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R-co 4Change Net Zero Equity Euro, taking the “Net Zero” path by supporting transition actors



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Through our management of the R-co 4Change Net Zero Equity Euro transition fund, we are convinced that the historical energy players have a key role to play in the transition. We are therefore particularly on the lookout for initiatives within the sector.

In this regard, in a note published in September 2021⁽¹⁾, Bertrand Hodée, analyst on the Energy sector at Kepler-Cheuvreux, highlighted a project that caught our attention. The integrated oil company ENI has invested in an initiative that could be the ultimate source of clean energy that we have been waiting for: Nuclear Fusion.

ENI: a transition player

The Italian energy company is an ambitious player in the oil sector. Through its greenhouse gas emissions reduction plan, it has set a Net Zero⁽²⁾ objective for 2040 for scope 1&2 and 2050 for scope 3⁽³⁾. In order to achieve this, the Group is taking numerous initiatives: it is accelerating its investments in renewable energies, increasing its carbon capture targets, but also investing in innovative solutions. In concrete terms, ENI has invested in Commonwealth Fusion Systems (CFS), a spin-off⁽⁴⁾ from the MIT, since its creation and holds a seat on the board. On another note, the Italian Group has just participated in a new round of financing by injecting €360 million. CFS could provide access to an infinite source of clean energy: nuclear fusion; a significant step forward in the fight against global warming.

Nuclear fusion, what is it exactly?

Nuclear fusion is nothing more than the natural energy phenomenon observed on the surface of the sun: hydrogen nuclei kept at a high temperature fuse and release a very large amount of energy. Unlike nuclear fission (a process used in nuclear power plants), which breaks an atom into several small pieces, fusion assembles atoms to form a larger one, with both phenomena (fission and fusion) releasing energy by changing the mass between inputs and outputs.

This apparent simple reaction has, however, proven to be particularly complex to reproduce. It requires the production of a very hot but not very dense plasma, confined by an intense magnetic field. The challenge is to maintain this plasma stable enough to create the chemical reaction and to release a quantity of energy greater than the amount injected to achieve it. Nuclear fusion research therefore aims to create a system that could replicate it.



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(1) Bertrand Hodée, Kepler Cheuvreux, Fusion Energy - The Holy Grail of Clean Energy, 17/09/2021.

(2) Net Zero¹ is a target arising from the Paris Agreement which involves reducing anthropogenic greenhouse gas emissions with the aim of approaching a theoretical zero.

(3) Scope 1 corresponds to direct emissions coming from facilities that are stationary or mobile located within the organizational scope. Scope 2 to indirect emissions related to energy consumption. Scope 3 to indirect emissions related to other stages of a product's life cycle.

(4) A spin-off is the creation of a new entity from a branch of activity of a group.

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What are the advantages of nuclear fusion?

- 1. Clean energy:** this process does not emit CO₂, the chemical reaction creates helium, an inert and non-toxic gas. No radioactive waste results from this process.
- 2. (Almost) infinite energy:** the elements needed for this nuclear fusion are available on earth in large quantities: deuterium (33 grams are found in one liter of seawater) and hydrogen isotopes (only 200 kg are needed to generate 1GW of electricity).
- 3. Safe energy:** unlike the fission process in nuclear power plants, there is no risk associated with the cooling of a reactor, which avoids the risk of disasters such as the one experienced in Fukushima.
- 4. Non-intermittent energy,** as opposed to current renewable energies.

By way of illustration, with this technology, the fusion of a single gram of hydrogen can generate more energy than the combustion of 11 tons of coal!

Genesis of the project: from ITER to CFS

The principles of fusion have been known since the 1950s. The emblematic ITER project was launched in 1988: as the project developed, a coalition of 35 States came together with the idea of recreating the fusion observed on the surface of the sun. The deployment of the project has come up against several constraints, both technical and financial, since the construction of a giant reactor represents an estimated cost of €25 to €50 billion. Technically, ITER should achieve a Q factor $> 10^{(5)}$. In the end, due to the electricity needed to run other ITER related processes, the net electricity creation will be close to 0. Research on the project is ongoing, but the commissioning of a commercial unit based on the ITER concept is not expected before 2050.

