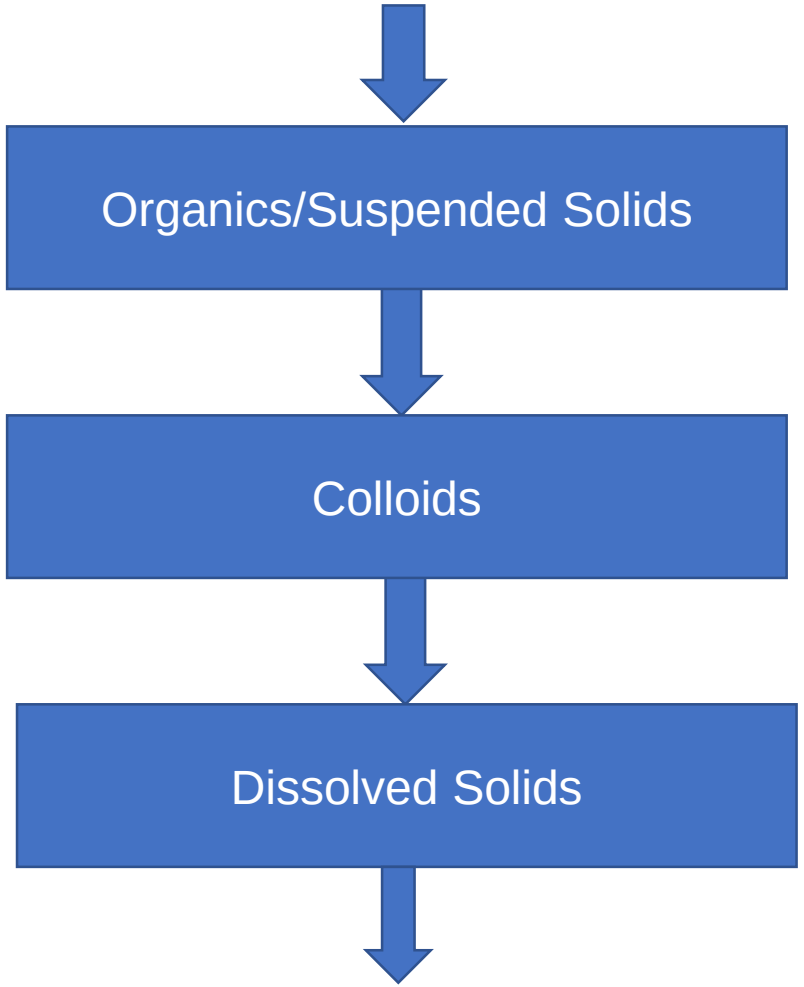
Industrial Water Salinity Control: Approach & Treatment

Val S. Frenkel, Ph.D., P.E., D.WRE.

Principal / Pacific Coast Managing Director /
Vice President Process Engineering Group

