

WARMHEART FAMILY HOMES

Biochar and Cold Stores

Help poor farmers help themselves

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Introduction

- **My name is Michael Shafer**
 - I am from the Warm Heart Foundation that many of you will visit after the conference.
 - I am here with Prachan (or P'Dang) Jakeo, Warm Heart Chief of Staff, and Kwanpirom (P'Aom) Suksri, Field Manager of the Warm Heart Biochar Program
 - If you are interested in anything I have to say today, you will find DIY videos, training materials and articles at www.warmheartworldwide.org/environment
- **Today I want to talk about two things that seem entirely unrelated**
 - Biochar and local cold stores
- **I am going to argue that they are perfect together as ways to help poor, rural farmers help themselves.**

The why

- **Why do we do what we do – all of us?**
- **We want to help poor farmers achieve *sustainable improvements in their quality of life***
- **Sustainability as traditionally defined in terms of:**
 - **Climate**
 - **Environment**
 - **Health**
 - **Wealth**
- **And also sustainability defined as:**
 - **Self-help, DIY, better yourself sustainability**
 - **Profitable sustainability**

The problems are many

- **Acrisol soils (acid, hard, neither absorb nor retain water, and low in nutrients and microbiota)**
- **High particulate levels (PM2.5), high rates of IM and premature death among elders, heart attacks, respiratory disease, stroke**
- **Pesticide residues**
- **Rising temperatures**
- **Declining productivity**
- **Drought, floods, storms**
- **Lack of Investment**
- **Lack of Infrastructure**
- **Poor market access**
- **Low value crops**
- **Cash requirements leading to reduction food production**
- **Bad nutrition**

Put differently, what do we have today?

- **Many small farmers grow low value animal feed corn**
 - On burned forest
 - Land extensive methods
 - Soil destructive
- **They are trapped in poverty**
 - Here 40% of the population works in agriculture, much in crops such as corn
 - Lower 3 quintiles of population (60%), average/capita income \$5.50/day
- **Labor productivity growth is minute even if the big operations are included, it is perhaps even negative**
 - Current contribution to Thai economy low
 - Potential contribution huge

The punchline right up front

- I am going to talk about
- Dry season, self-help biochar made at *0 cost* and *near 0 opportunity cost* from *crop waste* that will
 - Cool the climate
 - Clean the environment
 - Improve public health
 - Reduce rural poverty
- DIY cold stores made with *very low cost Styrofoam bricks* that will
 - Clean the environment
 - Encourage diversification out of corn
 - Permit diversification into delicate, value-added fruits and vegetables

A large pile of dark, porous biochar pellets is the central focus of the image. The pellets are irregular in shape and have a highly textured, porous appearance. They are piled on a light-colored surface, possibly a tarp or concrete. In the background, there are several large, rusted metal barrels or drums, some of which are partially obscured by the pile of biochar. The ground is dirt and there are some dry plant stalks scattered around. The overall scene suggests an outdoor industrial or agricultural setting where biochar is being produced or stored.

Biochar

What is biochar?

- **Fancy charcoal – pure carbon**
 - **Made at high temperature**
 - **Very fast**
 - **Very little oxygen**
 - **No smoke, no ammonia, methane, NOx, SOx, PM2.5**



How can farmers make biochar?

- Top Lit Up Draft (TLUD) – like those in the background

- Trough



- Trench



What are the benefits of *making* biochar?

- All biochar is good; crop waste biochar is best
- All biochar is
 - Carbon neutral in CO₂ emissions
 - Carbon negative overall (40% of plants' carbon retained as inert)
 - Used as soil amendment sequester 3.6 units of CO₂ per unit of biochar
 - Averts production of black carbon
 - Averts production of CO₂e (CH₄ and NO_x)
 - Averts production of smog precursor NO_x
 - Averts production of PM_{2.5} (haze/smoke)
- Crop waste biochar preserves forests, habitats, biodiversity and watersheds

How can farmers *use* biochar?

