Appendix 3 Evaluation Criteria Carie Fox, Public Policy Collaboration October 22, 2015

During Recon, the Water Supply Advisory Committee (WSAC or Committee) had elected to use Multi-Criteria Decision Support (MCDS) to sort out the strengths and weaknesses—and perceptions thereof—of the various options before them. The value of MCDS is that it teases out the thought processes that go into a decision: the large number of criteria that distinguish the options (such as *cost* or *reliability*), the facts about those criteria and the value WSAC members put on each criterion. The WSAC members developed the criteria and each associated rating scale, used the MCDS model in small groups, published their individual inputs and then discussed those inputs in plenary. In doing so they gained a keen understanding of the options and of their fellow Committee members' thought processes.

The criteria are listed in the April 24, 15 attachment and were developed collaboratively over a year. MCDS forces a painstaking approach to definitions and ratings scales, as the Committee discovered when they engaged in a trial run in December. MCDS pushed them to uncover the ways they had been comfortably using the same terms while obscuring significantly different meanings and assumptions. The criteria they used in the 'Real Deal' run of the MCDS model reflected a very disciplined, shared vocabulary, which was not only useful for the model but essential for their larger dialog.

The Committee members rated each of the options against each of the criteria using their agreed-upon rating scales. They also weighed each criterion according to the relative contribution they thought it should have on the decision. For instance, one Committee member weighed 'cost' very high but 'grants' very low. That meant that for her, if one proposal handily beat out the other in terms of grants, it did not matter much to her comparison of the options. She could agree that option X would be likely to get a lot of grants, but that wouldn't tip her decision. Using the model allowed the Committee members to tease out when differences in their preferred option was due to differences of opinion about ratings and when it was due to differences of opinion about values. It also provided insight about where their ratings differed from technical opinions.

The Committee's weights and ratings can be seen in the 071515 attachments.

The MCDS analyst prepared a series of graphs to help the Committee identify areas of variance around the ratings (did they see the 'facts' similarly?), variance around the weights (where were the big differences in values?) and the combination of ratings and values that really drove the differences among the Committee members' preferred options.

The greatest benefit of the MCDS came in the way it supported Committee dialog: the discipline required to create shared definitions and ratings scales, the small-

group conversations as people worked to populate the model and most valuably, the debrief at the public meeting in July where Committee members took turns asking questions like "I noticed that you gave *cost* a high weight but *grants* a low one: Why?" (The answer: "Grants obscure the cost of the option to society as a whole, which is what I am really interested in.") It also gave the technical team feedback about the areas where the WSAC as a whole seemed to misunderstand or disagree with the information they were receiving from the technical team, and this allowed for prioritization of analysis and discussion in the ensuing meetings.

The MCDS website the Committee used can be accessed and used at http://www.decisionharvest.com/dhroot/dhowners/santacruz/portfolio/df.asp.

List of Attachments

Attachment 1 042415 Recommended Evaluation Criteria for use with MCDS

Attachment 2 071515 Weightings

Attachment 3 071515 Ratings Spreadsheet

Attachment 4 071515 Ratings and Decision Scores

Attachment 5 071515 Common Themes from WSAC Member Comments during MCDS Exercise

DATE: April 24, 2015
TO: WSAC Members
FROM: Rosemary Menard

SUBJECT: Recommended Evaluation Criteria for use with MCDS

Following several working sessions and discussion with the full WSAC and the Planning Subcommittee attached is a set of criteria for the Committee to review and finalize so that they can be used with the MCDS model that Committee members will work with between the April/May meeting and the June meeting.

Agenda Item 10a

MCDS Evaluation Criteria Summary Table										
	Criterion	Alternative	Portfolio							
			Criteria	Criteria						
1.	Technical Feasibility	How feasible is this approach technically?								
2.	Legal Feasibility	Within the required timeframe for this approach are								
		necessary rights currently held in the form needed or								
		feasible to acquire or modify as needed?								
3.	Regulatory Feasibility	How easy or difficult would the regulatory approval								
		process for this approach be?								
4.	Implementability	How easy or difficult would this portfolio be to								
		implement? What degree of risk or uncertainty is								
		would be involved in implementing the portfolio?								
5.	Political Feasibility	What level of political support is this approach likely to								
		have?								
6.	Groundwater	How would this approach affect groundwater resources?								
	Resources									
7.	Marine Ecosystem	How would this approach affect the health of marine								
	Health	ecosystems?								
8.	Freshwater and	How would this approach affect the health of freshwater								
	Riparian Ecosystem	and riparian ecosystems?								
	Health									
9.	Terrestrial Ecosystem	How would this approach affect the health of terrestrial								
	Health	ecosystems?								
10.	Environmental Profile	How acceptable is the environmental profile of this								
		portfolio?								
11.	Operational Flexibility	To what extent does this approach increase operating								
		flexibility?								
12.	Addresses Peak Season	To what extent does this approach help address peak								
	Demand	season demand?								
13.	Yield (Informational	How much water will this approach save or produce?								
	Only – Not Rated)									
14.	Energy	How much Energy will this approach/portfolio require								
		per million gallons of water/how much greenhouse gas								
		will the approach/portfolio produce per million gallons								
		of water?								
15.	Adaptive Flexibility	How adaptable or flexible is this approach/portfolio to								
		changing conditions?								
16.	Regional Benefits	Would or could this portfolio provide benefits to other								
		regional water systems?								
17.	Local Economy	How would this portfolio affect local jobs?								
18.	Infrastructure	How would this portfolio affect the system's								
	Resilience	vulnerability to natural threats?								
19.	Supply Reliability	How would this portfolio affect the system's ability to								
		consistently meet an agreed upon level of service?								
20.	Supply Diversity	How does this portfolio affect the diversity of supplies?								

21. Sustainability	How sustainable are the actions in this portfolio?	
22. Cost Metrics	What are the upfront and net present value life-cycle	
	costs of alternatives and portfolios?	

1. Technical Feasibility: Alternative Criterion

Technical feasibility is an estimate of whether this approach would work as envisioned. For complex options, rated on the basis of core elements. That is, if an option includes many parts, feasibility is rated based on each of the material parts, with the rating tracking the "least feasible." For centralized options, assessment reflects feasibility at utility scale. When rating, City staff used a 10-year horizon on the assumption that it would be very difficult to make predictions about what technical innovations would occur more than 10 years out.

a. **Question:** How feasible is this approach technically?

b. Scale:

- Widely used,
- Demonstrated in field,
- Promising in 3-5 years,
- Promising in 6-10 years,
- More than 10

c. Recommended Actions:

- Retain the original question (above).
- The technical team will include information about their views on technical feasibility in the materials prepared for the various alternatives.
- Committee members with different views of this information can reflect those views in their MCDS ratings and provide an explanatory comment.

2. Legal Feasibility: Alternative Criterion

Legal Feasibility addresses siting including acquisition of land, easements or rights or way, water rights, or other legal rights relevant to implementing the alternative as envisioned. This criterion is distinct from Regulatory Feasibility, which relates to specific regulatory approvals that would be required, separate from the legal requirements addressed here.

- a. **Question:** Within the required timeframe for this approach, are the necessary rights currently held in the form needed or feasible to acquire or modify as needed?
- b. **Scale:** Unambiguous yes, Yes but some ambiguities, Can probably acquire, Difficult to acquire, Very unlikely

c. Recommended Actions:

- Retain the original question (above).
- The following changes have been made to this criterion:
 - o Eliminated a reference to environmental issues those will be addressed in the Regulatory Feasibility criterion

- Technical team will provide any available relevant information about land acquisition issues or water rights issues for the alternative and give an initial rating.
- The scale is revised to include a time element. The Subcommittee suggested consulting with an attorney on the revised scale. A preliminary revised scale is shown below:
 - o Unambiguous yes; legal issues are routine, non-controversial;
 - o Yes, but with some ambiguities; achievable within 6 to 12 months;
 - o Can probably acquire; achievable within 12 to 24 months;
 - Difficult to acquire; complex, contentious issues involved, likely requiring more than 2 years to resolve;
 - Very unlikely; significant and contentious legal issues involved, likely requiring more than 5 years, if ever, to resolve.

3. Regulatory Feasibility: Alternative Criterion

Regulatory Feasibility addresses environmental and regulatory review. When rating, the City staff looked at the difficulty of getting regulatory approvals under existing regulations as well as the possible necessity of responding to or taking advantage of potential new regulations that might come into place over the next decade. would occur more than 10 years out.

- a. Question: How easy or difficult would the regulatory approval process for this approach be?
- b. Scale
- Easy and quick; regulatory issues are limited, routine, and/or non-controversial;
- Slow but relatively sure; regulatory issues include some challenges but approvals and completed processes likely achievable within 6 to 12 months;
- Slow but with some questions due to number or complexity of regulatory issues needing to be resolved; Can probably acquire; achievable within 12 to 36 months;
- Regulatory approvals will be difficult to acquire; new regulations may need to be developed, the scope or number of regulatory process or approvals involves complex, contentious issues, timeframe for completion likely more than 3 years;
- Significant regulatory challenges make approvals or completion of the regulatory review process in a reasonable, predictable time highly uncertain, likely would be expensive and require more than 5 years, if ever, to complete.

4. Implementability - Portfolio Criterion

Implementability is a composite measure for portfolios that is intended to be a judgment call type of rating. Inputs into this rating include the information on technical, regulatory, and legal of the various alternatives included in the portfolio. This composite measure specifically excludes political feasibility because of the degree of individual judgment required in rating political feasibility.

- a. **Question:** How implementable would this portfolio be? What is the degree of uncertainty or risk that the one or more measures in the portfolio would not be able to be implemented due to a technical, legal, or regulatory issue or constraint?
- b. Scale:
 - Readily implemented

- o Minor uncertainties and risks related to implementation
- o Moderate uncertainties and risks related to implementation
- o Significant uncertainties and risks related to implementation
- o Unlikely to be implemented
- Scale could be expanded to include finer distinctions between the ratings if desired.

5. Political Feasibility: Alternative Criterion

Extent to which an approach will claim and retain the support of the Community: both formal political entities as well as informal social and political groups and the Community at large.

- a. **Question:** What level of political support is this approach likely to have?
 - o **Scale:** Acceptable now;
 - o Uncertain acceptability, could vary with time;
 - o Likely never acceptable.

6. **Groundwater Resources: Alternative Criterion**

This criterion looks at the potential for beneficial, neutral or negative effects of a particular approach on groundwater resources. The word "active" in the scale means putting water back not just resting wells.

- a. **Question:** How would this approach affect groundwater resources?
- b. Scale:
 - Actively restores,
 - o Allows restoration,
 - Does not affect,
 - o Degrades Resource,
 - o Depletes Resource

Note: The scales for Alternative Criteria 7, 8, and 9 are designed to describe the level of the potential impacts of an alternative but do not reflect the legal and policy requirements to avoid, minimize or mitigate for adverse environmental impacts.

7. Marine Ecosystem Health: Alternative Criterion

This criterion assesses whether and how a particular approach might affect the health of marine ecosystems.

- a. **Question:** How would this approach affect the health of marine ecosystems?
- b. Scale:
 - o Positive effect,
 - o does not harm,
 - o may harm,
 - o cumulative harm,
 - o significant harm to populations or species

8. Freshwater and Riparian Health: Alternative Criterion

This criterion assesses whether or how a particular approach would affect the health of freshwater and riparian ecosystems.

a. **Question:** If this approach were implemented, how would it affect freshwater and riparian ecosystems?

b. Scale:

- o Positive effect,
- o does not harm,
- o may harm,
- o cumulative harm,
- o significant harm to populations or species

9. Terrestrial Resources: Alternative Criterion

This criterion assesses whether or how a particular approach would affect the health of terrestrial ecosystems. No scale was created for this criterion, so one would need to be created if this criterion is to be used in future analyses.

a. Question: How would this approach affect the health of terrestrial resources?

b. Scale:

- o Positive effect,
- o does not harm,
- o may harm,
- o cumulative harm,
- o significant harm to populations or species

10. Environmental Profile: Portfolio Criterion

The environmental profile of a portfolio is made up of a composite of the environmental impacts or benefits of the measures included in the portfolio. Rating the environmental impacts or benefits (i.e., the profile) of a portfolio would involve a judgment call by the rater.

- a. **Question:** How acceptable is the environmental profile of this portfolio?
- b. **Scale:** A potential scale for the portfolio Environmental Profile criterion would be:
 - o The environmental profile of this portfolio is acceptable without mitigation
 - The environmental profile of this portfolio is acceptable with appropriate and effective mitigation
 - The environmental profile of this portfolio is not acceptable and/or cannot be made acceptable even with effective mitigation

11. Operational Flexibility: Alternative Criterion

a. The degree to which this approach increases management flexibility that in turn helps the system do more with existing resources while still meeting resilience, reliability and other goals. (This is particularly designed for approaches that don't actually increase supply or reduce demand, but might nevertheless be useful.) **Question:** To what extent does this approach increase operating flexibility?

b. Scale:

- o Increases operating flexibility
- Has no impact on operating flexibility
- o Decreases operating flexibility

12. Addresses Peak Season Demand: Alternative Criterion

This criterion addresses the extent to which a proposal adds to the water available to meet or peak season demand or reduces peak season demand.

- a. Question: To what extent would this approach help address peak season demand?
- b. Scale:
- All of the water produced is or can be available during the peak season (e.g., aquifer storage and recovery, off stream storage or peak season demand management)
- The majority of the water produced is or can be available during the peak season (e.g., Ranney collectors that allow the City to stay on the river during river turbidity events and therefore leave water in storage in Loch Lomond)
- o Little or none of the water produced is available during peak season (e.g., water transfers to other districts <u>if</u> the conditions of groundwater aquifers don't permit much return in the near term).

13. Yield: Alternative Criterion – Informational Only – Not Ratable

This criterion measures reduction in demand or increase in supply associated with a specific alternative.

- a. **Question:** How much water will this approach save or produce?
- b. **Scale:** Not Ratable (Information Only)

14. Energy: Alternative Criterion and Portfolio Criterion

This criterion is evaluated for both alternatives and portfolios. After considerable discussion by the Committee, staff and technical team, the metric selected to measure energy use is KWH per million gallons.

