Agess, Inc.

Date: 2/28/18

To: Bruce Wilcox
California Natural Resources Agency (CRNA)
Bruce.Wilcox@resources.ca.gov

Re: Request for Information (RFI) for Salton Sea Water Importation Projects

Title: Laguna Salada and Salton Sea Restoration Plan

Table of Contents -

Section 1 - Project Team

Agess, Inc.	Project Manager
Intrinsyx Technology Corporation	Scientific Director
Phytoremediation & Phytominig Consultants United	Plant Processing Consultant
Lucid Energy	Energy Generation Equipment
JOI Scientific	Alternative Energy Generation
Nag, Inc.	Geospatial Engineering
Joi Scientific	Technology Supplier
Parjana Distribution	Technology Supplier
Floating Islands West	Technology Supplier

Section 2 - Narrative Description

Project Description:
The project's aim is to widen and deepen the existing Coyote Canal to flood the dry lake bed of Laguna Salada, and, thus, bring sea water within a few miles of the US / Mexico border as phase 1. This project is at sea level and would provide new recreation, habitat, dust mitigation, and agriculture opportunities to the local tribe and neighboring Mexicali farmers. Phase 1 would be a the creation of a 30 mile canal widening to create a river with subsequent flooding of Laguna Salada constituting 142,000 acres of shallow flooding. Permitting to completion can be achieved in a few years' time. Phase 2 would be processed in tandem but separated due to complex water transfer permits crossing the border which require presidential approval from both countries. This phase would have two options. Option 1 will be an open canal, river or tunnel through Mount Signal. Option 2 will be an open canal, river or tunnel through the open desert at the northernmost tip of Laguna Salada to utilize gravity feed water to the Salton Sea.

Business Plan:

As a professional project management team our interests are in assisting local residents, businesses, municipalities, and governments to analyze the viability of a water import restoration project. A high level study will allow the State to make a more informed decision about the viability of a low cost multiphase project that can create new habitat as well as restoring degraded habitat with a simple gravity fed system. The business plan and means of recouping currently degraded property value and improving future values requires a multi agency and multi governmental partnership agreement which can be initiated with a Memorandum of Understanding (MOU) between the State and local municipalities.

Our business plan is to assist with the framework and the feasibility platform of Seawater Import. We do not seek reimbursement, but, rather, look to benefit from a schematic design and master planning of Laguna Salada and Salton Sea Restoration project. With this case study, we hope to influence a decision to initiate a collaborative partnership with industrial suppliers, local municipal agencies, the Unites States of America and Mexico - an otherwise seemingly unprecedented and unattainable goal. Revenue will be generated by hydro power, solar power, wind power, recreation, carbon capture / storage, seawater farming of food and biofuel. Resources will be conserved by mitigating dust, reducing exposure of local residents to emissive toxic dust, restoring ecology and creating new habitat more easily with the surplus of ocean water. The true opportunity of this proposal and others is to not only solve the Salton Sea's ailments but look at water in a whole new light. Untreated seawater is the future of the world's water supplies for agricultural production, aquaculture production, fuel production and habitat which turns arid deserts into productive ecologies. This will be a first of its kind global pilot project.
The sea(s) will benefit from a stable and controllable water elevation to mitigate emissive dust and increase property values that have bottomed out. Water importation will help to reduce salinity in the short term by dilution with ocean water but its salinity will eventually increase and return to levels which require alternative management. The short term will allow local water municipalities to eliminate mitigation water flowing into the sea and re-allocate this water to other areas for habitat, irrigation or profit through future water transfers. The project will create new habitat along and within the new canal(s) / river(s). The recreation opportunities on both sides of the border will attract new development. Alternative energy generation can supply the California grid with new sustainable and constant renewable resources. The endangered fish and bird species will be able to restabilize and flourish under restored conditions. Salinity can be reduced at phase 3 developed Vertical Tube Evaporator Multi-Effect Distillation (VTE-MED).

Section 3 - Planning and design process of project

Section 3A: Project Feasibility –

1. System Capacity:
    a. Salton Sea River - 1,200,000kAF per yr. to replace mitigation water and supplement evaporation / seepage of the Salton Sea.
    b. Cayote Canal River - 2,500,000kAF per yr. to address the refilling of Laguna Salada, evaporation / seepage of Laguna Salada, Evaporation of lined Coyote Canal River, lined Salton Sea River and evaporation / seepage of the Salton Sea.
2. Pumping Requirements: 0
3. Option 1 -
    a. Salton Sea River - 40 mile Channel Size: 50’ wide x 20’ deep
    b. Coyote Canal River - 30 miles Channel Size: 115’ wide x 20’ deep
4. Option 2 - Pipe Size: (6) 6m= 19ft diameter pipes for 1,200,000kAF per yr.
5. Water Quality - Stabilize at 61 g/liter TDS current levels for the first 5 years of use. The Sea will exceed 109 g/liter TDS by 2030 and 143 g/liter TDS by 2040 so the whole body will be much more saline if importation does not occur. Planning, permitting and construction of salinity control systems can be done in tandem with importation efforts so we can maintain at 61 g/liter TDS with the eventual goal of reducing to 61 g/liter TDS over a subsequent 20 year period.
6. Desalinization: Vertical Tube Evaporator Multi-Effect Distillation (VTE-MED) design provided by Sephton Water Technology can produce 5,000kAF per yr. with an investment of 24 million per facility. If comparing seawater desalination systems that can process 35 g/liter TDS to Salton Sea waters of 61 g/liter TDS the system would process double what traditional units can process what would equate to 10,000kAF per yr.
7. Fish and trash screens will be provided through a passive Tencate - Geotube system with large aggregate to allow proper filtration flow and protection of animals.

