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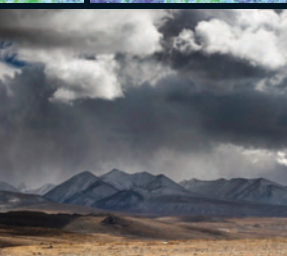
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Modelling tools available for  
the climate change key players





# GHG mitigation

GHG mitigation is becoming more and more critical but paradoxically, the monitoring of the GHG emissions is still far from being precise enough to assess the efficiency of the decisions already taken. Beyond the classic ARIA work in the construction of bottom-up emission inventories, ARIA atmospheric environment modelling capabilities are most valuable for improving the monitoring, recording and verification of the GHG emissions. Thanks to its multi-scale models which can go from the global scale to a very fine resolution (a few metres) and to the versatility of its models which can assimilate sensor readings of various types (micro-sensors, Lidar, Dial, fixed, etc.), ARIA can locate, assess and monitor GHG emissions of all kinds (point sources, area sources, linear sources, etc.).



**CARBOCOUNT CITY** is an emission inventory monitoring, reporting and verification system which provides more detailed information on the sources of GHG, enhancing city authorities' emission reduction plans. Currently tested in Paris, Rotterdam, and in the Brazilian city of Recife, it can be replicated in all mega-cities across the world.

**Partners:** was created within the Climate KIC innovation program with the following partners: Université de Versailles Saint-Quentin (UVSQ), TNO (Netherlands Organization for Applied Scientific Research), ARIA Technologies and LSCE (CEA/CNRS).

**Website:** [www.climate-kic.org/case-studies/carbocount-city/](http://www.climate-kic.org/case-studies/carbocount-city/)

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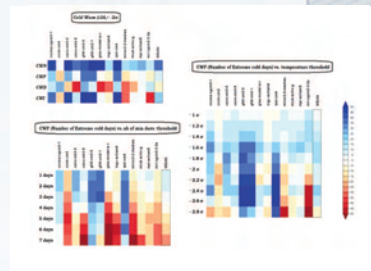
Most of the projects presented here were created within the Climate KIC innovation programme, Europe's largest public-private innovation partnership focused on climate change.



All the projects presented here involve ARIA Technologies as a key partner providing the tools for modelling the atmospheric environment in a wide range of contexts, scales and time-frames.

# Climate change adaptation

Climate change has a significant impact on the vulnerability of complex systems, on the probability of extreme events and on the potential damages that might occur. Again Modelling techniques are key to quantify those factors and determine when adaptation measures need to be taken. These tools will be extremely useful to assess the overall benefits of adaptation measures. For instance the health impact of more frequent heatwaves might be counterbalanced by the reduction of atmospheric emissions linked to cleaner mobility systems. ARIA modelling capabilities can thus be used for risk assessment and quantification as it is possible to simulate a very high number of events and determine statistical probabilities quite accurately.

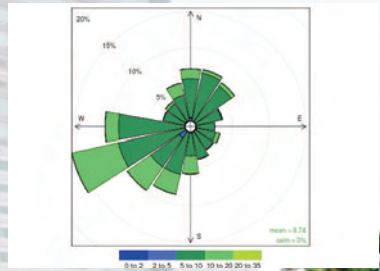


**SECIF** is a French project which aims at providing tailored climate information to the industry. The project comprises an assessment of the needs, three specific case studies, all related to the water and energy sectors (impact of cold waves on the energy sector, vulnerability of a waste water system to variable rainfalls, impact of wind and rainfall variations on renewable energies) and climate analyses (fresh data, new methods, extreme cases assessment, top-down methods).

**Partners:** SECIF is funded by ANR (the French National Research Agency) and led by IPSL. It gathers IDDRI, METEO-FRANCE, INSA, Veolia, ENGIE, EDF, CLIMPACT and ARIA Technologies.

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The **SOMS** (self-organizing maps) methodology is based on an artificial neural network approach used for pattern recognition and classification. It is often used by ARIA Technologies to classify a very large ensemble of meteorological situations represented by measurements or numerical model outputs. Clustering of these very large databases and the definition of a limited set of significant patterns allows the detailed study of the consequences of each typical situation on industrial operations (energy demand, energy production) or on transportation systems.

**Partners:** The SOMS methodology was successfully applied for EDF in France and the UK (wind resource estimation) and for ENGIE in the US (clustering of temperature fields).

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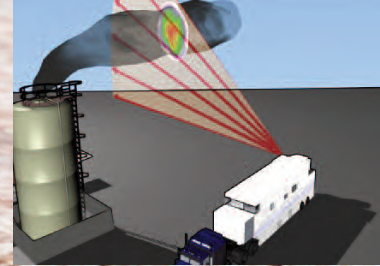


**KIC-T** The KIC Transitions project aims to make the decision-making process easier and more efficient for city planners and communities through the development of an innovative, scalable platform of web-based assessment tools. It is a SaaS (Software as a Service) which can be used by Web developers to launch air quality impact assessment studies on realistic urban development scenarios (roads, buildings, etc.)

**Partners:** KIC-T is a Climate KIC innovation programme led by Birmingham City University (BCU) with technical assistance from IBM, ETH Zurich, TNO, ESRI R&D, Greenhill Sustainability, SmarterBetterCities (SBC), ARIA Technologies and city supporters (Birmingham, Rotterdam and Zurich).

