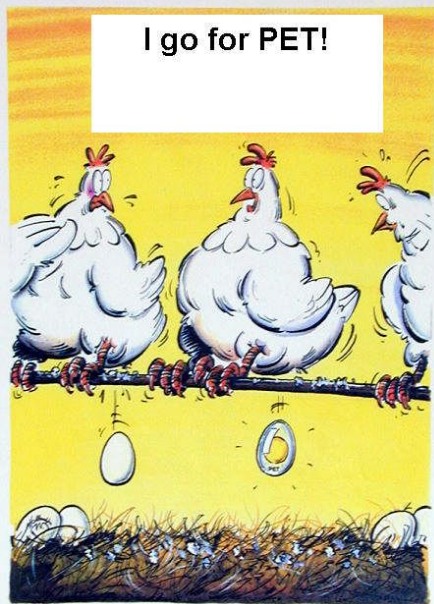


REDILO - R'07 Congress Davos



**PET-Bottle-to-Bottle-
Recycling**

Key Success Factors

**6 Years Experience in
Switzerland**

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REDILO - How to reach us



- **REtro-DIstribution-LOGistics**



REDILO GmbH

Plastics. Recycling. Solutions.

Untere Rainstrasse 20
CH-6340 Baar

info@redilo.ch / www.redilo.ch

Phone +41 43 311 55 66

Fax +41 43 311 55 67

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REDILO - Our services



- **Collecting- and recycling-systems**
- **Sorting and recycling plants**
- **Feasibility analyses / ISO 14001 / Business plans**
- **“Waste-check” (improvement of waste streams)**
- **Product design (Eco design, system conformity)**
- **Etc.**

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REDILO – Topics today



- **Value chain PET-bottles**
- **The PET-Recycling-System of Switzerland
(bottle-to-bottle-recycling)**
- **System conformity of PET-bottles**
- **Key Success Factors of B2B-Recycling**

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REDILO – Topics today




- Value chain PET-bottles
- The PET-Recycling-System of Switzerland (bottle-to-bottle-recycling)
- System conformity of PET-bottles
- Key Success Factors of B2B-Recycling

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Working the whole value chain










To get an integrated approach:




Value chain Plastics - packaging

HOME
16.06.2005

Surroundings : political, social, technical, legal...							
Business-Processes:	Packaging production	Consumption / Behaviour	Point of Return POR	Collection / Compacting	Sorting	Recycling	Sec-products
Business-Processes:							
Step 1 "Export"	Packaging, flakes						
Step 2 "Pellets"	Pellets, flakes						
Step 3 "Inline"	Fiber, film, compound (i.e. glassfiber), secondary market-products						
Step 4 "b-to-b"	Pellets, flakes						
Supporting-Processes:	Packaging-design, system-conformity, recyclability, guidelines, specifications...						
	Marketing, communication, incentives, stakeholders, education...						
	Finances, controlling, continuing improvement...						
Establishing value chain:	Project- and knowledge-management, steering, review / assessment...						

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The whole value chain in progress




Recycling-Technologie?
(What kind of „second life“?)

Sorting-technologie?
(What can be handled by recycler?)

System-conformity?
(color, glue, label, closures...?)


What should be collected and how?
(PET- or Plastic- or beverage-bottles /-packaging or...?)

Involvement consumers?
(Incentives, expectations, market-development, communication...?)



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Six years experience CH



Vision –

Strategy –

Reality!