In parallel to ITER, another nuclear fusion project has been set up: the CFS (Commonwealth Fusion Systems) was born in 2018 from a spin-off of the Boston MIT PSFC (Plasma Science and Fusion Center) which has been working on plasma physics since 1968. CFS has focused on the main challenge of nuclear fusion: keeping the plasma stable at a very high temperature (150 million degrees Celsius). Scientists have developed a machine in which powerful magnets keep the plasma in a circle and prevents it from leaking. The major evolution recently brought by the CFS, precisely concerns these magnets: the test carried out on 8 September showed that thanks to an evolution in materials science with a new type of superconductor, the new magnets make it possible to more than double the magnetic field without altering the properties of the superconductors. Such a result allows for a 27-fold increase in energy Q-factor, paving the way for much smaller and cheaper units benefiting from a simplified design.

In other words, the reactors will be able to be produced on production lines and assembled on any site because of their size, and all this at an estimated cost of between \$2 to \$3 billion per unit, which is 20-25 times cheaper than an ITER reactor. The production process will allow the various components of these reactors to be produced and then assembled anywhere, allowing even emerging countries to benefit from this process. To top it all off, the first experimental unit (SPARC) will be operational in 2025 and the first commercial nuclear fusion unit (ARC) (capacity 400MW) in 2031.

We are indeed talking about a potential revolution. It will of course be a complementary solution to existing renewable energies but will accelerate the energy transition.

R-co 4Change Net Zero Equity Euro: an impactful transition fund

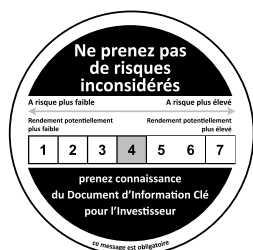
Within R-co 4Change Net Zero Equity Euro, we specifically seek to identify the transition players that demonstrate a willingness to innovate in sectors that are major contributors to greenhouse gas emissions, in order to reduce their impact on the environment. Indeed, rather than investing only in low emission sectors, we believe that our actions will be more effective by investing specially in the most emitting sectors. This seems to us like the most pertinent lever to significantly reduce greenhouse gas emissions. Of course, to achieve our objective, we take particular care in selecting players with a credible transition process, with an emissions reduction trajectory supported by a solid investment plan.

The idea is to create a virtuous circle: the best performing companies within these sectors will be favored by investors, and their transition process will be replicated by their competitors, which will be beneficial at a global level. This is how we will achieve our commitment to reduce the carbon intensity of our portfolio by an average of 7% per year, in order to limit the rise in temperature to 1.5°C, an objective in line with the Paris Agreement. We also believe that these initiatives will help reduce the valuation discount that drags these sectors due to concerns about the cost of transitioning to green energy.

(5) Multiplication factor of the energy produced versus the amount of energy required to produce it.
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R-co 4Change Net Zero Equity Euro



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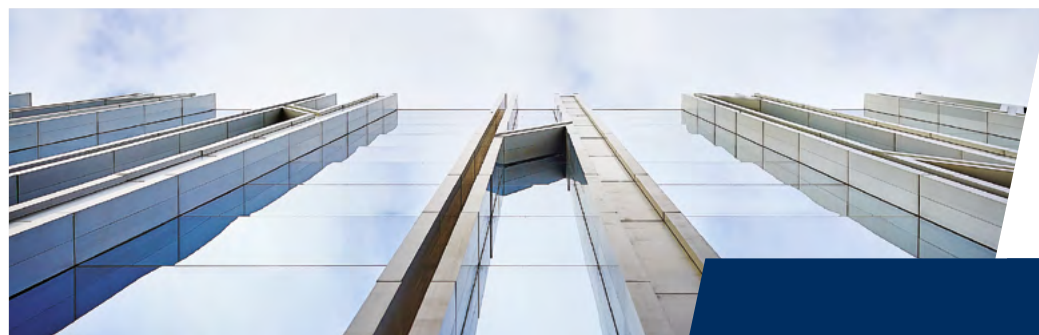
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