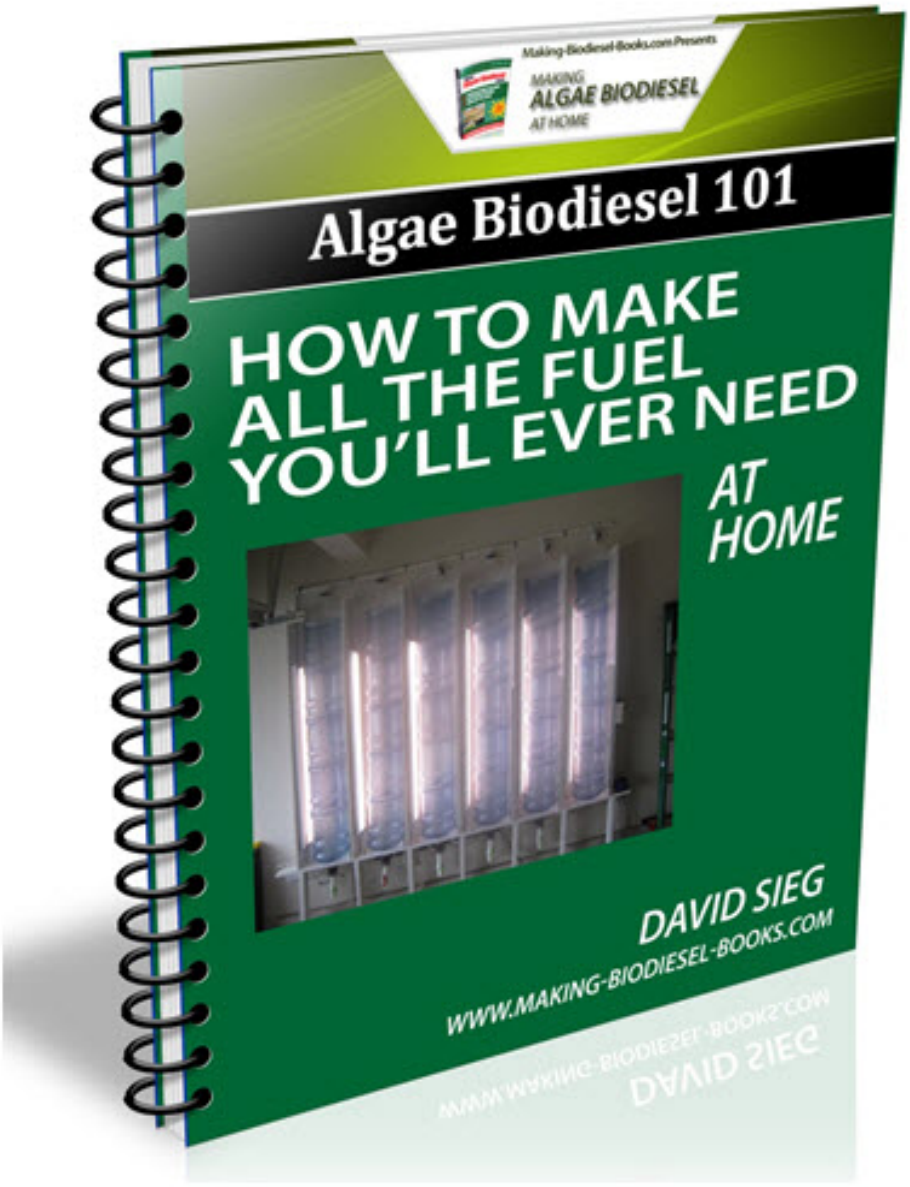
Algae Biodiesel 101

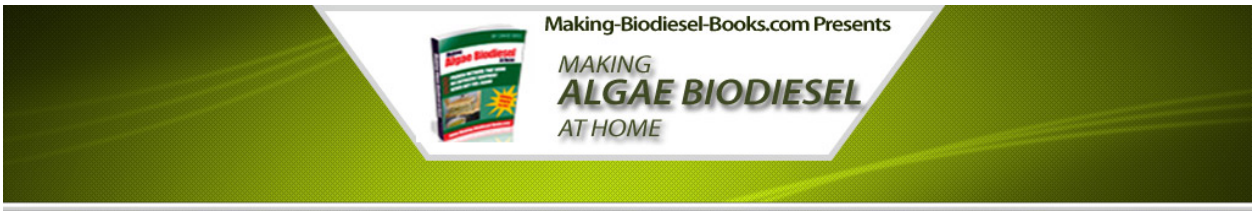


Legal:

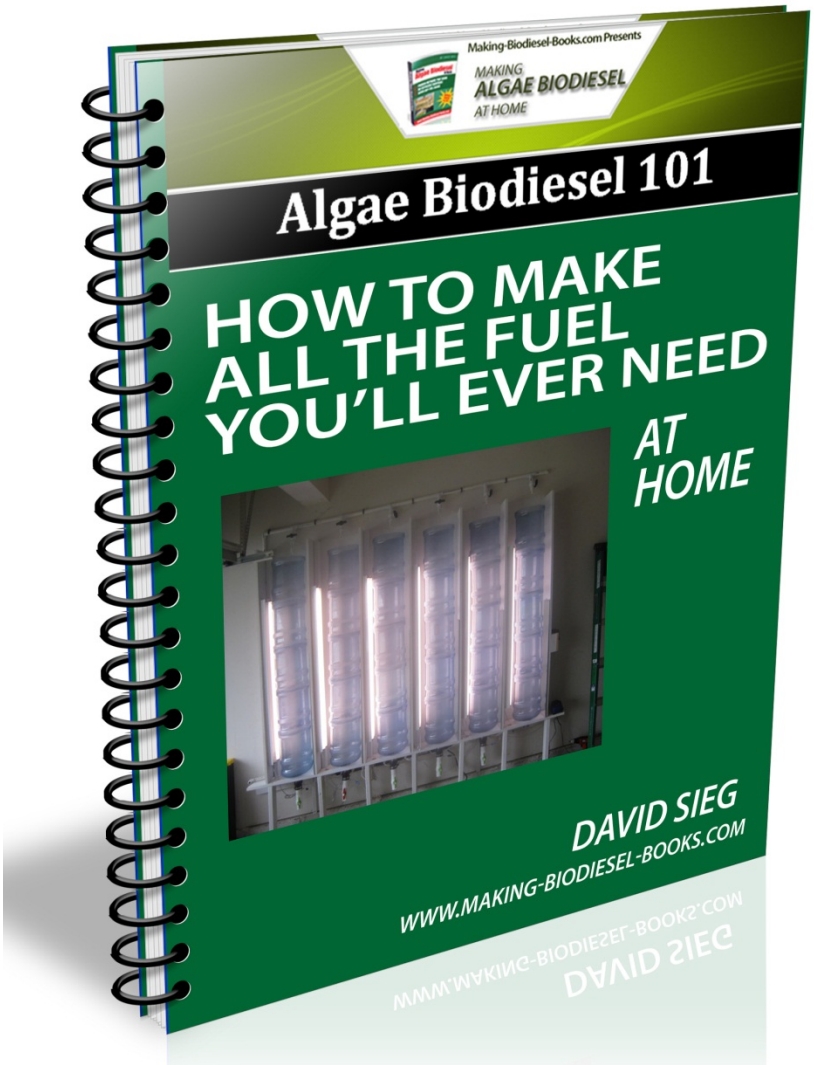
NOTICE: You Have the Right to share this report. As long as all content, links, stay the same and unchanged. This publication is intended to be an overview of the online publication "Algae Biofuels 101."

