Water reuse: coming to a city near you!

Drivers, scoping, partnerships and case studies for water reuse projects
Introductions

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Presentation outline

- Water reuse background
- Drivers for reuse projects
- How to identify opportunities
- Why you need partners
- Case studies
Yes, water reuse is here in the Midwest
What is water reuse?

- Conservation, reclamation, and repurposing of water to best manage the challenges of water supply, use, treatment, and disposal
- Matching alternative water sources to potential end uses with a need for water
- Wastewater, stormwater, grey water, process water, rainwater
Why should cities be involved? Cities are a major appropriator

2014 Minnesota water use (BGY)

- Other: 753
- Irrigation: 133
- Industrial Processing: 101
- Water Supply: 200
- Power Generation: 64

*2014 data from DNR SW UDS
Why should cities be involved? Cities are a major appropriator.
Why should cities be involved? Reduce peak infrastructure

General municipal water use

- Peak use
- Average use
- Summer irrigation
Presentation outline

- Water reuse background
- **Drivers for reuse projects**
  - How to identify opportunities
  - Why you need partners
  - Case studies
Common water reuse project drivers

- Secondary drivers
  - Cost of securing potable water from traditional sources
  - Corporate sustainability principles
  - Public education
  - Public safety
in some areas, current approach to water-supply management and development is unsustainable.

in some areas, aquifer levels are declining.

in some areas, lakes, streams, and wetlands are impacted.
Presentation outline

- Water reuse background
- Drivers for reuse projects
- **How to identify opportunities**
- Why you need partners
- Case studies
Identify opportunities by matching sources to end uses

Look around; connect the dots:

- Where is there abundant water?
- Who uses water?
- What is the quality of that water source?
- What is the water quality that is needed for the end use?
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Do I really have to partner with someone?

“The issues we face are so big and the targets are so challenging that we cannot do it alone. When you look at any issue, such as food or water scarcity, it is very clear that no individual institution, government or company can provide the solution alone.“

- Paul Polmen, CEO of Unilever (also Chairman of the World Business Council for Sustainable Development)
Different motivations are fine if the “machine” moves together to support the project.

Sometimes these partnerships involve organizations that would—on the surface—appear to be at odds.

“Collaboration between different types of organizations can produce previously unimagined solutions.”
- Network for Business Sustainability’s website
General process for water reuse projects

- Step 1: Identify project and possible partners
- Step 2: Do your homework
- Step 3: Engage possible partners and build the project team
- Step 4: Assess project feasibility
- Step 5: Define project
- Step 6: Execute, construct
- Step 7: Operate
- Step 8: Monitoring results
- Step 9: Tell the story of your success!
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Case study: Target Field Station (The Interchange)

“Your problem is my solution.”
Source: urban site with competing demands and stormwater requirements
Project drivers

- poor infiltration and contaminated soils
- stormwater requirements
- strict limitations on stormwater discharge
Hennepin Energy Recovery Center (HERC)

- Burns nearly 365,000 tons of municipal solid waste generating enough electricity for 25,000 homes and steam for the downtown district energy system
- Significant water user for cooling and other various processes in the facility
- 24/7 operation
Partnerships

- project owner (Hennepin County) already owned the HERC facility, though a private company manages it (Covanta).
- Covanta had already identified processes that could utilize lower quality water.
- Minneapolis was the permitting authority, involved in conceptual design review, and supportive of a water reuse project.
- MWMO was a granting authority, supportive of water reuse projects, and consulted on green features for the project.
Infrastructure: stormwater use at the HERC facility

Above-ground cisterns:
- 40,000 gallon capacity
- 90th percentile storm event
- Year-round function (snowmelt system) used for a variety of processes, including steam cooling and ash dust control.
- Over 1 million gallons/year of stormwater runoff used

Source: http://www.ballparkauthority.com/Target_Field_Station_Cisterns.html
Lessons learned: Target Field Station

- If partners are interested enough, fast-track reuse projects are possible.
- Involving permitting and granting agencies in the design and review of the project (early in the process!) can be helpful.
- Be sure to talk to the folks who will have to operate your project.
- A good stewardship story is valuable.
Case study: Dakota Prairie Refinery (wastewater reuse)

“It rains every day at a wastewater treatment plant.”
Case study: Dakota Prairie Refinery (wastewater reuse)

- 20,000 barrels/day diesel refinery
- First greenfield refinery constructed in the US since the 1970s
- Near Dickinson, ND
- Start-up in spring 2015
Water supply options:

- **Groundwater**: only available for back-up per state
- **Surface water**: poor and variable water quality
- **Potable water**: limited availability
- **Wastewater**: effluent from City of Dickinson, needed to create a partnership
Selected water source

City of Dickinson wastewater effluent was selected as the source for industrial water. Water will be used for:

- Cooling
- Boiler feed
- Fire fighting (backup)
- Washdown
- General, non-potable uses
How was the partnership created?

