Water Market Analysis, Business Model, and Go-To-Market Perspectives

Board Meeting Presentation

Thursday May 15th, 2008

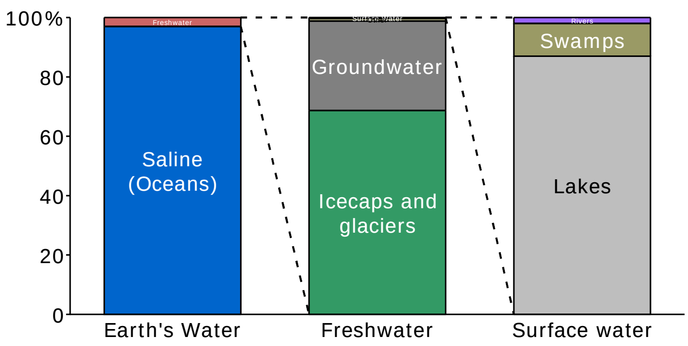
Stonybrook
PURIFICATION

Agenda

- **Water Market Overview**
- **Value Capture Drivers**
- **Business Model Levers**
- **Working Recommendations**
- **Appendix**

A Small Percentage Of Water Is Readily Available For Consumption

Distribution of Earth's Water

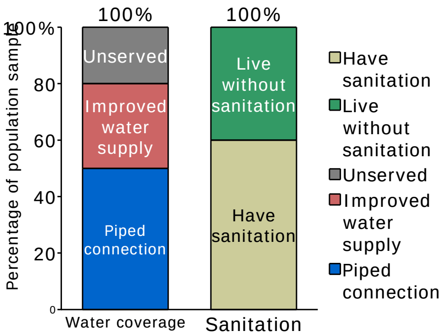


Although this fraction used to be enough to meet our needs, over consumption and pollution is making this no longer to be true

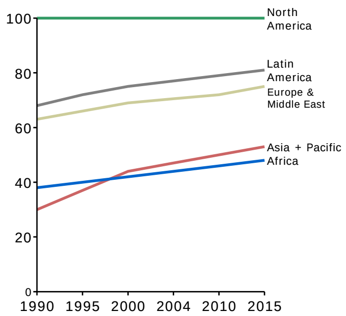
Note: Only about 1% of all available water is in form that can be used for freshwater applications (surface water representing a fraction
Source: U.S. Geological Survey

There Is Lack Of Access To Water Today And A Major Segment Of The Population May Continue To Experience Water Strains

Coverage and Availability



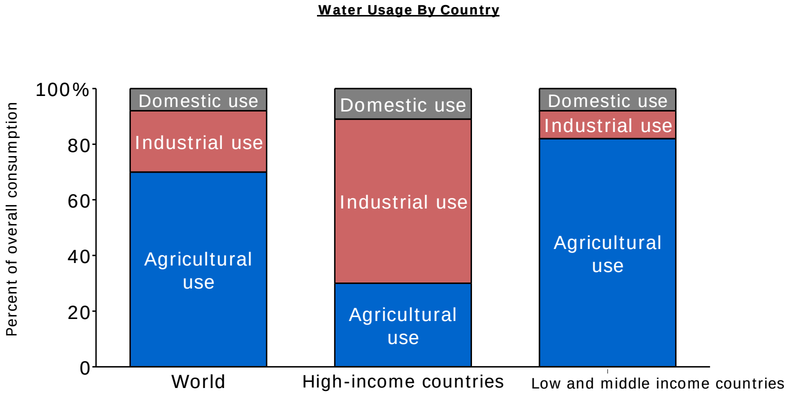
Geographic Sanitation Coverage (%)



Although water availability is critical, in the long-run, solutions that assure water quality are likely to be more important

Note: Projections for 2025 are business as usual
Source: Author's estimates and IMPACT-WATER projections, June 2002

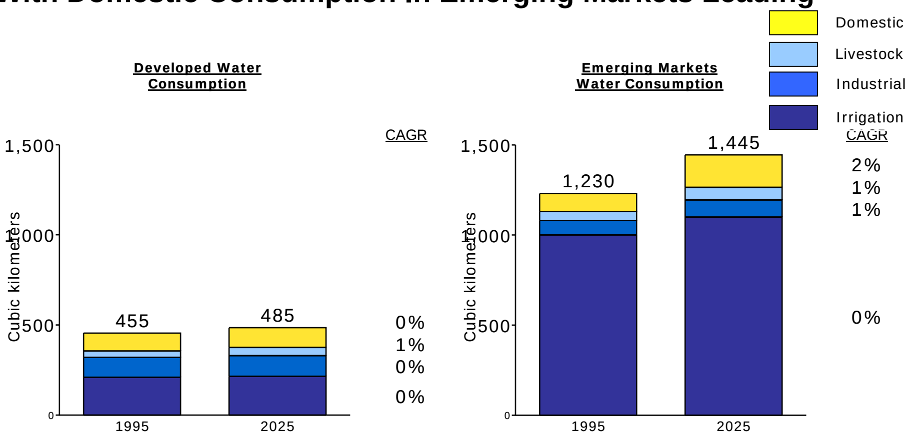
Various Factions Will Compete For Use Of Water – Water Is A Key Input For Living, Food, Energy, And Many Industries



Given that development assumes both industrialization and greater food production, access to water will be that much more important

Note: Only about 1% of all available water is in form that can be used for freshwater applications (surface water representing a fraction
Source: U.S. Geological Survey; High income countries defined as G8 economies

