

# ALCOHOL CAN BE A GAS!

## THE TWO-MINUTE SUMMARY

---

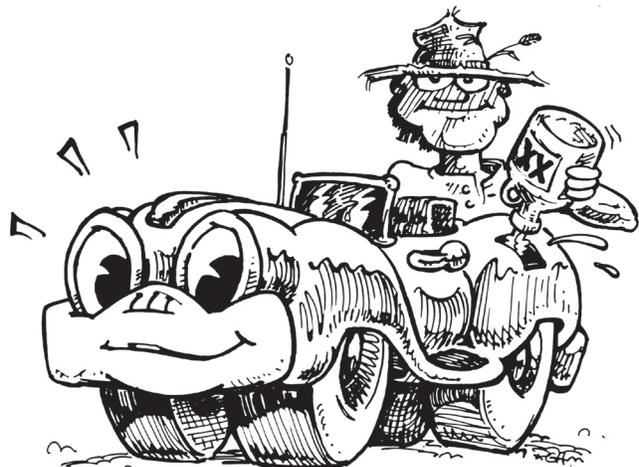
**1.** With alcohol fuel, almost every country can become energy-independent. Anywhere that has sunlight and land can produce alcohol from plants. Brazil, the fifth largest country in the world imports no oil, since half their cars run on alcohol fuel made from sugarcane, grown on 1% of its land.

**2.** We can reverse global warming. Since alcohol is made from plants, its production takes carbon dioxide out of the air, sequestering it, with the result that it reverses the greenhouse effect (while potentially vastly improving the soil). Recent studies show that in a permaculturally designed mixed-crop alcohol fuel production system, the amount of greenhouse gases removed from the atmosphere by plants—and then exuded by plant roots into the soil as sugar—can be 13 times what is emitted by processing the crops and burning the alcohol in our cars.

**3.** We can revitalize the economy instead of suffering through Peak Oil. Oil is running out, and what we replace it with will make a big difference in our environment and economy. Alcohol fuel production and use is clean and environmentally sustainable, and will revitalize families, farms, towns, cities, industries, as well as the environment. A national switch to alcohol fuel would provide many millions of new permanent jobs.

**4.** No new technological breakthroughs are needed. We can make alcohol fuel out of what we have, where we are. Alcohol fuel can efficiently be made out of many things, including waste products like stale donuts, grass clippings, food processing waste—even ocean kelp. Many crops produce many times more alcohol per acre than corn, using arid, marshy, or even marginal land in addition to farmland. Just our lawn clippings could replace a third of the auto fuel we get from the Mideast.

WITH ALCOHOL FUEL, YOU CAN BECOME ENERGY-INDEPENDENT, REVERSE GLOBAL WARMING, AND SURVIVE PEAK OIL IN STYLE. ALCOHOL FUEL IS “LIQUID SUNSHINE” AND CAN’T BE CONTROLLED BY TRANSNATIONAL CORPORATIONS. YOU CAN PRODUCE ALCOHOL FROM A WIDE VARIETY OF PLANTS AND WASTE PRODUCTS, FROM ALGAE TO STALE DONUTS. IT’S A MUCH BETTER FUEL THAN GASOLINE, AND YOU CAN USE IT IN YOUR CAR, RIGHT NOW. YOU CAN EVEN USE ALCOHOL TO GENERATE YOUR ELECTRICITY. ALCOHOL FUEL PRODUCTION IS ECOLOGICALLY SUSTAINABLE, REVITALIZES FARMS AND COMMUNITIES, AND CREATES HUGE NEW OPPORTUNITIES FOR SMALL-SCALE BUSINESSES. ITS BYPRODUCTS ARE CLEAN AND VALUABLE. ALCOHOL HAS A PROUD HISTORY AND A VITAL FUTURE.



# ALCOHOL CAN BE A GAS!

**5.** Unlike hydrogen fuel cells, we can easily use alcohol fuel in the vehicles we already own. Unmodified cars can run on 50% alcohol, and converting to 100% alcohol or flexible fueling (both alcohol and gas) costs only a few hundred dollars. Most auto companies already sell new dual-fuel vehicles

**6.** Alcohol is a superior fuel to gasoline! It's 105 octane, burns much cooler with less vibration, is less flammable in case of accident, is 98% pollution-free, has lower evaporative emissions, deposits no carbon in the engine or oil, resulting in a tripling of engine life. Specialized alcohol engines can get at least 22% better mileage than gasoline or diesel.

**7.** It's not just for gasoline cars. We can easily use alcohol fuel to power diesel engines, trains, aircraft, small utility engines, generators to make electricity, heaters for our homes—and it can even be used to cook our food.

**8.** Alcohol has a proud, solid history. Gasoline is a refinery's toxic waste; alcohol fuel is liquid sunshine. Henry Ford's early cars were all flex-fuel. It wasn't until gasoline magnate John D. Rockefeller funded Prohibition that alcohol fuel companies were driven out of business.

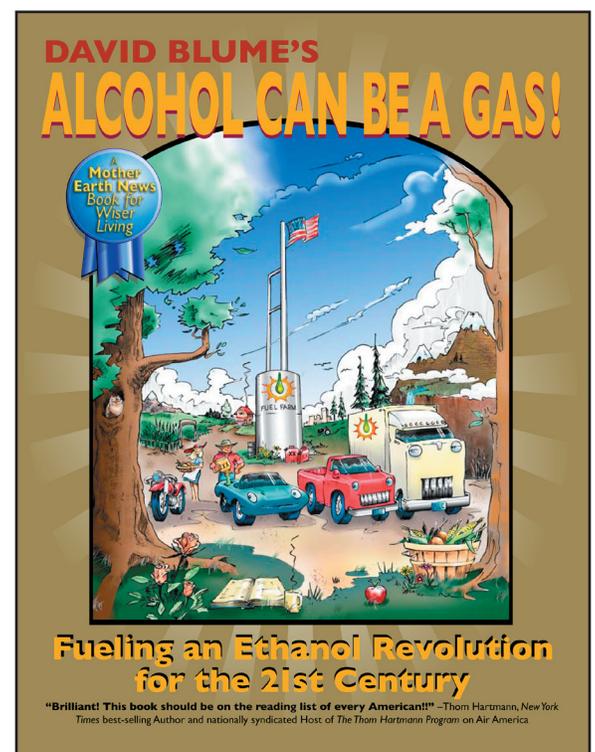
**9.** The byproducts of alcohol production, instead of being oil refinery waste, are clean and are worth more than the alcohol itself. In fact, they can make petrochemical fertilizers and herbicides obsolete. The alcohol production process concentrates and makes more digestible all protein and non-starch nutrients in the crop. It's so nutritious that when used as animal feed, it produces more meat or milk than the corn it comes from. That's right, fermentation of corn increases the food supply *and* lowers the cost of food.

**10.** Locally produced ethanol supercharges regional economies. Instead of fuel expenditures draining capital away to foreign bank accounts, each gallon of alcohol produces local income that gets recirculated many times. Every dollar of tax credit for alcohol generates up to \$6 in new tax revenues from the increased local business.

**11.** Alcohol production brings many new small-scale business opportunities. There is huge potential for profitable local, integrated, small-scale businesses that produce alcohol and related byproducts, whereas when gas was cheap, alcohol plants had to be huge to make a profit.

**12.** Scale matters—most of the widely publicized potential problems with ethanol are a function of scale. Once production plants get beyond a certain size and are too far away from the crops that supply them, closing the ecological loop becomes problematic. Smaller-scale operations can more efficiently use a wide variety of crops than huge specialized one-crop plants, and diversification of crops would largely eliminate the problems of monoculture.

