Israel's Electricity Policy

Arava Institute Course

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December 7th 2021

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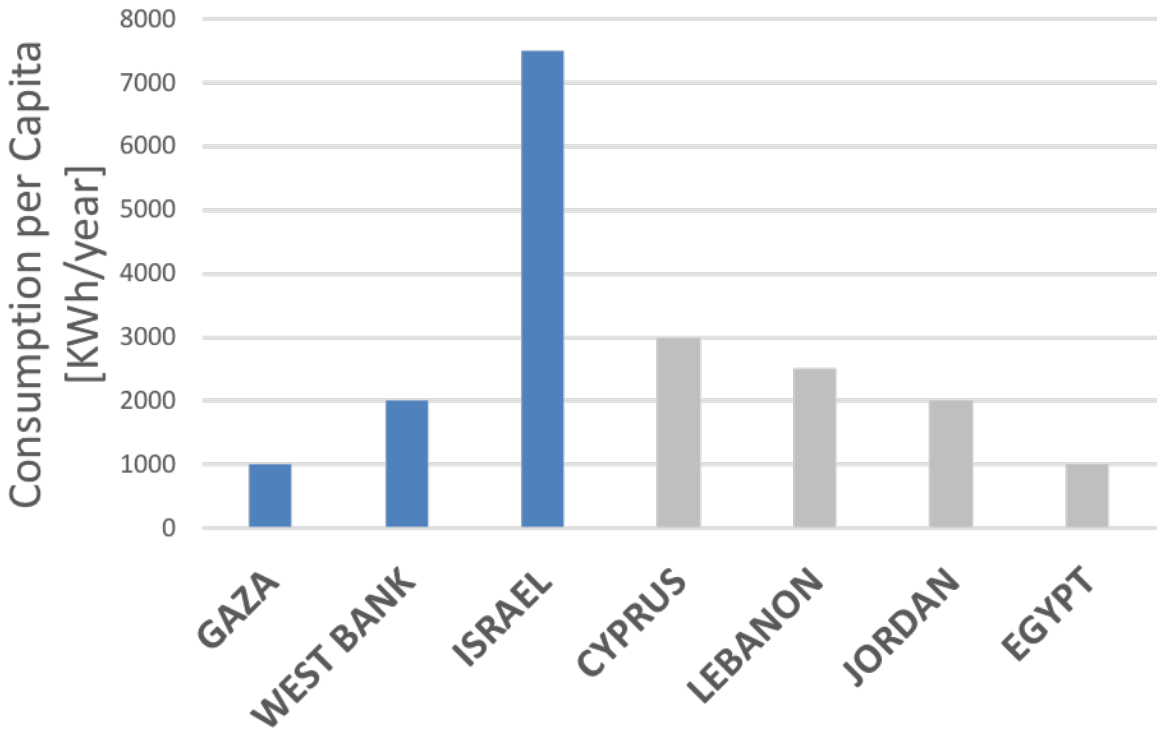
Agenda

- Electricity Demand
- Market structure
- Fuel mix and emissions target
- Renewables
- Storage

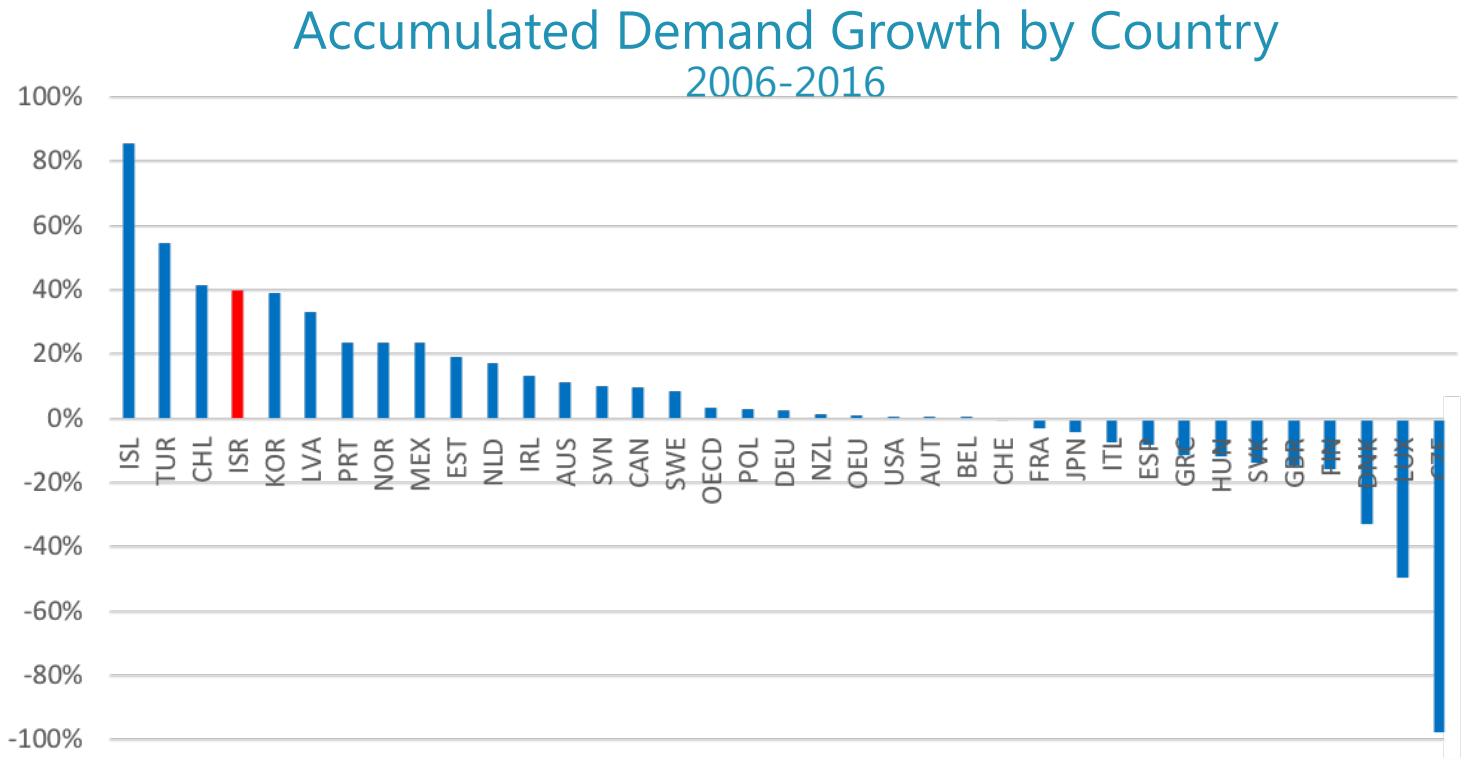
Electricity Demand

High consumption per capita, compared to neighbors



Israel is consuming ~72 TWh with a ~14 GW peak
Consumption per capita is high compared to neighboring countries

