Evaluation of Greenhouse Gas Emissions in Eilat

Rosalyn Bates, Samantha Marcil, David Schwartz

Climate Change In Israel

MAY 25, 2020, 6:43 AM

Long, intense and dangerous heat waves likely to become more common, expert says

But as the Mediterranean region warms 20% faster than the global average, an ambitious government roadmap, with 31 action points to help Israel adapt, remains without funding

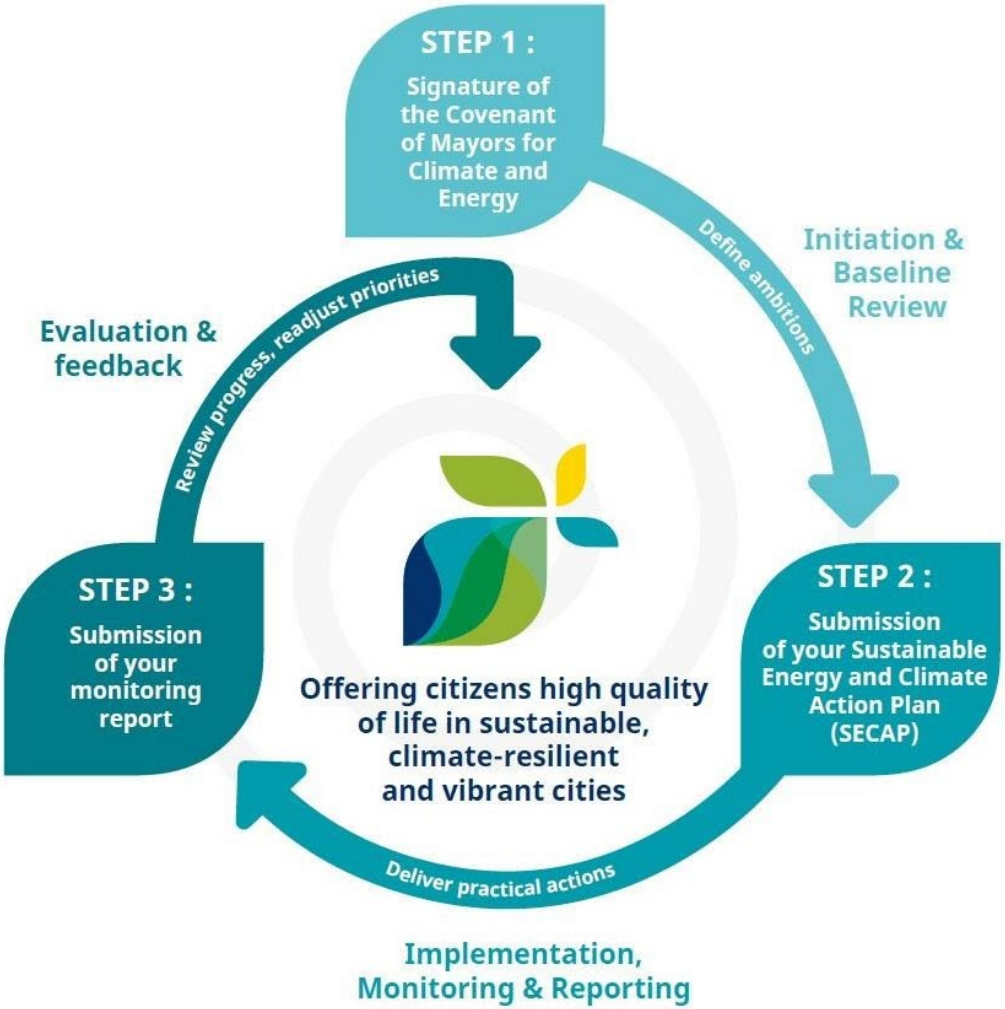
By **SUE SURKES** (Surkes, 2020)

MAY 19, 2020, 7:34 PM

Deadly heat wave broils Israel, drives record electricity use

Temperatures soar into the upper 40s Celsius throughout the country; firefighters battle wildfires, rescue people from elevators; at least three deaths blamed on heat (Staff, 2020)