**13.** The byproducts of small-scale alcohol plants can be used in profitable, energy-efficient, and environmentally positive ways. For instance, spent mash (the liquid left over after distillation) contains all the nutrients the next fuel crop needs and can return it back to the soil if the fields are close to the operation. Big-scale plants, because they bring in crops from up to 45 miles away, can't do this, so they have to evaporate all the water and sell the resulting byproduct as low-price animal feed, which accounts for half the energy used in the plant.



# ALCOHOL CAN BE A GAS!

## FACT SHEET

The International Institute for Ecological Agriculture is pleased to announce publication of the first comprehensive book ever written on alcohol fuel production and use for home and farm, *Alcohol Can Be A Gas! Fueling an Ethanol Revolution for the 21<sup>st</sup> Century*.

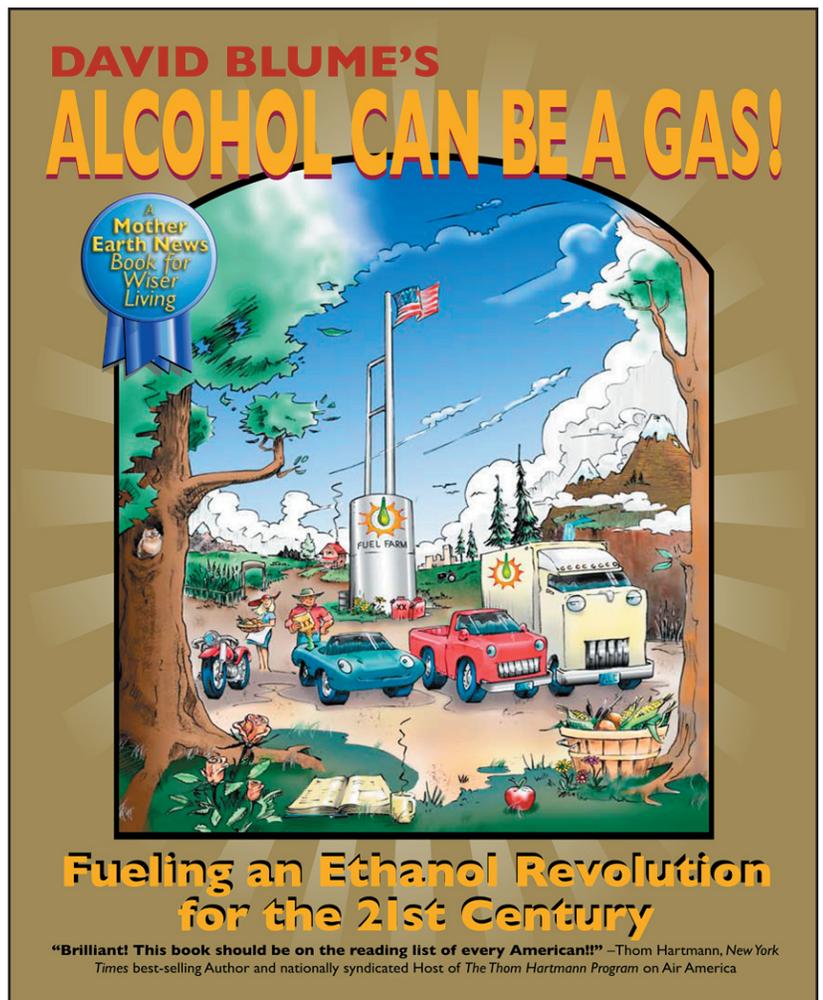
Until now, it has been very difficult for farmers, contractors, alternative energy aficionados, those concerned about Peak Oil, and small-scale entrepreneurs to obtain good, accurate information on producing alcohol, or on converting vehicles to run on the fuel. With all the conflicting news stories about ethanol, the public finds it difficult to sort fact from fiction. This text, which has been reviewed by scientists around the world, seeks to be the definitive reference work on the subject.

*Alcohol Can Be A Gas!* is written by David Blume, an ecological biologist who first began teaching others to produce and use alcohol in the late 1970s, while working at Mother Earth News Eco Village and Research Center. An early version of the book was written in 1983, to accompany the ten-part PBS television series *Alcohol As Fuel*, which Blume hosted. That version was never printed, due to conflict between PBS and its sponsors. The 2007 edition is completely rewritten; it is based on four years of full-time research, and visits to alcohol production sites in the U.S. and Brazil, by Blume and his team. It retains the original foreword by R. Buckminster Fuller.

*Alcohol Can Be A Gas!* contains 596 8-1/2" by 11" pages, with 514 charts, photos, and illustrations to reinforce the information-dense text. The book is geared for the nonscientific reader, but its 473 endnotes provide the technical foundation behind the accessible prose. A 700-word glossary and a 6300-entry index extend the book's usefulness.

More information, the table of contents, reviews, the index, excerpts from each of the chapters, clips from the DVD, and online ordering are available at <[www.alcoholcanbeagas.com](http://www.alcoholcanbeagas.com)>.

- The first and the definitive book on alcohol fuel production and use for home and farm
- By David Blume
- 596 8-1/2" by 11" pages
- 514 photos, illustrations, and charts
- 700-word glossary
- 6300-entry index
- 473 endnotes
- Posthumous foreword by R. Buckminster Fuller
- \$47 paperback, \$59 hardcover
- Published by:  
The International Institute for Ecological Agriculture, 309 Cedar Street #127, Santa Cruz, CA 95060 USA, phone 831-471-9164



# ALCOHOL CAN BE A GAS!

## CONDENSED TABLE OF CONTENTS

*Alcohol Can Be a Gas!* is divided into six "books."

- List of Figures
- Front Matter
- Introduction

### **BOOK 1: UNDERSTANDING ALCOHOL: VISIONS AND SOLUTIONS**

- Chapter 1: A History of Alcohol
- Chapter 2: Busting the Myths
- Chapter 3: The Permaculture Solution to Fossil Fuel Dependency
- Chapter 4: Darker Visions of Our Energy Future
- Chapter 5: Brazil

### **BOOK 2: MAKING ALCOHOL: HOW TO DO IT**

- Chapter 6: Selecting Feedstocks
- Chapter 7: Feedstock Preparation & Fermentation
- Chapter 8: Information on Various Feedstocks
- Chapter 9: Distillation
- Chapter 10: Designing Your Fuel/Feed Plant

### **BOOK 3: CO-PRODUCTS FROM MAKING ALCOHOL**

- Chapter 11: Alcohol Fuel Is Only the Beginning: Turning Waste into Profit
- Chapter 12: Micro-Distillery Model Farm

