Navigating the Current and Future Challenges of Biosolids Handling in New Jersey

Paul Knowles, PhD, PE
Hazen and Sawyer

AEA Annual Meeting and Conference,
Tuesday, Nov 19, 2024 - 11am ET

Agenda

1. Formation of the NJWEA Biosolids Working Group
2. Regulatory Updates
3. Available Master Planning Tools

Regulatory Updates

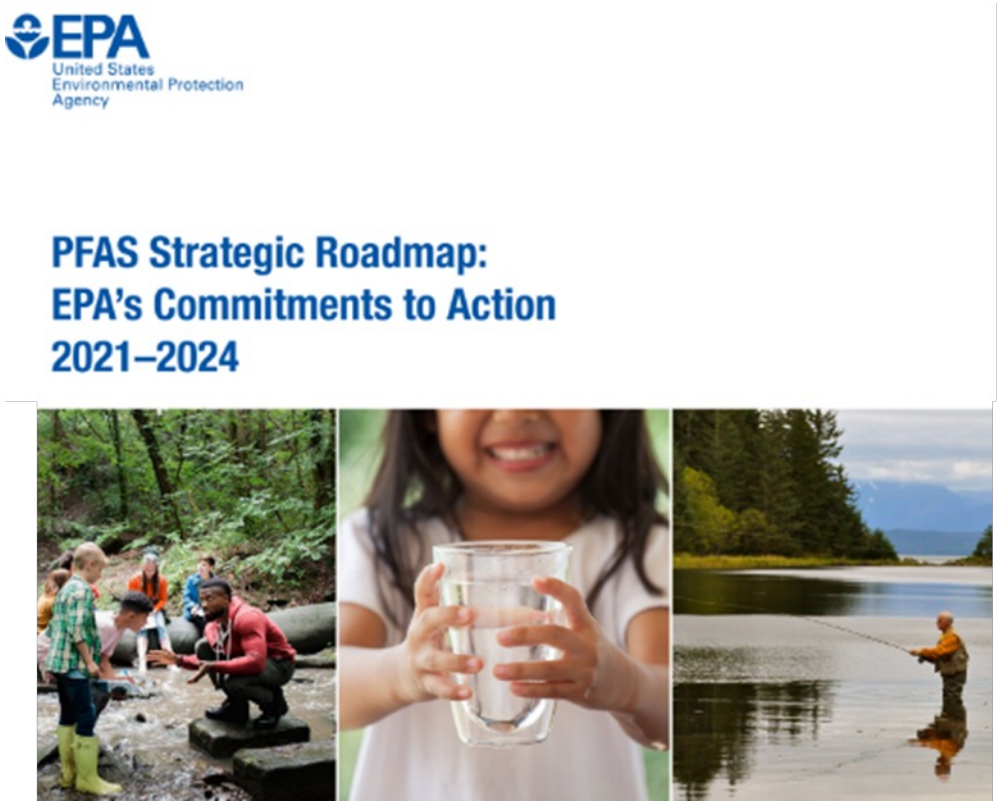
Slides by Dr. Mo Abu-Orf

2024 IS the Year EPA PFAS Roadmap for Biosolids

Winter 2024:
Completion of the risk assessment for PFOA and PFOS.

2025 – 2026:
Anticipated that EPA would issue a Final Rule

2026 – 2031:
Assuming a 5-year compliance schedule



The risk assessment will serve as the basis for determining whether regulation of PFOA and PFOS in biosolids is appropriate

Some States may not wait for the federal regulations and establishing local ordinances or policies:
e.g., Maine, Michigan and New York

Maine

March 22, 2019

Moratorium

PFOS	5.2 ppb
PFAO	2.5 ppb
PFBS	1.9 ppm

May 2021

National Council for Air and Stream Improvements (NCASI)

Pesticide Root Zone Model (PRZM)

EPA HAL of 70 ppt for PFOA and PFOS

PFOS	35 ppb
PFAO	32 ppb

April 20, 2022

First Sate to Ban Land Application of Biosolids

March 2023

EPA MCLs of 4 ppt for PFOA and PFOS

PFOS	2.00 ppb
PFAO	1.82 ppb

Connecticut

Connecticut Passes Act Preventing Use or Sale of Biosolids or Sludge Containing PFAS

