Guidelines for Designing and Implementing Electric Cooking Solutions in School Settings

Richard Sieff (Gamos Ltd/MECS)

Clean Cooking in Schools

Event by ESMAP - Energy Sector Management Assistance Program

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Modern Energy Cooking Services (MECS)

Key facts

- 12 year £99m UKAid (FCDO) funded programme 2018-2030
- Managed by Loughborough University (UK). Tier 1 partners ESMAP & CLASP
- Aim: to accelerate the transition to modern cooking
- Multi-fuel approach (biogas, bioethanol, primary focus is on electric cooking (eCooking)
- Key workstreams: Foundational Research & Training, Technology Accelerators, Market Shaping , Venture Building *(CLASP leading)* , Country Demonstrators, Leadership & Co-ordination
- Research supports the modern cooking transition via work on the enabling environment, supply chains, and consumer demand
- 11 priority countries in Africa and Asia but engagement and research covers many more.

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School eCooking transitions

The case for

- Compatibility with Cooking practices and electricity supplies
- Scope for multiple sustainability benefits (e.g. economic, environmental, health, social)
- Increasing range of available appliances

Challenges

- Upfront costs
- Limited awareness of the opportunities & technical confidence of staff
- Reliability of electricity supply

Opportunities

- Expanding electricity access (e.g. M300)
- Emerging routes to scale through multilateral collaborations
  - **Platform for clean cooking in schools** (SEforALL, WFP, School Meals Coalition, UKAid - MECS, Government of Iceland, Middle East Green Initiative - Forward7, Global Platform for Action and Lightrock
  - $US 80m **School Meals Accelerator** -100m children by 2030 (BMZ, Novo Nordisk Foundation, Rockefeller Foundation, and WFP)

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MECS School eCook Transitions guidelines

The need

- Schools vary enormously (e.g. size, menu, infrastructure).
- Choice of cooking solution depends on various factors, esp. menu, cooking practices, existing space existing electricity infrastructure, and upgrade requirements.
- Designing an appropriate eCooking solution requires **detailed knowledge** of the target school.

What the guidelines do

- Provide a suggested sequence of eight stages to select, assess, and design an eCooking solution for a school. Not all steps may be required while some projects may benefit from other steps.
- Provide a list of known eCooking appliance suppliers with details such as capacity, servings, power ratings and price.
- Developed from East Africa learning but applicable beyond.
- Limitations. The guidelines do not cover broader contextual factors (e.g. policy environment, political economy, stakeholder analysis esp. the utility) which are necessary for scoping and design a project.

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Assessment and planning (stages 1-3)

1. Pre-feasibility study

- **Aim:** support selection of target schools using key criteria: e.g., size, meal volumes, menu types, kitchen layout, electricity connection, water availability, school accessibility and motivation.
- **Method:** site visits are preferable but not required if reliable information is already available.

2. Inception survey

- **Aim:** Gather detailed information on cooking practices, conduct electrical infrastructure assessment to inform the design of the eCooking solution.
- **Method:** On-site or remote survey with school management, cooks, and where possible, electricians (30mins - 1hr per respondent). Include photos, measurements.

3. **Baseline cooking study**

- **Aim:** Record accurate data on existing fuel consumption, equipment, meal preparation routines, and kitchen operations to establish cost, time, and energy benchmarks (for comparison with transition phase data and possible carbon crediting purposes).
- **Method:** Energy recordings and cooking diaries – recommended to be recorded by an enumerator. Videos and photos useful.
- Recommend to obtain 3 measurements for the most common dishes (e.g., 3x rice and 3x beans) and 3 total daily fuel measurements.

