

Opportunities in overcoming extreme poverty through cooperation on climate protection

(dedicated to my grandchildren)

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<http://solarcooking.org/Seifert>

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In the public discussion, opportunities to overcome poverty in developing countries through global cooperation in combating climate change are hardly considered. It is suppressed that many millions of “climate refugees” will have to leave their homes in the coming decades if their living conditions worsen dramatically as a result of climate change.

The chances that I want to point out are first of all:

1. Financing the overcoming of poverty through cooperation in climate protection,
2. Open-Source Appropriate Technology (OSAT), for the improvement of the living conditions of poor families,
3. Chances of garden culture.

In the DGS magazine SONNENENERGIE (SE)¹ three articles were published² in which I presented these opportunities. I was invited by Prof. F.J. Radermacher and the Deutsche Bundesstiftung Umwelt (DBU) to a lecture³ on "Opportunities and Recommendations for Adapted Technologies in Developing Countries" in Osnabrück. The slides of the lecture and the three SE-essays as well as other articles are published on the website of Solar Cookers International (links see Appendix; illustrations of the present article are taken from some slides of the lecture): <http://solarcooking.org/Seifert>

One key to exploiting these opportunities is the creation of Innovation Institutes in Africa and their worldwide cooperation (SE 3/2017), which could be called African Research and Technology Institutes for Sustainability (ARTIS)⁴

1. Opportunities from the combination of climate protection and poverty reduction

At the 11th International Solar Forum (Cologne, 1998) of the Deutsche Gesellschaft für Sonnenenergie e.V., of which I have been a member since 1985, the title of my contribution⁵ was “Proposals for the financing of a global solar cooker program through Joint Implementation to comply with the commitments to reduce CO₂ and to overcome the firewood crisis”. At that time, CDM was



¹Official Journal of the Deutsche Gesellschaft für Sonnenenergie (German Society for Solar Energy, DGS) e.V.

² SE 3/2017, pp. 52-53, SE 1/2019 pp. 48-49, SE 3/2019 pp. 26-27; links see Appendix

³ Link see Appendix

⁴ [Traditional Charcoal in Africa and Need of African Institutes \(ARTIS\)](#)

⁵ Tagungsband 11. Internationales Sonnenforum, 26.-30. Juni 1998, DGS, ISES, pp. 859-866 (in German)

just emerging. The following year I participated with the article⁶ "Proposals for a Global Solar Cooker Program" for the International Conference World Solar Cooking and Food Processing, October 3-6, 1999 in Varese/Italy, which is included on the SCI website.

The huge opportunity from the combination of climate protection and poverty reduction through global cooperation is still far too little recognized. There was and there is resistance and misunderstanding about offsetting emissions. It was said that CDM was a trade in indulgences, one could simply buy off one's climate guilt with it. Prof. Radermacher warned urgently against this misunderstanding in his book⁷ "The Billion Joker - How Germany and Europe Can Revolutionize Global Climate Protection".

In my lectures on CDM and poverty reduction, I advised the critics to compare the two scenarios, a "business-as-usual" in which the firewood crisis progresses and trees as firewood or charcoal go up in flames (with annual emissions per household comparable to a car trip around the globe, or whether poor households emit hardly any CO₂ because sustainable technology is made accessible to them, with many other advantages for the households. Each household can save several tons of CO₂ emissions per year a total of approx. 800 million tons annually, i.e. in the order of magnitude of Germany's annual emissions.

We should note that the German Federal Environment Agency has determined that every tonne of CO₂ emission causes damage worth 180 euros.⁸

Recommendations for overcoming the firewood crisis through Open Source Appropriate Technology (OSAT)

Reduction of the need for firewood of a traditional three stone fire household to 1/12

The factor 1/12 also applies to the transition from traditional charcoal in improved stoves to Open Source Appropriate Technology (OSAT)



The aim of CDM was to use market mechanisms to achieve the required reduction in emissions with the lowest possible specific costs and with the involvement of developing countries. The free tradability of the Certified Emission Reductions (CERs) is to be viewed critically if this floods the market with the cheapest CERs. Instead of free trade, there should be targeted cooperation that clearly assigns the emission reductions.

