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Federal Department of Foreign Affairs FDFA
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Possible Approaches to Waste Management and Sample Cases from Switzerland

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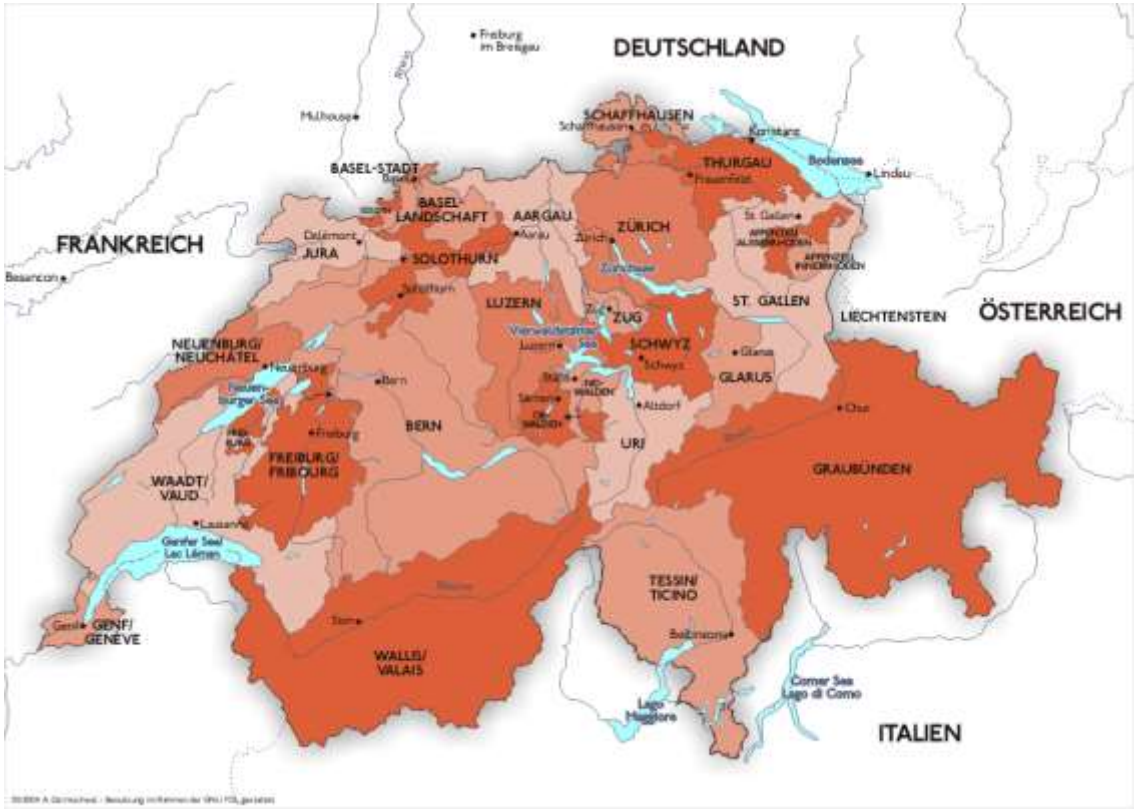
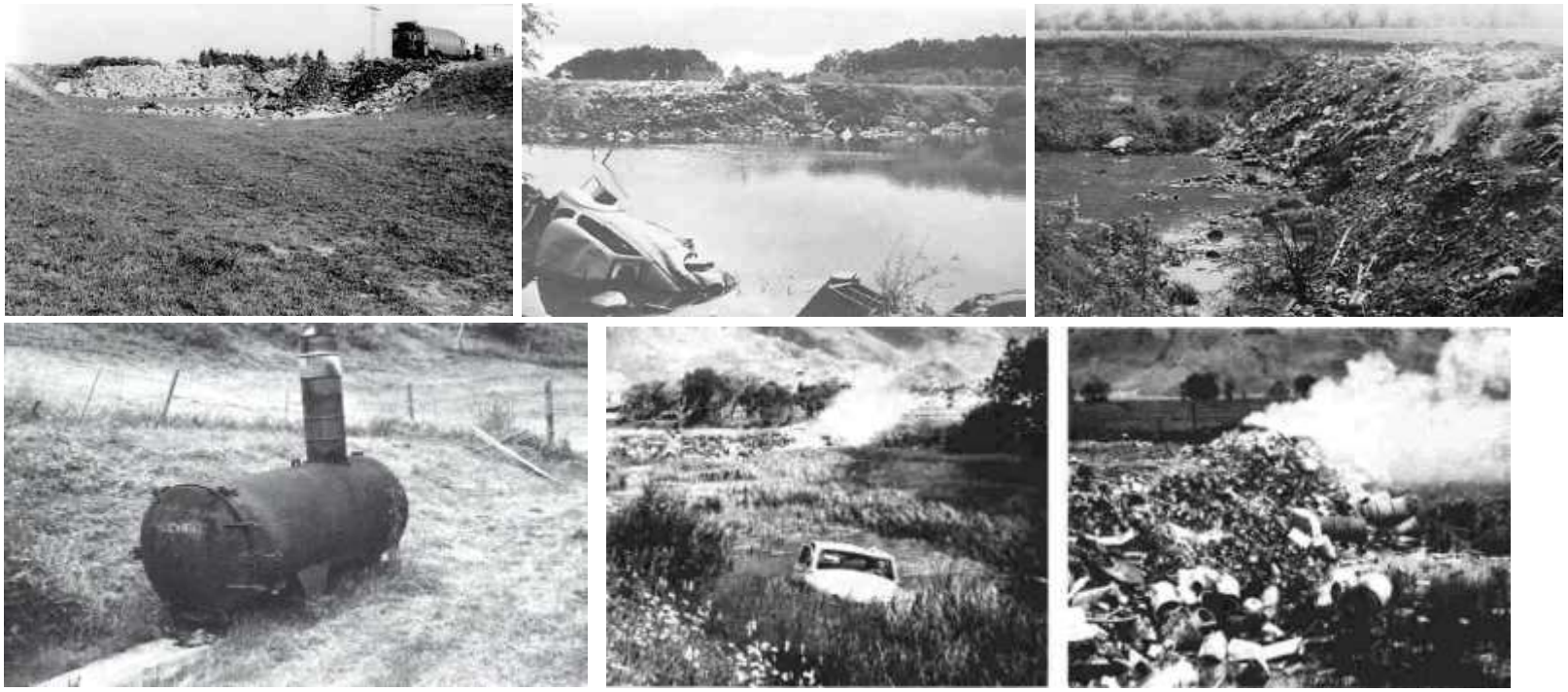
Switzerland: 1 country, 26 cantons (and over 2,800 municipalities)



