

## CV

### Category Solar Energy Expert 1

1. **Family name:** NYMAN
2. **First names:** Christer
3. **Date of birth:** 30.04.1956
4. **Nationality:** Finnish
5. **Civil status:** Married
6. **Education:**

| Institution [ Date from - Date to ] | Degree(s) or Diploma(s) obtained:   |
|-------------------------------------|---|
| Helsinki University (1977- 1983)    | M.Sc. Main field applied physics, master thesis<br>Luminescent solar concentrators for PV cells |

7. **Language skills:** Indicate competence on a scale of 1 to 5 (1 - excellent; 5 - basic)

| Language | Reading | Speaking | Writing |
|----------|---------|----------|---------|
| English  | 1       | 1        | 1       |
| Finnish  | 1       | 1        | 1       |
| Swedish  | 1       | 1        | 1       |

8. **Membership of professional bodies:**

- Association of International Consultants (AIC)
- International Solar Energy Society (ISES)
- Finnish Solar Energy Association (ATY)

9. **Other skills:** Fully computer literate

10. **Present position:** Chief Executive Officer Soleco ltd, IT consult

11. **Years within the firm:** 17

12. **Key qualifications:**

- Over 24 years of experience in the **solar energy sector** as consultant and head of one of the largest Finnish **solar energy consulting and research organizations**;
- In-depth knowledge and implementation of **photo-voltaic systems** and analysis and identification of **alternate technologies for the use of solar energy**;
- Experience in designing, implementing and monitoring one **solar power plants in Europe** (Imatran Voima Oy solar photo voltaic plant in Finland);
- Extensive knowledge of **renewable energy sources**.
- Appraisal projects main points including:
  - Technology updates for preparing tenders
  - Design methods of PV systems for projects
  - International market updating for making price levels for tendering
  - Procurement methods according to EU standard methods
  - Updating of specifications for tender processes
- Technical updates for projects including PV systems
- Courses and lectures in PV system applications and project management

Mr. Nyman's university studies and long career as a researcher with solar cells and solar energy applications together with his knowledge of basic physics and energy has made him a highly qualified expert in solar energy, and his knowledge and skills have been successfully tested in different applications in Finland and around the world. He started his solar energy career in 1984 with research of basics in solar cells and solar energy solutions. The first project he was

involved in was development of a data collection system for the first Finnish solar energy plant in the early 1990's. Over the years he has planned and designed also a number of different tasks for small solar energy solutions around Finland. Feasibility studies for photovoltaic (PV) application for a hotel in Seychelles in 1993 opened the international market. During 1998-1999 a pilot project was carried out with different PV applications (schools and healthcare) in Yemen, financed by World Bank. Another international project was a feasibility study for PV systems for health centres in Tanzania in 2001. Directly related to concessional credits Mr. Nyman was the solar energy expert in the appraisal team for development of rural education and health infrastructure facilities of Sri Lanka in 2005. He has also written a large amount of scientific articles for conferences, and as material of different projects. In 2006 a PV evaluation of 1000 school project in South Africa was carried out over 5 weeks, resulting in many valuable recommendations regarding RE projects. Today he is the most experienced independent solar energy consult in Finland. Year 2008 he was the project manager for the first finnish gridconnected PV system in a private household with feed in connection.

**13. Specific experience in the region (EU region):**

| Country  | Date from - Date to  |
|--|--|
| Finland  | Since 1984 different PV projects   |
| EU/ Portugal/Sweden/<br>Poland /Czech /Finland | <p style="text-align: center;">2002- 2004</p> <ul style="list-style-type: none"> <li>• EU project :RENEWCOLOGY :<br/>2002-04 Solar Education<br/>materials for web</li> <li>• PV training materials for different<br/>school levels</li> </ul> |

#### 14. Professional experience

| Date from -<br>Date to | Location | Company                 | Position                    | Description   |
|------------------------|----------|-------------------------|-----------------------------|---|
| 03/1982-<br>06/1991    | Finland  | VTT /research<br>center | researcher                  | <p>Solar PV cell basic research, manufacturing research, applied system research, monitoring and data acquisition of PV system performance:</p> <ul style="list-style-type: none"> <li>• Project management</li> <li>• Quality standards</li> <li>• Technology updates</li> </ul>   |
| 07/1991 -<br>ongoing   | Finland  | Soleco Ltd.             | CEO, Solar Energy<br>expert | <p>Soleco Ltd is a <b>solar energy research and consulting organization</b>.</p> <p>Areas of specialization:</p> <ul style="list-style-type: none"> <li>• Feasibility studies for solar energy projects;</li> <li>• Procurement specifications for tenders</li> <li>• System planning from design to realisation as turn key solutions for solar energy facilities;</li> <li>• Photo-Voltaic evaluation;</li> <li>• Training and education; design and installation methods</li> <li>• Project managing;</li> <li>• System plan of PV grid connected system with grid feed;</li> <li>• Thermal use of solar for heating systems.</li> <li>• Standardization work TC197 ISO Technical committee</li> </ul>                       |
| 2008                   | Namibia  | Finnconsult<br>Ramboll. | Solar Energy<br>expert      | <p>Appraisal of Rural Electrification Project, / Framework Contract for Concessional Credits Appraisals between the Ministry for Foreign Affairs of Finland and the contractor Finnconsult Ramboll. May2008</p> <p>Rural electrification project including appraisal of photo-voltaic systems. Design of technical specifications for PV systems. Preparation of tender dossier for the procurement for MME . The ministry need help in preparing the procurement specifications for tenders Procurement of PV equipments for the project need assistance, which was made at first stage, following by more in autumn.</p> <p>Mission for tender dossier preparation for the procurement of PV systems to MME December 2008</p> |
| 2008                   | Nepal    | EPRD Poland             | Solar Energy<br>Expert      | <p>Review, assess and modify the Technical Specifications prepared by the PTF for the Institutional Solar PV systems for the Renewable Energy Project Nepal.</p>  |

