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Chère lectrice, Cher lecteur,

Ce que vous avez sous les yeux est une publication dans la nouvelle série méthodologique de l'Institut national de Statistique belge, série intitulée "Statistics Belgium Working Papers". Notre propos est de mettre à la disposition de nos utilisateurs et de quiconque s'occupe de statistique, - qu'il appartienne au monde des affaires ou au milieu universitaire-, des études, des rapports et des documents préparatoires. En outre, nous voulons donner la possibilité aux membres de notre staff, aux statisticiens, aux méthodologistes et à d'autres de faire connaître leurs idées et les résultats de leurs travaux.

Ces articles visent à contribuer au développement des connaissances statistiques et à intensifier l'échange des idées.

Cependant, en tant que *working papers*, ces articles ne reflètent le point de vue officiel ni de l'Institut national de Statistique (INS) ni du gouvernement belge. La responsabilité quant au contenu incombe aux seuls auteurs.

L'INS lance cette initiative dans l'espoir de rehausser le niveau des discussions sur les besoins et les méthodes statistiques, et d'assurer une meilleure diffusion des idées et des résultats.

Pour des raisons de commodité, les articles des *Statistics Belgium Working Papers* seront publiés dans la langue du texte original.

Le staff ainsi que tous les cadres de l'INS, et plus particulièrement les auteurs, attendent avec impatience de recevoir tout commentaire ou toute question concernant les articles publiés.

Bruxelles,
Hans D'Hondt
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Institut national de Statistique

Statistics Belgium
Working Paper n°7

Les dépenses courantes de protection de l'environnement par les industries en Belgique

Current environmental protection expenditure by the Belgian industry
1999

Sommaire

Version francophone

Remerciement

Remerciements

Méthode

Méthode

L'enquête structurelle des entreprises a servi de base à la sous-enquête sur les dépenses environnementales. Elle porte sur une échantillon stratifié de +/- 41455 entreprises sur environ 700 000 entreprises répertoriées en Belgique (y compris les indépendants). Trois questions environnementales ont été posées à +/- 26596 sociétés uniquement. Il s'agit des taxes environnementales, des investissements destinés à lutter contre la pollution (LCP) en fin de cycle ("end of pipe") ou préventivement sous forme de "technologies intégrées". En outre, le détail des investissements par domaine environnemental (air, eau+sols, déchets, bruit) a été demandé à toutes (+/- 3373) les grosses industries et distributeurs d'eau et d'électricité. L'ensemble de l'enquête avait un caractère obligatoire. Les caractéristiques de cette enquête sont détaillées dans NSI-Belgium (2001).

Pour les données de l'année 1999, une annexe supplémentaire *facultative* demandait le total et le détail des dépenses *courantes* environnementales (voir annexe 1). Cette annexe a été envoyée aux industries qui recevaient déjà l'annexe sur le détail des investissements par domaine environnemental. Afin de marquer le caractère facultatif de l'enquête pilote, le questionnaire annexe correspondant figurait sur papier vert.

Il a donc été envoyé à toutes les industries (NACE 1->41) d'au moins 20 personnes ou d'un chiffre d'affaires d'au moins 200 millions de BEF (4,96 millions EUR). Environ 3373 questionnaires ont été envoyés. Parmi ceux qui ont été renvoyés par les entreprises, 3298 (97.8%) ont été retenus pour les calculs après vérifications et rappels téléphoniques. Un coefficient de pondération supérieur à 1 a dû être calculé pour les entreprises de certaines caractéristiques afin de compenser les non-réponses.

Mais l'annexe qui nous intéresse était souvent renvoyée vierge vu son caractère facultatif clairement mentionné.

Les réponses obtenues spontanément pour chaque question sont reprises dans la figure 1. On voit que le taux de réponse pour le total des entreprises identifiées est de 15% et que seulement 7% des entreprises couvertes ont répondu à toutes les questions.

Figure 1: Statistiques descriptives (réponses spontanées)(1000 BEF)

	N	Mean	Std. Deviation	Answer rate
TOTAL PAC current expenditures	504	15066	135470	15%
CE01 air	290	1374	12856	09%
CE02 water	328	4368	43839	10%
CE03 waste	379	9656	102272	11%
CE04 soil	278	2111	29856	08%
CE05 noise	266	100	469	08%
CE09 other	287	4695	47688	09%
Valid N (listwise)	225			07%

La deuxième phase de l'enquête pilote a consisté en le rappel téléphonique et le renvoi éventuel de faxes à:
-toutes les entreprises ayant renvoyé un questionnaire vierge ou barré ;
-toutes les entreprises ayant répondu 0 ;
-toutes les entreprises dont les réponses semblaient étonnantes (au vu de ce qu'on pouvait attendre de la classe d'entreprise – il s'agissait souvent de vérifier les unités utilisées) ;
-quelques entreprises ayant répondu correctement, afin de nous faire une idée des types de dépenses pris en comptes.

Plus de 2500 entreprises ont ainsi été rappelées par téléphone, ce qui correspond généralement à plusieurs coups de fil par entreprise. Le but était de populariser les questions pour une bonne réponse aux futures enquêtes, de percevoir la faisabilité de ces questions et enfin d'améliorer la qualité et la quantité des réponses.

La figure 2 résume les caractéristiques statistiques à la fin de la deuxième phase, telles qu'elles ont servi pour le calcul des résultats. Le taux de réponse est ainsi passé à 46% pour le total, 17% des répondants ayant donné une réponse précise pour tous les domaines environnementaux.

Figure 2: Statistiques descriptives (après relance téléphonique) (1000 BEF)

	N	Mean	Std. Deviation	Answer rate
TOTAL PAC current expenditures	1507	8551	90541	46%
CE01 air	709	1382	19155	21%
CE02 water	933	3390	39074	28%
CE03 waste	1393	4630	56853	22%
CE04 soil	713	285	2050	22%
CE05 noise	629	131	1790	19%
CE09 other	886	2266	28728	27%
Valid N (listwise)	576			17%

Qualité des réponses

Qualité des réponses

L'annexe II reproduit une étude effectuée à mi-parcours de cette enquête. Suivant cette étude (Kestemont, 2001), l'enquête en deux phases permet d'estimer l'erreur de réponse lors de la première phase, donc la clarté du questionnaire. Il en ressort (figure 2 de l'annexe II) que ce sont les domaines « air », « sol », « bruit » et « autres » qui sont le plus sujets à interprétation de la part des répondants. Pour l'air et « autres », certaines entreprises ont tendance à vouloir inclure les dépenses pour les économies d'énergie (en référence au CO_2 notamment). Pour le domaine du bruit, une difficulté peut venir de l'exclusion des dépenses de protection des travailleurs. Par contre les dépenses courantes pour les domaines des eaux usées ou des déchets semblent correspondre à un concept compris de manière uniforme par les entreprises. Pour ce qui est des déchets, cependant, un certain nombre d'entreprises n'avaient pas pensé à ajouter leur cotisation à Fost+ ou Val-i-pac (qui organise le recyclage des déchets en fin de consommation), voire les locations de conteneurs, mais ces montants ne sont généralement pas très importants.

La qualité des réponses corrigées (après enquêtes téléphoniques) peut souffrir d'un effet enquêteur ou de mauvaise foi des répondants. L'effet enquêteur est probablement faible vu que les deux enquêteurs principaux travaillent dans le même bureau et communiquent régulièrement avec le statisticien. Il reste qu'une différence de concept subsiste entre cette enquête et les résultats du travail de la Task-Force d'Eurostat (voir Eurostat, 2001). C'est logique puisque ces deux activités étaient menées en parallèle. Si l'expérience durant l'enquête pouvait apporter des indications à la Task-Force, le contraire n'était pas vrai pour des raisons de cohérence interne de l'enquête. Une différence réside *in fine* dans l'inclusion dans notre enquête des « taxes environnementales » et autres redevances. Dans la mesure où suivant le SEC95, la plus grande partie des redevances pour l'eau et les déchets sont considérés comme des payements et non des taxes, cette différence de concept n'a pas de répercussions importantes. Mais certaines taxes environnementales non affectées, comme les écotaxes fédérales ou des taxes communales forfaitaires ont pu être incluses dans les réponses.

Un effet linguistique est également possible (chaque enquêteur interrogeant, dans sa langue, les correspondants de même langue maternelle) mais probablement négligeable vu la qualité de traduction des documents écrits et l'unicité de culture professionnelle des grosses entreprises et des institutions fédérales (bilinguisme).

De manière générale, on peut considérer que la qualité des réponses est bonne, vu les échanges téléphoniques assidus et la possibilité de ne rien répondre en cas de doute. En cas d'enquête obligatoire, il faudra cependant s'assurer de la qualité des réponses des entreprises les plus récalcitrantes, surtout les premières années.

Un autre type d'erreur concerne le classement des entreprises suivant le code NACE. L'échantillon est extrait du registre des entreprises de l'INS (DBRIS). Ce dernier est constitué et mis à jour sur base des fichiers administratifs (TVA, ONSS, ONSSAPL, etc.). 700000 entreprises sont ainsi répertoriées. Une comparaison automatique des codes d'activité met en évidence les divergences. Celles-ci mènent à un contrôle téléphonique de routine. Les grosses enquêtes identifient également des erreurs de

classement qui sont communiquées à DBRIS. En fin de compte, un code d'activité
« statistique » est donné à chaque entreprise. Il correspond à l'activité réelle de
l'entreprise. L'enquête structurelle des entreprises et Prodcom en particulier
permettent de connaître le pourcentage de chiffre d'affaire de chaque branche
d'activité par l'intermédiaire des codes de produits et d'activités. Les entreprises sont
reclassées, si nécessaire, en fonction de leur activité principale réelle. En pratique, les
grosses entreprises sont finalement les mieux classées, même si leur classement
(monohiérarchique) est le plus flou puisqu'elles ont une plus grande diversité
d'activité.

Malgré ce travail continu, il reste des erreurs de classement. Nos enquêtes
téléphoniques sur l'environnement mènent parfois à découvrir qu'une entreprise est
mal classée parce que n'ayant par exemple aucune activité industrielle. Une dizaine
d'entreprises ont ainsi pu être reclassées. On assiste en effet parfois à une
spécialisation commerciale de certaines entreprises ou filiales. C'est le cas de
nombreuses imprimeries ou d'entreprises distributrices d'énergie. Cependant, ces
corrections n'ont pas été prises en compte dans notre enquête pour des raisons
pratiques. Elles participeront à un meilleur échantillonnage des futures enquêtes de
l'INS.

Enfin, il reste une source d'erreur liée au mode de gestion des grosses entreprises,
surtout dans un petit pays comme la Belgique où la législation économique et
environnementale est fortement régionalisée. L'affectation des investissements et
dépenses répond à une logique comptable, fonctionnelle ou fiscale, de sorte qu'une
dépense n'est pas nécessairement affectée au lieu et à l'unité de production où se
trouve réellement l'activité ou l'équipement correspondant. Cette traçabilité des
dépenses pose également problème à nos correspondants dans les entreprises, qu'il
s'agisse du comptable, du responsable environnemental, du directeur de production,
du chef du personnel, du responsable des achats, du responsable des investissements
etc. Plus l'entreprise est grande, plus le nombre de personnes à interroger est grand, et
plus on court le risque d'estimations dans les réponses à nos questions. Une enquête
rémanente, obligatoire, en phase conceptuelle avec les questionnaires administratifs
ou les habitudes de gestion permet aux entreprises de mettre en place le système
d'information adéquat et de réduire le risque d'erreur de réponse à nos enquêtes. Ceci
suppose une harmonisation des concepts non seulement au niveau statistique mais
également entre administrations et législations de régions et pays différents. C'est le
paradoxe classique de l'information, entre comparabilité et précision (voir Kestemont
et al, 1996).

Corrélations

Corrélations

Les graphes ci-dessous (figure 3) montrent qu'il n'y a pas de relation entre le total des dépenses courantes environnementales d'une entreprise et son chiffre d'affaire, ses dépenses énergétiques ou ses investissements environnementaux. Ceci se confirme lorsqu'on calcule le R^2 pour toute courbe de régression. Autrement dit, toute estimation sur base de ces variables est fortement biaisée, comme on le voit clairement pour la relation avec les dépenses énergétiques (figure 4)[1]. Il est donc nécessaire soit de trouver des méthodes d'approximation plus fines, soit d'obliger un nombre important d'entreprises à calculer le montant de leurs dépenses courantes environnementales. Ces considérations plaident pour une enquête obligatoire et récurrente.

