

Rossi E-CAT LENR device - an investigation

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Implications #1

If true - a truly astounding
scientific advance,
like radio or flight

Potential to save the planet, avoid
climate change

Dick - many humanitarian and
environmental projects

Would love to invest in it - has
offered \$200,000

Implications #2

If not true - a major mistake to
invest in it

Divert funds away from genuine
projects

Confuse those wishing to make
a better world for their children.

Australian Skeptics have investigated many frauds and scams for “free energy”, health products and the like: eg

- Water powered car
- Lutec (free energy) in Cairns
- Powerband (Sportsband)
- Sensaslim (Peter Foster)
- Aust. Vaccination Network (Meryl Dory)

Is this one different?

Yes - at least 6 scientists have
observed the tests or studied the
results,
and have been encouraged.
Thus more investigation is
warranted!

Some concerns 1:

Background

- Rossi once stated false qualifications on his CV - Chem. Eng. Degree from Kensington University
- Rossi has no published papers - thus established his own “Journal of Nuclear Physics”
- Two convictions and jail terms
- Patents - mixed results - Italy accepted, US rejected
- Origin of invention - university lab or garden shed?
- Other unsupported claims - eg a factory heated by an ECAT for a year, not supported

NOT SHOW STOPPERS - JUST DOESN'T FIT EXPECTATIONS

Some concerns 1:

Background

More serious: Thermoelectric generators - electricity from waste heat. Wiki says:

- Rossi sent 27 thermoelectric devices for evaluation to the [Engineer Research and Development Center](#); 19 of these did not produce any electricity at all. The remaining units produced less than 1 watt each, instead of the expected 800–1000 watt. [\[10\]](#)
- Thus his previous inventions failed to work as advertised.

Some concerns 2:

Theory

- Re the apparent approval from NASA:
- On closer reading, their support is for Low Energy Nuclear reactions (LENR) in general, not Rossi's device
- NASA even said: "Rossi's device has never been satisfactorily demonstrated"
- In the physics community, all LENR is regarded as "fringe", with no experimental verification
- Thus there is no established theory which might make it possible.

Some concerns 2:

Theory

QuickTime™ and a
decompressor
are needed to see this picture.

Rossi has not supplied real diagrams or explanations; diagrams such as this have been made by third parties based on his descriptions.

Some concerns 3:

Tests and demonstrations

General concerns:

- Lack of configuration diagram (equipment setup)
- Lack of running in stand-alone mode (power plug pulled)
- A mysterious blue box remains connected, so the input power “could be manipulated”
- Absence of radiation - the waste water runs down the drain, if nuclear reaction it would be radioactive
- Total vaporization? Rossi claims 100°C steam, but could be 90% hot water, so output power could be overestimated
- Flow measurements not consistent, so again, output power could be overestimated

Some concerns 3:

Tests and demonstrations

LIST OF DEMONSTRATIONS

- 29 March 2011 - Kullander
- 29 April - Lewan
- 14 June - Krivit
- 6 Oct - larger device - Lewan + scientists
- 28 October - Megawatt device

29 March - Kullander & Essen

QuickTime™ and a
decompressor
are needed to see this picture.

29 March demo - observed by Prof Kullander & Essen #2

These are two respected Swedish nuclear physicists.

Hanno Essen is on the board of Swedish Skeptics, a sister organization of Australian Skeptics, of which I am on the committee.

Their Report on their observation of a Rossi demonstration indicates that at face value, real energy gain was taking place.

I have discussed it with Essen, and he has confirmed the observations in the Report.

This seems to be strong evidence in Rossi's favor.

29 March demo - observed by Prof's Kullander & Essen #3

However, scientists are accustomed to observing nature, which is always straightforward.