- 8.3 mln people
- 41,284 km^2
- GDP per capita: 80,000 CHF
- 78 mln tons of waste
  (incl. construction, tunnels and mining)

Waste disposal → both central and cantonal / communal legislation

Waste ‘management’ 60 years ago



Waste ‘management’ in the 1950s

Once a cutting-edge hazardous waste site - now a very costly legacy: Kölliken

Summary of guiding principles and waste management concept: five goals

Goal I **Minimize environmental impact of waste elimination**
Water, soil and air must be impacted by harmful substances from waste as little as possible.

Goal II **Spare resources**
Raw materials and energy must be used as economically as possible in order to spare available global resources and to lower the environmental impact of raw materials production and the disposal of products and waste.

Goal III **Rationalize disposal infrastructure**
Disposal infrastructure must only be built where and when necessary.

Goal IV **Let the polluter finance waste disposal**
Waste disposal must generally be financed by the polluter. Where stimulation is required, the public sector must play a supporting role in order for the most appropriate solutions to take root.

Goal V **Reduce waste exports by disposing of waste domestically**
Every waste fraction must be disposed of domestically in an environmentally friendly manner.

Waste management in Switzerland: state of affairs today

- Overall, a well functioning system.
- Involvement of many actors, both public and private.
- Full circulation of many substances very nearly achieved.
- The general public is supportive of environmentally friendly practices of waste disposal.
- The costs of waste management are going down and are lower today in most cantons than 10-15 years ago.
- There is still a lot of potential in terms of natural resource conservation.

