

Controlled Cooking Test in Indonesia

A final report prepared by ICLEI Indonesia for Modern Energy Cooking Services (MECS)

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This material has been funded by UK aid from the UK government and is implemented by the Department of International Development; however, the views expressed do not necessarily reflect the UK government's official policies.'

Introduction

ICLEI Indonesia prepared this final report to convey the result of the implementation of controlled cooking test (CCT) in Indonesia to establish the energy consumed to prepare popular, culturally relevant dishes in a replicable test.


We have identified 10 dishes by office consensus that are in common productions in an ordinary household in Indonesia as follow:

- 1) Sayur bayam (spinach soup)
- 2) Ayam goreng kunyit (Indonesian turmeric fried chicken)
- 3) Pepes tahu (tofu steamed in banana leaves)
- 4) Tempe mendoan (deep fried tempeg in spiced batter)
- 5) Perkedel jagung (Indonesia corn fritters)
- 6) Nasi goreng (Indonesian fried rice)
- 7) Telor dadar (Indonesian Omelette)
- 8) Krupuk
- 9) Siomay

This report will provide documentation for each dish:

- a. Overview of appliance used;
- b. Quantities of ingredients used;
- c. Processes and their sequence for preparing the meal;
- d. Time taken and energy used;
- e. Quality feedback on taste from a panel of tasters;
- f. Photographs of the dishes being prepared.

Overview of Appliance Used

<p>Induction Stove Denpoo Brand Model 200-800</p>  <p>The advertisement for the Denpoo DIC 200-800 induction stove features the CKR Jakarta logo and the Denpoo brand name. It highlights the model number DIC 200-800 and the power rating DIC-200-800W. The stove is shown with a digital display and control buttons. Key features listed include Skin Touch Control, Overheating Protection, Timer Function, Electric Induction, and Stable Heat. The text 'KOMPOR INDUKSI 8 LEVEL PENYESUAIN DAYA' is also present.</p>	<p>Specification:</p> <ul style="list-style-type: none"> • Touchscreen panel • overheating protection • auto shut-out without pot • 8 level intelligent cooking function • 8 level temperature adjustment • High quality crystal plate • 4 digital displays • timer function • voltage 220v-240v,50/60Hz • max power 800watt • product dimension 211x251x43mm • waterproof
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Gas Stove with 2 Burner Gas Hob Brand Moderna Model BH 0725



The gas stove from Moderna has the following feature:

- **Enameled Grid**
An elegant and heat-resistant mat
- **One Hand Ignition**
The lighter integrated with the knob makes it easy to light the stove.
- **Tempered Crystal**
Take the appearance of a stove to a higher level with an elegant and durable design.

AC Digital Energy Meter – kWh Watt Voltage Ampere Frequency PF




FEATURES:

Low power consumption.
Calculates electricity expenses.
Cumulative Kilowatt-Hour Monitor.
Sets electricity price value which ranges 00.00COST/KWH ~99.99COST/KWH.
Large, clear LCD display for easy reading (screen dimension: 45mm x 70mm).
Electricity price setting by pressing COST, FUNCTION, UP and DOWN button according to the instructions.

SPECIFICATIONS:

-Power consumption of the Power Meter Monitor: 0.5W
-Operating voltage: 230VAC
-Frequency display: 50HZ
-Operating current: max 16A
-Wide voltage range: 230V-250V
-The set Wattage display (Watts) is 0W~9999W; but the real Wattage display (Watts) is 0~2900W
-Timing display range: 0 second~9999 days
-Voltage display range: 0V~9999V
-Current display (amps): 0.000A~16.000A
-Frequency display: 0Hz~9999Hz
-Price display range: 0.00COST/KWH~99.99COST/KWH
-Total KWh and cost display: 0.000KWh-9999KWh, 0.00COST----9999COST

<div>Rice Cooker Brand Cosmos model CRJ 610</div> <div></div>	<div><div><div>Rice</div><div>Cooker</div><div>Cosmos</div></div><div><div>Power</div><div>Supply:220V/350</div><div>Watt.</div></div><div><div>Capacity</div><div>1</div><div>Litre</div></div><div><div>Pan thickness: 2 mm.</div><div></div><div></div></div><div><div>Weight:</div><div>3</div><div>kg</div></div></div>
<div>Straight Microwave Oven 23 Litre R21DO(S)IN Brand Sharp</div> <div></div>	<div><div><div><div>• Mechanical Type</div><div>• Glass and push door</div><div>• Defrost by weight and time</div><div>• Paint cavity, cooking and signal</div><div>• Power Source 229-240 volt</div><div>• Unit 485 x 400 x292 mm</div></div></div></div>

Ayam Goreng Kunyit

(Indonesian Turmeric Fried Chicken)

Ayam Goreng Kunyit is a typical dish in Indonesia that can be served on various occasions. Several variations of *Ayam Goreng Kunyit* can be differentiated from the garnish used when served. It can be sprinkled with fried galangal (*lengkuas*) or fried grated coconut (*serundeng*). Whatever the garnish used as the final touch of this dish, the main ingredient used is turmeric (*kunyit*), which gives the chicken a unique taste and colour. Preparing *Ayam Goreng Kunyit* involves two stages of cooking. First is braising the chicken with herbs diluted in water or, in some variation, coconut milk. This step aims to ensure all the herbs and spices are infused perfectly into the chicken meaty. The second step is frying the cooked chicken in vegetable oil to make it crisp.

We are comparing two cooking processes of *Ayam Goreng Kunyit*, firstly by using a gas (LPG) stove and secondly by using a combination of the rice cooker and an induction stove to see the difference between fossil fuel-based appliances and electricity-based ones. A Rice cooker is being used here because of its capacity to boil water and its design, which is perfect for braising the chicken.

Ingredients:

- 600 gr breast chicken
- 600 ML Water
- 1 lemongrass
- 2 tbsp turmeric powder
- 4 bay leaves
- 3 kaffir lime leaves
- Salt
- Vegetable/ Cooking oil

Herbs (all grind into fine paste):

- 6 bulbs shallots
- 4 cloves garlic
- 1 tbsp coriander powder
- 1 segment of ginger
- ½ tsp white pepper
- 3 candlenuts

Note: these ingredients are divided into six parts as each experiment only serves one single portion of the dish

LPG/Gas Stove

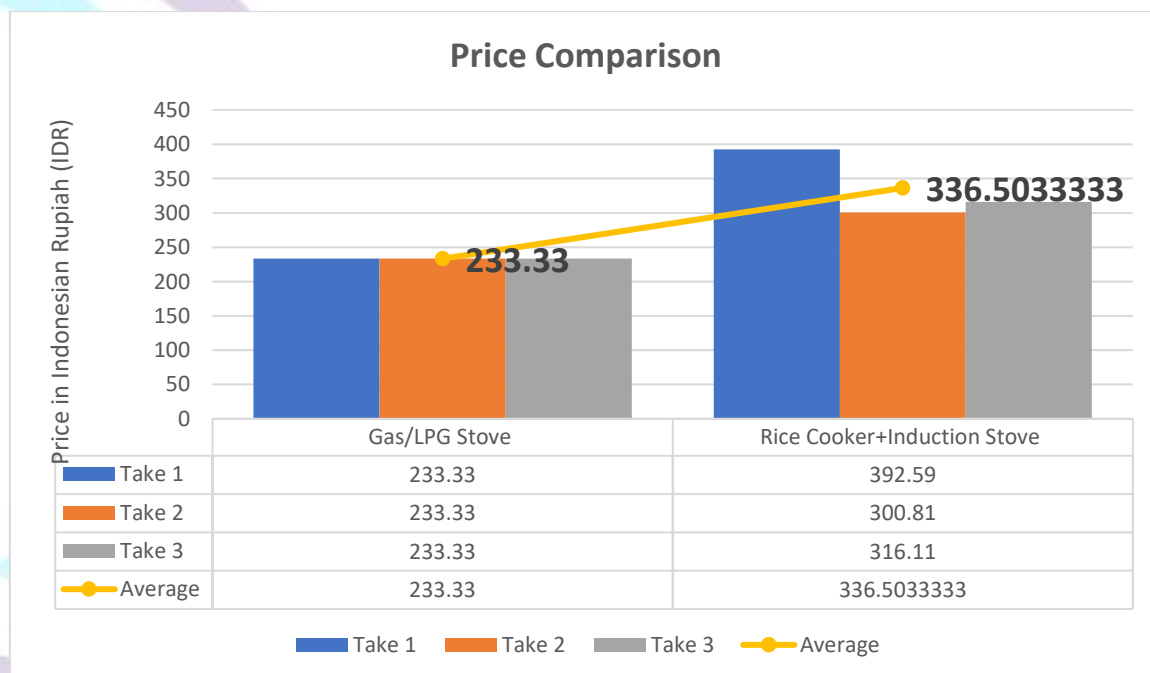
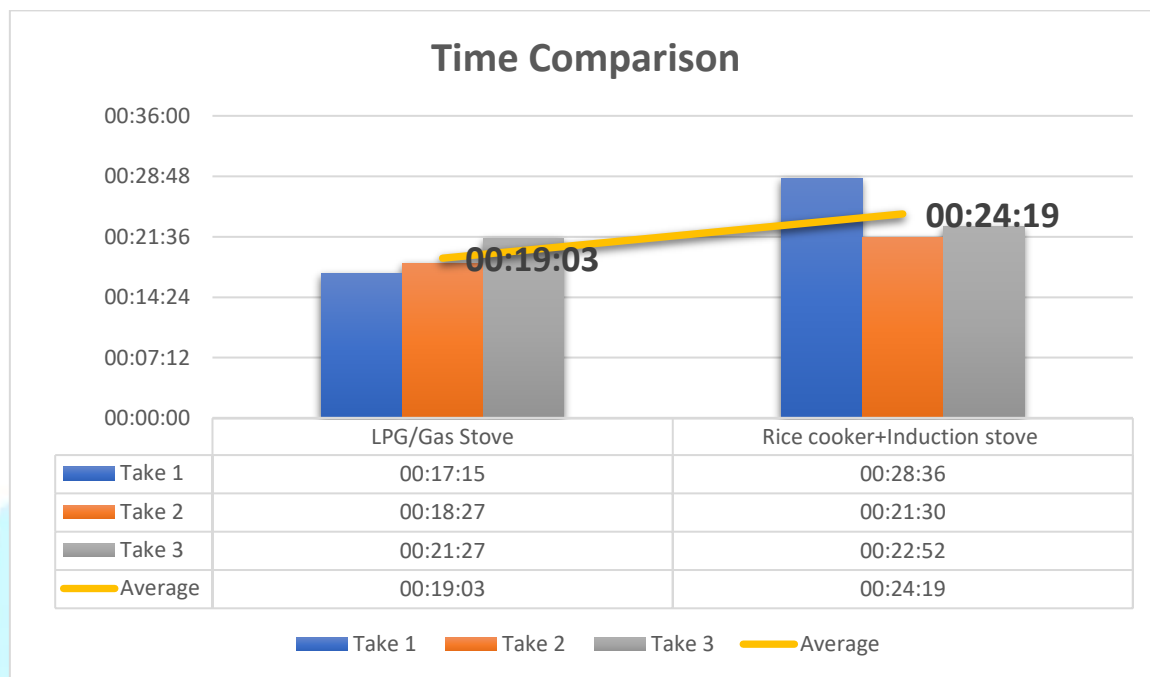
Menu	Tahapan	Take 1	Take 2	Take 3
Ayam Goreng Kuningit (Turmeric Fried Chicken)	Prepare pot to braise chicken	150 gr of chicken	160 gr pf chicken	140 gr of chicken
	Add water and paste of herbs and spices	150 ml of water	150 ml of water	150 ml of water
	Turn on the stove and set the fire to low			
	Put chicken and close the lid			
	Turn off the rice cooker after the water has receded and the flavors have been absorbed	10:26	11:50	15:00
	Put the chicken aside			
	Prepare frying pan to fry the chicken			
	Pour vegetable oil	150 ml vegetable oil	150 ml vegetable oil	150 ml vegetable oil
	Turn on the stove and set the fire to medium, wait until the oil temperature increased, then set the fire to low afterwards.	10:27 set the fire to medium 11:27 set the fire to low	11:51 set the fire to medium 14:04 set the fire to low	15:00 set the fire to medium 16:13 set the fire to low
	Fry the chicken until its skin brownish	11:57 frying the chicken 17:15 turn off the stove	14:27 frying the chicken 18:27 turn off the stove	16:50 frying the chicken 21:27 turn off the stove
Cooking time		Braising: 10:26 Total: 17:15	Braising: 11:50 Total: 18:27	Braising: 15:00 Total: 21:27
Weight of an empty LPG tube	5 Kg			
Weight of LPG tube before cooking	6.1 kg			
Weight of LPG tube after cooking	6 kg			