- a. Question: How much energy does this alternative require for ongoing operations and maintenance? How much energy does this portfolio require for ongoing operations and maintenance?
- b. Scale: Numeric value

15. Adaptive Flexibility: Alternative Criterion and Portfolio Criterion

Adaptive Flexibility measures the capacity of an alternative or portfolio to respond to changing conditions, for example to higher or lower demands, to more or less impact of climate change. Adaptive flexibility enhances the ability to meet the requirements of changing circumstances in a timely and cost effective manner.

- a. Question: How adaptable or flexible is this approach/portfolio to changing conditions?
- b. Scale:

- o Provides adaptive flexibility;
- o Has no influence on adaptive flexibility;
- o Reduces adaptive flexibility.

16. Regional Water Benefits: Portfolio Criterion

This criterion allows raters to consider whether an alternative or portfolio of measures would or could provide benefits to both SC water customers and the region.

- a. **Question:** Would this approach or portfolio improve or provide opportunities for improving regional water stability?
 - o Scale: Will provide significant regional benefits
 - o Will provide some regional benefits
 - o Won't provide regional benefits.

17. Local Economy: Portfolio Criterion

- a. This criterion is measured in terms of numbers of living wage jobs specifically produced as a result of ongoing operations and maintenance of programs or projects by measures included in the portfolio. The premise here is that a reasonable number of long-term, living wage jobs is a benefit to the community due to the ripple effect of wage earner spending on goods and services in Santa Cruz. Question: How many long-term, living wage jobs are created by the operations and/or maintenance of programs or projects resulting from the portfolio being evaluated?
 - o **Scale:** Produces 10 or more permanent living wage jobs
 - o Produces 3 to 9 permanent living wage jobs
 - o Does not add permanent living wage jobs.

18. Infrastructure Resilience: Portfolio Criterion

Infrastructure resilience is a measure of the system's ability to return to normal operation after an event. As an example, during a power outage caused by any type of circumstance, a system with integrated back up power generation is more resilient than one that does not have back up power generation capacity.

- a. Question: How would this portfolio affect the system's vulnerability to natural threats?
- b. Scale
- o Significantly reduces the system's vulnerability to one or more natural threats;
- o Somewhat reduces the system's vulnerability to one or more natural threats;
- o Does not impact system vulnerability positively or negatively;
- o Somewhat increases the system's vulnerability to one or more natural threat;
- Significantly increases the system's vulnerability to one or more natural threat.
- The technical team will provide input on operational flexibility or infrastructure redundancy associated with various alternatives that may get incorporated into portfolios. This information can be used to inform rating portfolios.

19. Supply Reliability: Portfolio Criterion

Reliability of water supply relates to how much water can be produced under various climate conditions such as drought or extreme precipitation. Remember that in the extreme climate change simplified scenario (the billion gallon shortfall), less rainfall isn't the only issue: turbidity, timing of storm events or other factors may also affect the supply.

a. Question: How would this portfolio affect the system's ability to consistently meet an agreed upon level of service?

b. Scale

- o Increases the reliability of supply;
- o Does not improve or reduce the existing level of supply reliability;
- o Reduces the reliability of supply.
- A couple of additional comments are relevant here:
 - This scale is purposefully qualitative—the quantitative analysis of the portfolios, including analysis of the measures and their effects using Confluence, .
 - When rating this criterion in the MCDS model, it is okay if Committee members use their best estimate of how the portfolio would affect reliability.
 - o Also, I think that the use of an "existing" reference point for a reliability criterion allows those working on scenarios to make a decision about whether they want to change the current benchmark in some fashion.

20. Supply Diversity – Portfolio Criterion

This criterion measures the how well prepared or positioned the system is to respond to future uncertainties based on the diversity of its supply portfolio. The premise is that supplies coming from different sources being less likely to as vulnerable to the same kinds of uncertainties.

a. **Question:** How does this portfolio affect the diversity of Santa Cruz water sources?

b. Scale:

- o Portfolio significantly increases the diversity of Santa Cruz's supply portfolio.
- o Portfolio somewhat increases the diversity of Santa Cruz's supply portfolio.
- o Portfolio does not increase the diversity of Santa Cruz's supply portfolio.

21. Sustainability - Portfolio Criterion

EPA's definition of sustainability is "Sustainability creates and maintains the conditions under which humans and nature can exist in productive harmony, that permit fulfilling the social, economic and other requirements of present and future generations."

One concept of sustainability that is very relevant to the WSAC's work is multi-generational equity. The idea behind this concept obviously is reflected in EPA's definition cited above, but a couple of additional perspectives that are relevant include taking actions now to avoid unduly burdening future generations, and protecting current users from paying for all the costs of rehabilitating or replacing current infrastructure when future generations will also benefit from these investments.

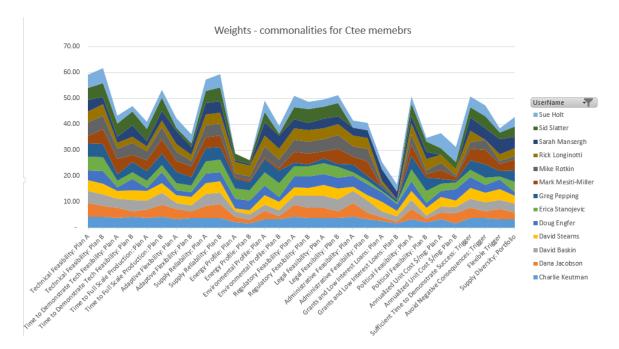
These two ideas may seem in conflict, but they are really opposite sides of the same coin and both need to be considered in decision-making.

- a. Question: How does this portfolio rate relative to the environmental, fiscal, and resource management aspects of sustainability?
- b. Scale:
 - o This portfolio is very sustainable
 - o This portfolio is somewhat sustainable
 - o This portfolio is not sustainable

22. Cost Metrics:

Information will be provided on the estimated capital costs of Consolidated Alternatives

Net Present Value costs will be provided for the lifecycle costs of operations and maintenance in the form of \$/mg.



Subject: Weights to Inform your Portfolio-building (ratings and decision scores later!)

Esteemed Ctte Members—

Figure A, a **stacked area graph** (above) provides a gestalt of the overall weights distribution. You can quickly see, for instance, that the potential to secure grants and low interest loans is probably not a deal-breaker. By contrast, *Technical Feasibility* appears to matter to a lot of people.

Attached, we also provide Figure B, which pulls out the weights for the **A/B criteria** and lets you compare them easily.

When you want to see more detail, go to Figure C 1-13, showing sets of **Portraits & Vignettes**. You are familiar with the Portraits from last time—this time they allow you to see how each person weighed all 30 criteria. That's a lot of criteria! Therefore, we took the portraits and simplified things a bit—you'll see these 'Vignettes' tell a quick and easy version of each portrait.

In Figure D, I took **all 13 Vignettes** and mocked them up on a single legal-size sheet; I hope you'll find it helpful to be able to see them all at once.

So... if you are wondering... did Philip and Carie just give us the same information in 5 different ways? Yes, that's exactly right. Scan these materials and pick what works best for you; ignore the rest.

Also, yes, a lot of these are radar graphs. I made a little sketch explaining **how to read a radar graph** should you wish a reminder.

All the graphs are high res so please zoom to your heart's content.

When you look at the portraits, are you tempted to say "uh oh we're all over the place"? You *are* all over the place, but don't say 'uh-oh.' By constantly refining the criteria and your thinking about the Portfolios, you have eliminated some of the easy stuff. For instance, imagine if you did another MCDS run—it is possible you would drop the *Grants & Loans* criterion. That means the next time you ran the model, an area of agreement would drop out of the showing. But you wouldn't have gone backwards in collaboration! Rather, you would be honing in more effectively on the tough stuff.

Still need cheering up? Go back and look at the stacked area graph. There's important agreement about the importance of *Technical Feasibility* and *Supply Reliability*.

Finally, weights in isolation can be misleading. Sometimes diverse weights are resolved by coming together on values and singing Kumbaya. But sometimes they are resolved by the facts. For instance, let's say one of you cares a lot about *cost* and not at all about *supply diversity*, and the other cares a lot about *supply diversity* and not at all about *cost*. That looks intransigent. But if you can come up with a plan that is cheap and offers diversity, there's no problem between the two of you, regardless of the differences in your values.

You will have a more complete picture—looking at the ratings (which orient you more towards the facts) and the weights in combination-- when we send our full report. Expect that on July 17^{th} .

Thanks for all your good work—

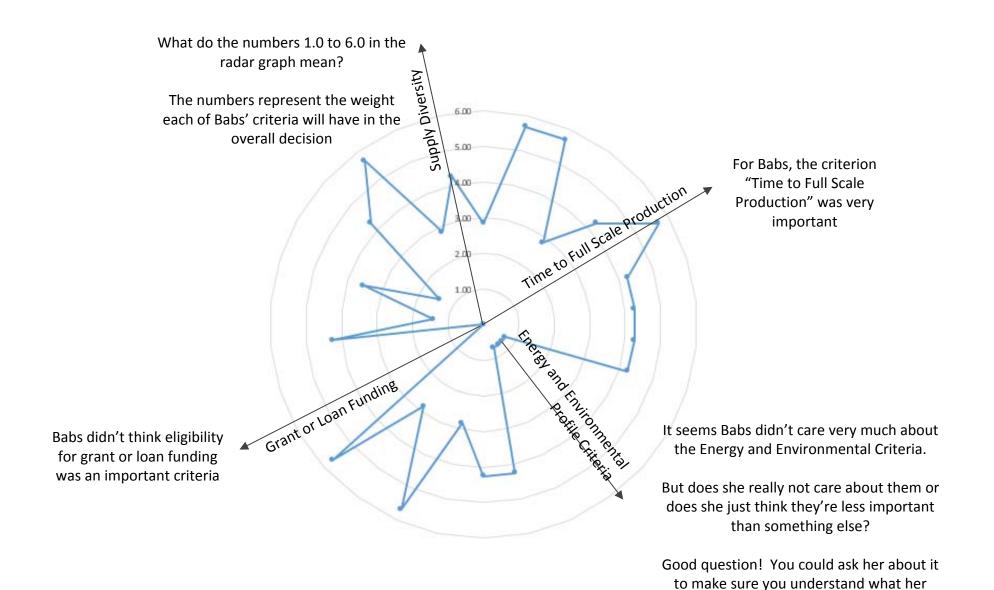
Carie

HOW TO READ RADAR GRAPHS

The radar graph figure below shows how Babs Smith weighed all the MCDS criteria for Plan A, Plan B and for the triggers.

Babs' radar graph can help others understand how she prioritizes the criteria from the most to the least important. Criteria with dots closest to the outer edge are more important than those closer to the center. See the notes below for additional explanation and discussion.

(Note: Names of all the criteria haven't been included to make this explanation less cluttered.)

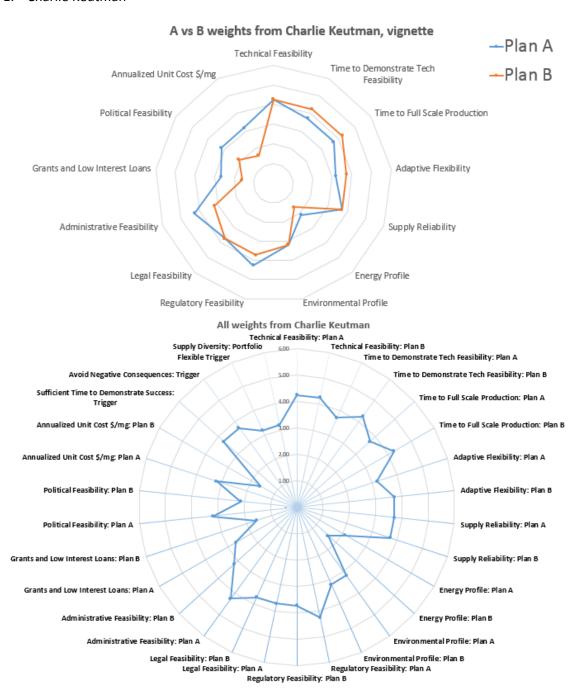


weights mean.

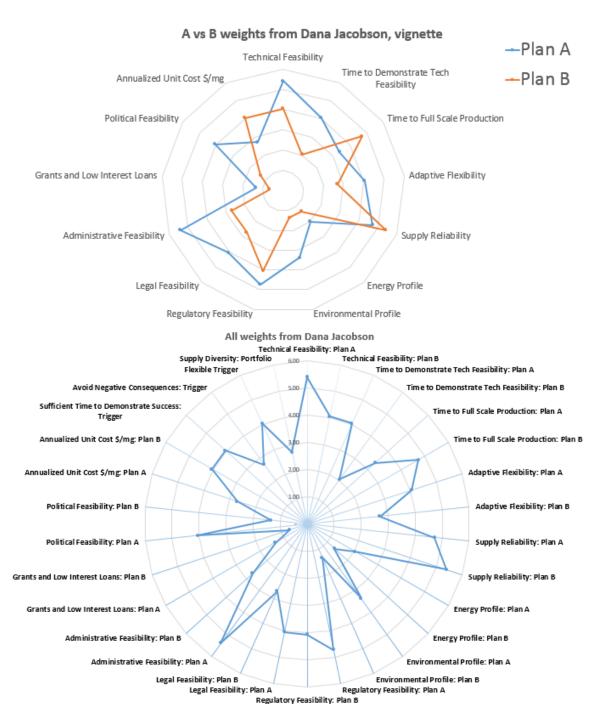
June WSAC MCDS: Weights Portraits for Committee Members v1