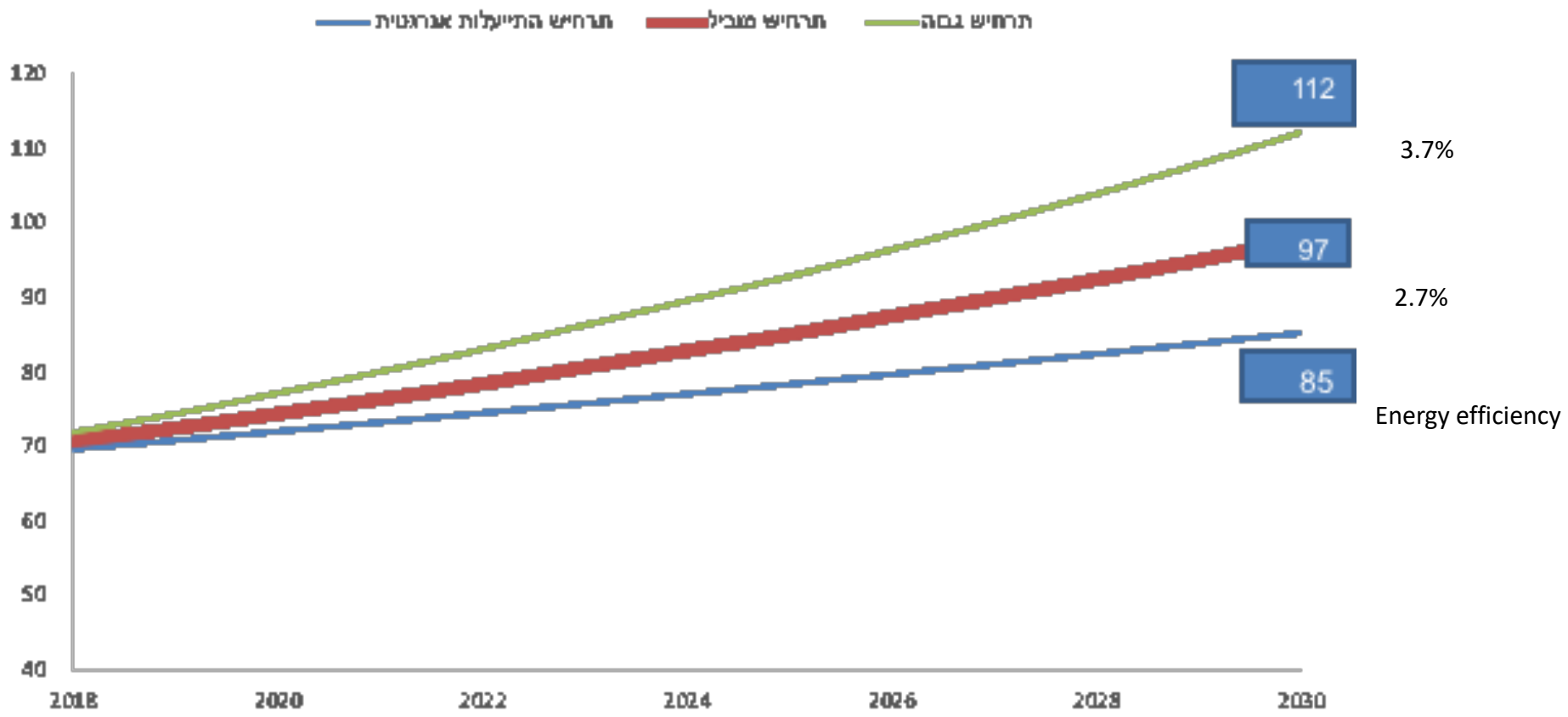
Rapid demand growth



Adapte from OECD data

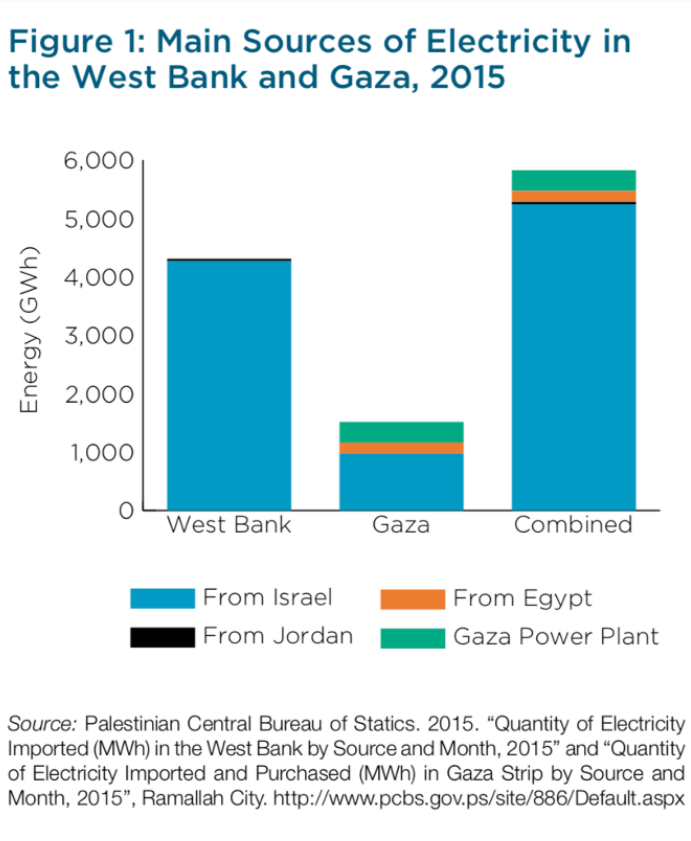
Demand is growing at a rapid rate compared to other western countries

Future demand is expected to grow by 2.7%/year



Israel supplies most of the Palestinian demand

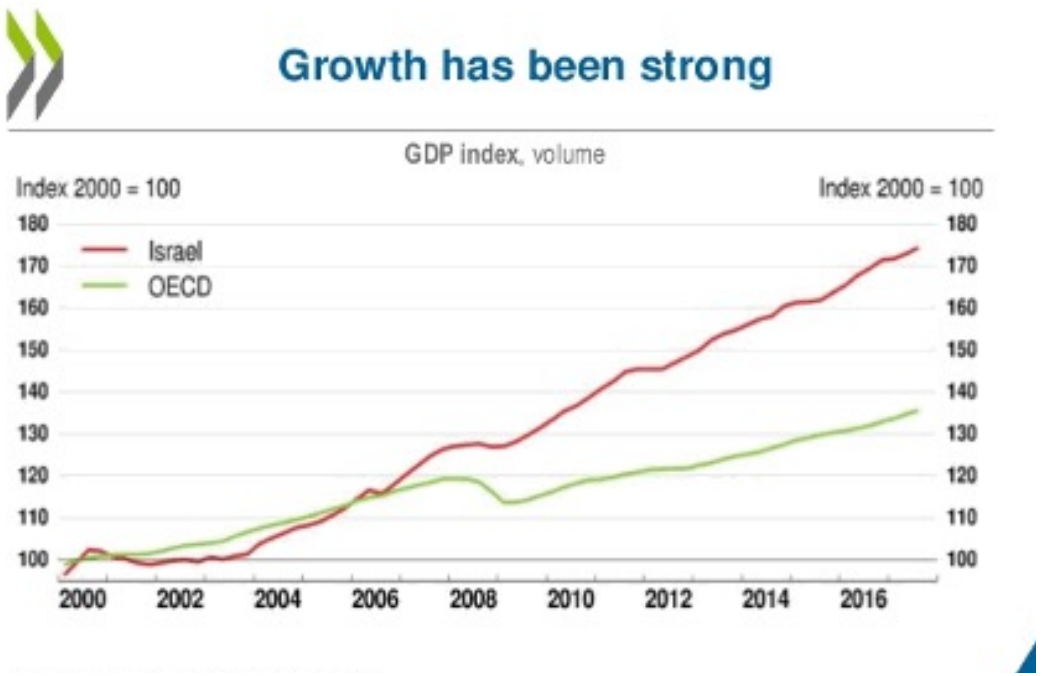
Map A.1: Electricity Supply System in the West Bank and Gaza



Source: Palestinian Central Bureau of Statics. 2015. "Quantity of Electricity Imported (MWh) in the West Bank by Source and Month, 2015" and "Quantity of Electricity Imported and Purchased (MWh) in Gaza Strip by Source and Month, 2015", Ramallah City. http://www.pcbs.gov.ps/site/886/Default.aspx

