PROJECT OBJECTIVES

1 Develop beyond state-of-the-art high-performance simulation tools that can help the energy industry to meet future energy demands and respond to carbon-related environmental issues using cutting-edge HPC systems

2 Promote cooperation between energy industries from the EU and Brazil

3 Build cooperation between leading research centres in EU and Brazil in HPC focusing on issues relating to the energy industry

Our partners:

COPPE UFRJ — Instituto Alberto Luiz Coimbra de Pós-Graduação e Pesquisa de Engenharia

Lancaster University

Inría — INVENTEURS DU MONDE NUMÉRIQUE

IBERDROLA

Laboratório Nacional de Computação Científica

Ciemat — Centro de Investigaciones Energéticas, Medioambientales y Tecnológicas

ITA

CER

UNIVERSIDADE FEDERAL DE PERNAMBUCO — VIRTUS IMPAVIDA

Total — COMMITTED TO BETTER ENERGY

REPSOL

.Inf — INSTITUTO DE INFORMÁTICA UFRGS

BR PETROBRAS

BSC — Barcelona Supercomputing Center — Centro Nacional de Supercomputación

HPC4E

High Performance Computing for Energy

HPC exascale simulations for

- Wind energy production and design
- Efficient combustion systems for biomass-derived fuels
- Exploration geophysics for hydrocarbon reservoirs

www.HPC4E.eu

in bit.ly/HPC4Energy

Wind energy
production and design

HPC tools and systems to respond to demand peaks, output prediction and resource assessment

Objectives:

- Decrease the uncertainty of wind resource assessments
- Evaluate methodologies for different environments and site conditions, onshore and offshore
- Provide more accurate online wind power forecasts to electricity network operators

BRAZIL

2015
8.7 GW representing 6.2% of the national electricity matrix

2019
Wind installed capacity of 19 GW

2015
142 GW enough to cover 11.4% of the EU electricity consumption.

EU

Efficient combustion
systems for biomass-derived fuels (bio-syngas and biogas)

HPC tools and systems to develop more efficient and renewable fuels, reduce greenhouse gas emissions, reduce hydrocarbon dependency and fuel costs
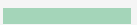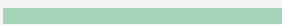
Objectives:

- Increase the accuracy of the prediction of pollutants by reducing the error margin to 5% with respect to standard schemes under varied fuel composition
- Provide accurate predictions of temperature, velocity and pollutants with less than 10% error
- Determine the most efficient regimes for hydrogen production in portable reformers using biomass fuels

2013
30% total ethanol produced worldwide

2014
24 bio-syngas and biogas productions plants totalling 84 MW

BRAZIL

45% of renewable energy coming from heat and power production of biomass-derived fuels

2013
14.500 bio-syngas and biogas plants totalling 7.86 GW

EU

Exploration geophysics
for hydrocarbon reservoirs

HPC tools and systems to improve available reserves and reduce the financial and environmental risks associatedwith exploration

Objectives:

- Two industrial workflows ready for production level testing
- Website featuring three very large-scale examples proposed by the industry
- 5% risk reduction in new prospects

Deep Cretaceous salts offshore Brazil

Volume expected to be over **50 billion barrels**: **4 times greater** than the current Brazil national reserves

The depth of most oil fields in Brazil entails technology challenges for exploration and production activities.

One of these challenges is developing essential **deep imaging techniques** for pre-salt oil that minimize exploration risks.