Section 3B: Water Source Identification –

1. Seawater import from the Sea of Cortez (Gulf of California) through Laguna Salada is supported by the Mexican Government as this benefit for their residents in the form of new recreation, ecotourism, habitat, seawater farming and manufacturing of farmed products.
2. Documentation from the water rights holder, The Federal Government of Mexico, would need to be initiated by the State of California and the Federal Government of the United States of America. Our collaborative team would not be able to secure the water rights without a letter of intent from the State of California that

this project is ready to be initiated. Typically this process would be a condition of the discretionary review project process and environmental studies. We would defer this item to a later date. If no adverse impacts will be realized then their federal government would be in support of a water use agreement of water from the Sea of Cortez.

3. The Cocopah people are Native American Indians indigenous to Southern California, northern Baja California, Mexico, and southwest Arizona and have participated in several expeditions exploring the path of the projects canals / rivers. They would be a water rights holder and fully support the effort. Similarly to achieve water rights coordination initiated by the State of California and the Federal Government of the United States of America in conjunction with The Federal Government of Mexico would create a Memorandum of Understanding (MOU) with the Tribe to create a mutually equitable agreement.

Section 3C: Land Use – Please see ***Exhibit A:*** *Laguna Salada & Salton Sea Restoration Project: Diagram* which shows a connection point to the top of the tidal flow from the Sea of Cortez which is the Coyote Canal. The Coyote Canal would be required to be deepened and widened to accommodate the additional water flow required. This is a pre existing easement so the land rights will not be difficult to amend. Laguna Salada was a previous lake and similarly the reintroduction of water would not be insurmountable for the underlying land owners. The Salton Sea Canal / River from the northernmost edge of Laguna Salada would be able to traverse the Cocopah Indian Tribe and they are in favor of the concept. On the United States side of the Border the path would be predominantly Bureau of Land Management (BLM) ownership and our current administration is in favor of private / public development. In conversations with the BLM requirements to mitigate disturbed land would be through conservation programs and other standard mitigation measures. Individual private land ownership could be partnered with or compensated through an acquisition agreement. As a last resort imminent domain could be exercised on either side of the border.

Section 3D: Environmental Impact –

• ***Salton Sea Salinity –*** Desalination system would be proposed in future phases and would utilize Solar Gradient Pond systems for high brine content that also create energy. Mr. Tom Sephton of Sephton Water Technology would be the subject matter expert and we would consult with his team to work out logistics of brine repurposing in open fallow fields. This can be a viable dust mitigation management systems as well. Additionally we would create high quality salt products for resale in the open market for a return on investment (ROI). Lastly we will implement the repurposing of excess salt for building materials.

Section 3E: Water Use – *The system would have the capacity to refill the Salton Sea utilizing existing mitigation water of 800,000kAF per yr. in addition to the future* 1,200,000kAF per yr. and the system could eventually keep pace with the evaporation and percolation rate 1,200,000kAF per yr. giving water rights owners the ability to resell and transfer those resources if need be. Evaporation loss of the total system would be 2,500,000kAF *per yr. from both rivers and seas.*

Section 3F: Cross Border Governmental Coordination and Permitting - Preliminary meetings to coordinate the cross border permitting process have been initiated with Bill Graham of AECOM who was the project manager for the Otay Mesa Water Districts cross border water transfer connection to a proposed desalination plant in Rosarito, Mexico. They would be the primary subject matter expert that would, should or could provide this service to the State of California since they are the subject matter experts with recent experience on this topic in a similar jurisdiction.

Section 3G: Project Development Schedule - *The negotiations on all sides of the issue will take as* few as 5 years and as many as 10 years *depending on the state's sense of urgency for the issue surrounding the shrinking of the Sea. This could be expedited if funding becomes available and a fully restored sea become the primary focus of state and local municipalities as part of their ten year plan.*

Section 3H: Operation Schedule - The permitting process will take as few as 5 years and as many as 10 years for a fully connected network. The construction process will take as few as 5 years and as many as 10 years for a fully connected network. This is why we propose a phased approach in which the Coyote Canal effort could take a year or two to permit and a year or two to build and will create 142,000 acres of ocean level salinity habitat.

Section 4 - Cost projection

Phase 1: Laguna Salada Dust Mitigation - 30 mile Canal / River

- *+/- $2-10 million*
- *+/- 142,000 acres*
- *+/- $14 - $70 / acre*

Phase 2: Salton Sea Dust Mitigation - 50 mile Canal / River

- *+/- $390-$398 million*

- *+/- 75,000 acres*
- *+/- $5,333 per acre*

Phase 1+2: Laguna Salada + Salton Sea Mitigation - 80 miles

- *+/- $400 million*
- *+/- 217,000 acres*
- *+/- $1843 per acre*

Phase 3: Vertical Tube Evaporator Multi-Effect Distillation (VTE-MED)

- *+/- $24million each 5,000kAF per yr ocean water 10,000kAF per yr Salton Sea wate*r
- +/- $1 billion: Total need for stability of the Salton Sea salinity

