



VPP PROJEKTS “ENERĢĒTIKAS UN KLIMATA MODELĒŠANA VIRZĪBĀ UZ OGLEKĻA NEITRALITĀTI”

Projekta zinātniskā vadītāja: Andra Blumberga, Dr.sc.ing., profesore



RTU
VASSI



VPP-EM-2018/NEKP-0001

ENERĢĒTIKAS UN KLIMATA MODELĒŠANA VIRZĪBĀ UZ OGLEKĻA
NEITRALITĀTI

Enerģētikas un klimata / Energoapgādes sistēmas modelēšanas demokratizēšana

Seminārs – praktiskā darbnīca

26.10.2021.

VPP-EM-2018/NEKP-0001





TIMES LATVIJA MODELIS MĀJSAIMNIECĪBU SEKTORS

Signe Allena-Ozoliņa, M.sc., pētniece

Dzintars Jaunzems, Dr.sc.ing., vadošais pētnieks



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VPP-EM-2018/NEKP-0001

ENERĢĒTIKAS UN KLIMATA MODELĒŠANA VIRZĪBĀ UZ OGLEKĻA
NEUTRALITĀTI

Saturs

1. Esošā situācija:
 1. Mājsaimniecības sektora analīze;
 2. Enerģijas patēriņš un izmantošana mājsaimniecībās;
2. Mājsaimniecības sektors TIMES modelī:
 1. Struktūra;
 2. Tehnoloģijas;
 3. Sasaiste ar citiem modeļiem;
 4. Nākotnes attīstības scenāriji;
 5. Piemērs VEDA2.0;
3. Rezultātu analīze.

MĀJSAIMNIECĪBU SEKTORS – kur mēs šobrīd esam?

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Go to www.menti.com and use the code 9074 0253

Jautājumu bloks 1/4

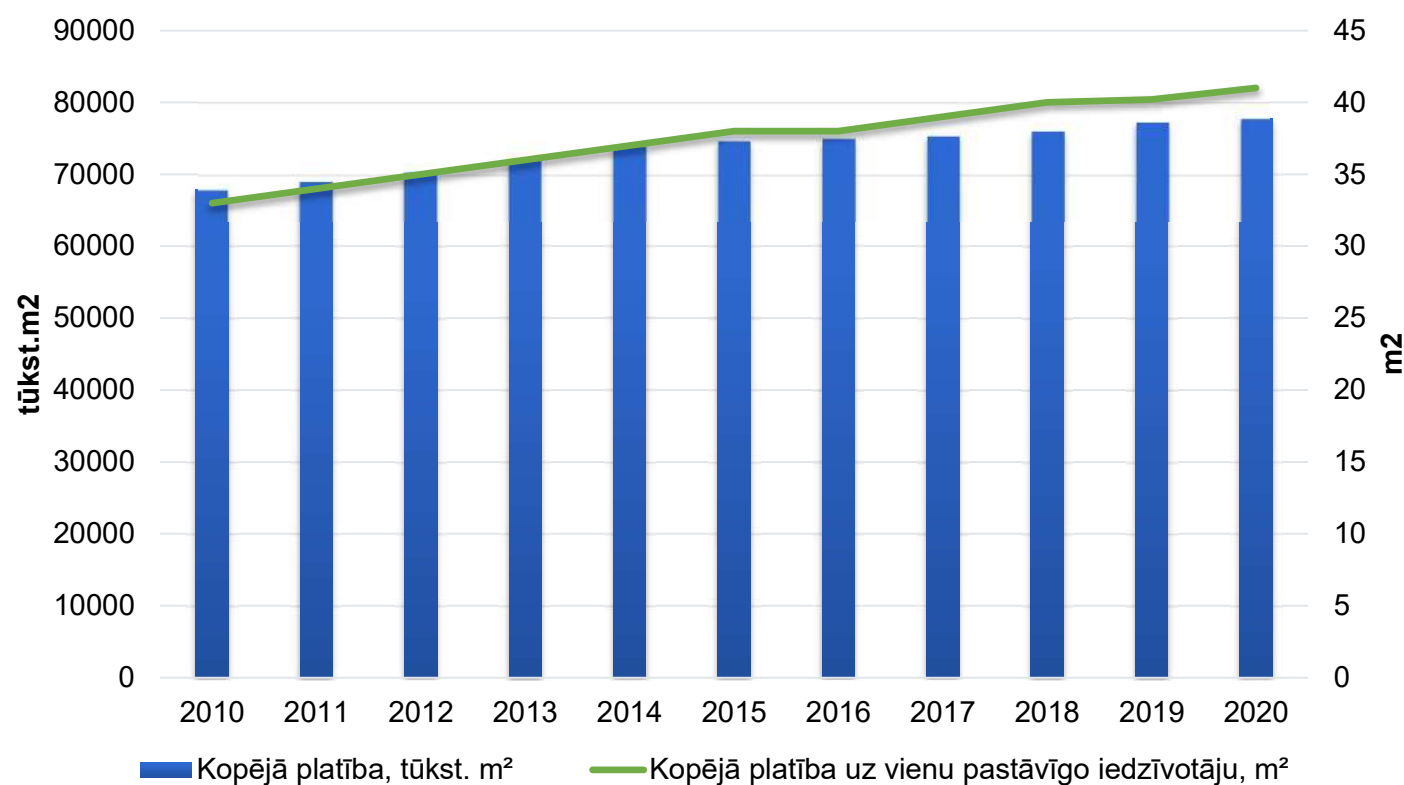
Go to
www.menti.com

Enter the code
9074 0253



Or use QR code

Dzīvojamais fonds

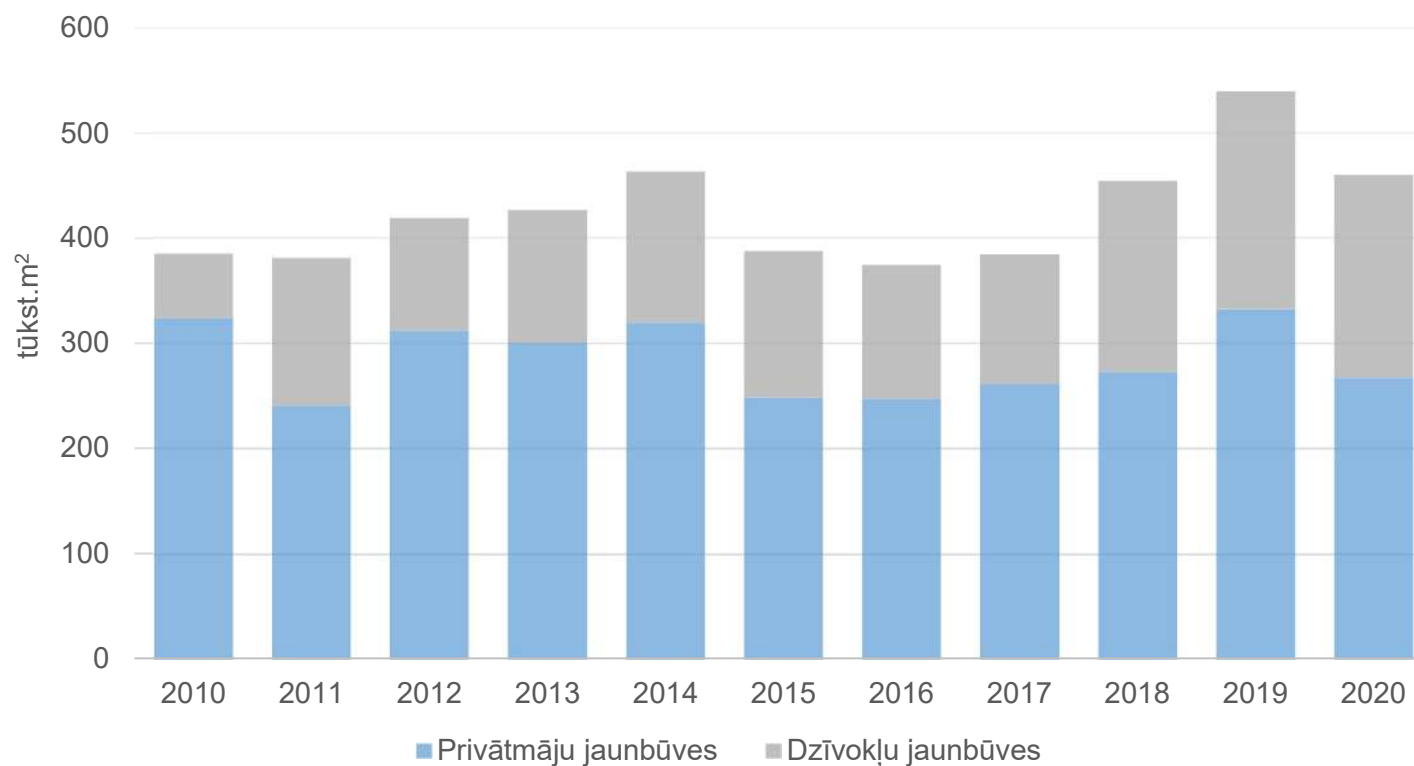


CSP - BUF010. Dzīvojamais fonds reģionos gada beigās 2010 - 2020

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Ekspluatācijā pieņemtās ēkas



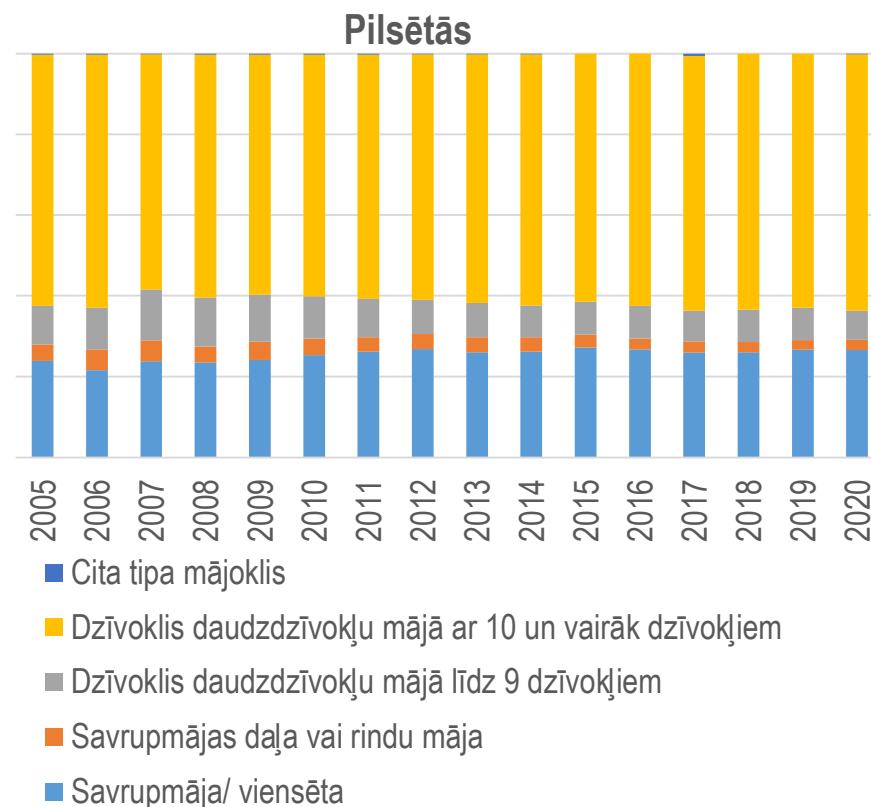
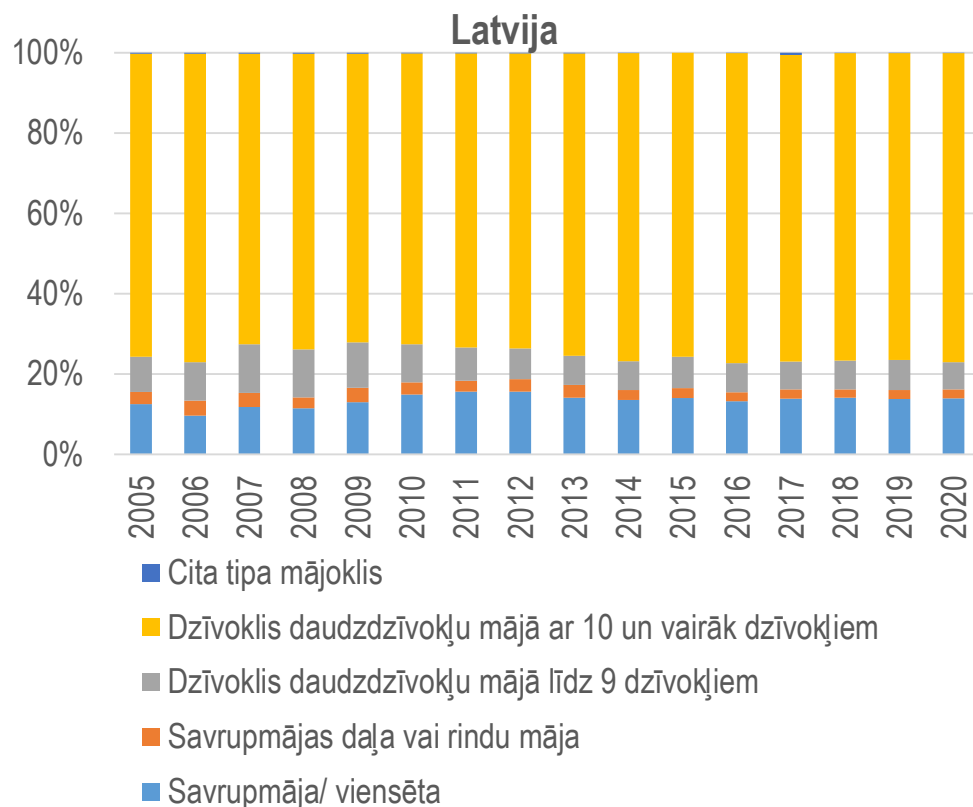
CSP - Ekspluatācijā pieņemtās ēkas reģionos un republikas pilsētās, tūkst. m2

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Mājokļa veids – vidējais Latvijas teritorijā un pilsētās

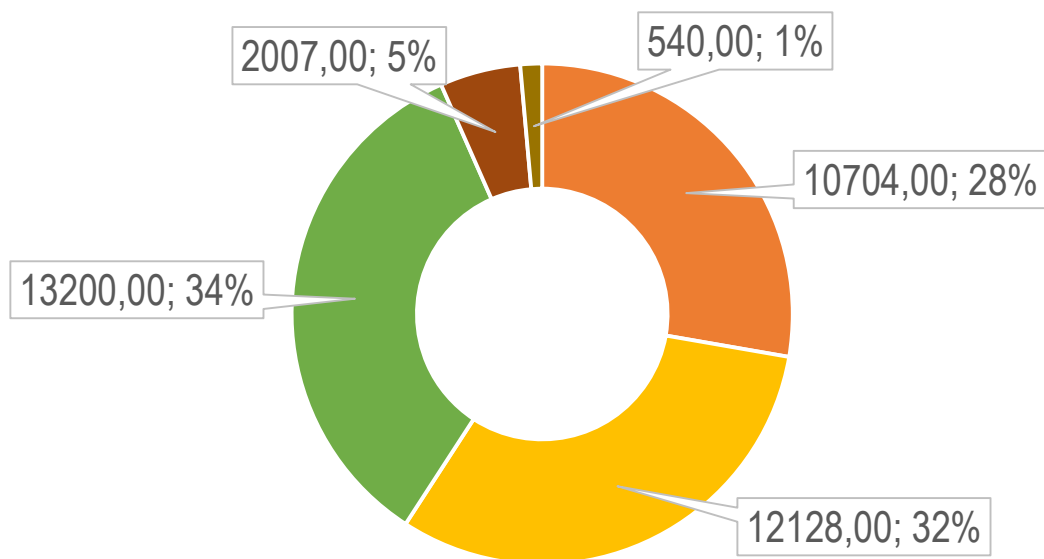
Avots: https://data.stat.gov.lv/pxweb/lv/OSP_PUB/START__POP__MA__MAA/MAA030/



~65 % dzīvo dzīvokļos (≥ 10 dzīvokļu ēka)
Neizbēgama «kopīpašuma traģēdija»!

Daudzdzīvokļu ēkas - veidi

Daudzdzīvokļu ēku veidi



- Daudzdzīvokļu mājas ar koka ārsienām
- Daudzdzīvokļu 1–2 stāvu mājas
- Daudzdzīvokļu 3–5 stāvu mājas
- Daudzdzīvokļu 6–9 stāvu mājas
- Daudzdzīvokļu 10 un vairāk stāvu mājas

“Ēku atjaunošanas ilgtermiņa stratēģija” (2020),
VZD Nekustamā īpašuma valsts kadastra informācijas sistēmas dati uz 01.01.2019.

Vecuma struktūra

Daudzdzīvokļu ēku tips un ekspluatācijas uzsākšana pēc gadiem

Daudzdzīvokļu mājas	Līdz 1941.g.	1941.-1960.	1961.-1979.	1980.-1992.	1993.-2002.	2003.-2014g.	2015.-2019.g.	Kopā	%
ar koka ārsienām	8622	1472	472	77	20	34	7	10704	27,7%
1–2 stāvu ēkas	5257	2833	3057	638	91	226	26	12128	31,4%
3–5 stāvu ēkas	2644	918	5350	3385	243	597	63	13200	34,2%
6–9 stāvu ēkas	674	32	361	657	52	195	36	2007	5,2%
10 un vairāk stāvu ēkas	0	0	172	264	23	72	9	540	1,4%
Kopā	17197	5255	9412	5021	429	1124	141	38579	
%	45%	14%	24%	13%	1%	3%	0,4%		

“Ēku atjaunošanas ilgtermiņa stratēģija” (2020),
VZD Nekustamā īpašuma valsts kadastra informācijas sistēmas dati uz 01.01.2019.