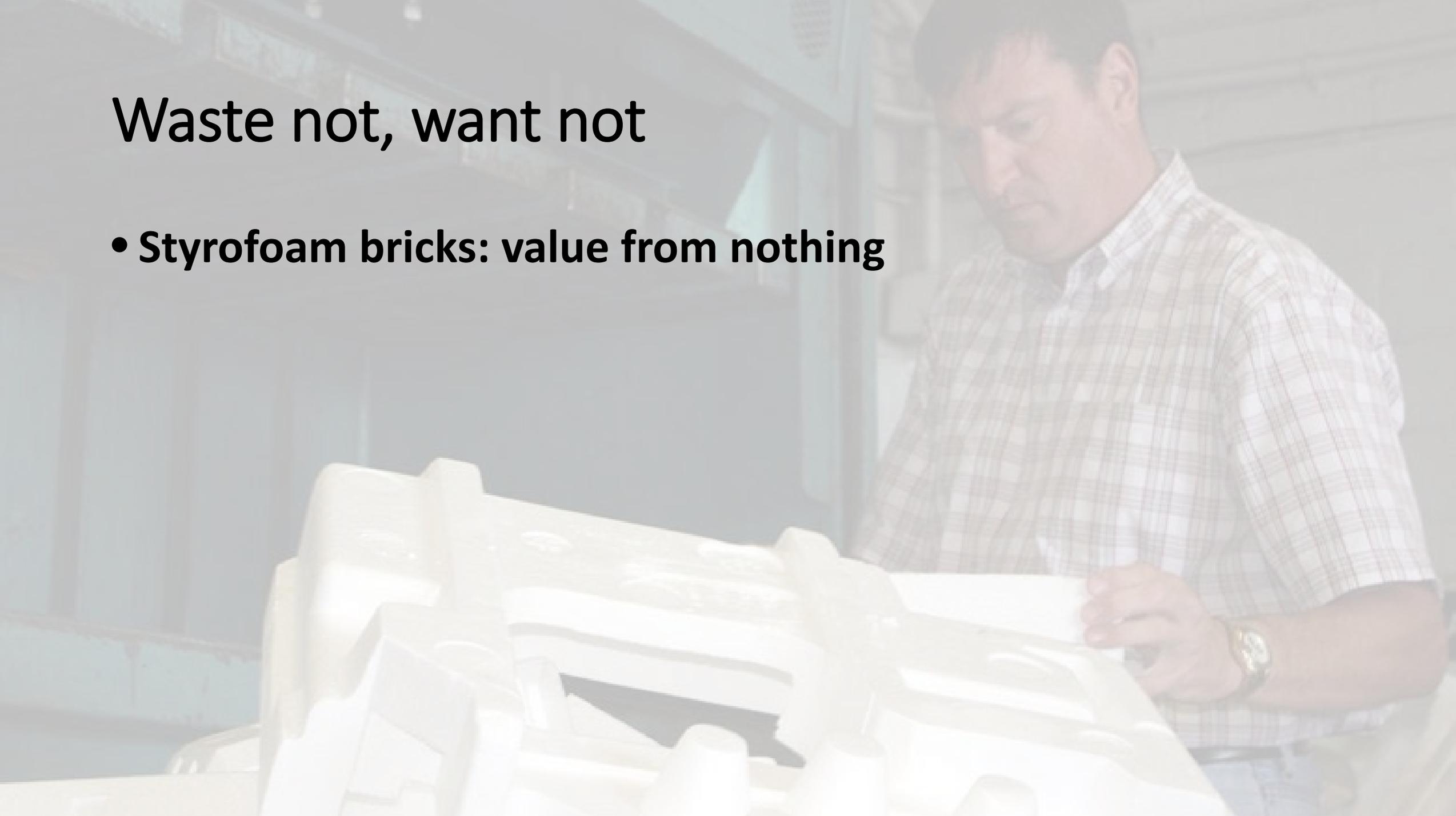
- **In their soil**
 - Raises pH
 - Increases porosity and water retention
 - Spurs soil life
 - Improves soil fertility and crop yields
 - Restores damaged soil
- **With their animals**
 - Reduces intestinal sickness
 - Improves weight gain
- **In their homes**
 - Does not smoke, saves lives



Local cold stores

Waste not, want not

- **Styrofoam bricks: value from nothing**



The virtues of foam bricks

- Foam cement is:
 - Light
 - Fire resistant
 - Cheap
 - Easy to make
- Foam cement provides
 - Great thermal insulation
 - Great sound insulation
- Foam cement
 - Removes Styrofoam from the environment and locks it up
 - Saves waste disposal costs and landfill space
 - Prevents burning and toxic smoke