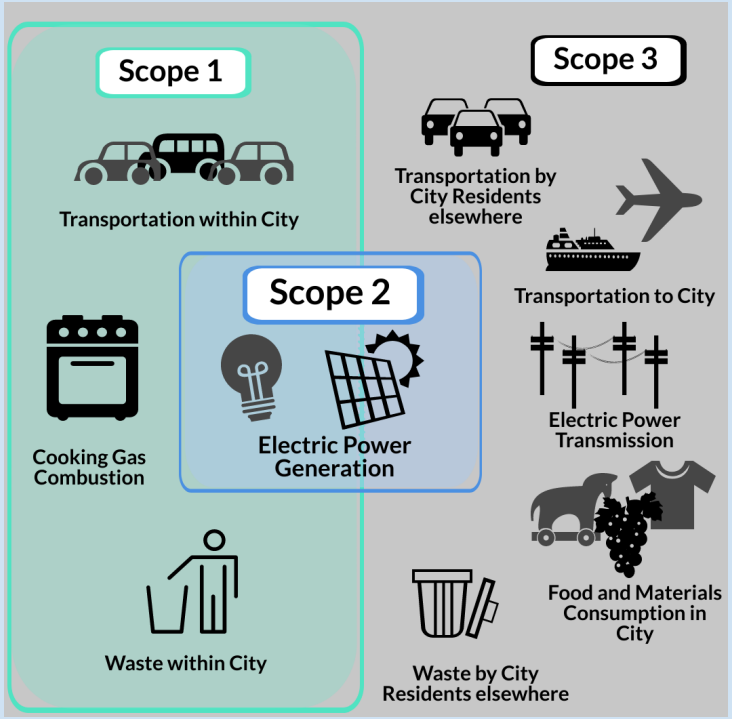
(GCoM About Us Page)



(Bertoldi, 2010)

Project Goal

To evaluate progress towards a 20% reduction in GHG emissions since 2014



Emission Scopes

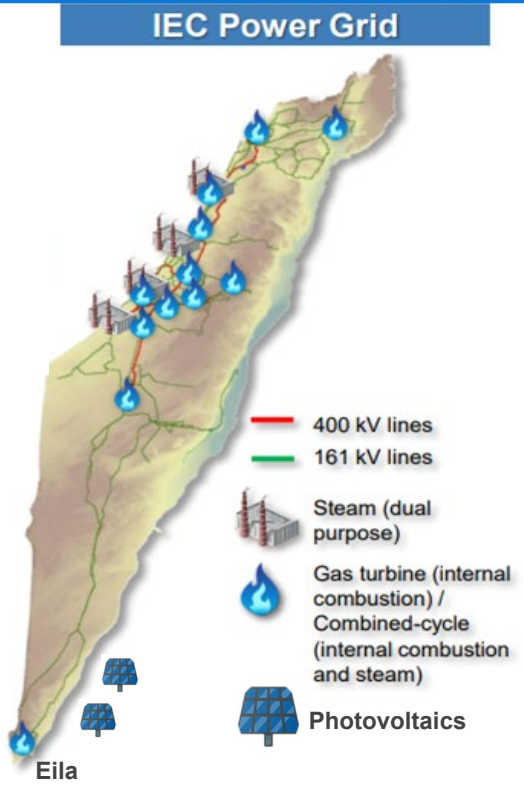
Emission Sources

Electric Power

Transportation

Waste

Emissions from Electric Power



IEC Investor Presentation (2019)

Emissions Factors

Year	Gram CO_2/ net-kwh	Gram N_2O / net-kwh	Gram CH_4 / net-kwh	Gram CO2eq/ net-kwh
2010	726	0.00899	0.00940	729
2011	733	0.00925	0.01021	737
2012	783	0.01030	0.01329	787
2013	700	0.00848	0.00936	703
2014	685	0.00860	0.00856	688
2015	693	0.00863	0.00881	696
2016	661	0.00767	0.00860	663
2017	639	0.00707	0.00864	641
2018	629	0.00680	0.00850	631
2019	642	0.00718	0.00865	645

IEC Environmental Report (2019)

Algorithm:

Power Demand in Eilat

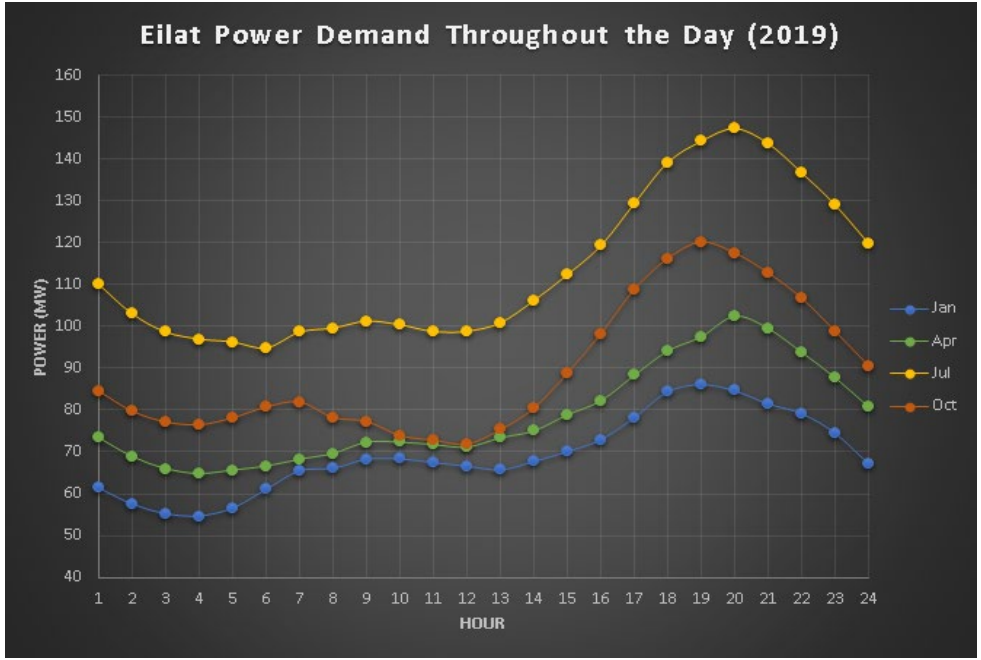
− Power Supply from PVs

Power Supply from Fossil Fuels

Σ Over every hour of the year

$*$ Emissions Factor ($645\ gCO_2eq/kWh$)

Power Demand in Eilat

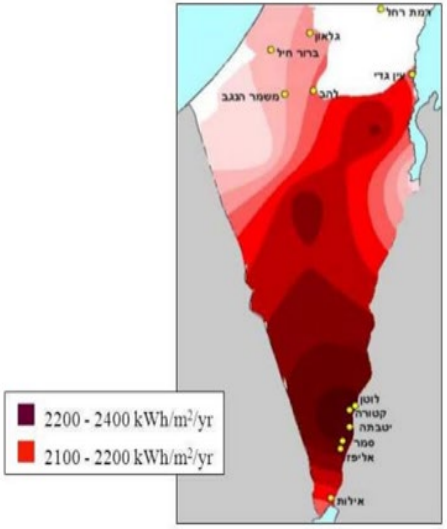


Rooftop Installations in Eilat

- 24,000 modules
- Area typically 1-2.0 m^2/module
- Approximately 6.7 MW installed capacity