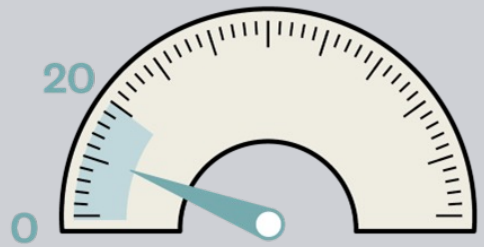
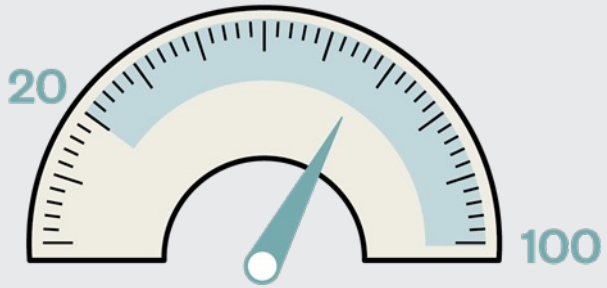
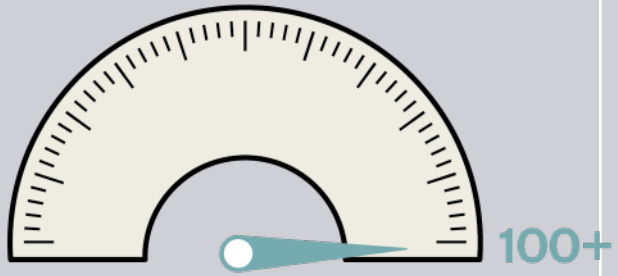
June 21, 2024

The State of Connecticut legislature passed an Act (SB-292) that will ban the use, sell or offer for sale in the state as a soil amendment any biosolids or wastewater sludge that contain PFAS. This Act goes into effect on October 1, 2024.

(f) No person shall use, sell or offer for sale in this state as a soil amendment any biosolids or wastewater sludge that contain PFAS.

Michigan

- Lead the nation in using biosolids (PFOS surrogate) to control PFAS into WRRF through IPP
- Interim strategy effective July 1, 2021
- Minimum of one representative sample per year for all PFAS Majors and IPP that intends to LA
- One sample for per permit cycle (5yrs) for al other WWTPs that intends to LA
- Update effective Jan 1, 2024
- Added PFOA as an analyte to review

PFOA or PFAS in Biosolids ppb	Action required for biosolids that are recycled
	No restrictions/additional requirements
	• Required to sample effluent and identify sources • Required to mitigate during LA • Reduce LA rate to 1.5 DT/acre or submit alternative strategy
	• Deemed industrially impacted and LA is prohibited • Required to sample effluent and identify sources

Significant Reduction in Effluent and Biosolids PFOS as of November 2023

PFAS IPP

EGLE

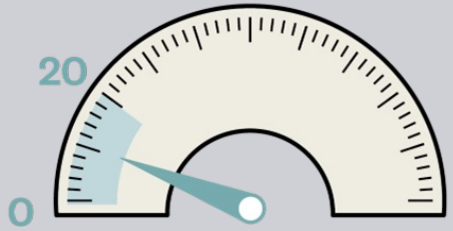
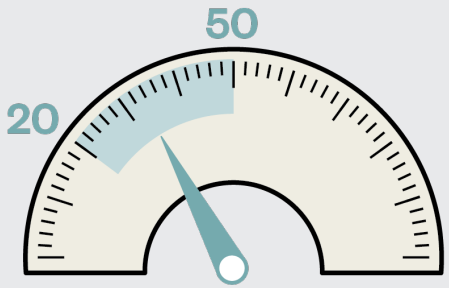
Reductions in PFOS in Industrially Impacted Biosolids from WWTPs

Municipal WWTP	Highest Effluent PFOS (ppt)	Most Recent* Effluent PFOS (ppt)	PFOS Reduction in Effluent	2017/2018 Biosolids PFOS (ppb)	2021 Biosolids PFOS (ppb)	2022 Biosolids PFOS (ppb)	2023 Biosolids PFOS (ppb)	PFOS Reduction in Biosolids
WWTP #50	540	3.6	99%	983	140	16	14	99%
WWTP #14	360	4.72	99%	1060	120	86.7	27.2	97%
WWTP #57	2000	7.24	99%	1680	33	30	23	99%
WWTP #54	240	6.5	93%	387	74/180	63	NA	84%
WWTP #92	4800	3.9	99%	2150	113	NA	17	99%

