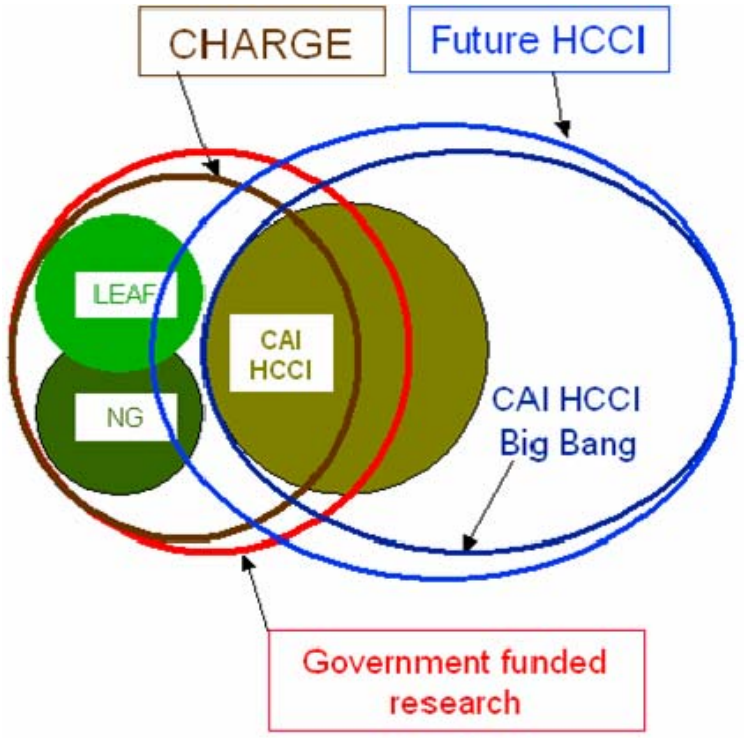
CHARGE program - Controlled Homogeneous Auto-Ignition Reformed Gas Engine

The project aimed in general at developing a clean and efficient powertrain system, in order to meet the challenge and requirement for the next generation of vehicles. It is a UK Government funded research project through the Foresight Vehicle Program. Jaguar's work with this project is part of the joint effort in Ford global CAI HCCI activities before "Big Bang". Total Budget £0.565 million.

The proposal integrated 3 technological elements, each of which has unique potential to improve exhaust gas emission and fuel consumption of internal combustion spark ignition (IC-SI) engines over levels achieved when fuelled by gasoline.

The 3 elements were: Natural Gas (NG) as an alternative fuel, homogeneous charge compression ignition (HCCI) for an innovative combustion system, and fuel reforming to produce a hydrogen-rich NG based fuel to improve combustion efficiency and to facilitate HCCI operation. This reforming process developed at Birmingham University is known as LEAF technology (Lower Emissions by Activation Fuels).



The project has demonstrated that the combination of HCCI (Homogeneous Charge Compression Ignition) and LEAF (Lower Emissions by Activation of Fuels through reforming) is an effective and promising concept for optimised operation of natural gas engines.

There is a system demonstrator (V6 engine with dual cam profile switching and fuel reformer). The project has also produced simulation models (Local equilibrium/2D reformer models, engine combustion and performance models and vehicle models). Research is now continuing in a new 3 year project called CHASE (Controlled Homogeneous Auto-Ignition Supercharged Engine).

Achieved objectives:

- A proven concept for the control of auto-ignition process in HCCI engines
- Optimised natural gas reforming catalysts
- Understanding the effects of key parameters in the engine system (including fuel reformer)

Partners for this project are:

- University of Birmingham
- Jaguar and Land Rover
- Mass Spec UK
- Johnson Matthey