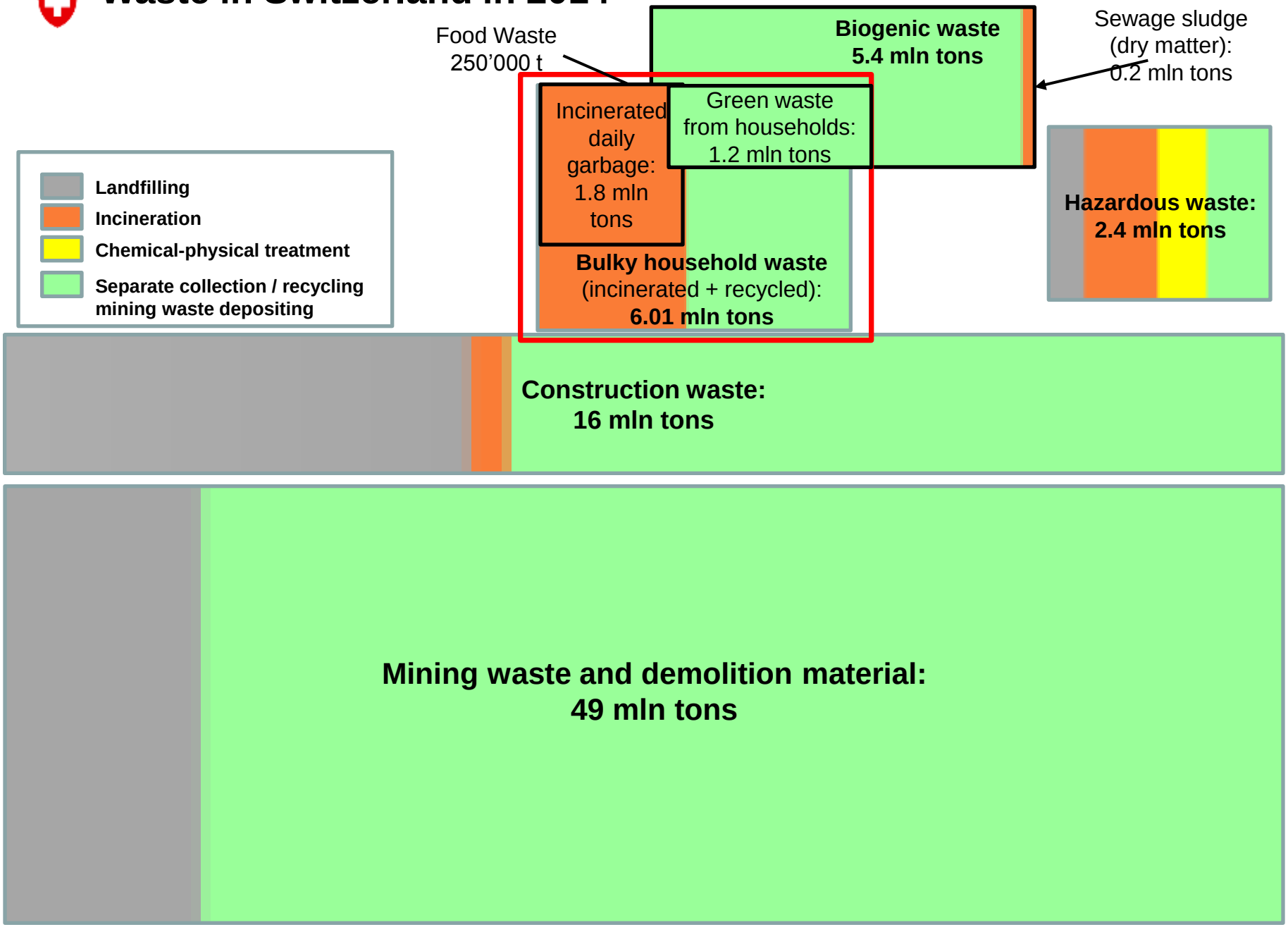
Waste disposal infrastructure in Switzerland: some figures

700	wastewater treatment plants
368	biogas and composting plants
290	landfills
30	waste incineration plants
6	cement plants
6	hazardous waste treatment sites
?	chemical-physical plants
?	biomass power stations

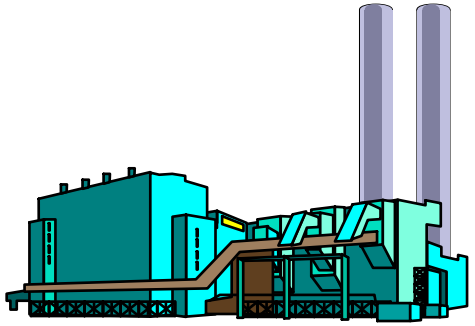
Private-public cooperation in:

- **Collection logistics**
- **Financing systems**

Waste in Switzerland in 2014



The Swiss model



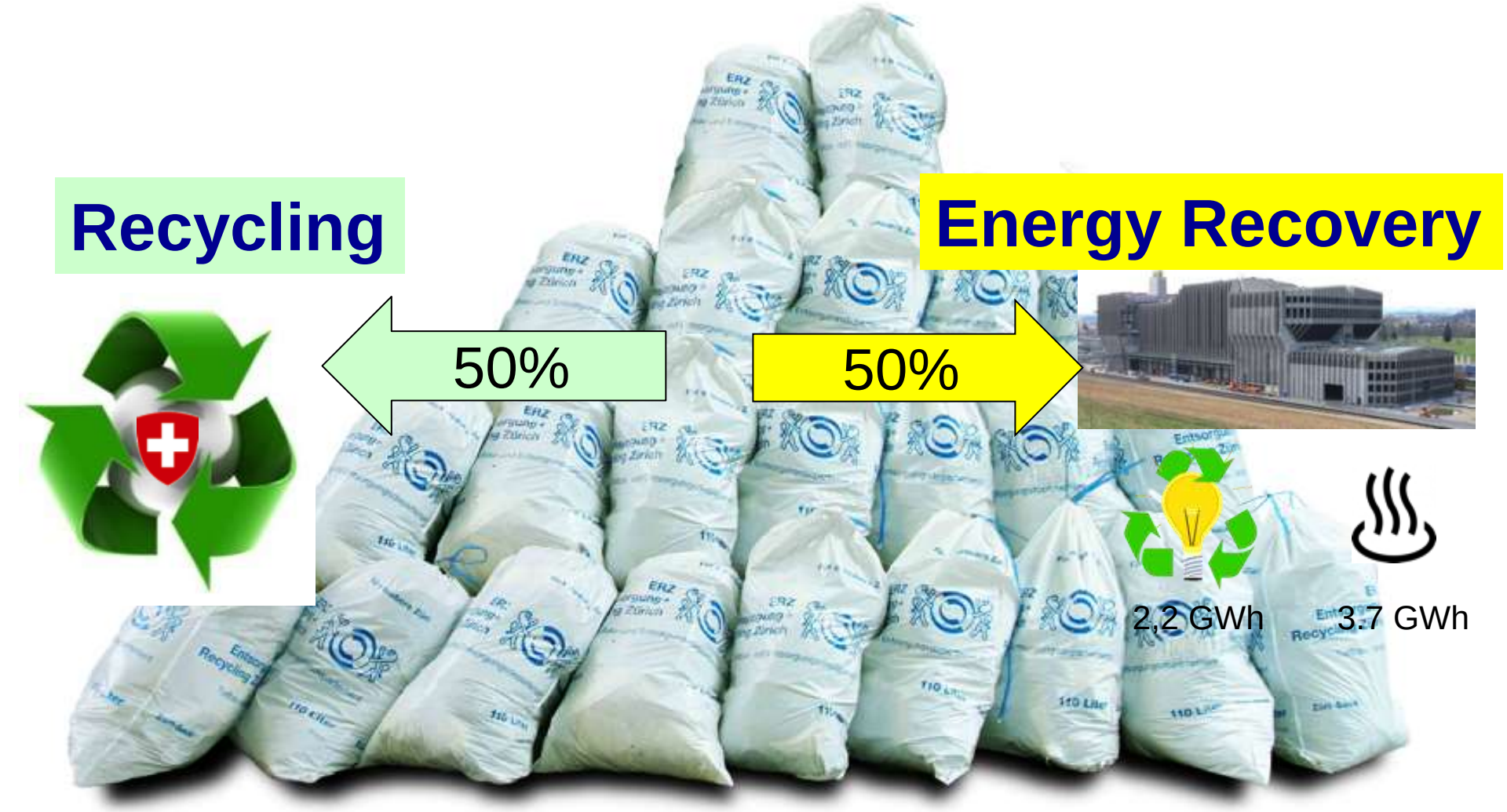
Recycling

- Confined to fractions that can be reprocessed in an ecologically and economically rational way
- widespread, well functioning system of collection with secure financing
- welcomed and demanded by the citizens

Incineration

- All plants are equipped according to Best Available Technology principles:
  - ecological (low emissions)
  - important energy producers
  - metal recovery from slag and bottom ash
- welcomed and demanded by the citizens

The Swiss model in simple terms



Why do we incinerate waste?