Source: Weights v7 – July 7th, 2015. Radial axis lines added to portrait,

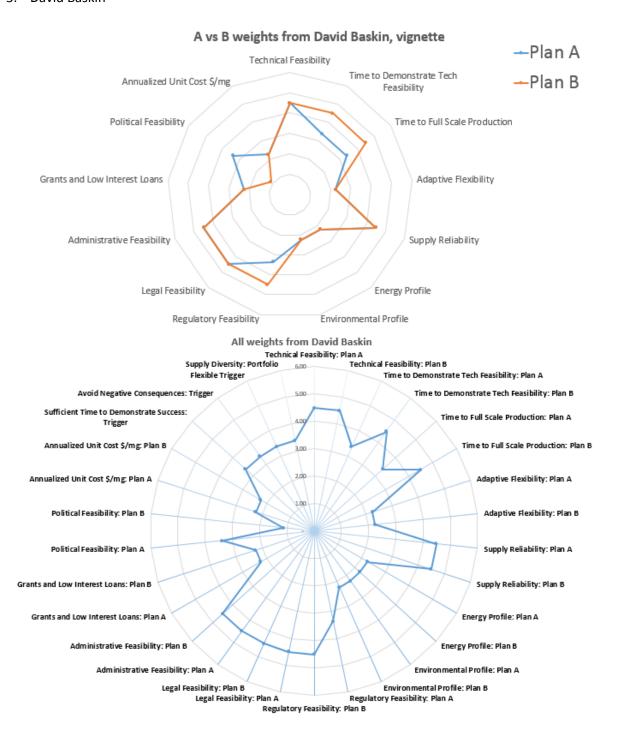
1. Charlie Keutman



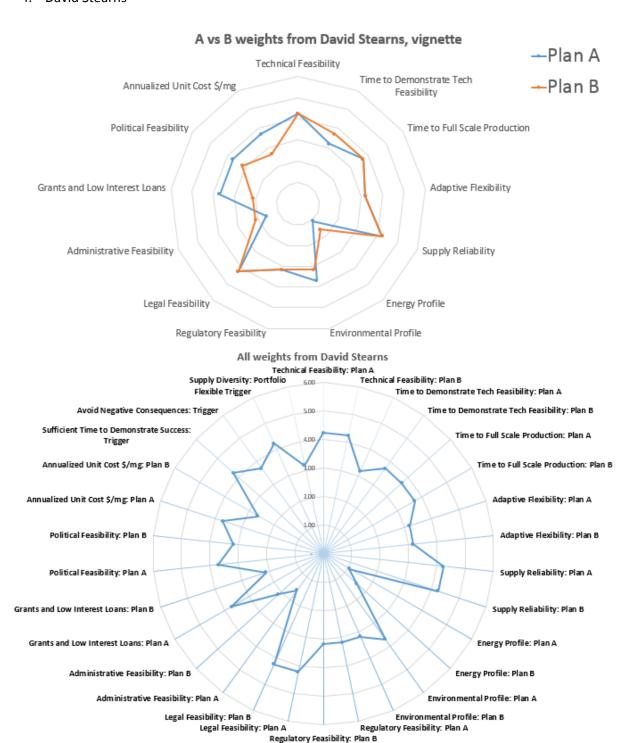
2. Dana Jacobson



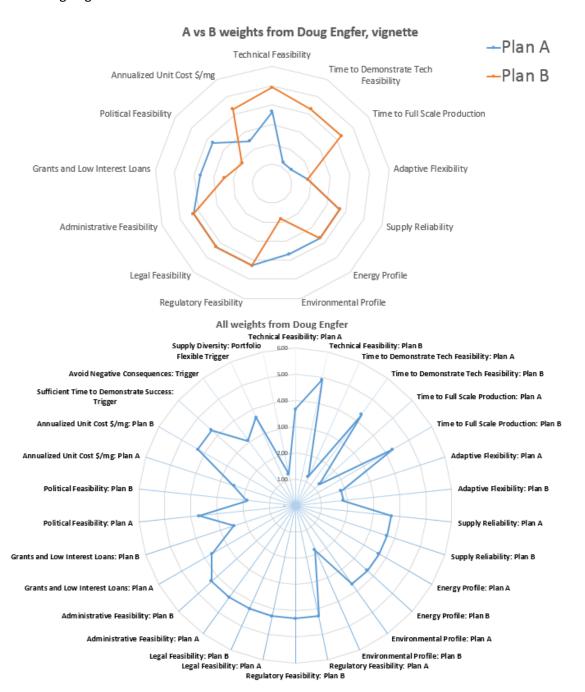
3. David Baskin



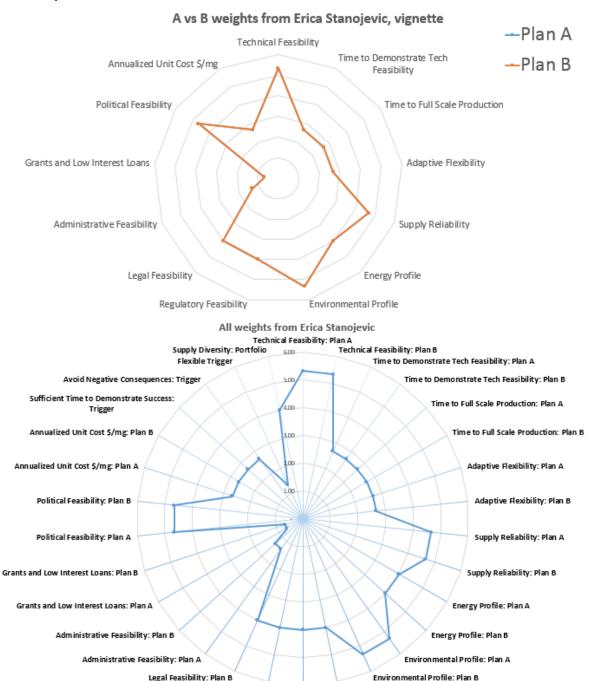
4. David Stearns



5. Doug Engfer



6. Erica Stanojevic

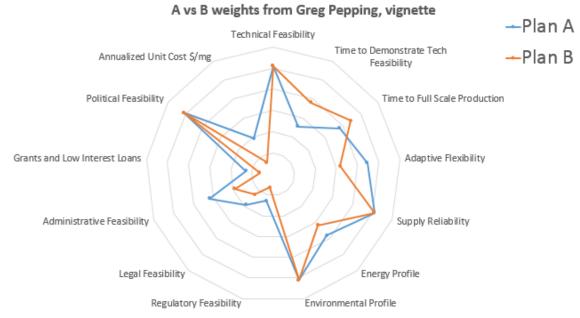


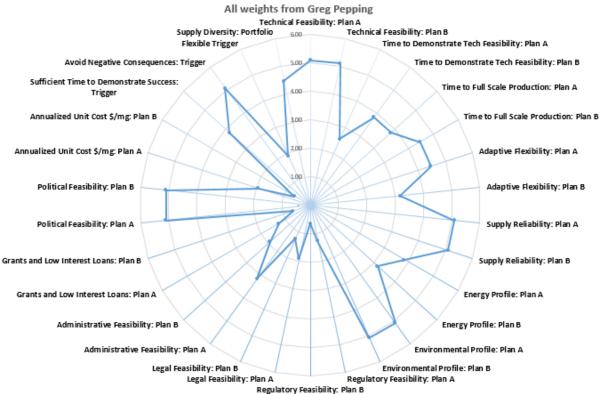
Regulatory Feasibility: Plan B

Regulatory Feasibility: Plan A

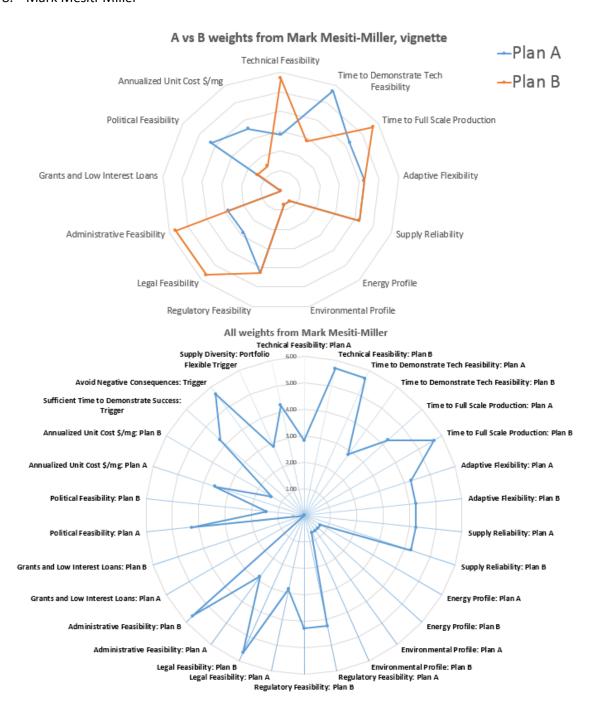
Legal Feasibility: Plan A

7. Greg Pepping

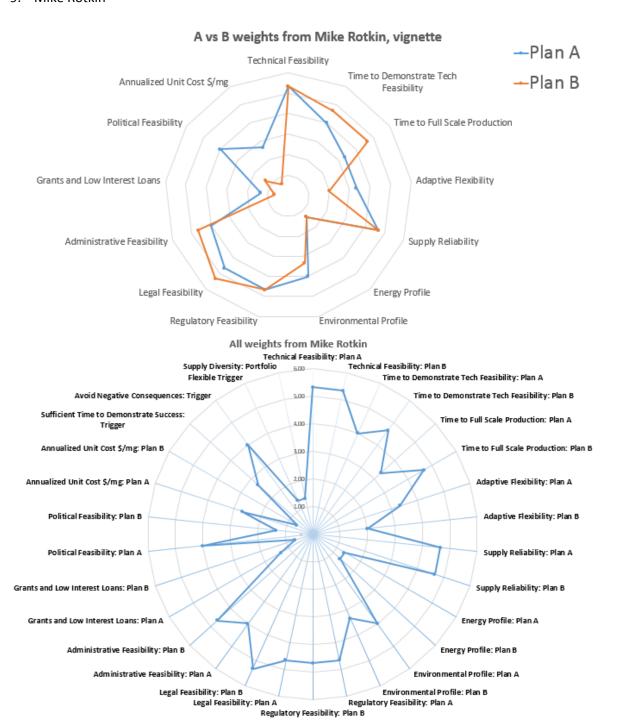




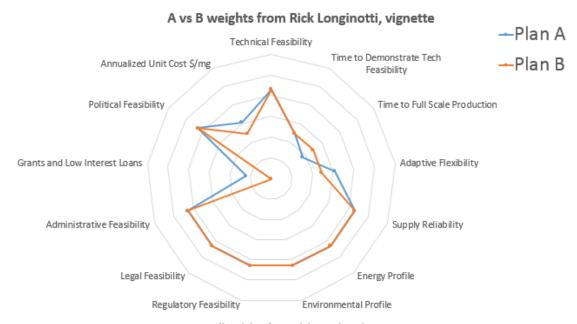
8. Mark Mesiti-Miller

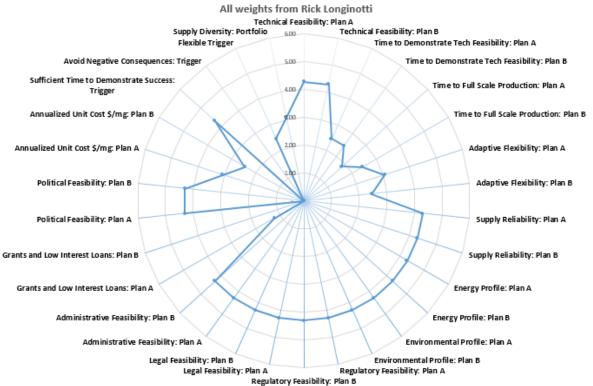


9. Mike Rotkin

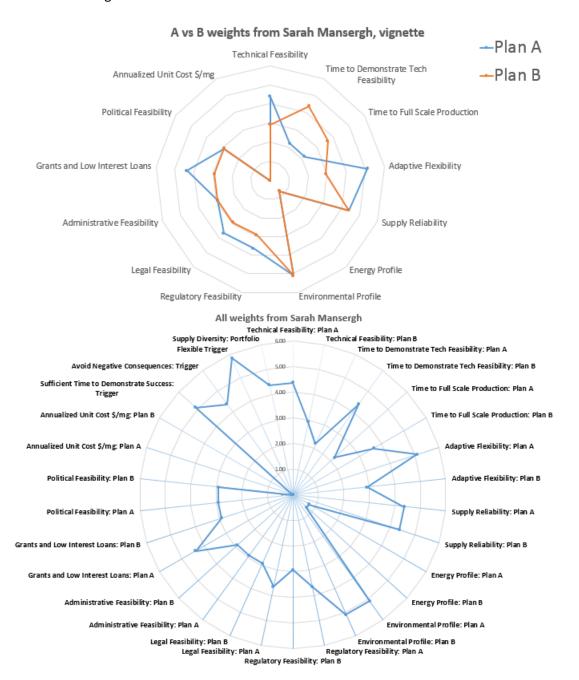


10. Rick Longinotti

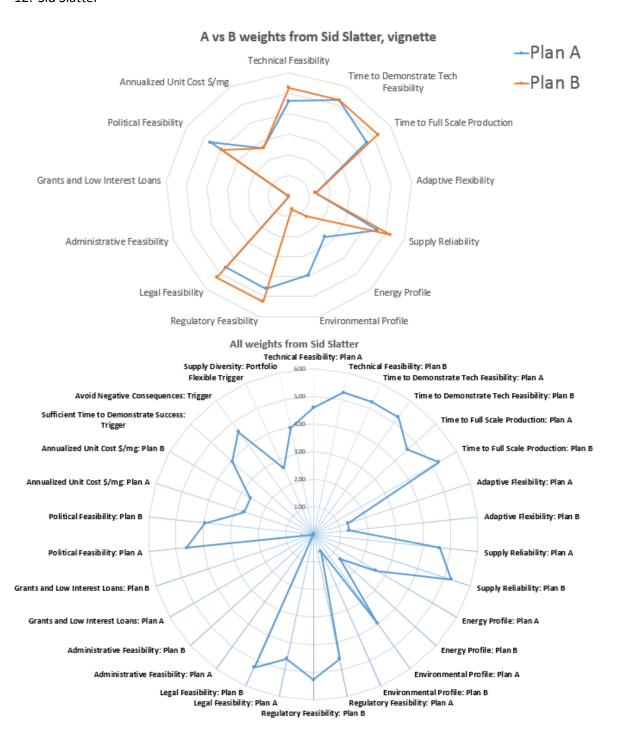




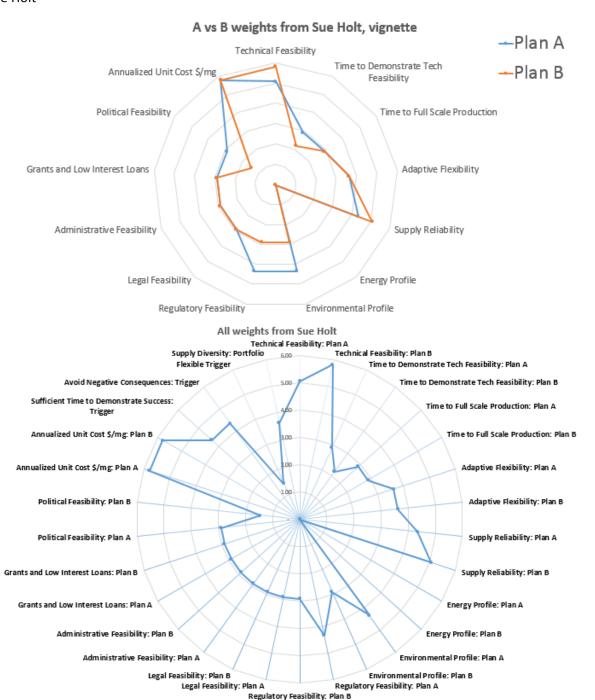
11. Sarah Mansergh

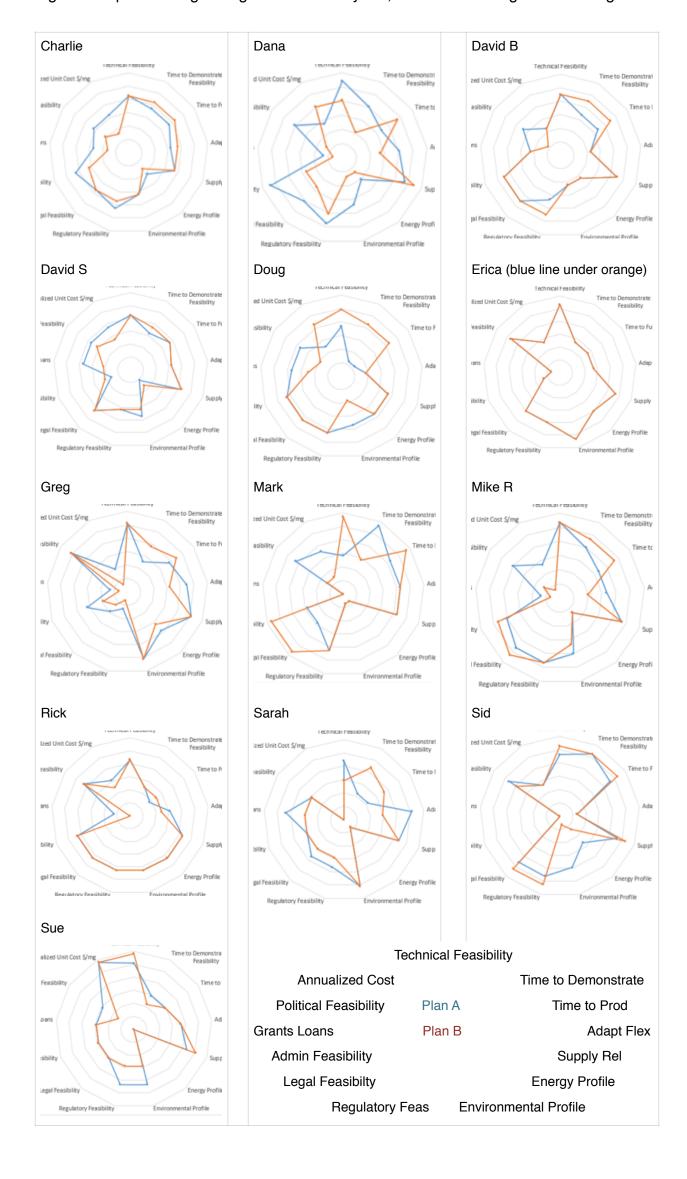


12. Sid Slatter



13. Sue Holt





OrgOrder CriteriaName	Alterna Ratings	Charlie Ke D	Dana Jacol D	avid Basl D	David Stea D	oug Engf E	rica StancG	ireg Pepp N	lark Mesi N	like Rotk R	ick Longi S	arah Mar Si	d Slatter	Sue Holt \	Wtd Stdev
1 Adaptive Flexibility: Plan A															
2 Adaptive Flexibility: Plan A	1.1	75	100	100	100	75	50	75	75	25	100	75	50	100	0.75
3 Adaptive Flexibility: Plan A	1.2	75	75	100	100	75	50	75	50	25	100	75	50	75	0.70
4 Adaptive Flexibility: Plan A	2	75	75	100	100	75	50	75	50	25	100	75	50	75	0.70
5 Adaptive Flexibility: Plan A	3	75	100	100	100	75	50	75	50	75	100	75	50	75	0.59
6 Adaptive Flexibility: Plan A	4.1	100	75	100	100	75	50	100	75	100	100	75	50	100	0.60
7 Adaptive Flexibility: Plan A	4.2	100	75	100	100	75	50	100	75	100	100	75	50	100	0.60
8 Adaptive Flexibility: Plan B															
9 Adaptive Flexibility: Plan B	1.1	75	100	75	100	100	75	75	100	100	75	75	100	100	0.35
10 Adaptive Flexibility: Plan B	1.2	75	100	75	100	100	75	75	100	100	75	75	100	100	0.35
11 Adaptive Flexibility: Plan B	2	100	100	100	100	100	75	75	100	100	75	75	100	100	0.32
12 Adaptive Flexibility: Plan B	3	100	100	100	100	100	75	75	100	100	75	75	100	100	0.32
13 Adaptive Flexibility: Plan B	4.1	100	100	100	75	100	100	100	100	100	75	75	100	100	0.29
14 Adaptive Flexibility: Plan B	4.2	100	100	100	100	100	100	100	100	100	75	75	100	100	0.25
15 Administrative Feasibility: Plan A															
16 Administrative Feasibility: Plan A	1.1	50	50	25	75	75	50	50	50	50	75	75	50	75	0.48
17 Administrative Feasibility: Plan A	1.2	50	50	25	75	75	50	50	50	50	75	75	50	75	0.48
18 Administrative Feasibility: Plan A	2	50	50	25	75	75	50	75	50	50	100	75	50	75	0.60
19 Administrative Feasibility: Plan A	3	50	50	25	75	75	50	50	50	50	75	75	50	50	0.46
20 Administrative Feasibility: Plan A	4.1	50	50	25	50	75	50	50	50	50	50	75	50	50	0.38
21 Administrative Feasibility: Plan A	4.2	50	50	25	75	75	50	50	50	50	75	75	50	50	0.46
22 Administrative Feasibility: Plan B															
23 Administrative Feasibility: Plan B	1.1	100	100	100	75	100	100	100	100	50	100	100	100	100	0.45
24 Administrative Feasibility: Plan B	1.2	100	100	100	75	75	100	100	100	50	100	100	100	100	0.47
25 Administrative Feasibility: Plan B	2	100	100	100	75	75	100	75	100	50	100	100	100	100	0.49
26 Administrative Feasibility: Plan B	3	100	100	100	75	75	50	75	100	50	100	100	100	100	0.58
27 Administrative Feasibility: Plan B	4.1	50	75	75	50	100	50	50	100	50	50	50	50	75	0.58
28 Administrative Feasibility: Plan B	4.2	100	75	75	100	75	75	50	100	100	75	50	50	75	0.57
29 Annualized Unit Cost \$/mg: Plan A															
30 Annualized Unit Cost \$/mg: Plan A	1.1	2.22	0.00	2.22	100.00	73.33	2.22	2.22	2.22	64.44	88.89	2.22	55.56	22.22	1.04
31 Annualized Unit Cost \$/mg: Plan A	1.2	2.22	0.00	2.22	100.00	84.44	2.22	24.44	2.22	64.44	88.89	2.22	55.56	22.22	1.04
32 Annualized Unit Cost \$/mg: Plan A	2	64.44	0.00	64.44	100.00	86.67	64.44	71.11	64.44	82.22	77.78	64.44	55.56	71.11	0.63
33 Annualized Unit Cost \$/mg: Plan A	3	0.00	64.44	0.00	100.00	84.44	0.00	20.00	0.00	55.56	0.00	0.00	55.56	20.00	0.99
34 Annualized Unit Cost \$/mg: Plan A	4.1	62.22	66.67	62.22	100.00	80.00	62.22	68.89	62.22	68.89	11.11	62.22	55.56	62.22	0.52
35 Annualized Unit Cost \$/mg: Plan A	4.2	64.44	66.67	64.44	100.00	84.44	64.44	71.11	73.33	82.22	11.11	64.44	55.56	71.11	0.55
36 Annualized Unit Cost \$/mg: Plan B		42.22	C 4 4 4	42.22	400.00	74.44	42.22	F2 22	42.22	FF F6	0.00	42.22	22.22	64.44	0.50
37 Annualized Unit Cost \$/mg: Plan B	1.1	42.22	64.44	42.22	100.00	71.11	42.22	53.33	42.22	55.56	0.00	42.22	33.33	64.44	0.53
38 Annualized Unit Cost \$/mg: Plan B	1.2	42.22	64.44	42.22	100.00	71.11	42.22	53.33	42.22	64.44	0.00	42.22	33.33	64.44	0.54
39 Annualized Unit Cost \$/mg: Plan B	2	77.78	82.22	77.78	100.00	86.67	77.78	82.22	77.78	64.44	22.22	77.78	22.22	82.22	0.53
40 Annualized Unit Cost \$/mg: Plan B	3	77.78	84.44	77.78	100.00	82.22	77.78	82.22	77.78	55.56	22.22	77.78	22.22	82.22	0.54
