Where were you when the gas ran out?

Or when the gas dried up and the oil was pumped out?

Short term blackouts can be fun and temporary gas shortages are little more than annoying. But what if the lights didn't come back on again and the pumps remained dry? **What then?**

That is the question Weizmann Institute of Science researchers have been asking themselves for decades. Ever since the Canadian Institute for Energies and Applied Research was established in the early 1980's the Institute has been a focal point in the search for sustainable and alternative energy sources.

The Institute's global $20-million Initiative for Research in Sustainable and Alternative Energy builds and expands upon this pioneering research. Our ambitious program already has more than 250 researchers working on projects ranging from solar power and biomass to nuclear fusion and conservation.

Now is the time to act! Waiting for the coming energy crisis to reach us – and it IS coming – means failing to act until it is too late.

You can be part of the solution. You can help prevent a looming catastrophe.

Go online to **www.weizmann.ca** to donate and learn more
or call us at **416-733-9430**.

The quest for alternative energy sources may be the defining global issue of our time.
Your generous support may be the defining action of your life.

מכון ויצמן למדע
WEIZMANN
SCIENCE
CANADA

Alternative
Energy
Initiative

Alternatives for energy issues tackled by Weizmann Institute of Science initiative

From skyrocketing prices at the gas pumps, to scathing reports about global warming, there is hardly a day that passes without the world fuming over energy issues.

Fortunately, while energy-related conflict and strife is prevalent, so too is our understanding of these problems and a desire to find alternatives and solutions.

Enter the Initiative for Research in Sustainable and Alternative Energy, an endeavour launched recently at the Weizmann Institute of Science in Rehovot, Israel.

The ambitious program seeks to bring together leading scientists to pursue innovative research projects that will ultimately result in clean, environmentally friendly and sustainable forms of energy.

"We are straining the resources of the world and we can't continue going in this direction," said Jay Smith, Weizmann Science Canada's chairman of the board and president. "That is why research in this area is so compelling."

A key goal of the initiative is to attract established researchers and burgeoning scientific minds to come to Weizmann and embark on dynamic research.

“We want to attract brilliant researchers who have new ideas and will conduct basic research in a variety of areas,”says Weizmann professor David Cahen.

The initiative is venturing into such diverse fields as solar power, methanol, hydrogen, | bio mass, fuel cells, nuclear fusion and energy conservation.

A fundraising campaign is under way to propel the endeavour with a target of raising $20 million worldwide.

Some major contributions have already been made, including $5 million (US) from Israeli-American philanthropist Yossie Hollander, $2 million (US) from the Sussman family and $1 million (US) from Canadian businessman, H. Thomas Beck.

The initiative’s projects involve researchers and students from different disciplines working hand-in-hand.

“There is no other Institute like this in the world, where all these scientists work together,”says Cahen.

“We organize lectures and forums where scientists share their ideas with young people to create awareness and plant the seeds for these young people to help solve critical energy problems.”

Here are some details of the Initiative for Research in Sustainable and Alternative Energy.

METHANOL

The Alterative Energy Initiative endeavours to pursue innovative methods of producing methanol, which could be a clean source of energy. Researchers are interested in producing methanol by capturing carbon dioxide and combining it with water (hydrogen).

HYDROGEN

There is much promise in the area of hydrogen research, such as the possibility of using it to produce electrical power. Researchers are considering a number of possibilities including hydrogen as a fuel produced by solar driven electrolysis, as well as hydrogen as an intermediate product in renewable energy production

SOLAR

Weizmann is a world leader in solar energy, boasting an on-campus solar tower and the Canadian Institute for Energies and Applied Research. Institute scientists are looking to continue to blaze trails in solar research, with such projects as generating electricity using solar energy and finding innovative ways to harness the power of natural sunlight.

BIOMASS

Plants have the potential to be phenomenal energy sources and Weizmann researchers are hard at work exploring ways to grow energy rich plants. For example, Weizmann scientists are aiming to produce ethanol through the fermentation of the sugars in straw.

NUCLEAR FUSION

Nuclear fusion can produce heat as hot as the sun. Recent breakthroughs in power fusion have shown it to be cheaper, more robust and a more dependable form of producing energy.

FUEL CELLS

The exciting feature of fuel cells isn’t only that creating them results in electricity, but that the by-product is water and heat; two clean forms of energy. Weizmann researchers are looking to combine fuel cells with photovoltaic solar cells to generate constant power.

