



# ZwitterCo Superfiltration Membranes Enable Nutrient Recovery in Digestate

**NEBRA Rountable Discussion**

# We founded ZwitterCo to enable industrial wastewater reuse, exceed sustainability goals, and recover chemical-free byproducts.

## BY THE NUMBERS

**4M+**

gallons per day of treatment capacity delivered

**> 20**

commercial projects sold or booked

**12**

licensed or owned patents

**\$46M**

total funding

## TEAM

**50+ water industry & membrane technology experts from:**

Dupont, Koch Separations Solutions, Mann+Hummel, Pall

**Innovation Center**

Woburn, Massachusetts  
Grand Opening Q3 2023

## ACCOLADES

**Breakthrough Technology Company of the Year**

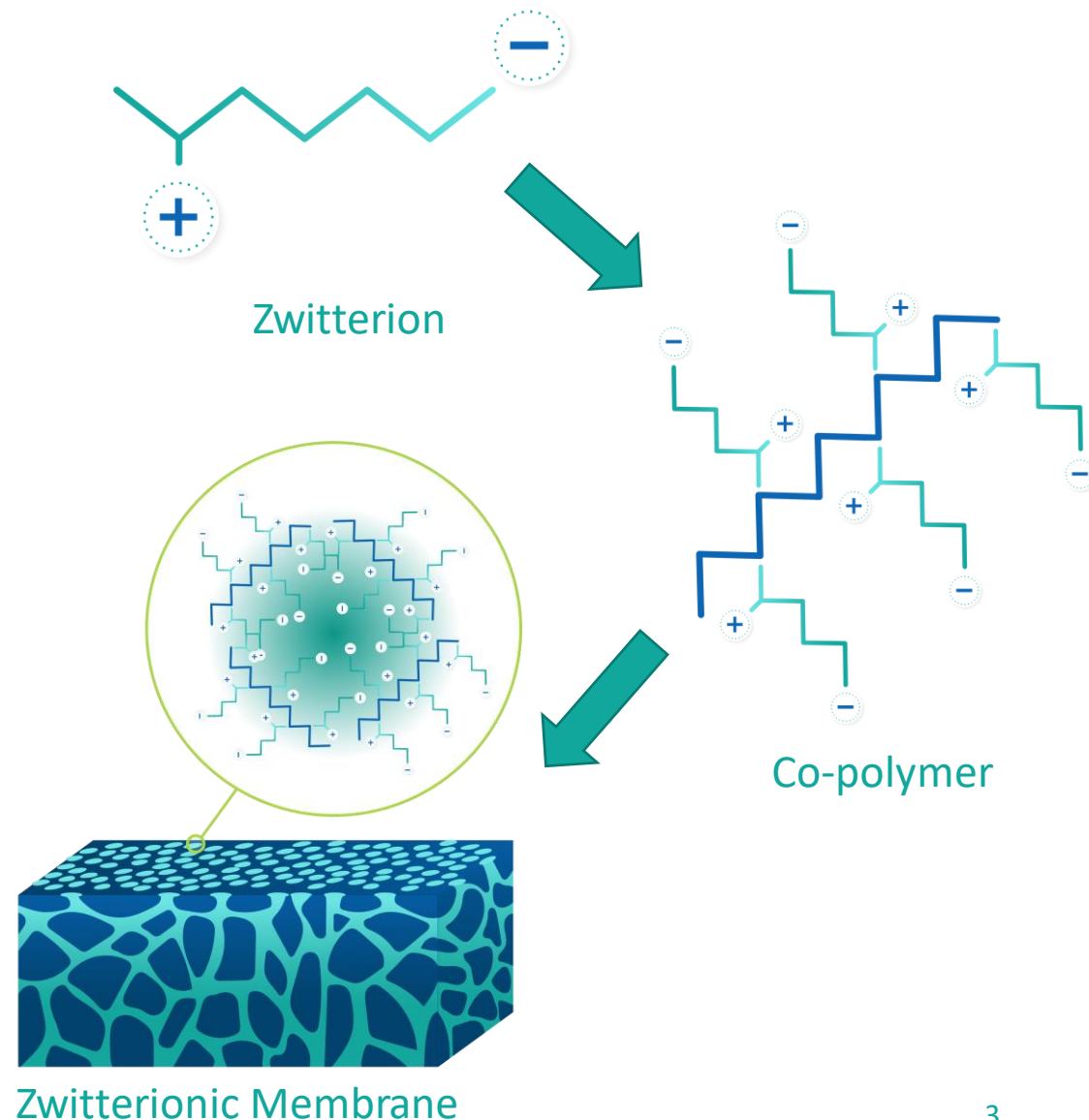
2023 Global Water Summit

