TO PROTECT THE PUBLIC FROM TOXIC EMISSIONS.



**STRONG
REGULATIONS**

**ADEQUATE
MONITORING**

**TOUGH
ENFORCEMENT**

IF ANY LINK IS WEAK THE PUBLIC IS NOT PROTECTED

While modern incinerators have
reduced dioxin emissions
there is no real accountability
in Italy

No accountability for the past

- Very few (if any) health studies of workers or local residents or monitoring of the food and the environment near incinerators.

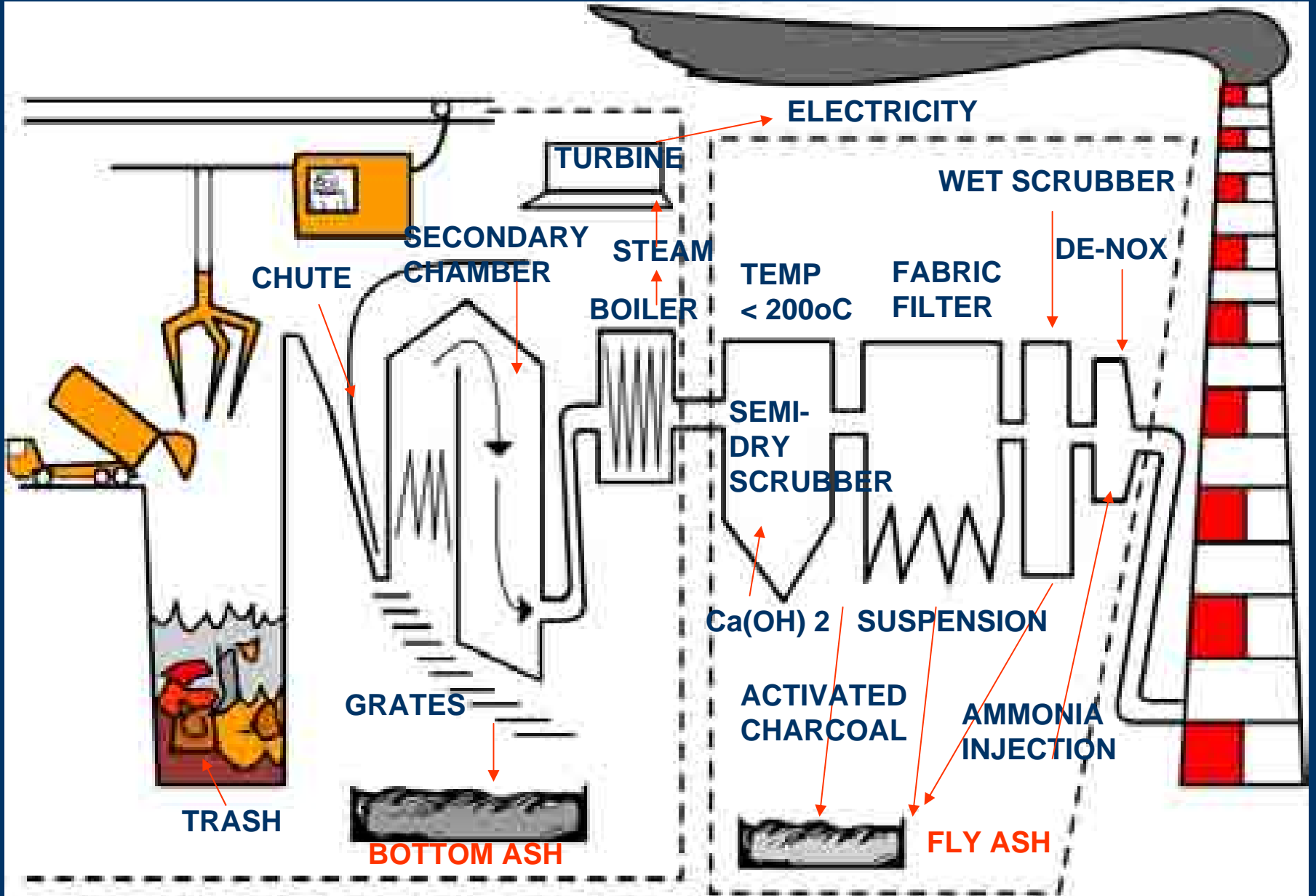
No accountability for the future

- Testing three times a year, means 54 hours of IDEAL data is being used to ESTIMATE 8000 hours of REAL operation.
- More scientific monitoring (the AMEX system) is now commercially available but Italian incinerator operators are not using this.

