Für Mensch & Umwelt

Umwelt Bundesamt

15th TFEIP Meeting – Ghent 2014

Workshop on Estimating Emissions from *NFR 1.A.4 Residential/Commercial Combustion and Mobile Machinery* – Session 1b: Mobile Machinery - Solutions and Thoughts from the Countries

New Activity Data for Revising the German Emissions Inventory for Mobile Machinery

Michael Kotzulla
Section I 2.6 – Emission Situation

0 - CONTENT OVERVIEW

1 - STATE OF PLAY – (A) THE NEB AS *THE* AD-SOURCE FOR NFR 1.A

The National Energy Balance as *the* AD source for NFR 1.A:

Bundesrepublik	Zeile							Gase				Erneuerbare Energien			Sonstige Energieträger	Elektrischer Strom und andere Energieträger			Energieträger in	
		Dieselkraftstoff	Heizöl leicht	Heizöl schwer	Petrolkoks	Flüssiggas	Raffineriegas	Andere Mineralölprodukte	Kokerei- u. Stadtgas	Gichtgas u. Konvertergas	Naturgase Erdgas Erdölgas	Grubengas	Wasser-, Windkraft u. Photovoltaikanlage	Biomasse und erneuerbare	Sonstige erneuerb. Energieträger	Nichterneuerbare Abfälle, Abwärme	Strom	Kernenergie	Fernwärme	Primärenergieträger	Sekundärenergieträger
	1	-	-	-	-	-	-	-	-	-	446652	12388	309226	1110880	42987	255039	-	-	-	4245564	
	2	373860	212138	112590	32155	39978	-	72656	-	-	3153962	-	-	20532	-	-	178988	1177858	-	9487934	1
	3	9655	10975	-	1452	2050	1572	7536	-	-	-	-	-	-	-	-	-	-	-	28450	
Inland	4	383515	223113	112590	33607	42028	1572	80192	-	-	3600614	12388	309226	1131412	42987	255039	178988	1177858	-	13761948	1
	5	207606	70889	79354	23936	12481	-	103552	-	-	619350	-	-	21119	-	-	201564	-	238	662026	1
	6	21046	-	92649	-	-	-	213	-	-	-	-	-	-	-	-	-	-	-	-	
	7	-	-	3381	-	-	-	-	-	-	70278	-	-	-	-	-	-	-	-	117099	
RAUCH IM INLAND	8	154863	152224	-62794	9671	29547	1572	-23573	-	-	2910986	12388	309226	1110293	42987	255039	-22576	1177858	-238	12982823	
	9	12	-	-	31655	302	-	-	-	-	-	-	-	-	-	-	-	-	-	310422	
nbrikettfabriken	10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	141149	
allg. Versorgung	11	23	6188	10959	310	9	-	959	4014	23464	396677	3239	-	96340	-	67060	-	-	-	2834048	
erke (nur für Strom)	12	80	2577	15909	408	2571	7312	13552	10588	45266	141429	1844	-	34374	-	17917	-	-	-	282076	
	13	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1177858	-	1177858	
hatovoltaik- u.a. Anlagen	14	-	-	-	-	-	-	-	-	-	-	4467	309226	391997	68	126	28051	-	-	705883	
g. Versorgung	15	-	799	318	-	-	-	-	32	121	129415	214	-	40714	-	34166	-	-	-	334751	
	16	-	3858	338	-	76	-	2050	16	59	94154	2492	-	30429	1105	28540	-	-	-	190801	
	17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	18	2779	43140	33298	-	2138	2486	121144	-	-	-	-	-	123717	-	-	-	-	-	3978529	
ger	19	-	-	-	-	-	-	18540	-	-	-	-	-	-	-	-	-	-	-	123717	
rgeramt	20	2895	56562	60822	32373	5096	9798	156245	14651	68910	761675	12255	309226	717569	1173	147807	28051	1177858	-	10079234	
	21	-	-	-	-	-	-	-	66551	-	-	-	-	-	-	-	-	-	-	-	
nbrikettfabriken	22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
allg. Versorgung	23	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1200902	-	-	-	1
erke (nur für Strom)	24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	181040	-	-	-	
	25	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	388696	-	-	-	
hatovoltaik- u.a. Anlagen	26	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	421283	-	-	-	
g. Versorgung	27	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	348639	-	
	28	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	137050	-	
	29	-	-	-	-	-	-	-	-	176516	-	-	-	-	-	-	-	-	-	-	
	30	1164097	657323	329152	54556	120156	167228	306892	-	-	-	-	-	-	-	-	-	-	-	-	4
ger	31	-	6574	14321	-	3319	14061	50745	-	-	-	-	-	123717	-	-	-	-	-	123717	
rgeramt	32	1164097	663897	343473	54556	123475	181289	357637	66551	176516	-	-	-	123717	-	-	2191921	-	485689	123717	7
	33	-	-	-	-	-	-	-	9165	14717	26	-	-	-	-	-	1135	-	-	26	
rikettfabriken	34	123	231	26	-	-	-	-	-	-	-	-	-	-	-	502	6904	-	309	23951	
rikettfabriken	35	9	63	-	-	-	-	-	-	-	-	-	-	4	-	5185	17045	-	5904	15334	
	36	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	125377	-	18445	-	
nnung	37	-	7	-	-	-	-	-	-	-	8427	-	-	-	-	-	2419	-	22	8427	
	38	103	1497	35441	19180	5217	153251	4982	1216	-	30264	-	-	259	-	2360	22906	-	5248	32883	
ger	39	-	158	324	-	515	-	2901	-	-	18550	-	-	-	-	-	-	-	-	18550	
mwandlungsbereich insgesamt	40	235	1956	35801	19180	5732	153251	7883	10380	14717	57267	-	-	263	-	8047	175786	-	29928	99170	
lurte	41	-	-	-	-	-	-	-	-	22019	499	64	-	925	-	-	89190	-	35334	1488	
NL. N. UMWANDLUNGSBEILANZ	42	1315820	757603	184056	12674	142194	19312	169936	41520	70869	2091545	69	-	515253	41814	99185	1876318	-	420189	2926648	6
R VERBRAUCH	43	-	56145	155526	8667	60098	19303	155650	-	-	103140	-	-	-	-	-	-	-	-	105043	
en	44	-	-	-	-	-	-	-	-2351	1047	49817	-	-	-	-	-	-	-	-	119785	
UCH	45	1315820	701458	28530	4007	82096	9	14286	39169	71916	2038222	69	-	515253	41814	99185	1876318	-	420189	2941290	5
n und Erden, rauri. Bergbau	46	53	898	64	178	144	-	41	-	-	4411	-	-	245	-	-	6748	-	286	4685	
	47	1	11561	1656	-	726	-	-	-	-	107811	-	-	2049	-	576	63303	-	8571	115574	
	48	3	2228	266	-	371	-	-	-	-	80067	-	-	34081	-	945	74412	-	26203	125466	
	49	4	1040	6642	-	6167	-	735	7277	-	179719	-	-	7072	-	61464	158015	-	68267	255946	
dustrie	50	1	2505	6470	270	1402	9	-	-	-	29175	-	-	1074	-	858	26794	-	20966	35311	
aren	51	-	3897	233	-	244	-	-	-	-	20125	-	-	321	-	66	50669	-	5042	20512	
	52	1	702	5293	-	291	-	-	-	-	61114	-	-	1340	-	787	18440	-	250	63430	
u. Erden	53	30	7058	1680	1834	715	-	5351	48	-	43309	-	-	10732	-	34112	28003	-	371	102556	
	54	3	333	4590	10	2	-	7665	30117	71916	78170	69	-	155	-	-	77615	-	1877	239491	
n	55	1	1369	187	1673	2541	-	-	-	-	37458	-	-	8	-	292	62813	-	785	38209	
	56	9	5076	2	-	1674	-	-	32	-	48294	-	-	710	-	22	57094	-	2579	49027	
	57	315	8827	44	-	686	-	-	-	-	22658	-	-	448	-	7	40333	-	5188	23113	
	58	10	1984	-	-	229	-	-	1678	-	37109	-	-	323	-	1	65299	-	13554	37432	
uvige	59	5	6612	1242	42	492	-	463	15	-	44321	-	-	60223	4	54	87908	-	15456	104602	
u. Erden, Verarbeit. Gewerbe insg.	60	436	54091	28369	4007	15684	9	14255	39169	71916	793741	69	-	118780	4	99185	817646	-	169495	1215354	1
	61	14730	-	-	-	-	-	-	-	-	-	-	-	1021	-	-	59760	-	-	1021	
	62	1197252	-	-	-	23613	-	-	-	-	8771	-	-	115335	-	-	-	-	-	124106	2
	63	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
ifffahrt	64	12050	-	-	-	-	-	-	-	-	-	-	-	773	-	-	-	-	-	773	
	65	1224032	-	-	-	23613	-	-	-	-	8771	-	-	117129	-	-	59760	-	-	125900	2
	66	-	469234	-	-	23606	-	-	-	-	845348	-	-	243041	34004	-	491760	-	164347	1151309	1
rtleistungen u. übrige Verbraucher	67	91362	178133	161	-	19193	-	31	-	-	390362	-	-	36303	7806	-	507152	-	86347	448827	
andel und Dienstleistungen	68	91362	647367	161	-	42799	-	31	-	-	1235710	-	-	279344	41810	-	998912	-	250694	1600136	2