Treatment Sequence

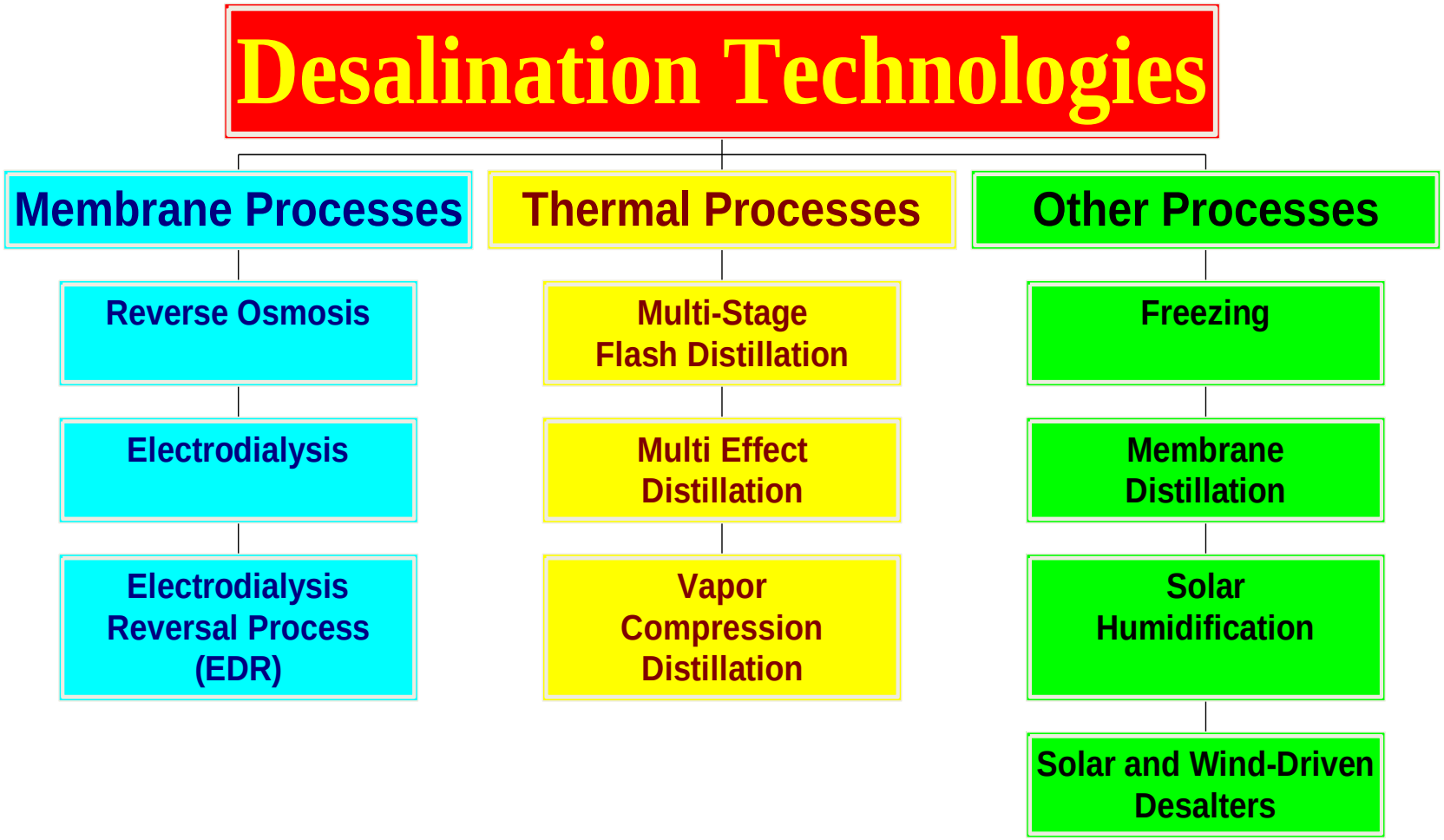
- Organics, Suspended Matter
- Colloidal Matter
- Dissolved Matter