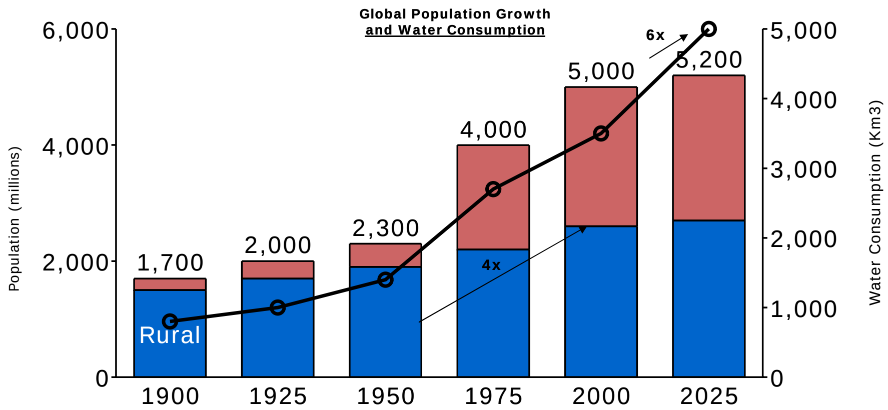
Business As Usual Projections Present Conservative Forecasts With Domestic Consumption In Emerging Markets Leading



Emerging markets are expected to have more than 3 times the aggregate water consumption of developed countries in 2025 – with increasing per capita pressure

Note: Projections for 2025 are business as usual
Source: Author's estimates and IMPACT-WATER projections, June 2002

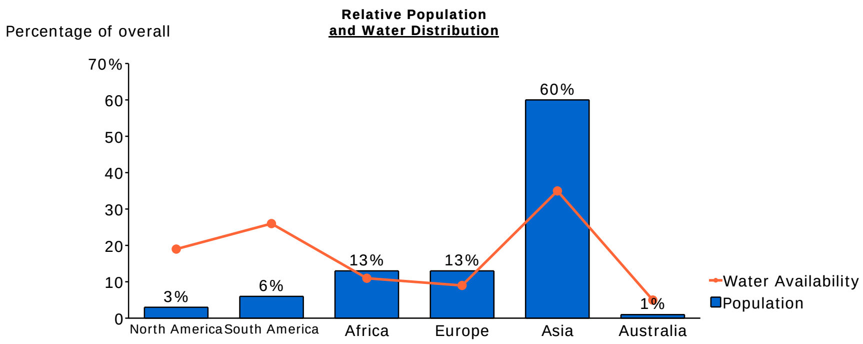
Water Consumption Has Exceeded And Is Expected To Continue To Outpace Population Growth



Water demand in emerging markets will rise with living standard increases, if pattern continues to hold true – water efficiency will become more important

Source: Jefferies International, Unesco, Aquastat

Uneven Distribution Aggravates The Situation, With Water Rich & Water Scarce Countries Not Facing Similar Challenges



Countries in the Asian continent are already strained from supply perspective, and with the decline of available water supplies things are likely to become worse

Source: United Nations Educational, Scientific and Cultural Organization/International Health Programs

Infrastructure Investment And Upgrades Are Needed To Assure Both Water Quality And Quantity

Surface or well water contamination

- More and more of our sources of water are becoming polluted by contaminants (organic and inorganic)
- Reliable access to surface water is becoming difficult to secure with increased industrialization

Infrastructure failure or lack of delivery to point of use

- After delivery and storage, water often becomes too contaminated to use because of outdated infrastructure
- In emerging markets water consumption (for residential and industrial applications) is outpacing development, planned improvements, and expected new investments

Waste water generation

- In developing countries, 80% of all waste water is discharged
- In G8 Countries, wastewater is processed primarily to remove biological loads – not treating for more advanced contaminants

The above drivers together impact the water availability and quality profile of a specific regions, further guided through regulations

Source: WHO Water Report

Global Regulations Are Strong Influencers, But Global Water Standards Only Vary Slightly Across Key Attributes

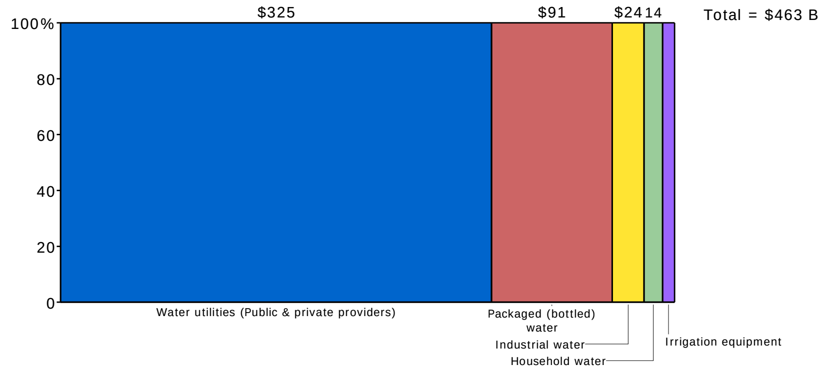
Attribute	EPA Standards	EUR Standards	WHO Standards
Conductivity	250 micro S/cm	250 micro S/cm	250 micro S/cm
Aluminum	0.2 mg/l	0.2 mg/l	0.2 mg/l
Antimony (Sb)	0.005 mg/l	0.005 mg/l	0.005 mg/l
Arsenic (As)	0.01 mg/l	0.01 mg/l	0.01 mg/l
Boron (B)	0.3 mg/l	1.00 mg/l	0.5 mg/l
Cadmium (Cd)	0.003 mg/l	0.005 mg/l	0.003 mg/l
Copper (Cu)	2 mg/l	2 mg/l	2 mg/l
Lead (Pb)	0.01 mg/l	0.01 mg/l	0.01 mg/l
Manganese (Mn)	0.5 mg/l	0.05 mg/l	0.4 mg/l
Mercury (Hg)	0.001 mg/l	0.001 mg/l	0.006 mg/l
Nickel (Ni)	0.02 mg/l	0.02 mg/l	0.07 mg/l
Selenium (Se)	0.01 mg/l	0.01 mg/l	0.01 mg/l
Sodium (Na)	<200 mg/l	<200 mg/l	<200 mg/l
Chloride (Cl)	<250 mg/l	<250 mg/l	<250 mg/l
Fluoride (F)	1.5 mg/l	1.5 mg/l	1.5 mg/l
Sulfate (SO4)	500 mg/l	250 mg/l	250 mg/l