Any concerns can be addressed by contacting me here: dsieg@making-biodiesel-books.com

The purpose of this free report is to give an expanded view of what is included in "Algae Biofuels 101"



Algae Biodiesel 101



Lesson #1 …

Understanding Algae Biodiesel Quickly and Easily

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Contents

3 Bonus downloads

- Lesson 1 in .pdf
- Aquatic Species Report
- Algae industry survey

Foreword

Welcome to your first ***Algae Biodiesel 101™*** lesson!

1) This lesson is all about Understanding algae biodiesel quickly and easily.

At the end of this lesson, you'll understand the entire algae biofuel basic process. This section is meant as an introduction.

2) What's In Store the First Few Months.

I want to give you just a quick look at what we'll be covering during the next10 lessons in your training…

- **Lesson 1:** Understanding Algae Biodiesel Quickly and Easily
- **Lesson 2:** 10 best algae strains to start with and where to get them
- **Lesson 3:** Algae growth dynamics 101
- **Lesson 4:** Building test bioreactors
- **Lesson 5:** Building bio-ponds
- **Lesson 6:** Building a backyard raceway pond
- **Lesson 7:** Building a garage bioreactor
- **Lesson 8:** Harvesting
- **Lesson 9:** Oil extraction
- **Lesson 10:** Making Algae Biodiesel
- **Lesson 11:** Quality testing and troubleshooting biodiesel Problems.
- **Lesson 12:** Making Algae Ethanol.

"The responsibility for change, therefore, lies with us. We must begin with ourselves, teaching ourselves not to close our minds prematurely to the novel, the surprising, the seemingly radical. This means fighting off the idea-assassins who rush forward to kill any new suggestions on grounds of its impracticality, while defending whatever exists now as practical, no matter how absurd, oppressive or unworkable it may be."

Alvin Toffler
The Third wave

3) Why You Should Never Cancel.

There are many reasons why you should stick with your membership (it's great training, if you keep quitting one thing and going to another you'll never get anywhere, even if you don't use it all now you can archive it to use later, etc.) but there is an all-important reason that I have to warn you about from the beginning. Each of your lessons is sequential and delivered by auto responder.

That means, if you decide to cancel and rejoin at some point in the future, you'll have to start all over again with the very first lesson. There is no "picking up where you left off" with this training program. I *strongly* encourage you to stick with this for the entire 12 month duration … trust me when I say that you'll thank me in the end.

4.) Also, you may want to "whitelist" dsieg@making-biodiesel-books.com which is the email address the lessons will originate from. This will insure you get every lesson**. If you don't "Whitelist" the email address, then those people with Yahoo, MSN, hotmail, and AOL your lessons may get caught in your spam checker.** Don't say you weren't warned.

Introduction

The most important thing to take away from this lesson is…Algae Biofuels is the synergy between different algae growth, harvesting, and fuel extraction principles.

Freedom, it's a little word, but such a huge concept. Take a moment to imagine…

Imagine freedom from oil companies. No more spending $50-$100 a week on diesel. Imagine freedom from the utility companies. No more spending $300 to $500 a month on heat or cooling. If you're a farmer, imagine freedom from "Big Ag", no more spending $1000's on oil based fertilizers. If you're a rancher, no more spending $1000's on animal feed. If you're a trucker, no more spending $100,000's on fuel. Imagine freedom from oil wars.

It's a reality and it can be YOUR reality. Algae can do that and more. In your hands is freedom.
OK, now back to reality; I'm not going to BS you. Making biodiesel from algae is a whole different ballgame. Why?

Number one, you're (probably) constrained by budget. Chances are you don't have multi-millions of dollars to spend on the best equipment, microbiologists, and genetic and mechanical engineers. Number two; you're constrained by parts, material, and equipment necessary, mostly because of point number one above.

You get around both of these obstacles by using your brain. You'll find lots of people out there, naysayers, who tell you "it can't be done." These are usually people who like to sit comfortably in their armchairs and criticize the legitimate efforts of people who actually DO something, if you're surrounded by those people they're right…it can't be done…BY THEM.

Like Henry Ford said "If you think you can do a thing or think you can't do a thing, you're right."
Luckily, the purpose of this book is to show you how to get around those challenges with "Yankee ingenuity." This doesn't mean however, that you'll get the same result as someone, or some commercial company who can outspend you. But that is true in just about anything.
If you study this book and put the ideas of this book into practice, you'll know more about algae biodiesel than 99% of the "experts" and consultants in the world today.

The thing to keep in mind is that this doesn't HAVE to be difficult and complicated. Experts and consultants charge a lot of money MAKING THINGS DIFFICULT AND COMPLICATED. They need to justify their high daily rates and per diems.

The oil companies WANT you to think you can't do this. They want you to think it is too complicated too. They WANT you tied to their gas pumps forever. Don't believe it for a second. You can be free of them.

Sure, some aspects are challenging. So what? If you didn't want a challenge, you wouldn't have be reading this now. Pick up the challenge! Your alternative is the gas pump (and Oil Company) down the street.

So how do you eat an energy elephant? One small bite at a time.

- Take this slow and easy.
- Take it one step at a time.
- Take good notes of everything you do, and every change you make.

- Always look for local and/or inexpensive solutions first. They exist and they are all around you.
- Share this book, and your knowledge with others. Start a co-op.

Trial and error in your personal situation is needed, and almost guaranteed. There is no "one-size-fits-all" in algae biodiesel. The methods presented here are based on methods which have worked for me and others in the past, but the variables involved in this undertaking, are too many, and too complex to cover in a short report such as this for all people, everywhere. I've tried my best though.

You're dealing with different processes here. These processes involve living organisms. Anytime you introduce life into the equation, the capacity for variation increases dramatically. This is not a "static" process, like making biodiesel. (Mix A + B = biodiesel) It's a dynamic process, which means it changes all the time, in every situation, because introducing a life form into the process forces that change.

On the other hand, creating biodiesel from algal oil is much easier in other ways. The trick is getting enough of it. It's clean oil, not waste oil. Which means no filtering, no dewatering, no titrating, none of the hassles involved in using waste oil.