New York State DEC: DMM7 Policy

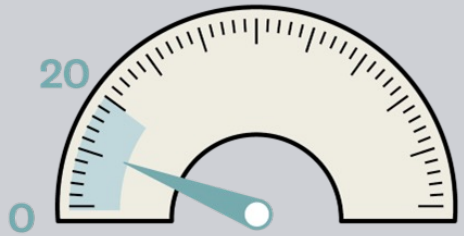
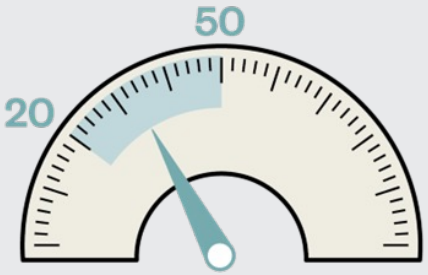
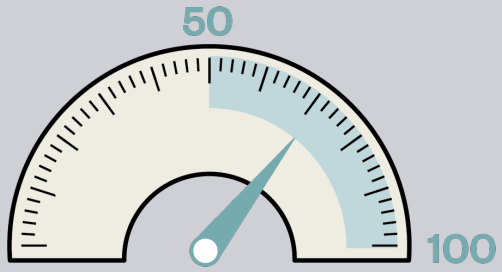
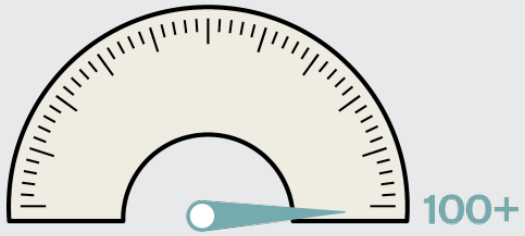
Followed the footsteps of MI and tighter

- Policy was approved Sept 20th, 2023
- Policy took effect on Oct 20th, 2023
- DEC to provide sampling/ analysis
- Supported by SUNY
- Within 180 days of policy issuance all permitted 361-2 and 381-3 facilities accepting biosolids must
  - **Develop and submit sampling plan to DEC**
  - **Sample each source and submit data to DEC**
  - **Use method 1633**

PFOA or PFAS in Biosolids ppb	Action required for biosolids that are recycled
	No action required
	Additional sampling required. DEC will take appropriate steps to restrict recycling after 1 year if PFOS or PFOA levels are not reduced below 20 ppb or less
	DEC will take action to prohibit recycling until PFOS or PFOA is below 20 ppb.

Maryland

- May 9, 2024 Law HB 1153/SB 956
- Oct 1, 24 – identify PFAS SIUs
- Jan 1, 25 – Monitoring/testing plans for PFAS SIUs
- June 1, 25 – PFAS action levels for pretreatment permits
- Sep 1, 25 – PFAS mitigation plans
- June 1, 26 – implement plans

PFOA AND PFAS in Biosolids (ppb)	Action required for biosolids that are recycled
	No restrictions/additional requirements
	• Required to implement source reduction • Reduce LA rate to 3.0 DT/acre or less
	• Required to implement source reduction • Reduce LA rate to 1.5 DT/acre or less
	Land application of the biosolids is recommended to be stopped

Colordo Biosolids Interim Strategy

Effective Started January 1, 2023 Updated Dec 7, 2023

Preparer Criteria

- In-state
- Out-state
- >30 dtpd
- <30 dtpd
- Third party

Sampling/ Analysis/Reporting

- Sampling guidance
- Sampling frequency depending on biosolids production
- Method 1633
- Electronic reporting

PFOS Check ≥ 50 ppb

- Develop and implement source control program within 3months
- Submit report of results within one year of report of results of source control program

Massachusetts

"Massachusetts Department of Environmental Protection shall establish and enforce as necessary a moratorium prohibiting the procurement of PFAS-emitting structures or activities and shall not grant approval to any person required to file an environmental notification form proposing a new use or structure or modification of an existing use or structure **where said proposal would generate emissions containing perfluoroalkyl and polyfluoroalkyl substances**"

SENATE DOCKET, NO. 1716 FILED ON: 1/19/2023

SENATE . . . . . No. 2053

Commonwealth of Massachusetts

PRESENTED BY:

Marc R. Pacheco

Actions

Nov 22, 2023 | Senate
- Bill reported favorably by committee and referred to the committee on Senate Ways and Means

Sep 12, 2023 | legislature
- Hearing scheduled for 09/20/2023 from 01:00 PM-05:00 PM in A-1

Feb 16, 2023 | House
- House concurred

Feb 16, 2023 | Senate
- Referred to the committee on State Administration and Regulatory Oversight