|      |                      |                     |                      |   |
|------|----------------------|---------------------|----------------------|---|
|      |                      |                     |                      | <p>Analyse, compare and prepare standardized Technical Specifications for solar PV equipments in conformity to the international norms and standards.</p> <p>Assessment of Technical Specifications in terms of training, maintenance, and after-sales services for all common components of PV systems</p>   |
| 2007 | United Arab Emirates | Al Hamad            | Solar Energy expert  | <p><b>Warehouses at Dubai industrial city phase1-3</b></p> <p><b>Project plan for photo-voltaic installations in Dubai.</b></p> <p>Identification of <b>new solar and wind energy systems</b> in order to meet the increased energy demand of large warehouses built in new industrial cities in UAE.</p> <p>Provision of <b>new models of solar energy</b> and identification of <b>alternate technologies for the use of solar energy.</b></p> <p>Client: Ministry of Energy</p>  |
| 2006 | South Africa         | Soleco Ltd.         | Photo-voltaic expert | <p><i>"Non-Grid Electrification of 1000 Rural Schools"</i> funded by the European Union (EU) as a contribution by the EU towards implementing an existing government programme to supply non-grid electricity to 16,400 schools in remote parts of South Africa. /Ekono Electrowatt</p> <p>The evaluation methodology was to establish the quality of the <b>photo-voltaic applications</b> in 1000 schools and to draw conclusions through:</p> <ul style="list-style-type: none"> <li>• Review of project documentation;</li> <li>• Interviews with bodies and persons responsible for the implementation of the project facilities, and their operation and maintenance; and</li> <li>• Findings on the status of the facilities and interviews with beneficiaries during visits to 26 schools in Limpopo and Eastern Cape provinces.</li> <li>• Procurement procedures and technical specifications.</li> <li>• The procurement procedure and tendering has was evaluated and found to had some problems</li> </ul> <p>The project was used to provide guidelines on how to set up similar PV projects in future.<br/>Funding: EU</p> |
| 2005 | Sri Lanka            | Finnconsult Ramboll | Photo-voltaic expert | <p>Solar Energy for the development of rural education and health infrastructure in Sri Lanka / Framework Contract for Concessional Credits Appraisals between the Ministry for Foreign Affairs of Finland and the contractor Finnconsult Ramboll</p> <p>Feasibility studies for school and health care electrification plans and assessment of <b>solar energy facilities.</b></p> <p>The results of the study were reviewed by the respective Provincial and Education and Health Directors. As the result of the exercise 587 villages were selected to be served by 1614 solar power systems.</p>   |

|           |            |                             |                                |  |
|-----------|------------|-----------------------------|--------------------------------|--|
|           |            |                             |                                | <p>The proposed <b>solar system package</b> unit to serve schools included:</p> <ol style="list-style-type: none"> <li>1. <b>Solar-powered water pumping system</b> with overhead water tank;</li> <li>2. Water supply for staff quarters from the overhead tank</li> </ol> <p>The scope of the appraisal was to evaluate the planning of solar energy sources, its implementation and the need for <b>alternate technologies</b>.</p> <p>Beneficiaries: North Central, Central &amp; Uva Provincial Councils and the former Ministry of Central Region Development.</p> <p>Tender dossier and technical specifications to be correct for procurement. The specifications of PV equipments was evaluated for the specifications for the tenders.</p> |
| 2001      | Tanzania   | Soleco Ltd.                 | Solar energy expert            | <p><b>Photovoltaic solar energy facility preparation.</b></p> <p>Tasks included:</p> <ul style="list-style-type: none"> <li>• Feasibility study on prospects for <b>photo voltaic applications</b> in rural areas;</li> <li>• <b>Specification of works</b> needed in order to set the corresponding parameters of the facility, including cost analysis;</li> <li>• <b>Development of an implementation plan.</b></li> <li>• <b>Preparation of technical specifications for PV for making tenders for the plan</b></li> </ul>   |
| 1998-1999 | Yemen      | Soleco Ltd.                 | Program manager                | <p><b>Photovoltaic solar energy feasibility study.</b></p> <p>PV installation of water-pump and radio communication<br/>Funding: World Bank</p>  |
| 1993      | Seychelles | Soleco Ltd                  | Solar energy expert            | <p><b>Feasibility study of Hotel Plantation club</b></p> <ul style="list-style-type: none"> <li>• study of electricity consumption of hotel to partly change into PV electricity</li> <li>• Plan of PV plant for hotel</li> </ul>  |
| 1989      | Finland    | Solar technical Association | Chairman/<br>Executive Officer | Solar energy research and development.   |

