

The CBA part

# The CBA data

## Data (see the "Full project data")

- Each group is provided with the following excel sheets **after screening** the scenarios
  - "Scenario overview" (contains: construction and maintenance costs, construction period, opening year)
  - "Consumers Surplus" (consumers surplus)
  - "Unit prices" (prices given in €ct)
  - "SBasis" (basis scenario)
  - 10 x "Sxx"
- Assumptions:
  - Price growth: 1.4%
  - Traffic growth: 1.4%
  - Emission growth: -15%
  - Discount rate: 3%

**Forget the "Initial project data"**

# Consumers surplus

- The consumer surplus (CS) measures all direct user benefits related to travel time savings as well as cost savings
  - Most importantly it conforms to the rule-of-a-half approximation
- The CS is calculated for 2035 and measured in 2022 prices
  - All values are in Euros
  - The value-of-time has been forecasted by a 1.4% increase per year
    - This conforms approximately to 70% of the GDP growth in fixed prices as recommended by HEATCO
  - Traffic has been forecasted with 1.4% per year
- You must calculate the impact in the opening year of the scenario

## Columns to use

Consumers surplus for year 2035										
scenario	Opening year	CS passenger	CS CarD	CS CarP	CS Air	CS Rail	CS freight	CS freight Truck	CS freight Rail	CS freight IWW
01	2024	€ 25.814.639	€ 3.292.020	€ 779.111	€ 523.559	€ 21.219.949	€ 43.975.545	€ 41.181.339	€ 2.794.206	€ 0
02	2026	€ 35.989.224	€ 874.797	€ 9.256.946	€ 474.148	€ 25.383.333	€ 346.362	€ 0	€ 346.362	€ 0
03	2028	€ 28.491.754	€ 25.427.347	-€ 4.651.241	€ 1.534.942	€ 6.180.706	€ 64.500.020	€ 64.507.209	-€ 7.190	€ 0
04	2026	€ 12.321.237	€ 18.800.697	-€ 10.653.150	€ 830.985	€ 3.342.704	€ 12.232.479	€ 12.201.238	€ 31.241	€ 0
05	2027	€ 92.462.354	€ 41.582.639	€ 9.523.842	€ 2.780.313	€ 38.575.561	€ 12.146.614	€ 11.835.689	€ 310.925	€ 0
06	2029	€ 380.888.794	€ 251.561.446	€ 102.120.764	€ 1.673.009	€ 25.533.575	€ 16.361.880	€ 13.158.877	€ 3.203.003	€ 0
07	2026	€ 16.376.222	-€ 8.352.864	€ 8.436.954	€ 2.642.290	€ 13.649.841	€ 2.041.799	€ 0	€ 2.041.799	€ 0
08	2027	€ 32.671.112	€ 11.078.106	€ 5.293.694	€ 1.487.546	€ 14.811.766	€ 342.466	€ 0	€ 342.466	€ 0
09	2030	€ 806.707.499	€ 229.531.283	€ 107.801.958	€ 9.569.090	€ 459.805.168	€ 162.446.223	€ 0	€ 162.446.223	€ 0
10	2028	€ 286.344.810	€ 138.850.247	€ 48.792.286	€ 3.049.163	€ 95.653.114	€ 183.071.755	€ 65.226.931	€ 117.844.824	€ 0
11	2027	€ 140.240.065	€ 98.022.962	€ 22.920.118	-€ 376.643	€ 19.673.628	€ 145.639.444	€ 91.542.939	€ 54.096.505	€ 0
12	2026	€ 36.250.561	€ 5.327.725	€ 10.082.210	€ 361.984	€ 20.478.641	€ 62.457.048	€ 35.941.454	€ 26.515.595	€ 0
13	2026	€ 27.000.735	€ 14.593.105	-€ 1.147.100	€ 1.137.161	€ 12.417.569	€ 2.794.206	€ 0	€ 2.794.206	€ 0
14	2027	€ 57.227.570	-€ 2.400.920	-€ 11.566.817	€ 7.157.099	€ 64.038.207	€ 36.832.502	-€ 5.395.036	€ 42.227.539	€ 0
