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The New Energy News (NEN) is now sent by email in two forms: Regular ASCII (the most basic form for computer handling of alphabetic characters) and also as a *.pdf file. If you have the application Adobe Acrobat on your computer you can easily read any file with a *.pdf file extension. If you do not have Adobe Acrobat, you can download it from the Internet for free (e.g. use hotbot.com).

ITEMS FOR NEN

If you find new-energy items that you believe others would like to read, send them by mail or email to us and we will give credit to the first person that sends in any particular item. Your help will make NEN a better source of new-energy information for all of us.

INE Annual Membership fees are **\$35.00**, which entitles members to an NEN subscription and INE website password information. If you have a friend or associate who would like to become a member please share this information.
INE Mail Address: The Institute for New Energy (INE), 3084 E. 3300 South, Salt Lake City, UT 84109-2154.

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WELCOME TO THE 2001 INE/EEMF SYMPOSIUM

By Patrick Bailey and Hal Fox

The Officers, Board Members, and staff of the INE and EEMF welcome all of the participants to this INE/EEMF 2001 Symposium! We are proud and pleased to present this symposium, and will have all of the formal papers published in Proceedings of this symposium, in the next issue of the Journal of New Energy.

Since its birth in 1993, the INE has been very supportive of other organizations and conferences that present papers in new forms of energy conversion, advanced physics, and the politics of new-energy technology. The lack of political acceptance seems to slow the progress of the commercialization of these new sciences. The INE has participated in four previous International Symposiums on New Energy (the 1993-1997 ISNE's), whose proceedings are still available. Since 1997, the INE has taken the lead in researching and reporting on new advances in these fields, publishing the latest information in our monthly e-mail newsletter, New Energy News (sent to INE members). In addition, INE has promoted these conferences to present and publish the theories, results, and repeatable data that are emerging in these advanced fields. The operation of Emerging Energy Marketing Firm, Inc. (EEMF) has assisted in the continued publication of New Energy News. EEMF also publishes the Journal of New Energy, which helps document many of the new-energy theory and research results. This journal is abstracted by Chem Abstracts, and the journal is distributed to many countries. The proceedings of the last three conferences, 1998-2000, have also been published in volumes of the Journal of New Energy.

The INE and the EEMF will continue to work closely with other international organizations that are interested in these technical areas. Such organizations include the Advanced Energy Network in South Africa, Antigravity News and Space Drive Technology in Nevada, Cycles in Australia, KeelyNet in Texas, the Planetary Association for Clean Energy (PACE) in Canada, Infinite Energy Magazine in the US, and Cold Fusion Times in the U.S. We also expect to continue working with the many other energy-interested groups and publications that have been growing within the US and around the world. Addresses and contact information for these and other groups can be found in the NEN and on the INE Website.

Let us continue to work together to seek, set, find, and achieve great goals! One of our goals is simply to help change the way the world produces and distributes energy.

You are welcome to join us!

Thank you for being here!

Dr. Patrick Bailey, President, Institute for New Energy
Hal Fox, President, Emerging Energy Marketing Firm, Inc.

**Final Status of the October 2001 INE/EEMF Conference:
Updated Oct. 23, 2001**

Submitted by Patrick Bailey and Hal Fox

Note that the day and time of these papers still may change!

This year's INE/EEMF (INE and Emerging Energy Marketing Firm) conference will be held during Friday and Saturday, October 26-27 at the Quality Inn City Center in Salt Lake City.

Registration Fees: \$100 by September 28th, 2001, and \$150 after that date. Payment should be mailed to:
INE, 3084 E 3300 So., Salt Lake City, UT 84109.

All of the available conference information can be found at:

<http://www.padrak.com/ine/INECONF01.html>

An INE Board of Director's Meeting will be held on October 27 in the afternoon.

The Preliminary Program for the Conference is shown below:

[Other papers have also been requested, and may be included]

Authors identified with a [C] have confirmed to be present at the conference.

Authors identified with a [NC] have confirmed to be not coming the conference.

INE/EEMF CONFERENCE SCHEDULE

Presentation time slots include introductions, presentation, questions, and short breaks.

Paper copies are expected to be available in print by the authors at the Conference for all attendees (At least 30 recommended).

Friday - Oct. 26, 2001

8:00 AM - Registration

8:30 AM - Introductions / Opening Remarks / Announcements

9:00 AM (45 Min. Each)

"A Summary of The Latest Developments Of High-Density, Charge-Cluster Technology", Hal Fox (EEMF) [C].

"Status Of The INE Devices Database, and the Interest and Commercialization Criteria Rankings", Dr. Patrick Bailey (INE) [C].

"Comments On An Interesting Experimental Feature In Electrolysis Loading Experiments", Dr. Dan Chicea (University Lucian Blaga, Physics Dept., Romania) [C].