Phase 4: Hydro Electric Energy Generating Equipment

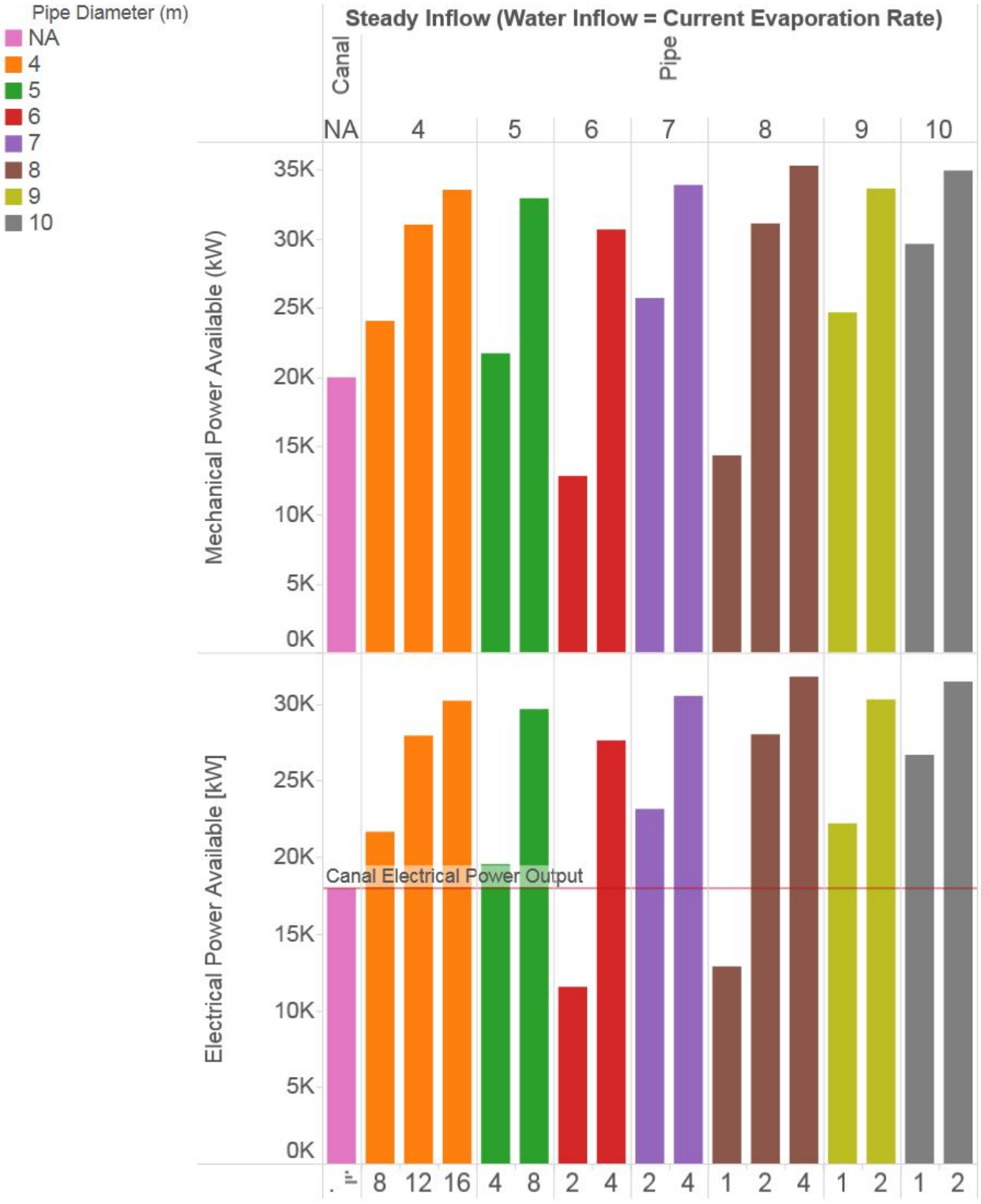
- +/- $1 billion in incremental phases
- Systems can be installed by industrial suppliers at no cost pending a power purchase contact

Section 5 - *Plan for funding of proposed project*

Funding should come from the State of California due to the Quantification Settlement Agreement (QSA). Private investors and philanthropy organizations could also participate in the project due to Return on Investment (ROI) but primary funding need to be provided by local, state and federal municipalities due to the scale of the project and the magnitude of the the hazardous consequences of inaction. The projects success will depend on the State of California Issuing several rounds of Requests for Proposals (RFP's) and Requests for Proposals (RFI's) since the current Request for Information (RFI) is short sighted in its assumption that a single organization, company, team, partnership or municipality can solve an issue of this magnitude with a singular solution.

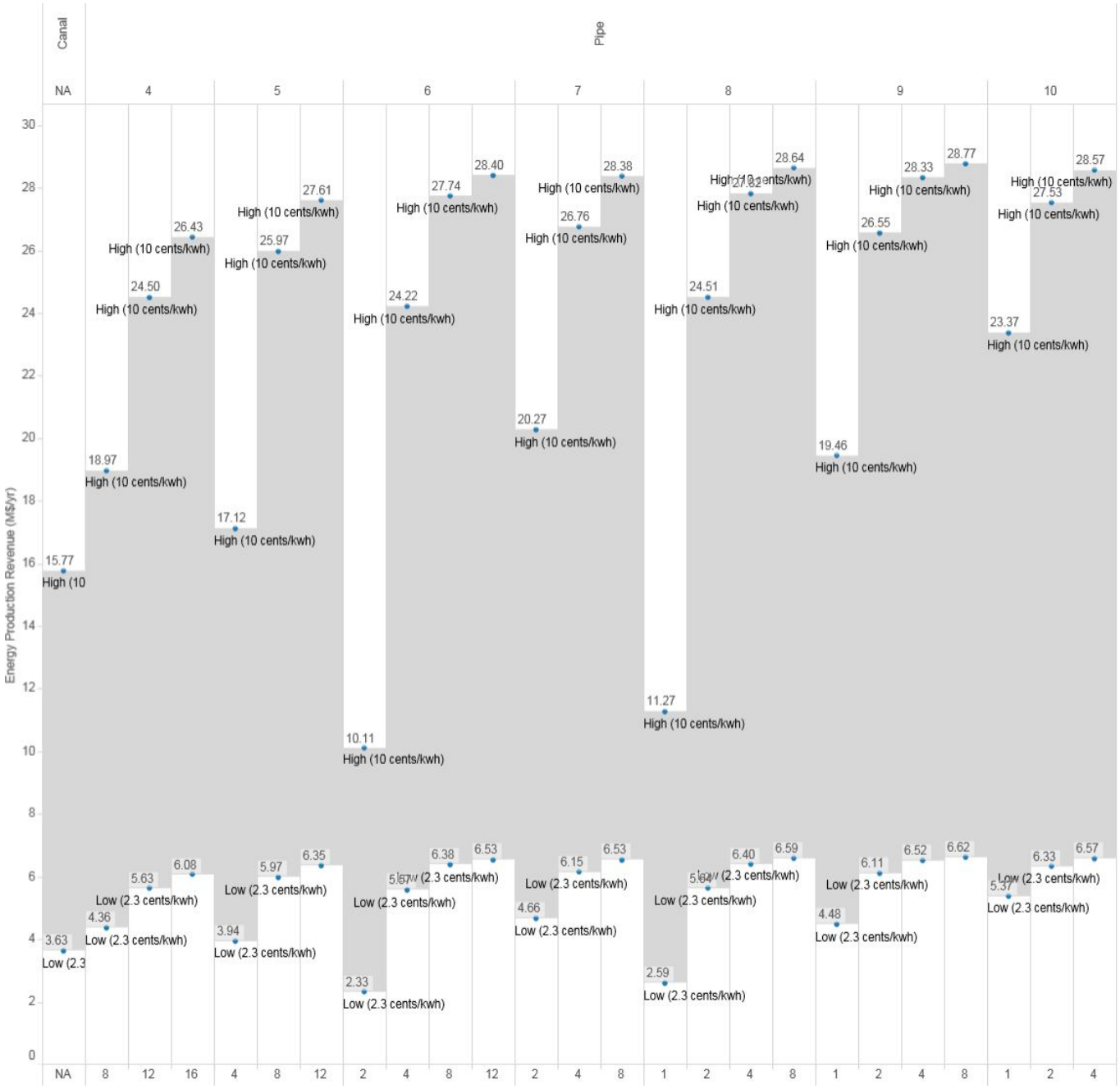
The Complexity of the multifaceted issues will need a multifaceted dynamic and evolving platform of collaboration of all stakeholders to address the issue. We suggest the funding comes in phases to attain the small scale high yielding phase 1 effort of Laguna Salada Restoration with the widening and deepening of the Coyote Canal /River as a viable phase 1 approach to initiate the larger restoration efforts and provide a viable alternative while the longer term lengthy cross border water transfer Salton Sea connections are in permitting process.