15	2027	€ 111.251.334	€ 36.128.921	€ 3.885.548	€ 10.084.067	€ 61.152.797	€ 260.811.701	€ 99.676.380	€ 161.135.321	€ 0
16	2026	€ 31.295.837	€ 17.677.533	€ 7.315.689	€ 1.086.287	€ 5.216.328	€ 416.020	€ 0	€ 416.020	€ 0
17	2027	€ 18.260.970	€ 11.938.868	€ 3.977.514	€ 1.545.220	€ 799.369	€ 1.387.938	€ 0	€ 1.387.938	€ 0
18	2029	€ 100.902.584	-€ 2.604.052	€ 332.222	€ 1.076.177	€ 102.098.236	€ 49.153.274	€ 41.883.980	€ 7.269.294	€ 0
19	2026	€ 38.326.682	€ 15.194.980	-€ 9.255.131	€ 860.433	€ 31.526.399	€ 15.557.414	€ 3.618.021	€ 11.939.393	€ 0
20	2026	€ 67.568.116	€ 38.349.040	€ 3.310.328	€ 1.475.435	€ 24.433.313	€ 26.603.746	€ 22.160.113	€ 4.443.633	€ 0
21	2027	€ 156.419.853	€ 55.571.260	€ 29.590.106	€ 1.230.880	€ 70.027.607	€ 343.208.034	€ 218.044.849	€ 125.163.184	€ 0
22	2028	€ 36.230.828	€ 22.710.529	€ 6.437.492	€ 1.656.655	€ 5.426.152	-€ 26.444.396	-€ 26.525.365	€ 80.969	€ 0
23	2027	€ 97.804.398	€ 62.362.513	€ 19.792.752	€ 2.499.621	€ 13.149.512	-€ 15.213.040	-€ 14.972.957	-€ 240.083	€ 0
24	2026	€ 738.954.112	€ 608.056.862	€ 129.722.497	€ 1.910.374	-€ 735.622	€ 45.620.462	€ 45.846.900	-€ 226.438	€ 0
25	2027	€ 34.385.256	€ 19.728.608	€ 11.149.209	€ 387.612	€ 3.119.826	€ 53.884.660	€ 54.088.381	-€ 203.721	€ 0
26	2026	€ 48.859.707	€ 32.828.692	€ 15.323.137	€ 256.623	€ 451.255	€ 88.329.928	€ 87.573.171	€ 756.756	€ 0
27	2026	€ 12.724.942	€ 7.773.956	€ 3.754.231	€ 843.448	€ 353.306	-€ 35.202.863	-€ 35.275.171	€ 72.308	€ 0
28	2027	€ 82.253.172	€ 61.644.188	€ 17.017.522	€ 291.708	€ 3.299.753	-€ 31.966.913	-€ 121.207.365	€ 89.240.452	€ 0
29	2028	€ 66.696.025	€ 42.956.612	€ 22.664.760	€ 786.934	€ 287.720	€ 112.787.572	€ 111.506.326	€ 1.281.246	€ 0
30	2027	€ 97.765.216	€ 44.783.101	€ 11.102.669	€ 1.229.510	€ 40.649.936	€ 140.774.941	€ 133.452.426	€ 7.322.516	€ 0
31	2027	€ 154.505.857	€ 113.953.378	€ 35.479.995	€ 1.226.420	€ 3.846.064	€ 238.156.626	€ 163.460.004	€ 74.696.622	€ 0
32	2028	€ 272.273.957	€ 107.544.982	€ 32.832.162	€ 1.646.297	€ 130.250.517	€ 55.780.609	€ 28.141.848	€ 27.638.761	€ 0
33	2026	€ 20.480.399	€ 21.379.157	-€ 227.815	€ 242.297	-€ 913.240	-€ 295.616	-€ 387.744	€ 92.129	€ 0
34	2027	€ 23.342.311	€ 18.505.632	€ 4.565.858	€ 869.794	-€ 598.973	€ 18.830.249	€ 18.639.701	€ 190.548	€ 0
35	2026	€ 37.536.934	-€ 11.066.339	-€ 206.419	€ 51.564.613	-€ 2.754.920	€ 0	€ 0	€ 0	€ 0
36	2028	€ 13.987.888	€ 1.804.713	€ 9.426.554	€ 1.749.115	€ 1.007.506	€ 18.428.154	€ 0	€ 0	€ 18.428.154

# S00\_Basis

The basis scenario describes a situation where no intervention is made.

We are interested in the difference between the basis and the scenario where something is constructed.

NOTE: The model assumes that an intervention in one place creates impacts that can be traced through the entire network. Thus, all countries should be included in all scenarios

