A MIDDLE-OUT STRATEGY FOR SHAVING THE SUMMER PEAK DEMAND: FINDINGS FROM A FIELD STUDY

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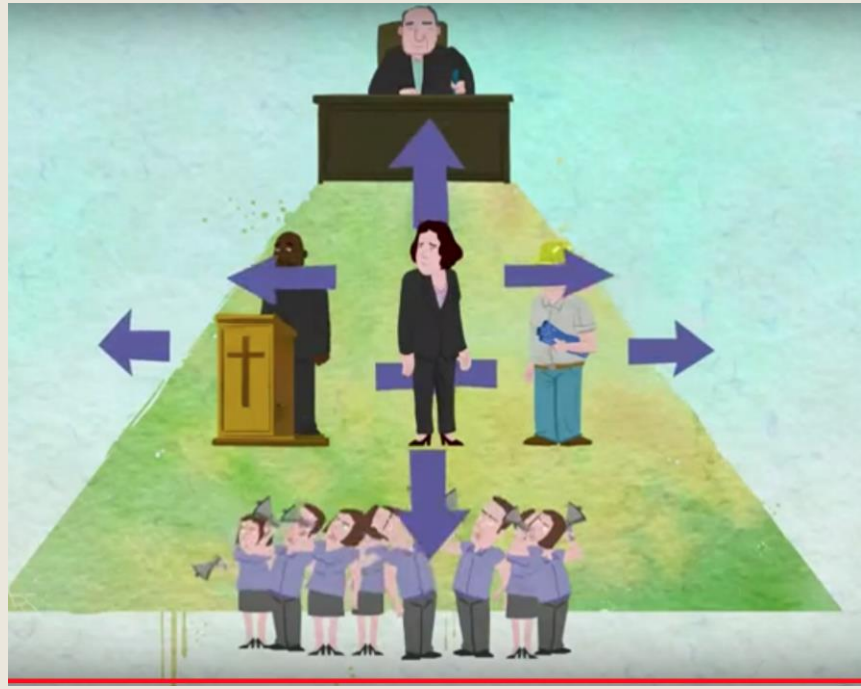
The Challenge:
‘Shaving’ the Summer Peak Residential Demand

- Fossil-fuel based electricity system
- >30°C in July and August
- ACs responsible for more than 60% of the residential peak demand
- Peak hours: Sun-Thu 10:00-17:00
- Expensive and polluting electricity
- Flat tariff
  - *Voluntary TOU → very low adoption*
- **Reducing peak demand entails environmental and economic benefits**

Middle Out:
From a Theory to Strategy

- Socio-techno-economic transition to a low carbo society
- Middle actors as effective agent of change
  - *Agency and capacity*
- Inducing change from the middle out:
  - *Downstream*
  - *Upstream*
  - *Sideways*
- Providing evidence to support the theory




How to construct a new theory?!

A Middle-Out Strategy

A Kibbutz - (as close as possible to) a lab setting to test the MO strategy

- Relatively low variance of standards of living
- Relatively high level of shared value
- A formal and non-formal community structure and communication channels
- Easy to identify middle actors

Middle Out Strategy for reducing peak demand in local communities

- Middle actors' involvement and mediation
- Kibbutz Yakum (Y) and HaZorea (H)
  - *n(Y)=65 hh, opt in recruitment*
  - *n(H)=235 hh, opt out recruitment*
- Electricity consumption data available from 2015
- Flat rate
- In both Kibbutzim $45 was offered in 2016 to households that reduced their consumption by 10% compare to 2015

2018 Experiment

- 150NIS (~43$) offered to households that reduced electricity consumption by at least 10%
- During July and August, twice a week (on Tue and Thu) at 11am, the contact person of the households received tailored (comparison to others) or generic (energy saving advice) SMS message.
- A weekly reminder message signed by a middle actor was sent via the Kibbutz local broadcast channel
  - *In Kibbutz H these messages were sent weekly, while in Kibbutz Y they were sent only 3 times.*
- **Only in Kibbutz H**, social community engagement events held in July
  - *a film featuring the impact of climate change on marine life, accompanied by a lecture on the topic;*
  - *a lecture about climate change and its impact on Israel and the Middle East;*
  - *an activity for teenagers about energy and climate change, involving the building of a mini geodesic dome;*
  - *an article in the local weekend newspaper about the project and its relation to climate change mitigation.*

Participants entitled for the incentive
(at least 10% reduction)

	Kibbutz Y	Kibbutz H
Number of participants	66 (opt in)	258 (opt out)
Entitled for incentive	20 (30%)	91 (35%)
Out of which (total consumption during peak hours in Jul & Aug):		
Small consumers (<292 kWh)	32%	53%
Medium consumers (293-360 kWh)	23%	19%
Large consumers (> 361 kWh)	55%	28%