Let me tell you a story

THE GRAPE LADY

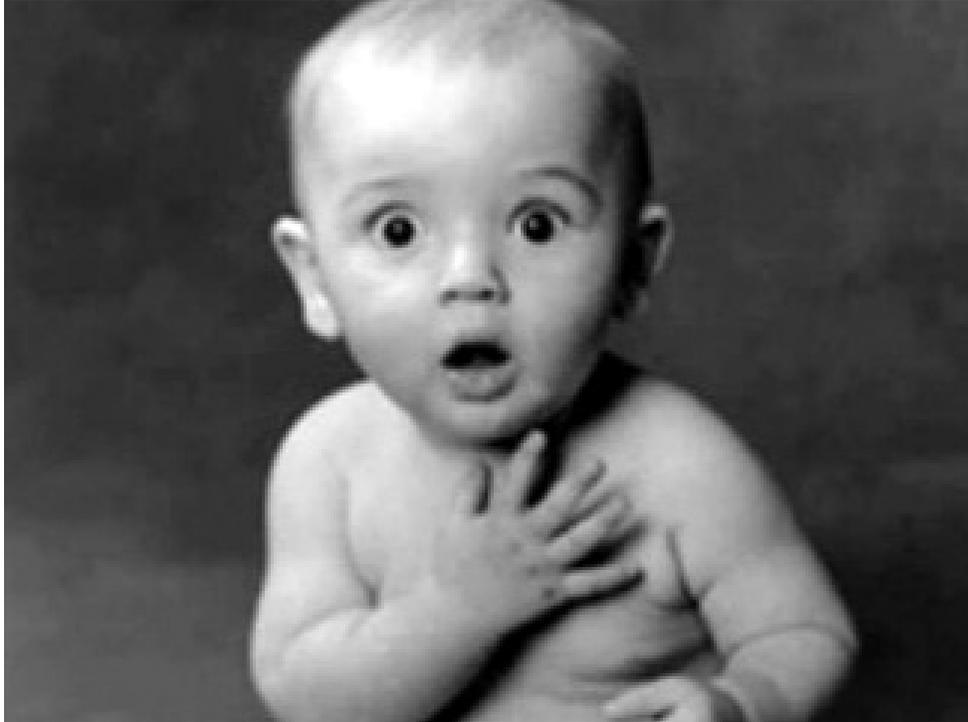
- AM: beautiful grapes
- PM: sorry grapes
- Why?
- No market infrastructure
 - No bulking
 - No cold store
 - No refrigerated transport



What would help?

- Imagine this woman picking her grapes in the cool of the early morning
 - And loading them into a chilled mini-transporter right in her field
- Imagine her transferring her grapes from the mini-transporter directly into a village cold store where
 - They could be bulked with other crops for immediate, cold shipment to market or
 - They could be stored cold and fresh until the time was right.

How I would I do it



- Styrofoam cement + CoolBot (<https://www.storeitcold.com/>)
- Foam cement insulated box on back of pickup or in a garden cart
- Foam cement insulated village bulking/cold store
- Insulated, chilled panel truck for market runs
- Accompanying business model to ensure sustainability

What does it take to build a village cold store?

- Waste Styrofoam
- A way to grind it
- Cement
- A Warm Heart brick making machine
- A room air conditioner + a CoolBot
- Cost: about THB35,000 with new 12,000 BTU air conditioner

- <https://www.storeitcold.com/>



What are the benefits of a village cold store?

- **Farmers can escape from land-extensive, forest eating, low-value, animal feed crops such as corn**
- **Farmers can focus on land-intensive, high-value crops for both home consumption and the market**
- **Farmers can manage market interactions because they can**
 - **Pick only fruit and produce that are completely ripe**
 - **Combine with others to send only full loads to market, reducing shipping costs and**
 - **Hold fruit and produce off the market until better prices prevail**

Is there a market?

- **Not right now because there is no supply.**
- **Who might be the market?**
 - **Anyone who values fresh, high quality fruits and vegetables provided reliably at a good price**
 - **Hotels**
 - **Good restaurants**
 - **High end markets**
 - **Discerning civilians**

Together, what can small-scale biochar and cold stores do for poor farmers and states?

- **Get them out of land extensive crops into land intensive crops**
- **Reduce pressure to burn forest, support forest regrowth and watershed improvement**
- **Restore soil and lower fertilizer input costs**
- **Lower production of low value crops, up production of high value crops**
- **Raise farmer income and start a grassroots economic stimulus**
- **Reduce production of animal feed, increase production of food for humans**
- **Improve farmer nutrition**
- **Reduce burning, better public health and lower healthcare costs**
- **Increase the national food supply and export potential**

Scale what you know

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