

Energy modelling and scenarios

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Cyprus
Energy
Agency



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Why it's important

- Create baseline
- Select appropriate actions – the most fitting pathway
- Monitor
- Adapt



ENERGee Watch



Energy modelling



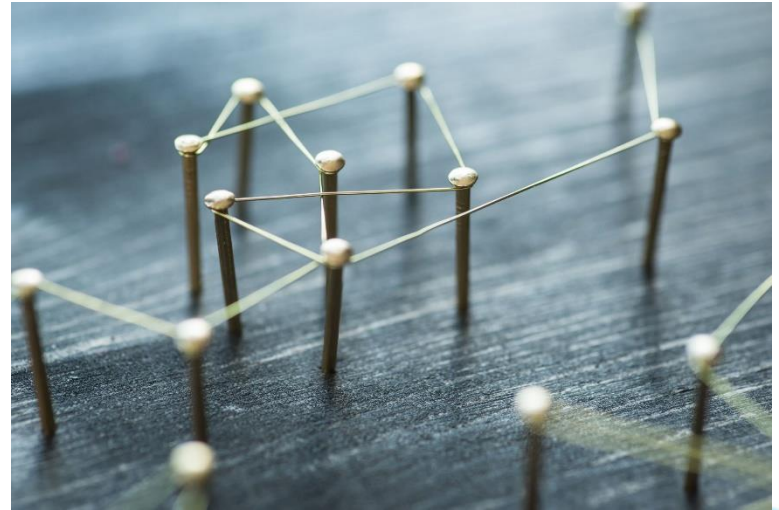
Assess the quality of data

- Bottom up or top down
- Hard data, statistics, soft data, measurements
- Consistency



What information you will need

1. Sources of emission
2. Quantities of emitting processes
3. Emission factors
4. Population/demographic data

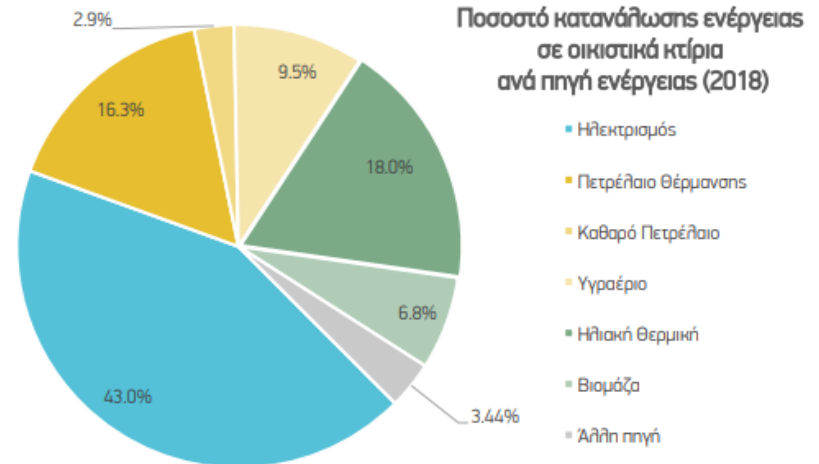


What information you will need

Scope	Indicators
Energy structure & Emissions	<ul style="list-style-type: none">• Level & evolution of energy consumption and emissions per sector and per energy carrier
Renewable Energy	<ul style="list-style-type: none">• Existing facilities, production, & trends of RES
Energy consumption/ management in local administration	<ul style="list-style-type: none">• Level & evolution of energy consumption and emissions per sector and per energy carrier• Assessment of energy efficiency of buildings & equipment
Energy consumption of municipal fleet	<ul style="list-style-type: none">• Composition of fleet (own and external) & annual energy consumption
Buildings	<ul style="list-style-type: none">• Typology of existing building stock

Energy Database of Cyprus

1. Electricity data for all sectors by postcode
2. Statistics on use of other energy sources
3. Total consumption of other energy sources
4. Assumptions based on observation



Energy Database of Cyprus



Cyprus
Energy
Agency

Select Community or Municipality or Region:

.....