Some of the very best minds on the planet at Exxon-Mobil, at Chevron, even the US Department of Defense, are trying to work out viable method of mass producing oil from algae. They have billions of dollars to spend. They have unlimited resources. I have to admit, I don't belong in that class of individual, either financially, or intellectually.

This work is meant as an overview of the entire algae biodiesel process. It's not perfect. It scratches the surface of the subject, and is meant as a starting point, not an ending. You're literally going into the biodiesel wilderness where most fear to tread.

This work, however, is meant to get you started in the right direction. You will want, and need to branch out on your own from there as your personal situation dictates. All situations are different. I generally worked and made biodiesel in Southeast Asia. The problems encountered there are totally different than say, Portland Maine, USA, or Dundee, Scotland. Temperature, humidity, salinity, type of algal strain, and many other factors come into play.

Your aim in Making Algae Biodiesel at Home can and should be to create an abundant, never-ending energy source that can be made, and used economically, giving back into the life-cycle, as you take something away from it, in a complete, never-ending, biological circle. Nothing wasted, everything used.

Above all, don't get discouraged. It's important to be realistic about this project. Trial and error are inevitable, and truthfully, necessary.

One final note: This eBook is intended for home-biodieselers. Not a commercial enterprise. Yes, I have included a number of commercial and large scale applications in here, but that is to get your brain working and see what other people have done are doing, where the big money is going. These are ideas to enlarge your own algal oil production. This work is not intended as a way to set up your own algae biodiesel enterprise and retire as the next J. Paul Getty.

The energy mess we are in now is going to be solved, I think, in large part by back-yard tinker's, small-scale production and home-grown solutions. In short… you. Don't count on the government to help you. There are too many vested interests in the industrial-complex that profit by keeping you "energy-slaves." Their one and only passion is keeping you tied to the gas pump. Believe it.

I personally respect every single one of you, more than you know, for having the courage, and the forward thinking, to even envision this goal. Let alone take steps towards it. Most people can't even do that. You are already a minority, and heroes in my eyes.

Also keep me updated on your progress...I mean that. I like hearing from you. You guys, my steady customers, have been an inspiration to me. I can't thank you enough for your encouragement, and also for the kick in the butt when I needed it.
All the best, and the best of health and happiness to you and your family. Keep in touch with me.

David Sieg/Tram Nguyen
Ho Chi Minh City, Vietnam, 2005
Bangkok, Thailand, 2008
Des Moines, Iowa USA – 2011
dsieg@making-biodiesel-books.com

Why Use Algae to Produce Biofuels?

Algae have a number of advantages over other land based crops when considering the algae to biofuels equation.

- Much greater productivity than their terrestrial cousins
- Non-food resource
- Use otherwise non-productive land
- Can utilize saline water
- Can utilize waste CO2streams
- Can be used in conjunction with waste water treatment
- An algal biorefinery could produce oils, protein, and carbohydrates
- Algal cultivation can be 50x more productive than traditional crops
- Potential for culture in areas not used for crop production
    - Desert land
    - Ocean

Co-products

- Co-products from the algae, (omega-3 oils) depending on strain, can bring as much as $3,000/ton USD
- Animal and Fish Feeds are currently selling for $2000/ton USD

Cost Considerations

- Can use wild algae for ethanol production = free algae inputs
- Raceway ponds are economical to build.
- Supporting mechanical infrastructure costs can be offset with solar energy inputs.

Wild algae

- Have to be fast growers to survive in nature
- Generally contain <10% oil (lipid)
- Generally contain high carbohydrate >50%
- Can be grown in open raceways without fear of contamination

Using Raceway Ponds

- Raceways are low cost installations ($75 000/ha)
- Raceways consume very little power (10 kW/ha)
- Starch to ethanol conversion plant is relatively expensive and energy intensive (distillation)

High oil producing algae

- Are slower growers than wild algae – double every 2-3 days
- Can be selected for maximum oil content – 50% not unusual
- Heed to be grown in protected environment – typically PBR's
- Most algae oil can be used for biodiesel production

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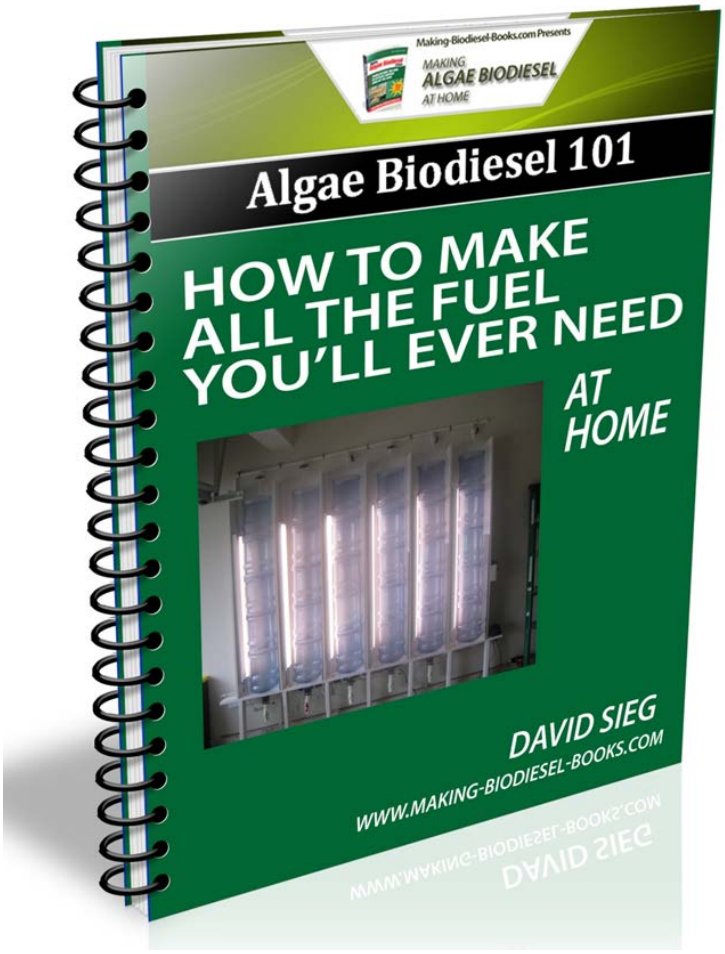
MAKING ALGAE BIODIESEL AT HOME

Algae Biodiesel 101



Lesson #2 …

8 best algae strains to start with and where to get them

By David Sieg and Information Specialists Corp.

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3 Bonus downloads!

