

D. GORDON HOWELL, P.ENG.

PROFESSIONAL CURRICULUM VITAE

Corp: Howell Mayhew Engineering
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EXPERIENCE SUMMARY (2020)

- 43 years – experiencing, working on, identifying and resolving barriers to the development of solar energy technologies
- 41 years – developing and presenting public lectures and courses on energy efficiency, solar photovoltaics (PV) and solar heating systems, in preparing case studies and other training material, operating manuals, reports and in conducting stakeholder value analyses
- 30 years – monitoring and evaluating energy efficiency and renewable energy systems, specializing in solar PV generating units
- 29 years – working on international committees that write PV system standards
- 20 years – writing interactive design, data acquisition, and data analysis software
- 25 years – design, development, permitting, grid-connection approvals, supply, installation and commissioning of grid-connected solar PV generating units
- 25 years – consulting on the development of solar PV generating units
- 25 years – connecting micro-generation generating units to the grid
- 16 years – design and installation of computer-based data acquisition systems, specializing in remote, long-term, reliable, unattended systems

EDUCATION

- 1975 B.Sc. Electrical Engineering, University of Alberta. Course emphasis on micro-processors, energy, and energy matters
- 1977 "Solar Heating and Cooling of Residential Buildings", Faculty of Extension, University of Alberta
- 1978 "Passive Solar System Design", Passive Solar Design Associates, Denver, Colorado
- 1984 "WATSUN Solar Simulation Program", seminar sponsored by the University of Waterloo at the 1984 Solar Energy Society of Canada Annual Conference
- 2000 Sustainable Building Symposium, Edmonton
- 2002 Sustainable Building Symposium, Edmonton
- 2004 "PV1", British Columbia Institute of Technology course on solar PV system design
- 2004 Sustainable Building Symposium, Edmonton
- 2005 "PV2", British Columbia Institute of Technology workshop on solar PV system installation
- 2006 "PV Technical Training", SMA America, at the Canadian Solar Industries Association Forum
- 2007 "PV2", British Columbia Institute of Technology course on solar PV system design
- 2008 "Photovoltaic Applications and the Canadian Electrical Code", Canadian Solar Industries Association

- 2010 “Photovoltaics for Electricians”, the Solar Energy Society of Canada, Northern Alberta Chapter
2012 “Photovoltaics for Inspectors”, the Solar Energy Society of Alberta

Taught introductory solar energy courses through Edmonton Public Schools Metro Continuing Education and Trimline Training Centre. Taught NAIT’s inaugural grid-connected solar PV course for technologists as part of their Alternative Energy Technology programme. See Professional/Volunteer Activities below.

EXPERIENCE

Managing Partner, Senior Project Development Engineer

Howell-Mayhew Engineering, Inc. Edmonton, Alberta. 1985 - present

- Consulting, developing, planning and implementing projects to utilise solar photovoltaic systems, including feasibility studies, economic analyses, performance simulations, technology assessments, design, procure, supply, installation, and commission
- Developing, planning and implementing projects to monitor, analyse, and evaluate the *in-situ* field performance of technologies demonstrating energy efficient housing and solar PV systems
- Conducting studies to identify and analyse barriers to solar PV
- Writing provincial, national and international standards on solar PV system testing, operation, and safety
- Participating on provincial and national committees to establish guidelines for the grid-connection of solar PV generating units
- Giving public presentations, courses, reviewing articles, and writing case studies on solar PV, solar heating and net-zero-energy housing
- Previously:
 - consulting on innovative solutions to instrumentation problems
 - developing and writing software for field monitoring and data analysis
 - developing and writing software for the design of solar PV systems

SELECTED CLIENT PROJECTS

Projects: Programme manager, City of Edmonton Renewable Energy Task Force (2010-2011)

- led a 23-member City of Edmonton Task Force that developed a report on the opportunities for using renewable energy within the City of Edmonton

Projects: Solar PV generating unit project development

- Complete development of solar PV generating units including planning, economic analysis, design, selection, procurement and supply of equipment, all permits, grid-connection approvals, selection and procurement of the installation through outsourced qualified experienced electrical contractors, and commissioning.
- Design of 71 PV systems, four building-integrated PV systems (BIPV), involved in a total of 159 PV projects. Projects in Alberta, BC, the Yukon and the NWT.

