

# Renewable Energy Toolkit

*a work in progress*

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*Cora Dickson, Senior International Trade Specialist  
Office of Energy and Environmental Industries*



The U.S. Environmental Solutions Toolkit is a buyer's resource guide that marries EPA expertise on solving environmental challenges with a catalogue of U.S. providers of related technologies. The U.S. Environmental Solutions Toolkit supports the President's National Export Initiative by fostering export opportunities for the U.S. environmental industry as well as advancing environmental protection goals.

**Disclaimer:** The information on this website is intended to assist buyers seeking to identify U.S. businesses providing technologies designed to solve the designated environmental challenge under which they are listed. Any business in this industry sector may request listing by contacting the International Trade Administration (ITA) at [envirotech@trade.gov](mailto:envirotech@trade.gov) and submitting the required information. The list is not exhaustive of all U.S. businesses in this sector. Listing does not constitute endorsement of the business or its products, services or technology by ITA. ITA has performed limited due diligence; but recommends strongly that parties perform their own due diligence, investigation, and background research before entering into a commercial relationship with any listed business or business contact facilitated through this product. ITA assumes no responsibility or liability for the actions users may take based on the information provided. ITA reserves the right not to list any particular business.

**Environmental Issue**

Select an option

**EPA Regulation**

Select an option

**Solution**

Select an option

**U.S. Solution Provider**

Select an option

# Next Generation Industry Toolkits

- Industry Toolkits being produced for Environmental Technologies, Renewable Energy, Smart Grid, Civil Nuclear, Oil & Gas and Aerospace
- Will enhance ITA's client engagement, export promotion and metrics tracking
- Easily scalable to other industry sectors

1. **Toolkit Website** – U.S. exporters apply to be included in the provider directory. Buyers search for U.S. solution providers (products and services)
2. **Application** – U.S. company visits a toolkit on the export.gov industry website, and applies to be listed in the solution provider directory
3. **Vetting** – U.S. company collaborates with industry specialists and USEAC staff on reviewing its application
4. **Account Management** – U.S. company manages its company and solutions information. Buyer manages its company info and contacts
5. **Matchmaking** – Buyers sign on to their accounts to view company's sales and contact information. Contact is made through Salesforce, and facilitated by USEAC, commercial, and industry specialists
6. **Translation:** Toolkit interface and data can be presented in Arabic, English, Russian, French, Mandarin, Spanish and Portuguese
7. **Metrics** – U.S. companies provide regular updates to ITA on outcome of contacts from potential buyers generated via the Toolkit as requirement for Toolkit membership

# Development of RE Taxonomy

## Consulting with:

- Industry associations
- U.S. Department of Energy experts
- Exhibitors at Conferences

## Coordinating with OCIO

- Usability of the registration process
- Search parameters that make sense to the international buyer

## Structure based on “Project” type

- Trade leads from Commercial Service tend to be “project focused” and based on a type of renewable energy resource
- Buyer’s HQ and/or nationality less important than location of the project
- Equipment, services tend to vary based on project type
- T&D, energy storage solutions will be located in the Smart Grid toolkit

## Beta testing

- June time frame
- Seeking participants via advisory committees, associations, etc.