- Lesson 2 in .pdf
- "Algae for Dummies"
- Botryococcus braunii Growing guide

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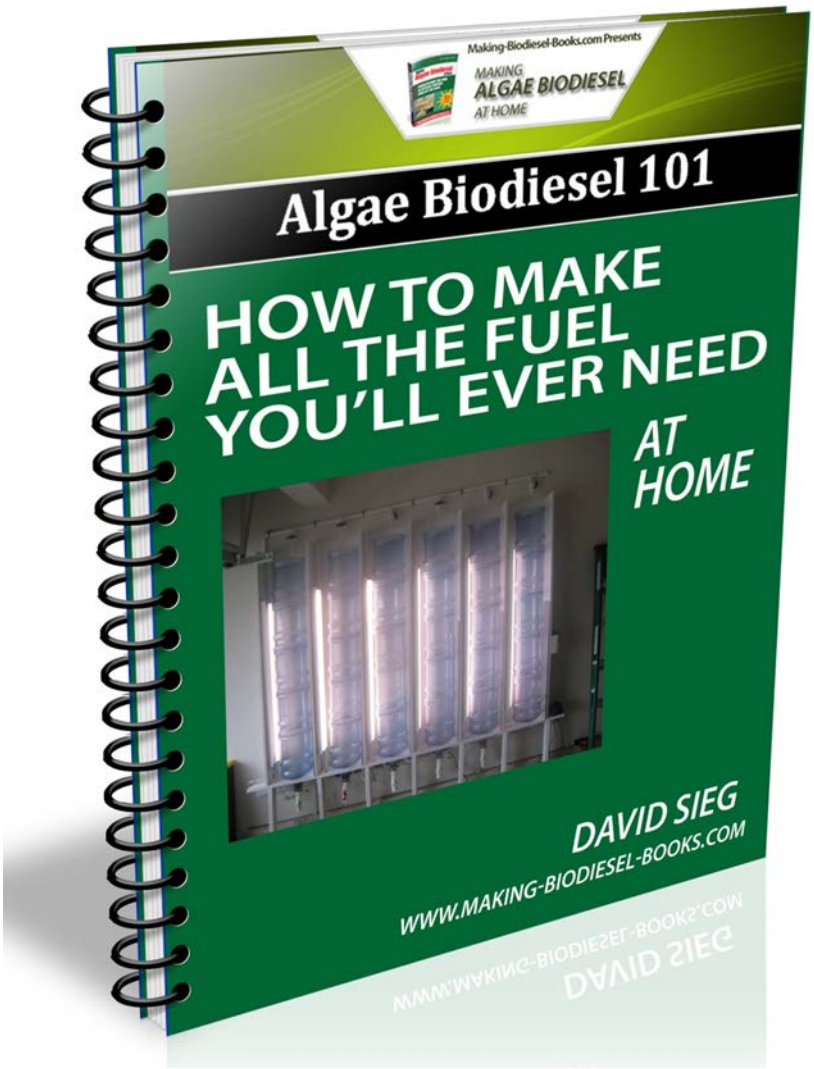
Algae Biodiesel 101



Lesson #3 …

Algae Growth Dynamics 101

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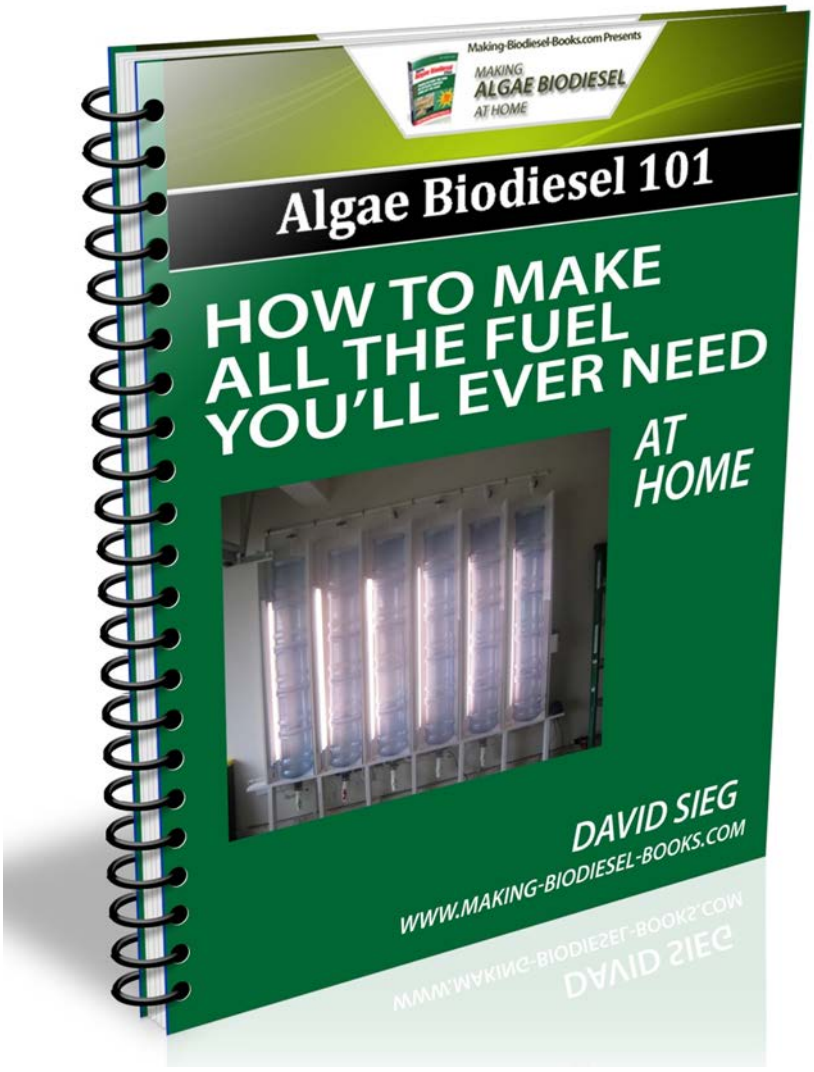
Contents

- **4 Bonus Downloads**
  - Lesson 3 in .pdf
  - Choosing the correct algae
  - CHLORELLA – THE MOST EXCITING NUTRITIONAL DISCOVERY ON PLANET EARTH
  - Making Algae Grow