Select Units:

kWh

NATIONAL STATISTICS

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
No. El. Residential Consumers	398,563	451,334	461,441	468,071	468,071	454,150	449,431	463,243	468,406	473,046	514,582	0
National Electricity Consumption (kWh)	4,912,238,784	4,801,342,355	4,584,649,245	4,396,515,493	3,889,180,636	3,902,557,916	3,991,990,534	4,271,336,892	4,030,786,481	4,254,026,955	1,719,207,721	0
Population	810,239	825,323	840,407	855,491	870,575	885,660	900,744	915,828	930,912	945,996	961,081	0
Heating Diesel	14,304	34,953	106,706	105,335	85,812	77,308	68,809	69,087	93,395	76,368	95,023	0
Diesel	348,841	357,835	343,599	305,099	259,759	249,801	264,887	287,408	311,173	324,962	338,194	0
Gasoline	383,468	390,302	384,756	372,113	349,110	340,766	345,342	353,606	350,898	341,604	333,678	0
LPG	55,440	52,658	58,618	56,904	51,364	48,410	53,809	54,906	56,646	53,665	60,664	0
Kerosene	18,544	13,878	16,491	16,970	11,640	9,478	13,546	13,887	14,381	11,015	14,914	0
Agriculture Diesel	23941	23,483	24,640	23,786	23,175	21,209	23,529	22,911	24,109	22,356	23,886	0

LOCAL STATISTICS

	CENSUS										CENSUS			
	2008	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Population	8435	6,303	7,371	7,940	8,308	8,778	9,244	9,712	10,181	10,649	11117	11,555	12,053	12,522
Living quarters (Occupied)	1823	1,981	2,159	2,297	2,455	2,613	2,770	2,938	3,086	3,244	3402	3,560	3,789	3,976
Living quarters (Vacant/ Of temporary residence)	211	227	244	260	277	293	309	326	342	359	375	391	408	424
Number of households	1823	1,983	2,162	2,302	2,461	2,621	2,781	2,940	3,100	3,259	3419	3,579	3,798	3,998
Number of Institutions	0	0	0	0	0	1	1	1	1	1	1	1	1	1
Average household size	3.5	3.5	3.5	3.4	3.4	3.4	3.4	3.3	3.3	3.3	3.2	3	3	3
LIVING QUARTER														
TYPE OF BUILDING														
Single house														214
Semi-detached or duplex														979
Row houses														154
Back-yard house														60
Apartment blocks														336
Conventional dwellings in partly residential buildings														86
Other type of building														26
ECONOMIC ACTIVITY														
Economically active population														2633
Unemployed persons														282
Employed persons														2351
In Primary sector (NACE A-B)														28
In Secondary sector (NACE C-F)														229
In Tertiary sector (NACE G-U)														2046
Not stated														48