Environmental Justice

Material taken from NJDEP EJ Training

NJ EJ Law – Limits on Facility Siting

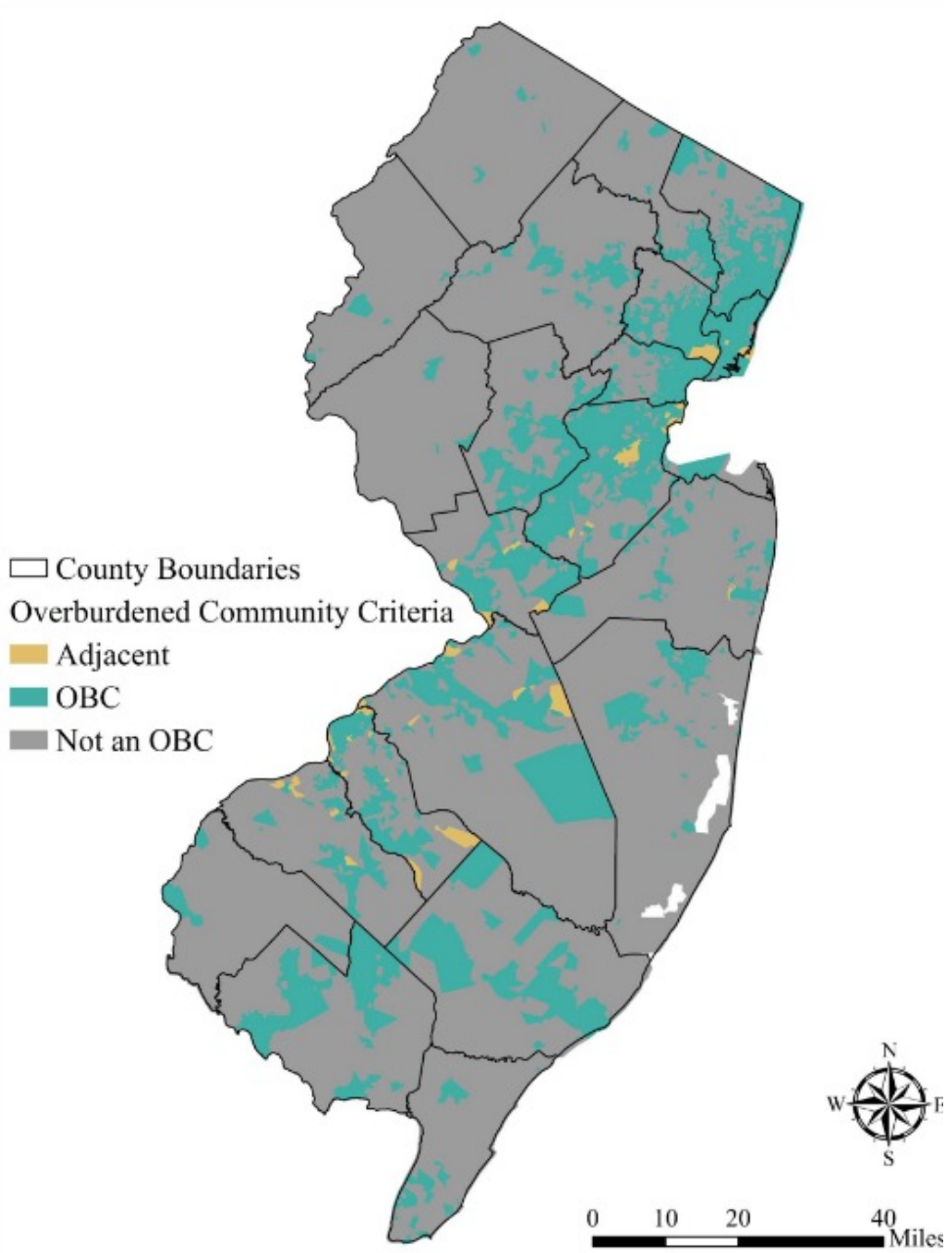
- **Applicability Determination – 3 criteria**
  - Being located in overburdened community
  - Type of facility
  - Permit type

- Overburdened community if stressors are greater than any of 50th percentile for State, County or adjacent block

- Stressors may be sources of environmental pollution or conditions that cause public health impacts

- If Combined Stressor Total exceeds geographic comparison, then considered adverse.