Figure 3 : Relations entre dépenses environnementales courantes, chiffre d'affaire, dépenses énergétiques et investissements environnementaux e-o-p
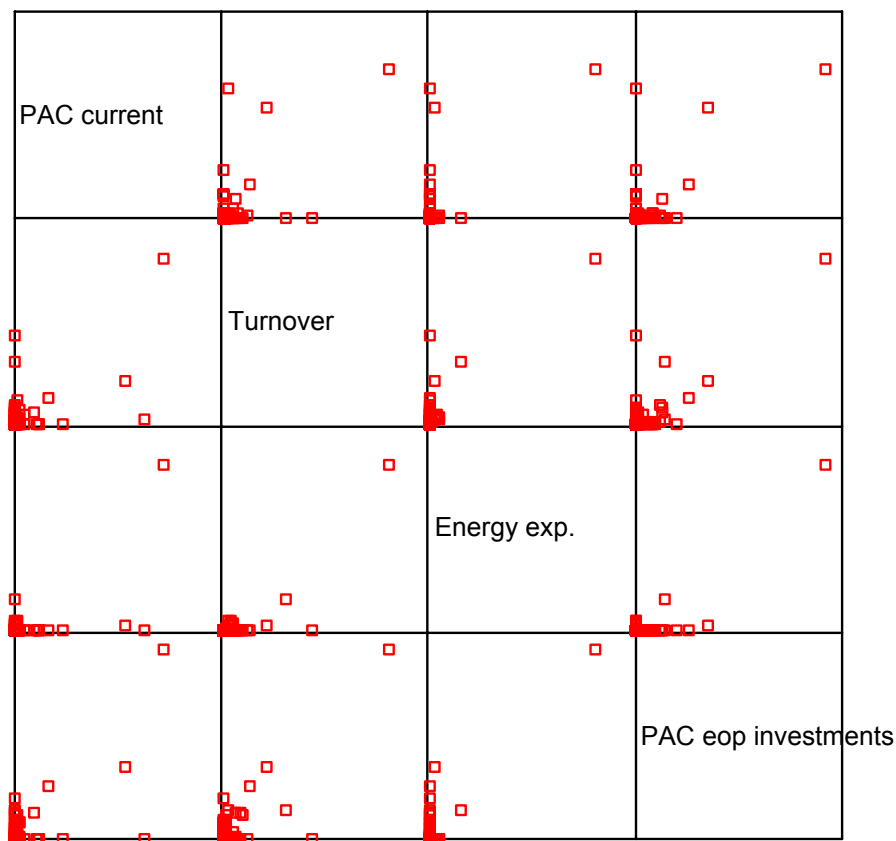
Source : INS

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[1] Il peut y avoir une relation des achats énergétiques avec les investissements End Of Pipe dans l'industrie, mais pas avec les investissements intégrés (voir NSI-Belgium, 2001)

Figure 4 : relation entre dépenses énergétiques et dépenses courantes environnementales (plage des entreprises de moyenne importance)(1000 BEF)
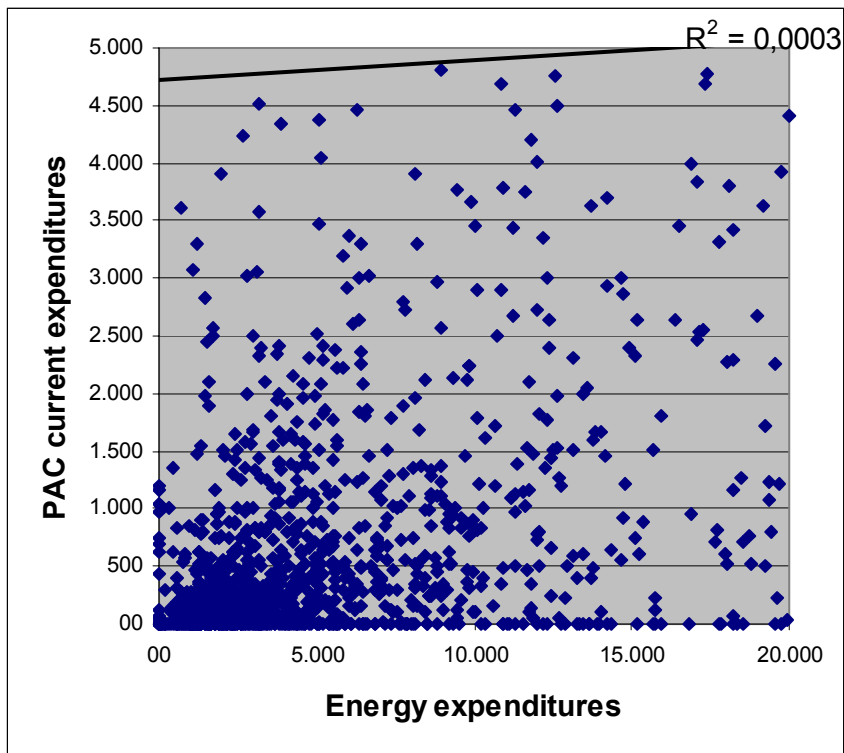
Traitement des non-réponses

Traitement des non-réponses.

Vu ce constat, confirmé par l'inexistence de relation curvilinéaire entre les variables, l'estimation des non-réponses devient problématique, d'autant plus que le taux de non-réponse reste élevé.

La matrice des corrélations avec quelques variables obligatoires disponibles (chiffre d'affaire, dépenses énergétiques, investissements PAC end-of-pipe, taxes totales, taxes environnementales) ne doit pas faire illusion (figure 5). Elle donne des coefficients de corrélation linéaire, or nous avons vu qu'il n'y a pas de relation linéaire. Cependant, faute de mieux, nous avons utilisé cet outil pour sélectionner la variable à partir de laquelle on pourrait utiliser des facteurs par défaut.

Figure 5 Corrélations entre quelques variables

Current PAC		12110 turnover	20110 energy	21110 PAC eop inv	30110 taxes	30130 env. taxes
CE01 air	Pearson Correlation	,519	,431	,663	,316	,558
	N	709	709	709	709	709
CE02 water	Pearson Correlation	,669	,648	,799	,397	,770
	N	933	933	933	933	933
CE03 waste	Pearson Correlation	,253	,229	,265	,128	,238
	N	1393	1393	1393	1393	1393
CE04 soil	Pearson Correlation	,331	,112	,579	,180	,629
	N	713	713	713	713	713
CE05 noise	Pearson Correlation	,346	,133	,676	,758	,473
	N	629	629	629	629	629
CE09 other	Pearson Correlation	,687	,820	,768	,376	,849
	N	886	886	886	886	886

** Correlation is significant at the 0.01 level (2-tailed) for all cells
Source : INS

La variable sur les investissements environnementaux (21110) donne à première vue la meilleure corrélation. Cependant, la grande quantité de valeurs nulles, pour une année donnée, en fait une mauvaise base d'estimations de valeurs individuelles. Cette variable pourrait servir de base, à l'avenir, pour des études de corrélation plus subtiles. Quant à la relation entre les « autres » dépenses courantes et les dépenses énergétiques ou les taxes « environnementales », on peut craindre qu'elle soit due à la prise en compte de l'énergie dans le domaine « autre » de l'environnement, mais ce n'est pas certain.

Facteurs par défaut

Facteurs par défaut

Les facteurs par défaut sont calculés sur base des réponses reçues, au sein de chaque NACE à 2 digits. Ils permettent d'estimer très grossièrement les dépenses courantes environnementales pour les entreprises qui n'ont pas répondu[2]. Ce sont les entreprises où nous n'avons pas réussi à joindre le correspondant compétent, ou celles qui ne voulaient pas répondre cette année vu le caractère non contraignant de la question ou la difficulté d'évaluer ces montants a posteriori (beaucoup ont promis de répondre les années suivantes).
Pour la clarté, ils sont exprimés en valeur de dépense courante par million d'unités de la variable explicative, dans le tableau ci-dessous.

La méthode de calcul est une moyenne pondérée :

$$F_I = \frac{\sum_i C_i}{\sum_i E_i}$$

où F est le facteur par défaut pour la NACE considérée
C_i est la dépense courante environnementale (pour le domaine considéré) déclarée par l'entreprise i.
E_i est la valeur, déclarée par l'entreprise i, de la variable explicative (le chiffre d'affaire 12110).

Les valeurs manquantes de dépenses courantes environnementales pour les entreprises j n'ayant pas répondu sont calculées au sein de chaque NACE par la formule :

$$C_j = F_I * E_j$$

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[2] En fait, La présente estimation ne concerne que les entreprises ayant répondu au questionnaire général mais n'ayant pas répondu aux questions facultatives sur les dépenses courantes. La correction pour non-réponse à l'ensemble du questionnaire, qui ne représente que quelques pourcents, est traitée de manière globale par l'application d'un facteur correctif aux pondérations des entreprises de même caractéristiques.

Figure 6 : Dépense courante environnementale par million de chiffre d'affaire

NACE	Air	N1	Water	N2	Waste	N3	Soil	N4	Noise	N5	Other	N9
14	39	8	813	8	437	12	1	8	0	8	461	9
15	105	98	968	164	1493	221	219	100	28	86	260	140
16	367	2	21	2	231	7	59	2	704	2	68	3
17	40	46	1494	77	1686	109	296	46	11	40	335	72
18	156	12	274	20	1159	42	20	13	0	11	39	13
19			3999	2	3526	3					643	1
20	651	28	105	29	5990	48	67	24	275	24	450	30
21	604	18	732	25	2012	42	86	19	90	19	325	25
22	2	58	1128	70	8881	101	33	59	0	56	83	68
23	16	4	104	4	9152	6	13	4	0	2	43	4
24	2017	65	3308	82	2663	109	302	60	230	50	2809	83
25	100	37	179	43	1707	74	95	39	38	32	168	46
26	364	46	6256	58	1511	68	207	48	57	38	519	48
27	349	22	1056	28	2427	38	171	20	227	20	302	25
28	119	82	409	98	1180	155	78	85	8	78	313	99
29	68	61	63	70	567	113	49	65	21	60	208	70
30	0	3	14	4	497	7	0	3	0	3	55	4
31	109	27	56	33	754	42	149	30	37	23	262	29
32	91	9	358	11	591	19	53	9	0	8	4	8
33	0	8	457	12	1335	18	122	9	0	8	237	9
34	24	12	112	17	870	35	67	14	9	11	219	20
35	67	8	458	12	1293	16	94	7	28	7	437	8
36	2013	32	891	40	1062	76	93	28	1	21	258	45
37	581	8	656	10	10268	15	159	9	539	8	480	11
40	418	10	1516	10	948	12	0	8	0	9	1455	12
41	0	5	104	4	1735	5	0	4	0	5	40906	4

Source : INS

Légende : Les facteurs sont exprimés en unité monétaire de dépense environnementale par million d'unité
monétaire de la variable explicative (le chiffre d'affaire correspondant à la variable 12110 de l'enquête structurelle).
N1, N2, N3, N4, N5, N9 représentent le nombre d'entreprises sur base desquelles ces facteurs ont été calculés.

Résultats

Résultats

Les résultats des estimations suivant les agrégations de secteurs de l'Enquête structurelle (figure 7) montrent que les dépenses courantes environnementales concernent des domaines variés suivant les secteurs. Elles sont les plus élevées dans le secteur chimique et celui du raffinage, industries importantes en Belgique. Alors que les déchets représentent plus de 98% dans le secteur du raffinage, le traitement des eaux usées représente 70% des dépenses courantes environnementales pour le secteur des minéraux non métalliques (Figure 8). Le domaines de la protection des sols et du bruit sont négligeables, tandis que le domaine de l'air est peu important.

Figure 7 : Dépenses courantes pour la protection de l'environnement dans les industries de plus de 20 travailleurs ou d'un chiffre d'affaire de plus de 4,96 millions EUR. Belgique, estimations (1000 EUR).

Secteur	Total	Air	Eau	Déchets	Sols	Bruit	Autres
Mines, carrières (C)	875	20	406	218	1	0	230
Aliments, boissons (DA)	70704	2935	21561	33570	4964	1767	5907
Textile, habillement, chaussures (DB+DC)	27773	477	10426	12788	1783	67	2232
Bois (DD)	11958	1033	167	9500	106	437	715
Papier, carton, imprimerie (DE)	55004	2222	7226	43246	449	333	1528
Cokéfaction, raffinage, nucléaire (DF)	93421	163	1039	91662	129	0	428
Chimie, caoutchouc, plastique (DG+DH)	296855	50916	83633	77071	8137	5980	71118
Minéraux non métalliques (DI)	49597	2013	34882	8357	1144	313	2888
Métallurgie (27)	49970	3850	11645	26764	1882	2498	3331
Métaux (28)	11723	662	2271	6568	436	45	1741
Machines et équipements (DK+DL+DM+DN)	63815	7475	7851	36692	2866	850	8081
Electricité, gaz (40)	88910	8577	31076	19426	0	0	29831
Eau (41)	41006	0	99	1665	0	0	39242

Source : INS

Figure 8 : Répartition par domaine de dépenses courantes pour la protection de l'environnement dans les industries de plus de 20 travailleurs ou d'un chiffre d'affaire de plus de 4,96 millions EUR. Belgique, estimations (%).

Secteur	Total	Air	Water	Waste	Soil	Noise	Other
Mines, carrières (C)	100%	2%	46%	25%	0%	0%	26%
Aliments, boissons (DA)	100%	4%	30%	47%	7%	2%	8%
Textile, habillement, chaussures (DB+DC)	100%	2%	38%	46%	6%	0%	8%
Bois (DD)	100%	9%	1%	79%	1%	4%	6%
Papier, carton, imprimerie (DE)	100%	4%	13%	79%	1%	1%	3%
Cokéfaction, raffinage, nucléaire (DF)	100%	0%	1%	98%	0%	0%	0%
Chimie, caoutchouc, plastique (DG+DH)	100%	17%	28%	26%	3%	2%	24%
Minéraux non métalliques (DI)	100%	4%	70%	17%	2%	1%	6%
Métallurgie (27)	100%	8%	23%	54%	4%	5%	7%
Métaux (28)	100%	6%	19%	56%	4%	0%	15%
Machines et équipements (DK+DL+DM+DN)	100%	12%	12%	57%	4%	1%	13%
Electricité, gaz (40)	100%	10%	35%	22%	0%	0%	34%
Eau (41)	100%	0%	0%	4%	0%	0%	96%

Source : INS

Le détail par NACE-2 digits (figure 9) montre que les dépenses courantes sont en moyenne plus élevées que les investissements en matière de protection de l'environnement, mais qu'il n'y a pas de relation systématique entre ces deux types de dépenses. Le détail par NACE-3 digits figure en annexe III, mais ces résultats sont à considérer avec prudence vu la méthode d'estimation des données manquantes.

Figure 9 : Dépenses pour la protection de l'environnement et autres caractéristiques des industries de plus de 20 travailleurs ou d'un chiffre d'affaire de plus de 4,96 millions EUR. Belgique, estimations (1000 EUR).