PVs in the Southern Arava

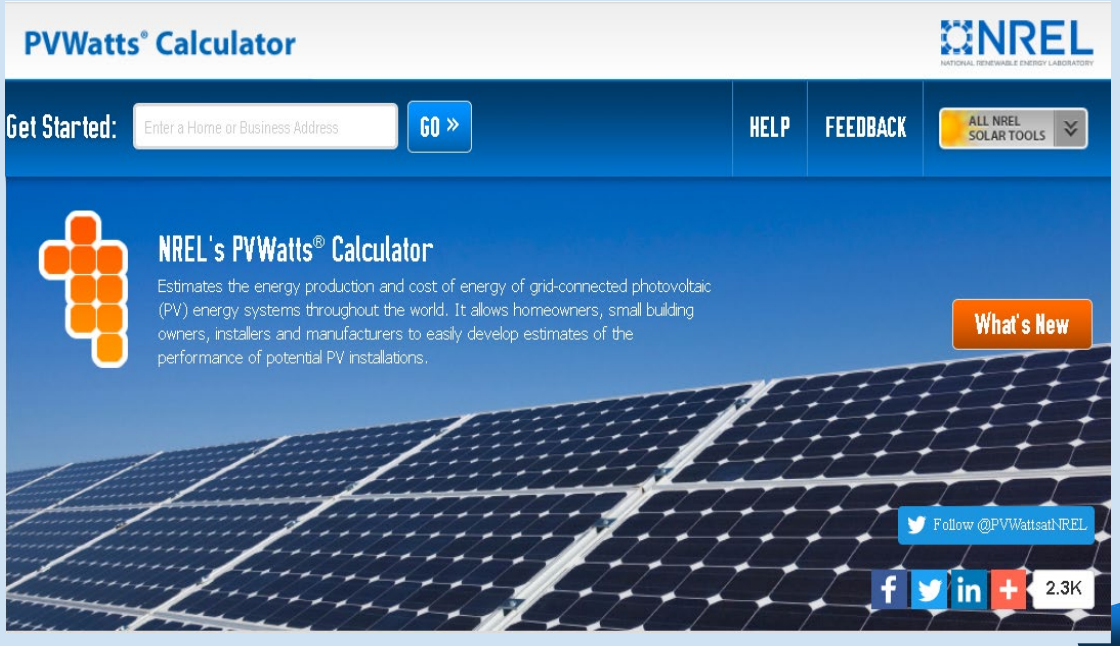
Ketura Sun Solar Field



- Plentiful of solar insolation (over 2000 kWh/$m^{2.}$/year)
- Nearly 190 MW of PVs installed by 2019

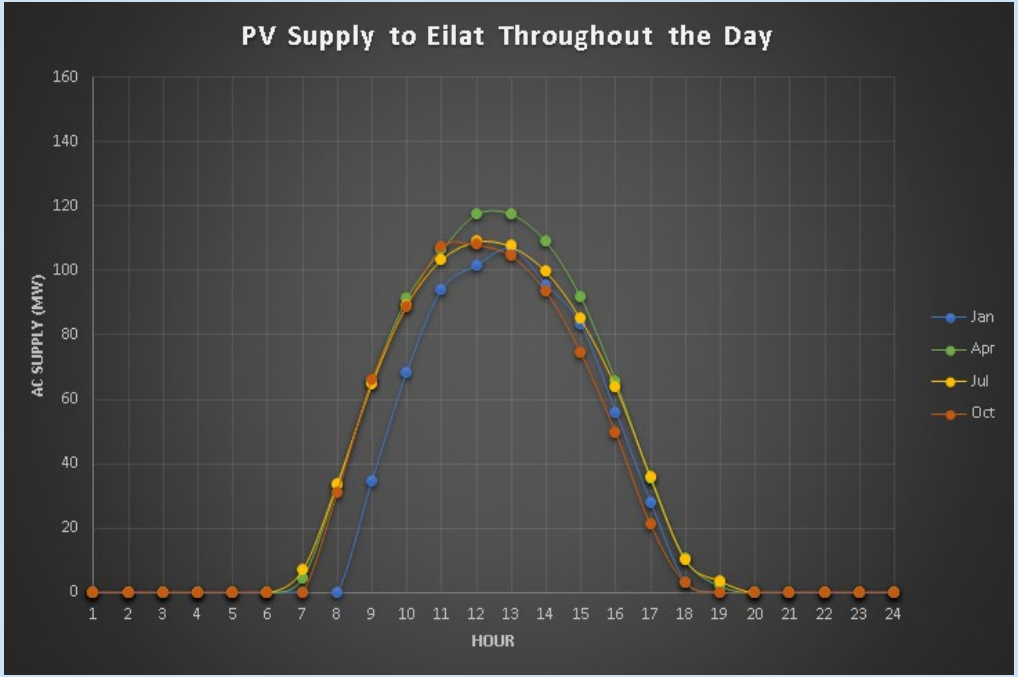
Modeling Photovoltaics

- National Renewable Energy Lab PVWatts
  - Meteorological Database
  - Predicts PV performance