"Scalar Compression" Moray B. King [C].

12:00 Noon - Lunch

1:30 PM

"An Introduction to the EV Workshop", Kenneth Shoulders [C] (45 Min.).

"New Sources Of Energy From The Point Of Unitary Quantum Theory", Lev Sapogin, Yuri Ryabov, and Valery Graboshnikov (Russia) [C, Sapogin & Graboshnikov] (45 Min.).

"Magnetic Motors", Tom Valone [C] (45 Min.).

"Magnetic Vortex Domains and Structures - Insights from Research at the Oregon Vortex", Nick Nelson [C] (75 Min.).

5:00 PM - Dinner

7:00 PM - On

"A Discussion of EVs, and Audience Participation Workshop", Kenneth Shoulders [C].

Saturday - Oct. 27, 2001

8:00 AM - Registration

8:30 AM - Introductions / Opening Remarks / Announcements

9:00 AM (45 Min. each)

"Dangers of Using Volt and Amp Meters to Measure Device Efficiency: Examples of Fraudulent Over-Unity Claims", Patrick Bailey (INE) [C].

"Vortex Dynamics And Exploiting Energy From The Vacuum", Xing-liu Jiang, Jin-zhi Lei, Chang-ye Chen, Xiong-wei Wen (Science School , Beijing University of Aeronautics and Astronautics, Beijing, China) and Li-jun Han (Department of Materials Science and Engineering, Beijing University of Aeronautics and Astronautics, Beijing, China) [C, Jiang & Gao].

"Cold Fusion Phenomenon And Atomic Processes In Transition-Metal Hydrides And Deuterides", H. Kozima and J. Warner (Low Energy Nuclear Laboratory, Portland State University, Portland, OR) [C, Kozima].

"Goodbye Einstein", Bruce Harvey [C].

12:00 Noon - Lunch

1:00 PM (10-15 minutes each) - Papers Sent In, Authors Not Expect: To Be Summarized (By):

"High-Density Tidal Energy Powering Ahead", Michael Maser, Blue Energy Canada [?] (PB).

"A New Paradigm For Time - Evidence from Empirical and Esoteric Sources", Donald Reed [NC] (HF).

"Water is the main power carrier of future power engineering" Ph.M. Kanarev, The Kuban State Agrarian University, Department of Theoretical Mechanics, Krasnodar (1 Hr) [NC] (HF).

"Twisting & Untwisting Of Spirals Of Ether And Fractal Vortices Connecting Dynamic Ethers", Chiharu Sano (International Club of Scientists, St.-Petersburg, Russia) [NC] (HF).

"Perspectives of the Torsion Technologies", V. F. Panov [NC] (HF).

"Fusion by Sound Waves", Gabriel Ducrey [NC] (HF).

"Energy Stored in a Gravitational Field", Mahmoud A. Melehy [NC] (HF).

"Shape Power Anti-Gravitation Breakthrough" Dan A. Davidson, RIVAS [NC] (PB).

"Why Exotic Inventions Don't Make It Into The Public Domain", Dan A. Davidson, RIVAS [NC] (PB).

3:00 - 4:00 PM (10-15 minutes each) Discussions of other Papers and Recent Books

"DIRAC'S EQUATION - A Relativistic Generalization of the Schrodinger Wave Equation - The Other Half", Don Hotson [NC] (PB).

"Free Energy Surprise" & "Occult Ether Physics: Tesla's Hidden Space Propulsion System and the Conspiracy to Conceal It", William Lyne [NC] (PB).

"Universal Laws, Keely's Secrets, and Atlin", Dale Pond [NC] (PB).

"A Possibility of Control of Gravity in Photoluminescent Materials", Fran de Aquino (Brazil), [NC] (HF).

4:00 PM - INE BOARD MEETING (Open)

5:00 PM - EEMF BOARD MEETING (Private)

Additional papers may also be included: Interested authors should send an abstract of their paper to both Hal Fox halfox@qwest.net and Patrick Bailey ine@padrak.com as soon as possible, in order to be included in this year's INE/EEMF Conference and its formal Proceedings, which will be published in the Journal of New Energy.

INE/EEMF Conference Summary

By Patrick Bailey and Hal Fox

The Conference was held at the Quality Inn, SLC, UT, Oct. 26-27, in nice warm sunny weather.

The hotel and the hot tub were in great shape, the Pine Restaurant was closed, and the Mexican Restaurant near the Pine location (on the ground floor) was open for breakfast, lunch, and dinner.

The conference attracted about 40-50 attendees. Almost everyone signed a public address list that will be available soon. Many attendees were old friends from last year and previous years.

The conference program was nearly exactly the same as that posted on the INE website, at <http://www.padrak.com/ine/INECONF01.html>, as listed above, except that the authors of the paper titled "Vortex Dynamics And Exploiting Energy From The Vacuum" (Xing-liu Jiang, et. al.) were not able to attend.

