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### Fuel for food

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**Switching to renewable energy sources in the country's midday meal programme will save millions of rupees. But only a few kitchens are doing anything about it, says Keya Acharya.**

This is a story of facts and figures and sheer size. Of an auditorium-sized room dense with hot steam from cooking. Of seven tonnes of cooked rice and four tanker-loads of steaming *sambar* that needed 70 pairs of hands for cutting two tonnes of vegetables. Of a further 250 kg of *masala* used daily, along with 1000 coconuts, 3000 stainless steel vessels, and 30 one-tonne vehicles carrying food to 300 schools for 200,000 children in Karnataka, 75,000 of whom are from Bangalore alone. This is the kitchen of the Adamyia Chetana Trust at Basavangudi in Bangalore, working with the State government in the midday meal (MDM) programme.

India's flagship MDM is the world's largest such programme, feeding 12 crore children in over 12.65 lakh schools around the country, with a central budget of Rs. 13,215 crores. The Central Government gives cereal grains to each State, along with financial help for setting up kitchen-cum-storages, and LPG in some areas. Each primary school child's meal is allotted Rs. 3.70, and Rs. 4.70 for standards VI to X. State Governments pitch in with fuel and financial assistance. A basic cereal menu of 100 gm of uncooked rice per primary school child and 150 gm for higher classes is mandated. Accompaniments of *dal* or *sambar*, vegetables and curd are standard in menus in the southern States, while northern Indian schools have *chapatis*.

Some ten kilometres from Adamyia Chetana, en route to Kanakpura, the Akshaya Patra (AP) kitchens of ISKCON resemble cooking factories, with each storey of the building handling one part of the cooking process. Huge chutes connect each floor through the ceiling, sending food materials down to the next process. Thus, the top floor, with huge silos of grain, handles the 'dry-cleaning' of eight tonnes of rice and two tonnes of *dal* daily, then sends this down the chutes for washing and then down again directly into steam vats for cooking. Using 500 litres of oil daily for cooking (2000 litres if it is a 'special rice' day), this AP kitchen cooks 120,000 daily meals for government schools in south Bangalore alone. A GPS with special software tracks its 35 trucks, while all staff are connected through 'walkie-talkies'.

But there's something more impressive than these volumes, these mind-boggling logistics. Till a year ago, Adamyia Chetana used 350 litres of diesel per day, or an equivalent of 60 LPG cylinders for generating steam for the giant vats used in steam-cooking. The fuel costs alone per meal then worked out to 60 paise per child. Last year, Adamyia Chetana switched to biomass briquettes for steam generation and to biomass pellets for cookstoves for 'tarkas' needed in chutneys and *dals*. Using one tonne of briquettes (at Rs.5.50 per kg) per day to generate 12,000 kg of steam from a boiler requiring 10 HP to pump in water, energy costs have come crashing down to an incredible eight to nine paise per child in 2013. "When we cook for thousands, every paise counts," says Tejaswini Ananthkumar, head of Adamyia Chetana.

Energy costs come down further if the numbers are higher: on diesel in 2006, fuel costs were 60 paise per meal, which then came down to 20 paise per child for 50,000 meals cooked on LPG, and today the kitchen in Bangalore cooks 75,000 meals on nine paise for fuel cost per meal, using steam and two smokeless 'chulas' designed by ASTRA at the Indian Institute of Science, Bangalore. At the AP Kanakpura kitchen, 4000 kg of briquettes are used to ensure food is

cooked at an optimal 93 degrees Celsius, so that it remains safe for eight hours.

Twenty-five-year-old Somashekhar, the 'boiler man' demonstrates how his walkie-talkie helps in conservation. "The kitchens tell me when one cooking cycle is nearly finishing, and I then load the next set [of briquettes]. I load 300 kg at first, and then 50 kg less each time." AP-ISKCON cooks MDM in 19 kitchens in nine States of India. Twelve of these kitchens are now on gasifier steam through briquettes.

Though centralised kitchens, such as these two, are only in urban areas constituting less than 25 per cent of MDM, switching to renewable energy even in urban MDM will amount to savings of millions of rupees to the public exchequer.

