Small Hydro Perspective in The USA

Boualem Hadjerioua: United States of America

International Energy Agency (IEA) 2013: Tokyo, Japan
There are about 1150 hydropower plants in the U.S. (~50%) with installed capacity between 1-30 MW, in which around 700 (60%) have capacity between 1-5 MW. The total installed capacity for hydropower plants with installed capacity less than 30 MW is 8.1 GW (~10% of the U.S. total).

Source: EIA
Small hydropower has long been developed in the U.S., but still thousands of small hydro sites remain untapped; many of them are technically and environmentally feasible, but current tariffs and incentives may not provide a financially viable life cycle pro forma. With improved technology, government regulation streamlining, and recognition of carbon and fuel cost, this will improve.
March 2011, Reclamation released a report “Hydropower Resource Assessment at Existing Reclamation Facilities”
http://www.usbr.gov/power/AssessmentReport/index.html

http://nhaap.ornl.gov/content/non-powered-dam-potential

March 2012, Site Inventory and Hydropower Energy Assessment of Reclamation Owned Conduits
http://www.usbr.gov/power/AssessmentReport/index.html

http://nhaap.ornl.gov/nsd

There are other small hydropower development opportunities:

- Existing pipelines
- Water treatment/discharge/cooling plant
- Existing canals
The development of small hydro creates jobs in rural areas and could lead to substantial new distributed, base-load, emissions-free renewable energy generation.

Small hydro presents a substantial, largely-untapped opportunity for economic development throughout the nation.

Small hydro is particularly significant as an economic development opportunity for rural areas.

The *FERC process could be burdensome for very small projects.

In recent years, *FERC has made a valiant effort to improve the accessibility of information regarding small hydro permitting requirements.

An on-going effort is taking place to address this problem by FERC to streamline the current permitting framework for small hydro.

*Federal Energy Regulatory Commission
Hydropower Life-Cycle Costs

Where cost could be reduced?
New Technologies can help reduce costs
Several of the hydropower benefits are not account for

- **Development and Construction Stage**
  - Investment tax credit/grant

- **Operation and Maintenance Stage**
  - Energy production revenue
  - Ancillary services revenue
  - Capacity revenue
  - REC sales revenue
  - Federal incentives: PTC, MACRS, CREB
  - State performance-based incentives

- **End-of-Life Stage**
  - Non-hydropower benefits: Irrigation, water supplies, flood control, navigation, recreation
  - Residual value of project
Low Hanging Fruits

- Existing canals & pipelines
- Industrial facility discharges
- Water & wastewater treatment discharges
- Existing Non-Powered Dams

Small hydro projects typically take advantage of existing infrastructure to minimize environmental impact.
Natural Gas-low cost thermal power plant & fuel for USA Market

- USA Natural Gas supply is plentiful
- USA Natural Gas futures are below or about $4 per thousand

Natural Gas simple cycle and combined cycle plants:
- Located strategically
- Can be permitted
- Construction schedule and cost is predictable
- Reduced transmission needed.
What Makes a Project financeable?

- Conventional, proven technology
- Long Term PPA and Interconnection Agreement; Payment Guarantee Needed
- Pro Forma with a satisfactory ROI; with adequate contingency for generation risk events
- Owner balance sheet & track record
- Bankable EPC contractor & engineer

PPA: Power Purchase Agreement
ROI: Return on Investment
EPC: Engineering Procurement Construction
Some deal killers and challenges

- Social controversial issues
- Environmental issues
- Endangered species
- Political issues
- Agency issues
- Ownership issues
- Tax issues
- Payment issues
- Resource issues

- Unprofessional behavior
- Poor contract terms
- Risk apportioned improperly
- Under capitalized owner
- Equipment issues
- Labor issues
- Material issues
Some Common International Issues

- Price
- Contract Terms
- Delivery
- Payment
- Claims & Process
- Culture
- Taxes, Hidden Taxes
- Import Duties
- Shipment Damage
- Receiving Damage
- Political Issues
- Corruption
- Unfair Trade Practices
- Temporary Storage
- Repair
- Warranty
- Insurance
- Force Majeure
- Work Visas
- Site & Personnel Security
- Project & Land Ownership
- Other
What Counts in the 2013 World?

- Long Term Power Purchase Agreement
  - Good initial power rates
  - Power rate escalation
  - Payment terms guaranteed
- Reasonable Interconnection Agreements
- Acceptable Country & Political Risk
- Currency Repatriation & Tax Holidays
- Competitive EPC Contract pricing with financing option
- Incentives

It is all about satisfy the minimum requirements and ROI
Thank you for your attention

Presenter Contact information:

Boualem Hadjerioua, Oak Ridge National Laboratory, ORNL, hadjeriouab@ornl.gov