Source: NEB for Germany, 2010 (Working Group on Energy Balances, 2012)

(A) THE NEB AS *THE* AD-SOURCE FOR NFR 1.A

AD FOR OFF-ROAD MOBILE SOURCES FROM THE NEB

NEB lines including AD for other non-road/off-road mobile sources:

(i) 67 – Commercial, Trade, Services and other Consumers

including AD for military (!) which is also available separately

provided fuels relevant for mobile sources:

- *diesel oil, gasoline, jet kerosene, avgas* → assumption: 100 per cent mobile combustion
- (*LPG* → currently 100 per cent stationary, but revision under way)

(ii) 68 – Households

provided fuels relevant for mobile sources:

- *diesel oil & gasoline* → assumption: 100 per cent mobile combustion

(A) THE NEB AS *THE* AD-SOURCE FOR NFR 1.A

Mobile Emission Sources	Quality of Activity Data used	
1.A.3.a Civil Aviation	available directly from NEB line 63	
1.A.3.b Road Transport	available directly from NEB line 62	
1.A.3.c Railways	available directly from NEB line 61	
1.A.3.d i (i) Internat. Inland Navigation	no data available *(negligible NT overestimation)*	
1.A.3.d i (ii) Internat. Maritime Navigation	available directly from NEB line 6 *(-1.A.4.c iii)*	
1.A.3.d ii National Navigation	available directly from NEB line 64	
1.A.4.a ii Households & Gardening	available directly from NEB line 66	
1.A.4.c iii Fishery	calculated from NEB line 6 only	
1.A.5.b Other: Military vehicles	available directly from Mineral Oil Statistics	

...with 100% of diesel oil, gasoline, kerosene, avgas delivered to *Households & Gardening*, *Fishery* and *Military* assumed to be used in mobile sources

(A) THE NEB AS *THE* AD-SOURCE FOR NFR 1.A

Mobile Emission Sources	Quality of Activity Data used	
1.A.3.a Civil Aviation	available directly from NEB line 63	
1.A.3.b Road Transport	available directly from NEB line 62	
1.A.3.c Railways	available directly from NEB line 61	
1.A.3.d i (i) Internat. Inland Navigation	no data available *(negligible NT overestimation)*	
1.A.3.d i (ii) Internat. Maritime Navigation	available directly from NEB line 6 *(-1.A.4.c iii)*	
1.A.3.d ii National Navigation	available directly from NEB line 64	
1.A.4.a ii Households & Gardening	available directly from NEB line 66	
1.A.4.c iii Fishery	calculated from NEB line 6 only	
1.A.5.b Other: Military vehicles	available directly from Mineral Oil Statistics	
1.A.2.g vii Construction: vehicles/machinery	tier1 estimate from NEB line 67	
1.A.4.c ii Agriculture: vehicles / machinery	tier1 estimate from NEB line 67	
1.A.4.c ii Forestry: vehicles / machinery	no separate data available	

(A) THE NEB AS *THE* AD-SOURCE FOR NFR 1.A

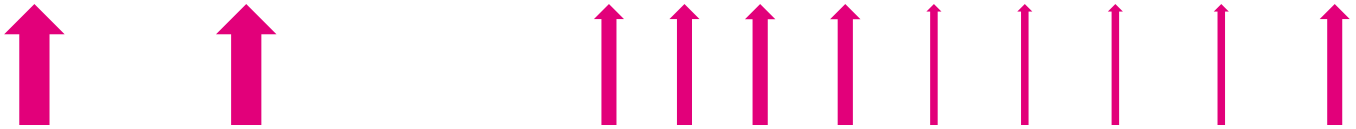
Mobile Emission Sources	Quality of Activity Data used	
1.A.2.g vii Construction: vehicles/machinery	tier1 estimate from NEB line 67	
1.A.4.c ii Agriculture: vehicles / machinery	tier1 estimate from NEB line 67	
1.A.4.c ii Forestry: vehicles / machinery	no separate data available	

...with AD included in NEB line 67 – *Commercial, Trade, Services, and other consumers:*

National Energy Balance Germany 2010	line	hard coal			lignite			mineral oil products							gases	renewables		other energy carriers	elec-tricity
Status: 25.09.2012		[TJ]																	
		raw coal	bri-quet-tes	coke	raw lign.	bri-quet-tes	other lign. prod.	gaso-line	kero-sene	diesel oil	LFO	HFO	LPG	other M.O.P.	natural gas	biomass, renew. wastes	other ren.	non-ren. waste and heat	elec-tricity
Commercial, Trade, Services and other consumers	67	10.161	0	229	0	0	2.169	9.204	3.286	89.516	212.022	225	24.605	32	425.397	32.323	7.207	0	529.499

1 STATE OF PLAY – (B) NEB LINE 67

thereof stationary combustion	100%			100%			-	-	-	100%	100%	100%	100%					100%



National Energy Balance Germany 2010	line	hard coal			lignite			mineral oil products							gases	renewables		other energy carriers	elec-tricity
Status: 25.09.2012		[TJ]																	
		raw coal	bri-quet-tes	coke	raw lign.	bri-quet-tes	other lign. prod.	gaso-line	kero-sene	diesel oil	LFO	HFO	LPG	other M.O.P.	natural gas	biomass, renew. wastes	other ren.	non-ren. waste and heat	elec-tricity
Commercial, Trade, Services and other consumers	67	10.161	0	229	0	0	2.169	9.204	3.286	89.516	212.022	225	24.605	32	425.397	32.323	7.207	0	529.499

thereof mobile combustion	-	-	-	-	-	-	100%	100%	100%	-	-	-	-			-		-

(B) NEB LINE 67

National Energy Balance Germany 2010	line	hard coal			lignite			mineral oil products							gases	renewables		other energy carriers	elec-tricity
Status: 25.09.2012		[TJ]																	
		raw coal	bri-quet-tes	coke	raw lign.	bri-quet-tes	other lign. prod.	gaso-line	kero-sene	diesel oil	LFO	HFO	LPG	other M.O.P.	natural gas	biomass, renew. wastes	other ren.	non-ren. waste and heat	elec-tricity
Commercial, Trade, Services and other consumers	*67*	10.161	0	229	0	0	2.169	9.204	3.286	89.516	212.022	225	24.605	32	425.397	32.323	7.207	0	529.499
thereof mobile combustion		-	-	-	-	-	-	100%	100%	100%	-	-	-	-			-		-
minus deliveries to military								**4.862**	**3.286**	**997**									

