

Project Overview

Marine and Hydrokinetic (MHK) Environmental Compliance Cost Reduction Strategies



Sandia
National
Laboratories



U. S. DEPARTMENT OF
ENERGY

PROJECT TEAM



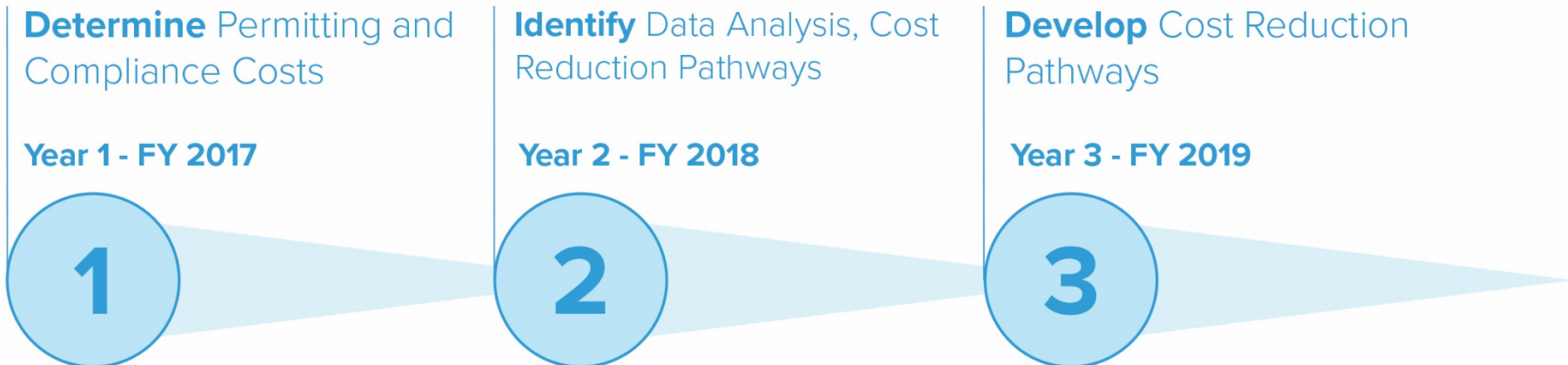
H.T. HARVEY & ASSOCIATES
Ecological Consultants

PROJECT OVERVIEW

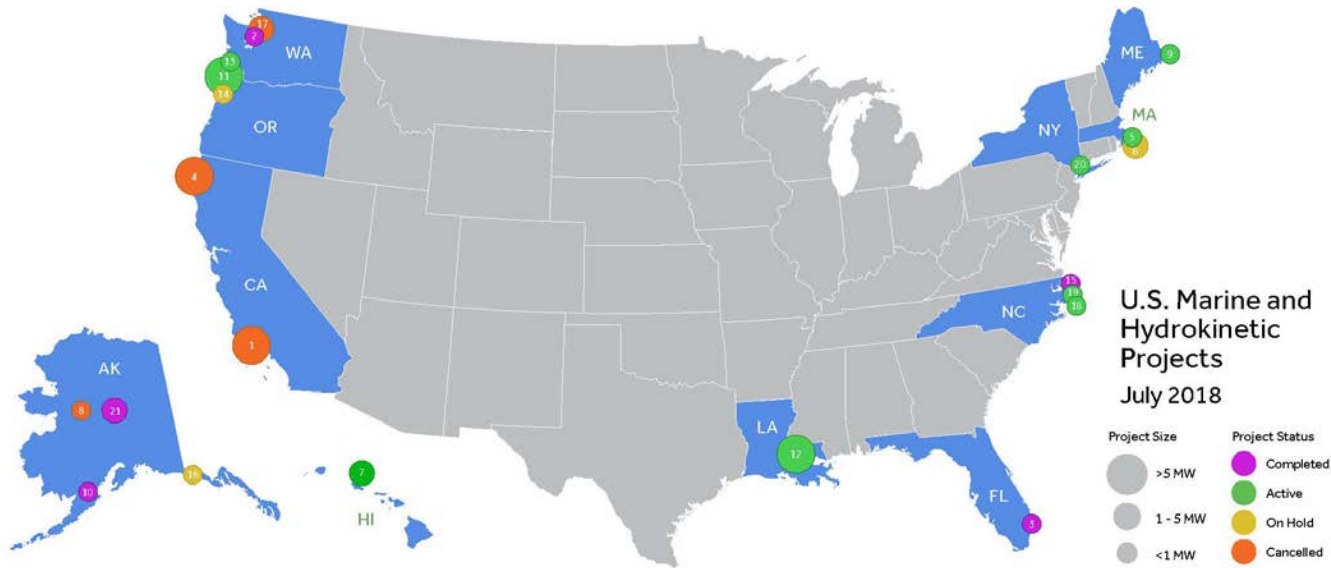
Objectives:

- Develop detailed and accurate estimates of the environmental compliance costs associated with licensing and permitting MHK industry developments
- Lessons learned from industry and federal / state regulatory agencies
- Identify opportunities for cost reduction pathways.

PROJECT PROCESS



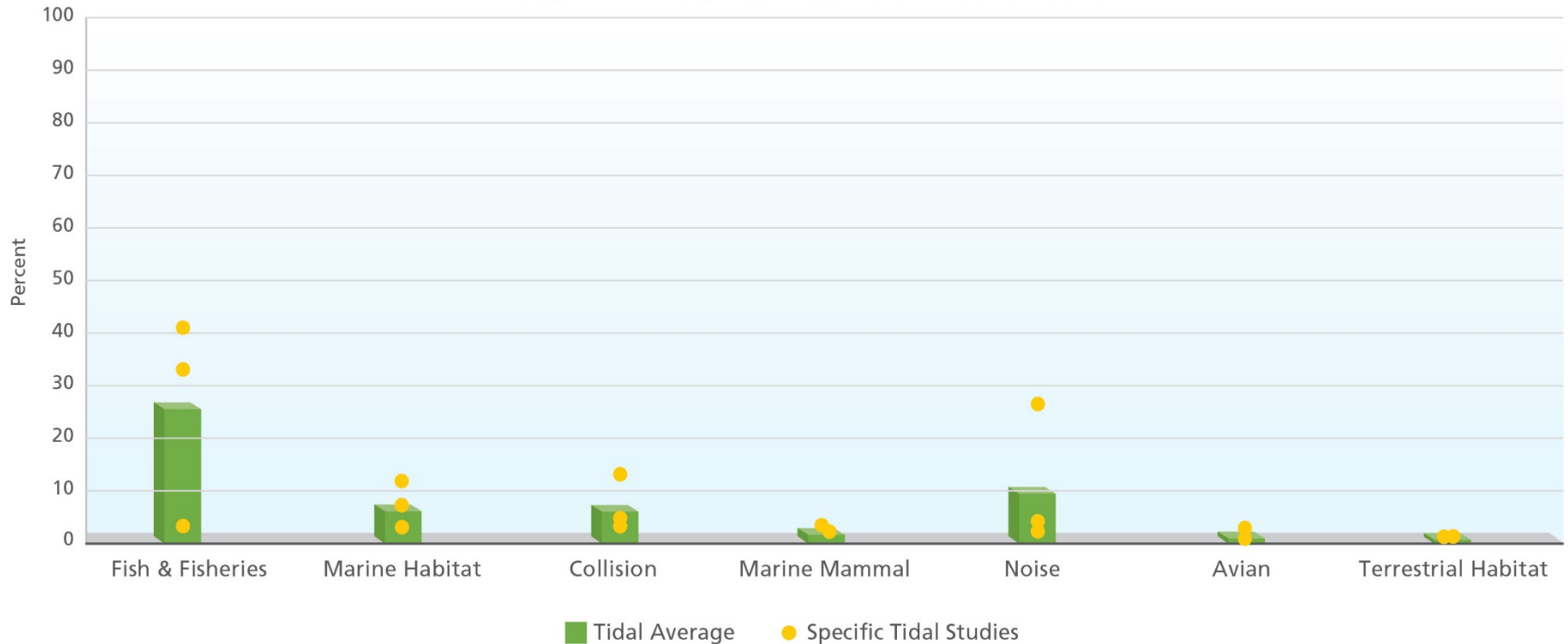
U.S. MHK Projects



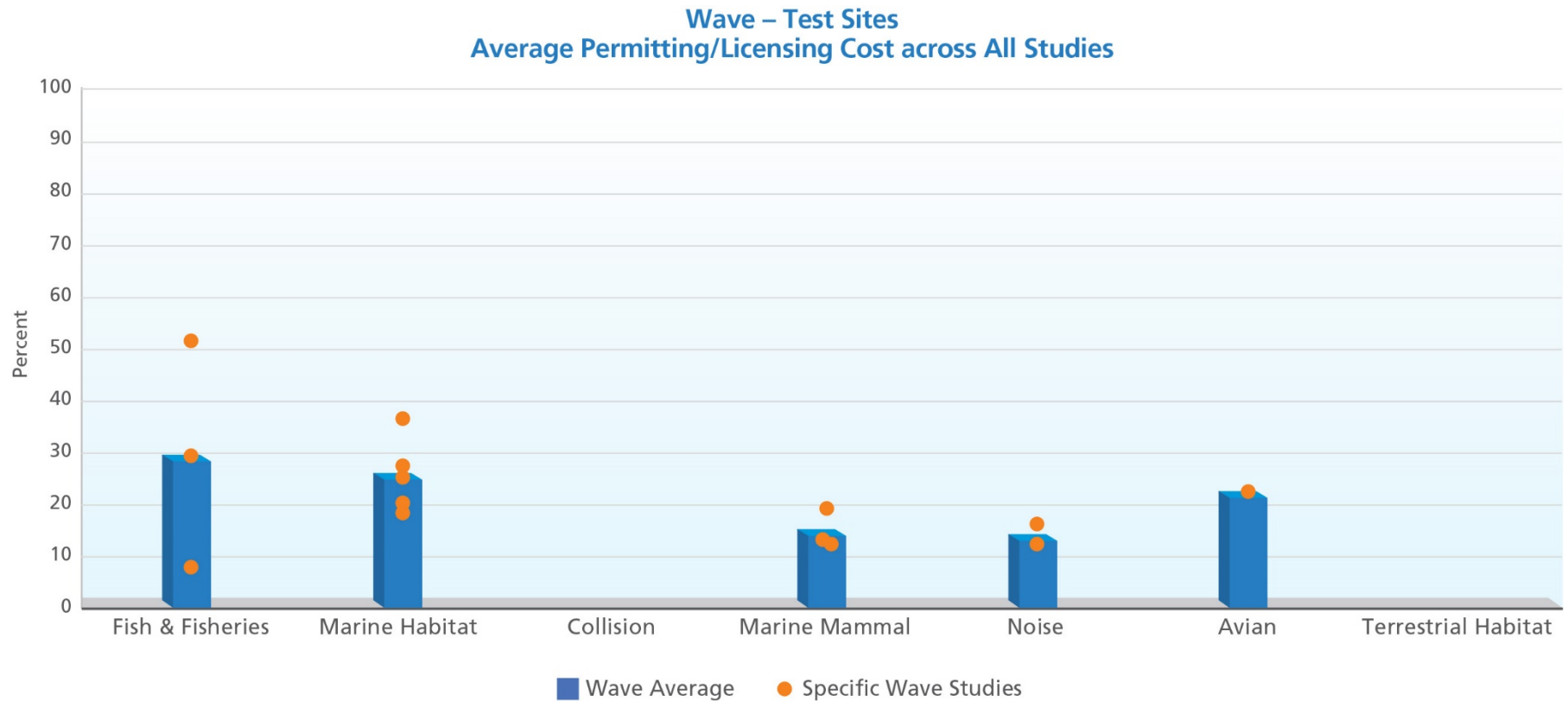
#	Project Name	Location	Type	Sub-Type	Capacity (KW)
1	CalWave	Central Coast, CA	Wave	Test Site	2-30 MW
2	Columbia Power - StingRay Wave Power System	Pudget Sound, WA	Wave	Test Deployment	500 kW
3	Florida Atlantic University - Brower Test Site	BocaRaton, FL	Ocean Current	Test Site	N/A