41 Annualized Unit Cost \$/mg: Plan B	4.1	64.44	68.89	64.44	100.00	71.11	64.44	71.11	64.44	60.00	15.56	64.44	11.11	68.89	0.53
42 Annualized Unit Cost \$/mg: Plan B	4.2	66.67	71.11	66.67	100.00	84.44	66.67	73.33	75.56	68.89	15.56	66.67	6.67	71.11	0.58
43 Energy Profile: Plan A															
44 Energy Profile: Plan A	1.1	93.75	68.75	93.75	81.25	81.25	93.75	75	62.5	81.25	100	56.25	81.25	81.25	0.27
45 Energy Profile: Plan A	1.2	93.75	62.5	87.5	81.25	81.25	93.75	87.5	25	81.25	100	43.75	81.25	81.25	0.45
46 Energy Profile: Plan A	2	100	75	93.75	68.75	68.75	81.25	93.75	50	62.5	87.5	62.5	50	81.25	0.35
47 Energy Profile: Plan A	3	62.5	75	62.5	68.75	18.75	68.75	56.25	37.5	50	50	25	37.5	81.25	0.41
48 Energy Profile: Plan A	4.1	25	87.5	25	12.5	50	81.25	18.75	25	12.5	0	62.5	25	75	0.62
49 Energy Profile: Plan A	4.2	87.5	75	87.5	25	68.75	81.25	87.5	25	25	0	0	25	68.75	0.72

50 Energy Profile: Plan B															
51 Energy Profile: Plan B	1.1	75	37.5	75	25	37.5	87.5	75	0	50	37.5	56.25	12.5	50	0.50
52 Energy Profile: Plan B	1.2	75	37.5	75	25	37.5	87.5	75	0	50	37.5	43.75	12.5	50	0.50
53 Energy Profile: Plan B	2	87.5	62.5	81.25	37.5	62.5	56.25	81.25	50	37.5	50	62.5	6.25	62.5	0.42
54 Energy Profile: Plan B	3	81.25	62.5	81.25	37.5	62.5	56.25	81.25	50	25	50	25	6.25	62.5	0.45
55 Energy Profile: Plan B	4.1	0	68.75	0	0	43.75	43.75	0	25	0	0	62.5	18.75	75	0.56
56 Energy Profile: Plan B	4.2	87.5	62.5	87.5	12.5	68.75	43.75	87.5	37.5	12.5	0	0	6.25	68.75	0.67
57 Environmental Profile: Plan A															
58 Environmental Profile: Plan A	1.1	75	25	75	100	100	100	100	75	100	100	100	75	100	0.79
59 Environmental Profile: Plan A	1.2	75	50	75	100	100	100	100	75	100	100	100	75	100	0.60
60 Environmental Profile: Plan A	2	75	75	75	100	75	100	75	75	100	75	100	75	100	0.46
61 Environmental Profile: Plan A	3	100	75	75	100	75	100	75	75	100	25	100	75	100	0.77
62 Environmental Profile: Plan A	4.1	75	25	75	75	75	25	25	75	75	25	100	75	25	1.01
63 Environmental Profile: Plan A	4.2	75	25	75	75	75	25	25	75	100	25	100	75	25	1.08
64 Environmental Profile: Plan B															
65 Environmental Profile: Plan B	1.1	75	25	100	75	75	50	75	100	100	25	100	75	100	0.78
66 Environmental Profile: Plan B	1.2	75	25	100	75	75	50	75	100	100	25	100	75	100	0.78
67 Environmental Profile: Plan B	2	75	25	100	75	75	50	50	100	100	25	100	75	100	0.81
68 Environmental Profile: Plan B	3	75	25	100	75	75	50	50	100	100	25	100	75	100	0.81
69 Environmental Profile: Plan B	4.1	25	25	75	75	50	0	0	100	0	25	25	75	25	0.96
70 Environmental Profile: Plan B	4.2	50	25	75	75	50	0	0	100	100	25	25	75	25	1.00
71 Grants and Low Interest Loans: Plan A															
72 Grants and Low Interest Loans: Plan A	1.1	100	75	50	100	75	0	50	75	100	100	75	25	75	0.58
73 Grants and Low Interest Loans: Plan A	1.2	100	75	50	100	75	0	50	75	100	100	100	25	75	0.60
74 Grants and Low Interest Loans: Plan A	2	100	100	50	100	100	0	100	75	100	50	75	50	100	0.59
75 Grants and Low Interest Loans: Plan A	3	100	100	50	100	100	0	100	75	100	100	100	50	100	0.59
76 Grants and Low Interest Loans: Plan A	4.1	50	100	50	100	100	0	75	75	100	50	75	50	75	0.55
77 Grants and Low Interest Loans: Plan A	4.2	50	100	50	100	100	0	75	75	100	100	75	50	75	0.56
78 Grants and Low Interest Loans: Plan B															
79 Grants and Low Interest Loans: Plan B	1.1	100	100	50	100	75	100	75	50	100	50	100	50	100	0.29
80 Grants and Low Interest Loans: Plan B	1.2	100	100	50	100	75	100	75	50	100	50	100	25	100	0.33
81 Grants and Low Interest Loans: Plan B	2	75	75	50	100	75	25	25	25	100	50	100	0	75	0.41
82 Grants and Low Interest Loans: Plan B	3	75	75	50	100	100	25	25	25	100	50	75	0	100	0.43
83 Grants and Low Interest Loans: Plan B	4.1	50	50	50	75	75	25	50	50	100	50	75	25	75	0.27
84 Grants and Low Interest Loans: Plan B	4.2	50	50	50	75	75	25	50	50	75	100	75	25	75	0.27
85 Legal Feasibility: Plan A															
86 Legal Feasibility: Plan A	1.1	50	50	25	50	50	50	25	25	100	100	75	50	50	0.91
87 Legal Feasibility: Plan A	1.2	50	75	25	50	50	50	25	25	100	100	75	50	50	0.93
88 Legal Feasibility: Plan A	2	25	75	25	50	50	25	50	0	100	100	75	50	50	1.09
89 Legal Feasibility: Plan A	3	25	75	25	50	50	25	50	0	100	100	75	50	25	1.12
90 Legal Feasibility: Plan A	4.1	25	75	25	50	50	25	0	25	100	100	75	50	50	1.12
91 Legal Feasibility: Plan A	4.2	25	75	25	50	50	25	0	25	100	100	75	50	50	1.12
92 Legal Feasibility: Plan B															
93 Legal Feasibility: Plan B	1.1	50	75	75	100	50	100	50	25	100	100	75	100	75	0.94
94 Legal Feasibility: Plan B	1.2	50	75	75	100	50	100	50	50	100	100	75	100	75	0.81
95 Legal Feasibility: Plan B	2	50	0	50	100	50	25	25	25	100	0	25	100	75	1.36
96 Legal Feasibility: Plan B	3 • • • • • • • • •	50	0	50	100	50	25	25	25	100	0	25	100	75	1.36
97 Legal Feasibility: Plan B	4.1	25	50	50	75	100	25	25	75	100	100	50	100	75	1.13
98 Legal Feasibility: Plan B	4.2	50	100	50	100	50	25	50	50	100	100	50	100	75	1.03