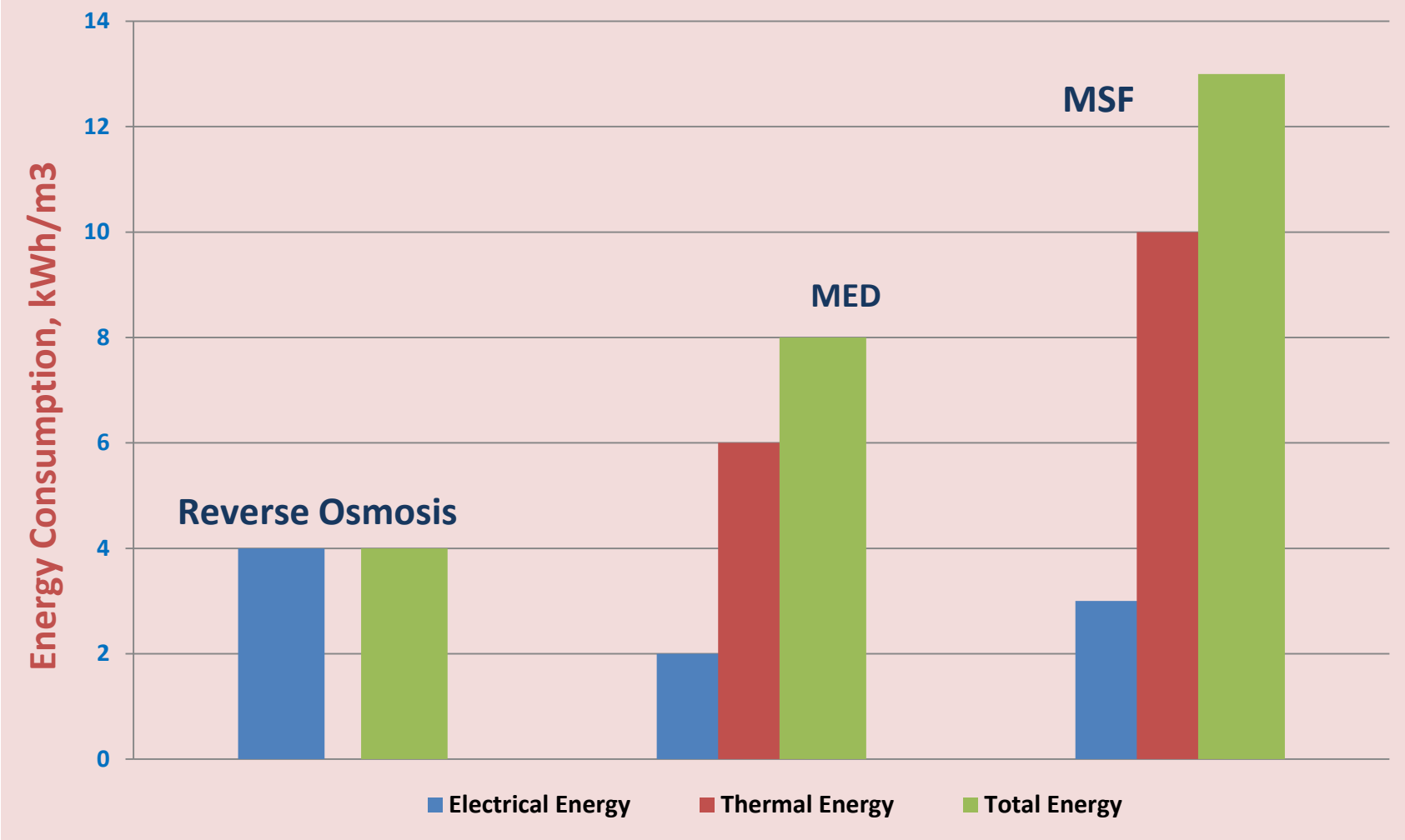
Industrial Wastewater compared to Municipal Wastewater

CHALLENGES	STRATEGIES for SOLUTION
• Smaller volumes in general, while very unbalanced hydraulically (high turn down ratio)	• Equalization
• Higher solids, minerals and organics loads	• Streams segregation, advanced technologies
• Water composition is very unique to each industry, application and each discharger	• Streams segregation, advanced technologies
• Discharge may not be an option	• High system recovery, ZLD