(B) NEB LINE 67

National Energy Balance Germany 2010	line	hard coal			lignite			mineral oil products							gases	renewables		other energy carriers	elec-tricity
Status: 25.09.2012		[TJ]																	
		raw coal	bri-quet-tes	coke	raw lign.	bri-quet-tes	other lign. prod.	gaso-line	kero-sene	diesel oil	LFO	HFO	LPG	other M.O.P.	natural gas	biomass, renew. wastes	other ren.	non-ren. waste and heat	elec-tricity
Commercial, Trade, Services and other consumers	*67*	10.161	0	229	0	0	2.169	9.204	3.286	89.516	212.022	225	24.605	32	425.397	32.323	7.207	0	529.499
thereof mobile combustion		-	-	-	-	-	-	100%	100%	100%	-	-	-	-			-		-
minus deliveries to military								4.862	3.286	997									
remaining amounts, to be allocated								4.342	0	88.519									

(B) NEB LINE 67

National Energy Balance Germany 2010	line	hard coal			lignite			mineral oil products							gases	renewables		other energy carriers	elec-tricity
Status: 25.09.2012		[TJ]																	
		raw coal	bri-quet-tes	coke	raw lign.	bri-quet-tes	other lign. prod.	gaso-line	kero-sene	diesel oil	LFO	HFO	LPG	other M.O.P.	natural gas	biomass, renew. wastes	other ren.	non-ren. waste and heat	elec-tricity
Commercial, Trade, Services and other consumers	*67*	10.161	0	229	0	0	2.169	9.204	3.286	89.516	212.022	225	24.605	32	425.397	32.323	7.207	0	529.499
thereof mobile combustion		-	-	-	-	-	-	100%	100%	100%	-	-	-	-			-		-
minus deliveries to military								**4.862**	**3.286**	**997**									
remaining amounts, to be allocated								**4.342**	**0**	**88.519**									
annual share construction								42%		42%									
2010 consumption 1.A.2.g vii								***1.824***		***37.178***									
annual share agric. + forestry								58%		58%									
2010 consumption 1.A.4.c ii								***2.518***		***51.341***									

(B) NEB LINE 67

National Energy Balance Germany 2010	line	hard coal			lignite			mineral oil products							gases	renewables		other energy carriers	elec-tricity
Status: 25.09.2012		[TJ]																	
		raw coal	bri-quet-tes	coke	raw lign.	bri-quet-tes	other lign. prod.	gaso-line	kero-sene	diesel oil	LFO	HFO	LPG	other M.O.P.	natural gas	biomass, renew. wastes	other ren.	non-ren. waste and heat	elec-tricity
Commercial, Trade, Services and other consumers	*67*	10.161	0	229	0	0	2.169	9.204	3.286	89.516	212.022	225	24.605	32	425.397	32.323	7.207	0	529.499
thereof mobile combustion		-	-	-	-	-	-	100%	100%	100%	-	-	-	-			-		-
minus deliveries to military								**4.862**	**3.286**	**997**									
remaining amounts, to be allocated								**4.342**	**0**	**88.519**									
annual share construction								42%		42%									
2010 consumption 1.A.2.g vii								***1.824***		***37.178***									
annual share agric. + forestry								58%		58%									
2010 consumption 1.A.4.c ii								***2.518***		***51.341***									

Problem: uniform shares used for *entire* time series!

2 - THE STUDY: NEW AD FOR A BETTER INVENTORY

ISI

Fraunhofer Institut System- und Innovationsforschung

TECHNISCHE UNIVERSITÄT MÜNCHEN

BASE

BASE-ING.

et al.

(A) BACKGROUND

approach	questionnaire + subsequent modelling
included	construction industry office-like enterprises *(banks | publishers | mail operators)* manufacturing enterprises *(metal | wood | garages | paper & print)* retail trade *(retailer: food + non-food | whole-sale: food + non-food)* public services *(hospitals | schools | public baths)* restaurants, hotels, homes food production *(bakers | butchers | other food)* laundries agriculture horticulture airports textile, clothing, leather
not covered	market stands,
other	road lighting, military, others

(A) BACKGROUND

approach	questionnaire + subsequent modelling
relevant	**construction industry** office-like enterprises *(banks | publishers | mail operators)* manufacturing enterprises *(metal | wood | garages | paper & print)* retail trade *(retailer: food + non-food | whole-sale: food + non-food)* public services *(hospitals | schools | public baths)* restaurants, hotels, homes food production *(bakers | butchers | other food)* laundries **agriculture** → more than 100 enterprises interviewed **horticulture** → not yet included separately in inventory **airports** → not yet included in inventory textile, clothing, leather
not covered	market stands,
other	road lighting, military, others

(B) RESULTS TO BE USED IN THE INVENTORY

2006		Brenn- und Kraftstoffe sowie Fernwärme								Brst./ Kraftst./ FW
Grp. No.	Split Bezeichnung	Beleuch-tung [TWh/a]	mech. Energie [TWh/a]	Warm-wasser [TWh/a]	sonst. Prozess-wärme [TWh/a]	Prozess-kälte [TWh/a]	Klima-kälte [TWh/a]	IuK [TWh/a]	Raum-heizung [TWh/a]	[TWh/a]
1	Baugewerbe	0,0	3,7	1,1	0,0	0,0	0,0	0,0	8,7	13,5
2	Büroähnliche Betriebe	0,0	0,0	2,5	0,0	0,0	0,1	0,0	66,5	69,1
3	Herstellungsbetriebe	0,0	0,0	0,1	1,4	0,0	0,0	0,0	4,7	6,3
4	Handel	0,0	0,0	1,9	0,0	0,2	0,0	0,0	37,2	39,4
5	Krankenhäuser, Schulen, Bäder									
21	Krankenhäuser	0,0	0,0	1,9	1,0	0,0	0,3	0,0	9,7	12,9
22	Schulen	0,0	0,0	0,7	0,4	0,0	0,0	0,0	18,3	19,4
23	Bäder	0,0	0,0	0,5	3,6	0,0	0,0	0,0	0,1	4,2
6	Beherbergung, Gaststätten, Heime	0,0	0,0	3,2	12,0	0,0	0,0	0,0	31,0	46,2
7	Nahrungsmittelgewerbe									
5	Backgewerbe	0,0	0,0	0,3	0,7	0,0	0,0	0,0	0,4	1,4
6	Fleischereien	0,0	0,0	0,2	0,0	0,0	0,0	0,0	0,4	0,6
7	Restl. Nahrungsmittelgewerbe	0,0	0,0	0,1	0,0	0,0	0,0	0,0	0,1	0,2
8	Wäschereien	0,0	0,0	0,1	0,4	0,0	0,0	0,0	0,1	0,5
9	Landwirtschaft	0,0	23,2	1,2	3,5	0,0	0,0	0,0	10,8	38,7
10	Gartenbau	0,0	0,0	0,4	3,3	0,0	0,0	0,0	0,6	4,3
11	Flughäfen	0,0	0,5	0,0	0,0	0,0	0,2	0,0	1,2	2,0
12	Textil, Bekleidung, Spedition	0,0	0,0	0,0	0,4	0,0	0,0	0,0	1,7	2,1
Summe Gruppen 1 - 12 (über FB erfasste Betriebe)		0,0	27,5	14,1	27,0	0,2	0,8	0,0	191,3	260,8
13	Nicht über FB erfasste Betriebe	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,2	0,3
14	Übrige	0,0	3,0	0,4	0,4	0,0	0,0	0,0	3,4	7,3
Gesamt		0,0	30,5	14,6	27,5	0,2	0,8	0,0	195,0	268,4