Algae Biodiesel 101



Lesson #4 …

Building test bioreactors

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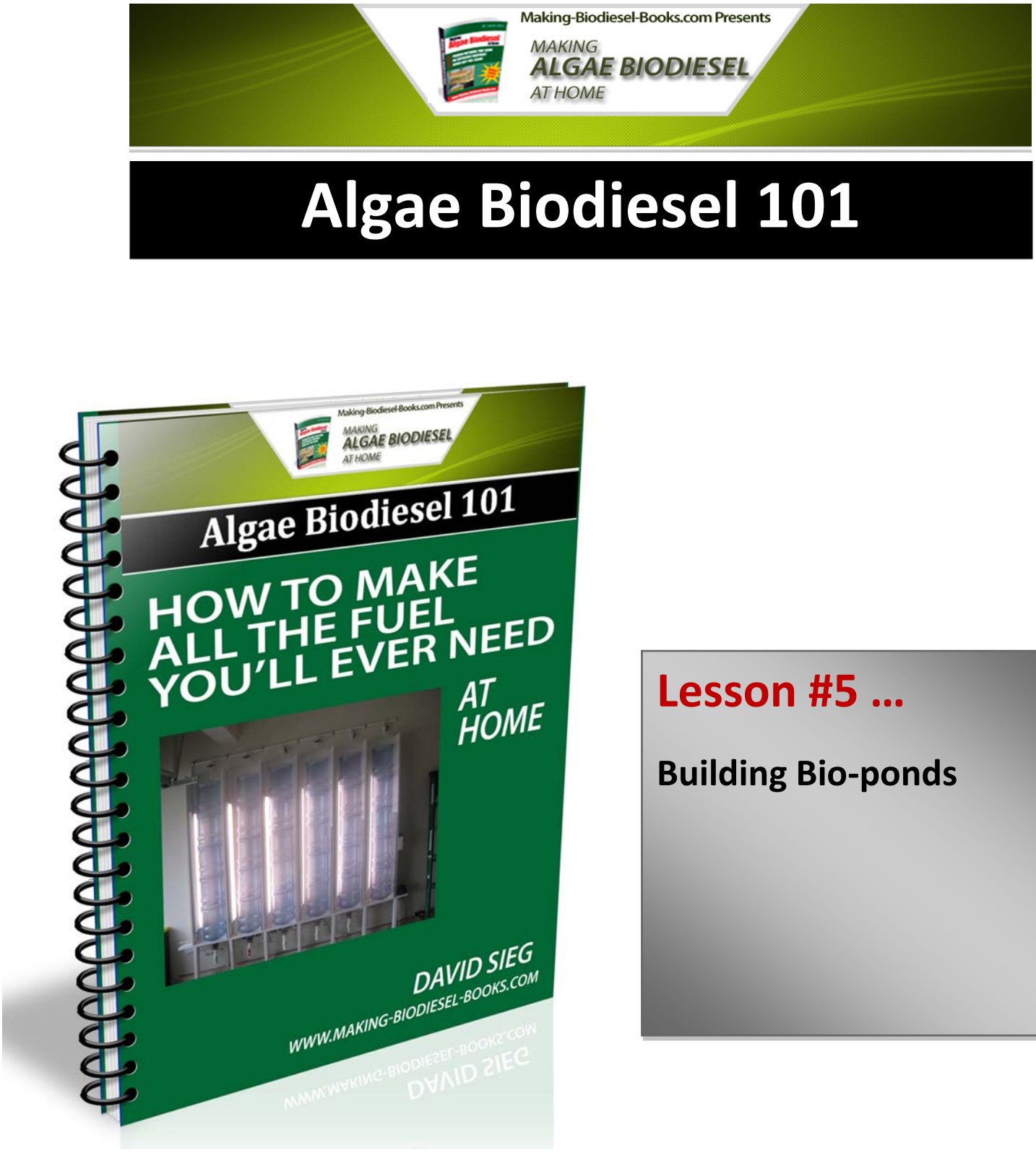
- **4 Bonus Downloads**
  - Lesson 4 in .pdf
  - PBR Shopping list
  - PBR parts list (detail)
  - PBR Resource list



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Lesson #5 …

Building Bio-ponds

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Contents

- **Bonus Downloads**
  - Lesson 5 in .pdf
  - Biopond shopping list
  - Biopond parts list

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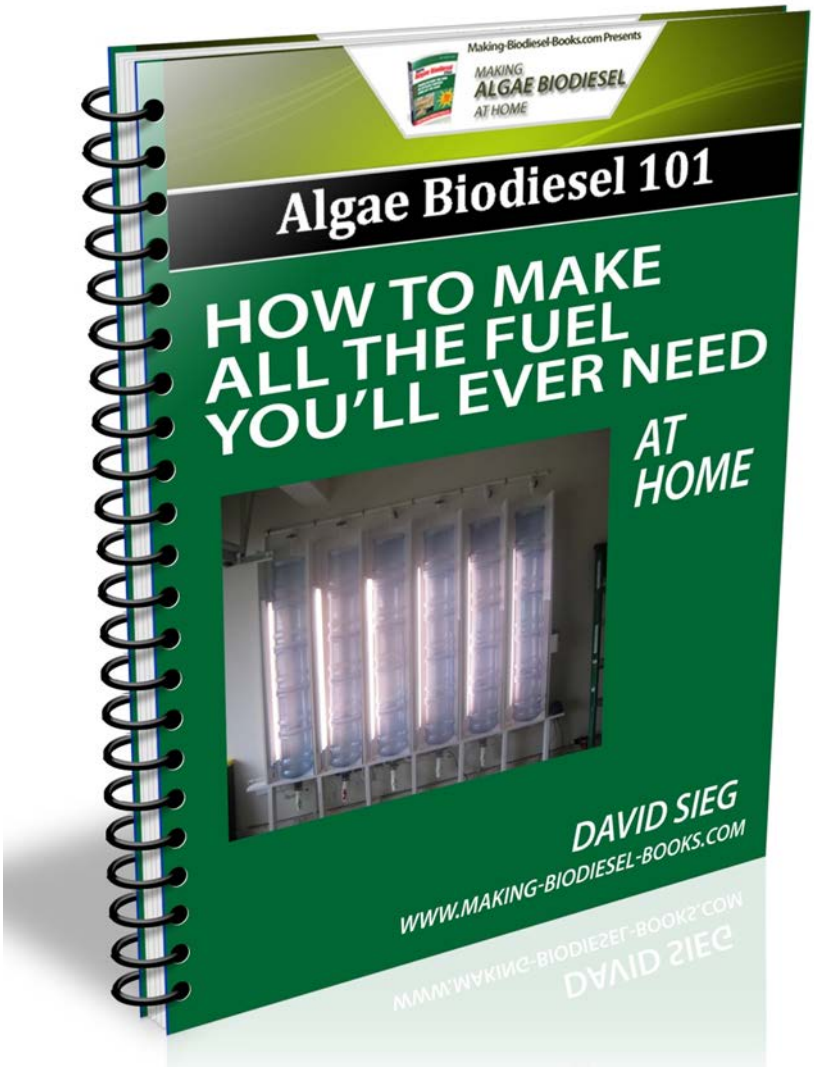

Lesson #6 …

Building a Backyard Raceway Pond

By David Sieg and Information Specialists Corp.

