YAHARA HILLS

SUSTAINABILITY CAMPUS

A hub for recreation, environmental education, renewable energy, and innovation of circular economies.

DECEMBER 7, 2021

Artistic rendering of future reclaimed open space.

INTRODUCTIONS

JOHN WELCH
Director
Dane County Department of Waste & Renewables
welch@countyofdane.com

John has a bachelors degree in Civil & Environmental Engineering from UW-Madison and is a registered Professional Engineer. He has over 15 years of experience in the waste & recycling industry, including 10 years leading the Department. During that time he has overseen the design, development, and construction of facilities for household hazardous waste, construction & demolition recycling, wood recycling, gas upgrading, manure digestion, habitat restoration, and landfilling.

John and his team are passionate about advancing waste diversion efforts in Dane County and beyond. As part of that effort, he has been active in many local, state, and national organizations working to improve the waste & recycling industry.

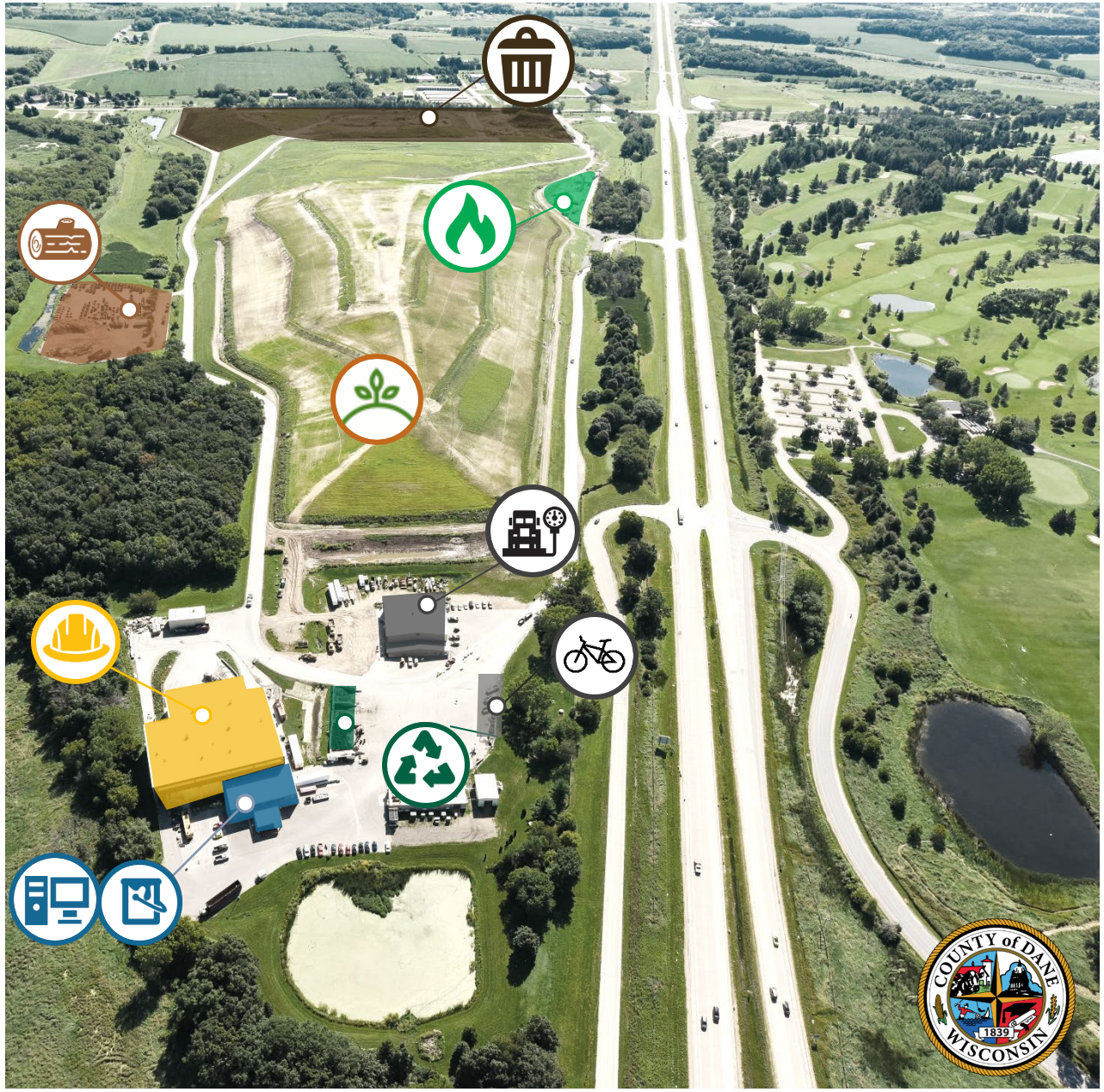
WASTE & RENEWABLE'S MISSION

Providing environmentally-sound and sustainable waste management and renewable energy solutions for current Dane County residents and future generations.

A view of the renewable natural gas plant through the native plants on the Rodefeld landfill.

ABOUT DANE COUNTY DEPT. OF WASTE & RENEWABLES

- ACTIVE LANDFILL
- RECYCLING PROGRAMS
- CONSTRUCTION AND DEMO RECYCLING
- CLEAN SWEEP
- RENEWABLE NATURAL GAS
- EDUCATION & TOURS



CONSTRUCTION & DEMO RECYCLING

- Accepts over 80,0000 tons of material per year for recycling
- Recycles metal, wood, shingles, tires, vinyl siding, cardboard, aggregate, and other materials
- Public Private partnership, operated by a third party
- Employs approximately 15 on site staff + others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CLEAN SWEEP & PRODUCT EXCHANGE ROOM

- Accepts household hazardous waste and electronics from Dane County residents
- Low, stable, waste disposal fees to promote responsible waste management.
- Open year round, M-Sat, while many other County-run programs in WI operate just a few days a year

EDUCATION & TOURS

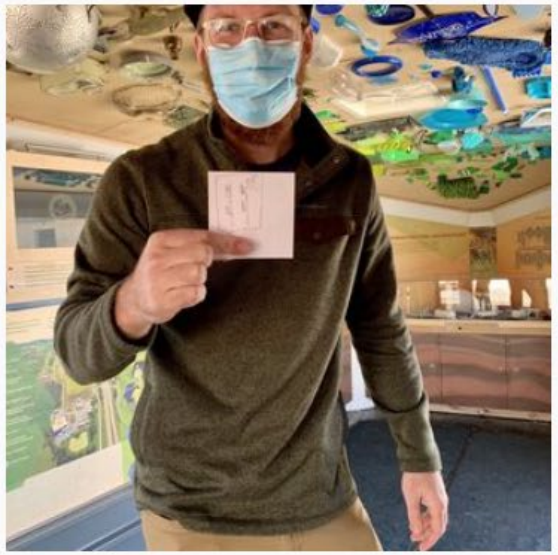
- Annually host nearly 1,000 guests
- Trash Lab has expanded our ability to meet people where they are.
  - Reaching +6,000 visits in less than 2 years
  - Project has been recognized by the Associated Recyclers of Wisconsin and the American Alliance of Museums

Dane County partnered with the Madison Children's Museum to create the TrashLab, an interactive exhibit that's goal is to educate citizens to rethink waste and understand the complex social systems that underlie waste generation and the scientific principles of waste management.