- **Potential exemptions**
  - Compelling public interest
  - Net benefits considered within the OBC



Biosolids Working Group

Working Group Members

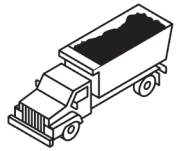
NJWEA Biosolids and Energy Committee
Subcommittee on Biosolids Working Group

Working Group Snapshot

Round Table Participants

8 utilities

>11M people serviced



>630K WTPY CAKE

Round Table Outcomes

Table 1 Ranking of Current Challenges Facing Biosolids Handling Today

Rank	Challenge
#1	Potential regulatory restrictions on future disposal (i.e. due to **PFAS**)
#2	**Costs for infrastructure** maintenance and investment
#3	**Community pressures** on operation (due to environmental justice, traffic, odor, noise etc.)
#4	Increasing **costs for hauling and disposal** services
#5	**Carbon footprint** associated with biosolids management
#6	Ongoing access to **end markets**

Working Group Work Plan

1. **Annual conference May 2024 –** Round Table and Working Group Formation
2. **Sep 2024 -** Regulatory barriers
3. **Dec 2024 -** Market barriers
4. **Feb 2025 -** Technology barriers.
5. **Annual conference May 2025** – Funding barriers

Master Planning Tools

Multi Criteria Decision Analysis

What is Multi-Criteria Decision Analysis (MCDA)

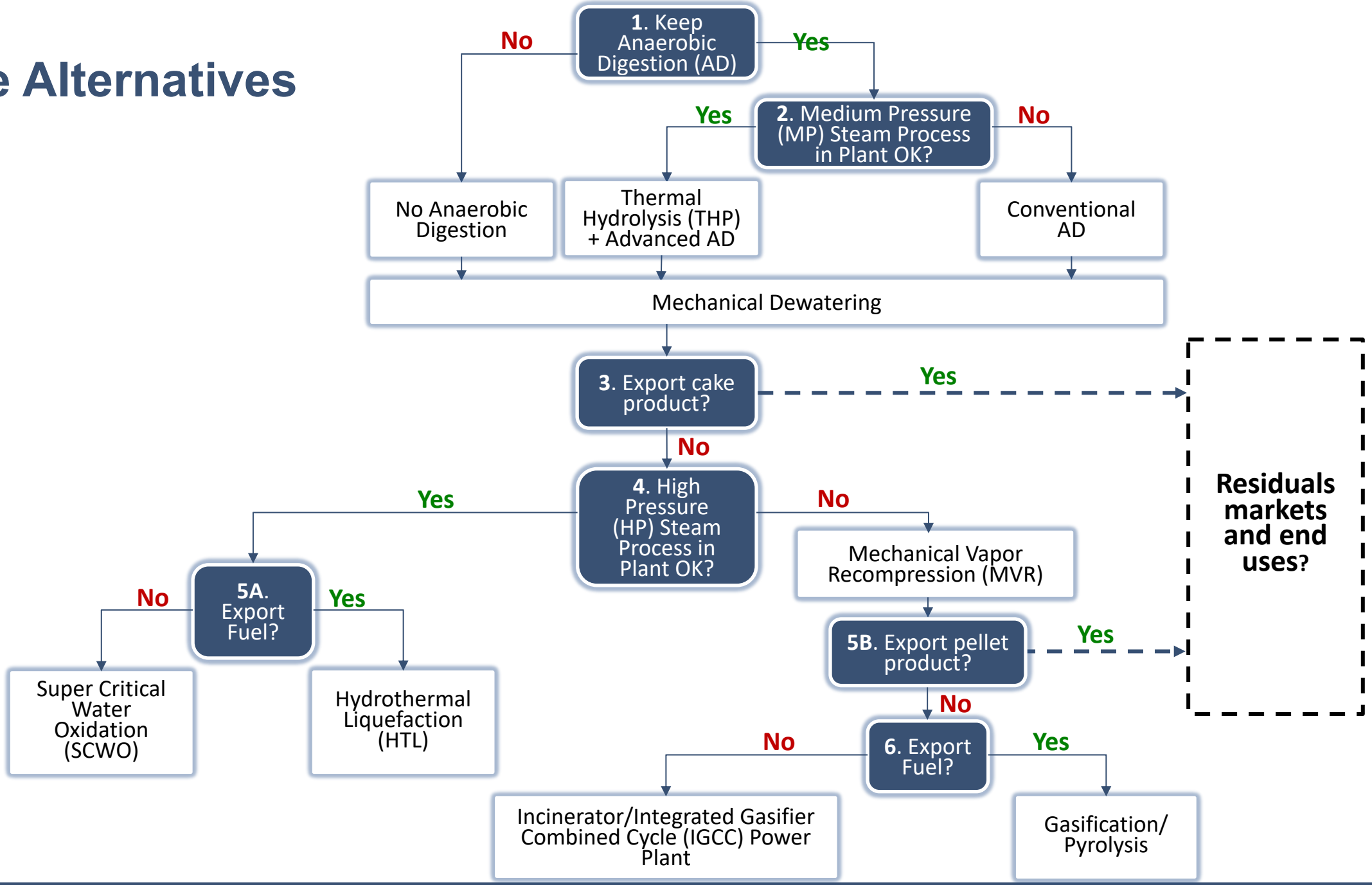
Collective term for approaches that support decision making by considering various factors in an explicit and transparent manner