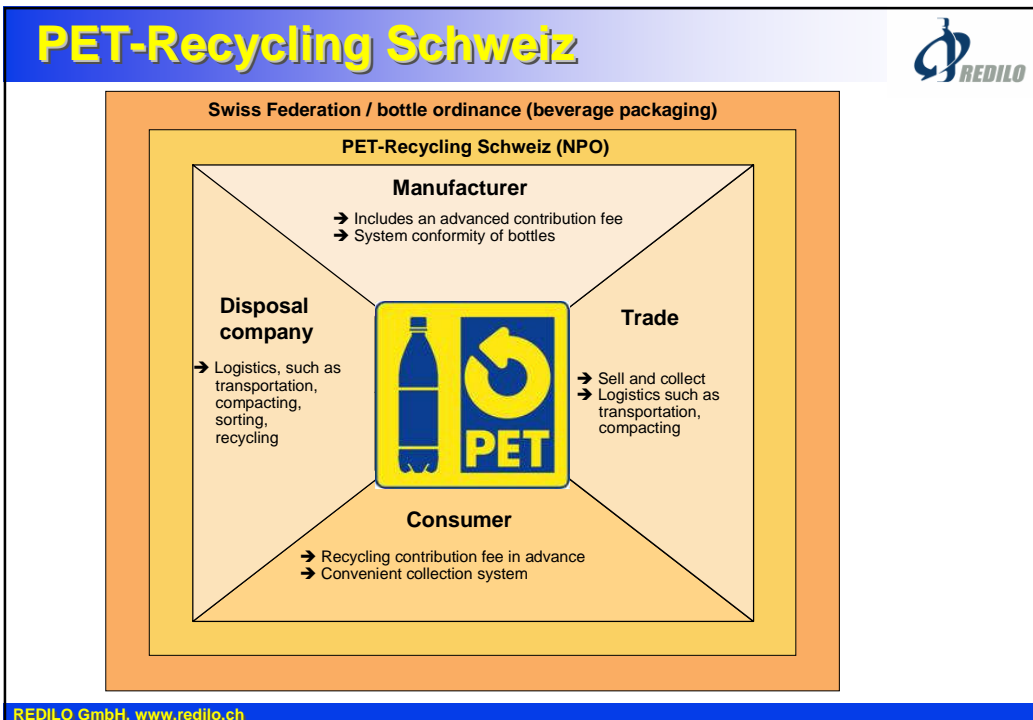
Role of PET-Recycling Schweiz:

- Decision bottle-to-bottle for Switzerland in 1998
- Decision technology (URRC-Unpet) in 1998
- Tender to choose running company in 1998
- Foundation of running company in 1999
- Start of production start and green light of Swiss health authority in 2000




Let's go for PET-bottle-to-bottle-recycling!

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PET-Recycling Switzerland



Key aspects of Swiss system:



- Involvement of all important market players
- Introduction of a pre-levied recycling fee
- Development of a "recycling brand"
- Intensive communication with consumers and
- Involvement of existing logistics systems (high percentage of outsourcing)

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PET-Recycling Schweiz



Facts and figures:



- Private owned Non-Profit-Organisation
- About 18 employees (13 ZH, 3 W-CH)
- Outsourcing processes logistics and recycling
- 2006: about 32'300t PET bottles recycled
- 2006: about 1'000 Mio. PET-bottles recycled

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PET-Recycling Schweiz



Key goals of Swiss system:



- Reach the 75% goal by the government
- Close the loop: bottle-to-bottle-recycling
- To lower the operation-costs (transportation, sorting...)

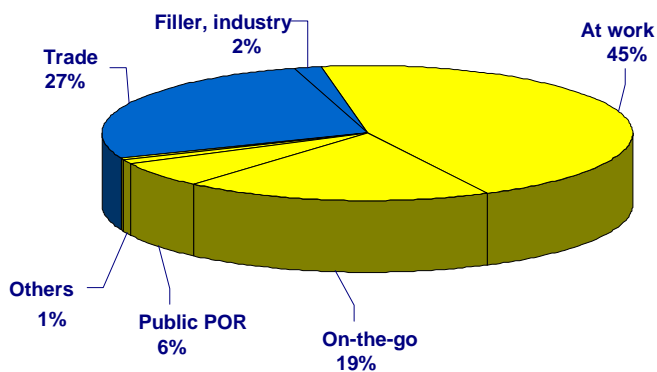
More information this afternoon at workshop W1 at 14:30h!