Instagram

Search

POSTS IGTV SAVED TAGGED



2021 Outstanding Achievement in Education

American Alliance of Museums Accredited Museum

2021 Sustainability Excellence Award


TRASHLAB
RETHINK. PROTECT. REDESIGN.
DANE COUNTY DEPARTMENT OF WASTE & RENEWABLES

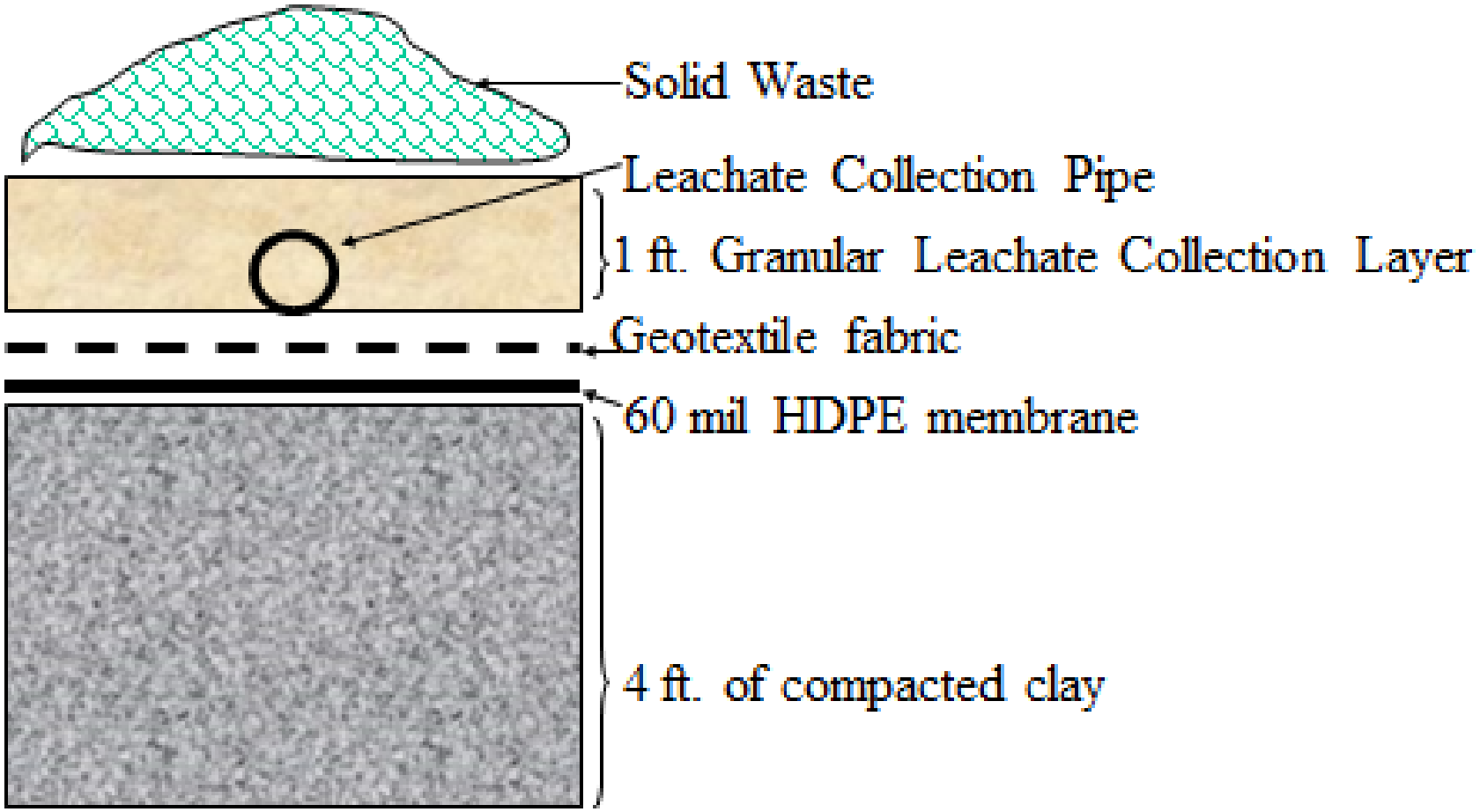

PROTECT
REUSE
1 2 3
THE RENEWABLE NATURAL GAS (RNG) PLANT

LANDFILL

- Accept 290,000 tons of material each year
- Limited by local agreements to taking waste from Dane County
- Waste acceptance at the site since 1985
- Expanded in 1994 and 2015

HOW LANDFILLS WORK – LINER SYSTEM

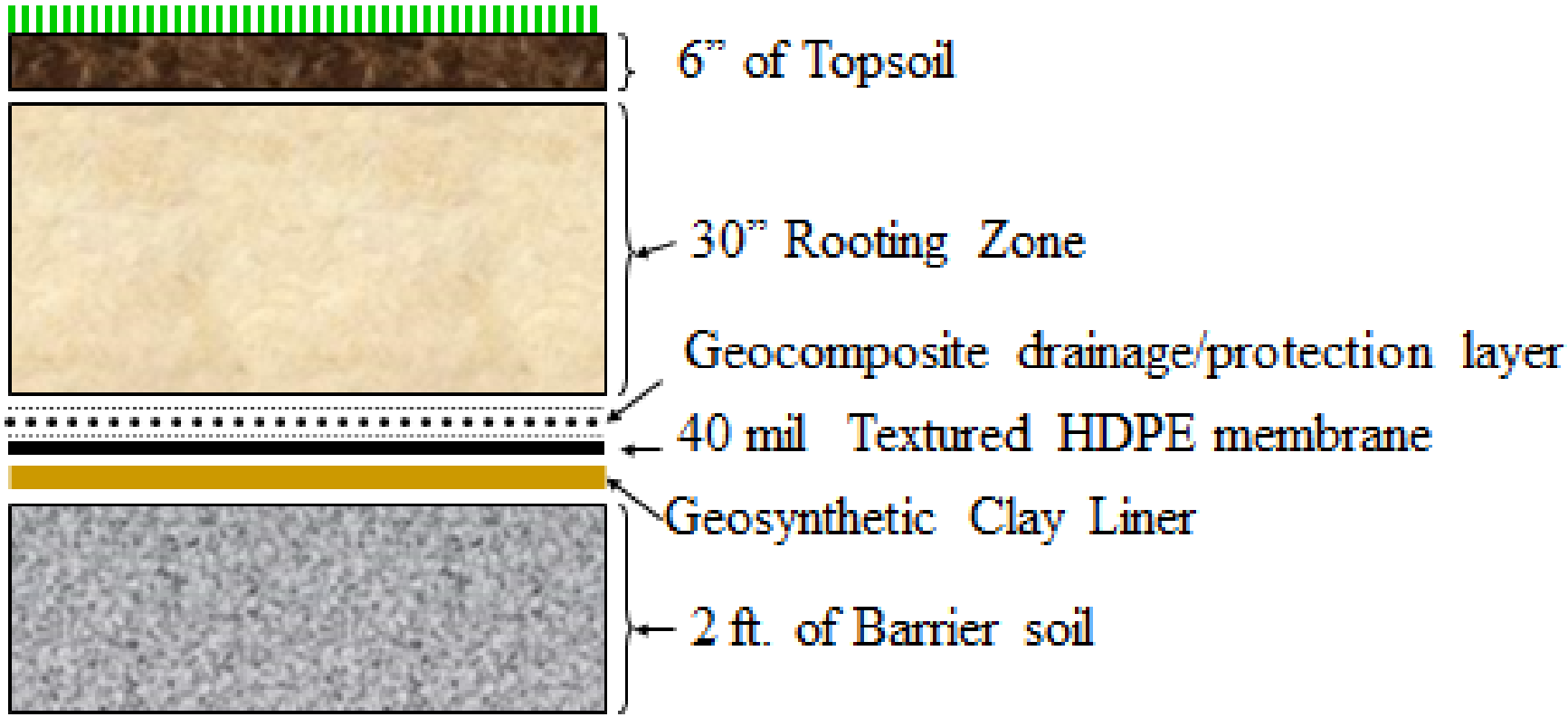
- Barrier layer to protect groundwater
- Convey liquids (leachate) to collection sumps



Construction of Phase 11/12 liner in summer of 2020. Crews are placing HDPE membrane. This is the final horizontal phases of construction for the Rodefeld site.

HOW LANDFILLS WORK – COVER SYSTEM

- Barrier layer to prevent gas emissions and keep liquids and atmospheric air out
- Convey surface water to collection points

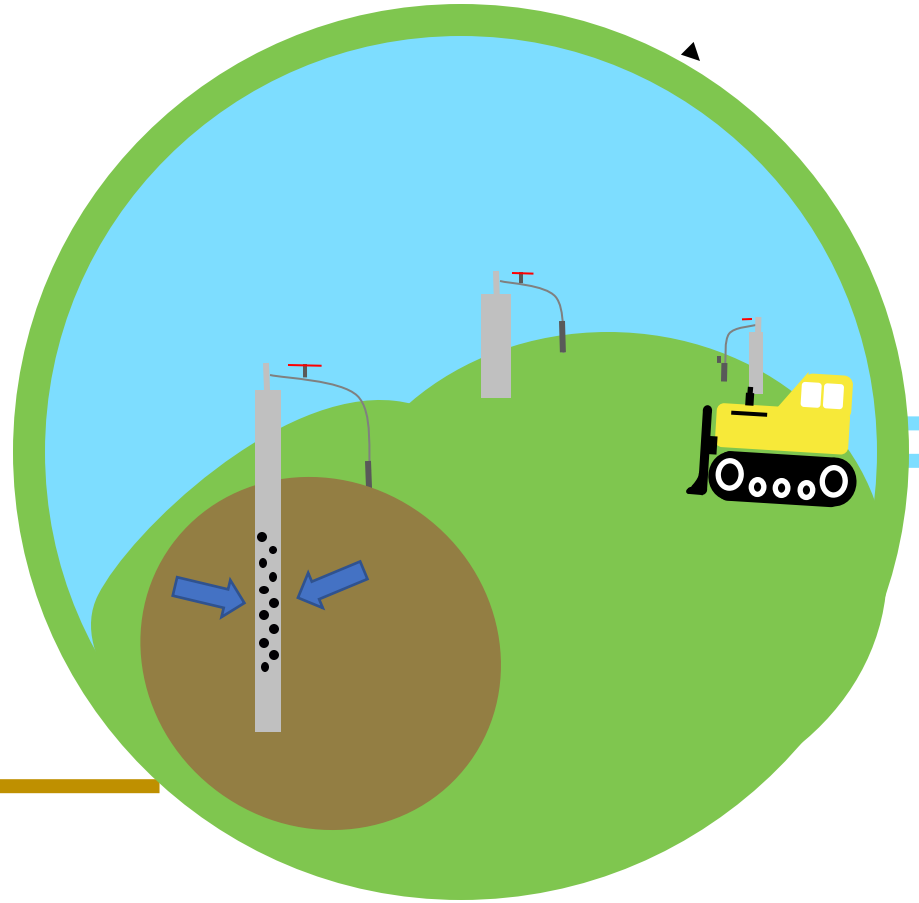


Landfill final cover placement at the Rodefeld Landfill that occurred in 2018-2019. Cover consists of a barrier layer HDPE membrane, drainage layer and a rooting zone.