Energy (conversion from kg to joule)	4,993 kJ
Cost	<p>Rp 233.33 for each take</p> <p><i>A tube of 3 Kg LPG is sold around Rp 21,000, so we assume that the tariff per Kg LPG is 7,000</i></p>

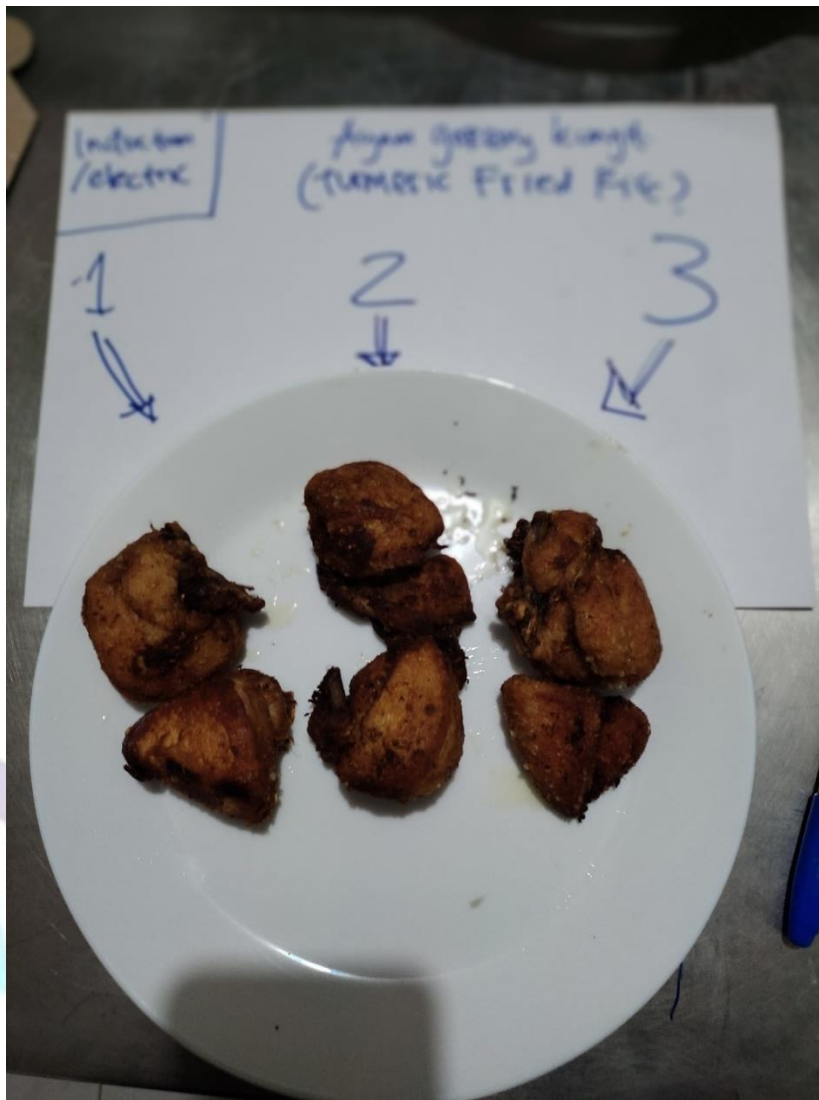
Rice Cooker and Induction Stove

Dish	Steps	Take 1	Take 2	Take 3
Ayam goreng (Turmeric fried chicken)	Prepare rice cooker			
	Add paste of herbs and spices, dilute it with water	150 ml of water	150 ml of water	150 ml of water
	Put the chicken into the rice cooker	157 gr of chicken	166 gr of chicken	145 gr of chicken
	Turn on the rice cooker			
	Cook until the water recedes then turn off the rice cooker	23:14	16:57	18:05
	Set aside the chicken			
	Prepare frying pan to fry the chicken on the induction stove			
	Pour vegetable oil			
	Turn on the induction stove, set it to medium heat. Wait until the temperature of vegetable oil increased then decrease to low heat	Heat indicator: 800, set to 600 after 1:50	Heat indicator: 800, set to 600 after 1:20	Heat indicator: 800, set to 600 after 1:30
	Fry the chicken until its skin brownish	2:15 start frying 5:22 end frying	1:47 start frying 4:33 start frying	1:50 start frying 4:47 end frying
Average Power		Braising: 48.5 W (Lo) – 431.7 W (Hi) Frying: 1W (Lo)- 937.2W (Hi)	Braising: 18.2 W (Lo) – 425.1 W (Hi) Frying: 1.0 W (Lo) – 938.6 W (Hi)	Braising: 47.6 W (Lo)- 422.6 W (Hi) Frying: 1W (Lo)- 942.8W (Hi)
Energy		Braising: 0.163 KWh	Braising: 0.117 KWh Frying: 0.060 KWh	Braising: 0.124 KWh Frying: 0.062 KWh

	Frying: 0.068 KWh		
Time	Braising: 23:14 Frying: 5:22 Total: 28:36	Braising: 16:57 Frying: 4:33 Total: 21:30	Braising: 18:05 Frying: 4:47 Total: 22:52
Cost	Rp 392.59	Rp 300.81	Rp 316.11



From this experiment we concluded that in terms of time and cost to prepare *Ayam Goreng Kunyit*, using gas/LPG stove is more efficient and cheaper than using combination of rice cooker and induction stove. However, we found that frying *Ayam Goreng Kunyit* on the induction stove gives more crispier and crunchier result.



Turmeric fried chicken cooked by using rice cooker (for braising) and induction stove (for frying).
Photo Credit: Nisa Nidasari (ICLEI)



Turmeric fried chicken cooked by using gas stove. Photo Credit: Nisa Nidasari (ICLEI)

Pepes Tahu

(Tofu Steamed in Banana Leaves)

Tofu or bean curd is a familiar dish across East and Southeast Asia. It is considered a cheap alternative to protein as a substitute of meat. Indonesia has a variation of tofu-based dishes. The most popular one is *Pepes Tahu*, or tofu steamed in banana leaves which is believed to be originated from the West Java region, the land of the Sundanese ethnicity. What distinguish *Pepes Tahu* is its aromatic banana cover that gives unique smell when steamed (or in some variation, grilled). To prepare *Pepes Tahu* for this cooking experiment, we are using a traditional steamer on gas stove and rice cooker which has special rack for steaming. It must be noted that the design of most rice cooker models sold in Indonesia is enabling user to use it more than just steaming rice but other dishes as well.

Ingredients:

- 300 gr firm tofu, mashed
- 2 small eggs.
- Salt to taste

- Banana leaves and toothpick to secure the wrapping
- *Kemangi* (Indonesian basil leaves)

Herbs and spices (all grind/blend into fine paste)

- ¼ tsp white pepper powder.
- 5 shallots, peeled, chopped.
- 2 cloves garlic, peeled, chopped.
- 3 candlenuts, chopped.
- 2 big red chillies, chopped.
- 1 tsp turmeric powder

LPG/Gas Stove

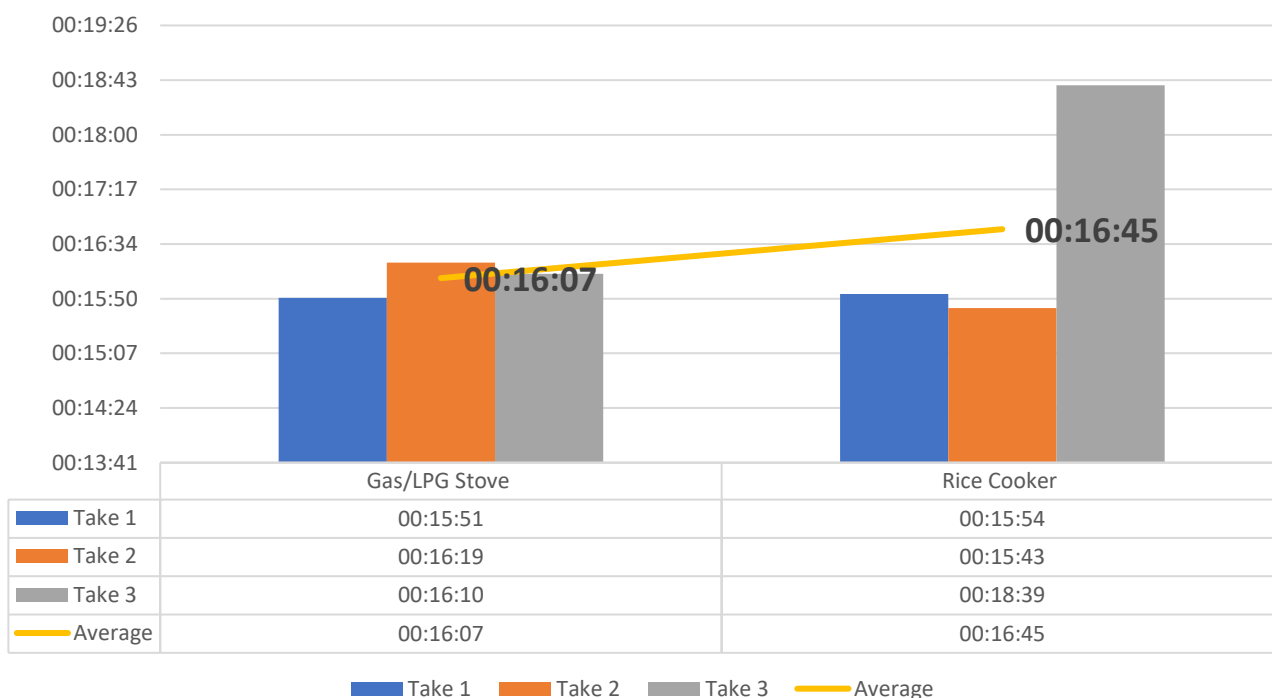
Cuisine	Steps	Take 1	Take 2	Take 3
Pepes Tahu	Mash firm tofu in a mix bowl			
	Chop <i>Kemangi</i> leaves and mix it with mash tofu			
	Add the eggs and mix thoroughly			
	Add fine paste of herbs and spices, mix thoroughly			
	Scoop 3 tbsp of the mixed ingredients onto 1 piece of banana leaf			
	Roll and secure both ends of the banana leaf using toothpick			
	Prepare steamer of gas stove			
	Light up the stove (low fire)	0:00	0:00	0:00
	Put the parcel into the steamer then close the lid. Steam the parcel of tofu until it is solid.			
	Turn off the stove	15:51	16:19	16:10
Total Cooking Time		15:51	16:19	16:10
Weight of an empty LPG tube		5 Kg		

