SUFFICIENCY ASSUMPTIONS AND TARGETS FOR KEY RESIDENTIAL BUILDINGS INDICATORS

ndicator Indicator	General comments/precision/definition	Unit		Theoretical potential		Assumptions drivers and justifications and policy proposals	s Other relevant indicators	Impacts of the indicator on energy use	Base year data	Lith Local socio-economical context and analysis of historical trends	vania Retained target	Background E	Base year data	Hun Local socio-economical context and analysis of historical trends	gary Retained target	Background/justification	Go Base year data	Prospective decarb data (Green supreme?)	France	Potential 2050 level (nW)	o-economical EU Sources / Other useful sources
POPULATION		thousands	Theoretical potential (in 2050?)	Sources	Comments on the source				2 824		2 138	EUROSTAT forecast for 2050	9 798	Population decreases, although its pace is slowing. Natural decrease is a key factor of the population loss. Government supports childbearing, providing benefits to families increasing with the no. of	9 270	projection provided by Ministry			64956,00	69688,00	
Number of households (k)		thousands	population / avg_household_size	to be calculated from demographic projections + assumption on avg_household_size				Relates to the effects desribed in "household size"	1 357	During 2010-2017 the NoH slightly increased (b 8.1 thousand). Following the living style when living single or without children is prefered an improved fiving standard, the number of final the style of the style of the style father. If engigation flow will not be managed families will move to live outside the country and this shall impact on decrease of households	972	Due to expected reduction in population by 1.4% a year, the number of households could reduce from 1357 thousand (2017) to 972 thousand (2050)	4134	children. Population decrease, although its pace is slowing. Natural decrease is a ky factor of the population loss. Government supports childbearing, providing benefits to families incorange with the no. of	4031	Based on the population size and on the assumption about the average household size.	40 723		28 865	30 195,60	221, 364 (EU- <u>Eurosiat</u> 28) (<u>(thousands)</u>
Average household size			1: 4 persons/inh or 2 persons/inh (high energy assumption) 2: use the levels that were effective 30 years ago each of the country (= reverse the historical tren 3: hypothesis in the Negawatt 2017-2050 scenari for France: from 2,15 in 2020 to 2,20 in 2050 4: doubling from 2020 to 2050	3 : Negawatt 2018 ("Scenario Negawatt 2017-2050 ; hypothèses et	1 : depending on what is called a "household" (fully shared dwelling or all considers other more independent forms of cohousing) this is a very ambitious level; see if realistic 2 : may be more consistant with each socio-cultural and infrastructural notnetae, especially since La and IT back and until recently quite high household size levels in comparison with other European countries.	Cohabitation, cooperative and community living, smaller dwellings, facilitation of collective buying of dwellings, introduction of a more modular concept for new buildings construction. Policy measures proposals in knihmen et al 2020: - "oily and community award practices that favour affordable and sustainable housing practices. - financial support/tax advantages for communal (public) housing projects - easy and preferential access to communal eal estate for community (public) housing projects. - high fees for misappropriated living space. In the state of the special state of bliving spaces through expropriation when market signals fail to lead to affordable and sustainable apartment sizes. cleaning boson and information centers for people who are seasoning for communal living opportunities. - easy and preferential access to continue to the special state of the space of the spaces through expreparation when market signals fail to lead to affordable and sustainable apartment sizes - relearing boson and information centers for people who are seasoning for communal living opportunities. - easy and preferential access to a special space of the special space of the special special space.	Quantitative indicators: - Turnover rate (to reflect inertia in housing patterns transitions) - Rooms per period Rooms per period Rate of overcrowded and under-occupied dwellings (% of dwelling) - Renovation pace (cal influence the stock of dwellings adapted for additional forms of cohousing)	Floor area per capita is significantly correlated with the number of occupants per household with more number of occupants per household tending to lead to smaller floor areas per capita miss has in particular a strong impact on heating consumption. Fremstad et al. (2018): USA context - each additional member to a household would entail drop of about 6% in the per capita emissions Underwood and 22thran (2015): I will derive care and 25thran (2015): I will derive care and 25thran (2015): I will derive care and 25thran (2015): The Williams (2003): I co-housing would have on average readed 51% space savings; 57% electric savings and 8% goods savings per capita in the USA (2016): I williams (2003): In or household what we not average readed that consideration in my master their sings published but swallable in the folder see Godé 20 assessed with a cross-sectional explanationy model that bringing back the ang. household is seeden to the level it was in 1999 (2018) and they parameters unchanged would entail theoretics saving of 6,2 to 9,1% of the current overall residential consumption in Sweden -> my condition is that the effect of household side on energy use is significant but maybe not enough to just the strong efforts needed to reverse household size dynamics trends. However, these effort may be more justified by the broaders socioe-environmental benefits of co-housign in terms or enabling more compact froms of housign and neighbordoor, thus reducing in terms or - enabling to share other treducible environmental foctprint between the co-inhabitants - enabling more compact froms of housign and neighbordoor, thus reducing pressure on lar use, building embedded energy and resource consumption - higher callaboration, mutual assistance and co-learning that foster both positive social