No landfilling of combustible waste since 2000

- To reduce volumes
- To recover energy
- To destroy harmful organic compounds
- Because pollutants emissions are low in modern plants
- To stabilize residue to be deposited
- To avoid methane emissions that would happen if fermentable material were deposited directly, i.e. to help save the climate
- To recover metals from slags and bottom ash

Waste incineration in Switzerland is politically accepted

Waste to Energy

Less fuel is needed for the same power output

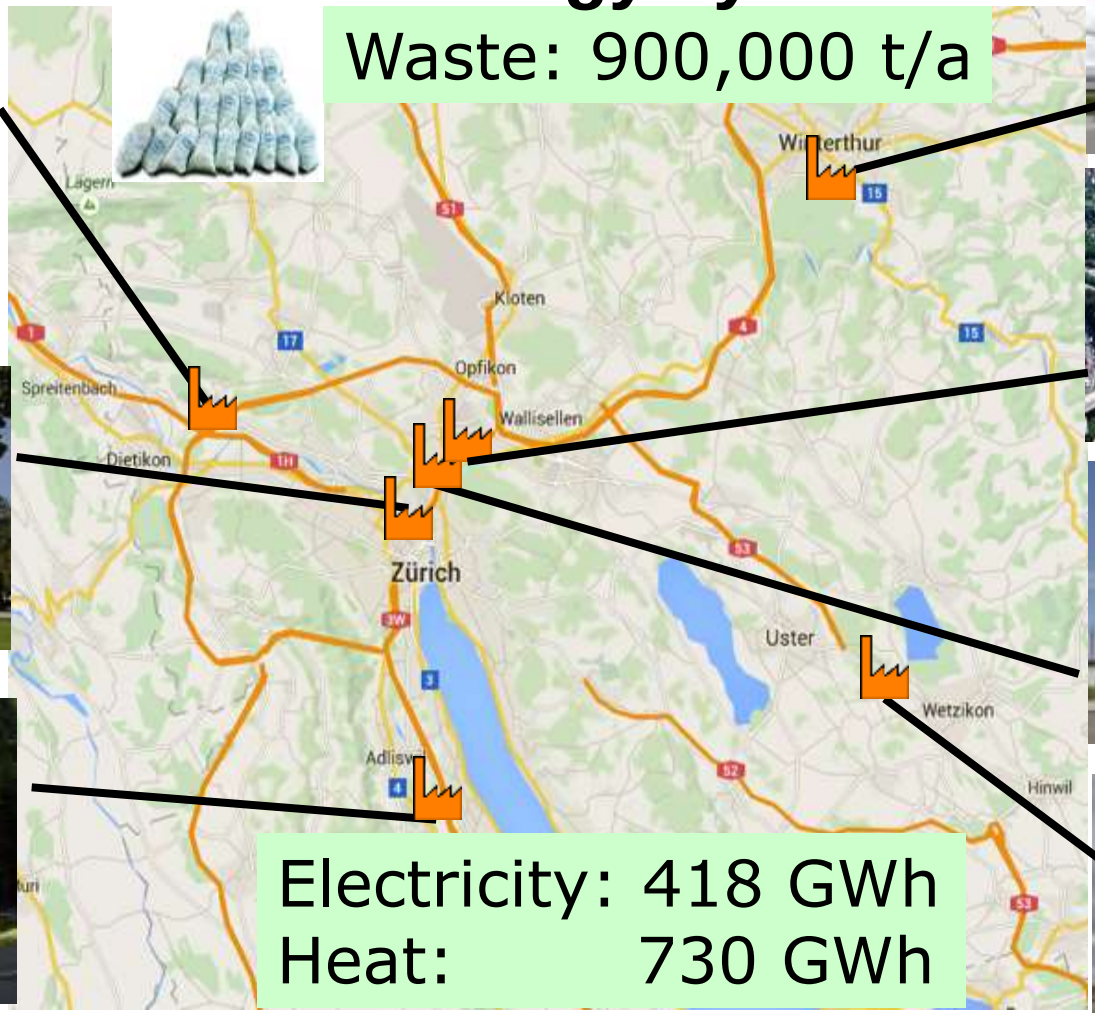
1 t of waste

1 Züri garbage bag

300 l of heating oil

approx. 1.7 l of heating oil

Example 1: Waste to Energy system in Zurich, 2014



Example 2:
Waste to Energy plant in Lucerne

WTE Plant

Output to paper mill
Electricity: 155,000 MWh/a
Steam: 320,000 MWh/a

Waste input
200,000t/a

Paper Mill

Recycling in Switzerland

Specific waste fractions are collected separately and recycled if:

- recycling is more **ecological** than disposing of waste by other means and producing a new product