NACE	Turnover	Energy	21110	21120	21140	Air	Water	Waste	Soil	Noise	Other
14	499612	22736	0	192	875	20	406	218	1	0	230
15	22262497	316952	16819	4465	68360	2343	21526	33197	4869	629	5796
16	1615919	3537	87	191	2345	593	35	373	95	1138	111
17	5922235	128460	3915	587	22863	239	8833	9989	1751	67	1984
18	1527021	5735	0	0	2511	238	419	1763	31	0	60
19	293502	2519	0	130			1174	1035			189
20	1587048	38135	784	620	11958	1033	167	9500	106	437	715
21	3669059	124372	1155	3792	14122	2214	2685	7383	315	332	1193
22	4033143	32551	413	2445	40882	8	4541	35862	135	1	335
23	10015484	352426	4178	10647	93421	163	1039	91662	129	0	428
24	24958759	774569	27987	44477	282466	50285	82510	66326	7542	5740	70063
25	6289143	103403	4779	5031	14389	630	1124	10745	595	240	1055
26	5529436	242683	5419	6192	49597	2013	34882	8357	1144	313	2888
27	11027294	469220	16017	23854	49970	3850	11645	26764	1882	2498	3331
28	5572192	84794	2896	1729	11723	662	2271	6568	436	45	1741
29	7595215	53232	868	1443	7418	513	477	4310	375	162	1581
30	142579	639	5	0	81	0	2	71	0	0	8
31	3906321	29316	4108	4177	5346	424	220	2951	583	145	1023
32	3907823	19235	138	110	4290	354	1399	2315	206	0	16
33	982584	6288	0	0	2088	0	443	1297	118	0	230
34	16253131	73379	2311	11535	21144	392	1825	14147	1087	139	3554
35	1534265	11111	0	486	3646	103	702	1983	145	43	670
36	2634749	23593	651	715	11378	5303	2348	2799	246	3	679
37	664184	9968	404	658	8425	386	436	6820	106	358	319
40	20497297	9072791	13202	53886	88910	8577	31076	19426	0	0	29831
41	959309	24945	78	3215	41006	0	99	1665	0	0	39242

Source : INS

Légende :

21110 = Investissements (« end-of-pipe ») destinés à luter contre la pollution.

21120 = Investissements destinés à prévenir la pollution (technologies intégrées plus propres)

21140 = Dépenses courantes totales pour le protection de l'environnement

Les codes NACE de la première colonne correspondent aux activités économiques de la NACE-rev1 pour les regroupements industriels C à E (voir : http://statbel.fgov.be/figures/d01_fr.asp?s=toc)
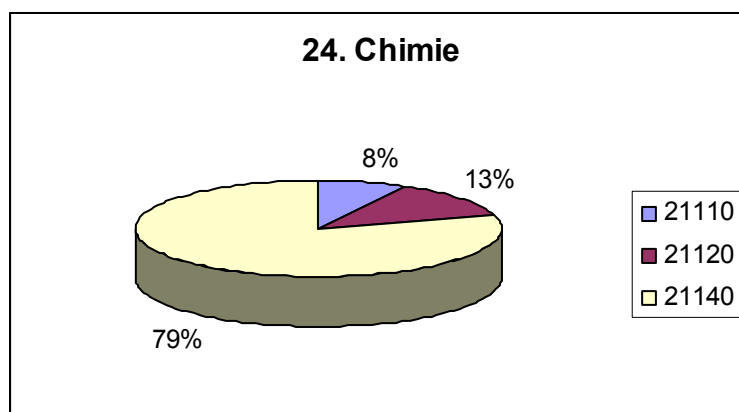
Figure 10 : Dépenses pour la protection de l'environnement et autres caractéristiques des industries de plus de 20 travailleurs ou d'un chiffre d'affaire de plus de 4,96 millions EUR. Belgique, estimations (1000 EUR et %).

NACE	Turnover	21110	21120	21140	Total PAC	21110%	21120%	21140%	PAC/ turnover
14	499612	0	192	875	1067	0%	18%	82%	0,2%
15	22262497	16819	4465	68360	89644	19%	5%	76%	0,4%
16	1615919	87	191	2345	2623	3%	7%	89%	0,2%
17	5922235	3915	587	22863	27365	14%	2%	84%	0,5%
18	1527021	0	0	2511	2511	0%	0%	100%	0,2%
19	293502	0	130			0%	100%	0%	0,0%
20	1587048	784	620	11958	13362	6%	5%	89%	0,8%
21	3669059	1155	3792	14122	19069	6%	20%	74%	0,5%
22	4033143	413	2445	40882	43740	1%	6%	93%	1,1%
23	10015484	4178	10647	93421	108246	4%	10%	86%	1,1%
24	24958759	27987	44477	282466	354930	8%	13%	80%	1,4%
25	6289143	4779	5031	14389	24199	20%	21%	59%	0,4%
26	5529436	5419	6192	49597	61208	9%	10%	81%	1,1%
27	11027294	16017	23854	49970	89841	18%	27%	56%	0,8%
28	5572192	2896	1729	11723	16348	18%	11%	72%	0,3%
29	7595215	868	1443	7418	9729	9%	15%	76%	0,1%
30	142579	5	0	81	86	5%	0%	95%	0,1%
31	3906321	4108	4177	5346	13631	30%	31%	39%	0,3%
32	3907823	138	110	4290	4538	3%	2%	95%	0,1%
33	982584	0	0	2088	2088	0%	0%	100%	0,2%
34	16253131	2311	11535	21144	34990	7%	33%	60%	0,2%
35	1534265	0	486	3646	4132	0%	12%	88%	0,3%
36	2634749	651	715	11378	12744	5%	6%	89%	0,5%
37	664184	404	658	8425	9487	4%	7%	89%	1,4%
40	20497297	13202	53886	88910	155998	8%	35%	57%	0,8%
41	959309	78	3215	41006	44299	0%	7%	93%	4,6%

Source : INS

Légende : voir tableau 9. Total PAC = dépenses totales pour la protection de l'environnement.

Figure 11. Part des différents types de dépenses environnementales dans quelques secteurs

Source : INS

15. Alimentation

- 21110
- 21120
- 21140

Source : INS

34. Construction automobile

- 21110
- 21120
- 21140

Source : INS

40. Energie

- 21110
- 21120
- 21140
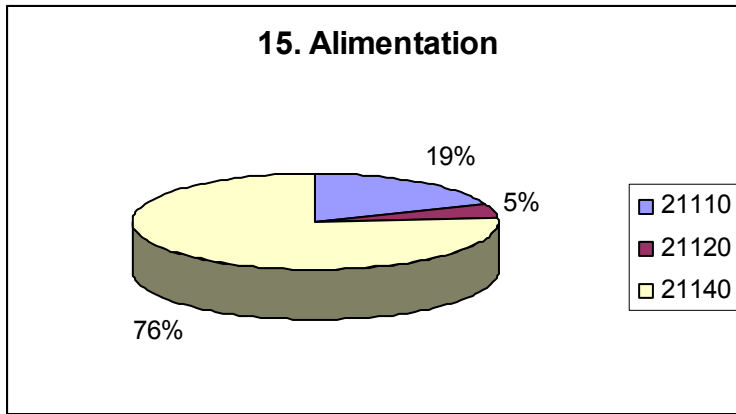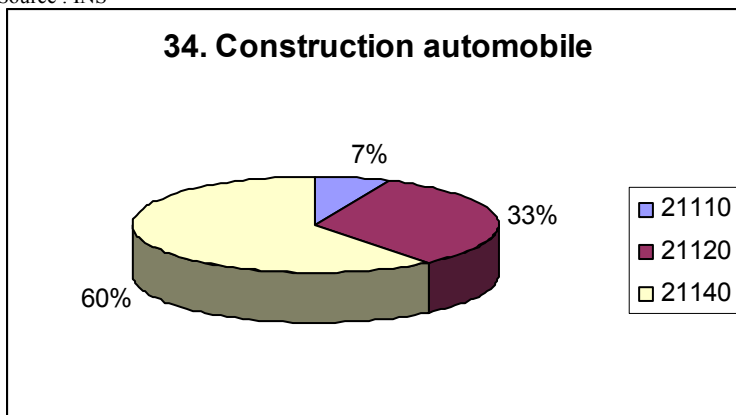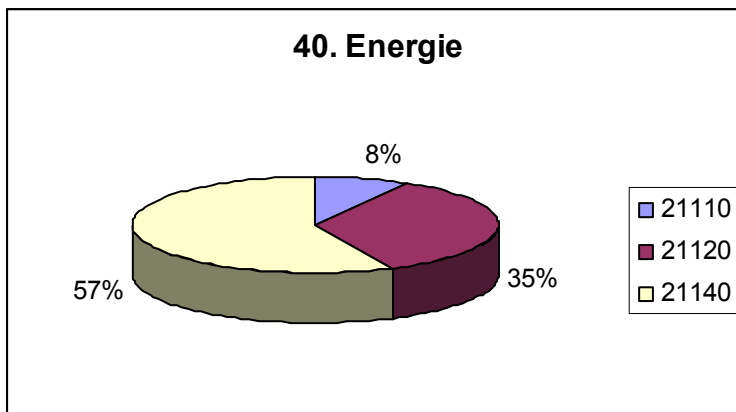
Source : INS

Figure 12 Dépenses courantes environnementales par domaine pour quelques secteurs

15. Alimentation

- Air
- Water
- Waste
- Soil
- Noise
- Other

24. Chimie

■	Air
■	Water
□	Waste
□	Soil
■	Noise
■	Other

18%
25%
29%
2%
3%
23%

Source : INS

34. Construction automobile

■	Air
■	Water
□	Waste
□	Soil
■	Noise
■	Other

1%
17%
2%
9%
5%
66%

Source : INS

40. Energie

■	Air
■	Water
□	Waste
□	Soil
■	Noise
■	Other

10%
34%
34%
0%
0%
22%
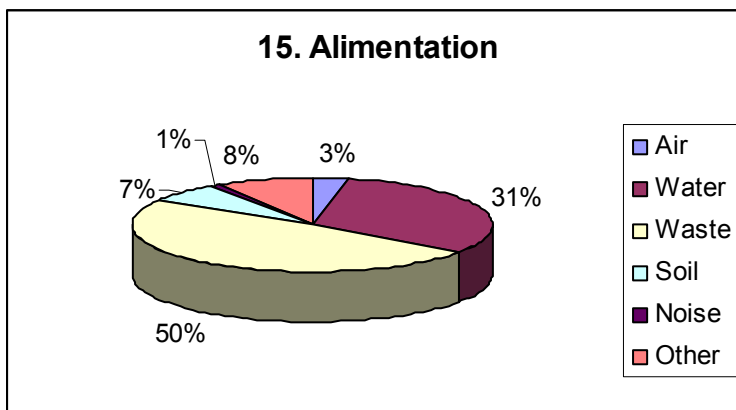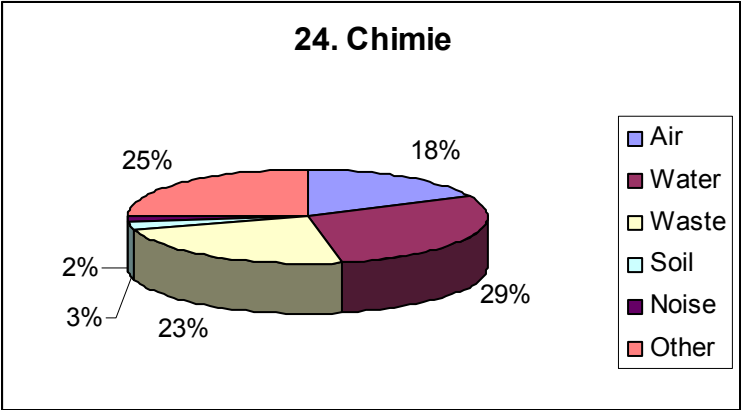
Source : INS

Comparaison avec d'autres enquêtes

Comparaison avec d'autres enquêtes.

La répartition entre domaines environnementaux et les résultats publiés par la fédération des entreprises chimiques (Fedichem, 1997) montre que les données sont comparables. Les chiffres de Fedichem semblent indiquer que le domaine « autre » inclut, également dans la réponse à notre enquête, la taxe sur la force motrice, considérée dans ce secteur comme relevant de l'environnement.

Il est fort possible qu'une contagion culturelle existe au sein des entreprises habituées à des enquêtes sur cette question. Un certain temps de mise à niveau des concepts sera nécessaire pour éviter des biais entre secteurs, notamment en ce qui concerne la perception de ce qui appartient à l'environnement ou non. Tout ce qui touche à l'énergie devrait susciter une attention particulière. Il pourrait être utile de demander explicitement les montants relatifs aux économies d'énergie pour éviter que ceux-ci ne soient inclus dans d'autres rubriques (« air » ou « autres » notamment).
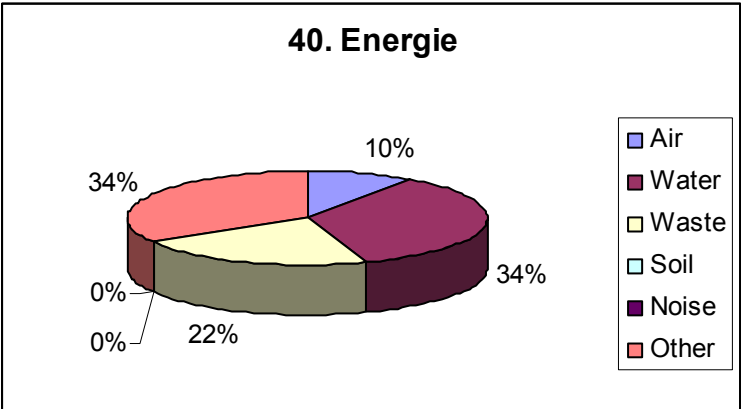
La fédération des entreprises alimentaires effectue également des enquêtes sur les dépenses environnementales (Fevia, 1999). Les extrapolations à l'ensemble du secteur y sont effectuées sur base des 87 entreprises ayant répondu au questionnaire et qui représentent 34% du chiffre d'affaire du secteur[3]. Ses résultats couvrent l'ensemble du secteur (sans seuil de taille d'entreprise) et leur présentation ne facilite pas la comparaison avec nos chiffres. En reconstituant des définitions comparables aux nôtres à partir de leurs chiffres plus détaillés, on arrive à des ordres de grandeur comparables mais des différences de proportions des domaines environnementaux (figure 11). La comparaison des résultats suggère que sous notre rubrique « autres », les entreprises aient pu inclure la taxe sur la force motrice, qui fait explicitement partie de l'environnement dans l'enquête de la fédération. Ici aussi, une «contagion culturelle » entre enquêtes différentes a probablement joué. On remarquera la distinction intéressante que fait la FEVIA entre les différentes types de dépenses liées aux déchets (frais de fonctionnement déchets, frais de fonctionnement emballages, élimination des déchets, cotisation aux organismes de collecte sélective et de recyclage, taxes et redevances sur les déchets).