Similarity of global water standards indicates the potential for widespread and global solutions

Source: Secondary Research (EPA & WHO Websites)

The Water Related Spending Market Is Significant, But Current Pattern Does Not Track Global Consumption

Water Market Overview

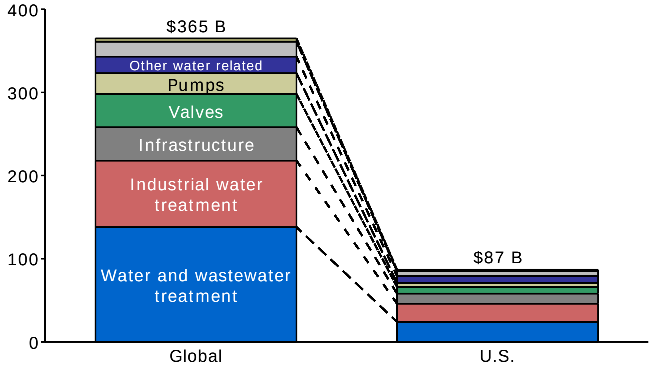


After water utilities, packaged water, and industrial water segments have the highest spend – this is not accounting for potential impact around pricing of water

Source: GWI Water Intelligence Report

From An Infrastructure Perspective, Treatment Systems Dominate Overall Water Market Spending

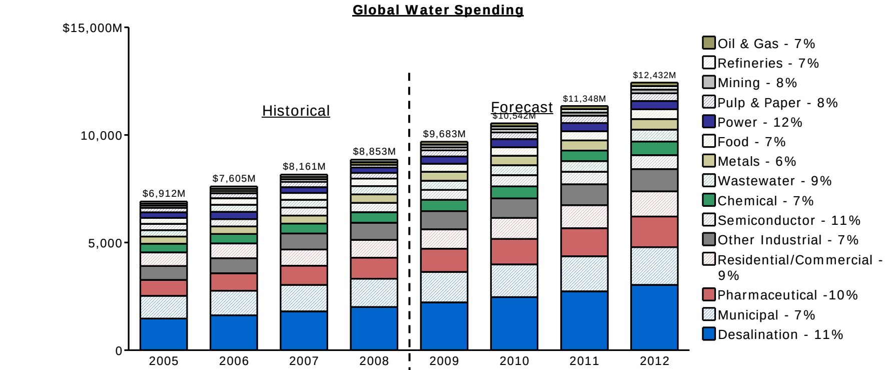
Water Technology Spending



Large-scale water treatment solutions comprise majority of expenditures– the U.S. accounts for 24% of the overall market

Source: Goldman Sachs Water Report

Desalination, Power, Pharma, and Semi Are Expected To Drive Global Growth



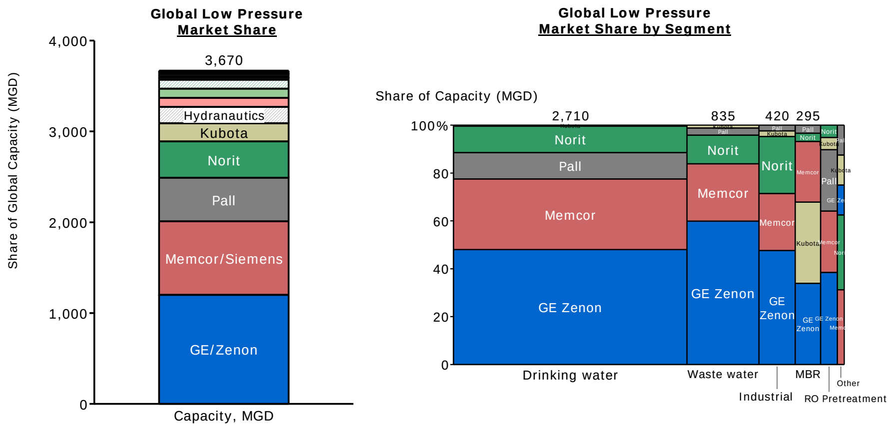
	2005	2006	2007	2008	2009	2010	2011	2012
Power - 12%	256	338	264	248	341	381	387	392
Semiconductor - 11%	289	343	372	430	462	517	579	647
Pharmaceutical -10%	738	811	892	980	1,075	1,181	1,298	1,425
Desalination - 11%	1,462	1,621	1,799	1,998	2,218	2,461	2,733	3,033