**ZwitterCo's filtration membrane helps large farms and industrial processors recycle their wastewater."**



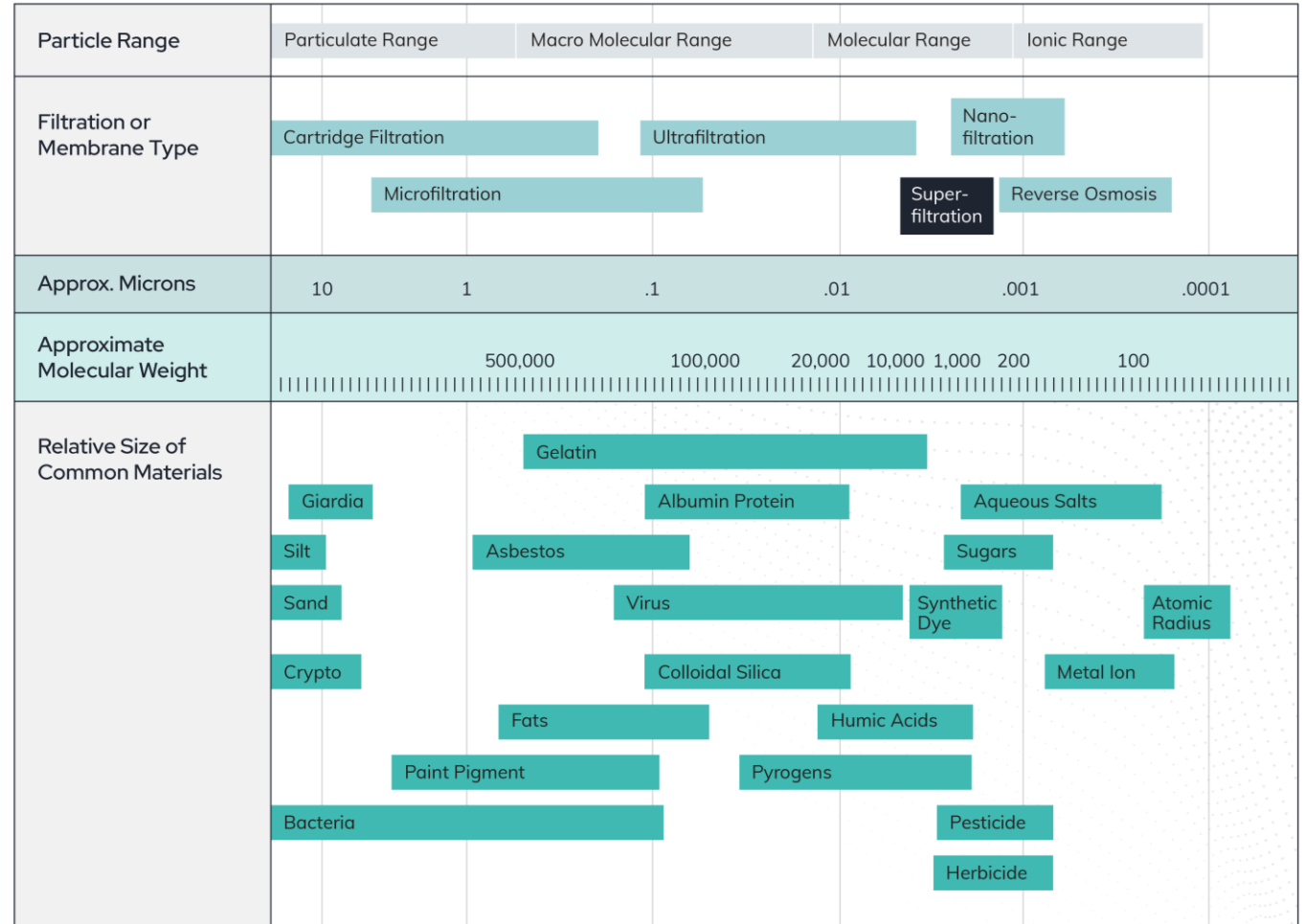
# A New Material Chemistry

- Patented, self-assembling zwitterionic co-polymer chemistry
- Zwitterionic pores **attract water and repel organics** to prevent fouling
- Our membranes **recover upon cleaning**, even after filtering fluids that ruin standard membranes in days



# A Unique Superfiltration Membrane

- Superfiltration (SF) membranes are a class of membrane that falls between ultrafiltration (UF) and nanofiltration (NF)
- SF membrane characteristics:
  - MWCO of 500 – 3,500 Daltons
  - Lower salt rejection than NF
  - Higher organic rejection than UF