pra transitions and an eudalmonic achievement of weit-being	pita. a i icity 2.2 https://osp.stat.gov.lt/lie statistikos-metrasiti/kom- 19).1 205/gyventojai-i-socialine- is statistiko/amu-ukiu-pajamo gyvenimo-salygos fit fof:	During 2008-2018 the ANS reduced from 2.5 to 2.5 persons. The main reasons of this are the fast that more often people choose to live single from their pureris instead of intergenerational from the properties of the properties o		Currently average household size is smaller in LT than in EQD series (2.3). The observed reduction in severage household size is could be soldwised to 2.2 series (2.3). The observed reduction in severage household size could be soldwised to 2.2 series (2.3). The observed reduction motivating on residence (buch as, Law on Family American County (2.3). The county of Family, Law on the series (2.3) and the county of Family, Law on the series (2.3) and the county of Family, Law on the series (2.3) and the county of Family, Law on the series (2.3) and the county of Family in the C	2,37	Average household size fell from 2.40 to 2.31 between 2010-2017. Cohabitation is not typical, young generation starts family later. Owing a flat is more typical than renting, Real estate prices have girown substantially recently. The government supports new builds linked with enouraging families to have more children, https://www.portiolin.hu/bank/20 21010/jmegerkestet-a-komany-legszebb-jandek-3516-millior-kaphatnak-a-csiladol-461568f	2,3	Official Government projection states 2.15 for 2650. We assume that the popular at the table and the state of the same that the popular at the same time we assume that delayed family formation will reach a stable levet.	2		2,2	whether th structur observed in last few right dirin reduction a signific proportion houses in n	2,3 (EU-28) Eurostat difficult to say y are cyclical or it, the trends France over the ears go in the totion is alight tunit areas and or disple-family we whosting, but totion of new
Vacancy rate	vacant conventional dwellings / conventional dwellings	%					Quantitative indicators: - Turnover rate (the migration rate can reflect available options to move to a small reflect. This indicator is connected with the vacanc rate since we need a minimum rate of vacancies to make people move.) - Rate of overcrowded and under-occupied dwellings (% of dwellin Narrative indicators: - Share of rented dwellings (in relation with Turnover rate)	Personal suggestion (Lukas): no direct influence on energy use. But lowering vacancy rates have indirect impacts on embedded energy (e.g. if it enables to avoid the construction of ne	ew	4% Currently the vacancy rate is about 4% in Lithuania.	15%	household size. Taking into consideration the assumption that in future population will reduce, the demand for developed will reduce to the developed will reduce the ten to scance years are could increase from AR (2027) (6) 135% (COSC). This increases can be reduced by spirits 35% of entire purposes than housing only developed for other purposes than housing.	12.5%	Vacancy rate will definitely grow as the number of new buildings is unarbor of even buildings in the number of ready higher buildings. We propose that some measures will offset this expected increase and moderate it. Factors which can offset the increasing waxancy rate: Growing number of single-bouseholds. Utilization of empty dwellings other than housing Dennillision of buildings with or buildings will be considered to the proposed of the pr	15%	According to official projection, population will decrease by 6%, while the average household size will decrease to 2.3 level, see previous row. Thus the vacancy tate will increase by 2.41% point to 14.91%. Official projection less significant increase. Expert estimate: more significant increase.	8%	Green supreme : no assumption	7%	tertiary sp. of which unoccupies the assa significant increae surfaces, negs/watt roughly to population 1.1 billic compares 550 milli projects 3	ces, a large part more remains . By maintaining implion of a lowdown in the cof tertiary the 2007-2050 cerearior returns rate indexed to growth to reach mit 2005, mit 2005, mit 21, also stabilisation of
Building stock description Number of dwellings		thousands				Cohabitation, cooperative and community living , smaller dwelling facilitation of collective buying of dwellings, introduction of a mor modular concept for new buildings construction, reduction in the nd build trend	ne l	Relates to the effects desribed in "household size"	1459.405/1262.390 EUROST/ https://osp.stat.gov.lt/statist rodikliu-analize8/	2017, from which 864,213 dwellings were in multifamily houses and 595,192 were in Individual houses. The number of dwellings in individual house increases faster than the number of dwellings in	13	45 Reduction in a number of households is the key driver of this decrease. The against blockmization of controllation of all blockmizes of controllation of all beliefs part controllation of ever once. According to this blockmization Pregram is foresent to noders 28 thouseholds of building by 2050. Modernization of buildings will reduce the demand for new dwestings.		Based on the number of household and vacancy rate input data. No. of flats is increasing, already above 4.5 million in 2021-partially due to the above mentioned support policy- and also to encouraging new builds by decreasing the VAT from 27% to 55% when buying newly built flats.	4 632	Assuming decreasing number of households (decreasing population) and increasing vacancy rate. The number of newly built dwellings (mostly in cities) exceed seemolitions (mostly in smaller settlements). This trend is assumed to change due to high the share of fold, shandowed houses want in the countrylade, which will probably be demolithed, thus exceeding the rate of new builds, how covering the rate of new builds.	38 610 620 41 968 070	Green supreme : no assumption	28 700 28 865 091 34 984 000	surface pe current le person. 30 915 583 of new, project acc impler incertive;	age dwelling corcupant at the Eurosiat (DVI) (Douglands) Eurosiat (DVI) (Douglands) Laysawe (sucx.o. dwellings, this coupled Loysawe (sucx.o. dwellings, this coupled Loysawe (sucx.o. dwellings loysawe (sucx.o.