**Website:** [www.climate-kic.org/projects/kic-transitions/](http://www.climate-kic.org/projects/kic-transitions/)

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**FUME** aims at quantifying fugitive methane emissions from hard-to-tackle sites and sources. A differential absorption lidar (DIAL) provides identification and quantification of methane emissions from fugitive and area sources, point sensors provide continuous measurement at a specific location and models provide forecast concentrations based on knowledge of source terms. The first products are 1. a methane impact assessment and sensor placement tool 2. a methane measurement service and 3. a methane boundary fence leak detection instrument.

**Partners:** FUME was created within the Climate KIC innovation programme and is led by the NPL Centre for Carbon Measurement with LSCE, Veolia, CERE, ARIA Technologies, Cuadrilla Resources and National Grid.

**Website:** [www.climate-kic.org/projects/fume/](http://www.climate-kic.org/projects/fume/)

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**SNEIM** (sewage network combined emissions inventory & monitoring) is designed to address the issue of CH4 emissions associated with wastewater collection networks. Specifically, the project objective is to evaluate and confirm whether zones identified as high risk for H2S production are also correlated with CH4 formation. Furthermore, the project will evaluate whether H2S mitigation strategies yield a corresponding impact on CH4 emissions. Ultimately, the goal is to demonstrate that novel systems designed for dynamic management of sewer networks can be cost-effectively "upgraded" to include a module focused on monitoring and mitigation of CH4 emissions.

**Partners:** SNEIM was created within the Climate KIC innovation programme and is led by SUEZ with ARIA Technologies and LSCE (CEA/CNRS).

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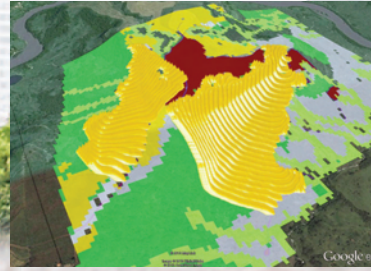


**URBMOBI** (Urban Mobile Instruments for Environmental Monitoring) is a novel mobile instrument for urban areas. It provides temporally and spatially distributed environmental data without the costs for a large number of fixed measurement stations. Its sensors can be operated on buses, trams or other vehicles. Data will be integrated into real-time climate models to provide climate services, with visualization tools and a graphical user interface.

**Partners:** URBMOBI is a Climate KIC innovation programme led by RWTH Aachen with TNO, ARIA Technologies, Budapest University of Technology and Economics (BME) and Meteorological Environmental Earth Observation (MEE0).

**Website:** [www.climate-kic.org/projects/urban-mobile-instruments-for-environmental-monitoring/](http://www.climate-kic.org/projects/urban-mobile-instruments-for-environmental-monitoring/)

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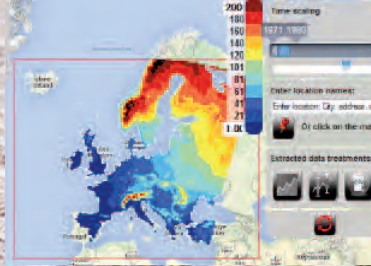


The **Oasis** Modelling Framework provides an open marketplace for models and data leading to much wider access to understandable tools for catastrophe risk assessment. This allows for the insurance community to exploit large elements of available research in hazards and vulnerability, with a specific focus on forest fires and heavy rains modelling. Since it was established in September 2012, OASIS has grown to over 40 insurance members and over 60 associate members. OASIS was named Innovation of the Year at the London Market Awards 2014.

**Partners:** Oasis was created within the Climate KIC innovation programme and is led by the Imperial College London with Delft Technical University, IPSL (Institut Pierre Simon Laplace), CLIMPACT, Deltares, ARIA Technologies and Numtech.

**Website:** [www.oasislmf.org/](http://www.oasislmf.org/)

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Climate extremes (heat waves, cold spells, droughts, storms and wind stilling) affect in particular energy production, supply, demand and security in several ways. While national, European or international projects have generated vast amounts of climate projections for the 21st century, their practical use in long-term planning remains limited.

**E3P** (Extreme Events for Energy Providers) provides the energy supply and production industry with the ability to present plans for climate adaptation and risk assessment.

**Partners:** E3P is a Climate KIC innovation programme led by CEA with EDF, ENGIE, ARIA Technologies, Numtech, CLIMPACT-METNEX, CNRS (the French National Centre for Scientific Research), METEO-FRANCE, Imperial College London, Wageningen UR, Alterra.

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The "Smart Sustainable Districts" **SSD** programme works closely with highly ambitious districts across Europe to identify solutions to their sustainability and climate change challenges. These solutions provide exemplars that can also be replicated citywide or in other districts. In one of the Grand Paris "ecoquartier" ("ecodistrict"), ARIA will coordinate the design and implementation of an innovative and collaborative web application based on share data and providing services to citizens and stakeholders.

**Partners:** Institute for Sustainability, ARIA Technologies, TUB (Technical University of Berlin), TUM (Technical University of Munich), TNO, Utrecht Sustainability Institute, ICL

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