(B) RESULTS TO BE USED IN THE INVENTORY

2006 balance for fuels and public heat

Brenn- und Kraftstoffe sowie Fernwärme

Grp. No.	Split	Bezeichnung	Beleuchtung [TWh/a]	mech. Energie [TWh/a]	Brst./ Kraftst./ FW [TWh/a]
1		Baugewerbe		3,7	13,5
2		Büroähnliche Betriebe	0,0	0,0	69,1
3		Herstellungsbetriebe	0,0	0,0	6,3
4		Handel	0,0	0,0	39,4
5		Krankenhäuser, Schulen, Bäder			
	21	Krankenhäuser	0,0	0,0	12,9
	22	Schulen	0,0	0,0	19,4
	23	Bäder	0,0	0,0	4,2
6		Beherbergung, Gaststätten, Heime	0,0	0,0	46,2
7		Nahrungsmittelgewerbe			
	5	Backgewerbe	0,0	0,0	1,4
	6	Fleischereien	0,0	0,0	0,6
	7	Restl. Nahrungsmittelgewerbe	0,0	0,0	0,2
8		Wäschereien	0,0	0,0	0,5
9		Landwirtschaft		23,2	38,7
10		Gartenbau		0,0	4,3
11		Flughäfen		0,5	2,0
12		Textil, Bekleidung, Spedition	0,0	0,0	2,1
Summe Gruppen 1 - 12 (über FB erfasste Betriebe)			0,0	27,5	260,8
13		Nicht über FB erfasste Betriebe	0,0	0,0	0,3
14		Übrige	0,0	3,0	7,3
Gesamt			0,0	30,5	268,4

Groups relevant for MM inventory

- Construction industry
- Agriculture
- Horticulture
- Airports
- Other *(Forestry!, Military)*

(B) RESULTS TO BE USED IN THE INVENTORY

2006 balance for fuels and public heat

Brenn- und Kraftstoffe sowie Fernwärme

Grp. No.	Split	Bezeichnung	Beleuchtung [TWh/a]	mech. Energie [TWh/a]	W wa [TWh/a]	sonst Wärme [TWh/a]	Kälte [TWh/a]	Kälte [TWh/a]	[TWh/a]	Heizung [TWh/a]	Brst./ Kraftst./ FW [TWh/a]
1		Baugewerbe		3,7					0,0	8,7	13,5
2		Büroähnliche Betriebe	0,0	0,0	2,5	0,0	0,0	0,1	0,0	66,5	69,1
3		Herstellungsbetriebe	0,0	0,0	0,1	1,4	0,0	0,0	0,0	4,7	6,3
4		Handel	0,0	0,0	1,9	0,0	0,2	0,0	0,0	37,2	39,4
5		Krankenhäuser, Schulen, Bäder									
	21	Krankenhäuser	0,0	0,0	1,9						12,9
	22	Schulen	0,0	0,0	0,7						9,4
	23	Bäder	0,0	0,0	0,5						4,2
6		Beherbergung, Gaststätten, Heime	0,0	0,0	3,2						46,2
7		Nahrungsmittelgewerbe									
	5	Backgewerbe	0,0	0,0	0,3	0,7	0,0	0,0	0,0	0,4	1,4
	6	Fleischereien	0,0	0,0	0,2	0,0	0,0	0,0	0,0	0,4	0,6
	7	Restl. Nahrungsmittelgewerbe	0,0	0,0	0,1	0,0	0,0	0,0	0,0	0,1	0,2
8		Wäschereien	0,0	0,0	0,1	0,4	0,0	0,0	0,0	0,1	0,5
9		Landwirtschaft		23,2					0,0	10,8	38,7
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Summe Gruppen 1 - 12 (über FB erfasste Betriebe)			0,0	27,5	14,1	27,0	0,2	0,8	0,0	191,3	260,8
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Gesamt			0,0	30,5	14,6	27,5	0,2	0,8	0,0	195,0	268,4

Groups relevant for MM inventory

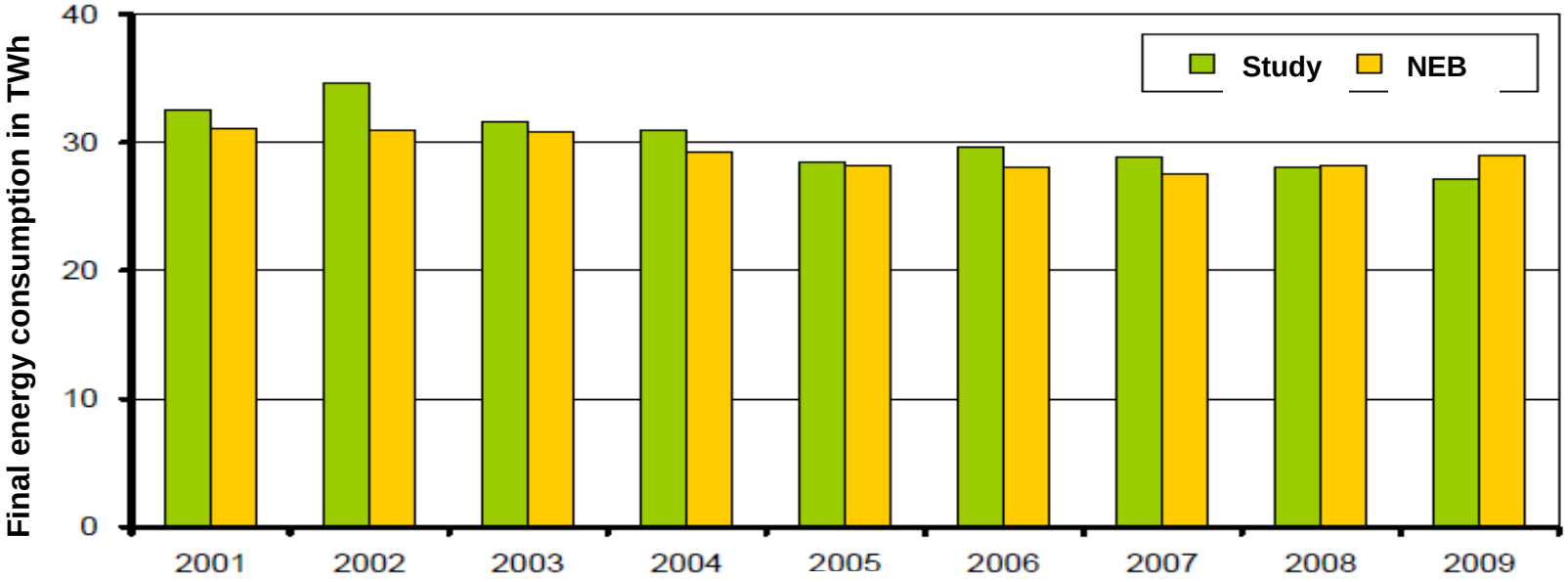
- Construction industry
- Agriculture
- Horticulture
- Airports
- Other *(Forestry!, Military)*

All other covered groups show no fuel use for the generation of mechanical energy.

(B) RESULTS TO BE USED IN THE INVENTORY

COMPARISON OF AD FROM STUDY AND NEB - **liquid fuels**

- besides 2002 and 2009 very good conformity



32.5	34.6	31.6	31.0	28,5	29,6	28,9	28.1	27.1
31.1	31.0	30.8	29.2	28.2	28.1	27.5	28.2	29.0
1.05	*1.12*	*1.03*	*1.06*	*1.01*	*1.05*	*1.05*	*1.00*	*0.93*

Source: Study (Fraunhofer et al., 2011)

(C) STUDY OUTLOOK

The 2006 Study meanwhile developed into an ongoing project.