I have looked more closely at their measurements:

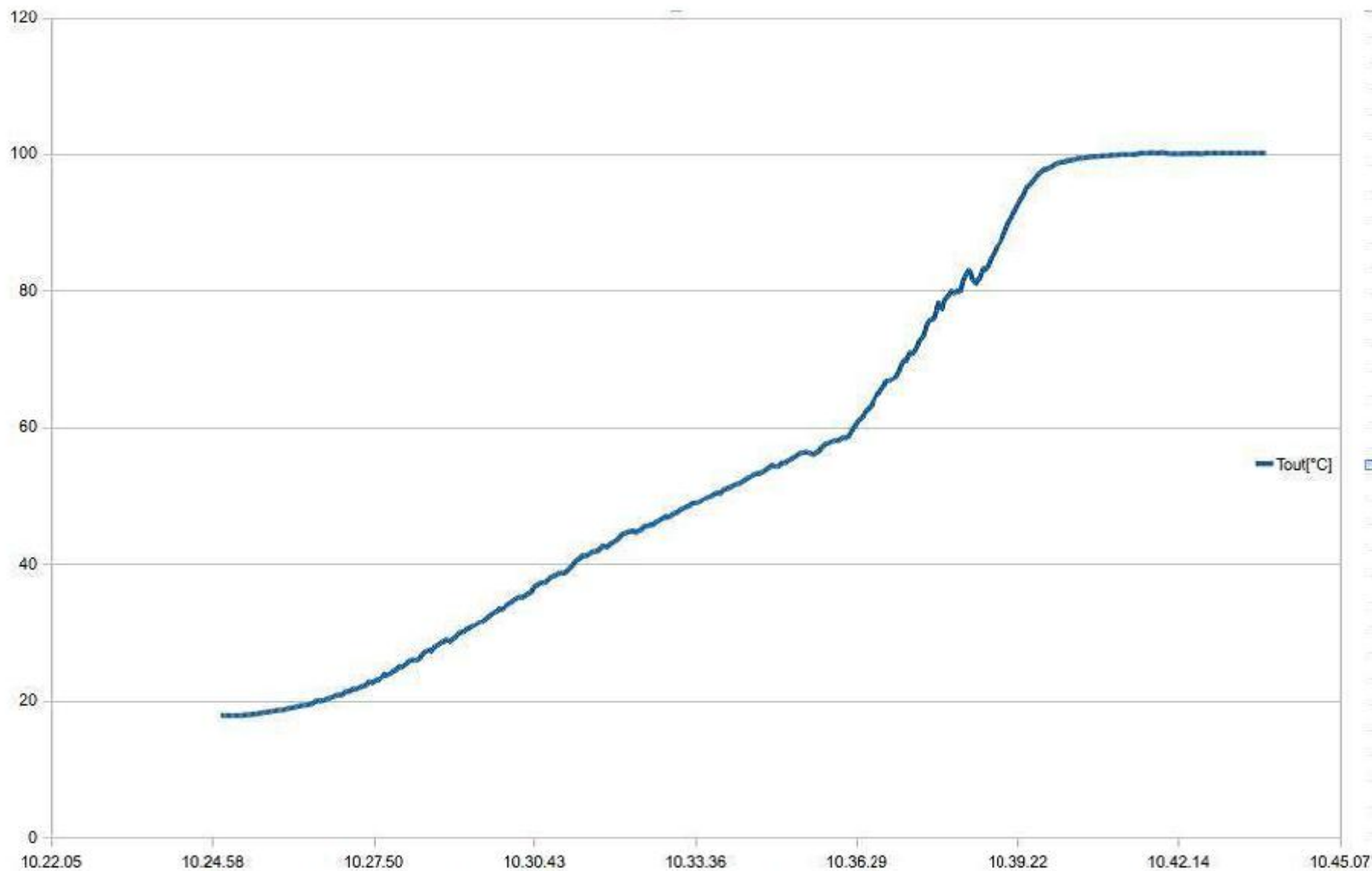


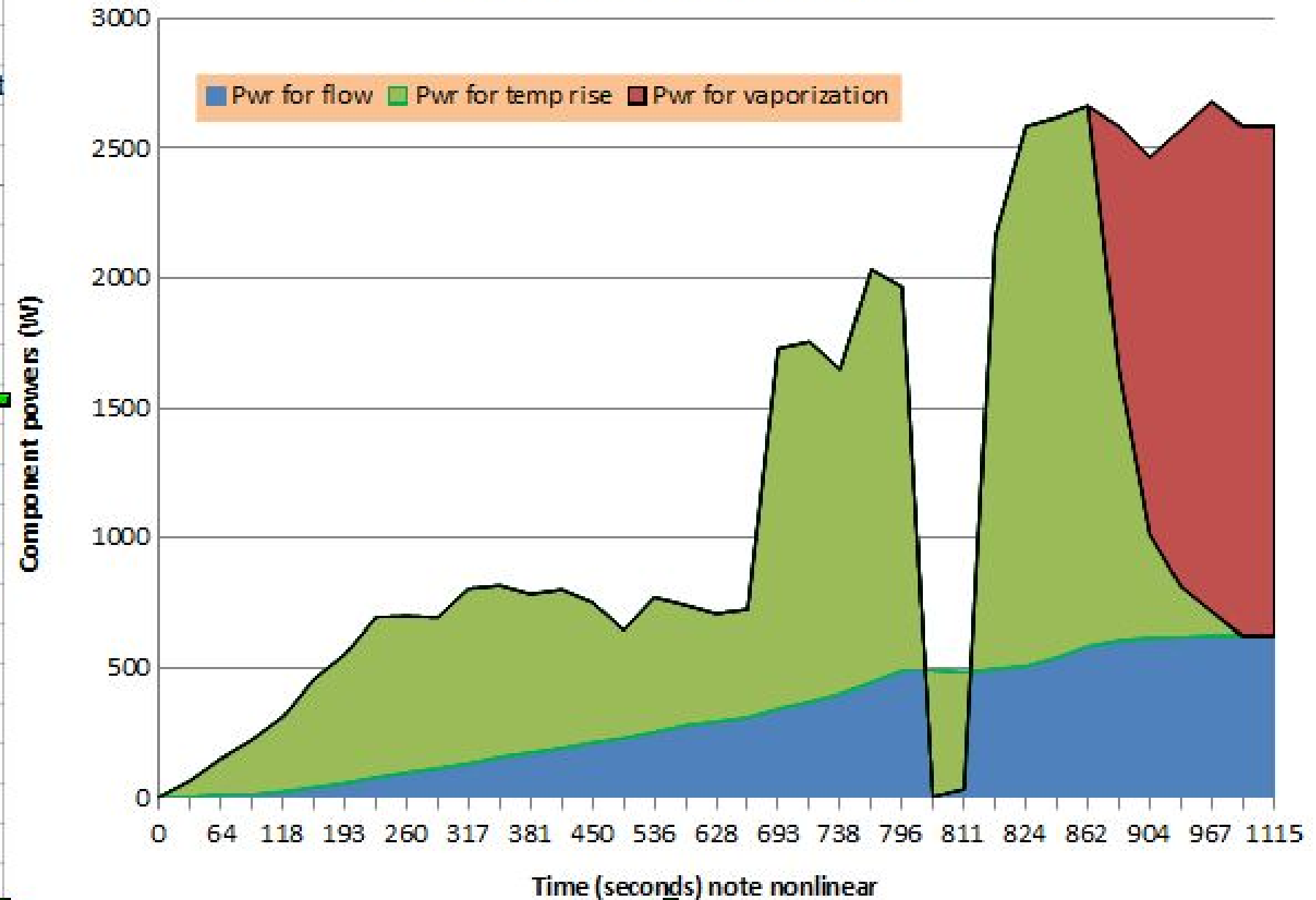
Figure 6. The evolution of temperature in Celsius degrees versus the time in hour.minute.second. (Photo: Giuseppe Levi).

