



water is life

District of Columbia Water and Sewer Authority
George S. Hawkins, General Manager

A UTILITY APPROACH TO RESEARCH AND TECHNOLOGY TRANSFER

Presentation for:

MWCOG Lab-to-Market Technology Forum

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Large water/wastewater utility

Service to DC (retail) and suburbs (wholesale)

Independent, governmental authority

Nonprofit, ratepayer funded



DC Water Research Program

DO more

- Growth
- More Stringent Regulations – Now and in the Future
 - Eliminate CSOs (370 – 1076 mgd and higher),
 - Nutrients (TN<3 & TP<0.18),
 - Class A Biosolids (pathogen re-growth / reactivation)
 - Future – PCBs, EDCs, secondary treatment for CSO by-pass

IN less

- Space constraints
- Aging infrastructure
- Urban environment – visual impact, odour, noise

WITH less

- Sustainability Vision
 - Energy Neutrality
 - Resource Recovery – Energy, Biosolids, Nutrients, Water
- Cost – long term rate impacts



New Regulations

Aging Infrastructure

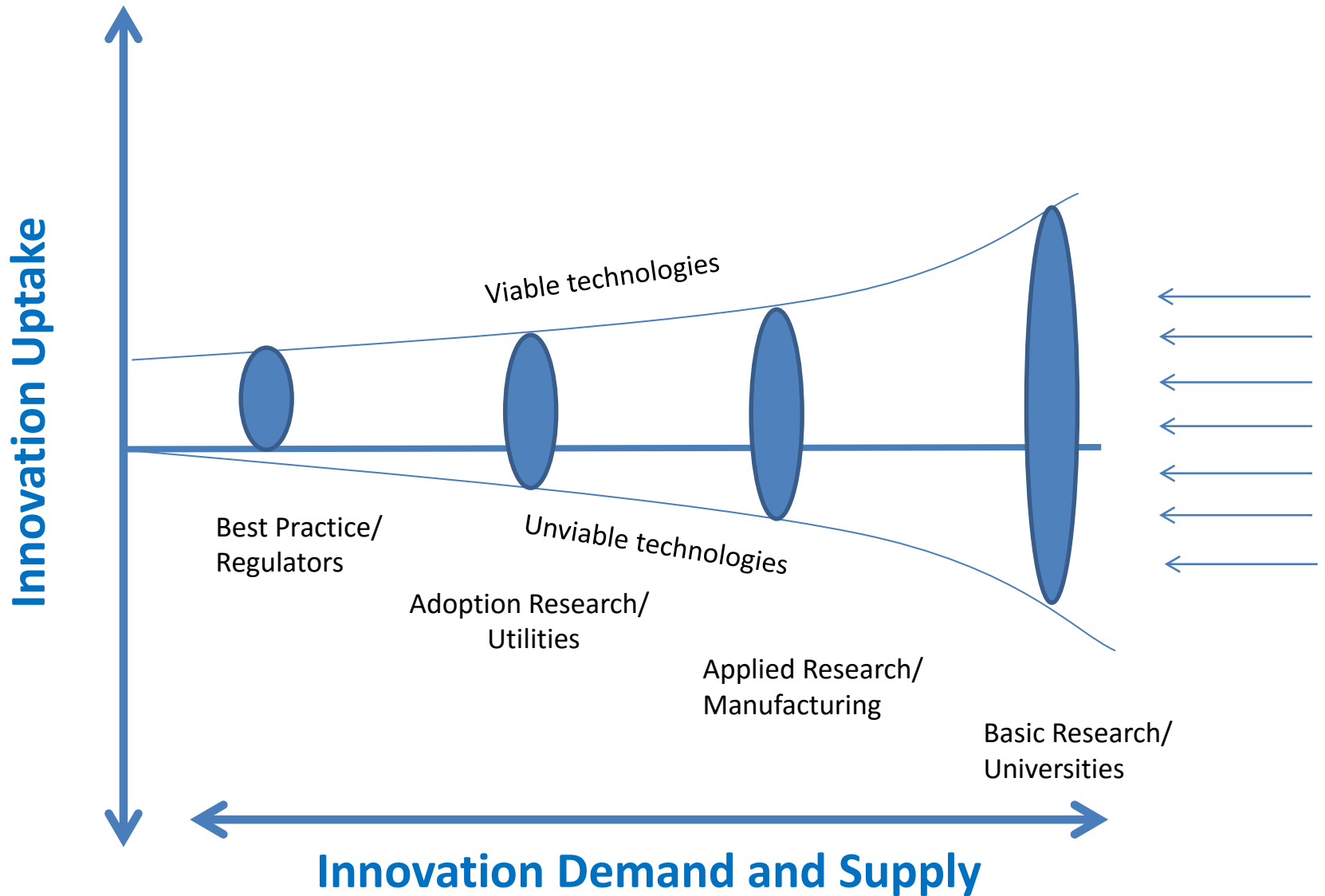
Affordability





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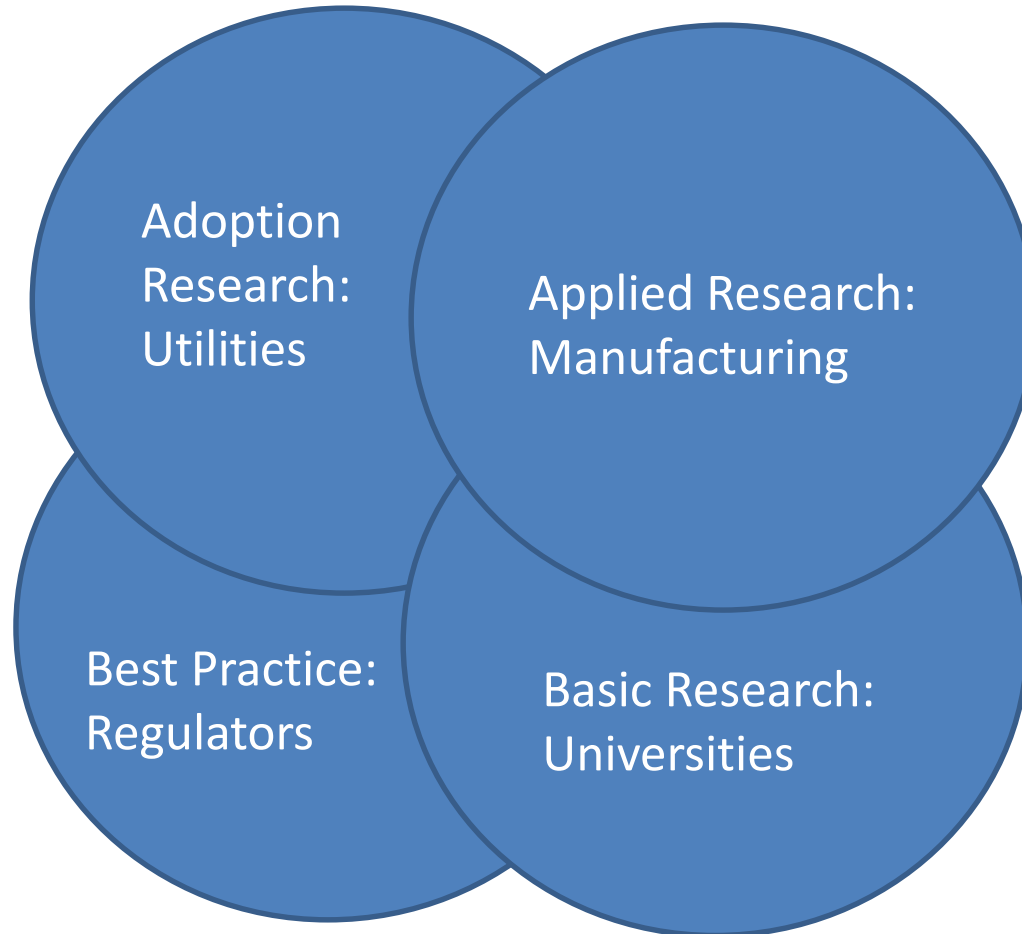
Innovation: Old Model





