Growth of hydropower industry provides number of opportunities as global investment continues

Fact-file
- Hydropower is expected to provide 19 per cent of the world’s electricity by 2020 and 21 per cent by 2030
- This will lead to a rise in demand for specialist contractors to help this become reality
- Jobs in large and small hydropower combined amounted to 1.7 million in 2014, most of which fell in construction and installation in China
- The International Energy Agency (IEA) suggests only 5 per cent of the world’s small-scale potential is being exploited
- Small hydropower potential could be increased to 200 GW

Introduction
Renewable power generation can help countries meet their sustainable development goals through provision of access to clean, secure, reliable and affordable energy.

Hydropower is a form of renewable energy that uses the water stored in dams, as well as water flowing in rivers to create electricity in man-made hydropower plants. Like many other forms of electricity generation, hydropower uses the energy of falling or flowing water to turn the blades of a turbine which in turn produces electricity.

According to the International Energy Agency, hydropower currently represents about 16 per cent of total electricity production, though it is estimated that it will provide around 19 per cent of the world’s electricity by 2020, and 21 per cent by 2030.

Globally, significant hydropower potential remains unexploited, with technical potential some 4.8 times greater than current output. Currently, more than 25 countries in the world depend on hydropower for 90 per cent of their electricity supply and 12 countries are 100% reliant on the energy source.
Collectively, fossil-derived energy accounts for 68 per cent of the world’s electricity needs (coal 41 per cent; gas 22 per cent; oil 5 per cent), whilst renewables provide 21 per cent of all electricity (hydro 16 per cent; biomass and waste 2 per cent; other renewables 3 per cent). Finally, energy generated from nuclear plants comes in at 11 per cent.

Did you know? Hydropower is the most flexible source of power generation available and is capable of responding to demand fluctuations in minutes. Because of this, it can quickly complement other renewables that may not work effectively if, for example, the sun isn’t shining or the wind isn’t blowing.
Employment opportunities

Designing, building, operating and maintaining a hydropower plants requires a host of expertise and many hours of manpower.

What Roles are Available in Hydropower?

- **Hydrologists**
  Plan large hydropower projects and manage resultant water resources.

- **Mechanical engineers**
  Consider the physics involved in the operation of hydropower systems, often in the planning and development stages of a project.

- **Civil engineers**
  Design structural aspects of a power plant and consider ways to harness the power of running water.

- **Environment scientist**
  Evaluate the potential effects of a plant on its surroundings and provide solutions for negative environmental impacts.

- **Installers and operators**
  Build, maintain and operate hydropower plants, as well as analyse data to keep the plant functioning properly.

- **Plant electrician**
  Test and inspect electrical components and make sure everything is properly installed, repaired and maintained.

In 2013, 46 per cent of global hydropower employment was accounted for by China, followed by Brazil (8 per cent), India (7 per cent) and The Russian Federation (6 per cent), according to IRENA’s Renewable Energy and Jobs Annual Review 2015.

In 2016-17, Procorre is expecting these employment ‘hotspots’ to shift to include Canada, Turkey, India and Pakistan. In Brazil, debilitating droughts have resulted in reservoir levels and lake water flow nearing zero capacity, leading to the temporary deactivation of several hydropower facilities in early 2015. This will undoubtedly have a knock-on effect on the levels of employment across the country.

Typically, hydropower plants have a long life, with many facilities operating between 30 and 80 years. This means many of the job opportunities are in the refurbishment of existing plants and in the construction and installation of new facilities, especially in China which is the world’s largest producer of hydroelectric power and is aggressively building dams. As most of these newer plants will be heavily automated, the demand for skilled operators could be low, though there will still be a requirement for contractors that are able to repair and maintain the country’s older hydropower facilities. This is also true of new and old plants across the world.
Untapped potential

Despite being a mature technology (the first hydropower plant in Wisconsin, USA was fully operational in 1882), hydropower still has significant untapped potential, particularly in the development of new plants. In 2014, approximately 37GW of new hydropower capacity was commissioned, bringing total global capacity to over 1,000GW. The resultant hydroelectric power has the potential to run 37 million homes across the world and in turn, help some poorer countries find a solution to their energy crises.