The hunt for the cheapest reductions is dangerous. An almost unlimited volume of trade arises when the reward of not doing harm takes the place of strict environmental legislation. At least these emission reductions should only be usable for the CO₂ balance of one's own country, not for trading. From 2012 onwards, the CER price dropped over the years to less than 0.5 euros. I wrote about causes, consequences and new opportunities in my SE-articles 1/2019 "Cooperation on Climate Protection" and 3/2019 "Climate Protection and Combating Poverty". The original CDM is no longer

⁶ Conference Proceedings International Conference „World Solar Cooking and Food Processing – Strategies and Financing“, Varese/Italia, 3-6 Oct. 1999, pp. 275-282

[http://img2.wikia.nocookie.net/cb20100318190527/solarcooking/images/1/14/Internat-Conf-Varese - Seifert.pdf](http://img2.wikia.nocookie.net/cb20100318190527/solarcooking/images/1/14/Internat-Conf-Varese_-_Seifert.pdf)

⁷ F.J. Radermacher; Der Milliarden-Joker – Wie Deutschland und Europa den globalen Klimaschutz revolutionieren können. Murmann Publishers www.murmann.publishers.de Hamburg (2018)

⁸ <https://www.umweltbundesamt.de/presse/pressemitteilungen/hohe-kosten-durch-unterlassenen-umweltschutz>

suitable because of the reduction commitments required by the Paris climate agreement, including in developing and emerging countries.

The decisive factor is not that certificates are traded, but that sustainable activities are carried out that effectively lead to a reduction in greenhouse gas emissions or the greenhouse gas inventory in the atmosphere. A contribution to limiting the greenhouse gas concentration in the atmosphere can only be made if the certificates are not used in full to offset emissions. The financing of activities that compensate much more than their own emissions, especially through "top emitters" through voluntary compensation, is therefore effective in limiting the greenhouse gas concentration. This "billion dollar joker" is presented in detail in Radermacher's book. Because of the relatively low compensation costs, this requirement can be met easily. Innovation institutes can make a significant contribution to the elaboration of the demanding documentation for cooperation projects.

We have to pull out all the stops, because since the German Physical Society first warned of the climate catastrophe in 1986, emissions have not been reduced by 2% per year, as the warning demanded, on the contrary.

Early warning of an impending climate catastrophe from the Energy Working Group of the German Physical Society

Warnung vor einer drohenden Klimakatastrophe

Bereits heute beginnen...

Um die drohende Klimakatastrophe zu vermeiden, muß bereits jetzt wirkungsvoll damit begonnen werden, die weitere Emission der genannten Spurengase drastisch einzuschränken. Wenn diese Einschränkungen aufgeschoben werden, bis in vermutlich ein bis zwei Jahrzehnten deutliche Klimaänderungen sichtbar werden, wird es aller Voraussicht nach bereits zu spät sein.

Aufgerufen sind deshalb

- die **Politiker**, die künftige Energieversorgung im Zusammenhang mit der drohenden Klimakatastrophe zu beraten und die nötigen Entscheidungen bald zu treffen, dies auf nationaler wie auf internationaler Ebene;
- **Wirtschaft und Wissenschaft**, die benötigten Verfahren und Anlagen für rationellere Energienutzung und umfangreichere Nutzung nichtfossiler Energieträger verfügbar zu machen;
- **jeder einzelne Bürger**, durch sein eigenes Verhalten zu sparsamer Nutzung von Energie und zur Verminderung der Emission von Schadstoffen beizutragen.

Article (4 pages) in the
Technischen Rundschau,
Berne, February 11, 1986

*"This means from now on
a reduction of all emissions
by around 2% per year, and
that worldwide."*

Warnings have also
been given about
climate tipping points.

Der Arbeitskreis Energie der Deutschen Physikalischen Gesellschaft e.V. warnt eindringlich vor einer nahen drohenden Klimakatastrophe, hervorgerufen durch den weltweit rapide steigenden Gehalt der Luft an Kohlendioxid und einigen weiteren Spurengasen.

Der Gehalt der Luft an Kohlendioxid und an weiteren Spurengasen wie Ozon, Distickstoffdioxid und diversen Kohlenwasserstoffen steigt weltweit rasch an. Verursacht wird dieser Anstieg durch:
– Verbrennung von Kohle, Erdöl und Erdgas
– Waldrodungen und Bodenerosion und
– diverse industrielle und landwirtschaftliche Aktivitäten.
Die Gase lassen das Sonnenlicht ungehindert auf die Erde einfallen, behindern aber die Wärmeabstrahlung der Erde in den Weltraum, nachteilig (Treibhauseffekt).
Es besteht der begründete Verdacht, daß bei weiterer Anreicherung der Luft mit diesen Spurengasen schon innerhalb der nächsten 50 bis 100 Jahre:
– die mittlere Temperatur auf der Erde um mehrere Grade ansteigen wird
– die aquatornahen Trockengebiete sich ausweiten und nach Norden, in Europa bis in den Mittelmeerraum hinein verschoben werden
innerhalb weniger 100 Jahre
– die Meerespiegel um 5 bis 10 Meter ansteigen werden.