Enerģijas patēriņš un izmantošana mājsaimniecībās

Go to www.menti.com and use the code 1198 1992

Jautājumu bloks 2/4

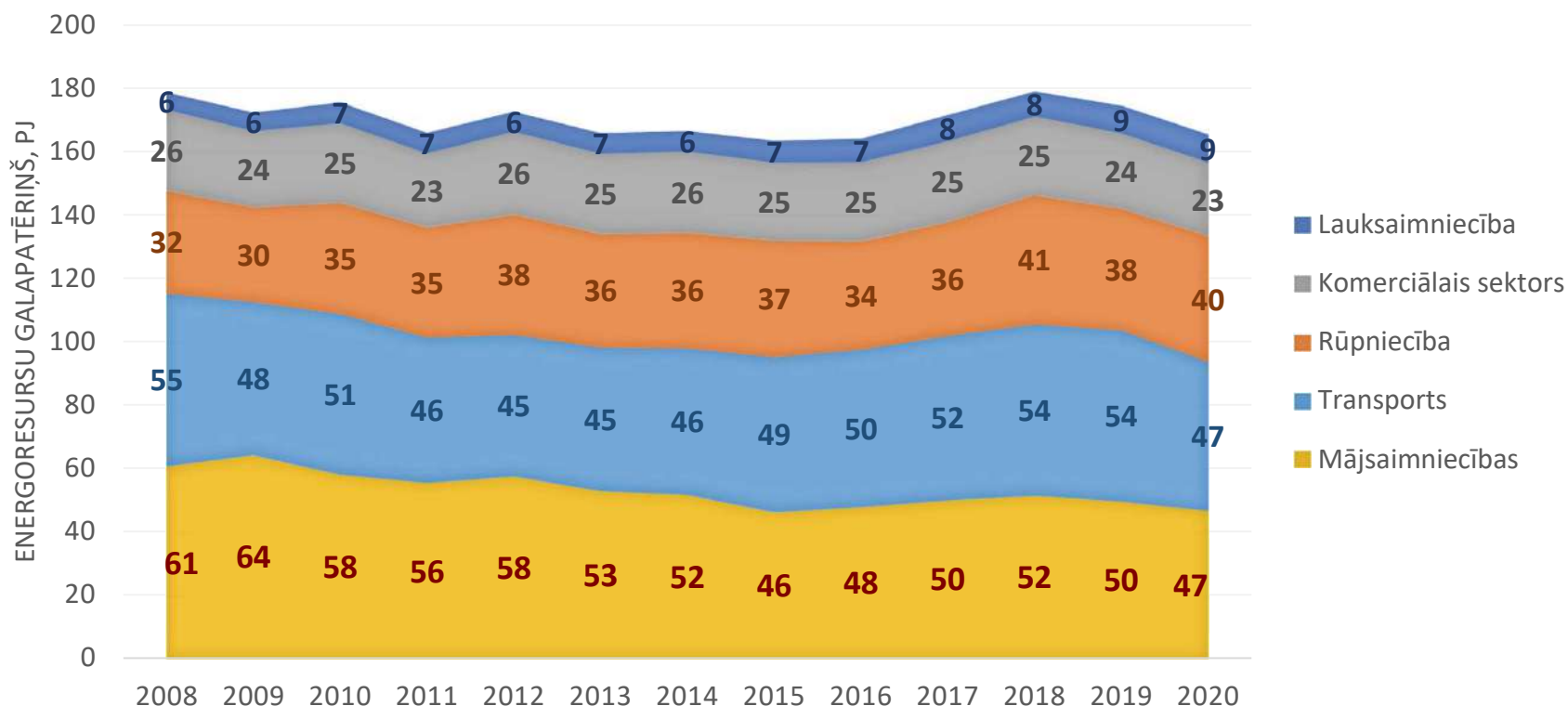
Go to
www.menti.com

Enter the code
1198 1992



Or use QR code

Mājsaimniecību sektora patēriņš sastāda ~30% no galapatēriņa

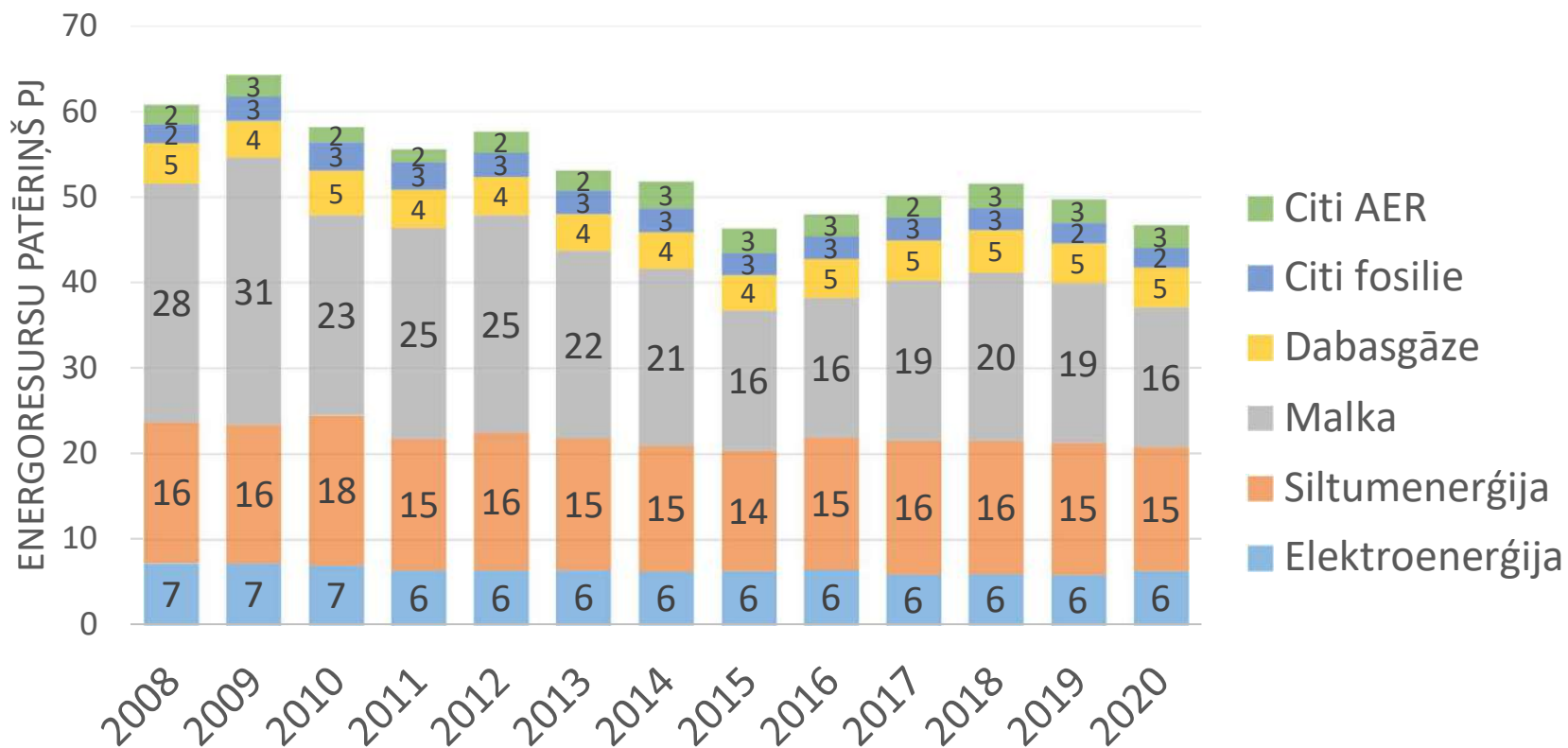


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Energoresursu patēriņa dinamika mājsaimniecībās



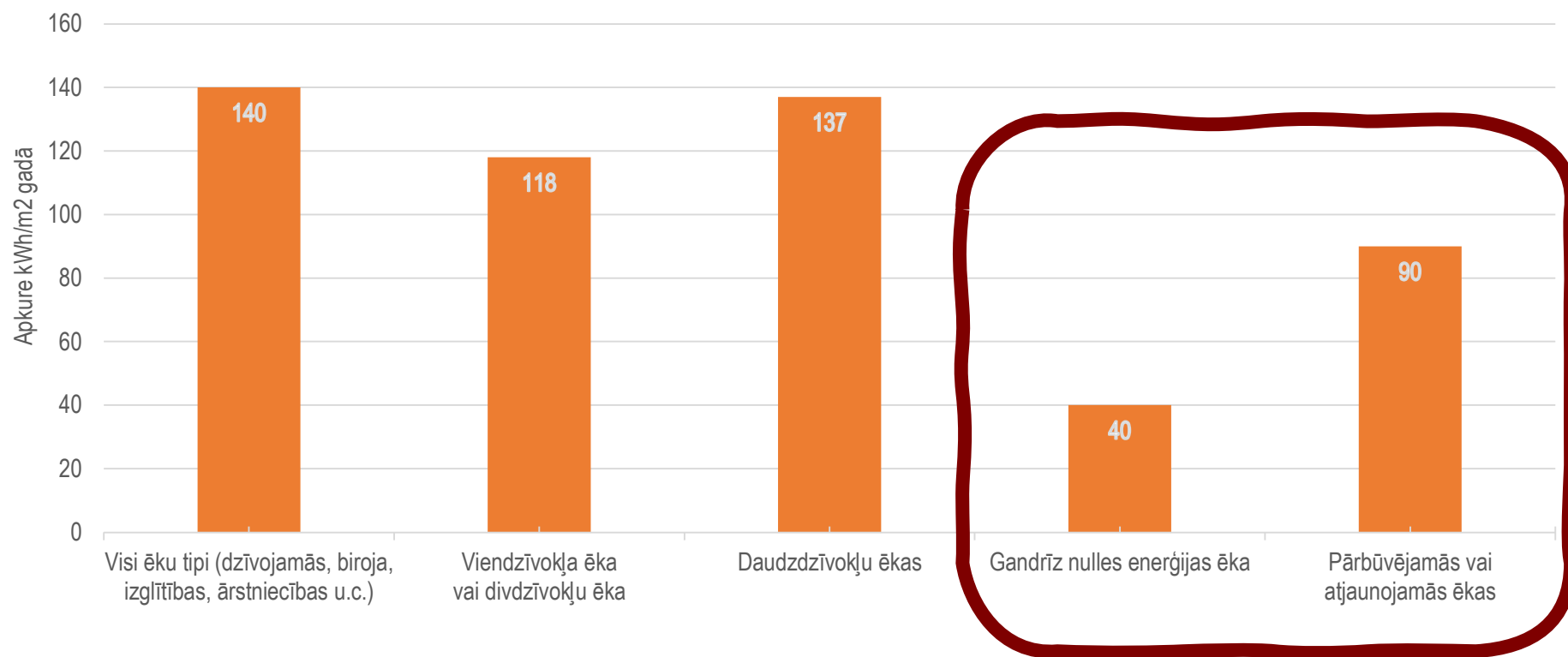
CSP - Energobalance, TJ, tūkst.toe (NACE 2. red.)

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Mājsaimniecības – enerģijas patēriņš apkurei

2019. gads



“Ēku atjaunošanas ilgtermiņa stratēģija” (2020),
VZD Nekustamā īpašuma valsts kadastra informācijas sistēmas dati uz 01.01.2019.

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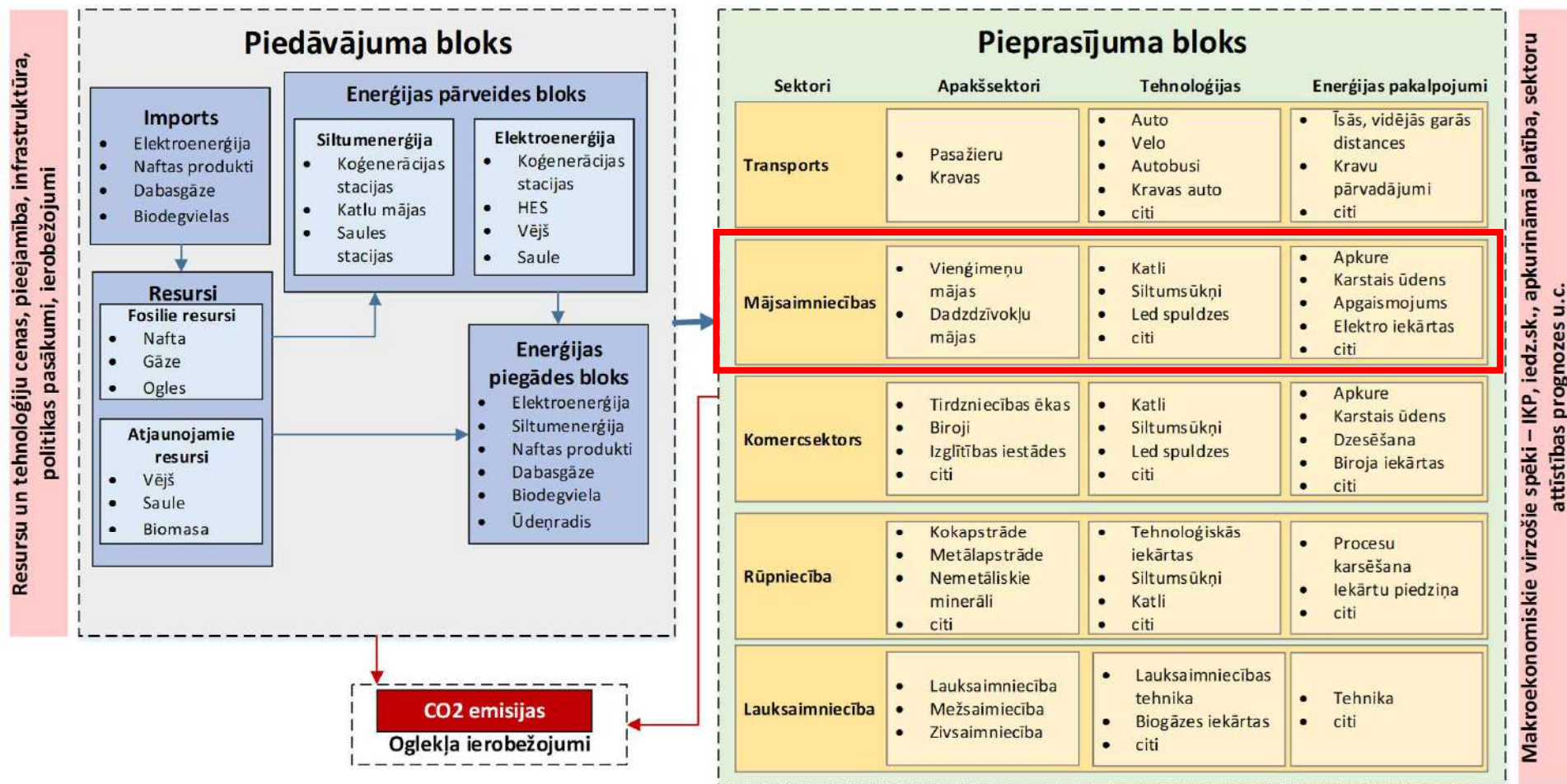
MĀJSAIMNIECĪBU SEKTORS STRUKTŪRA TIMES MODELĪ

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TIMES LATVIJA modeļa vispārējā struktūra

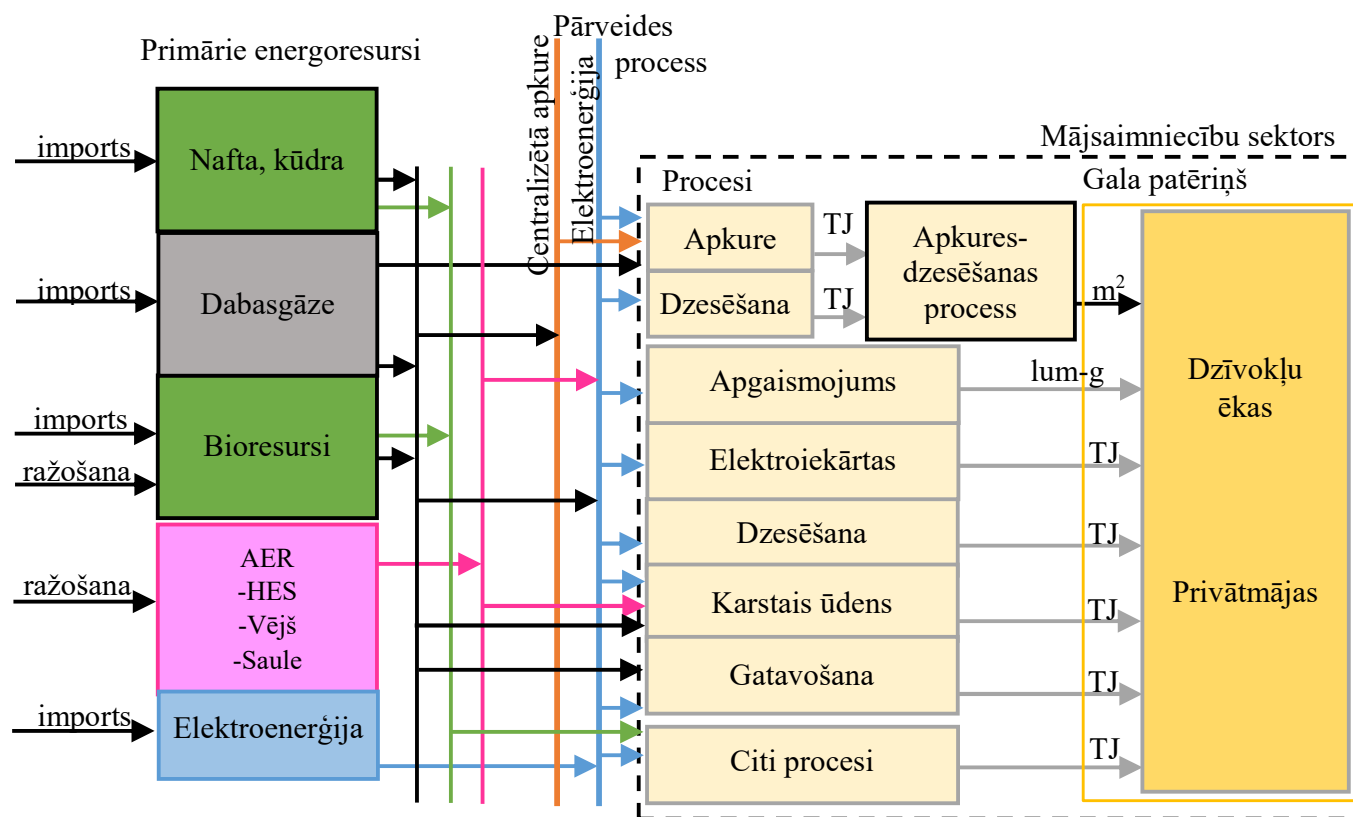


CO2 emisijas
Oglekļa ierobežojumi

Makroekonomiskie virzītie spēki – IKP, iedz.sk., apkurināmā platība, sektoru attīstības prognozes u.c.