Abstracts of all of the papers that we have will be posted very soon on the INE website and in upcoming New Energy News. Selected papers will also be posted very soon on the INE website, after obtain the author's approvals.

Full papers will be published in the Journal of New Energy, from authors that can publish.

Hal Fox, Hal's wife, Sylvia, and Maria are to be very much congratulated for their planning, help, and assistance in making this conference as great as it was.

Highlights of the conference included:

All papers by their authors were videotaped.

Hal Fox summarized the "New Energy Devices That Will Change The World", and also discussed in his lead-off paper how "The greatest discovery of the 20th Century is the multiple, independent discovery of high-density electron charge clusters (HDCC) and their uses." After over twelve years of: "searching the world for new-energy devices that have a strong commercial potential, four have been identified." Of these, discussed in Hal's paper, is the HDCC and the work of Ken Shoulders.

Patrick Bailey summarized the now 145 (or so) devices that are now on the INE

Database. He also noted that the NEW Database data (dated Oct. 24, 2001) has "html" in capital letters in the four files: DEVICES.HTML, DEVICES_N.HTML, DEVICES_I.HTML, and DEVICES_C.HTML. Otherwise (and for the general public) the old *.html files (for these 4 files) will show the old July 7, 2000, database data.

Dan Chicea summarized his successful "cold fusion" experimental results, and also noted that thin film metal cathodes seem to give a higher excess power density.

Moray King presented a dynamite slide show reviewing a lot of known and some unknown devices and patents, to promote his new idea that compressing a scalar field may be the manner in which new potential (free, or zero point) energy could be created. This presentation needs to be made into a videotape real soon!

Ken Shoulders reviewed a lot of his previous work with EVs (high density charge clusters), and dazzled the conference with the many applications that he envisions today, most using simple plastics technologies! His workshop went into many technical details of such EV applications. His ideas for a very large 4-dot color flat TV screen would revolutionize the entertainment industry, and your living room!

Lev Sapogin and Yuri Ryabov traveled all the way from Moscow to present their paper! They have developed a new quantum theory model (UQT) that provides the theoretical basis for so-called "over-unity" devices and their development!

Tom Valone presented an in-depth review of magnetic motors, both circular and linear, and discussed the problems associated with the "back-EMF" that is usually generated (unfortunately) in such motor designs. The linear motors were very fascinating. A model of part of one such motor was demonstrated, where a wooden ramp had magnets along the inside edges (and not opposite from each other), so that a metal ball, when placed at the bottom of the ramp, would be pulled up the ramp! Is the resulting kinetic energy when the ball drops from the other end of the ramp really "free energy"? Can we close that loop and make a real over-unity device? Stay tuned...

Nick Nelson demonstrated some very interesting dynamics with small magnets, and some unbelievable effects with a small magnetic vortex that he found in the conference room, on the 2nd floor. As a past tour guide for many years at the "Oregon Vortex", he had more than a few very interesting stories about what magnetic vortices can do and how they are really constructed and operate.

Patrick Bailey presented a review of how voltage and current meters are calibrated to read RMS (0.707 of peak) values, so that you get the right power measurements (0.5 peak power) when simply multiplying these meter readings - ONLY when the voltage and current are in phase and are also sinusoidal waveforms. Otherwise, anyone can build an apparent "over-unity" device using such simple math - like possibly the Adams Motor in New Zealand and the new EM rotational device in NE Australia.

Bruce Harvey traveled from Birmingham, England, and presented a very good

review as to why we can toss out almost all of Einstein's relativity, and especially the Lorenz Transformation. ("Goodbye Einstein": I liked that!) He is very knowledgeable in these areas, and presented very useful insights on how to fix these misconceptions in today's "physics" and how to get new E&M equations that will still work for the old historical data, and also the new advanced energy data!

H. Kozima is teaching at a University in Oregon, on loan from his laboratory Japan, and was able to present his results cold fusion phenomena in transition metals and deuterides. His research is also summarized at his website at <http://web.pdx.edu/~pdx00210/>.

All the other papers were summarized as much as possible, and almost all of them had handouts. All of the authors had many interesting things to say! Read their abstracts - and get their papers!

All of the papers presented by the authors had a full copy of the paper handed out to each conference attendee. Most of the summarized papers also had a handout, as did all of the ones presented and summarized by Patrick Bailey. These handouts include the author's address and email contact information.

Patrick Bailey will be submitting paperwork for the INE to get on the IRS formal approved non-profit corporation list, and he will be submitting a very large proposal to several corporations and agencies this year.

INE members are encouraged to submit advanced energy related new articles and emails each month to the NEN! Let's share whatever interesting information we find. URLs are required for articles from the internet.