De Fre and Wevers (1998)

- De Fre and Wevers compared 6 hour testing for dioxins with 2 week testing (on same incinerator)
-
- They found 30-50 times higher concentration (mass divided by total volume of flue gas) in the 2 week test compared to 6 hour test.
- Reason: 2 week test picks up upset conditions as well as start up and shut down.

Incinerators generate toxic ash



Politicians often approve
incineration before they have
any idea where the toxic ash
is going to go!

Ash disposal in other countries

- Germany puts fly ash into nylon bags and buries in salt mines (like nuclear waste)
- Some Japanese incinerators vitrify the ash
- Denmark sends its ash to Norway!
- The Netherlands puts the fly ash into asphalt and the bottom ash into road building and cement blocks for building!
- Italy?

Incineration is extremely unpopular

- In the US over 300 incinerator proposals defeated since 1985
- US has not permitted a new trash incinerator since 1995.

Incineration is a poor investment

- **Most of the money spent on incinerators goes into complicated machinery and leaves the community, whereas**
- **The money spent on the alternatives goes into jobs and stays in the community.**

INCINERATION
IS
NOT
SUSTAINABLE

Incineration is a waste of energy!

- 3-4 times more energy saved by reusing objects and recycling and composting materials in waste stream.
- In Italy a law passed in the 1990's requires power companies to purchase electricity at three times the price from other sources.
- This explains the current rush to build new incinerators even though they are so unpopular.

Gasification

- Engineering consultants' view:
- “Many of the perceived benefits of gasification and pyrolysis over combustion technology proved to be unfounded. These perceptions have arisen mainly from inconsistent comparisons in the absence of quality information.”

Fichtner Consulting Engineers Ltd,
Stockport, Cheshire
March, 2004

Gasification: Track Record

- **Thermoselect**, Karlsruhe, Germany. Shut down in November 2004.
- Designed to process 225,000 msw (world's largest) never managed more than half of this.
- Parent company lost 400 million Euros. **Ingo Goedecke** www.goedecke.de
- Claimed “no emissions” but on various occasions between 2000 and 2004 exceeded limits for Total Organic Carbon (TOC), NO_x, particulates, HCl and dioxins.

Gasification: Track Record

- **Brightstar**, Woolongong, Australia. Shut down in April 2004. Parent company lost over 100 million Euros. Jason.collins@au.greenpeace.org
- Plant had many technical problems.
- Exceeded limits for NO_x, CO and arsenic.
- Other Brightstar proposals in Australia (Gosnell and Salisbury), and UK (Derby and Kent) cancelled.

Gasification: Track Record

Lurgi pulled out of business in 2003 (see letter)

Lurgi letter

- “...a decision has been taken within Lurgi to discontinue marketing gasification and pyrolysis technologies for waste conversion applications.
- This decision has come after rigorous analysis of market requirements, technical feasibility and economic sensitivities of gasification and pyrolysis of waste, as applied by Lurgi and our competitors.
- We recognize there is a positive bias towards gasification/pyrolysis amongst politicians and environmentalists. However, we are in no doubt that in the short to medium term neither technology will be developed and commercially proven to the point where it can compete.”
- Letter (08-09-2003) to Fichter Consulting Engineers Ltd, Cheshire, UK

A better approach:
ZERO WASTE 2020



NO TO INCINERATION



NO TO LANDFILL

**NO TO A
THROWAWAY
SOCIETY**



**MOVING
TOWARDS THE
FRONT END -we
need to design
waste out of the
manufacturing
system**

**ZERO WASTE
BY
2020**

**YES TO A
SUSTAINABLE
SOCIETY**

To achieve Zero Waste

We need three things:

- 1) INDUSTRIAL RESPONSIBILITY (at front end)
- 2) COMMUNITY RESPONSIBILITY (at back end)
- 3) GOOD POLITICAL LEADERSHIP to link these two together

INDUSTRIAL RESPONSIBILITY

- 1) Better industrial design of products and packaging
- 2) Extended Producer Responsibility - companies should anticipate that they will be required to take back durable goods (cars, TVs, computers, copying machines etc) after use as well as non-recyclable packaging material.
- 3) Clean Production - reduce use of toxics in products and processes.