# Filtration for the Most Challenging Separations

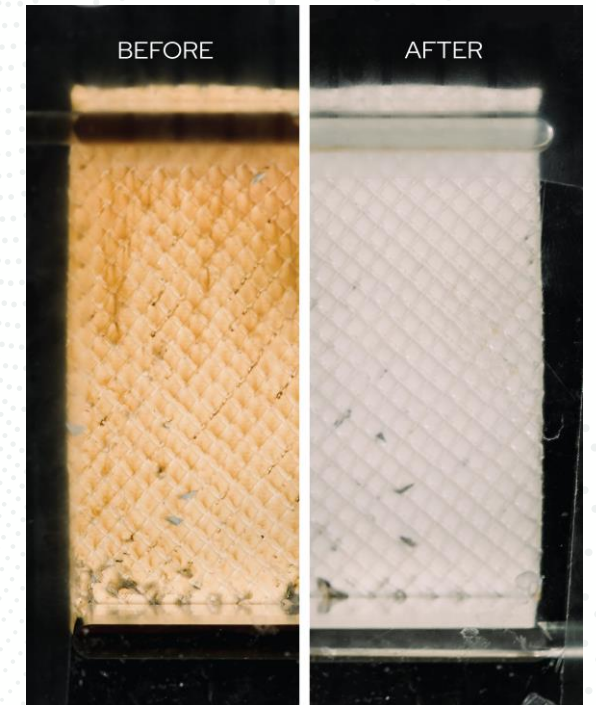
## Unprecedented Performance

- Handles over **50,000 ppm** (5%) fats, oils, and grease
- **Full performance recovery** after mild maintenance wash

## Precision Separation for Discharge or Reuse

- **99+% removal** of fats, oils, greases, proteins, and suspended solids
- Produces **ideal feedwater for reverse osmosis** or other downstream polishing stages

**ZwitterCo Membranes**  
*Full recovery after cleaning*





## Digestate – Food and Manure

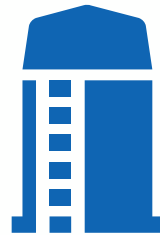


# A Better Way to Manage Digestate

## Current Options

### Storage

- Limited space
  - Especially problematic for urban food waste digesters
- Increases CI score