Desalination Technologies



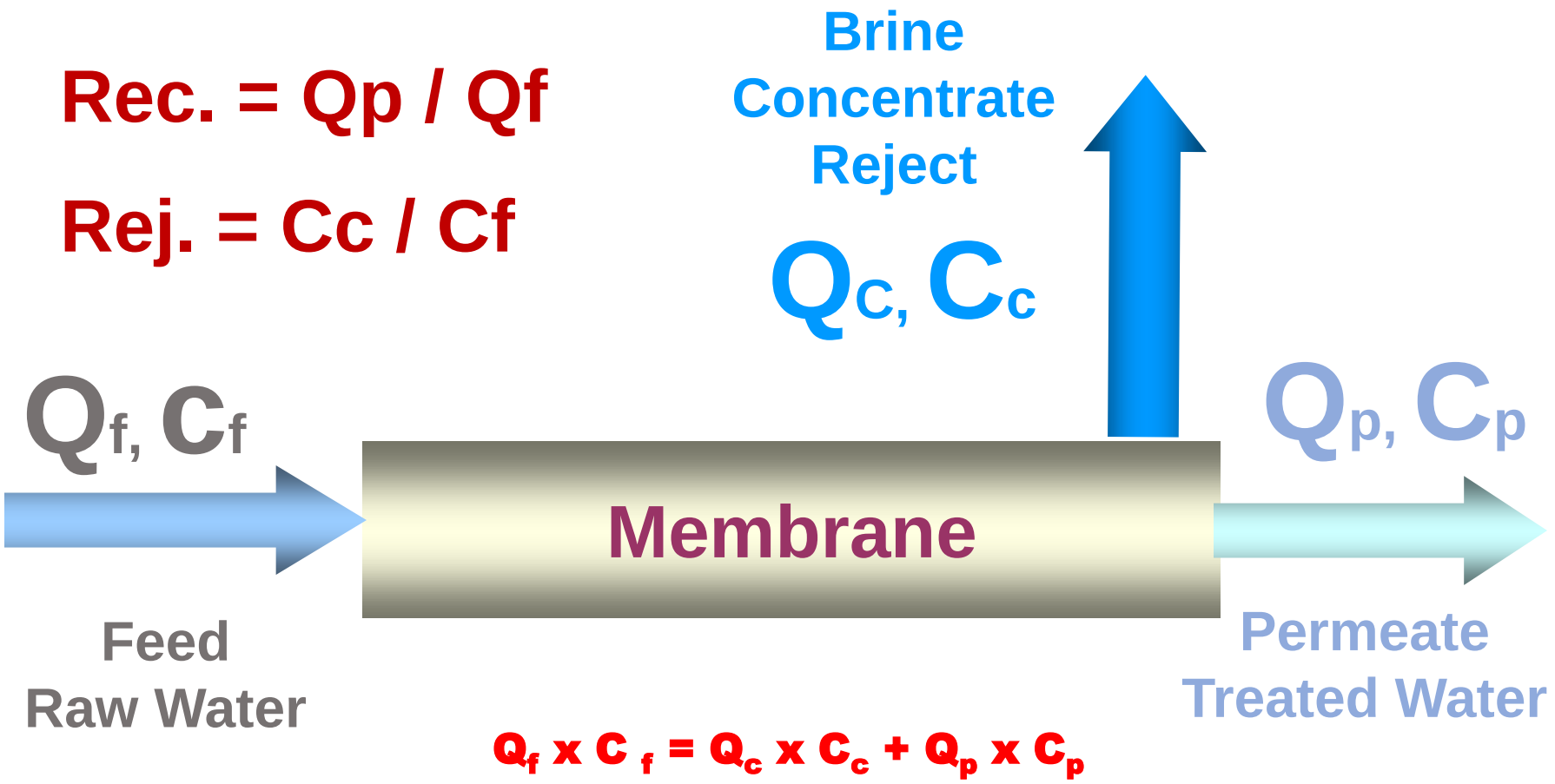
Average Energy Consumption by Desalination Technologies