INDUSTRIAL RESPONSIBILITY IN ACTION

XEROX CORPORATION EUROPE

- Recovering old copying machines from 16 countries
- Over 95% of materials reused or recycled!
- \$76 million saved in 2000 !!

COMMUNITY RESPONSIBILITY

- Begins with separation:
- 1) compostables,
- 2) recyclables and
- 3) residuals (bad industrial design)
- Drop off of household toxics
- Reuse and Repair Centers (and retraining)
- Deconstruction versus demolition
- Composting facilities (backyard, community and centralized).

1. COMPOSTABLES

2. RECYCLABLES

3. RESIDUALS



**LOCAL
USE ?**

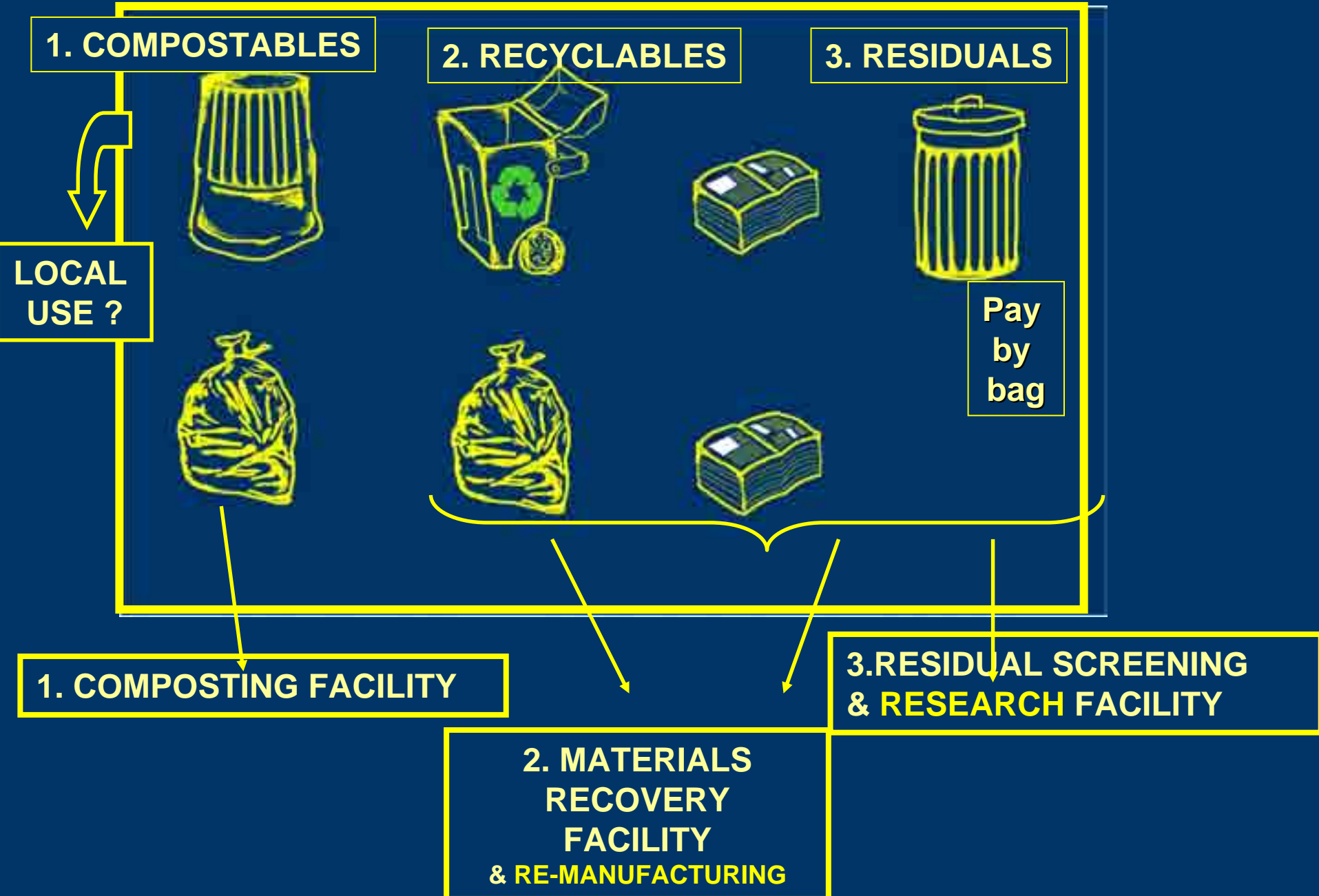


**Pay
by
bag**

1. COMPOSTING FACILITY

**2. MATERIALS
RECOVERY
FACILITY
& RE-MANUFACTURING**

**3. RESIDUAL SCREENING
& RESEARCH FACILITY**



High-capture strategies for collection of biowaste and their optimisation

Enzo Favoino



Working Group on Composting
And Integrated Waste Management
Scuola Agraria del Parco di Monza

Communities which started door to door collection since Sept 2004

Commune	Population	% waste diverted
Sonnino	7,154	54%
Sermoneta	7,000	64%
Monte San Biagio	6,270	35%
Roccagorga	4,365	48%
Lenola	4,200	65%
Fumone	1,100	30%
Torre Cajetani	1,345	38%
Monterosi	3,029	54%
Bassiano	1,670	50%
Castelforte	4,700	52%

San Francisco