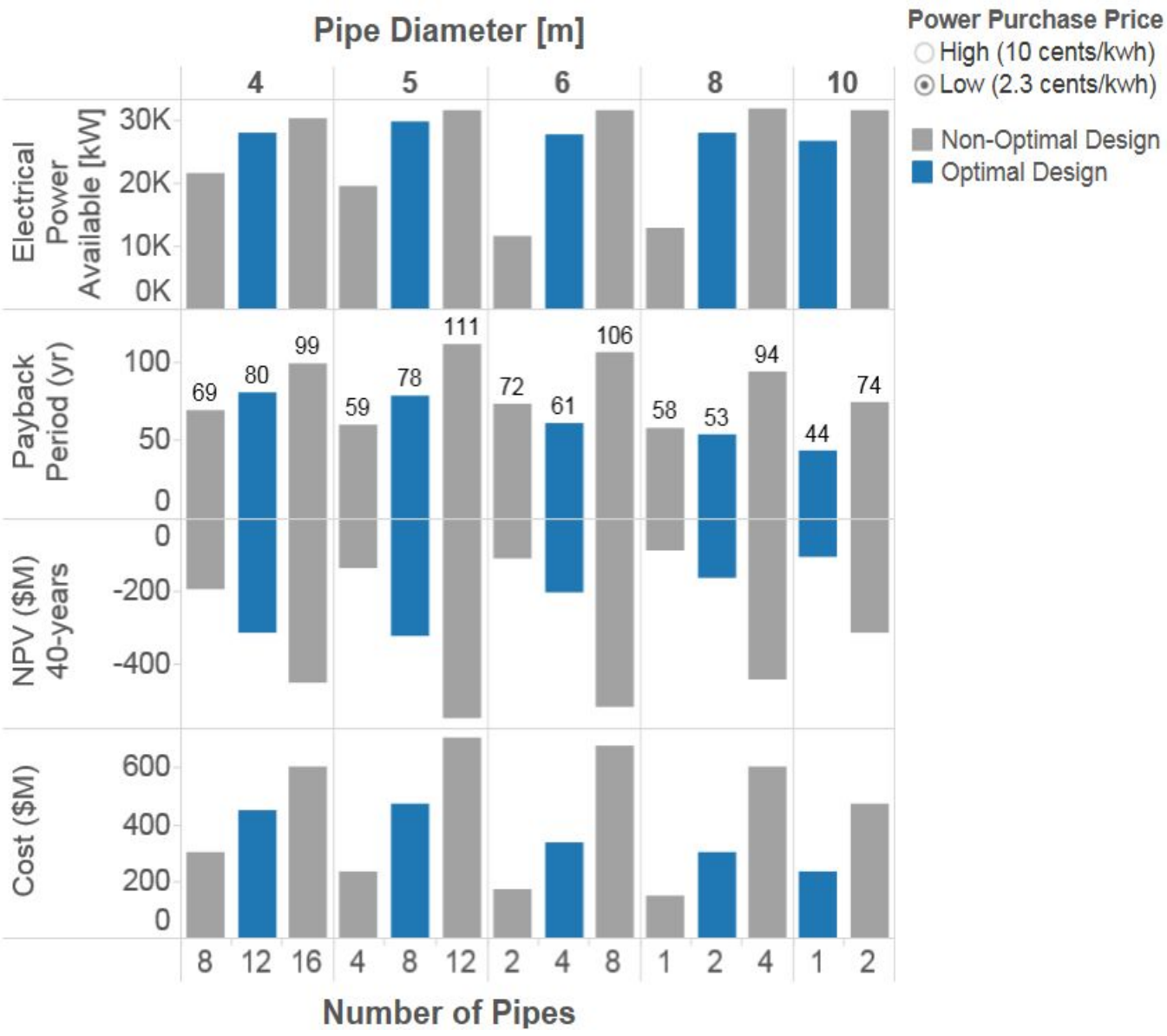
Section 6 - *Tables and Graphs:* *Courtesy of David Forney*