WASTE AS A RESOURCE: LANDFILL GAS-TO-ENERGY

ANAEROBIC DIGESTION

Organic materials decompose in the absence of oxygen and this process generates landfill gas



ELECTRICITY

Landfill gas can be used as fuel in generators to make electricity

RENEWABLE NATURAL GAS

Landfill gas can be cleaned up and compressed and used as fuel in vehicles

HISTORY OF LANDFILL GAS-TO-ENERGY IN DANE COUNTY

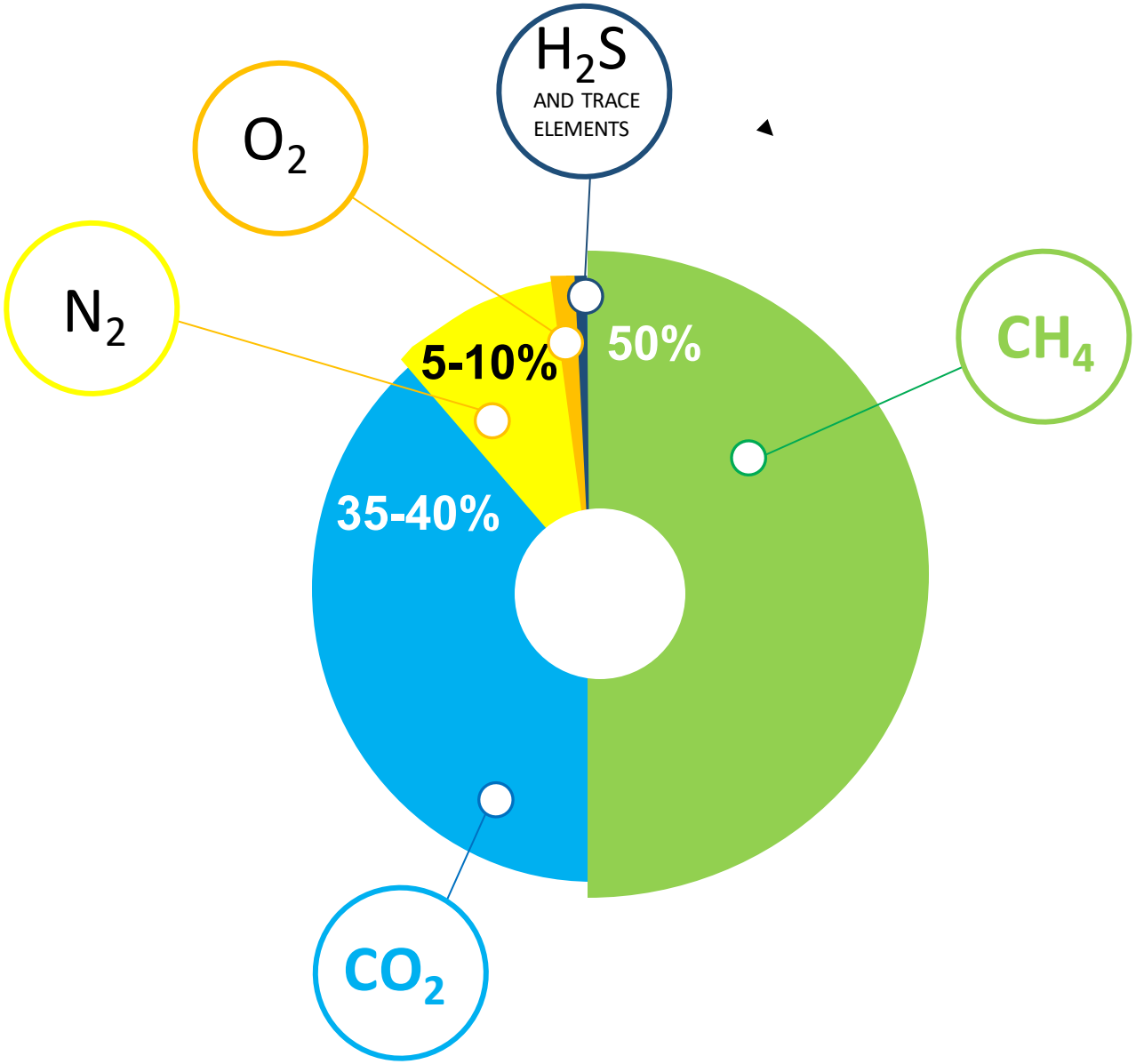
1995 Electrical production at Verona Landfill begins

1997 Electrical production at Rodefeld Landfill begins

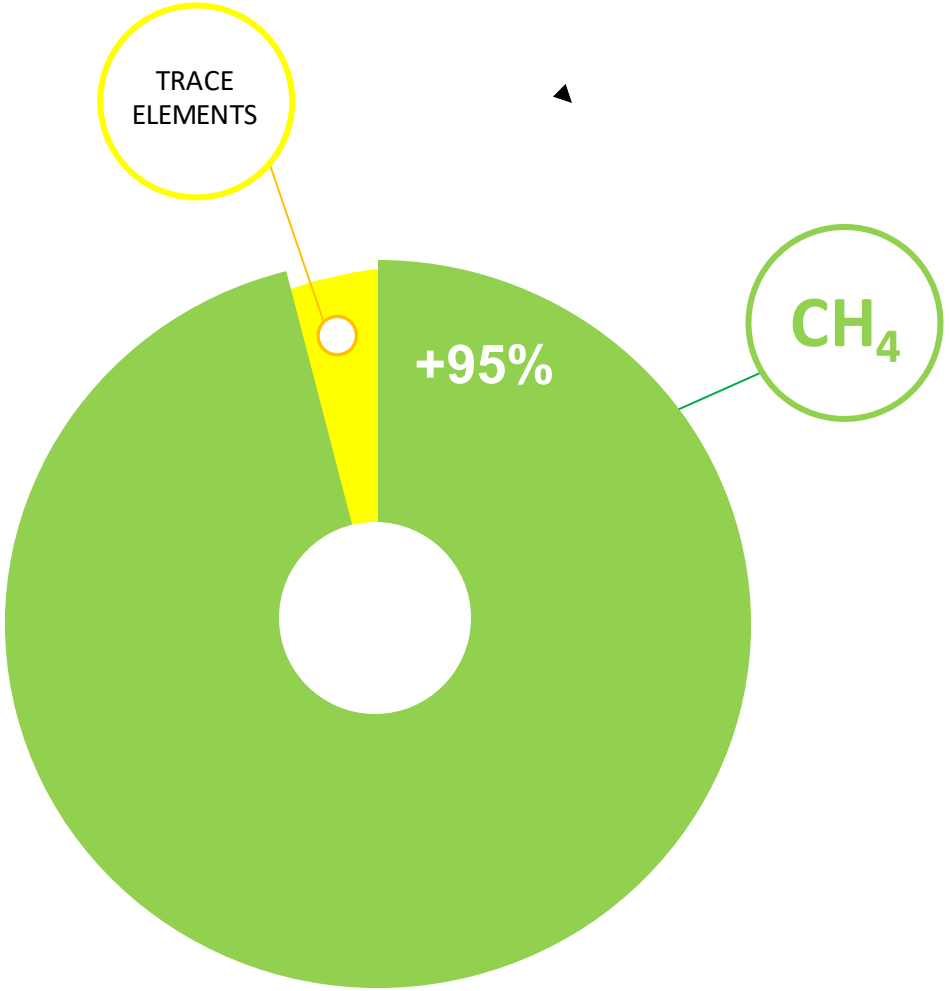
2010 Began diverting a portion of Rodefeld's LFG for processing into compressed natural gas (CNG) for vehicle fuel