- Population = 850,000
- Little space
- Education has to be done in three languages
- Over 50% diversion reached by 2000
- 63% diversion reached by 2004
- 75% diversion by 2010 (goal)
- 100% diversion by 2020 i.e. Zero Waste

The “Fantastic 3”



BUS SHELTER AD



Line 1

INFINITY

1 RECYCLE
2 COMPOST
3 TRASH

Recycling Is Now As Easy As

1 2 3

RECYCLE
Plastic, Paper, Glass, Metal

COMPOST
Food Scraps, Yard Trimmings, Paper

TRASH
Waste, Tuff, Hard

San Francisco's Original Recycling Companies
Making Recycling Easier.

1 RECYCLE
2 COMPOST
3 TRASH

Food Scraps Too!

COMPOST

Food Scraps
and Food-Soiled Paper
with Your Yard Trimmings
Together in the Green Cart!

San Francisco's Original Recycling Companies.
Making Recycling Easier.

11 28 2001

DEDICATED COMPACTING SIDE-LOADERS FOR COMPOSTABLES



Compost Facility



RICH COMPOST READY FOR MARKET



ORGANIC PRODUCE RETURNS TO SF MARKETS & RESTAURANTS



SPLIT COMPACTING SIDE-LOADERS FOR RECYCLABLES AND REFUSE





Recycle Central



@ Pier 96

NEW ZEALAND

- By 2004 over 60% of the municipalities in NZ had declared a Zero Waste goal by 2020.

Recycling not enough

- Where possible seek local remanufacturing -
- Capture the “value added”
- This is where the jobs and business opportunities are.