Weight of LPG tube before cooking	5.4 Kg
Weight of LPG tube after cooking	5.3 Kg
Energy (conversion from kg to joule)	4,999 kJ
Cost	Rp 233.33 for each take <i>A tube of 3 Kg LPG is sold around Rp 21,000, so we assume that the tariff per Kg LPG is 7,000</i>

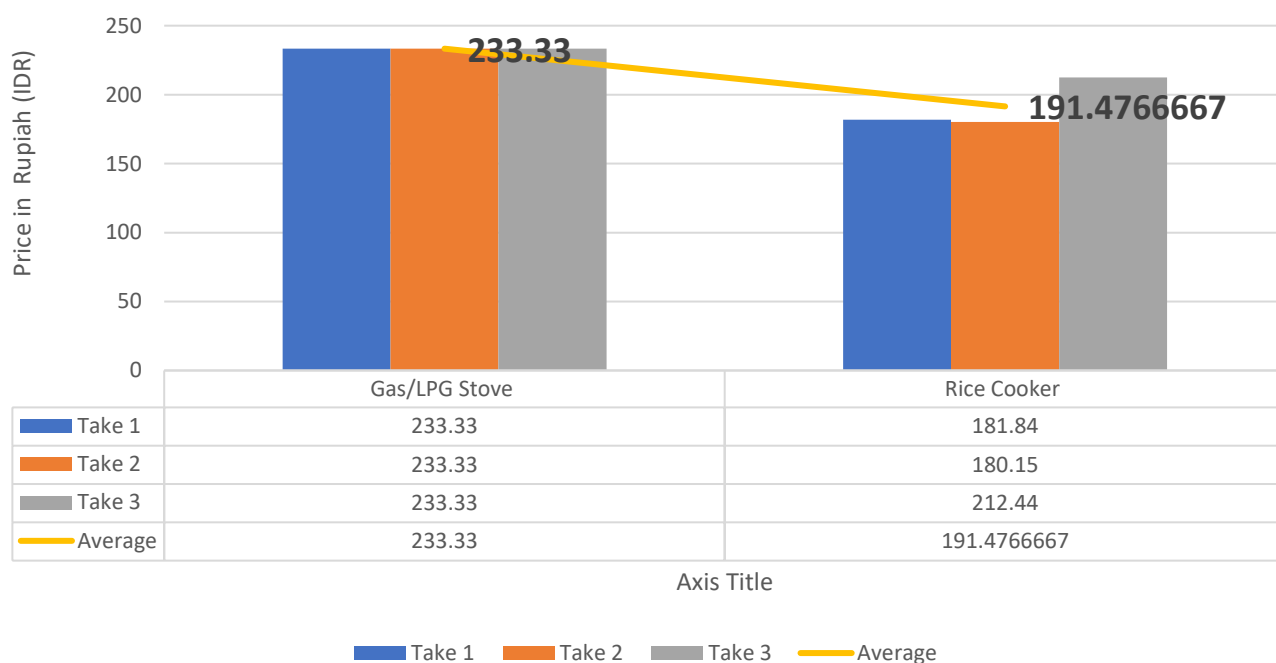
Rice Cooker

Cuisine	Steps	Take 1	Take 2	Take 3
Pepes Tahu (Induksi)	Mash firm tofu in a mix bowl			
	Chop <i>Kemangi</i> leaves and mix it with mash tofu			
	Add the eggs and mix thoroughly			
	Add fine paste of herbs and spices, mix thoroughly			
	Scoop 3 tbsp of the mixed ingredients onto 1 piece of banana leaf			
	Roll and secure both ends of the banana leaf using toothpick			
	Prepare rice cooker, put the rack for steaming			
	Put the parcel into the rack, close the rice cooker's lid			
	Turn on the rice cooker, steam the parcel of tofu until it is solid	0:00	0:00	0:00
	Turn off the rice cooker	15:54	15:43	18:39
Avg power		5.5 W-414.2 W	13.2 W-412.4 W	13.3-410.7 W
Energy used		0.107 KWh	0.106 KWh	0.125 KWh
Time		15:54	15:43	18:39
Cost		Rp 181.84	Rp 180.15	Rp 212.44

Time Comparison



Price Comparison



As it can be seen from the diagram, preparing *Pepes Tahu* by using rice cooker is cheaper than using gas/LPG stove. We also found that there is no significant difference in terms of total time to cook *Pepes Tahu* on gas/LPG stove and rice cooker. Regarding the taste, we found that the panel testers could not see the difference between

Pepes Tahu made by steamer on gas/LPG stove and one made by using rice cooker. Both methods resulted in a firm and solid tofu with similar taste and unique aromatic scent of banana leaves.



Steamed tofu in banana leaves cooked by using gas stove. Photo Credit: Nisa Nidasari (ICLEI)



Steamed tofu cooked by using rice cooker. Photo Credit: Nisa Nidasari (ICLEI)

Perkedel Jagung (Indonesian Corn Fritters)

Indonesian corn fritters or *perkedel jagung* (also known as *bakwan jagung*) are easy snacks made mainly from corn kernels and carrots. The mixture of corn, carrots, ground spices, green onions, and chopped kaffir leaves gives a tasty note when you take a bit into it. To prepare this dish, we are using a LPG/gas stove and an induction stove as comparison.

Ingredients:

- 300 gr of corn kernels
- 100 gr of grated carrot
- 150 gr of flour
- 50 gr of rice flour
- 1 egg
- 3 green onions (chopped)
- 5 kaffir lime leaves (chopped)
- Water

Herbs (all grind into fine paste)

- 10 bulbs of red shallots
- 5 cloves of garlic
- 1 tbsp coriander seeds
- 2 candlenuts
- Salt and pepper

LPG/Gas Stove

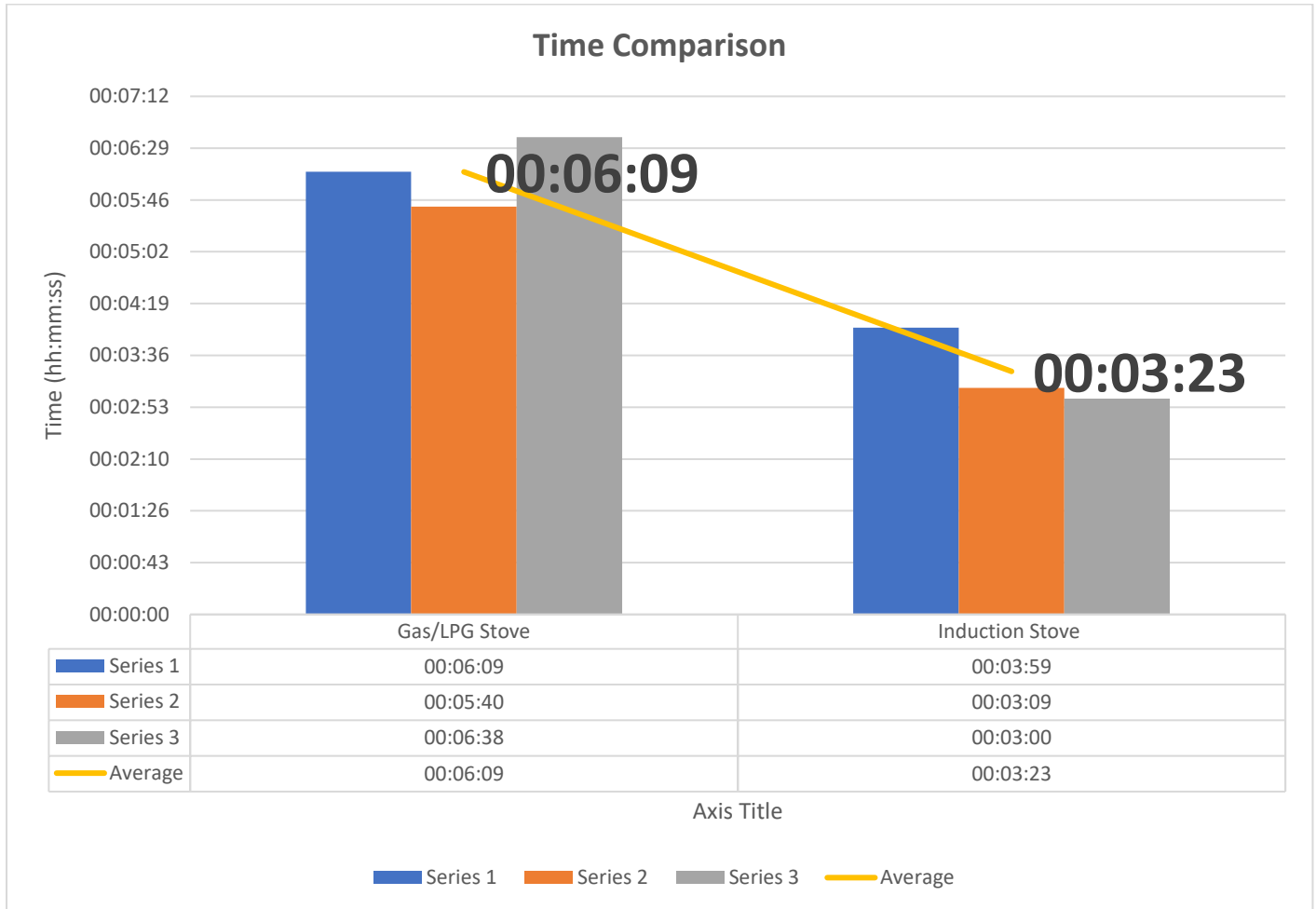
Cuisine	Steps	Take 1	Take 2	Take 3
Perkedel Jagung (Kompur Gas)	Put corn kernels and grated carrot in a mixing bowl			
	Put flour and rice flour into the mixing bowl., then crack an egg. Mix it all thoroughly			
	Add grind herbs, chopped green onions, and chopped kaffir lime			