2019 Full scale renewable natural gas (RNG) plant brought online at Rodefeld

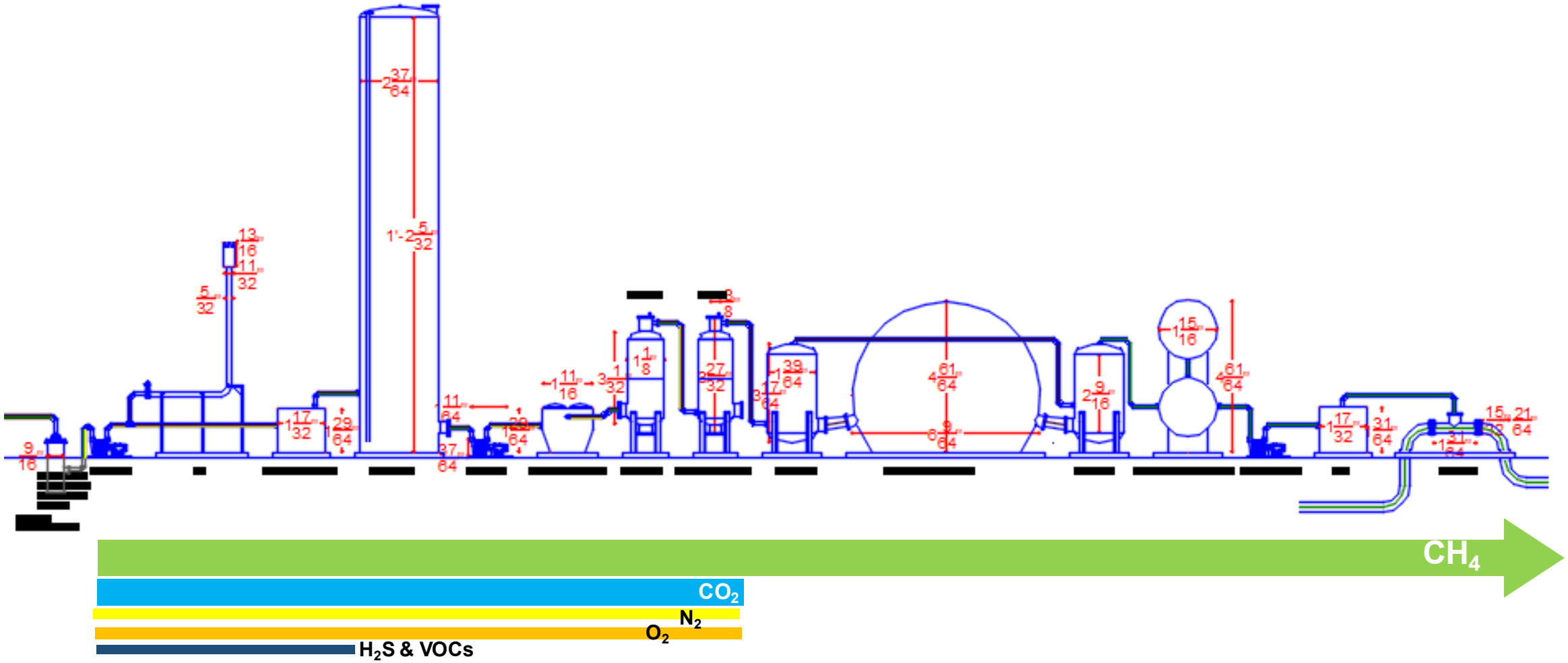
LANDFILL GAS

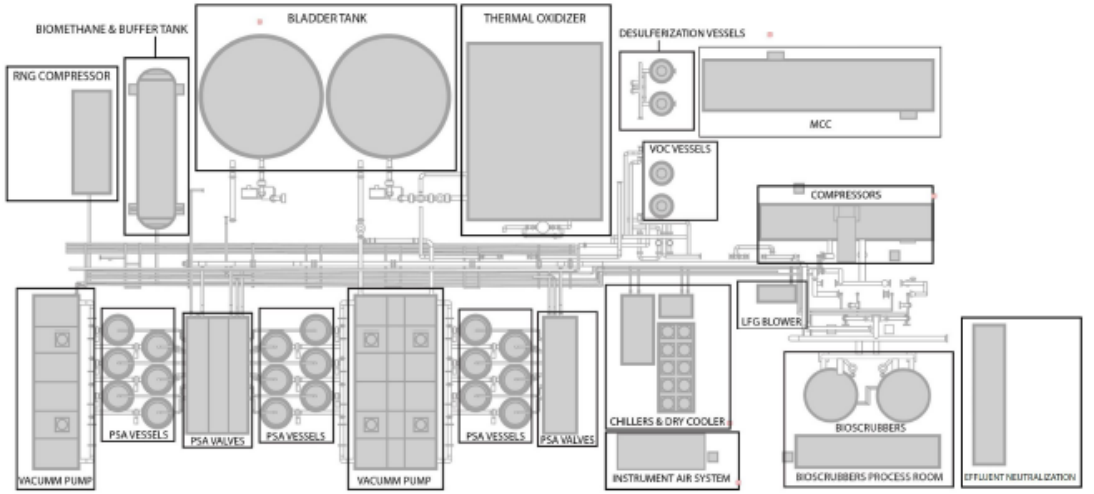


RENEWABLE NATURAL GAS

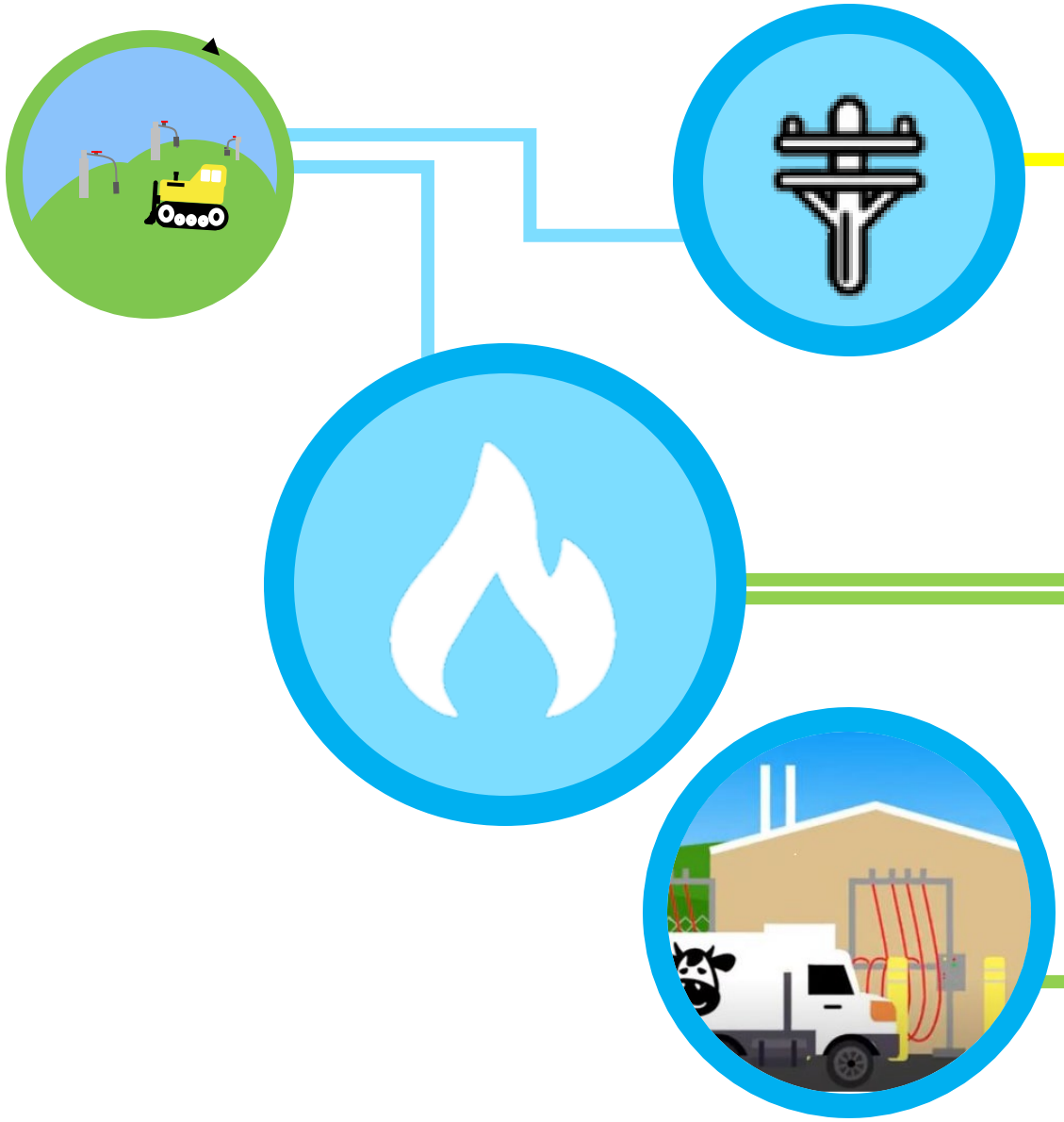


LANDFILL GAS PROCESSING AND COMPRESSION




BIOMETHANE & BUFFER TANK
BLADDER TANK
THERMAL OXIDIZER
DESULFERIZATION VESSELS
RNG COMPRESSOR
MCC
VOC VESSELS
COMPRESSORS
LFG BLOWER
PSA VESSELS
PSA VALVES
PSA VESSELS
PSA VESSELS
PSA VALVES
CHILLERS & DRY COOLER
BIOSCRUBBERS
VACUMM PUMP
VACUMM PUMP
INSTRUMENT AIR SYSTEM
BIOSCRUBBERS PROCESS ROOM
EFFLUENT NEUTRALIZATION