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Mājsaimniecību sektora vispārējā struktūra TIMES



26.10.2021.

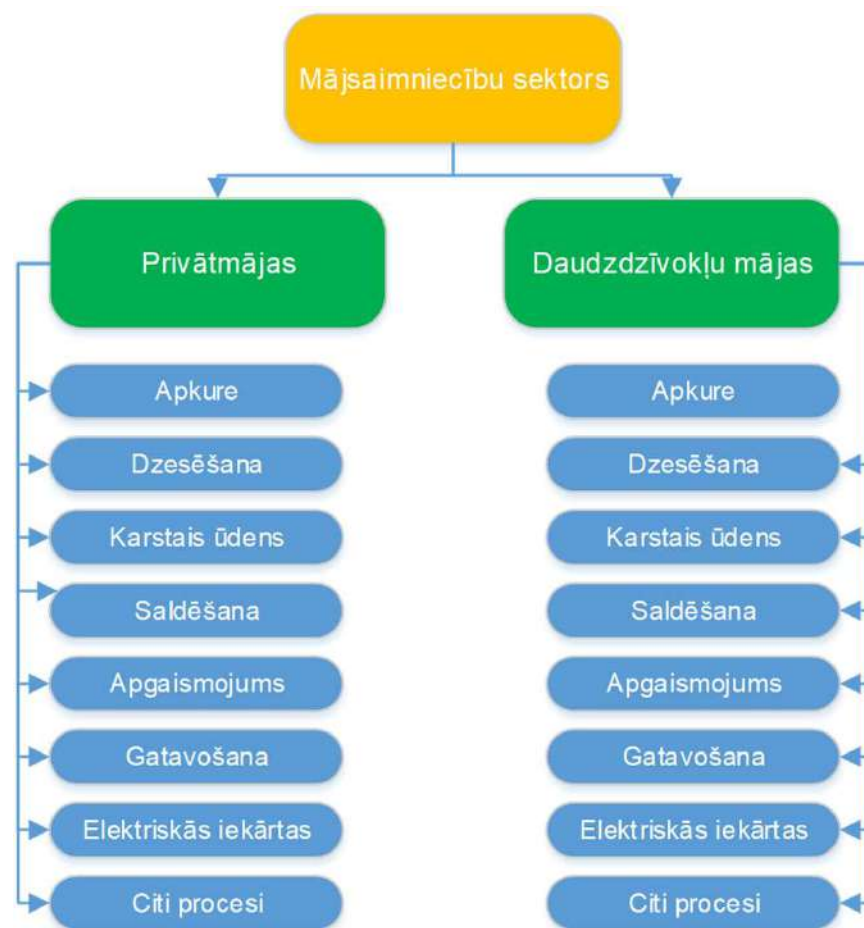
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Mājsaimniecību sektora dalījums TIMES

Sektors

Apakšsektors

Pieprasījuma
procesi



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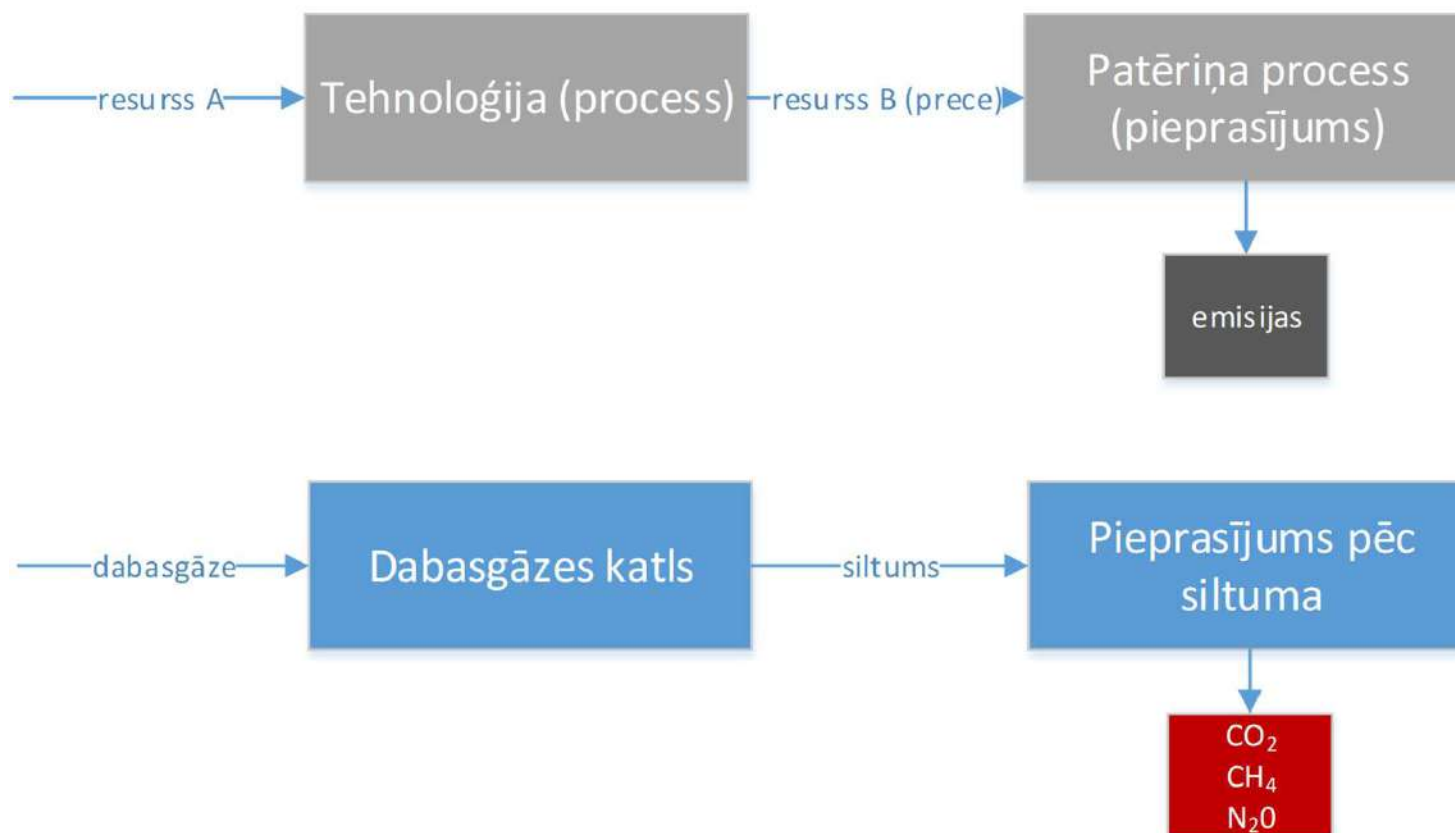
MĀJSAIMNIECĪBU SEKTORS PROCESI

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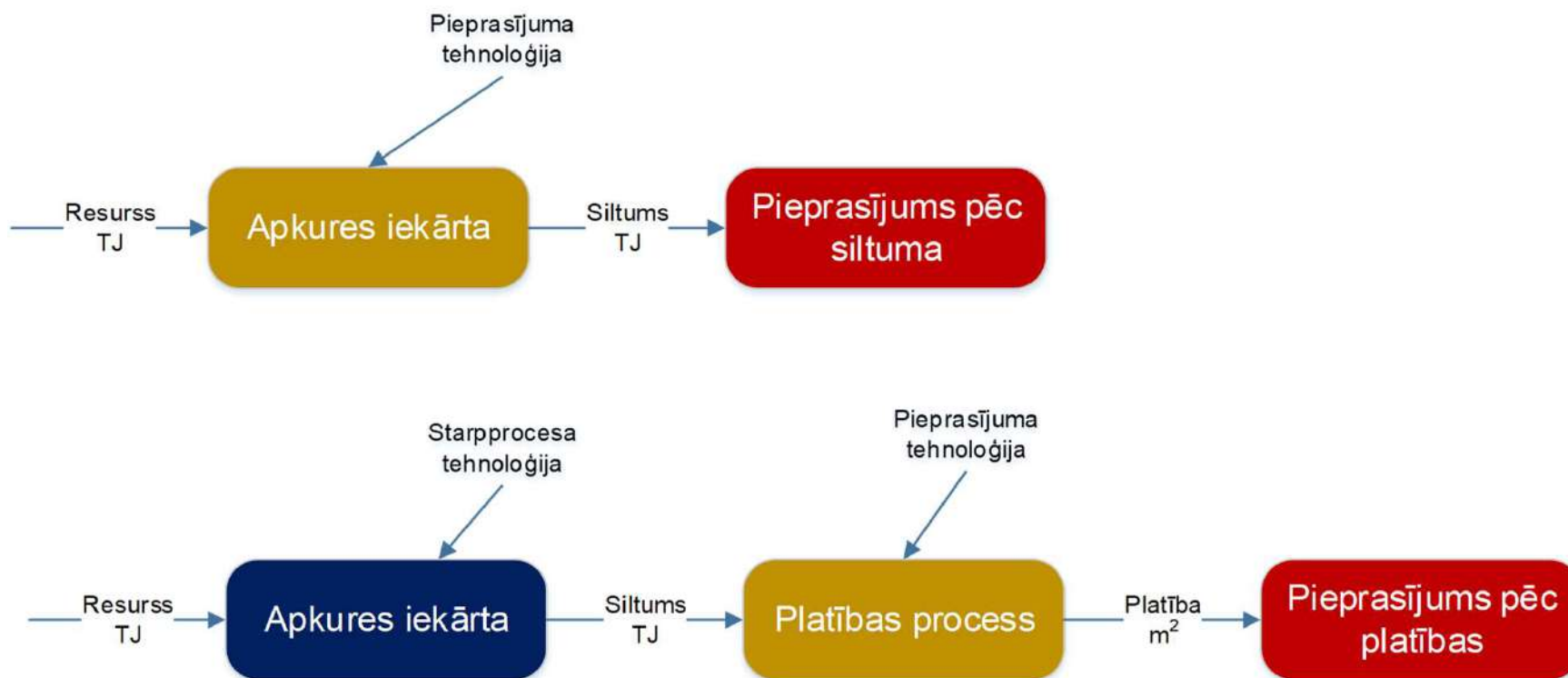


Tipisks process mājsaimniecību sektorā



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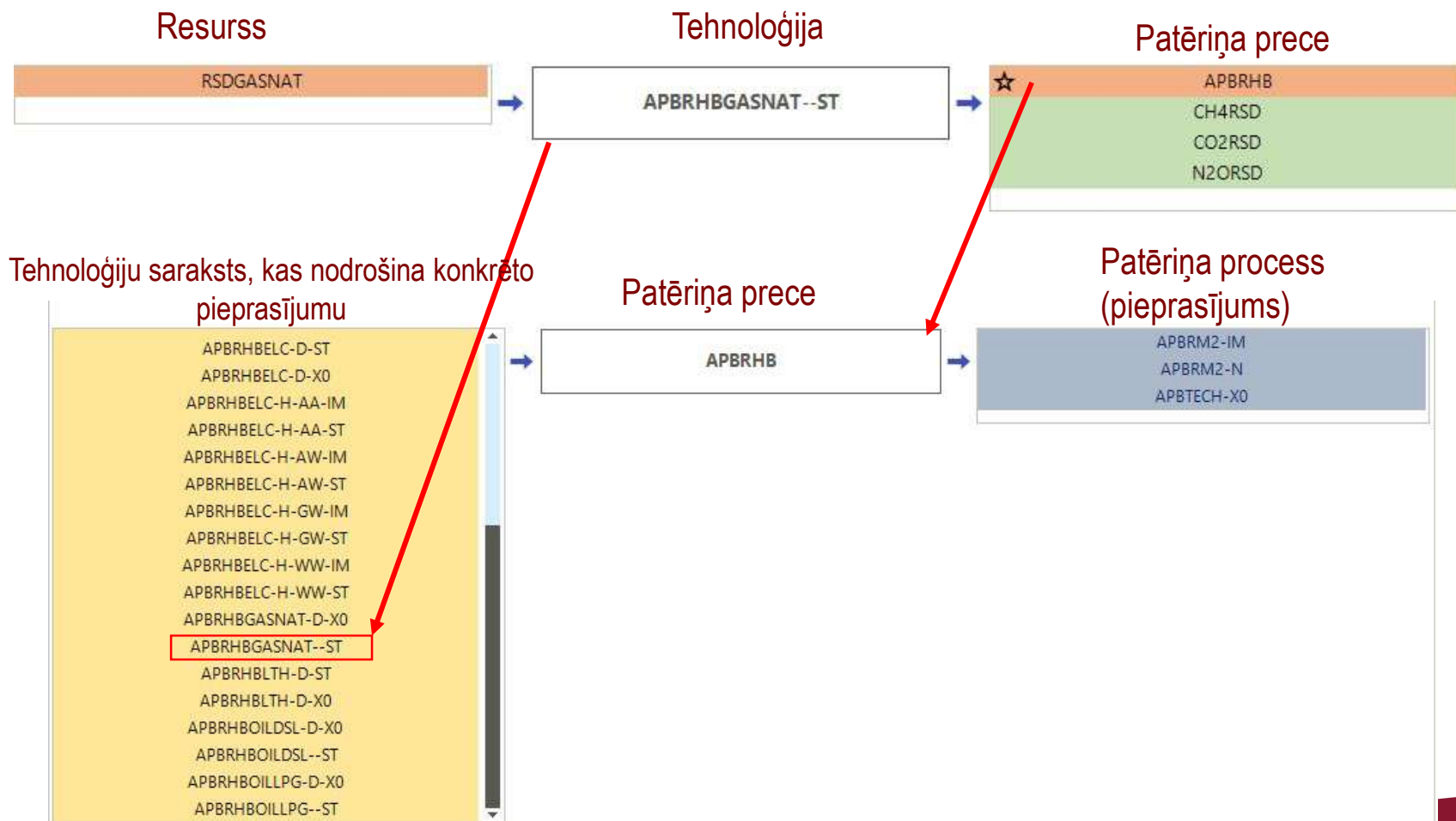
Apkureināmās platības ieviešana modelī



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Procesi TIMES rīkā



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MĀJSAIMNIECĪBU SEKTORS TEHNOLOĢIJAS

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Tehnoloģijas

TEHNOLOĢIJU SARAKSTS

dalījums pēc tipa, resursa veida un klases

Apkures tehnoloģijas

- Dabsgāzes apkures katls
- Koksnes briķešu apkures katls
- Elektrības siltumsūkņis gaiss - gaiss
- Elektrības siltumsūkņis zeme - ūdens
- ...

Dzesēšanas tehnoloģijas

- Elektriskais dzesēšanas iekārta

Ūdens sildīšanas tehnoloģijas

- Dabsgāzes ūdens sildīšanas katls
- Elektiskais ūdens sildīšanas katls
- ...

Saldēšanas iekārtas

- Elektriskā iekārta-Standard
- Elektriskā iekārta-Uzlabota
- ...

Apgaismojuma ierīces

- Elektriskais apgaismojums-Standard
- Elektriskais apgaismojums-Uzlabots
- ...

Gatavošanas iekārtas

- Dabsgāzes iekārta- Standarta
- Dabsgāzes iekārta- Uzlabota
- Elektriskā iekārta- Standarta

Citas elektriskās tehnoloģijas

- Elektriskās iekārtas

Citas tehnoloģijas

- Benzīna iekārtas
- Dabsgāzes iekārtas
- ...