Average floor area per capita		m2	2:30m2/capita 3:35m2/capita 4:-25% in 2050 5: use the levels that were effective 30 years ago	Emission Technologies" 3 - Rienwirth and Thomas 2019 - "Estimating the Suffciency Potential	requires only 10m2 more since part of the facilities can then be shared (bathroom, kitchen, common living space, etc.) 4: based on the double assumption that household size double by 2050 and that house size increase by 50%, thus decreasing individual living	to support and inform for new forms of housing, moving to smaller dwellings, sharing flats (Thomas et al 2018)	Ing De Cuantitative indicators: Turnover rate (to reflect inertia in housing patterns transitions) Rooms per person Rate of overcrowded and under-occupied dwellings (% of dwellings) Marrative indicators: Share of rented dwellings (in relation with Turnover rate)	UBA, 2019 - In Germany, with a decline is per cap, living space by 0.5%/year (resp. 3%/year) compared to business as usual projections, and focusing on 3 target groups (1, senior with its energy consumption would amount to 30.01%) resp. 53.75%) and 48.86.0028/y (resp. 13.886.0028/y). The largest potential is found in the target group 1, with potential savings about 1.47% (resp. 377%). For comparison, residential final energy consumption was about 644TWh in 2018 in German (source : UBA).	arge ngs in	During 2005-2019 the AFAC increased by 2.8% year and was 36.66 m2. The useful floor area per capita was 32.2 m1 in cities and 42.2 m1 in villages in 2015. Improving himse standards, the lead to an increasing interest in acquaistion of a notice of the control of	f 32	Analysis of historical trend showed that useful floor are could grow by 0,5% a year, therefore, it could read 32,2 a 27/2pa. Purchaning of individual houses outside the city, smaller flasts in multifamily buildings in cities are report of individual houses outside the city, smaller flasts in multifamily buildings in cities are reported rivers of increase in susful floor area per capita. Notwern, considering frust the second during winter time, trundering flast the second during winter time. Therefore, headed floor area could be 3,3 mil. (zep. 100. This number corresponds one that was estimated after analysis of results of survey.) There gus saving referred mil 20,000. The results of survey demonstrated the headed floor area was 31 millions.	37	Floor area per capita increased by 15% over the last 12 years, partially due to decreasing this size, but still below that of DE and FR, although growing at a higher pace.	35	xeeping the growth at a moderate path can be incentived by policies. Newly built devellings not to have smaller size, while demollithed buildings are larger (mosts) houses in the countryside)	47	41,2m2/cap with population assumed to be 71,902M in 2004 - assumption on total floor area dwellings	41	currery enough gift the sharin the accor young wor people. major in number of decohabi would cons approxim additio	It level, by by (if, of example, if of students or inmodation of ers with eliderly in stactor has a inpact on the new dwellings Calculated from Codyssee (nW for France) Calculated from Codyssee (nW for France) Calculated from Codyssee (nW for France) All of the current Calculated from Codyssee (nW for France) To a current Calculated from Codyssee (nW for
Average floor area per dwellin	ns.	m2	= avg_floor_area_per_cap x avg_household_size	to be calculated from avg_floor_area_per_cap and avg_household_size		Deep renovations could go beyond just thermal considerations.	Quantitative indicators: - Turnover rate (to reflect inertia in housing patterns transitions) - Treated floor are: - Renovation pace (can influence the stock of dwellings adapted for different forms of cohousing) Narrative indicators: - Share of rented dwellings (in relation with Turnover rate)	F Relates to the effects described in "average floor area per capita" and "household size".	68,7	Ouring 2005-2017 the AFAD increased by 12.19 a year. Dwellings were larger in villages (80.8 m) than in cites (82.6 m) Exesse individual houses dominate in villages.	70	The size of dwelling could increase insignificantly, i.e. from 8,6 m2 (2017) to 70 m2 (2000) stating into account versage floor area per capita (32m2) and hosehold size (2.2).	82	The average floor area of dwellings in Hungary is 82 m2, approximately 10% lower than the Europe-wide average (91 m2). It shows an increasing trend, growing from 78 m2 in 2005. However, the average floor area of newly built flats has slightly decreased in recent years, from 100 m2 in 2017 to 98 m2 in 2020.	70	Given the population size, the average floor area per capita and the number of dwellings. As the assumptions for our TIMES model for BAU scenario for 2050 its value is 76.	92	Green supreme : no assumption	91	number of	sation of the dwellings in the ulation. Odyssee for area fowlings (surlog))
Total floor area of dwellings (Mm2)		millions m2	= avg_floor_area_per_dwelling x nb_dwellings				Quantitative indicators: - Turnover rate (to reflect inertia in housing patterns transitions) - Rooms per person Narrative indicators: - Share of rented dwellings (in relation with Turnover rate)	Relates to the effects described in "average floor area per capita"	10	During 2005-2017 the total floor area of dwellings increased by 25%. Following the tren 00,187 that people prefer individual houses outside the city which are in their nature larger than multifamily flats.	s : 81570 (total); 68970 (heated)	Demand for total floor area of dwellings and demand for heated area shall reduce. The reductions will be caused by deteriorating demographic situation in Lithuania.	381,36	The total floor area increases due to the increasing No. of dwellings.	324,46	based on average floor area per dwelling and on the number of dwellings.	3 850,57	2,96Md m2	2 637,13	2 753,54	Calculated from Odyssee
New dwellings size in m2		m2	1: 30m2 + 10m2/additional cap above 3 member 2: 30m2/capita 3: 35m2/capita 4: hypothesis in the Negawatt 2017-2050 scenari for France: from 91,2m2 in 2020 to 78,3m2 in 20	2: Grubler et al 2018." A Low Energy Demand Scenario for Meeting the 15°C Target and Sustainable Development Goals without Negative Emission Technologies" 3: Bilenvirth and Thomas 2019. "Estimating the Suffciency Potential in Buildings: The Space between Underdimensioned and Oversized"	Translation into energy intensities available in Milliward-Hopkins et al 2000 ("Providing decent living with minimum energy: A global scenario") For the 3 fast potentials, make an assumption on anget household size for every buildings definition group to the scene one as the overella everge household size) to get the target average floor area for new dwellings	- a norm to limit the size of new constructions - a norm to set an absolute limit to consumption for a new dwelling	Quantitative indicators : - Rooms per person (total average or average in new dwellings)	Same effects as for "average floor area per capita" except that new dwellings enables to integrate this parameter as well as to anticipate the integration of possible common spaces a guest room) in the building design.	