Quantitativ geschätzte Veränderungen über Annull und Zeitraum der Klimaveränderungen werden – die Schweregrade selbst kurzfristige Wetterprognosen vor Augen – allerdings auch in absehbarer Zukunft kaum zu erwarten sein. Die mittlere Temperatur auf der Erde schwankt von Jahr zu Jahr um maximal etwa 1 °C. Über ein Jahrzehnt reduzieren sich diese Schwankungen im Mittel auf 0,2 bis 0,5 °C. Auch langfristige Klimaschwankungen, wie sie im periodischen Wechsel zwischen Eis- und Warmzeiten innerhalb der letzten Jahrmillionen etwa zehnmal

aufgetreten sind, bedingen Schwankungen der mittleren Temperatur auf der Erde nur um wenige Grade. Als wesentlicher Grund für den periodischen Wechsel von Eis- und Warmzeiten werden heute die bekannten periodischen Schwankungen der Exzentrizität der Erdbahnbewegung um die Sonne und der Kreiselbewegung der Erdrotationsachse angesehen. Dabei bleibt aber die gesamte Energieeinstrahlung von der Sonne auf die Erde unverändert. Es ändert sich nur der jahreszeitliche Anteil der Einstrahlung auf Nord- und Südhemisphere. Damit verknüpft sind Änderungen der jahreszeitlichen Wärmeströmungen und damit der Meeresströmungen, vor allem des verstärkten oder verminderten Aufquellens nördlicher Tiefenwasser in aquatornahen Zonen. Diese wiederum ermöglichen eine entsprechend verstärkte oder verminderte Einbindung von Kohlendioxid aus der Atmosphäre in pflanzliche Organismen an der Meeresoberfläche. Die so bewirkte Änderung des Kohlendioxidgehalts der Atmosphäre hat dazu über den Treibhauseffekt eine entsprechende Temperaturänderung auf der Erde zur Folge.

Der Kohlendioxidgehalt der Atmosphäre betrug gegen Ende der letzten Eiszeit vor rund 10.000 Jahren 180 bis 200 ppm (ppm = millionstel Volumanteil der Luft) und stieg bis zur nachfolgenden Warmzeit vor etwa 5000 Jahren auf 280 bis 300 ppm an. Weiter wissen wir, daß er in den tausend Jahren von 900 bis 1800 konstant geblieben ist bei rund 270 ppm. Der Kohlendioxidgehalt der Luft wird im ständigen, natürlichen Kreislauf von Kohlendioxid zwischen Pflanzenwelt, Atmosphäre, Wasser der Meere und Meeresbodenmineralen geregelt. Der Gehalt der Luft an Kohlendioxid

2. Opportunities from the development and dissemination of adapted, generally accessible technology

Examples of projects for the sustainable equipping of households, small businesses and schools through cooperation in climate protection are:

- Energy equipment for households;
- Equipping school kitchens and school workshops;
- Household biogas systems connected with solar cookers;
- Small business equipment, e. g. bakeries or dryers for preserving food
- Gardens and nurseries with biochar sinks, combined with soil improvement.

The pictures on the right side show household energy equipment, the cost of which per ton of CO₂ saved is around 20 euros with a depreciation period of 7 years. The CO₂ saving per year is 4 tons. Cheaper compensation could be obtained if only an efficient furnace was provided, but a comprehensive solution should be sought to get out of the poverty trap.

Equipping 200 million households with around 1 kW of household energy means 200 GW of installed capacity. This corresponds to the capacity of approx. 200 nuclear power plants, but without their disadvantages, almost without operating costs and with a few percent of the investment costs.

Opportunities for Open Source Appropriate Technology (OSAT) were demanded by E.F. Schumacher as "Intermediate Technology" in his famous book "Small is Beautiful". As an engineer, I was challenged to take part in the development of solar cookers (since 1983) and efficient firewood stoves. These examples for OSAT are reported on the SCI website⁹. Compared to the size of the tasks, we are still at the beginning with the development and distribution.

