

Small Hydroelectric
renewable power generation

NLine Energy: MCWRA Small Hydropower Workshop

March 22, 2013



Agenda

- About NLine Energy
- Technologies
- Environmental
- Regulatory
- Interconnection
- Tariffs, Finance & Grants
- Comments & Questions





NLine Energy:

What We Do

- Small hydropower development company
 - *“With an integrated product and full-service development approach, we harness wasted energy found in man-made conveyance systems that create cost-effective renewable electricity, increase system efficiency and offset greenhouse gas emissions for California water agencies”*
- Headquartered in El Dorado Hills, California
- Service-disabled, veteran-owned small business
- Class A General Engineering contractor
- MCWRA member
- NHA Small Hydro committee co-chair
- ACWA Approved Preferred Provider for Small Hydro (competitive RFQ)



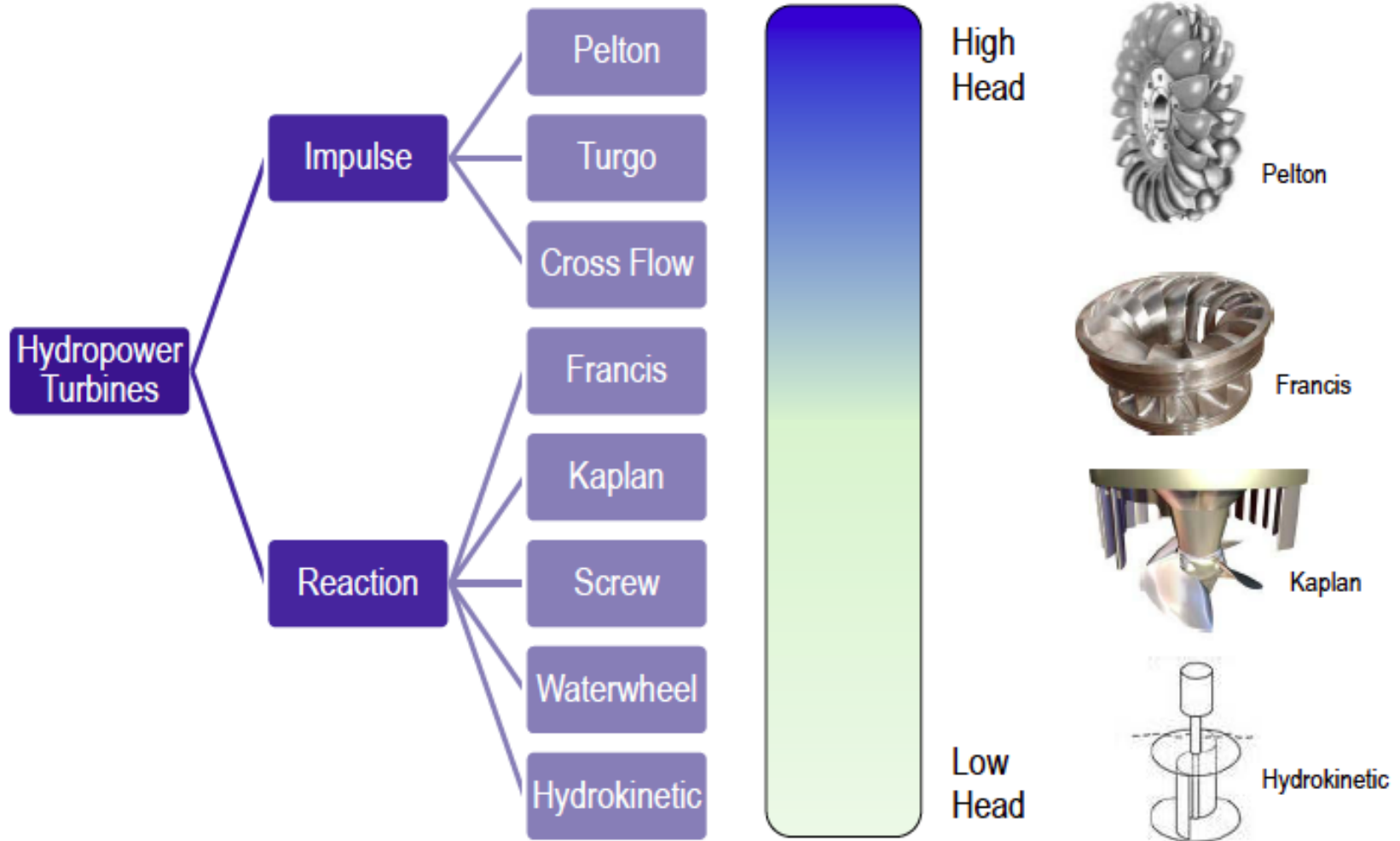
Hydropower Technology

“Tidbits”

- Proven technologies
- Long-term service life
- High efficiencies
- Low maintenance costs
- Newer technologies
 - “Off-the-Shelf” vice custom built
 - Smaller
 - Modular
 - Intelligent
 - Less civil costs
 - Cost effective



Traditional Hydropower Turbine Technologies



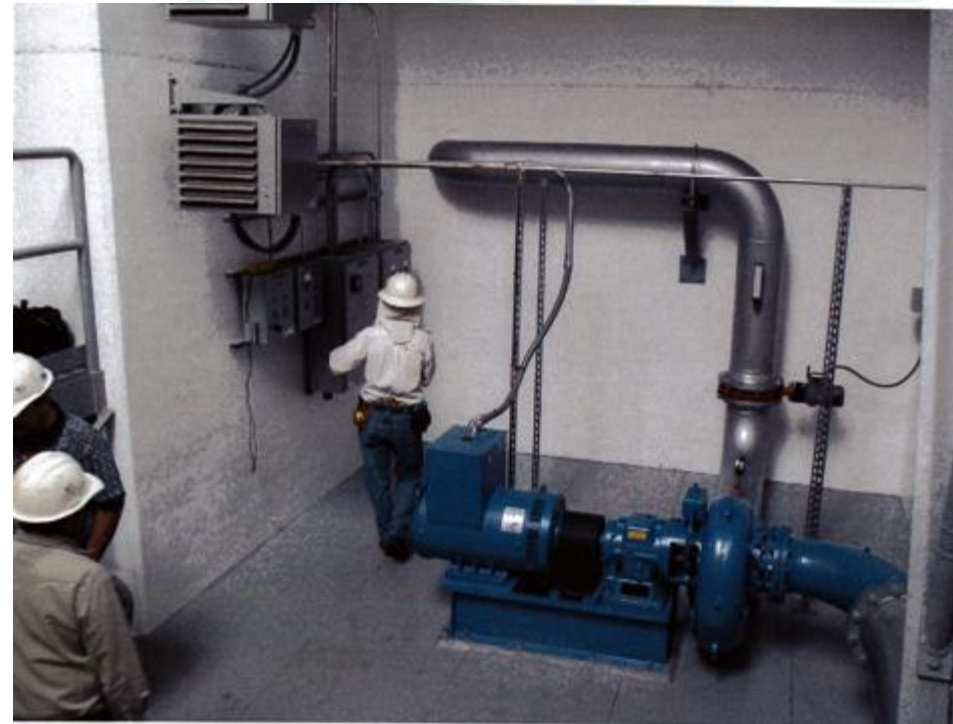
High-Head Turbine Technologies

- Pressure reducing valves/vaults, energy dissipation devices, sleeve valves, turnouts, etc.
- Minimum average flow >4 cfs
- Minimum head differential >150 feet
- Operates 35-100% annually