Enumerators interviewing head cook during inception survey training on school in Kampala (JFT, MECS)

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Design, installation and training (stages 4-5)

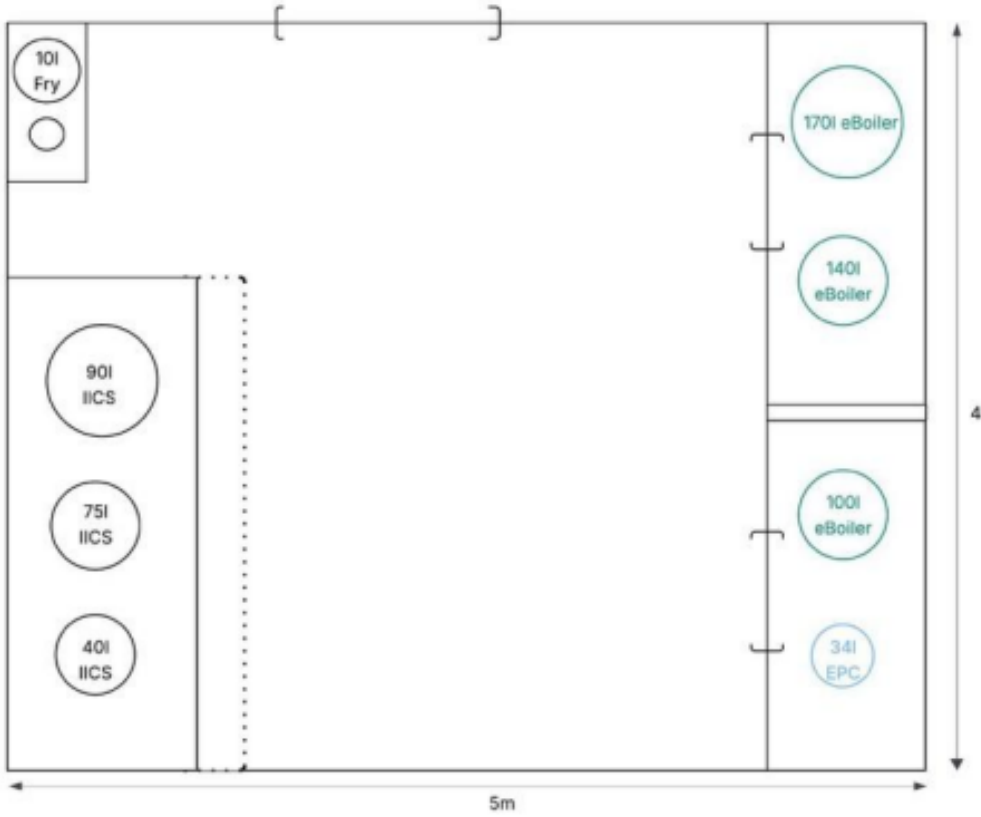
Draft schematic & designing and assessing the eCook option in Kampala, Uganda (JFT, MECS)

4. Design of eCooking solution, installation and adaption

- **Aim:** Design an eCooking solution based on data from stages 1-3.
- Solution involves identifying and procuring suitable appliances and planning and implementing any necessary kitchen or electrical infrastructure upgrades.
- **Method:** Engage school stakeholders in the process to improve agency and ownership.

5. Cook training and orientation

- **Aim:** Deliver hands-on training to cooks and kitchen staff to help them adjust to the new appliances and utensils.
- Very important for sustained uptake and requires careful design and adequate time and resourcing.
- **Method:** Hands on training either 'live' during school days (high risk) or at another allocated time (less pressure). Combination of both recommended with trainers accompanying cooks for first live week.



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Usage and monitoring (stages 6-8)

6. Transition cooking study (2 weeks – immediately after introduction of eCooking)

- **Aim:** Evaluate the initial transition to eCooking in terms of times, fuel use and costs, and how kitchen staff have adapted to identify any initial challenges.
- **Method:** As per baseline study, record energy measurements and kitchen processes data for dishes prepared but with the new eCooking appliance(s). eCooking appliances should be metered (either integrated metering or external meter).
- Assumption is a full eCooking transition for the targeted baseline dishes occurs. If stacking occurs, then all fuels/appliances used should be recorded.

