



# **Executive Summary Final Report**

## Meeting the Human Resources Needs of Canada's Renewable Electricity Industry

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## Executive Summary

Electricity-related Renewable Energy (RE) technologies play a crucial role in sustainable economic development for the world and for Canada. Significant reductions in pollution and improvements in environmental conditions are expected as the low carbon electricity generated by renewable technologies gains market share. A massive global shift in technologies is underway and Canada is participating with plans for additional RE capacity in every province.

Growth in RE capacity will impact employment and labour markets. Adding capacity to meet government policy targets and the industry's vision of RE potential would create 620,000 person-years of construction employment and accumulate 34,000 jobs in operations by 2022. In most jurisdictions the addition of new jobs is a major policy goal related to these investments. A more limited deployment of RE capacity is considered in alternative scenarios that project 185,000 construction person-years of work and up to 19,000 jobs in operations.

Electricity Human Resources Canada (EHRC), in collaboration with Employment and Social Development Canada and industry stakeholders has initiated Renewing Futures (RF); a major human resources (HR) research project that will assess current and forecast data tracking the impact of RE deployment on labour markets. Renewing Futures will create a national human resources strategy that will guide the development of a skilled workforce to meet labour requirements.

The scope of the RF plans includes seven sectors:

1. Wind
2. Solar
3. Bioenergy
4. Geothermal
5. Hydro (Small and Large)
6. Marine; Tidal and Wave
7. Integration and Storage

Economic activity related to the deployment of these technologies and their connection to the grid is spread among many employers. RF analysis identifies this employment across the supply chain including:

- Research and development
- Manufacturing and distribution
- Project planning
- Construction and installation
- Operation and maintenance, and
- Grid operation, maintenance and distribution

There are important "legacies" including the urban populations, industrial and resource activity, wind, sun, rivers, tides, biofuels and geothermal energy that are unevenly distributed across Canada's

geography. Further, Canada's provinces have jurisdiction over both the energy and labour policies that drive RE deployment. The RF analysis and strategy is prepared on a Provincial basis to reflect this diversity.

Finally, the time frames for the RF project extend back to the 1990s and forward to 2022 – spanning the long term changes that are crucial to understanding trends and planning HR support systems.

Research activities that support the strategy include:

- A global review of research sources covering government policy, human resources management and labour market analysis for RE activity,
- A Technology Review that created a profile of the seven technologies that will be deployed and provincial energy market assessments that project additions to RE capacity from 2011 to 2022,
- Input from over 400 stakeholders from interviews, focus groups, regional engagement sessions and an employer survey, and
- A RF labour market information system that includes measures of supply and demand, market balances for eighteen key occupations and an inventory of post-secondary programs that train new RE employees.

We built the case for a strategy up across five themes.

### ***Growth and change***

Growth is the dominant theme in the global story of renewable energy. But the future path of RE deployment in Canada is uncertain and growth involves change that can be both risky and disruptive. RF research developed three scenarios to measure the range of growth and related risks by sector and region.

- A. The *Utility Case* is based on a review of Provincial utility reports, energy plans and interviews with energy planners in each province.
- B. The *Reference Case* is based on the National Energy Board (NEB) 2011 "Energy Supply and Demand Projections to 2035".
- C. The *Vision Case* is based on the announced targets and published visions of the industry itself and the government policy statements and objectives for RE.

Together these three cases bracket the range of likely growth in the RE systems from 2012 to 2022. The Vision case is referenced more frequently in the report as it is designed to test the higher limits of investment and deployment of RE and, in turn, define the upper levels of labour requirements. RE employment in the Vision case increases two to three fold from the starting base in 2012. Growth on this scale can be disruptive; displacing workers in other areas and creating employment cycles. There are concerns about product and service quality, workplace productivity, reliability, quality and safety.

The report concludes that *environmental pressures will dominate and the industry must prepare for the growth path described in the Visions case for each of the seven technologies*. This growth will include both benefits and costs. A national HR Strategy must include elements that address all of these.