(e.g.	Area of new dwellings is volable in Lithuania. Historically, the average size of new dwelling was 300-200 hours 200-200 bit average 1133-2 lize of new dwellings decreased from 113.5 m is 1013 m if a zee of new single family houses of dwellings in multifamiliy building decreased from 72.5 m 2 to 61.5 m 2.	(multifamilly building)	sequencing, not seen of the second gas it seems to second status are set through a project. Herefore, families could be deli individual houses up to 200 mil. Newdeys individual houses in the comparable to the selection (including interest ratio.) Moreover, comparable house lessing secretaries houses at more theoremarks considered in the comparable houses and the considered in the comparable houses and the considered in the comparable houses and the considered in the consideration in	100,08	The size is decreasing slightly in recent years (98 in 2020), which might be mainly due to the decreased floor area of new flast smoothy in cites, possibly reflecting the increased per square meter pices, which is 178% of the pirce MTLSC//www.kh.hu/stafat, files/iak/hu/stafat, file	80,5	Based on the average household size and the average floor area per capita.	104	Green supreme : no assumption	91.2 (nW 2020)	67,137	Odyssee (Floor area of new Joseph (Floor area)) (NW for FF)
Size of heating system	Rated output power	kW	1:10W/m2	1: PHI 2016 ("Criteria for the Passivhaus")	German Passivhaus standard; for new buildings only. The Passivhaus standard can also apply to very low retrofit buildings. For information, the Plassivhaus instituted also developed an alternative standard ("EnerPHT" standard for some existing buildings whose architecture desen't allow to meet the Passivhaus standard; but this one desen't necked as chiefe on the Passivhaus standard; but this one desen't allow to meet the Passivhaus standard; but this one desen't necked as criteria on heating rated power, only on kVM/m2/pear.	e Very dependant on average dwelling size.	Quantitative indicators: - Population living in a dwelling with a leaking roof, damp walls, fill or forndation or rot in window frames of floor by poverty status - Treated floor area - Renovation pace	Suggestion from Lukas Godé: the adapted size of the heating system is defined by the dwel characteristics (insulation, surface to be heated, heating temperature, etc.). Reducing the the heating system can thus maybe not considered to have a direct impact one in the case of an oversized heating system compared to the dwelling characteristics).	ze of			Tardenis h. Marian and the the minimum and the state of t						Green supreme : no assumption // only in terms of yearly consumption needs per m2			
Average needs for hot water Other uses of heat		toe/dw	1: 20L/cap/day, energy intensity of 96-220KJ/L 2: at 50°C; in individual house 22,7L/cap/day = 371kWh/cap/yes; in collective bousing 18L/cap/day = 294kWh/cap/year	Supplementary materials of Millward-Hopkins et al 2020 ("Providing decent living with minimum energy: A global scenario"), p2 Negawatt 2018 ("Scenario Negawatt 2017-2050; hypothlese et résultats") (in French)	low range assumption , assuming that water for bathing is 100% heate and water for annitation 25%. The level in toe/dwelling could be obtained with an assumption on household size and then "365days"	ed i	Classifitative indicators: -Population living in a develling with a leaking roof, damp walls, fit or foundation or not in window frames of flood by powerty status. -Lax of sanitary facilities (pathy, shower, flushing tolety (% of population) -Heating Degree Day HDD/Cooling Degree Day CDD -Indoor temperature levels (**CQ Narrative indicators: -Heating/cooling system adequate for site and performance of building (NMF final energy /) of full-load hours) and enabling reasonable use (yes / no) -Develling controllarly warm in winter (% of population)			Energy needs for hot water preparation 0,09 reduced from 0.12 foeldw (2010) to 0.09 toeldw (2017). Reduction 29N.	0.08	About 50 % of dwellings are supplied with hor water from central district heating networks. In individual house more popular become use of receivable careing plean jumps, safe criection and the contraction of the contracti	893 (2.26 toe per dwelling in Ody	Unit: WMV person. Total int hot water energy use decreases but per cipita wheels fluctually and the person of the	520	We assume 35% decrease due to state of dishwasher appliances, higher efficiency of water heating systems and deployment of heat pumps.	0,27	Green supreme : no assumption	0,080	0,062	Odyssee
Aurrage needs for cooking (sverage duration of use)		toe/dw	Assumptions available in Negawatt 2018 direct in terms of energy consumption (not in terms of average duration use) but localised to FR context					Cooking represents only a small share of residential consumption in the EU (in 2016, 4% in h 5% in U and on average 5% in EU-28 - Odyssee-MURE)	HU,	Energy needs for cooking reduced from 0.084 too(few (2010) to 0.066 toe(few (2017). This reduction mainly caused by replacement of oil direction over which are more energy efficient. Gas over which are more energy efficient. Gas over efficiency is about 40%, electric (vera - 70% and induction over - 80% over - 80%).		Convently Program for replicament of use liquidities gas balloon in world many luddings by electric or raduring jas is undergoing. Solidiri for one dwelling up to 800 ELT. The Program will have impact on significant reduction of gas use for cooking and subtiding to now efficient own ellipsectric or substitution one efficient own ellipsectric or substitutions of the ellipsectric or restorant careful her cooking of how will have impact on further reduction in energy use for cooking.	337.4 (0.86 toe per dwelling in Ody	Unit: kWh/ person. Total cooking energy use is basically constant, such as per capita consumption. Value presented is kWh/person [nrg_d_hhq] eurostat	219,92	Based on TIMES model estimation, mainly due to fuel change and efficiency improvements	0,06	Green supreme : no assumption	0,038	0,024388226	Odyssee