RO Technology

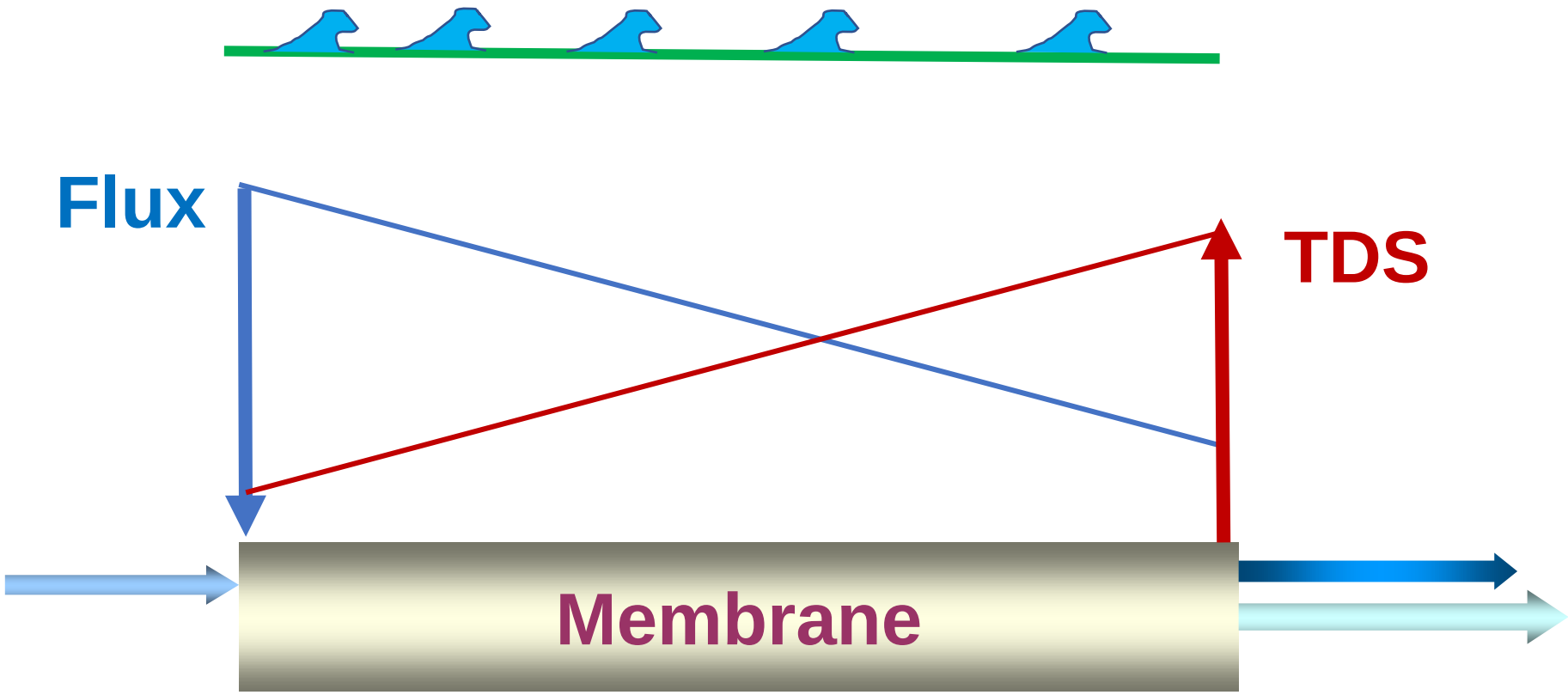
Rec. = Qp / Qf

Rej. = Cc / Cf



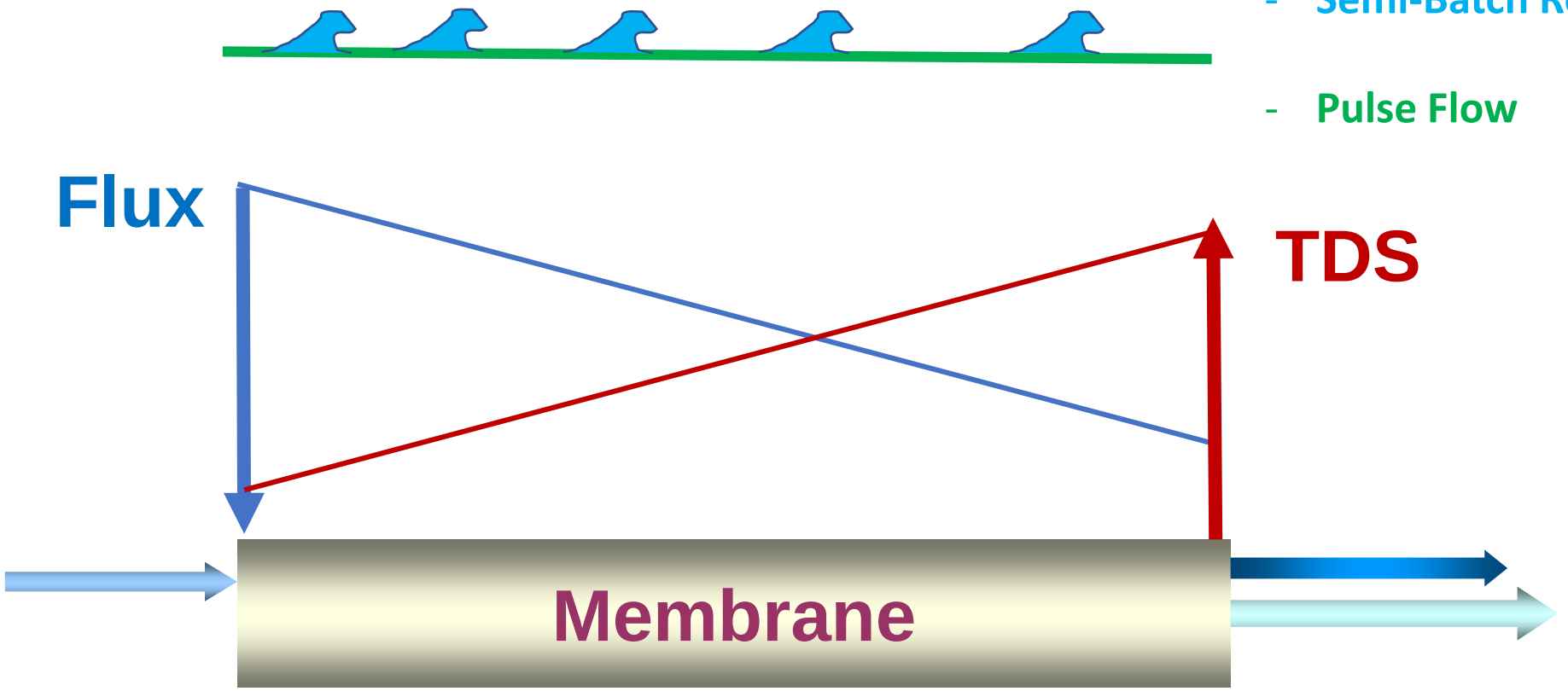
$$Q_f \times C_f = Q_c \times C_c + Q_p \times C_p$$

RO Technology – **Continuous Operation**



RO Technology – **NON-Continuous Operation**

- **Flipping Flows**
- **Semi-Batch Recirculated**
- **Pulse Flow**



Summary

- Industrial water treatment may need different approach comparing to the municipal water
- The stream segregation is one of the key considerations for industrial wastewater treatment and reuse
- Currently we facing significant increase in industrial water reuse needs due to the several reasons such as, but not limited to climate changes, increase of natural disasters and uncertainty in water supply, lack of water sources, increase cost of water, tight discharge criteria, regulatory pressure, corporate mandates
- Salinity control is the key

Questions?

GREELEY AND HANSEN

Val S. Frenkel, Ph.D., P.E., D.WRE.

Principal / Pacific Coast Managing Director /
Vice President Process Engineering Group

Principal

vfrenkel@greeley-hansen.com

(415) 412-1380