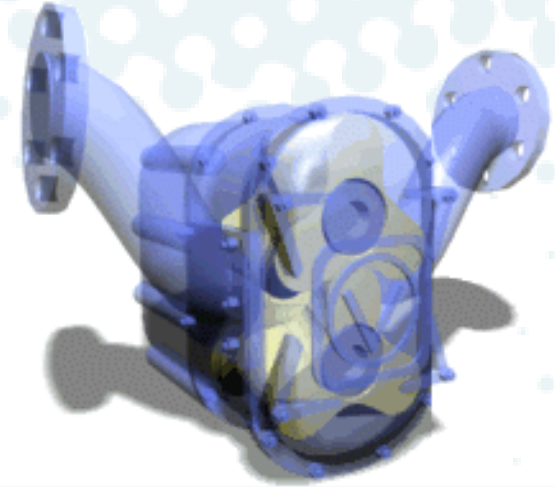
Pump-As-Turbines

- “Pumps in reverse”
- High efficiencies
- Narrow operating envelopes
- Cost effective



Zeropex Difgen

- Volumetric displacement turbine
- Reversible pump / turbine
- Maintain upstream and downstream pressure



Low-Head Turbine Technologies

- Canals, check structures, dam/reservoir environmental flows, spill, large diameter transmission lines, etc...
- Head >3 feet, but <150 feet
- Flows >50 cfs
- Operation during irrigation season or other flow regime



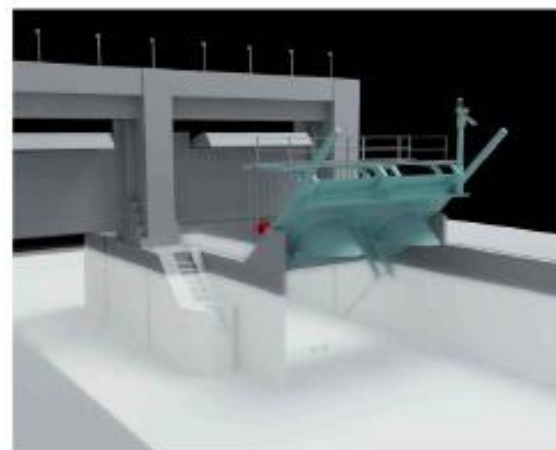
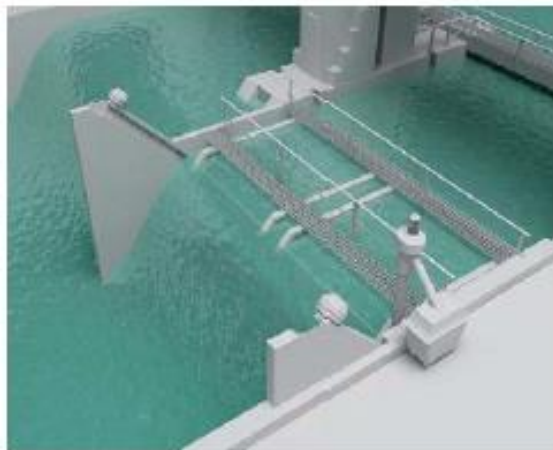
M2J Technologies: Very Low Hydro (VLH)