- Complex problems are broken down into smaller and more consistent pieces
- Competing pros and cons are documented

> We can't just consider cost! What about the other stakeholders' concerns…"

- Different stakeholders:
- Different objectives and priorities
- Different hopes and fears

1. Define Alternatives



2. Develop Criteria

Criterion	Category	Qualitative (QL) or Quantitative (QN)	Correlation	Norm min	Norm max
Risk (Volume Reduction)	Diversification	QL	-	Min	Max
Capital Cost	Economy	QN	-	0	Max
Operating Cost	Economy	QN	-	0	Max
Carbon/GHG Footprint	Environment	QN	-	Min	Max
Energy Balance	Environment	QN	-	Min	Max
Staffing	People	QL	+	0	Max
Environmental Justice	Equity	QN	-	0	Max
Technology Maturity	Innovate on RR	QL	+	1	5

3. Weight Criteria (Pairwise Comparison)

- The relative importance of one criterion relative to another can be expressed
- Requires consideration of every possible pairing of criteria

Example Scores

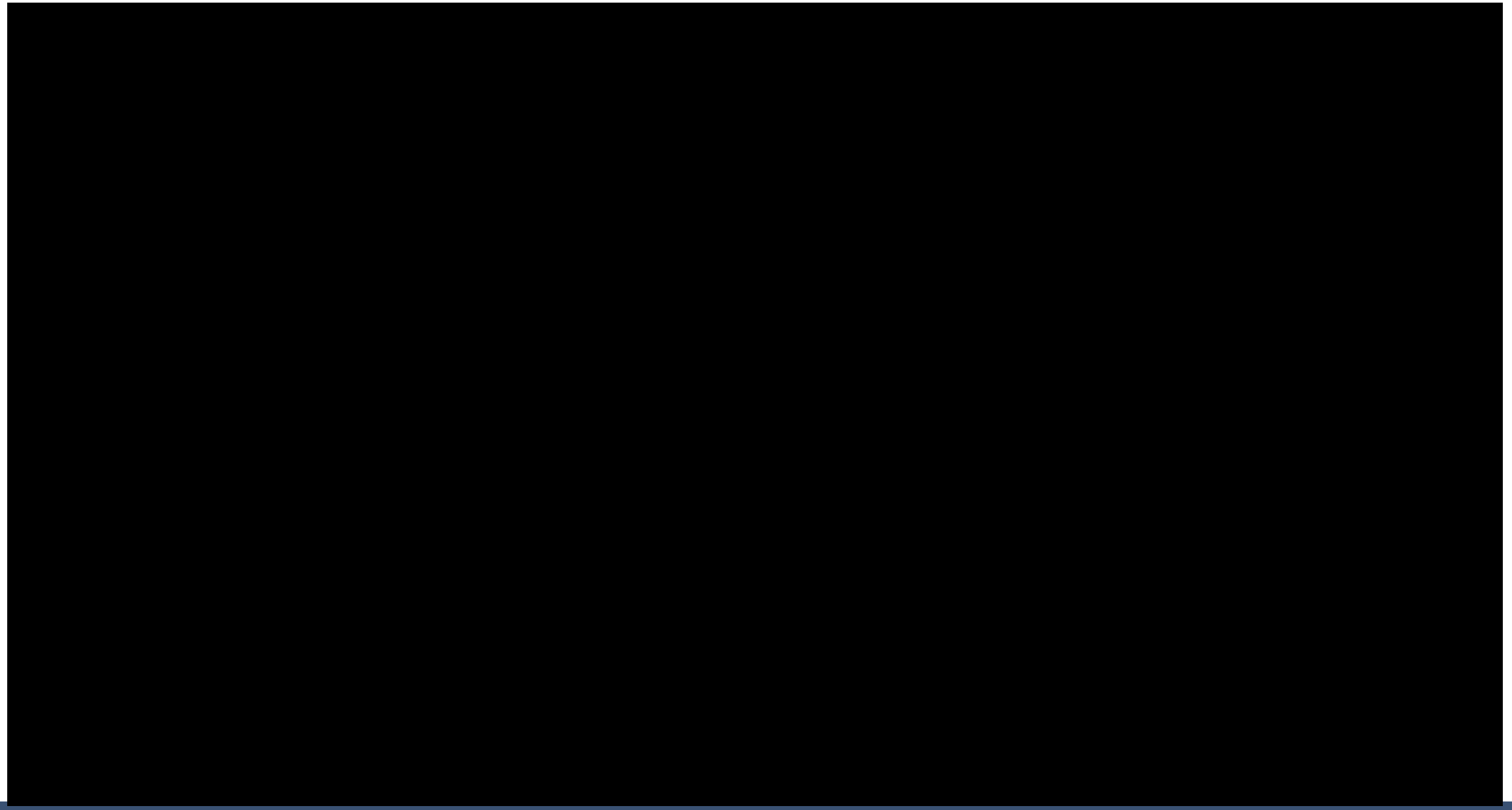
	Negative Score in Favor	Positive Score in Favor	
	-4 (Most) to 0 (Equal)	0 (Equal) to 4 (Most)	
Pair	**Criterion 1**	**Criterion 2**	**Score**
1	Contingency	Resiliency	**-3**
2	Contract Dependence	Resiliency	**2**
3	Contract Dependence	Contingency	**0**