The current list of INE Officers for 2001 was approved for 2002. Almost everyone felt that this conference is a great annual review of our research, and that it should be continued every year into the future. Hal's office will look for a August-October date for INE/EEMF 2002.

Additional insights from the conference will be posted in future New Energy News articles.

The INE Database Has Been Updated - and Password Protected

Submitted by Patrick Bailey, INE President

The INE Database of "Devices of Interest" has been updated on the INE Website. However; these data files have been "password protected" for INE Members, as explained below. The entire database is now on the Internet in the Data Base Guide file, at <http://www.padrak.com/ine/DBGUIDE.html>

The INE Database now contains about 145 different devices and experiments of interest, ranked by an "Interest Criteria" and also by a "Commercialization Criteria". These criteria are explained in detail in the DB Guide file.

Four summary files are also included that contain all of these devices, as links, sorted by: Device Name, Inventor's Name, Interest, and Commercialization Criteria. These files are all automatically generated after I have been given the "Template Data" for any new or updated device. Each device file contains ALL the template data for that device.

These files were last uploaded on the INE website on July 7, 2000. They have ALL been uploaded again on October 24, 2001, (except DBGUIDE.html) with the following "password protection" for INE members: Instead of asking for FILENAME.html - note the lower-case "html" - you should instead ask for FILENAME.HTML - where these are case-sensitive. These DEVICE filenames have now become all uppercase. The links from the new DEVICE*. HTML files will take you to the updated *. HTML files. The links from the old DEVICE*.html files will take you to the old link *.html files. The DBGUIDE.html file has not been changed.

Thus INE Members will be able to see the NEW DATA, and the general public will not.

These file names will all be fixed and made consistent in the future, and at that time the entire INE Device Database will be "password protected" at that time. When this occurs, the required password will be sent to you in a future NEN.

Help with this database! Review the new data (*.HTML files), send me in new template data - and send me in updated template data. This is OUR INE database. Let's expand it and keep it current! Thank you!

Journal of New Energy, FFs, and NENs on CD

Fusion Information Center has available a Release 1 CD containing all of the publications from July 1989 through September 1999 of the following publications: Journal of New Energy, New Energy News, and Fusion Facts. Order from the EEMF or INE office in Salt Lake City, Utah: \$US\$49.00 +US\$2.00 S&H or US\$5.00 S&H for mailing outside of the US.

ARTICLES

THE DAY THE WORLD CAME TO ITS SENSES ?

Submitted by Bailey, Patrick

Reference: Bill Moore
Last in four part series of editorials on September 11th tragedy
EV World October 07,2001

<http://evworld.com/databases/storybuilder.cfm>

This week, Phil Watts, the chairman of Royal Dutch Shell, gave a remarkable speech in New York, just three weeks after the tragedy of September 11th.

Accustomed to making and approving business decisions and technology plans that extend decades into the future, Watts told an audience assembled under the auspices of the United Nations Development Program, that Shell, one of the largest oil companies in the world, was preparing for the "End of the Hydrocarbon Age."

He painted two possible scenarios he termed, "Dynamics as Usual" and "The Spirit of the Coming Age."

Under the first scenario, Shell envisions an "evolutionary" carbon shift from coal to natural gas to renewables. Petroleum's current 40 percent global energy share will drop to 25 percent by 2050. Natural gas market share will climb to 20 percent while the remainder will come from a combination of nuclear and various renewable sources.

Under "The Spirit of the Coming Age" scenario, the world would experience a far more dramatic shift from carbon-intensive fuels to hydrogen. Watt's stated this second scenario, "explores something rather more revolutionary, the potential for a truly hydrogen economy, growing out of new and exciting developments in fuel cells, advanced hydrocarbon technologies and carbon dioxide sequestration."

Watts envisioned fuel cells beginning to reach serious market penetration by 2025 and as a result dramatically altering the energy landscape long before oil becomes scarce.

Watts isn't just talking the talk. He has pledged to walk the walk by committing between \$500 million and \$1 billion over the next five years to develop new energy businesses, concentrating primarily on solar and wind energy.

Watts concluded his remarks by saying that oil companies can no longer assume they will dominate the next 100 years as they have the previous century. "That would be a very complacent view."

HYDRO LOOKS TO OCEAN POWER FOR GENERATORS

Submitted by Patrick Bailey

VICTORIA -- B.C. Hydro is considering two projects to generate electricity by harnessing the power of the sea.

Companies from Australia, England, Scotland and Washington State have been shortlisted for two demonstration wave-energy plants to be run in joint ventures

with Hydro, said corporation spokeswoman Mary Venneman.

A study has identified sites at Winter Harbour and Ucluelet as potentially good sites to generate electricity from wave action, she said.

The sites are close to existing transmission lines.

If successful, the projects would be the first ocean-powered generators in Canada.

Similar technology is being tried in Washington State and small wave plants are already in use in Europe.