Size of appliances Specific electricity	Which appliances ? refrigerator, dish washer, freezer, oven, TV, washing machine ?		Assumptionss available in Negawatt 2018 according to the appliances considered, and adapt to FR context	oted		Thomas et al 2018: -move from specific (efficiency) to absolute consumption metrics (efficiency) troats and one twith/Rg/cycle) and/or a combination of progressive efficiency standards and a maximum absolute level (for TVs, refrigerators)	-2-8-	Brischke et al. 2015 - Some context-specific estimations of potential savings made in Germa on the basis of three approaches to sufficiency : reduction (of size, features, usage time of services, etc.), substitution (of technical equipment eg. using clothes line instead of a unified and adjustment of technical estivation. In addition to perficiency or features, which saving some strained in provide an overalla potential of assisting in a significant portion and the savings of sufficiency oriented experience (see the page is estimated to provide an overalla potential of 126 some strained in the page is estimated to provide an overalla potential of 126 some strained in the page is estimated to the combination of sufficiency and fefficiency is assessed to cut by 80% the committee on sufficiency and fefficiency is assessed to cut by 80% the committee of appliances. Sufficiency measures have the largest potential in ICT and electronics, clothes and dish wash cooking and bating as well as cooling and freezing appliances. Efficiency measures have a la potential for lighting appliances. See all the hypothesis in the pager.	dryer) to be of to be ded to									a socie			
consumption number of appliances/househo	This indicator reflects the opportunities to ook share individual items and thus reduce the number of devices through common use.		1: see in source 2: 2: ICT system/household 3: some hypothesis available in Negawatt 2018 according to the appliances considered 2: 25 appliances/cap incl. ICT 5: "number of appliance per household constant" "doubling household size-"halving th number of appliances per capita". + "doubling appliance usage (except for regrigerators which re 24hours anyway, and no full dubling for TV since they can be shared)"	for this indicator 2: Rao and Min 2018 "Decent Living Standards: Material Prerequisites for Human Wellbeing" - Translation into energy intensities available in Millward-Hopkins et al 2020 ("Providing decent living with minimum energy: A global scenario") 3: Negawatt 2018 ("Scenario Negawatt 2017-2050; hypothèses et	t		Quantitative indicators : - Equipment rate Narrative indicators : - Characterisation of the level of use of diverse types of equipmen - Uletime of appliances	The biggest impact in term of energy use is about indirect impacts on embedded energy use capita.	t per	The first steps have been already observed towards sharing-economy (for espample, car sector), but historically this was not relevant in case of appliances. Ethinamises prefer private assets instead of common use.				Exactly the same as in Lithuania.				Green supreme : no assumption			

SUFFICIENCY ASSUMPTIONS AND TARGETS FOR KEY PASSENGER TRANSPORT INDICATORS

		Unit Theoretical potential (in 2050?)	Sources	Comments on the sources	Assumptions drivers and justifications and policy proposals	Other relevant indicators	Impacts of the indicator on energy use	Base year data	Local socio-economical context and analysis of historical trends	Retained target	Background/justification Bas	year data	Local socio-economical context and analysis of historical trends	tained target Background	Base year data	Potential 2050 data (négaWatt)	Local socio-eco- cultural context	Data sources and potential further sources
	General comments POPULATION	thousands						2824,03		2137,9	EUROSTAT forecast for 2050	9797561	Government supports childbearing, providing benefits to families	Projection used in the NECP and LTS modelling, received from the Ministry of Innovation and Technology	64	4956 69688		
	Number of parsons per car	1: 3 pers/vehicle 2: (Fenney) from 1.66 in 2020 to 2,039 in 2050 3: linear force by 38% from 1.6 (rural areas) and 1.6 (urban areas) to 2.5 pers/vehicle between 2015 and 2050	Supplementary info of Millward-Hopkins et al 2020 ("Providin decent living with minimum energy. A global scenario"), p.16 Segward 2022 scenario Skuhnhenn et al 2020 ("A Societal Transformation Scenario for Stayring Below 1.5°C")	 very ambitious, maybe even unrealistic (keep in mind that this is an average value). Backgeround and assumptions not very detailed 	Policy proposals:see proposals for "p. Am by pooledf/shared car" -formalising hitch-hiking	Narrative indicators: -symbolic order/function of the car	The average direct and embedded energy use of car per p.km is inversely proportional to the vehicle average occupancy rate	1.35 (estimation from Transport sector modeling) pkm/car in 2016: 21034		1.6	The occupancy rate can increase by 20% based on new car-sharing of procises with creates possibility to use car without being the owner of car.			1.70 HU Times model - average computed value	Green Supreme : no quantitative level found		The occupancy rate increase to 2.0 persons per vehicle, compared with 1.8 today, is thanks in justicular to the compared with 1.8 today, is thanks in justicular to the compared of the compared of a service-based mobility offer, such as one care development of a service-based mobility offer, such as one care development of the compared of the compar	
Equipment / Level of use	Car use (km by car per year)	km 1: 12692p.km/vehicle /year	1: supplementary info of Grubler et al 2018 ("A Low Energy Demand scenarios for meeting the 1.5"C target"), p. 50	1 : not vey high assumptions on the limitation of the need to travel by car. The scenario deen't have sufficiery assumptions on occupancy rates and uses a rate of 1,19 for 3050, which is a sufficiency to 1,10700km/ethicke/year	high pneirotation of caribaring -local tarvices -local tourism -local tarvices -local tourism -local tarvices -local tourism -	d nt nt -symbolic order/flunction of the car Quantitative indicators :	No direct impact on energy use, but for the same mobility service provided, a more intensive use of less cars entails impacts in terms of : embodied energy (pavings in manufacture / dismantling) - urban space given to less energy intensive transport modes (in particular active modes)	12397				11500	No statistics, only assumptions - 11500 km per year based on TIMES modelling		GreenSupreme : for vehicles used by car- sharing services, and control of the con	193,85 n.a	11681.07	Odyssee, https://osp.stat.gov.ll/services-portl
	Number of carsivehicles per person	number(cap 1: 0,34 (2,9pers/vehicle) Ita	1 : supplementary info of Grubler et al 2018 ("A Low Energy Dem scenarios for meeting the 1.5"C target"), p. 50	indirectly obtained using the assumptions of the scenario for a population of 1,556b in the dobal North with 532M vehicles in 2050	Policy proposals : -see proposals for "p.km pooles/j.hared car /cap"	Narrative indicators : - symbolic order/function of the car	No direct impact on energy use. Same indirect impacts as for "car use".	0,483	Since 2014 number of cars per person increasing by 3.9% a year. In 2018, Lithuania achieved EU level which trend suggests a long-term growth in passenger cars per person.	0,5	The number of passengers cars per person will stabilize due to increase of car sharing and renting.	0,355	one of the lowest in Hungary - dose to theroelical potential - but it is increasing - it is an interesting question how car sharing can develop	we assume that it grows further first, but then shared cars and 0,3 renting will be more and more popular, so that the trend can be reversed	GreenSupreme : - 2-804 cars for 7, 90204 cap = 2,48 cap per vehicle	,491 n.a		Eurostat [road_eqs_carhab] Last update: 08-02-2021