ECONOMICS OF RNG



$0.04/KWH PURCHASE POWER AGREEMENT

Prices for electricity generated by landfill gas dropped to $0.04/KWH from $0.12/kWH

$1.8/MSCF of gas resulting in: a net loss for county

+$3.0/dth SALE OF GAS

Actual gas generates approximately $3-$4 per dekatherm (dth)

$14.4/MSCF of gas resulting in:

+$2.0/RIN EPA'S RENEWABLE FUELS STANDARDS

RNG Plant generates approximately 800-1000 dth per day. Each dth of gas generates about 10 RINs. RIN prices vary but have been as high as $3.0/RIN in 2021.

$10MIL revenue budgeted for 2021

REVENUE FROM OFFLOAD STATION

Contracts are secured with multiple dairies to offload biogas at our facility. Digesters are charged by the dth to use the station.

$2.8MIL estimated to general fund for 2021

RODEFELD LANDFILL'S TIMELINE

2021

Started filling in the last horizontal expansion. Currently seeking a vertical expansion approval from Wi Dept of Natural Resources

2027

Rodefeld Landfill closes without a vertical expansion.

2030

Rodefeld Landfill is at maximum capacity.

First bloom of the Rodefeld Landfill's native prairie final cover..

OLD PARADIGM

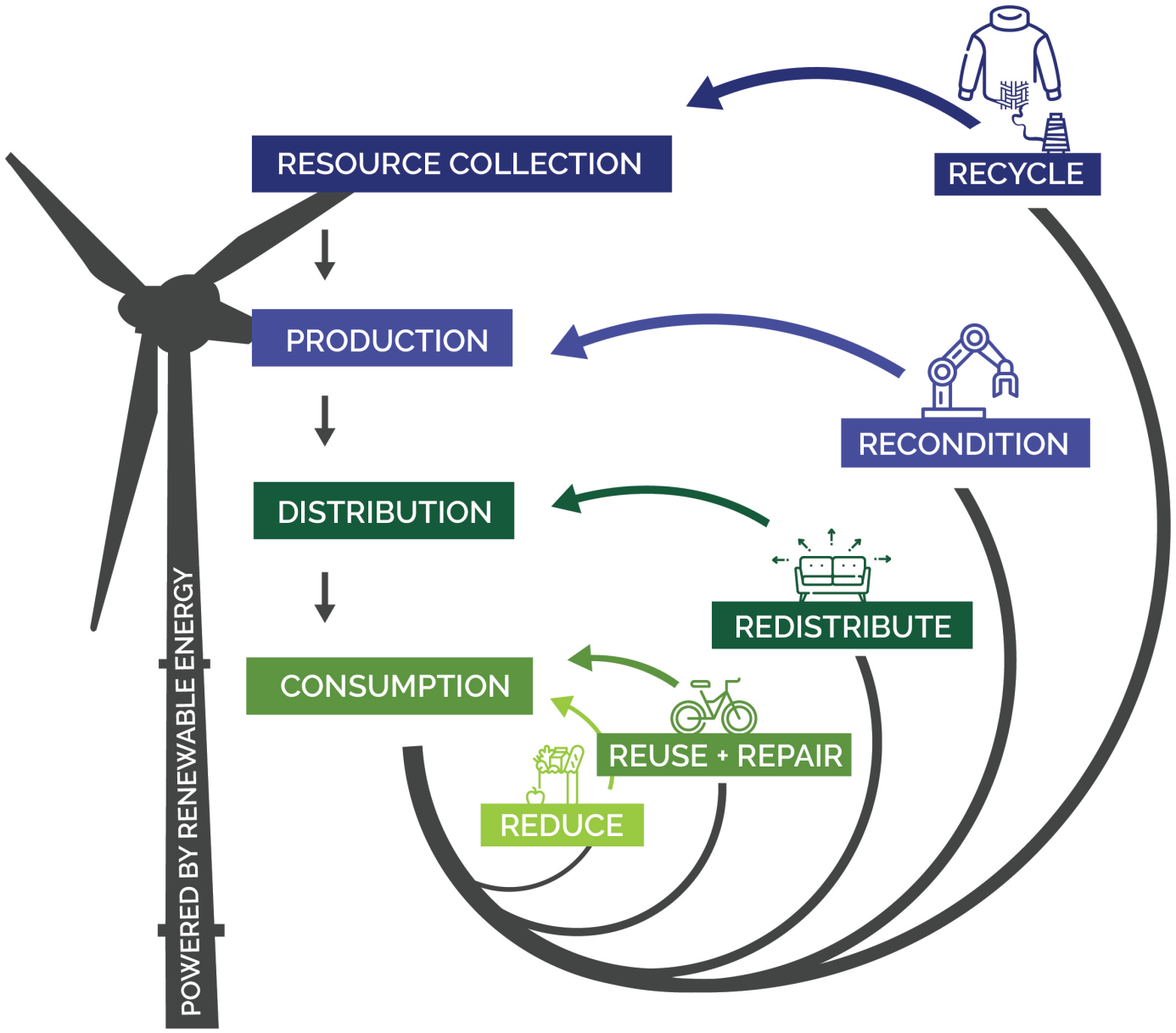
- Waste is a liability
- Minimal business activities
- Zero energy generation
- No cultural or social significance, a place to avoid

THE VISION

- Waste is a resource
- Innovative social hubs and business activity
- Landfill gas to energy projects and other renewable energies
- Well planned space with recreation before, during and after landfilling

CIRCULAR ECONOMIES

- Not just about recycling
- Educating communities about the impacts of our choices
- Repairing and building things to last and be repaired
- Using recycled materials to create markets
- Engineering materials and items to be recycled



