# Post-doctoral position

<table>
<thead>
<tr>
<th><strong>Short title</strong></th>
<th>Uncertainties in the LCA of energy production technologies</th>
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<tbody>
<tr>
<td><strong>Subject</strong></td>
<td>&quot;Uncertainties in the environmental impact assessment methods of energy production technologies based on LCA (Life Cycle Analysis)&quot;</td>
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<td><strong>Key-words</strong></td>
<td>Renewable energies, environmental impact assessment, Life Cycle Assessment</td>
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<td><strong>Type of contract</strong></td>
<td>Contract limited to 18 months</td>
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<td><strong>Duration</strong></td>
<td>18 months starting 1st March 2018</td>
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| **Degrees & Profile** |  - PhD in Sciences  
  - Knowledge of LCA software – Brightway, openLCA, Simapro – is required  
  - Applied Mathematics and Statistics backgrounds required  
  - Experience in Matlab, Python or R programming required  
  - Scientific publications : at least 3 published articles  
  - Fluency in English is required |
| **Location**    | Laboratoire d’accueil :  
  Centre « Observation, Impacts, Energie » (O.I.E.)  
  MINES ParisTech – ARMINES  
  Département Énergétique et Procédés  
  SOPHIA ANTIPOLIS (06 - France)  
| **Entity overview** | **The Center "Observation, Impacts, Energy" (O.I.E.)** is a joint Research Laboratory MINES ParisTech/ARMINES that focuses on energy. It addresses the temporal and spatial issues linked to renewable energy resources as well as to the environmental impacts of energy pathways. **MINES ParisTech** trains high-level engineers and scientists since its foundation in 1783. Originally in charge of the training of civil engineers of Mines and of the Inspectors of Mines, the School has developed research and third cycle programs (specialized masters, PhD) since 1960s, linked to industry and international academics. **MINES ParisTech** is one of the founding members of **ParisTech**, and of PRES Paris Sciences et Lettres (**PSL Research University**)  
 **ARMINES** is the first contractual research association in France, and was created in 1967 as an initiative of the École des Mines de Paris. It focuses on industry-oriented research. **MINES ParisTech** and **ARMINES** are distinguished with the **Institute Carnot** label since 2006. |
| **Missions**    | **Context:**  
  The large growth of renewable energies since the beginning of 2000s is expected to be maintained and even increase in the coming years. These technologies may contribute significantly to the future electricity mix. Compared to other energy sources, renewable energy technologies such as photovoltaics or wind power are considered to have zero or nearly-zero environmental impacts during the operation phase, although they may have significant impacts in other phases such as manufacture and installation or end-of-life. Due to the expected growth of renewable energies at a global scale in the energy transition context, a life cycle approach is necessary to calculate the impacts of specific energy technologies and global electricity mixes. The use of Life Cycle Assessment (LCA) has been extended both in public research and in industrial contexts as a tool for eco-conception and for environmental reporting. However, most of LCA studies on energy production technologies are based on life cycle inventories for average production processes and estimations from expert knowledge. The use of average inventories based on estimations with diverse levels of accuracy may involve significant uncertainties affecting LCA results. The variation ranges of these LCA results can influence decision-making in the framework of national and international policies. **Objectives:** |
The researcher will contribute, in the project INCER-ACV, to the methodological development required to take into account uncertainties and variability of operational parameters of energy production technologies in the estimation of their environmental impacts. The approach consists in carrying out an uncertainty analysis and the generation of simplified parametric models for a case study addressing photovoltaics. Then, the approach will be generalized in the form of a protocol that can be applied to other energy technologies or other industrial sectors. Finally, the applicability of the protocol will be validated in an industrial context with the collaboration of CRIGEN (a research center belonging to the Groupe ENGIE), partner of the project.

The main tasks of the researcher will be:

- identifying photovoltaics’ operational parameters and their mathematical relationships with life cycle inventories (LCIs)
- developing parametric models for the LCIs, allowing uncertainty propagation of the input operational parameters in python programming language
- characterizing uncertainties of these input parameters
- conducting the uncertainty analysis based on the stochastic simulation using the parametric inventory models
- identifying the key parameters and simplified parametric models for the estimation of the environmental performance from this reduced set of key parameters
- participating in the definition of the standard protocol for the generalization of the method
- contributing to the computer implementation of the protocol
- collaborating with CRIGEN for the validation of the protocol in an industrial context

Partners and collaborations:
The researcher will work in an interdisciplinary and multicultural environment. The tasks will be conducted in collaboration with the research center CRIGEN (belonging to the Group ENGIE), in the framework of the project INCER-ACV (2017-2020), funded by ADEME.

Références (References):

Deadline for application: 15th January 2018

How to apply:
Adresser lettre de motivation, *curriculum vitae* et liste de publications:
à l’attention de : Paula PEREZ-LOPEZ, Tenure Track
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