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[3] Dans notre enquête, seules les moyennes et les grandes entreprises sont considérées. Notre résultat doit donc être plus petit que celui de l'enquête de la Fevia. Le nombre d'entreprises ayant répondu varie entre 88 et 228 suivant les questions.

Figure 11 : Dépenses courantes environnementales des industries alimentaires

Source des données :	D'après FEVIA	D'après FEVIA	D'après FEVIA	INS	INS
Couverture	Tout le secteur	Tout le secteur	Tout le secteur	>20 travailleurs ou >5mio EUR	
	1000 EUR	% sans force motrice	% avec force motrice	1000 EUR	%
	1998	1998	1998	1999	1999
Fonctionnement, déchets	10957	9%			
Fonctionnement, air	2256	2%			
Fonctionnement, eau	45761	39%			
Fonctionnement, emballages	3223	3%			
Fonctionnement, autres	2256	2%			
Elimination déchets	13138	11%			
Cotisations déchets	23054	20%			
Taxes déchets	2975	3%			
Taxes eau	11899	10%			
Taxe sol	744	1%			
Taxe eau de surface	1239	1%			
Taxe force motrice	7437				
Taxe autres	496	0%			
Total	**125434**		**100%**	**70705**	
Total sans "force motrice"	**117997**	**100%**			
Air	2256	2%	2%	2936	4%
Eau	58900	50%	47%	21561	30%
Déchets	53347	45%	43%	33570	47%
Sol	744	1%	1%	4964	7%
Bruit				1767	2%
Autres	10189		8%	5907	8%
Autres sans « force motrice »	2752	2%			

Source : INS

Conclusion

Conclusion

L'enquête pilote a servi plusieurs objectifs. Elle a permis de tester auprès des entreprises la compréhension et la faisabilité des questions sur les dépenses courantes environnementales. Elle a également familiarisé les entreprises avec les définitions standardisées émergeant progressivement au niveau international.

Il ressort de tests de corrélation que les variables considérées ne peuvent pas être déduites d'autres variables statistiques courantes. La question sur les dépenses courantes environnementales 21140 devrait donc faire partie du Règlement sur la Structure des Entreprises.

Sur le plan méthodologique, il est nécessaire d'interroger un grand nombre d'entreprises, car les situations sont fort différentes de l'une à l'autre. Le caractère facultatif de l'enquête engendre des coûts importants pour l'INS. Même après un nombre de contacts téléphoniques important, beaucoup d'entreprises ne répondent pas à cause du travail que cela peut demander. Les dépenses courantes sont en effet plus difficile à évaluer que par exemple les investissements, car les montants sont répartis entre plusieurs petites factures difficiles à identifier. Une enquête répétée et obligatoire aurait pour effets une diminution importante des coûts d'enquête, une mise à disposition plus rapide des résultats et l'adaptation structurelle du système d'information des entreprises. Cependant, comme on risque une réponse de moins bonne qualité de la part des entreprises récalcitrantes, il est important que le système de définitions choisi corresponde le plus possible à un optimum « culturel » et que les services administratifs s'en inspirent également lors de leurs exigences auprès des entreprises. Les échanges entre statisticiens et administrations, notamment au niveau de la Commission, sont importants en amont des systèmes d'informations.

Pour les enquêtes futures, nous devrons améliorer notre questionnaire afin d'attirer clairement l'attention sur le traitement de certains postes spécifiques comme le domaine des économies d'énergie, la taxe sur la force motrice etc. Dans un but pédagogique, il serait probablement bon de lister explicitement les postes typiques importants qui doivent être inclus ou exclus des réponses, en adaptant éventuellement cette liste ou les questionnaires aux secteurs économiques. L'expérience montre que quelques exemples concrets ajoutés entre parenthèse après la question peuvent améliorer la qualité des réponses, alors que les notes de bas de page plus théoriques ont moins d'impact. Par exemple pour les déchets, on pourrait mentionner pour les industries concernées les frais de fonctionnement pour les déchets et les récupérations d'emballages, l'élimination des déchets, la cotisation Fost+ et Val-i-Pac, et les redevances. Pour « autres », il faudrait également expliciter ce qui est inclus et ce qui est exclu (comme l'énergie, la taxe sur la force motrice, les taxes non affectées…).

Cette étude s'est limitée aux premiers résultats et aux questions méthodologiques. Il est maintenant possible d'analyser ces résultats plus en détail. On pourrait par exemple les présenter par classe de taille au-delà du seuil considéré. Pour obtenir une estimation des dépenses environnementales courantes pour l'ensemble des entreprises, il serait sans doute nécessaire de procéder à un échantillon auprès des plus petites entreprises. Mais une telle approche poserait certainement de nouvelles questions.

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Bibliographie

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Version anglophone

Word of thanks

Method

Method

The structural business survey served as the basis for the sub-survey on environmental expenditure. It concerns a stratified sample of +/- 41455 companies from about 700 000 registered companies in Belgium (including self-employed persons). Three environmental questions were only asked to +/- 26596 firms. They concerned environmental taxes, investments destined to abate end of pipe pollution and preventive investments in the form of "integrated technologies". Furthermore, details on investments per environmental domain (air, water + soil, waste, noise) were asked to all (+/- 3373) the large industries and distributors of water and electricity. The whole of the survey was obligatory. The characteristics of this survey are described in detail in NSI-Belgium (2001).

For the data of 1999 a *facultative* supplementary annex asked for the total and the details of *current* environmental expenditures (see annex 1). This annex was sent to the industries that already received the annex on the details of the investments per environmental domain. Finally, to indicate the facultative character of the pilot survey the corresponding enclosed questionnaire was printed on green paper.

It was sent to all the industries (NACE 1->41) that employ at least 20 persons or have a turnover of at least 200 billion BEF (4,96 billion EUR). About 3373 questionnaires were sent. 3298 (97.8%) of those that were sent back by the companies were retained for the calculations after the verifications and telephone reminders. It was necessary to calculate a weighting coefficient higher than 1 for companies that have certain characteristics to compensate non-responses.

However the annex that interests us was often sent back empty because of its facultative character that was clearly mentioned.

The answers that were received spontaneously for each question are given in figure 1. It shows that the answer rate for the total of the identified companies is 15% and that only 7% of the companies covered have answered to all the questions.

Figure 1: Descriptive statistics (spontaneous answers) (1000 BEF)

	N	Mean	Std. Deviation	Answer rate
TOTAL PAC current expenditures	504	15066	135470	15%
CE01 air	290	1374	12856	09%
CE02 water	328	4368	43839	10%
CE03 waste	379	9656	102272	11%
CE04 soil	278	2111	29856	08%
CE05 noise	266	100	469	08%
CE09 other	287	4695	47688	09%
Valid N (listwise)	225			07%

The second phase of the pilot survey consisted in reminders by telephone or, if necessary, by fax to:
-all the companies that had sent back an empty or crossed out questionnaire;
-all the companies that had answered 0;
-all the companies that had given somehow surprising answers (in view of what could be expected of the company class – often it concerned controlling the units used);
-some companies that had answered correctly, to get an idea of the types of expenditure that had been taken into account.

More than 2500 companies have been contacted by telephone. In general, this corresponded with several telephone calls per company. The purpose was to make the questions more clear in order to receive good answers to future surveys, to examine the feasibility of these questions and, finally, to improve the quality and the quantity of the answers.

Figure 2 shows the statistical characteristics at the end of the second phase, as far as they have been used to calculate the results. This way the answer rate amounted to 46% for the total, as 17% of the respondents had given a precise answer for all the environmental domains.

Figure 2: Descriptive statistics (after renewed telephone contact) (1000 BEF)

	N	Mean	Std. Deviation	Answer rate
TOTAL PAC current expenditures	1507	8551	90541	46%
CE01 air	709	1382	19155	21%
CE02 water	933	3390	39074	28%
CE03 waste	1393	4630	56853	22%
CE04 soil	713	285	2050	22%
CE05 noise	629	131	1790	19%
CE09 other	886	2266	28728	27%
Valid N (listwise)	576			17%

Quality of the answers

Quality of the answers

Annex II describes a study that was carried out halfway through this survey. According to this study (Kestemont, 2001), by using the two phases survey the answer error can be estimated during the first phase, hence the clearness of the questionnaire. It appears (figure 2 of annex II) that the domains "air", "soil", "noise" and "other" are most subject to interpretation by the respondents. Certain companies tend to include the expenditures for energy saving (especially when referring to CO2) for air and "other". For the domain noise, the exclusion of expenditures for employee protection may pose a problem. On the other hand, current expenditures for the domains waste water and waste seem to be a generally known concept for the companies. For the domain waste though, a certain number of companies forgot to add their contribution to Fost+ or Val-i-pac (which organise the recycling of waste at the end of the consumption line), and even the location of containers, but in general these amounts are not very large.

The quality of the corrected answers (after telephone surveys) may be suffering from interviewer effect or the dishonesty of respondents. The pollster effect is probably weak as the two main pollsters work in the same office and regularly communicate with the statistician. A difference of concept remains between this survey and the working results of the Task-Force of Eurostat (see Eurostat, 2001). This is logical because these two activities have been carried out simultaneously. Although the experience during the survey could offer directions to the Task Force, the opposite was not the case because of the internal coherence of the survey. Finally, a difference resides in the inclusion in our survey of « environmental taxes » and other taxes. As far as according to SEC95, the largest part of taxes for water and waste are considered as payments and not as taxes, this difference has no important repercussions. However certain non-attributed environmental taxes, such as the federal eco-taxes or fixed municipal taxes could be included in the answers.

A linguistic effect is also possible (because each pollster interviews the correspondents of the same mother tongue in his own language) but this is probably negligible because of the quality of the translation of the written documents and the unity of the professional culture of large companies and federal institutions (bilingualism).

In general, we can say that the quality of the answers is good, because of the unremitting telephone exchange and the possibility to omit answering when in doubt. For obligatory surveys though, it is important to verify the quality of the answers of the most reluctant companies, especially the first years.

The classification of companies in accordance with the NACE code is another type of error. The sample is extracted from the register of companies of Statistics Belgium (DBRIS). It is made up and actualised on the basis of administrative documents (VAT, ONSS l'Office national de Sécurité sociale, ONSSAPL l'Office national de sécurité sociale des administrations provinciales et locales, etc.). 700000 companies are listed. An automatic comparison of the activity codes brings out the divergences, which lead to a routine telephone control. Large surveys also indicate classification errors that are communicated to DBRIS. Finally a "statistical" activity code is given

to each company. This code corresponds with the actual activity of the company. By means of the codes of products and activities the structural business survey and in particular Prodcom make it possible to know the percentage of turnover of each activity branch. If necessary, the companies are reclassified according to their principal actual activity. In practice, the largest companies are ultimately best classified even if their classification (mono-hierarchic) is the most vague because their activities are much more diversified.

Despite this continuous work there remain errors in the classification. Our environmental surveys by telephone sometimes indicate that a company is not misclassified because, for instance, it lacks an industrial activity. About ten companies could be reclassified this way. Sometimes a commercial specialisation of certain companies or subsidiaries is observed. This is the case for numerous printing offices or energy supplying companies. However, these corrections have not been taken into account in our survey for practical reasons. They will improve the samples for future surveys of Statistics Belgium.

Finally, there is one source of errors that is linked with the kind of management of the large companies, especially in a small country like Belgium where the economic and environmental legislation is heavily regionalized. The attribution of the investments and expenditure responds to an accountable, logical, functional or fiscal logic. Therefore, expenditure is not necessarily attributed to the place or the production unit where the actual activity or the corresponding equipment is situated. This traceability of expenditure also poses problems for our correspondents in the companies, whether it concerns an accountant, a person responsible for environmental issues, a production director, a personnel manager, a person responsible for purchase, a person responsible for investments, etc. The larger the company, the more people have to be interviewed and the higher the risk of estimations in the answers to our questions. A permanent, obligatory survey that is conceptually in phase with the administrative questionnaires or the managing habits gives companies the possibility to develop an adequate information system and to reduce the risk of answer errors to our surveys. This would require a harmonisation of concepts not only on a statistical level but also between administrations and legislations of regions and different countries. It is the classic paradox of the information, between comparability and precision (see Kestemont et al, 1996).

Correlations

Correlations

The following graphs (figure 3) show that there is no relation between the total of the current environmental expenditures of a company and its turnover, its energy expenditure or its environmental investments. It is confirmed when the R^2 is calculated for the whole regression curb. In other words, estimation on the basis of these variables is always heavily biased, as is clearly shown for the relation between the energy expenditures (figure 4)[1]. It is thus necessary either to develop more detailed approximation methods, or to compel an important number of companies to calculate the amount of their current environmental expenditure. These considerations are in favour for an obligatory and recurrent survey.