The four competing companies will give demonstrations of their proposals at a public information session tomorrow night in Victoria.

**"ENERGY INDEPENDENCE NOW!
We Need A New Energy Revolution"**

Submitted by Patrick Bailey via email from Dr.Robert Bass

<http://www.sfgate.com/technology/beat>

Hal Plotkin, Special to SF Gate
Thursday, October 4, 2001

"... eliminating all terrorism is sure to remain an unobtainable goal in a world where America's need for oil overwhelms our concerns for human rights."

Amid this week's latest batch of unbearably sad stories about the victims of the Sept. 11 terrorist attacks, one of the most important stories is the one we haven't read.

It's the story about how, after the last major crisis in the Middle East 25 years ago, America embarked on a crash program to develop new solar, wind, geothermal and fuel-cell technologies to successfully become energy independent.

You didn't read it, because it didn't happen.

The news we're reading this week might look very different if we had followed that course, which was recommended at the time by scores of environmentalists, ranging from author/activist Barry Commoner to our then-governor, Jerry Brown.

Had we listened to them, the US government might not have earned our well-deserved reputation as a hypocrite nation that prizes oil above everything else,

including the very values we purport to uphold.

Of even more immediate concern, our continuing dependence on foreign oil leaves the American economy dangerously vulnerable, particularly if the already unstable situation in the Middle East continues to deteriorate.

That's why a campaign for energy independence remains one of our best weapons against terrorism. In the long run, one of the most effective steps we can take to preserve freedom here at home and to extend its benefits to others around the world is to loosen oil's slimy grip on our domestic and foreign policies.

There is an undeniable relationship between America's alliances with oppressive Middle East regimes and the organized, religiously fueled terror campaign that seeks to punish the US for being the chief enabler of those dictatorships. Put simply, we rely on oil-rich despots at our own peril.

[More on the URL]

**The Future of Natural Gas in the World Energy Market
By The Emirates Center for Strategic Studies and Research**

Submitted by Remy Chevalier

Reference:

<http://www.ecssr.ac.ae/publications/03uae.booksfuture.htm>

or

<http://www.palgrave-usa.com/catalogue/catalogue.asp>

The global trend to replace traditional fossil fuels like coal and oil with clean burning gas has been spurred on largely by heightened environmental concerns, and international commitments to comply with noxious emission limits. The physical and combustion characteristics of natural gas are able to respond to these environmental concerns, thus providing highly industrialized nations in particular with a means to meet the requirements of international environmental agreements. The use of natural gas also includes the important advantage of high efficiency in gas-to-electricity conversion, a factor central to developing nations. Both the above have created a new demand sector for natural gas, which is reflected in the substantial growth of internationally traded gas over the last decade.

This volume reflects the insight of gas industry experts who gathered at the ECSSR's Fifth Annual Energy Conference, entitled The Future of Natural Gas in the World Energy Market, held in October 1999, in Abu Dhabi. It covers topics ranging from the commercial opportunities and constraints relating to natural gas exploitation-and its implications for the global oil industry-to the emerging gas technologies that are likely to chart its future development. The book also assesses the impact of government regulation and liberalization on the industry, from the Canadian and European perspectives, as well as the regional

developments in the Asian market, thus presenting a broad vision of past and future trends in the natural gas industry.

Contents:

Introduction--Michael W. Clegg * The Future Role of Natural Gas in the World Energy Market: An Overview--Timothy J. Considine & Adam Z. Rose * Liberalization of the European Natural Gas Industry and Its Implications--Paul Horsnell * Government Regulation, Natural Gas Industries and Markets: The Canadian Experience--Judith Dwarkin * The Development of Natural Gas Markets in Asia: The Importance of Economic Growth--Robert N. McRae * The World Natural Gas Market and Its Implications for the World Oil Market--Øystein Noreng * New and Prospective Technologies for Natural Gas Development--Suresh P. Babu * Concluding Observations--Michael W. Clegg

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DRIVEN BY SOUND

Submitted by Remy Chevalier

Reference: New Scientist magazine, vol 164 issue 2216, 11/12/1999, page 30
By Bennett Daviss;
Science journalist based in New Hampshire

An acoustic engine generates electricity

Imagine an engine that can run on household rubbish has no moving parts and is kind to the environment. Too good to be true? It could soon be powering your home, says Bennett Daviss

LYING in pieces around a Denver machine shop is what looks like a giant piece of sewer pipe with an oblong loop at one end. In reality, it is a powerful new type of engine and an environmentalist's dream-yet also a throwback to the early Industrial Revolution.

Much of this invention's power lies in its simplicity. The design, developed over the past three years by scientists at Los Alamos National Laboratory in New Mexico, is the offspring of an odd union. Half its intellectual genes come from the Stirling engine: a 180-year-old invention that can, in theory, be made quieter and cleaner than its internal-combustion cousins, but has so far been tricky to produce at a competitive price. Its other parent is the thermoacoustic engine, a modern device that uses heat to make sound waves, but is notoriously inefficient.