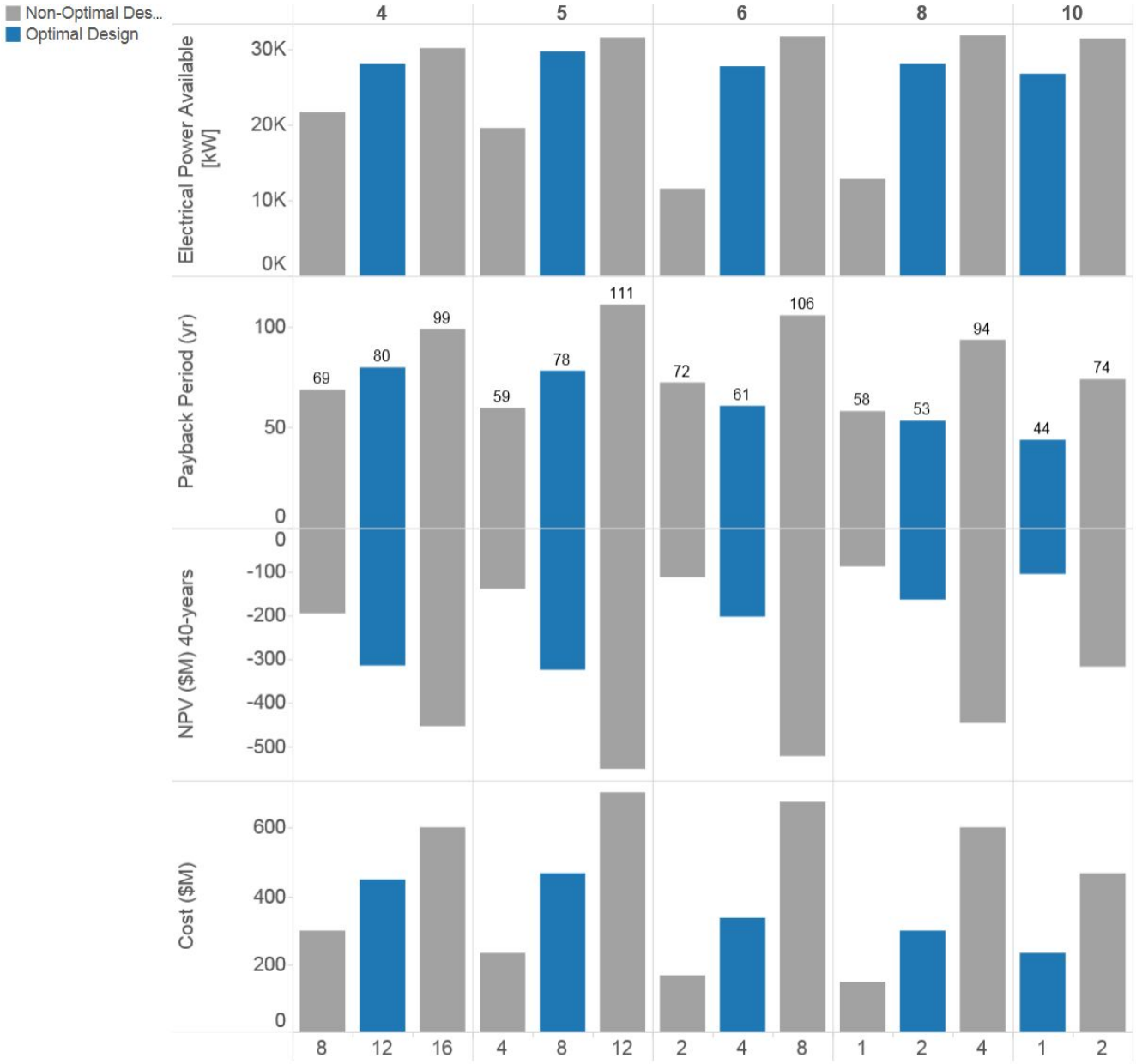


Inflow Scenario / Water Delivery / Pipe Diameter (m) / Number of Pipes

Steady Inflow (Water Inflow - Current Evaporation Rate)