Figure 3: Relations between current environmental expenditures, turnover, energy expenditures and e-o-p environmental investments

Figure 3: Relations between current environmental expenditures, turnover, energy expenditures and e-o-p environmental investments

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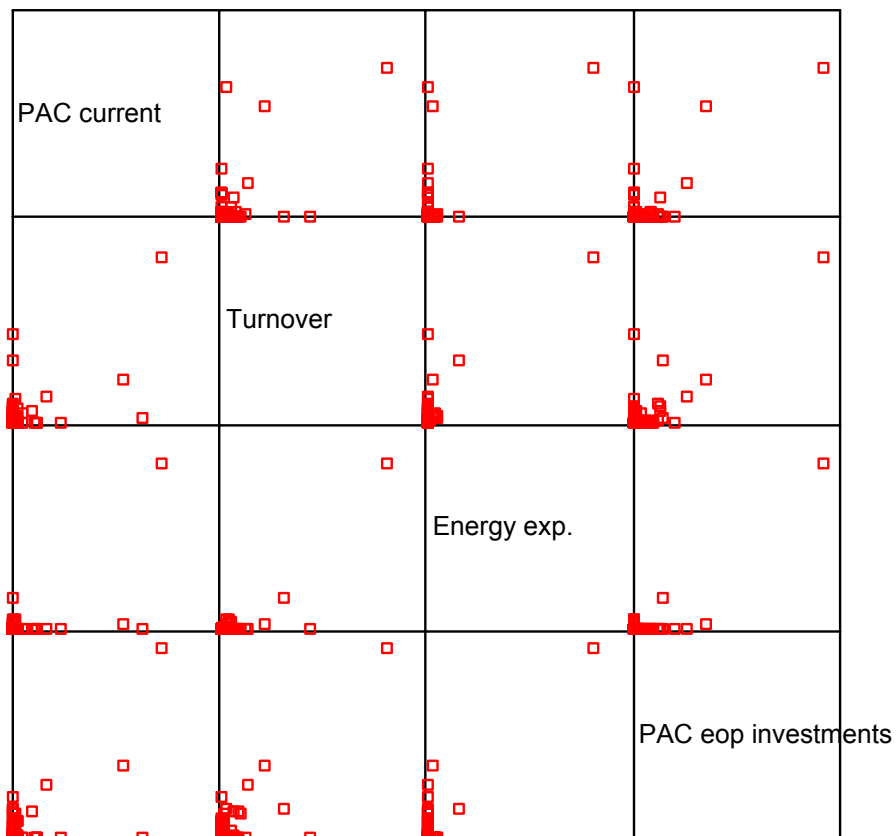
[1] There can be a relation between energy purchases and End Of Pipe investments in industry, but not between energy purchases and integrated investments (see Statistics Belgium, 2001)

Figure 4: relation between energy expenditures and current environmental expenditures (margin of companies of average importance)(1000 BEF)
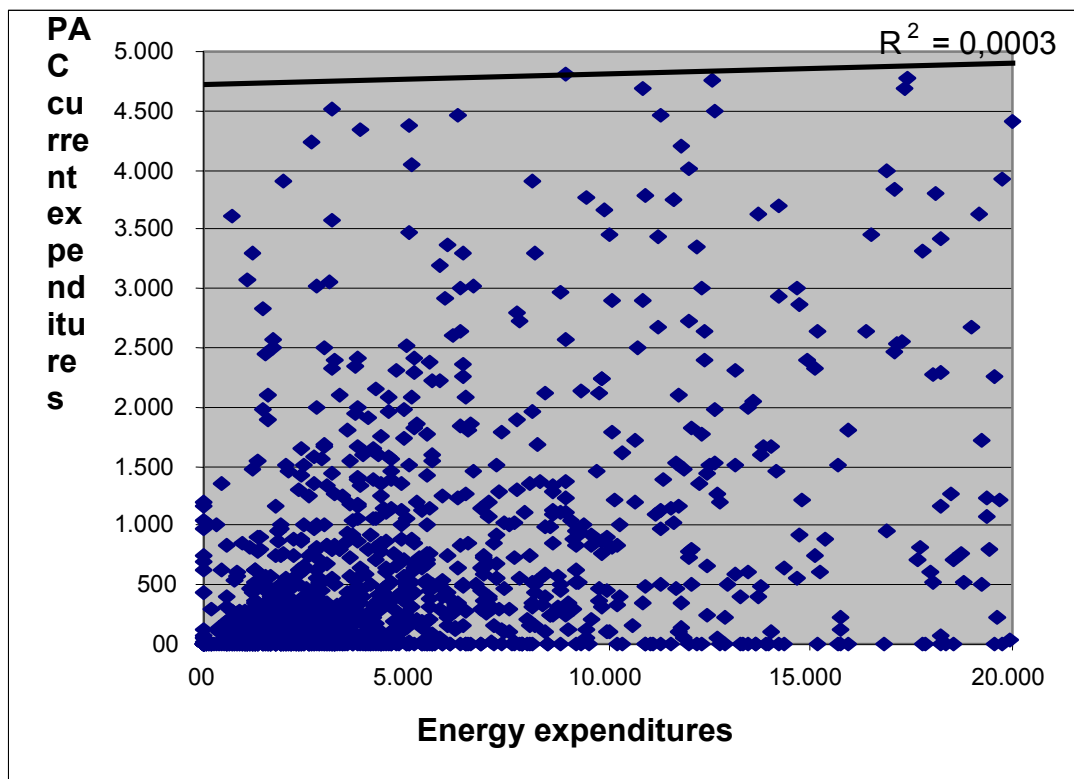
Processing of non-response

Processing of non-response.

In view of these findings, which are confirmed by the inexistence of a curvilinear relation between the variables, the estimation of non-responses becomes problematic, even more so because the non-response rate remains high.

The matrix of correlations between some available obligatory variables (turnover, energy expenditures, PAC end-of-pipe investments, total of taxes, environmental taxes) should not raise false hopes (figure 5). It shows linear correlation coefficients, while we have seen that no linear relation exists. However, for want of anything better, we have used this instrument to select a variable as a starting point to use default factors.

Figure 5 Correlations between a number of variables

Current PAC		12110 Turnover	20110 Energy	21110 PAC eop inv	30110 Taxes	30130 Env. taxes
CE01 air	Pearson Correlation	,519	,431	,663	,316	,558
	N	709	709	709	709	709
CE02 water	Pearson Correlation	,669	,648	,799	,397	,770
	N	933	933	933	933	933
CE03 waste	Pearson Correlation	,253	,229	,265	,128	,238
	N	1393	1393	1393	1393	1393
CE04 soil	Pearson Correlation	,331	,112	,579	,180	,629
	N	713	713	713	713	713
CE05 noise	Pearson Correlation	,346	,133	,676	,758	,473
	N	629	629	629	629	629
CE09 other	Pearson Correlation	,687	,820	,768	,376	,849
	N	886	886	886	886	886

** Correlation is significant at the 0.01th level (2-tailed) for all cells

The variable on environmental investments (21110) gives a first perception of the best correlation. However, the large quantity of zero values, for a given year, makes it a bad basis for estimations of individual values. In the future, this variable can serve as a basis for more subtle correlation studies. The fact that energy was taken into account in the domain "other" of environment could be the cause of the correlation between "other" current expenditures and energy expenditures or "environmental" taxes, but this is not certain.

Default factors

Default factors

In each NACE default factors are calculated with 2 digits on the basis of the received answers. They make a very rough estimate possible of current environmental expenditures for companies who did not answer[2]. These are companies where we could not reach the correspondent in charge, or which did not want to answer this year because of the non compulsory character of the question or the difficulty to evaluate these amounts a posteriori (many companies have promised to answer in the years to come).
To be perfectly clear, they are expressed in terms of the value of the current expenditure per million units of the explicative variable in the following table.

The calculation method is a weighted average:

$$F_I = \frac{\sum_i C_i}{\sum_i E_i}$$

with F the default factor for the considered NACE
C_i the current environmental expenditure (for the considered domain) declared by company i
E_i the value that is declared by company i for the explicative variable (turnover 12110).

In each NACE, values that lack current environmental expenditures for companies j because they did not answer, are calculated by the formula:

$$C_j = F_I * E_j$$

---

[2] In fact, the present estimation only concerns companies that have answered to the general questionnaire but not to the facultative questions about current expenditures. The correction for non-response to the whole of the questionnaire, which represents only a few percent, is treated in a global way by applying a correcting factor to the weighing of companies with the same characteristics.

Figure 6: Current environmental expenditure per million turnover

NACE	Air	N1	Water	N2	Waste	N3	Soil	N4	Noise	N5	Other	N9
14	39	8	813	8	437	12	1	8	0	8	461	9
15	105	98	968	164	1493	221	219	100	28	86	260	140
16	367	2	21	2	231	7	59	2	704	2	68	3
17	40	46	1494	77	1686	109	296	46	11	40	335	72
18	156	12	274	20	1159	42	20	13	0	11	39	13
19			3999	2	3526	3					643	1
20	651	28	105	29	5990	48	67	24	275	24	450	30
21	604	18	732	25	2012	42	86	19	90	19	325	25
22	2	58	1128	70	8881	101	33	59	0	56	83	68
23	16	4	104	4	9152	6	13	4	0	2	43	4
24	2017	65	3308	82	2663	109	302	60	230	50	2809	83
25	100	37	179	43	1707	74	95	39	38	32	168	46
26	364	46	6256	58	1511	68	207	48	57	38	519	48
27	349	22	1056	28	2427	38	171	20	227	20	302	25
28	119	82	409	98	1180	155	78	85	8	78	313	99
29	68	61	63	70	567	113	49	65	21	60	208	70
30	0	3	14	4	497	7	0	3	0	3	55	4
31	109	27	56	33	754	42	149	30	37	23	262	29
32	91	9	358	11	591	19	53	9	0	8	4	8
33	0	8	457	12	1335	18	122	9	0	8	237	9
34	24	12	112	17	870	35	67	14	9	11	219	20
35	67	8	458	12	1293	16	94	7	28	7	437	8
36	2013	32	891	40	1062	76	93	28	1	21	258	45
37	581	8	656	10	10268	15	159	9	539	8	480	11
40	418	10	1516	10	948	12	0	8	0	9	1455	12
41	0	5	104	4	1735	5	0	4	0	5	40906	4

Source : INS

Légende : Les facteurs sont exprimés en unité monétaire de dépense environnementale par million d'unité
monétaire de la variable explicative (le chiffre d'affaire correspondant à la variable 12110 de l'enquête structurelle).
N1, N2, N3, N4, N5, N9 représentent le nombre d'entreprises sur base desquelles ces facteurs ont été calculés.

Results

Results

The results of the estimations in accordance with the aggregations of the sectors of the Structural Survey (figure 7) show that the current environmental expenditures concern domains varied according to the sectors. They are the highest in the chemical sector and the refining sector, important industries in Belgium. While waste represents more than 98% in the refining sector, the treatment of waste water represents 70% of the current environmental expenditures for the sector of non metallic mineral products (Figure 8). The domains soil and noise protection are negligible while the domain air is less important.

Figure 7: Current expenditures for environmental protection in industries with more than 20 employees or with a turnover of more than 4,96 million EUR. Belgium, estimations (1000 EUR).

Sector	Total	Air	Water	Waste	Soil	Noise	Other
Mines, carrières (C)	875	20	406	218	1	0	230
Aliments, boissons (DA)	70704	2935	21561	33570	4964	1767	5907
Textile, habillement, chaussures (DB+DC)	27773	477	10426	12788	1783	67	2232
Bois (DD)	11958	1033	167	9500	106	437	715
Papier, carton, imprimerie (DE)	55004	2222	7226	43246	449	333	1528
Cokéfaction, raffinage, nucléaire (DF)	93421	163	1039	91662	129	0	428
Chimie, caoutchouc, plastique (DG+DH)	296855	50916	83633	77071	8137	5980	71118
Minéraux non métalliques (DI)	49597	2013	34882	8357	1144	313	2888
Métallurgie (27)	49970	3850	11645	26764	1882	2498	3331
Métaux (28)	11723	662	2271	6568	436	45	1741
Machines et équipements (DK+DL+DM+DN)	63815	7475	7851	36692	2866	850	8081
Electricité, gaz (40)	88910	8577	31076	19426	0	0	29831
Eau (41)	41006	0	99	1665	0	0	39242

Figure 8: Distribution per domain of current environmental protection expenditures in industries with more than 20 employees or with a turnover of more than 4,96 million EUR. Belgium, estimations (%).

Sector	Total	Air	Water	Waste	Soil	Noise	Other
Mining and quarrying (C)	100%	2%	46%	25%	0%	0%	26%
Food products, beverages (DA)	100%	4%	30%	47%	7%	2%	8%
Textiles, clothes, footwear (DB+DC)	100%	2%	38%	46%	6%	0%	8%
Wood (DD)	100%	9%	1%	79%	1%	4%	6%
Paper, paperboard, printing (DE)	100%	4%	13%	79%	1%	1%	3%
Coke, refined petroleum products and nuclear fuel (DF)	100%	0%	1%	98%	0%	0%	0%
Chemicals, rubber, plastic (DG+DH)	100%	17%	28%	26%	3%	2%	24%
Non-metallic mineral products (DI)	100%	4%	70%	17%	2%	1%	6%
Basic metals (27)	100%	8%	23%	54%	4%	5%	7%
Fabricated metal products (28)	100%	6%	19%	56%	4%	0%	15%
Machinery and equipment (DK+DL+DM+DN)	100%	12%	12%	57%	4%	1%	13%
Electricity, gas (40)	100%	10%	35%	22%	0%	0%	34%
Water (41)	100%	0%	0%	4%	0%	0%	96%

The specification per NACE-2 digits (figure 9) shows that the current expenditures are on average higher than the investments concerning environmental protection, but that there is no systematic relation between these two types of expenditure. The specification per NACE-3 digits can be found in annex III, but these results are to be considered with caution because of the estimation method of the lacking data.
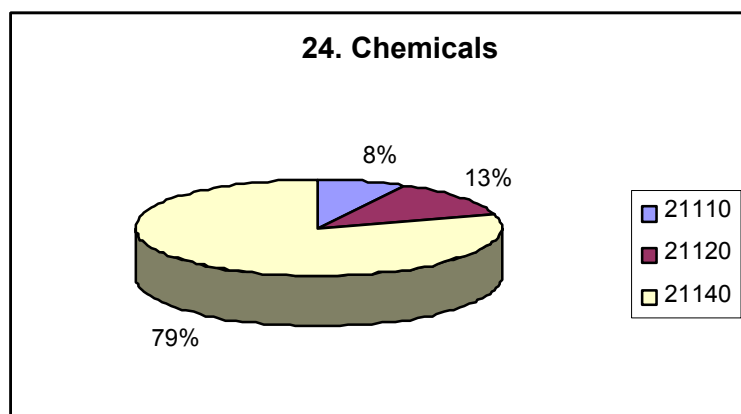
Figure 9: Expenditures for environmental protection and other characteristics of industries with more than 20 employees or with a turnover of more than 4,96 million EUR. Belgium, estimations (1000 EUR).