The model is being updated biennially including

1. **Revision of provisional data used for past years**
   (at the moment: AD for 2010)

2. **Addition of AD for recent years**
   (at the moment, AD for 2011 and 2012)

3. **Adding provisional data for most recent year**
   (at the moment, AD for 2013)

4. **Adding forecast for the ongoing year**
   (at the moment, AD for 2014)

3 - OUTLOOK: WHAT THE INVENTORY COULD LOOK LIKE IN 2015
(A) DERIVING A NEW CONSTRUCTION INDUSTRIES SHARE

APPROACH

1. ADDING-UP ANNUAL AD for
   - 01 – Construction Industries
   - 09 – Agriculture and
   - 10 – Horticulture

Mechanical Energy produced in		2006	2007	2008	2009	2010
Construction Industries		*3.7*	*3.2*	*2.9*	*2.9*	*2.9*
Agriculture	[TWh]	*23.2*	*22.8*	*22.1*	*21.1*	*21.1*
Horticulture		*0*	*0*	*0*	*0*	*0*

2. ESTIMATING THE ANNUAL PERCENTAL CONTRIBUTIONS

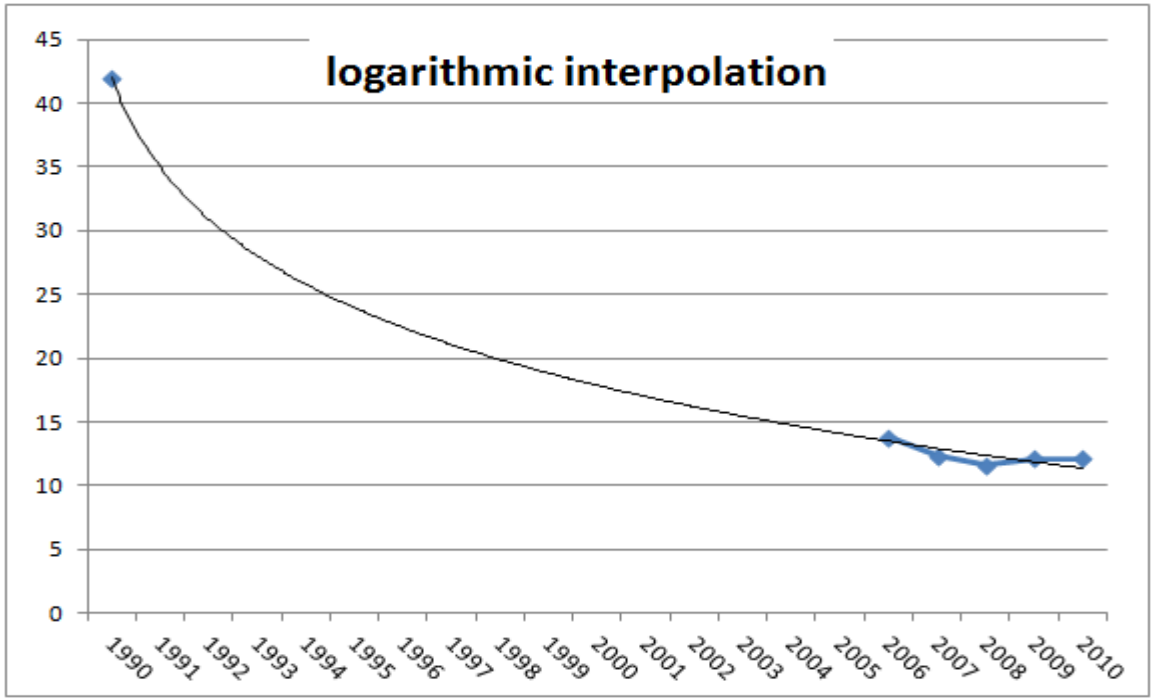
		2006	2007	2008	2009	2010
Fuel use in Contruction Industries and Agriculture	[TWh]	27	26	25	24	24
thereof used in Construction Industries	[%]	*13.8*	*12.3*	*11.6*	*12.1*	*12.1*
resulting share for Agriculture (and Horticulture)		*86.2*	*87.7*	*88.4*	*87.9*	*87.9*

(A) DERIVING A NEW CONSTRUCTION INDUSTRIES SHARE

3. RECALCULATING THESE SHARE BACK TO 1990...
   (*and here the problems begin!)*

(A) DERIVING A NEW CONSTRUCTION INDUSTRIES SHARE

3. RECALCULATING THESE SHARE BACK TO 1990...
   ...via interpolation



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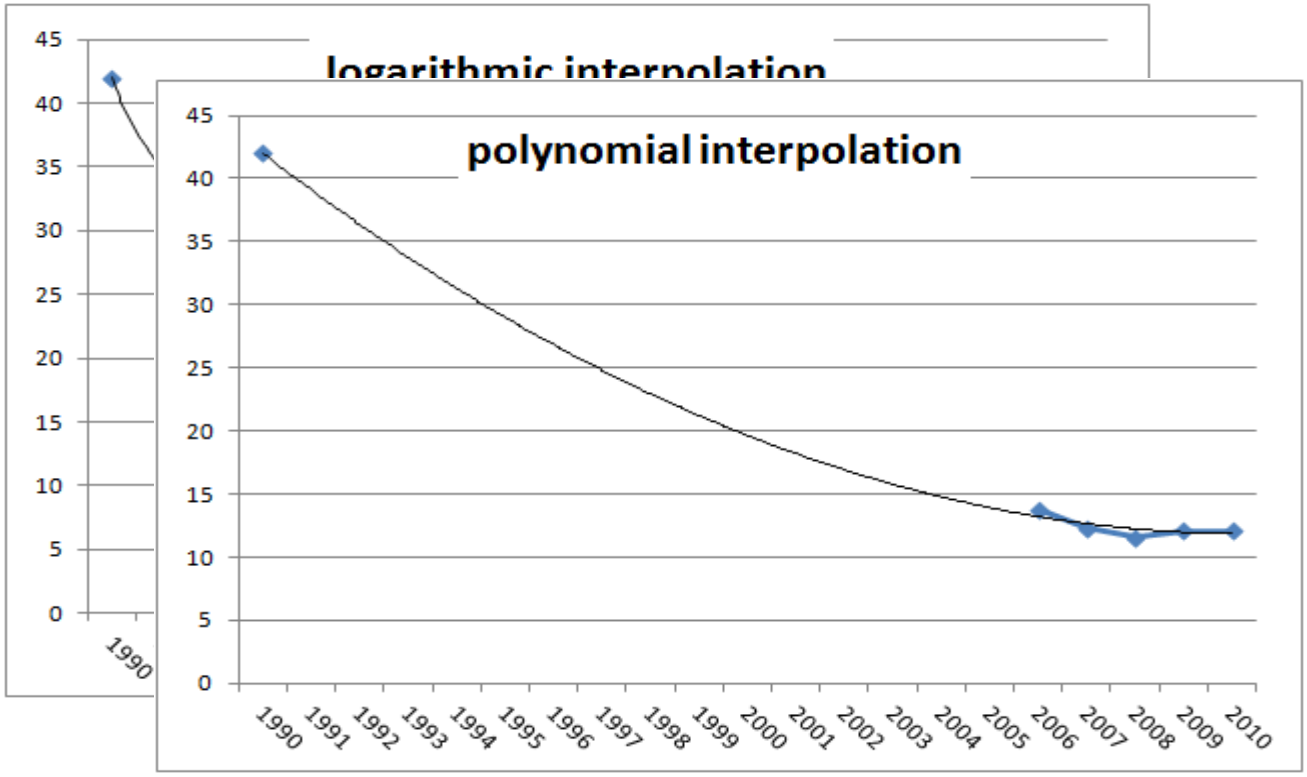