pvwatts.nrel.gov

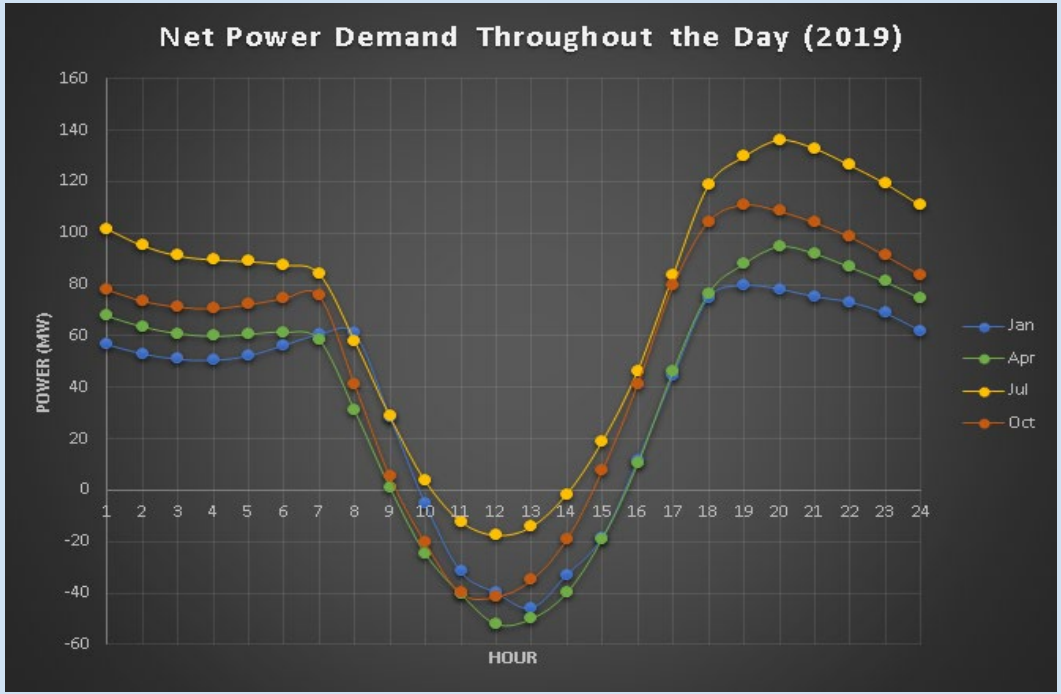
PVWatts Results



Assumptions:

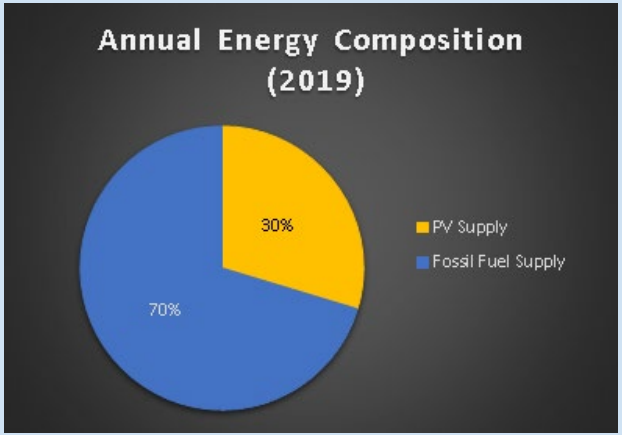
- Production occurs during daylight hours
  - 96% inverter efficiency
- Max output during mid-day
  - 95% goes to Eilat
- Summer has longer daylight
  - 5% transmission losses
- Spring has greatest PV propeak power