DEMIOS

Creating
wealth from
waste

Robert D. Demios

UNIT 1
A WASTE
MANAGEMENT
STRATEGY FOR
CAMBODIA

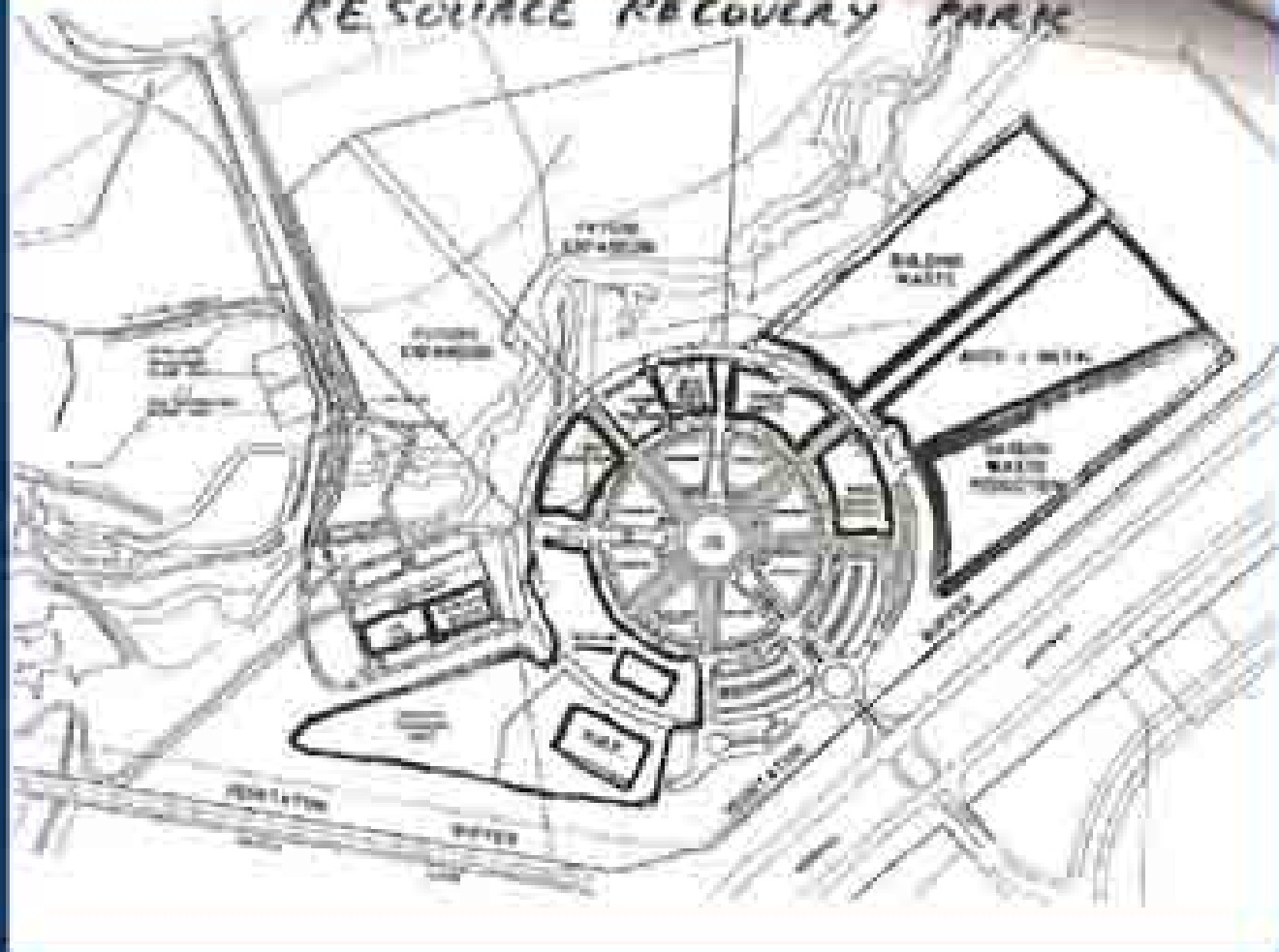
NO WASTE BY 2010



Canberra, Australia

- Currently building a “Resource Recovery Estate” to co-locate all the businesses re-using, repairing and re-manufacturing items from discarded objects, organic materials and deconstructed buildings (see video).

RESOURCE RECOVERY PARK



Nova Scotia

- 50% waste diverted from landfills in 5 years (Halifax ~ 60%)
- 1000 jobs created since April 1996
- Another 2000 jobs created in industries using separated materials
- GPI analysis available on internet

Materials re-used in manufacturing in Nova Scotia:

- All cardboard
- All paper
- Most plastic containers and some plastic film
- All waste paint
- All organic material
- All glass
- All tires
- Steel goes to Quebec