### **BOOK 4: USING ALCOHOL AS FUEL**

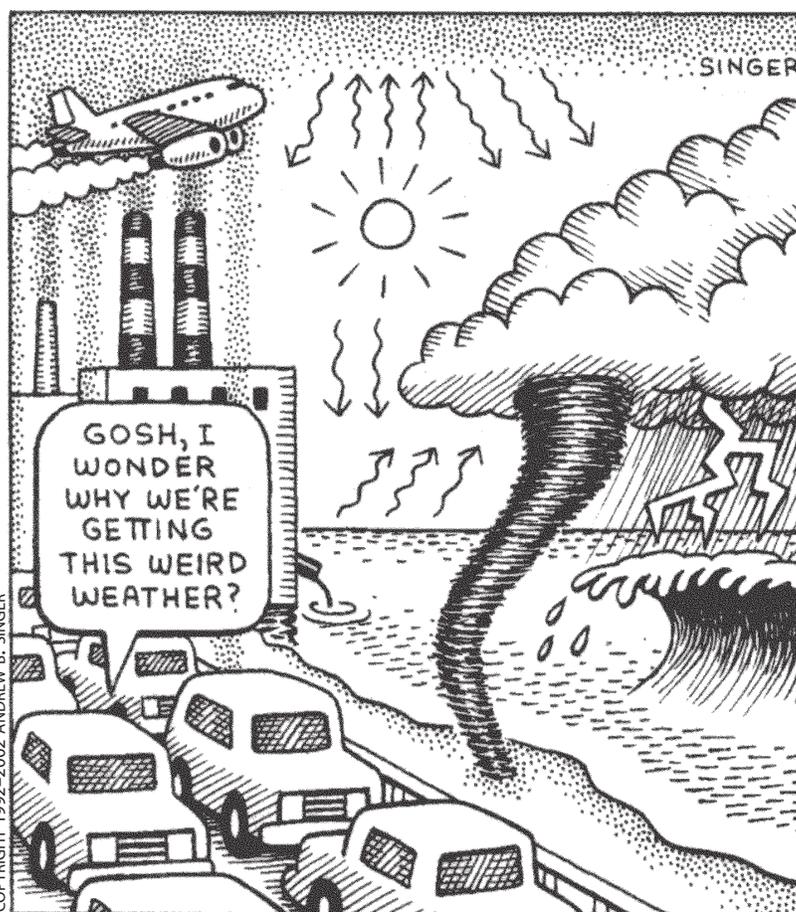
- Chapter 13: Surprise! Ethanol Is the Perfect Fuel
- Chapter 14: Alcohol Versus Gasoline in Your Engine
- Chapter 15: Carburetion
- Chapter 16: Fuel Injection
- Chapter 17: Cold-Start Systems
- Chapter 18: Ignition Timing
- Chapter 19: Assorted Adjustments
- Chapter 20: Converting to High Compression
- Chapter 21: Smaller Engines
- Chapter 22: Flexible-Fuel & Dual-Fuel Systems
- Chapter 23: Methanol & Butanol
- Chapter 24: Cogeneration & Other Systems to Provide Energy from Alcohol
- Chapter 25: How Diesel Engines Can Run on Alcohol

### **BOOK 5: THE BUSINESS OF ALCOHOL: HANDS-ON ADVICE**

- Chapter 26: Economic & Legal Considerations
- Chapter 27: Practical Experiences with Alcohol Production

### **BOOK 6: A VISION FOR THE NATION**

- Chapter 28: Fueling a Revolution: Proposed Incentives and Regulatory Changes to Rapidly Make the U.S. a Renewables-Powered Country
- Chapter 29: Community-Supported Energy (CSE)
- Back Matter
- Glossary
- Index



# ALCOHOL CAN BE A GAS!

## WHAT PEOPLE ARE SAYING

---

*"David Blume's Alcohol Can Be a Gas! is the most comprehensive and understandable book on renewable fuels ever compiled. Over a quarter century in the making, the book explains the history, technology, and even the sociology of renewable fuels in a fashion that can be appreciated by the most accomplished in the ethanol and biodiesel fields as well as the novice and young students of the issues. You will laugh out loud at his sharp wit and the dozens of cartoons. When you finish reading Dave's book, you will have a much better understanding of how our nation's energy policy evolved, why it is what it is today, and what needs to be done for the future. I have worked in the renewable energy sector in one form or another for close to four decades, and I can recommend Alcohol Can Be a Gas! as the best book I have ever read on the subject."*

—LARRY MITCHELL, CHIEF EXECUTIVE OFFICER,  
AMERICAN CORN GROWERS ASSOCIATION

---

*"As intersections of the food-energy-climate matrix form in Iowa cornfields, Amazonian rain forests, and Canadian gene-splicing labs, and as end-game battles for their control pit theocratic flat-worlders against biologists, climatologists, and tree-huggers over the very survival of life on Earth, David Blume emerges like a wizard on a misty pinnacle, backlit by the full moon, revealing a gemstone in his extended palm."*

—ALBERT BATES, AUTHOR OF  
THE POST-PETROLEUM SURVIVAL GUIDE  
AND COOKBOOK: RECIPES FOR CHANGING TIMES

---

*"Brilliant! This book should be on the reading list of every American!!"*

—THOM HARTMANN, NEW YORK TIMES BESTSELLING  
AUTHOR AND NATIONALLY SYNDICATED HOST OF  
THE THOM HARTMANN PROGRAM ON AIR AMERICA

"DAVE BLUME HAS WRITTEN THE DEFINITIVE OPUS ON ALCOHOL AS A FUEL. FROM THE 30,000-FOOT VIEW TO THE MOST MINUTE TECHNICAL DETAIL, *ALCOHOL CAN BE A GAS!* MAKES A STRONG CASE FOR THE PRACTICAL, ECOLOGICAL, POLITICAL, AND ECONOMIC SENSE IN CONVERTING TO ETHANOL. IT'S HEARTENING TO SEE THE WORLD'S ORIGINAL 'ALCOHOL PIONEER' STAY ABREAST OF THE TIMES WITH A BOOK THAT HAS THE PROMISE TO KNOCK SOME SENSE INTO OUR INSIDIOUS FOSSIL-FUELED ECONOMY. THIS BOOK IS MUCH NEEDED IN THIS ERA OF PEAK OIL AND FAST-ACCELERATING CLIMATE CHANGE."

—JOHN SCHAEFFER, PRESIDENT & FOUNDER OF REAL GOODS,  
& EXECUTIVE DIRECTOR OF THE INSTITUTE FOR SOLAR LIVING

---

*"Humanity has used up roughly half of the world's oil and topsoil. Just in time, David Blume has given us Alcohol Can be a Gas! It's a practical road map for supplying all of our energy needs without drilling, strip-mining, and/or depleting the soil. In fact, following Blume's model, soil fertility would actually increase worldwide; energy production would be not only sustainable, but democratic—and highly profitable on the small scale. This is a brilliant visionary work. And, with Mr. Blume's witty personality, reading it is certainly a gas."*

—LARRY KORN, SOIL SCIENTIST, TRANSLATOR, & EDITOR OF  
THE ONE-STRAW REVOLUTION: AN INTRODUCTION  
TO NATURAL FARMING

# ALCOHOL CAN BE A GAS!

*“Everything you wanted to know about alcohol-fuel production but were afraid to ask. More than 20 years ago, veteran biofuel guru Blume (Alcohol Can Be a Gas!, 1983) beat the drum for alcohol-based alternative fuels. Blume’s latest book is a well researched and expanded update to his original work, incorporating 21st-century concerns over global warming, domestic-energy policy, grassroots biofuel solutions, and the challenges of going green in a world dominated by the fossil fuel “oiligarchy.” Blume systematically and entertainingly builds his case for individual responsibility and activism in dealing with the nation’s domestic-energy challenges, and he excludes no one in preaching his gospel of alcohol-fuel independence. For the novice, Blume tells the story of alcohol production’s rich history in America, from the Civil War to today, and effectively demystifies the thorny pros and cons of the current national energy-policy debate regarding ethanol. This education alone is worth the cover price. Make no mistake, the book is more than a bully pulpit for championing sociopolitical opinions on global-energy woes—it is a technical how-to book. Written with enterprising do-it-yourselfers in mind, Blume offers countless hands-on technical solutions ranging from home stills to for-profit manufacturing strategies, and builds chapters on detailed charts, graphs, and step-by-step building instructions, giving activist-minded readers the data and resources they need to implement personal and individualized energy solutions. A well-executed, socially conscious, proactive, and rigorous call to action.”*