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Innovation: New Model



Co-Innovation

- Within DC Water
- Other Utilities (Alex Renew, WSSC, Fairfax County, HRSD, PWD, NYCDEP, Thames Water, Strass, Salzburg)
- Universities (GWU, HU, UMd, VMI, VT, BU, PSU, U. Waterloo, U. Innsbruck, Ghent U., U. Queensland, U. Cape Town)
- Manufacturing (WWW, Cambi, DEMON)
- Consulting (AECOM, Brown & Caldwell, B&V, HDR, CH2M HILL, Arcadis)

Utilities: Nearly \$1 billion in construction

Universities: Approximately 60 MS and PhDs in past 10 years

Manufacturing: 6 Patents/Applications/Licensing

Overall goals of individual process implementations:



Internal revenue: intensification and resource savings through process optimizations:

Intensification factor and resource savings are calculated compared to conventional treatment (**nitrification/denitrification**, **mesophilic digestion**) or the current Blue Plains operation (**carbon**, **mainstream**)

Intensification factor	Resource savings
2-4	50% hauling cost Electricity production

Intensification factor	Resource savings
3-5	60% aeration 100% methanol

Intensification factor	Resource savings
1.5-2.5	10-50% aeration 25-75% methanol cost

Minimize Carbon demand and increase capacity with mainstream deammonification

Maximize Energy Recovery in Cambi / MAD

Minimize Carbon demand in Sidestream Deammonification system

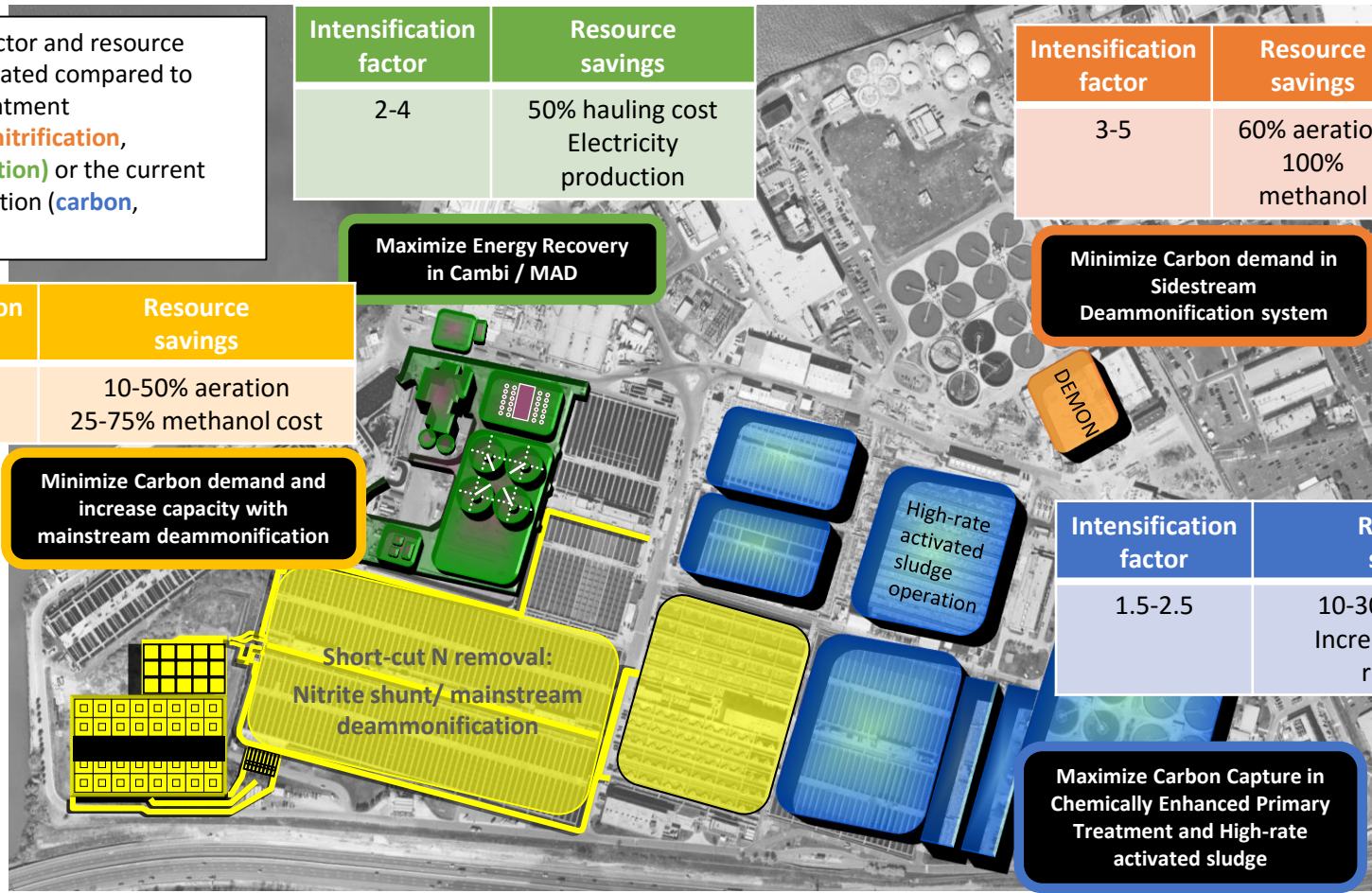
DEMON

High-rate activated sludge operation

Intensification factor	Resource savings
1.5-2.5	10-30% aeration Increased energy recovery

Short-cut N removal: Nitrite shunt/ mainstream deammonification

Maximize Carbon Capture in Chemically Enhanced Primary Treatment and High-rate activated sludge



External revenue: patents

*Applied for patent
**Accepted patent
***Commercialization phase

Screens for anammox retention*

Maximize Energy Recovery
in Cambi / MAD

Minimize Carbon demand in
Sidestream
Deammonification system

Controls for short-cut N removal:
- ABAC control*
- AVN control***
- AVN + final polishing control***