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*Single Family House

* Space Heating	
SFHRHOLLPG --ST	Single Family House-Residential Heating: LPG Device-Standard
SFHRHBOLDL --ST	Single Family House-Residential Heating: Diesel oil Device-Standard
SFHRHBOACOA --ST	Single Family House-Residential Heating: Coal Device-Standard
SFHRHBGASNAT --ST	Single Family House-Residential Heating: Natural Gas Device-Standard
SFHRHBIOFW --ST	Single Family House-Residential Heating: Firewood Device-Standard
SFHRHBIOVWA --ST	Single Family House-Residential Heating: Wood Waste Device-Standard
SFHRHBIOWBK --ST	Single Family House-Residential Heating: Wood Briquettes Device-Standard
SFHRHBIOWDP --ST	Single Family House-Residential Heating: Wood Pellets Device-Standard
SFHRHBIOCHA --ST	Single Family House-Residential Heating: Charcoal Device-Standard
SFHRHBELC -D-ST	Single Family House-Residential Heating: Electricity Device-Standard
SFHRHBELC-H-AA-ST	Single Family House-Residential Heating: Electricity Heat Pump Air to Air -Standard
SFHRHBELC-H-AW-ST	Single Family House-Residential Heating: Electricity Heat Pump Air to Water -Standard
SFHRHBELC-H-WW-ST	Single Family House-Residential Heating: Electricity Heat Pump Water to Water -Standard
SFHRHBELC-H-GW-ST	Single Family House-Residential Heating: Electricity Heat Pump Ground to Water -Standard
SFHRHBELC-H-AA-IM	Single Family House-Residential Heating: Electricity Heat Pump Air to Air -Improved
SFHRHBELC-H-AW-IM	Single Family House-Residential Heating: Electricity Heat Pump Air to Water -Improved
SFHRHBELC-H-WW-IM	Single Family House-Residential Heating: Electricity Heat Pump Water to Water -Improved
SFHRHBELC-H-GW-IM	Single Family House-Residential Heating: Electricity Heat Pump Ground to Water -Improved
* SFHRHBELC-H-WGAV-IM	Single Family House-Residential Heating: Electricity Heat Pump Water/Ground to Air, Improved
* Space Cooling	
SFHRBCLC -A-ST	Single Family House-Residential Cooling: Electricity Air Device-Standard
* Floorspace	
SFHRM2-IM	Single Family House-Residential processa m2-Improved
SFHRM2-N	Single Family House-Residential processa m2- New
* Water Heating	
SFHRWHOILLPG -D-ST	Single Family House Residential Water Heating: LPG Device-Standard
SFHRWHOILDSL -D-ST	Single Family House Residential Water Heating: Diesel oil Device-Standard
SFHRWHCOACOA -D-ST	Single Family House Residential Water Heating: Coal Device-Standard
SFHRWHGASNAT -D-ST	Single Family House Residential Water Heating: Natural Gas Device-Standard
SFHRWHBIOFW -D-ST	Single Family House Residential Water Heating: Firewood Device-Standard
SFHRWHBIOVWA -D-ST	Single Family House Residential Water Heating: Wood Waste Device-Standard
SFHRWHBIOWBK -D-ST	Single Family House Residential Water Heating: Wood Briquettes Device-Standard
SFHRWHBIOWDP -D-ST	Single Family House Residential Water Heating: Wood Pellets Device-Standard
SFHRWHBIOCHA -D-ST	Single Family House Residential Water Heating: Charcoal Device-Standard
SFHRWHRNWSOL -D-ST	Single Family House Residential Water Heating: Solar Device-Standard
SFHRWHRNWSOL -D-IM	Single Family House Residential Water Heating: Solar Device-Improved
SFHRWHCLC -D-ST	Single Family House Residential Water Heating: Electricity Device-Standard
* Refrigeration	
SFHRRFELC -D-ST	Single Family House Residential Refrigeration: Electricity Device-Standard
SFHRRFELC -D-IM	Single Family House Residential Refrigeration: Electricity Device-Improved
SFHRRFELC -D-BE	Single Family House Residential Refrigeration: Electricity Device-Better
SFHRRFELC -D-AD	Single Family House Residential Refrigeration: Electricity Device-Advanced
SFHRRFELC -D-AD+	Single Family House Residential Refrigeration: Electricity Device-Advanced+
* Lighting	
SFHRLTCLC -D-ST	Single Family House Residential Lighting: Electricity Device-Standard
SFHRLTCLC -D-IM	Single Family House Residential Lighting: Electricity Device-Improved
SFHRLTCLC -D-AD	Single Family House Residential Lighting: Electricity Device-Advanced
* Cooking	
SFHRCKOLLPG -D-ST	Single Family House Residential Cooking: LPG Device-Standard
SFHRCKOLLPG -D-IM	Single Family House Residential Cooking: LPG Device-Improved
SFHRCKGASNAT -D-ST	Single Family House Residential Cooking: Natural Gas Device-Standard
SFHRCKGASNAT -D-IM	Single Family House Residential Cooking: Natural Gas Device-Improved
SFHRCKBIOFW -D-ST	Single Family House Residential Cooking: Firewood Device-Standard
SFHRCKBIOVWA -D-ST	Single Family House Residential Cooking: Wood Waste Device-Standard
SFHRCKBIOWBK -D-ST	Single Family House Residential Cooking: Wood Briquettes Device-Standard
SFHRCKELC -D-ST	Single Family House Residential Cooking: Electricity Device-Standard
SFHRCKELC -D-IM	Single Family House Residential Cooking: Electricity Device-Improved
* Electric Appliances	
SFHRMELC -D-ST	Single Family House Residential ELA Appliances: Electricity Standard
* Other Applications	
SFHRMANRG -D-ST	Single Family House Residential Other Applications: Standard



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Tehnoloģiju datu bāze

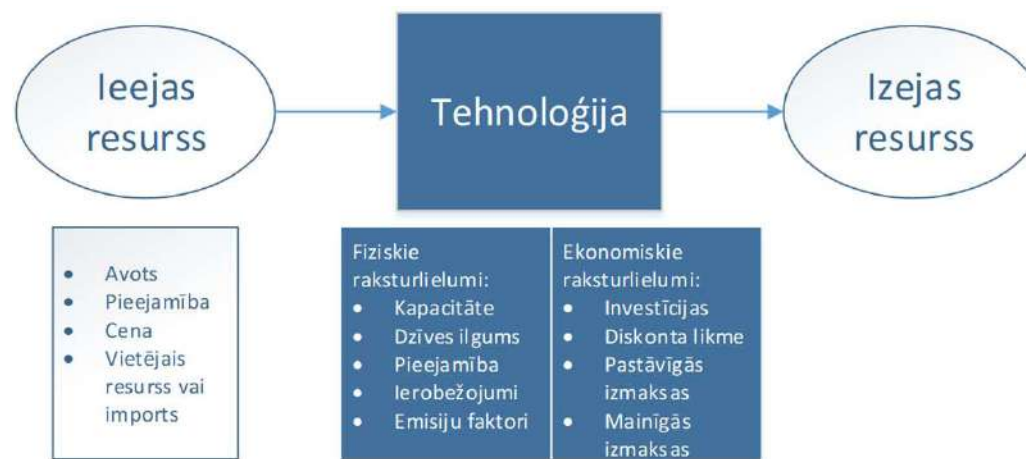
Datu bāzei izmantotie avoti:

JRC Energy Technology Reference Indicator projections for 2010-2050;
Demystifying the Costs of Electricity Generation Technologies, World bank group, 2020;
Dānijas enerģētikas aģentūra: katalogs + The Danish Levelized Cost of Energy Calculator;
IRENA Renewable Cost Database, 2020;
Projected Costs of Generating Electricity, International Energy Agency (IEA) (2015).
Simple Levelized Cost of Energy (LCOE) Calculator Documentation, National Renewable Energy Laboratory (NREL) (2018).
U.S. Energy Information Administration | Levelized Cost and Levelized Avoided Cost of New Generation Resources AEO2020;
LAZARD Levelized Costs of Energy Analysis, Larzard, 2020;
E3Mlab - PRIMES model – 2018 - Technology pathways in decarbonisation scenarios.
Department for Business, Energy & Industrial Strategy, BEIS Electricity Generation Costs, UK (2020);
Levelized cost of electricity. Renewable energy technologies. Fraunhofer Insitute for Solar Energy Systems, 2018;
Tiešsaistes datu bāzes:
https://openei.org/wiki/PRIMRE/Databases/Technology_Database/Technologies

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Tehnoloģiju parametri



0.000

0.000

Total Count:

19

ACT / UP / ANNUAL / LHS / LV / 2...

commodity_group

lim_type

time_slice

side

region

scenario

currency

Sum of val_field

year

process	user_constrai	attribute	2017	2018	2020	2025	2030	2040	2050	
APBRHBGASNAT	-	ACT_EFF			0.87	0.87	0.90	0.93	0.95	0.96
		NCAP_COST			10.15	10.04	9.78	9.51	9.26	9.01
		NCAP_FOM		0.66						
		NCAP_OLIFE		20.00						
		NCAP_START	2018.00							
	ShareofAPBRHB	UC_ACT			1.00					
	ShareofAPBRHB	UC_ACT			1.00					

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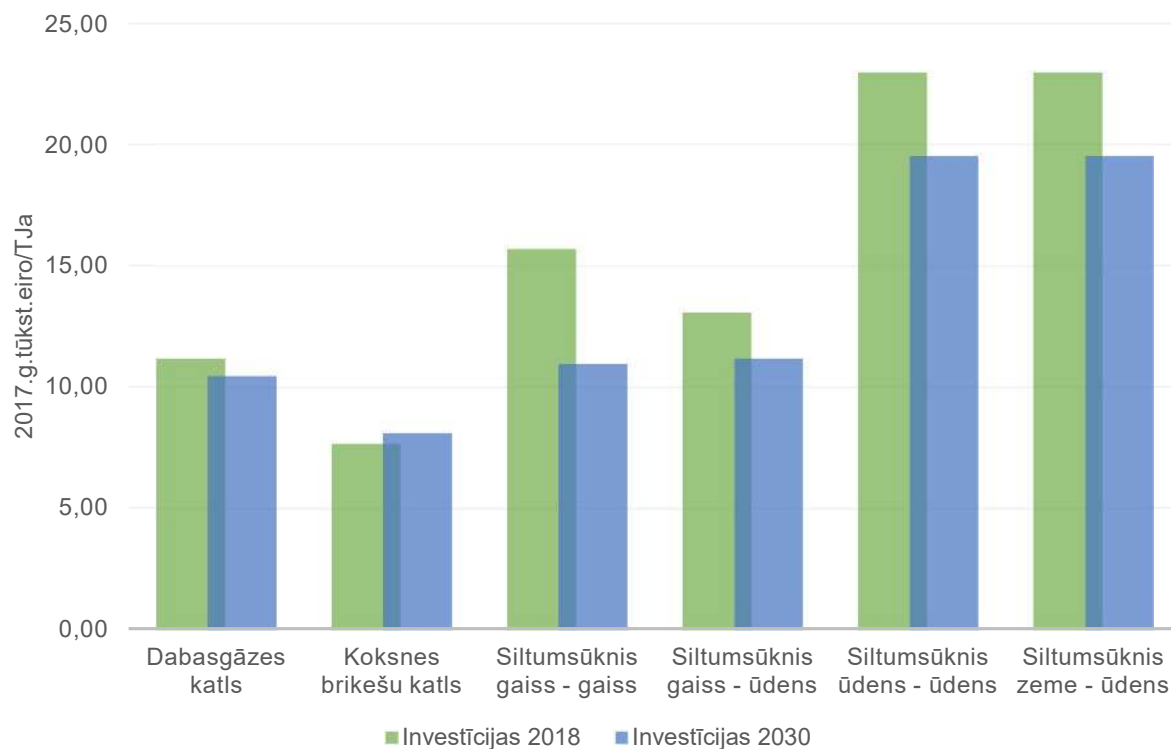
Tehnoloģiju raksturlielumi



- Tehnoloģijas ekspluatācijas ilgums;
- Esošā un nākotnes efektivitāte;
- Investīcijas (2018->2050);
- Fiksētās un mainīgās ekspluatācijas izmaksas (2018->2050);
- Koģenerācija: siltums/elektrība (2018->2050);
- Jaudas pieejamības faktors;
- Citi parametri (piem., ierobežojumi u.c.)