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- **Bonus Downloads**
  - Lesson 7 in .pdf
  - Garage PBR shopping list
  - Garage PBR Parts List
  - Garage PBR Resource List

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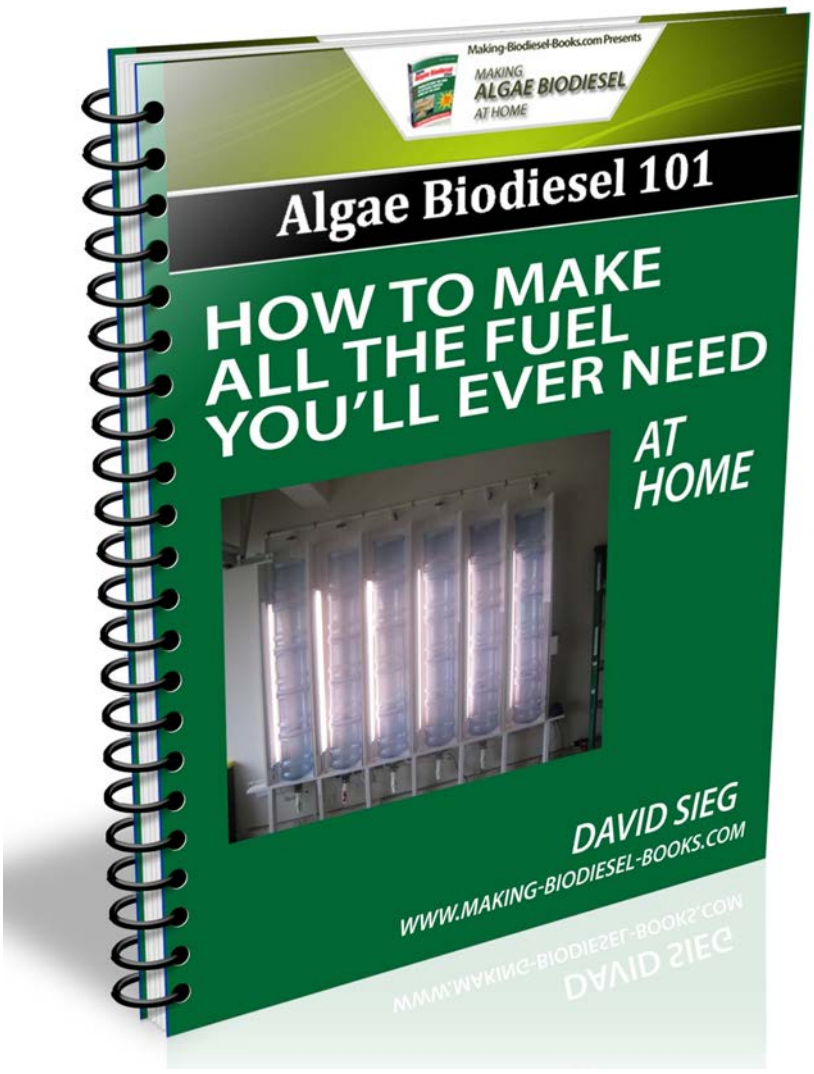

Lesson #7 …

Building a Garage Bioreactor

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Contents

- **Bonus Downloads**
  - Lesson 7 in .pdf
  - Garage PBR shopping list
  - Garage PBR Parts List
  - Garage PBR Resource List

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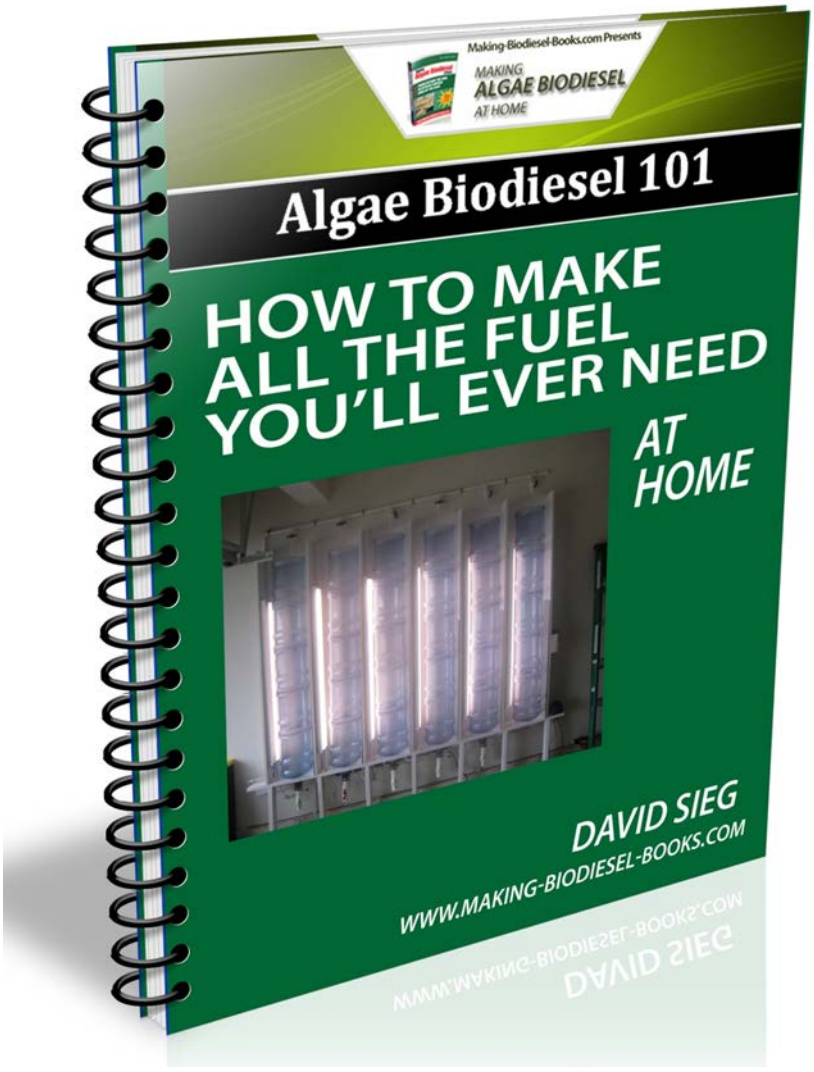

Lesson #8 …

Algae Harvesting

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- **Bonus Downloads**
  - Lesson 8 in .pdf
  - Algae Harvesting by Froth Floatation
  - Microalgae Harvesting and Processing