Analysis

The first graph is the output temperature vs time.

I constructed a simulation to find what power profile would reproduce that curve.

E-Cat Simulation - Bryce

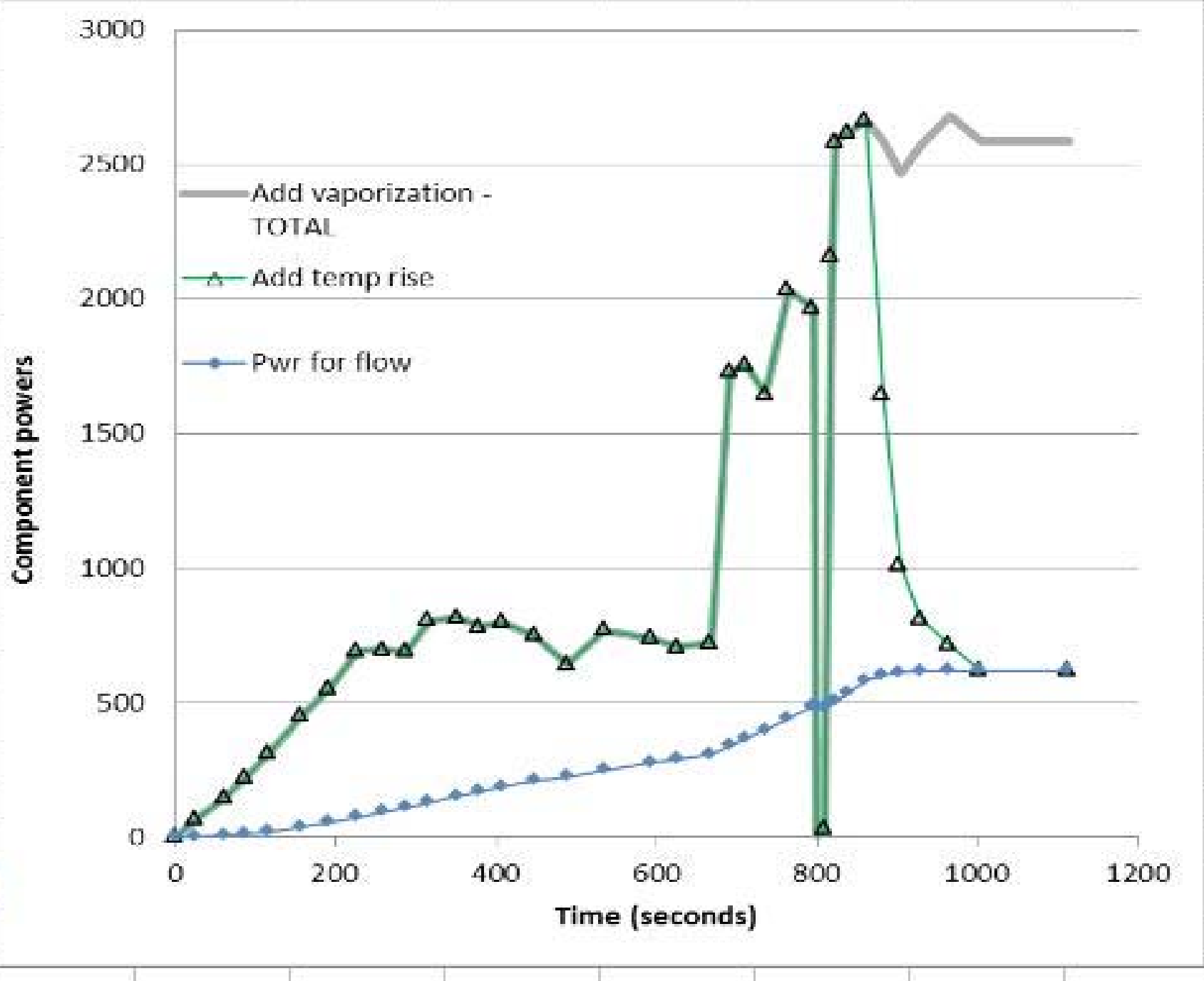


Analysis

The blue area is the power required to heat the continuous water flow to the recorded water temperature.