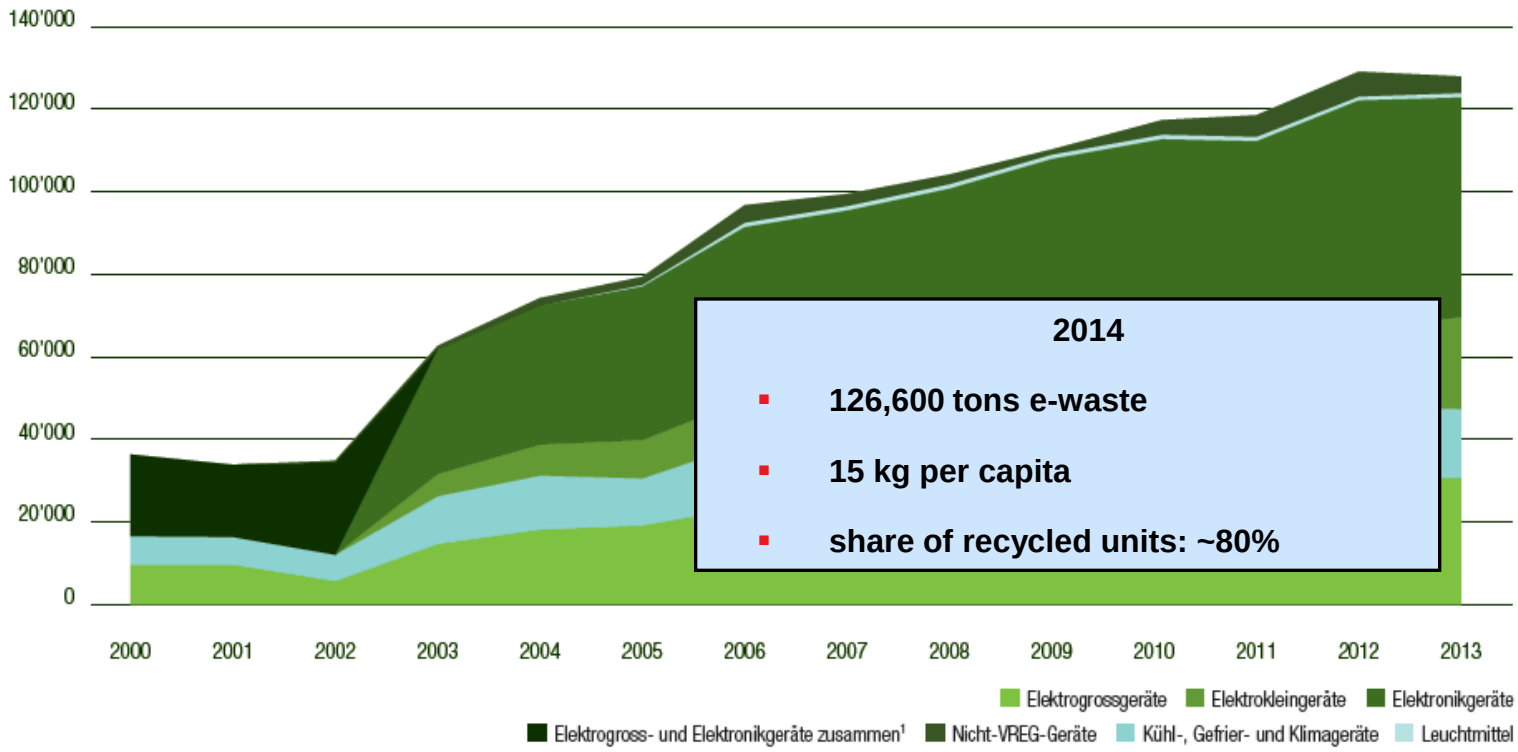
  und
- recycling is **economically** and **technically** feasible and proportionate: somebody must finance it!

Swiss Recycling Law: main tenets

- Wholesalers, retailers, producers and importers must take back free of charge
- Consumers must give back
- Those with a disposal duty (wholesalers, retailers, producers, importers) must do the disposal
- Everyone must comply with environmental requirements.

Case study: Waste electrical and electronic equipment (WEEE) in Switzerland

- Number of recycled EEE units in Switzerland (tons)



Fachbericht 2014, SENS, SLRS, SWICO

Why is refrigerator recycling very important?