Tech Description		Unit Act/Cap	TechName	Comm-IN	Comm-OUT	START	OLIFE	ELIFE	LIFE	NCAP_CO ST-2018	NCAP_CO ST-2020	NCAP_CO ST-2025	NCAP_COST ~2030	NCAP_COST ~2040	NCAP_COST ~2050	EFF-20 18	EFF-20 20	EFF-20 25	EFF-20 030	EFF-20 040	EFF-20 50	AF	FXOM		
			*Units			Yr				2017thsd EUR/TJ/a	2017thsd EUR/TJ/a	2017thsd EUR/TJ/a	2017thsd R/TJ/a	2017thsd R/TJ/a	2017thsd R/TJ/a								2017thsd EUR /		
*Single FamilyHouse																									
*Space Heating																									
Single Family House-Residential Heating: LPG Device-Standard	TJ / TJ/a		SFHRH-BOL-LPG-ST	RSDEL	SFHRH-B	2018	20	7		10.81	10.46	10.12	9.94	9.42	8.90	0.79	0.79	0.82	0.85	0.86	0.87	0.16			
Single Family House-Residential Heating: Diesel oil Device-Standard	TJ / TJ/a		SFHRH-BOLDL-D-ST	RSDEL	SFHRH-B	2018	20	7		13.95	13.79	13.40	13.01	12.63	12.27	0.77	0.77	0.80	0.83	0.84	0.85	0.16	16.00		
Single Family House-Residential Heating: Coal Device-Standard	TJ / TJ/a		SFHRH-BECCO-A-COA-ST	RSDEL	SFHRH-B	2018	10	3		10.12	9.94	9.77	9.59	9.42	9.24	0.75	0.75	0.75	0.75	0.75	0.75	0.16			
Single Family House-Residential Heating: Natural Gas Device-Standard	TJ / TJ/a		SFHRH-BGASNA-T-ST	RSDEL	SFHRH-B	2018	20	7		11.17	11.04	10.76	10.46	10.19	9.91	0.87	0.87	0.90	0.93	0.95	0.96	0.16	20.90		
Single Family House-Residential Heating: Firewood Device-Standard	TJ / TJ/a		SFHRH-BBIOFW-D-ST	RSDEL	SFHRH-B	2018	20	7		9.06	9.06	9.24	9.24	9.42	9.59	0.70	0.71	0.73	0.75	0.77	0.79	0.16	43.00		
Single Family House-Residential Heating: Wood Waste Device-Standard	TJ / TJ/a		SFHRH-BBIOFWA-D-ST	RSDEL	SFHRH-B	2018	20	7		7.68	7.84	8.05	8.10	8.13	8.20	0.72	0.74	0.77	0.79	0.82	0.85	0.16	43.00		
Single Family House-Residential Heating: Wood Brquettes Device-Standard	TJ / TJ/a		SFHRH-BBIOWBK-D-ST	RSDEL	SFHRH-B	2018	20	7		7.68	7.84	8.05	8.10	8.13	8.20	0.80	0.81	0.83	0.84	0.85	0.85	0.16	43.00		
Single Family House-Residential Heating: Wood Palets Device-Standard	TJ / TJ/a		SFHRH-BBIOWOP-D-ST	RSDEL	SFHRH-B	2018	20	7		7.68	7.84	8.05	8.10	8.13	8.02	0.81	0.83	0.82	0.81	0.84	0.87	0.16	43.00		
Single Family House-Residential Heating: Charcoal Device-Standard	TJ / TJ/a		SFHRH-BBIOCHA-ST	RSDEL	SFHRH-B	2018	15	5		4.88	5.06	5.58	6.28	6.97	7.68	0.80	0.81	0.83	0.84	0.85	0.85	0.16			
Single Family House-Residential Heating: Electricity Device-Standard	TJ / TJ/a		SFHRH-BELC-D-ST	RSDEL	SFHRH-B	2018	20	7		27.91	27.73	27.38	26.86	25.47	24.07	1.00						1.00	0.16		
Single Family House-Residential Heating: Electricity Heat Pump Air to Air-Standard	TJ / TJ/a		SFHRH-BELC-H-AA-ST	RSDEL	SFHRH-B	2018	12	4		15.70	15.17	14.65	10.99	10.70	10.46	2.17	2.17	2.43	2.69	2.81	2.93	0.16	1.01		
Single Family House-Residential Heating: Electricity Heat Pump Air to Water-Standard	TJ / TJ/a		SFHRH-BELC-H-AW-ST	RSDEL	SFHRH-B	2018	20	7		13.08	12.90	12.21	11.17	10.46	9.94	1.98	1.98	2.22	2.45	2.56	2.67	0.16	0.16		
Single Family House-Residential Heating: Electricity Heat Pump Water to Water-Standard	TJ / TJ/a		SFHRH-BELC-H-WW-ST	RSDEL	SFHRH-B	2018	20	7		23.02	21.63	20.58	19.54	18.66	17.79	3.30	3.30	3.70	4.10	4.31	4.52	0.16	0.16		
Single Family House-Residential Heating: Electricity Heat Pump Ground to Water-Standard	TJ / TJ/a		SFHRH-BELC-H-GW-ST	RSDEL	SFHRH-B	2018	20	7		23.02	23.02	20.58	19.54	18.66	17.79	3.60	3.60	4.04	4.47	4.70	4.93	0.16	0.16		
Single Family House-Residential Heating: Electricity Heat Pump Air to Air-Improvement	TJ / TJ/a		SFHRH-BELC-H-AA-M	RSDEL	SFHRH-B	2018	12	4		16.74	16.39	16.05	17.44	17.27	17.09	4.25	4.25	3.84	3.42	3.71	4.00	0.16	1.59		
Single Family House-Residential Heating: Electricity Heat Pump Air to Water-Improvement	TJ / TJ/a		SFHRH-BELC-H-AW-M	RSDEL	SFHRH-B	2018	20	7		16.39	16.05	15.35	13.61	13.08	12.56	4.15	4.15	3.64	3.12	3.39	3.65	0.16	0.38		
Single Family House-Residential Heating: Electricity Heat Pump Water to Water-Improvement	TJ / TJ/a		SFHRH-BELC-H-WW-M	RSDEL	SFHRH-B	2018	20	7		20.93	20.23	19.54	17.44	16.57	15.7	4.50	4.50	4.51	4.52	4.75	4.98	0.16	0.38		
Single Family House-Residential Heating: Electricity Heat Pump Ground to Water-Improvement	TJ / TJ/a		SFHRH-BELC-H-GW-M	RSDEL	SFHRH-B	2018	20	7		20.93	20.23	19.54	17.44	16.57	15.7	3.88	3.90	4.42	4.93	5.18	5.43	0.16	0.38		
Single Family House-Residential Heating: Electricity Heat Pump Water/Ground to Water-Improvement	TJ / TJ/a		*SFHRH-BELC-H-WGAV-SFHRH	RSDEL		2018	15	5		16.39	15.7	14.83	13.95	13.26	12.56	3.90	3.90	4.42	4.93	5.33	5.73	0.16	0.25		
*Space Cooling																									
Single Family House-Residential Cooling: Electricity Air Device-Standard	TJ / TJ/a		SFHRH-BELC-A-ST	RSDEL	SFHRH-B	2018	12	4		19.18	19.01	18.83	18.49	17.96	17.44	5.50	5.50	5.50	5.50	5.50	5.50	0.16	0.48		
*Floorspace																									
Single Family House-Residential procesa m2-Improved	m2-g / m2		SFHRM2-M	SFHRH-B	SFHRH-B	2018				50	241.86	246.00	247.79	247.49	247.74	248.21	2.78	2.78	2.78	2.78	2.78	2.78	1.00		
Single Family House-Residential procesa m2- New	m2-g / m2		SFHRM2-N	SFHRH-B	SFHRH-B	2018				50							4.27	4.27	6.94	6.94	6.94	1.00			
*Water Heating																									
Single Family House Residential Water Heating: LPG Device-Standard	TJ / TJ/a		SFHRH-BOL-LPG-D-ST	RSDEL	SFHRH-B	2018	20	7		10.81	10.46	10.12	9.94	9.42	8.90	0.97	0.97	0.97	0.97	0.97	0.97	0.10	0.66		
Single Family House Residential Water Heating: Diesel oil Device-Standard	TJ / TJ/a		SFHRH-BOLDL-D-ST	RSDEL	SFHRH-B	2018	20	7		13.95	13.79	13.40	13.01	12.63	12.27	0.92	0.92	0.92	0.93	0.93	0.95	0.10	0.51		
Single Family House Residential Water Heating: Coal Device-Standard	TJ / TJ/a		SFHRH-BECCO-A-COA-D-ST	RSDEL	SFHRH-B	2018	10	3		10.12	9.94	9.77	9.59	9.42	9.24	0.75	0.75	0.75	0.75	0.75	0.75	0.10	0.57		
Single Family House Residential Water Heating: Natural Gas Device-Standard	TJ / TJ/a		SFHRH-BGASNA-T-D-ST	RSDEL	SFHRH-B	2018	20	7		11.17	11.04	10.76	10.46	10.19	9.91	0.97	0.97	0.97	0.97	0.97	0.97	0.10	0.66		
Single Family House Residential Water Heating: Firewood Device-Standard	TJ / TJ/a		SFHRH-BBIOFW-D-ST	RSDEL	SFHRH-B	2018	20	7		9.06	9.06	9.24	9.24	9.42	9.59	0.70	0.70	0.71	0.72	0.74	0.75	0.10	0.41		
Single Family House Residential Water Heating: Wood Waste Device-Standard	TJ / TJ/a		SFHRH-BBIOFWA-D-ST	RSDEL	SFHRH-B	2018	20	7		7.68	7.84	8.05	8.10	8.13	8.20	0.80	0.82	0.84	0.85	0.87	0.88	0.10	0.41		
Single Family House Residential Water Heating: Wood Brquettes Device-Standard	TJ / TJ/a		SFHRH-BBIOWBK-D-ST	RSDEL	SFHRH-B	2018	20	7		7.68	7.84	8.05	8.10	8.13	8.20	0.80	0.82	0.83	0.85	0.87	0.88	0.10	0.41		
Single Family House Residential Water Heating: Wood Palets Device-Standard	TJ / TJ/a		SFHRH-BBIOWOP-D-ST	RSDEL	SFHRH-B	2018	20	7		7.68	7.84	8.05	8.10	8.13	8.02	0.85	0.87	0.88	0.90	0.92	0.95	0.10	0.48		
Single Family House Residential Water Heating: Charcoal Device-Standard	TJ / TJ/a		SFHRH-BBIOCHA-D-ST	RSDEL	SFHRH-B	2018	15	5		4.88	5.06	5.58	6.28	6.97	7.68	0.83	0.84	0.85	0.86	0.87	0.88	0.10	0.57		
Single Family House Residential Water Heating: Solar Device-Standard	TJ / TJ/a		SFHRH-BRWWSOL-D-ST	RSDEL	SFHRH-B	2018	25	8		20.05	18.49	17.61	16.74	15.87	15.00	0.40	0.41	0.43	0.45	0.48	0.50	0.10	0.09		
Single Family House Residential Water Heating: Solar Device-Improved	TJ / TJ/a		SFHRH-BRWWSOL-D-M	RSDEL	SFHRH-B	2018	25	8		21.42	20.05	19.18	18.32	17.44	16.74	0.43	0.44	0.45	0.46	0.48	0.51	0.10	0.09		
Single Family House Residential Water Heating: Electricity Device-Standard	TJ / TJ/a		SFHRH-BELC-D-ST	RSDEL	SFHRH-B	2018	7	2		27.91	27.73	27.38	26.86	25.47	24.07	0.95	1.00	1.00	1.00	1.00	1.00	1.00	0.10		
*Refrigeration																									
Single Family House Residential Refrigeration: Electricity Device-Standard	TJ / TJ/a		SFHRH-FELC-D-ST	RSDEL	SFHRH-F	2018	7	2		167	166.67	200.00	250.00	300.00	350.00	0.45	0.45	0.45	0.45	0.45	0.45	1.00	0.10		
Single Family House Residential Refrigeration: Electricity Device-Improved	TJ / TJ/a		SFHRH-FELC-D-M	RSDEL	SFHRH-F	2018	7	2		251	251	267.12	283.70	316.85	350.00	0.45	0.45	0.45	0.45	0.55	0.58	1.00	0.10		
Single Family House Residential Refrigeration: Electricity Device-Better	TJ / TJ/a		SFHRH-FELC-D-BE	RSDEL	SFHRH-F	2018	7	2		248	248	273.35	298.68	349.34	400.00	0.60	0.60	0.62	0.64	0.66	0.67	1.00	0.10		
Single Family House Residential Refrigeration: Electricity Device-Advanced	TJ / TJ/a		SFHRH-FELC-D-AD	RSDEL	SFHRH-F	2018	7	2		391	391	400.52	410.42	430.21	450.00	0.70	0.70	0.72	0.73	0.74	0.75	1.00	0.10		
Single Family House Residential Refrigeration: Electricity Device-Advanced+	TJ / TJ/a		SFHRH-FELC-D-AD+	RSDEL	SFHRH-F	2018	7	2		802	802	752.06	701.65	600.82	500.00	0.80	0.80	0.81	0.81	0.82	0.82	1.00	0.10		
*Lighting																									
Single Family House Residential Lighting: Electricity Device-Standard	m-lum-yr / m-lum		SFHRH-LTEL-C-D-ST	RSDEL	SFHRH-L	2018	7	2		26.20	26.20	26.20	26.20	26.20	26.20	3.92	3.96	4.00	4.04	4.08	4.12	1.00			
Single Family House Residential Lighting: Electricity Device-Improved	m-lum-yr / m-lum		SFHRH-LTEL-C-D-M	RSDEL	SFHRH-L	2018	12	4		32.94	32.94	32.94	32.94	32.94	32.94	6.40	6.47	6.53	6.59	6.65	6.70	1.00			
Single Family House Residential Lighting: Electricity Device-Advanced	m-lum-yr / m-lum		SFHRH-LTEL-C-D-AD	RSDEL	SFHRH-L	2018	15	5		50.86	50.86	50.86	50.86	50.86	50.86	9.98	9.98	9.98	9.98	9.98	9.98	1.00			
*Cooking																									
Single Family House Residential Cooking: LPG Device-Standard	TJ / TJ/a		SFHRH-COL-LPG-D-ST	RSDEL	SFHRH-C	2018	15	5		8	6057	6120	6193	6266	6339	6401	0.42	0.42	0.43	0.43	0.43	0.43	1.00		
Single Family House Residential Cooking: LPG Device-Improved	TJ / TJ/a		SFHRH-COL-LPG-D-M	RSDEL	SFHRH-C	2018	15	5		8	6057	6120	6193	6266	6339	6401	0.42	0.42	0.43	0.43	0.43	0.43	1.00		
Single Family House Residential Cooking: Natural Gas Device-Standard	TJ / TJ/a		SFHRH-CGASNA-T-D-ST	RSDEL	SFHRH-C	2018	15	5		11.17	11.04	10.76	10.46	10.19	9.91	0.87	0.87	0.90	0.93	0.95	0.96	0.16	20.90		
Single Family House Residential Cooking: Natural Gas Device-Improved	TJ / TJ/a		SFHRH-CGASNA-T-D-M	RSDEL	SFHRH-C	2018	15	5		6.55	6057	6057	6057	5961	5913	5865	0.42	0.43	0.43	0.43	0.48	0.47	1.00	3.71	
Single Family House Residential Cooking: Firewood Device-Standard	TJ / TJ/a		SFHRH-CBIOFW-D-ST	RSDEL	SFHRH-C	2018	15	5		9.06	9.06	9.24	9.24	9.42	9.59	0.70	0.70	0.71	0.72	0.74	0.75	0.10	0.41		
Single Family House Residential Cooking: Wood Waste Device-Standard	TJ / TJ/a		SFHRH-CBIOFWA-D-ST	RSDEL	SFHRH-C	2018	15	5		7.68	7.84	8.05	8.10	8.13	8.20	0.80	0.82	0.84	0.85	0.87	0.88	0.10	0.41		
Single Family House Residential Cooking: Wood Brquettes Device-Standard	TJ / TJ/a		SFHRH-CBIOWBK-D-ST	RSDEL	SFHRH-C	2018	15	5		7.68	7.84	8.05	8.10	8.13	8.20	0.80	0.82	0.83	0.85	0.87	0.88	0.10	0.41		
Single Family House Residential Cooking: Electricity Device-Standard	TJ / TJ/a		SFHRH-CELC-D-ST	RSDEL	SFHRH-C	2018	15	5		27.91	27.73	27.38	26.86	25.47	24.07	1.00						1.00	0.16		
Single Family House Residential Cooking: Electricity Device-Improved	TJ / TJ/a		SFHRH-CELC-D-M	RSDEL	SFHRH-C	2018	15	5		7.15	5803	5803	5803	5930	5930	5930	0.75	0.75	0.78	0.78	0.83	0.86	0.342		
*Electric Appliances																									
Single Family House Residential EL Appliances: Electricity Standard	TJ / TJ/a		SFHRH-MELC-D-ST	RSDEL	SFHRH-M	2018	50	17		11.91						1.00						1.00	0.16		
*Other Applications																									
Single Family House Residential Other Applications: Standard	TJ / TJ/a		SFHRH-MNRG-D-ST	RSDEL	SFHRH-M	2018	50	17		5.96						1.00						1.00	0.16		

Tehnoloģiju investīciju piemērs – apkures iekārtas



26.10.2021.

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MĀJSAIMNIECĪBU SEKTORS IEVADDATI, PROGNOZES SASAITE AR CITIEM MODEĻIEM

26.10.2021.

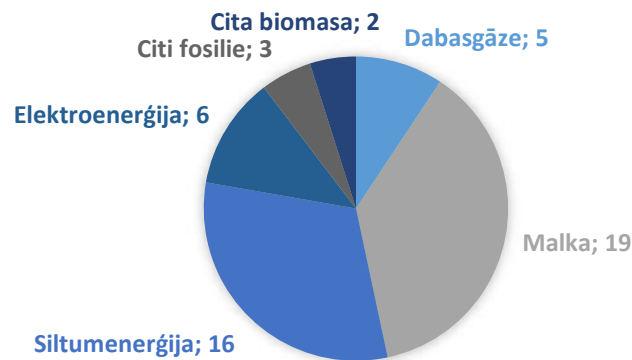
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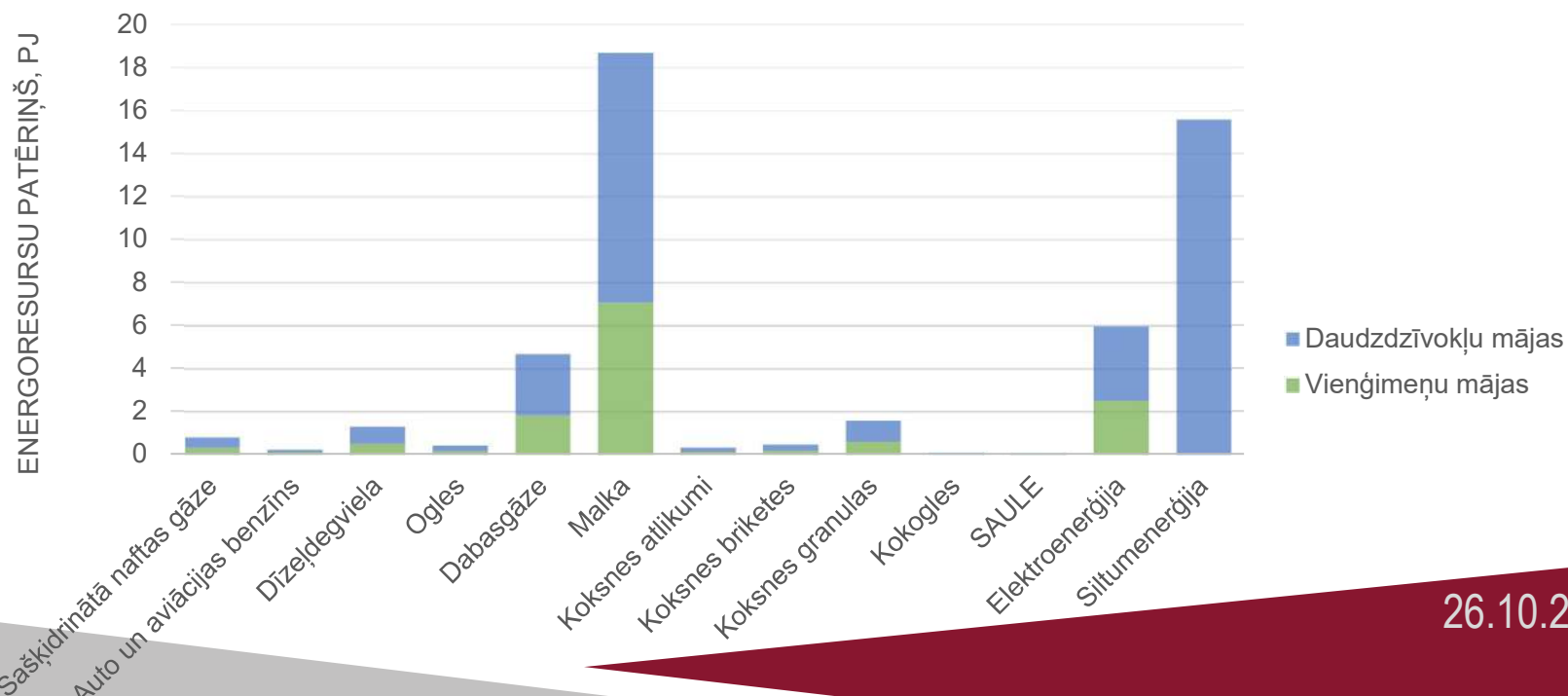
Energoresursu patēriņš māsaimniecībās – CSP un TIMES 2017.g.

Patēriņa dalījums māsaimniecībās

Avots:CSP



Patēriņš māsaimniecībās TIMES



26.10.2021.

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Jautājumu bloks 3/4

Go to
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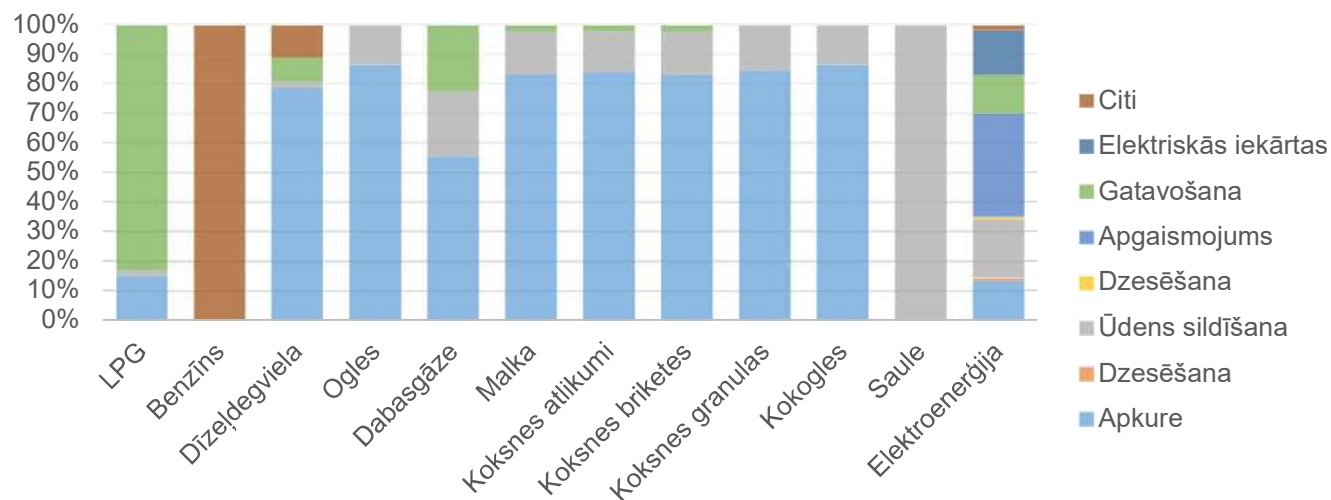
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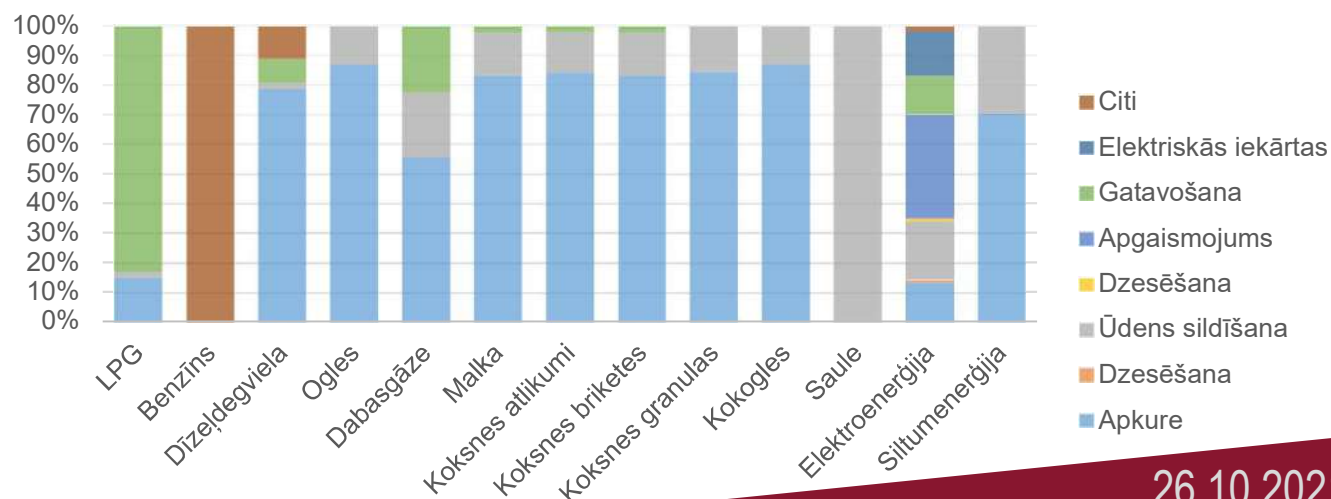
Or use QR code