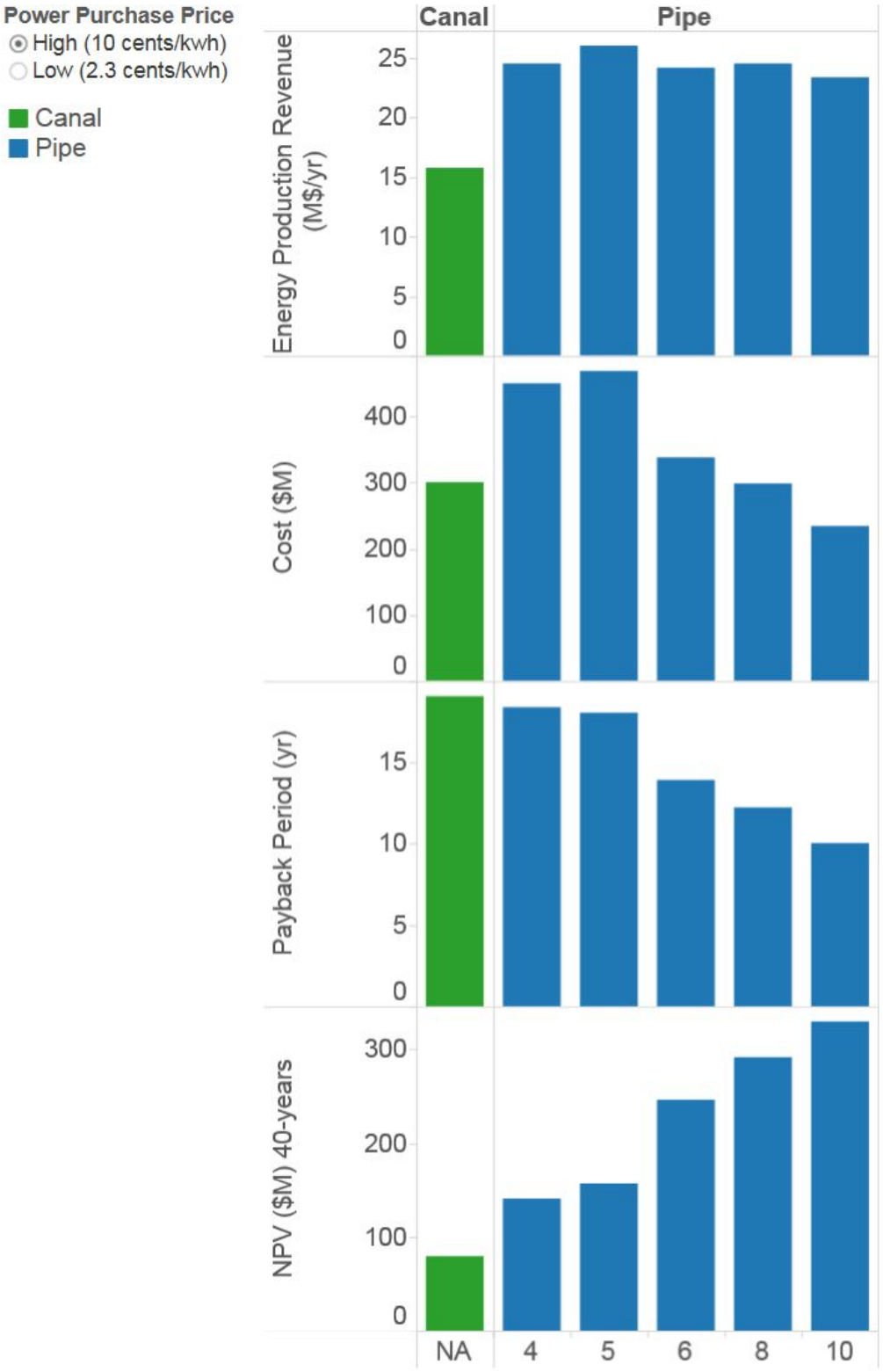

Pipe Diameter [m]
4
5
6
8
10
Electrical Power Available [kW]
30K
20K
10K
0K
Payback Period (yr)
100
50
0
69
80
99
59
78
111
72
61
106
58
53
94
44
74
NPV ($M) 40-years
0
-200
-400
Cost ($M)
600
400
200
0
8 12 16 4 8 12 2 4 8 1 2 4 1 2
Number of Pipes
Power Purchase Price
High (10 cents/kwh)
Low (2.3 cents/kwh)
Non-Optimal Design
Optimal Design