- Provide clients expert advice on technical and regulatory issues with solar PV and electrical system standards and codes
- Fully designed, developed and installed a 2.3 kW grid-connected PV system on HME's Cold Climate Solar House in Edmonton (1994), the 12th grid-connected solar PV system in Canada, the 1st grid-connected PV system west of Toronto and the 4th grid-connected PV system on a house in Canada. Including monitoring its performance and identifying and evaluating the barriers to the implementation of PV technology

Projects: Connecting solar PV and microwind generating units to the grid

- Guiding 75 projects through the technical and legal interconnection approvals process with clients and Wires Owners
- Developing and submitting approvals documentation to the Wires Owner, Alberta Electric System Operator, and the Alberta Utilities Commission. Advocating for the projects before the Alberta Utilities Commission
- Projects in Alberta, BC and the Yukon

Projects: Providing “quarterback” services to homebuilders and architects on the development of net-zero-energy homes and buildings

- Involved in some of Canada’s first net-zero-energy homes, including Riverdale, Mill Creek, Belgravia, Belgravia Green, Parkland and Red Deer
- Organised the team that designed, developed and constructed Edmonton's first and one of Canada's first 12 net-zero energy homes, in the Riverdale neighbourhood and organised the media outreach that saw the home toured by 8400 people
- Homebuilders include Habitat Studio & Workshop, Effect Home Builders, Rosecrest Homes, and Laebon Homes

Project: Writing and presentations

- Wrote the appendix on the grid-connection of micro-wind systems for Pembina Institute’s Landowner’s Guide to Wind Energy in Alberta (2010)
- Develop and deliver 500 solar-related presentations since 1995 for public and selected audiences across Canada
- Wrote the technical specifications and grid-connection document for the Alberta Municipal Solar Showcase (2005)
- Document PV grid-connection issues and barriers for the Canadian Solar Industries Association report (2003)
- Developed and spearheaded the technical content of the Micropower Grid-Connected Interconnection Manual for Alberta (2003) for the purpose of empowering people to safely grid-connect micropower systems and to help guide regulators to reduce its complexity
- Participated on the International Energy Agency Photovoltaic Power Systems (PVPS) Programme Task 1 on PV market information (2002-2004). The committee develops national and international survey reports on PV market growth, and disseminates reports on the PV solutions developed by other PVPS Tasks.

PROFESSIONAL VOLUNTEER ACTIVITIES

I recognise that I can lead far more effectively if I personally decide to do what I am encouraging, empowering and advising others to do. I recognise the importance of community development in the on-going health, sustainability, and growth of me, my professional work and my profession. To this end, I pursue the following volunteer activities:

Activity: International Electrotechnical Commission (IEC) Technical Committee 82 (Solar Photovoltaic Energy Systems) (1990 to present) www.iec.ch

- Representing Canada to develop world standards
- Working Group (WG1) – Glossary standards, member
- Working Group (WG3) – PV system standards, member
- Co-authored IEC Document 61836-Ed 2.0, "Glossary of Terms and Symbols"
- Co-authored IEC Document 61724, "Photovoltaic System Performance Monitoring – Guidelines for Measurement, Data Exchange and Analysis".

Activity: Clean Air Strategic Alliance (2003 to 2006)

- Renewable and Alternative Energy Project Team, member
- Electrical Efficiency and Conservation Project Team, member
- Alberta Building Technical Council, Energy Codes Advisory Committee (1995 to 1998), member. Representing the Clean Air Strategic Alliance/Alternate Energy Producers to evaluate the impact assessment of the National Energy Code for Buildings.

Activity: Distributed Generation Committees (2001 to 2006)

- Alberta Distributed Generation Interconnection Policy Committee, member
- Alberta Distributed Generation Interconnection Technical Committee, member
 - Sub-Committee on Micro Distributed Generation (Chairman)
- Alberta Safety Codes Council Task Force on MicroPower and the Canadian Electrical Code, member
- MicroPower Connect, member www.micropower-connect.org
- Measurement Canada, working group on developing net metering standards, member

Activity: Canadian Standards Association www.csa.ca

- Canadian Electrical Code Section 50 (Solar Photovoltaics), member from 2000 to 2011
- Technical Committee on Interconnection, member from 2004 to 2006
- SCOPEER (Strategic Committee on Performance, Energy Efficiency, and Renewables), SCC c400, member from 2000 to 2004
- Renewables Committee, TC c420, member 2000 to 2004
- Integrated Committee on Photovoltaics, vice-chairman, 2014 to present

Activity: Solar Power Investment Co-operative of Edmonton www.joinspice.ca

- Board member and treasurer (2018 to present)

Activity: City of Edmonton Energy Transition Leadership Network

- Member (2018 to present)

Activity: Eco-Solar Home Tour, Edmonton (2000 to present) www.ecosolar.ca

- Founder and member of the organising team
- Organise annual public tour of energy efficient and solar homes in the Edmonton area
- Empower other cities and towns to promote their own leaders and examples of energy efficiency, solar, and sustainability

Activity: Public awareness (ongoing)

- 500 talks, lectures and presentations since 1995, on solar PV, solar heating and net-zero-energy homes to the general public, schools, University classes, NAIT classes and specialised public and technical groups.
- 18 courses through Edmonton Public Schools Metro Continuing Education and the Trimline Renewable Energy Training Centre. Developer and instructor of "*Solar Energy: Practical Opportunities Now*".
- 118 media interviews – TV, radio, newspaper, magazines.
- Mentoring of University, NAIT and school students and their class and science fair projects – 8 people and groups.
- Judge: Emerald Awards for the Alberta Emerald Foundation for Environmental Excellence (2007, 2008, 2009)