4	Humboldt WaveConnect Pilot Project	Central Coast, CA	Wave	Test Site	25 MW
5	MRECo - Bourne Tidal Test Site	MA	Tidal	Test Site	50 kW
6	MRECo - Muskeget Channel	Muskeget Channel, MA	Tidal	Test Deployment	5 MW
7	Navy Wave Energy Test Site	HI	Wave	Test Site	1 MW
8	New Energy - Ruby Test Deployment	Ruby, AK	Tidal	Test Deployment	25kW
9	ORPC - Cobscook Bay Tidal Energy Project	Eastport, ME	Tidal	Commercial Deployment	300 kW
10	ORPC - Igiugig	Igiugig, AK	Tidal	Test Deployment	25 kW
11	PacWave-S	Newport, OR	Wave	Test Site	20 MW
12	Pioneer Valley Renewables - Scotlandville Bend	Baton Rouge, LA	Tidal	Test Deployment	6 MW
13	PacWave-N	Newport, OR	Wave	Test Site	100 kW
14	Resolute Energy Camp Rilea Trials	National Guard Base Camp Rilea - Warrenton, OR	Wave	Test Deployment	60 kW
15	Resolute Marine Energy - Duck Field Research Facility - USACE	NC	Wave	Test Deployment	25 kW
16	Resolute Marine Energy Yakutat Project	Yakutat, AK	Wave	Test Deployment	500 kW
17	Snohomish PUD - Admiralty Inlet	Snohomish, WA	Tidal	Commercial Deployment	300 kW
18	UNC - Gulf Stream	Cape Hatteras, NC	Ocean Current	Test Deployment	N/A
19	UNC - Jeanette's Pier	Nags Head, NC	Wave	Test Site	N/A
20	Verdant Power - Roosevelt Inlet Tidal Energy	NY	Tidal	Commercial Deployment	175 kW
21	Whitestone Poncelet - River In-Stream Energy Conversion (RISEC)	Tanana River, AK	Tidal	Test Deployment	2 MW