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PET Recycling Switzerland



Collection bins – distribution:



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REDILO – Topics today



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System-conformity PET-bottle



Definition of “system-conformity”:

“Bottle can be collected, sorted and recycled without any additional costs”

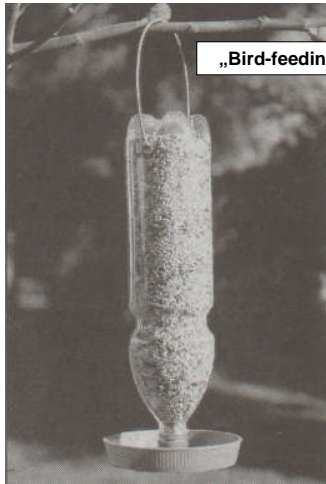
- Communication / know-how-transfer
- Checklists for self-analysis
- Specific tests and analysis with partners
- Guidelines and assessment procedures EU-Level

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System-conformity PET-bottle



All depends on the secondary market:



„Bird-feeding-machinery“



„Closed loop – bottle to bottle“

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System-conformity PET-bottle




What we do (conformity-process):

- Communication / know-how-transfer
- Checklists for self-analysis
- Analysis by REDILO and partners
- Specific tests and projects with industry




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Criteria system conformity




- Which points are to be considered:
 - Closures
 - Labels
 - Glues
 - Additives
 - Colors
 - etc.




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System-conformity PET-bottle




Example of Checklist for analysis:



Checklist for design and system conformity PET bottles PRS

state: 07.05.07

Instructions: Please fill in the yellow fields. Comments at the end of the paper. Thank you.

Product		Company						
Brand:		Name:						
Description:		Street:						
Content:		Postcode / Place						
Size of bottle (cl):		Contact:						
Weight of bottle (gr.)		Phone / E-Mail:						
Sales / year (no. bottles):		Launching date:						
Sales / year (weight kg):		Test-no. (by PRS):						
Content: Beverages such as soft-drinks, juices, ice-tea, water, syrup, beer and beverages with a protein concentration of max. 1g per 100 ml.								
Bottle	Body	Materiel	Mono-layer PET-A					
		Colour	Transparent (clear) Light blue transparent Green transparent Brown transparent					
		others:						
		Plasma coatings	Actis Plasmax DLC					
		others:						
		Co-Injection	Nylon EVOH					

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REDILO – Topics today



- Value chain PET-bottles
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- System conformity of PET-bottles
- **Key Success Factors of B2B-Recycling**

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Key Success Factors B2B




What do you think are the key success factors?




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Key Success Factors B2B




Collection / System conformity:

- Only beverage bottles (no oil, milk etc.)
- Accepted bottle design criterias (e.g. no PVC)
- Little misuse of bottles (storage chemicals...)
- Enough bottles to achieve minimum quantity for plant (e.g. 10'000 tons a year means about 1 mio. bottles a day)
- ...




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Key Success Factors B2B



Sorting:

1. Delivery / input
→ 2. Initial triage / pre cleaning
→ 3. Sorting / grading
→ 4. quality control
→ 5. Compression
→ 6. Interim storage
→ 7. Delivery / output





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Key Success Factors B2B



Sorting:

- Smooth and efficient process (manual or machinery)
- Clear quality specification (e.g. removal colour, labels)
- Adapted compression for transportation
- ...



99,99% sorting-
efficiency = 100ppm!

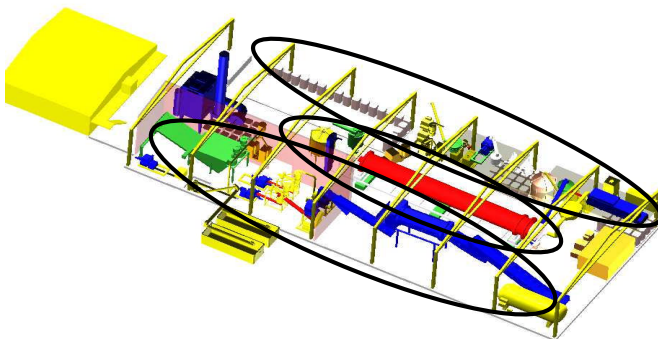
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Overview RecyPET



