

Incineration: A Poor Solution for the Twenty First Century

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Devon, February 3, 2010

- Since 1985
- I have given over 2000 pro bono presentations on waste to communities in 52 countries, including
 - 49 states in the US,
 - 7 provinces in Canada,
 - 189 cities in Italy...

Paul Connett
ha parlato
in
189 città'



- **And on Jan 12, 2010, I gave a presentation (Zero Waste: Theory and Practice Around the World) before the Division for Sustainable Development at the United Nations**

OUTLINE

1. A few words about Sustainability
2. Arguments against incineration
3. The Zero Waste 2020 Strategy
4. Zero Waste steps around the world
5. Linking Zero Waste to Sustainability
6. Back to the Big Picture

DIFFERENT TIMES DEMAND DIFFERENT QUESTIONS

20th CENTURY

WASTE MANAGEMENT

*“ How do we get rid
of our waste
efficiently with
minimum damage to
our health and the
environment ?”*

21st CENTURY

RESOURCE MANAGEMENT

*“ How do we handle our
discarded resources in
ways which do not
deprive future
generations of some, if
not all, of their value ?”*

DIFFERENT TIMES DEMAND DIFFERENT QUESTIONS

20th CENTURY

**WASTE
MANAGEMENT**

**The key issue
was SAFETY**

21st CENTURY

**RESOURCE
MANAGEMENT**

**The key issue is
SUSTAINABILITY**

Sustainability

- We would need **FOUR planets** if every one consumed as much as the average **American**
- We would need **TWO planets** if every one consumed as much as the average **European**
- Meanwhile, **India, China etc.** are copying our consumption patterns
- Something has got to change and **the best place to start is with waste**

**We are living on this
planet as if we had
another one to go to**

of Society



New Century Edition

The McDonaldization of Society



New Century Edition

G E O R G E R I T Z E R

**We cannot run a throwaway society on
a finite planet**

**Waste is the evidence that we are doing
something wrong**

Landfills BURY the evidence

Incinerators BURN the evidence

We need to face the real problem...

**Our real task is to fight
over-consumption**

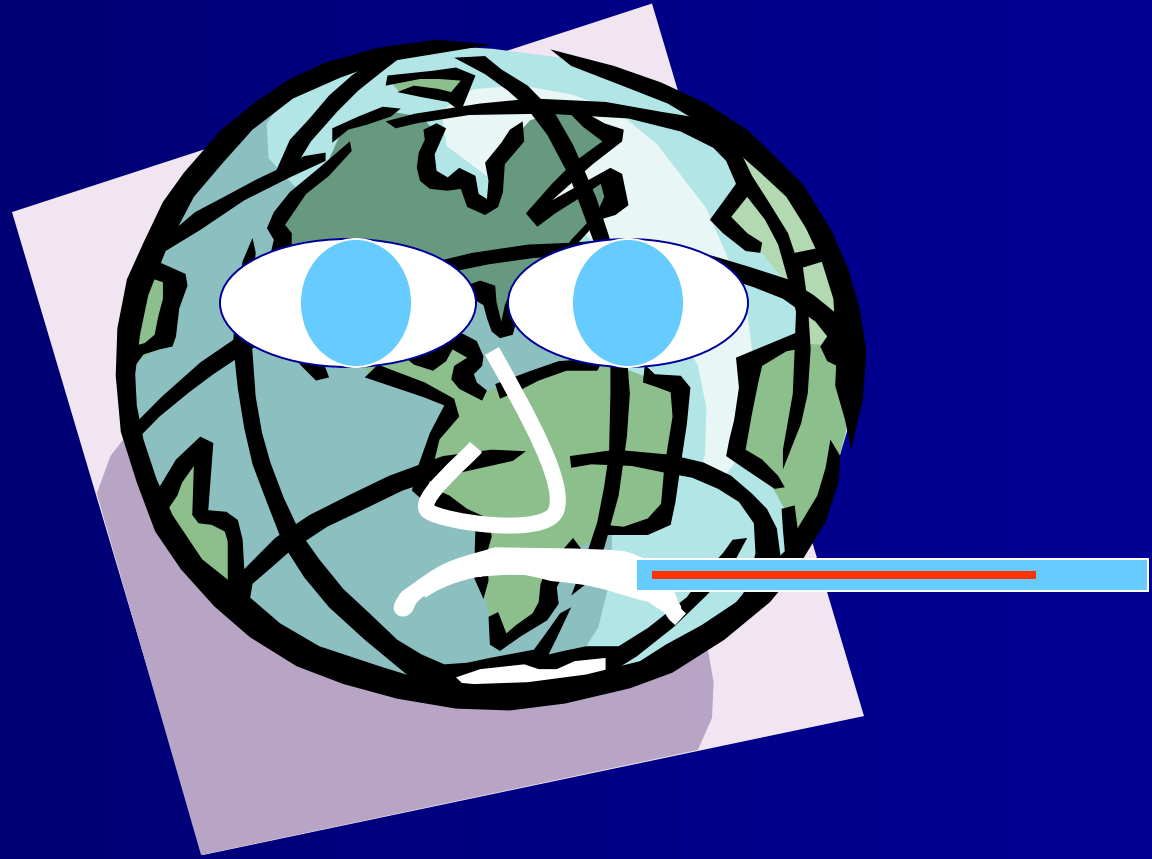
**“The world has enough
for everyone’s need
but not for everyone’s
greed”**

Mahatma Gandhi

Not only is
over-consumption
giving us a local waste crisis

but also...

... a Global crisis



... a Global crisis



Global warming is a symptom

... a Global crisis



**Global warming is a symptom
Over-consumption is the cause**

The Global Crisis:

Since the Industrial Revolution we have imposed a **linear society on a planet that functions in circles**

A LINEAR SOCIETY

A LINEAR SOCIETY

Extraction

A LINEAR SOCIETY

Extraction

Production

A LINEAR SOCIETY

Extraction

Production

Consumption

A LINEAR SOCIETY

Extraction

Production

Consumption

Waste

Advertising/TV



Extraction

Production

Consumption

Waste

Over-advertising
produces
Over-consumption

By the time a high school student leaves school, he or she will have watched over 350,000 TV commercials.

*Paul Hawken
The Ecology of Commerce.*

Myth versus Reality

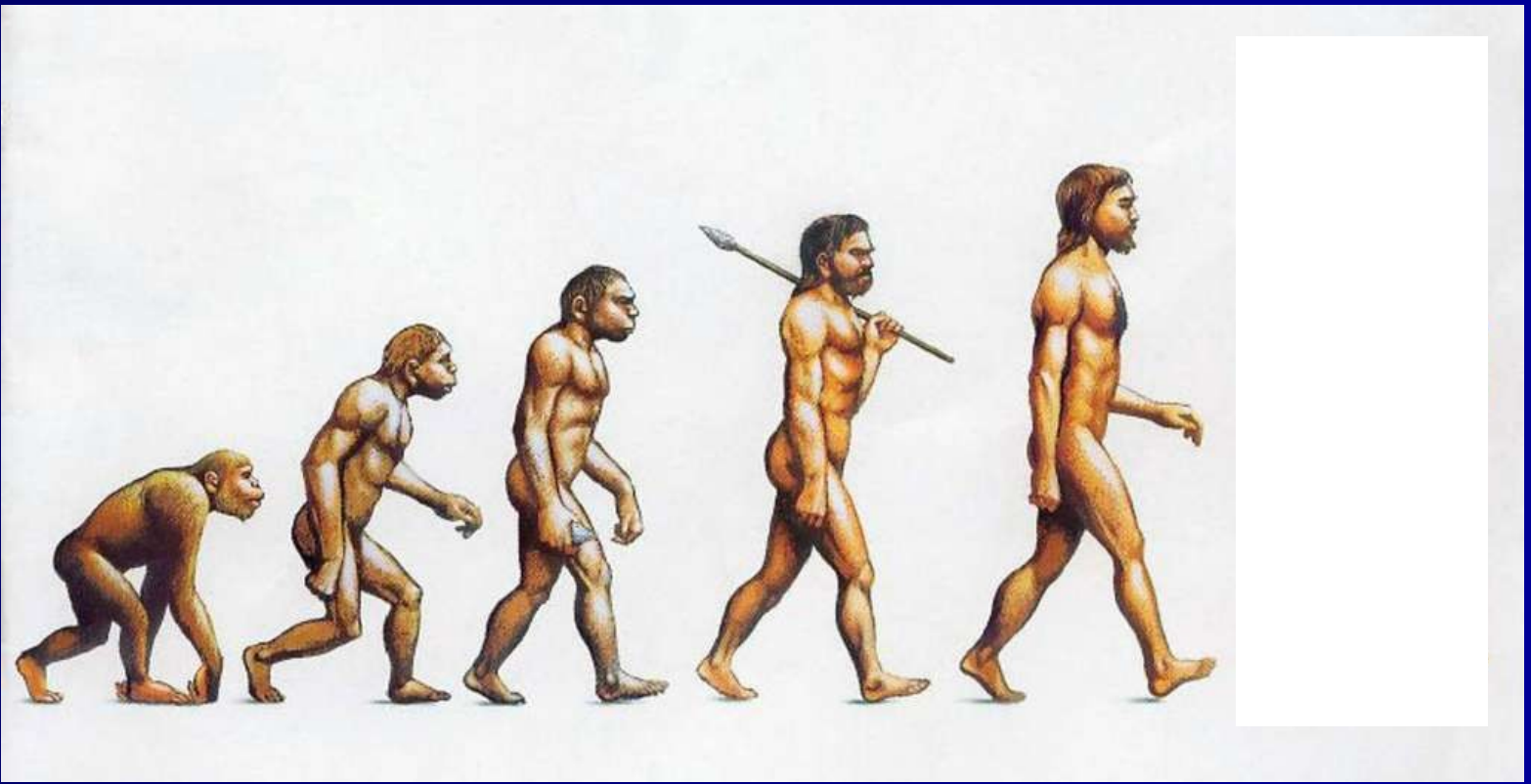
- **THE MYTH:**

- The more you consume the happier you become

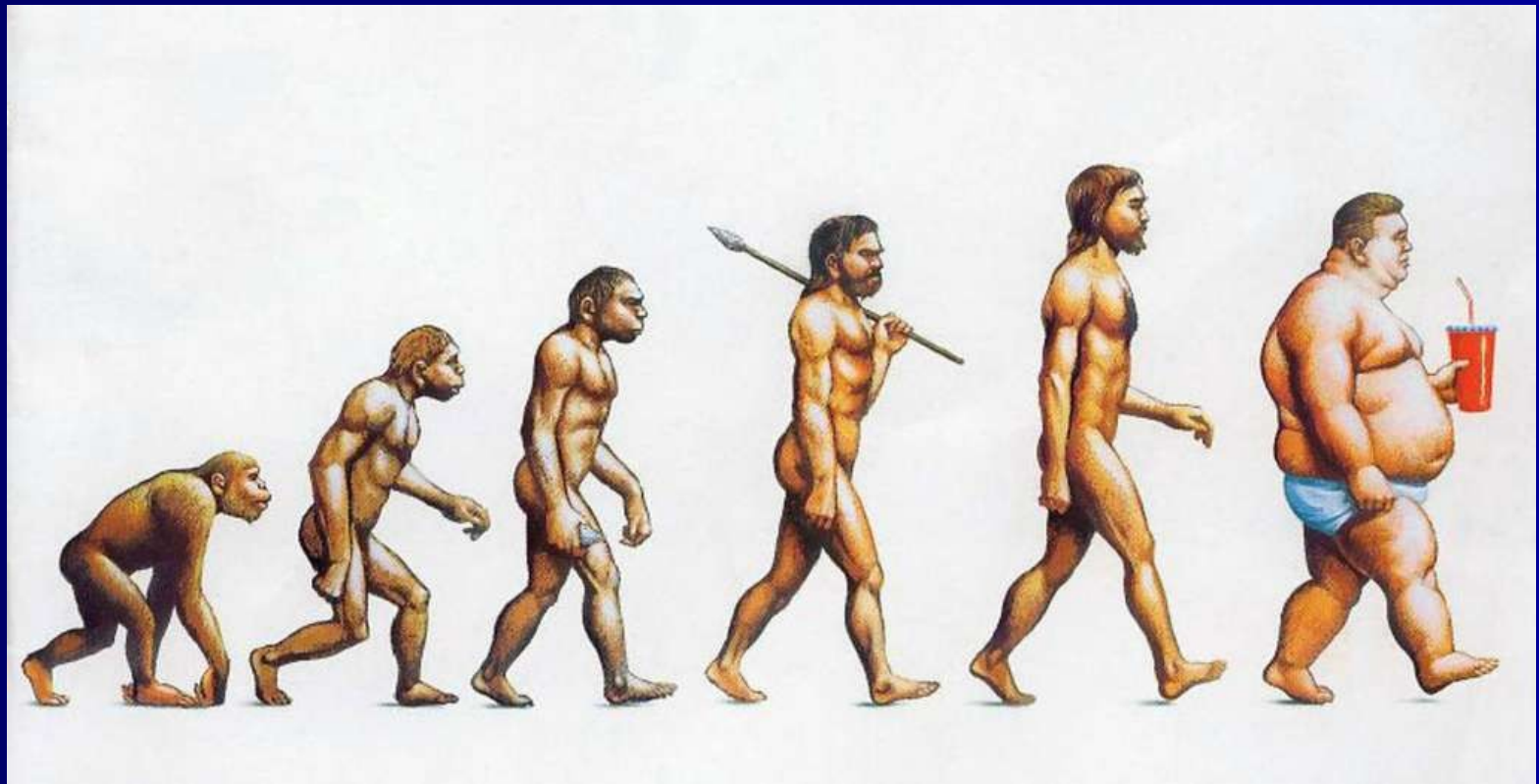
- **THE REALITY:**

- The more you consume the fatter you become!
- And the more waste you produce

Man



Modern Man!