Desalination presents itself as the largest opportunity in terms of spending, followed closely by industrial solutions

Note: Total CAGR is 9%
Source: McIlvaine Forecast

GE and Siemens Command 50% Of The Market --- (UF & MF)

Market Dominated By Incumbents With Horizontal Solutions



Consolidation within the market impacts initial decision to go after horizontal solution versus a vertical approach, and geographic market (where players may or may not be vertically integrated)

Source: Secondary Research, Water Institute Low Pressure Report

Desalination, Residential, Pharma, and Food Have The Most Attractive Market Metrics

○ Low
● High

Segment	Market	2008 Market Size (M)	2012 Market Size (M)	Global Growth	US Growth	China Growth	India Growth	Element Value Capture	Pain Points	Rating
Res / Com	Residential /Commercial	825	1167	9%	9%	9%	9%		• Performance	●
Municipal	Desalination	1,998	3,033	11%	11%	9%	35%		• Cost	●
Municipal	Municipal	1320	1752	7%	6%	11%	10%	35%		◐
Municipal	Wastewater	389	551	9%	8%	13%		10%	• Fouling, Decrease reuse costs	◐
Industrial	Pharmaceutical	980	1,425	10%	10%	23%	15%	50%		●
Industrial	Power	248	392	12%	8%	4%	65%	50%		◐
Industrial	Semiconductor	430	647	11%	13%	13%	8%	50%		◐
Industrial	Food and Beverage	345	453	7%	7%	7%	7%	50%	• Sanitation	◕
Industrial	Mining	122	166	8%	2%	12%	5%	50%	• Effluent pollution	◐
Industrial	Refineries	124	165	7%	6%	5%	7%	50%		○
Industrial	Metals	394	492	6%	4%	10%	8%	50%		○
Industrial	Chemical	492	633	7%	5%	15%	6%	50%		○
Industrial	Other Industrial	797	1035	7%	6%	11%	12%	50%		◐

Source: Market projections are for membrane data, Element value capture based on industrial processes estimate

Number Of Pain Points Exist Within Each Target Segment

○ Small ● Large

Segment	Target Problem	Identified Challenges	Pro's/Con's	Attractiveness
Residential / Commercial	Home / Village Purification	Nothing for NF/RO for home unit, lack of clean potable water	Hard to sell to market, Need corporate distribution partner	●
Residential / Commercial	Calcium rejection	Current water softeners are big and expensive	Target Ca and Mg	◐
Residential / Commercial	Hotel solution	Assuring water quality in emerging market hotels may be a critical challenge	Attractive beach-head segment, require extensive validation	◐
Municipal	RO Pretreatment	Can't get dissolved materials (Ca/Mg dissolutants), Nowhere to dispose brine, 30% of existing RO capital costs	Save chemical costs, Need to save energy	●
Municipal	Water-reuse – Municipal wastewater applications	Fouling very costly, public perception, membrane bioreactor use	High-flux/low fouling, just fit sequence in the back-end	◐
Municipal	Phosphorous rejection	Algae growth in irrigation, emerging US/EUR regulation, current approach expansion	Concentrate P> reduce costs	◐
Municipal	Membrane bioreactors	High fouling (due to raw sewage)	Higher flux/fouling risk, back flushable and chlorine resistant	◐
Industrial	Water-reuse – Industrial applications	Fouling very costly, public perception, membrane bioreactor use	High-flux/low fouling, just fit sequence in the back-end	●
Industrial	Food processing	Milk-processing/juice/cheese	Lower cost; high flux > must be significant	◐
Industrial	Bilge water	Micro-organisms and oil, future regulations around dumping, reduced space, public relations for cruise lines		○
Industrial	Produced water	Existing NF for oil, gas oils can't dispose of salt content, expensive, organics and bugs	Must be hydrophilic, remove hexane/bezane (growing problem)	●
Industrial	Dual Stage NF			●

Source: Secondary Research, Red indicates currently selected problems

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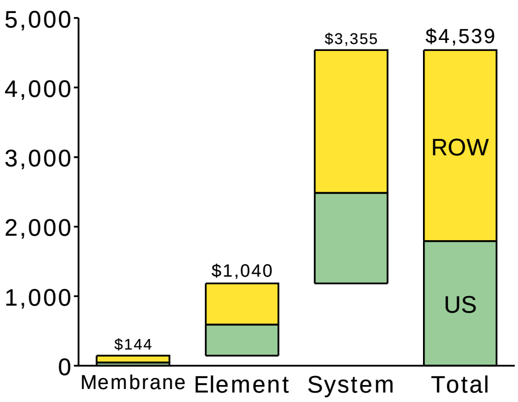
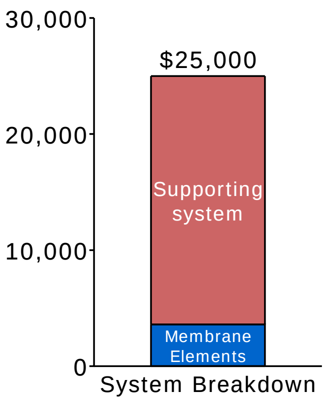
Element Level Opportunity Accounts for 33% of Overall Market

Membrane, Element, and System Capture By Market
WW Membrane Sold ($MM)



