Declaration of Clean Cooking with Woodgas: Woodgas is a Clean Fuel

(Latest version at woodgas.com/declaration) (v. 2017-10-19) (for Pre-Forum comments)

Whereas over three billion people (40% of the world's population), living in 500 million low-income households, are still cooking their meals with solid fuels (including renewable wood, wood derivatives, agro-refuse, pellets, dung, charcoal, and non-renewable coal) on stoves that are inadequate for truly clean combustion and yield harmful, unhealthy emissions (particulate matter (PM), black carbon, and carbon monoxide (CO) in smoke) that result from incomplete combustion;

Whereas the other 60% of the world's households enjoy better health in part because they use fossil-based, industrially-produced fuels (that is, refined, "intermediary" fuels made from crude oil and gas) that are gases and liquids (liquid petroleum gas (LPG) and piped natural gas (PNG)), plus electricity that is intermediary energy derived at considerable cost from hydro, fossil, solar and nuclear facilities, these being the carefully standardized and regulated so-called "clean fuels" that are only clean when used in their highly specific, industrially-produced burners and stoves, and which were not necessarily created cleanly;

Whereas many solid fuels also can be converted into "intermediary combustion products" that are liquids or gases with clean combustion in appropriate household cooking stoves, most notably 1) liquid alcohol (by fermentation and distillation), 2) biogas (by anaerobic bio-digestion), and 3) woodgas (by pyrolysis), and these can be called "clean fuels" when appropriately combusted;

Whereas these three additional clean fuels that are derived from solid biomass have been carefully evaluated by the Global Alliance for Clean Cookstoves (GACC) and by the World Bank's Energy Sector Management Assistance Program (ESMAP) and have been judged as being sufficiently advanced regarding low emissions to be in the category of "clean cooking solutions" (see ESMAP technical report 007/2015), as faithfully displayed in a "Classification of Stove Technologies and Fuels" (attached and at woodgas.com/resources);

Whereas, of all intermediary clean-burning liquid and gaseous fuels, only woodgas is created within its own specialized device (a micro-gasifier) for immediate use by way of consistent, air-controlled pyrolysis of solid renewable fuel (with charcoal co-product) in small amounts appropriate for residential cooking, with the processes being so subtle that uninformed observers often fail to realize that it is the intermediary woodgas (and not the parent solid biomass fuel) that is cleanly combusted for the cooking tasks;

Whereas scientifically-designed, comparatively-inexpensive micro-gasifier woodgas-burning stoves with either natural draft (ND) or forced air (FA or fan-assisted) air control can use appropriately-selected, locally-available, renewable biomass fuels in quantities as low as half of the fuel usage of traditional solid-fuel cookstoves currently in use by impoverished people;

Whereas the environmental and economic prospects of LPG, PNG and electricity to reach more than 300 million of the needy households by 2030 are at best limited, even as population growth will add 10's of millions of impoverished households per year in developing societies;

Whereas at least 200 million of the neediest households must continue to rely on their traditional biomass solid fuels, and additional hundreds of millions of needy households will be waiting for decades for "promised" LPG, PNG and electricity while continuing to use biomass fuels that could be cleanly burned with economical, proven (and improving) woodgas-producing stove technologies available today;

Whereas the failure to facilitate access to clean-burning woodgas stoves to needy people could be viewed as economic and social discrimination against the world's poorest people, especially where and while there is continuing major financial support to provide other fuels to convert the most accessible of poor households to become consumers of commercially-sold, higher-cost fuels that cannot be produced locally; and

Whereas national governments, international agencies, and concerned people and businesses do clearly advocate the Sustainable Development Goals (SDGs) that include improving the health and living conditions of these less fortunate people, including the provision of clean cooking as a fundamental necessity as part of household energy; now, therefore be it

DECLARED by conscientious entities and individuals who advocate clean cooking solutions that:

1. there are no "clean fuels" *per se*, but they can be "clean" (by definitions that are subject to discussion) only when properly combusted in appropriate, specialized combustion devices (burners and stoves), and fuels by themselves are neither clean nor dirty;

2. woodgas is a clean fuel when appropriate micro-gasifiers with designated solid fuels are used by adequately-experienced cookstove users;

3. woodgas has the potential to reach hundreds of millions of households to provide cleaner cooking while using smaller quantities of their current, locally-available fuel supplies, and all with sustainable financing, reduced expenditures, and even potential net profit;

4. leaders, authorities and all parties interested in clean cookstoves should recognize in words, writings, actions and financial support that solid biomass can become a very clean-burning fuel for cooking in woodgas stoves for millions of households; and

5. the expression "Woodgas is a Clean Fuel" is more than a motto, and it should be a guiding principle for prompt actions to assist at least one billion of the most underserved people on Earth, this being a most worthy goal that also has realistic prospects for being accomplished with honorable expedience. [End]