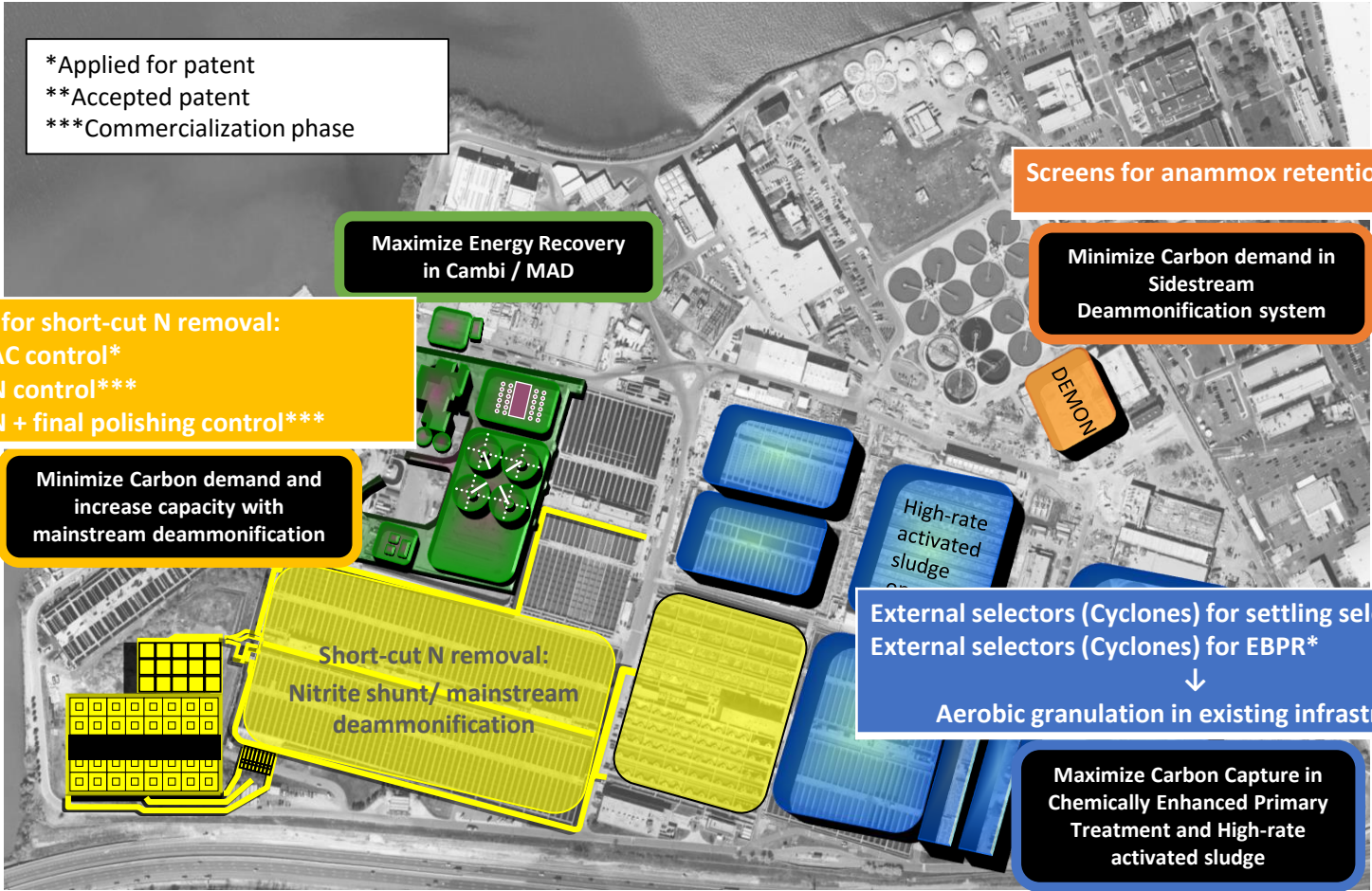
Minimize Carbon demand and
increase capacity with
mainstream deammonification

DEMON

External selectors (Cyclones) for settling selection**
External selectors (Cyclones) for EBPR*
↓
Aerobic granulation in existing infrastructure

Short-cut N removal:
Nitrite shunt/ mainstream
deammonification

Maximize Carbon Capture in
Chemically Enhanced Primary
Treatment and High-rate
activated sludge



DC Water New Revenue Efforts

New Regulations

Aging Infrastructure

Affordability



- **Practical Solutions**
 - AvN: Driven by specific need for intensification and resource recovery
- **Industry Contacts**
 - AvN: Identified through personal connections
- **Internal resources**
 - AvN: Patent written in-house, filed professionally



AvN is a control system that balances ammonia oxidizers and nitrite oxidizers. It was developed at DC Water and HRSD and licensed to World Water Works in September 2015.

- Goals: generate revenue and support state of the art
- University tech transfer model, not industry (UMCP provided guidance)
- New policy for corporate IP ownership, including revenue sharing
- Procurement exemption
- AvN: Multiparty agreement to direct revenues to research via WERF



- Current Patents
 - 6 research applications
 - 2 granted
 - 1 tool application
- Licenses
 - 1 completed: AvN
 - 1 with settled terms
 - Several active negotiations
- Revenue
 - None yet; expected spring 2017
- Broader focus
 - Combine technologies both internally and with partners
 - Also seek non-royalty revenue
 - Assist with marketing and service

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Q & A

*for more information please contact:
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