Their singular offspring promises to combine the advantages of both and may be the first commercially viable engine with no moving parts. As early as next month, the machine now being completed in Denver will begin to liquefy natural gas in a remote location where conventional fuels are difficult and expensive to supply. Soon afterwards, other versions might be pumping water or making electricity in developing nations. Within a decade, you might have one making both hot water and electricity in your home.

The inspiration for this miraculous device comes from Robert Stirling, a 19th-century Scottish clergyman, and was born of his concern for the workmen in his flock. The steam engines that powered the industrial revolution use a fire under a boiler to heat water and build up a head of high-pressure steam. As the steam is

released, it pushes pistons, which in turn drive crankshafts.

But the boilers could not always contain these high pressures and they occasionally exploded, scalding, maiming or killing workers unlucky enough to be nearby. Stirling was disturbed by this flaw. In 1816, when he was 26 years old, he conceived and patented a solution that did away with steam and high pressures.

In one of its simplest forms, Stirling's engine consists of a hollow cylinder filled with air, with a piston at each end. These pistons are linked together and in front of each piston there is a heat exchanger. The heat exchanger at one end-the hot end-is used to heat the air, while the other-at the cold end-is used to cool the air.

Heating the hot end expands the air there, driving the nearest piston outward. The two pistons then work in unison, sloshing the air to the cylinder's cooler end, where heat is extracted. Finally, the piston at the cold end compresses the air and the cycle begins again. The hot expanding gas does more than enough work to drive the linked pistons.

This process can be made more efficient by extracting the heat from the air before it reaches the cold end and replacing the heat when it returns. Passing the gas through a porous material with a high heat capacity does this. This device, Stirling's ingenious creation, is known as a regenerator.

The regenerator insulates the two sides, storing heat from hot gas passing one way so that the cold gas can pick it up when it returns later in the cycle. Without the regenerator, the temperatures at the two ends would be nearly equal, drastically cutting the efficiency of the engine.

Unfortunately, Stirling's motors weren't as tough as the steam engine, and the design might have been left as a footnote in engineering history if it hadn't been for Nicolas Carnot, an engineer in Napoleon's army. A few years after Stirling filed his patent, Carnot concocted a mathematical theory that could be used to calculate how efficient an ideal power plant would be at converting heat into work. This led to the discovery that Stirling's design could-at least in theory-be made to yield nearly perfect efficiency.

For almost two centuries, scientists have been seduced by the Stirling engine's potential, building prototype after prototype. But they have always been disappointed. The pistons must fit tight enough to prevent gases escaping between the piston's edges and the cylinder wall. In an internal combustion engine, a small amount of "blow-by" can be tolerated, but if it occurs in a Stirling engine, efficiency plummets. Yet the piston's edges must not touch the cylinder wall; if they do, the edges will wear and leak.

The high-tolerance machining this requires makes Stirling's model too expensive to compete with the internal combustion engine.

Steady rhythms

Among the modern scientists who find Stirling's idea maddeningly fascinating is Peter Ceperley at George Mason University in Virginia. Ceperley is an expert in

wave motion, and that gives him an unusual perspective on the Stirling engine. In 1979 he realised that, whereas internal combustion engines deliver their power in brief explosions, a Stirling motor's action is much smoother. In the steady rhythms of its internal motions and pressures, it mimics a travelling wave.

It dawned on Ceperley that waves-not of liquid, but of sound-could form the basis for a Stirling engine. There would be no need for any troublesome moving parts, because the sound wave would move the gas back and forth. Gas pistons would replace the metal pistons of ordinary engines and reproduce in miniature the Stirling cycle of expand, slosh, compress, slosh. So Ceperley set about constructing acoustic engines from tubing and heat exchangers. As in the mechanical Stirling engine, the regenerator maintains a smooth temperature gradient between the hot and cold exchangers.

So how does the engine work? Think of a small blob of gas inside the regenerator moving back and forth with the sound wave. The temperature gradient in the regenerator increases the motion of the blob by successively cooling and warming it. This exaggerates its contraction and expansion, amplifying the wave. But the idea's bang was soon reduced to a whimper. Ceperley's prototypes were plagued by inexplicable energy losses that left them unable to yield any net power output. Ceperley was stumped.

That's when Greg Swift joined the quest. A specialist in low-temperature physics, he arrived at Los Alamos in 1981 and was intrigued by Ceperley's idea, but soon fell into line with the conventional view that a travelling-wave engine was impractical.