1 refrigerator: 2,800 kg CO_2 eq. **1 car: 2,832 kg CO_2 eq.**

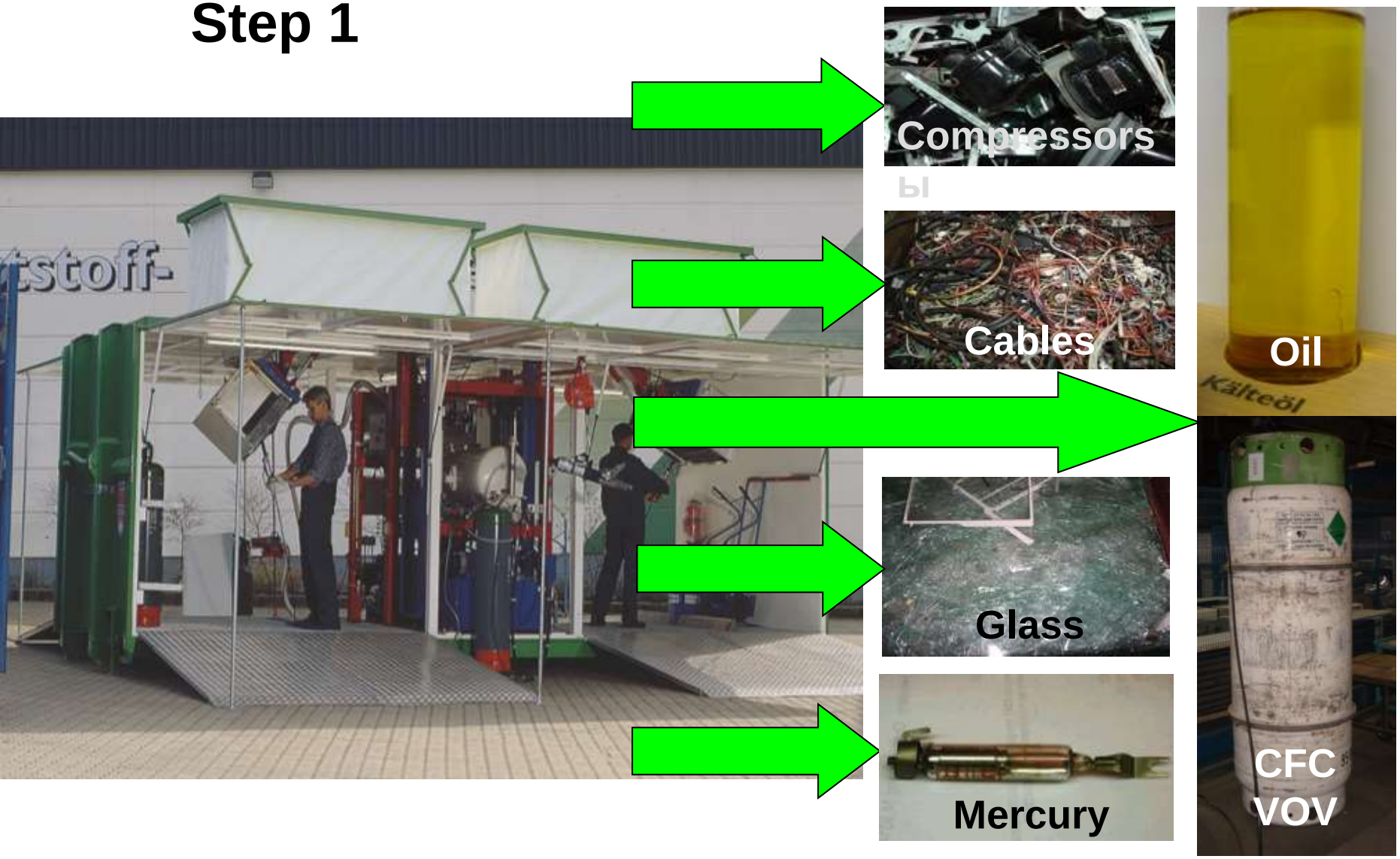
1. **Chlorofluorocarbon compounds are the number one ozone killer. The ozone in the atmosphere filters ultraviolet radiation**
2. **Huge impact on the greenhouse effect**
3. **There are still a huge quantity on CFC refrigerators in use**

One fridge with CFC has the same CO_2 eq. as driving a car 15,000 km.