Energy Database of Cyprus



LOCAL ELECTRICITY CONSUMPTION

	2009		2010		2011		2012		2013		2014	
	Consumption (kWh)	No. of Consumers	Consumption (kWh)	No. of Consumer	consumption (kWh)	No. of Consumer	consumption (kWh)	No. of Consumer	consumption (kWh)	No. of Consumers	Consumption (kWh)	No. of Consumer
RESIDENTIAL SECTOR	16,863,829	3,480	18,578,402	3,842	18,081,108	3,994	18,604,326	4,152	15,556,204	4,240	15,677,320	4,208
Residential	16,215,126	3,354	17,952,147	3,699	17,471,925	3,849	18,040,472	4,004	15,371,353	4,092	15,467,916	4,066
Residential storage heaters	648,703	126	626,255	143	609,183	145	563,854	148	184,851	148	209,404	142
PRIMARY SECTOR	885,768	69	846,837	68	826,521	71	822,161	72	695,186	75	654,294	73
Agriculture, Forestry and Fishing [A]	885,768	69	846,837	68	826,521	71	822,161	72	695,186	75	654,294	73
Mining and Quarrying [B]	0	0	0	0	0	0	0	0	0	0	0	0
SECONDARY SECTOR	16,253,952	257	17,810,412	311	16,524,031	315	14,883,289	324	13,126,195	293	13,700,047	287
Manufacturing [C]	15,437,553	174	16,253,275	198	15,377,461	202	14,281,897	202	12,649,458	197	12,999,911	197
Electricity, Gas, Steam and Air Conditioning Supply [D]	0	0	0	0	0	0	0	0	0	0	0	0
Water Supply; Sewerage, Waste Management and Remediation Activities [E]	759,075	13	1,461,663	7	956,416	6	270,478	7	214,903	7	494,994	8
Construction [F]	63,324	70	95,474	106	190,154	107	330,914	115	261,834	89	205,142	82
TERTIARY SECTOR	7,374,494	387	8,176,954	459	8,106,641	493	9,037,298	511	8,501,591	534	8,619,956	528
Wholesale and Retail Trade; Repair of Motor Vehicles and Motorcycles [G]	3,937,018	119	4,251,935	147	4,400,307	145	5,252,972	149	4,991,618	154	4,908,355	147
Transportation and Storage [H]	918,975	93	1,255,020	108	1,173,244	121	1,119,502	123	1,163,467	132	1,225,963	124
Accommodation and Food Service Activities [I]	375,411	30	468,630	33	477,520	31	435,439	35	318,300	39	466,032	39
Information and Communication [J]	969,675	17	931,398	21	848,390	24	975,278	26	904,905	28	896,087	30
Financial and Insurance Activities [K]	144,443	5	135,313	5	106,207	4	103,831	3	91,109	4	102,677	6
Real Estate Activities [L]	0	0	0	0	336	1	0	1	0	0	0	0
Professional, Scientific and Technical Activities [M]	229,843	22	317,006	30	295,247	33	292,116	34	225,232	32	252,990	34
Administrative and Support Service Activities [N]	33,398	5	2,297	1	1,919	1	1,311	1	1,393	1	1,910	1
Public Administration and Defence; Compulsory Social Security [O]	16,133	4	24,275	6	27,337	7	46,024	8	41,746	8	40,834	9
Education [P]	81,931	10	202,047	16	195,861	20	210,723	20	188,933	21	177,234	24
Human Health and Social Work Activities [Q]	119,046	5	20,522	2	20,947	4	22,842	5	19,093	6	20,912	6
Arts, Entertainment and Recreation [R]	519,833	44	424,858	16	423,650	18	426,044	19	409,464	20	395,612	22
Other Service Activities [S]	27,939	32	143,853	74	135,676	84	150,856	87	146,331	89	141,450	86
Activities of Households As Employers [T]	849	1	0	0	0	0	0	0	0	0	0	0
Activities of Extraterritorial Organisations and Bodies [U]	0	0	0	0	0	0	0	0	0	0	0	0
PUBLIC LIGHTING	998,195	96	1,024,931	102	1,018,961	103	954,832	122	987,484	118	1,079,869	126
Public Lighting – Urban areas	94,539	12	77,004	10	76,729	10	149,043	29	269,833	35	361,339	40
Public Lighting – Rural areas	892,378	74	937,125	82	932,242	83	795,719	83	708,316	73	704,614	73
Public Lighting – Traffic Lights	6,773	5	6,962	5	7,459	5	7,147	5	6,879	5	6,874	5
Public Lighting – Other Lighting	3,305	5	3,840	5	2,531	5	2,923	5	2,456	5	7,042	8
TOTAL	42,382,238	4,289	46,437,536	4,782	44,557,262	4,976	44,301,906	5,181	38,866,660	5,260	39,731,486	5,222