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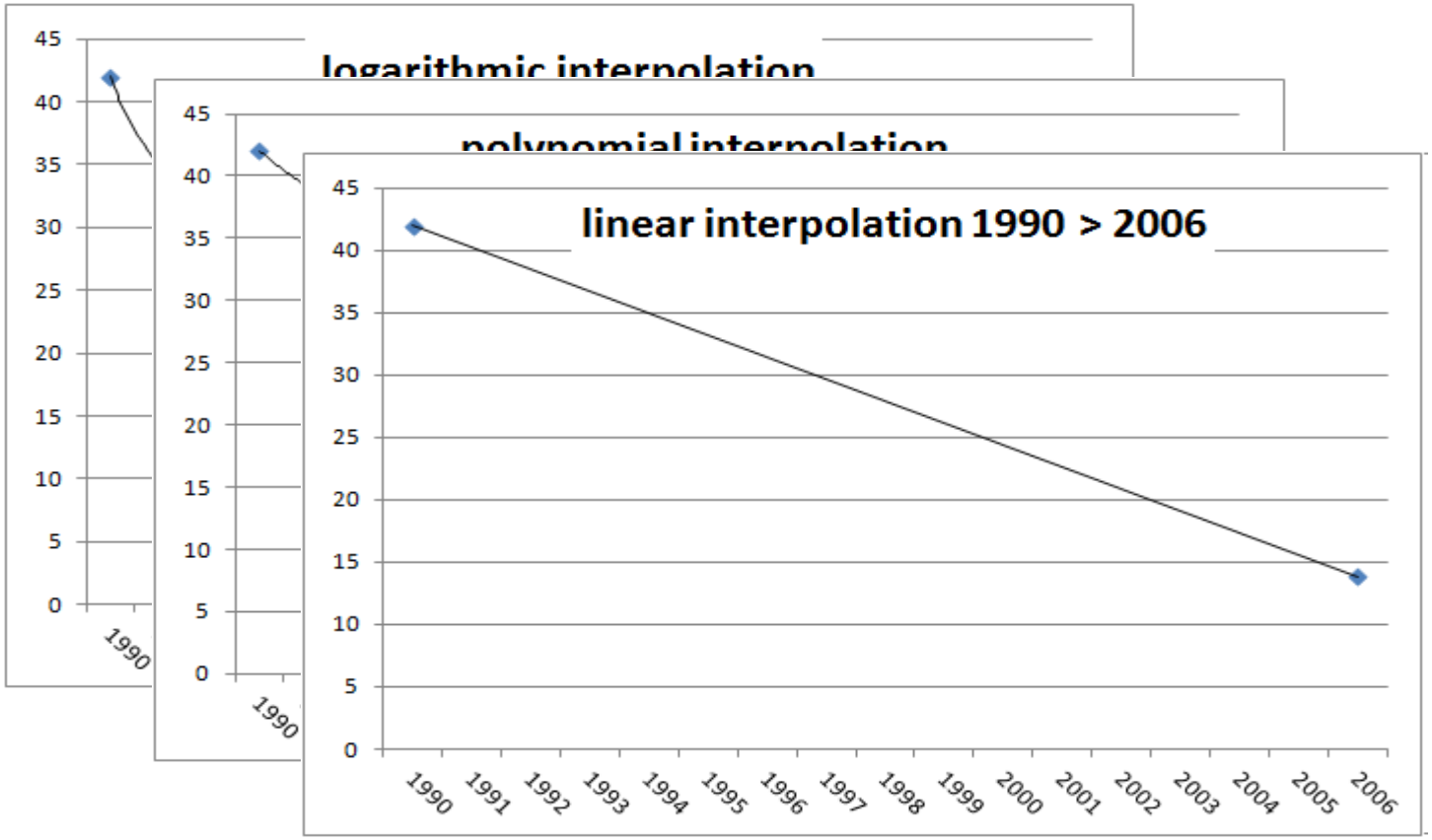

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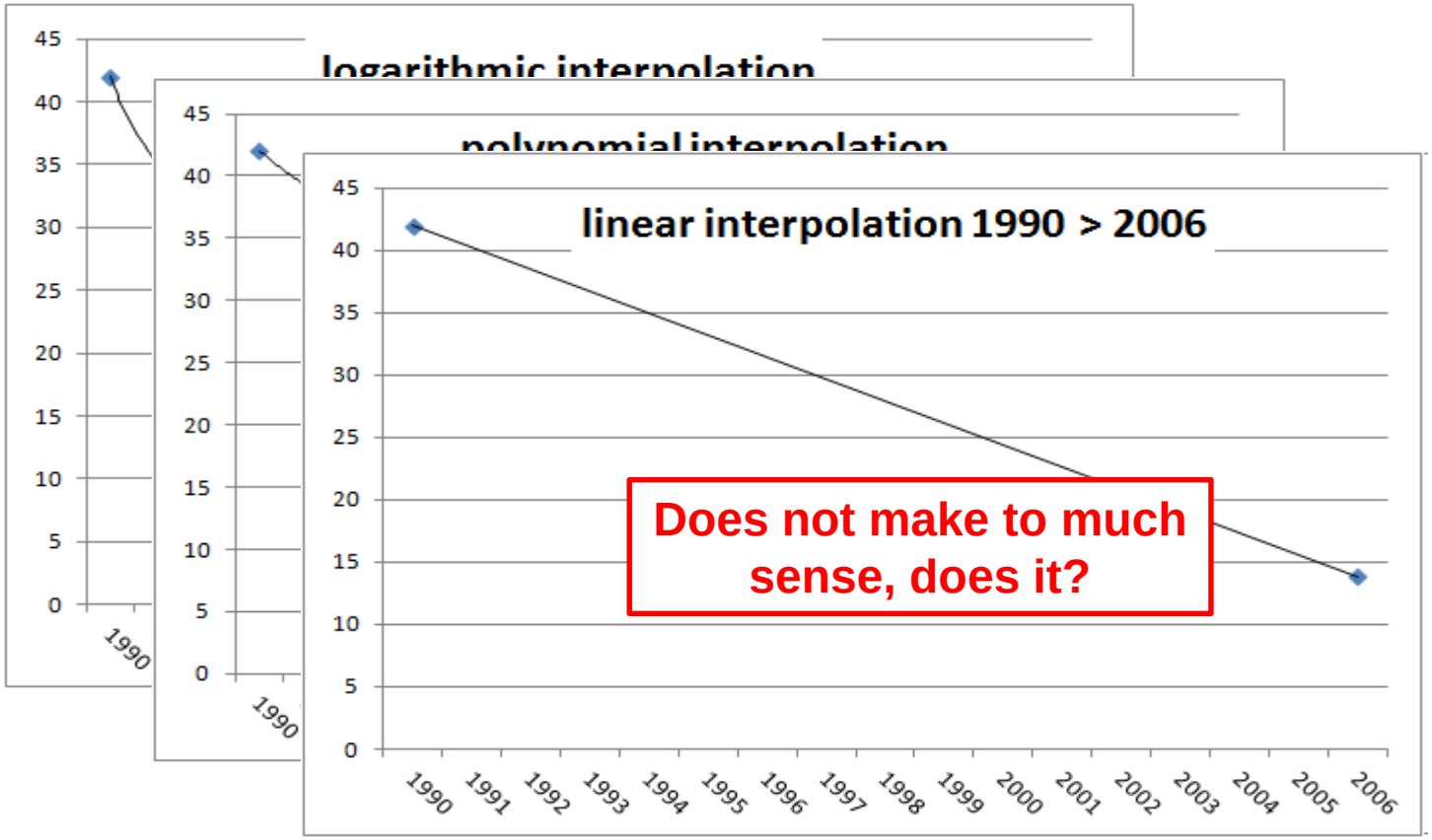