The green area is the power required to heat up the water sitting in the device and its metal structure (under certain assumptions). This power goes to zero as 100C is approached.

The red area is the power required to boil the water into steam (under certain assumptions).



Analysis

- The third graph is the same quantities as line graphs on a linear time scale.
- There a very poor fit to the “nuclear reaction” theory -
- It starts when the water in only a warm 28C - if real, the nuclear reaction would start itself on a warm day!
- The input power is about 750 watts for a time, then jumps suddenly to around 1700 watts.
- The power stops for 20 seconds, and resumes at an even higher level (2600 watts), despite a cooler temperature.

Analysis

- These are NOT characteristics one would expect of any natural reaction started by heat.
- Alternative hypothesis: That the electrical power is being manipulated, unseen by the observers.
- It starts out at 750 watts
- At 700 seconds, it is increased to 1700 watts
- At 800 seconds it is disconnected, and then reconnected to a higher voltage source, giving 2600 watts.
- The data seems to fit the second hypothesis better.

Conclusion from 29 March test

- The data provided is more indicative of the input electrical power being manipulated, than of a real nuclear reaction.
- As always, such conclusions can be revised if new data is provided.

April test - Lewan



Note big blue box

It connects to two heaters in the device, and was manipulated during the test, so the real input power is not clear.

14 June - observed and filmed by Krivit

Rossi's calculations rely on all the output water being vaporized.

But observer Steven Krivit says Rossi took pains to drain the outlet hose of water before showing the steam issuing forth.

Thus, calculations show the power out could be only 600 W not 5000 W as claimed (the input was 770 W)

6 October - larger device - Lewan



6 October - larger device - Lewan #2

- Rossi this time had a much larger device. The output hot water or steam was passed through a heat exchanger and the power measured in this secondary flow (thus eliminating the vaporization problem).
- This was attended by several scientists (Peterssen, colleague of Kullander, Ikegami)
- And a very careful observers (Lewan of Ny Teknic magazine).
- At face value, the notes indicate a self sustaining mode of 3 hours, where the input power was 100 watts and the output was 2000 watts (a COP of 20),

6 October - larger device - Lewan #3



Lewan's detailed notes were analyzed by several independent scientists and others. They noted many concerns. I have added my own observations:

- Rossi started the nuclear reaction 2 hours before it was fully filled with cooling water! Irresponsible even for a car engine. Remember what that did at Three Mile Island and Fukushima!
- Power from blue box was adjusted frequently

6 October - larger device - Lewan #4



- The blue box remained on even during the so-called “self sustaining mode”
- A second mysterious box labelled “frequency producer” was connected, and not properly instrumented - who knows what power it was providing?
- The output temperature measurement was defective (probe placement on heat exchanger) so the output power was overestimated

6 October - larger device - Lewan #4



Conclusions:

- The setup was very shoddy
- The startup would be extremely dangerous if any nuclear reaction was involved
- The so-called 3-hour self sustaining mode was never stable, and two sources of electrical power were operating
- The procedures were so bad, that the claims of energy gain do not stand up.

28 October - Megawatt device



28 October - Megawatt device



This device is an array of 321 smaller devices.

The test was claimed to be the acceptance test to satisfy the unnamed customer who is buying it.

Rossi released the test results, as 3 pages of typed sheets with handwritten figures, apparently taken from instruments on the day. Two such sheet sfollow.

The Hydrogen tank has been weighted by means of a scale before and after the loading of the Hydrogen in the reactor.