Energy Database of Cyprus



RESIDENTIAL SECTOR
Residential
Residential storage heaters
PRIMARY SECTOR
Agriculture, Forestry and Fishing [A]
Mining and Quarrying [B]
SECONDARY SECTOR
Manufacturing [C]
Electricity, Gas, Steam and Air Conditioning Supply [D]
Water Supply; Sewerage, Waste Manag. and Remediation Act. [E]
Construction [F]
TERTIARY SECTOR
Wholesale and Retail Trade [G]
Transportation and Storage [H]
Accommodation and Food Service [I]
Information and Communication [J]
Financial and Insurance Activities [K]
Real Estate Activities [L]
Prof. Scientific and Tech. Activities [M]
Admin. and Support Service Activities [N]
Public Administration and Defence [O]
Education [P]
Health and Social Work Activities [Q]
Arts, Entertainment and Recreation [R]
Other Service Activities [S]
Activities of Households As Employers [T]
Extraterritorial Org. and Bodies [U]
PUBLIC LIGHTING
Public Lighting - Urban areas
Public Lighting - Rural areas
Public Lighting - Traffic Lights
Public Lighting - Other Lighting
TRANSPORT
Urban and suburban passenger road land transport
Other passenger road transport services (taxi, tourism, school buses, etc.)
Local Electricity Production from Renewable Energy Sources

2009										
kwh	kwh	kwh	kwh	kwh	kwh	kwh	kwh	kwh	kwh	kwh
Electricity	Heating Diesel	Kerosene	LPG	Natural gas	Biomass	Charcoal	Solar	Wind	Diesel	Gasoline
16,864,262	4,575,444	742,293	2,219,193	0	2,637,648	1,019,091	5,545,056	0	0	0
16,215,543	4,399,440	713,739	2,133,827	0	2,637,648	1,019,091	5,545,056	0	0	0
648,720	176,004	28,554	85,366	0	0	0	0	0	0	0
885,791	240,324	38,989	116,563	0	0	0	0	0	0	0
885,791	240,324	38,989	116,563	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0
16,260,370	4,411,602	715,712	2,139,726	0	0	0	0	0	0	0
15,437,950	4,188,471	673,513	2,031,502	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0
753,095	205,950	33,412	99,890	0	0	0	0	0	0	0
63,326	17,181	2,787	8,333	0	0	0	0	0	0	0
7,374,684	2,000,826	324,602	970,445	0	0	0	886,053	0	0	0
3,937,119	1,068,180	173,295	518,091	0	0	0	473,037	0	0	0
918,999	249,334	40,450	120,932	0	0	0	110,416	0	0	0
375,421	101,855	16,524	49,402	0	0	0	45,106	0	0	0
969,700	263,089	42,682	127,604	0	0	0	116,507	0	0	0
144,447	39,190	6,358	19,008	0	0	0	17,355	0	0	0
0	0	0	0	0	0	0	0	0	0	0
229,849	62,360	10,117	30,246	0	0	0	27,616	0	0	0
33,399	9,061	1,470	4,395	0	0	0	4,013	0	0	0
16,133	4,377	710	2,123	0	0	0	1,938	0	0	0
81,933	22,229	3,606	10,782	0	0	0	9,844	0	0	0
119,049	32,299	5,240	15,666	0	0	0	14,303	0	0	0
519,846	141,040	22,881	68,407	0	0	0	62,458	0	0	0
27,940	7,580	1,230	3,677	0	0	0	3,357	0	0	0
849	230	37	112	0	0	0	102	0	0	0
0	0	0	0	0	0	0	0	0	0	0
998,221	0	0	0	0	0	0	0	0	0	0
94,541	0	0	0	0	0	0	0	0	0	0
893,001	0	0	0	0	0	0	0	0	0	0
6,773	0	0	0	0	0	0	0	0	0	0
3,905	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	1,485,744	0	0	0	35,886,374	36,915,076
0	0	0	0	0	1,443,125	0	0	0	34,092,055	36,915,076
0	0	0	0	0	36,619	0	0	0	1,794,319	0
42,120	0	0	0	0	0	0	42,120	0	0	0
-					+		+			