RESIDUAL SCREENING FACILITY

SCREENING FACILITY AT LANDFILL

**MORE
RECYCLABLES**

MORE TOXICS

**DIRTY
ORGANIC
FRACTION**

**NON-RECYCLABLE PACKAGING
AND OBJECTS**

**BIOLOGICAL
STABILIZATION**

INTERIM LANDFILL

Composting of Residuals

- Suggested facility for Rome landfill
- The Bedminster system
- Uses a rotary cement kiln
- Video

Video from Perth, Australia

RESIDUAL SCREENING & RESEARCH FACILITY

SCREENING FACILITY AT LANDFILL

NON-RECYCLABLE PACKAGING & OBJECTS

Local University
Department

RESEARCH FOR NEW USES FOR DISCARDS
& BETTER INDUSTRIAL DESIGN FOR REST

INTERIM LANDFILL

- If we can't re-use it, recycle it or compost
 - industry shouldn't be making it.
- We need better industrial design for the 21st Century.

A comparison

- With incineration or gasification
- You convert **three** tons of trash to
 - **one ton of ash**
 - that nobody wants!

With a zero waste strategy

- You convert **three** tons of trash into:
 - One ton of recyclables
 - One ton of compostables,
 - and
 - One ton of education!

GOOD LEADERSHIP

We need political and industrial leaders

who are

visionary

creative

and

WHO ARE NOT BORING

VIDEOS

paul@fluorideALERT.org

On the Road to Zero Waste

Part 1: Nova Scotia, Canada

Part 2: Burlington, Vermont, US

Part 3: Canberra, Australia.

Part 4: San Francisco Bay Area

Pieces of Zero

Collection 1: Leadership and Creativity

“Pieces of Zero”

- 1) Coles Bay, Tasmania has banned plastic shopping bags.
- 2) Ireland has put a 15c tax on plastic shopping bags - In one year use dropped by 92% and 12.7 million Euros has been put into environmental fund.
- 3) COOP supermarket allows customers to refill plastic shampoo and detergent bottles...

Contact details

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www.no-burn.org

www.grrn.org

Video Excerpts from
On the Road to Zero Waste
series

If time!

Gasification

- Engineering consultants' view:
- “Differences in recycling rates are due to the use of front-end recovery systems that can be generally be employed in conjunction with any thermal treatment technology to achieve similar results.”

Gasification

- Engineering consultants' view:
- “In terms of energy efficiency of standalone plants when optimised for power generation, existing gasification and pyrolysis technologies are less efficient than modern combustion technology.”

Gasification

- Engineering consultants' view:
- "...there is no reason to believe that these technologies are any less expensive than combustion and it is likely, from information available, that the more complex processes are significantly more expensive."

Gasification

- Engineering consultants' view:
- “Site footprints, building heights and stack heights are generally not determined by whether the thermal conversion technology is pyrolysis, gasification or combustion, but by the quantities of waste handled and the thermal energy released”

Gasification

- “...the real potential of gasification and pyrolysis technologies is likely to be limited to:
- Situations where the host community is willing to employ gasification or pyrolysis, but does not wish to use combustion;
- The treatment of selected homogenous waste streams such as plastics and possibly refused derived fuels (RDF); and
- The treatment of small quantities of clinical and hazardous waste where energy efficiency is less important than in high volume applications.”

HUMAN BORINGS

- Have no imagination
- have no vision
- have no sense of humor
- are obsessively tidy
- confuse being clever with being wise
- have more faith in machines than people
- believe science and technology can fix every problem
- believe man is the centre of the universe
- **And a woman's place is in the kitchen!**

ALL FOOD SCRAPS, YARD TRIMMINGS AND COMPOSTABLE PAPER GO IN THE GREEN CART



ALL BOTTLES, CANS AND
RECYCLABLE PAPER GO IN THE
BLUE CART



WHAT CAN'T BE RECYCLED OR COMPOSTED GOES IN THE BLACK CART



INDUSTRIAL RESPONSIBILITY IN ACTION

1) THE BEER INDUSTRY, ONTARIO, CANADA

- Uses refillable glass bottles
 - 98% recovered
 - on average each bottle reused 18 times
 - Refillable glass bottles 11 cents cheaper per serving than disposable bottles.
 - 2000 jobs in collection and cleaning
 - No cost to municipality
 - Packaging costs internalized