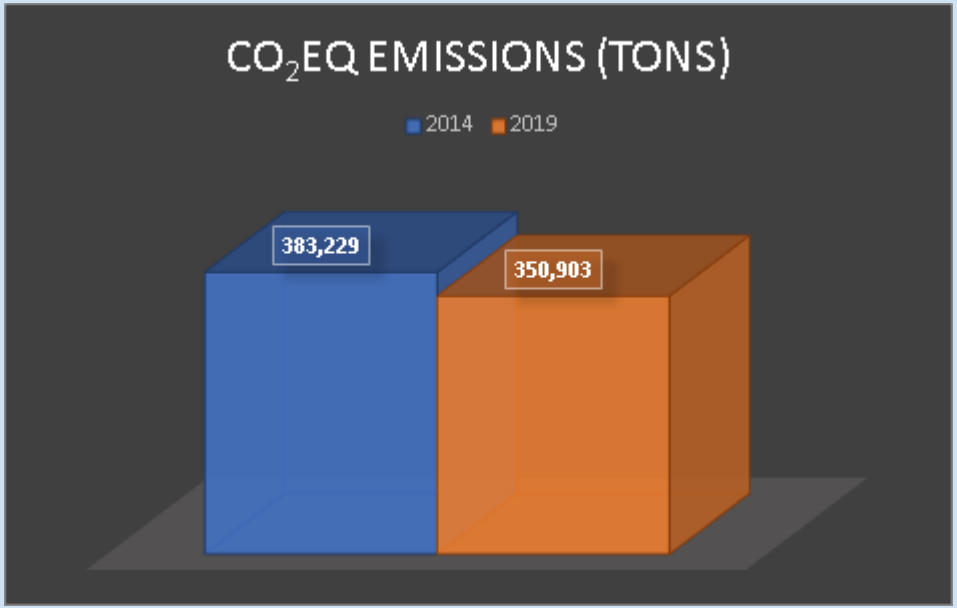
Comparing PV Supply to Demand



- Satisfies demand throughout most of the day
- Energy storage would allow Eilat to utilize excess production

Emissions Results from Power





Transportation Data Collection

- Central Bureau of Statistics
- Municipality of Eilat
- Distance assumption based on BEI

Vehicle Category	Number of Vehicles	Total Annual Distance (km)
Private Vehicle	17,430	242,277,000
Light Truck	1,122	23,898,600
Truck	597	8,716,200
Minibus	44	2,204,400
Bus	55	3,162,500
Taxi	503	36,618,400
Motorcycle	1,617	11,642,400
Municipal Vehicles	12	121,915
Special Vehicles	33	597,300
Total:	**21,413**	**329,238,715**

Transportation Estimation Methods

Baseline Emissions Inventory

Vehicle Category	Emission Factor (g CO_2 (eq)/km)
Private Vehicle	300
Light Truck	396
Truck	1011
Bus	820
Taxi	300
Motorcycle	100
Municipal Vehicle	847
Special Vehicle	847