So Swift and his colleagues spent most of the next 16 years designing and testing refrigerators that use acoustic engines powered by standing waves. Unlike a travelling wave, a standing wave stays in one place, oscillating like a plucked guitar string. The standing-wave engines did produce some net power output, unlike Ceperley's, but they were still not efficient enough to be cost-effective. Nevertheless, Swift and his colleagues were laying the groundwork that would lead them back to Ceperley's concept, and their present revolutionary design.

For their work in standing-wave engines, the Los Alamos team built a computer model that showed them how pressure oscillations behave in a closed system. As the model evolved, the group tested an array of geometries for the loops and tubing of their engines to determine which would yield greatest efficiency.

The result surprised them. In a standing wave, the peaks of pressure and gas velocity occur at different times in the cycle. But their model told them that it would be far more efficient to have pressure and gas velocity in phase-which is exactly what happens in a travelling wave. By flaring and constricting the tubing at strategic points, the team coaxed each wave's pressure and velocity to crest at precisely the same moment. In other words, they converted the standing waves into travelling waves, and in the process boosted the engine's efficiency dramatically. After almost 20 years, Ceperley had been proved right: travelling waves could be the basis of an efficient engine after all. But a few tricks were needed to make it work.

In the new Los Alamos engine, the piping is filled with helium, pressurised to 30 atmospheres. The hot heat exchanger is held at temperatures up to 700 °C, the cold one at about 20 °C. In between is the regenerator, a stack of about 800 sheets of stainless steel mesh with threads 65 micrometres in diameter and openings roughly 170 micrometres square.

The loop is attached to a resonator, a piece of steel tubing 4.5-metres long, which acts like an organ pipe, tuning the sound to a specific pitch. The Los Alamos team chose a length that gives them 80 oscillations per second. It's important to keep the frequency low, because the higher it is, the faster gas oscillates back and forth and the greater the frictional losses.

And there is one more magic ingredient. The Los Alamos model identified the mysterious energy loss that had dogged Ceperley's attempts: the sound waves were driving a gale of gas around the loop which chilled the hot heat exchanger, slashing the engine's efficiency.

Once they saw the problem, the engineers found a way to eliminate it. They inserted a "jet pump"-a disc cut with precisely tapered slots, which are wide at one end and narrow at the other. As a sound wave passes through, it builds up a backpressure that neutralises the wind.

When they put all this together, the team found that they had boosted the engines average efficiency to 30 per cent-about the same as an internal combustion engine, and far better than any other acoustic engines. But they don't see their creation as replacing internal combustion engines. For one thing, it can't accelerate or decelerate quickly. Also, says Swift, "vehicle propulsion requires rotating shafts, so the sensible thing is to use an engine that has a crankshaft. Our religion is to get rid of moving parts."

So what can you do with a machine that turns heat into sound? Sound waves can't turn a crankshaft, but they can drive a microphone to generate electricity, or separate impurities from air, or even separate air into its constituent gases.

And the engine can be run backwards, using sound to pump heat from the cold end to the hot, cooling without using ozone-eating chemicals. There may be thermoacoustic air conditioning in your car one day, and acoustic Stirling engines might be ideal for cooling space-based telescopes and detectors, which now use liquid helium that runs out in a few years (New Scientist, 8 March 1997, p 32).

But the first fruits of this work will come from liquefying natural gas. In remote locations where oil is pumped, such as offshore or in deserts, the natural gas that surfaces along with the oil is often burnt away. There is no practical alternative: it would be too expensive to build a pipeline, or to provide sufficient electric power to cool and compress the gas, so that it can be shipped out as a liquid.

In the New Year, at a well still to be chosen, Chart Industries of Denver will join two 12-metre-high versions of the Los Alamos engine together.

These will work together to burn natural gas and generate intense sound waves, which will produce some 2000 litres of liquified natural gas a day.

"The engines will be linked so their vibrations cancel," says Scott Backhaus, who

works with Swift at Los Alamos.

Fine-tuning

While that test unfolds, Swift and Backhaus are asking their modelling software "what if?" They have calculated the energy losses caused by individual components of their engine and are plotting necessary adjustments to boost efficiency.

"There are two main components that are bogging us down," Backhaus says. The first is the corners in the loop of tubing. "When a flow turns a sharp corner, it doesn't want to stay close to the wall, and that causes a lot of turbulence," he says. "We can model that and change the interior shape of the tubing to minimise it."

The heat exchangers can be improved, too. The team calculates that a stack of metal plates, each would provide the most efficient heat transfer separated from the next by less than 30 micrometres. This would generate less drag on the gas than the mesh screens. But the gaps between the plates must vary by less than 10 per cent over their 20-centimetre breadth. A tricky bit of engineering.

With refinements like that, the engine's efficiency could eventually reach 38 to 40 per cent-roughly the same as today's best car engines. Then the Los Alamos power plant could become a cost-effective home power station-a small engine tucked away in the basement, generating both heat and electrical power. Swift's team and a New York engineering company are planning a 1-kilowatt device that, if scaled up, could meet the energy needs of most households.