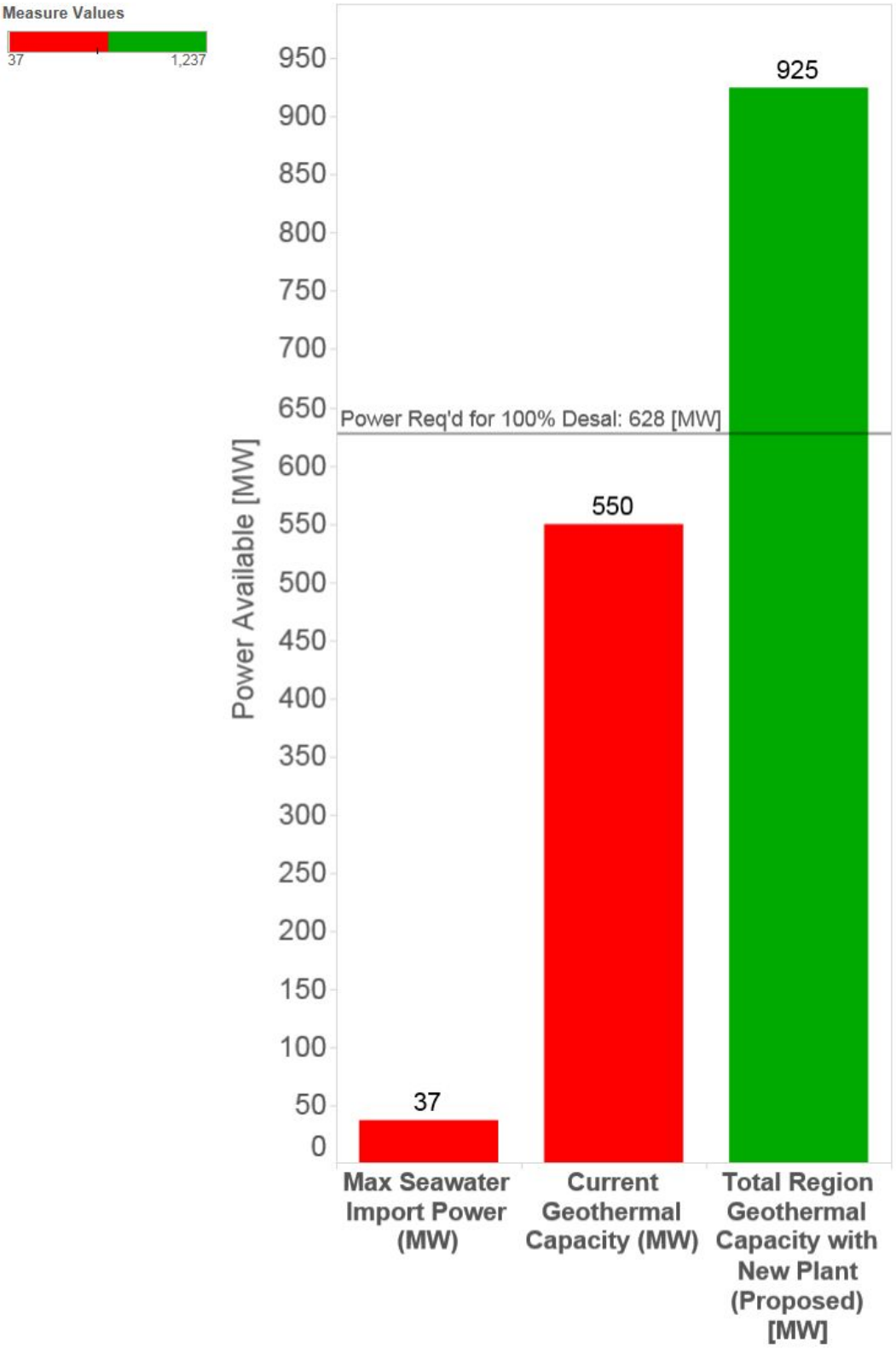


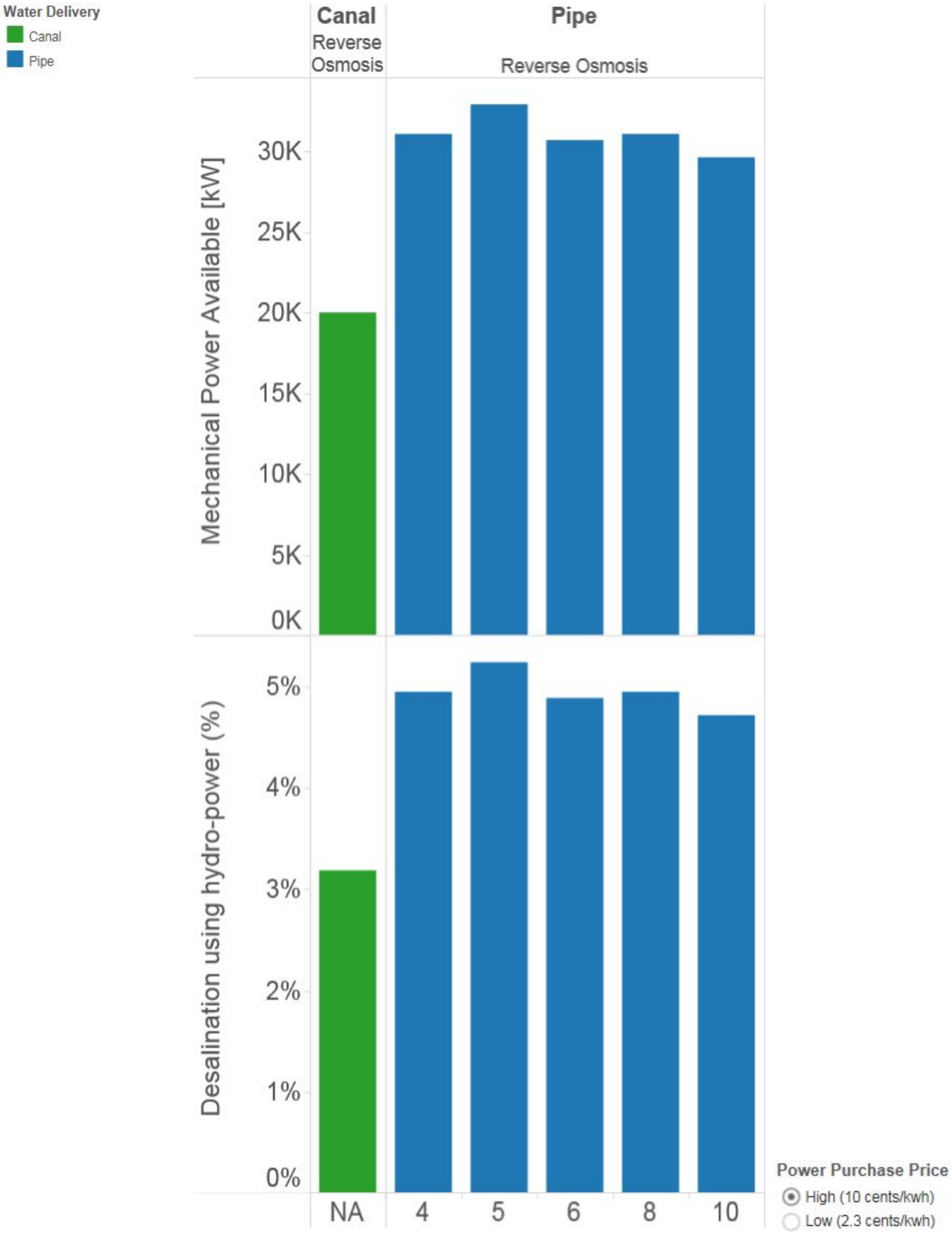
Power Purchase Price

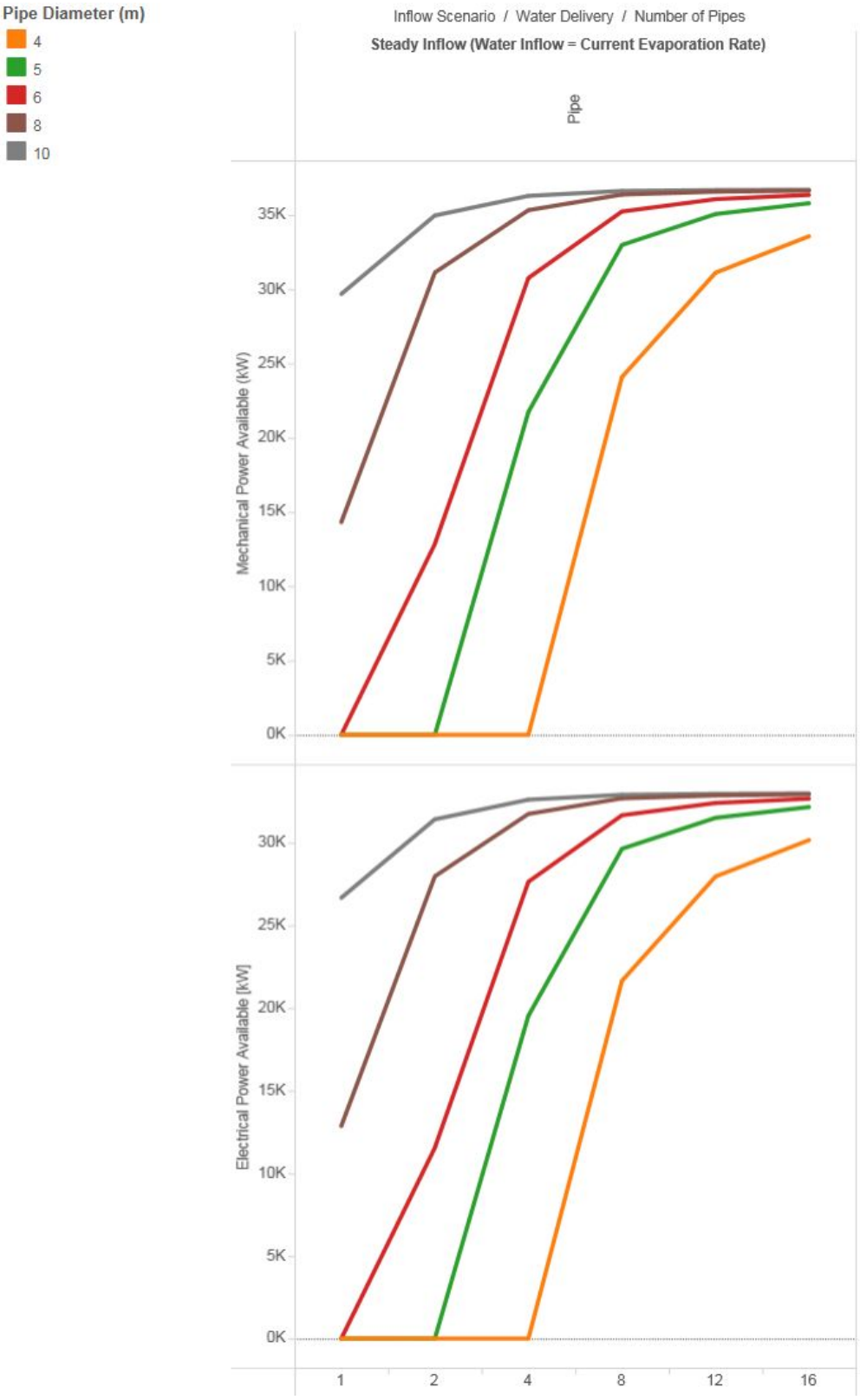
- ○ High (10 cents/kwh)
- ◉ Low (2.3 cents/kwh)

Non-Optimal Design
Optimal Design


Power Purchase Price
High (10 cents/kwh)
Low (2.3 cents/kwh)
Canal
Pipe
Canal
Pipe
Energy Production Revenue (M$/yr)
25
20
15
10
5
0
Cost ($M)
400
300
200
100
0
Payback Period (yr)
15
10
5
0
NPV ($M) 40-years
300
200
100
0
NA
4
5
6
8
10


Measure Values
37
1,237
950
900
850
800
750
700
650
600
550
500
450
400
350
300
250
200
150
100
50
0
Power Available [MW]
Power Req'd for 100% Desal: 628 [MW]
925
550
37
Max Seawater Import Power (MW)
Current Geothermal Capacity (MW)
Total Region Geothermal Capacity with New Plant (Proposed) [MW]


Water Delivery
Canal
Pipe
Canal
Reverse Osmosis
Pipe
Reverse Osmosis
Mechanical Power Available [kW]
30K
25K
20K
15K
10K
5K
0K
Desalination using hydro-power (%)
5%
4%
3%
2%
1%
0%
NA
4
5
6
8
10
Power Purchase Price
High (10 cents/kwh)
Low (2.3 cents/kwh)


Pipe Diameter (m)
4
5
6
8
10
Inflow Scenario / Water Delivery / Number of Pipes
Steady Inflow (Water Inflow = Current Evaporation Rate)
Pipe
Mechanical Power Available (kW)
35K
30K
25K
20K
15K
10K
5K
0K
Electrical Power Available [kW]
30K
25K
20K
15K
10K
5K
0K
1
2
4
8
12
16

Section 7 - *Diagrams and Exhibits*