7. Sustained use study (2 weeks - 4-6 weeks after eCooking introduction)

- **Aim:** Observe longer-term uptake and usage patterns and monitor for any challenges or changes since adoption (e.g. any reversion to previous cooking fuels/methods).
- **Method:** Repeat stage 6. Any reversion to previous baseline cooking fuels/methods should also be recorded.

8. Follow up survey (3 months after eCooking introduction)

- **Aim:** Understand user experience and long-term use identify any emerging challenges and evaluate overall sustainability.
- **Method:** Qualitative survey with school management and kitchen staff (interviews or optional focus group discussions).

Serving posho for lunch in Kampala (JFT, MECS)

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Institutional eCooking appliances list

- **Aim:** Raise awareness of the range of eCooking appliances suitable for institutional cooking
- Covers key details: e.g. capacity, servings, power ratings, required connection type and price
- Two sections: for smaller (30-300 individual portions) and larger institutions
- Focus on East African market although some generic-type appliances (e.g. induction stoves, rice cookers) are often available in other markets or can be imported.

	SMALLER SCHOOLS AND INSTITUTIONS ECOOKING APPLIANCES (30-300 individual portions) *This segment indicates eCooking appliances suitable for institutions providing for between 30 people to 200 single servings. The suitability of appliances is dependent on the infrastructure in place. Higher power ratings for 1 phase (over 13amp, 3kW), and 3 phase connections require specific electrical infrastructure.*							
	Appliance	***Capacity***	***Pots***	***Max capacity ppl servings (per full pot)[1]***	***Price range (from…)***	***Notes***	***Power rating (max) - examples***	***Phase (1 or 3)[2]***
	***EPCs*** *Through local distributors*	*21l* *40l* *55l* *65l*	*1* *1* *1* *1*	*42* *80* *110* *130*	*$250* *$800* *$900*	*EPCs have been used widely in eCooking trials in the domestic space, with demonstrated time and energy efficiencies. Larger versions are suitable for institutional settings (numerous ongoing projects have implemented them in schools in several African countries).*	*15a,3.6kW* *25a,4.5kW*	*1* *1* *1* *1*
	***Induction stove*** *Through local distributors*	*26cm (50l)* *26cm (70l)*	*Variable (50l)* *(70l)*	*100* *140*	*$250 induction stove + pots: $103(50l)*	*Requires additional cookware. Size is limited by the dimension of induction stove ring (& pot).*	*13a,3kW*	*1*

	SELECT LARGER SCALE ECOOKING PROJECTS AND DEVELOPERS IN EAST AFRICA (2024)					
	Project	***Capacity (l)***	***Pots***	***Max capacity ppl servings (per full pot)***	***Price range (from…)***	***Notes***
	***ATMOSFAIR*** *[Tanzania]*	*170l* *(several)*	*1*	*520*	*variable*	*Off-grid or hybrid solution. Newly developed 170 litre, 9 kW efficient electric boilers currently trialling at the Magnificat School in Sanya Ju, Tanzania, on a 64kWp PV system (atmosfair). Local installer in Tanzania: Watu na Umeme.*
	***ECOCA/PESITHO*** *[Uganda]*	*70-400l (several sizes)*	*1*	*250-1500*	*variable*	*The Pesitho Ecoca school kitchen project was realized in the Kyangwali refugee settlement in Uganda as part of the Camp+ initiative, a project initiated by Care with the goal of being the world's most sustainable refugee settlement.*
	***ECOBORA*** *[Kenya]*	*300l-500l*	*1*	*600-1000*	*variable*	*In Kenya, ECOBORA offer a range of clean, affordable cookstoves that are being used by rural and peri-urban schools. Can be used using off-grid or grid electricity, or hybrid.*