Submerged VLH in Working Position



VLH in Withdrawn Maintenance Position



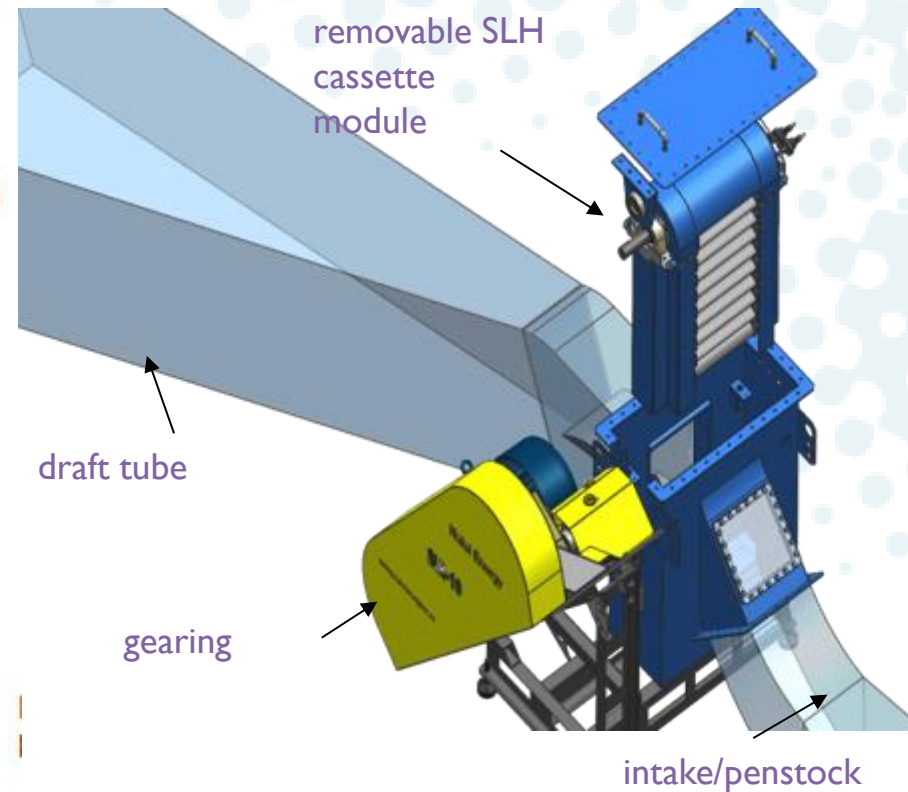
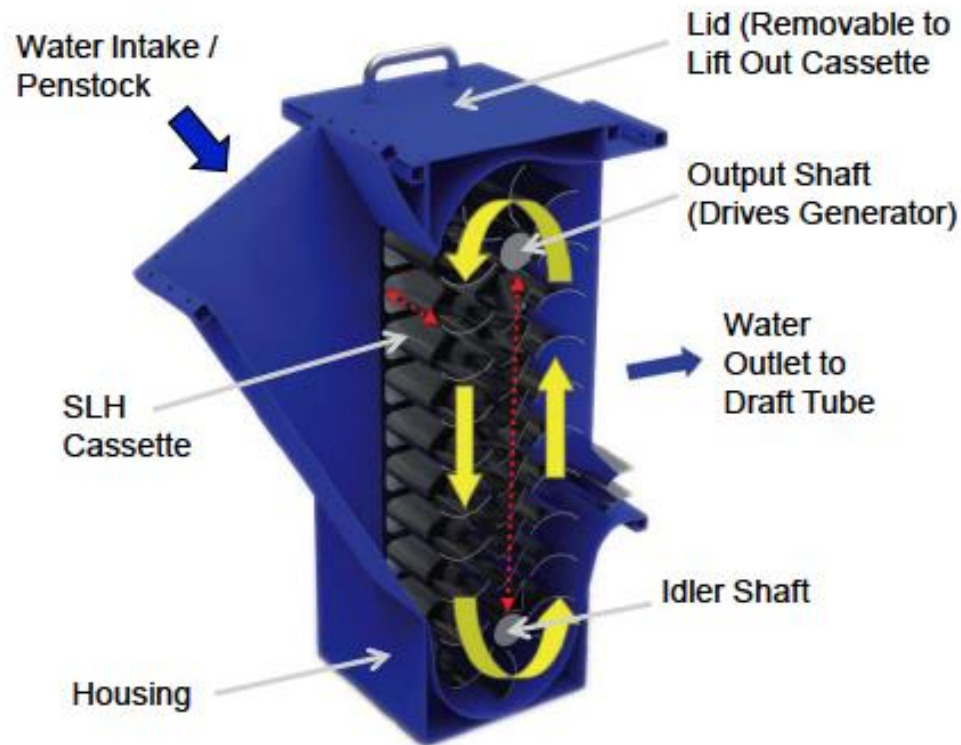
Ritz-Atro Archimedes Screw Turbine