Example of mechanical/chemical recycling:


URRC-Unpet-Mechanical recycling (RecyPET, Frauenfeld CH)




bottle-to-bottle:


1. step mechanical
(grinding, washing, swim-sink, drying...)
2. step chemical
(hot dry air and caustic soda)
3. step end control,
confection, packaging

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Key Success Factors B2B	
Mechanical recycling (pre-treatment):	
<i>Input control (check, if with in specification)</i>	
<i>Sorting Non-PET (metal, other plastics, packaging)</i>	
<i>Sorting colour (e.g. transparent, blue, green)</i>	
<i>Pre-washing whole bottles (removing labels)</i>	
<i>Grinding flakes (e.g. down to <10 mm)</i>	
<i>Air separation (e.g. removing PA barrier)</i>	
<i>Washing (removing glue)</i>	
<i>Swim / Sink (removing polyolefin)</i>	
<i>Drying (e.g. <0.7%humidity)</i>	
<i>Bottle-to-Bottle recycling process</i>	
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Key Success Factors B2B	
Mechanical recycling (pre-treatment):	
<ul style="list-style-type: none"> • Adapted and flexible process (depending on input) • Energy and resource recovery (water, waste heat) • Efficient separation of different Non-PET • ... 	
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Key Success Factors B2B




B2B-Recycling:

- Accepted and approved quality for regulation authority (challenge test, about 0.04% misused bottles)
- Accepted and approved quality for bottle maker (clear spec. with converters e.g. IV, accepted Non-PET)
- Efficient process (e.g. minimum input quantities, energy, handling of hazardous material, in-/output-ratio, restart loss ...)
- ...









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Conclusion successful B2B



➔ All stakeholders involved (from system conformity, collection, sorting to recycling and secondary markets.

➔ The whole value chain is managed, processes adapted.

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B2B PET recycling = good example closed loop economy

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REDILO - R'07 Congress 

Plastics Recycling in the North-South-Context
Monday, September 03, 14:30 – 18.00h


Knowledge platform PET Recycling

Best Practice
 - North (PRS, Switzerland) and
 - South (Swisscontact, Costa Rica)

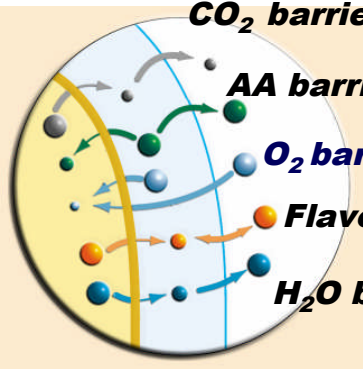
Plastics recycling - fight poverty?

Join the discussion!

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Criteria system conformity 

Specification of PET-bottle – adapted to market?



Demanded shelf-live determines bottle-specification: Still or sparkling water, juices, beers....

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Material specifications - example



- moisture max. [%] 0,8
- PVC max. [ppm] 10
- glue max [ppm] 10
- dust max [%] 1
- aluminium max [ppm] 20
- bulk density [kg/m³] 350 - 500
- HDPE, PP ...max [ppm] 20
- coloured PET Flakes max [ppm] 50
- ...

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Quality of recycled PET



Quality indicators	Details	Process involved
Non PET bottles	System boundary: which bottles to be collected. Labelling and communication.	Communication Collection System conformity
Dust	Dust produced by the machinery (e.g. parts smaller 1mm < 0.3%).	Recycling
Impurities	Silicon valves disturb the recycling process and are very difficult to remove and should therefore not be used.	System conformity
New market	Markets like juices with a higher demand for barriers (e.g. nylon or plasma coating, e.g. nylon < 500 ppm).	System conformity Recycling
Misused bottles	Recycling process has to be proved to remove chemically misused bottles (e.g. 0.03%) by doing a challenging test.	Recycling

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