|            |         |   |                          |   |
|------------|---------|---|--------------------------|---|
| 1984 -1991 | Finland | VTT.<br>Technical<br>research<br>centre,<br>Semiconductor<br>laboratory | Solar cell<br>researcher | <p><b>Solar energy research and development</b></p> <p>Carried out intensive research on <b>solar energy solutions and alternate technologies</b>.<br/>Between 1989 and 1991, responsible for the planning and operational monitoring of the <b>Imatran Voima Oy solar photo voltaic plant (30kW)</b>.<br/>Tasks included:</p> <ul style="list-style-type: none"> <li>• Planning of PV plant and data acquisition system for monitoring the performance of the plant;</li> <li>• <b>Grid connected PV plant with battery backup;</b></li> <li>• <b>Cost-benefit analysis of different solar technologies;</b></li> <li>• Research for equipment needed;</li> <li>• <b>Specification of works</b> needed in order to set the corresponding parameters of the facility, including cost analysis.</li> </ul> |
|------------|---------|---|--------------------------|---|

## 15. Other relevant information

### Publications

- C. Nyman, Eureka project EU333, Alpsolar, Progress Report 1992, performance data of IVO 30 kW PV power plant.
- C. Nyman, Photovoltaic activities in Finland, Proc.12th E.C. European Photovoltaic Solar Energy Conference; Amsterdam, The Netherlands, April 1994.
- Wilk H., Szeless A., Beck A. Meier H., Heikkilä M., Nyman C., Field testing and Optimisation of Photovoltaic Solar Power Plant Equipment, Proc.12th E.C. European Photovoltaic Solar Energy Conference, Amsterdam, The Netherlands, April 1994.
- C. Nyman, Photovoltaic at Nordic Latitudes in Finland, CADDET Renewable News Letter, Oct 1994.
- C. Nyman, N.Argaw, Simulation and measurement of water pumping systems in Ethiopia, 13th European Photovoltaic Solar Energy Conference, Nice, France, October 1995.
- C. Nyman, L. Mansner, Photovoltaic navigational aid system for multipurpose use, 13th European Photovoltaic Solar Energy Conference, Nice, France, October 1995.
- C. Nyman, Photovoltaics in Finland, 14th European Photovoltaic Solar Energy Conference, Barcelona, Spain, July 1997.
- C. Nyman, Ageing of photovoltaics, 14th European Photovoltaic Solar Energy Conference, Barcelona, Spain, July 1997.
- C. Nyman, Ageing of photovoltaics, 2nd World Conference on Photovoltaic Solar Energy Conversion, Vienna, Austria, July 1998.
- C. Nyman, First experience of water pumping system in Yemen, 16th European Photovoltaic Solar Energy Conference, Glasgow, UK, May 2000.
- C. Nyman, First experience of water pumping system in Yemen, EuroSun2000 ISES-Europe, Third ISES –Europe Solar Congress, Copenhagen, Denmark, June 2000.
- C. Nyman, The potential of using PV in Yemen, 17th European Photovoltaic Solar Energy Conference, Munich, Germany, October 2001.
- C. Nyman, H. Tikkanen, Implementation of PV in Tanzania, PV in Europe, Rome, Italy, October 2002.
- C. Nyman, PV basic materials for education RENEWCOLOGY, EU Leonardo project <http://www.renewcology.nu/>
- C. Nyman, World largest village electrification for the Development of Rural Education and Health Infrastructure Facilities of Sri Lanka, 22th European Photovoltaic Solar Energy Conference, Milano, Italy, September 2007
- C. Nyman, Solar Energy for the Development of Rural Education and Health Infrastructure Facilities of Sri Lanka, 22th European Photovoltaic Solar Energy Conference, Milano, Italy, September 2007

- C. Nyman, Lessons learnt of EU 1000 school programme 1999-2002 in South Africa, 22th European Photovoltaic Solar Energy Conference, Milano, Italy, September 2007

Conferences attended and member of committee

- Scientific committee 17<sup>th</sup> European Photovoltaic Solar Energy Conference 2001
- Scientific committee 19<sup>th</sup> European Photovoltaic Solar Energy Conference 2004
- Scientific committee 20<sup>th</sup> European Photovoltaic Solar Energy Conference 2005
- Scientific committee 21<sup>th</sup> European Photovoltaic Solar Energy Conference 2006
- Scientific committee 22<sup>th</sup> European Photovoltaic Solar Energy Conference 2007
- Scientific committee 23<sup>th</sup> European Photovoltaic Solar Energy Conference 2008
- Scientific committee 24<sup>th</sup> European Photovoltaic Solar Energy Conference 2009

Member of TC 197 ISO Standard group technical committee 2008 -