HOW W&R IS ALREADY CLOSING THE LOOP

870 TONS OF **BRUSH & LOGS** GROUND INTO WOOD CHIP TO BE USED AS ANIMAL BEDDING AND MULCH

+80,000 TONS OF **CONSTRUCTION & DEMOLITION MATERIAL** PROCESSED FOR RECYCLING

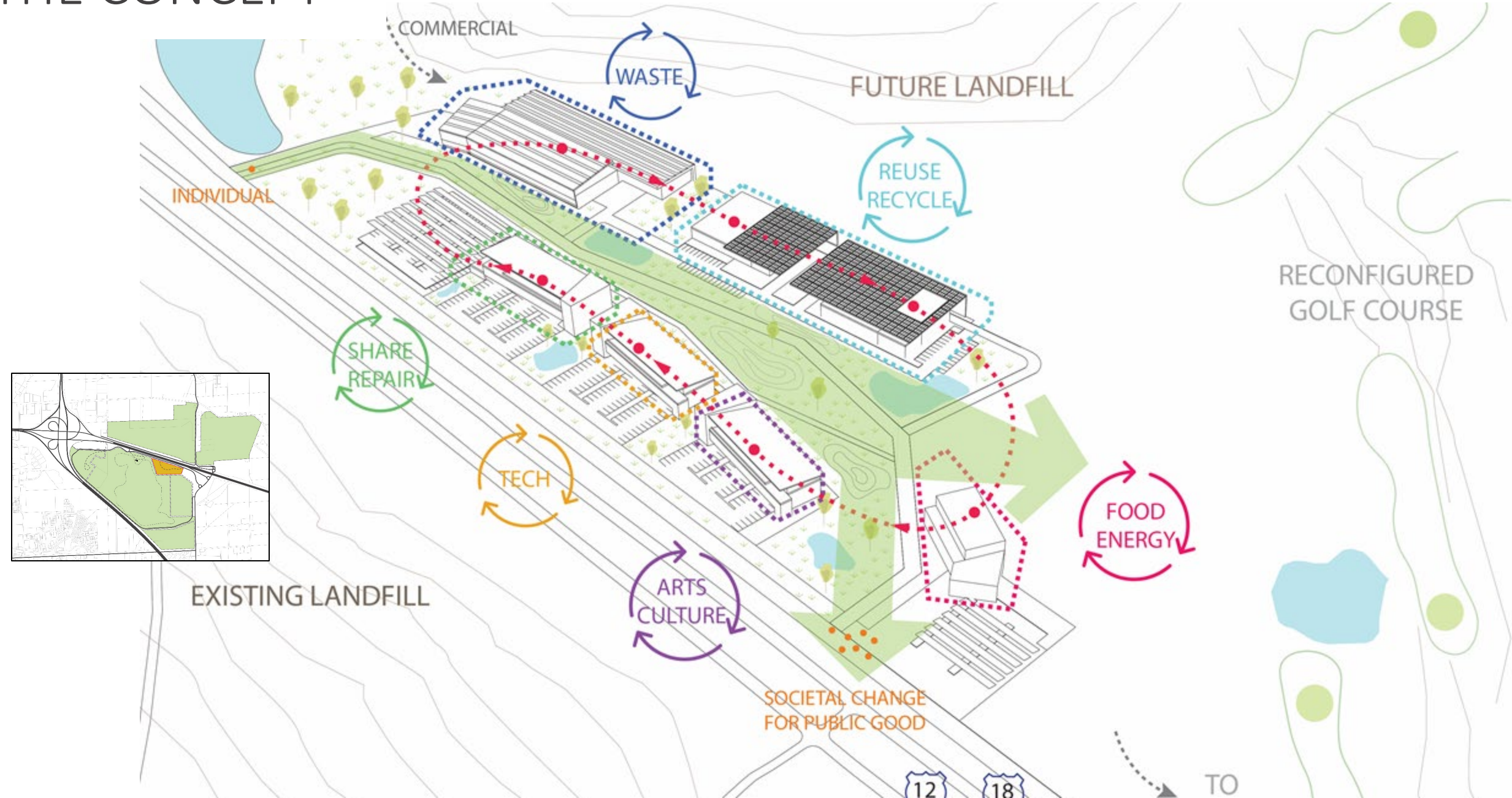
39 TONS OF **CHEMICALS** EXCHANGED AND USED AGAIN THROUGH CLEAN SWEEP'S PRODUCT EXCHANGE ROOM

657 TONS OF **TIRES** RECYCLED INTO PLAYGROUND TILE OR INCINERATED FOR ENERGY

PRODUCED **RENEWABLE NATURAL GAS** EQUIVALENT TO

2,568,140 GALLONS OF GASOLINE

THE CONCEPT


COMMERCIAL
WASTE
FUTURE LANDFILL
INDIVIDUAL
REUSE
RECYCLE
RECONFIGURED
GOLF COURSE
SHARE
REPAIR
TECH
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ENERGY
ARTS
CULTURE
EXISTING LANDFILL
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FOR PUBLIC GOOD
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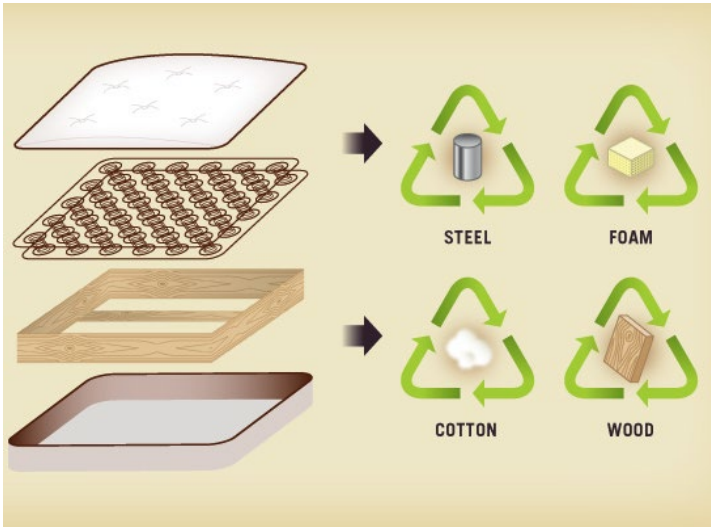
TO

MATTRESS RECYCLING



- Springs recycled as scrap metal, wood frames create landscaping mulch, cotton used in industrial oil filters and foam paddings turns into carpet underlay
- Local markets currently in place for this opportunity (foam, wood, etc.)
- Currently accept +20K mattresses per year at the landfill
- Each recycled mattress saves 23 cubic feet of landfill space
- 1 new job created for every 3,000-5,000 mattresses recycled

ORGANICS & FOOD WASTE

Photo from JOHN HART, STATE JOURNAL ARCHIVES

- Estimate 30% of the waste that is landfilled could be composted
- Composting organic material reduces GHG emissions and generates a marketable soil amendment
- Campus will include composting operation and W&R will work closely with surrounding communities to develop a program that can accept food waste
- Site will save space for a digester and composting program will allow County to assess feasibility of a digester

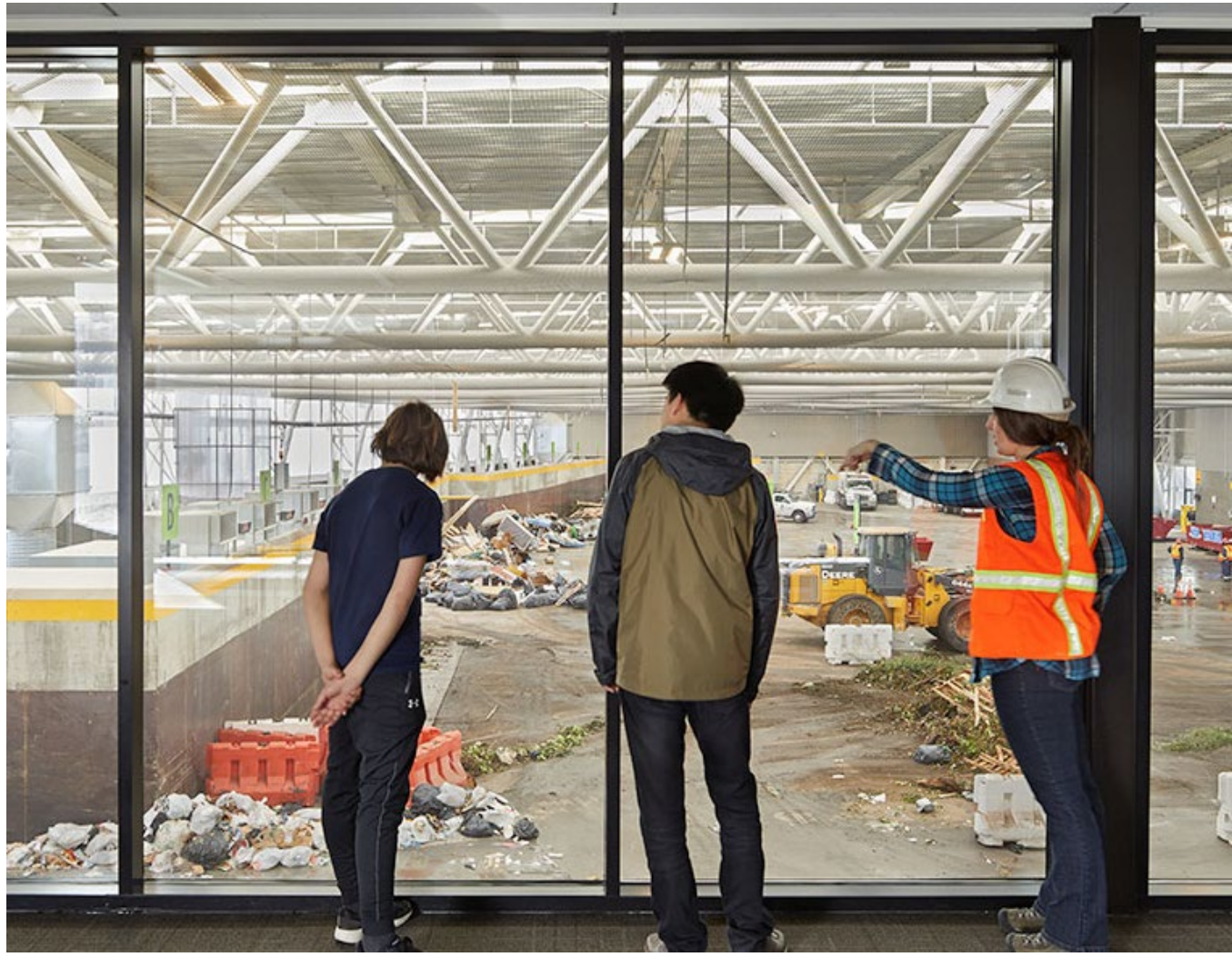
RESALE & UPCYCLING

Image courtesy of Lina Östling

- Diversion of high value items has significant environmental impact when considering full lifecycle costs of new goods
- Several successful examples including a Habitat for Humanity Restore near Lacrosse County's Landfill
- Retail use would create functional transition from landfilling activities to recreational use of the golf course
- W&R is engaging with local resale stores to determine future needs and interest
- Retuna Recycling Mall (Sweden) recycling center shown to the left:
  - $11.7M in revenue and 50 jobs generated in 2.5 years