99 Political Feasibility: Plan A															
100 Political Feasibility: Plan A	1.1	100	75	100	100	100	100	75	100	100	100	100	100	75	0.41
101 Political Feasibility: Plan A	1.2	100	100	100	100	100	100	75	100	100	100	100	100	75	0.35
102 Political Feasibility: Plan A	2	100	100	100	100	100	100	75	100	100	100	100	100	100	0.26
103 Political Feasibility: Plan A	3	100	100	75	100	100	100	75	100	75	50	100	100	100	0.61
104 Political Feasibility: Plan A	4.1	100	25	75	75	100	100	25	50	75	25	100	75	75	1.09
105 Political Feasibility: Plan A	4.2	75	50	75	75	100	100	50	75	75	25	100	75	75	0.81
106 Political Feasibility: Plan B															
107 Political Feasibility: Plan B	1.1	100	50	75	100	75	75	75	100	50	25	50	75	75	0.58
108 Political Feasibility: Plan B	1.2	100	50	75	100	75	75	75	100	50	25	50	75	75	0.58
109 Political Feasibility: Plan B	2	75	50	75	100	50	25	75	75	50	25	50	50	75	0.56
110 Political Feasibility: Plan B	3	75	50	75	100	50	25	75	75	50	25	50	50	75	0.56
111 Political Feasibility: Plan B	4.1	75	50	75	100	75	25	25	100	25	25	75	75	75	0.72
112 Political Feasibility: Plan B	4.2	50	75	75	100	75	25	50	75	50	25	75	75	75	0.56
113 Regulatory Feasibility: Plan A															
114 Regulatory Feasibility: Plan A	1.1	50	50	50	50	100	25	50	25	50	75	75	100	75	0.90
115 Regulatory Feasibility: Plan A	1.2	50	50	50	50	100	25	50	25	75	75	100	100	75	0.99
116 Regulatory Feasibility: Plan A	2	50	50	50	50	50	25	25	0	75	75	100	100	75	1.10
117 Regulatory Feasibility: Plan A	3	25	50	50	50	50	25	25	0	25	50	100	100	75	1.12
118 Regulatory Feasibility: Plan A	4.1	25	25	50	50	50	25	0	0	50	25	100	100	50	1.18
119 Regulatory Feasibility: Plan A	4.2	25	75	50	50	50	25	25	25	50	50	100	100	50	0.98
120 Regulatory Feasibility: Plan B															
121 Regulatory Feasibility: Plan B	1.1	50	50	50	50	50	100	50	50	50	50	75	100	50	0.69
122 Regulatory Feasibility: Plan B	1.2	50	50	50	50	50	100	50	50	50	50	75	100	50	0.69
123 Regulatory Feasibility: Plan B	2	50	0	50	50	50	25	50	25	50	0	25	100	50	0.94
124 Regulatory Feasibility: Plan B	3	50	0	50	50	50	25	50	25	50	0	25	100	50	0.94
125 Regulatory Feasibility: Plan B	4.1	50	25	50	50	100	100	25	50	50	25	25	100	50	1.03
126 Regulatory Feasibility: Plan B	4.2	50	75	50	50	100	100	50	75	100	50	50	100	50	0.83
127 Supply Diversity:															
128 Supply Diversity:	1.1	50	50	50	100	100	50	50	100	100	100	50	100	100	#N/A
129 Supply Diversity:	1.2	50	50	50	100	100	50	50	100	100	100	50	100	100	#N/A
130 Supply Diversity:	2	100	100	100	100	100	100	100	100	100	100	100	100	100	#N/A
131 Supply Diversity:	3	100	100	100	100	100	100	100	100	100	100	100	100	100	#N/A
132 Supply Diversity:	4.1	100	100	100	100	100	100	100	100	100	100	50	100	100	#N/A
133 Supply Diversity:	4.2	100	100	100	100	100	100	100	100	100	100	50	100	100	#N/A
134 Supply Reliability: Plan A															
135 Supply Reliability: Plan A	1.1	67	83	67	83	100	83	83	67	67	100	83	50	67	0.61
136 Supply Reliability: Plan A	1.2	67	67	67	83	100	83	83	67	67	100	83	50	83	0.61
137 Supply Reliability: Plan A	2	67	83	67	83	83	83	67	83	67	100	83	50	100	0.60
138 Supply Reliability: Plan A	3	67	100	67	83	83	83	67	83	67	100	83	50	100	0.65
139 Supply Reliability: Plan A	4.1	83	83	67	100	83	83	83	100	100	100	83	50	100	0.63
140 Supply Reliability: Plan A	4.2	83	83	67	100	83	83	83	100	100	100	83	50	100	0.63
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144 Supply Neababity: Plane	141 Supply Reliability: Plan B															
143 Supply Neinbillity, Pian B	142 Supply Reliability: Plan B	1.1	83	100	83	100	100	83	83	100	83	83	83	100	67	0.46
144 Supply Neababity, Plane 2		1.2	83	100	67	100	100	83	83	100	83	83	83	100	83	0.46
145 Suppa Nechabity: Plana		2	100	33	100	100	100	83	67	100	100	83	83	100		0.87
146 Supply Reliability: Plane 4.2		3	100	33	100	100	100	83	67	100	100	100	83	100		0.87
147 Supply Reliability: Plan 4		4.1	100		100	100	100	83	100	100	100	100	83	100		
143 Feachinal Feachibility: Plan A		4.2	100	100	100	100	100	83	100	100	100	100	83	100	67	0.46
149 Ten/mical Feesiblity, Plan A 1.																
151 Technical Feasibility: Plan A 3	149 Technical Feasibility: Plan A	1.1	33	50	33	83	100	67	67	33	33	83	83	33	100	1.17
152 Technical Feasibility: Plan A	150 Technical Feasibility: Plan A	1.2	33	50	17	50	100	67	67	33	33	83	83	33	100	1.21
152 Technical Feasibility: Plan A	151 Technical Feasibility: Plan A	2	33	33	33	50	67	67	33	50	17	67	83	17	67	0.93
154 Technical Feasibility: Plan B 4.1 1.1	•	3	33	33	33	50	67	50	33	33	33	67	83	17	67	0.85
155 Technical Feasibility: Plan B	153 Technical Feasibility: Plan A	4.1	33	33	50	67	67	67	33	33	17	83	83	17	67	1.03
155 Technical Feasibility: Plan B	154 Technical Feasibility: Plan A	4.2	33	33	50	67	67	67	33	33	17	83	83	17	67	1.03
157 Technical Feasibility: Plan B																
188 Technical Feasibility: Plan B 2	156 Technical Feasibility: Plan B	1.1	83	100	33	100	100	100	83	83	100	83	50	100	100	0.98
193 Fichnical Feasibility: Plan B 1	157 Technical Feasibility: Plan B	1.2	83	100	33	100	100	100	83	100	100	83	50	100	100	0.99
160 Technical Feasibility: Plan B 4.1 100 50 100	158 Technical Feasibility: Plan B	2	100	100	100	100	100	100	83	67	100	83	100	100	100	0.48
161 Technical Feasibility; Plan B	159 Technical Feasibility: Plan B	3	100	100	100	100	100	100	83	67	100	83	100	100	100	0.48
162 Time to Demonstrate Tech Feasibility: Pla 1.1	160 Technical Feasibility: Plan B	4.1	83	50	100	100	67	100	83	100	100	83	100	100	33	1.00
163 Time to Demonstrate Tech Feasibility: Pl 1.1	161 Technical Feasibility: Plan B	4.2	100	50	100	100	100	100	100	100	100	83	83	100	100	0.66
164 Time to Demonstrate Tech Feasibility: Pl 2	162 Time to Demonstrate Tech Feasibility: Pla	an A														
165 Time to Demonstrate Tech Feasibility: Pl 2	163 Time to Demonstrate Tech Feasibility: Pl	1.1	50	75	0	25	75	75	25	75	50	100	100	100	100	1.06
166 Time to Demonstrate Tech Feasibility: Pl 4.1	164 Time to Demonstrate Tech Feasibility: Pl	1.2	50	75	0	50	75	75	25	75	25	75	100	100	100	1.01
167 Time to Demonstrate Tech Feasibility: Pl 4.1	165 Time to Demonstrate Tech Feasibility: Pl	2	50	50	0	50	50	25	25	75	25	75	75	25	75	0.79
168 Time to Demonstrate Tech Feasibility: Pl 4.2	166 Time to Demonstrate Tech Feasibility: Pl	3	50	50	0	25	50	25	25	50	50	50	75	25	75	0.68
169 Time to Demonstrate Tech Feasibility: Plan 1.1	167 Time to Demonstrate Tech Feasibility: Pl	4.1	50	0	0	50	50	25	50	75	50	25	75	25	75	0.82
170 Time to Demonstrate Tech Feasibility: Pl	168 Time to Demonstrate Tech Feasibility: Pl	4.2	50	0	0	50	50	25	50	75	100	75	75	25	75	0.98
171 Time to Demonstrate Tech Feasibility: Pl 2 1.2 100 50 100 50 100 75 75 75 100 75 100 75 25 100 100 100 0.82 173 Time to Demonstrate Tech Feasibility: Pl 2 1.1 100 50 100 50 100 75 75 100 75 100 75 25 100 100 100 0.82 173 Time to Demonstrate Tech Feasibility: Pl 3 100 50 100 50 100 75 75 100 75 25 100 100 100 0.82 174 Time to Demonstrate Tech Feasibility: Pl 4.1 100 50 100 50 100 75 100 75 100 75 25 100 100 100 0.82 174 Time to Demonstrate Tech Feasibility: Pl 4.1 100 50 100 50 100 50 100 100 100 75 100 75 25 100 100 100 0.82 175 Time to Demonstrate Tech Feasibility: Pl 4.2 100 100 50 100 50 100 50 100 100 100 75 25 100 100 100 0.82 175 Time to Demonstrate Tech Feasibility: Pl 4.2 100 100 50 100 50 100 50 100 100 100 75 100 100 100 100 0.67 176 Time to Full Scale Production: Plan A 1.1 100 50 100 0 50 75 50 75 50 75 75 100 0 100 100 100 100 100 100 100 100	169 Time to Demonstrate Tech Feasibility: Pla	an B														
172 Time to Demonstrate Tech Feasibility: Pl 2 1 100 50 100 50 100 75 75 100 75 100 75 25 100 100 100 0.82 173 Time to Demonstrate Tech Feasibility: Pl 3 1 100 50 100 50 100 75 75 100 75 100 75 25 100 100 100 0.82 174 Time to Demonstrate Tech Feasibility: Pl 4.1 100 50 100 50 100 50 100 50 100 75 100 75 100 75 25 100 100 100 0.90 175 Time to Demonstrate Tech Feasibility: Pl 4.2 1 100 50 100 50 100 50 100 50 100 50 100 50 100 75 100 100 100 75 100 100 100 0.90 100 100 100 100 100 100 100 100 100 1	170 Time to Demonstrate Tech Feasibility: Pl	1.1	75	100	75	75	75	100	25	100	100	50	100	100	100	0.82
173 Time to Demonstrate Tech Feasibility: Pl 3	171 Time to Demonstrate Tech Feasibility: Pl	1.2	75	100	75	75	75	100	25	100	100	50	100	100	100	0.82
174 Time to Demonstrate Tech Feasibility: Pl 4.1	172 Time to Demonstrate Tech Feasibility: Pl	2	100	50	100	75	75	100	75	100	75	25	100	100	100	0.82
175 Time to Demonstrate Tech Feasibility: PI	173 Time to Demonstrate Tech Feasibility: Pl	3	100	50	100	75	75	100	75	100	75	25	100	100	100	0.82
176 Time to Full Scale Production: Plan A 1.1	174 Time to Demonstrate Tech Feasibility: Pl	4.1	100	50	100	50	100	100	75	100	75	25	100	100	100	0.90
177 Time to Full Scale Production: Plan A 1.1 50 100 0 50 75 50 75 50 75 75 100 0 100 1.01 178 Time to Full Scale Production: Plan A 1.2 50 75 100 0 1.05 179 Time to Full Scale Production: Plan A 1.2 50 75 75 100 0 100 1.05 179 Time to Full Scale Production: Plan A 1.0 50 75 75 75 75 75 75 75 75 7	175 Time to Demonstrate Tech Feasibility: Pl	4.2	100	50	100	50	75	100	100	100	100	75	100	100	100	0.67
178 Time to Full Scale Production: Plan A 1.2 1 100 0 50 75 50 100 50 75 75 100 0 100 1.05 179 Time to Full Scale Production: Plan A 2 1 100 0 75 0.81 180 Time to Full Scale Production: Plan A 3 1 100 0 75 0.81 181 Time to Full Scale Production: Plan A 4.1 1 100 100 75 0.81 182 Time to Full Scale Production: Plan A 4.2 1 100 100 100 100 100 100 100 100 100	176 Time to Full Scale Production: Plan A															
179 Time to Full Scale Production: Plan A 2	177 Time to Full Scale Production: Plan A	1.1	50	100	0	50	75	50	75	50	75	75	100	0	100	1.01
180 Time to Full Scale Production: Plan A 3	178 Time to Full Scale Production: Plan A	1.2	75	100	0	50	75	50	100	50	75	75	100	0	100	1.05
181 Time to Full Scale Production: Plan A	179 Time to Full Scale Production: Plan A	2	50	75	0	75	50	50	50	50	75	75	75	0	75	0.81
182 Time to Full Scale Production: Plan A	180 Time to Full Scale Production: Plan A	3	50	75	0	75	50	50	50	50	75	75	75	0	75	0.81
183 Time to Full Scale Production: Plan B 184 Time to Full Scale Production: Plan B 1.1	181 Time to Full Scale Production: Plan A		50	75	0	75	50	50	50	75	50	75	75	0	75	0.81
184 Time to Full Scale Production: Plan B 1.1 75 100 10	182 Time to Full Scale Production: Plan A	4.2	75	75	0	75	50	50	50	75	100	75	75	0	75	0.90
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187 Time to Full Scale Production: Plan B 3 100 75 100 100 75 100 100 75 75 100 100 100 0.47 188 Time to Full Scale Production: Plan B 4.1 75 75 100 100 75 75 100 75 75 100 100 0.51	185 Time to Full Scale Production: Plan B	1.2	75	100	100	100	100	100	100	100	100	75	100	100	100	0.37
188 Time to Full Scale Production: Plan B 4.1 10 100 100 100 75 75 100 100 100 0.51	186 Time to Full Scale Production: Plan B		100	75	100	100	100	75	100	100	75	75	100	100	100	0.47
	187 Time to Full Scale Production: Plan B	3	100	75	100	100	100	75	100	100	75	75	100	100	100	0.47
189 Time to Full Scale Production: Plan B 4.2 4.2 4.2 4.2 4.2 4.2 4.2 4.2 4.2 4.2	188 Time to Full Scale Production: Plan B		75	75	100	100	100	75	75	100	75	75	100	100	100	0.51
	189 Time to Full Scale Production: Plan B	4.2	100	100	100	75	100	75	50	100	100	75	100	100	100	0.64