NACE	Turnover	Energy	21110	21120	21140	Air	Water	Waste	Soil	Noise	Other
14	499612	22736	0	192	875	20	406	218	1	0	230
15	22262497	316952	16819	4465	68360	2343	21526	33197	4869	629	5796
16	1615919	3537	87	191	2345	593	35	373	95	1138	111
17	5922235	128460	3915	587	22863	239	8833	9989	1751	67	1984
18	1527021	5735	0	0	2511	238	419	1763	31	0	60
19	293502	2519	0	130			1174	1035			189
20	1587048	38135	784	620	11958	1033	167	9500	106	437	715
21	3669059	124372	1155	3792	14122	2214	2685	7383	315	332	1193
22	4033143	32551	413	2445	40882	8	4541	35862	135	1	335
23	10015484	352426	4178	10647	93421	163	1039	91662	129	0	428
24	24958759	774569	27987	44477	282466	50285	82510	66326	7542	5740	70063
25	6289143	103403	4779	5031	14389	630	1124	10745	595	240	1055
26	5529436	242683	5419	6192	49597	2013	34882	8357	1144	313	2888
27	11027294	469220	16017	23854	49970	3850	11645	26764	1882	2498	3331
28	5572192	84794	2896	1729	11723	662	2271	6568	436	45	1741
29	7595215	53232	868	1443	7418	513	477	4310	375	162	1581
30	142579	639	5	0	81	0	2	71	0	0	8
31	3906321	29316	4108	4177	5346	424	220	2951	583	145	1023
32	3907823	19235	138	110	4290	354	1399	2315	206	0	16
33	982584	6288	0	0	2088	0	443	1297	118	0	230
34	16253131	73379	2311	11535	21144	392	1825	14147	1087	139	3554
35	1534265	11111	0	486	3646	103	702	1983	145	43	670
36	2634749	23593	651	715	11378	5303	2348	2799	246	3	679
37	664184	9968	404	658	8425	386	436	6820	106	358	319
40	20497297	9072791	13202	53886	88910	8577	31076	19426	0	0	29831
41	959309	24945	78	3215	41006	0	99	1665	0	0	39242

Figure 10: Expenditures for environmental protection and other characteristics of industries with more than 20 employees or with a turnover of more than 4,96 million EUR. Belgium, estimations (1000 EUR et %).
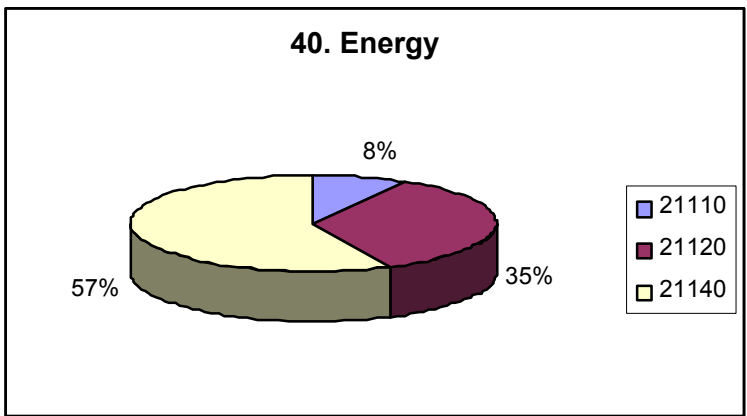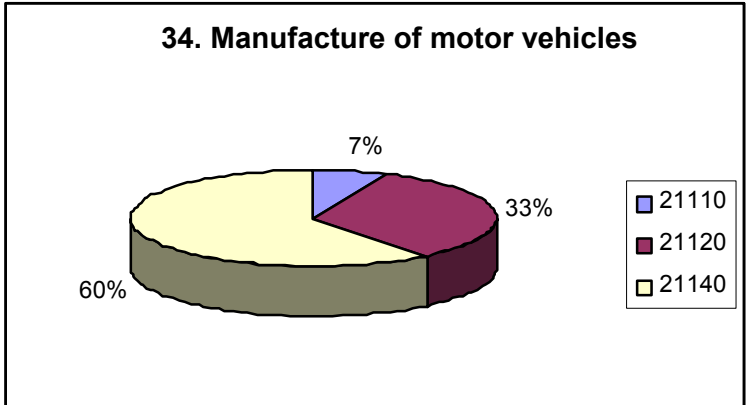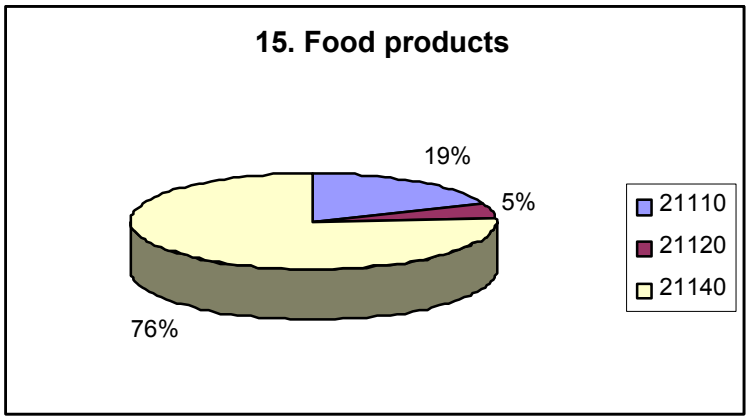
NACE	Turnover	21110	21120	21140	Total PAC	21110%	21120%	21140%	PAC/ turnover
14	499612	0	192	875	1067	0%	18%	82%	0,2%
15	22262497	16819	4465	68360	89644	19%	5%	76%	0,4%
16	1615919	87	191	2345	2623	3%	7%	89%	0,2%
17	5922235	3915	587	22863	27365	14%	2%	84%	0,5%
18	1527021	0	0	2511	2511	0%	0%	100%	0,2%
19	293502	0	130						
20	1587048	784	620	11958	13362	6%	5%	89%	0,8%
21	3669059	1155	3792	14122	19069	6%	20%	74%	0,5%
22	4033143	413	2445	40882	43740	1%	6%	93%	1,1%
23	10015484	4178	10647	93421	108246	4%	10%	86%	1,1%
24	24958759	27987	44477	282466	354930	8%	13%	80%	1,4%
25	6289143	4779	5031	14389	24199	20%	21%	59%	0,4%
26	5529436	5419	6192	49597	61208	9%	10%	81%	1,1%
27	11027294	16017	23854	49970	89841	18%	27%	56%	0,8%
28	5572192	2896	1729	11723	16348	18%	11%	72%	0,3%
29	7595215	868	1443	7418	9729	9%	15%	76%	0,1%
30	142579	5	0	81	86	6%	0%	94%	0,1%
31	3906321	4108	4177	5346	13631	30%	31%	39%	0,3%
32	3907823	138	110	4290	4538	3%	2%	95%	0,1%
33	982584	0	0	2088	2088	0%	0%	100%	0,2%
34	16253131	2311	11535	21144	34990	7%	33%	60%	0,2%
35	1534265	0	486	3646	4132	0%	12%	88%	0,3%
36	2634749	651	715	11378	12744	5%	6%	89%	0,5%
37	664184	404	658	8425	9487	4%	7%	89%	1,4%
40	20497297	13202	53886	88910	155998	8%	35%	57%	0,8%
41	959309	78	3215	41006	44299	0%	7%	93%	4,6%

Figure 11. Part of the different types of environmental expenditures in a number of sectors

15. Food products

19%
5%
76%

21110
21120
21140

34. Manufacture of motor vehicles

7%
33%
60%

21110
21120
21140

40. Energy

8%
35%
57%

21110
21120
21140

Figure 12: Current environmental expenditures per domain for a number of sectors

15. Food products

1%
8%
3%
7%
31%
50%

Air
Water
Waste
Soil
Noise
Other

24. Chemicals

Air	18%
Water	29%
Waste	23%
Soil	3%
Noise	2%
Other	25%

34. Manufacture of motor vehicles

Air	2%
Water	9%
Waste	66%
Soil	5%
Noise	1%
Other	17%

40. Energy

Air	10%
Water	34%
Waste	22%
Soil	0%
Noise	0%
Other	34%
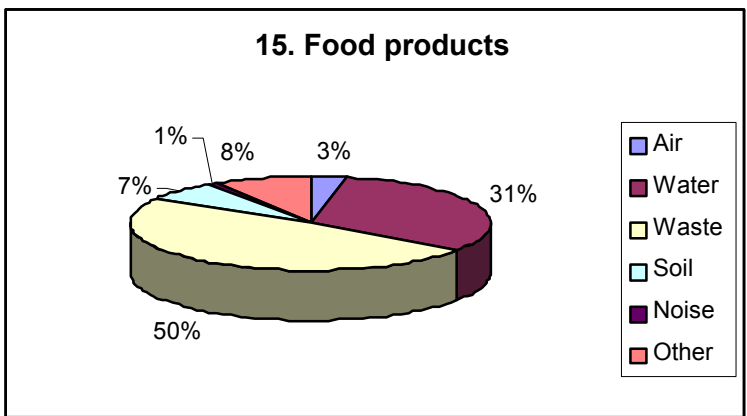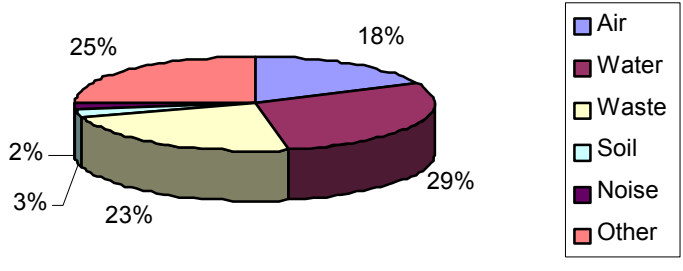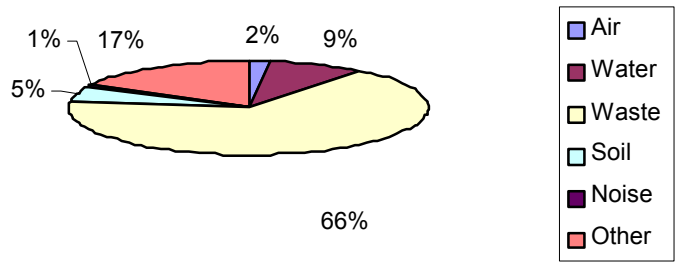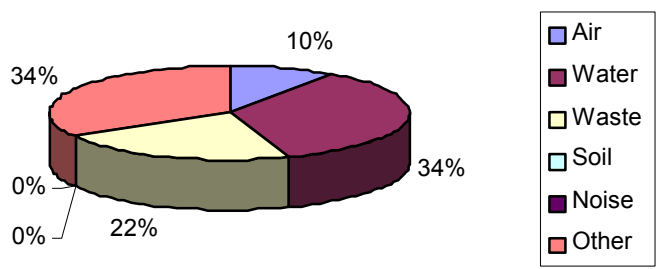
Comparison with other surveys

Comparison with other surveys.

The distribution between the environmental domains and the results published by the federation of chemical companies (Fedichem, 1997) shows that the data are comparable. The figures of Fedichem seem to indicate that the domain « other » includes, in the answer to our survey also, taxes on the motive power, which is considered in this sector as relevant for the environment.

It is very likely that there is a cultural contagion within companies who are accustomed to surveys about this question. A certain period of time to level the concepts will be necessary to prevent biases between sectors, particularly concerning the perception of what belongs to environment and what does not. Special attention has to be given to everything concerning energy. It could be useful to ask explicitly for the amounts regarding energy economies to try and prevent that they are included into other sections (notably « air » or « other »).

The federation of food companies also holds surveys about environmental expenditures (Fevia, 1999). They made the extrapolations to the whole of the sector on the basis of the 87 companies that had answered the questionnaire and that represented 34% of the turnover of the sector[3]. These results cover the whole of the sector (without company size threshold) and their presentation does not facilitate the comparison with our numbers. By reconstituting definitions that are comparable to ours and using their figures that are more detailed, we obtain comparable orders of magnitude but the proportions of environmental domains differ (figure 11). The comparison of results suggests that companies include the tax on motive force, which is explicitly part of the environment in the survey of the federation, into our section « other ». This was probably also due to « cultural contagion » between different surveys. FEVIA makes an interesting distinction between the different types of expenditures linked to waste (waste operating costs, packaging operating costs, waste elimination, contribution to organisms of selective collection and recycling, taxes and levies on waste).

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[3]Only middle and large companies have been taken into account in our survey. Our result has to be smaller than that of the survey of Fevia. The number of companies that answered varies between 88 and 228 according to the questions.