- The City of Dickinson was in the process of upgrading their wastewater treatment plant.
- DPR and Dickinson had a conversation at a regional water meeting and came to an understanding.
- DPR purchases treated wastewater from Dickinson.
Project infrastructure

- Forcemain from WW TP to the refinery, with extra capacity for future users
- Treatment plant for microbial control
- Treated water storage
- Level of treatment based on end use and public health risks

3D model of the disc filter ahead of UV
Lessons learned: DPR and City of Dickinson Partnership

- The partnership details took a long time to finalize.
- There were lots of changes: which organizations were involved, timelines, and project constraints.
- A good working relationship is necessary.
Case study: City of Eagan (water reuse)

“If you build it, they will use it.”
Case study: City of Eagan (water reuse)

- Step 1: Identify project and possible partners
- Step 2: Do your homework
- Step 3: Engage possible partners and build the project team
- Step 4: Assess project feasibility <now>
- Step 5: Define project
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Project drivers

- Long-term availability of the water:
Project drivers

- Groundwater is the sole source for the City of Eagan potable water supply
- Average potable water use is expected to increase 10% from 2010 to 2040
- Potential for groundwater aquifer drawdown concerns by 2040
- Potential impacts to natural resources
Eagan model projection of aquifer drawdown

Potential drawdown impacts from City of Eagan
Revised Eagan model projection of aquifer drawdown

Potential drawdown impacts from City of Eagan with 15% reduction

Figure shows the difference between modeled heads from current pumping (based on 1995-2005 reported water use) and modeled heads for 2040 with 15% reduction in groundwater pumping for the Prairie du Chien-Jordan Aquifer.
Identify the source

Look around…

- Where is there abundant water?
- Who uses water?
- What is the quality of that water source?
- What is the water quality that is needed for the end use?
Identification of a source

- **MCES Seneca Wastewater Treatment Facility**
  - Located in the City of Eagan
  - Treats and discharges ~20 MGD to the Minnesota River
  - Basin underdrains discharge ~1 MGD to the river
Identify the user

Look around…

- Where is there abundant water?
- **Who uses water?**
- What is the quality of that water source?
- What is the water quality that is needed for the end use?
GIS evaluation of users and source
Brainstorm of possible reuse system water users

- Irrigation
- Process water
- Fire fighting
- Vehicle washing
- Aquifer recharge
- Fen recharge
Irrigation use of city potable water

Eagan Irrigation Users near Hwy 13

Water Consumption (1,000 gal per Year)

- One major irrigator in study area
Identification of a source

- Look around…
- Where is there abundant water?
- Who uses water?
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Conceptual project area
How was the partnership formed?

- The City of Eagan is looking to promote a sustainable water supply.
- The City cannot do water reuse projects alone and is looking for partners.
- Conservation has reduced the peak flows but more needs to be done.
- Non-potable water use for irrigation and commercial/industrial processes is a simple solution.
How would water reuse benefit both private companies and the City of Eagan?

- Reduces Eagan’s peak summer demand
- Reduces the need to expand current infrastructure
- Matches private company corporate sustainability policy
- Reduces operational cost for both parties
current partnerships

▪ Eagan is the lead party working with Barr on the reuse system users and infrastructure.

▪ Metropolitan Council is supportive of a water reuse project, sharing feasibility funding. CH2M is working on reuse treatment.

▪ University of Minnesota is an education partner using the project in the Capstone Project Program.
project partners and stakeholders

- **Owners:**
  - City of Eagan, working with Barr
  - Metropolitan Council, working with CH2M

- **Users:**
  - Preliminary discussions with private users

- **Regulatory**
  - DNR
  - MPCA
  - MDH
  - Dakota County
Current project status

Current: project feasibility study stage

- Identify users and treatment needs
- Identify infrastructure needs and costs
- Confirm partnerships
- Regulatory and permitting issues
- Identify deal breakers

Future: design and bidding
Conceptual reuse distribution system schematic
Conceptual reuse distribution system piping
In conclusion

- Reuse projects are happening in Minnesota.
- Partnering is essential for many reuse projects.
- Reuse projects can help conserve water, achieve stormwater management, and sustain water supply goals.
Resources

- WateReuse Association
- MPCA MIDS calculator: harvest and reuse
- Met Council Stormwater Reuse Guide
- MPCA Municipal Wastewater Reuse
- Envision Rating System™
Discussion and questions?

Any questions or comments?

Thank you!