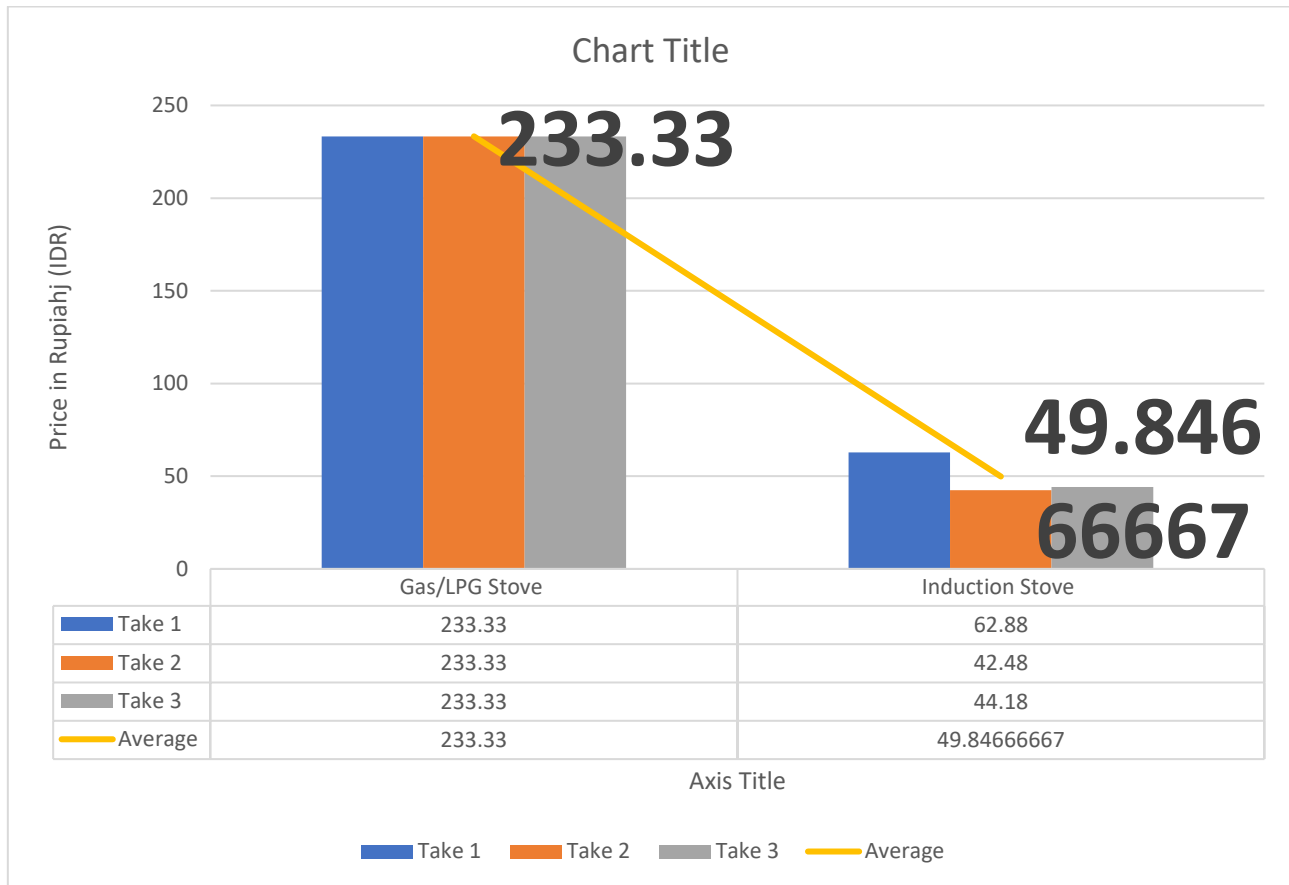
	leaves. Mix it all thoroughly			
	Prepare frying pan in a gas stove, add vegetable oil			
	Turn on the stove, set fire to medium	0:00	0:00	0:00
	Set fire to low after vegetable oil heats up	1:00	1:00	1:00
	Drop a ladleful of batter into the hot oil, and cook it until golden brown	1:35	1:50	1:58
	Scoop it out from the oil and turn off the stove	6:09	5:40	6:38
Total Cooking Time		6:09	5:40	6:38
Weight of an empty LPG tube	5 Kg			
Weight of LPG tube before cooking	5.4 Kg			
Weight of LPG tube after cooking	5.3 Kg			
Energy (conversion from kg to joule)	4,993 kJ			
Cost	Rp 233.33 for each take			
	<i>A tube of 3 Kg LPG is sold around Rp 21,000, so we assume that the tariff per Kg LPG is 7,000</i>			

Induction Stove

Cuisine	Steps	Take 1	Take 2	Take 3
Perkedel Jagung	Put corn kernells and grated carrot in a mixing bowl	Start 700, 1:25 ke 300	1:00 ke 300	
	Put flour and rice flour into the mixing bowl., then crack an egg. Mix it all thoroughly			

	Add grind herbs, chopped green onions, and chopped kaffir lime leaves. Mix it all thoroughly			
	Prepare frying pan in an induction stove, add vegetable oil			
	Turn on the stove, set to medium (indicator 700)	0:00	0:00	0:00
	Set to low (indicator 300) after vegetable oil heats up	1:25	1:00	1:36
	Drop a ladleful of batter into the hot oil, and cook it until golden brown	1:30	1:10	1:50
	Scoop it out from the oil and turn off the stove	3:59	3:09	3:00
Avg power		1.7W- 837.7 W	1.1 w- 835.4W	1.3-845.4 W
Energy used		0.037 KWh	0.025 KWh	0.026 kwh
Time		3:59	3:09	3:00
Cost		Rp 62.88	Rp 42.48	Rp 44.18





This experiment gives us a clear indication that for cooking method which only involves frying, using an inductive stove is far cheaper than using gas/LPG stove. The total time to cook is also halved of the total time to prepare *Perkedel Jagung* by using gas/LPG stove. However, we found that it is quite difficult to control the quality of its taste when cooking by using inductive stove. Panel testers said that *Perkedel Jagung* fried by gas/LPG stove is tastier than one cooked by inductive stove.



Corn Fritters cooked by using gas stove. Photo Credit: Nisa Nidasari (ICLEI)



Corn fritters cooked by using induction stove. Photo Credit: Nisa Nidasari (ICLEI)

Tempe Mendoan (Deep-fried tempeh in spiced batter)

Tempe mendoan is another variation of tempeh that originated from Purwokerto, a region in Central Java. It is coated with batter mixed with herbs and spices that give an aromatic taste when you take a bite into it. Tempe mendoan can be served as a snack (usually with *petis* paste as a condiment) or as main dish with rice. To prepare *tempe mendoan* for this cooking experiment, we are using LPG/gas stove and an induction stove to compare.

Ingredients

- 250 gr tempeh
- 150 gr flour
- 50 gr rice flour
- 1 bunch spring onions
- 3 kaffir lime leaves
- 250 ml water
- Vegetable/cooking oil

Herbs (Grind into fine paste):

- 3 cloves of garlic
- 2 bulbs of shallots
- 1 tsp of coriander powder
- 1 tsp black pepper
- Salt

LPG/Gas Stove

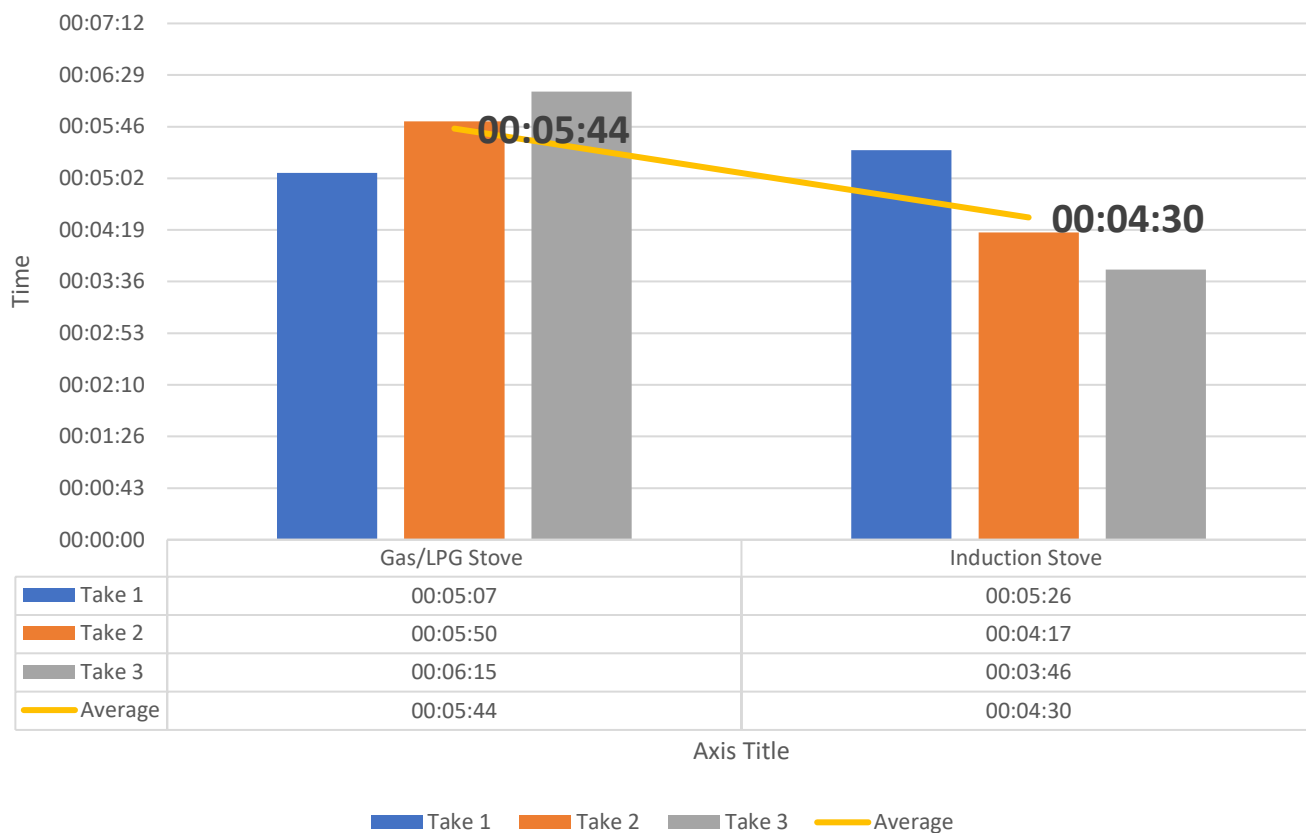
Cuisine	Steps	Take 1	Take 2	Take 3
Tempe mendoan	Thinly slice tempeh			
	Mix flour and rice flour in a mixing bowl			
	Pour water into the bowl			
	Add chopped green onions			
	Add fined paste of herbs and spices			
	Mix thoroughly			
	Add salt and pepper			
	Coat sliced tempeh with the mixture			
	Prepare a frying pan on the stove			
	Pour vegetable oil			
	Set fire to medium	0:00	0:00	0:00
	Set fire to low	1:30	1:46	1:25
	Deep-fry coated tempeh	1:45	2:10	1:40
	Turn off the stove	5:07	5:50	6:15
Weight of an empty LPG tube				
Weight of LPG tube before cooking		5.6 kg		
Weight of LPG tube after cooking		5.5 kg		
Energy (conversion from kg to joule)		4,993 kJ		
Cost		Rp 233.33 for each take		

A tube of 3 Kg LPG is sold around Rp 21,000, so we assume that the tariff per Kg LPG is 7,000