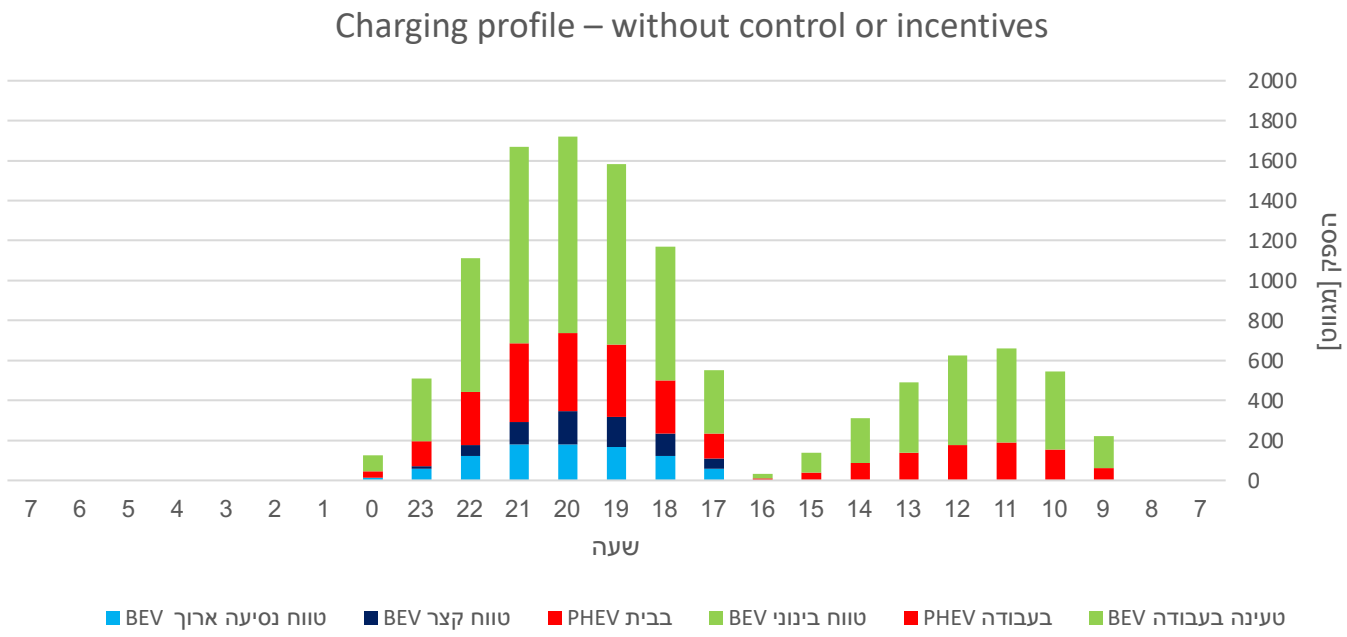
Source: [World Bank]

Demand is growing due to strong GDP growth



Additional factors:

EVs are expected to add 0.5% to the annual demand growth



Market structure

Israel is an electricity island

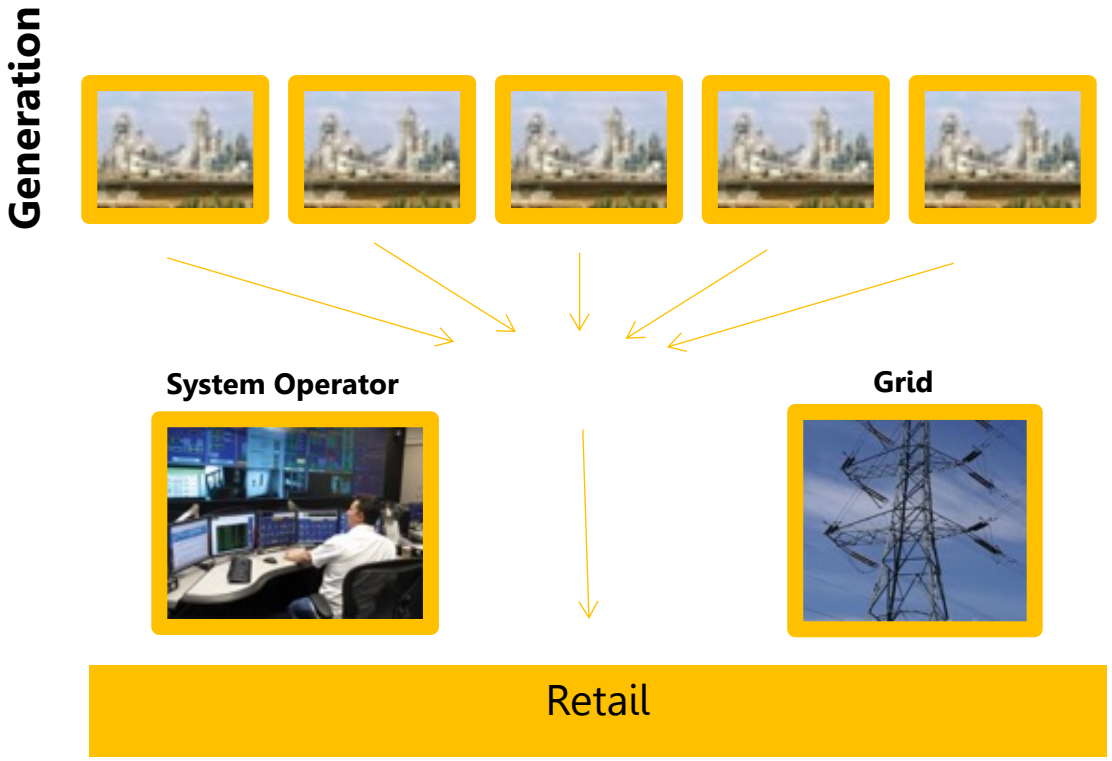
The Israeli grid is not connected to neighboring countries
An MOU for a connection to Jordan was recently signed

The market reform, 2018:
from a monopoly to an unbundled competitive market

Privatization and competition →

Independent system operator →

Retail competition →



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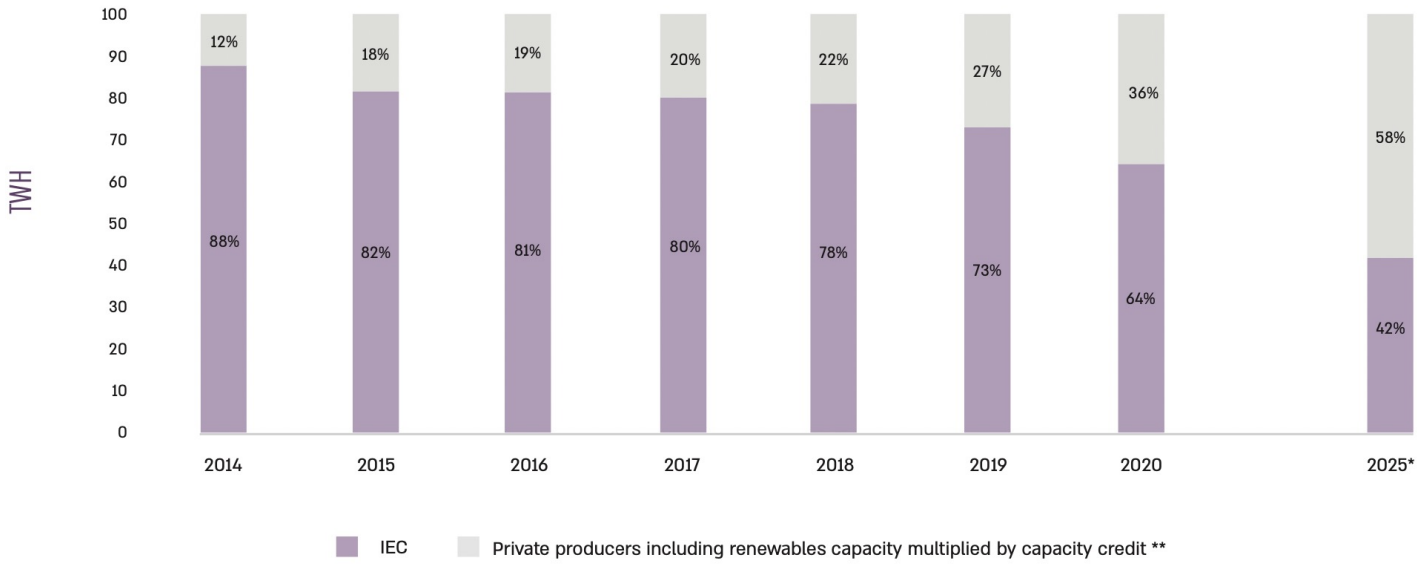
Private producers market share