One of the tasks of innovation institutes would be to build up competencies on the knowledge available worldwide, to find the best solutions and to overcome the obstacles to dissemination. In my essay "OSAT: Open Source Technology for Africa" (SE 3/2017) I described opportunities, not least through the creation of millions of relatively easy-to-finance jobs through adapted technology and garden culture.

3. Garden culture is a huge opportunity

The recommended garden city concept (SE 1/2019) differs from the failed attempts to catch up on development and from imposed programs. Instead, it realizes what is adapted, local, manageable and oriented towards the common good, so that people escape the poverty trap. There are no young people in the garden city who do not get an education, no hunger, no monocultures, no factory

Example: Household energy equipment

One-third of humanity uses wood or charcoal for cooking, with catastrophic consequences, in particular cooking in urban households with traditionally produced charcoal.

Equipping 200 million households with approximately 1 kW household energy means 200 GW of installed capacity. This corresponds to the capacity of about 200 nuclear power plants, but without their disadvantages and with less than 5% of the investment costs.

Each household can save about 4 to 8 tons of CO₂ emissions per year, a total of more than 800 million tons per annum, which is roughly the annual emissions of Germany.



- 1 PV and LED-lamps
- 2 Thermos-basket
- 3 Efficient stove
- 4 Parabolic solar cooker

Traditional charcoal in African households – A continent in danger

Annual Saving of CO ₂ -Emission per Household	Stove: 3-Bones fuelwood	Charcoal traditional	Charcoal improved
Emission Factor EF of wood (IPCC 2006)	kg CO ₂ /MJ	0,112	0,112
Net calorific Value NOV of wood (UNFCCC, default value)	MJ/kg wood	15	15
Share L _{air} of non renewable wood (assumption)		86%	86%
Saving of CO ₂ per kg of saved wood	kg CO ₂ /kg wood	1,438	1,438
Consumption of fuelwood per household without thermos and solar technology (see leaf 8)	kg wood/year	4,000	4,000
Consumption of fuelwood per household with efficient stove, thermos and solar technology	kg wood/year	288	288
Saved fuelwood per household with efficient stove, thermos and solar technology	kg wood/year	3702	3702
Saved CO ₂ -Emission through efficient stove, thermos and solar technology	t CO ₂ /year	5,29	5,29

For traditional kilns, up to approx. 6 tons of logs and thick branches are used per household per year.

The reduction of this wood consumption with the help of Appropriate Technology corresponds to a saving of approx. 8 tonnes of CO₂ emissions per year.

This corresponds to the emission of a car drive of about 50,000 km, more than the length of the equator (50,000 km * 0.16 kg CO₂/km) per year!

see article: <http://solarcooking.org/Seifert> (Publications, Sept 2016)

⁹ <http://solarcooking.org/Seifert>

farming, no mass tourism, no exploitation and other evils. The dissemination of adapted technology and garden culture with supervision by the innovation institutes would offer everyone secure jobs. When I was doing solar cooker building courses in Ningxia Province in November 2009 (report on the Internet¹⁰), invited by ALCAN Ningxia, I was accompanied by the Vice President of a Chinese Organization for Environmental Protection and Poverty Reduction (CEPA) and we also visited a village for family settlement. He said that most people would rather live in a town than in the new village building. That should apply generally. My suggestions therefore relate to garden cities with the size of the small town of Neuötting, where I've been at home for 42 years.

As a member of a working group on the subject of bio-coal from invasive water hyacinths from lakes in Africa, I corresponded with the President of the Agric Society Switzerland Ghana (ASSG)¹¹, Mr. Felix Jenny, who also belongs to the working group I initiated. He wrote to me in an email on October 2020:

"I fully agree with your conclusion in the essay in the direction of "garden culture" based on my Africa experience. From 2009 to 2016 we only served farmers in Ghana with biochar (they only paid around 10-15% of the costs we incurred). It wasn't until 2016 that we really realized that we could use "garden culture", i.e. backyard gardening, to get a multiple of the local added value out of the franc we invested in terms of food production. Why? Because the farmers can only cultivate and harvest basic products (maize, sorghum) that produce little yield on the soil that has been improved with biochar, whereas the gardeners can grow and harvest 3 times a year. Because in every village there is a minimum of water, so that the plants in the backyards can be supplied with sufficient water even in the dry season. In addition, there are many more varieties of useful plants in backyard gardening that the Gardener can select and cultivate in order to get the maximum yield from the emerging market situation."