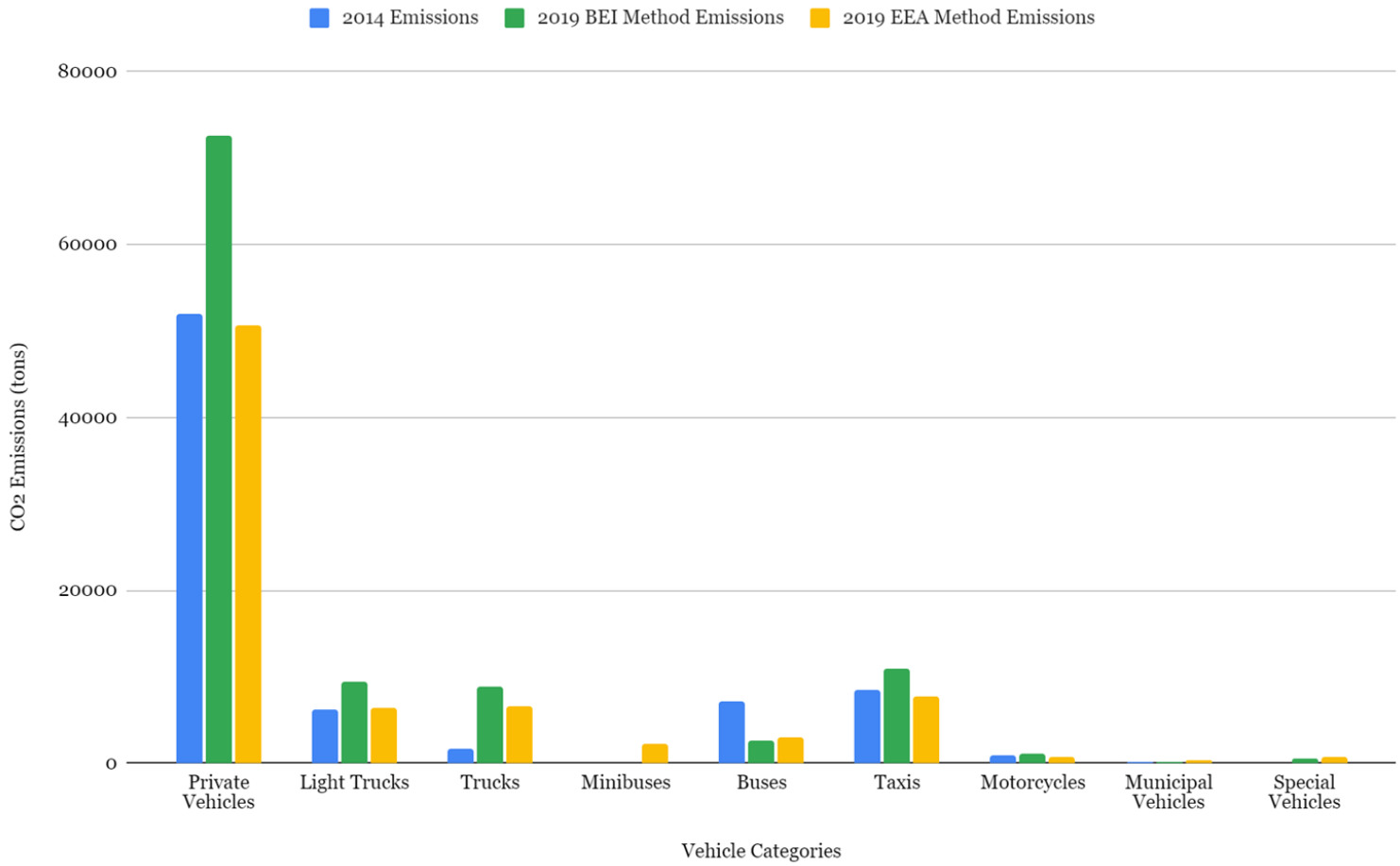
IPCC Emission Factors

European Environment Agency

Vehicle Category	Fuel Consumed (g/km)	Emission Factor (g CO_2 (eq)/km)
Private Vehicle	66	209
Light Trucks	85	269
Trucks	240	761
Minibus	331	1049
Buses	301	954
Taxis	66	209
Motorcycles	17	54
Municipal Vehicles	930	2948
Special Vehicles	392	1242

EEA Fuel Consumption

Transportation Emission Results



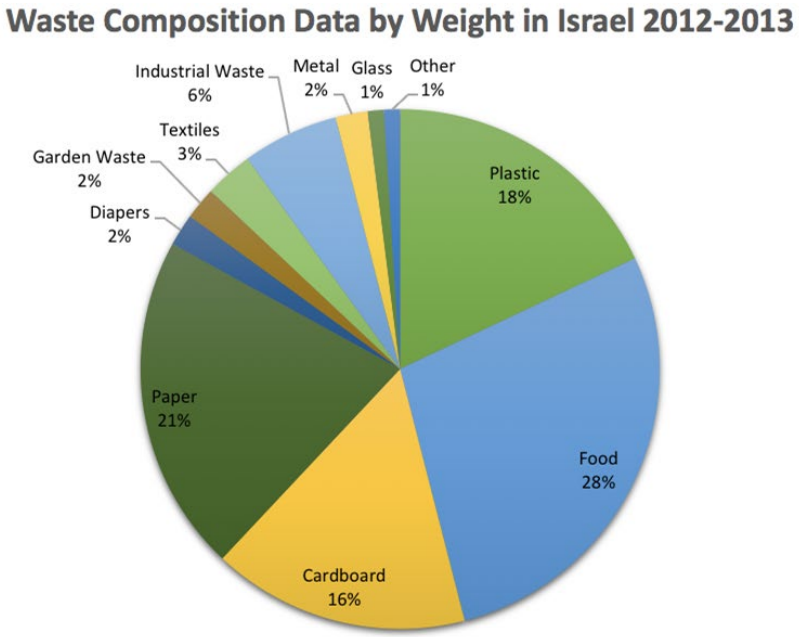
78,469

CO_2 eq tons

Transportation Emission Reduction Measures

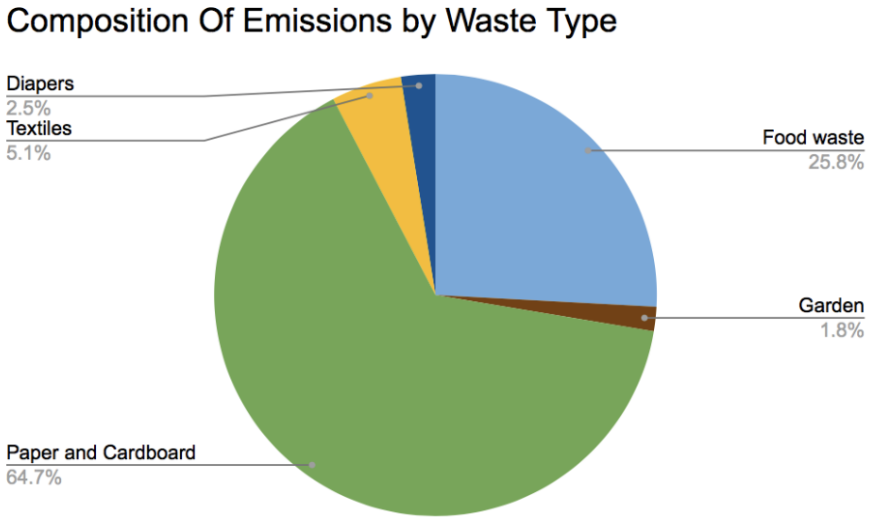
- Increased use of public transportation
- Hybrid/Electric vehicle use