Exhibit A: *Laguna Salada & Salton Sea Restoration Project: Diagram*

E***xhibit B:*** *Laguna Salada & Salton Sea Restoration Project: River Rendering*

Exhibit C: *Laguna Salada & Salton Sea Restoration Project: Mt. Signal River*

Section 8 - References and Supporting Data:

Agess Inc: Nathan White & David Forney “Seawater Import: Energy and Ecology Study”
https://docs.google.com/presentation/d/1t4gw6j26P0OXKBWe8cwiX09kdqCH8N9wJwGL7mJYyao/edit?usp=sharing

Thomas Sephton: “Brine Lake VTM-MED Pilot with Geothermal Waste Steam”
https://drive.google.com/open?id=0B_oJ5M-1ITQoUzY5dUpORjJHcHltSXgyQjFoOHVsZlR1aTk4

David Forney: “Ecological Restoration Potential of Management Strategies at the Salton Sea”
https://drive.google.com/file/d/0B_oJ5M-1ITQocXlWTFBfdWpGLXRNX2J0cGRLd0R1RHplX29n/view?usp=sharing

David Forney: Sea Water Import: Interactive Diagram
https://public.tableau.com/profile/publish/SeaWaterImport/PerformanceComparison#!/publish-confirm

John Freeman, Ph D: Intrinsyx Technology Corporation “Contamination Removal Rates”
https://docs.google.com/spreadsheets/d/1MGZ1_IKBlrTup3l1AZD7zSGk4VUDa5emSBYNQYsTePQ/edit?usp=sharing

Joi Scientific, Ken Harden: “Salton Sea proposal”
https://drive.google.com/open?id=0B_oJ5M-1ITQoSVZsazFra1RrM2s

Lucid Energy - “Lucid Site Assessment Key Parameter checklist-160414”
https://drive.google.com/open?id=0B_oJ5M-1ITQoQUlhYTFFSERELWgwLVhZV1czaDlSVEFGeFdB