—KIRKUS DISCOVERIES

*“Finally, an alcohol book for the layman and backyard enthusiast. In our culture’s collective, industrialized love affair with mega-everything, Blume cuts across the government-subsidized factories with ecologically practical models. Here is a viable energy system that can be embedded in a region, linking rural producers to urban users of energy and food. Self-reliance and resiliency follow community-based alcohol production, and we all owe a debt of gratitude to Blume for codifying his life’s passion in what is a veritable compendium of information.”*

—JOEL SALATIN, FARMER, & AUTHOR OF YOU CAN FARM & EVERYTHING I WANT TO DO IS ILLEGAL

*“What a tour de force! This is the most comprehensive and authoritative guide through all the controversy about ethanol as transportation fuel, showing it as a clear winner in the quest for solutions to our environmental and geopolitical problems. Engagingly written, full of important and amazing information and resources, this book meets every challenge to the vision for a clean, democratic path to a prosperous future for all.”*

—JOE JORDAN, ATMOSPHERIC RESEARCHER, NASA/AMES RESEARCH CENTER, SETI INSTITUTE, & CABRILLO COLLEGE

*“Ethanol champion David Blume has completed his opus, Alcohol Can Be a Gas! It is a great read. The history of petroleum, history of alcohol, technical coverage of production process, vehicle development (conversion), and feedstocks—it’s all in the text, complete with charts and pictures. David’s wit, wisdom, and hardcore experience illuminate this biofuel’s potential. We have eagerly awaited this publication and will use it in our Sustainable Transportation and Biofuels courses.”*

—DR. JACK MARTIN, APPROPRIATE TECHNOLOGY PROGRAM, APPALACHIAN STATE UNIVERSITY; VICE-CHAIR, RENEWABLE FUELS & TRANSPORTATION DIVISION, AMERICAN SOLAR ENERGY SOCIETY

*“The overarching importance of this delightful book is that it demonstrates how beside the point is the current pseudo-debate about the net energy from corn ethanol. As Blume demonstrates, fuel alcohol must be an important component of our solar-based future. It can be made from a huge variety of feedstocks, including sugar beets and cane, nuts, mesquite, Jerusalem artichokes, algae, even coffee-bean pulp; there is no real scarcity of land to grow fuel. There is a scarcity of independent, original thinking, and Blume’s book provides plenty of it, along with ample doses of amazing, startling, and sometimes scary information—ecological, technological, and political-economic. This is a vast, detailed compendium drawn from decades of experience by an alert, smart, and skeptical hands-on thinker. Blume has given us his biofuels bible, and we can learn from him and survive quite nicely—or follow what he calls MegaOilron into oblivion.”*

—ERNEST CALLENBACH, AUTHOR OF ECOTOPIA, ECOTOPIA EMERGING, & ECOLOGY: A POCKET GUIDE

# ALCOHOL CAN BE A GAS!

## ABOUT THE AUTHOR

**D**avid Blume started his ecological training young. He and his father Jerry grew almost all the food their family ate, organically—on a city lot in San Francisco in the mid-'60s!

Dave taught his first ecology class in 1970. After majoring in Ecological Biology and Biosystematics at San Francisco State University, he worked on experimental projects, first for NASA, and then as a member of the *Mother Earth News* Eco Village alternative building and alternative energy teams.

When the energy crisis of 1978–79 struck, Dave started the American Homegrown Fuel Co., an educational organization that taught upwards of 7000 people how to produce and use low-cost alcohol fuel at home or on the farm.

KQED, San Francisco's Public Broadcasting System station, asked Dave to put his alcohol workshop on television, and together they spent two years making the ten-part series, *Alcohol as Fuel*. To accompany the series, Dave wrote the comprehensive manual on the subject, the original *Alcohol Can Be A Gas!* Shortly after the first show aired, in 1983, oil companies threatened to pull out their funding if the series was continued. KQED halted the distribution of the series and book (see this current book's Introduction for the whole story).

In 1984, Dave founded Planetary Movers, an award-winning social experiment and commercial venture, well known for productive activism (e.g., on behalf of Nicaragua's Sandinistas), as well as for pioneering practices of progressive employment, green marketing, and the sharing of a percentage of profits for peace and the environment.

In 1994, he started Our Farm. This community-supported agriculture (CSA) farm was also a teaching farm, based on sustainable practices, that hosted over 200 interns and apprentices from all over the world, and held regular tours for thousands of people. Our Farm grew as much as 100,000 pounds of food per acre, without a tractor, using only hand tools, on a terraced, 35-degree slope.

DAVID BLUME IS THE EXECUTIVE DIRECTOR OF THE INTERNATIONAL INSTITUTE FOR ECOLOGICAL AGRICULTURE. HE HAS BEEN AN ALCOHOL FUEL PIONEER SINCE THE SEVENTIES, AND HAS CONSULTED FOR A WIDE ARRAY OF CLIENTS, INCLUDING GOVERNMENTS, FARMERS, AND COMPANIES INTERESTED IN TURNING WASTE INTO VALUABLE AND PROFITABLE PRODUCTS.



PHOTO BY BOB FITCH

# ALCOHOL CAN BE A GAS!

The International Institute for Ecological Agriculture (IIEA), founded by Dave in 1993, is dedicated to healing the planet while providing for the human community with research, education, and the implementation of socially just, ecologically sound, resource-conserving forms of agriculture—the basis of all sustainable societies. The IIEA teaches permaculture, an ethical system of ecological land design, which incorporates the disciplines of agriculture, hydrology, energy, architecture, economics, social science, animal husbandry, forestry, and others.

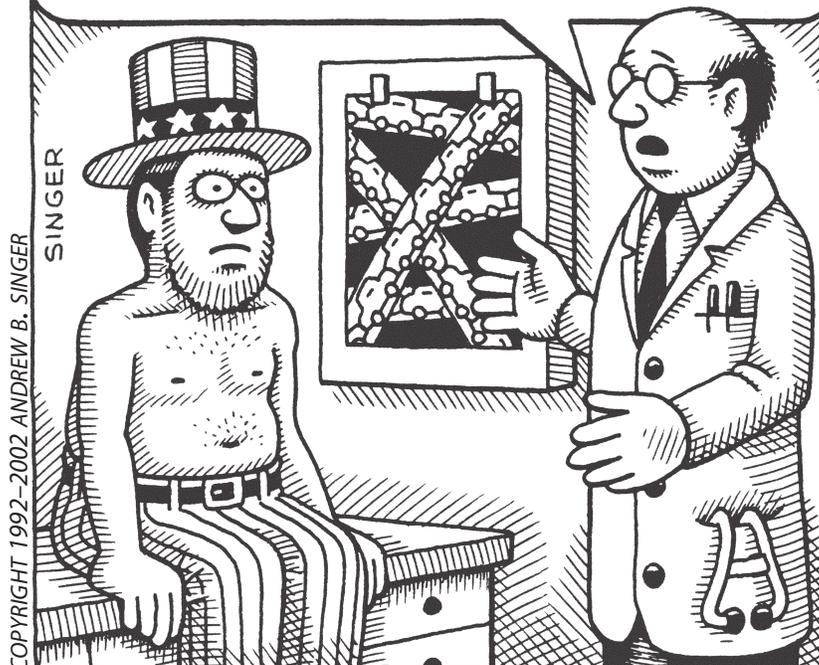
Dave and his IIEA associates are establishing a biofuels station in Santa Cruz, California, that will offer alcohol fuel in a driver-owned cooperative, as detailed in this book. Dave is currently Executive Director of the IIEA.