Figure 11: Current environmental expenditures of food industries

	According to FEVIA Whole sector 1000 EUR	According to FEVIA Whole sector % without motive force	According to FEVIA Whole sector % without motive force	INS >20 employees or >5mio EUR 1000 EUR	INS %
Source of the data:					
Coverage					
	1998	1998	1998	1999	1999
Operating costs, waste	10957	9%			
Operating costs, air	2256	2%			
Operating costs, water	45761	39%			
Operating costs, packaging	3223	3%			
Operating costs, other	2256	2%			
Elimination waste	13138	11%			
Contributions waste	23054	20%			
Taxes waste	2975	3%			
Taxes water	11899	10%			
Taxes soil	744	1%			
Taxes water de surface	1239	1%			
Taxes motive force	7437				
Taxes other	496	0%			
Total	**125434**		**100%**	**70705**	**100%**
Total without "motive force"	**117997**	**100%**			
Air	2256	2%	2%	2936	4%
Water	58900	50%	47%	21561	30%
Waste	53347	45%	43%	33570	47%
Soil	744	1%	1%	4964	7%
Noise				1767	2%
Other	10189		8%	5907	8%
Other without « motive force »	2752	2%			

Conclusion

Conclusion

The pilot survey served the purpose of many objectives. The comprehension and the feasibility of the questions on current environmental expenditures could be tested within companies. It has also familiarised companies with the standardised definitions that are more and more used on an international level.

The correlation tests show that the considered variables cannot be deduced from other current statistical variables. Question 21140 on current environmental expenditures should be part of the Structural Business Regulation.

Methodologically, it is necessary to interview a large number of companies because situations vary heavily from one company to another. The facultative character of the survey generates important costs for Statistics Belgium. Even after an important number of telephone contacts, many companies do not answer due to the work that this may cost. Current expenditures are indeed more difficult to evaluate than, for example, investments because the amounts are divided over many little invoices that are difficult to identify. Using a repeated and obligatory survey, would diminish the costs importantly, make results faster available and adapt the information system of the companies structurally. However, considering that we risk receiving an answer of lesser quality from reluctant companies, it is important that the chosen defining system corresponds as good as possible to a « cultural » optimum and that the administrative services also take this as a starting point for their requirements of companies. It is important to have exchanges between statisticians and administrations, particularly on the level of the Commission, before defining information systems.

For future surveys we have to improve our questionnaire to clearly draw attention to the treatment of specific posts such as the domain of energy economies, the tax on motive force etc. For pedagogic reasons, it would probably be good to explicitly list important typical posts that have to be included in or excluded from the answers, by adapting this list or the questionnaires to the economic sectors. Experience shows that some concrete examples added between brackets after the question can improve the quality of the answers, while the more theoretical footnotes have less impact. For waste, for instance, operating costs for waste for the concerned industries can be mentioned and the recuperations of packaging, the elimination of waste, the contribution Fost+ and Val-i-Pac, and the levies. For « other », it should also be explicitly mentioned what is included and what is excluded (such as energy, taxes on motive force, non attributed taxes, …).

This study was limited to the first results to the methodological questions. Its results can now be analysed more in detail. They can, for instance, be given per size class from the considered threshold on. To obtain an estimation of current environmental expenditures for the whole of the companies, it will undoubtedly be necessary to proceed to a sample of the smaller companies. But such an approach would certainly pose new problems.

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Annexes

Questionnaire

Numéro d'identification INS de l'entreprise :
Nom de la personne à contacter pour ce cadre :
Mme/M ....   Téléphone: .... Fax: ....

La réponse aux questions de ce cadre est facultative.

Ce questionnaire pilote vise à améliorer et étendre le cadre IE (investissements liés à la pollution). Il sert à tester la nomenclature européenne CEPA et la question complémentaire sur les dépenses courantes. Vos suggestions sont donc particulièrement bienvenues.
Nous recommandons une concertation entre le service environnement et le service financier de l'entreprise.
Si vous n'êtes pas en mesure de chiffrer exactement vos montants, veuillez les estimer avec le plus de précision possible.

* Veuillez utiliser l'unité monétaire choisie pour le questionnaire détaillé (GD)

Domaine de pollution	Code CEPA	Valeur (1000 BEF / 1 EUR)*
	1 EPACD	2 VALCE
Total des dépenses courantes consacrées à la protection de l'environnement [a] **dont:**		....
• Protection de l'air ambiant et du climat [b]	CE.01.00.00	....
• Gestion des eaux usées [c]	CE.02.00.00	....
• Gestion des déchets [d]	CE.03.00.00	....
• Protection des sols et des eaux souterraines [e]	CE.04.00.00	....
• Réduction du bruit et des vibrations [f]	CE.05.00.00	....
• Autres [g]	CE.09.00.00	....

Vos remarques:

(a) Celles-ci comprennent les dépenses internes (salaires et autres), et externes comme les taxes (rubrique 024 dans la partie 8 du questionnaire détaillé) et les autres payements à des tiers.
(b) Prévention, traitement ou contrôle de la pollution de l'air, sous forme gazeuse, liquide ou solide (particules).
(c) Collecte et transport des eaux usées. Prévention, traitement ou contrôle de la pollution de l'eau, y compris le traitement des eaux de refroidissement. Autres mesures tendant à restaurer ou à préserver la qualité et la quantité des eaux de surface.
(d) Prévention et réduction de la production de déchets; collecte, transport, traitement et élimination des déchets; contrôle des déchets, activités de recyclage si elles visent principalement à la réduction et au traitement des déchets.
(e) Prévention des infiltrations de polluants, décontamination des sols, contrôles, etc.
(f) Prévention des bruits et des vibrations à leur source (à l'exclusion de la protection sur les lieux de travail), mesures tendant à isoler les récepteurs des bruits et vibrations, et contrôle des niveaux d'émissions sonores.

JAARLIJKSE ENQUETE NAAR DE STRUCTUUR VAN DE ONDERNEMINGEN
Kader CE - Lopende uitgaven voor milieubescherming

Identificatienummer NIS van de onderneming :
Naam van de contactpersoon voor dit kader :
Mevr./De heer.. Telefoon : .... Fax: ....

De antwoorden op de vragen in dit kader zijn facultatief.

Deze piloot-vragenlijst heeft de bedoeling het kader IE (investeringen voor milieubescherming) te verbeteren en uit te breiden. Al uw suggesties terzaken zijn zeer welkom.
Het invullen gebeurt bij voorkeur in overleg tussen de afdeling leefmilieu en de financiële afdeling.
Indien u uw bedragen niet exact kunt becijferen, mag u ze zo nauwkeurig mogelijk schatten.

* Gelieve de munteenheid te gebruiken die u ook voor de gedetailleerde vragenlijst (GD) gekozen heeft

Aard van de milieuhinder	CEPA code	Waarde (1000 BEF / 1 EUR)*
	1 EPACD	2 VALCE
Totale lopende uitgaven voor milieubescherming [(a)]		....
waarvan:		
• Lucht- en klimaatbescherming [(b)]	CE.01.00.00	....
• Afvalwaterbeheer [(c)]	CE.02.00.00	....
• Afvalbeheer [(d)]	CE.03.00.00	....
• Bodem- en grondwaterbescherming [(e)]	CE.04.00.00	....
• Geluids- en trillingsbestrijding [(f)]	CE.05.00.00	....
• Andere [(g)]	CE.09.00.00	....

Uw opmerkingen:

(a) Hiertoe behoren: interne uitgaven (lonen en andere), externe uitgaven zoals belastingen (rubriek 024 in deel 8 van de gedetailleerde vragenlijst) en andere betalingen aan derden.
(b) Preventie, reductie en controle van vervuilende emissies in gasvormige, vloeibare of vaste toestand (deeltjes).
(c) Verzamelen en vervoeren van afvalwater. Preventie, verwerking of controle van waterverontreiniging, inclusief verwerking van koelwater. Andere maatregelen tot herstel of bewaring van de kwaliteit en de kwantiteit van het oppervlaktewater.
(d) Afvalpreventie en -reductie; verzamelen, vervoeren, verwerken en elimineren van afval; afvalcontrole, recyclage-activiteiten voor zover zij voornamelijk de afvalreductie en -verwerking beogen.
(e) Bescherming van grond en grondwater tegen insijpeling van vervuilende stoffen; bodemontsmetting, controle enz.
(f) Geluids- en trillingspreventie aan de bron (exclusief maatregelen voor de geluidsreductie op de werkplaats), maatregelen ter isolatie van ontvangers voor geluiden en trillingen en controle van het niveau van de geluidsemissie.
(g) Bescherming van biodiversiteit en landschap, bescherming tegen straling, onderzoek en ontwikkeling, algemene administratie, informatie, ondeelbare uitgaven en andere.

Uw contactpersoon voor de milieuvragen: Mevr. R. Braekman (tel: 02/ 548 63 36)

Estimation de l'erreur initiale de réponse

Estimation of the initial response error

Factors affecting quality of statistics on environmental expenditures by companies in Belgium.

Bruno Kestemont, Statistics Belgium

Summary

The paper analyses the effect of the different enquiry phases on the quality of statistics for a limited number of pilot economic environmental variables. 3,000 Belgian companies were interviewed on these variables within the framework of the Structural Business Surveys. The status and underlying methods of these surveys varied according to the used parameters and the company types: mandatory or facultative, simplified or detailed, census or sample, variables with high or low occurrence, paper questionnaire with or without a follow up by telephone.

The sampling error is high for environmental investments, mainly due to the sampling method and the low occurrence rate. The response ("measurement") error is high for new concepts like "current environmental expenditures" or "investments in integrated technologies". Telephone calls to firms having declared odd values or no values at all for current environmental expenditure resulted in an important rate of corrections of the original paper responses.

Introduction

Sustainable development policy needs a new generation of statistics in the interface between disciplines like economy, sociology and environment.

In this context, data on environmental expenditure are regarded as indicators of environmental commitment. In Europe, governments, industries and households are increasingly prompted to respond directly to the environmental impact they cause, according to the polluter-pay principle. Both at international and national level statistics on the related expenditures are in great demand. This is important for two reasons, namely (UN, 2000):

(a) To be aware of the *costs* of environmental regulations and the repercussions on competitiveness and economic performances.
(b) To be aware of the *opportunities* for the environmental protection sector which is widely said to become one of the fastest-growing business sectors in coming years.

However, due to the emergence of new "interdisciplinary" or "horizontal" concepts in statistics the quality of responses has become more important than the sampling quality of the surveys needed. In the case of classical surveys, specialists try to find a common jargon to communicate with specialists in other fields (accountants responding to economical statisticians, or technicians responding to environmental statisticians). In the case of horizontal surveys, accountants are not specialized in environmental concepts nor are those in charge of environmental issues specialized in economical concepts. The respondent will try to answer the question to the best of

his/her ability including an interpretation based on his/her own "culture". If we ask for "environmental expenditure", the respondent must know "what is meant by environment" and "what is meant by expenditure". Ideally, accountants and environmental specialists of companies should consult each other before answering, and carefully read the extensive documentation and footnotes of the questionnaire. But in practice, this is not the most common attitude. We have to determine how to quantify the resulting response error.

Background

Structural Business Surveys make use of a stratified sample of 40,000 units out of 700,000 Belgian enterprises (including self-employed persons). The first survey was held in 1996 using data from 1995. Response is mandatory. There is a simplified questionnaire for small enterprises. The largest companies receive additional questions and annexes depending on the kind of sector they belong to. The following environmental questions are asked to a sample of 25,000 companies: total "end-of-pipe" investments to fight pollution, total investments to prevent pollution (additional costs of cleaner technology), and total environmental taxes. About 3,000 enterprises in the industry sector must also complete a table containing a breakdown of environmental investments in four fields: atmospheric emissions, waste, water protection, and "noise and vibrations".

Method

A pilot survey on *current* environmental expenditures started in 2000 (data 1999). A simple one-page non-mandatory questionnaire, on a green support, was added to the general "business structure" questionnaire sent to the 3000 units mentioned above. This questionnaire only contained the following questions and related explanatory footnotes: "total current expenditure for environmental protection", including "protection of ambient air and climate", "wastewater management", "waste management", "protection of soil and groundwater", "noise and vibration abatement", "others". Each question was defined by a footnote of about 2 lines. The breakdown in environmental domains followed the CEPA classification (based on UN-ECE, 1994) and used definitions similar to those in the usual "environmental investments" annex of the Business survey. The only new concept was "current expenditures for environmental protection", which was specified in the first footnote as "including internal expenditures (salaries and others), and external expenditures such as environmental taxes and other payments to third parties". This is a large definition. The respondent had the possibility to contact a specific environmental help desk mentioned in the document. He/she could also put down remarks in an additional blank box. No additional information was enclosed.

The second phase of the survey was a telephone interview, not only to enhance the response rate and to accustom companies to this new parameter, but more specifically to estimate the response error of the first phase. All companies that had responded, "zero", or had crossed the questionnaire were interviewed by telephone. Many companies having responded nothing and several companies having sent a detailed answer were contacted as well. After discussion, new answers were collected by fax.

This provisional study is limited to a range of 496 initial responses (zero or positive). The initial non-responses and the crossed questionnaires are not considered here. After a manual check, the 96 most "doubtful" answers were selected and checked by telephone. This was the case for almost all questionnaires with a "zero" response, and for a number of questionnaires where the relative amount appeared to be higher or lower than normal for the related sector. The phone call consisted of open and closed questions, explanations and examples in order to verify and correct the figures given. Further contacts by fax or telephone resulted in a "corrected response". These couples of values (initial response, corrected response) are the basis of the calculations presented here.