2.1 | Market Share in Production Segment – Installed Capacity



Private Producers Market Share is expected to grow from 22% in 2018 to 58% in 2025

Fuel mix and emissions target

Emission reduction commitment

Resolution 171 July 2021

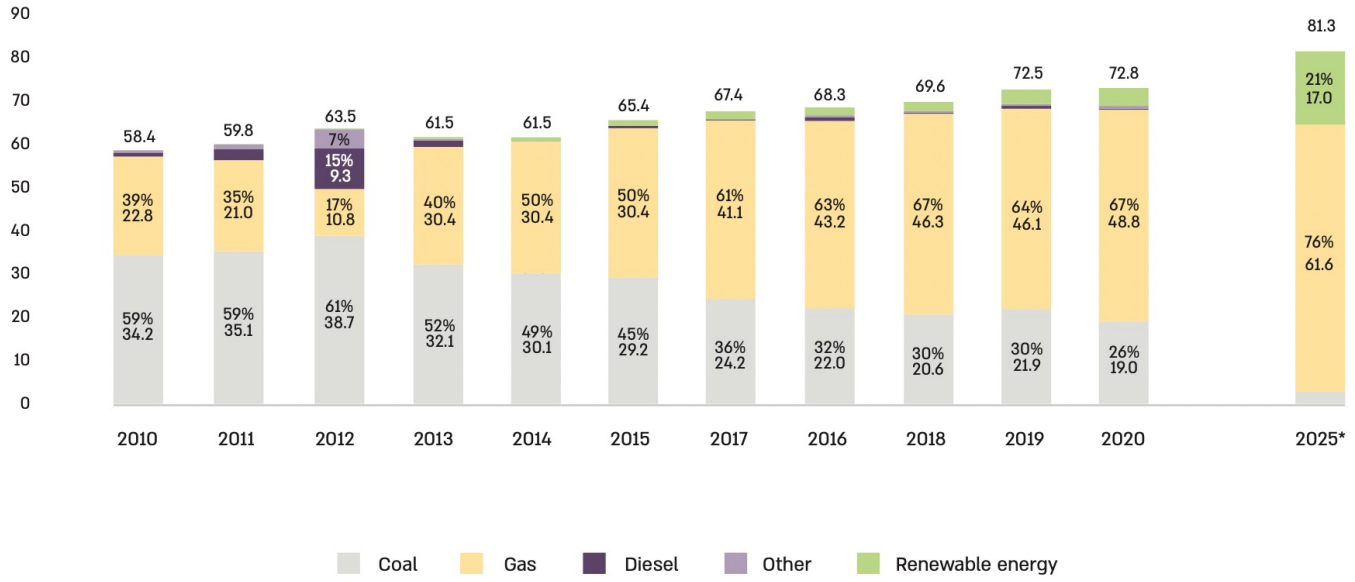
Israel committed to 27% reduction by 2030

- From 79 Million Tons in 2016 to 58 Million Tons in 2030

Israel is committed to 85% reduction by 2050

Israel's fuel mix is becoming cleaner

3.1 | Fuel Mix in the Sector (TWh)



Off-shore gas reservoirs = 900 BCM

Economist.com

The annual gas consumption is ~10 BCM,
and it is expected to double by the year 2040
85% of the local gas use is consumed by the electricity sector

Coal generation is also becoming cleaner…

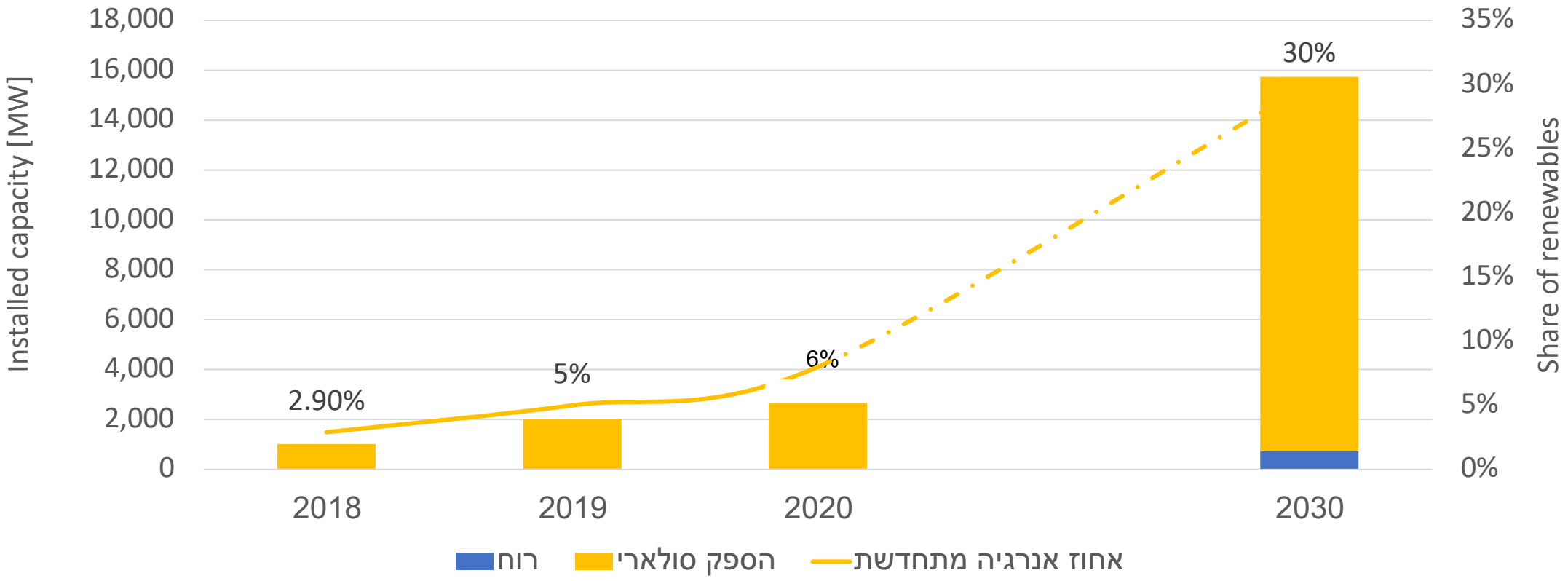
Emission reduction project
3 billion dollar => 90% reduction of local emissions

...However, the use of coal will be eliminated by 2026

4 old coal units will be replaced by new CGGTs
6 units will be converted to natural gas