EDUCATION

- Site to be designed with education and community access as a core principle
- Central to W&R mission to minimize waste and protect our environment
- Opportunities to collaborate with Ho-Chunk Gaming Madison
- **Critical to moving towards a more sustainable waste management system**



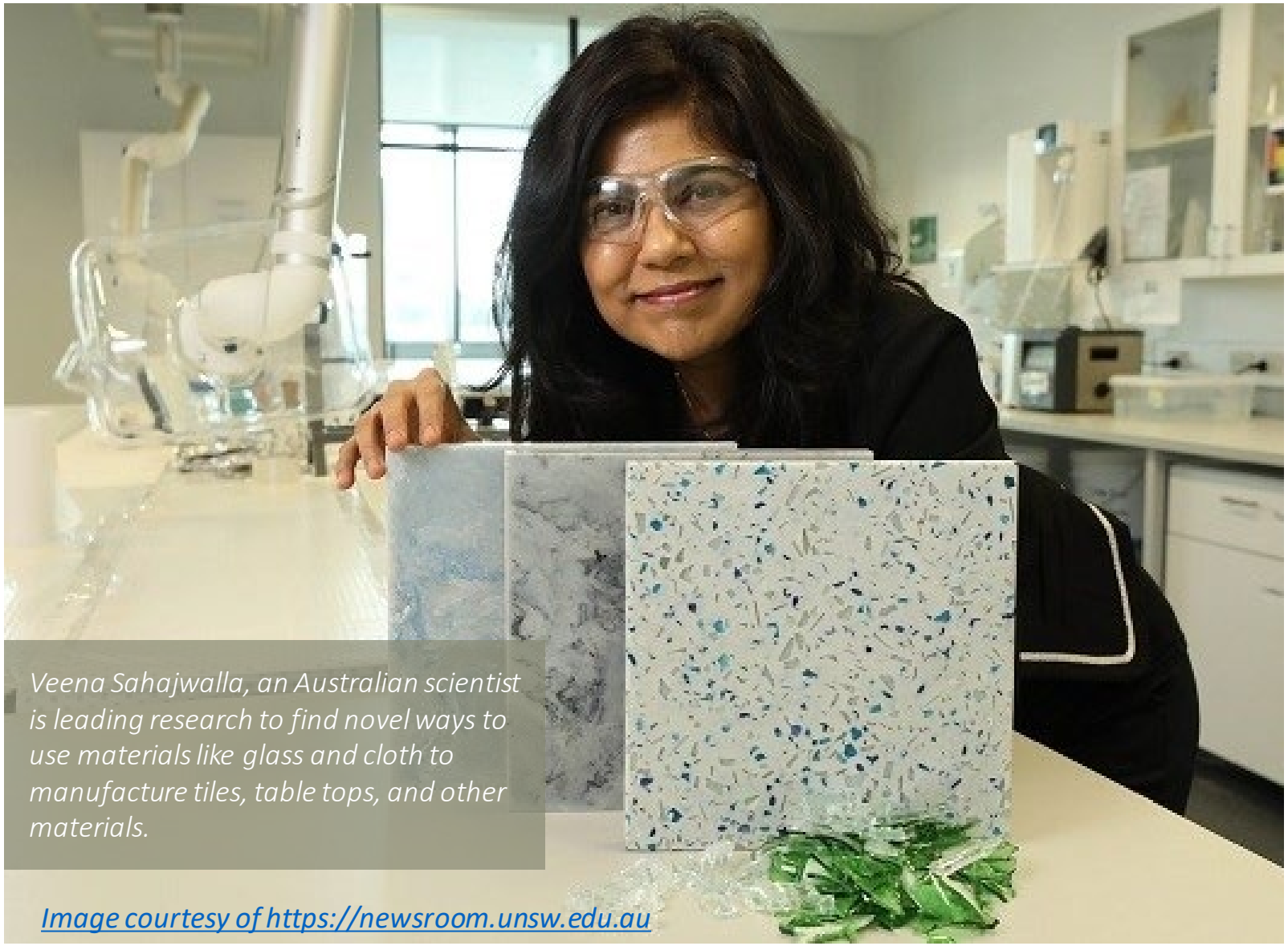
Dane County Biogas Plant Technician monitoring flow of renewable natural gas – generated and processed at the existing landfill – into the interstate pipeline.

RENEWABLE ENERGY

- Dane County W&R already a leader in renewable natural gas technology
- Industrial heat capture
- Solar (onsite and nearby)
- Green building and energy efficiency a priority for new construction
- Geothermal in or near landfill

RESEARCH & TECHNOLOGY

- Research of new technologies and emerging wastes
  - Batteries
  - Solar Panels
  - Carbon Capture
  - Other problem wastes and recycling opportunities
- W&R is an industrial advisory board member of the UW's Center on Chemical Upcycling of Waste Plastic



Veena Sahajwalla, an Australian scientist is leading research to find novel ways to use materials like glass and cloth to manufacture tiles, table tops, and other materials.

Image courtesy of https://newsroom.unsw.edu.au

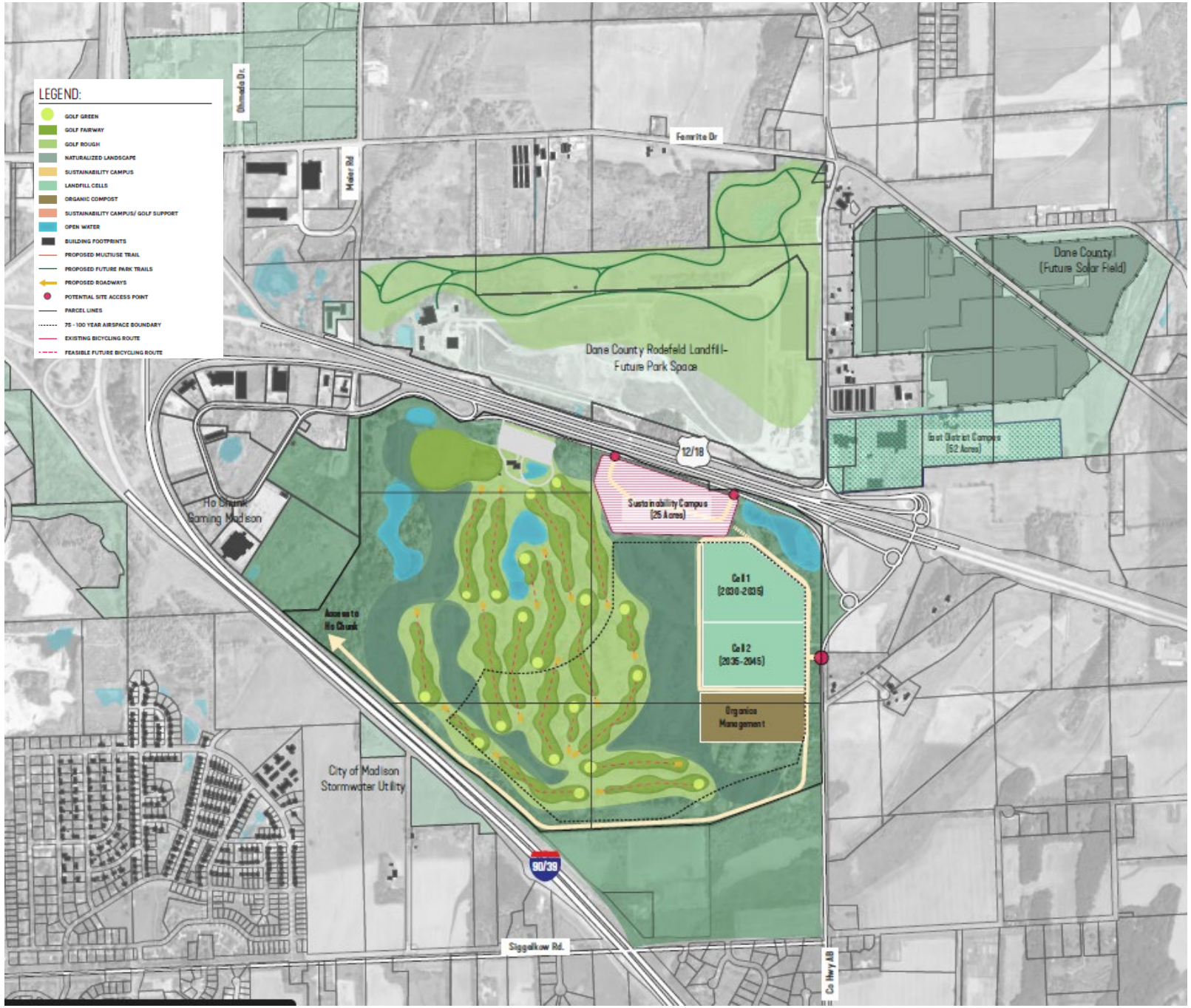
RECREATION

Image courtesy of Unsplash

- Conversion of Rodefeld Landfill to recreational uses
- Connectivity of trails and recreation opportunities
- Minimal site impacts for nearly a decade at Yahara
- Maintain and enhance current recreation with buffers and restoration

