*INFORMATION CALL 2019*
*DOCTORAL INPhINIT FELLOWSHIPS PROGRAMME – INCOMING FRAME*

# PhD POSITION OFFER FORM

## Position

1. Project Title/ Job Position title:
   **Carbon budget and Unburnable fossil fuels reserves**

2. Area of Knowledge:
- **Physical Sciences, Mathematics and Engineering**

3. Group of disciplines: Geology, Earth Sciences, Environmental and Atmosphere Sciences, Mines, Geological Engineering, Oceanography, Hydrology

LIFE SCIENCES

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| Medicine, Public Health, Sport Sciences, Nutrition, Clinical Psychology, Health Management |
| Animal, Plant, Environmental Biology, Physiology, Ecology and Conservation |
| Human Biology, Microbiology, Molecular Biology, Genetics, Cellular Biology, Genomics and Proteomics, Biochemistry |
| Agriculture, Veterinary Science, Animal Production, Forestry |
| Biotechnology, Bioinformatics, Pharmacy, Food Technology |

PHYSICAL SCIENCES, MATHEMATICS AND ENGINEERING

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| Theoretical and Applied Mathematics, Computer Sciences |
| Physics |
| Geology, Earth Sciences, Environmental and Atmosphere Sciences, Mines, Geological Engineering, Oceanography, Hydrology |
| Civil and Construction Engineering, Energy, Nuclear Energy and Renewable Energy Engineering |

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| Chemistry and Chemical Engineering |
| Telecommunications, Electronics, Robotics, Biomedical Engineering, Automation Engineering, ICT |
| Industrial Engineering, Mechanical Engineering, Metallurgy, Materials, Nanotechnology, Aeronautical, Naval and Aerospace Engineering |

4. Research project/ Research Group description (màx. 2.000 caràcters)

How much more of Earth's fossil fuels can we extract and burn in the short- to medium-term future and still avoid severe global warming? An article in *Nature* argues that most of the world's fossil fuel reserves has to be left in the ground, unburned, to keep global temperature rise to no more than 2°C (Jakob and Hilaire, 2015). This is what is meant by 'unburnable fuels' and it relates directly with research by climate science about 'carbon budgets' (Kevin Anderson and Alice Bows Larkin 2011).

An initial study in 2013 by the Carbon Tracker and Grantham Institute (Imperial College – LSE) had compared the known global fossil fuel reserves (coal, oil and gas) with the carbon budget. They estimated that if all of the world's reserves of fossil fuels were burned, 2,860 billion tonnes of CO2 would be emitted to the atmosphere (so called 'carbon bubble', see : carbonbubble.info). This was more than 2.5 times greater than the allowed budget for a likely increase of 2ºC. In other words, the present speed of taking fossil fuels from the ground and burning them might have to be slowed down.

If carbon capture technology does not prove effective and the needed rapid decarbonisation implies that fossil fuels reserves have to be left unburned, what would be the implications in terms of climate policies? How should this proposal be operationalized and implemented?

In *Nature* Christophe McGlade and Paul Ekins (2015) at University College London examined further the implications of the carbon budget for the use of fossil fuels. They used an economic optimisation method: how to gain the most economic value from the limited amount of coal, oil and gas that can be burned, and in what regions. This analysis estimates that 88% of global coal reserves, 52% of gas reserves and 35% of oil reserves are unburnable and must be left in the ground. Such precision in the numbers by type of fuels is somewhat questionable, and this research project wants to explore different scenarios.

5. Job position description (màx. 2.000 caràcters)

The proposed PhD thesis will critically assess the implications of the carbon budget for the use of fossil fuels, exploring the notion of "unburnable fuels" in relation to climate policies. Instead of an economic optimization method (comparing costs and benefits of leaving fossil fuels in the ground in specific locations) we propose a multi-criteria approach. In the absence of additional carbon absorption capacity in land and the oceans, leaving fossil fuels in the ground makes sense. However, what type of fuels (gas, oil and coal) should be left unburned? How much? Where? When? How?

In recent years the notion of a 'carbon budget' has entered the lexicon of climate science (e.g. IPCC, 2013; Meinshausen et al, 2009). Although the science underpinning the carbon budget is increasingly robust (see Le Quere et al, 2013), some scientists, politicians, and the broader public have been slow to recognize its socio-economic and political implications. The higher the probability of limiting warming to no more than 2°C, the more stringent the budget and the stronger the position of the idea of leaving fossil fuels in the ground (Climate Council, 2015). According to the IPPC report (2013), the world's carbon budget could be entirely used up within 15-25 years, a scenario that could lock the world into a future 4°C or 6°C degrees warmer (Christoff, 2013; Potsdam Institute, 2012). The consequences and risks of the current 'business as usual' scenario highlight the urgency with which deep decarbonisation must take place. Nevertheless, how should the decarbonisation take place? The contribution from this PhD project is that instead of focusing only on negotiations between countries, it takes a commodity chain perspective: from extraction of fossil fuels to transport to final burning, focusing on the awareness and actions at the local level preventing damage from fossil fuels extraction (or fossil fuel burning) that make a quantifiable significant contribution against climate change.

## Group Leader

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4. Research project/ Research Group website (Url): http://envjustice.org/
5. Website description: EnvJustice research project, funded by the European Research Council.

## Other relevant websites (optional)

1. Url: http://ictaweb.uab.cat/
2. Website description: Institute of Environmental Science and Technology, Autonomous University of Barcelona


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