of Society



New Century Edition

A LINEAR SOCIETY

**Extraction of
Virgin
Materials**

**Production of
Manufactured
items**

Consumption

Waste

A LINEAR SOCIETY

ENERGY



**Extraction of
Virgin
Materials**

**Production of
Manufactured
items**

Consumption

Waste

A LINEAR SOCIETY

ENERGY



**Extraction of
Virgin
Materials**

**Production of
Manufactured
items**

Consumption

Waste



Solid waste
Air pollution
Water pollution
Carbon dioxide

ENERGY



**Extraction of
Virgin
Materials**



ENERGY



**Production of
Manufactured
items**



Consumption

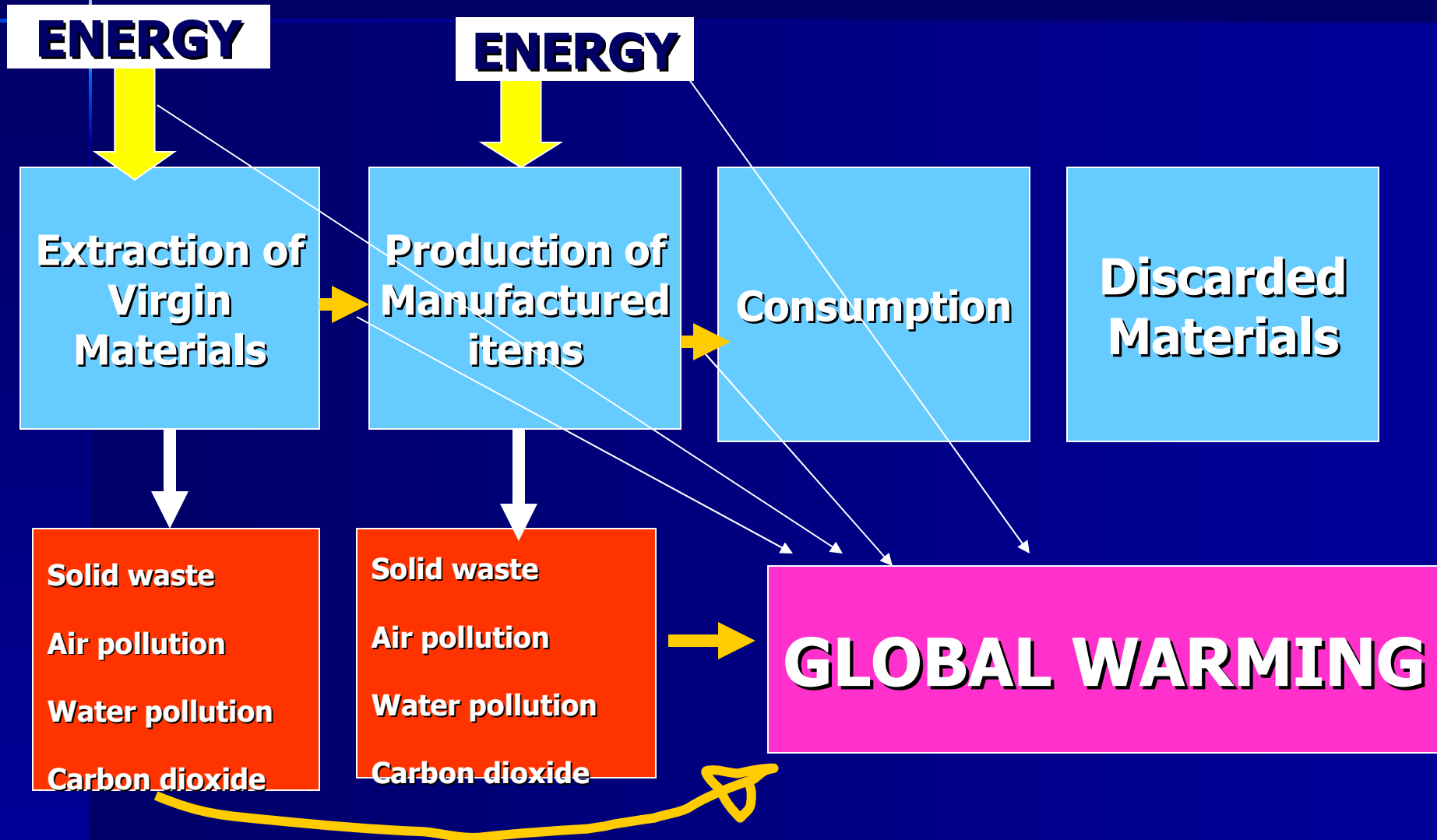
**Discarded
Materials**



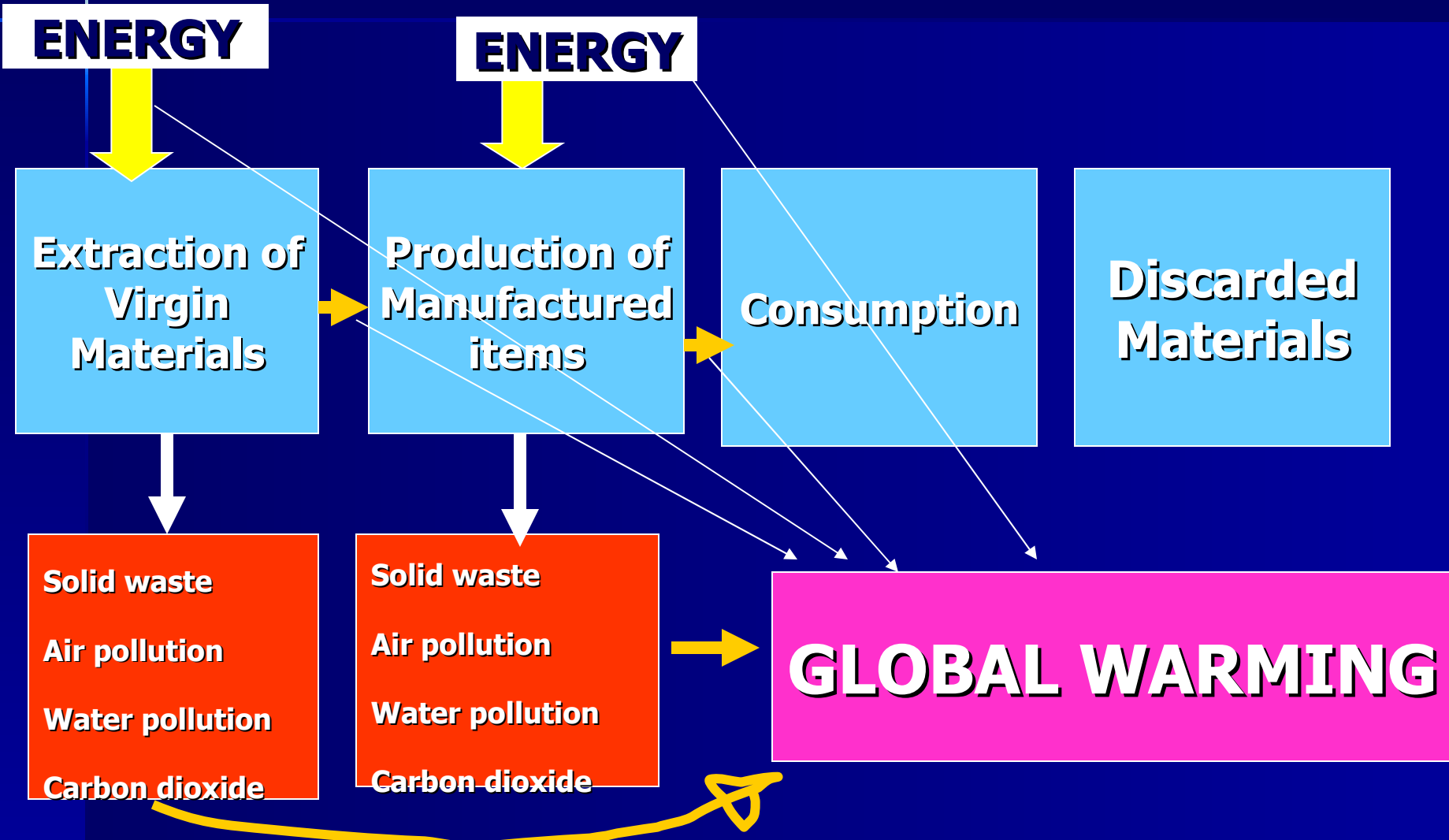
**Solid waste
Air pollution
Water pollution
Carbon dioxide**



**Solid waste
Air pollution
Water pollution
Carbon dioxide**



How do waste management practices affect this picture?