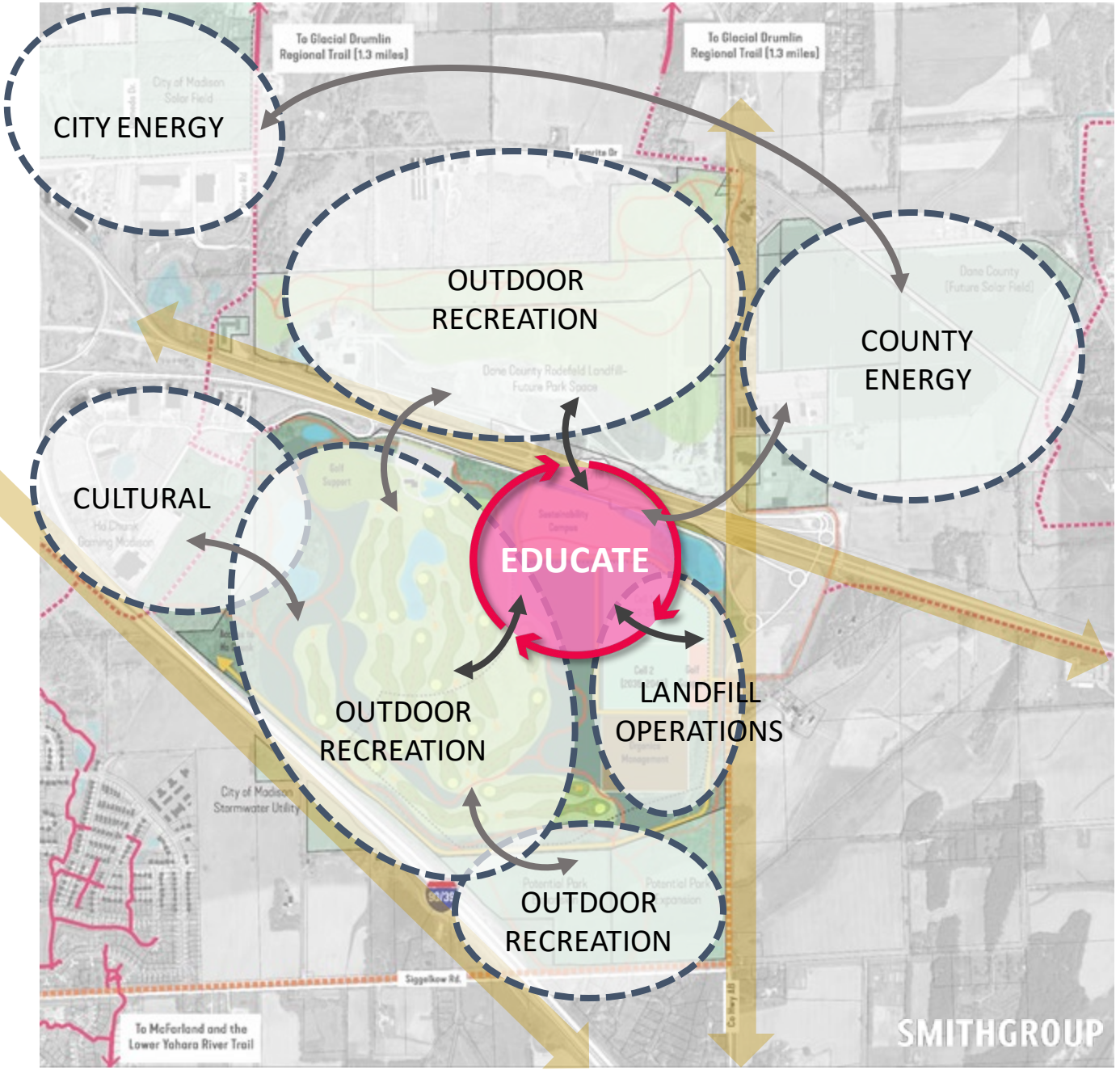
RECREATION

- Alignment with planned trail extensions
- Preliminary engagement with various groups
- Funds budgeted for 2022 planning and stabilization at Rodefeld
- Dane County Parks to include Rodefeld in Parks and Open Space Plan
- Plans for expansion of native prairie on the final cover



THE WIDER PICTURE

- Campus can serve as a connection between environmental projects and recreational activities
- Site has potential to serve waste management needs for +75 years
- Alignment with the goals of the neighbors and the community a top priority



ESTIMATED PROJECT TIMELINE

Site investigation activities.

No significant change for minimum of 2-3 years.

Composting and organics management at the site.

W&R Education Center and business park development begin.

Construction of landfill infrastructure

Waste acceptance begins

2025

- 36 holes of golf possible through 2024
- Minimal disruption to the site prior to 2028/2029
- Goal to begin composting of organics and food in 2025 (15-30 acres)
- City to maintain access to existing buildings along AB
- Waste Education Center and Admin Facilities planned for the Sustainability Campus in 2025
- Potential for workshop, maker spaces, or other businesses within the Education Center

2030-2045

- 18 holes of golf possible until 2045 (and possibly beyond)
- Maintain golfing experience with buffers, protection of existing trees, and thoughtful planning and traffic patterns
- Relocate golf storage/maintenance facilities near clubhouse
- Potential for additional recycling or reuse businesses at Sustainability Campus

why YAHARA?

location

- Proximity to urban service area
  - Job access
  - Waste hauling distance
- Access to major roadways
- Topography, geology, hydrology, etc
- Setbacks to wetlands, wells, screening, etc
- Public utilities available
  - Important for sustainability campus businesses

local economics

- Minimize waste hauling costs
- Keep tipping fees steady
- Job opportunities
- Economic growth
- Localize waste and recycling systems
- Site has potential to serve waste management needs for 75+ years

sustainability

- Maintain (and increase) level of services currently provided
- Move Dane County towards a circular economy with local recycling and reuse options
- Organics management options, composting then possibly digestion
- Restore wetlands, habitat and help mitigate effects of flooding and climate change
- Renewable energy

A view of the renewable natural gas plant through the native plants on the Rodefeld landfill.

equity

- Prevent shifting the burden of our waste to another community
- Job training and employment opportunities
- Increase access to existing park with alterative recreation options
- Align project goals with those of Ho-Chunk Gaming Madison

Photo from City of Madison Streets Division

POTENTIAL STAKEHOLDERS AND PARTNERS

neighbors

Surrounding communities & landowners

HO-CHUNK GAMING MADISON

golf MADISON PARKS

COUNTY of DANE WISCONSIN 1839

CITY OF MADISON WISCONSIN

educators & partners

CUWP Chemical Upcycling of Waste Plastics

Dane County Parks Always in Season

MADISON REGION ECONOMIC PARTNERSHIP

WISCONSIN UNIVERSITY OF WISCONSIN-MADISON

SUSTAIN DANE

collectors & processors

Pellitteri WASTE SYSTEMS

RE-USE Consulting

Habitat for Humanity ReStore

LRS LAKESHORE Recycling Systems

Liberty TIRE RECYCLING

government

WISCONSIN DEPT. OF NATURAL RESOURCES

CITY OF MADISON WISCONSIN

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

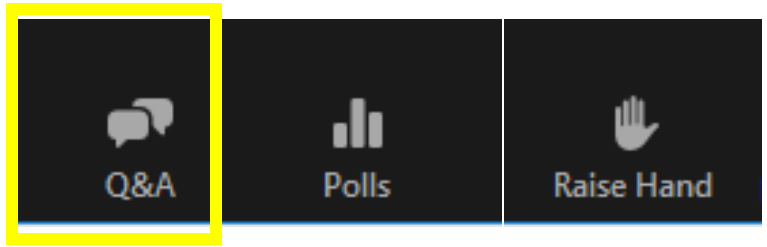
EDA U.S. ECONOMIC DEVELOPMENT ADMINISTRATION

TAMARA D. GRIGSBY OFFICE FOR EQUITY AND INCLUSION

Dane County Office of Energy & Climate Change

QUESTIONS

- Approximately 20 questions received prior to the meeting
- Information also available in FAQs
- Q&A Function available in zoom to submit questions tonight.



ADDITIONAL OPPORTUNITIES

- Site tour scheduled for Thursday December 16, 2021 from 3:30pm-5:00pm
- Register on Eventbrite: https://www.eventbrite.com/e/dane-county-landfill-tours-tickets-163267356057