### ***Technologies and the Supply Chain***

Findings show that work in the six core RE sectors will grow dramatically but will deploy mostly the current, mature technologies and systems. In the Vision scenario, the deployment reaches 42,800 MW and this effort will create 620,000 person-years of construction and installation jobs across the 2012 to 2022 period. Employment in operations rises each year to a total of 34,000 jobs in 2022. The Reference and Utility scenarios offer an alternative view of more modest expansion that creates between 185,000 and 190,000 person years of work in construction and between 19,000 and 21,000 jobs in operations by 2022.

Wind systems provide the largest increment to capacity as turbines, rotors and bases continue to increase in size. As systems grow in scale new materials will be used and the complexity of installation and operations will increase.

Solar PV systems will also provide a large component of the incremental RE capacity. Additions are almost entirely in Ontario. Solar systems are relatively labour intensive and the deployment of new systems will be largely confined to existing technologies. Employment gains are concentrated in the manufacturing and distribution part of the supply chain and labour market impacts will depend on the extent of local sourcing of components. There is some potential for innovation in, for example, building integrated systems and work continues on the potential for solar thermal.

Biofuel systems have been part of Canada's RE portfolio for many years. There is a large potential for growth and some innovation through the addition of, for example, "purpose grown" agricultural systems. New capacity is expected to be developed in parallel with growth in forestry resources.

Geothermal system potential exists across Canada and activity is centered in pilot projects and site assessment for feasibility and development. Canadian companies have developed technical expertise in this area and are active in international development.

Canada is a world leader in hydroelectricity and large sites provide over half of total national electrical power capacity. The RF analysis includes provision for the addition of 11,400 MWs of new large hydro capacity to the conventional utility system. Labour market impacts and HR implications for this development fall into the growth and management of the utilities and the related consulting firms and contractors who have traditionally built and maintained these systems. RF analysis treats small hydro developments as a separate activity and tracks the addition of over 900 MWs of capacity in five provinces.

Tidal and Wave systems are being introduced as a trial basis with activity and employment related to this work in Nova Scotia. Canada has one of the few operating tidal systems at Annapolis. The RF plans include some limited ongoing development of tidal capacity.

The most important technological changes will be concentrated at the interconnection points and in the distribution systems maintained by the utilities. Increasing the capacity of the grid and adding Smart Grid improvements involve upgrading the technical skills of a range of key occupations and integrating new IT and distribution systems. Changes in storage and grid systems have the largest technological implications across the system. Here new technologies are prominent with significant and variable impacts on skills, training and certification.

By 2022, in the Vision Scenario, there will be 100,000 people working on RE projects. Employment is widely distributed among employers at varying points on the supply chain and across regions. A large proportion of jobs will be in Ontario.

### *Stakeholders and their diverse roles*

Provincial government energy policy is the critically important determinant of RE deployment patterns. Strong growth will be facilitated where these policies provide incentives and recognize the skills and qualifications of the needed workforce. On the other hand, budget cuts or policy limitations could restrict the deployment of RE systems.

Employer survey findings describe 350 respondents working in RE deployment. In general these employers were working in more than one RE sector and offering services at several points across the supply chain. Many employers also reported working in areas outside RE. Firms in the sample were small with half of the sample employing fewer than 10 workers. Altogether the firms in the sample employ 19,800 people. Given the diversified nature of these businesses, their workforce likely is employed for a large part of the time outside RE.

The workforce is concentrated in technical areas with employers reporting that technicians and skilled trades were the most numerous and engineers were the third most numerous groups of employees.

The Renewing Futures LMI system focuses on eighteen key occupations, identified by the employers. These occupations fall in three broad groups; leaders and managers, engineers and technologists and skilled trades. Some 41,000 employees in these and other occupations are estimated to work, in 2012, in RE jobs spread across the supply chain. Most of the labour force in each of these occupations, are not working in RE jobs. Key market outcomes, including compensation, entry qualifications and certifications, are determined in the wider markets. These broader market conditions are the starting point for RE managers.

A review of post-secondary training and certification identified 95 specific programs across Canada. These programs include all three occupational groups and the largest number of programs is offered by community colleges to engineering technicians and technologists. These programs form the initial core of a training system. There are no apprenticeship programs that target RE. Many private, short term training and certification programs are offered for solar and wind, but growth is uneven and certification standards are not widely applied.

*Labour markets*

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