If 2013 was anything to go by, Procorre is expecting around 60 per cent of available hydropower jobs to be in the construction and installation of new plants over the coming 12 months. Three years ago, this segment created some 805,000 jobs, equating to 54 per cent of total hydropower employment. Large hydropower in particular was estimated to support 1.5 million direct jobs, 70 per cent of which were in the construction and installation of new plants in China.

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2. REN21 Renewables Global Status Report 2015
Hydropower hotspots

China, along with Brazil, the United States, Canada, Russia, India, Turkey, Norway, Japan and France, make up the top ten producers of hydropower across the globe. Major projects in these countries include the Fengning pumped storage station in Hubei province, China; the Kargı Hydropower project in Turkey; and the Kishanganga Hydropower plant in India. In Pakistan, the government has launched several ambitious hydropower projects to meet bold 2005-2030 Energy Security Plan targets, including the controversial Neelum Jhelum project which is around two-thirds complete.

With 75GW of hydropower planned across a number of projects in China before the end of 2017, Procorre expects that this will be the main source of jobs for contractors in the hydropower industry over the coming 12-24 months. Of those, around 126,000 are expected in small hydropower whilst the majority of the 1.5 million direct jobs in large hydropower worldwide are expected to be in China.

10 Countries with the Greatest Hydropower Capacity

China, along with Brazil, the United States, Canada, Russia, India, Turkey, Norway, Japan and France, make up the top ten producers of hydropower across the globe.

Small-scale potential

The International Energy Agency (IEA) considers that only five per cent of the world’s small-scale potential is being exploited and that small hydropower potential could be increased to 200Gw. Realising this potential could have a huge knock-on effect, creating a wealth of jobs in the construction of facilities, the manufacturing of large hydropower turbines and the operation and maintenance of installations.

The addition of indirect jobs has the potential to double the estimates for employment in construction and installation, as well as the manufacturing segment of the value chain. Construction and installation require significant intermediate goods (such as cement, sand, bricks and cables), while manufacturing needs machinery and raw materials, creating additional demand and jobs in the respective sectors. The addition of indirect jobs in the operation and maintenance segment could result in an increase of up to 50 per cent.

2 IRENA Renewable Energy and Jobs Annual Review 2015

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Hydropower hotspots

The European Union also supports around 20 per cent of total hydropower jobs. EU countries with the largest installed hydropower capacity include Norway, France, Italy, Spain, Sweden, Switzerland and Germany, with the maintenance and upgrading of existing infrastructure an important focus throughout the continent. However, European hydropower potential is already well exploited and expected future growth is somewhat limited. As such, Procorre is expecting job opportunities mainly for those able to refurbish existing facilities.

The outlook for hydropower

With less than one-quarter of the world’s technical hydropower potential in operation, the prospects for growth in hydro capacity are good. However, long lead times, project design, planning and approval processes, as well as the time required to secure financing for these large multi-year construction projects, mean that capacity growth is more likely to be slow and steady than rapid. The conventional hydropower activities focus on adding new generating capacity, improving the efficiency and capacity at existing hydroelectric facilities, adding hydroelectric generating capacity to existing non-powered dams, and increasing advanced pumped-storage hydropower capacity.

Major Hydropower Projects Underway in Key Employment Hotspots

Turkey: Kargi Hydropower project
- Currently under construction with 102 MW capacity on completion & $250 USD million invested
- Estimated up to 15 GW of new capacity currently under construction in Turkey: Yusufeli (540 MW), Çetin (517 MW) and Kogi (180 MW) projects

India: Kishanganga project
- Construction began in 2007 and is due to complete in late-2016
- Total installed capacity will reach 330 MW & $687 USD million invested

China, Hebei province: Fengning Pumped Storage Station
- Due to start producing energy in 2019
- When complete in 2021 will be the largest in the world
- Expected installed capacity of 3,600 MW & $1.87 USD billion invested

Notes to editors
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About Procorre
Procorre is a global professional services consultancy, which successfully manages the whole life cycle of projects, across a range of industries.

Currently deploying over 1,500 highly skilled and experienced consultants on projects around the world, Procorre seeks to acquire the best talent and provide them with a more rewarding way to work.

Procorre also offers a range of advisory and consultancy services to clients worldwide, as well as collaborating with preferred suppliers to ensure consultants have access to the best projects across the globe.

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