Rays of hope

Professor Jacob Karni sees the sun as the great energy source of the future

Sunshine is welcomed by most of us for its soothing heat and natural beauty.
But when Jacob Karni sees the sun's rays beaming down, he has visions of something much grander than warm weather.
The esteemed professor sees the phenomenal power of solar energy.
"Solar energy is available in many countries," says Karni, who heads the Weizmann Institute of Science's Energy Center and oversees the Institute's solar program.
"It can be turned into electricity, heat, or clean fuels…And it's all within our grasp."
Indeed, not only is there an abundant amount of sunlight, but it is a renewable source of energy.
Karni believes solar energy has the power to meet the world's immense energy needs.
For 16 years, the scientist, who holds eight international patents and has published over 70 scientific articles, has been working towards that goal at Weizmann's sunny campus in Rehovot, Israel, focusing on harnessing solar power in a cost-effective way and then transporting it to the people who will use it.
In one such project, the scientist is exploring how to generate a synthetic fuel that could potentially run cars with solar energy, all while not producing any greenhouse gases.
His pioneering work also includes such feats as developing a sunlight absorber and a high-pressure receiver window, as well as an ongoing study into solar-driven hydrogen production.
His concepts have also paved the way for two industry-led commercialization programs, including a solar-thermal demonstration plant in China, which uses state-of-the-art technology to convert sunlight into electricity.
Karni notes that if solar panels were placed in China, the eastern part of the country could conceivably be provided with significant energy.
Modestly, the father of four doesn't take individual credit for these accomplishments.
"(Our) effort takes a multidisciplinary group and the Weizmann Institute has the capability to bring the necessary disciplines together," he relates.
The need to move forward on Karni's projects and other pursuits of alternative, sustainable sources of clean energy is pressing.
Not only are non-renewable resources of energy, like oil, dwindling, but the constant burning of fossil fuels is wreaking havoc on the environment.
"The mean surface temperature of the earth is higher today than at any time in the last millennium," Karni says.
"Within five to ten years, we must provide a large-scale practical approach for renewable energy production, storage and transport."
While Karni and his colleagues have made tremendous strides, what will help fuel them forward is significant funding.
"It is clear that we simply cannot rely on government funding," he says, noting such support is shrinking.
Only with support beyond the government can the goals be achieved.
To learn more about Karni's projects and other energy initiatives, please visit www.weizmann.ca.

ABOUT THE WEIZMANN INSTITUTE OF SCIENCE

Based in Rehovot, Israel, the Weizmann Institute of Science is a pioneering multidisciplinary research institute, regarded as one of the best in the world. Noted for its wide-ranging exploration of the sciences and technology, the Institute boasts 2,500 scientists, technicians and research students. Institute research efforts include the search for new ways of fighting disease and hunger, exploring mathematics and computer science, probing the physics of matter and the universe, creating novel materials and developing new strategies for protecting the environment. The following timeline illustrates key highlights in the institute's history.

- In 1934, the Daniel Sieff Research Institute is founded. Renowned chemist and future president of Israel, Dr. Chaim Weizmann, is a driving force behind its establishment.
- In 1949, the Institute is formally renamed the Weizmann Institute of Science.
- Cancer research is introduced to Israel by the institute in the 1950s. Today, cancer studies are at the forefront of the Institute's research efforts. Highlights include Weizmann scientists being among the first to study and clone the p53 gene, associated with most malignant tumors in humans. Weizmann scientists also pioneered the use of MRI as a non-invasive means of diagnosing cancer. I addition, Weizmann scientists are conducting pioneering research on the viability of photodynamic therapy (PDT) to treat malignant tumors. Clinical testing is underway in Canada and elsewhere.
- The Canadian Society for the Weizmann Institute of Science, now known as Weizmann Science Canada, was founded in 1964 to advance Canada's commitment to Weizmann's progress and provide significant contributions to world science.
- A Weizmann computer scientist created a computer language called Statecharts that facilitates the development of sophisticated systems such as those used in aircraft, space shuttles, and nuclear power stations.
- A Weizmann scientist helped develop several methods for encrypting and decrypting information which led to the development of"smart cards."
- In the 1980s, The Canadian Institute for Energies and Applied Research is created setting in motion the building of a solar tower on the Weizmann campus.
- To confront world hunger, Weizmann scientists have developed new wheat varieties that provide nearly a 40 percent higher yield.
- Research on stem cells by a Weizmann scientist yielded the creation of human kidneys in mice. This development offers hope for patients suffering from organ failure.
- The first research accelerators in Israel for the study of atomic nuclei were established at the Weizmann Institute.
- The first science park in Israel, Kiryat Weizmann, was established on the initiative of the Weizmann Institute. It is home to numerous companies implementing Weizmann research.
- Extracurricular science programs were launched in Israel by the Institute's Youth Activities Section, now called Young@Science. Supplemented by summer science programs, these efforts enrich the education of more than 24,000 Israeli and international youngsters each year. This year, the annual Science Fair attracted over 11,000 visitors to the Weizmann campus.
- The world's first interactive outdoor science Museum, the Clore Garden of Science, is set on the Institute's campus. Approximately 100,000 Israelis and guests from abroad annually visit the award-winning museum annually.

מכון ויצמן למדע
WEIZMANN
SCIENCE
CANADA