As a child, I experienced extreme poverty for years after the war, but there were opportunities to escape the poverty trap. Looking back on almost 80 years of life, I would like to point out global opportunities. I see the combination of climate protection and technology transfer in developing countries through global cooperation as peace work. Because the consequences of climate change threaten world peace and the challenge is, on the other hand, an opportunity for global action in solidarity.

With my suggestions I want to show that overcoming poverty in developing countries causes unbelievably low costs because the great opportunities of adapted technology and cooperation in climate protection are realized and the active participation of those affected is made possible.

Garden settlements with appropriate water technologies instead of slums, camps and "reception centers"

It is a matter of the solution of the social question, to which funds from the compensation of greenhouse gas emissions can make a decisive contribution.



¹⁰

https://vignette.wikia.nocookie.net/solarcooking/images/8/86/Reisebericht_Ningxia_Nov2007.pdf/revision/latest?cb=20150127192329

¹¹ <https://assg.info/content/82/67/ueber-uns>

Overview of the publications with links
by Imma Seifert and Dr.-Ing. Dieter Seifert
on the Solar Cookers International website
<http://solarcooking.org/Seifert>

- **Slides of DBU-Presentation:**
September 2019: Opportunities and Recommendations for Appropriate Technologies in Developing Countries ([English](#), [German](#), [Spanish](#)) - Dieter Seifert
- **Essay SE 3/2019 SONNENENERGIE 3/2019:**
August 2019: Climate Protection and Overcoming Poverty Traps - Proposals for the realization of the UN Development Goals ([English](#), [German](#), [Spanish](#)) - Dieter Seifert
- **Essay SE 1/2019 SONNENENERGIE 1/2019:**
June 2019: Proposals to finance energy projects of developing countries by the voluntary compensation of greenhouse gas emissions ([English](#), [German](#)) - Dieter Seifert
- **January 2019:** Compensation of CO₂ emissions as a global opportunity for climate protection ([German-original](#), [English](#), [Spanish](#)) - Dieter Seifert
- **Essay 3/2017 SONNENENERGIE 3/2017:**
August 2017: OSAT: Open Source Technology for Africa - Freely Accessible and Appropriate ([German-original](#), [English](#)) - Dieter Seifert
- **May 2017:** [Examples of Open Source Appropriate Technology \(OSAT\) for Development Cooperation](#) - Dieter Seifert
- **January 2017:** [Vorschläge zu OSAT und ARTIS](#) - Dieter Seifert
- **January 2017:** [Lamentation of a Village Elder](#) - Dieter Seifert
- **October 2016:** [Ben Stove workspace](#) - Dieter Seifert
- **September 2016:** [Holzkohle in Afrika und ARTIS-Institutes](#) - Dieter Seifert
- **June 2016:** [Traditional Charcoal in Africa and Need of African Institutes \(ARTIS\)](#) - Dieter Seifert
- [A cookbook showing how to cook in a parabolic solar cooker](#) - Imma Seifert
- **February 2016:** [Remarks on Stove Technologies](#) - Dieter Seifert
- **November 2015:** [About the Peace-Making Effects of Solar Technologies](#)
- **April 2015:** [How to overcome the firewood crisis](#) - Dieter Seifert
- **July 2006:** [Clean Development Mechanism \(CDM\) - A Powerful Instrument to Fulfill the UN Millenium Goals - Experiences, Visions and Suggestions](#) - Dieter Seifert
- **October 1999:** [Proposals for A Global Solar Cooker Program](#) - Dieter Seifert
- **June 1997:** [Erfahrung mit Solarkochen](#) - Sonnenenergie

Articles in the media

- **May 2013:** [“La cocina parabólica es mucho más que un horno”: Entrevista Imma y Dieter Seifert](#) - ERA Solar (Interview with Manolo Vílchez)
- **May 2013:** [Audio Interview with Dieter and Imma Seifert about the history of the SK parabolic cookers](#) (German) (Interview with Michael Bonke)
- **July 2006:** [Audio interview in which Dr. Dieter Seifert discusses how to use CDM to finance solar cooking projects](#) (Interview with Tom Sponheim)