Renewables

16 GW of solar capacity is needed for meeting the target



Wind farms are installed too…

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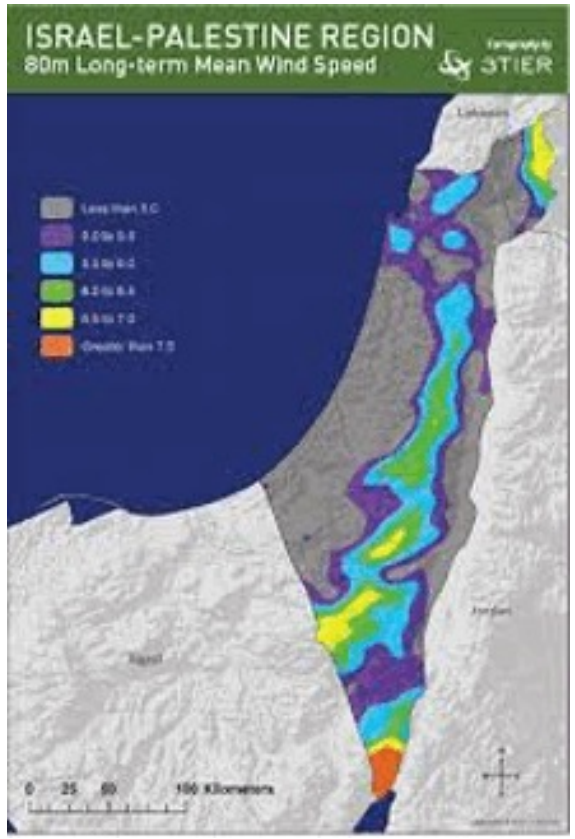
But the potential for wind is limited…



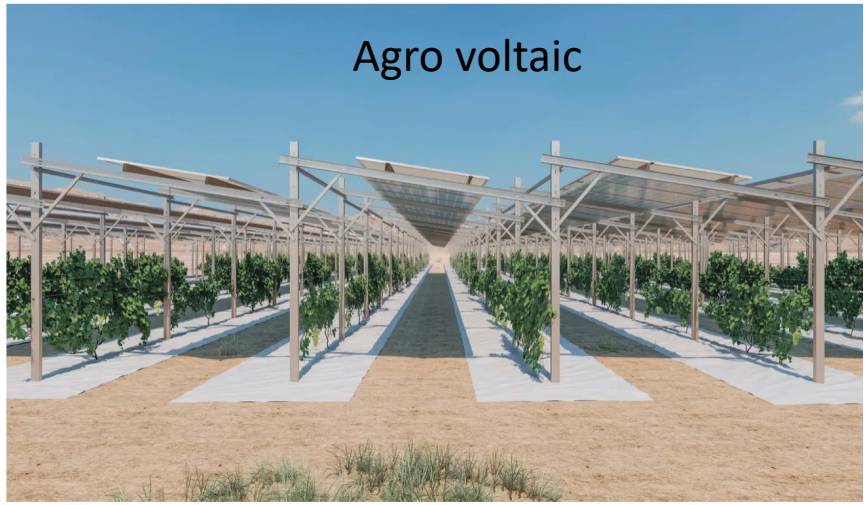
Birds migration in Israel

Renewable scheme

- Regulated Feed in Tariffs for rooftops <630 KW
- Auctions for plants >630 KW
  - State owned land
  - Private land
  - PV + Storage Auctions

- New Regulation:
  - Bilateral contracts for medium voltage plants
  - Wholesale market exposure for large scale plants

The land challenge leads to extensive dual use



מטעי דוראל צילום: הדמיה: חיים ערוסי

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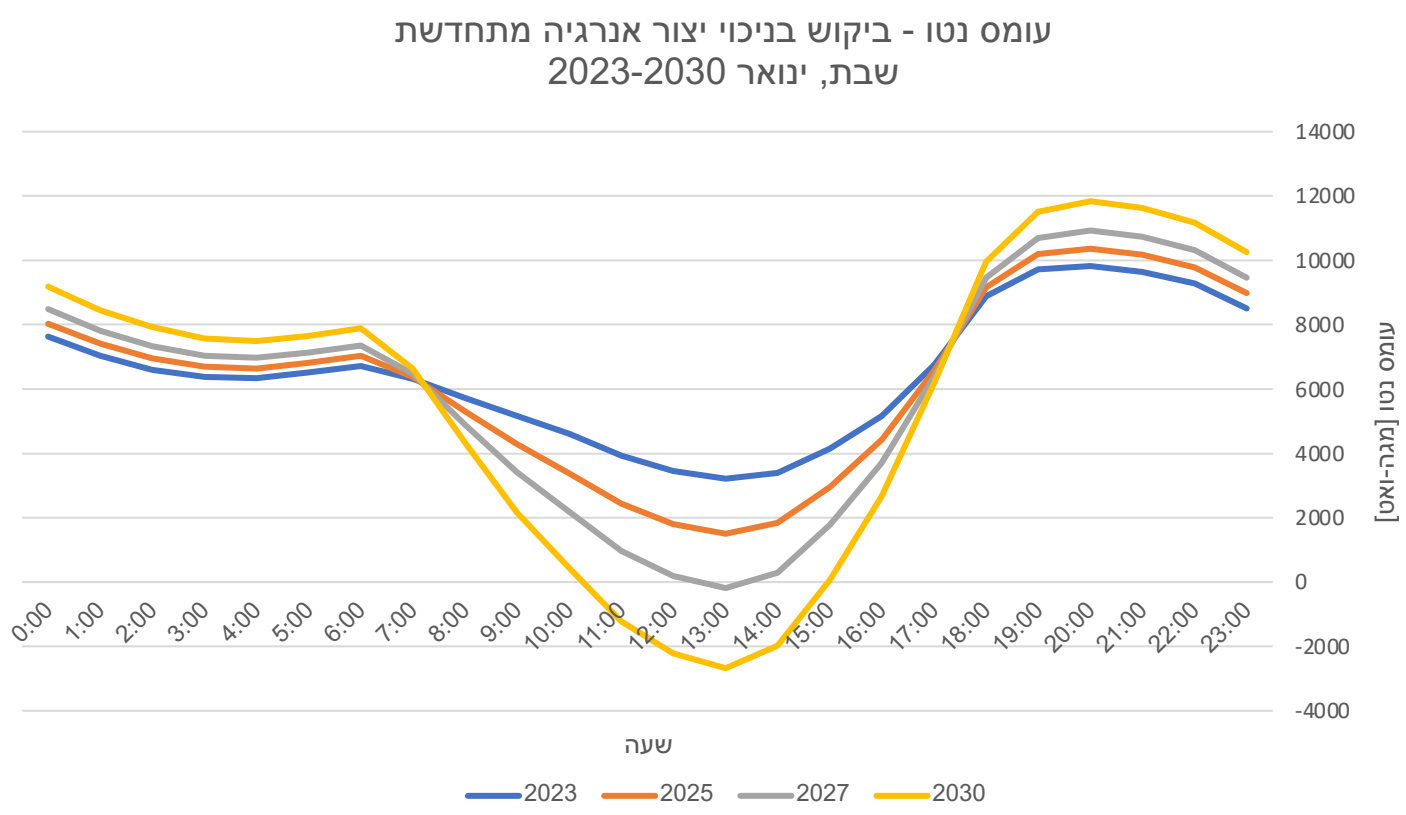
The "duck curve "