Permitting Tidal Projects

Tidal – Commercial Deployments
Average Permitting/Licensing Cost across All Studies



Permitting Wave Test Projects

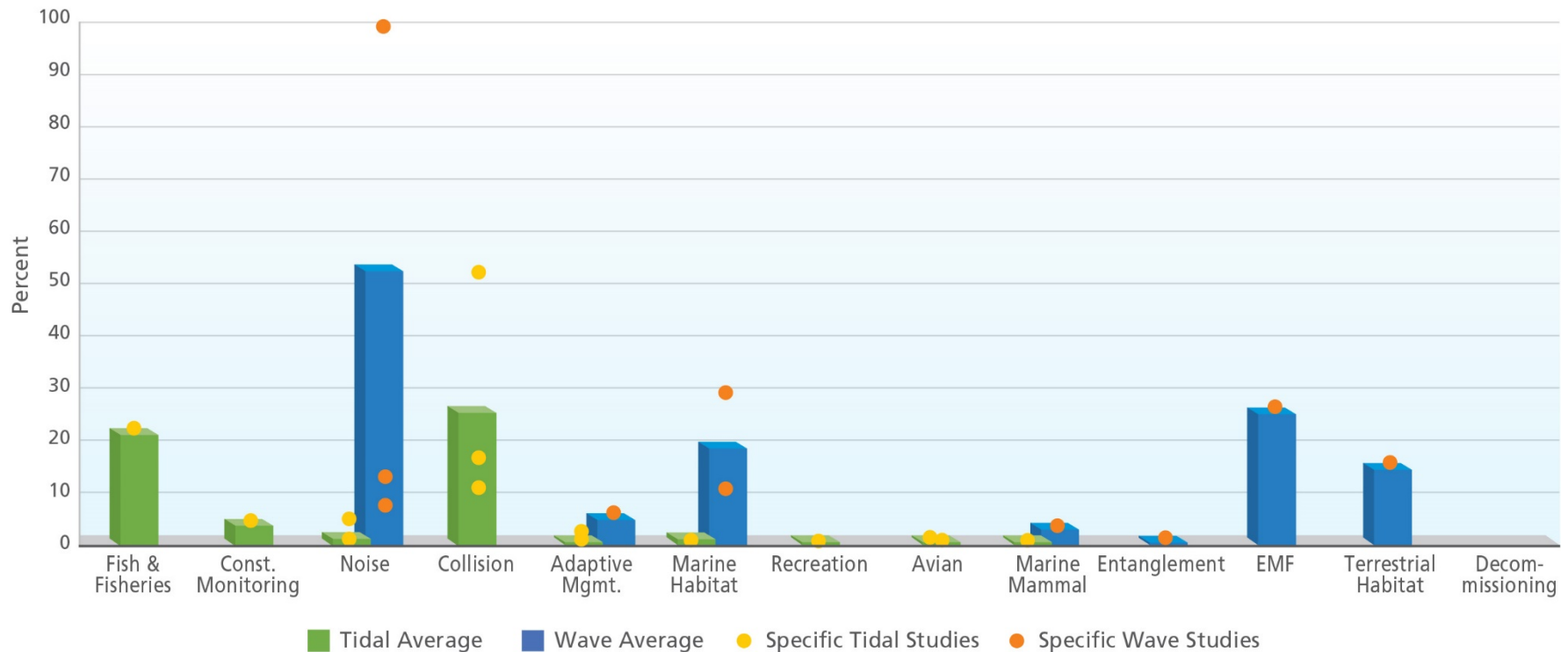


Monitoring-Compliance for Tidal and Wave Projects

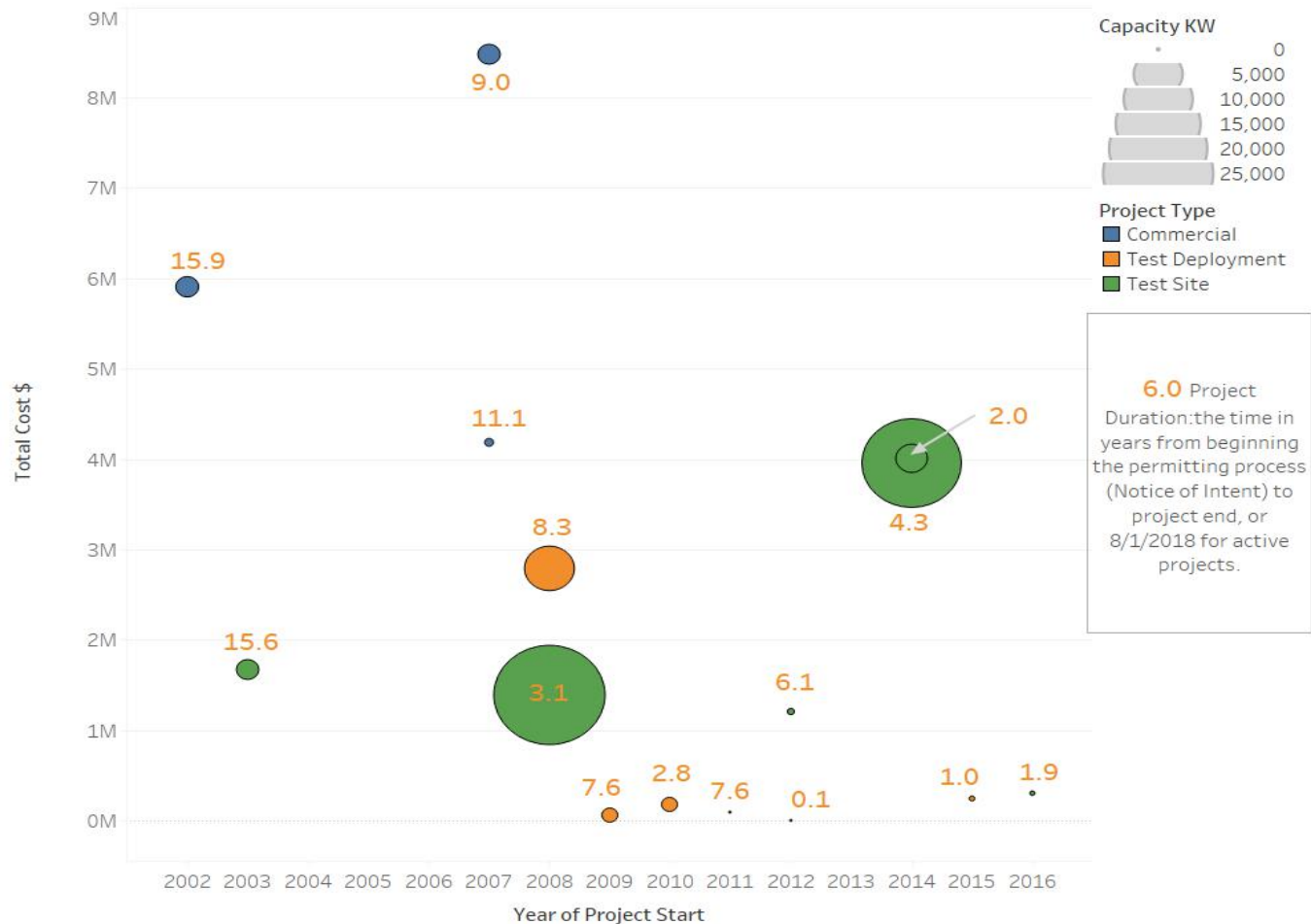
Average Monitoring & Compliance Cost across All Studies

Grouped by Power Generation Type (Tidal and Wave)

Tidal sorted high to low - includes all three deployment types



Total Permitting and Compliance Cost by Project With Start Date and Capacity



Preliminary Cost Reduction Pathways Suggestions

- Pre-Permitted Test Facilities with Operational Envelope
- Adaptive Management
 - Mechanism to narrow study scope
 - Helps retire risk
 - Enables devices in the water sooner
- Progressive Deployment
 - One or a few in the water; gradually more reduces future permitting costs through learning
- Increase Opportunities to “Get in the Water”
 - In water experience reduces risk, improves design
- Consider Policies for Small, Temporary Deployments, Progress to Permanent
 - Massachusetts allows this if no impacts are realized
- Enhanced Agency Coordination (within projects, across projects)
- Encourage Government, Academic Site Specific Research Before Licensing and During Compliance
- Data Sharing – Studies, Monitoring and Adaptive Management Plans from Projects

Next Steps (make bullets blue)

- Continue to Fill Data Gaps
- Quantitative and Qualitative Data Analysis
- Preliminary Cost Reduction Pathways Roadmap
- IMREC Spring 2019 (save the date!)
- Webinar
- Final Report, with Final Cost Reduction Roadmap

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Questions?



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