Municipal Solid Waste Methods



- First Order Decay Method
- 70% of methane recaptured
- Sources: Eilat Environmental Unit, IPCC, EPA

Municipal Solid Waste Results



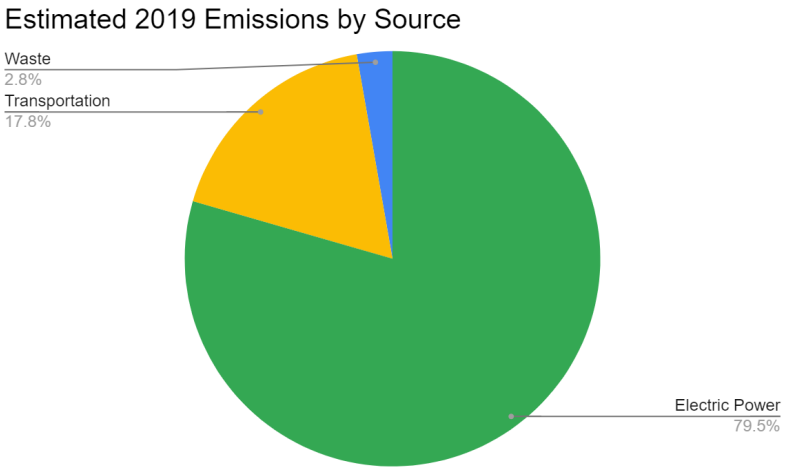
Type	Total CO_2(eq) Emissions
Food waste	3,149
Garden	217
Paper and Cardboard	7,887
Textiles	626
Diapers	306

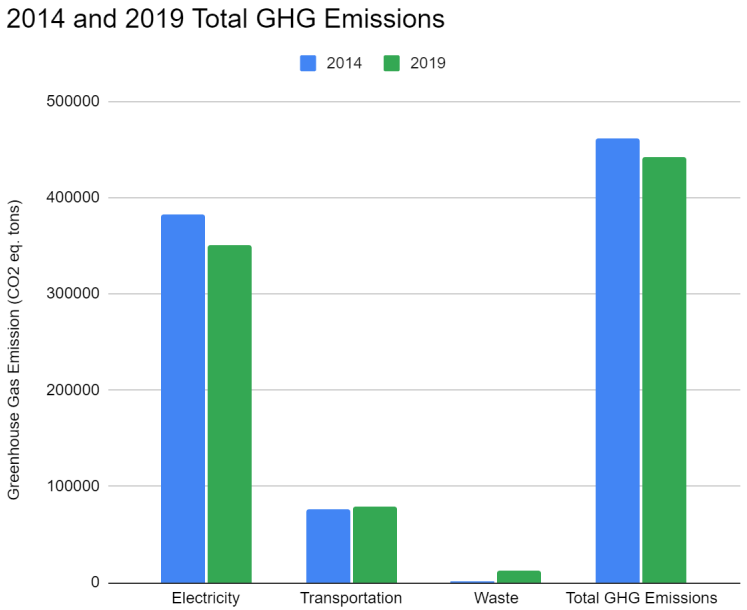
Total Waste Emissions: 12,185 CO_2(eq) tons

Municipal Solid Waste Discussion

- Cannot make clear comparison to BEI waste emissions
- Data from 2015 still significant
- Make efforts to encourage recycling

Conclusions





Total: 441,558 CO_2eq tons

Thank you

We would like to thank each person that has made this project possible

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- Our sponsors, Assaf Admon and Elad Topel
- The Arava Institute

Thank you!
Any questions?