Energy Database of Cyprus



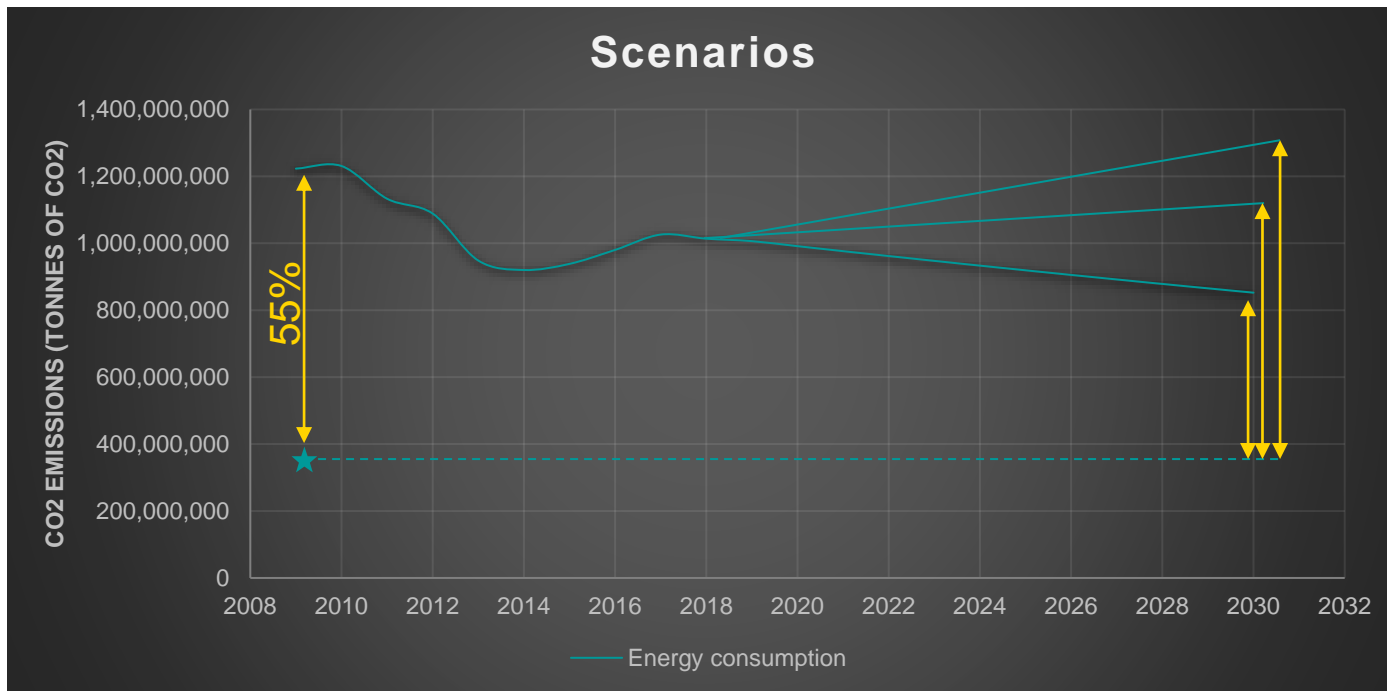
	tones CO ₂	tones CO ₂	tones CO ₂	tones CO ₂	tones CO ₂	tones CO ₂	tones CO ₂	tones CO ₂	tones CO ₂	tones CO ₂	tones CO ₂	tones CO ₂
	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Electricity	37,006	40,523	38,642	37,252	32,190	32,949	33,253	35,837	36,220	40,083	43,531	0
Heating Diesel	2,998	2,425	2,826	2,808	2,338	2,157	2,496	2,457	2,627	2,178	2,779	0
Kerosene	486	354	429	452	317	264	381	383	404	314	436	0
LPG	1,307	1,209	1,370	1,364	1,258	1,214	602	1,361	1,432	1,376	1,595	0
Diesel	9,582	9,545	9,343	8,558	7,524	7,381	7,914	8,355	9,204	9,668	10,334	0
Gasoline	9,192	9,112	7,089	7,032	6,742	6,739	6,881	6,313	6,995	6,906	6,916	0
TOTAL	60,571	63,169	59,700	57,466	50,369	50,705	51,527	55,307	56,882	60,525	65,590	0