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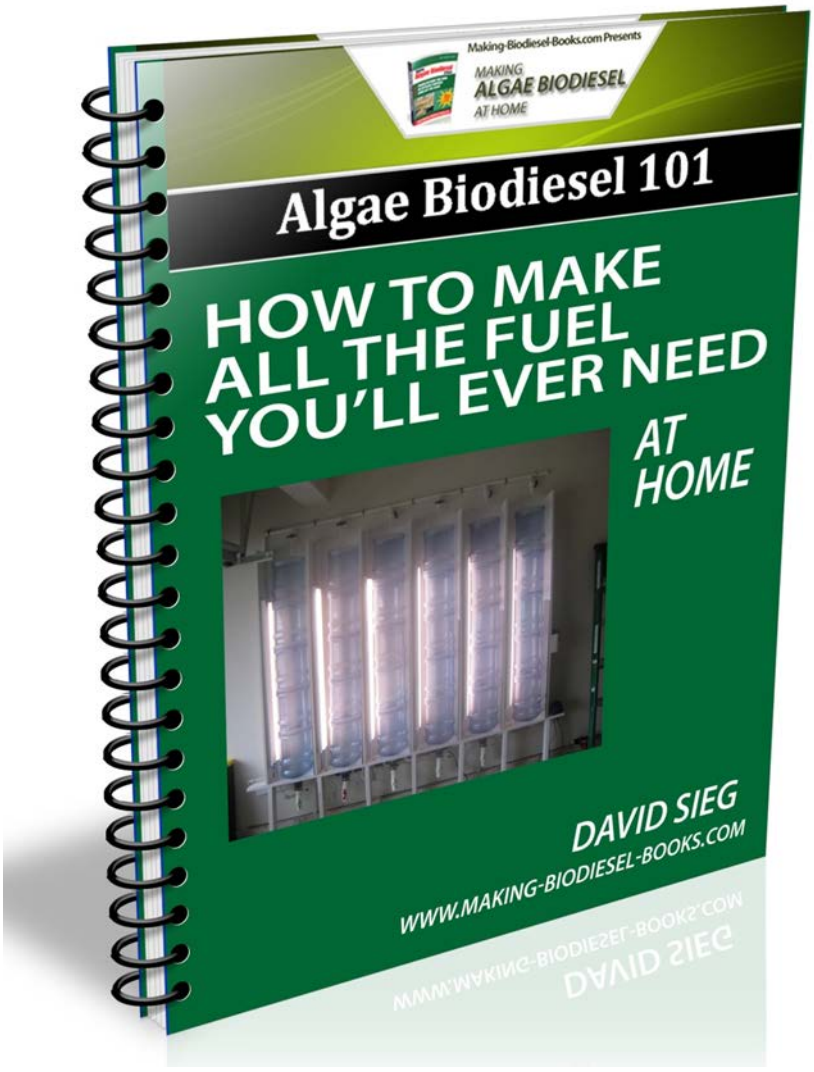
MAKING ALGAE BIODIESEL AT HOME

Algae Biodiesel 101



Lesson #9 …

Algae Oil extraction

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- **Bonus Downloads**
  -
    - Lesson 9 in .pdf
    - Oil Seed Pressing
    - Oil Press Plans

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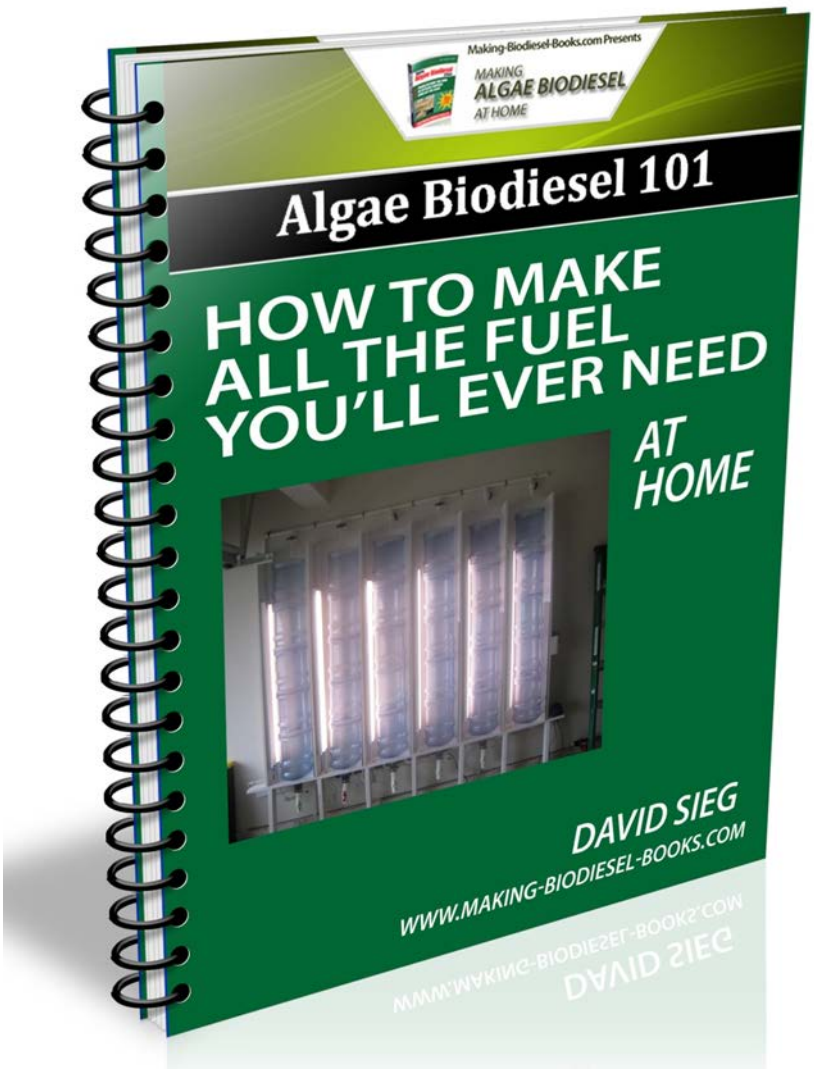

Lesson #10 …

Making Algae Biodiesel

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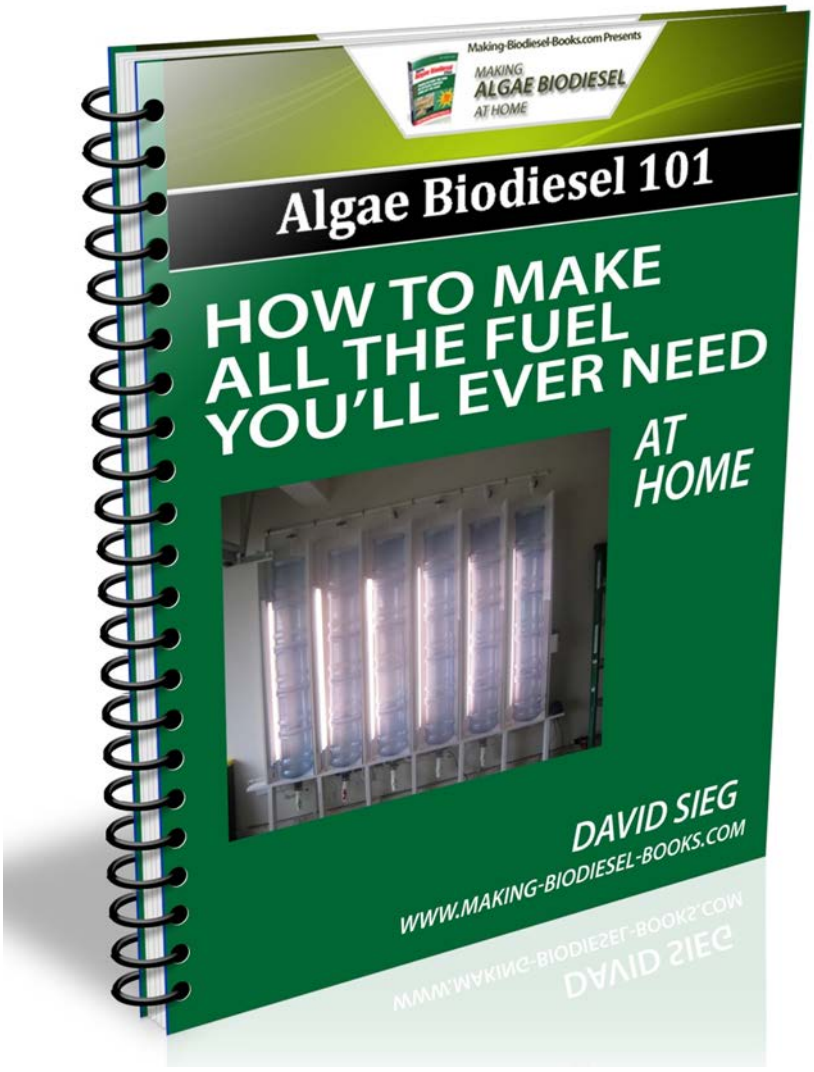
- **Bonus Downloads**
  - Lesson 10 in .pdf
  - 90 liter biodiesel processor Build Manual
  - Biodiesel at home manual
  - Biodiesel Handling and Use Guidelines