	A	B	C	D	E	F	G	H
1	scenario	CountryCode	vkm_petrol_Carpassenger	vkm_diesel_Carpassenger	vkm_hgv_Freight	Total_IWW_TonKM	PersonKM_RailPassenger	TonKM_RailFreight
2	0 AL		2198066588	543756939,5	777221203,1		126971036,2	595578509,5
3	0 AT		43085971023	27049782273	6885318710	7106424796	15860344443	24759775097
4	0 BA		5027797169	1233582154	843493599,9	738717753,1	599998370,6	1208454192
5	0 BE		42897807442	32553789751	8407811729	9588655720	14152909321	9815037091
6	0 BG		27971419042	6835117289	3840698194	2100634487	17009960396	23009822898
7	0 BY		19233008883	4636389728	10435219922		7711612314	26951465733
8	0 CH		39946537085	5712937149	3643506649	38941402,01	11678970821	11557304285
9	0 CZ		31730503341	6890501850	8547687988	45302166,1	9360773304	35367292149
10	0 DE		3,8001E+11	88671910289	46527679506	75684748123	1,149E+11	1,1011E+11
11	0 DK		37244766877	3865846675	7242730556		6384748372	3395010484
12	0 EE		3356648931	609642916,1	1819968541		290241631,6	30995576388
13	0 ES		1,76106E+11	94465085669	48189132688		29510204596	24316357539
14	0 FI		29660485878	4329604264	5653968811		7655092176	22105140771
15	0 FR		2,45353E+11	1,67729E+11	44047509616	12023247334	95137533292	55777392152
16	0 GR		27384386348	6779242622	6284560549		2931596326	1428385097
17	0 HR		22445419305	5576919616	2670384436	311895128,2	9156131179	7506877549
18	0 HU		29563781303	6074378920	5396885516	11182448778	15426045379	23852046253
19	0 IE		27587363107	4773782727	4870776481		1939275352	655379161,2
20	0 IT		2,11596E+11	55783952589	36794525170		51018835010	35835678625
21	0 LI		79960872,23	23695145,26	17673163,12		13065986,8	27023258,91
22	0 LT		8541370665	2035272762	4647743251	1945882,944	13133661829	36824130330
23	0 LU		5550919726	2630558672	903457691,5		158397219,4	574870310,2
24	0 LV		7229481949	1438646966	2599006572	3057704,258	8056356934	50294595758
25	0 MD		5605122954	1383321122	1618291932		1412250402	3462909678
26	0 ME		1515772533	374882579,9	189442827		135159230,6	1899399712
27	0 MK		4799690843	1188801675	1354947359		733830160,6	414917952,8
28	0 NL		95300016067	19265209296	10286574412	39737084737	12558822565	6571852762
29	0 NO		40194211089	9403871464	3860302535		4528023915	4756462458
30	0 PL		96095814001	18900619149	30156034408	883070320	53870261563	1,31673E+11
31	0 PT		37367256349	9777746558	6717896615		4717636803	4654175808
32	0 RO		38572847080	9424124358	13976914293	21604111222	11339483897	57844965226
33	0 RU		1,58108E+11	38793216186	90632809279		1,05348E+11	2,32853E+11
34	0 SE		57554852548	4488326451	8431172179		17913194334	35584287482
35	0 SI		11790024713	3085947062	2334983761		5738166068	9988556231
36	0 SK		12780130582	3096643950	4069192402	706201278,9	2520588074	23498612921
37	0 TR		1,1411E+11	27980098824	11229697803		50477638654	13378092439
38	0 UA		74014816516	18038035610	22515409332		35592575321	77262588011
39	0 UK		3,30508E+11	75070056794	26289449496	326382649,3	48531516569	37357668506
40	0 YU		20537373838	5018813426	2144024092	13212523345	20572184091	9339879397



# Unit prices– 2022 price level

Euro cent!