Household which were not occupied for more than consecutive 3 days were excluded

Overall peak demand reduction of participating households in each Kibbutz

	Kibbutz Y (n=60)		Kibbutz H(n=238)	
	2017	2018	2017	2018
Total Jul & Aug peak consumption (kWh)	24,971	23,835	74,547	70,035
Change in kWh (%)		1,136 (-4.5%)		4,512 (-6%)
Jul & Aug Average (stdv) peak consumption /household	416 (186)	397 (179)	313 (191)	294 (190)

Changes in residential peak consumption (kWh) between 2015-2018

	Kibbutz Y (n=53)				Kibbutz H (n=204)			
Year	2015	2016*	2017	2018**	2015	2016*	2017	2018**
Total Jul & Aug peak consumption (kWh)	20,727	21,996	23,337	22,694	62,682	63,684	62,609	59,103
Change in kWh (%)		1,269 (6%)	1,341 (6%)	-643 (-3%)		1,002 (2%)	-1,075 (-2%)	-3,506 (-6%)
Jul & Aug Average (stdv) peak consumption /household	391 (185)	415 (177)	440 (175)	428 (164)	307 (181)	312 (199)	307 (177)	290 (181)

Kibbutz Y - Changes in residential consumption (kWh)

	Participating hh (flat rate)	Non-participating hh (flat rate)	Non-participating hh (Time of Use)
Number of hh	60	100	102
Total (average) peak consumption Jul & Aug 2017	24,971 (416)	29,481 (295)	37,551 (368)
Total (average) peak consumption Jul & Aug 2018	23,835(397)	30,445 (304)	37,134 (364)
Change (%)	-4.5%	3%	-1%

Survey results

	Tailored SMS	Timing of SMS	Reminder from Kibbutz	Energy saving tips	Kibbutz Involvement	Economic incentive	Postpone demand (shift)	AC temp setting
Kibbutz H. n=131 (53%)								
Average	**3**	**2.7**	**2.7**	**3**	**3.1**	**2.4**	**3.6**	**3.3**
Median	**3**	**3**	**3**	**3**	**3**	**2**	**4**	**4**
Mode	**3**	**1**	**1**	**3**	**4**	**1**	**5**	**5**
Kibbutz Y. n=36 (50%)								
Average	**3.5***	**3.3***	**3.5***	**3.4***	**3.4**	**3**	**3.8**	**3.5**
Median	**3**	**3**	**4**	**4**	**4**	**3**	**4**	**4**
Mode	**3**	**3**	**3**	**4**	**4**	**5**	**5**	**4**

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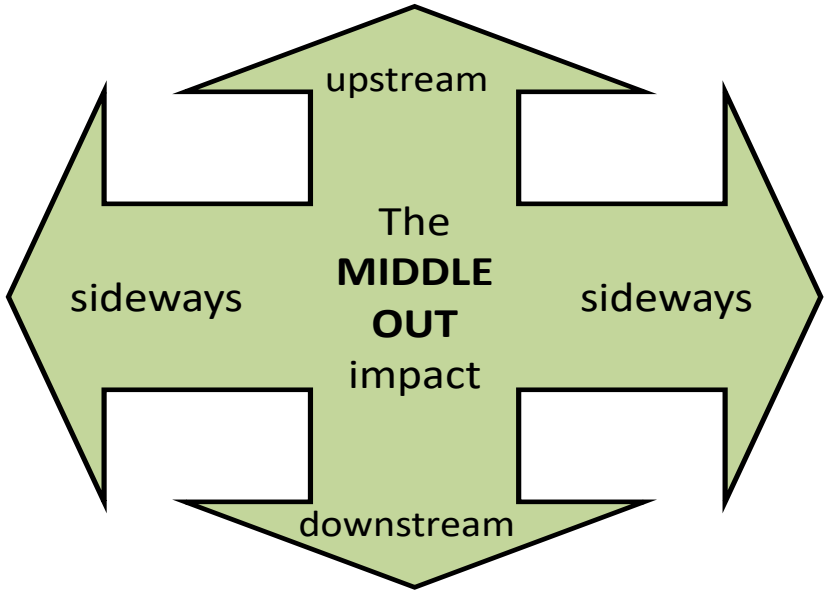
Average	3	2.7	2.9	2.6	3.1	2.4	3.5	3.3
Median	3	3	3	3	3	2	4	4
Mode	3	1	3	1	4	1	5	5
Kibbutz Y. n= 34(52%)								
Average	*3.6	*3.4	*3.5	*3.5	3.5	*3	3.7	*3.5
Median	3	3	4	4	4	3	4	4
Mode	3	3	4	3	4	5	5	4

1: not at all----------5: very much

T test, $p<0.5$

Mishkey HaKibbutzim organization and an energy supplier are interested in replicating the project next year

Kibbutzim showed interest in similar projects



Kibbutzim showed interest in similar projects

Households reduced their peak consumption

THANK YOU

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