Project name:	Loccioni	Loccioni, Italy
Electric output:	2x 7kW	
Height of fall:	1m	=3.281 ft
Capacity:	2x 1000l/s	=2x 22.8 MGD
Screw diameter:	2,2m	=7.2 ft



Natel Energy's HydroEngine

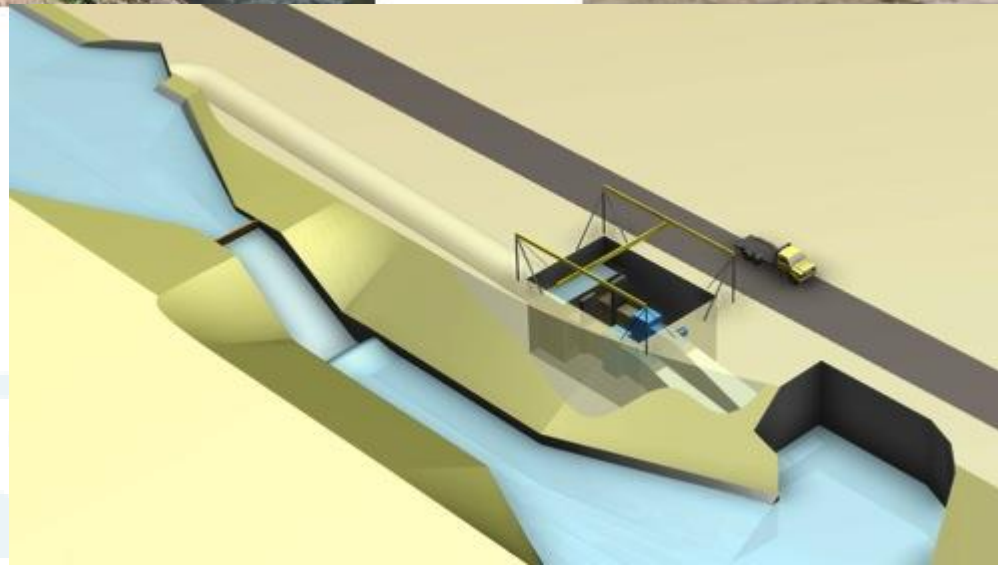


Natel Energy: Configurations

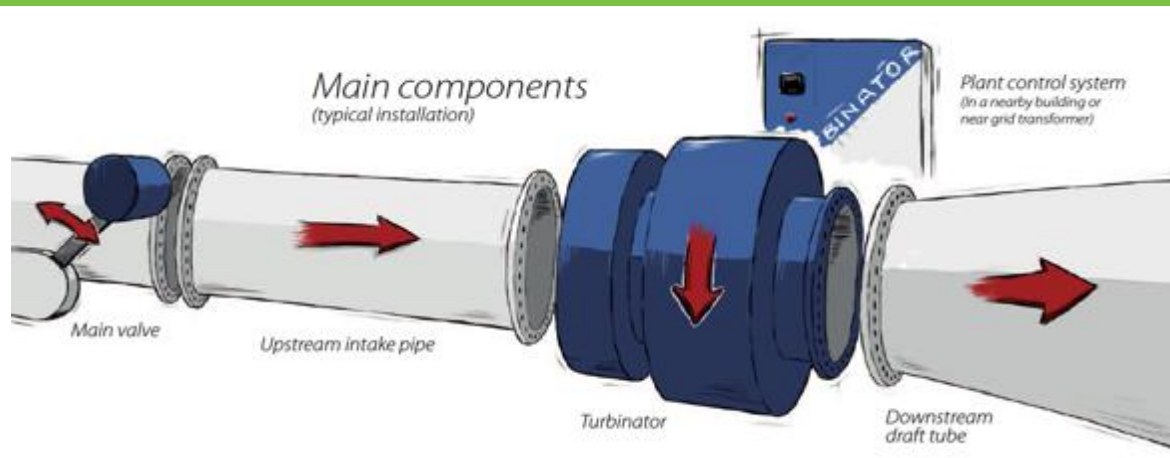
Before