Resursu izmantošana procesiem mājssaimniecībās

Privātmājas



Daudzdzīvokļu mājas



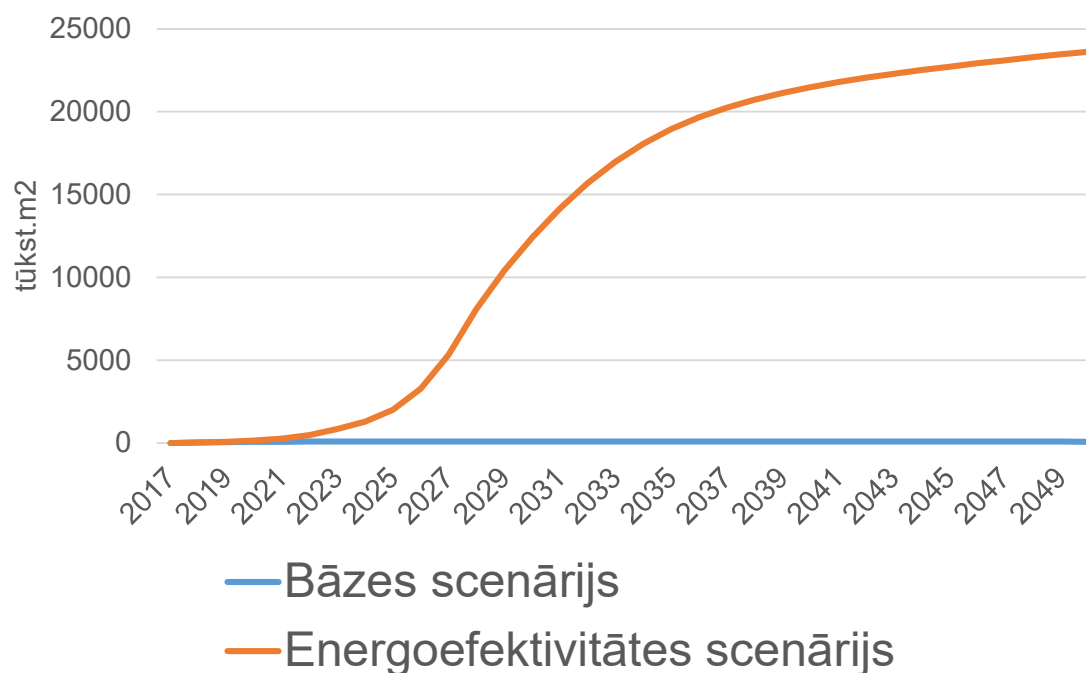
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Sasaiste ar citiem modeļiem

VPP-EM-2018/NEKP-0001



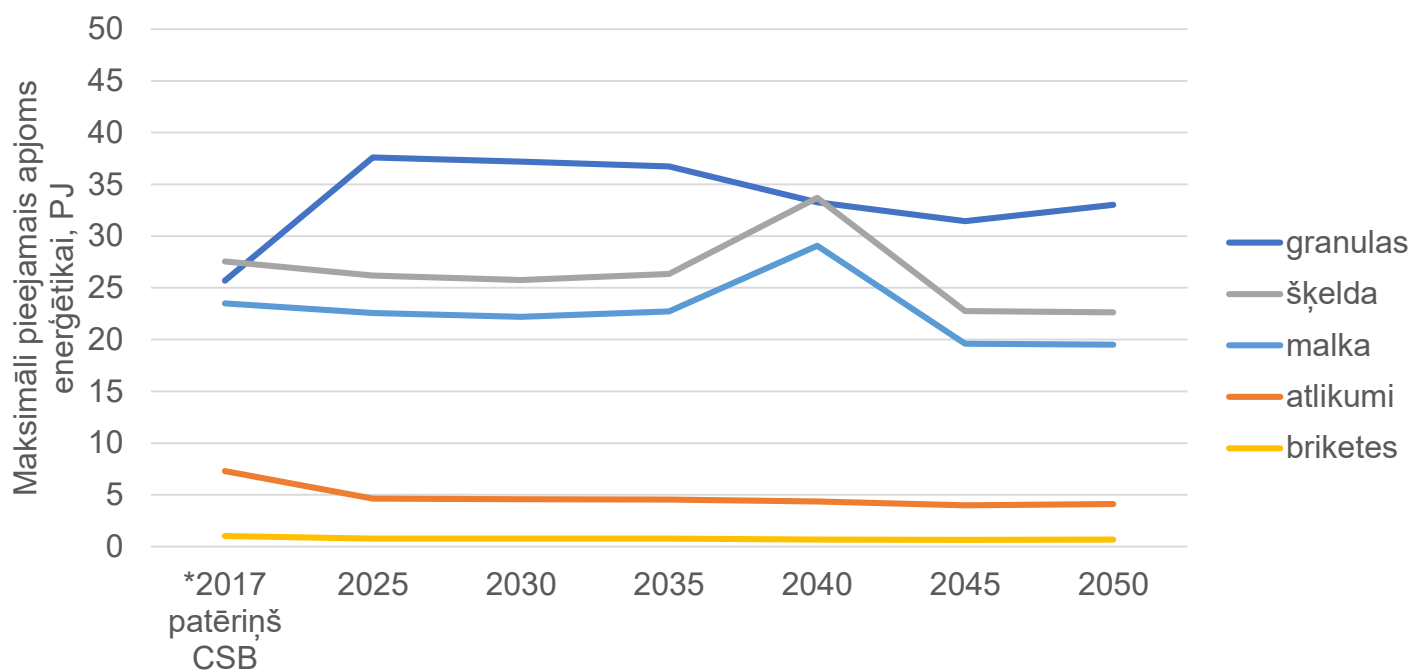
Sasaiste ar SD modeli (RTU): Dzīvojamā sektora nosiltinātā platība



26.10.2021.

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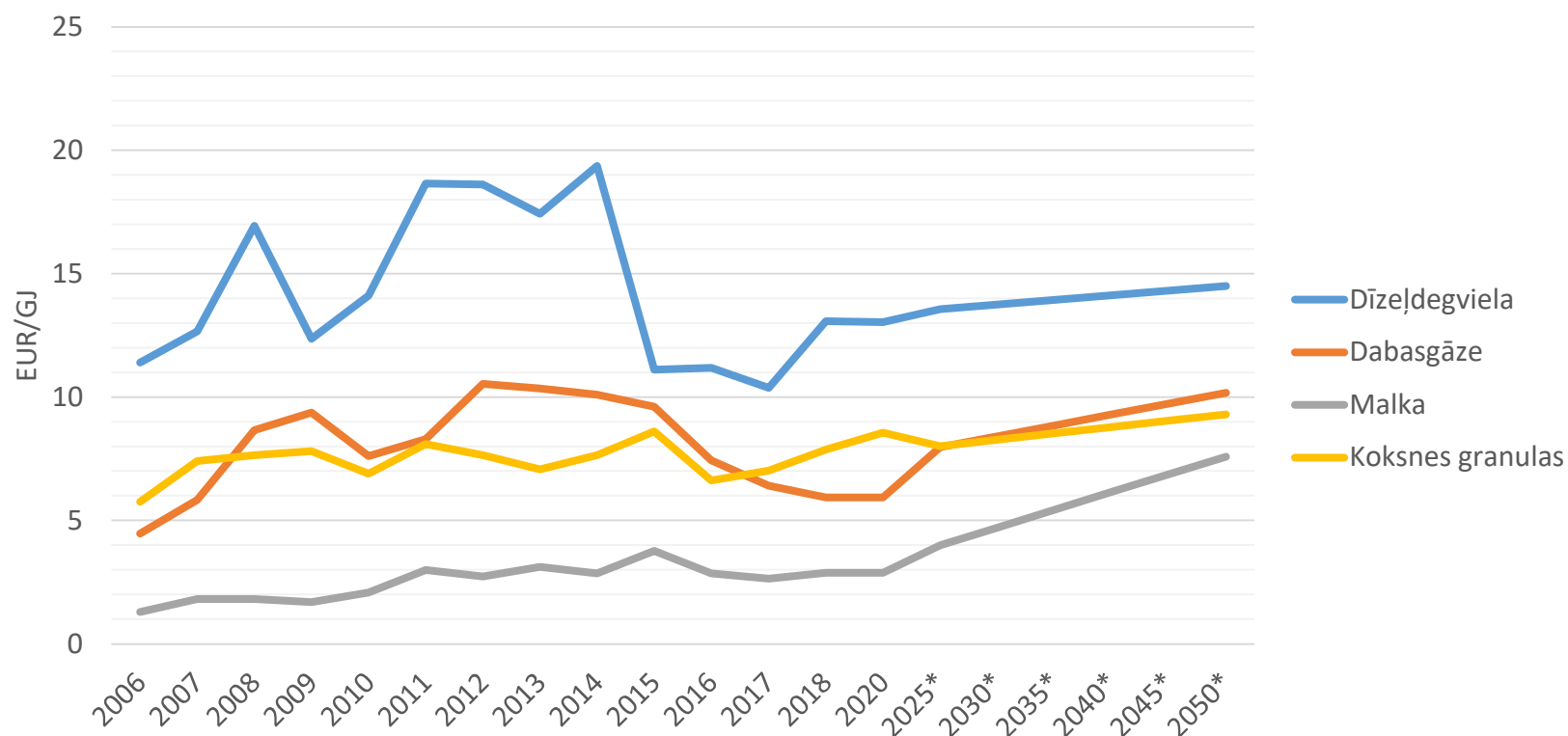
Sasaiste ar *Meža eksperts* modeli (LLU): Maksimālu pieejamais koksnes un koksnes produktu apjoms enerģētikai



26.10.2021.

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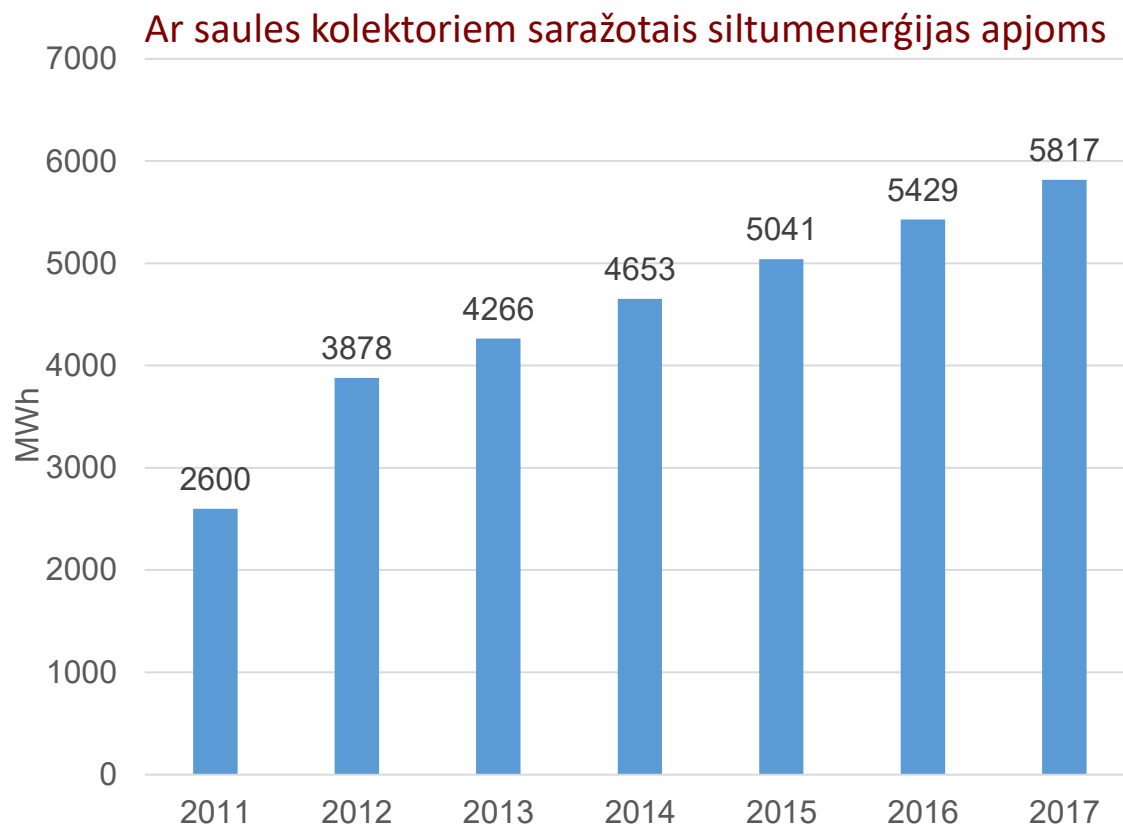
Resursu cenas bez nodokļiem – dinamika un prognozes



26.10.2021.

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Saules kolektori mājsaimniecību sektorā



Aprēķini balstīti uz KPI Atjaunojamo energoresursu izmantošana mājsaimniecību sektorā projektā realizētajiem projektiem (2011.-2013.g.)

Pienēmums: uzstādīšanas apjoms bez atbalsta – 20% no vidēji uzstādītās jaudas projektu laikā

26.10.2021.

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MĀJSAIMNIECĪBU SEKTORS SCENĀRIJU APRAKSTS

26.10.2021.

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Scenāriju attīstība



26.10.2021.

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MĀJSAIMNIECĪBU SEKTORS

MODEĻA DARBĪBA – PIEMĒRS AR VEDA2.0

26.10.2021.

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MĀJSAIMNIECĪBU SEKTORS REZULTĀTI

26.10.2021.

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Ko risina TIMES?

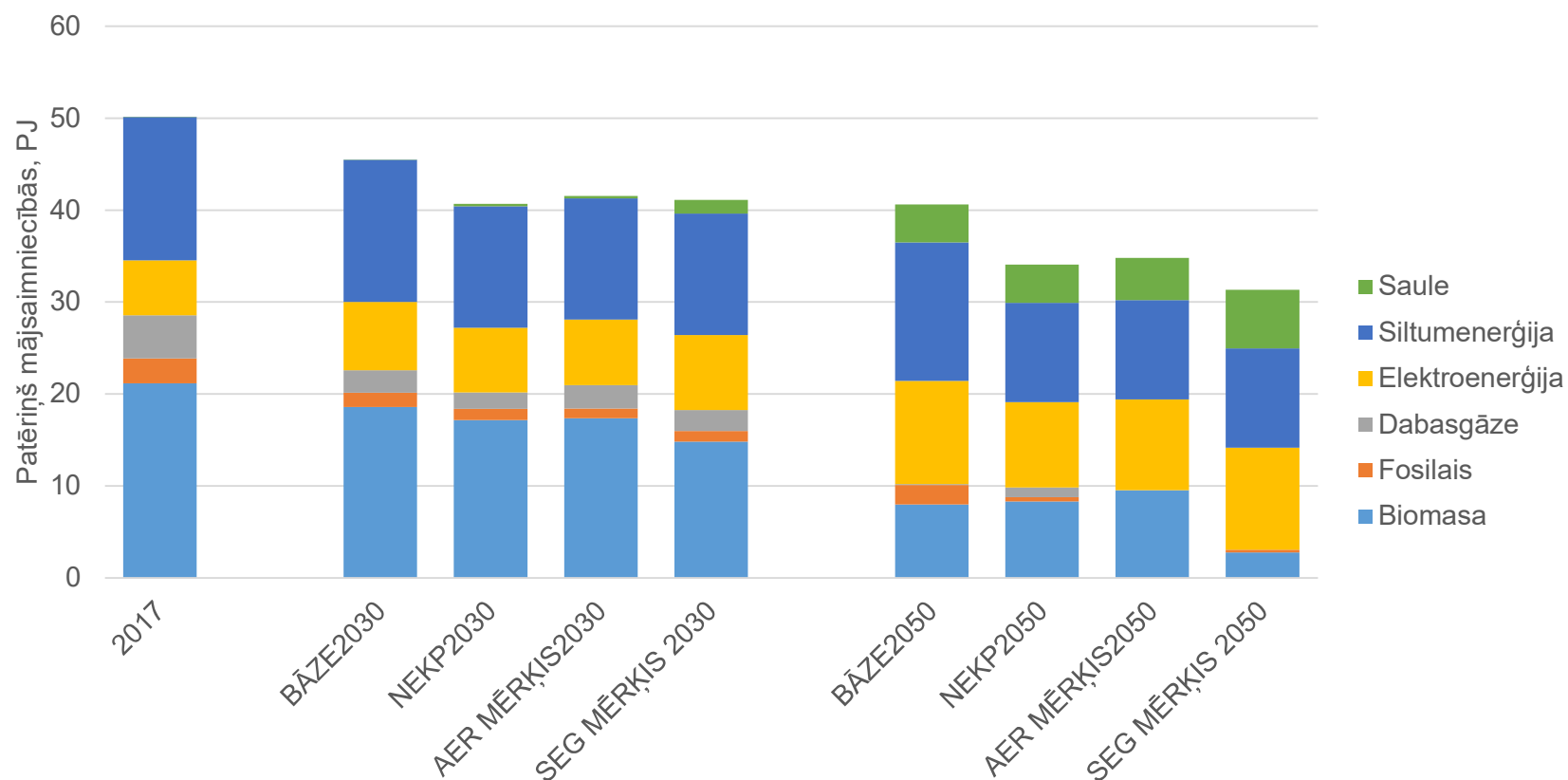
$$VAR_OBJ(z) = \sum_{r \in REG} REG_OBJ(z, r)$$

Kopējās sistēmas izmaksas, atņemot ieņēmumus.