The evening peak is expected to grow by 4500 MW until 2030

Rapid ramp rate

Excess generation at noon, up to -5000 MW

Peak demand and excess demand

2021

חודש/שעה	0:00	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00
ינואר	7966	7098	6585	6347	6344	6684	7384	8253	8329	8086	7718	7389	7181	7150	7345	7726	8322	9493	10883	11182	11144	10766	10058	9093
פברואר	7441	6678	6241	6042	6069	6414	7037	7796	7876	7664	7349	7014	6803	6796	6949	7215	7689	8473	9944	10374	10337	9963	9328	8477
מרץ	7206	6487	6068	5870	5884	6211	6624	7360	7412	7192	6881	6581	6359	6293	6442	6731	7165	7896	9098	9767	9789	9498	8909	8102
אפריל	6664	6083	5703	5489	5465	5682	6008	6422	6829	6810	6550	6241	5986	5808	5779	5885	6102	6471	7093	7706	8359	8214	7825	7285
מאי	7144	6727	6416	6244	6195	6233	6212	6682	7318	7485	7490	7381	7268	7305	7406	7527	7710	7920	8275	8400	8487	8414	8079	7671
יוני	8413	7921	7548	7317	7192	7171	7031	7553	7985	8209	8388	8577	8779	9160	9645	10094	10313	10370	10217	9864	9836	9818	9474	9001
יולי	9167	8603	8185	7899	7740	7706	7599	8127	9107	9434	9575	9683	9848	10106	10543	10904	11178	11334	11330	10918	10794	10747	10367	9805
אוגוסט	9359	8814	8399	8115	7944	7910	7847	8187	9097	9941	9956	9991	10084	10233	10515	10741	10898	11005	11051	10892	11019	10844	10482	9936
ספטמבר	8644	8120	7743	7490	7364	7363	7501	7758	8540	9287	9427	9343	9255	9383	9653	9797	9948	10031	9970	10220	10328	10106	9700	9202
אוקטובר	7275	6802	6544	6357	6276	6352	6536	6785	7293	7612	7628	7484	7343	7381	7560	7716	7816	7972	8240	8758	8719	8482	8143	7731
נובמבר	6441	6013	5762	5631	5651	5849	6107	6587	6952	6929	6780	6638	6425	6362	6409	6577	6746	7513	8096	8318	8209	7942	7490	6987
דצמבר	7149	6485	6084	5896	5911	6220	6763	7458	7748	7644	7394	7145	6891	6801	6850	7063	7434	8563	9397	9705	9689	9386	8803	8112

2025

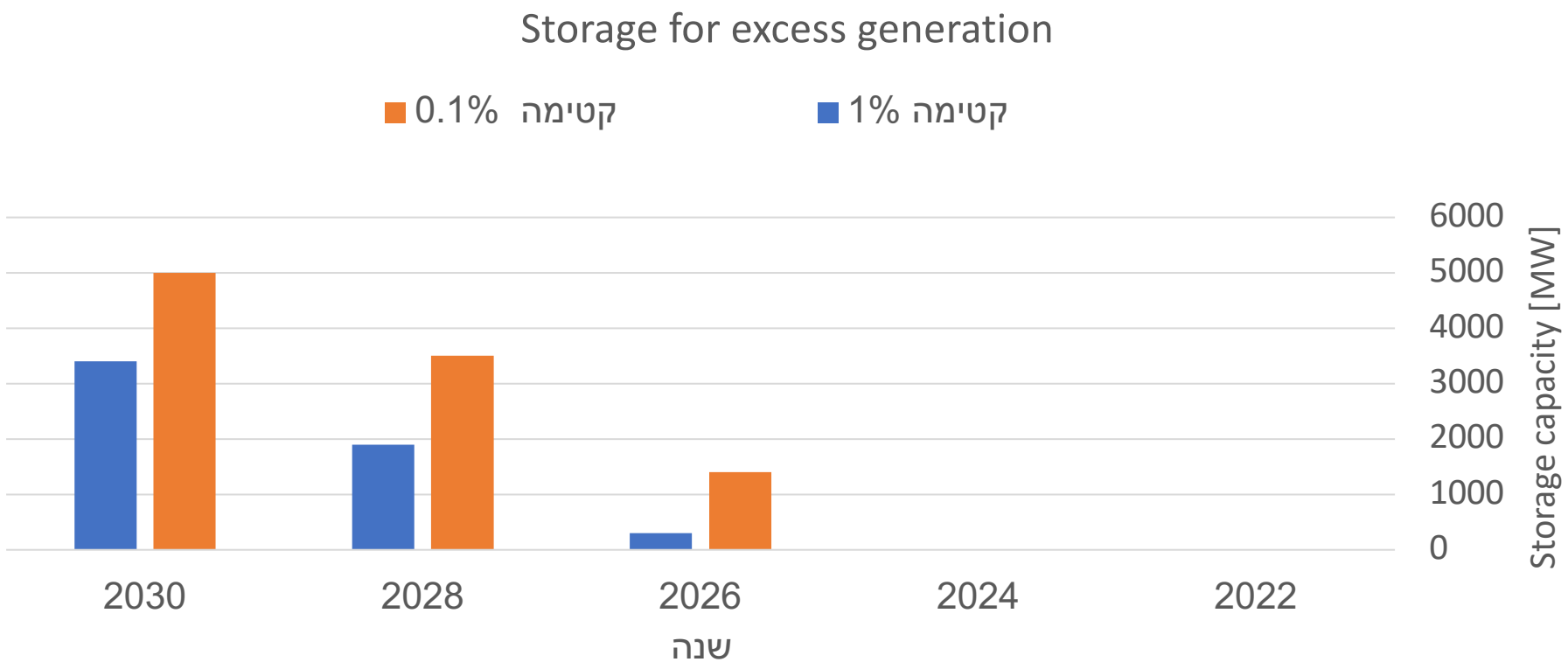
חודש/שעה	0:00	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00
ינואר	8831	7879	7314	7037	7036	7409	8203	8796	7935	6554	5095	3984	3439	3342	3873	4987	6661	9149	11692	12274	12405	11977	11185	10099
פברואר	8289	7429	6945	6706	6736	7128	7836	8379	7590	6293	4881	3700	3088	3003	3408	4323	5859	7857	10506	11367	11517	11114	10407	9448
מרץ	8028	7216	6742	6521	6543	6914	7378	7975	7277	5833	4347	3164	2440	2249	2726	3687	5065	7097	9473	10681	10889	10585	9924	9029
אפריל	7430	6786	6359	6116	6092	6333	6697	7156	7475	6484	4936	3520	2531	1894	1845	2370	3229	4620	6551	8176	9245	9109	8705	8120
מאי	7938	7485	7127	6943	6905	6950	6932	7464	8171	7304	6235	5044	4181	3837	3923	4406	5285	6552	8129	9100	9363	9296	8942	8509
יוני	9340	8794	8384	8131	8016	8001	7847	8443	7697	6440	5802	5560	5685	6419	7577	8965	10112	11014	11134	10834	10847	10880	10509	9984
יולי	10158	9538	9084	8768	8595	8570	8464	9072	10044	8915	7976	7368	7252	7429	8228	9363	10692	11948	12475	12016	11891	11865	11474	10863
אוגוסט	10383	9789	9327	9012	8833	8808	8743	9137	10167	11023	9448	8491	7971	7630	7973	8525	9257	10371	11274	11917	12129	11963	11603	11012
ספטמבר	9604	9026	8614	8343	8214	8219	8392	8684	9562	10232	9385	8121	7110	6684	6849	6993	7832	8877	9727	10954	11401	11183	10760	10224
אוקטובר	8110	7573	7293	7092	6999	7088	7305	7586	8032	7617	6559	5245	4175	3859	4205	4803	5527	6484	7831	9335	9680	9431	9071	8620
נובמבר	7193	6719	6438	6287	6300	6523	6823	7364	7448	6363	5127	4213	3224	2788	2798	3420	4284	6035	7762	8923	9105	8875	8378	7814
דצמבר	7962	7220	6771	6566	6579	6924	7527	8314	8158	6980	5697	4661	3734	3316	3248	3806	4972	7172	9172	10338	10683	10470	9821	9040