Before the loading the weight measured is: 13604.5 kg

After the loading the weight measured is: 13602.8 kg

The Hydrogen tank pressure has been measured before and after the load:

Hydrogen pressure before the load: 55 BAR

Hydrogen pressure after the load: 55 BAR

Average temperature of the water at the input: 18,3 °C

Average temperature of the steam: 104,5 °C

(the diagrams of the temperatures is in the attachment 2)

Energy consumed from 12,30 (when the reactor has been turned on) and 18,00 (when the reactor has been turned off): wh 66 kWh (SIXTYSIX)

Total energy production from 12,30 through: 18,00

Water flow rate: Wh 675.6

Water not vaporized: tot l 5

Water vaporized: tot l 3716

Total Energy produced: (steam kg x 627.5) + (100 - input water T) x kg of water heated x 1.14 = kWh 2635

Ratio between Energy produced and Energy consumed (COP): 2635:0

Description of the test installation:

The 1 MW Energy Catalizer (E-Cat) is an assembly of 107 modules of 10 kW each, connected in parallel. Each module is made by 3 sub-modules of 3.3 kW each, put in parallel.

All the modules are set in a container made by steel. The assembly is commanded by a control panel supplied with the necessary software and all the necessary electronic components, whose description has been detailed in the sale agreement. All the components result to be set as guaranteed from a preliminary check.

The dimensions of the container are:

Length 5 m

Width 2.6 m

Height 2.6 m

Weight (declared from the Manufacturer) 10 tons

Noise emissions: below 50 dB(A) at 5 meters from the plant

Waste emissions: none

Gas or smoke emissions: none

Liquid emissions: none

The water is supplied to the reactors by means of 2 pumps with a flow rate capacity of 3,000 liters per hour, regulated by valve to the due flow rate of ~~2000~~ ~ 350 l/h

Type of pumps: DAB Jet 82 M

The reactors have been also served by a RFG, whose data are reported in the sale agreement description. The Energy consumed by the RFG system has been calculated in the calculation of the COP.

The heat made by the reactor has been dissipated in a steam condenser and the water obtained from the condensation of the heat has been recycled to the reactor. Additional water has been added from the grid to compensate the water evaporated from the reservoir, by means of floating valves, to maintain constant the level of water in the reservoir.

The modules have been divided in 2 rows, each with an independent pump, so that each pump has a flow rate of 750 kg/h, for a total of 1.500 kg/h.

The dissipators have been designed by Leonardo Corporation, and are made by 2 air-water heat exchangers each cooled by 2 axial fans.

CONCLUSION:

The results of the test are satisfactory to accept the delivery.

RESERVES:

TO BE UPGRADED THE SYSTEM OF GASKETS. SOME LEAKS HAVE BEEN NOTICED.

~~FOR THE TEST~~
ING. DOMENICO FLORAVANTI

~~FOR THE TEST~~



28 October - Megawatt device

The order and arrangement of the data is very confused.

Rossi has since published several amendments to these figures.

It is not credible that anyone would buy a \$1000 piece of equipment based on such a shoddy record - let alone a claimed \$1 million item of new technology.

Conclusions on tests of Rossi's ECATs

In all tests, experts studying reports, photographs, data and videos have identified serious problems.

These may have misled the observing scientists. The claimed power gains are not supported with any confidence.

The characteristics are more indicative of input electrical power being manipulated, and water flow being misunderstood, than a real nuclear reaction.

Overall Conclusions on Rossi's claims

Apply the “Three legged stool” test:

- Theory
- Measurement
- Credibility

All 3 legs need to be in solid for it to stand up.

With Rossi's ECAT, on data published so far, all 3 aspects are very shaky. There can be no confidence that it works.

Conclusions #2

Thus, more confirmation is needed before investing.

Two types of demonstration would be acceptable:

A: Self-sustaining - no input connected, for long enough to rule out batteries and chemical energy, or

B: Measure power-in and power-out, very reliably.