MCDS Ratings and Decision Scores

Philip Murphy, InfoHarvest and Carie Fox, Fox Mediation July 17th, 2015

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Introduction

A week ago (and in your Wednesday packet) you received the Weights results reflecting your inputs to web decision model. This packet includes the ratings and the decisions scores in the form of a spreadsheet (separate attachment) and 3 graph sets (below). The packet also includes ground rules for the Thursday post-MCDS conversation (way below).

Note, if you want to go back to look at the MCDS Model while you're going through this material, you can find it at http://www.decisionharvest.com/dhroot/DHOWNERS/santacruz/portfolio/df.asp. The site is live but data isn't being collected.

Why these Materials Matter

The new materials in this packet are meant to serve three Ctte needs:

- 1. Understand what your fellow members' ratings are (these are a platform for asking, on Thursday, what people's underlying reasoning is);
- 2. Understand and prioritize the sources of variance in your ratings (which gives you an opportunity to reduce the 'stupid variance' and appreciate the 'constructive variance');
- 3. Strategize how you will structure and communicate about your proposed Portfolios, while building on the Portfolio's strengths and lessening/mitigating their weaknesses.

Vocabulary, How it Ties Together and Where the Graphs Come In

Here's a reminder of core MCDS terms, showing how they build on one another and also showing (in highlight) where the new materials fit in:

- Weights are what you value
- Ratings are 'the facts' about how well the options are likely to perform, as the 13 Ctte members judged them.

You will find the ratings in the spreadsheet. 1

- **Variance** in ratings shows whether you 13 were tight in rating. For instance, when rating *Political Feasibility* for Portfolio 2A your ratings were fairly tight: the variance for *Political Feasibility* was quite low. Your ratings for *Regulatory Feasibility* for 2A were all over the place, so that variance is high (and worth discussing, we think).
- Standard Deviation in the Variance means that we lopped off the tails on the bell curve created by your ratings variance. This is a useful way to prioritize the ratings sets for general discussion on Thursday and Friday. (When you get to negotiation, the tails you'll find in the spreadsheet may be more important.)
- **Standard Dev x Weight:** just because two rating sets have equal standard deviation doesn't mean they are equally important to discuss—we prioritized the items with high variance and high average ctte weight.

This is where the 3-foot graph comes in—you probably care about the top foot. Remember, this graph (on the next page) is entirely zoomable.

¹ Excel jockeys, please sort and filter to your heart's content. I recommend sorting by Column R (Weight x Standard Deviation) to get your own version of the 3 foot graph.

• **Decisions Scores** show how your weights and ratings combine at an individual ctte level. They give a snapshot your June decision preferences—for instance "for Jane, Portfolio 1.1A comes out ahead of Portfolio 2A."

We have generated bar graphs with the decision scores for all 13 of you at the Portfolio level and at the Plan A and Plan B level. The decision scores graphs are explained in detail on page 4 and are presented on pages 3 through 16, one page for each ctte member.

• **Contribution to the Decision** shows what combination of weights and ratings contributed to the individual's decision scores.

To be able to visually scan a ctte member's emphasis of weights and ratings, use the contribution graphs. The contribution graphs are explained in detail on page 4 and are presented alongside the decision scores. Thus each individual ctte member's page contains 5 graphs: three decision scores (Portfolio, A and B) and two contribution graphs (A and B).

The Three Foot Graph

The graph shown to the left orders the variance from most important to least—we took the amount of variance and factored it by the average committee weight.

This graph is entirely zoomable so you can blow it up and explore it in detail. Especially the top foot!

The scale at the very bottom of this graph shows the normalized rating for a particular rating set. The transition in color of the bars denotes the average rating. The breadth of the bar shows the standard deviation in the variance (the variance with the outliers removed).

(You may have to manipulate the graph to see the scale at the bottom—or alternatively, don't worry about it because it is the relative spacing and width that matters more than the number!)

We left out the triggers—it is obvious that your trigger discussion needs to mature; we don't need to belabor that issue with graphs.

The column on the left shows each ratings set, for instance *Legal Feasibility: Plan B-Portfolio 3.0.* The order of the ratings sets shows the priorities based on multiplying the standard deviation times the weight, as discussed in the first line.

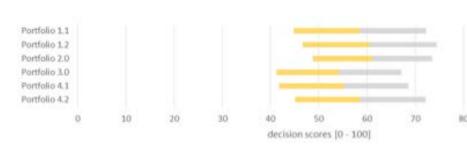
The purpose of this graph is to help you prioritize your discussion so that you can focus on narrowing the variances that matter most.

Decision Scores and their contributions for Individual Ctte members All zoomable!

Explanation

For the individual Ctte decision scores we present the Portfolio results and then both the scores and the contributions for the A's and B's—5 graphs in all for each individual. When we did the A and B graphs, we used the A criteria only (weights and ratings) or the B criteria only and normalized appropriately. Here's an example of an A Decision Score graph:

Joe's Plan A Decision Scores with StdDev of Variance Draped on Top



Think of this graph as a horse race: 1.2 is a nose ahead of the rest, given Joe's weights and ratings. But Joe's 2 and 4.2 are neck and neck. A change in how Joe weighs and rates, or else an

improvement in one of the runner-ups, might easily cause a different option to pull ahead. True, it would take a the most work to pull 3.0 into the lead for Joe.

The relative positions matter most, but for those mathematically inclined, the scale at the bottom is Joe's normalized weight x ratings decision score for all the A criteria—line that scale up with the junction from yellow to gray and you get his mathematical decision score. If there were a perfect A option, it would get a score of 100.

The Ctte as a whole saw plenty of difference among the As, and Joe himself is much less persuadable about the Bs. But based on his ratings and weights, Joe seems quite persuadable when it comes to As.

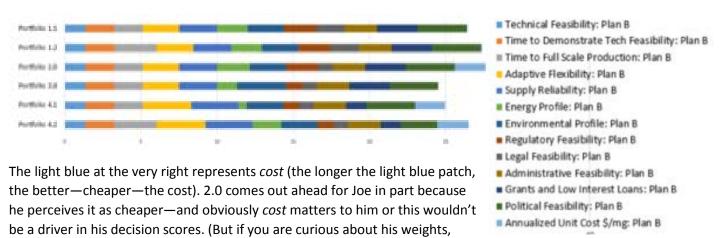
The purpose of the bars is to identify Joe's 'zone of persuasion'. Philip essentially had Joe keep his weights but borrow ratings from the within-standard deviation ratings in the full Ctte. The orange shows how far down such borrowing would pull Joe's decision scores down; the gray shows how far up he might go. You can see that though 3.0 would require a lot of

persuading (or a lot of tweaks to improve 3.0 in Joe's eyes), even it is still within the zone of persuasion. (Notice in the little postage stamp to the right, Portfolios 2 and 3 are not in the zone of persuasion.)



But if you wanted to persuade Joe, either by convincing him to change his ratings or by improving a Portfolio in his eyes, where should you focus? That's where the contribution graphs come in.

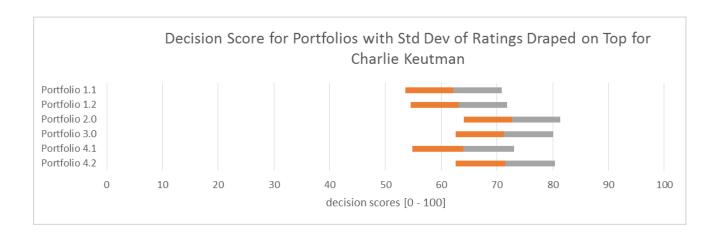
Contributions to the Decision Scores for Joe's Plan A

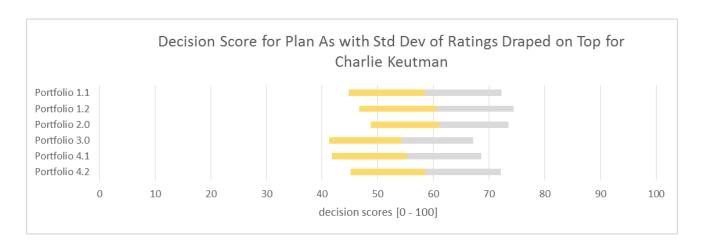


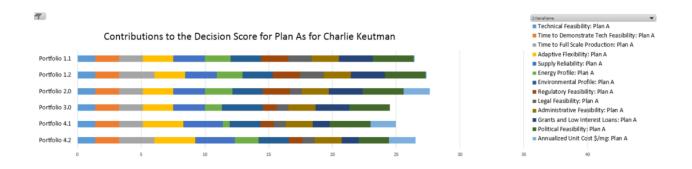
Use these graphs to figure out what makes Joe tick.

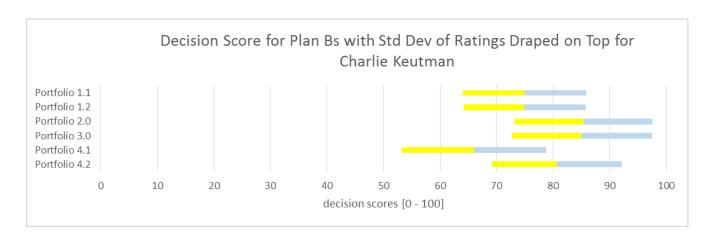
look at his portrait to see the weights alone.)

