

## Warm Heart JRO

### 200 l (55 gallon) Natural Draft TLUD Biochar Production Oven

The Warm Heart JRO is a simple, sturdy, low-tech, low-cost biochar production oven that is easy to make from readily available materials using basic hand tools. It is an ideal basic charring oven for learners and accommodates a wide range of feed stocks. The Warm Heart JRO works most efficiently with relatively chunky feed stocks such as corn cobs, coconut and other nut shells, short small diameter wood or very large wood chips. It will make excellent biochar from more awkward feed stocks such as bamboo and branches, but they are much more time consuming to load or load less compactly. (For such feed stocks and others including, for example, corn stalks and tree prunings, we suggest the Warm Heart Trough Ovens.)

Low density feed stocks such as straw produce very low yields and high density feed stocks such as rice husk and dried coffee cherry tend not to char without forced draft. (For low density feed stocks such as straw, leaves, potato and peanut hay, we also suggest the larger Warm Heart Trough Oven.)

Warm Heart is happy to provide drawings for the Warm Heart JRO, and instructional brochure and instructional video for how to make one upon request. [info@warmheartonline.org](mailto:info@warmheartonline.org). Both video and brochure can be downloaded in English or Thai from <http://warmheartworldwide.org/education-seminars-and-training-materials/>

If you would like to purchase a pre-assembled Warm Heart JRO, the cost is 1,500 THB without shipping (red truck). To order, please contact Aom at 094-624-0901 or [info@warmheartonline.org](mailto:info@warmheartonline.org).



Cost	1,500 THB	CO <sub>2</sub> sequestration	At molecular weight, 36 kg
Construction time	2-3 hours	GHG emissions	No measurable NO <sub>x</sub> , SO <sub>x</sub> or CH <sub>4</sub>
Skill level required	Modest	Particulate emissions	
Unit volume	200 l (55 gal)	PM10	Not measurable
Typical efficiency	25-30%	PM2.5	Not measurable
Example load/yield			
Corn cob	40 kg		
Biochar	12		

## Warm Heart 200 L. Trough Oven



The Warm Heart Trough Oven (TO) is a light, easily transported, flame cap trough that is inexpensive, easy to build and inherently tough. It is ideal for charring household quantities of awkward feed stocks such as corn stalks and tree branches. (For serious quantities, use the Warm Heart 2,000 L. Trough Oven (2 & 20 M<sup>3</sup>). With all the recommended feed stocks the TO eliminates smoke and particulate emissions. Lower density feed stocks such as corn stalks produce relatively low biochar yields, but prunings, for example, produce high yields of excellent char. Like all flame cap units, the TO takes some experience to master, but once mastered will pyrolyze a great deal of feed stock very fast. With practice, the Warm Heart Trough series also handle low density feed stocks such as straws, and work well with chunky feed stocks such as coconut husk and corn cob. (For feed stocks such as a cob, however, we recommend the Warm Heart JRo for its ease of use. For large quantities – several tons – of feed stock, a team of two can manage 6 to 8 burns/day with 7 or 8 JRos ganged together.)

Warm Heart is happy to provide drawings for the Warm Heart 200 L. TO on request. An instructional brochure and video for how to make one will be available soon. Request yours at

[info@warmheartonline.org](mailto:info@warmheartonline.org) or download from <http://warmheartworldwide.org/education-seminars-and-training-materials/>

If you would like to purchase a pre-assembled Warm Heart TO, please contact Aom at 094-624-0901 or email her at [info@warmheartonline.org](mailto:info@warmheartonline.org).

Cost	4,500 THB
Construction time	1 day
Skill level required	Modest
Unit volume	200 l.
Typical efficiency	20%

Used correctly, the TO series does not smoke (release particulates). We do not have lab data regarding GHG emissions.



## Warm Heart 500 L. Trough Oven



The Warm Heart 500 L. Trough Oven (TO) is designed specifically for use in steep mountain fields. It is a light, easily transported, flame cap trough that is inexpensive, easy to build and inherently tough. It is sized to permit a cutting team to pull in down a sloping field to arrive at the bottom with a full load of ready biochar. It is ideal for charring corn stalks, but works well with dry rice straw, soy and potato hay, and orchard tree prunings. With all the recommended feed stocks the TO eliminates smoke and particulate emissions. Lower density feed stocks such as corn stalks produce relatively low biochar yields, but prunings, for example, produce high yields of excellent char. Like all flame cap units, the TO takes some experience to master, but once mastered will pyrolyze a great deal of feed stock very fast. (Our experiments suggest that a hired team of four can cut and pyrolyze the corn stalk to produce one tonne of biochar in 4.5 days. More motivated workers can certainly do better.) The TO 500 L. also works well with chunky feed stocks such as corn cob that is often available in huge quantities in mountain villages. (For feed stocks such a cob, however, we recommend the Warm Heart JRo for its ease of use. For large quantities – several tons, a team of two can manage 6 to 8 burns/day with 7 or 8 JRos ganged together.)

Warm Heart is happy to provide drawings for the Warm Heart TO 500 L. on request. An instructional brochure and video for how to make one will be available soon. Request yours at

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If you would like to purchase a pre-assembled Warm Heart TO, please contact Aom at 094-624-0901 or email her at [info@warmheartonline.org](mailto:info@warmheartonline.org).

Used correctly, the TO series does not smoke (release particulates). We do not have lab data regarding GHG emissions.

Cost	6,000 THB
Construction time	1 day
Skill level required	Modest
Unit volume	200 l.
Typical efficiency	20%

## Warm Heart 2,000 L. Trough Oven



The Warm Heart TO 2 K is a sturdy, inexpensive flame cap trough of 2 m<sup>3</sup> capacity that is built tough to be towed around fields, flat or steep, and orchards. It is ideal for charring large volumes of awkward feed stocks – entire fields of corn stalk or orchards piled with drying prunings. Hook one – or two or five – behind your pick up or tractor and off you go. The only issue will be how fast your team can drag stuff to the TO. Once one is filled to the top with char, quench it, unhitch it, and push on. It takes some experience to master the TO 2 K, but once mastered, you can produce an amazing amount of char in no time – no smoke and great quality. But, buyer beware, this is very hot work!

For example, a family team of four working a low density corn field can cut five tons of stalk and produce one ton of char in four days using three 2Ks. At local wages and biochar prices, this pays 2.5 times the going local rate for men.

With practice, the Warm Heart T series also handle low density feed stocks such as straws, and work well with chunky feed stocks such as coconut husk and corn cob. (For feed stocks such a cob, however, we recommend the Warm Heart JRo for its ease of use. For large quantities – several tons – of feed stock, a team of two can manage 6 to 8 burns/day with 7 or 8 JRos ganged together.)

Warm Heart is happy to provide drawings for the Warm Heart TO 2 K. on request. An instructional brochure and video for how to make one will be available soon. Request yours at [info@warmheartonline.org](mailto:info@warmheartonline.org) or download from <http://warmheartworldwide.org/education-seminars-and-training-materials/>

If you would like to purchase a pre-assembled Warm Heart TO, please contact Aom at 094-624-0901 or email her at [info@warmheartonline.org](mailto:info@warmheartonline.org).

Used correctly, the TO series does not smoke (release particulates). We do not have lab data regarding GHG emissions.

Cost	7,500 THB
Construction time	2 days
Skill level required	Modest
Unit volume	2 m <sup>3</sup>
Typical efficiency	20%