LANDFILLS

ENERGY

ENERGY

**Extraction of
Virgin
Materials**

**Production of
Manufactured
items**

Consumption

**Discarded
Materials**

Solid waste

Air pollution

Water pollution

Carbon dioxide

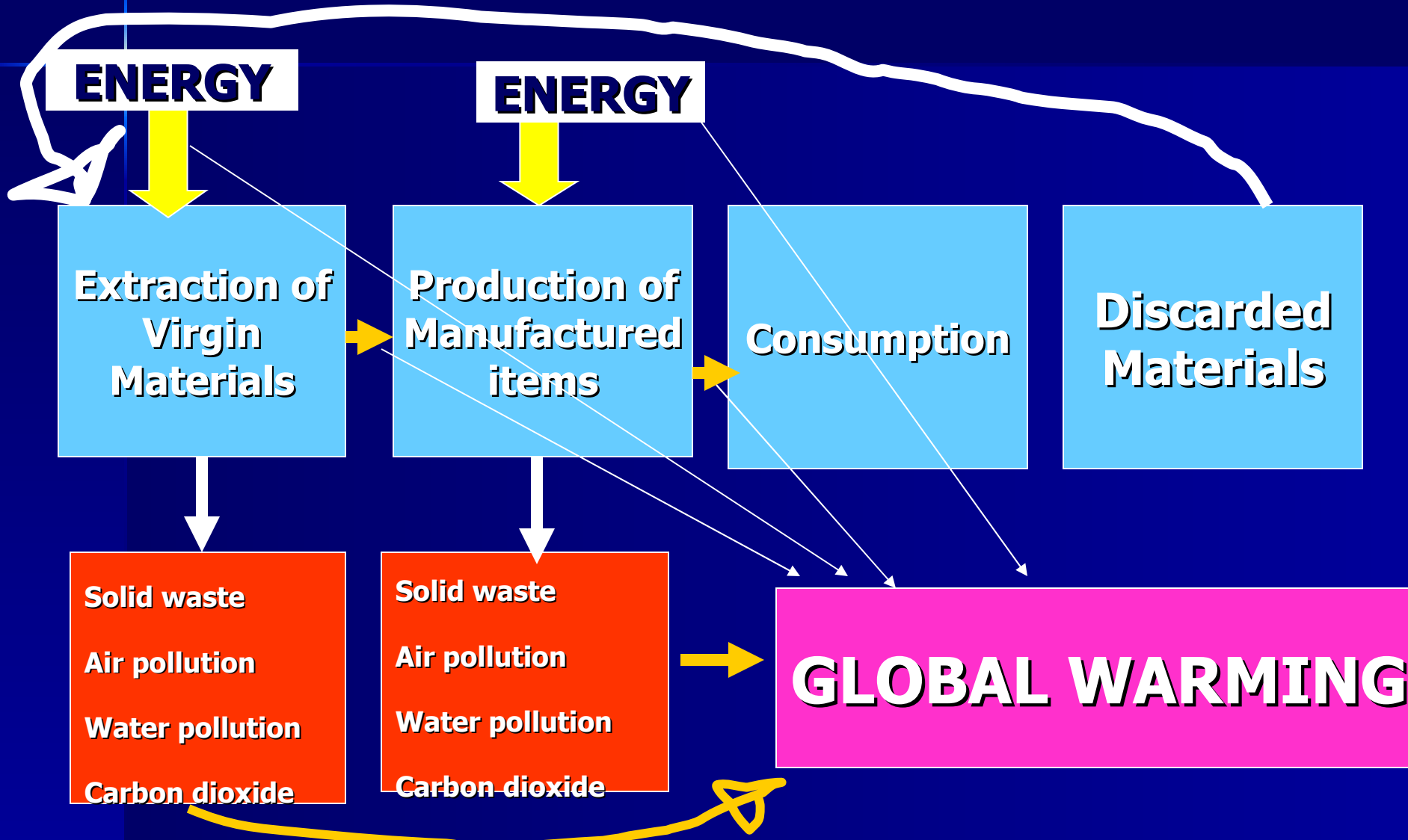
Solid waste

Air pollution

Water pollution

Carbon dioxide

GLOBAL WARMING



INCINERATION

ENERGY

ENERGY

**Extraction of
Virgin
Materials**

**Production of
Manufactured
items**

Consumption

**Discarded
Materials**

Solid waste

Air pollution

Water pollution

Carbon dioxide

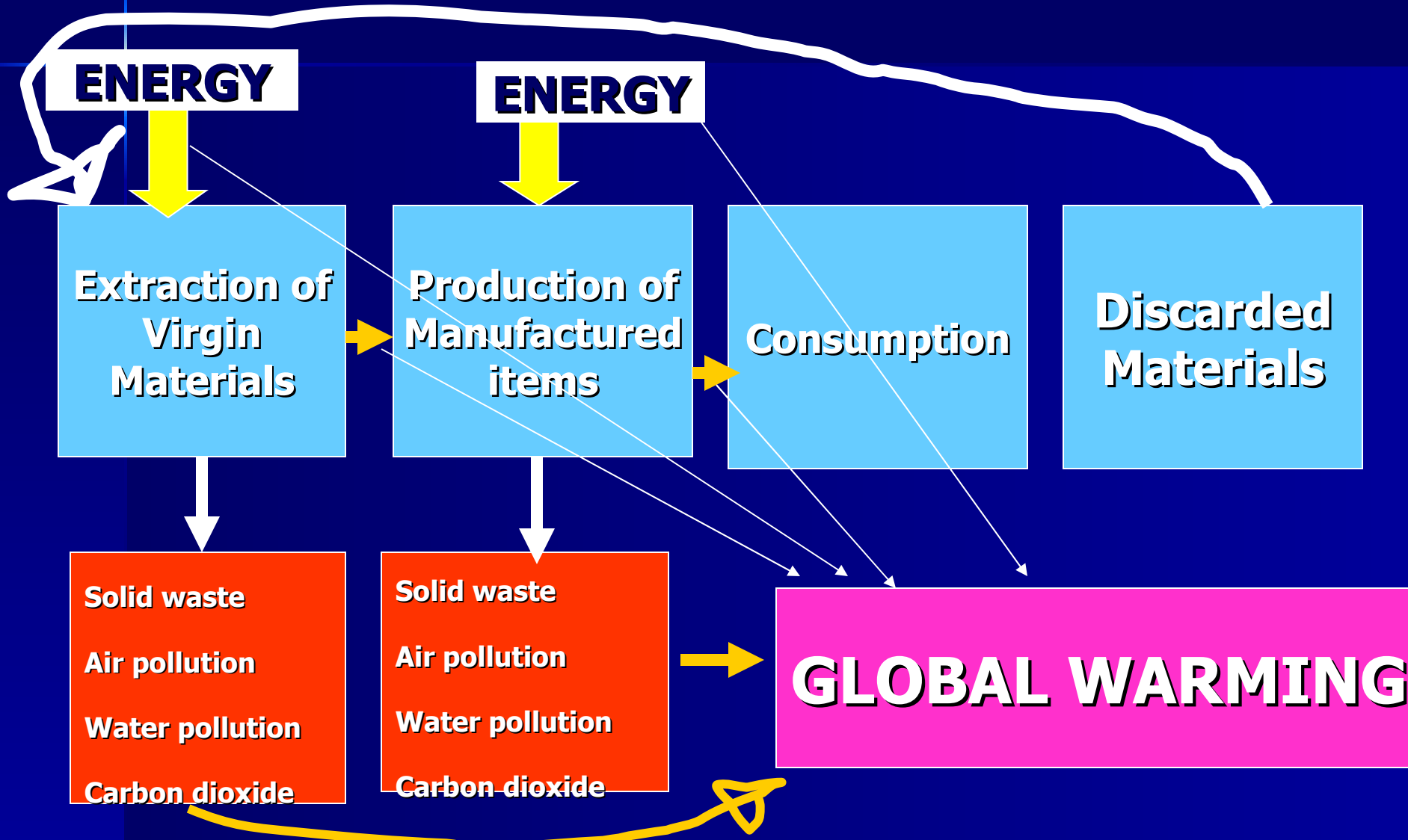
Solid waste

Air pollution

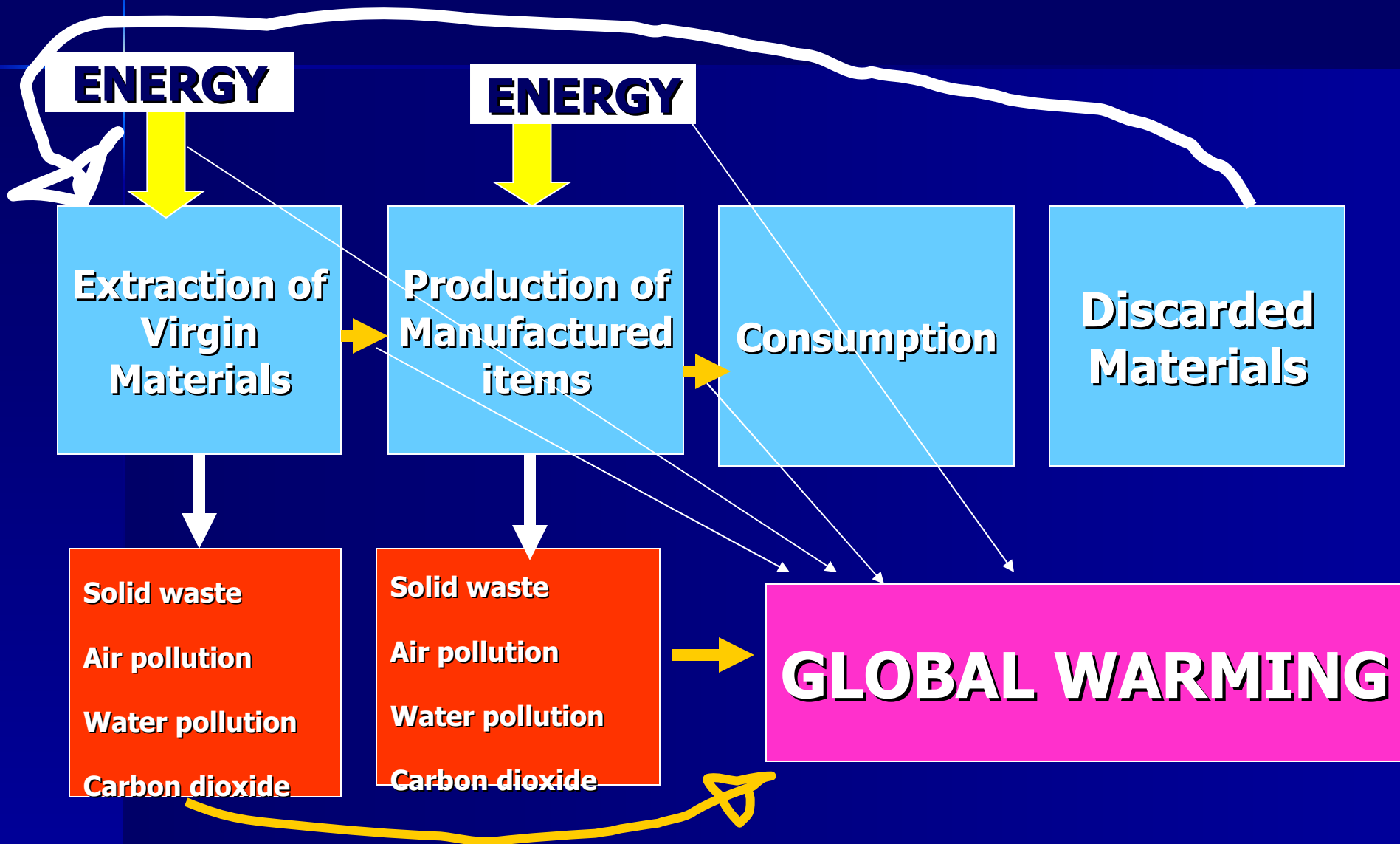
Water pollution

Carbon dioxide

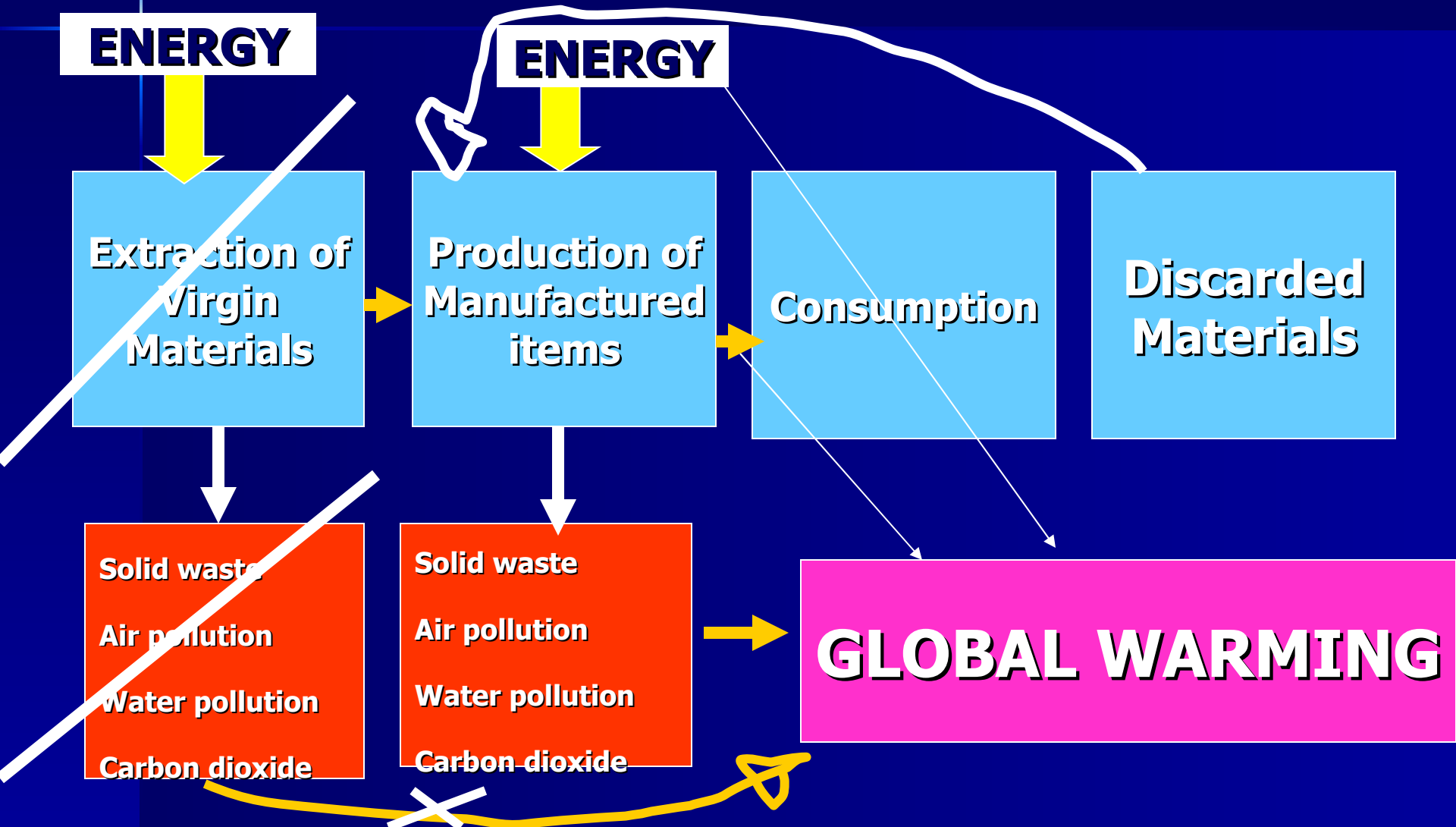
GLOBAL WARMING



OTHER THERMAL DESTRUCTION FACILITIES



RECYCLING OF MATERIALS



REUSE OF OBJECTS

ENERGY

ENERGY

**Extraction of
Virgin
Materials**

**Production of
Manufactured
Items**

Consumption

**Discarded
Materials**

Solid waste

Air pollution

Water pollution

Carbon dioxide

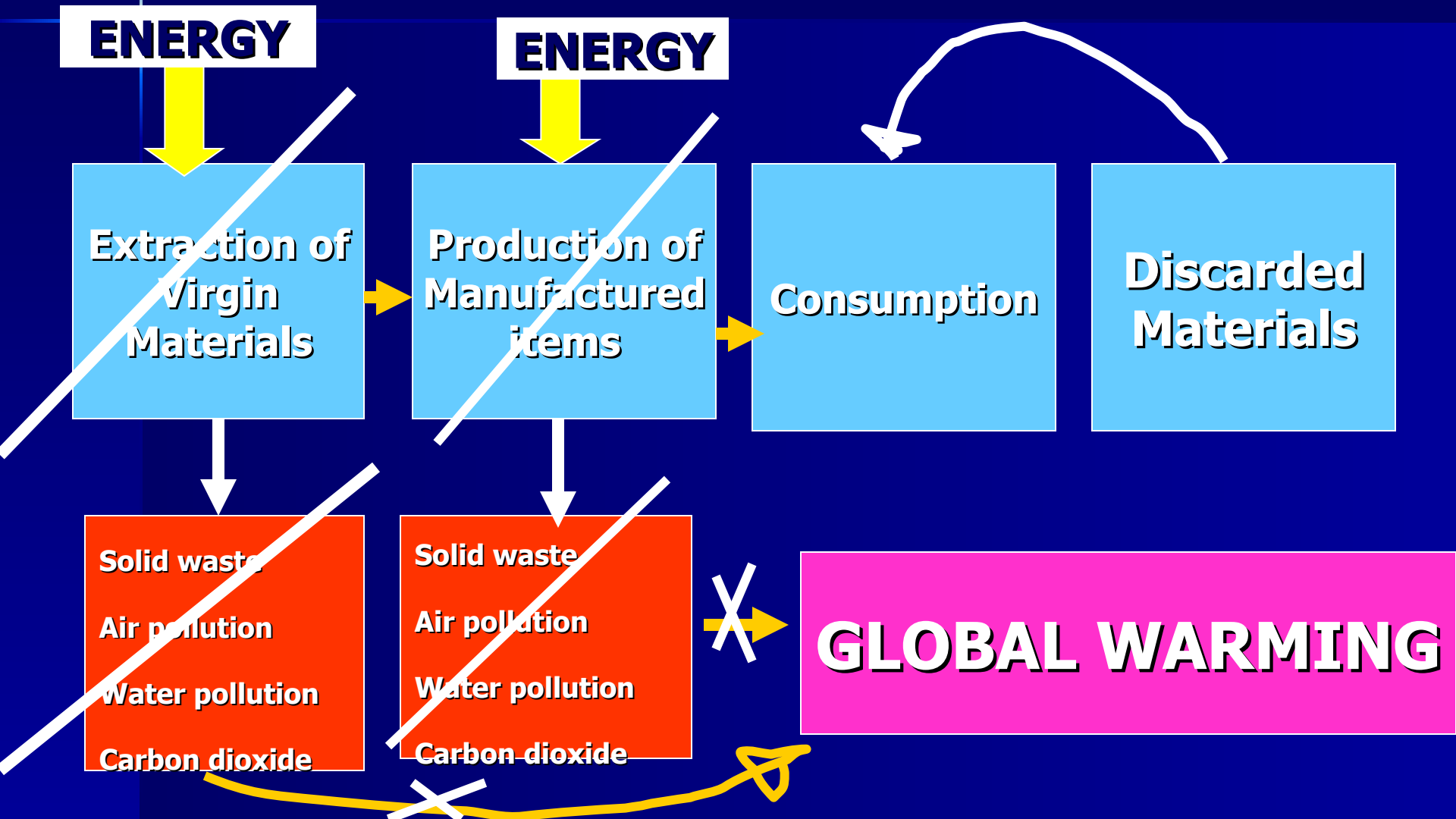
Solid waste

Air pollution

Water pollution

Carbon dioxide

GLOBAL WARMING



COMPOSTING

ENERGY

ENERGY

**Extraction of
Virgin
Materials**

**Production of
Manufactured
Items**

Consumption

**Discarded
Materials**

Solid waste

Air pollution

Water pollution

Carbon dioxide

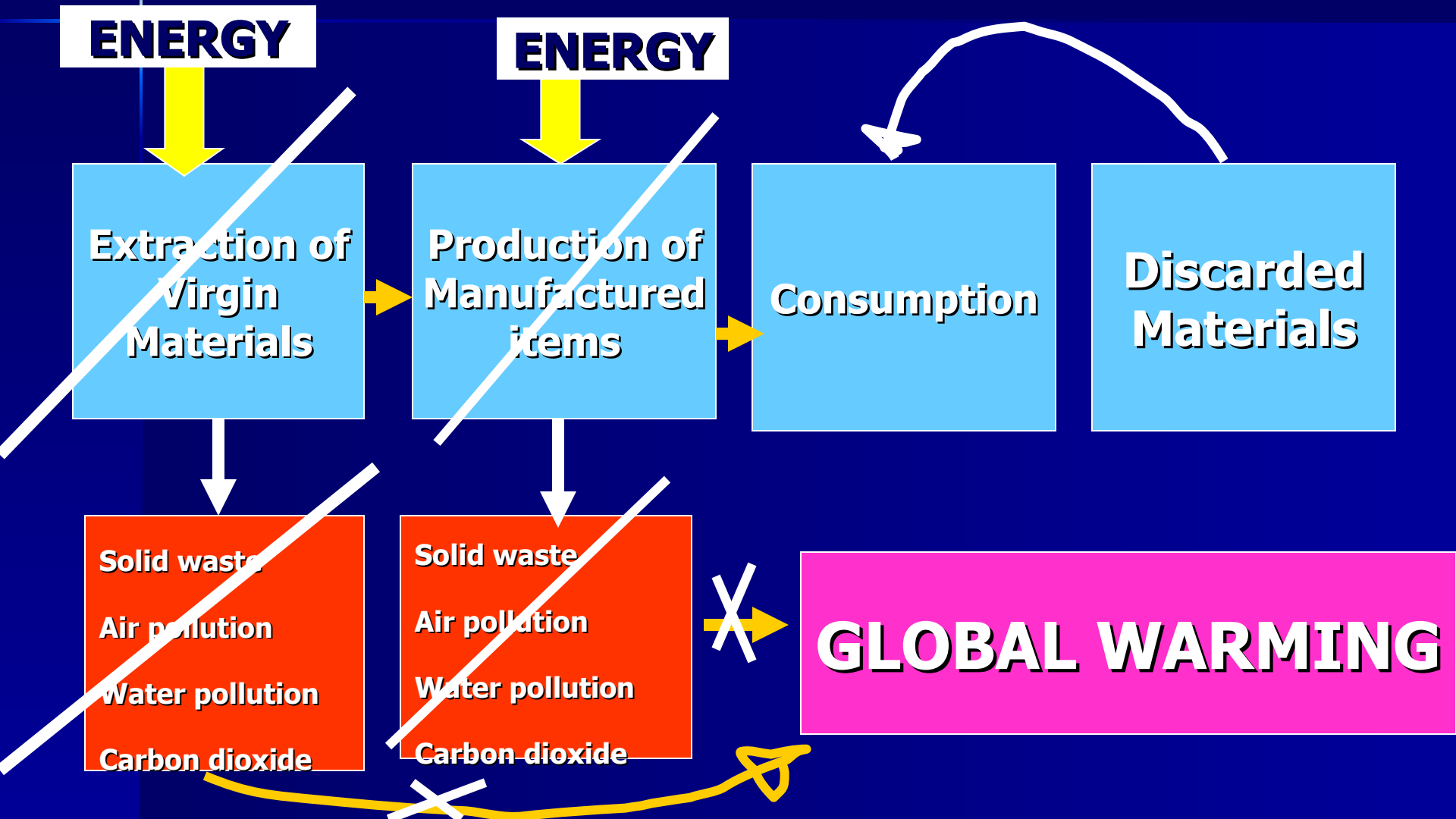
Solid waste

Air pollution

Water pollution

Carbon dioxide

GLOBAL WARMING



COMPOST



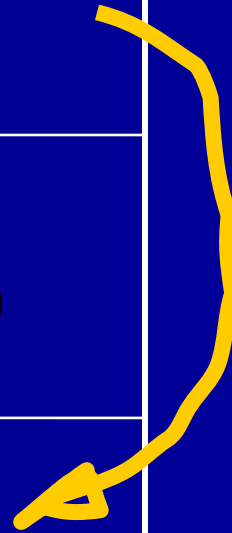
Kg Greenhouse gas/tonne Municipal Waste

<i>A combination of recycling and composting</i>	-461
<i>Incineration generating electricity</i>	-10

Waste Management Options and Climate Change. AEA 2001

Kg Greenhouse gas/tonne Municipal Waste

<i>A combination of recycling and composting is 46 times better</i>	-461
<i>at reducing greenhouse gases than</i>	X 46
<i>Incineration generating electricity</i>	-10



Waste Management Options and Climate Change. AEA 2001

Incineration is a waste of energy!

- About 4 X more energy saved by reusing, recycling and composting the various components in the discard stream
- Contact: Dr. Jeffrey Morris,
jeff.morris@zerowaste.com

Energy Comparison: **Recycling** versus **incineration** (ICF consulting, 2005)

material	Energy savings from recycling GJ/tonne	Energy output from incineration GJ/tonne	Energy savings recycling versus incineration
Newsprint	6.33	2.62	2.4
Fine paper	15.87	2.23	7.1
Cardboard	8.56	2.31	3.7
Other paper	9.49	2.25	4.2
HDPE	64.27	6.30	10.2
PET	85.16	3.22	26.4
Other plastic	52.09	4.76	10.9

Incineration is not sustainable

- Incineration does not challenge the **over-consumption** of finite resources.
- Every time we burn something we have to return to the beginning of the extraction, manufacture and consumption system.
- **Incineration wastes energy**
- **Incineration wastes the opportunity to really fight global warming**
- **IN SHORT: Incineration sabotages genuine moves towards sustainability**

2. OTHER arguments against incineration

- 1) It is a poor economic investment
- 2) Very few jobs created for very large capital investment
- 3) It wastes valuable time
- 4) It is very inflexible and stifles innovation
- 5) It generates a toxic ash

OTHER arguments against incineration (continued)