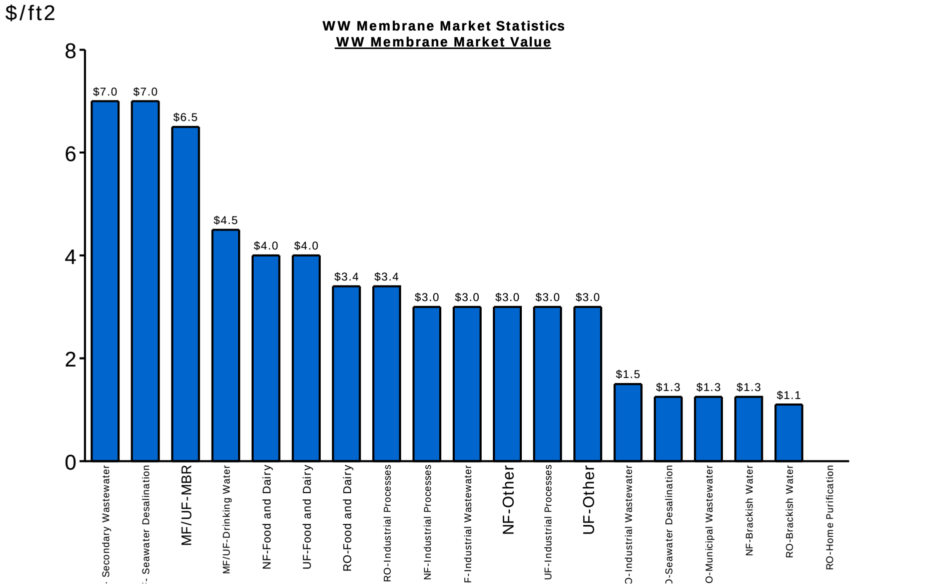
Breakdown of 15 g/min
Nanofiltration unit ($)



Although membrane's comprise lower share of overall value, in larger systems, membrane might comprise a significantly greater portion of overall costs

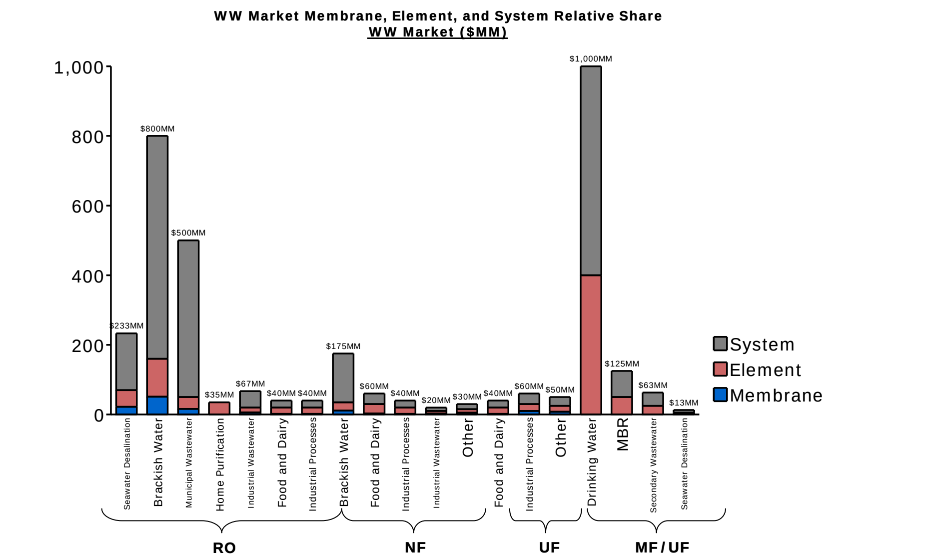
Source: Bjarne Nicolaisen, Stony Brook Water Purification Potential Markets for spiral wound membrane elements; primary research

End-Market Selected Impacts Overall Membrane Value Capture - Wastewater and Desalination Capture Highest Dollar Per Sq. Foot



Source: Bjarne Nicolaisen, Stony Brook Water Purification Potential Markets for spiral wound membrane elements

Drinking Water, Brackish, and Desal Have Largest Market Share, With MF Drinking Water Systems Capturing Majority Of Dollars

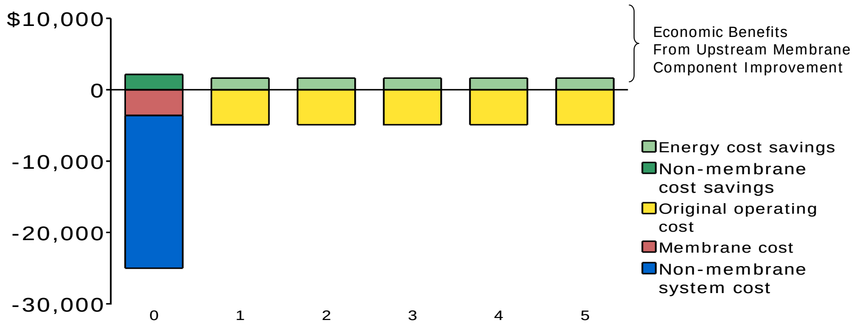


Source: Bjarne Nicolaisen, Stony Brook Water Purification Potential Markets for spiral wound membrane elements

Primary Value Generator Is The Membrane Productivity Improvement Driving Capex And Operating Cost Savings

- "Enhancing output to reduce overall costs are critical, we like upwards of 50%" - Thermax