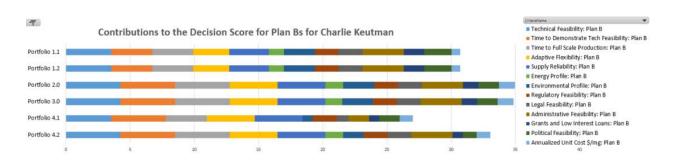
Charlie Keutman



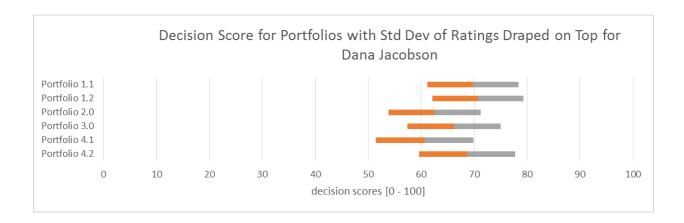


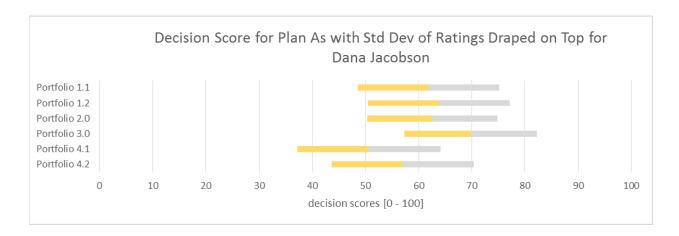


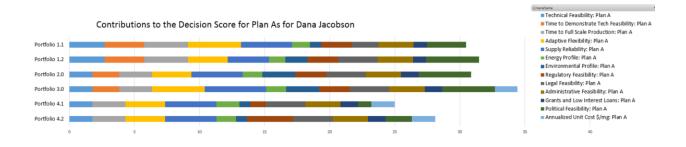


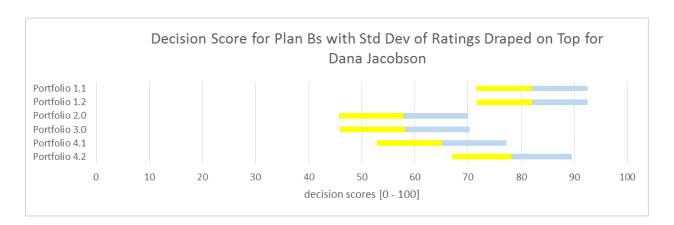


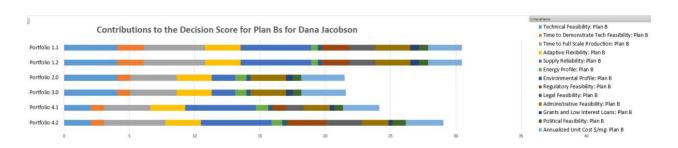
Dana Jacobson



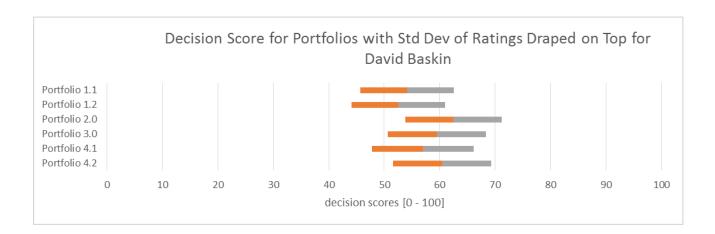


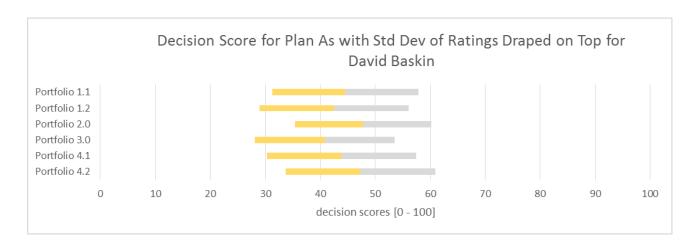


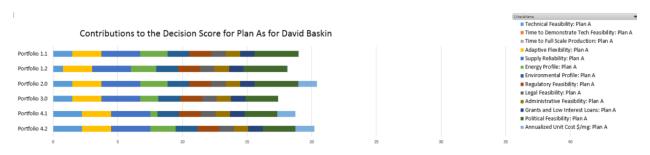


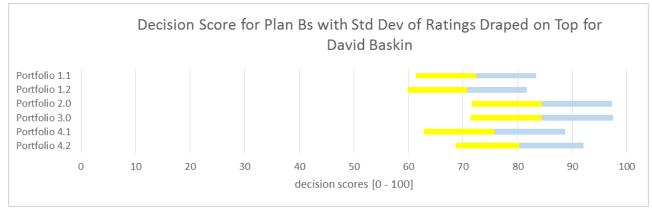


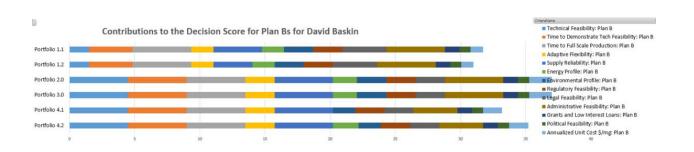
David Baskin





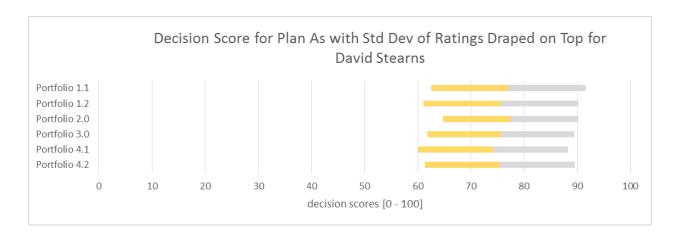


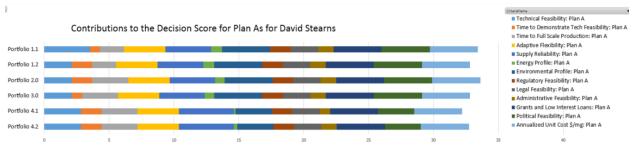


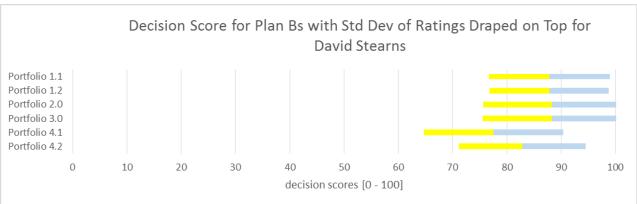


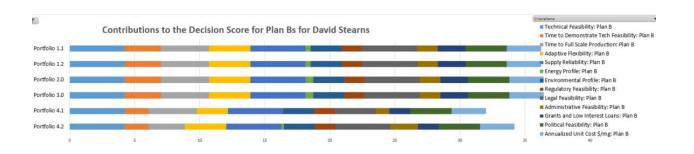
David Stearns



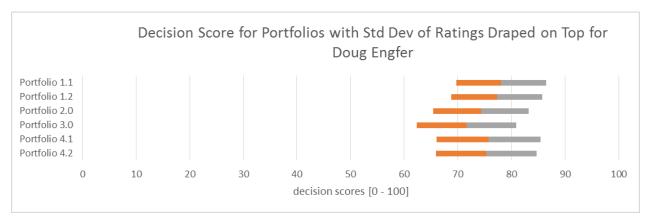


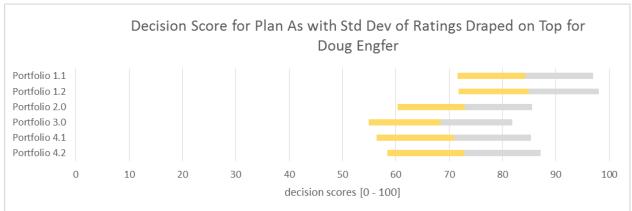


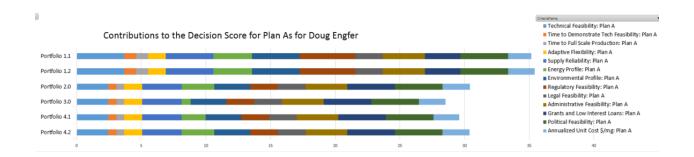


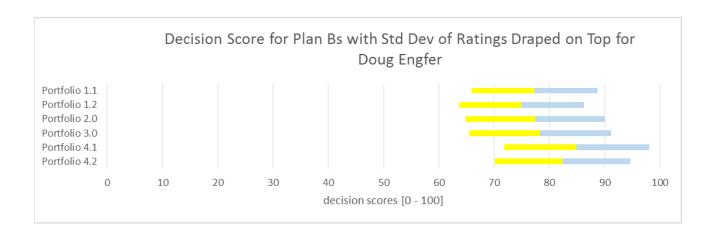


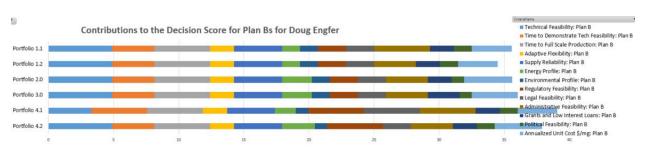
Doug Engfer



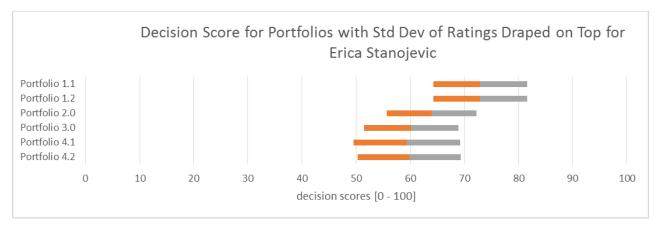




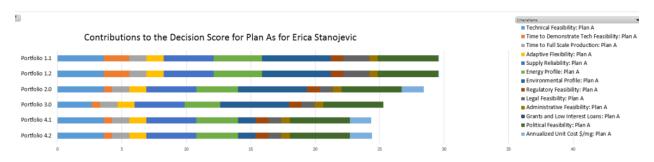




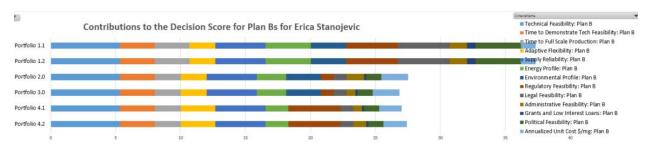
Erica Stanojevic



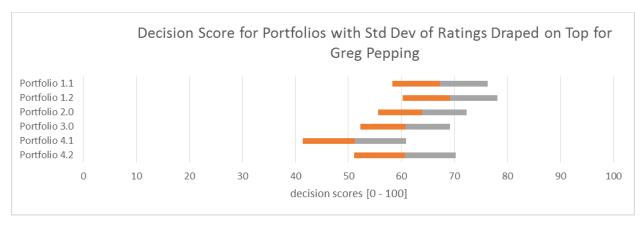


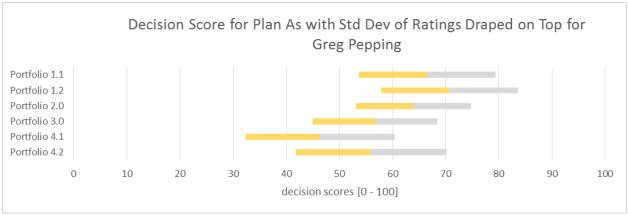


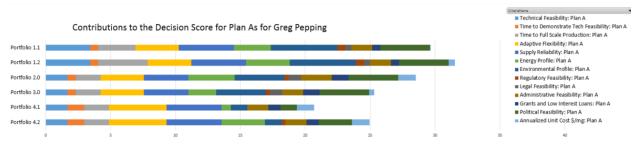


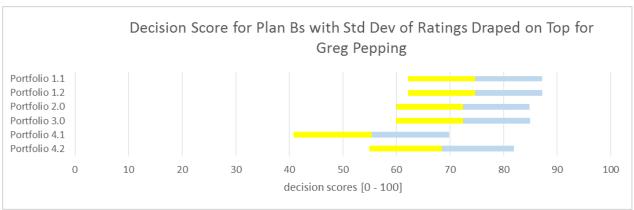


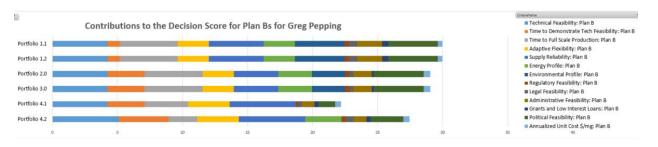
Greg Pepping



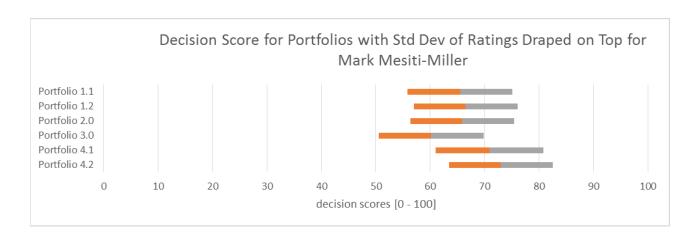


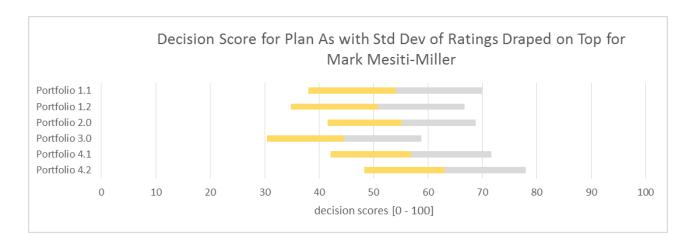


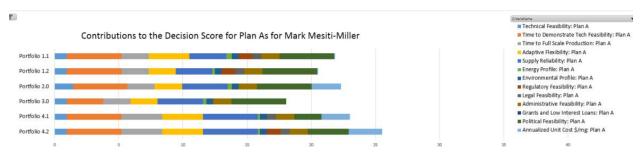


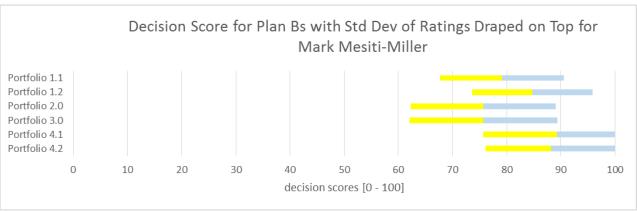


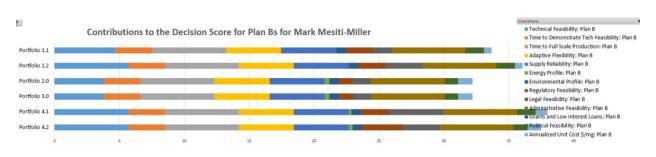
Mark Mesiti-Miller



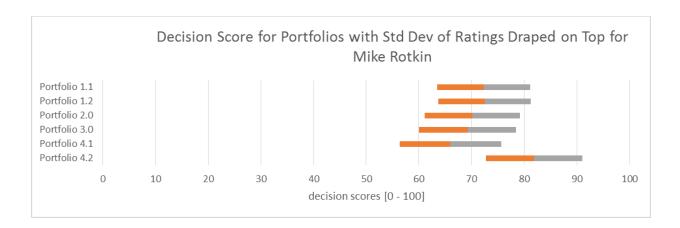


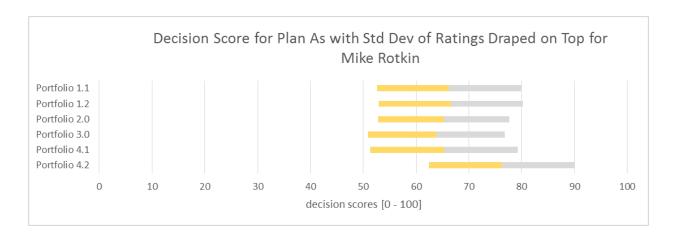


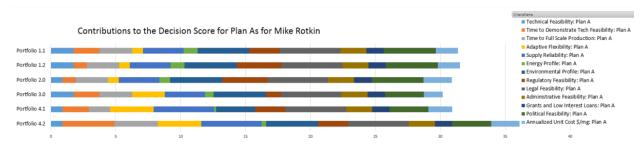


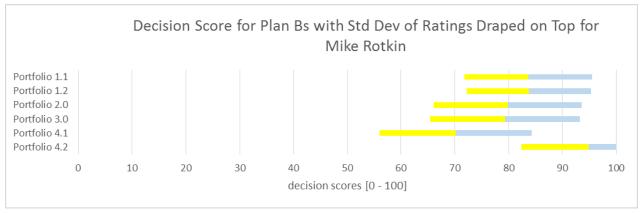


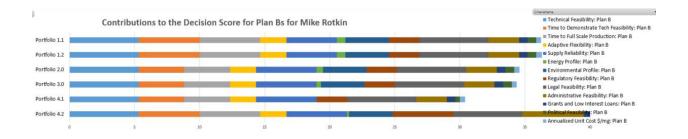
Mike Rotkin







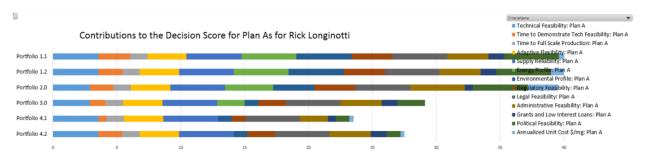


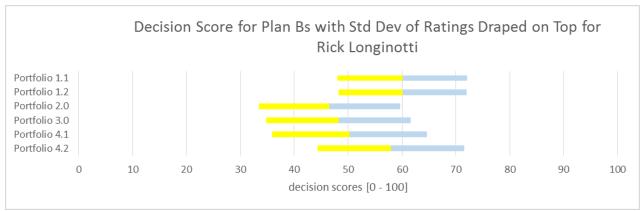


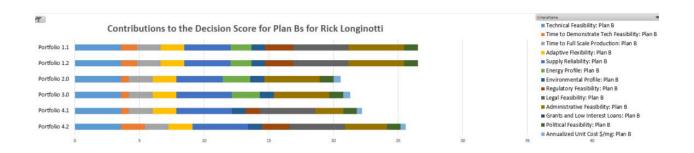
Rick Longinotti



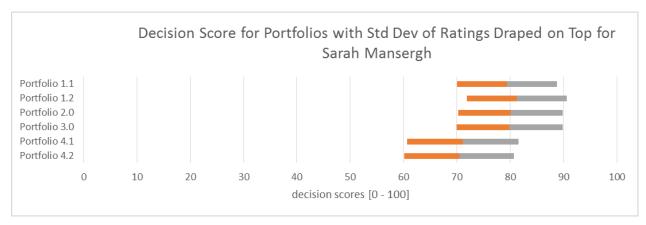


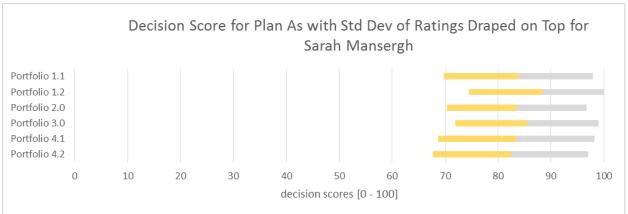


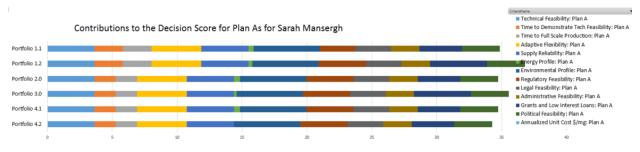


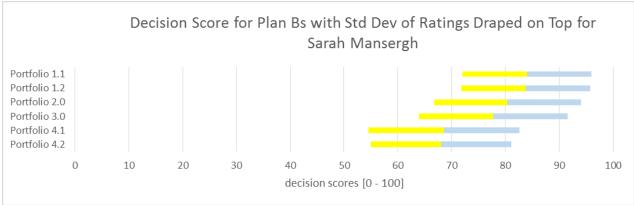


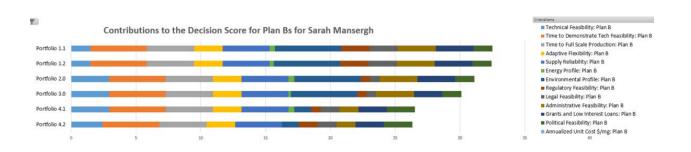
Sarah Mansergh







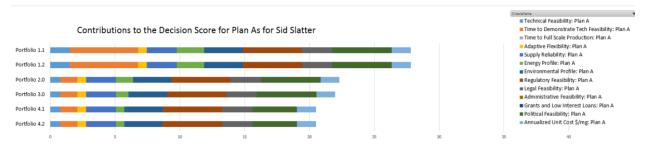




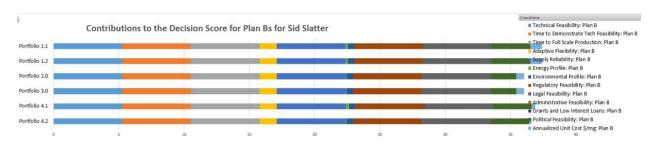
Sid Slatter



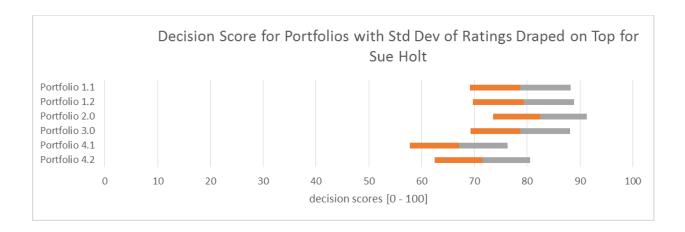


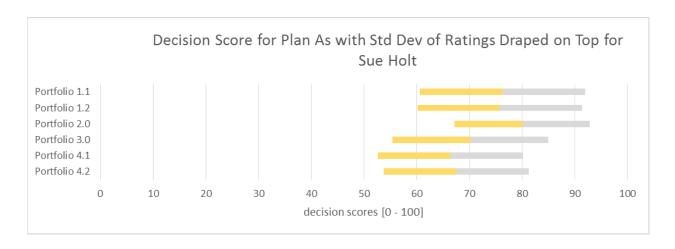


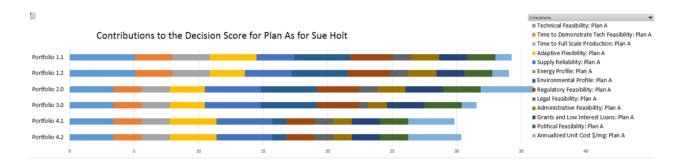


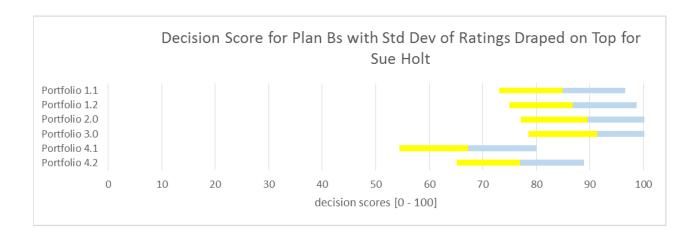


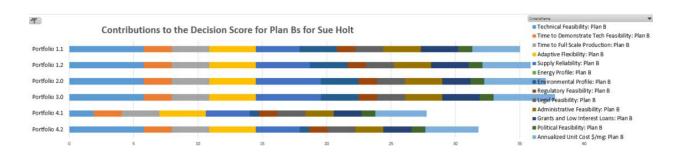
Sue Holt











DATE: July 17, 2015

TO: WSAC

FROM: Rosemary Menard

SUBJECT: Common Themes from WSAC Member Comments during MCDS Exercise

On Monday, July 13, 2015, WSAC members received a table compiling the comments made during the Committee's recent evaluation of portfolios using the MCDS model. That table sorted the comments by criteria or question and lumped together all the comments made on a given criteria or question in one place. The listing of the items in the table is strictly alphabetical, which isn't necessary the most sensible way to organize the material, but is what excel spread sheets do when sorting this kind of thing. Given this, the material presented in this memo will follow the order of the information presented in the table, making it easier for anyone who wants to review the actual comments as they look at this summary.

One other general comment: With very limited exceptions, when Committee Members commented about something, they generally did it when rating Plan A. There were very few comments recorded when looking at the Plan Bs. It does appear from the comments that in most cases the comments made were not specific to a Plan A or Plan B, so I have removed reference to those in the information presented below.

Criteria/Question	Common Themes of Comments
Adaptive Flexibility	 Many aspects go to make up adaptive flexibility: regional collaboration and/or agreements with reasonable terms, interconnections, and supply diversity (and presumably the infrastructure to make all these work together) General conflation between supply diversity and adaptive flexibility
Administrative Feasibility	 Optimism that necessary and favorable (for both parties) agreements could be (and would be developed) Skepticism that Santa Cruz could depend on getting water back in the quantities needed within a reasonable time frame.
Annualized Unit Cost	General confusion about/skepticism of cost date – particularly about lack of clarity and transparency about assumptions
Avoid Negative Consequences (Trigger)	 Concern that the trigger for in lieu set the bar too high and required return water too soon Statement that this trigger (appropriately, in the commenter's view) focuses attention on the need for parallel versus linear, sequential approaches

Criteria/Question	Common Themes of Comments
Do Triggers seem to	General sentiment that the triggers were a good start but need lots of
work well?	work (as expected).
	Some concern that the triggers are too negative and will result in
	artificially or unnecessarily constraining implementation of Plan A,
	particularly in lieu recharge – don't want the triggers to set up Plan A to
	fail.
	Concern that timelines in for demonstrating performance in the triggers
	are too long.
	Concern that the structure of the triggers needs to be reframed and
	focused around performance testing and aquifer recovery goals that can
Energy Profile	 be monitored to produce verifiable data on results. Significant confusion/consternation about energy data, its clarity.
Ellergy Profile	 Significant confusion/consternation about energy data, its clarity, transparency and accuracy
	 Indication that the importance of energy as a criterion is less critical if
	the comes from renewable sources as well as the opposite, that energy
	intensity, in and of itself, is an issue regardless of source.
	Comment that the criteria focused on energy as an operating cost and
	might have focused on other characteristics, such as overall energy