"It's a compelling use for Stirling engines, especially one as simple as the Los Alamos version seems to be," says Brent van Arsdell, president of the American Stirling Company in Wichita, Kansas. "Because the same energy does two things, the net efficiency of the system can be very good, even if the efficiency of the engine itself isn't anything special." Its biggest advantage is that you can burn anything to drive the engine-natural gas, oil, methane, wood or even household rubbish. Some engineers predict it will eventually be used for everything from hybrid electric vehicles to gathering solar power-converting sunshine to electricity more efficiently than today's photovoltaic cells.

"A few people are talking to us about distributed power generation," says Backhaus. That is, making electricity not at giant, centralised stations but at a much larger number of smaller installations. "You could heat the engines with solar energy, setting them out in the desert, and they could each produce 10 or 20 kilowatts of electricity," he says. "You also could heat them by burning the methane seeping out of waste dumps."

According to Steven Garrett, professor of acoustics at Pennsylvania State University and a consultant to the Los Alamos group, "There are uses for this that have yet to be imagined."

LETTERS

**To INE:
Produce Your Own Electricity (just sent us the money...)**

Email from: David davidrex@northlink.com

Under alternate energy savers, advertised in Popular Science, it begins "Attention Homeowners! Produce your own electricity from a revolutionary new "permanent Magnet" generator that we plan to install and maintain at no-cost once a target number of households are registered..... etc. They are soliciting a "registration" for \$5.00, a "free energy video for \$9.95, or both for \$14.95. The organization is TechKnowLogic PMB #221, 5820 W. Peoria Ave. Suite 107, Glendale, AZ 85302-1301.

You might add this or critique it on your site list.

To all: This is probably one of the devices by Dennis Lee. Mr. Lee has a long history of promoting such devices and seems to be unwaveringly pursuing this goal with religious zeal, despite all legal and corporate attempts to stop his advertising claims. Maybe one day he will actually be given the design for such a working machine by G*d or some Angel. Until then, I suggest that all INE members go to one of his demonstrations and demand to see proof that "extra energy" is actually produced by any of his devices - not just by "meter readings". I also suggest that you sincerely talk to the promoters of the local event, who think they are providing a worthy public service - in return for a cash cut, of course. I personally would not invest in any of these schemes. The INE has been telling anyone that claims to have a "working device", to send us a videotape of it working and extracting electrical energy with measurements done by meters AND (repeat AND) at least one high-bandwidth digital oscilloscope that calculates the average power levels itself. So far, over 10 years, we have not seen one such videotape - instead we have seen a lot of hand waving and religious promotions. We are in contact with very wealthy technology founders that are willing to write 6-digit checks to promote such worthy devices as soon as they see videotape as I just described. I have written to Mr. Lee's organization several times to get such videotape, and to test any of his devices with the PROPER equipment, with absolutely zero results or replies. Until such videotape is received and seen, we can only assume that any other claims, until proven, are just lies in pursuit of money.

Patrick Bailey, President, INE.

[One paper at this year's INE/EEMF Conference was written to explain the dangers of such meter measurements and such financial schemes to the general uneducated public; entitled: "Dangers of Using Volt and Amp Meters to Measure Device Efficiency: Examples of Fraudulent Over-Unity Claims", by Patrick Bailey. The full paper should be on the INE website very soon.]

Very Advanced Betavoltaic Technology

Forwarded email from:
Integrity Research Institute, Thomas Valone iri@erols.com

I was researching your site and wanted to see if you have heard about the very novel ideas we have been discovering concerning betavoltaic technology. Our company is working with Quantum Bit Induction Technologies Inc. www.quantumbit.com

to develop a new and very high energy density betavoltaic power system. Our energy systems will be roughly 6 times the energy density of Dr. Brown's Tritium based power system with Astro Power Inc. If you are interested in discussing this technology please contact me by email to arrange a phone interview. My company is going to be using www.betavoltaic.com and .net for this project and we are expecting to be online later next week with the new site.

Michael McDonnough
Co-CEO/COO
TekSphere International Inc.

MEETINGS

THE NINTH INTERNATIONAL CONFERENCE ON COLD FUSION
International Convention Center, Tsinghua University, Beijing, CHINA
May 19-24, 2002

Dear Colleagues and Friends,

I am glad to make the first announcement for ICCF-9.
We have the WebSite and e-mail address now for The Ninth International Conference on Cold Fusion. That is:

<http://iccf9.global.tsinghua.edu.cn>

And the e-mail address:

Iccf9@tsinghua.edu.cn

Your early suggestions and comments would help us to make a better arrangement for ICCF-9.

We are looking forward to seeing your early reply (Pre-registration!).
Sincerely yours,

Li, Xing Zhong

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