Capital Investment and Operating Cost
For Sample System ($25k @ 15 g/min)

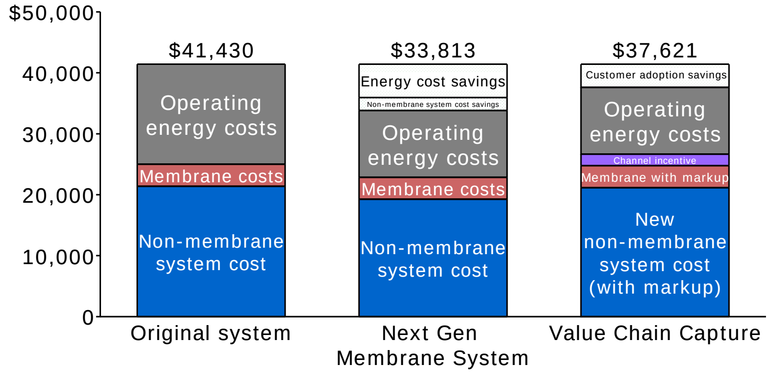


A more comprehensive picture of total operating, capital costs, and benefits enabled through technology will help reveal required lifetime product economics

Note: Calculation based on a small system, values may be better with original system, See Appendix
Source: Peter Yu

Significant Performance Improvement Creates Economic Argument To Incent Customer, Channel, And Partner Adoption

Lifetime System Value Comparison (NPV)
and Relative Value Capture ($25k @ 15 g/min)



50% improvement in productivity can lead to a 10% savings for customer over lifetime of system and leave value for other players to promote adoption – question is whether 10% is enough and what value capture can be negotiated!

Note: Channel receives $2000k in incentives (higher margins), system developer gains market penetration, and membrane manufacturer gains share
Source: ST Analysis

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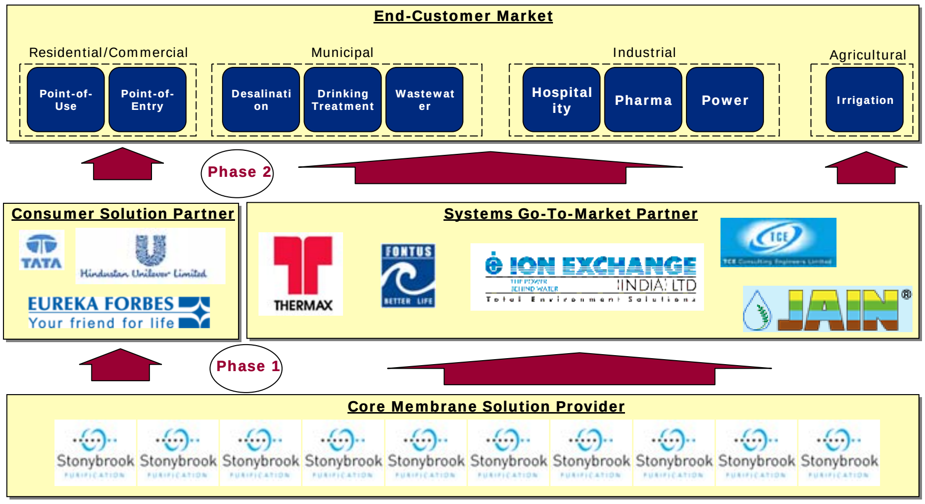
Strategic Decisions Will Impact Risk/Reward Profile Of Venture, Candid Assessment Of Technology Is A Key Issue

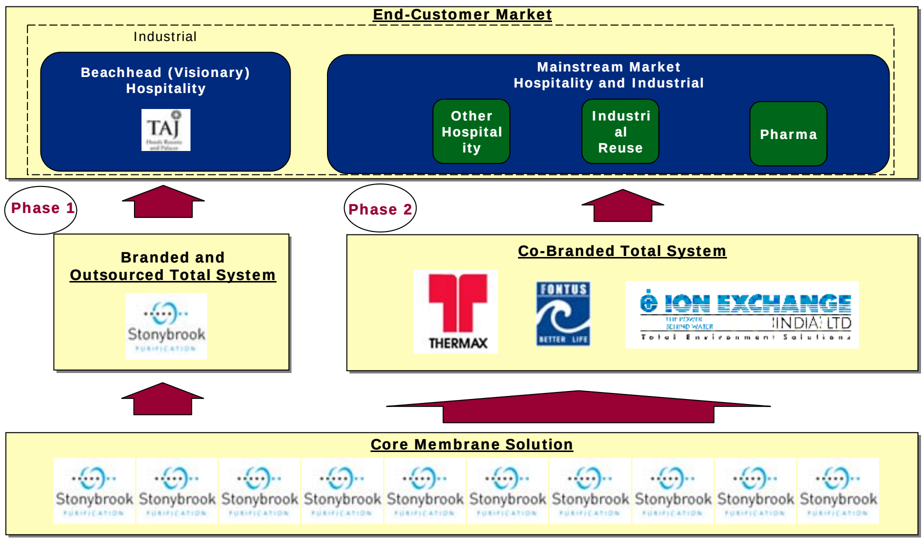
	Horizontal generic solution leveraging breakthrough product	**Customized and application specific approach**
Key Actions / Priorities:	• Manufacture membrane product with applicability across numerous markets • Work with numerous channel partners to develop solutions • Promote volume and scale in manufacturing (potentially with an outsourcing model)	• Develop highly-disruptive product offering tailored for a specific end customer • Selectively work with visionary customer and channel partner to go-to-market • Become a market leader within specific water filtration category
Investment:	• Manufacturing facility (initial and marginal cost) • Ongoing R&D expenditures • Partnership development	• Manufacturing costs (initial) • Ongoing R&D expenditures • Sales and marketing resources
Benefits:	• High multi-market penetration potential	• Larger share of value created
Costs:	• Smaller share of overall customer value	• Lower multi-market penetration potential
Risks:	• Negotiating appropriate strategic partnerships • Assuring category leadership in multiple markets • Forward pricing may fail against next gen products	• Selecting and securing initial beachhead customer • Transitioning to wider go-to-market
	Applicable for breakthrough technology **Broad market entry approach that focuses on achieving scale and manufacturing prowess**	**Applicable for incremental innovation** **Focused market entry approach that allows for share gain in specific category**