## ZwitterCo-Enabled Solution

### Reduce Storage Needs

- Generate useable byproducts
- Less volume of fertilizer product to store

# A Better Way to Manage Digestate

## Current Options

### Off-Site Hauling

- Expensive
- Increases CI score



## ZwitterCo-Enabled Solution

### Reduce Offsite Hauling

- Significantly limit offsite hauling
  - Reduced by more than 50% in some cases



# A Better Way to Manage Digestate

## Current Options

### Membrane Bioreactor

- Biological process
- Does not produce fertilizer
- Difficult to scale up
- Large tanks are not ideal



## ZwitterCo-Enabled Solution

### Spiral-Wound Membrane

- Physical separation process
- Concentrated organic fertilizer
- Easily scalable
- Smaller footprint

# ZwitterCo in Digestate

- Ideal pretreatment to reverse osmosis
  - Removes organic foulants
  - Better water quality
  - Less cleaning of RO elements
  - Longer lifetime of RO elements
- Spiral configuration is energy efficient
  - Smaller pumps
- Achieve sustainability goals
  - Enables water reuse



# Manure Digestate

## Overview:

- Brown County Organics in Wisconsin
- Centralized digester servicing 13 farms
- 35,000 head of dairy cattle manure
- 1 MGD of digestate



# Manure Digestate

## Challenges:

- Hauling manure digestate offsite
- Facing regulatory pressure on soil and groundwater contamination
- Wasting valuable nutrients in manure



# Manure Digestate

## ZwitterCo SF + RO Solution:

- 50% reduction in hauling
- Meets discharge requirements
  - Over 100 million gallons per year
- Concentrates ammonia-based nitrogen
  - Sellable organic liquid fertilizer