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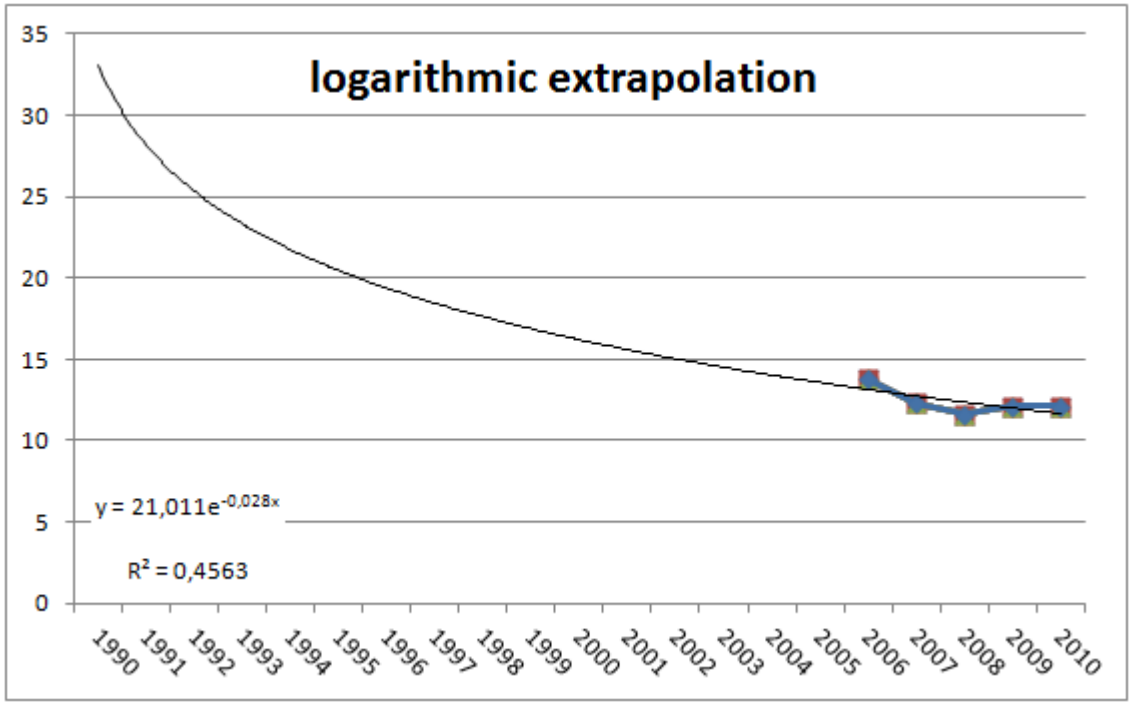
   ...via backward extrapolation from study data?



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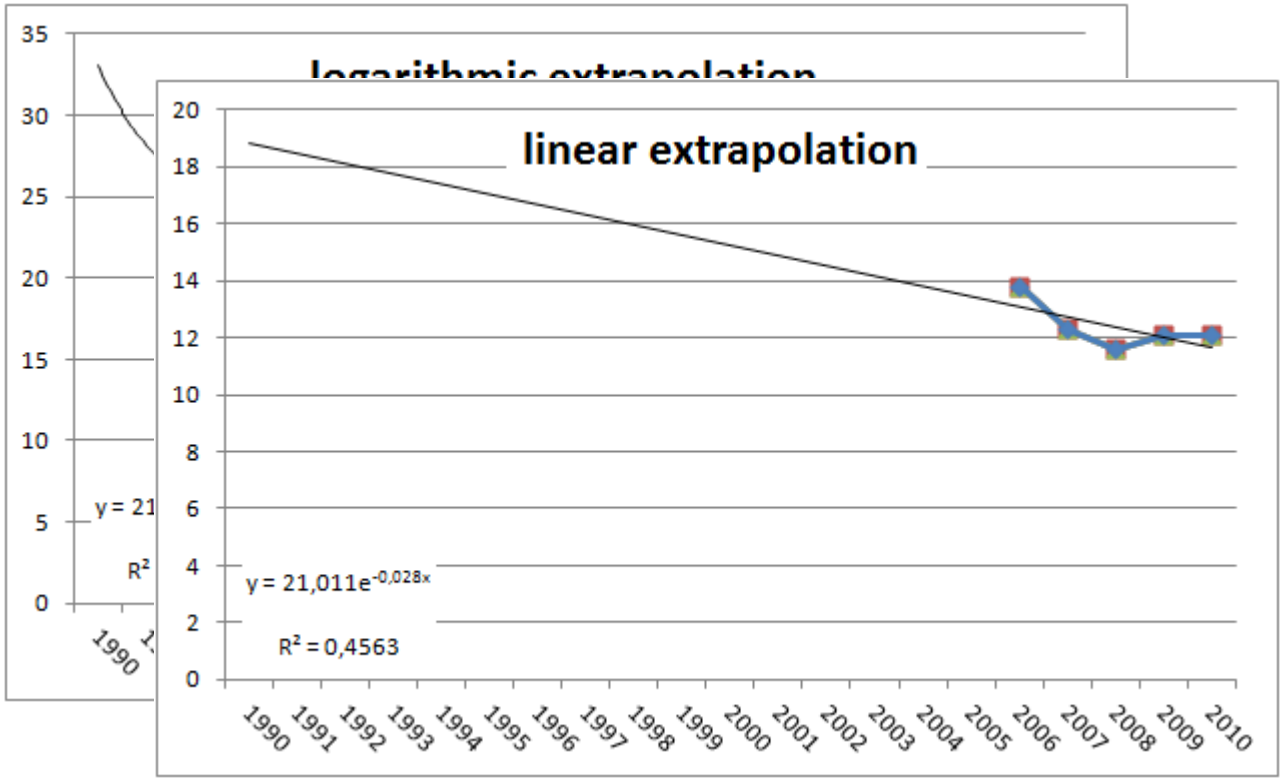

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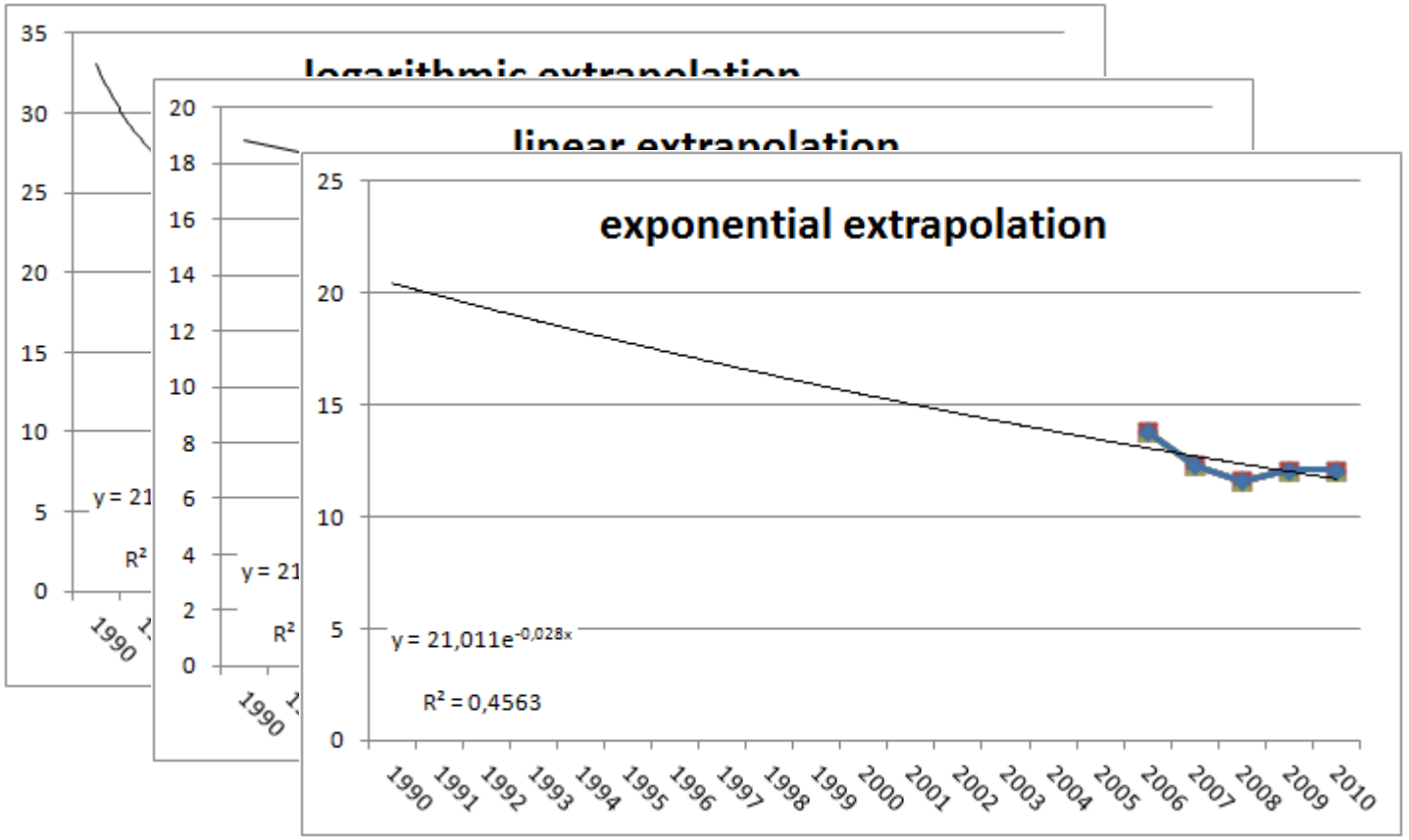