# Renewable Energy Toolkit

Solar

Wind

Geothermal

Biomass Power

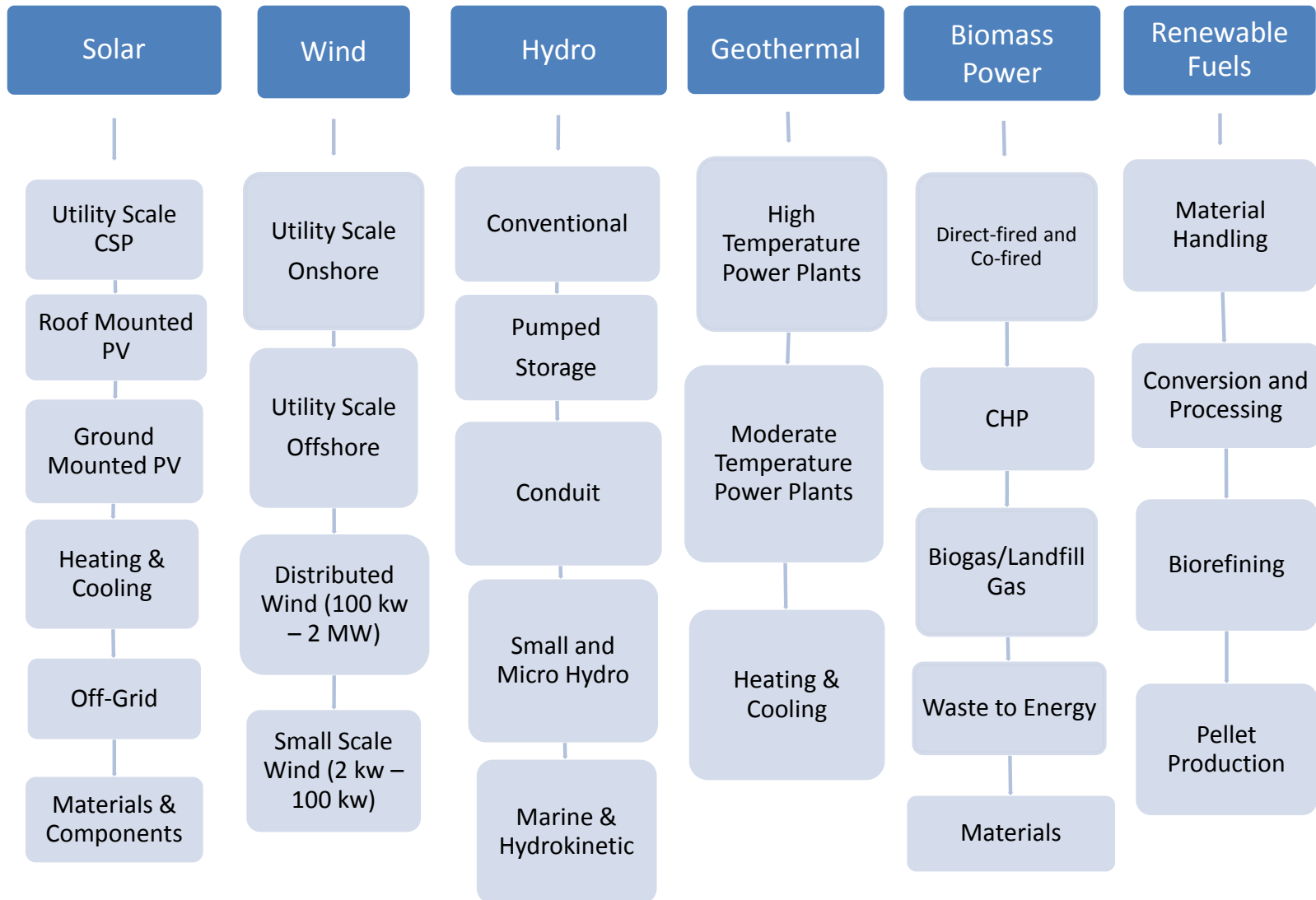
Hydro & Marine

Renewable  
Fuels

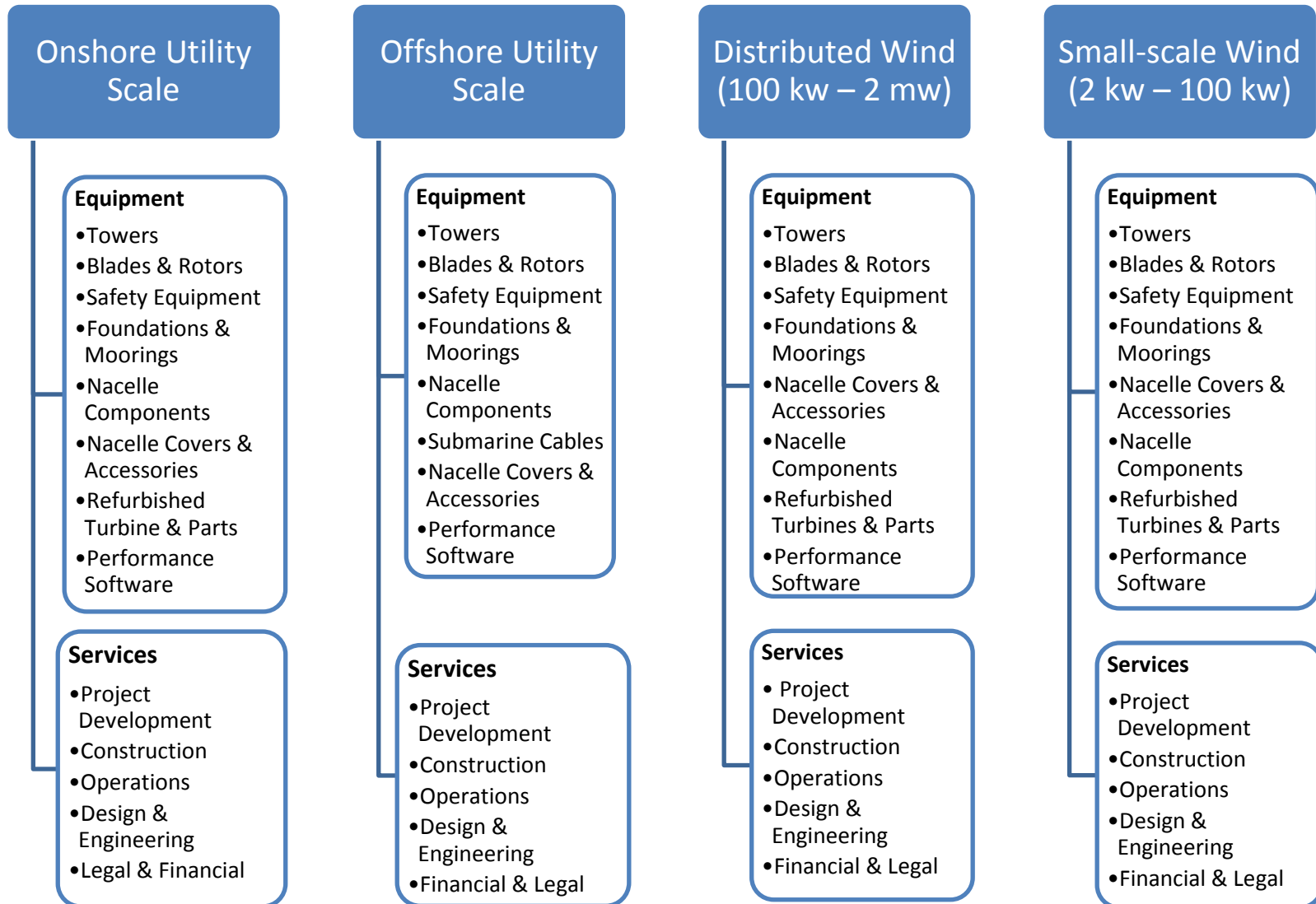
For each module, buyers can search by:

- Equipment,
- Services, or
- Equipment AND services

## PROJECT TYPES UNDER EACH SECTOR MODULE



# INDUSTRY TOOLKIT: WIND PROJECT TYPES



## WIND EQUIPMENT

After selecting the categories of equipment, companies will be provided these options or they can specify “other.” Additional options will be added during beta version testing.

### **Onshore Utility Scale**

Towers – Segmented steel, concrete, pre-cast concrete, steel lattice, hybrid, guyed poles

Blades & Rotors – Horizontal axis blades

Safety Equipment – Lighting, fall prevention, lifts, climb assists

Foundations & Moorings – Plate, shallow, pile

Nacelle Components– Generators, motors, bearings, gearboxes, couplings, hydraulic systems, brakes, shafts, yaw motors & drives, hubs

Nacelle Covers & Accessories – Fiberglass covers, carbon fiber covers, wind vanes, anemometers

Refurbished Turbines & Parts – Towers, blades & rotors, nacelle components, nacelle covers & accessories

Performance Software – Component modeling, aerodynamics analysis, wind prediction & reaction, system monitoring

### **Offshore Utility Scale**

Towers – Segmented steel, concrete, pre-cast concrete, steel lattice, hybrid, guyed poles

Blades & Rotors – Horizontal axis blades

Safety Equipment – Lighting, fall prevention, lifts, climb assists

Foundations & Moorings – Gravity anchors, mono pile anchors, tripod anchors, suction bucket anchor, jacket anchor, floating anchor

Nacelle Components– Generators, motors, bearings, gearboxes, couplings, hydraulic systems, brakes, shafts, yaw motors & drives, hubs

Nacelle Covers & Accessories – Fiberglass covers, carbon fiber covers, wind vanes, anemometers

Refurbished Turbines & Parts – Towers, blades & rotors, nacelle components, nacelle covers & accessories

Performance Software – Component modeling, aerodynamics analysis, wind prediction & reaction, system monitoring



## WIND EQUIPMENT (CONTINUED)

### **Distributed Wind (100 kw – 2 MW)**

Towers – Segmented steel, concrete, pre-cast concrete, steel lattice, hybrid, guyed poles