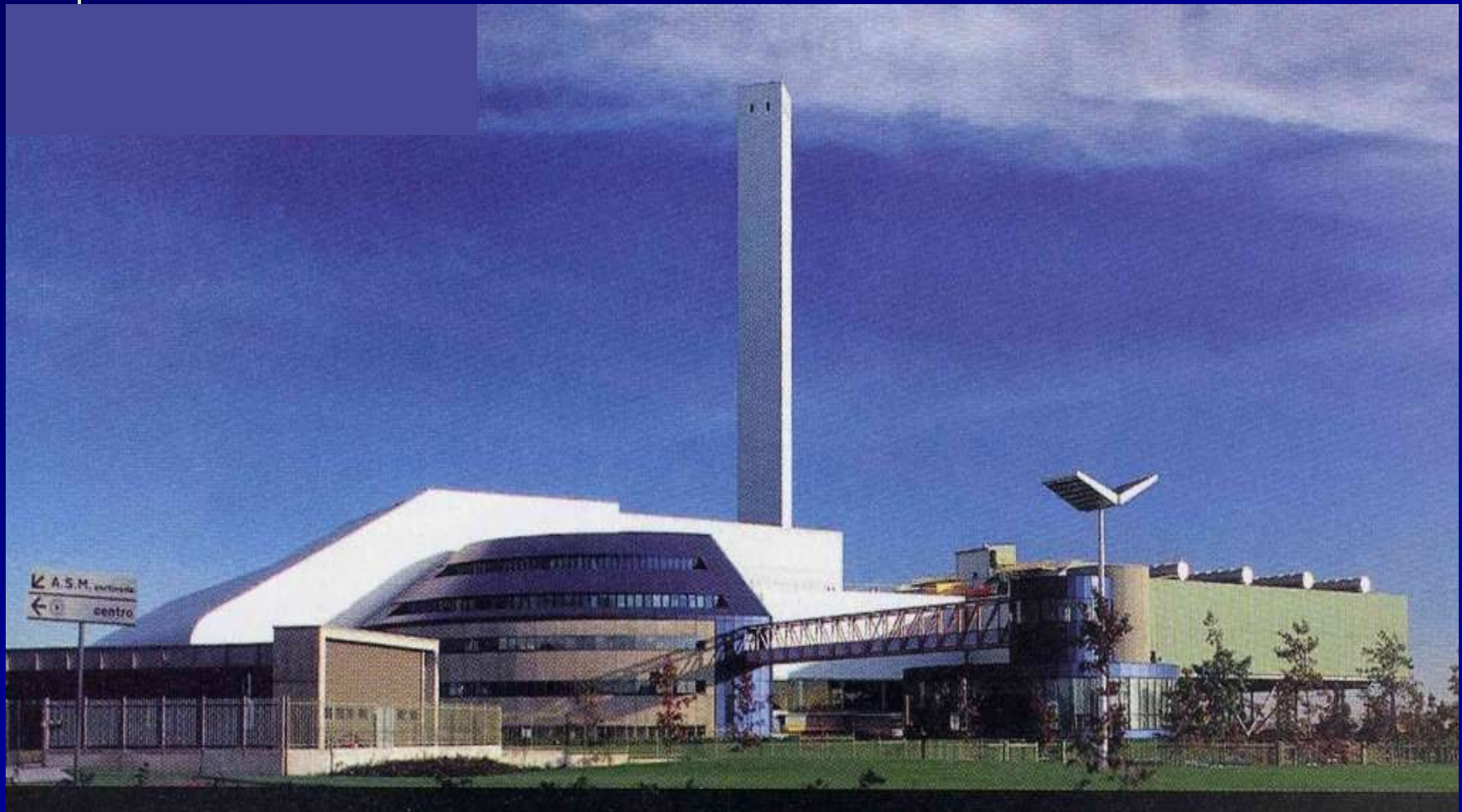
- 6) It doesn't get rid of landfills
- 7) It produces toxic air emissions
- 8) Incineration is extremely unpopular with the public
- 9) There is a far better and sustainable alternative

1. Incineration is a poor investment

- **Most of the money spent on incinerators goes into complicated machinery and leaves the community (and even the country)**
- **Over half the money spent on a modern incinerator goes into air pollution control equipment**
- **Incineration (without massive subsidies) is one of the most expensive way of generating electricity**

**2. Incineration creates
very few jobs**

An incinerator in Brescia, Italy



**The Brescia incinerator
cost 300,000,000 Euro
and has created just 80
jobs.**

**The Brescia incinerator
cost 300,000,000 Euro
and has created just 80
jobs.**

**Another 500,000,000
Euros of taxpayers money
spent on so called
“alternative energy”**

- **In contrast, the money spent on the alternatives goes into jobs and stays in the community.**

Nova Scotia program (Canada)

- Diverted 50% of waste from landfill in 5 years (Halifax ~ 60%)
- **1000 jobs created** in collection and treatment of recyclables and compostables
- **Another 2000 jobs created** in the industries handling the recovered materials

3. Incineration wastes valuable time!

- **It takes about 25 years (or more) to pay off the massive capital investment costs involved with building an incinerator.**
- **We don't have 25 years to waste on a non-sustainable solution!**

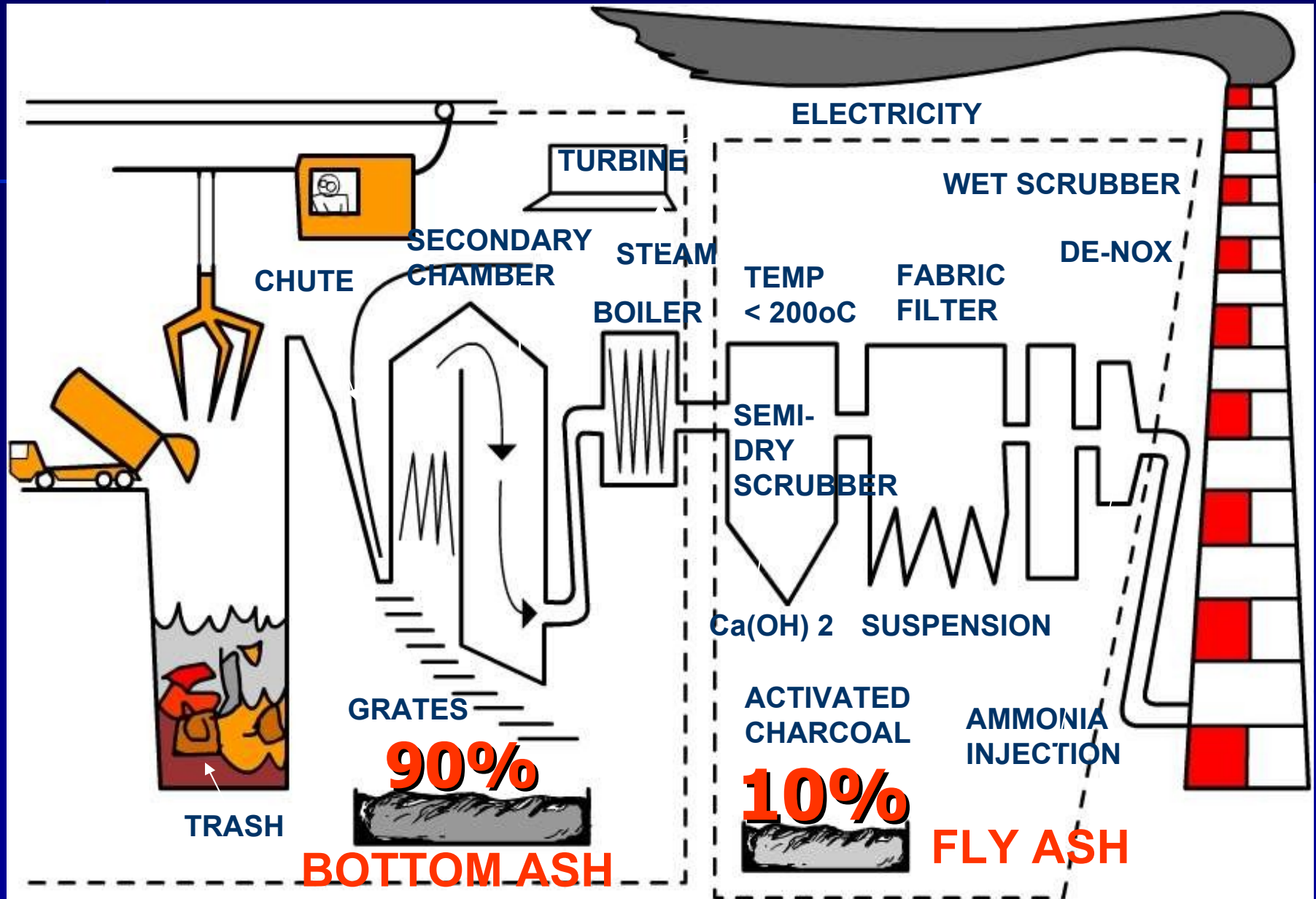
4. Incineration stifles innovation

- **“An incinerator needs to be fed for about 20 to 30 years and in order to be economic needs an enormous input from quite a region, so for 20 to 30 years you stifle innovation, you stifle alternatives, just in order to feed that monster which you build”**
- **Ludwig Kraemer, former Head of EU Waste Management, BBC 1 Panorama Documentary “Rubbish”**

5. Incinerators produce a toxic ash

- For every **four** tons of waste burned you get **one ton of ash (or more)**
- That nobody wants!

For every 4 tons of trash you get about one ton of ash



Ash is toxic and difficult to get rid of

- In Germany & Switzerland fly ash put into nylon bags and placed in salt mines
- In Japan some incinerators vitrify the ash
- In Denmark...
- They send all the ash to Norway!

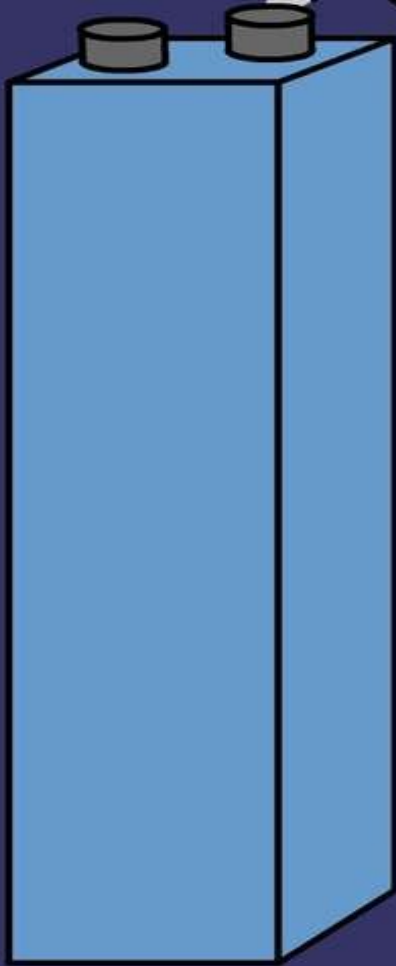
6. Incineration does not get rid of landfills

- You still need a landfill for the toxic ash

7. Incinerators put many highly toxic and persistent substances into the air

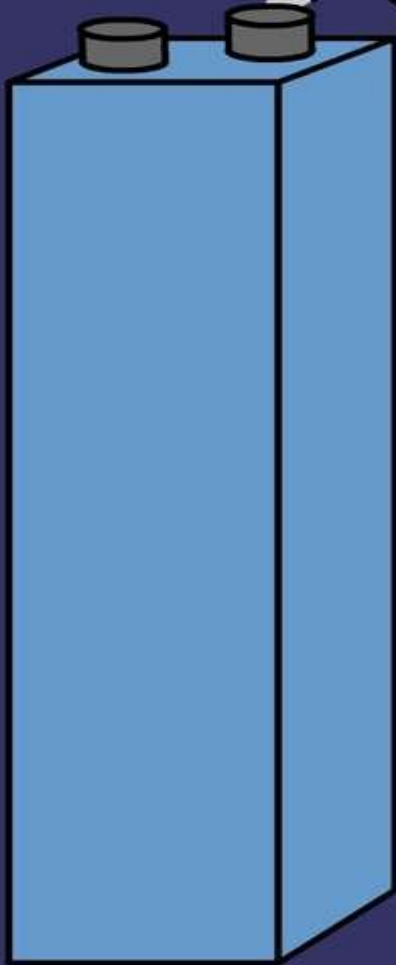


AIR EMISSIONS



- CO₂ + H₂O
- ACID GASES:
HCl, HF, SO₂
NO_x
-
-

AIR EMISSIONS



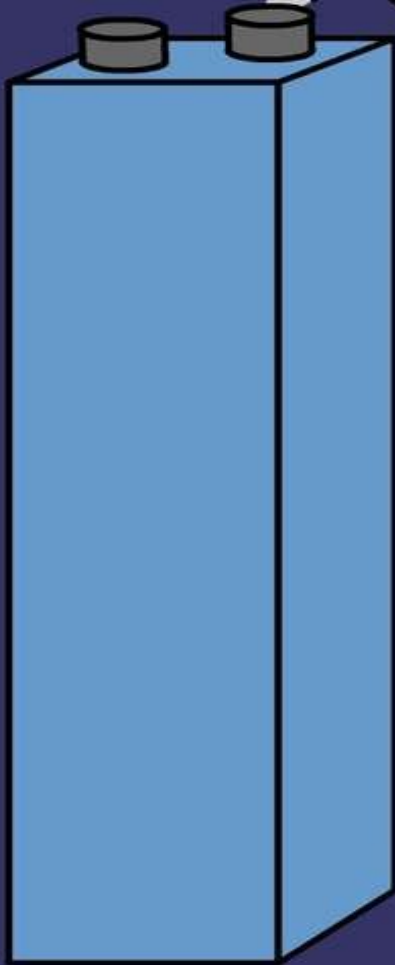
- CO₂ + H₂O

- ACID GASES:
HCl, HF, SO₂
NO_x

- TOXIC METALS:
Pb, Cd, Hg, As, Cr etc

-

AIR EMISSIONS



- CO₂ + H₂O

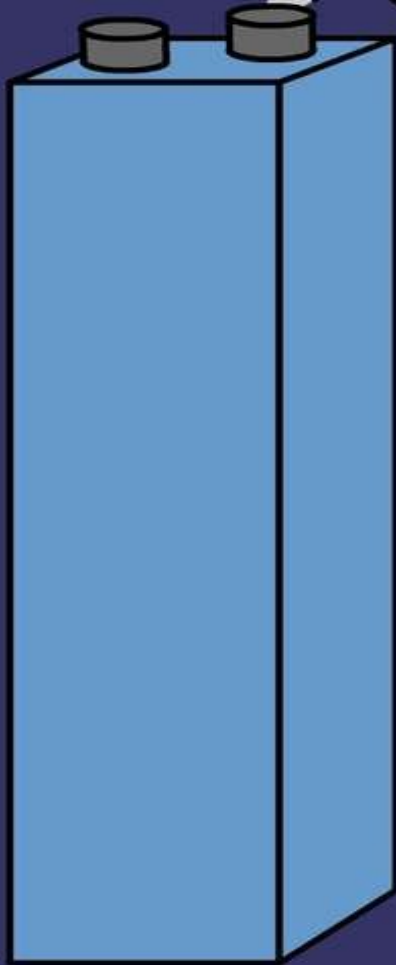
- ACID GASES:
HCl, HF, SO₂
NO_x

- TOXIC METALS:
Pb, Cd, Hg, As, Cr etc

- NEW COMPOUNDS:

PCDDs (DIOXINS)
PCDFs (FURANS)
PCB's
ETC

AIR EMISSIONS



- CO₂ + H₂O

- ACID GASES:
HCl, HF, SO₂
NO_x

- TOXIC METALS:
Pb, Cd, Hg, As, Cr etc

- NEW COMPOUNDS:

PCDDs (DIOXINS)
PCDFs (FURANS)
PCB's
ETC

NANO
PARTICLES

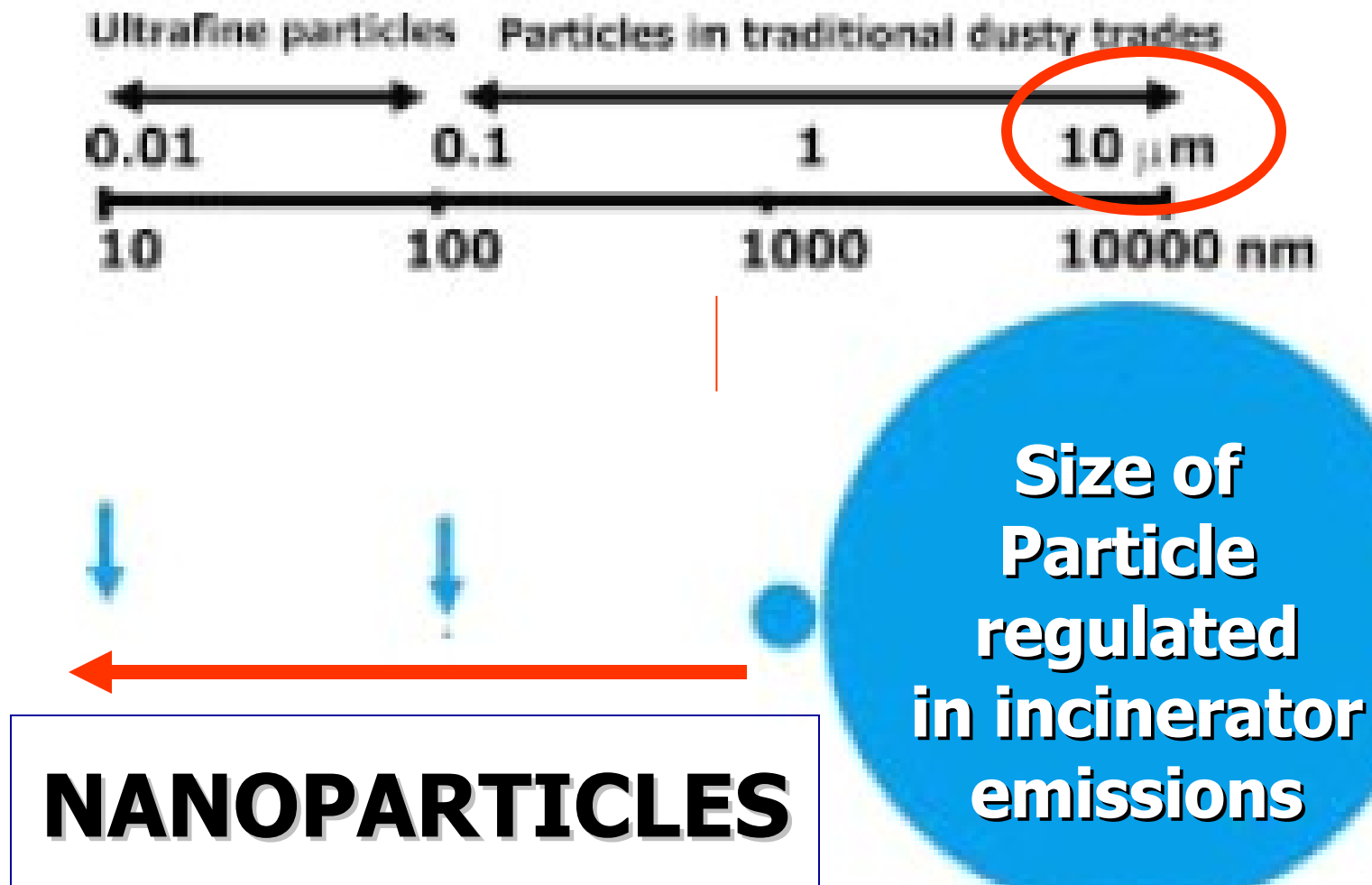


Figure 3 Relative size of ultrafine particles compared with particles in traditional dusty trades.