Funkcija ietver:

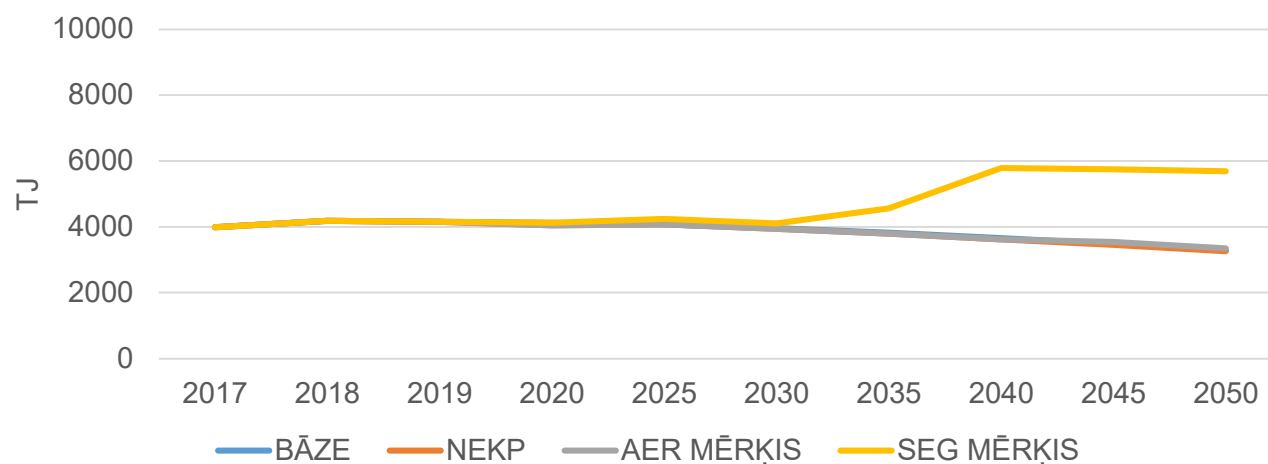
- Investīciju izmaksas
- Fiksētās un mainīgās ekspluatācijas un uzturēšanas izmaksas
- Izmaksas resursu ražošanai un ārējam importam
- Nodokļi, subsīdijas
- Ieņēmumi no ārējā eksporta

Gala enerģijas patēriņš mājstaimniecībās

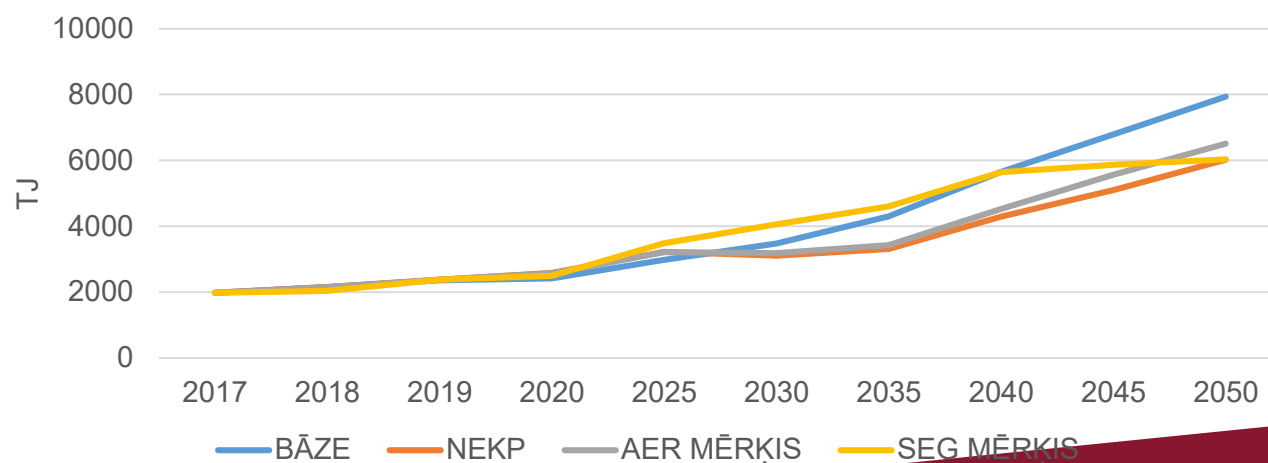


Elektroenerģijas patēriņš mājsaimniecībās

Elektroiekārtām



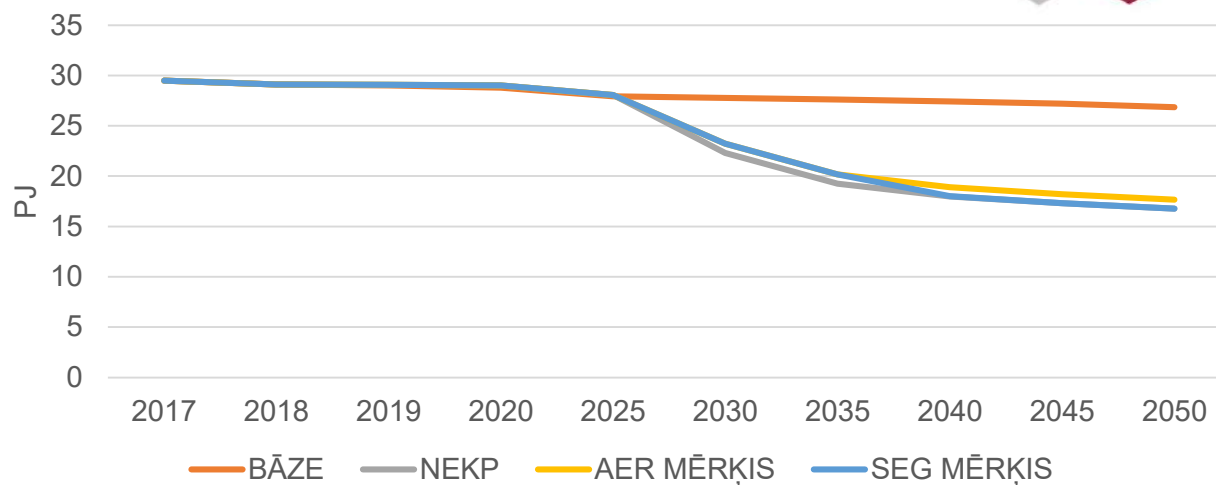
Siltuma iegūšanai



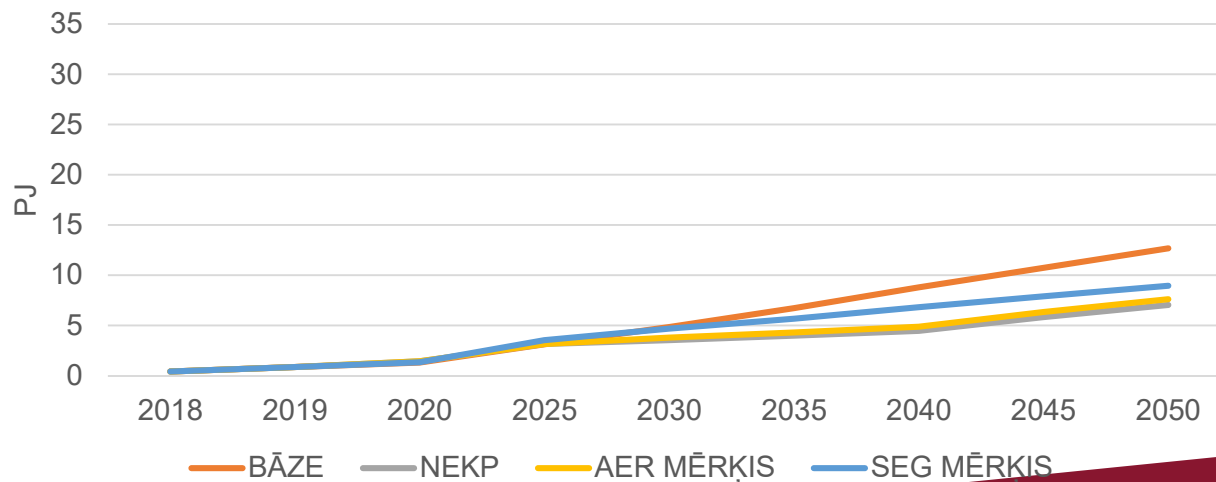
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Siltumenerģija mājsaimniecībās

Saražotā siltumenerģija



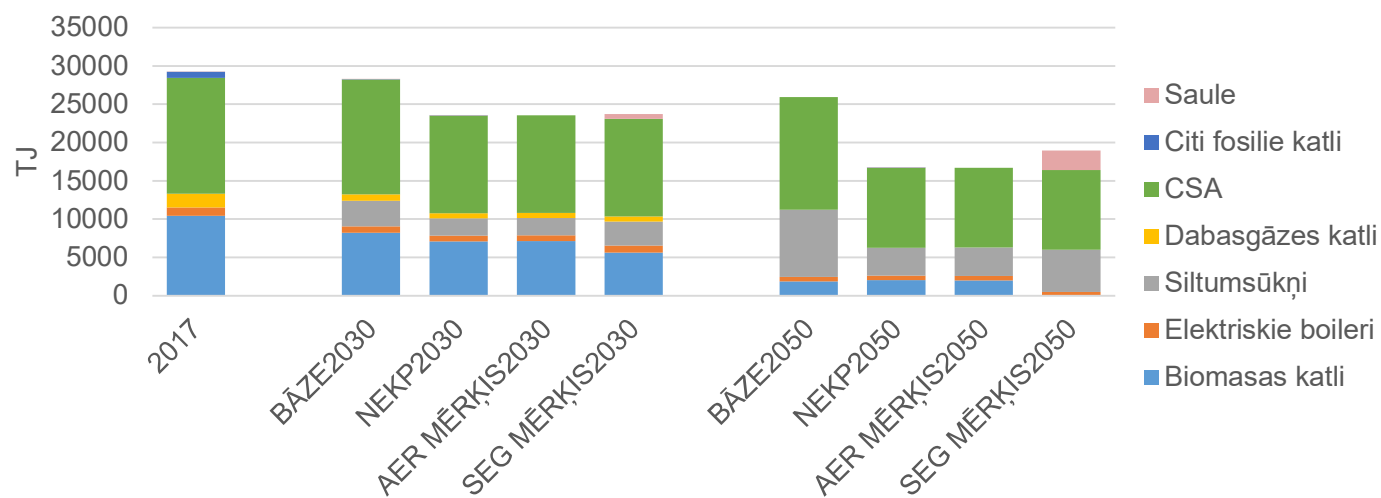
Ar siltumsūkņiem
saražotais siltums



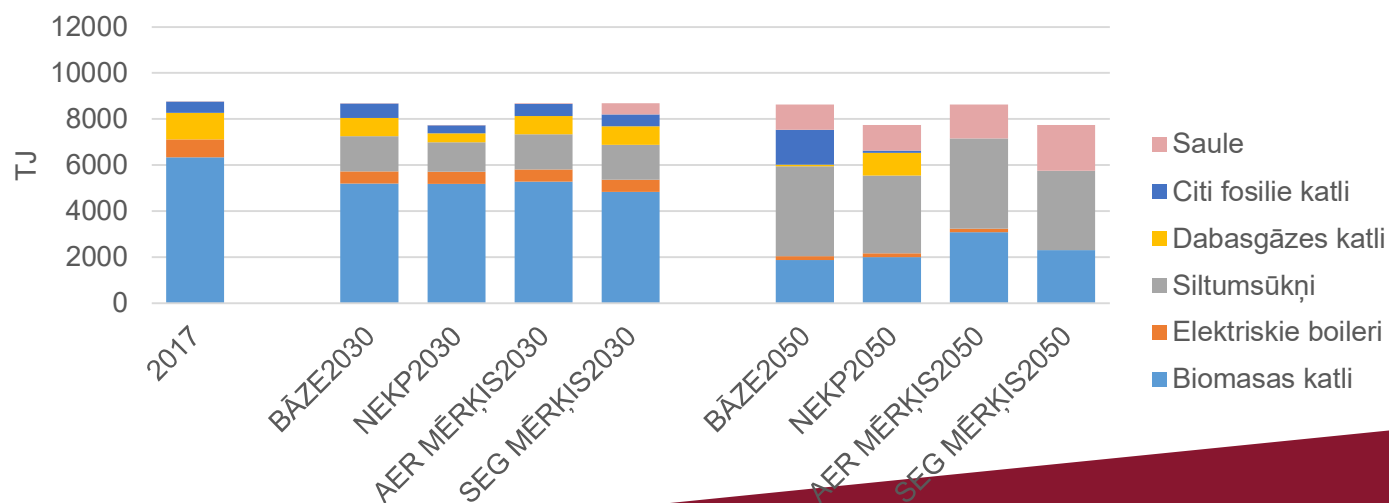
VPP-EM-2018/NEKP-0001

Siltumenerģija mājsaimniecībās

Daudzdzīvokļu ēkas

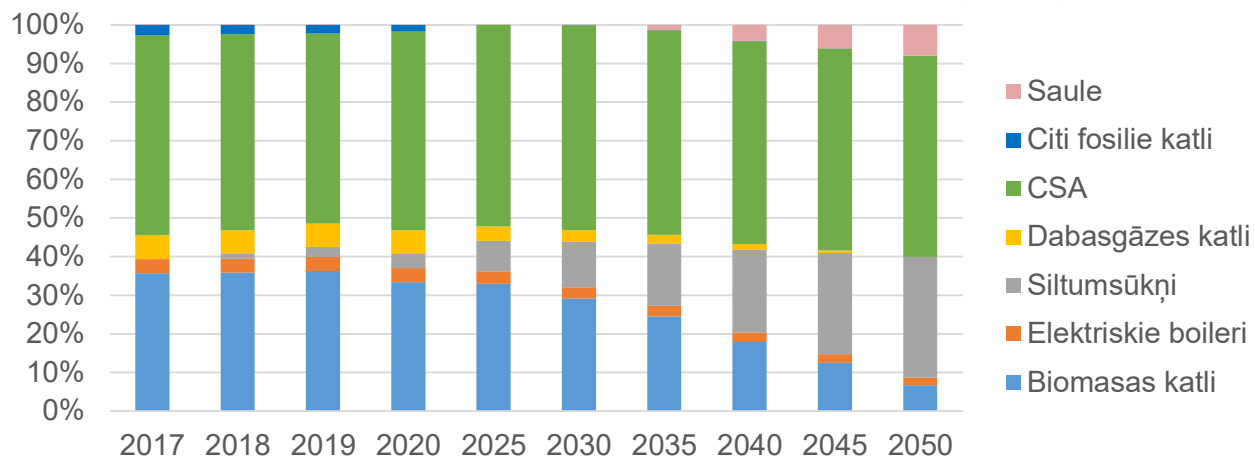
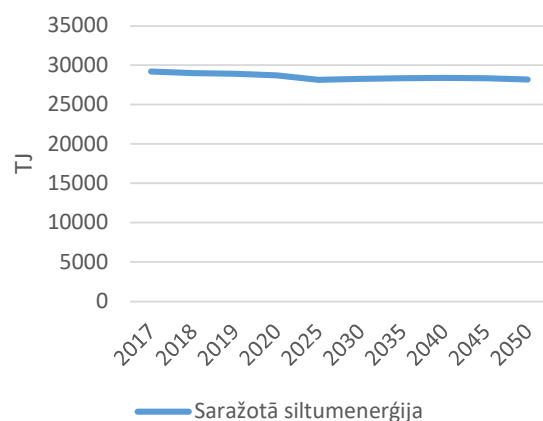


Privātmājas

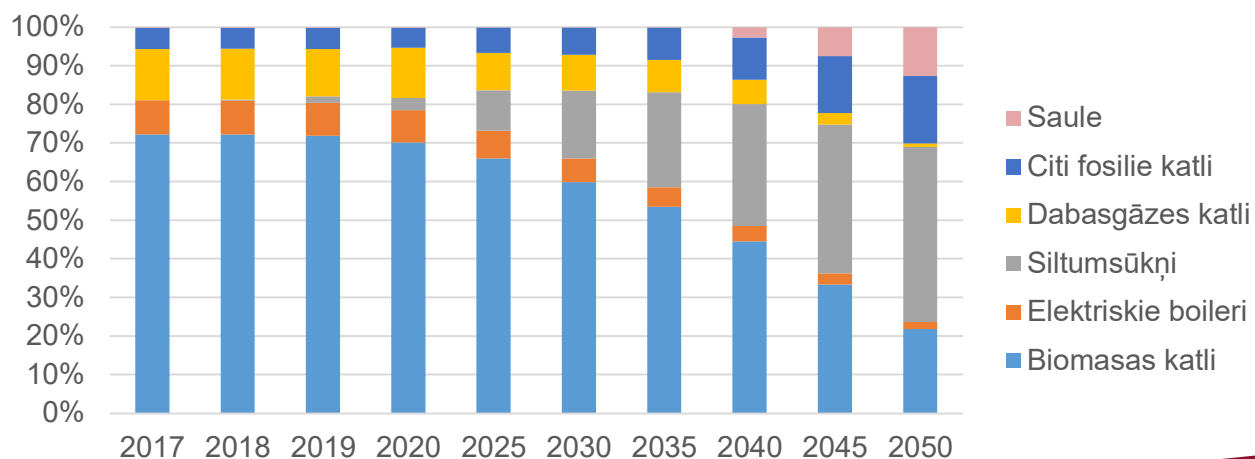
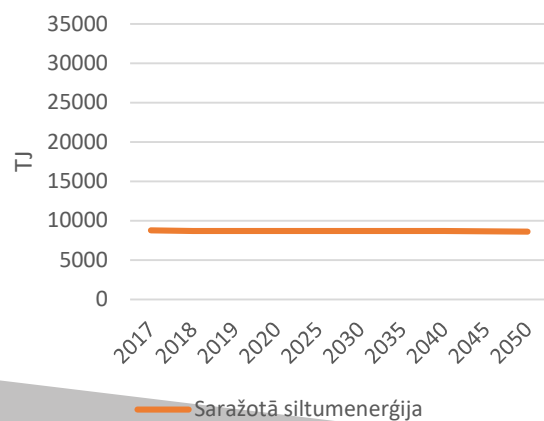


Siltumenerģija – BĀZES scenārijs

Daudzdzīvokļu ēkas



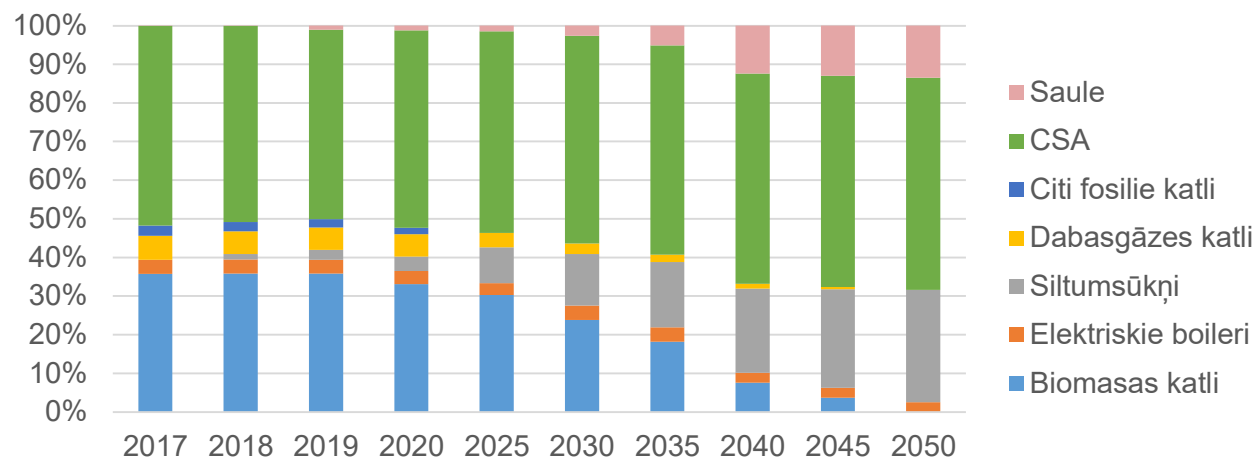
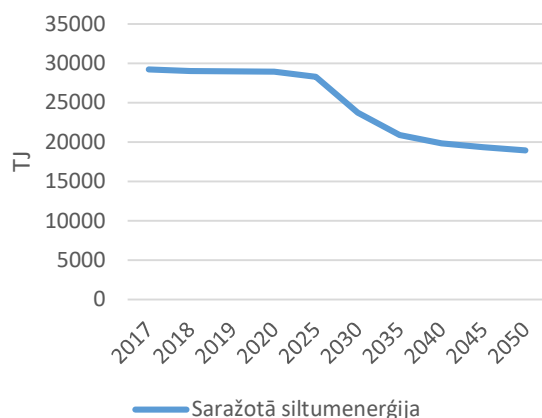
Privātmājas