Blades & Rotors – Horizontal axis blades

Foundations & Moorings – Plate, shallow, pile

Safety Equipment – Lighting, fall prevention, lifts, climb assists

Nacelle Components – Generators, motors, bearings, gearboxes, couplings, hydraulic systems, brakes, shafts, yaw motors & drives, hubs

Nacelle Covers & Accessories – Fiberglass covers, carbon fiber covers, wind vanes, anemometers

Refurbished Turbines & Parts – Towers, blades & rotors, nacelle components, nacelle covers & accessories

Performance Software – Component modeling, aerodynamics analysis, wind prediction & reaction, system monitoring

### **Small-scale Wind (2 kw – 100 kw)**

Towers – Concrete, pre-cast concrete, steel lattice, hybrid, guyed poles

Blades & Rotors – Horizontal axis and vertical axis blades

Foundations & Moorings – Plate, shallow, pile

Safety Equipment – Lighting, fall prevention, lifts, climb assists

Nacelle Components – Generators, motors, bearings, gearboxes, couplings, hydraulic systems, brakes, shafts, yaw motors & drives, hubs

Nacelle Covers & Accessories – Fiberglass covers, carbon fiber covers, wind vanes, anemometers

Refurbished Turbines & Parts – Towers, blades & rotors, nacelle components, nacelle covers & accessories

Performance Software – Component modeling, aerodynamics analysis, wind prediction & reaction, system monitoring

## WIND SERVICES

After selecting the categories of equipment, companies will be provided these options or they can specify “other.” Additional options will be added during beta version testing.

**Project Development** – Siting & staging, strategic planning, surveys and analysis, environmental evaluations & statements

**Construction** – materials and services, transport & shipping, set up, supervision & management, component placement

**Operations** – site services, management, advanced engineering, advanced technology, performance monitoring, maintenance, inspection

**Design & Engineering** – Resource assessment, mapping, turbine sizing & selection, turbine design, energy yield assessment, feasibility studies, conceptual design, civil engineering

**Legal & Financial** – Interconnectivity, permitting, negotiations, contract procurement, financial modeling, cost planning, licensing

## REGISTRATION – MANUFACTURER EXAMPLE

Your company wishes to export:  Goods  Services

Manufacturer must register separately for each sector and project type if its equipment can be used in multiple sectors or multiple types of projects

Select one:

Solar  Wind  Hydro  Geothermal  Biomass  Renewable Fuels

Select project type:

Onshore Utility Scale  Offshore Utility-Scale  Distributed  Small Scale

Select equipment category:

Towers  
 Blades & Rotors  
 Safety  
 Foundations & Moorings  
 Nacelle Components  
 Nacelle Covers & Accessories  
 Performance Software

### Specific Products - Check all that apply:

gravity anchors  
 mono pile anchors  
 tripod anchors  
 suction bucket anchor  
 jacket anchor  
 floating anchor

Manufacturer does NOT have to register each product that it offers in the category

## REGISTRATION – SERVICE PROVIDER EXAMPLE

Your company wishes to export:  Goods  Services

Service provider must register separately for each sector and project type according to their service category

Select one:

Solar  Wind  Hydro  Geothermal  Biomass Power  Waste to Energy

Select project type:

Onshore Utility Scale  Offshore Utility-Scale  Distributed  Small Scale

Select service category:

Project Development  
 Construction  
 Operations  
 Design & Engineering  
 Financial & Legal

### Specializations - Check all that apply:

Interconnectivity  
 Permitting  
 Negotiations  
 Contract Procurement  
 Financial Modeling  
 Project Finance

## BUYER'S SEARCH OPTIONS: STEP 1

Sector

Select an option

Project Type

Select an option

Solar, Wind, Hydro,  
Geothermal, Biomass  
Power, Renewable Fuels

Equipment and services may vary according to the type of project. For example, towers for onshore, offshore, and small wind are different. Thus, the buyer must choose project type before proceeding to the next search stage.

## BUYER'S SEARCH OPTIONS: STEP 2

Equipment or Material Solution

Select an option

Service Solution

Select an option

Product or Specialization

Select an option

U.S. Solution Provider

Select an option

Find Solutions

Clear

Equipment and Service Categories from the sector will be displayed in the pull down menus. Products and specializations will filter accordingly

# BUYER'S SEARCH RESULTS: EXAMPLE

## Project Type

Wind: Offshore

- A paragraph describing salient features of the project type
- Link to the Smart Grid toolkit for energy storage, transmission equipment, etc. as relevant

Products and Services selected by the company (associated with the solution category) will be listed in 3<sup>rd</sup> column