Score of **-3** indicates that the participant is "**very strongly**" in favor of *Contingency* over *Resiliency* within this pair comparison.

Score of **+2** indicates that the participant is "**strongly**" in favor of *Resiliency* over *Contract Dependence* within this pair comparison.

Score of 0 indicates that the participant feels *Contract Dependence* is **"equal"** to *Resiliency* within this pair comparison.

4. Alternatives Scorings - Quantitative



4. Alternative Scoring - Qualitative

Criterion	Staffing	Technology Maturity
Guiding Principle	People	Innovate on RR
SCORING THRESHOLDS		
SCORE OF 1	Most amount of specialized workers required	No large-scale installs
SCORE OF 2		Limited large scale installs, short run time
SCORE OF 3	Neutral to current staff skills	Lots of installs, short run time.
SCORE OF 4		Few installs, long run time.
SCORE OF 5	Least amount of specialized workers required	Lots of installs, long run time.

4. Alternatives Scorings – Combined Raw Scores

HazenConverge
Multi-Criteria Decision Tool
v2.3 Copyright Hazen and Sawyer, DPC. 2020
Hazen

Open | Close | Instructions | Print Report

2/15/2022

Launch Pairwise Comparison

Results Pane

4. Alternatives Scores

Criteria	1 2018 Baseline	2 2030 Baseline	3 2050 Compost Class A Land	4 2050 Class B to Biomass Boiler	5 2050 Class B to Reclamation	6 2050 Class B to Pyrolysis, Biochar to Urban Ag	7 2050 Class B to Pyrolysis, Biochar to Ag	8 2050 Class B to Pyrolysis, Biochar to Reclamation	9 2050 Class A to Urban Ag	10 2050 Class A to Ag	11 2050 Class A to Reclamation	12 2050 Fuel Cells, Class B to Ag
Resiliency	1	1	1	5	1	5	5	5	2	2	2	1
Contingency	1	1	1	5	1	5	5	5	1	1	1	1
Contract Dependence	5	5	5	5	2	5	5	4	5	5	5	5
Capital Cost	0	0	0	0	$0	$0	$0	$0	$1,800	$1,800	$1,800	$0
Operating Cost	$ 333	$ 388	$ 261	$ 129	$ 286	$ 100	$ 100	$ 100	$ 469	$ 469	$ 469	$ 221
Carbon/GHG Footprint	0.51	0.27	-0.22	-0.07	-0.44	-0.30	-0.30	-0.40	-0.23	-0.23	-0.41	-0.29
Energy Balance	0.46	0.70	0.57	4.49	0.81	3.88	3.88	3.88	0.12	0.12	0.12	0.81
Staffing	3	3	3	3	3	3	3	3	1	1	1	2
Environmental Justice	0	0	0	0	0	0	0	0	71	71	71	0
Technology Maturity	5	5	5	5	5	1	1	1	5	5	5	3

5. Apply Weightings and Normalization

HazenConverge
Multi-Criteria Decision Tool
v2.3 Copyright Hazen and Sawyer, DPC. 2020
Hazen