2030

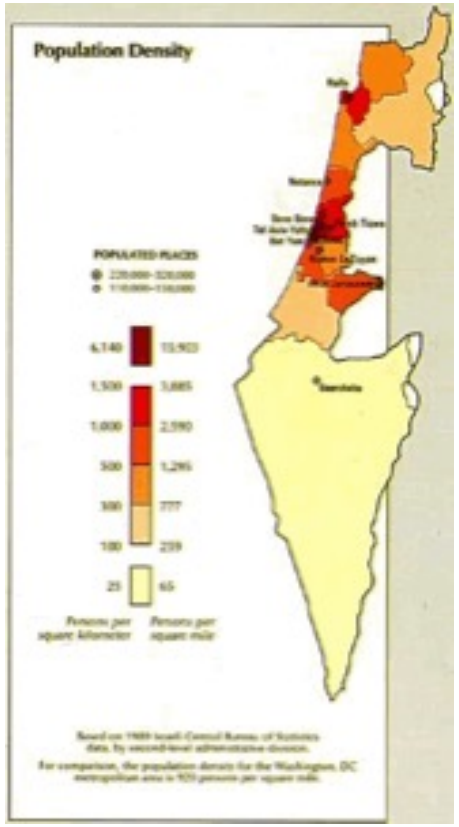
חודש/שעה	0:00	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00
ינואר	9780	8737	8117	7794	7795	8205	9105	9376	7430	4736	2020	6	-926	-1098	-180	1778	4698	8701	12570	13477	13801	13316	12430	11207
פברואר	9228	8258	7723	7436	7470	7914	8720	9010	7217	4669	1989	-166	-1240	-1419	-726	936	3699	7097	11101	12458	12825	12392	11606	10527
מרץ	8939	8021	7486	7239	7272	7691	8212	8646	7083	4225	1381	-823	-2126	-2465	-1613	121	2584	6119	9845	11680	12107	11790	11049	10056
אפריל	8280	7567	7088	6811	6788	7056	7463	7970	8185	6073	3037	343	-1495	-2661	-2736	-1730	-133	2433	5873	8664	10213	10092	9677	9045
מאי	8813	8323	7910	7715	7692	7747	7733	8335	9122	7060	4751	2308	581	-204	-141	753	2425	4909	7895	9843	10314	10256	9885	9429
יוני	10361	9756	9305	9030	8930	8923	8754	9436	7328	4360	2774	2033	2064	3194	5117	7580	9795	11674	12111	11876	11943	12044	11646	11064
יולי	11243	10564	10072	9725	9537	9523	9423	10125	11085	8271	6083	4644	4199	4274	5484	7503	10046	12569	13710	13200	13077	13079	12685	12020
אוגוסט	11509	10863	10349	10000	9816	9802	9737	10195	11360	12227	8814	6709	5478	4563	4966	5886	7274	9549	11443	13013	13325	13177	12828	12191
ספטמבר	10663	10026	9576	9288	9159	9172	9387	9720	10706	11284	9296	6668	4590	3519	3557	3692	5315	7462	9363	11720	12566	12360	11924	11352
אוקטובר	9037	8425	8124	7910	7803	7906	8162	8481	8851	7589	5289	2626	480	-245	288	1391	2831	4708	7300	9945	10738	10477	10099	9606
נובמבר	8031	7506	7192	7018	7021	7273	7620	8231	7989	5678	3186	1379	-508	-1375	-1408	-264	1400	4288	7337	9580	10101	9916	9368	8737
דצמבר	8863	8034	7531	7309	7318	7704	8372	9264	8593	6175	3698	1754	45	-750	-952	4	2086	5520	8865	11020	11782	11675	10951	10070

עומס נטו נמוך מ 2000 מ"ו | עומס נטו בין 2000 ל 10000 מ"ו | עומס נטו גדול מ 10000 מ"ו

Israel will need at least 3.5 GW of storage for excess generation and peak demand