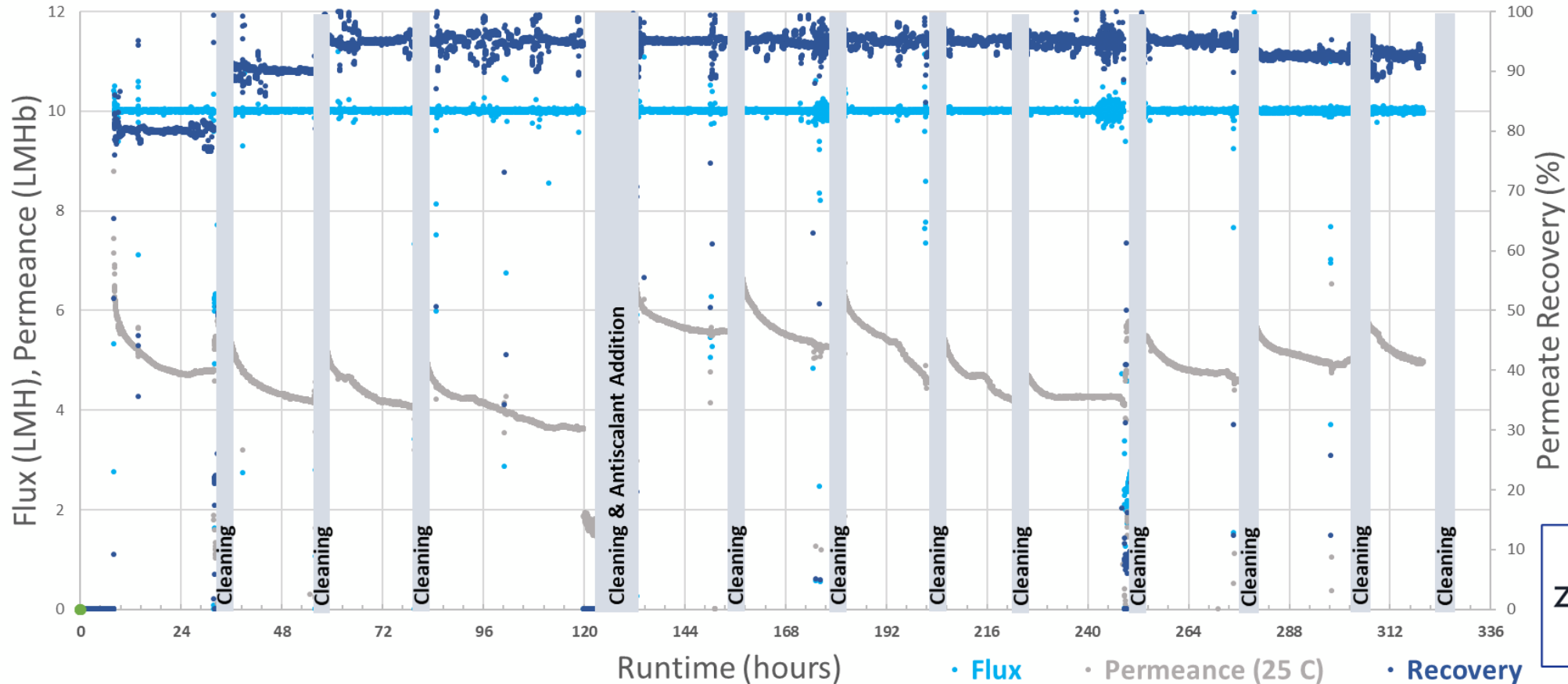


ZwitterCo SF Permeate (Center), ZwitterCo SF Concentrate (second from right), RO Permeate (far right)

RESULTS

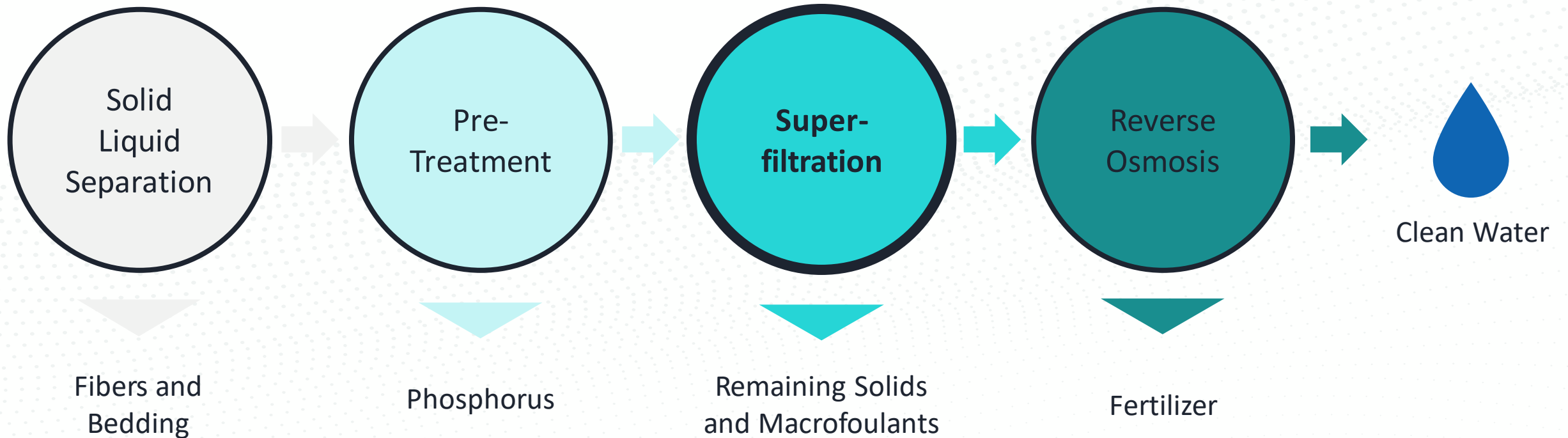
# Manure Digestate Field Test Results

Pilot run at 95% recovery



ZwitterCo + Digested Organics  
Piloting was completed in partnership with Digested Organics.

# Nutrient Recovery Process





ZWITTERCO

[www.zwitterco.com](http://www.zwitterco.com)