	A	B	C	D	E	F	G	H	I	J	K	L	M
1				Ap_car petrol	Ap_car diesel	Gw_car petrol	Gw_car diesel	AP hgv diesel	GW hgv diesel	Accidents car	Noise car	Accidents - HGV	Noise - HGV
2		Country		€ct/vkm	€ct/vkm	€ct/vkm	€ct/vkm	€ct/vkm	€ct/vkm	€ct/vkm	€ct/vkm	€ct/vkm	€ct/vkm
3	AL	Albania		0,086	0,244	0,787	0,784	1,862	3,653	0,338	0,279	1,077	2,419
4	AT	Austria		0,135	0,533	0,787	0,784	4,253	3,653	0,410	0,585	4,122	3,861
5	BA	Belarus		0,074	0,210	0,787	0,784	1,600	3,653	0,291	0,240	0,926	2,079
6	BE	Belgium		0,132	0,379	0,787	0,784	2,844	3,653	0,470	0,540	7,981	3,564
7	BG	Bulgaria		0,066	0,187	0,787	0,784	1,423	3,653	0,259	0,214	0,824	1,850
8	BY	Bosnia & Herzegovina		0,083	0,234	0,787	0,784	1,786	3,653	0,325	0,268	1,033	2,321
9	CH	Switzerland		0,254	0,716	0,787	0,784	5,465	3,653	0,994	0,820	3,162	7,103
10	CZ	Czech Republic		0,119	0,340	0,787	0,784	2,594	3,653	0,182	0,405	1,597	3,971
11	DE	Germany		0,122	0,502	0,787	0,784	4,040	3,653	0,312	0,479	3,161	3,163
12	DK	Denmark		0,113	0,299	0,787	0,784	2,265	3,653	0,320	0,704	2,940	4,645
13	EE	Estonia		0,170	0,483	0,787	0,784	3,692	3,653	0,185	0,577	2,273	5,651
14	ES	Spain		0,140	0,280	0,787	0,784	1,996	3,653	0,370	0,471	0,407	3,108
15	FI	Finland		0,157	0,448	0,787	0,784	3,420	3,653	0,370	0,534	2,106	5,236
16	FR	France		0,139	0,509	0,787	0,784	4,019	3,653	0,480	0,558	0,555	3,686
17	GR	Greece		0,138	0,174	0,787	0,784	1,058	3,653	0,380	0,370	1,099	2,438
18	HR	Croatia		0,117	0,330	0,787	0,784	2,516	3,653	0,457	0,378	1,456	3,270
19	HU	Hungary		0,219	0,651	0,787	0,784	5,017	3,653	0,200	0,263	1,733	1,742
20	IE	Ireland		0,231	0,658	0,787	0,784	5,023	3,653	0,382	0,785	3,093	7,689
21	IT	Italy		0,123	0,380	0,787	0,784	2,930	3,653	0,340	0,466	0,307	3,077
22	LI	Liechtenstien		0,254	0,716	0,787	0,784	5,465	3,653	0,994	0,820	3,162	7,103
23	LT	Lithuania		0,177	0,504	0,787	0,784	3,852	3,653	0,155	0,602	2,372	5,896
24	LU	Luxembourg		0,242	0,689	0,787	0,784	5,258	3,653	0,350	0,822	3,238	8,049
25	LV	Latvia		0,179	0,512	0,787	0,784	3,906	3,653	0,149	0,610	2,405	5,979
26	MD	Moldova		0,066	0,187	0,787	0,784	1,423	3,653	0,259	0,214	0,824	1,850
27	ME	Montenegro		0,082	0,230	0,787	0,784	1,758	3,653	0,320	0,264	1,017	2,285
28	MK	Macedonia		0,070	0,197	0,787	0,784	1,506	3,653	0,274	0,226	0,871	1,957
29	NL	Netherlands		0,129	0,421	0,787	0,784	3,262	3,653	0,415	0,565	1,104	3,728
30	NO	Norway		0,251	0,710	0,787	0,784	5,414	3,653	0,984	0,812	3,132	7,036
31	PL	Poland		0,226	0,562	0,787	0,784	4,183	3,653	0,230	0,223	0,060	1,462
32	PT	Portugal		0,135	0,385	0,787	0,784	2,939	3,653	0,272	0,459	1,810	4,499
33	RO	Romania		0,080	0,227	0,787	0,784	1,734	3,653	0,315	0,260	1,003	2,253
34	RU	Russia		0,080	0,227	0,787	0,784	1,734	3,653	0,315	0,260	1,003	2,253
35	SE	Sweden		0,114	0,211	0,787	0,784	1,467	3,653	0,190	0,658	1,472	4,344
36	SI	Slovenia		0,167	0,562	0,787	0,784	4,422	3,653	0,348	0,333	1,402	8,210
37	SK	Slovakia		0,221	0,648	0,787	0,784	4,981	3,653	0,141	0,188	0,846	1,240
38	TR	Turkey		0,108	0,306	0,787	0,784	2,336	3,653	0,425	0,351	1,352	3,036
39	UA	Ukraine		0,066	0,187	0,787	0,784	1,423	3,653	0,259	0,214	0,824	1,850
40	UK	United Kingdom		0,260	0,543	0,787	0,784	3,973	3,653	0,190	0,891	0,265	5,874

# Impacts to be included in the CBA (I)

- Consumers surplus (given)
  - Passengers
  - Freight
- Air Pollution
  - Car petrol
  - Car diesel
  - HGV diesel (heavy goods vehicle)
  - Train person
  - Train freight
  - IWW (inland water ways)
  - Air
- Global warming
  - Car petrol
  - Car diesel
  - HGV diesel (heavy goods vehicle)
  - Train person
  - Train freight
  - IWW (inland water ways)
  - Air

## Impacts to be included in the CBA (II)

- Accidents
  - Car
  - HGV (heavy goods vehicle)
  - Train passengers
  - Train freight
- Noise
  - Car
  - HGV (heavy goods vehicle)
  - Train passengers
  - Train freight

**Sum your first-year impacts to these 5 main categories**  
**Check them with the TAs before proceeding**