The picture is dire in rural areas, where there are now 577,000 MDM kitchens (with 24 lakh helpers). Almost all are run on firewood, some on dung-cake, or on government-supplied LPG, with fuel costs currently estimated to be 30 to 40 paise per meal, says Sejal Dand, Gujarat State Advisor to the Supreme Court Commissioners.

Dr. K Ashok Rao of the Delhi-based Swami Sivananda Memorial Institute (SSMI), working on women and children's health, says the thermodynamic efficiency of MDM rural cookstoves is a mere 8 per cent to 12 per cent. As per the government's own reports, smoke-filled school rooms are common. "The consequent impact on ecology and health is anybody's guess," says Rao. And there is little research on the amount of firewood being used in India to fuel the MDM.

"Assuming each child gets 200 grams of cooked food, at least 24 million kg of food is cooked daily", says Rao. "Hundreds of thousands of tonnes of food is being processed every day by the government at public expense, and still the government has no fuel policy, not even one on its agenda."

In spite of a national renewable energy policy, highlighted by the national action plan on climate change and committed to reducing 25 per cent of carbon emissions, mindsets are straggling. Twenty two out of 29 States have failed even in their policy obligations to purchase at least 5 per cent renewable energy from the national grid, with the national capital Delhi being the worst offender, having virtually no renewable energy supply in its chain. The mid day meal appears to be no exception to the current milieu.

Tejaswini adds, "There is little research on renewable energy cookstoves. Unlike the fuel energy sector, there is no lobby to push this. On the one hand, the government gives subsidy for energy, on the other, it pays no attention to alternatives," she complains, highlighting the need for building a local industry to help the MDM.

"Coconut shells, even tender coconut husks, can be used as alternative fuel," says Tejaswini. "This will reduce fuel costs, remove urban organic waste, promote local industry, and very importantly, it will reduce our country's need for foreign exchange in petroleum imports," she says.

Irregular supply to large-scale applications is currently the biofuel industry's bugbear, with numerous biomass systems unable to run at par. But, as biofuel manufacturers point out, the organised growth of the industry is hampered by a lack of government help for collection, storage, transportation or marketing, thus making the middleman king in this industry too.

Davangere's Surya Biofuels says it manages only by stocking bio-waste during harvesting season for crops such as groundnut and paddy, while Manjunath Oli of Alternate Fuels in Bangalore says they designed their own briquette-machines at Nagpur. Oli also complains of the lack of government price controls on husking mills. "They put any old price they want (on the waste)," he says.

Appropriate technology, meanwhile, is receiving some attention. Svati Bhogle of the Bangalore-based TIDE (Technology Informatics Design Endeavour) and her team designed an energy-efficient biomass cookstove, currently being marketed in Tamil Nadu and Karnataka. "Our data from schools show a saving of 3.6 tonnes of firewood per school per year, a reduction of one hour's cooking time and a safe cooking environment," says Bhogle.

From 2011 to early 2013, SSMI's recommendations on fuel savings, nutrition and health became input for a series of interactions involving academicians, technologists, NGOs and the ministries of women and child development, human resources and new and renewable energy. SSMI hopes to establish a methodology through baseline studies to be undertaken in Andhra Pradesh, which could help towards policy subsequently.

"For several years now SSMI has been raising its voice about the problem of fuel energy," says Rao. "It is time for the Government of India to get serious."

Meanwhile, the two early 'MDM conservation pioneers', Adamya Chetana and Akshaya Patra, are trying to become 'zero waste' operations. Akshaya Patra composts its kitchen waste, while piggery farms collect all Adamya Chetana's kitchen scraps, and starch from the rice is re-used in the *sambar*. This year, the trust is deciding on ways to reuse 65,000 to 75,000 litres of water everyday.

Akshaya Patra has recently found a solution, treating and reusing 80,000 daily litres of starch back into vegetable-washing, and is looking for ways to reuse its treated water, two lakh litres daily, back into the kitchens. Conservation in the MDM is a distinct possibility.

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