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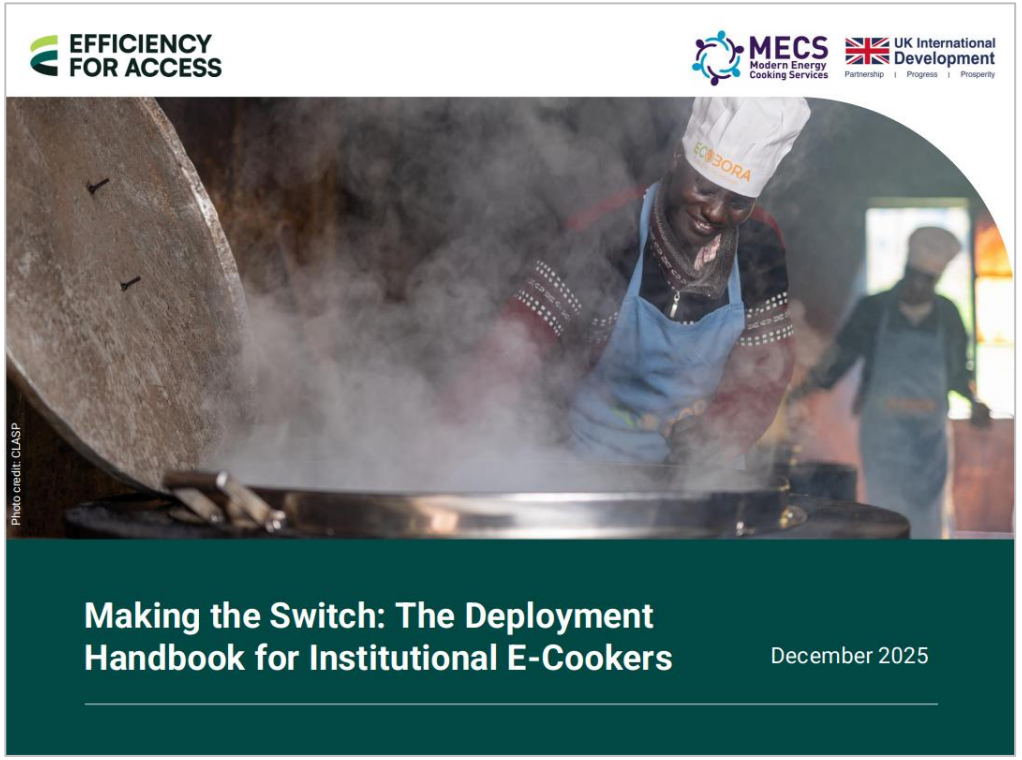
Examples of the Guidelines in Use

Previous/Ongoing work

- **MECS School Kitchen and Cooking Studies (SKACS)** – school baseline energy measurements in 6 countries
  - Informed the development of the SKACS protocol and its three components: inception surveys, energy measurement studies, and cooks/management surveys.
  - Energy measurement studies merge KPT and CCT approaches to inform eCooking implementation and carbon finance applications.
- **MECS Demonstrators in Uganda and Tanzania** – have informed and applied the guidelines to support X schools (UG) and X (TZ)
- **Efficiency for Access/MECS** – informed the handbook 'Making the Switch: The Deployment Handbook for Institutional E-Cookers
  - Focuses on how to deploy and scale eCooking technologies in institutions from initial readiness assessments to installation, financing, and long-term adoption.



Future MECS work

- Assessing Demonstrator and SKACS results
- Uganda Demonstrator extension – exploring a carbon finance model for schools