Horizontal Go-To-Market Approach (Ex: India) -- Working With Partners A Membrane Company Could Quickly Gain Scale



- Leverage horizontal membrane technology to sell through to many markets

Focused Go-To-Market Approach (India) – Developing The Whole Product Might Assure Segment Leadership



- Validate initial product independently with customer (incurring sales/bus. Dev costs) to gain pricing power

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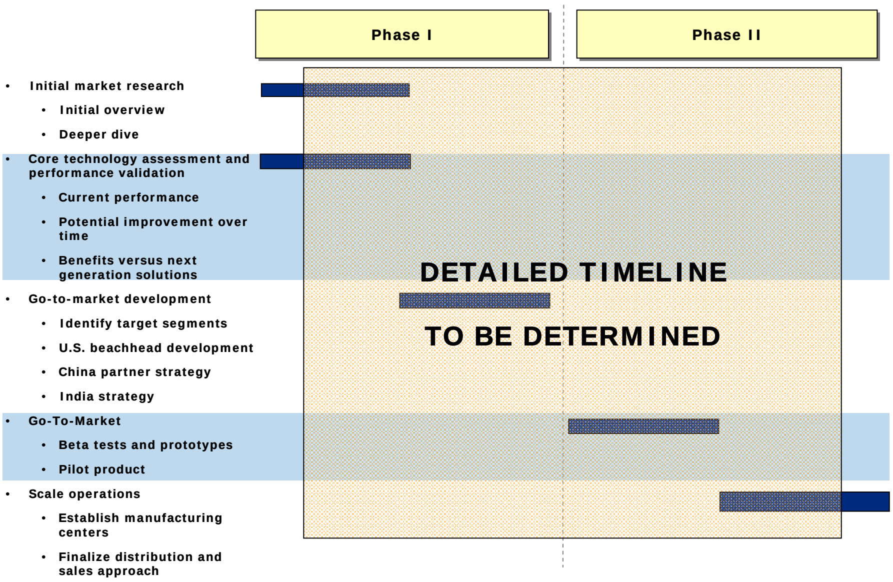
Conclusions (page 1 of 2)

- **A storm is brewing that will help drive customer adoption for new water technologies in select markets**
  - Demand for water in "water scarce" countries like China and India is expected to increase with industrialization and development (water market could grow from 10-15% in select markets)
  - Globally, views on water are changing, and new regulations around usage, pricing, etc will only push for more efficient use of available infrastructure capital
  - Available supply of water is declining from over-consumption, pollution, and potential impacts of climate change
  - Single focus on developed economies does not accurately portray the urgency of the situation (we must think global and act local)
- **Market data reveals some end-market segments to be fundamentally more attractive than others**
  - Attractive segments include desalination, residential (point-of-use), commercial, and industrial (pharma, semi, and food)
  - In contrast, the refinery segments has least attractive market metrics (small size and low growth)

Conclusions (page 2 of 2)

- **Value capture driven by potential cost savings of system within a segment**
  - Even though membrane players capture, 5% to 30% of system value across various applications, market penetration of a horizontal solution can be significant enough to justify a "partner for a solution" approach
  - Incumbent players currently dominate high-attractiveness membrane markets (top 4 have 80% of global market share)
  - Depending on performance of system (energy savings, CO2 reduction, membrane replacement, etc) there can be enough value to incent customers, channel, and solution partner to adopt new solution – confirm minimum customer requirements (and performance of alternatives)
- **A technology assessment (performance today & improvement over time) should drive business model and longer-term investment decision**
  - Strategic decision needs to be made on the specific approach that should be used to go-to-market (based on relative uniqueness of underlying technology)
  - Selectively partnering with players in the value-chain is critical for the overall success of the venture and accelerate development of the right "whole product"
  - Performance of underlying technology will determine addressable market size, and capital raised needs to match the size of this potential opportunity to create a plan with acceptable venture returns

Next Steps: Deep-Dive Of Segments, Solutions, & Pain Points



Note: Above milestones do indicate expected resource changes

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There Are A Number Of Emerging Water Problems