Incineration, nanoparticles & Health

Statement of Evidence

**Particulate Emissions and Health
Proposed**

Ringaskiddy Waste-to-Energy Facility

**Professor C. Vyvyan Howard MB. ChB.
PhD. FRCPath. June 2009**

VYV.howard@gmail.com

Nanoparticles & Health

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2. Polichetti, G., et al., *Effects of particulate matter (PM10, PM2.5 and PM1) on the cardiovascular system*. *Toxicology*. **In Press**.
3. Pope, A.C., 3rd and D.W. Dockery, *Health Effects of Fine Particulate Air Pollution: Lines that Connect*. *Journal of the Air & Waste Management Association*, **2006**. 56: p. 709-742.
4. Nawrot, T.S., et al., *Stronger associations between daily mortality and fine particulate air pollution in summer than in winter: evidence from a heavily polluted region in western Europe*. *J Epidemiol Community Health*, **2007**. 61(2): p. 146-149.
5. Donaldson, K., X.Y. Li, and W. MacNee, *Ultrafine (nanometre) particle mediated lung injury*. *Journal of Aerosol Science*, **1998**. 29(5-6): p. 553-560.

Nanoparticles & Health

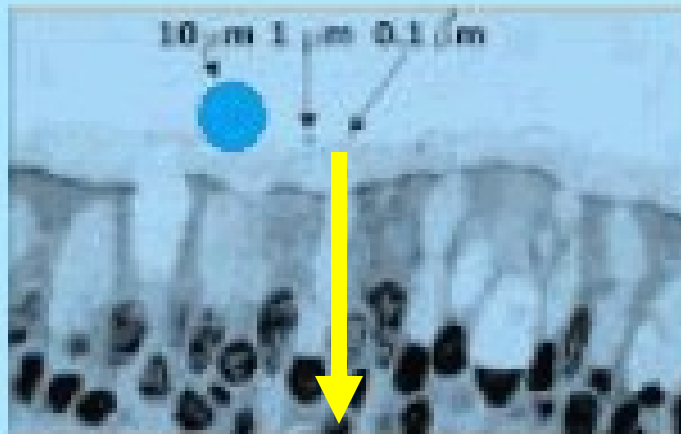
6. Donaldson, K., et al., *Combustion-derived nanoparticles: A review of their toxicology following inhalation exposure. Particle and Fibre Toxicology*, **2005**. 2(1): p. 10.
7. Li, N., et al., *Ultrafine particulate pollutants induce oxidative stress and mitochondrial damage. Env Health Pers*, **2003**. 111(4): p. 455-60.
8. Bai, N., et al., *The pharmacology of particulate matter air pollution-induced cardiovascular dysfunction. Pharmacology & Therapeutics*, **2007**. 113(1): p. 16-29.
9. Brook, R., et al., *Air pollution and cardiovascular disease: a statement for healthcare professionals from the Expert Panel on Population and Prevention Science of the American Heart Association. Circulation*, **2004**. 109: p. 2655 - 2671.
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Nanoparticles & Health

11. Oberdorster, G., E. Oberdorster, and J. Oberdorster, *Nanotoxicology: an emerging discipline evolving from studies of ultrafine particles. Environ Health Perspect*, **2005**. 113: p. 823 - 839.
12. Seaton, A., et al., *Particulate air pollution and acute health effects. The Lancet*, **1995**. 345(8943): p. 176-178.
13. Yang, W., J.I. Peters, and R.O. Williams Iii, *Inhaled nanoparticles--A current review. International Journal of Pharmaceutics*, **2008**. 356(1-2): p. 239-247.
14. Salvi, S., *Health effects of ambient air pollution in children. Paediatric Respiratory Reviews*, **2007**. 8(4): p. 275-280.
15. Kim, C.S. and P.A. Jaques, *Respiratory dose of inhaled ultrafine particles in healthy adults. Philosophical Transactions of the Royal Society of London. Series A: Mathematical, Physical and Engineering Sciences*, **2000**. 358(1775): p. 2693-2705.

Incineration and nanoparticles

- **Nanoparticles are not efficiently captured by air pollution control devices**
- **Travel long distances**
- **Remain suspended for long periods of time**
- **Penetrate deep into the lungs**



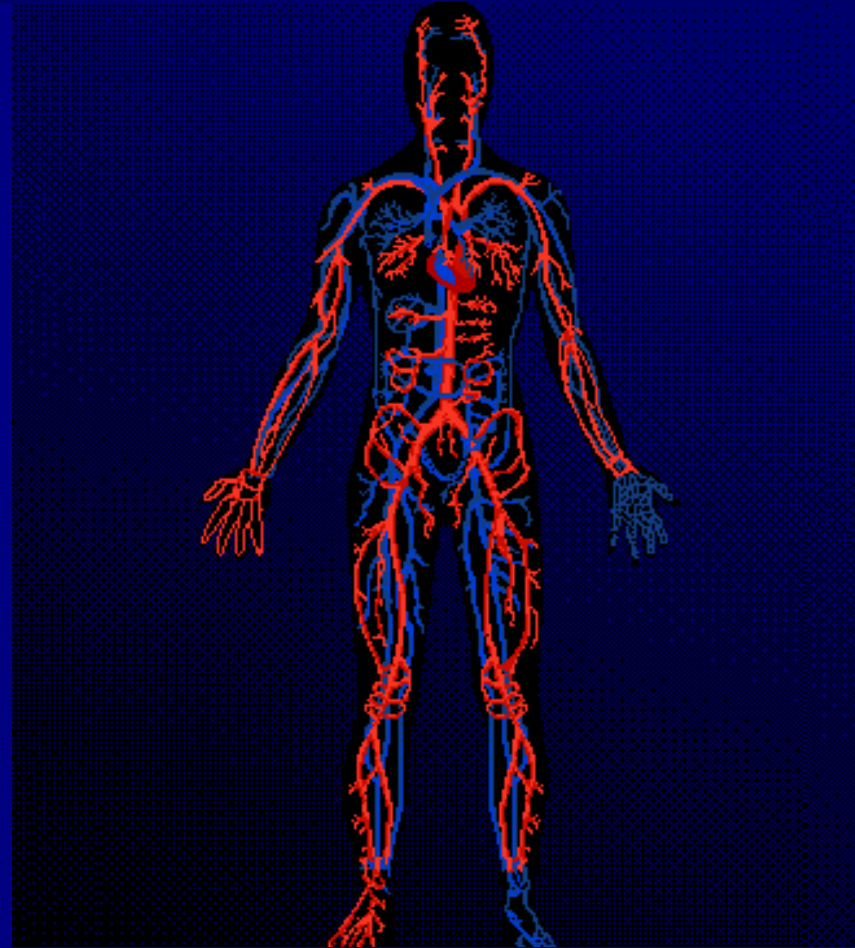
BLOOD

Nano particles are
so small they
can easily cross
the lung membrane

Figure 1 Relation between ultrafine particles and cellular structures in the lung. Idealised particles of 10, 1, and 0.1 μm are shown compared with a bronchial epithelium; note that the top end of the range of ultrafine particles (0.1 μm, 100 nm) is not really visible. On the right are shown the same three particles relative to cells.

Nano Pathology

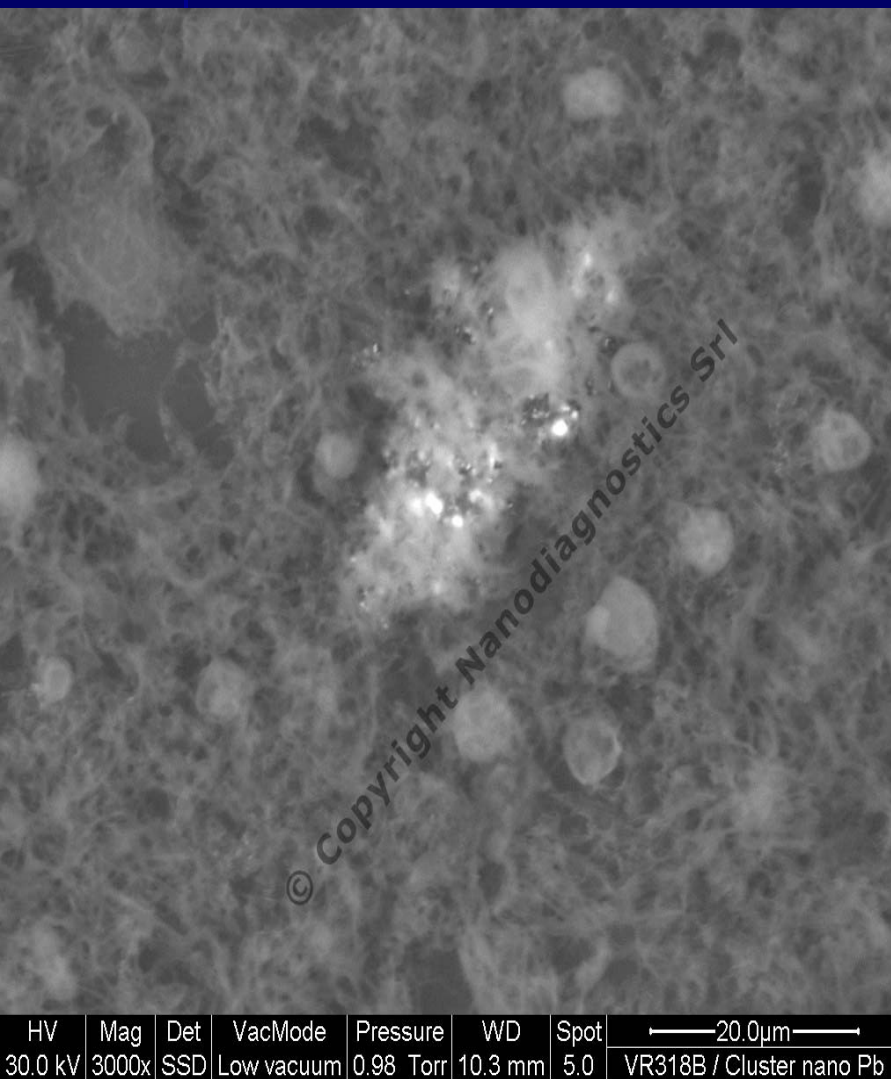
- Once nanoparticles have entered the bloodstream they can easily cross the membranes of every tissue in the body.



Nano Pathology

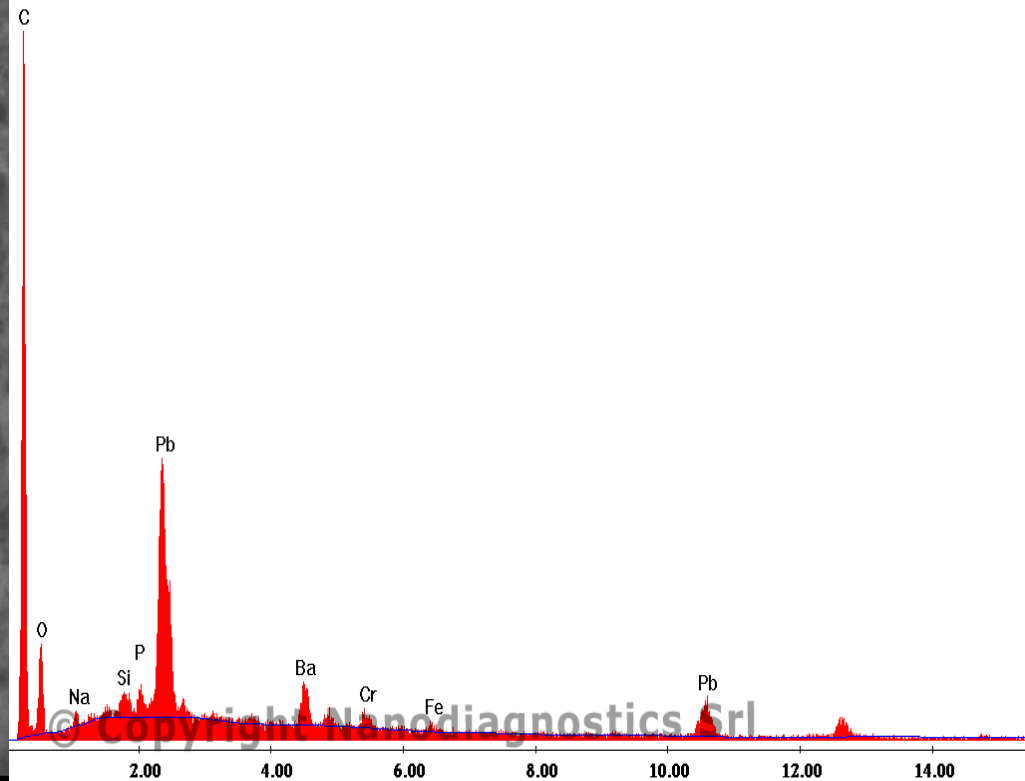
- They can even cross the blood brain barrier

Aggregati di Piombo, Bario, Cromo, Ferro e Silicio in Cervello.



E:\in_esamel318 VR318 BIVR318B_009.spc

Label A: DJ 319 A / spleen / cluster 20 um con debris da 1 a 0,1 um



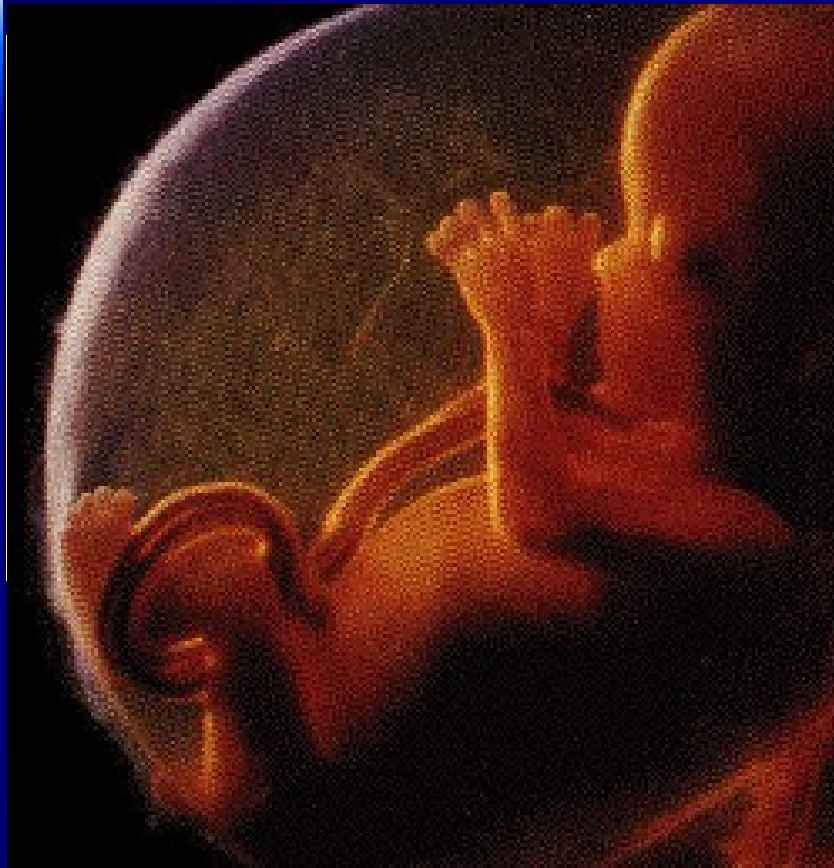
Dioxins and Incineration

**(more detailed ppt
available)**

Dioxins - major concerns

- **Dioxins accumulate in animal fat.**
- **One liter** of cows' milk gives the same dose of dioxin as breathing air next to the cows for **EIGHT MONTHS** (Connett and Webster, 1987).
- Dioxins steadily accumulate in human body fat.
- The man cannot get rid of them **BUT A woman can...**
- **...by having a baby!**

Dioxins: the highest dose goes to the fetus



In nine months
much of the
dioxin which has
accumulated in
the mother's fat
for 20-30 years
goes to the fetus

Dioxins can disrupt fetal and infant development

- Dioxins act like fat soluble hormones
- Disrupt at least 6 different hormonal systems:
 - male and female sex hormones;
 - thyroid hormones;
 - insulin; gastrin and glucocorticoid.