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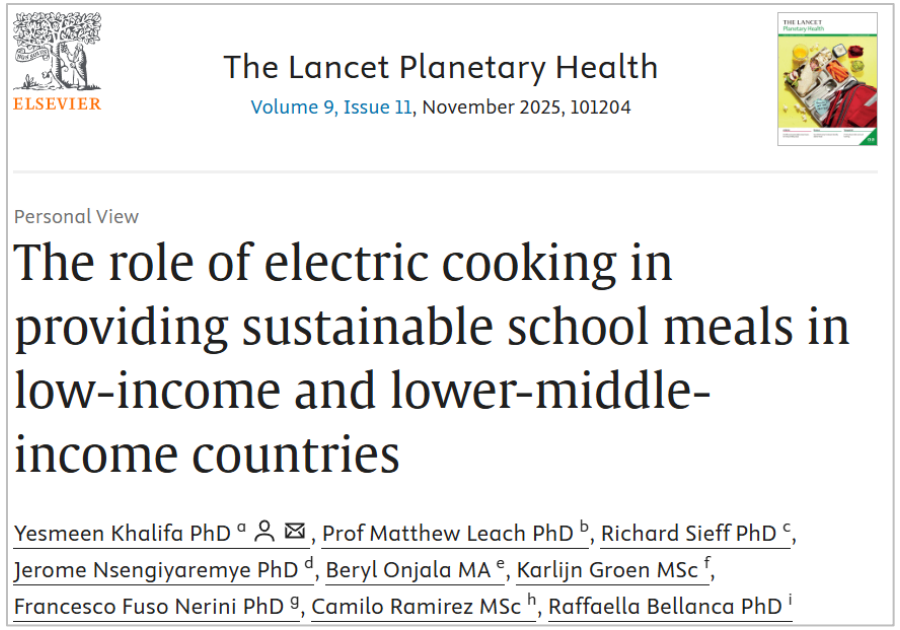
Useful links

Useful links

- MECS (2025) School eCook Transitions guidelines – link
  - also includes links to SKACS data collection tools
- Efficiency for Access/MECS (2025) Making the Switch: The Deployment Handbook for Institutional E-Cookers – link
- Khalifa et al. (2025) *The role of electric cooking in providing sustainable school meals in low-income and lower-middle-income countries*. The Lancet Planetary Health. link
  - MECS led paper highlighting how eCooking for school meals can provide multiple sustainability benefits (draws on 4 case studies in Kenya, Lesotho, Guinea, and Nepal)
- MECS (2024) Commercial and Institutional working paper – link



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Lancet Paper Case Study: WFP Green School Kitchen (GSK), Nepal

Funders/Collaborators: WFP, Min of Ed & AEPC, Gov of Norway, Japan, MECS

Aim: provide integrated electricity & clean cooking solutions

Intervention: install grid-tied solar PV systems + 1 or 2 induction stoves with backup MICS. Surplus solar power used for other school needs or sold to grid.

Case study: 6 of 17 GSK schools. Baseline fuels: 1 LPG, 5 firewood (FW)

Methods: KIs cooks/principals, smart meters in 3 sch for eCooking energy data

Sample Nepal Results

- Baseline fuel fell markedly, no changes to school menus
  - 1*LPG school – complete transition (no stacking)
  - 5*FW schools: ave. FW consumption fell by 89.3% (eq. ~4.8kg/student/mth)
- LPG school saved 6000NPR pcm (US$41) on LPG, and 86.5% on electricity costs (S43-$5 pcm) due to surplus solar generation
- FW schools. No cost savings as wood collected. 80-96% cost savings if FW was purchased.
- Circular economy: local PV training may create future jobs,1 school used surplus solar power to irrigate school garden.
- Reduced health issues/FW collection times reported – prev. 4-5hrs (heavily gendered)

Findings support overall paper conclusion that eCooking for school meals can provide multiple sustainability benefits and that **unique contexts** exist in each school –further **supporting** the **rationale for the guidelines**.

Image 1. Ariel view of the solar panels on a school in Nuwakot and the school garden (image credit: WFP/Nepal Engineering team)

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Contact Information

- Website: https://mecs.org.uk
- Email: mecs@lboro.ac.uk
- Follow on X (Twitter): @MECSprogramme
- LinkedIn: Modern Energy Cooking Services

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UKaid from the British people | AYRTON FUND

A UK Government commitment to spend up to £1 billion of Official Development Assistance on the Research, Development, and Demonstration of clean energy technologies and business models for developing countries, between April 2021 and March 2026.

There are 12 challenges with MECS leading on the Modern Cooking Challenge – aiming to Unlock the transition from biomass to genuinely clean cooking, delivering major health and environmental benefits.

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