He has consulted for a wide array of clients, including governments, farmers, and companies interested in turning waste into valuable and profitable products. Recent work includes a feasibility study for a macadamia growers' cooperative in Mexico, and a water harvesting/reforestation project in Antigua, West Indies. He is working with

a farming college connected to the government of Ghana to develop alternative fuels, to train agricultural extension agents in organic farming, and to design an ecological strategy to stop the Sahara Desert from advancing. He also recently inspired the city of Urbana, Illinois, to hold a conference between builders, lenders, developers, municipalities, building inspectors, architects, and engineers, to coordinate the mainstreaming of natural building technologies. He has helped the Ford Motor Company demonstrate alcohol-fuel-powered vehicles at a series of U.S. events.

"Farmer Dave" is often called upon to testify before agencies on issues related to the land and democracy. He is a frequent speaker at ecological, sustainability, Peak Oil, and agricultural conferences in the Americas, and has appeared in interviews over 1000 times in print, radio, and television. Dave firmly believes in Emma Goldman's view of, "If I can't dance, I don't want to be in your revolution," and he can frequently be found on the dance floor when he isn't flagrantly inciting democracy.

SAM, YOUR TRANSPORTATION ARTERIES ARE BADLY **CLOGGED**. YOU NEED TO START DEVELOPING SOME ALTERNATIVE TRANSPORT AND LAY OFF THE OIL AND HEAVY ENERGY CONSUMPTION. OTHERWISE, YOU'RE GONNA HAVE A **HEART ATTACK**.



COPYRIGHT 1992-2002 ANDREW B. SINGER

# ALCOHOL CAN BE A GAS!

## SPEAKING TESTIMONIALS

---

*"I have seen David Blume speak several times, and each time he was thoroughly inspiring to the audience. Most recently he spoke at our 'Alternative Fuels Smackdown' at our annual SolFest, which draws 10,000 people. David was by far the best speaker on the panel, was animated in his presentation, clear, compelling, and inspirational in his delivery. I hope to have him back in the near future speaking on ethanol, biofuels, and renewable energy. He's one of the best speakers I've witnessed in a long time."*

—JOHN SCHAEFFER, FOUNDER AND PRESIDENT OF REAL GOODS,  
AND EXECUTIVE DIRECTOR OF THE INSTITUTE FOR SOLAR LIVING

---

*"I was one of the organizers of Bay Area Veg Fair, a conference that attracted around 5000 attendees. I asked David Blume to be one of our speakers after having seen him speak at numerous Bay Area events and being very impressed with his speaking abilities. He did a wonderful job—he was informative, witty, energetic, and really engaged the audience. David is extremely knowledgeable about his subject matter. What I really like about him is that he can tailor his talk to his audience's concerns and questions. I highly recommend David as a speaker."*

—STAN KING, CHAIR SIMPLICITY FORUM

---

*"David Blume presented a full-day, 8 hour workshop for the Solar Living Institute, and was a speaker at our first annual Green Career Conference in 2006. David has consistently been a pleasure to work with, and provided participants with first-rate presentations. David's speaking style is entertaining and full of cutting-edge information. He kept the class engaged for eight hours through his interactive teaching style. As one of our students said: 'David is very knowledgeable and enthusiastic. This was a great*

*"DAVID BLUME'S PLENARY PRESENTATION AT THE 'FIRST U.S. CONFERENCE ON PEAK OIL AND COMMUNITY SOLUTIONS' ON THE OPPORTUNITY OF BIO-FUELS WAS INFORMATIVE, ENGAGING, AND INSPIRING. AS THE HIGHEST-RATED SPEAKER AT OUR CONFERENCE, BLUME SHINED IN HIS EXPLANATION OF THE PROCESS AND PROMISE OF ALCOHOL FUEL REPLACING GASOLINE IN THE NEAR FUTURE. HIS PRACTICAL SKILLS AS A FARMER AND DISTINGUISHED ACCOMPLISHMENTS IN BRAZIL AND ELSEWHERE MAKE HIM ONE OF THE MOST KNOWLEDGEABLE AND EXPERIENCED IN HIS FIELD."*

—MEGAN QUINN, OUTREACH DIRECTOR, COMMUNITY SERVICE, INC.

---

*class! I'm confident that anyone who chooses to engage David as a speaker/presenters/instructor will be pleased with the results, and recommend him highly as a speaker on a variety of topics in which he has many years of expertise."*

—LINDSAY DAILEY, WORKSHOP DIRECTOR,  
SOLAR LIVING INSTITUTE

---

*"I featured David Blume on my Food Chain Radio program and found him to be both articulate and forceful. In fact, he 'stole the show' from some otherwise powerful speakers. He did a great job of fielding questions from the audience and in working ideas back and forth with fellow guests."*

—MICHAEL OLSON, HOST, FOOD CHAIN RADIO

---

# ALCOHOL CAN BE A GAS!

*"I have spent many hours listening to Dave Blume speak on permaculture and on energy production—specifically ethanol production and its utilization. Although I have heard numerous others speak on the topic of permaculture, I have yet to encounter a speaker more knowledgeable or engaging than Dave. Dave has a unique ability to analyze the natural world, always seeking to discern a more harmonious role for humans in that world, and this analytical ability provides him fascinating insights on how permaculture can transform the way we live on this planet. I have known people who, after attending one of Dave's permaculture introduction talks, could not sleep because they were so excited over the impact of his message and insights. Having spent five years earning an engineering degree and over two decades working in corporate America, I am no stranger to speakers and presentations. Despite all that time in the role of student, I consider Dave to be one of the very best instructors I have ever encountered. He understands his material at a depth few can match, he has insights uniquely his own, and he is not afraid to speak the truth."*

—MARK HOFFMAN, PRESIDENT,  
CENTER FOR SUSTAINABLE COMMUNITY

*"Farmer Dave" Blume is nothing short of a genius and American hero. His ability to accurately inform and genuinely entertain an audience is a rare skill among energy and agriculture speakers on today's circuit. As a coordinator for Portland Peak Oil, I invited Farmer Dave to speak to our group for his presentation of Alcohol Can Be a Gas! I booked Dave on the Thom Hartmann show in Portland the morning before his evening talk. He was on for only eleven minutes but what an eleven minutes! His draw was impressive. That night Dave held the attention of over 120 people in the room for several hours, and his approach of asking, "What do you want to know?" allowed him to tailor his presentation on the fly. His teaching style of combining a wealth of knowledge, history, humor, and calls to action will make him an excellent addition to a professional speaking organization. I can only hope Dave keeps his rates low for us as he grows in demand!"*

—RANDY WHITE, INTERNET COORDINATOR, CLEAR CHANNEL

*"David Blume was the keynote speaker at our recent 28th Annual American Agriculture Movement Convention held in Oklahoma City, OK. His topic was alternative energy, and he addressed at 6 pm. At 9 pm our people were still asking questions. David was very informative, and no one had a question he could not answer. We were very pleased we chose him for our keynote speaker."*

—JOYCE JOBGEN, CONVENTION COORDINATOR,  
AMERICAN AGRICULTURE MOVEMENT

*"There is no doubt in my mind that Dave Blume will inspire audiences of all kinds with his fluid teaching style, eclectic expertise, and stimulating ideas. Not only does he present powerful solutions that are much needed in our present time of ecological crisis; he also empowers listeners with innovative and practical tools to create their very own solutions. He is an illuminating and exciting voice for the cause ... catch him if you can."*

