Cooking Stove Model for Developing Nations

Assumptions:

1) The LuciaStove is designed for mass production of up to 1,000,000 stoves per year (can be more but let's stick to this number for now)
2) Limited use, cooking only, for a standard household produces 300g char per day
3) 80% of biochar is carbon
4) Pyrolytic stoves use fuel which is normally considered waste, thus decreasing the need for trees and allowing the carbon that is already sequestered in forest to stay.
5) There are 1.6 billion – 2.5 billion open fires used for cooking that could be replaced with pyrolytic stoves.
6) We have standing requests for 40,000 to 50,000 stoves per year now and so could assume to meet our goal of 1,000,000 stoves per year by 2020
7) Our stoves are designed to have a long life 10 years so each stove can sequester carbon for a decade.
8) 5kg wood =2.5 kg Carbon

If in 2020 we were to deliver 1,000,000 stoves

300g = 0.3kg char per stove per household per day, times 365 days /year = 109.5 kg or 0.1905 tonnes per stove per year.

0.1905 t/y of biochar time 0.8 (percentage of carbon in biochar) = 0.0876 t/y of carbon times 2.86 (C=12, O=16) = 0.250526 tonnes of CO2 measurably sequestered per stove per year.

0.250526 times 1,000,000 = 250,536 tonnes CO2 measurably sequestered per year for WS stove programs. I'm a little rusty on integrals but assuming (for the sake of simplicity) linear growth from now to 2020 the actual total WS sequestration would be 5,200,000 total stoves distributed times 0.250526 t/y/s = 1,302,735.2 tonnes of C02 measurably sequestered per year with only WS programs.

I have several times stated "measurably sequestered" because fully pyrolytic stoves use biomass too small to be used normally, thereby eliminating the need to harvest living trees. Since we can assume an open fire uses 5kg of wood per day (http://www.hedon.info/docs/BP49-6-Stanley.pdf) this would mean an additional reduction of

2.5 x 5200000 = 13,000,000 kg C per day / 1000 = 13,000 tonnes C/d x 365 = 4,745,000 tonnes C/year x 2.86 = 38,812,202 tonnes CO2 per year in tree savings

For **a total of 40,114,937.2 tonnes of CO2 per year just for cookstoves** by 2020 and that translates to a great deal of finances for the nations that most need support.

2. Assuming $20 per stove (in reality in developing nations LuciaStoves can cost as little as $12 but let's keep the math simple) (5,200,000 stoves x $20) / 40,114,937 tonnes C02 = $2.59 per tonne of CO2 sequestered

3. **What if trees were planted with the biochar and the biochar used to reduce seedling dieout rates** as we do in step five of our five step program? Trees are currently used in many carbon offset mechanisms, by applying biochar to seedling root masses the seedling will require fewer nutrients and less water thereby increasing seedling survival rates and entitling developing nations to restored and healthier forests and more carbon earning options.

As a final thought if stoves were used for heating (see attached photo of the Stove called the LuciaGrrr we have developed for our programs in Mongolia and Afghanistan), or this link (http://www.youtube.com/watch?v=GMB5NVzyJZw) of a heater we are working on for developed nations, the char produced would be not 300g per day but 12 kg per day during heating seasons and that starts to add up when you consider the absorptive properties of char and the fact that the Gobi is expanding by 1300 square km per year.

Not counting this last consideration since WorldStove pledges ALL of the carbon credits earned from the stoves produced at the local Stove Hubs in developing nations to the Stove Hubs themselves, assuming a very low value for carbon credits of $12.5, subtracting the cost to sequester the tonne of CO2 using stoves of $2.5 this would mean a small company like WorldStove would generate $**401,149,372 per year exclusively for participating developing nations.**