Dioxins interfere with fetal and infant development

- **Linda S. Birnbaum** (Health Effects Research Laboratory, US EPA)
Developmental Effects of Dioxins
Environmental Health Perspectives, 103: 89-94, 1995

Our Stolen Future

**How Man-made Chemicals are
Threatening our Fertility,
Intelligence and Survival**

Theo Colborn

John Peterson Myers

Dianne Dumanoski

1994

Institute of Medicine, 2003

**Dioxins and Dioxin-like Compounds in
the Food Supply**

Strategies to Decrease Exposure

July 1, 2003

Institute of Medicine, 2003

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

Dioxins & Incineration (conclusions)

- We have too much dioxin in our food
- We have too much dioxin in our bodies
- We have too much dioxin in our babies
- We shouldn't be putting any more dioxin into the environment if we can possibly avoid doing so
- **Incineration is an AVOIDABLE source of dioxin**

8. Incineration is very unpopular with the public

- Between 1985-95 over 300 incinerator proposals rejected in the USA.
- No new incinerator permitted since 1995.
- Incinerators are so unpopular with the public they use different names - resource recovery facilities, waste-to-energy, thermal valorization etc etc

The modern incinerator is attempting to perfect a bad idea

- At the **industrial level** 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!
- And at the **personal level** to search for a lifestyle beyond consumerism

The Waste problem will not be solved with better **technology**

- But with
- Better **organization**
- Better **education**
- and better **industrial design**

3. The ZERO WASTE 2020 strategy

**ZERO WASTE
IS A
NEW
DIRECTION**

THE BACK END OF WASTE MANAGEMENT

**THE
BACK END
OF
WASTE
MANAGEMENT**



**THE
FRONT END
OF
RESOURCE
MANAGEMENT,
INDUSTRIAL
DESIGN
&
POST-CONSUMERISM**

THE KEY

is to find a way to use

COMMUNITY RESPONSIBILITY

at the back end to drive

INDUSTRIAL RESPONSIBILITY

at the front end

Zero Waste can be approached with a series of simple steps

- which are
- Practical
- Cost effective and
- Politically acceptable

10 steps to Zero Waste

1. Source Separation
2. Door-to-door Collection
3. Composting
4. Recycling
5. Re-use, repair & deconstruction

10 steps to Zero Waste

6. Waste reduction initiatives
7. Economic incentives
8. Residual Separation and Research
9. Better industrial design
10. Interim landfill for the stabilized
“dirty” organic fraction.

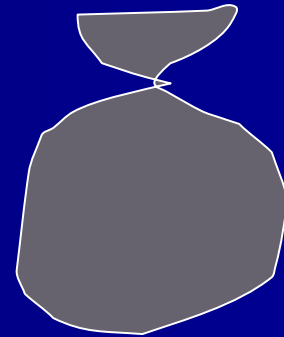
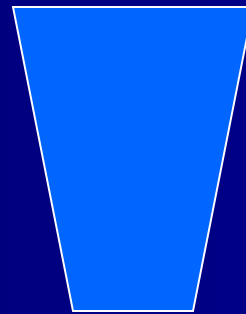
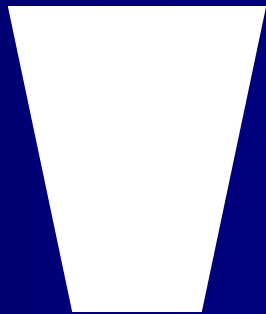
1. Source Separation
&
2. Door-to-door collection

“The Fantastic 3”



The San Francisco system

I "Fantastici 4"



Capannori, Italia

Capannori

LUNEDI	ORGANICO	
MARTEDI	MULTIMATERIALE	
MERCOLEDI	CARTA	
GIOVEDI	FRAZIONE RESIDUA	
VENERDI	ORGANICO	
SABATO	MULTIMATERIALE	

3. Composting

Organic Fraction heirarchy

- 1) Food to humans (in time marketing, Prof. Andrea Segre, Facolta di Agraria, U. Bologna)
- 2) Food to animals (bones, meat etc)
- 3) Backyard composting
- 4) Community composting (e.g. Zurich, Switzerland)
- 5) Co-composting with local farmers
- 6) Centralized composting facility.

The importance of Composting

- 1) Returns nutrients to the soil
- 2) Increases soil's retention of water
- 3) Retains carbon (vs. Global warming)
- 4) Makes it easier for cities to handle the recyclables (jobs and businesses!)
- 5) But to use compost in agriculture you MUST have it clean – which means you MUST have DOOR-TO-DOOR collection.



**Composting
Facility**

Composting plant for San Francisco



Local farmers are using the compost to grow fruit and vegetables for San Francisco



4. Recycling



1

2

3



**Composting
Facility**

**Materials
Recovery
Facility**

MATERIALS RECOVERY FACILITY



at Pier 96



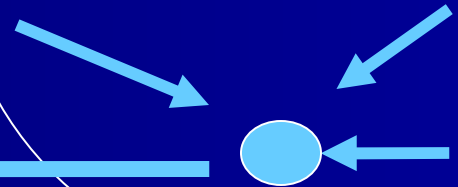
Cities

Rural areas



**Composting
Plants**

**Recycling
Plants**



5. Reuse, Repair & Deconstruction

Value of Los Angeles discarded materials

Market Categories	%	Tons/Year	\$/ton	\$
1.Reuse Reusable items	2.0	72,000	550	39,600,000
2.Paper	22.0	792,000	20	15,840,000
3.Plant Debris	5.5	198,000	7	1,386,000
4.Putrescibles	17.0	612,000	7	4,284,000
5.Wood	4.0	144,000	8	1,152,000
6.Ceramics	13.0	468,000	4	1,872,000
7.Soils	10.0	360,000	7	2,520,000
8.Metals	4.0	144,000	40	5,760,000
9.Glass	2.0	72,000	10	720,000
10.Polymers	8.0	288,000	100	28,800,000
11.Textiles	2.0	72,000	20	1,440,000
12.Chemicals	0.5	18,000	15	270,000
No market (diapers, treated wood, mistakes)	10.0	360,000		0
TOTAL PER YEAR	100	3,600,000		\$103,644,000

Reuse, Repair & Deconstruction



Urban Ore, Berkeley, California



- Urban Ore operating for 30 years

- Grossing \$3 million per year
- 27 full-time well-paid jobs

Economics

- “Economically, incineration represents ONE BIG BLACK BOX
- The Zero Waste strategy represents 100’s of LITTLE GREEN BOXES”
- (Ted Ward, Zero Waste, Del Norte County, California)





Deconstruction



Deconstruction

**Reuse &
Repair Center**



Deconstruction

**Reuse &
Repair Center**

**Furniture,
Flooring, etc**

VIDEOS

- www.AmericanHealthStudies.org
- Examples of Reuse and Repair Centers from California, Vermont, Nova Scotia and Australia

Reuse and Repair Centers

Can be used for:

1. Poverty relief
2. Job training (Burlington, Vermont, see video)
3. Community building (recreate the village within the city)

San Francisco

- Population = 850,000
- Very little space
- 50% waste diverted by 2000
- 63% waste diverted by 2004
- 70% waste diverted by 2008
- 72% waste diverted by 2009
- GOAL:75% waste diverted by 2010
- GOAL:100% by 2020 (or very close!)

Please Note

Mass burn incineration only gets
75% diversion from landfill.

For every 4 Tons of waste burned
you get at least 1 Ton of Toxic Ash.



**Composting
Facility**

**Materials
Recovery
Facility**

**Residual
Fraction**

We have to minimize the residual fraction with...

- 1) Waste reduction initiatives**
- 2) Economic incentives**

6. Waste Reduction Initiatives

Undesirable packaging

- Four options:
- Ban it
- Tax it
- Put a returnable deposit on it
- Avoid it

Ireland

- Government put a 15 cent tax on plastic shopping bags
- reduced use by 92% in one year!

Italy

In time collection of food
from supermarkets and
restaurants

Prof. Andrea Segre

Agriculture Dept.,

U. of Bologna

andrasegre@unibo.it

Italy

- Several supermarket chains are providing dispensers which allow customers to refill **shampoo** and **detergent** bottles...
- As well as **wine, water** and **milk**

Italy

EFFECORTA,
Capannori



L'esperienza effecorta

www.effecorta.it

**95% of products come from within
70 km of store**



60 dispensing systems for solids



60 taps for liquids





No plastic used for shopping bags



- Un pizzico di creatività a monte può far risparmiare milioni a valle



7. Economic Incentives

The "Pay by bag" system

1

2

3

The "Pay by bag" system

1

2

3

free

The "Pay by bag" system

1

free

2

free

3

The "Pay by bag" system

1

free

2

free

\$

**The more
you make,
the more
you pay!**



Waste
Reduction
Initiatives

Composting
Facility

Materials
Recovery
Facility

Residuals
?



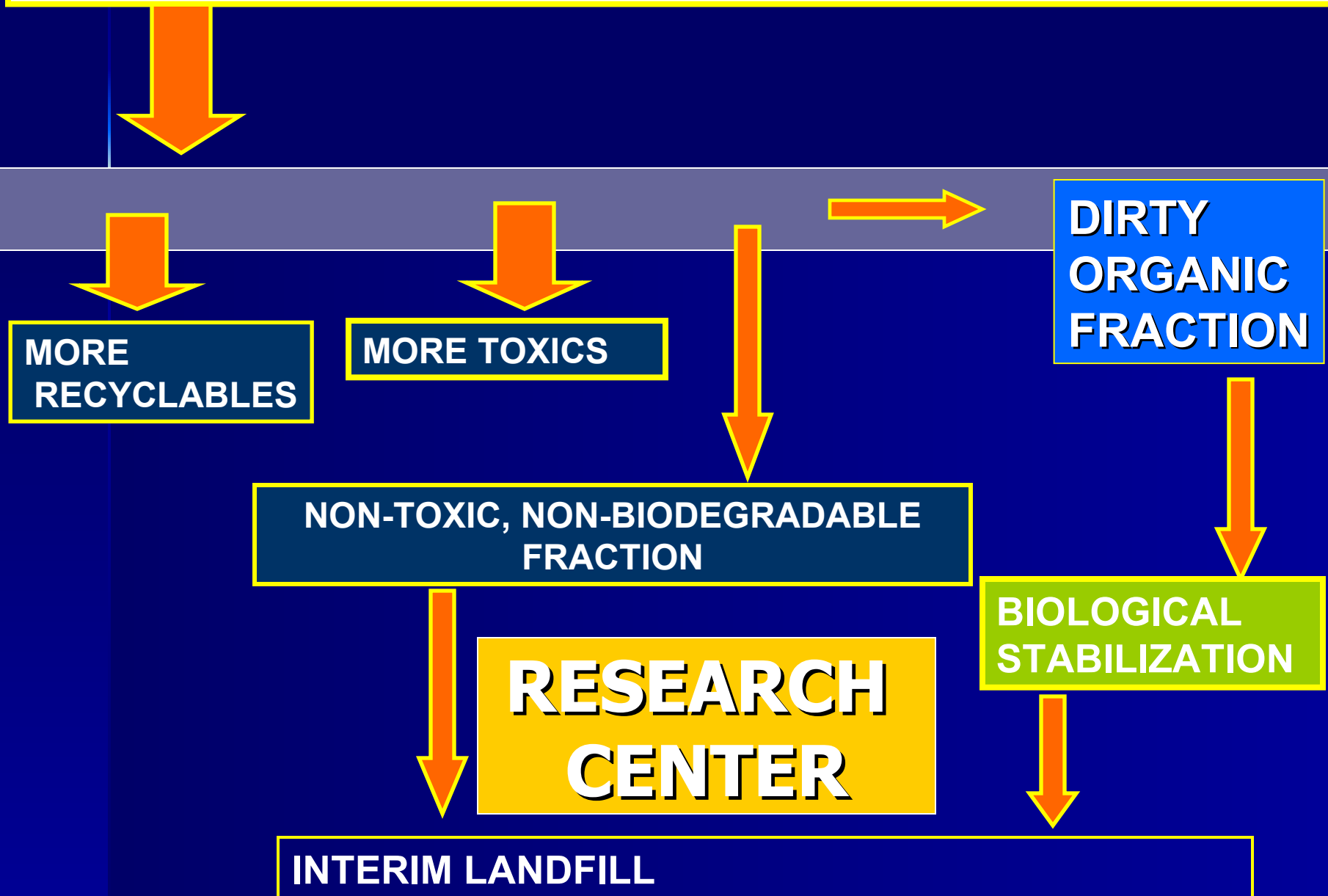
Reuse & Repair
& Deconstruction

8. Residual Separation & Research Facility

RESIDUAL SEPARATION & RESEARCH FACILITY

- 1. Built at entrance to landfill
- 2. No material can enter landfill without it being separated and screened
- 3. More material recycled
- 4. Toxics removed and identified
- 5. Dirty organics biologically stabilized
- 6. Non-recyclable materials STUDIED

RESIDUAL SCREENING & RESEARCH FACILITY



NON-RECYCABLE MATERIALS

**Local
University**

**Or
Technical College**

**RESEARCH
CENTER**

RESEARCH CENTER

- TASKS:
- Improve **capture rate** of reusables, recyclables and clean compostables
- Recommend improved **waste avoidance strategies** for local businesses
- Develop **local uses** for some materials
- Recommend better industrial designs to industry on packaging and products
- Research for CLEAN Production

NON-RECYCLABLE MATERIAL

- 1) CAN IT BE AVOIDED?
- 2) CAN IT BE USED LOCALLY?
- 3) CAN IT BE RE-DESIGNED?

NON- RECYCLABLE MATERIALS & OBJECTS

PLASTICS &
COMPOSITE

HOUSEHOLD
TOXICS

DIRTY
ORGANIC
FRACTION

S

**ZERO WASTE
RESEARCH CENTER**

THE RESIDUAL SEPARATION AND ZERO WASTE RESEARCH CENTER



**COMMUNITY
RESPONSABILITY**

THE RESIDUAL SEPARATION AND ZERO WASTE RESEARCH CENTER



The Message to Industry:

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

RESIDUAL SEPARATION & RESEARCH FACILITIES

Progress Report:

1. Residual separation facilities operating in Nova Scotia (see video)
2. Zero Waste Research Center announced for Capannori, Italy Jan 23, 2010
3. Residual separation and research facility to be opened in Trapani, Italy, February, 2010.

FRAZIONE RESIDUA - Capannori Porta a Porta

1.	Tessili e cuolo	16.52 %
2.	Pannolini	13.95 %
3.	Materiale organico da cucina	10.56 %
4.	Altra plastica: non imballo	9.98 %
5.	Imballaggi cellulosici poliaccoppiati	8.05 %
6.	Imballaggi poliaccoppiati in plastica	7.45 %
7.	Imballaggi flessibili in plastica	6.81 %
8.	Materiale organico da giardino	4.64 %
9.	Imballaggi rigidi in plastica (non bottiglie)	3.23 %
10	Giornali (quotidiani e riviste)	2.54 %

FRAZIONE RESIDUA — Capannori

1.	Tessili e cuoio	16.52 %
2.	Pannolini	13.95 %
3.	Materiale organico da cucina	10.56 %
4.	Questa e' l'analisi del 17% che rimane dopo la separazione dell' 83% del materiale raccolto porta a porta	
5.		
6.		
7.		
8.		
9.		
10		



Belice Ambiente S.p.A.