MEMBERSHIPS

The Association of Professional Engineers, Geologists, and Geophysicists of Alberta www.apegga.com
Canadian Solar Industries Association (former) www.cansia.ca
Solar Energy Society of Alberta (co-founding member in 1976) www.solaralberta.ca

Fusion Canada Youth and Community Society www.fusioncanada.ca
– Founder and team member (since 2002)

Johann Strauss Foundation www.johannstrauss.ca
– Member of the Board of Directors (since 1997), Vice-president
– Co-ordinator of Music for the Johann Strauss Ball (since 1998)

AWARDS

1971 Winner, Grade 12, "*Electromagnetic Submarine*", Edmonton Regional Science Fair
2002 "*Emerald Award for Environmental Excellence*" for Individual Commitment, Alberta Emerald Foundation <<https://emerald.foundation.ca>>
2010 "*Alberta's 50 Most Influential People*", Alberta Venture Magazine
2017 "*Senate 150th Anniversary Medal*" from the Senate of Canada celebrating the achievements of Canadians who have made significant contributions to their community
<<https://sencanada.ca/en/sencaplus/news/senate-medals-in-the-making-for-canadas-unsung-heroes/>>
2018 "*Capital Region Rotary Integrity Award*", Rotary Club of Edmonton Riverview

MEDIA

2018 Was the featured person in the City of Edmonton's first *Renewables* video highlighting climate change leadership from Edmonton's citizens
<https://www.edmonton.ca/city_government/environmental_stewardship/season-one.aspx>

ENGINEERING LINEAGE

Douglas P. Howell Father. Chemical Engineering. University of Alberta, Edmonton. 1949.
Charles M. Moore Maternal grandfather. Civil Engineering. Queens University, Kingston. 1919.

SELECTED PUBLICATIONS/PAPERS

25 papers and articles dealing primarily with solar energy projects and research and development applications in Canada. Among them:

Howell, G. 2015. *Dancing with Physics*. Solar PV and the Jeanne & Peter Lougheed Performing Arts Centre, Camrose. Article in *Canadian Consulting Engineer* magazine. 2015 May. Volume 56, No.3. 4 pp.

Weis, T., A. Doukas, and K. Anderson. 2010. *Landowners' Guide to Wind Energy in Alberta*. Appendix by G. Howell. The Pembina Institute and The Pembina Foundation. Drayton Valley, Alberta.

Brostrom, M., and G. Howell. 2008. *Challenges of Designing and Building a Net Zero Energy Home in a Cold High-Latitude Climate*. Proceedings of the 3rd International Solar Cities Congress. Adelaide, South Australia.

Howell, G. and P. Robertson. 2004. *Micropower Grid-Interconnection Manual for Alberta*. Proceedings of SESCO 2004, the 29th Annual Conference of the Solar Energy Society of Canada, Inc. Waterloo, Ontario.

Nodelman, J.R., and D.G. Howell. 1998. *Working towards a Sustainable Culture – Integrating it into a Utility*. Proceedings of the Renewable Energy Technology in Cold Climates '98 Conference, the 24th Annual Conference of the Solar Energy Society of Canada, Inc. Montréal, Québec.

IEC 61724. *Photovoltaic system performance monitoring – Guidelines for measurement, data exchange and analysis*. Published standard of the International Electrotechnical Commission's Technical Committee 82 (Solar Photovoltaics). 1998. 38 pg.

Nodelman, J.R., T.J. Tupper, T. Dinwoodie and D.G. Howell. 1997. *EPCOR'S Building-Integrated, Grid-Connected PV System in Edmonton*. Proceedings of the 23rd Annual Conference of the Solar Energy Society of Canada, Inc. Vancouver, British Columbia.

Howell, D.G. and C.R. Price. 1997. *New Standards Prepare the Way for Business Opportunities in Photovoltaics*. Proceedings of the 23rd Annual Conference of the Solar Energy Society of Canada, Inc. Vancouver, British Columbia.

Howell, D.G., S. Marsh and M. Oprisan. 1996. *Edmonton Power's Grid-Connected Photovoltaic System*. Proceedings of the 22nd Annual Conference of the Solar Energy Society of Canada, Inc. Orillia, Ontario.

Howell, D.G. and G.M. Rekken. 1984. *Analysis of the Non-economic Benefits of Low-energy Passive Solar Housing - A Case Example*. Proceedings of the 10th Annual Conference of the Solar Energy Society of Canada, Inc. Calgary, Alberta.

Janz, B., D.G. Howell, and A. Serna. 1982. *Wind Energy in the Northwest Territories*. Contract Report #5, Science Advisory Board of the NWT. Department of Information, Government of the NWT. Yellowknife, NWT. 108 pp.

Howell, D.G. 1980. *Developments in Renewable Energy: A Brief Review*. Canadian Home Economics Journal. Vol. 30, No. 6: 212-215.