Water Problem	Description	Geographies Affected	Segments influenced
Salting of Water Supply	Measure of dissolved solids in water which are also cause of hardness (some regions have dissolved solids higher than median >75%). Salt water is intruding into aquifers around coast	US (Southwest, Mid-west, Texas, parts of Northeast), Global coastal issue	Municipal, Industrial
Acid Rain	Conversion of nitrogen and sulphur oxide emissions from industrial factories into nitric and sulphuric acid	US (Northeast and Southeast)	Municipal, Industrial
Aquifer Depletion	Water levels in many aquifers are dropping and areas where there are high water withdrawals (> 1.120 billion gallons per day)	US (Southwest, Southeast, Illinois)	Municipal, Industrial
Arsenic Contamination	Arsenic entering water supply because of use in industry and metallurgy (and from bedrock)	US (Southwest, Central, Midwest, parts of Northeast), India	Municipal, Industrial
Elevated Nutrient Contamination	Runoff from fields adds nutrients (nitrate, phosphorous) from fertilizer applications to streams and other surface water impacting health and algal growth	US (West, Midwest, Southeast), India, China	Municipal
Energy Production Demand	Areas where water usage due to energy is increasing (over 50% or more water withdrawals go to ward energy production)	US (Midwest and Northeast)	Municipal
Mercury Contamination	Mercury released from burning fossil fuels or from natural processes (methylmercury)	US (West, Northeast, Southwest), India	Municipal, Industrial
Mining Pollution	Strip mining causes increased of dissolved solids and toxic metals	US (California, Northwest, and Pennsylvania), Africa	Municipal
Organic and Industrial Toxins	PCV (polychlorinated vinyls) and VOCs (volatile organic compounds) contamination from industrial coolants	US (West, Northeast, Southeast)	Industrial
Radioactive and Radon Contamination	Industrial and military activities, and presence of uranium ore near water aquifers. Radon increases risk of lung cancer	US (West)	Industrial
Pesticide Contamination	DDT contamination (EPA has not set maximum standard)	US (West, Central, Midwest, Southeast, parts of Northeast)	Municipal, Industrial

Source: University of Illinois

Water Membrane Technologies Initial Overview

MF (Microfiltration)
0.1 to 1.0 microns

- MF is used to remove submicron suspended materials on a continuous or semi-continuous basis.
- The size range is from approximately 0.01 to 1.0 microns (100 to 10,000 angstroms). By definition, microfiltration does not remove dissolved materials.

UF (Ultrafiltration)
0.01 to 0.1 microns

- UF is a membrane process which removes dissolved non-ionic solute, typically organic materials (macromolecules).
- Ultrafiltration membranes are usually rated by "molecular weight cut-off," the maximum molecular weight of the dissolved organic compound (in Daltons) that will pass through the membrane into the permeate stream.
- These compounds are generally considered smaller than 0.01 micron (100 angstroms) in size.

NF (Nanofiltration)
10 to 100 angstroms

- NF can be considered "loose" reverse osmosis.
- It rejects dissolved ionic contaminants but to a lesser degree than RO. NF membranes reject multivalent salts to a higher degree than monovalent salts (for example: 90% vs. 20%).
- These membranes have molecular weight cut-off limits for non-ionic solute in the range of 400 to 1000 Daltons

RO (Reverse Osmosis)
<10 angstroms

- RO produces the highest quality permeate of any pressure driven membrane technology.
- Certain RO polymers will reject above 99% of all ionic solute, and have molecular weight cut-offs in the range of 50 to 100 Daltons.

Source: Pennet

Technology Assessment And Entry Approach Will Drive Returns

	Factor	Potential Approach
Revenue Growth	Rate of customer adoption	Selling to point-of-use market to capture consumer demand
	Channel partner decision and go-to-market approach	Signing application or territory specific exclusive licensing agreements
	Selected beachhead market	Developing product to provide performance against key water problem
Margin Expansion	Negotiated partnership agreements	Signing a perpetual agreement with initial customer to gain scale
	Price expansion	Moving to adjacent markets to gradually drive to higher price points
	Pushing economies of scale	Forward building scale to lower price points
Capital Invested	Manufacturing system requirements	Developing product specifications so that existing manufacturing facilities can be used
	Outsourcing decisions	Deciding to outsource supporting materials
	Market access decisions	Agreeing to a mini-multinational model for geographic access
Operating Costs	Ongoing R&D investments	Minimizing R&D investment and instead relying on an acquisition strategy
	Other operating costs	Distribution expenses across multiple locations
	Sales and marketing strategy	Allowing co-branding to reduce marketing expenses
Exit Multiple	Comparable market multiples	Water problem pushes higher public market multiples
	Synergies to potential buyers	Opportunities to integrate product with other solutions drives higher prices
	Technology assets	Generic nature and (horizontal) solutions will assure longer longer-term revenue generation potential

Membrane Productivity Improvement Analysis (Assumptions)

	Analysis
Variables	
System capacity	15 g/min
Total System cost	$25k ($3.6k membrane cost and $21.4 non-membrane system costs)
Assumed operating power	7.5 horsepower
Assumed operating hours	24 hours per day (100% of time)
Conversion variables	746 W per horsepower, 0.10 cents /KWh, 15% discount rate
Membrane productivity improvement	50% (improvement in flux over existing solution) – directly linked to productivity
Steps	
1. Calculate Dollars per year on energy	7.5 horsepower x 746 W/horsepower x 24 hours/day x 1/1000 x 0.10 cents/Kwh x 365 days
2. Determine realized efficiency of system	=1/(1+membrane productivity improvement)
3. Calculate new dollars per year on energy	Old dollars/year * efficiency factor
4. Discount other costs	10% lowering of price on non-membrane system costs
4. Continue to NPV calculation	Assume discount rate 15%, calculate discount factor, include energy savings

Source: Expansion from slide 21