Regione Siciliana - Ato Tp2

Un'esperienza siciliana

GLI IMPIANTI

LE DISCARICHE

PARTANNA

Satura

**C.BELLO DI
MAZARA**

In esercizio

CASTELVETRANO

Chiusa

I CENTRI DI RACCOLTA

13 centri per il conferimento individuale

IL POLO TECNOLOGICO

**IMPIANTO DI
COMPOSTAGGIO**

Completato

**IMPIANTO
SELEZIONE E
VALORIZZAZIONE
FRAZIONE SECCA**

In costruzione

**OPERE DI
URBANIZZAZIONE,
AUTORIMESSA, CENTRO
DI RICERCA**

In costruzione

IL "MODELLO" DI BELICE AMBIENTE SPA



Raccolta porta a porta



Un centro di raccolta



Un angolo del Polo Tecnologico

LA RICERCA

LO STUDIO E L'ANALISI PER UN "MODELLO SICILIANO"



WITH THE ZERO WASTE 2020 STRATEGY

WE CONVERT 3 TONS OF TRASH

into:

1 ton of compostables

1 ton of recyclables

and

1 ton of EDUCATION for
SUSTAINABILITY!

9. Better Industrial Design

10. An interim landfill
for biologically
stabilized dirty organic
fraction


Interim landfill

- 1. The interim landfill needs to be owned by the local community – not by a private company
- 2. We need to shift the profit from waste disposal to genuine resource recovery
- 3. Incinerators and mega-landfills are in the corporate interest of multi-national waste corporations – zero waste is in the public interest (and the planet's interest!)
- 4. Key question: will political leaders side with corporate interest or the public interest?

SUMMARY

10 steps to Zero Waste

Source Separation



**Source
Separation**

**Door to Door
Collection**

**Source
Separation**

**Door to Door
Collection**

Composting

**Source
Separation**

**Door to Door
Collection**

Composting

Recycling

**Source
Separation**

**Door to Door
Collection**

Composting

Recycling

**Reuse, Repair
& Community
Center**

**Source
Separation**

**Door to Door
Collection**

Composting

Recycling

**Reuse, Repair
& Community
Center**

**Waste
Reduction
Initiatives**

**Source
Separation**

**Door to Door
Collection**

Composting

Recycling

**Reuse, Repair
& Community
Center**

**Waste
Reduction
Initiatives**

**Economic
Incentives**

**Source
Separation**

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Collection**

Composting

Recycling

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**Residual
Separation &
Research
Center**

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**Better
Industrial
Design**

**Source
Separation**

**Door to Door
Collection**

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Center**

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**Residual
Separation &
Research
Center**

**Better
Industrial
Design**

Temporary Landfill

**Source
Separation**

**Door to Door
Collection**

Composting

Recycling

**Reuse, Repair
& Community
Center**

**Waste
Reduction
Initiatives**

**Economic
Incentives**

**Residual
Separation &
Research
Center**

**Better
Industrial
Design**

Temporary Landfill

2020

70 - 80%

COMMUNITY RESPONSIBILITY

**Residual
Separation &
Research
Facility**

**Better
Industrial
Design**

2020

INTERIM LANDFILL

70-80%

COMUNITY RESPONSIBILITY

20-30%

**INDUSTRIAL
RESPONSIBILITY**

INTERIM LANDFILL

2020

Industrial Responsibility

1. Design for sustainability
2. Clean production
3. Extended Producer Responsibility (EPR)

EPR- packaging

- **The Ontario (Canada) Beer industry has used refillable glass bottles for 50 years**
- **98% recovered**
- **Each bottle reused 18 times**
- **It saves the company money**
- **2000 jobs in collection and cleaning**
- **No cost to municipality**

EPR- products

XEROX CORPORATION EUROPE

- Recovers copying machines from 16 different countries
- Takes them to huge warehouses in the Netherlands, where the machines are stripped down for re-useable parts and recyclable materials
- **95% of materials recovered! AND**
- **This is saving Xerox \$76 millions a year!!**

**Solid waste is the visible
face of inefficiency!**

For more examples of Industrial Responsibility

- Contact Gary Liss at gary@garyliss.com
- For more information on EPR initiatives contact Bill Sheehan at
- Bill@productpolicy.org

4. Progress towards Zero Waste around the world

- www.zwia.org (Zero Waste International Alliance)
- www.GRRN.org (Grass Roots Recycling Network)
- www.CRRA.org (California Resources Recovery Association)
- www.no-burn.org (Global Alliance for Incineration Alternatives)

California

- As a result of a state law passed in the early 1990's hundreds of California cities exceeded over 50% diversion from landfills and incinerators by 2000
- Some communities said why stop at 50%, why not aim for 60%, 70%...?
- Why not aim for Zero Waste?

Envision a world without waste

Mayor's directives

Phase out of Urban Landfills

RENEW LA

No wasted resources

Optimize City's collection programs

70% diversion by 2015

90% diversion by 2025

Alternative Technology

Convert the City's 750+ collection trucks to clean-burning LNG by 2010

Sustainable waste resources/biosolids management

**ZERO
WASTE**

Envision a world without waste



LOS ANGELES, CALIFORNIA (pop. 4 million)

Solid Waste Integrated Resources Plan

All of us together can make Zero!

Media Breakfast Briefing

January 23, 2007

Reina Pereira, Project Manager, SWIRP and
Senior Environmental Engineer,
Los Angeles Bureau of Sanitation



CITY OF LOS ANGELES

SANITATION
DEPARTMENT OF
PUBLIC WORKS

ZERO
WASTE PLAN
Solid Waste Integrated Resources Plan

Canberra, Australia



NEW ZEALAND

Over 70%
of communities
have declared
a Zero Waste
strategy



Prince Edward Island, Canada

- Whole island has door-to-door collection of recyclables and compostables

Nova Scotia, Canada (video)

- 50% diversion in 5 years (Halifax ~ 60%)
- 1000 jobs created collecting and treating discarded materials
- Another 2000 jobs created in the industries handling the collected material
- Nearly all the separated materials are re-used in Nova Scotia's own industries.

Italy

- Over 2000 communities in Italy are achieving over 50% diversion using “door to door” collection systems
- Over 200 communities achieving over 70% diversion

Italy

- **Novara** - (a city near Turin, population = 100,000) achieved **70% diversion** in just **18 months!**

Italy

- **Salerno** (near Naples, pop 145,000) 18% to 72% **in one year!**

Italy

- The **Treviso** region - 22 communities averaging **76% diversion** (Priula consortium)

Italy

- **Villafranco d'Asti**
(Piedmont, population = 30,000) has reached **85% diversion**

Spain

- Usurbil in Basque Country
- Has gone from 28% to 86% in 7 months

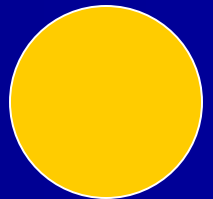
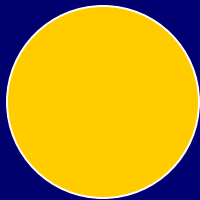
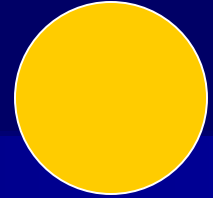
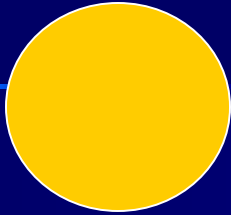
5. Linking Zero Waste to Sustainability

The Zero Waste Research Centers

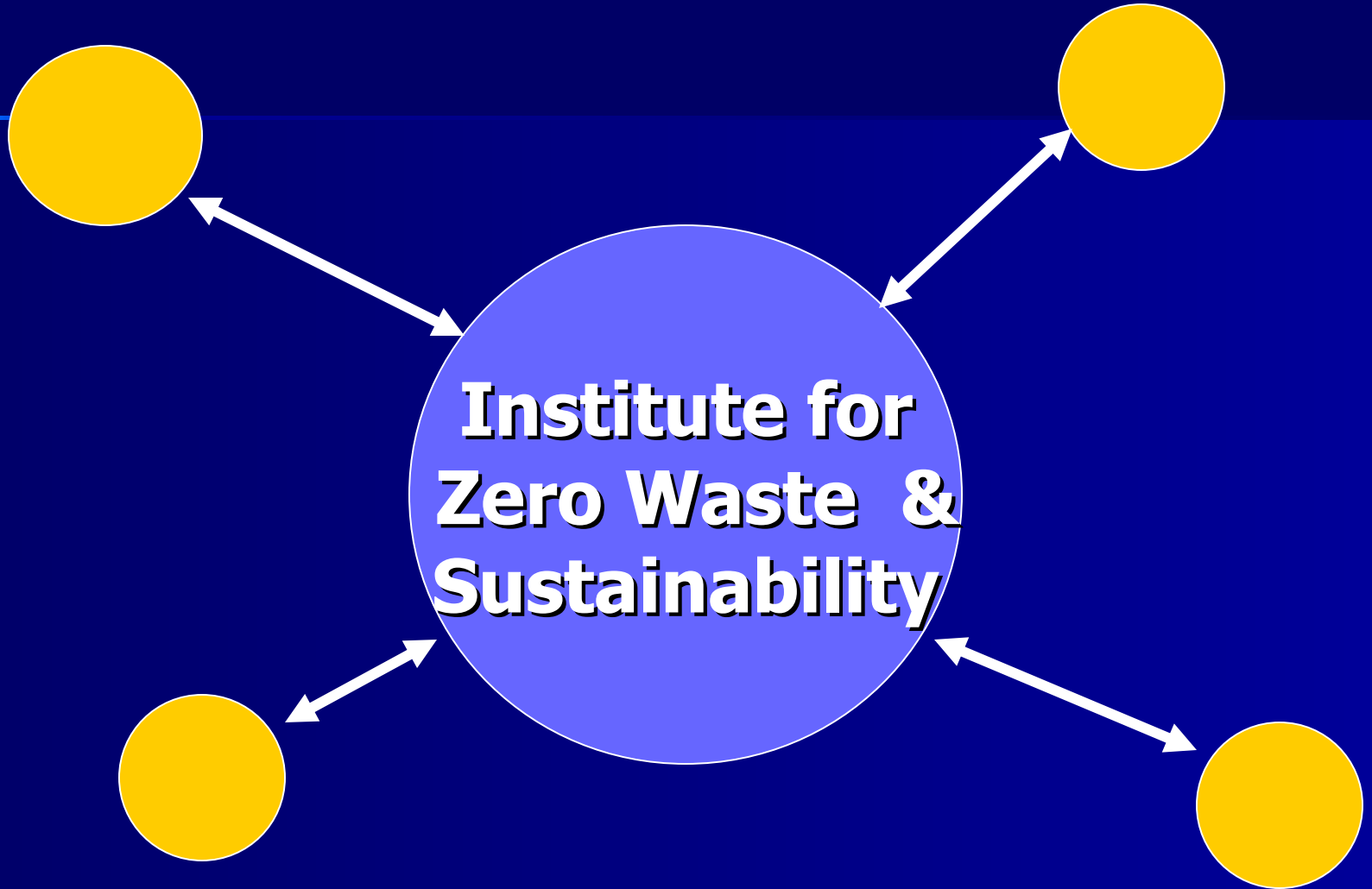
The Zero Waste Research Centers

**Can become the
“University-Community
laboratories for
sustainability”**

Zero Waste Research Centres



Zero Waste Research Centres



Institute for Zero Waste and Sustainability

Institute for Zero Waste and Sustainability

2) Research for better industrial design

Institute for Zero Waste and Sustainability

- 1) Research for better industrial design**
- 2) Linking zero waste with other key developments needed for sustainability**



Better
Industrial
Design

**Sustainable
Agriculture**

**Education
For
Sustainability**

**Sustainable
Architecture**

**Sustainable
industries
& Jobs**

Zero Waste 2020

**Sustainable
Energy**

**Sustainable
Economic
development**

**Sustainable
Community
development**



Composting

Better
Industrial
Design

**Sustainable
Agriculture**

**Education
For
Sustainability**

**Sustainable
Architecture**

**Sustainable
industries
& Jobs**

Zero Waste 2020

**Sustainable
Community
development**

**Sustainable
Economic
development**

**Sustainable
Energy**



Composting

Research Center

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Composting

Research Center

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Deconstruction

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Architecture**

**Sustainable
industries
& Jobs**

Zero Waste 2020

**Anaerobic
Digestion**

**Sustainable
Energy**

**Sustainable
Community
development**

**Sustainable
Economic
development**



Composting

Research Center

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& Jobs**

Zero Waste 2020

Anaerobic
Digestion

**Sustainable
Energy**

**Sustainable
Community
development**

**Sustainable
Economic
development**

**Incineration is
not sustainable
energy!**



Composting

Research Center

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Industrial
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Agriculture**

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Deconstruction

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Zero Waste 2020

**Anaerobic
Digestion**

**Sustainable
Energy**

**Sustainable
Community
development**

**Sustainable
Economic
development**

100's of "green boxes"



Composting

Research Center

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Agriculture**

**Education
For
Sustainability**

Deconstruction

**Sustainable
Architecture**

**Sustainable
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& Jobs**

Zero Waste 2020

**Anaerobic
Digestion**

**Sustainable
Energy**

**Sustainable
Community
development**

**Sustainable
Economic
development**

**Reuse &
Repair
Centers**

100's of "green boxes"