After



CleanPower

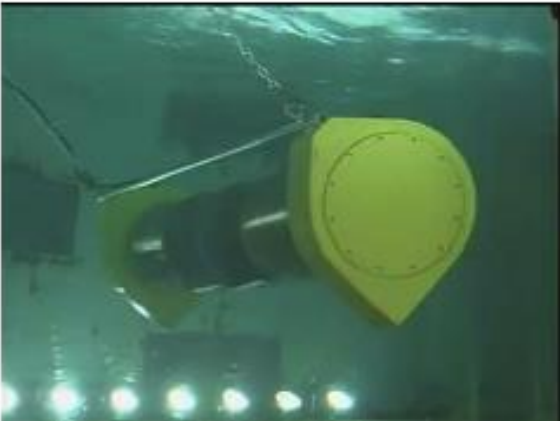
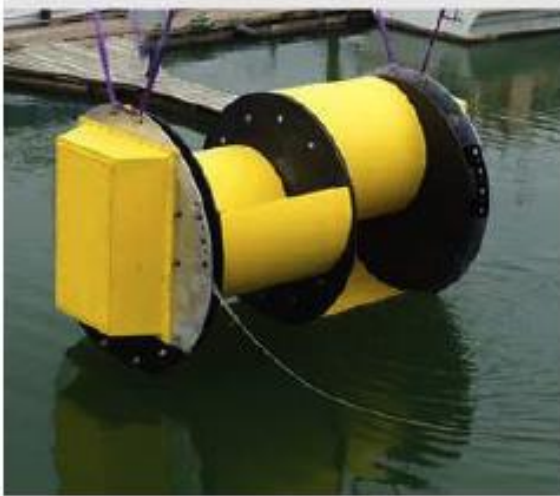


Hydrokinetic Turbine Technologies

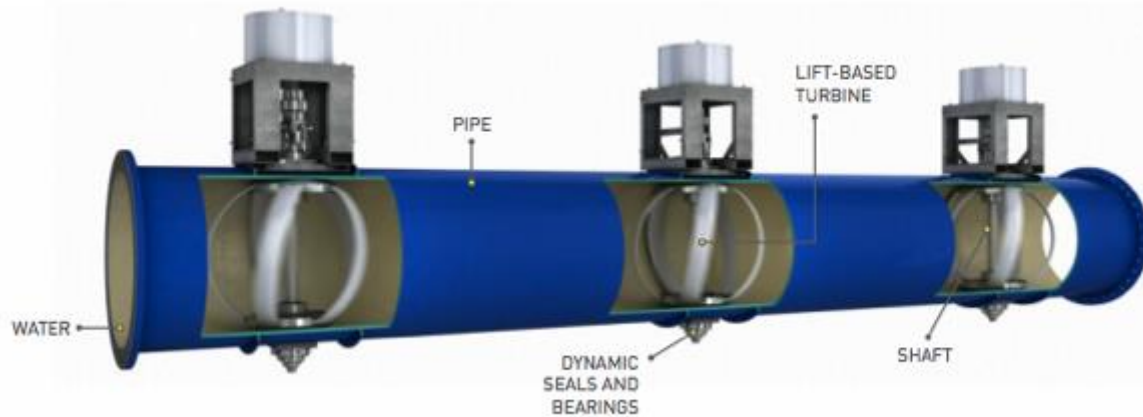
- Canals, rivers, tidal pools, effluent drops, transmission pipelines, etc...
- Head <12 feet or N/A
- Velocity, rather than flow