	Rate of private car ownership = 's, of population who has access to a private car, even if this car is shared within the household 7 to be confirmed. 'S finumber of whiclip per person ' population'; 7:	no consistent theoretical potential found so far			Policy proposals: - see proposals for "p.km pooled/shared car/cap" - see proposals for "p.km pooled/shared car/cap" - see proposals for "p.km pooled. - deeplog cape, beauting services for occasional heavy goods / cargo transport - deeplog cape, beauting services for occasional heavy goods / cargo transport - Policy proposals:	Narrative indicators : - symbolic order/function of the car Quantitative indicators :	No direct impact on energy use. Same indirect impacts as for "car use".	86,6				63 (No. of private cars per 100 households)	66/100 HH, of which 63 is own car in 2017, growing to 70 out of 74 by 2019 per 100 HH, https://www.ksh.hulstadet_filesijov/h uljov0324.html	we assume that it grows further first, but then shared cars and renting will be more and more popular	Green Supreme : no quantitative level found. " for urban population, almost none own a private car arrymore"			
	Passenger-km by reason for	1 : 662p.km/cap/y	Negawatt 2018 ("Scenario Negawatt 2017-2050 ; hypothèses et résultats") (in French)	t Potential adapted to local French socio-economical context, not theoretical. From 793 in 2020		Quantitative indicators: - Number of telework days /pers. /year - Distance travelled from home to work (by mode and distance class) Quantitative indicators:						n.a.			quantitative level 82- found. Green Supreme : no	24,59 574,91		
	movement (/cap) private	1 : 3295p.km/cap/y	Negawatt 2018 ("Scenario Negawatt 2017-2050 ; hypothèses et résultats") (in French)	t Potential adapted to local French socio-economical context, not theoretical. From 4480 in 2020.	Policy proposals : - relocalisation of services in villages - promotion of local tourism rather than international one	 Proportion of children able to go to school without cars / independent of motorized transport 	The overall energy use for private purpose is proportional to p.km (and also to the transport mode average energy intensity in MJ/p.km)					n.a.		total potentials in cited literature	quantitative level 171i found.	162,85 12550,50		
	Panicap	1. 16218 p.km/caply 2. II 1650bp.km/caply (urban) to 1500bp.km/caply (rural) 3. II 1650bp.km/caply (urban) to 1500bp.km/caply (rural) 3. not explicitlely given, but model shares are swallable on a graph so the author should be able to provide for the p.km/caply		folder "sources for the theoretical potential".	Current drivers: - see the work of Cairlo Mattiol who is at the forefront on the question of mobility needs. See in particular, Mattioli 2016: "Transport needs in a climate constrained world" which have put in the source folder Policy proposals: - addressing socia-infrastructural structuration problems, relocalisation of need satisfiers, limitation of travel patterns that do not arise from need satisfaction (see horse).	Marrative indicators : - Trips (pers. Iday	The overall energy use for mobility is proportional to total p.km/cap, and also to the overall mobility average energy intensity in MJIp.km.	12208,0	During 2014-2018 passenger travelling distances started increasing by 4.5% a year. On werage Librarians travel less than the average EU where travelling distances has been constantly increasing since 2012.	15000	Assessed potential is almost the same as defined in the "ALow Energy Demand scenarios for meeting the 1.5"C target"	9341,0	pkm per capita Source: DG MOVE Pocketbook, 2019. It increased from 7550 pkmicap 12000. According to the decomposition tool of Odyssee, activity, most change (e.g. to cars) and other factors, such as behavioural change caused the increase in overall passenger transport since 2000.	are very close to our projections (botal 16377 pirm in 2005) but the shares of localiton-glistance differmach lower share of local (2024 vs. 7365 local and 13083 vs. 1050) - 114499 shares of south share of active modes in cities and stereorking, we can have a somewhat lover value for local (2000) and lower LD towards the theoretical poetnal in literature (11599 including int. available).	Grenfe2: 13234.3 13212kmicaply 13234.3 GreenSupreme: 13338kmicaply	987,41 13125,40		
	pikm by car local pikm by car par capital distance cap	1 : 13495b p.km/year (Global North) / 8674p.km/cap/year 2 : 9635b p.km/year (Global North) / 6535p.km/cap/year 3 : U : 1700p.km/cap/y (urban) b 260pp.km/cap/year HU : 1907p.km/cap/y (urban) b 170p.km/cap/y (urban) 4 : 2342b p.km/y (Urban) b 170p.km/cap/year 5 : 7526p.km/cap/year (urban), 23878p.km/cap/year (urban)				Narrative indicators : - symbolic order/function of the car	The overall energy use for each mode of transport is proportional to jum, and also to the transport mode average energy intensity in Mulp.in. See the energy intensities associated with the different mode of transport.	11088,0	During 2014-2016 plan by car per capital increased by 5.3% a year.	11000	The passenger care will remain from main temporal mode and efficiency temporal following interest translated by care will increase mainly due to improvement of fiving mainly continued to the proposed passenger of the passenger	1414,8 4774,2	6189 total car plen per cap, 4518 in 2000 - increasing trend	Total projected value for 2050 is 10904 based on our econometric analysis. SS7 principata received from TMES activations assuming maximum model with potential. 5181 Pass source for urban (-187)	GreenEe2: 8161 km/capy) (439) daily life + 3552 km) distance tripo) Green Supreme: 6737 km/cap /y (5752 daily distance) tripo) International tripa International tripa 11118.2 11118.2 11118.2 11118.2	79,03 6640,94	18551	