Clicking on the company will bring up contact card; buyer can submit contact request via a form that also notifies ITA field offices

### Additional Information

Link to DOE page about offshore wind

Link to trade association page

## Solutions and Providers

Solution Category

Development

These links specific to project type will be offered to buyer after the contact form has been submitted

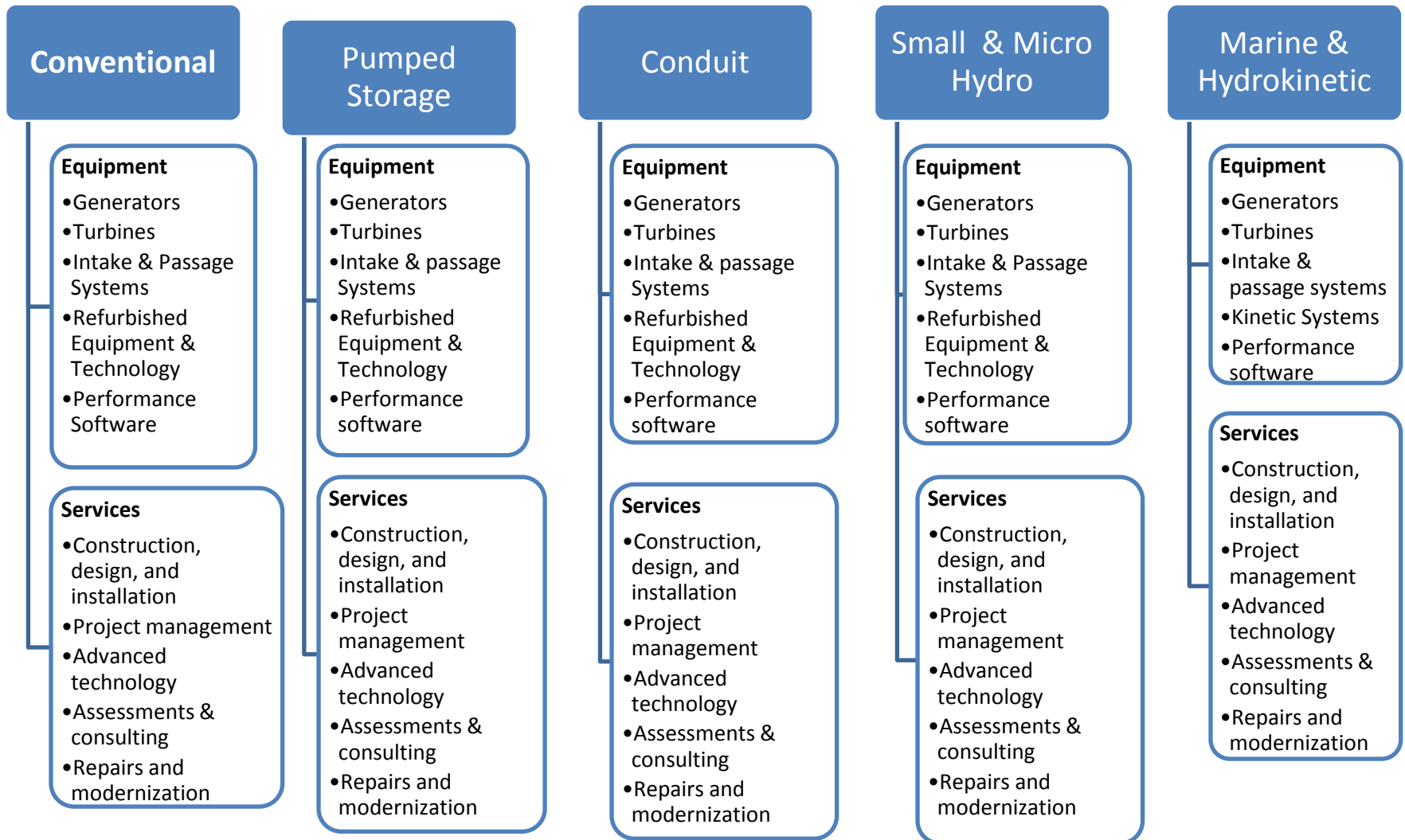
### Providers

- Adanta, Inc.
- AEEC
- AMO Environmental Decisions
- AMS, Inc.
- Cardno FRI

### Products/Services

Consulting, Financial Siting & Staging

# INDUSTRY TOOLKIT: HYDRO PROJECT TYPES





# HYDRO EQUIPMENT

Category examples such as the ones below will be provided on the top page for the module. Company will specify these details in their description. (red indicates categories/equipment unique to the project type)