—KAREN CHEN, ECOLOGY MANAGER, ECOGATHERINGS

## **SOME RECENT AND UPCOMING APPEARANCES BY DAVID BLUME:**

- 6/12/07 WSPT AM/FM, Stevens Point WI
- 6/15–17/07 MREA's MidWest Regional Energy Fair, Custer WI
- 8/16–19/07 SolFest, Hopland CA
- 9/6/07 evWorld.com
- 9/12/07 NRDC, Nathaniel Greene interview
- 9/25/07 KUSP, Central Coast Public Radio, Santa Cruz CA
- 9/25/07 EcoReview, Community TV of Santa Cruz County CA
- 10/4/07 Thom Hartmann Air America Show, Portland OR
- 10/6/07 KPOJ, Progressive Talk Radio, Portland OR
- 10/6/07 Portland State University, Portland, OR
- 10/7/07 Peak Oil Forum, Salem OR
- 10/20/07 Retzer Nature Center, Milwaukee WI
- 10/27/07 University of Illinois Chicago
- 11/17/07 Green Careers Conference, UC Berkeley

# ALCOHOL CAN BE A GAS!

## BUSTING THE ETHANOL MYTHS

---

### MYTH #1: IT TAKES MORE ENERGY TO PRODUCE ETHANOL THAN YOU GET FROM IT!

Most ethanol research over the past 25 years has been on the topic of energy returned on energy invested (EROEI). Public discussion has been dominated by the American Petroleum Institute's aggressive distribution of the work of Cornell professor David Pimentel and his numerous, deeply flawed studies. Pimentel stands virtually alone in portraying alcohol as having a negative EROEI—producing less energy than is used in its production.

In fact, it's oil that has a negative EROEI. Because oil is both the raw material and the energy source for production of gasoline, it comes out to about 20% negative. That's just common sense; some of the oil is itself used up in the process of refining and delivering it (from the Persian Gulf, a distance of 11,000 miles in tanker travel).

The most exhaustive study on ethanol's EROEI, by Isaias de Carvalho Macedo, shows an alcohol energy return of more than eight units of output for every unit of input—and this study accounts for everything right down to smelting the ore to make the steel for tractors.

But perhaps more important than EROEI is the energy return on fossil fuel input. Using this criterion, the energy returned from alcohol fuel per fossil energy input is much higher. In a system that supplies almost all of its energy from biomass, the ratio of return could be positive by hundreds to one.

### MYTH #2: THERE ISN'T ENOUGH LAND TO GROW CROPS FOR BOTH FOOD AND FUEL!

According to the U.S. Department of Agriculture, the U.S. has 434,164,946 acres of "cropland"—land that is able to be worked in an industrial fashion (monoculture). This is the prime, level, and generally deep agricultural soil. In addition to cropland, the U.S. has 939,279,056 acres of "farmland." This

THE VITUPERATIVE BILE AROUND ALCOHOL FUEL IS TOTALLY MISPLACED. WHEN USED WITH A VISION THAT INCORPORATES ORGANIC FARMING—A SHIFT AWAY FROM INDUSTRIAL FARMING, TOWARD SUSTAINABLE PRACTICES—ETHANOL IS AN EXCELLENT OPTION TO SOLVE OUR ENERGY PROBLEMS. ALL OF THEM, IF WE WISH.

---

land is also good for agriculture, but it's not as level and the soil not as deep. Additionally, there is a vast amount of acreage—swamps, arid or sloped land, even rivers, oceans, and ponds—that the USDA doesn't count as cropland or farmland, but which is still suitable for growing specialized energy crops.

Of its nearly half a billion acres of prime cropland, the U.S. uses only 72.1 million acres for corn in an average year. The land used for corn takes up only 16.6% of our prime cropland, and only 7.45% of our total agricultural land.

Even if, for alcohol production, we used only what the USDA considers prime flat cropland, we would still have to produce only 368.5 gallons of alcohol per acre to meet 100% of the demand for transportation fuel at today's levels. Corn could easily produce this level—and a wide variety of standard crops yield up to triple this. Plus, of course, the potential alcohol production from cellulose could dwarf all other crops.

### MYTH #3: ETHANOL'S AN ECOLOGICAL NIGHTMARE!

You'd be hard-pressed to find another route that so elegantly ties the solutions to the problems as does growing our own energy. Far from destroying the land and ecology, a permaculture ethanol solution will vastly improve soil fertility each year.

The real ecological nightmare is industrial agriculture. Switching to organic-style crop rotation will cut energy use on farms by a third or more: no more petroleum-based herbicides, pesticides, or chemical fertilizers. Fertilizer needs can be served either by applying the byproducts left over from the alcohol manufacturing process directly to the soil, or by first running the byproducts through animals as feed.

#### **MYTH #4: IT'S FOOD VERSUS FUEL—WE SHOULD BE GROWING CROPS FOR STARVING MASSES, NOT CARS!**

Humankind has barely begun to work on designing farming as a method of harvesting solar energy for multiple uses. Given the massive potential for polyculture yields, monoculture-study dismissals of ethanol production seem silly when viewed from economic, energetic, or ecological perspectives.

Because the U.S. grows a lot of it, corn has become the primary crop used in making ethanol here. This is supposedly controversial, since corn is identified as a staple food in poverty-stricken parts of the world. But *87% of the U.S. corn crop is fed to animals*. In most years, the U.S. sends close to 20% of its corn to other countries. While it is assumed that these exports could feed most of the hungry in the world, the corn is actually sold to wealthy nations to fatten their livestock. Plus, virtually no impoverished nation will accept our corn, even when it is offered as charity, due to its being genetically modified and therefore unfit for human consumption.

Also, fermenting the corn to alcohol results in more meat than if you fed the corn directly to the cattle. We can actually increase the meat supply by first processing corn into alcohol, which only takes 28% of the starch, leaving all the protein and fat, creating a higher-quality animal feed than the original corn.

#### **MYTH #5: BIG CORPORATIONS GET ALL THOSE ETHANOL SUBSIDIES, AND TAXPAYERS GET NOTHING IN RETURN!**

Between 1968 and 2000, oil companies received subsidies of \$149.6 billion, compared to ethanol's paltry \$116.6 million. The subsidies alcohol did receive have worked extremely well in bringing maturity to the industry. Farmer-owned cooperatives now produce the majority of alcohol fuel in the U.S. Farmer-owners pay themselves premium prices for their corn and then pay themselves a dividend on the alcohol profit.

The increased economic activity derived from alcohol fuel production has turned out to be crucial to the survival of noncorporate farmers, and the amounts of money they spend in their communities on goods and services and taxes for schools have been much higher in areas with an ethanol plant. Plus, between \$3 and \$6 in tax receipts are generated for every dollar of ethanol subsidy. The rate of return can be much higher in rural communities, where re-spending within the community produces a multiplier factor of up to 22 times for each alcohol fuel subsidy dollar.

#### **MYTH #6: ETHANOL DOESN'T IMPROVE GLOBAL WARMING! IN FACT, IT POLLUTES THE AIR!**

Alcohol fuel has been added to gasoline to reduce virtually every class of air pollution. Adding as little as 5–10% alcohol can reduce carbon monoxide from gasoline exhaust dramatically. When using pure alcohol, the reductions in all three of the major pollutants—carbon monoxide, nitrogen oxides, and hydrocarbons—are so great that, in many cases, the remaining emissions are unmeasurably small. Reductions of more than 90% over gasoline emissions in all categories have been routinely documented for straight alcohol fuel.

It is true that when certain chemicals are included in gasoline, addition of alcohol at 2–20% of the blend can cause a reaction that makes these chemicals more volatile and evaporative. But it's not the ethanol that's the problem; it's the gasoline.

Alcohol carries none of the heavy metals and sulfuric acid that gasoline and diesel exhausts do. And straight ethanol's evaporative emissions are dramatically lower than gasoline's, no more toxic than what you'd find in the air of your local bar.