	pkm by local bus kep. Plem by Road pkm by bus par capita pkm by long-distance bus kep	1:5601 b p. kmly / 3728p. km/caply 2:2001 b p. kmly / 1988p. km/caply 3:LI:3400p.km/caply (urban) bs 2500p.km/caply (urban) HU:2154p. km/caply (urban) bs 2500p.km/caply (urban) 4:1248p.p.kmly (EU-CH) / 2343p.km/caply 5:nd explicitely jelven. but modal shares are available on a graph so the author should be able to provide for the p.km/caply			-Policy proposals: - European, national, regional and localimunicipal planning - European, national, regional and localimunicipal planning - Development of rail infrastructure and quality of rail infrastructure - Policy policies in grid and proper security (Requestor, nuture, eq nightrains) and quality (service, punctuality etc.) - Plant portions grid in: an; to satisfor, EULETS, individual flying quotas - Road safety - Free transportation Controversed proposal: free public transportation: this measure does not seem to affect significantly the use of car but safter those who were already using public transports, or those who were using active modes (Feamiley 2015). After the implementation of such measures, only 30 free uses use reprecuously using the circ in Taillin (Ectanis), and only 195 in Headest (Beglum) (Reboulds 2019). In	Narrafive indicators : - Perceived quality of the transport system (availability, accessability reliability, confort): - Quantitative indicators : - Age composition of public transport vehicles	к.		2.0 During 2010-2017 pikm by bus per capits increased by 1.4% a year. The attractiveness of public transport is considerably other in Lithuania than in the EU as public transport accounted only in 9.5% of total passenger transport but during that years popular per season of the period of the pe	1500	Passengers will have from by thus. Franchal support to spoids of pick-integer (Dissal). Despite the springer (Dissal) and the fragments for Clinical Charges is a stronger of the spoid of	476, 1392,	remained constant in the period of 2000-2017, slightly increased to 1930 in 2018, 2.5% yearly increase	Illerahue, the cortical potential HU: 2154 p. Amicagly (uran) to 3420 706 2154 p. Amicagly (uran). projected value: 375 local and 2897 uran; we assume increase in public transportation on max potential model shift aboved in the 2897 model, but we can decrease urban plam assuming shift to non- motorized modes (-98)	Short distance public transport: GreenEsiz and GreenSupreme (same assumptions), 1858m/capy (Transport: 1933m/cap) (GreenEz), 3115m/cap (GreenEz), 3115m/cap (GreenEz), continuation of the transport: 1933m/cap (GreenEz), continuation of the transport of	10,38 530,95		
	pkin by motorsyc W Yang	1: 371b p.km/y / 550p.km/cap/y 2: 697b p.km/y / 473p.km/cap/y 3: not considered 4: 153b p.km/y (EU-CH) / 287p.km/cap/y 5: not explicitely given, but modal shares are available on a graph so the authors should be able to provide for the p.km/cap/y			comparison, increasing car parking prices had a much stronger direct effect on car use (Keblowski 2019) - Tele- and Returbe work hour allows for longer, slover treating routes) - Intermodality: integrated ticketing between different modes of transports, bike parkings directly nearby heavy public transport infrastructures (metingional train and train stations); (e.g. in the Netherlands maximum 200m away from the entrance of the station with different parking possibilities: guarded parking, socure boxes, simple bite nacks) and 2014 respectively. - Policy proposals for air transport in Kuhnhenn et al 2020:			-				183	motorcycle pkm statistics do not cover scooters in Hu statistics - we have only estimates used for the Hu times model	255 planticap according to our projections, potential max based on model shift opportunities is 534 princips, was assume the rest can be non-motorized biking (-279)	Included in car as "private motorized vehicle)	968,80		
	plm by metro, tram, adoution railicap Plum by rail Model Split Plum by rail	1: 2215b p.km/y/ 1424p.km/cap/y 2: 2014b p.km/y 1366p.km/cap/y 3: 11: 3400p.km/cap/y (urban) to 5200p.km/cap/y (rural) H1: 2154p.km/cap/y (urban) to 3200p.km/cap/y (rural) 4: 1334b p.km/y (EU-CH) / 2503p.km/cap/y 5: not explicitely given, but modal shares are available on a	1: supplementary into of Grubler et al 2018 ("A Low Energy Demand scenarios for meeting the 1.5"C target"), p. 74 2: found in Grubler et al 2018. See the scenario in GEA Efficier 3: supplementary into of Milward-Hopkins et al. 2020 ("Provid decent living with minimum energy: A global scenario"), p15	on mobility levels that the scenario partially offsets with high assumption on vehicles occupancy rates. 2. International travels included. For the "Global North" in 2050, assuming a population of 1,474b people. GEA is not a sufficiency oriented oceaning bot interesting susmylptions on mobility levels. [ing] 1. International travels (especially rail, road) included. Calculated on the basis of the 2nd proposition followed height partial procession followed height per a low mobility levels and proposition followed height per a low form both levels in pulmora place and modal split.	 companies allowing employees to take the time they need to travel by train or bus and paying any extra costs 	"Namelive indicators: - Perceived quality of the transport system (availability, accessability reliability, confront) - Quantifable indicators: - Age composition of public transport vehicles*	к	150	During 2010-2017 pkm by train per capita increased by 2.8% a year. The attractiveness of public transport is considerably lower in Lithuraina han in the EU as public transport accounted only to 9.5% of total passenger transport but during last years popularity of buses and trains is increasing. No metro and train in sincreasing. No metro and train in	700	Traveling by rail could increase significantly in future. Litherais takes part in the Pail Balle future interest and the pair and the pail of the pair and the pa	311	Decreased from 948 in 2000 - opposit trend to the EU, includes international	Projected value for 2009 is 300 plan per cell for the supplication to supplication to solid for the supplication to supplication to solid for the supplication to supplication to solid for the supplication to supplication to continuous districts in supplication to continuous supplication to supplicatio	Included in bus as "short distance public transport" Included in bus as "long distance public transport" 1153,5 Included in bus as "long distance public transport" International trips	3995936 181,1502698 2402,766617		
Description needs	Plem navigation /Cap	graph so the author should be able to provide for the p.km/sap/y	EUCale/2020 "Ambiblious" scenario with 1,5°C target and capability approach to the share of carbon budget; http://looc.european-calculator.go. S: Kuhnhenn et al 2020 ("A Societal Transformation Scenario: Staying Below 1.5°C")	See the Milward Hopkins et al 2020 for the complete description of the calculation method. Calculation sheet available in the folder "sources for theoretical potential".	-ending public subsides such as no fuel tax and title or no VAT.* nod. veril,			67,2	During 2010-2018 pkm by navigation per capita increased by 43% due to river transport for tourism and recreation purposes.	140	stoning-disclosed or of their types of passenger transport between the feature of the contract	0,0	no navigation in HU, only lww, but passenger transport is negligible	expected, as well as better connections and availability.	not considered	135,002155		
