



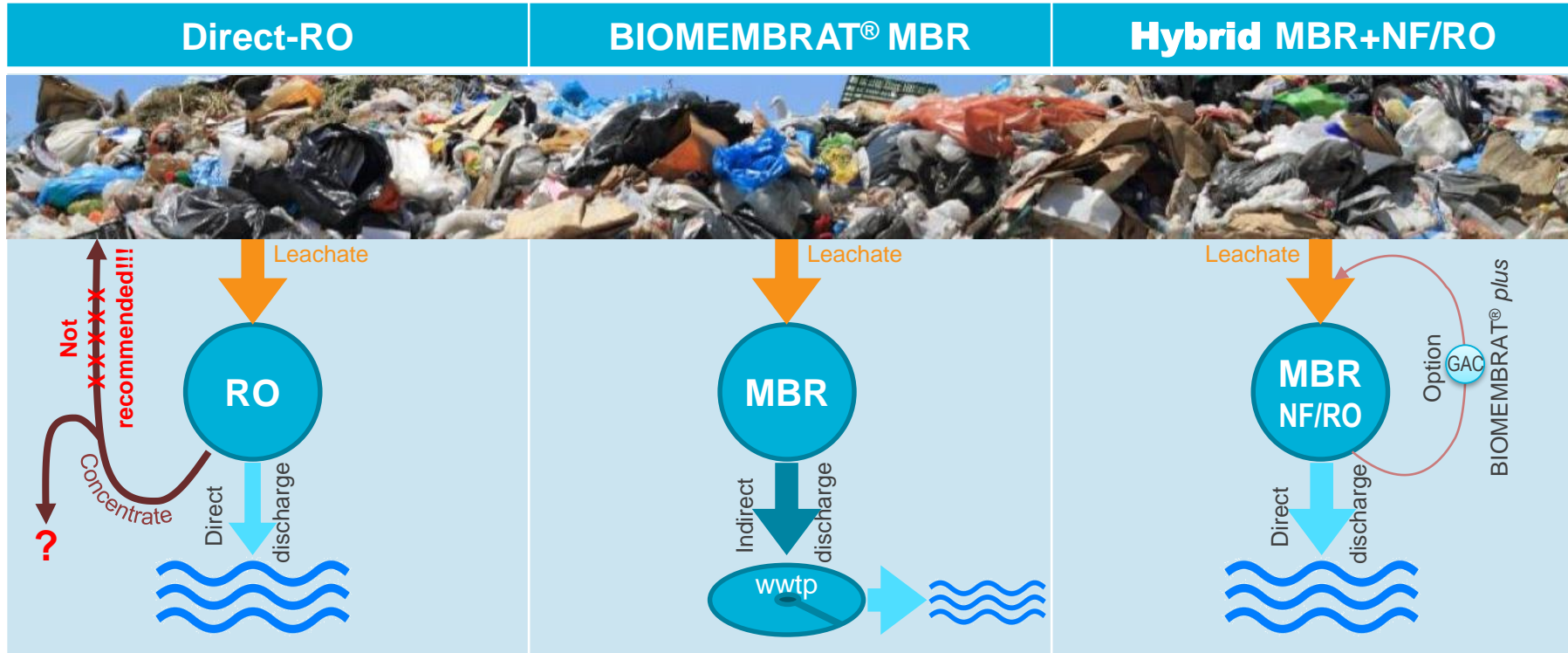
# WEHRLE

## LEACHATE TREATMENT CONCEPTS

Energy Technology · Environmental Technology · Manufacturing

# LEACHATE TREATMENT PROCESSES

## Plant Set-Up and Concentrate Disposal



# LEACHATE TREATMENT BY SEPARATION



## WEHRLE Direct RO



## Standard solution for many landfills

- ▶ Standardized container or skid systems
- ▶ Competitive price, short delivery times
- ▶ Quick & simple installation
- ▶ Very compact
- ▶ No activated biology required
- ▶ Generates concentrate that needs to be disposed of

CAPEX	OPEX	Effluent quality	Remains
+	-	++	-

# LEACHATE TREATMENT BY ELIMINATION



## WEHRLE BIOMEMBRAT® MBR



- ▶ True elimination of COD/BOD/NH<sub>4</sub>-N
- ▶ Compact design, small foot-print
- ▶ Membranes separated from aeration  
→ less precipitation on membranes
- ▶ Self-cleaning effect on membranes
- ▶ Very low chemicals requirement / CIP
- ▶ Generates no concentrates

CAPEX	OPEX	Effluent quality	Remains
-	++	+	+

# COMBINATION OF ELIMINATION & SEPARATION



## Hybrid Process BIOMEMBRAT®+NF/RO



- ▶ High-End Solution for leachate treatment
- ▶ High effluent quality for river discharge or irrigation
- ▶ No concentrate (BIOMEMBRAT-*plus*) or small amount only, easy to evaporate
- ▶ Typically most effective and most sustainable treatment technology for leachate

CAPEX	OPEX	Effluent quality	Remains
--	++	+++	+++

# ROUGH PROCESS SELECTION




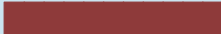















## Process Overview depending on leachate load and discharge limits

	Indirect discharge COD < 400 mg/l	Direct discharge COD = 100 ... 200 mg/l	Direct discharge with salt reduction
Low loaded COD < 1.500 mg/l NH <sub>4</sub> N < 500 mg/l	Sand filtration Activated Carbon	MBR + Activated Carbon	Reverse Osmosis
Medium loaded COD < 15.000 mg/l NH <sub>4</sub> N < 1.500 mg/l	MBR + Activated Carbon	MBR + Nanofiltration optional concentrate treatment with Activated Carbon	
High loaded COD > 15.000 mg/l NH <sub>4</sub> N > 1.500 mg/l		Anaerobic Biology MBR Nanofiltration / Activated Carbon	MBR + Reverse Osmosis
Very high loaded COD > 60.000 mg/l	Anaerobic Biology MBR Reverse Osmosis		

**Note:** this is a rough overview – the optimum process selection depends on case-by-case conditions!

# PROCESS SELECTION

## Process Combinations & Characteristics

	concentrate volume	concentrate components	H <sub>2</sub> SO <sub>4</sub> consumption	membrane cleaning	membrane lifetime
RO	 20 ... 35 %	<ul style="list-style-type: none"> <li>• anorganic components</li> <li>• COD / BOD</li> <li>• <b>NH<sub>4</sub>-N</b></li> </ul>	 1.5 ... 4.0 l/m <sup>3</sup>	 4 / month	 1 ... 2 years
MBR	 0 %	<ul style="list-style-type: none"> <li>• No concentrate</li> </ul>	≈ none	 0.5 / month	 (UF) > 5 years
MBR + RO	 15 ... 25 %	<ul style="list-style-type: none"> <li>• anorganic components</li> <li>• non biodegradable COD</li> </ul>	 1.0 ... 1.5 l/m <sup>3</sup>	 2 / month	 (UF > 5 years)  (RO) 2 ... 4 years
MBR + NF	 10 ... 15 %	<ul style="list-style-type: none"> <li>• <b>low</b> anorganic components</li> <li>• non biodegradable COD</li> </ul>	 0.5 ... 1.0 l/m <sup>3</sup>	 1 / month	 (UF > 5 years)  (NF) 3 ... 5 years



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