As for global warming, the production and use of alcohol neither reduces nor increases the atmosphere's CO<sub>2</sub>. In a properly designed system, the amount of CO<sub>2</sub> and water emitted during fermentation and from exhaust is precisely the amount of both chemicals that the next year's crop of fuel plants needs to make the same amount of fuel once again.

Alcohol fuel production actually lets us *reduce* carbon dioxide emissions, since the growing of plants ties up many times more carbon dioxide than is created in the production and use of the alcohol. Converting from a hydrocarbon to a carbohydrate economy could quickly reduce atmospheric carbon dioxide.

# ALCOHOL CAN BE A GAS!

## ALCOHOL FUEL: WHO CARES?

### FARMERS

can increase their profits by producing and using alcohol fuel. They can:

- Create an economic engine that can vitalize the family farm.
- Create substantial off-season income.
- Make their own fuel for under \$1.00 a gallon—and get the government to pay them \$.61 for every gallon they use.
- Make more money raising non-traditional energy crops, rather than traditional crops.
- Improve soil by rotating high-value energy crops into current crop rotations.
- Make money by using distillery byproducts as high-quality animal feed and fertilizer.
- Establish an alcohol fuel station in town and sell their excess ethanol.

### CONSUMERS

can be part of the solution, not the problem, while saving money. They can:

- Run a 50% alcohol/gasoline mixture right now in whatever vehicles they're driving.
- Easily convert vehicles to use alcohol fuel for optimum performance.
- Improve air quality by using ethanol.
- Save money by using ethanol.
- Buy sustainably produced ethanol from a Community-Supported Energy (CSE) Co-op.
- Band together to create their own CSE, enjoying energy independence and great tax breaks.

### CONTRACTORS

can save a lot of money by making their own fuel. They can:

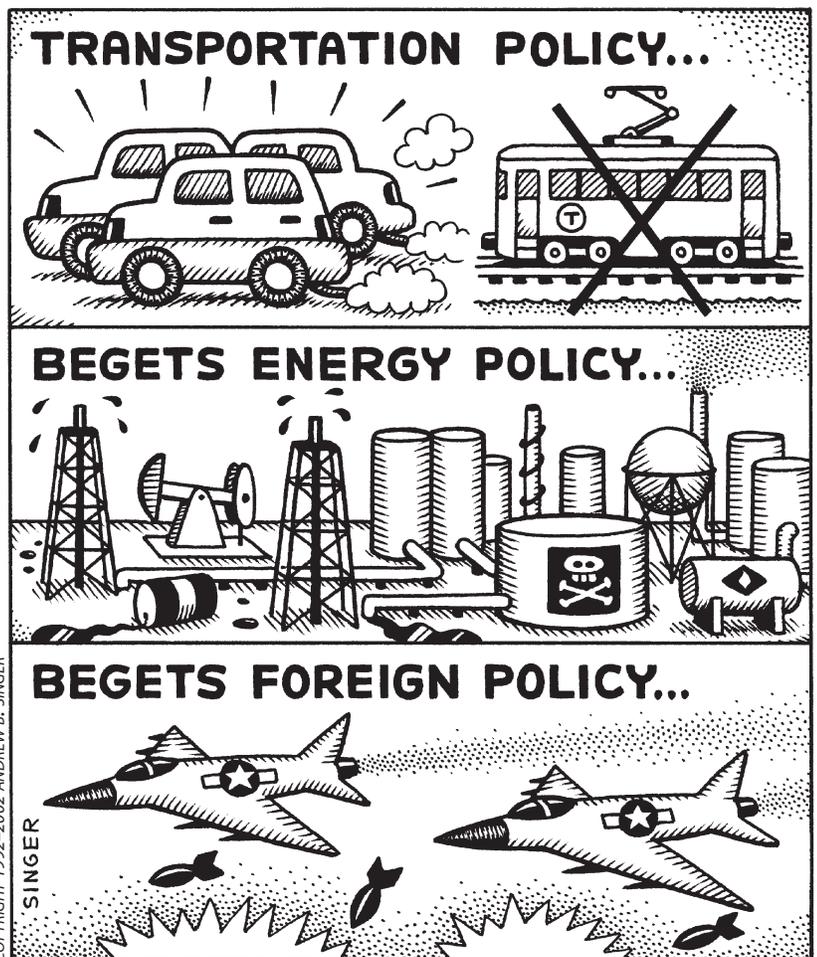
- Build their own alcohol fuel production plant.
- Make their own fuel for under \$1.00 a gallon—and get the government to pay them \$.61 for every gallon they use.
- Earn money helping others develop ethanol production plants.

- Triple the life of their engines.
- Choose from six different ways to convert diesel engines to alcohol fuel.

### ENVIRONMENTALISTS

see that ethanol can help reverse global warming. They can:

- Implement a plan using alcohol fuel to stop, and ultimately reverse, atmospheric greenhouse gas emissions.
- Use alcohol fuel to transform industrial agricultural into a diversified, localized system that eliminates all waste effluents, provides more humane treatment of livestock, and produces plentiful organic food.



- Use alcohol fuel to eliminate all need for imported oil.
- Use alcohol fuel to eliminate the need for herbicides and GMO crops.
- Use alcohol fuel to save money on fuel while improving air quality.

## **COMMUNITY PLANNERS**

can use alcohol fuel to solve problems and increase revenue. They can:

- Set up a farm/micro-distillery to serve as an economic engine to revitalize depressed communities—by providing jobs, producing valuable food and fuel, and generating revenue.
- Keep expenditures for food and fuel inside the community.
- Set up an ethanol filling station and save money operating fleets.
- Earn money selling fuel to the public.
- Produce ethanol from municipal biomass; for example, cattails in sewage treatment systems.
- Create a Community-Supported Energy (CSE) Co-op that can provide low-priced fuel to community members.

## **SELF-SUFFICIENCY ENTHUSIASTS**

can use alcohol fuel to become completely energy independent. They can:

- Make their own fuel and sell any extra.
- Produce fuel that will be as valuable as any sort of currency.
- Use ethanol as a motor fuel or as a co-generation fuel to generate electricity and heat, or for cooking and lighting.

## **FOOD DISTRIBUTORS & GROCERS**

can save money by producing and using alcohol fuel. They can:

- Turn their produce waste into fuel.
- Eliminate landfill costs for disposing of damaged produce.

## **BOAT OWNERS**

find that ethanol is a far superior fuel. They can:

- Save money by using ethanol instead of the \$5.00/gallon gasoline marinas sell.
- Enjoy using a fuel that doesn't stink.
- Improve engine performance: Ethanol won't stall the engine if there's water in the fuel, since alcohol absorbs the water.
- Clean sludge out of the fuel system with ethanol.

## **RACE-CAR DRIVERS & OWNERS**

can use alcohol fuel to get more power. They can:

- Increase horsepower up to 40%, since ethanol burns cooler than gasoline.
- Push the engine much harder.
- Run far richer than stoichiometric.
- Enjoy using a fuel that's 105 octane and that tolerates 18:1 compression.
- Eliminate engine tear-downs and repairs, since, unlike methanol, alcohol will not damage engine or seals.
- Enjoy not having to provide a special fuel delivery system, unlike with methanol.

## **PILOTS & AIRPLANE OWNERS**

can use ethanol to great advantage. They can:

- Run their engine more efficiently, since alcohol fuel has oxygen built in and becomes more efficient at higher altitudes.
- Extend engine life; avoid thousands of dollars in expensive engine rebuilds.
- Save money; ethanol is much cheaper than leaded Avgas.
- Enjoy using a fuel that is 105 octane and that burns much cooler and cleaner than gas.

## **PERMACULTURISTS**

can create elegant integrated systems with alcohol fuel. They can:

- Produce solar-based fuel, along with such co-products as food, fertilizer, and animal feed.
- Create a fully integrated food/fuel agricultural system.