Algae Biodiesel 101



Lesson #11 …

Washing, Quality Testing, and Trouble Shooting Biodiesel

By David Sieg and Information Specialists Corp.

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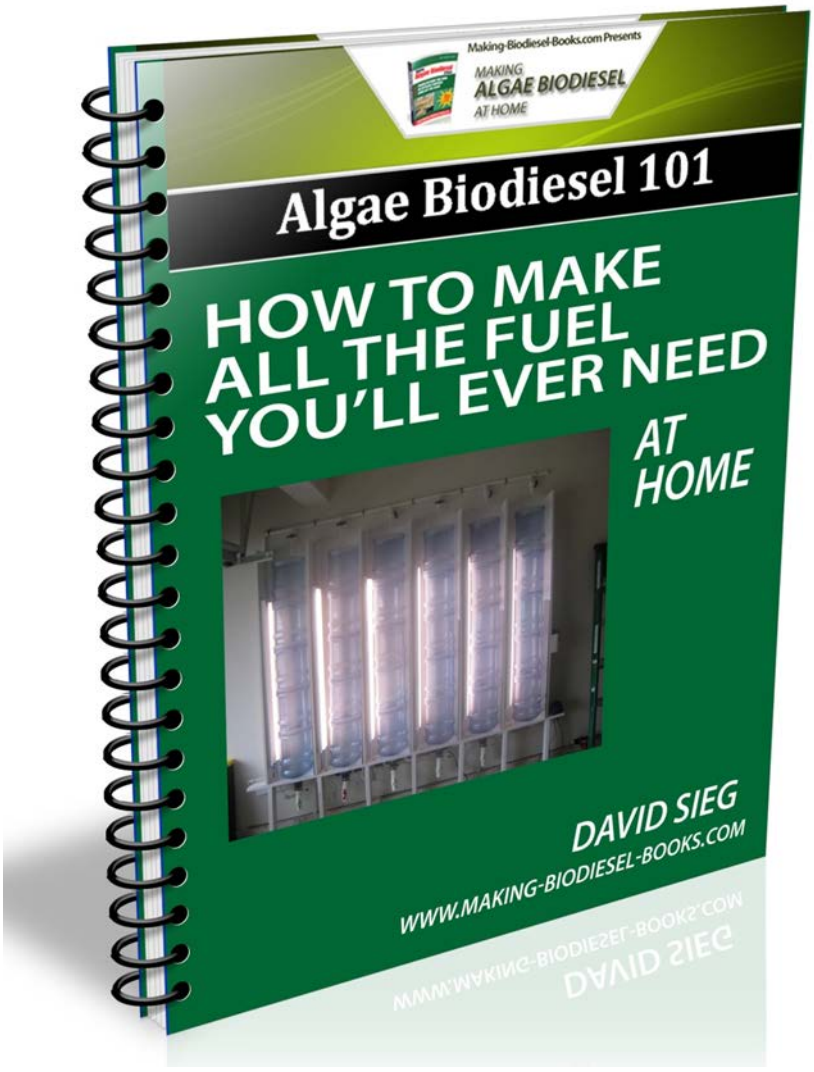
- **Bonus Downloads**
  - Lesson 11 in .pdf
  - NREL Quality Testing Biodiesel
  - Qualitative tests for biodiesel

Algae Biodiesel 101



Lesson #12 …

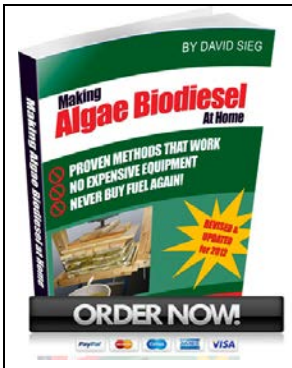
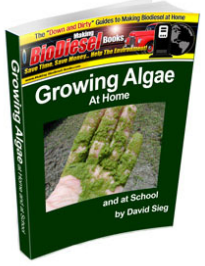
How to Make Bio Gasoline (Ethanol)

By David Sieg and Information Specialists Corp.

Contents

- **Bonus Downloads**
  -
    - Lesson 12 in .pdf
    - ATF Forms
    - Step by Step Ethanol" A quick guide on producing ethanol
    - Building a Home Alcohol Still

Other Books in This Series

	• How to cultivate algae • Create our own algal lab for pennies • Open pond designs • Build an algae green house • Build your algae bio reactor for $215 • Algae harvesting techniques • Oil extraction techniques • Making Bio diesel from algae oil
	• **Written for the layman**, Different, **inexpensive methods** of building open ponds • **Extensive details** • **Numerous examples**. • **Low-cost** open ponds at **home**. • **Build commercial open ponds** • Places to buy materials and parts, • **Extensive knowledge on commercial open ponds** • Details for alternative algae products.
	• **A simple algal bio reactor that cost less than $35**, • **A test bio reactor** that allows you to test 10 different strains, or 10 different variables at once. • **The "Bio reactor Diary"** Step-by-step instructions on how to get your PBR up and going. • **How to build tubular Photobioreactors less than $150!** • **How to DOUBLE THE CAPACITY** of a tubular bio • **How to build a "Fence" type bio reactor ess than $200.** • **How to build a 80 gallon home** • **How to build a 150 gallon bio reactor**
	• How to cultivate algae ***the RIGHT WAY.*** • **Different types of cultures** • **Preparing your algal lab to grow cultures.** • **The different variables necessary, and how to use them correctly.** • **How to create the optimal conditions for growing algae** • **Setting your experiments the RIGHT WAY** • **Estimating the growth of algae.** • **Growth Dynamics of algae** • **Where to buy algal strains inexpensively.**

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