Open | Close | Instructions | Print Report

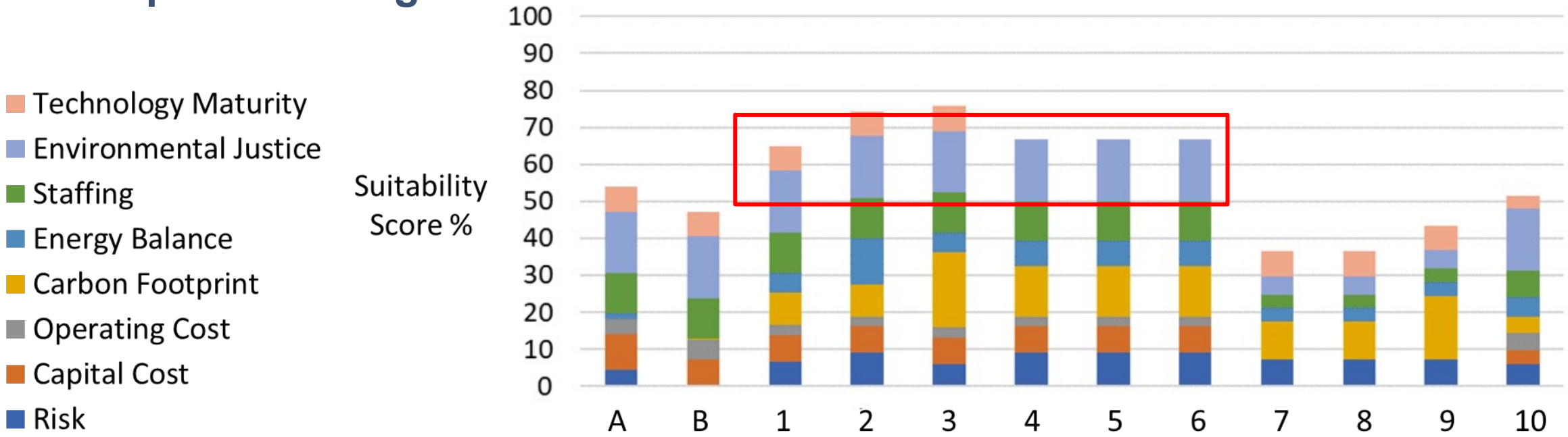
2/15/2022

Launch Pairwise Comparison

Results Pane

Criteria	1. Categories	Category	2. Weighting: Relative Criteria Weight	Weight within Category	Weight within Total Score	3. Normalization: +/- Correlation	Raw Scores will be evaluated against this Range: Low	High
Resiliency		Diversification	11%	42%	11%	+	1	5
Contingency		Diversification	11%	41%	11%	+	1	5
Contract Dependence		Diversification	5%	17%	5%	+	1	5
Capital Cost		Economy	7%	41%	7%	-	0	1800
Operating Cost		Economy	10%	59%	10%	-	0	Max Raw Score
Carbon/GHG Footprint		Environment	18%	55%	18%	-	Min Raw Score	Max Raw Score
Energy Balance		Environment	15%	45%	15%	+	Min Raw Score	Max Raw Score
Staffing		People	8%	100%	8%	+	0	Max Raw Score
Environmental Justice		Equity	9%	100%	9%	-	0	100
Technology Maturity		Innovate on RR	7%	100%	7%	+	1	5

6. Compare Rankings



Scenario	Scenario Description	Scenario	Scenario Description
A	2018 Baseline	5	2050 Digested, dried residuals to Pyrolysis, Biochar to Agriculture
B	2030 Baseline	6	2050 Digested, dried residuals to Pyrolysis, Biochar to Land Reclamation
1	2050 Compost – Class A to Agriculture	7	2050 THP, Class A to Urban Agriculture
2	2050 Digested, dried residuals to Solid Fuel	8	2050 THP, Class A to Agriculture
3	2050 Digested residuals to Land Reclamation	9	2050 THP, Class A to Land Reclamation
4	2050 Digested, dried residuals to Pyrolysis, Biochar to Urban Agriculture	10	2050 Biogas to Fuel Cells, Digested residuals to Agriculture

Conclusions

1. US EPA Ruling expected soon
2. NJ utilities are already collaborating through the NJWEA Biosolids Working Group to identify shared challenges and opportunities
3. Latest master planning tools can help to rapidly evaluate a broad spectrum of alternatives according to organizational priorities

Navigating the Current and Future Challenges of Biosolids Handling in New Jersey

Paul Knowles, PhD, PE
Hazen and Sawyer

AEA Annual Meeting and Conference,
Tuesday, Nov 19, 2024 - 11am ET