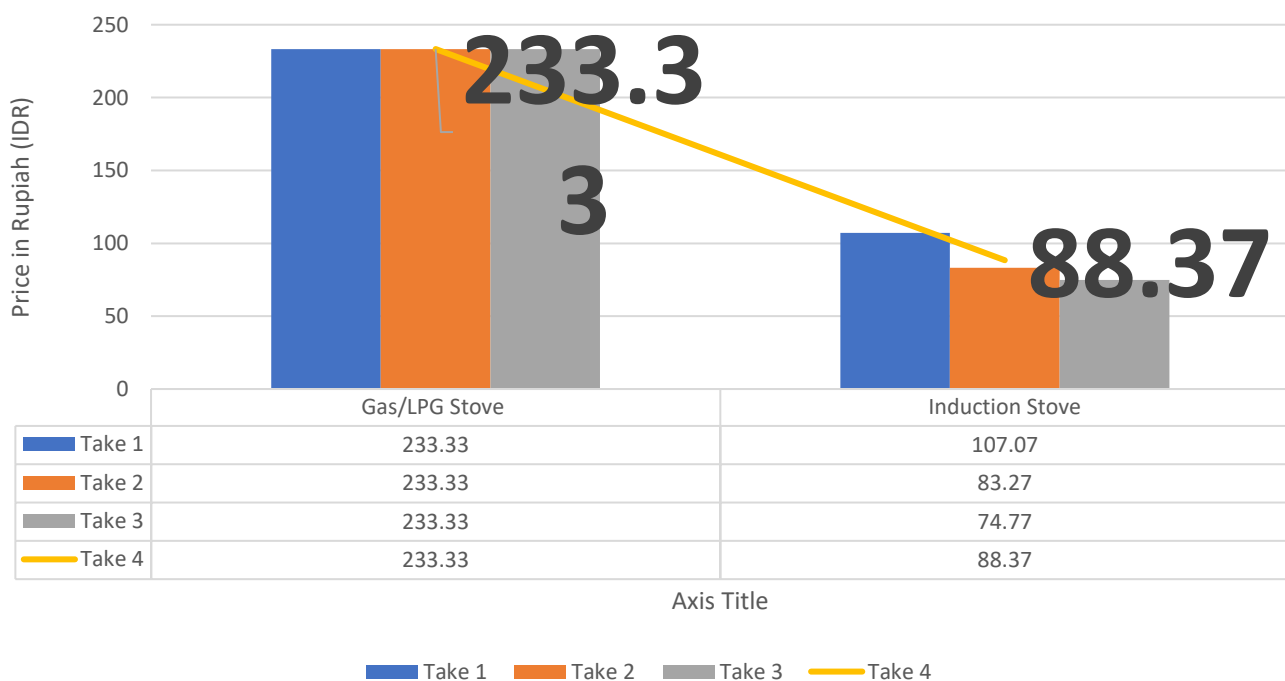
Induction Stove

Cuisine	Steps	Take 1	Take 2	Take 3
Tempe mendoan (Induksi)	Thinly slice tempeh			
	Mix flour and rice flour in a mixing bowl			
	Pour water into the bowl			
	Add chopped green onions			
	Add fined paste of herbs and spices			
	Mix thoroughly			
	Add salt and pepper			
	Coat sliced tempeh with the mixture			
	Prepare a frying pan on the induction stove			
	Pour vegetable oil			
	Set to medium	Indicator 700	Indicator 700	Indicator 700
	Set to low	1:25, Indicator 300	1:26, Indicator 300	1:15, Indicator 300
	Deep-fry coated tempeh	1:42	1:50	1:35
	Turn off the stove	5:26	4:17	3:46
Average Power		1.3 W – 844.2 W	1.1 W- 833.8 W	1.3 W – 835.7 W
Energy used		0.063 KWh	0.049 KWh	0.044 KWh
Time		5:26	4:17	3:46
Cost		Rp 107.07	Rp 83.27	Rp 74.77

Time Comparison



Price Comparison



This experiment confirming the previous result where we found that if it is only involving one cooking method, cooking by using inductive stove is much cheaper than using gas/LPG stove. The time to prepare the dish is also faster than cooking by using gas/LPG stove. However, as we found on the *Perkedel Jagung* experiment, panel testers conclude that *Tempe Mendoan* fried by gas/LPG stove is much crunchier and tastier than one cooked by using inductive stove.



Tempeh Mendoan cooked by using gas stove. Photo Credit: Nisa Nidasari (ICLEI)



Tempeh Mendoan cooked by using induction stove. Photo Credit: Nisa Nidasari (ICLEI)

Sayur Bayam (Spinach Soup)

Sayur bayam (spinach soup) is an effortless soup to prepare yet nutritious. Most children like it because of its clean taste, which also makes this soup is commonly known as *sayur bening*, or clear soup in English. *Sayur bayam* can be served with or without rice. It can be enjoyed when it is warm or cold. For this cooking experiment, we are using an LPG/Gas stove and a rice cooker to compare.

Ingredients

- 600 Gr spinach
- 3 big red chilies

- 5 bulbs of red shallot
- 240 gr of corn kernels
- Salt and pepper
- 500 ml of water

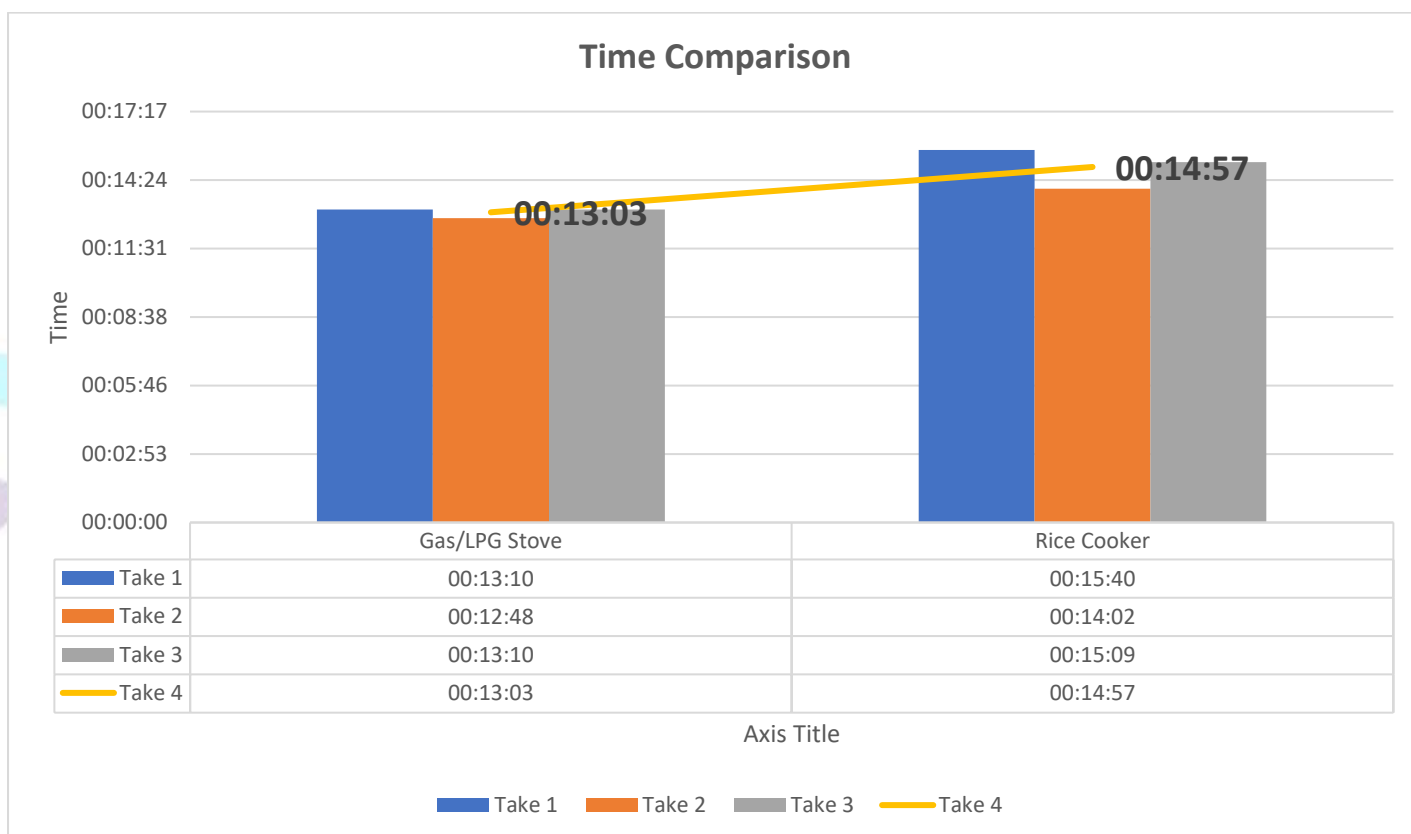
LPG/Gas Stove

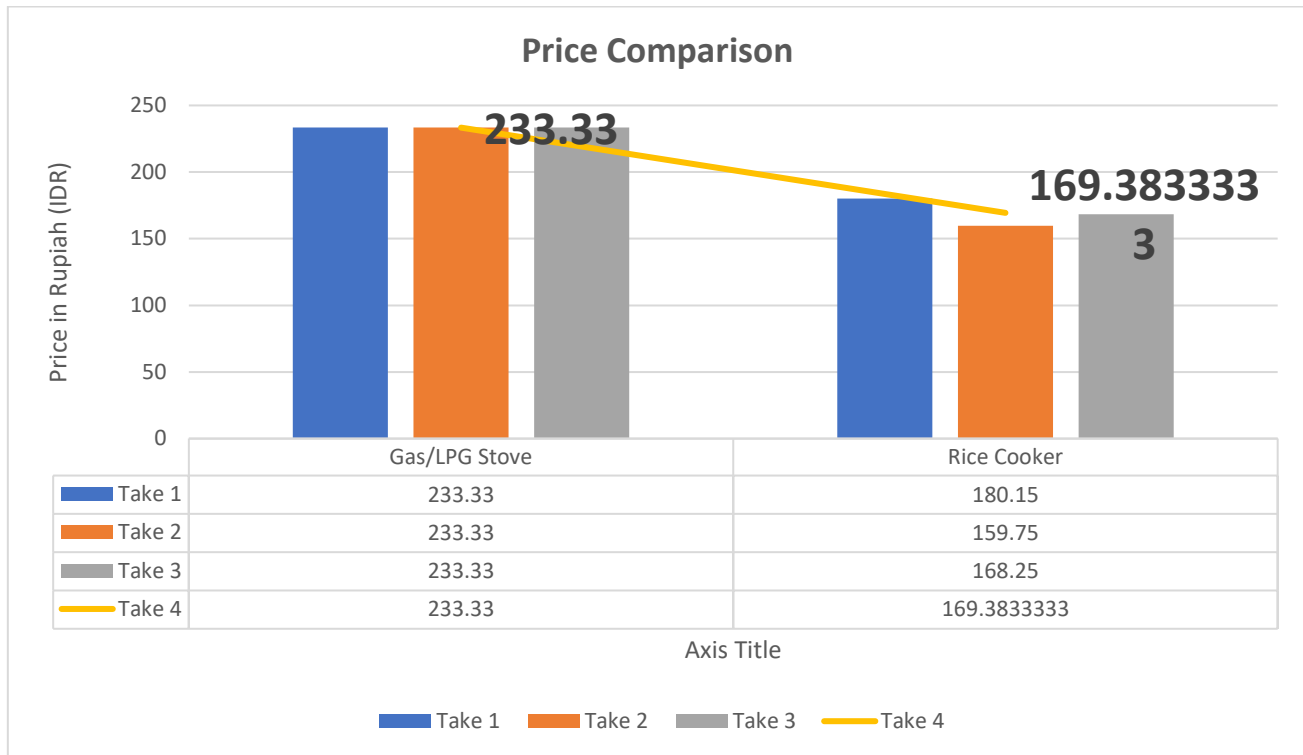
Cuisine	Steps	Take 1	Take 2	Take 3
Sayur bayam	Cut the spinach into bite-size, wash thoroughly, then set aside	50 gr of spinach	50 gr of spinach	50 gr of spinach
	Thinly slice red shallots and red chilies			
	Prepare pot on the stove, then pour water	500 ml of water	500 ml of water	500 ml of water
	Turn on the stove, set the fire to low	0:00	0:00	0:00
	Put sliced red shallots and chilies	2:46	3:00	3:49
	Add salt and pepper	3:00	3:16	4:05
	Add corn kernels	5:17, 40 gr corn kernels	6:10, 40 gr corn kernels	6:30, corn kernels
	Add chopped spinach to the pot, don't let it overcooked	10:27	9:47	10:08
	Turn off the stove	13:10	12:48	13:10
	Matikan api			
Weight of an empty LPG tube		5 Kg		
Weight of LPG tube before cooking		5.6 Kg		
Weight of LPG tube after cooking		5.5 Kg		
Energy (conversion from kg to joule)		4,993 kJ		
Cost		<p>Rp 233.33 for each take</p> <p><i>A tube of 3 Kg LPG is sold around Rp 21,000, so we assume that the tariff per Kg LPG is 7,000</i></p>		

Rice Cooker

Cuisine	Steps	Take 1	Take 2	Take 3
Sayur bayam (Rice cooker)	Cut the spinach into bite-size, wash thoroughly, then set aside			

	Thinly slice red shallots and red chilies			
	Prepare the rice cooker			
	Pour water into the bowl inside the rice cooker			
	Put sliced red shallots and chilies	9:51		
	Add salt and pepper		7:00	7:30
	Add corn kernels	9:55	7:50	8:00
	Add chopped spinach	10:36	12:15	14:58
	Turn off the rice cooker	15:40	14:02	15:09
Average power		46.4 W (Lo) - 416.3 W (Hi)	45.5 W (Lo) – 413.0 W (Hi)	29.2 W (Lo)-405.4 W (Hi)
Energy used		0.106 KWh	0.094 KWh	0.099 KWh
Time		15:40	14:02	15:09
Cost		Rp 180.15	Rp 159.75	Rp 168.25





There are no significant differences between cooking *Sayur Bayem* by using gas/LPG stove and rice cooker. The gap on time and cost to prepare the dish between these two appliances is not as wide as other dishes prepared on the previous experiments. In terms of taste, there is also no difference between the once prepared by rice cooker and by gas/LPG stove.