	intensity of portfolios or measures or source of energy.
Environmental Profile	Focus on describing the environmental benefits of various approaches
	particularly those supporting aquifer restoration (in lieu, ASR), those
	supporting fish flow releases, those reducing the amount of wastewater
	discharged to the ocean
	• Comment on potential human/ecosystem health issues associated with
	options using purified recycled water and the need for greater
	resolution of those concerns before proceeding.
Flexible Trigger (Criteria)	Comment about the structure of the triggers not being adaptive enough
	(i.e., didn't do well according to this criteria).
	Concern that the structure of the triggers needs to be reframed and
	focused around performance testing and aquifer recovery goals that can
Grants and Low Interest	be monitored to produce verifiable data on results.
Loans	 Comments fairly consistently reflected concerns that there was not adequate information available to rate the portfolios for this criterial
Legal Feasibility	Based on some comments, legal challenges to regulatory/permitting
Legai i easibility	issues were reflected in ratings here rather than in Regulatory Feasibility
	criterion.
	 Concern about the uncertainty introduced by having the City's access to
	water stored in other aquifers be potentially subject to dispute by
	individual citizens and/or agencies also using those aquifers
Philosophy for weighing	Weights for B represent the likely very different political, regulatory, and
Criteria between Plan A	administrative and even financial reality that would be in place in the
and Plan B	event that Plan A failed partially or completely.
	Weights for A represent the many regional and sustainability benefits of
	winter water harvest and storage options.
	• Weights for B represent the difference in certainty for supplies produced
	by B options.

Political Feasibility	Political feasibility is acknowledged to evolve over time. If A fails, B
Regulatory Feasibility	 options would be more acceptable. Generally acknowledged that the regulatory process is long, and complex, but that the regulatory process for some options are more straight forward or would be easier than others.
Sufficient Time to Demonstrate Success (Trigger)	 Concerns about the real/perceived arbitrariness of timelines and performance metrics laid out in the triggers, lack of understanding of why the various metrics were chosen, and recognition that at least to some degree we lack (or might lack) the data on which to establish such timelines and performance metrics. Concern about length of time required to prove up some of the supply options and what that means should we have continuing drought. Concern about why the triggers are different for in lieu and ASR.
Supply Diversity (Portfolio level Criterion)	 Concern that supply diversity is being equated to increased supply reliability and noting that there isn't an established "if this, then that" relationship between supply diversity and supply reliability. Recognition that, based on their design, all portfolios (ultimately) resulted in increasing supply diversity.
Supply Reliability	 Comment that issues with groundwater injection and recovery create some (likely resolvable) uncertainty, so higher ratings for in lieu approaches. Comment regarding the supply reliability benefits of "climate independent' supplies found in Plan Bs. Recognition that the relative uncertainties of the Plan As and the relative certainty of the Plan Bs represent real differences but not necessarily insurmountable differences when it comes to improving supply reliability.
Technical Feasibility	 Comments acknowledge some variability in the technical feasibility particularly with some of the Plan B options, but perhaps more focused on the timeliness of proving up rather than the eventual success in doing so. More complicated/multi-partner/multi-element options generally viewed as less technically feasible than less complex options. Acknowledgement of the benefits of having highly technically feasible back up plans.
Time to Demonstrate Technical Feasibility	Major focus of comments is on how much time it takes to prove up some of the options and what is too long a time or too short a time to be reasonable in meeting the community's needs.
Time to Full Scale Production	 Comments focus on the ambiguities related to getting to full scale production and the difficulty of interpreting/judging the information provided.

Difficult to Rate	Concern about ability to rate portfolios for some of the more technical
Criteria	criteria.
	Concern about ability to rate portfolios related to performance related
	criteria (time to demonstrate technical feasibility, time to full scale production).
	Cost difficult to rate due to inaccurate/confusing information.
	Energy difficult to rate due to inaccurate/confusing information.
	Avoiding negative consequences trigger seemed set up to cause Plan A to fail.
Difficult to Rate Portfolios	• Comments focused on various individual responses to portfolios and portfolio elements.
Missing Solution Pieces	Hanson Quarry, a simpler in lieu plan, additional conservation especially more conservation for lower costs, passive recharge (presumably individual property based, but unclear)
Similarities of Portfolios	Recognized the similarities of ASR in many of the options
Comments Not Specifically Related to a Criterion or Question	 Would have been great for our "fact based" process to have more fully taken advantage of the knowledge and experience of various technical specialists in rating these portfolios. KaffeeKlatches were very useful
	• Concerns about considering in lieu and/or ASR in both SV and Soquel areas in the same plan – saw there being big differences in the likelihood of success in the two different aquifers and found having to rate them together difficult and probably resulting in an inaccurate representation of the how the Plan As did in the various portfolios.