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Interview With Andrea Rossi, LENR Energy Pioneer

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Background

As we explained in earlier Huffington Post articles ([HP#1](#)) and [HP#2](#)), a revolution of sorts is brewing in the clean energy field, with the emergence of fusion and "low energy nuclear reaction" (LENR) energy. These processes, unlike fission reactions used in conventional nuclear reactors, need not emit dangerous radiation, nor do they produce radioactive byproducts. The fuel is plentiful and free -- the key ingredient, hydrogen, is the most abundant element in the universe.

Scientists at universities and large government laboratories have been feverishly working for decades, spending billions of dollars, pounds, euros and yen, to develop a practical "hot" fusion energy system. Recently the U.S. aerospace firm [Lockheed Martin](#) announced plans to build a 100-megawatt nuclear fusion reactor. Two other commercial ventures pursuing this track are [Tri Alpha Energy](#) and [Energy/Matter Conversion Corp.](#) of San Diego, California. Still other researchers are reviving an approach long considered to be dead and buried: "cold fusion," or, as its practitioners prefer to describe it, "low energy nuclear reaction" (LENR) energy.

One pioneer in LENR is Andrea Rossi, an Italian-American inventor-entrepreneur with a checkered past, who recently formed a venture to commercially market systems based on an LENR process he has developed. We should add that many are understandably skeptical of Rossi's claims; yet he reports that he has a full-scale working prototype, delivering 1 MWatt continuous net output power, which is already seven months into a one-year acceptance test at a commercial client's site. Several observers have seen the system in operation, and have reported that it is working as claimed, as evidenced by significantly lower utility bills for the customer. On 25 August 2015, the U.S. Patent Office awarded Rossi a patent for his process.

Given the potential importance of these developments, scientifically, economically and environmentally, we have been following progress in this area in earlier Huffington Post articles (HP#1) and HP#2), to which we refer the reader for some additional background information. We present here an interview with Andrea Rossi, in the form of a set of questions posed by us, and Rossi's responses (which we have lightly edited):

Interview with Rossi

1. What originally inspired you to investigate low-energy nuclear reaction (LENR) energy, and to pursue it for many years?

AR: I have actually been working in the field of alternative energies since I was 20 years old, mainly because I was very shocked at the first oil crisis following the Yom Kippur war in 1973. So I vowed to work with the aim of making oil less necessary. I was fascinated by the Fleischmann-Pons work in 1989, and ever since then I have been trying to make something useful with LENR.

In 1990, after the Fleischmann-Pons demonstrations, I tried my own experiments in my factory at Milan, Italy (where I was developing means to derive energy from organic wastes). I did not have any success in replicating the Fleischmann-Pons experiment, but I was totally fascinated from the idea, so I tried other systems to achieve a similar effect. I think that the real importance (and merit) of the F&P experiments has been the idea to make energy from nuclear effects by means of quantum tunneling.

2. What are your primary motivations at the present time? Providing low-cost energy? Stopping global warming? Others?

AR: My primary motivation at the present time is to provide low-cost energy that is able to help resolve environmental problems. Initially, however, the main "social" reasons to pursue this work were not related to global warming, because this issue has been raised only recently (although it surely concerns me and is an added reason to pursue this work), but instead was to search for a cheap energy source that hit two targets with one bullet: cheaper energy and reduced global pollution (since the use of traditional fuels is the source of most of the global pollution induced by human activities). This has been the philosophical motivation of my work.

3. Many scientists, when told of your work, are very skeptical that you have developed a new source of clean nuclear energy. What would you offer as the primary scientific evidence that it is truly working?

AR: Maybe they are right! My own view is that the only way, in the end, to convince people that my technology really works is to produce products that can be bought off the shelf. As long as a product is not on the real market, anyone can say whatever he or she wants and gain credibility. In my view, facts speak much louder and clearer than words. If I tell you that man can fly, we can discuss the possibility ad infinitum, with positivists and negativists producing much sophistry. But if I can show you a working airplane, the discussion is over. So this has been my approach -- produce a commercial product.

4. What do you believe is the best theoretical explanation?

AR: My theory is that a proton from a hydrogen atom enters, by the quantum tunneling effect, into a nucleus of Li-7 (i.e., a lithium nucleus of atomic weight 7), forming a nucleus of Be-8 (i.e., a beryllium nucleus of atomic weight 8), which then decays in a few seconds into two alpha particles (helium nuclei), accompanied with the release of significant nuclear energy. See the paper by Norman Cook and myself, [On the Nuclear Mechanisms Underlying the Heat Production by the E-Cat](#). The isotopic shifts have been experimentally measured by secondary ion mass spectrometry (SIMS) -- see the [Lugano experiment report](#).

The shift of the lithium isotopes has been reconciled with our understanding of the process, although the shift of the nickel isotopes has not (and I think that there is a problem with the small amount of the sample -- only 2 mg out of an initial fuel charge of 1 gram). More analysis is underway. The reactions we assume for nickel and lithium are explained in the Cook-Rossi paper mentioned above. What I can say more is that lithium plays a primary role, with nickel acting mostly a catalyst. The overall mechanism is described in the [patent](#) granted to us by the U.S. patent office.

5. Is there a chance that your system could emit significant radiation (e.g., neutrons)? What evidence can you cite that this is not a major problem?

AR: The reaction mentioned in point 4 above does not emit neutrons. I have worked 16 hours per day on my reactors since I was 20 years old, and I am in good health! The report of the Lugano experiment (see above) includes a complete description of the equipment and measurements that we always make of radiation emitted by the apparatus. In years of work, we have never detected, outside the apparatus, ionizing radiation significantly above the pre-existing background level.