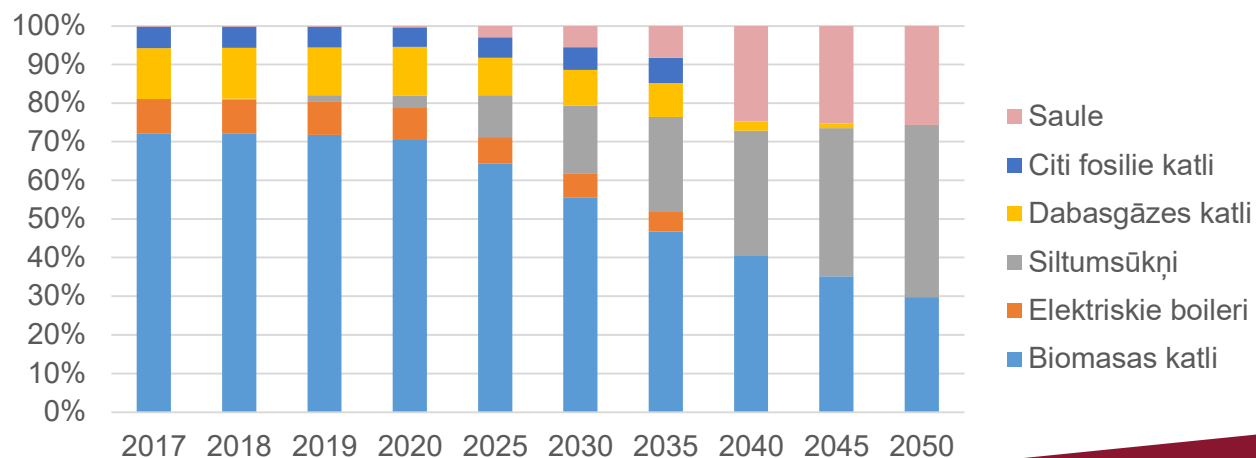
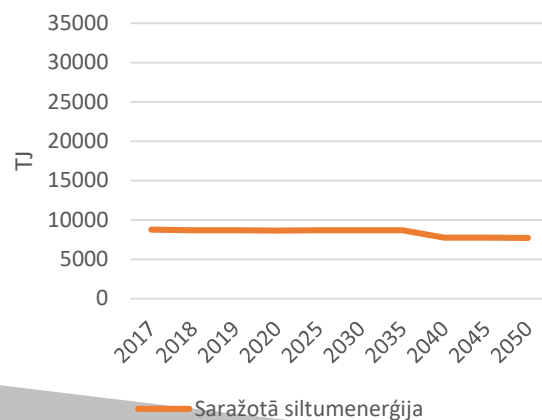
VPP-EM-2018/NEKP-0001

Siltumenerģija – SEG MĒRĶA scenārijs

Daudzdzīvokļu ēkas

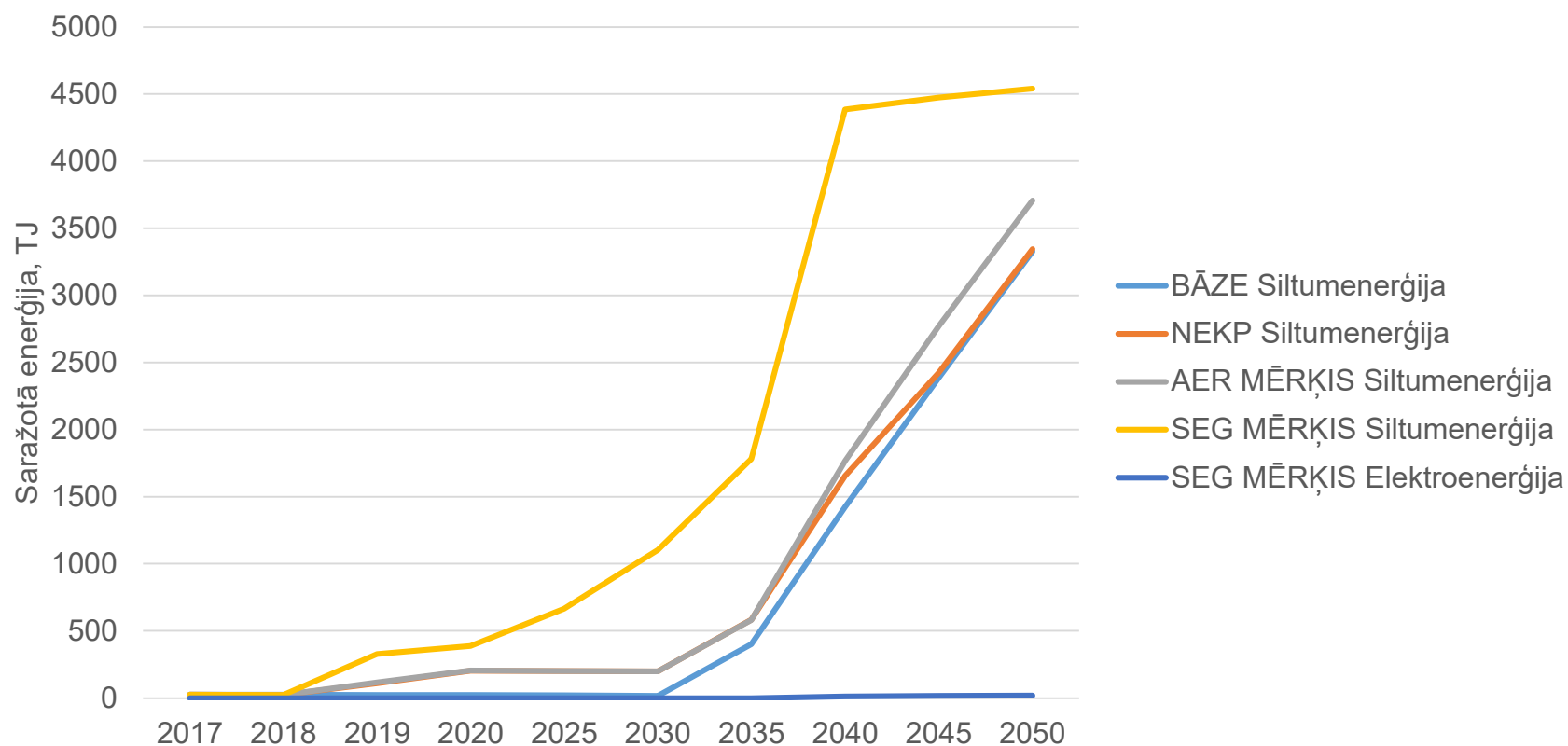


Privātmājas

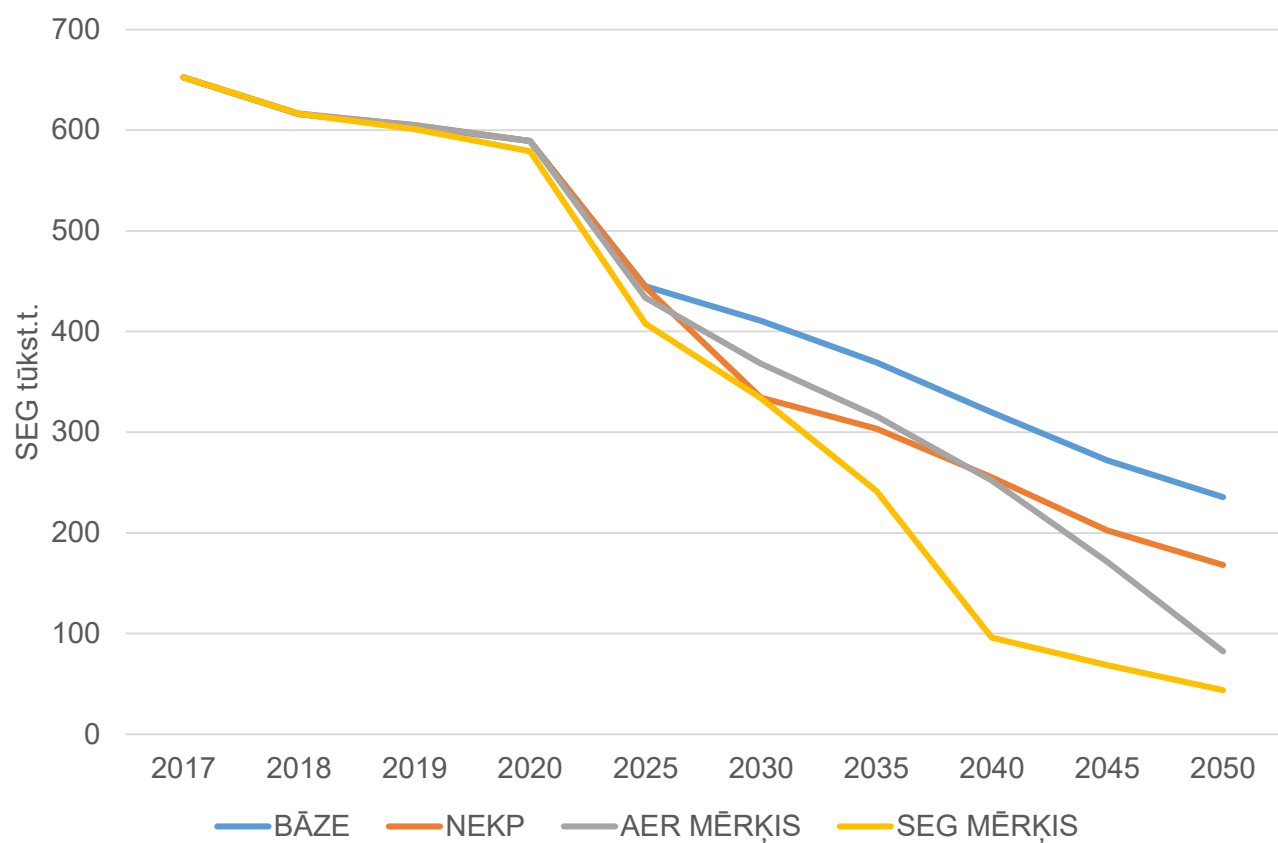


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Saules enerģija mājsaimniecību sektorā



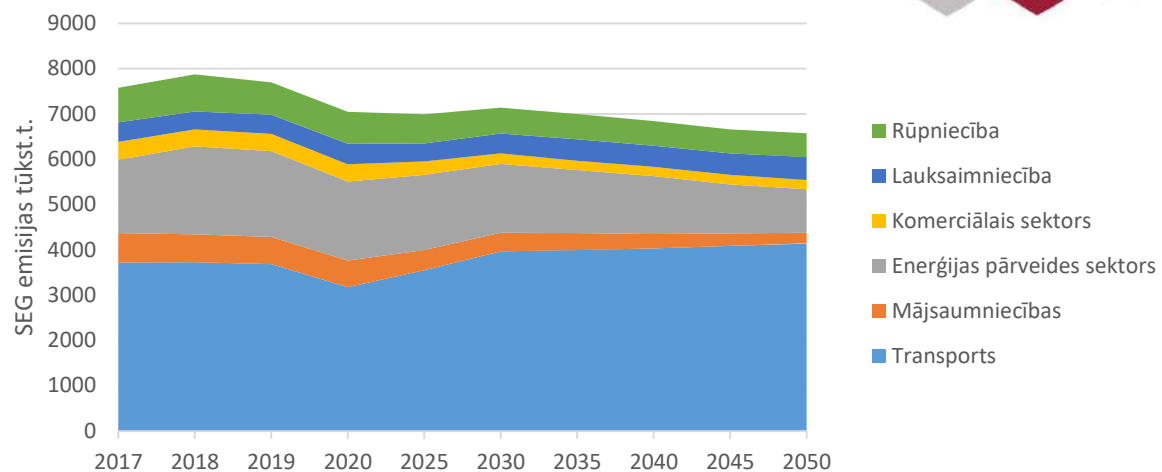
SEG emisijas mājsaimniecību sektorā



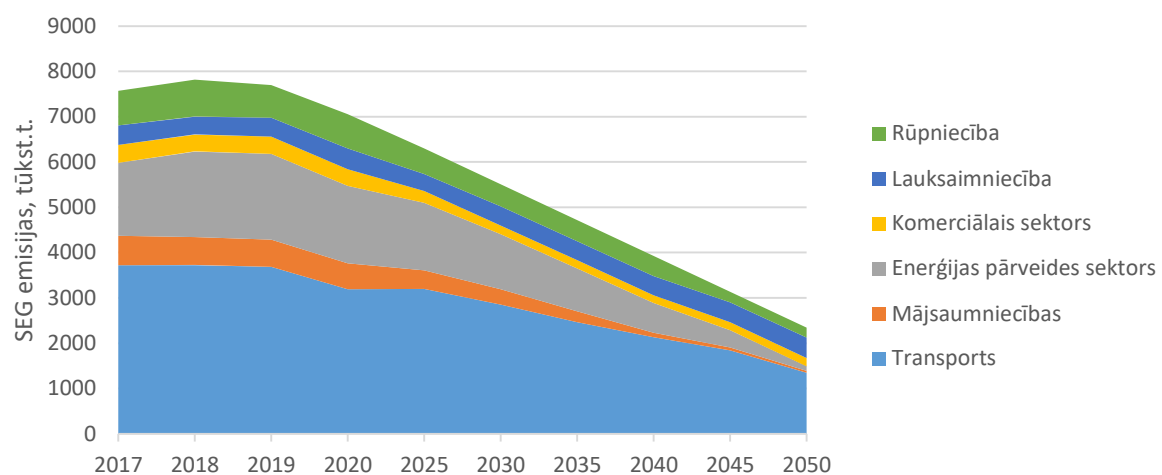
VPP-EM-2018/NEKP-0001

Kopējās SEG emisijas

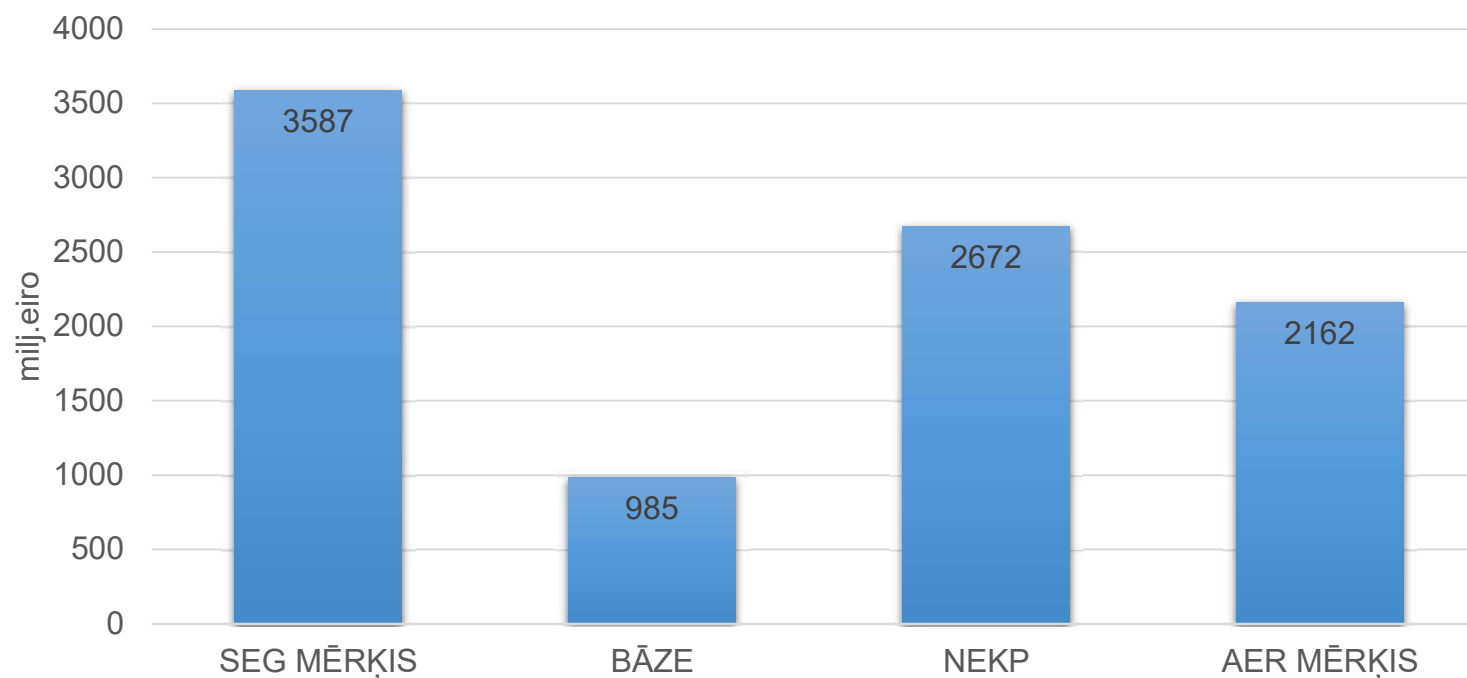
BĀZES scenārijs



SEG mērķa scenārijs



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