	tones CO ₂	tones CO ₂	tones CO ₂	tones CO ₂	tones CO ₂	tones CO ₂	tones CO ₂	tones CO ₂	tones CO ₂	tones CO ₂	tones CO ₂	tones CO ₂
	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
RESIDENTIAL	16,655	17,805	17,422	16,777	13,423	13,400	13,723	14,077	16,293	15,452	17,125	0
PRIMARY	877	615	610	806	679	633	567	667	720	614	640	0
SECONDARY	16,094	17,131	16,198	14,596	12,829	13,263	13,017	15,131	13,536	17,476	19,926	0
TERTIARY	7,299	7,865	7,946	8,863	8,309	8,345	8,543	9,246	9,192	9,470	10,102	0
PUBLIC LIGHTING	872	896	891	835	863	944	882	917	943	939	548	0
TRANSPORTS	18,774	18,657	16,433	15,590	14,266	14,120	14,795	15,268	16,199	16,574	17,250	0
TOTAL	60,571	63,169	59,700	57,466	50,369	50,705	51,527	55,307	56,882	60,525	65,590	0

Scenarios

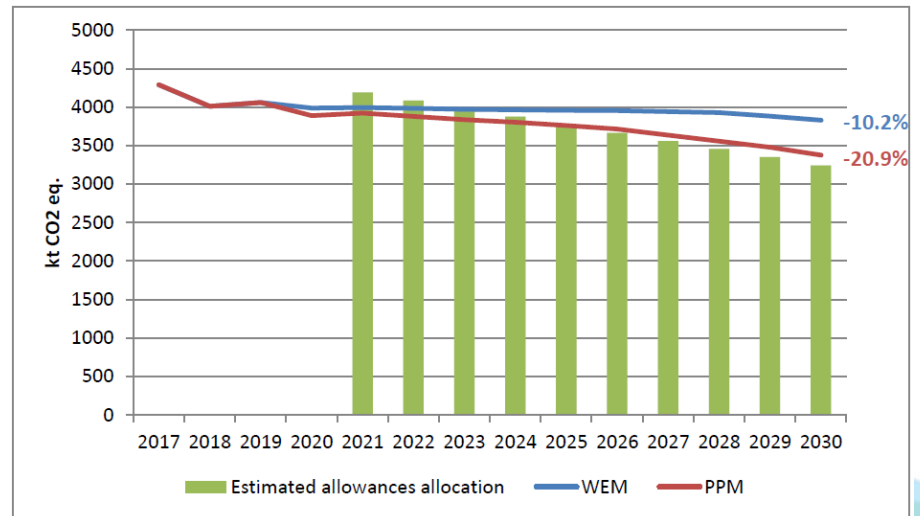


Why we need scenarios



What affects the scenarios

- National actions
- Growth projections
- Development projections (rural/urban)
- Sector projections
- Plans for change in use



What affects the scenarios

2. Linear Relationship according to Figure 2.10

2019	1	4950
2020	2	5050
2021	3	5205
2022	4	5315
2023	5	5400
2024	6	5495
2025	7	5495
2026	8	5750
2027	9	5805
2028	10	5902
2029	11	6032
2030	12	6200