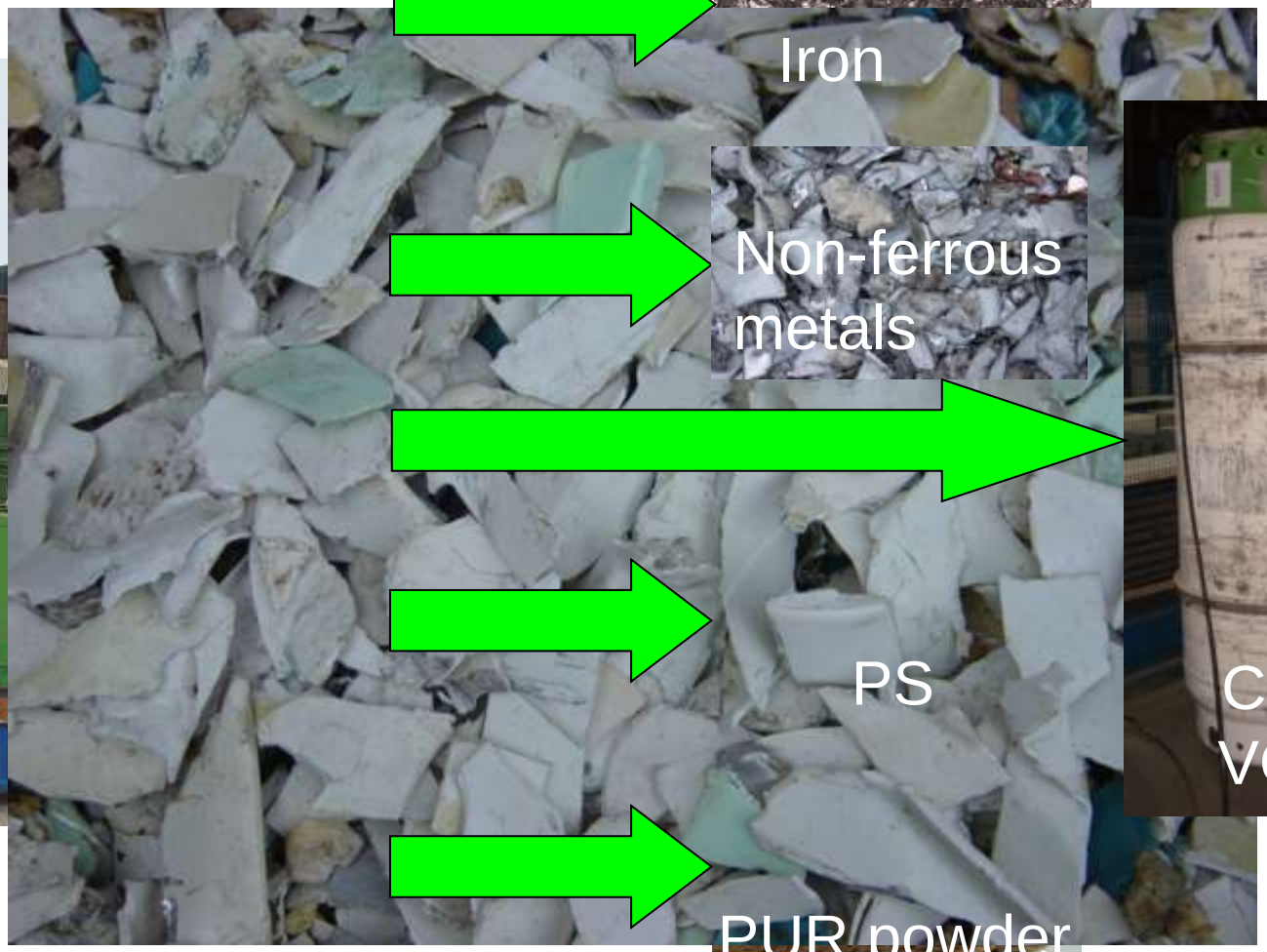
The Russian Federation produces about 3.8 mln old fridges per year
$\Rightarrow$ 10,640,000,000 kg CO_2 eq. per year
$\Rightarrow$***This is a huge negative impact for global warming***

* 15,000 km/a and 8 l / 100 km fuel: 2.36 kg CO_2/l

Example: Smart Fridge Recycling Step 1



Example: Smart Fridge Recycling
Step 2 – mobile recycling



Iron

Non-ferrous metals

PS

PUR powder

CFC
VOC

Example: Smart Fridge Recycling
Final products

Iron

Aluminium

Copper

Polystyrene
< 80%

Polystyrene
> 98%

Polystyrene
regranulate

PUR oil binder

Source: www.parlament.ch