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Acceptance and endorsement is
by signature, by advocacy, and by actions

Classification of Stove Technologies and Fuels: 1-page version

[This and the full 4-page version 1.0 (2017-04-10) are available at woodgas.com/resources and drtlud.com/resources]

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The classification table below enhances the important "Overview of Improved and Clean Cooking Technologies" from the 2015 joint publication of the Global Alliance for Clean Cookstoves (GACC) and the World Bank's Energy Sector Management Assistance Program (ESMAP). Three principal groupings are identified [author's comments in brackets]:

A. (Left) Improved Cooking Solutions (ICS) with direct combustion of solid fuels. [The "old ways." Largely inadequate to solve the cookstove challenge for clean-burning stoves for 500 million households.]

B. (Right) Non-biomass fuels and stoves. [LPG, NG and electric stoves are used by affluent societies and are aspirational for impoverished people. With current supplies and prices, plus subsidies, LPG could reach perhaps 250 million households that have modest incomes and can be reached by fuel supply chains.]

C. (Center) Three technologies that change biomass into gases or liquids that are then burned cleanly. [Modern woodgas stoves could serve the least accessible and poorest 250 million households using their same currently-used, locally-grown fuels. The Top-Lit UpDraft (TLUD = tee-lud) micro-gasifier stoves are "climate friendly," earning up to 4 carbon credits per stove per year, sufficient to financially sustain stove maintenance and continual usage. While cooking every meal, these pyrolytic stoves create useful charcoal (or biochar), resulting in potential income for many of the poorest people on Earth.] (Contact the author to become involved.)

Classification of Stove Technologies and Fuels (V. 1.0 – 2017)

Div	Not-Clean Cooking Solutions (ICS)					Modern Advanced Clean Cooking Solutions (MACCS)					
Fuel	Solid Biomass as Solid Fuel: Wood, dung, agro-refuse, charcoal, (Coal is localized and fossil solid fuel.)					Solid Biomass as Initial Fuel for Creation of Gases & Liquid Fuels			Non-Biomass Fuels		
Cooking Technologies	**Base-line: Three-stone fire**	**"Improved Cooking Solutions" (ICS)**				**Advanced Clean Cooking Solutions (ACCS)** Combustible gases and liquids for cooking are created ("refined" or "derived") from initial biomass that undergoes an intermediate process.			**Fossil-Fuel Stoves** Processed petroleum to become gases.	**Electric Stoves** Electricity remotely generated. Much from fossil fuels.	**Solar Stoves** Depen-dent on sunlight.
		Legacy & Basic **ICS** Stoves	Inter-mediate **ICS** Stoves	**Char-coal ICS** stove							
what is Combusted?	**Bio-mass as Solid Fuel**	**Bio-mass as Solid Fuel**	**Bio-mass as Solid Fuel**	**Char-coal** has only 30% of energy of wood.		**Woodgas from Biomass:** Gas-burning with gases from solid dry biomass; makes char.	**Biogas from Biomass:** Gas-burning with gases from solid wet biomass.	**Liquids from Biomass** Ethanol, Methanol from biomass.	**LPG, NG** (nat. gas), DME, (Exclude kerosene) (Coal is solid and seldom clean-burning.)	**Electricity** Derived from renewable hydroelectric, solar, & (min) biomass. Also from fossil fuels (oil, gas, coal) and nuclear.	**No com-bustion** present in solar cook-stove.
Key Features and Stove Types	**Three rocks to support a pot;** Open fires and shel-tered fires. Many supple-mental stoves.	**ICS Clay, mud, brick, and simple metal to contain fire** Artisan produced.	**ICS Rocket-style stoves** w/ high fuel efficien-cy and moder-ately clean burning.	**ICS Char-coal stoves** cause defor-esta-tion and high C0 emis-sions.		**Pyrolysis** in fan-assisted or natural draft **TLUD gasifiers** produce gases & "C negative" charcoal with re-sale value. **TChar stoves** can replace charcoal ones.	**Anaerobic digestion** of biomass decaying in containers yields combustible gases. Always local production; biogas is never transported.	Industrial **distillation** of biomass yields **liquid alcohol t**o burn in appropriate stoves. Many as supplemen-tary.	**Processed fossil fuels, with high fuel and combustion efficiencies;** LPG in metal cylinders or NG via pipelines. Subsidized. "C positive".	**No combus-tion** present in the stove; dependent on grid power; batteries are not sufficient. Electric or induction heating elements in a stove structure.	Reflective "dish" or solar-collector box, with need to **orient toward the sun.** Solar box ovens.

Adapted and expanded from *The State of the Global Clean and Improved Cooking Sector,* ESMAP 2015, Tech Rpt 007/15, Figure 1.1 (p. 13). https://openknowledge.worldbank.org/bitstream/handle/10986/21878/96499.pdf