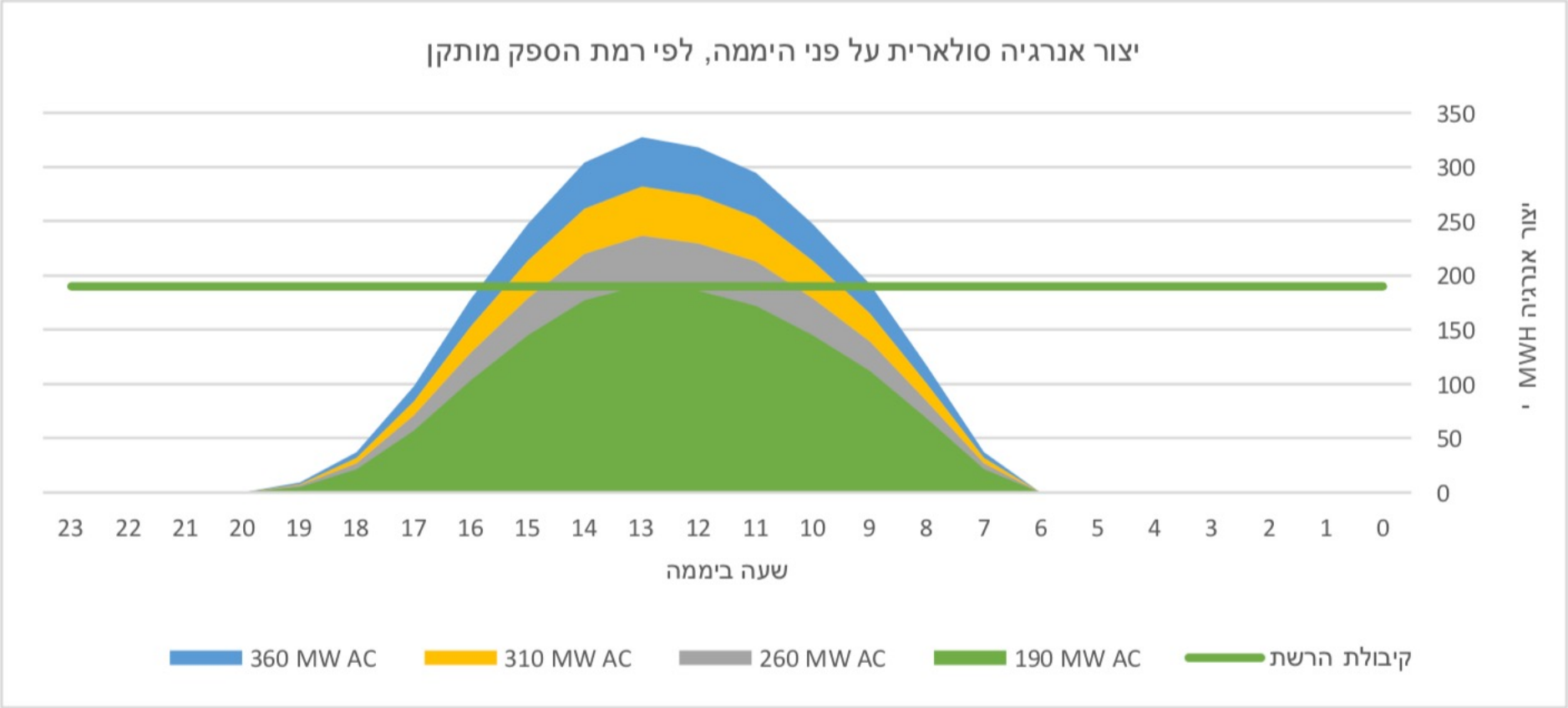


High population density
is a challenge for solar plants connection



Transmission lines near
Bedouin settlements

Storage can also mitigate grid congestion



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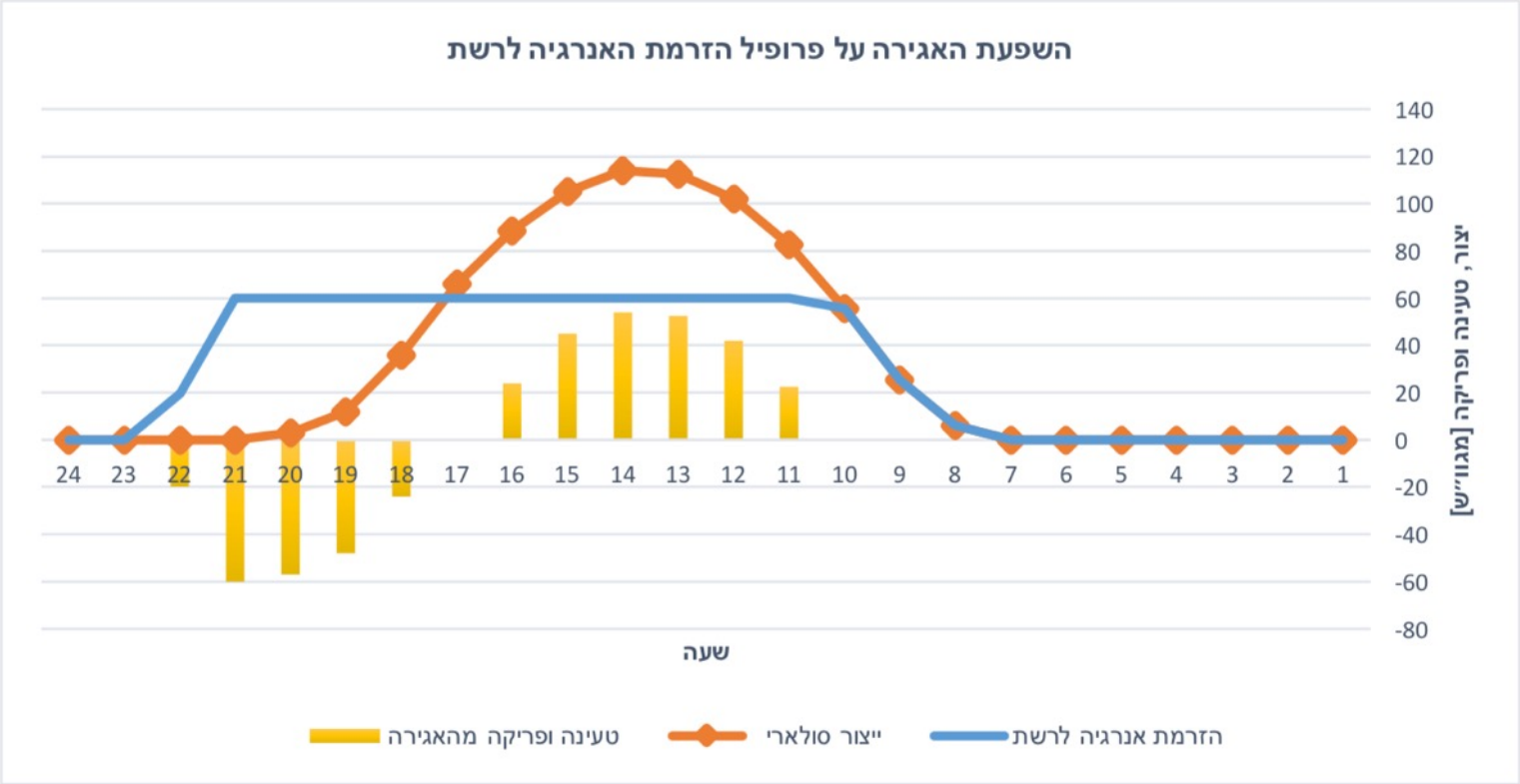
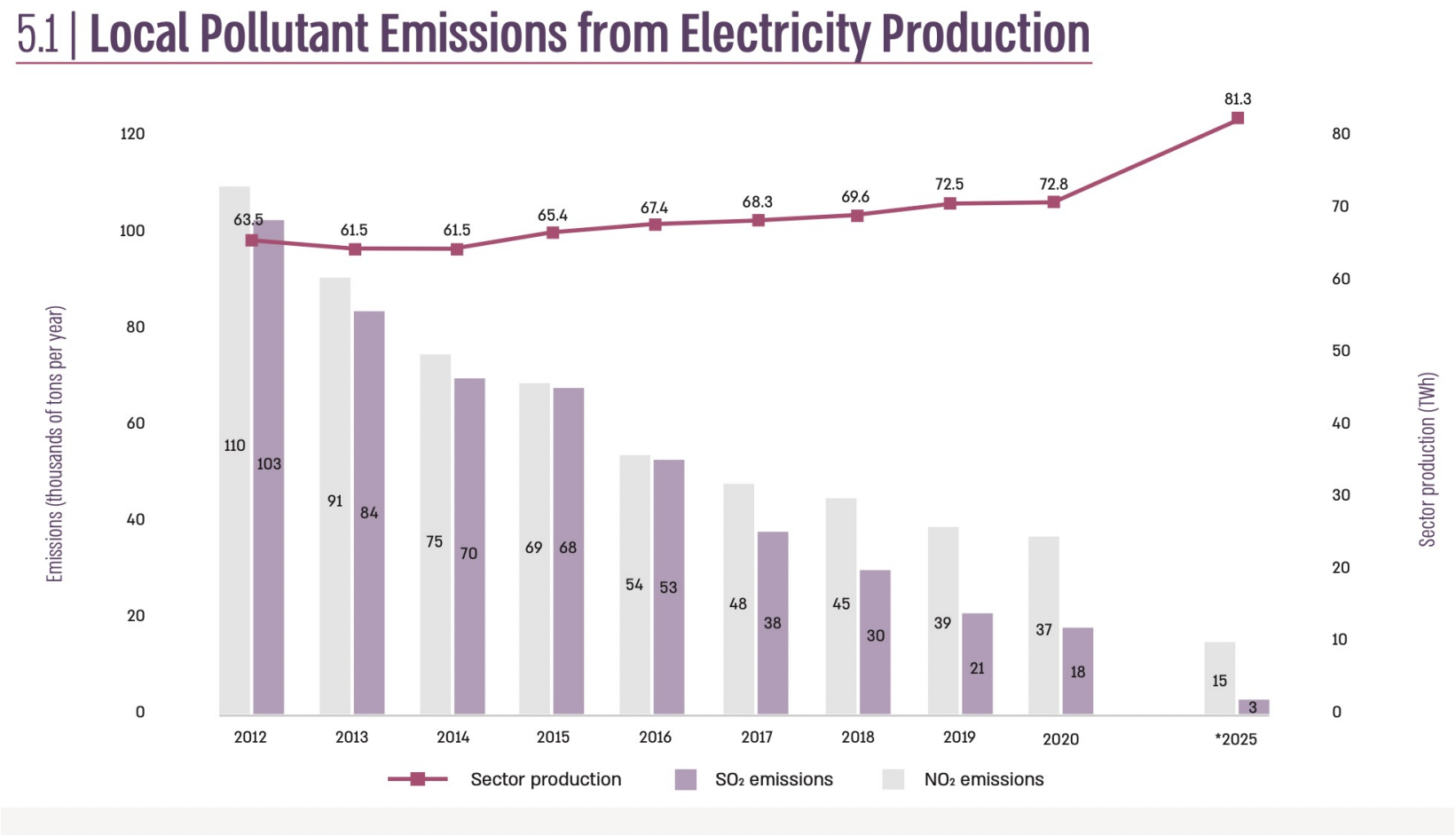
PV + storage minimize grid development requirements



Emissions Reduction

Local emissions reduction



CO_2 emissions from electricity generation