## Conventional Hydropower

Generators – Synchronous generators & parts, Induction generators & parts, Vertical type generators & Safety Equipment

Turbines – Governors, Kaplan turbine & parts, Francis turbine & parts, Pelton turbine & parts, Tubular turbine & parts, Inclined-Jet Turbine & parts, Cross-flow turbines & parts, Propeller turbines & parts, Straflo turbines & parts, Archimedean screw

Intake & passage systems - Gates, hydraulic systems, penstocks, spillways, fish passage

Refurbished Equipment & Technology – Bearings, turbine parts, generator parts, intake, piping, controls, coating & sealant, gates, rings, nozzles

Performance Software – Controls, operations analysis, prediction & reaction technology, system monitoring

## Pumped Storage

Generators - Synchronous generators & parts, induction generators & parts, vertical type generators & parts

Turbines – Governors, **Reversible pump turbine & parts**, Inclined-jet turbine & parts, tubular turbine & parts, Pelton turbine & parts, Francis turbine & parts, Kaplan turbine & parts, Staflor turbine & parts, cross-flow turbine & parts

Intake & passage systems - Gates, hydraulic systems, penstocks, spillways, fish passage

Refurbished Equipment & Technology – Bearings, turbine parts, generator parts, intake, piping, controls, coating & sealant, gates, rings, nozzles

Performance Software – Controls, component modeling, operations analysis, prediction & reaction, system monitoring

## Conduit Hydropower

Generators - Vertical type generators & parts, horizontal type generators & parts, induction generators & parts, synchronous generators & parts

Turbines - Governors, Kaplan turbine & parts, Francis turbine & parts, zero head turbine & parts, in-stream turbine & parts, Pelton turbine & parts, tubular turbine & parts, inclined-jet turbine & parts, cross-flow turbine & parts, Straflo turbine & parts, kinetic turbine & parts, Archimedean screw & parts

Intake & passage systems - Gates, screens, penstocks, spillways, fish passage

Refurbished Equipment & Technology – Bearings, turbine parts, generator parts, intake, piping, controls, coating & sealant, gates, rings, nozzles

Performance Software – Controls, component modeling, operations analysis, prediction & reaction, system monitoring

## HYDRO EQUIPMENT (Continued)

### Small Hydro

Generators - Synchronous generators & parts, induction generators & parts, vertical type generators & parts, horizontal generators & parts

Turbines - Governors, Open-flume Francis turbine & parts, spiral-case Francis turbine & parts, propeller turbine & parts, Kaplan turbine & parts, cross-flow turbine & parts, zero head turbine & parts, in-stream turbine & parts, Archimedean screw & parts

Intake & passage systems - Gates, screens, siphon intake, spillways, penstocks

Refurbished Equipment & Technology – Bearings, turbine parts, generator parts, intake, piping, controls, coating & sealant, gates, rings, nozzles

Performance Software – Controls, component modeling, operations analysis, prediction & reaction, system monitoring

### Marine & Hydrokinetic Power

Generators - Vertical type generator & parts, horizontal type generator & parts, induction generator & parts, synchronous generator & parts

Turbines - Governors, Kaplan turbine & parts, Francis turbine & parts, zero head turbine & parts, in-stream turbine & parts, Pelton turbine & parts, tubular turbine & parts, cross-flow turbine & parts, kinetic turbine & parts, propeller turbine & parts

Intake & passage systems - screens, fish passage

Kinetic Systems - Oscillating water columns, attenuators, overtopping devices, point absorbers

Refurbished Equipment & Technology – Bearings, turbine parts, generator parts, intake, piping, controls, coating & sealant, gates, rings, nozzles

Performance Software – Controls, component modeling, operations analysis, prediction & reaction, system monitoring

## HYDRO SERVICES

Category examples such as the ones below will be provided on the top page for the module. Company will specify these details in their description. *(red indicates categories/equipment unique to the project type)*

**Project Management**– Siting & staging, strategic planning, surveys and analysis, environmental evaluations & statements, risk management

**Construction , design, and installation**– Materials and services, component modeling, transport & shipping, component placement, impoundment, underwater construction, cofferdam services, concrete placement, engineering, modeling, pipe fitting & placement

**Operations** – site services, management, advanced engineering, performance monitoring, maintenance, inspection

**Assessment & Consulting**– Resource assessment, mapping, turbine sizing and selection, energy yield assessment, feasibility studies, conceptual design, civil engineering, hydrology