Spinach soup cooked by using gas stove. Photo Credit: Nisa Nidasari (ICLEI)



Spinach soup cooked by using rice cooker. Photo Credit: Nisa Nidasari (ICLEI)

Nasi Goreng (Indonesian Fried Rice)

Nasi goreng is a famous Indonesian dish, thanks partly to President Obama, who remembers this particular dish as his favourite during his childhood in Jakarta. *Nasi goreng* is quite a popular cuisine, as you can find it at street vendors at night. It is also known as a dish of choice to utilize leftover rice. To prepare *Nasi Goreng* for this experiment, we use a gas/LPG stove and an induction stove to compare.

Ingredients:

- 600 gr rice
- 300 gr of frozen vegetables
- 6 green onions (chopped)

Herbs and Spices (grind all into a fine paste)

- 10 bulbs of red shallots
- 5 cloves of garlic
- 10 curly red chillies
- 8 gr of shrimp paste

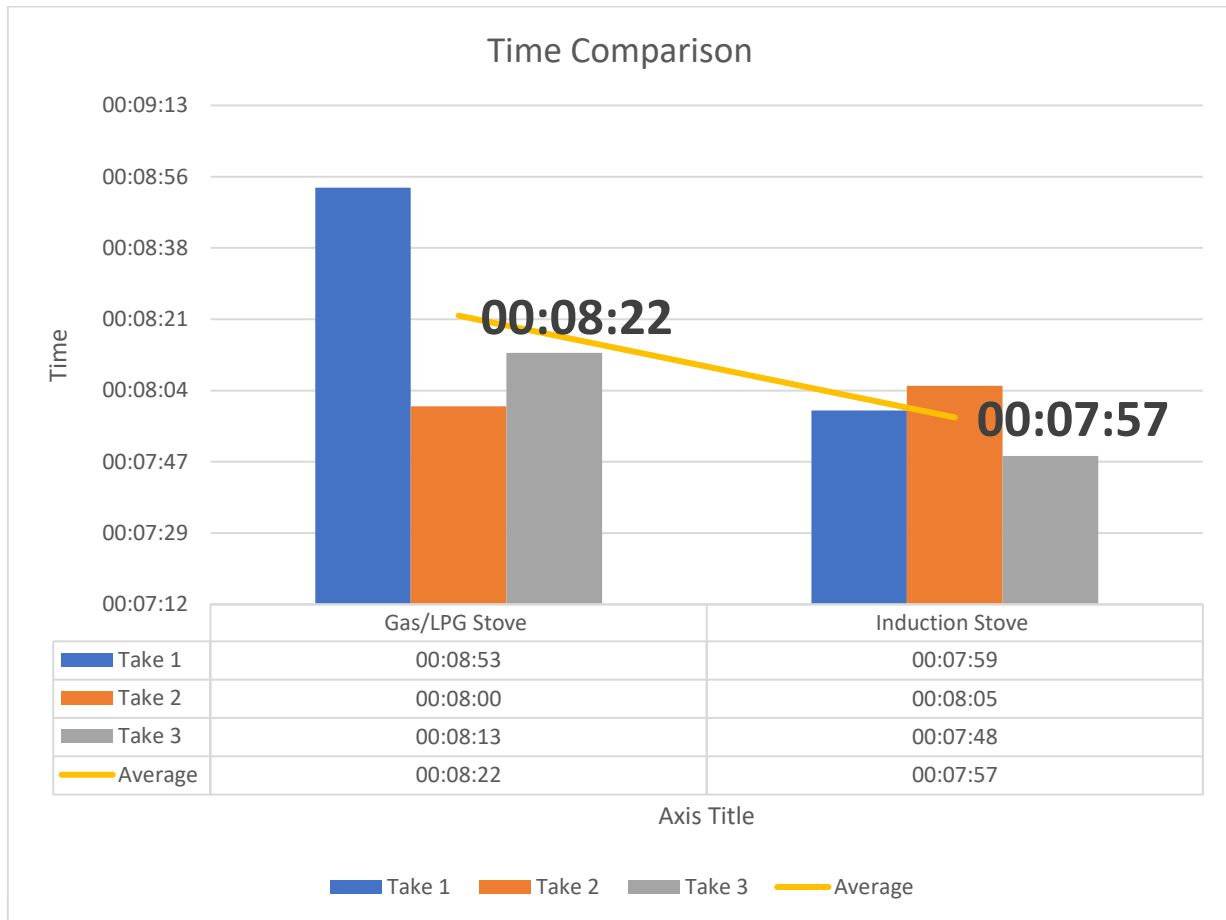
- 3 tbsp of soy sauce
- Salt and pepper to taste

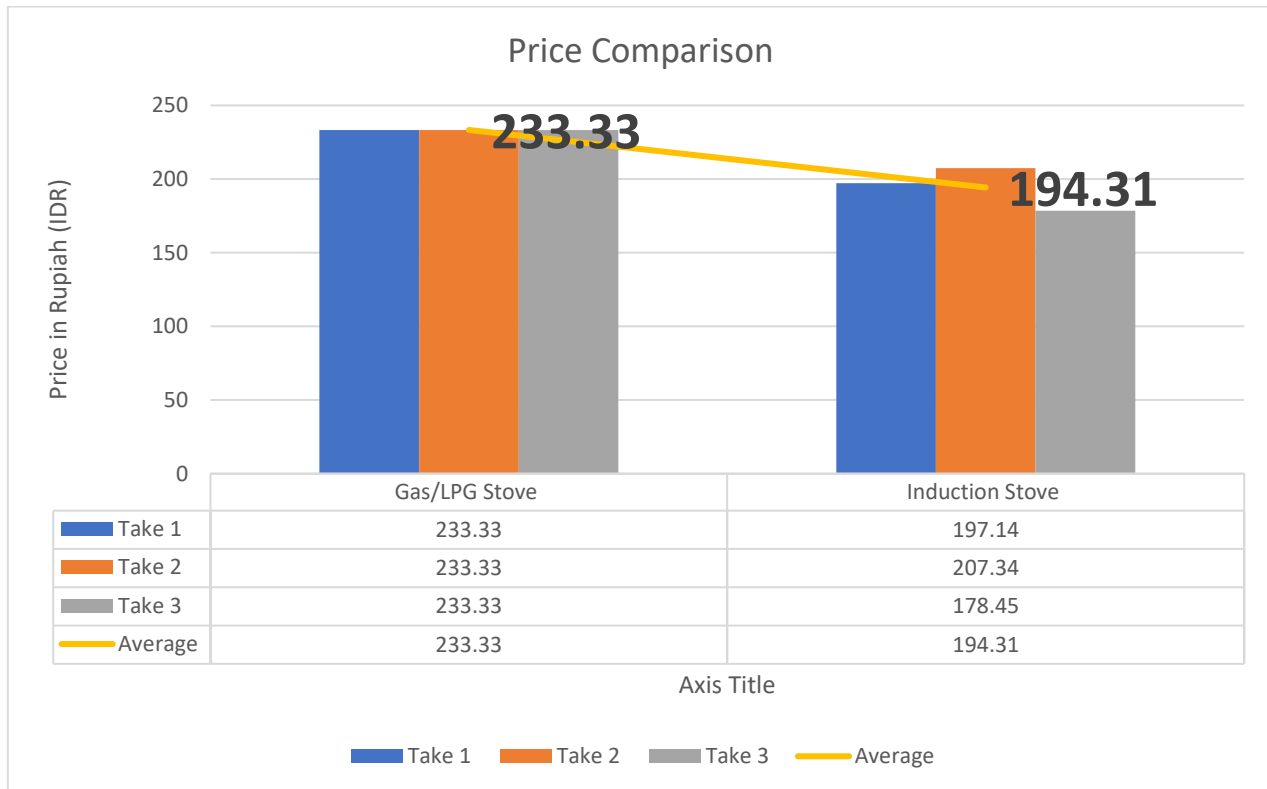
Gas / LPG Stove

Cuisine	Steps	Take 1	Take 2	Take 3
Nasi goreng	Prepare a wok on the gas stove			
	Add 3 tbsp of vegetable oil			
	Turn on the stove, set the fire to medium, then set it to low after the oil heats up	50s	1:12	1:00
	Add paste of herbs and spices, and stir-fry until it smells good	1:50	1:45	1:30
	Put frozen vegetables	3:08, 50 gr of frozen vegetables	3:00, 50 gr of frozen vegetables	3:00, 50 gr of frozen vegetables
	Put rice and mix it thoroughly	4:30, 100 gr of rice	4:30	4:43
	Set fire to high	4:59	4:50	5:10
	Put thinly chopped green onions, mix it thoroughly			
	Stir-fry the rice until it dries up			
	Turn off the stove	8:53	8:00	8:13
Weight of an empty LPG tube		5 Kg		
Weight of LPG tube before cooking		5.6 Kg		
Weight of LPG tube after cooking		5.5 Kg		
Energy (conversion from kg to joule)		4,993 kJ		
Cost		Rp 233.33 for each take		
		<i>A tube of 3 Kg LPG is sold around Rp 21,000, so we assume that the tariff per Kg LPG is 7,000</i>		

Induction Stove

Cuisine	Steps	Take 1	Take 2	Take 3
Nasi goreng (Induksi)	Prepare a wok on the induction stove			
	Add 3 tbsp of vegetable oil			
	Turn on the stove, set it to medium (Indicator 500), then put it to low (Indicator 300) after the oil heats up	1:30 set to 300	1:59 set to 300	1:20 set to 300
	Add paste of herbs and spices, and stir-fry until it smells good			
	Put frozen vegetables			
	Put rice and mix it thoroughly			
	Set the stove to high (indicator 700)	2:57 set to 700	3:15 set to 700	3:05 set to 700
	Put thinly chopped green onions, and mix them thoroughly			
	Stir-fry the rice until it dries up			
	Turn off the stove	7:59	8:05	7:48
	Avg Power	1W- 927.2 W	1.1 w- 930.7W	1.3-925.7 W
	Energy Used	0.116 KWh	0.122 KWh	0.105 KWh
	Time	7:58	8:05	7:48
	Cost	197.14	207.34	178.450





Preparing Nasi Goreng by using an induction stove is slightly more efficient than using a gas/LPG stove. Both its cost and time to prepare Nasi Goreng are cheaper and faster than the other one. However, the panel testers found that the *Nasi Goreng* cooked by an induction stove is not as dried as the one cooked by a gas/LPG stove. It must be noted that fire plays important role in *Nasi Goreng* recipe. The higher setting of the fire on the stove, the tastier it becomes. That is way street vendors who sell *Nasi Goreng* on the street are common to use modified Gas/LPG stove where they can set the fire higher than usual stove used in households.