	Plans by sir Kap	1: 2850b p.km/y/ 1832p.km/czp/y 2: 2724b p.km/y / 1841p.km/czp/y 3: 1000km/czp/y 4: 518b p.km/y (EU-Cn) / 1160p.km/czp/y 5: 581pkm/czp/y						627,8	During 2010-2016 plum by air per capita increased by 14% mainly due to new routes of cheap airlines.	1000	People will travel more by alt. The renovation and expension of airports (or building of the new apport) and new additional routes could have significantly reduce the flow of passengers traveling by air between the Bullic State (due to tokat price and time needs).	430	increases dynamically statistics differ - 176 (Eurostat), 734 (CSO), 430 (Primes) includes international, but statistics differ in methodology	projection based on Primes is 1389, so we can choose option 3 in Blerature if environmental costs will be reflected in air ticket prices	National: GreenEe2: 1674m/caply GreenSupreme: Økm/caply 310 International: no figure in p.km given although the authors	00,08 1263,32	(data included international) No national flying anymore, rail. highspeed, interoity and nighthatins for Europe, world reduced through	
	Pain by estit (cap	1 : not considered 2 : not considered 3 : 100fcm/cap/y 4 : 1320b p.km/y (EU+CH) / 2474p.km/cap 5 : not explicitely given, but modal sharer are available on a graph so the author should be able to provide for the p.km/cap/y			romput and activity-mixed urban planning, neighbourhoods with a preponderance of speed limits below 30 kmh and a convivial built environment. (Mertiens et al 2017) - compact and activity-mixed urban planning, leidso outside big cities), pedestrian continuities, limitation of car speed and allocated space, providing the conditions for intermodality (secured bibs parkings at tran stations, possibility to take bibs on tocated trains	Regulation imposing bike places in buildings / city - Safe bike parking footilies Safe bike parking footilies Caustifiative indicators:	ey.	80 (estimation based on assumption to kin per day, 5 months per year and 15 days from the population. The of		200	The main driver for soft mobility - the contenting venerating of the existing bisycle contenting venerating of the existing bisycle and the content of the existing bisycle and the contenting of the contenting venerating parts in 2014-2002, EUR ** 10.2 million of temporar Regional visib pedestrains paths in 2014-2002, EUR ** 10.2 million of temporar Regional and contenting of the construction and reconstruction and position beginning to the construction and cons	na.	According to European Cycling Federation, data were collected until 2002 only.	Bicycle roads are improving, their length increased from 1202 km to 3413 km between 2000 and 2019 and 1040 and	GreenEd2:	3165527 1137,455516	taxation	
	pkm by pooled/shared caricap	no consistent theoretical potential found so far			Delity proposals: - develop carsharing services in various forms corresponding to various needs (heavy good/cargo transport, long distance travel, etc.) - infrastructures: declicated cargool lanes (see in Queber thttp://www.lheatratdoc.ac/gia/firewi/queber-planning-more-cargool-lanes-north-and-south of-montreal-1.13373546; also some experimentations in process in Nuntes (France)), parking lots, preferential tarifs for parking - existence of a robust internet platform/application for car pooling/	Narrative indicators : - symbolic order/function of the car	No direct impact on energy use. Same indirect impacts as for "car use" (see above)	n.a.				n.a.			Green Supreme: no quantitative level found. "car long- distance journeys are mainly covered through car sharing"	n.a n.a		
	Rate of home office	% 1:25%	1: Fana et al 2020 "The COVID confinement measures and EU labour markets" (EC JRC report)	1 : current ratio of "teleworkable" employment according to the EC; but very dependant on the treakdown of economic activities assumed for 2000 (mapbe some elements available in the Negraval European scenario ?). In particular the ratio of jobs in the tertiary sector. - further assumption should be made on the share of people effectively teleworking (feren if position is theorecisally, externed are reasons why some workers can't or don't war to telework, and the number of day per week teleworkers. - some interesting and unexpected observations were made in France that teleworking potentially leads to overall more mobility because of the indirect impacts it has on the way people organize their private activities and how it influences the average distance between home and working place over the medium-term (rebound effects). See p. 24 of "FVM_2000" in the source folder.	-enable the conditions for teleworking at home [internet connection, dedicated space, etc.]	Quantitative indicators: - Number of telework days /pers. /year	Nook et al 2020 (systemic review on th energy and dimate impacts of teleworking): the potential impacts on energy use for teleworking are still unclear: - leaving saide considerations on the indirect impacts on work and private lifestyle patterns, teleworking shows direct positive impact mashly through reduced commuter travel - but potential unpredictable increases in non-work travel and home energy use that may outgweigh the gains from reduced work travel "the available evidence suggests that economy wide energy savings are typically modes (due to reboowd effects e.g. dispersion of residential location and longer commutes and non-existent" according to this review, future studies are needed to "capture the dynamic configurations that coad potentially support televorking a socially, economically, and environmentally constructive practice"	e e							Green Supreme : no quantitative level			
	average car weight	1:550-800kg 2: an assumption is made in Millward-Hopkins et al but not very clear ("1t including passengers" 800kg assuming 3 people in the vehicle 7)	read in https://atterrissage.org/technologies-osciete-durab 653140478700 - Weglet of the Renaul ZCV here: http://www.cmc.buse.org.w/passenge: http://www.cmc.buse.org.w/passenge: Weight of the Circon CL here: https://en.witspedic.org/wiki/Circon/CL here: confirmation from the constructor, i couldn't find the official inf	1: strong assumption from a political perspective (but not irrealistic since this would be an average target), realistic from the technological perspective, at least for combustion engine cars (the first ZCV sold in 1949 was 510kg, the Citroen CL currently sold weights 805kg with a SCH pening. School and	Current drives: - car culture and car as a social symbol (Mattill et al 2020, p.14) - parloy proposals: - regulation towards car manufactures - tax on overweighed whicles see e.g. the weight tax to be set in France https://www.rfl.fr/en/france/20201015-government-u-turn-as-france-slaps-weight-tax-on-heavy-cars-suor-climate-poliution (for now only for vehicles over 1800kg)	Marrative indicators : - symbolic order/flunction of the car	Car direct energy consumption is in large part proportional to its weight (only consumption due to serodynamic drag is not). See Cullen, Allwood and Borgstein (2011). Lighter cars potentially leads also to a relieve in embodied energy (less material needed)	Data for 2020 (source: https://www.regifts.htt/psalaugos/demens-leikinsalaugos/demens-le	.		100 125 >15	2, 0 kg: 935354 -1249 kg: 1247421 -1499 kg: 750241 0 kg: 529981 age: 1225 kg	5		2,7 found Green Supreme : no	5		Eurostat [fsa_ehomp] Eurostat [road_eqs_uniweig]