**Advanced Technology** – control replacement and modernization, performance software, monitoring software, digitization, systems optimization

**Legal & Financial** – Interconnectivity, regulatory compliance, permitting, negotiations, contract procurement, financial modeling, cost planning, licensing

**Repairs and Modernization** – Concrete repair, scour & erosion services, underwater repair, turbine repair and replacement, component replacement, corrosion protection & maintenance

# GEOHERMAL MODULE: PROJECT TYPES

## High Temperature Power Plants

### Equipment

- Turbines
- Pumps and Motors
- Vessels
- Heat Exchange Equipment
- Piping Systems
- Electrical – Instrumentation
- Working Fluids
- Abatement Systems
- Safety/Personnel Protection
- Injection Well
- Production Well
- Ancillary Equipment

### Services

- Consulting
- Project Development
- Exploration
- Pre-Construction
- Design
- Siting & Staging
- O&M
- Financial & Legal

## Moderate Temperature Power Plants

### Equipment

- Turbines
- Pumps and Motors
- Vessels
- Heat Exchange Equipment
- Piping Systems
- Electrical – Instrumentation
- Working Fluids
- Abatement Systems
- Safety/Personnel Protection
- Injection Well
- Production Well
- Ancillary Equipment

### Services

- Consulting
- Project Development
- Exploration
- Pre-Construction
- Design
- Siting & Staging
- O&M
- Financial & Legal

## Heating & Cooling

### Equipment

- Ground Loop Systems
- Heat Pumps
- Distribution Unit
- Control Systems

### Services

- Project Development
- Installation
- Service & Maintenance

## GEOTHERMAL EQUIPMENT

After selecting the categories of equipment, companies will be provided these options or they can specify “other.” Additional options will be added during beta version testing.

### **High Temperature Power Plant**

Turbines – steam turbine, binary turbine, speed reducer/gearbox, lubrication systems, replacement box

Pumps and Motors – working fluid pumps, production pumps, injection pumps, cooling water pumps, condensate pumps, chemical treatment pumps, compressors, fans and motors, steam ejectors

Vessels – condensate tanks, steam separators, storage tanks, process vessels and receivers

Heat Exchange Equipment – vaporizer/boilers, shell and tube heat exchangers, air coolers, air-cooled condensers, condenser, cooling tower

Piping Systems – steam pipes (steel), valves and fittings, specialty alloy piping/fitting/valves, insulation, mist separator

Electrical – Instrumentation – generator, controls, circuit breakers, wiring, transformers, instrument sensors, switchgear, motor control center

Working Fluids - refrigerants

Abatement Systems – hydrogen sulfide, corrosion, scaling

Safety/Personnel Protection – above-ground access (ladder, railing, etc.), fire protection systems

Injection Well: well, casing, cement

Production Well: well, casing cement

Ancillary Equipment – Transmission lines, Compressor stations, Electrical substations, Lighting, Fencing

## GEOTHERMAL EQUIPMENT (CONTINUED)

### **Moderate Temperature Power Plant**

Turbines – steam turbine, binary turbine, speed reducer/gearbox, lubrication systems, replacement box

Pumps and Motors – working fluid pumps, production pumps, injection pumps, cooling water pumps, condensate pumps, chemical treatment pumps, compressors, fans and motors, steam ejectors

Vessels – condensate tanks, steam separators, storage tanks, process vessels and receivers

Heat Exchange Equipment – vaporizer/boilers, shell and tube heat exchangers, air coolers, air-cooled condensers, condenser, cooling tower

Piping Systems – steam pipes (steel), valves and fittings, specialty alloy piping/fitting/valves, insulation, mist separator

Electrical – Instrumentation – generator, controls, circuit breakers, wiring, transformers, instrument sensors, switchgear, motor control center

Working Fluids - refrigerants

Abatement Systems – hydrogen sulfide, corrosion, scaling

Safety/Personnel Protection – above-ground access (ladder, railing, etc.), fire protection systems

Injection Well - well, casing cement

Production Well - well, casing cement

Ancillary Equipment– Transmission lines, Compressor stations, Electrical substations, Lighting, Fencing