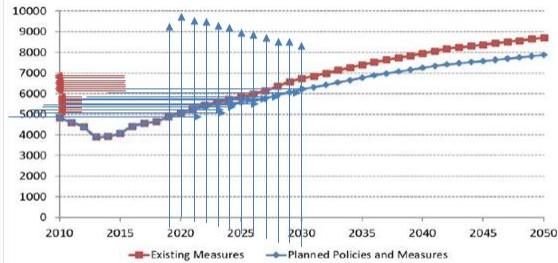
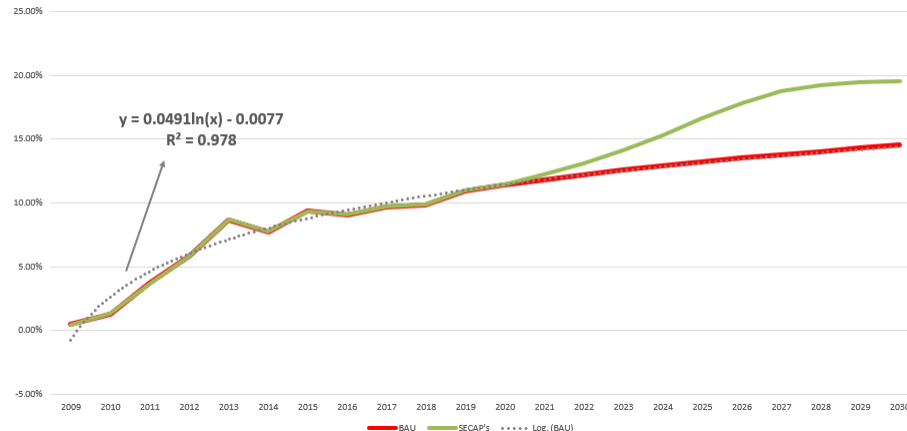


Figure 2.10: Forecast of final electricity demand in Cyprus (million kWh)

This is the calculated value of 2030 for BAU consumption

19,069,709,946

RES % Share for BAU and SECAP Scenarios



What affects the scenarios

- Touristic developed
- Touristic growing
- Urban developed/growing
- Peri-urban developed/growing
- Village
- Etc.

4		Touristic growing
5	RESIDENTIAL SECTOR	
6	Residential	2.5%
7	Residential storage heaters	2.5%
8	PRIMARY SECTOR	
9	Agriculture, Forestry and Fishing [A]	1.0%
10	Mining and Quarrying [B]	0.5%
11	SECONDARY SECTOR	
12	Manufacturing [C]	3.0%
13	Electricity, Gas, Steam and Air Conditioning Supply [D]	0.0%
14	Water Supply; Sewerage, Waste Management and Remediation Activities [E]	2.5%
15	Construction [F]	4.0%
16	TERTIARY SECTOR	
17	Wholesale and Retail Trade; Repair of Motor Vehicles and Motorcycles [G]	4.0%
18	Transportation and Storage [H]	4.0%
19	Accommodation and Food Service Activities [I]	4.0%
20	Information and Communication [J]	4.0%
21	Financial and Insurance Activities [K]	2.0%
22	Real Estate Activities [L]	4.0%
23	Professional, Scientific and Technical Activities [M]	1.0%
24	Administrative and Support Service Activities [N]	1.0%
25	Public Administration and Defence; Compulsory Social Security [O]	1.0%
26	Education [P]	1.0%
27	Human Health and Social Work Activities [Q]	2.0%
28	Arts, Entertainment and Recreation [R]	1.0%
29	Other Service Activities [S]	2.0%
30	Activities of Households As Employers [T]	1.0%
31	Activities of Extraterritorial Organisations and Bodies [U]	1.0%
32	PUBLIC LIGHTING	
33	Public Lighting - Urban areas	3.5%
34	Public Lighting - Rural areas	3.5%
35	Public Lighting - Traffic Lights	3.5%
36	Public Lighting - Other Lighting	3.5%
37	TRANSPORTS	
38	Urban and suburban passenger road land transport	3.0%
39	Other passenger road transport services (taxi, tourism, school buses, etc.)	3.0%
40		
41	Local Electricity Production from Renewable Energy Sources	4.5%

Avoiding double-counting



- Affects future scenarios
- An issue of authority
- Communication with competent authorities

Thank you!

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