Nasi Goreng Cooked by Induction Stove. Photo Credit: Nisa Nidasari (ICLEI)



Nasi Goreng Cooked by Gas/LPG Stove. Photo Credit: Nisa Nidasari (ICLEI)

Telur Dadar

(Indonesian Omelette)

Telur dadar is a simple dish usually prepared in the morning for breakfast. It is also usually served as additional dish to enjoy *Nasi Goreng*. It is technically an Indonesian version of an omelette filled with chopped red shallots, green onions, and curly red chilies. To prepare *telur dadar* for this cooking experiment we are using an LPG/gas stove and an induction stove to compare.

Ingredients:

- 2 eggs
- 3 red shallots
- 3 curly red chilies
- 1 green onions
- Salt and pepper

LPG/Gas Stove

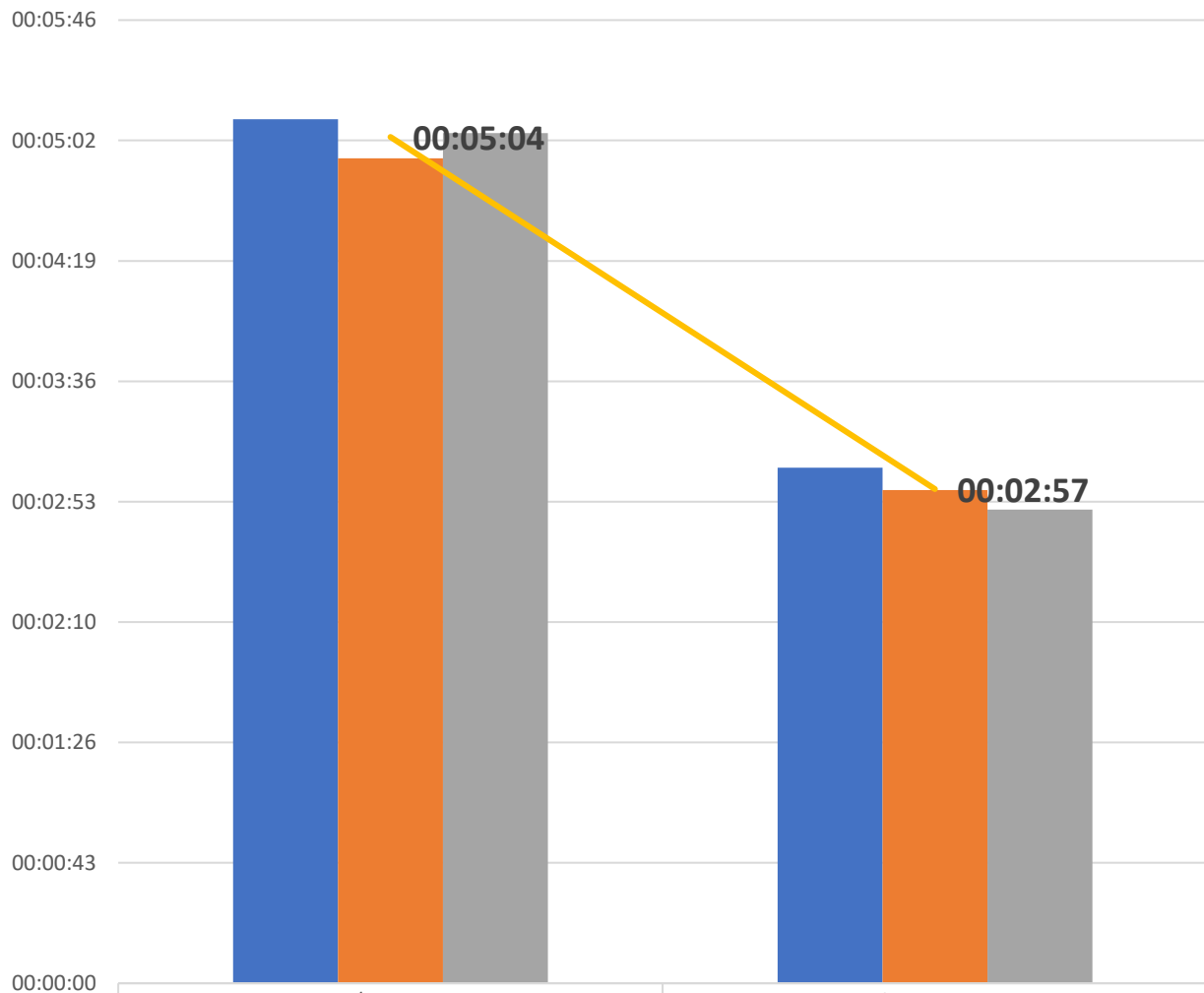
Cuisine	Steps	Take 1	Take 2	Take 3
Telur dadar	Thinly chopped red shallots and curly red chilies			
	Thinly chopped green onions			
	Crack 2 eggs into a mixing bowl			
	Add chopped shallots, chilies, and green onions into the mixing bowl. Mix it thoroughly.			
	Add salt and pepper			
	Mix it thoroughly			
	Prepare a frying pan on a gas stove			
	Add 3 tbsp cooking oil			
	Turn on the stove, set fire to low, and wait until the oil heats up	0:00	0:00	0:00
	Put the mixture onto the frying pan	1:53	1:52	1:30
	Flip it	4:10	3:29	4:07
	Turn off the stove	5:10	4:56	5:05
Weight of an empty LPG tube		5		
Weight of LPG tube before cooking		5.5 Kg		
Weight of LPG tube after cooking		5.5 Kg		

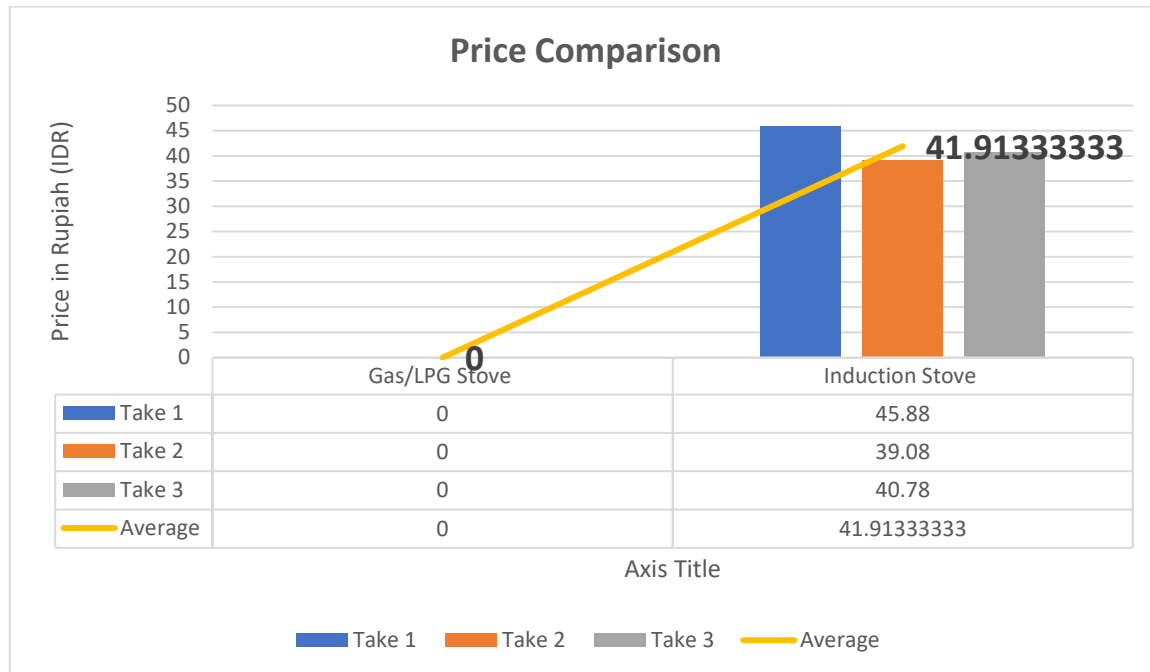
Energy (conversion from kg to joule)	Our device to weight the LPG tube could not detect the weight differences between the tube before and after the cooking
Cost	NA

Induction Stove

Cuisine	Steps	Take 1	Take 2	Take 3
Telur dadar	Thinly chopped red shallots and curly red chilies			
	Thinly chopped green onions			
	Crack 2 eggs into a mixing bowl			
	Add chopped shallots, chilies, and green onions into the mixing bowl. Mix it thoroughly.			
	Add salt and pepper			
	Mix it thoroughly			
	Prepare a frying pan on an induction stove			
	Add 3 tbsp cooking oil			
	Turn on the stove, set it to a low level (Indicator 300), and wait until the oil heats up	0:00	0:00	0:00
	Put the mixture onto the frying pan	0:50	0:38	0:43
	Flip it	2:10	1:58	1:50
	Turn off the stove	3:05	2:57	2:50
Average Power		1W- 827.7 W	1.1 w- 825.4W	1.1W-835.4 W
Energy		0.027 KWh	0.023 KWh	0.024 kwh
Time		3:05	2:57	2:50
Cost		Rp 45.88	Rp 39.08	Rp 40.78

Time Comparison





We found that cooking Telur Dadar on an induction stove is faster than cooking in gas/LPG stove. It also gives the same result and taste. The panel testers could not see the difference between omelettes made by induction stove and the one made by gas/LPG. However, in terms of price, we could not measure how much it cost to cook by gas/LPG, because our weight measurement could not detect significant change on the LPG tube before and after we cooked *Telur Dadar*.



Telur Dadar Cooked by a Gas/LPG stove. Photo Credit: Nisa Nidasari (ICLEI)



Telur Dadar Cooked by an Induction Stove. Photo Credit: Nisa Nidasari (ICLEI)

Krupuk Udang

Krupuk Udang is Prawn crackers (Indonesian: krupuk udang) are a deep fried snack made from starch and prawn. They are a common snack food in Southeast Asian Cuisine, but they are most closely associated with Indonesia and Malaysia. To prepare *Krupuk Udang* we use a gas/LPG stove and a microwave. The reason to choose microwave instead of an induction is to reduce the usage of vegetable oil in cooking this dish. S

Ingredients:

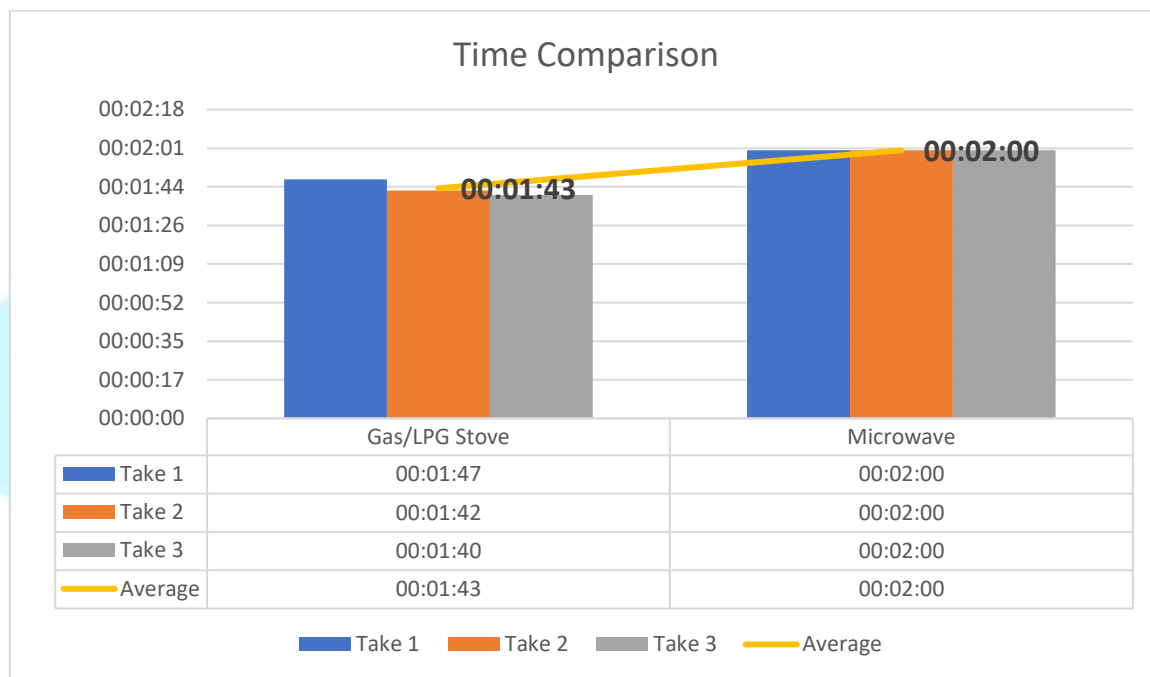
- Krupuk Udang 3 pcs

Procedures:

- Heat 125 ml of oil for 1 minute
- fry Krupuk Udang for 40 seconds

We tested cooking krupuk udang on gas stove and on microwave. The result showed the dish need a longer time of cooking using microwave compared to the gas stove. However, using microwave is a healthier option because we don't need to use cooking oil. Based on the quality feedback from a panel of tester, there is no difference in taste between krupuk udang prepared by gas stove and microwave. The looks are also similar.

Device/Appliance	Time	Average Power	Energy	Cost
Gas Stove	00:01:47	Undetected as it is very small	Undetected as it is very small	NA
	00:01:42	Undetected as it is very small	Undetected as it is very small	NA
	00:01:40	Undetected as it is very small	Undetected as it is very small	NA
Microwave	00:02:00	687 W	0.022671 KWh	Rp 38.53
	00:02:00	680 W	0.02244 KWh	Rp 38.13
	00:02:00	681 W	0.022473 KWh	Rp 38.19



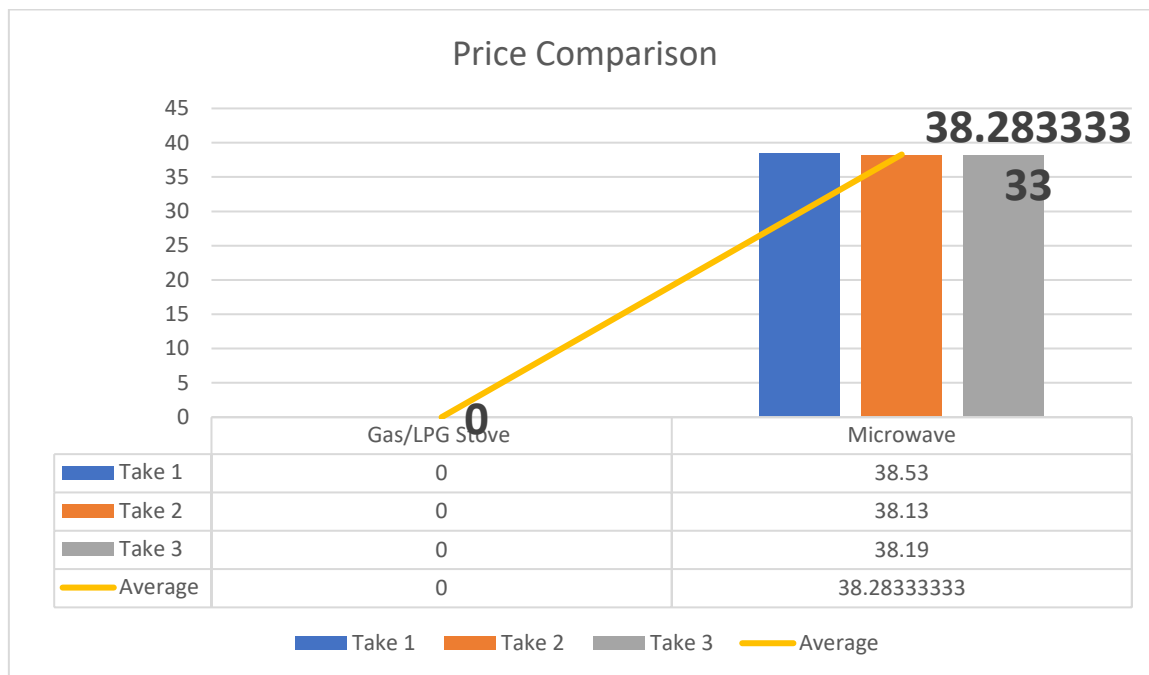


Figure 1 krupuk using gas stove. Photo Credit: Nisa Nidasari (ICLEI)



Figure 2 krupuk using microwave. Photo Credit: Nisa Nidasari (ICLEI)

Siomay

Siomay is an Indonesian steamed fish dumpling with vegetables served in peanut sauce. It is derived from Chinese Shumai. It is considered a light meal that is a type of Chinese Dim Sum, but is cone shaped. It is traditionally made from pork but frequently substituted with tenggiri (Spanish) fish meat for halal reasons. Sometimes other types of seafood such as tuna, mackerel, and prawn also can be used to make siomay.

Ingredients:

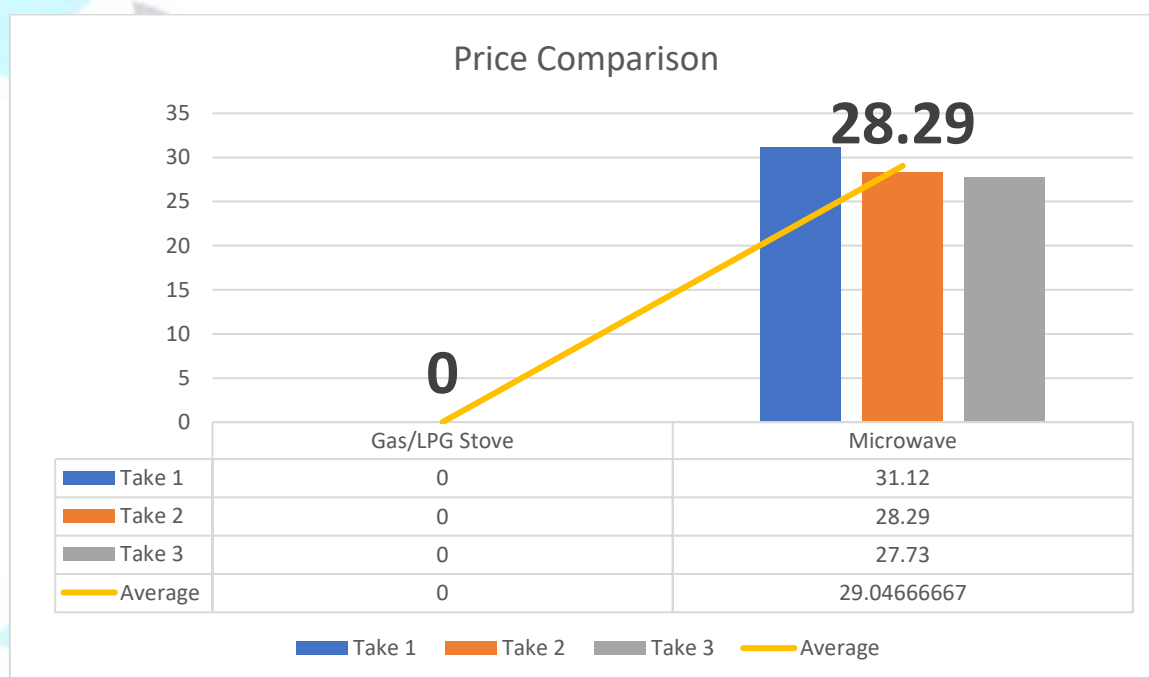
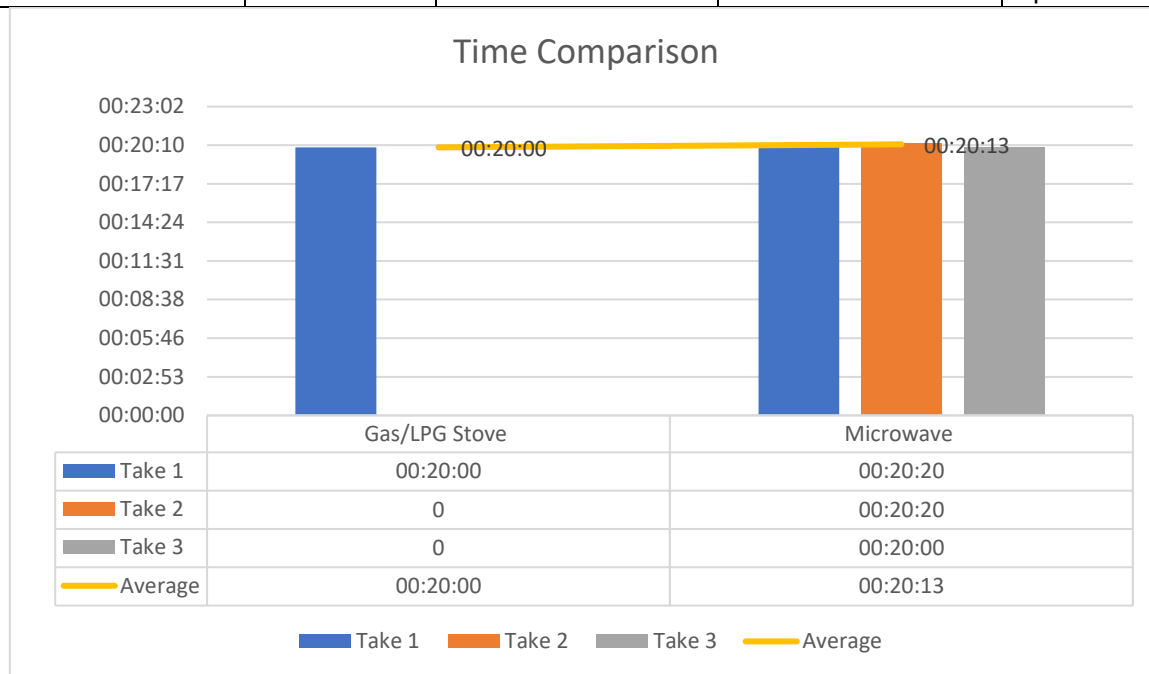
- 500 grams frozen siomay

Procedure:

- steam the siomay in the pan for 20 minutes

We tested cooking siomay on gas stove and on rice cooker. The result showed the dish took the same amount of time to cook in the two devices and there is no different in taste based on the quality feedback from a panel of testers.

Device/Appliance	Time	Average Power	Energy	Cost
Gas Stove	20 mins	Undetected as it is very small	Undetected as it is very small	NA
Microwave	20 mins	55 W	0.018315 KWh	Rp 31.12
	20 mins	50 W	0.01665 KWh	Rp 28.29
	20 mins	49 W	0.016317 KWh	Rp 27.73





Siomay cooked by using rice cooker. Photo Credit: Nisa Nidasari (ICLEI)



Siomay cooked by using gas stove. Photo Credit: Nisa Nidasari (ICLEI)