Hydrovolts



Lucid Energy's PowerPipe



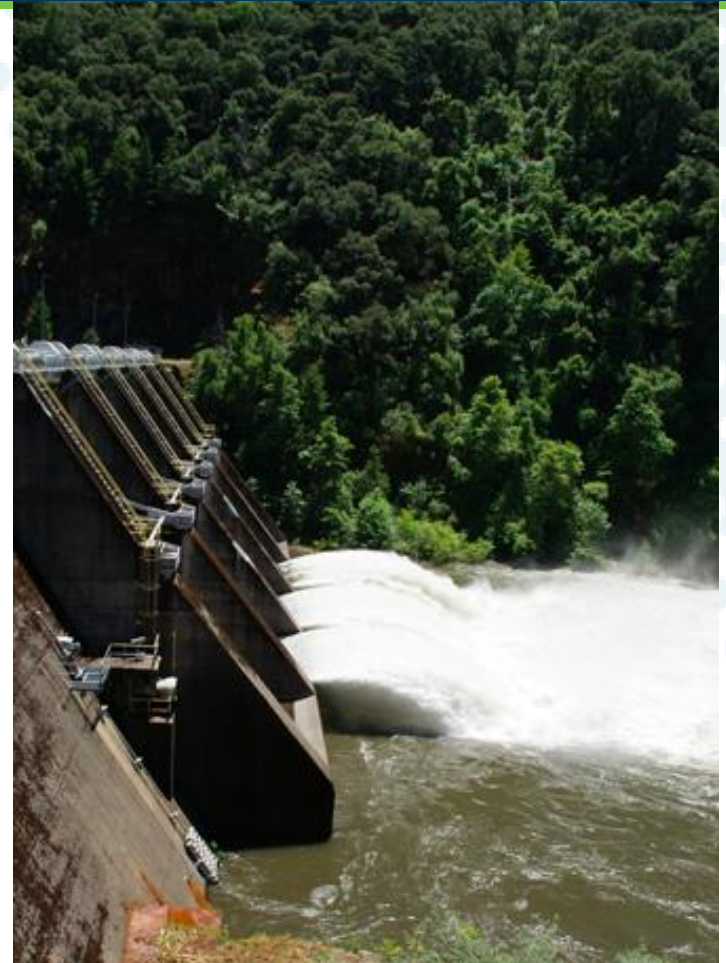
Environmental: CEQA

- Categorical Exemption
 - Title 14 CA Code of Regulations, Chap 3, Art. 19, Sec. 15328:
Categorical Exemption for small hydroelectric projects at existing sites
 - <5 MWs
 - Will not change flow regime in stream, canal or pipeline



Regulatory: FERC Exemptions

- FERC Exemptions
 - Small hydropower
 - <5 MWs
 - Existing dam or natural water feature
 - Conduit Exemptions
 - <40 MW for municipal projects
- HR 267 – Ease process, timeline and costs for exemption



Interconnection

- Rule 21 Interconnection overhaul
 - Clear timelines & fast track process for <3 MWs
 - Defined eligibility
 - Codified study tracks
 - Cost certainty
- But....
 - If you miss a timeline or deliverable, you are bounced out of the queue
 - Utility may ask for upgrade funds
 - Not fully implemented at CPUC



Tariff Options

	On-Site Use	Net-Energy Metering	RES-BCT “Aretha Franklin”	Feed-in Tariff (Re- MAT)	Renewable Auction Mechanism	3 rd Party Sale
Limits	N/A	N/A	5 MW	1.5-3 MW	3-20 MW	N/A
Price	Best	Good	Varies	Varies	TBD	TBD
Incentives	SGIP	SGIP	SGIP*	N/A	N/A	Varies*
RECs	Retain	Retain	Retain	Lose	Lose	Lose*
Term	N/A	N/A	N/A	10,15, 20, 25 years	20 years	TBD

Financing

- Cash / Reserve Account
- Bonds
- State/Federal loans
- Privately-placed debt
- PPA / Lease



Grants & Subsidies

- **Federal**
 - DoE
 - US Treasury Investment Tax Credit / Production Tax Credit
 - Bureau of Reclamation
 - US Department of Agriculture
- **California**
 - Self-Generation Incentive Program
 - CEC EPIC
 - DWR
- **Local**



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