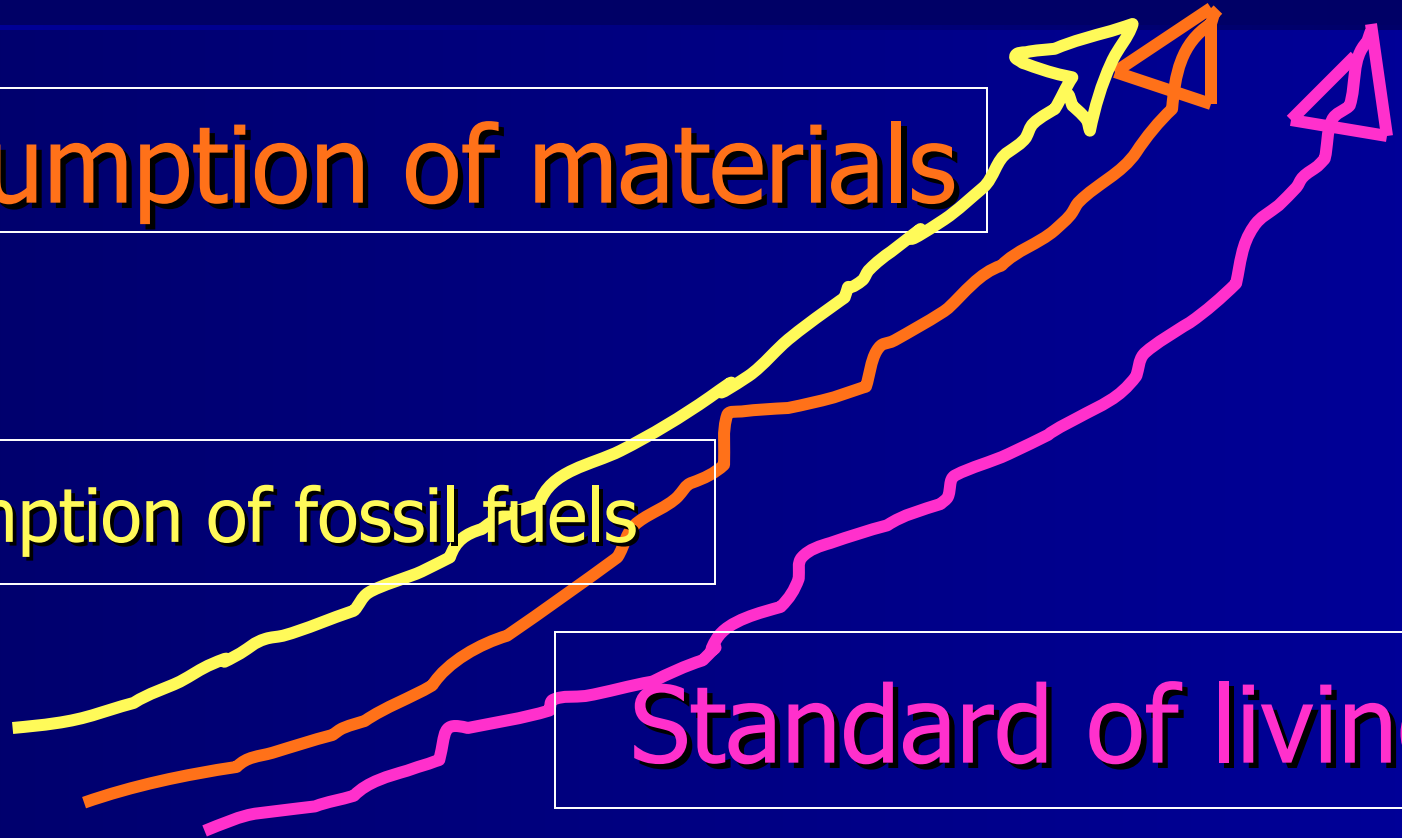
6. Back to the Big Picture

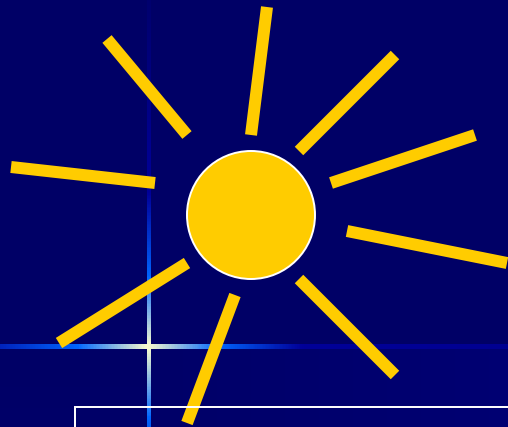
Current situation

Consumption of materials

Consumption of fossil fuels

Standard of living

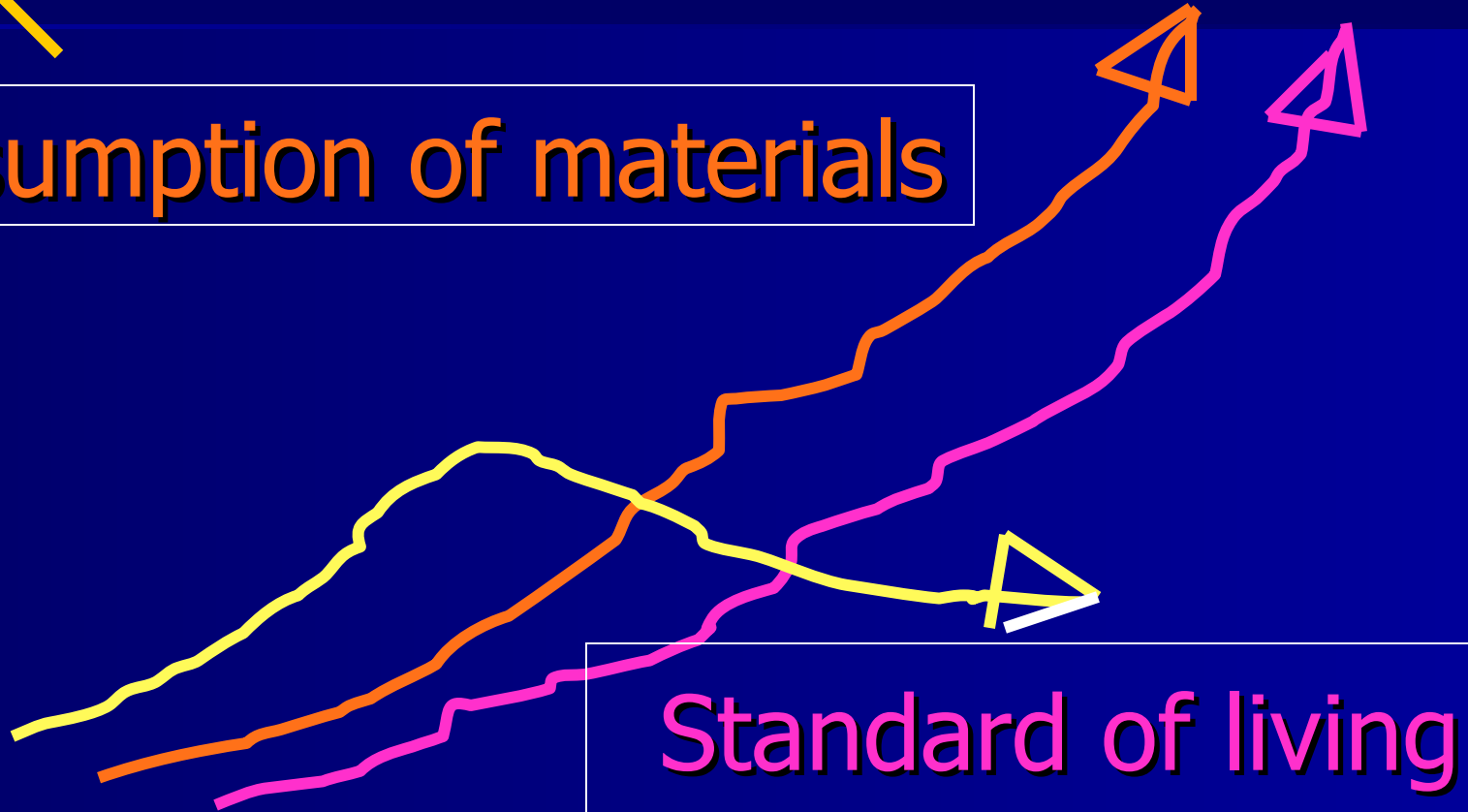




Solar Energy

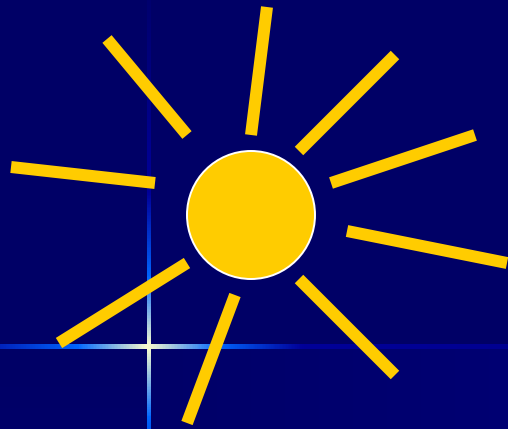
Change 1

Consumption of materials



Standard of living

Change 2



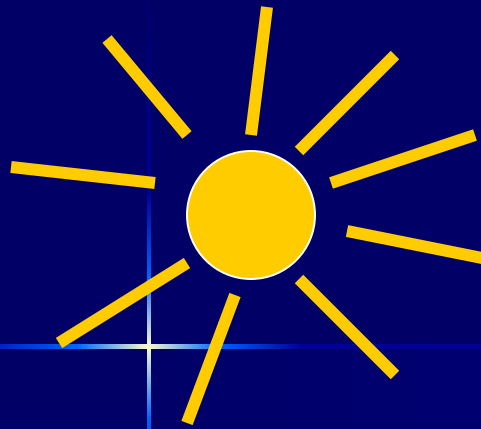
Solar Energy

Zero Waste

Standard of living



Change 3



Solar Energy

Zero Waste

Quality of Life



We have to separate the
Quality of life from the
material consumption

We have to separate the **Quality of life** from the **material consumption**

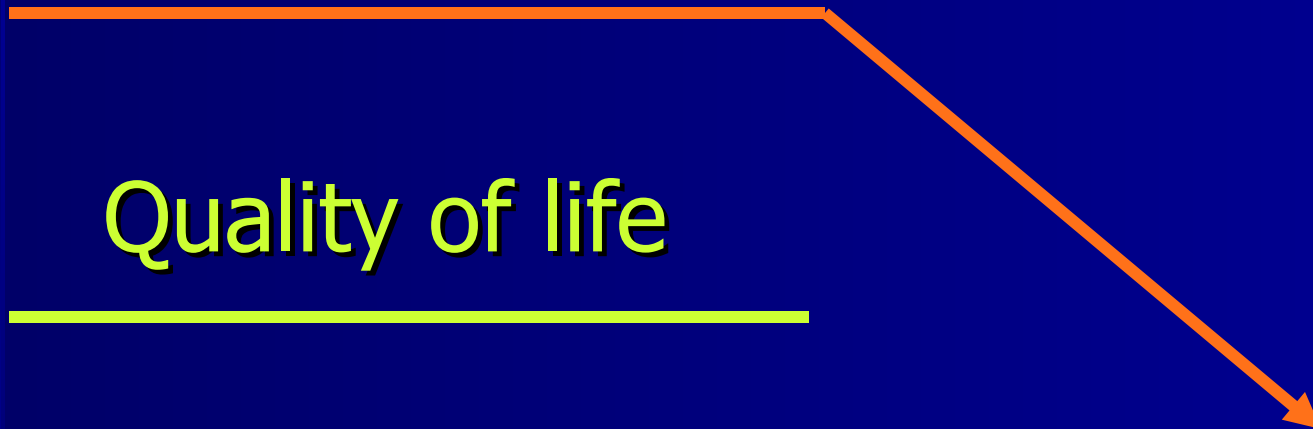
Material consumption

Quality of life

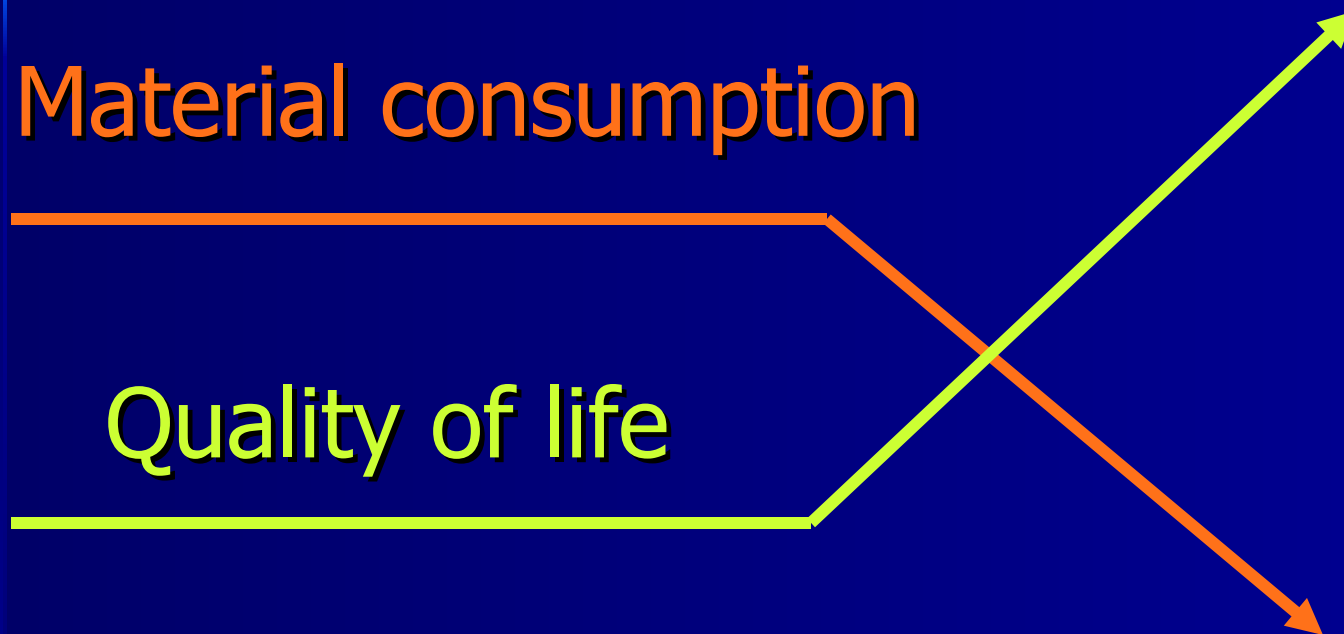
We have to separate the **Quality of life** from the **material consumption**

Material consumption

Quality of life



We have to separate the
Quality of life from the
material consumption



To fight over-consumption

Consume less

Enjoy more!

To fight over-consumption

**We need to swap a life built
around acquiring a series of
objects...**

**To a life built around a series
of expanding human
relationships**

In the 1960's

**“Make Love,
Not War”**

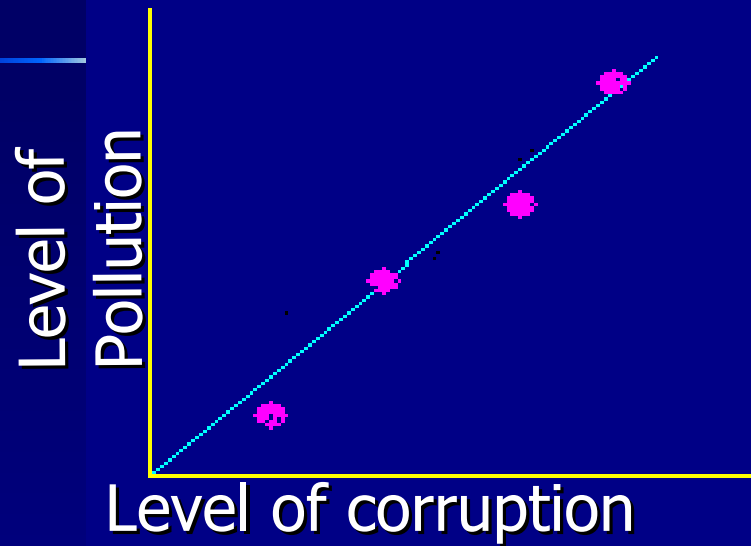
In the 2000's

**“Make Love,
Not Waste”**

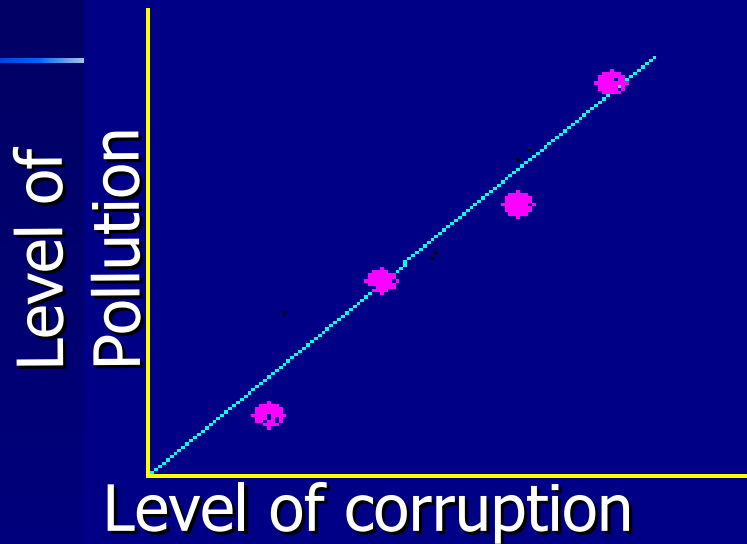
In the 2000's

**“Make Friends,
Not Waste”**

THE BAD LAW

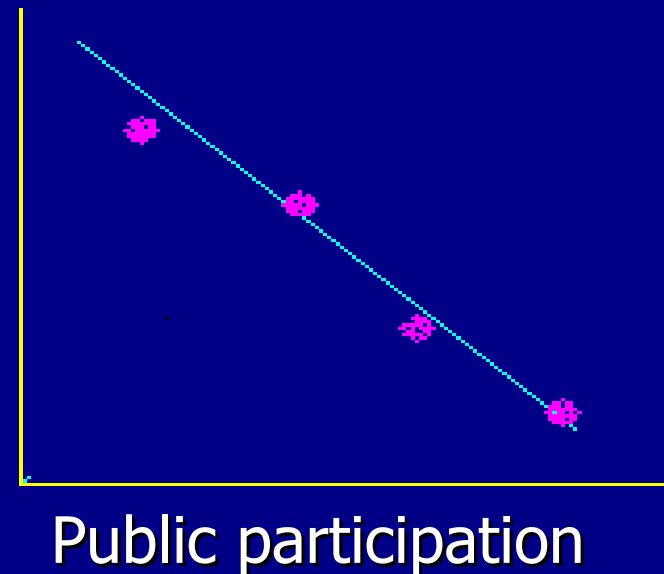


THE BAD LAW



Level of
Pollution

THE GOOD LAW



Public participation

EFFECTING CHANGE

Is like driving a nail
through a piece of wood

EFFECTING CHANGE



Experts may
sharpen the
point

EFFECTING CHANGE



Experts may
sharpen the
point

But you need the hammer of public
opinion to drive the nail home

Three final messages

- 1. **To citizens** - don't let the experts take your common sense away
- 2. **To politicians** - put your faith back in people
- 3. **To activists** -
- HAVE FUN!!!!!!!!!!!!!!!!!!!!!!

“The Battle Hymn” dei rifiuti

(Chorus)

We don't want incineration

We don't want incineration

We don't want incineration

We know there's a better way!

“The Battle Hymn” dei rifiuti

Mine eyes have seen the garbage
That's a smoldering on the grate
We must stop incineration
Before it is too late
Unless we wish the dangers
We had better separate
And we must do it now!

“The Battle Hymn” dei rifiuti

(Chorus)

We don't want incineration

We don't want incineration

We don't want incineration

We know there's a better way!



**God
recycles,
The devil
burns**





www.FluorideALERT.org