6. Several other research groups have reported being able to reproduce some of your effects. Which of these reports do you find the most convincing? What additional studies would you like to see?

AR: The most interesting work, in my view, is by Russian physicist Alexander Parkhomov. The professors that performed the [Lugano experiment](#) employed infrared thermal measurements, to avoid the indirectness of a heat exchange system. In contrast, [Alexander Parkhomov](#) has used classic calorimetry. He has also partially confirmed, in further analysis made with the Science Academy of Russia, the isotopic shifts of lithium and more reasonable shifts with nickel that were reported in the Lugano experiment. Of course, additional studies are necessary to explore and reconcile and isotopic shift of nickel that I use as a catalyst. More studies are on course: Prof. Norman Cook is still working with me to prepare a more solid and conclusive paper; we are searching for a mathematician to give our study a rigorous mathematical structure.

7. Many are skeptical of reports of your test system at the commercial site. Do you plan to permit scientists and others to observe this system in operation?

AR: The commercial plant is in the factory of a customer, and it is up to him to decide if and when to open the doors of his factory after the end of the tests, not us. Keep in mind that the tests currently on course could end up with either positive or with negative results. No reports will be delivered before the end of the tests. If the results are negative, we will have to retrieve the plant and resolve the problems. If the results are positive, the plant will be reproduced on industrial scale and put on the market. We have pre-orders for a combined value of USD\$3 billion. The resulting technology will be tested mainly by our customers.

8. What have been the principal challenges to keeping this system operational?

AR: Our principal challenge has been reliability, which means to keep the reactors working in a stable mode, producing energy 24 hours per day, 7 days per week. Our current system is the end result of thousands of earlier prototypes. The control system acquires data from the temperature, pressure and flow-metering gauges to regulate the operation of the E-Cats working in harmony. It is important for us to provide effective control and instrumentation, sufficient to keep the equipment working correctly, yet to avoid excessive or potentially faulty instrumentation that might compromise the reliability of the system in global operation. It is also imperative that the monitoring equipment provide the alarms and other information required by our safety certification company (SGS).

9. The U.S. Patent Office recently awarded you a patent for an LENR system. Could you briefly summarize this patent? What other patents do you intend to pursue?

Yes, I am very proud of the recently awarded U.S. patent. Some photos of this patent, and in fact the entire patent text, are available at <http://www.journal-of-nuclear-physics.com>. I have 64 other patents pending, and I am working on even more of them with my attorneys.

10. Assuming all goes well, what are your plans for commercial roll-out? Where will these systems be manufactured? Roughly how many potential customers have expressed interest? How many U.S. and non-U.S.?

AR: Assuming all goes well, we have, as I said, circa 3 billion U.S. dollars worth of pre-orders. Obviously we have not accepted a single cent so far. The roughly 600,000 pre-orders we have received will be turned into real orders only when the plants are ready for delivery and the customers confirm acceptance of the proposals we provide at that point. So we are already organizing the manufacture of these systems. Along this line, we want to offer prices that are very competitive, by means of economy of scale, to discourage "reverse engineering" (by making such reverse engineering pointless). Manufacturing will initially be done in the U.S. and in Europe. If at the end of the current one-year contractual test period (end of February 2016), our results are positive, manufacturing will begin.

11. What do you believe are the most promising potential applications for your technology? Utility-scale electrical generation? Commercial water desalination? Home or small business use? In what time frames?

AR: We foresee applications for central heating of commercial buildings, heat production for industrial processes and electric power generation. My dream is for domestic heat and power generation. We have already obtained safety certification for our industrial plants. Domestic systems are still on course in the certification process. Some have asked whether the E-Cat could be used for water desalination. This is questionable. Obviously it is technologically possible, since we can distill water with the E-Cat, but reverse osmosis is very cheap. Honestly, I do not think that the E-Cat can be competitive relative to reverse osmosis, along the price figures that I am aware of. The issue here is just economic.

12. What "political" challenges do you foresee? Regulatory agencies? Environmental groups (because of nuclear reactions)? Oil and gas companies? How do you plan to deal with these challenges?

AR: The chief political challenges we see are: (a) explaining our product to the public and to potential customers; (b) providing evidence of the fact that it does not emit radiation, does not use radioactive materials, does not produce radioactive waste of any kind, and in fact does not emit emissions of gas, liquids or wastes of any kind; (c) respecting all existing laws and working at the maximum of our possibilities; and (d) explaining that this energy source is not an alternative to other energy sources, but a new source that is to be integrated with others in synergy with them -- for example, improving the emissions with combined systems.

13. Is there anything else you wish to add?

AR: All I want to add is this: Our work is very difficult, and at the moment I am not able to ensure that the final results will be positive. Many issues remain to be tested and understood, but my team is working to the extreme limits of our abilities to place the E-Cat system on the shelves. Until we reach this milestone, it will be as if we have done nothing. Thank you for your attention. It has been a delight and honor for me to provide this information. Andrea Rossi.

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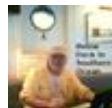
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Nainoa Mariner

The blessing of Rossi is that he is an actual experimentalist in the field and not one of the countless pundits. There are precious few experimentalists in cold fusion and of those a tiny fraction reliably produce the reactions in amounts that are not miniscule and thereby disputable. That Rossi says helium is the primary nuclear ash is good to hear as it jives well with my own helium findings in cold fusion reactions. Hopefully Rossi's Italian spring tide will rise on schedule and lift all cold fusion boats. To read some of the history of experiments in the field there is atom-ecology.russgeorge.net

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Guy Chapman · Reading, England

When you say "actual experimentalist", at what point has he actually demonstrated this device under controlled conditions? Oh, wait, I know the answer: he hasn't. There have been no demonstrations where