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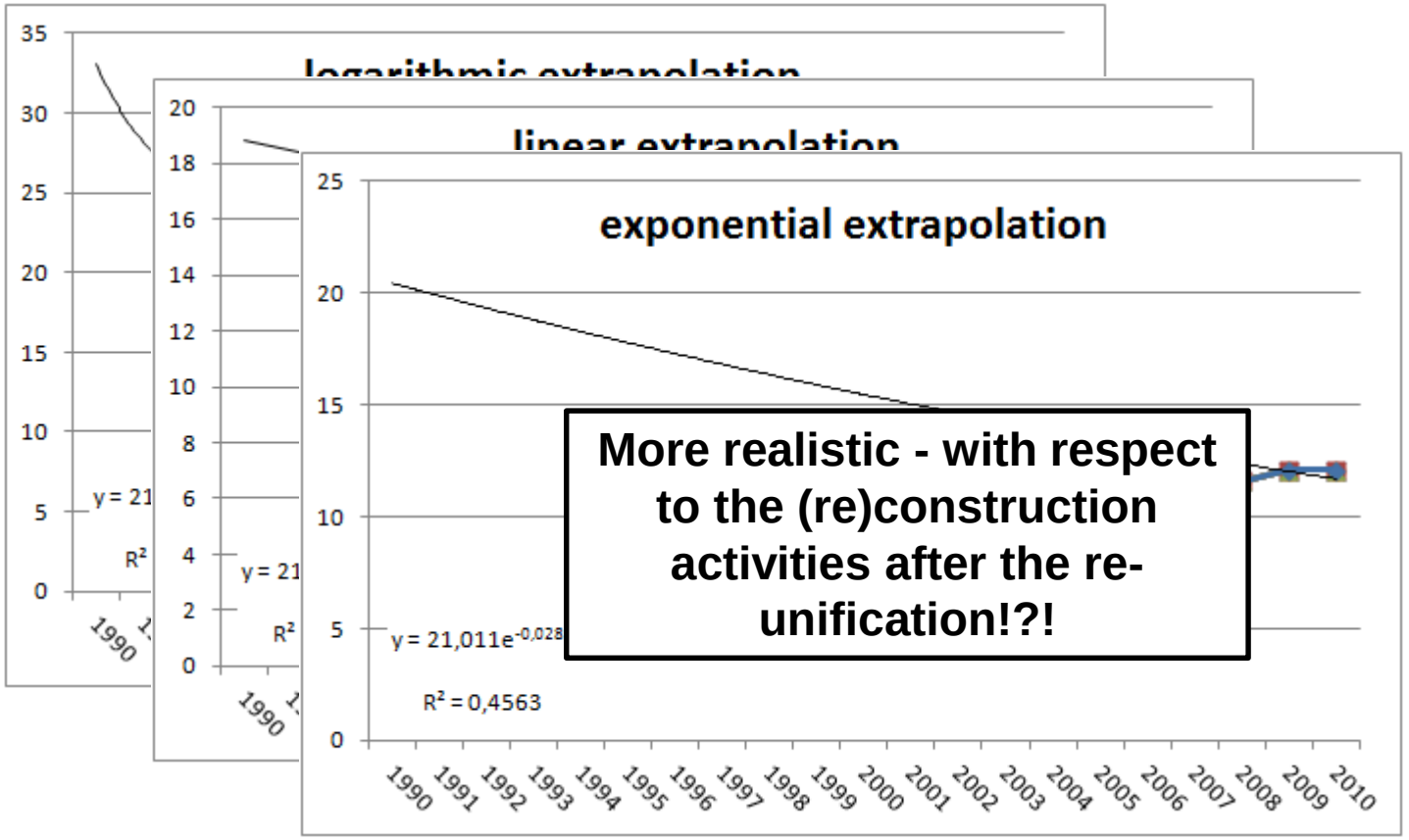

(A) DERIVING A NEW CONSTRUCTION INDUSTRIES SHARE

3. RECALCULATING THESE SHARE BACK TO 1990...
   ...via backward extrapolation from study data!

→ keeping with **the current ratio of 42 per cent** as starting value in 1990 **does not make sense**

→ but: backward extrapolation alone does not result in reliable data either (especially due to the **post-reunification construction boom**)

→ therefore, such extrapolation must take into account other **indicator data** such as

- cement and asphalt production,
- kilometres of roads paved,
- flats built,
- etc.

available from official statistics *(not yet screened in detail!)*

(B) BUT WHAT ABOUT AIRPORT VEHICLES, FORK LIFTERS ETC.?

Currently, airport ground-vehicles and fork lifters are not considered separately within Germany's emission inventories due to lack of data.

(B) BUT WHAT ABOUT AIRPORT VEHICLES, FORK LIFTERS ETC.?

Currently, airport ground-vehicles and fork lifters are not considered separately within Germany's emissions inventories, but:

regarding fork lifters (especially within NFR 1.A.4.b ii)...
...NEB line 67 already provides data for LPG and CNG use - which currently is allocated to stationary combustion entirely.

Based upon the revised TREMOD MM model used, a share of this AD will be allocated to mobile sources with the 2015 submission!

regarding airport ground-vehicles (NFR 1.A.4.b ii, too?!?)...
...the needed AD could be derived from the Study

This would result in a revision of the entire diesel oil and gasoline distribution onto the different mobile sources covered by NEB line 67.

(C) AND WHAT ABOUT SEPARATING 2- & 4-STROKE ENGINES?

At the moment, implied EF are applied, including the emissions behaviour of both 2- an 4-stroke engines.

Separation only relevant for

1. UNFCCC: CO_2 from lubricant co-combustion in 2- an 4-stroke engines to be reported in different CRFs

2. More detailed and transparent information & data for national IIR or other requests.

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2. More detailed and transparent information & data for national IIR or other requests.

Based upon the recently revised TREMOD MM model used, separate EF will be implemented in the German reporting data base with the 2015 submission!

Thank you very much for your attention!

Michael Kotzulla
michael.kotzulla@uba.de

http://www.umweltbundesamt.de/themen/luft/emissionen-von-luftschadstoffen/

http://iir.umweltbundesamt.de