## **HOME BREWERS**

can take their skills to the next level. They can:

- Distill their fermented mash into fuel alcohol.

## **ANYONE WHO IS DISGUSTED EACH TIME THEY FILL THEIR TANK WITH GAS**

can do something positive instead. By using alcohol fuel, they can:

- Be part of an environmentally sensible, achievable way to stop, and reverse, global warming while eliminating all need for imported oil.
- Be part of a solution that can produce enough fuel, in an environmentally sustainable way, to completely offset the impact of Peak Oil, while increasing our food supply.
- Help put energy production into the hands of the people.

# PREFACE

---

I am often accosted by people whom I would normally consider my colleagues. They are typically environmental activists informed by what they read on the Internet, people who watched *An Inconvenient Truth*, people who are aware of Peak Oil, sustainable agriculture, and climate change.

They say “Dave, don’t you know that fossil fuels, (and fossil-fuel-based fertilizers) are beginning to run out and “There Is No Alternative’? [My acronym for this is “TINA”.] The only thing we can do is stop driving, stop using energy, walk to our green jobs in the new localized economy, and go back to farming by hand. Power down.”

They also say, “The reason we are in this mess—polluted air, lung cancer, melting ice caps, drowning polar bears, food traveling 10,000 miles from farm to eater, horrible wars for oil, MTBE-poisoned groundwater, massive monoculture farms growing animal feed to be shipped to other countries to feed their rich people’s cattle, requiring billions of gallons of pesticides—is all because of the internal combustion engine and cheap fossil fuels. Why are you writing a book which is all about making it possible for American soccer moms to drive their massive SUVs while the rest of the world starves for basic energy and food?”

They say, “Don’t you get it?!!”

Believe me, I get it. I agree that we, particularly in the United States, are using and wasting a disgustingly huge quantity of energy. My fellow ecologists have a deep knowledge of natural systems, and we find ourselves every day walking through a world of horrible environmental wounds that we cannot help seeing.

Conservation and, more importantly, good design are the basic foundations on which to plan our energy future.

This book is not about providing unlimited clean fuels for SUVs. It’s about shaping energy policy now with our own individual and group actions, to make sure the energy future we get is the one we

THIS BOOK CHARTS A CLEAR, ATTAINABLE PATH THAT WILL  
WORK—AND THAT IS, IN FACT, ALREADY IN MOTION.  
THIS PATH, IN THE BEST TRADITIONS OF MARTIAL ARTS,  
TURNS THE FORCES DESTROYING OUR PLANET BACK  
AGAINST THE PLUNDERERS, AND PUTS BOTH THE POWER  
AND THE RESPONSIBILITY FOR IMPLEMENTING THE  
SOLUTION IN THE HANDS OF ORDINARY PEOPLE,  
WORKING TOGETHER AT THE LOCAL LEVEL.

want and not the one the Oilygarchy is planning for us. This book is about maintaining your power and hope in the face of “this mess.” It charts a clear, attainable path that will work—and that is, in fact, already in motion. This path, in the best traditions of martial arts, turns the forces destroying our planet back against the plunderers, and puts both the power and the responsibility for implementing the solution in the hands of ordinary people, working together at the local level.

This is why I refuse to give in to a philosophy of despair, why I refuse to surrender to those who plunder the planet, although so many of us have given them our permission to destroy the Earth under the banner of TINA. TINA allows the powerful to decide which energy we will use to pollute our planet.

And while people in developed countries may practice a little well-meaning conservation, they will not be willing to return to a world where the basic unit of energy is their human labor. The multinational energy corporations know this, and they are planning their transition to fuels that make petroleum look like Mr. Clean (see Chapter 4). A dying planet is of secondary importance to these people.

In many ways, my strident colleagues are correct when they say that the central cause of our planet's woes can be characterized by our use of engines and fossil fuels. But they are wrong about TINA. The central solution, which ripples out to every corner of the planet, is to replace those fuels with available solar-based fuels all over the planet. As you will see, even in a cursory examination of this book, this alternative is powerful, inexpensive, fast, and effective—and will regenerate ecological systems, if done properly.

As I point out in this book, it is possible to make ethanol using a badly designed industrialized model, one that corporate agribusiness currently employs. In this system, biofuels production would amplify the abuses to our environment.

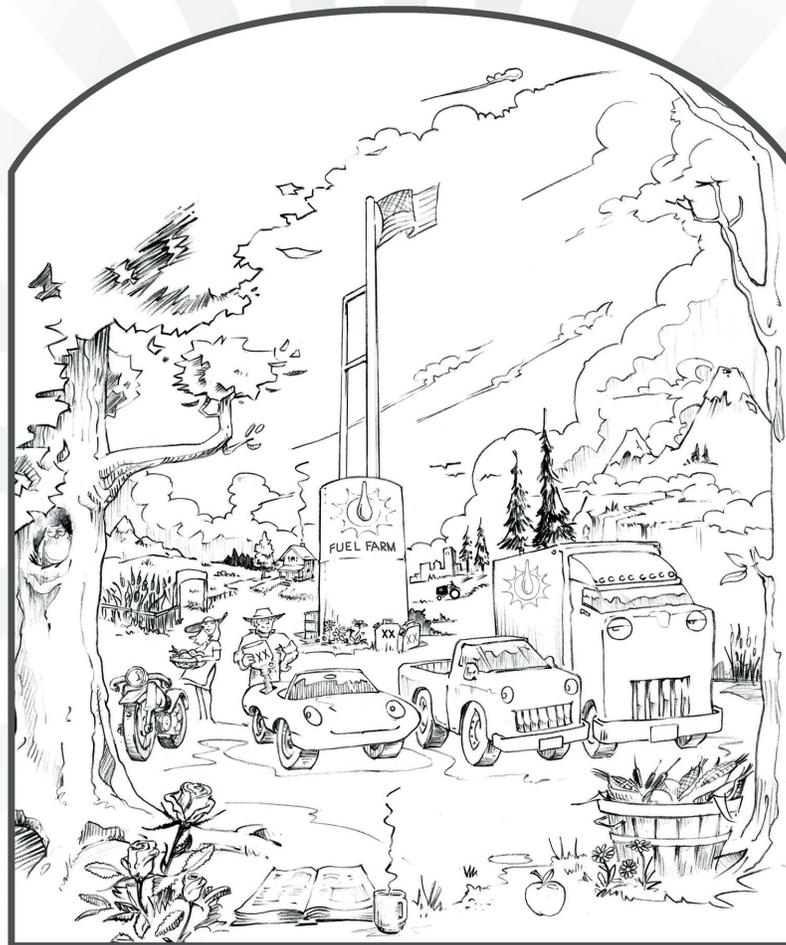
But this book shows how a permaculturally designed ethanol system provides us with surpluses of local food, energy, community, and power—all while deepening our topsoil, eliminating the use of toxic agrichemicals, and reversing global warming.

It's about doing things on a human scale and as you will see, the human scale has virtually all the advantages in this struggle. Our energy/food production system can either affirm our living environment or treat the Earth as one big strip mine to exploit.

Yes, there is an alternative to a chaotic post-petroleum world. But it will take your help, blood, and sweat to make it happen. In fact, it's going to take a revolution.

Share. Organize. Win.

## David Blume's ALCOHOL CAN BE A GAS!



### Fueling an Ethanol Revolution for the 21st Century

CONTACT TOM HARVEY AT 530-257-3533 OR AT [THECOMMUNICATIONS@PUBLICIST.COM](mailto:THECOMMUNICATIONS@PUBLICIST.COM)