### **Heating & Cooling**

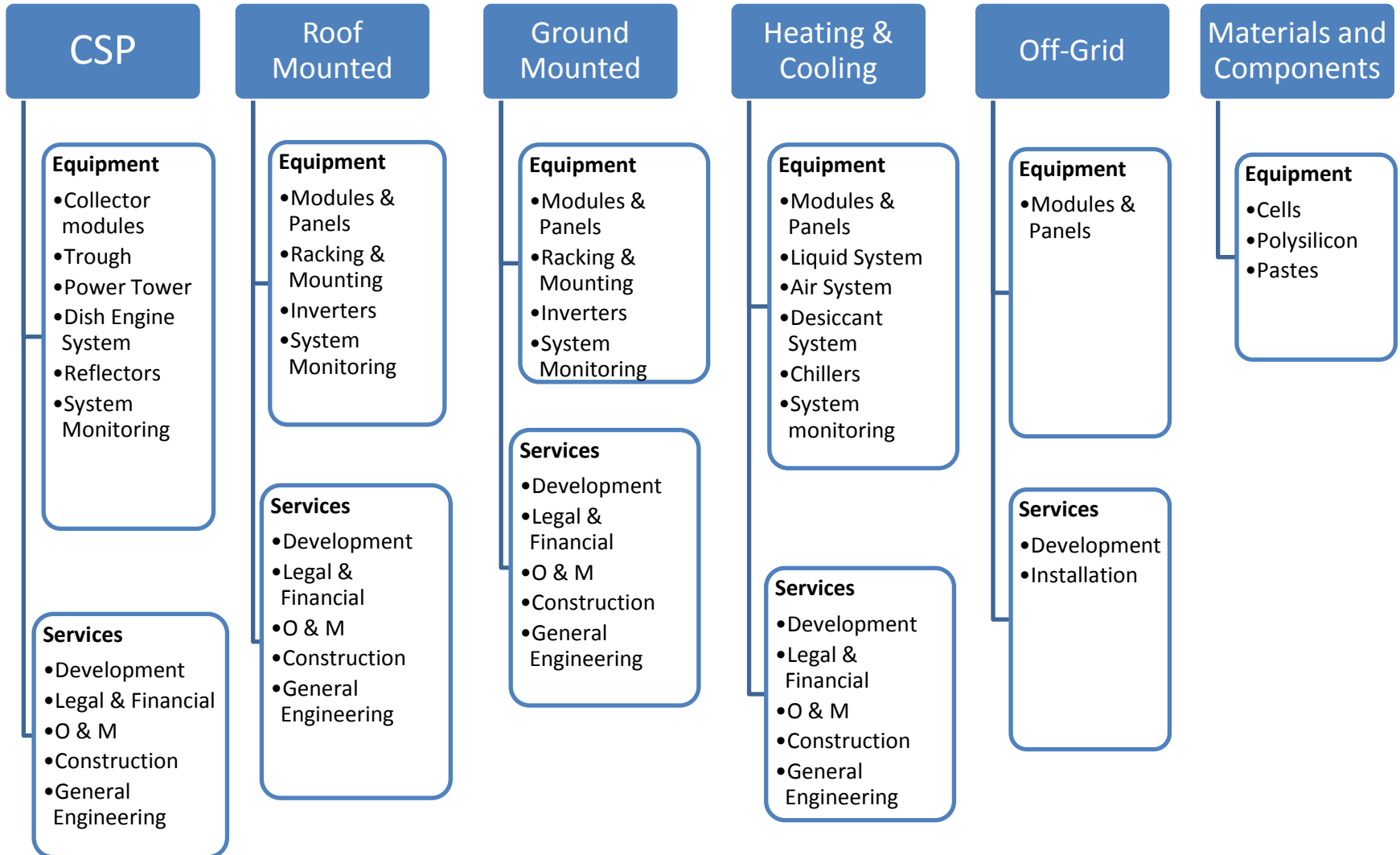
Ground Loop –Closed-Loop Horizontal, Closed-Loop Vertical, Closed-Loop Pond/Lake, Open-Loop/Ground Water, Hybrid

Heat Pumps – Compressors, refrigerant reversing valve, air heat exchanger/air coil, electrical controls

Distribution Unit – ducts, registers

Control Systems

# SOLAR MODULE: PROJECT TYPES



# Your Feedback is Welcome

The RE Taxonomy is still being finalized.

Coming soon:

- Fleshing out the solar sector equip/services solutions (esp. heating & cooling)
- More research needed for Biomass Power & Renewable Fuels

For the sectors we have developed so far: did we miss any...

- Project types?
- Equipment Categories?
- Services Categories?
- Specific equipment or service specializations?

Will YOU participate in beta testing?

[Cora.Dickson@trade.gov](mailto:Cora.Dickson@trade.gov)

Office (202) 482-6083

Work Cell (202) 603-5475