Strecker et al. (2000) describe a model of response variability in repeated surveys using the same working system. In the present study, we have 2 responses for the same variable (unknown real value), but we are using different working systems and a rational repeated survey. However, this model can be used to identify the main sources of errors within the context of a pilot survey. The "response variability " between 2 repeated surveys, focused on "doubtful" respondents, is used to rank variables from the most distinct ones to those generating the most errors. It is estimated as follows:

$y_{i1} = $ initial response on paper questionnaire

$y_{i2} = $ "corrected" response after telephone interview

$d_i = y_{i2} - y_{i1} = $ deviation of individual responses

d_i is actually the individual cultural or perception difference between the paper survey and the interview process. We make the hypothesis that it is an estimation of the individual response error due to the system of paper survey. The residual response error (as compared to the real value) is neglected here.

$$S_{R_i}^2 = \frac{d_i^2}{2} = \text{estimator of variance of individual responses}$$

$$S_R^2 = \sum_{i=1}^{N} S_{R_i}^2 = \text{estimator of the variance of responses}$$

$$V_R = \frac{S_R^2}{2N} = \text{estimator of variability of responses (with 2 repeated surveys)}$$

$$Y_1 = \sum_{i=1}^{N} y_{i1} \ ; \ Y_2 = \sum_{i=1}^{N} y_{i2}$$

$$V_R^{1/2}(\%) = \frac{\frac{S_R}{\sqrt{2N}}}{\frac{Y_1 + Y_2}{2N}} (\%) = \text{estimator of relative variability of responses}$$

The relative variability of responses gives an estimation of the effect of a phone call compared to a simple paper survey. The calculation is based on a stratified sample: all the "doubtful" initial responses, not selected at random but "rationally" selected, form the first stratum. This gives of course a higher contrast in the results (higher variability). The second stratum is a sample of the remaining "credible" answers (rate

22/401). In practice, we had no estimation effect for the latest, because the variability was null (all of the 22 respondents confirmed their initial answer), but the formulas above can easily be adapted to stratified samples and grossing over problems, in the case we would find a variability of responses by the "credible" respondents. The overall result points out the parameters for which the "cultural difference" between the interviewers and the respondents is the highest. The same focus is given within the only stratum of "doubtful respondents", but with a higher contrast. From the interviewer's point of view, the parameters with the highest variability of responses are the parameters with higher expected "response error". From the point of view of the respondents, the parameters with the highest variability of responses are the parameters for which questions are clear or not relevant.

Results

The telephone calls resulted in a higher response rate (not studied here) and in the correction of a range of initial responses.

After various explanations and call-backs, 24% of the "doubtful respondents" confirmed their initial response for total expenditure. 8% reduced the total value and 67% updated it with a higher value.

Parameter	% of doubtful respondents			Variability of responses of doubtful respondents
	confirming paper response	Correcting response: reduced value	Correcting response: bigger value	
Total current expenditures for environmental protection of which	**24%**	**8%**	**67%**	**10%**
-protection of ambiant air and climate	90%	3%	7%	**4%**
-wastewater management	67%	1%	32%	**3%**
-waste management	34%	2%	64%	**4%**
-protection of soil and groundwater	89%	1%	10%	**82%**
-noise and vibration abatement	97%	0%	3%	**24%**
-others	80%	2%	18%	**48%**

Table 1: Variability of responses following 2 survey systems for 96 doubtful respondents
* Denominator is initial (paper) value.

The variability of responses of doubtful respondents is calculated between the initial and corrected responses. This variability is higher for the subtotals "protection of soil and groundwater", "others" and "noise and vibration abatement". It rounds 10% in the total expenditure. This may indicate a lower understanding or clarity of those concepts in our questionnaire. Actually, it is a proxy of the cultural misunderstanding between the various people involved in the measurement: the author of the questionnaire and the interviewer on the one hand, and the respondent on the other hand. The best "standard" concepts are those where the overall share of expenditure is the highest (air, wastewater, waste), which is not surprising: these are also the

domains in which companies have most expertise, having to deal with various legislations since several years.

We telephoned a sample (22/401) of the "credible", respondents. None of them corrected their response. As a first approximation, we then estimated that the variability of responses by the "credible respondents" is 0%.

The calculation of variability on the 496 respondents considered is shown in the table below. This gives a (provisional) estimation of the response error for this part of the survey.

Table 2: Estimation of response error (variability of responses) by 496 respondents

Parameter	% of respondents			Variability of responses	Effect on total result*
	confirming paper response	Correcting response: reduced value	Correcting response: bigger value		
Total current expenditures for environmental protection	**85,0%**	**2,0%**	**13,0%**	**2,2%**	-3,0%
of which					
-protection of ambiant air and climate	98,0%	0,6%	1,4%	**2,4%**	0,0%
-wastewater management	93,8%	0,2%	6,0%	**0,9%**	0,3%
-waste management	87,3%	0,4%	12,3%	**0,4%**	2,5%
-protection of soil and groundwater	98,0%	0,2%	1,8%	**47,5%**	-63,6%
-noise and vibration abatement	99,4%	0,0%	0,6%	**5,7%**	12,4%
-others	96,2%	0,4%	3,4%	**4,1%**	5,0%

* Denominator is initial (paper) result

The "rational" phone calls affect the results (hopefully to a better estimate). In the case of the questionnaires considered here, a reduction of 3% of the estimation of total expenditure was achieved. It gives an idea of the error on paper answer, which ranges from −64% to +12% following the variable considered. The impact of a unique erroneous answer to the question "protection of soil and groundwater" was important (the respondent initially included the value of a provision for future soil protection, which actually falls out of the definition). As shown in the tables, when we phoned "doubtful" respondents, they more often reported bigger amounts than smaller ones. Most of the time, an initial underestimation of expenditures was due to the fact that the respondent did not believe to be concerned with environmental protection: "what we do is only to respect external constraints, but our goal is to make profit, not to protect the environment". However, our questionnaire did not make any distinction between mandatory or voluntary environmental expenditure. The effect of interviewers here is that in some cases we perfectly know that "zero" is not probable for several kinds of industries affected by environmental regulations. Another type of easy to identify error appears when the current environmental protection expenditure is higher than a certain percentage of the turn over (in this case, it could be an error of units, or the inclusion of other types of expenditures like security or investments). Other kinds of errors are not so evident to identify in a first year survey.

The results should also be compared to the relative importance of each domain in current environmental expenditures. The provisional results (for 496 enterprises) is shown below (based on corrected responses):

Table 3: Share of current environmental expenditures according to domain

-Protection of ambient air and climate:	9	% of total
-Wastewater management:	25	%
-Waste management:	48	%
-Protection of soil and groundwater:	2.4	%
-Noise and vibration abatement:	0.4%	
-Other:	15	%

A comparison of this table with the previous one shows that the parameters where the estimated response error is the highest are also of minor importance on the total. The

cost of getting a good quality response for those parameters is high for a limited impact on the quality of the total. On the other hand, the formulation used to ask about current expenditure for wastewater or waste seems to be good. A simple paper questionnaire, without any intervention of interviewers, gives satisfactory results for the parameters "air", "wastewater" and "waste" at low cost (or at a higher sampling size). The item "Other" should be examined more thoroughly. The items "soils & groundwater" and "noise & vibration" should be removed from the questionnaire and included in "Other".

Discussion

Various survey methods are in competition, characterized by various costs and various expected errors. When designing a survey - at a fixed budget - the question is to minimize the total error. Quantifying the different types of errors (mainly sampling errors and measurement errors) can help to optimise a survey.

For the traditional question on environmental protection investments, the sampling error is high as compared to the response error due to the fact that the variability of environmental investment in a given year is high (NSI-Belgium, 2001). For budgetary reasons, small enterprises are surveyed with a small sample rate, which makes the yearly results sensitive to chance. In the case of "end-of-pipe" investments, expenditure is easy to identify, and answers are generally precise.

Current environmental expenditures occur more often than investments, and the sampling error is lower. From one year or enterprise to another, results vary less but the response error is here higher for the following reasons:

-The question is new for the enterprises.
-An economical definition ("current" expenditure) is crossed with a functional definition ("environmental protection"). The accountant best understands the first one; the environmental technician understands the latter. The latter is moreover in competition with other possible functions.
-The amounts are low, which makes not all related expenditures easily identifiable. An estimate is often necessary (for example to identify the share of employees dealing with environmental protection).

In the case of integrated investments (environmental part in a cleaner technology), both sampling and response (measurement) errors are important (NSI-Belgium 2001).

The variability of responses (even estimated) is a practical tool for pilot surveys. The method of selecting "rationally" the strata (doubtful and credible respondents) is close to the day-to-day work of the statisticians. It is useful to phone to all respondents with suspect responses, not only to allow them to clarify their meaning and correct the response, but also for the interviewers in order to identify special cases or difficulties in their questionnaires. However, a phone call to a sample of supposed "credible" answers is also useful. It allows the calculation of an estimated response error, but also, it could help to identify possible non-expected problems. The coverage of the stratum "doubtful respondents" depends of the ability of the survey system (surveyors + automatic verification tools) to identify them. It has an impact on the precision of

the estimation of the response error, but not on the estimation itself, providing good statistical formulas and sample method within the remaining strata is applied.

Further work consists of deepening the methods of estimating response errors for the all survey, and to extend this exercise to other variables. We intend also to calculate the sampling error for the same variables in order to compare the different types of errors for each type of parameter.

Conclusion

In order to get an optimal quality of results for a given budget, the statisticians must always balance the largest sources of errors: measurement (or response) errors and sampling errors. On the one hand, a small number of heavy questionnaires accompanied with telephone calls, provide better quality responses but also unacceptable sampling errors. On the other hand, simplified questionnaires, sent to a large sample provide low sampling errors but also a lower quality of responses. Even for apparently popular concepts like "environment" or "waste", a period of "popularisation" of their meaning in statistics is necessary to reach a satisfying quality.

In the case of environmental investments, the sampling errors are the most problematic. In the case of current environmental expenditures, the response error can be problematic for marginal domains like soil protection or noise abatement. In the case of integrated investments in cleaner technologies, both types of errors are problematic.

The major sources of response errors can be identified and reduced by using a rational repeated survey and then calculating the variability of responses.

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Acknowledgments:

Questions-réponses sur le rapport final

Answers to follow-up questions on the final report

UJ: What do you mean by the following statement? " It was necessary to calculate a weighting coefficient higher than 1 for companies that have certain characteristics to compensate non-responses."

BK: This means that the answers from the companies that have responded are extrapolated sectorially.

In our pilot survey all companies in the concerned strate initially have the weight of 1 (when all large companies are surveyed). Since only 97,8% answered to the SBS survey (indicating their turnover etc), a weight slightly higher than 1 was calculated at the level of the whole SBS survey for companies of groups where there still remained non-responding companies. The cumulative weighed sum of the economic results is then 100% in order to cover the entire universe. The hypothesis for non-response was that the answers would proportionally be the same for companies of the same group (same size class, same NACE). In practice, the turnover was used to extrapolate the result of responding companies within a group to non-responding companies of the same economic sector. Moreover, as far as our pilot survey is concerned, we have companies that sent the questionnaire back but did not respond (responding was not obligatory). The method for correcting the non-response is explained in the chapters "traitement des non-réponse" and "facteurs par défaut". Implicitly, this technique overvalues the weight of the companies that have responded, by integrating the weight of the non-responding companies of the same group. The resulting weight of individual responding companies is then often higher than1. The total result given in the report is the estimated total of the universe (of large companies).

UJ: How should I interpret the "response rates" in figures 1 and 2? Have you received back questionnaires from 97,8 % of the enterprises, but did only 46% of the enterprises answer the question on environment? Should I assume that these 46% include companies that have declared 0 for current expenditure? Do you have any information on how many of the enterprises actually declared current expenditures higher than0?

BK: 97,8% of the companies sent the questionnaire back together with the SBS (obligatory) questionnaire. But many of the facultative environmental questionnaires were not filled out. Only 15% of the companies answered the question "total".

Then we tried to phone the non-responding companies.
After the phone calls, 46% of the companies had answered the "total" question, still many did not give any detail.

This 46% includes companies that continued to declare 0 (and confirmed this).

The number of enterprises declaring expenditure higher than 0 is 1217 (after the second phase) (=> 1507-1217= 290 declared 0 or confirmed this during the phone phase).

This number was only 201 after the first phase (simple paper questionnaire) (=>504-201= 303 answered 0).

UJ: Do the figures on current expenditure presented in the report also include payment of environmental taxes? If so, do you know whether this constitutes a large part of the total (e.g. because of the inclusion of payments of all energy-related taxes and transport taxes)?

BK: Yes, payment of "environmental taxes" is included. However, as environmental taxes are not well defined, it is possible that companies declared taxes related to energy (not to transport) to the category "other" or "air". We have no idea of the magnitude of this, but it should be limited for 3 reasons:
-In the obligatory questionnaire, there are questions asking details of the taxes for the following items: transport taxes, building taxes, excise taxes, environmental taxes, other.
-In our questionnaire, "environmental taxes" should be declared as mentioned above; implicitly, transport taxes and excise taxes are thus excluded.
-Moreover the companies had the opportunity to describe in writing on the form or by phone which taxes they had included. We did not find that energy-related taxes had been included, but it is possible that some companies included taxes like our national "taxes on energy" or local "taxes on motive force" in "other", because some of them favour the idea that this kind of taxes should be considered as environmental (mainly the tax on energy, which was aimed to reduce CO_2 emissions).

UJ: Could you explain the layout in figure 3? I did not understand how to read that.

BK: This is a cross-graph showing the relations between pairs of variables. Each point is a company. For example, the graph of cell (2,1) has the turnover as abscise and PAC current exp as ordinate. Cell (3,1) has Energy exp as abscise and PAC current exp as ordinate. Cell (3,2) is the relation between turnover and energy exp, etc. This kind of graph gives a quick view of the possible relations between variables, before going into further correlation analyses. If we see that there is no linear relation, it makes no sense to calculate a linear relation coefficient (but we could identify another type of relation, e.g. curvilinear, by this tool). After this first cross-graph, it is possible to zoom into some of them like in figure 4. (In our example, the conclusion remains the same: there is no correlation!). We tried all graphs and relations (linear, curvilinear etc.) and found no relations. Of course, we did not present all the resulting graphs: we only choose one example (figure 4) in order to show the "visual" method used as a first step. The report does not explicitly mention that graph 4 zooms into the part of the graph where most of the companies are (lower-left part of the related graph in figure 3).

UJ: The question of correlation is really important and interesting, both for choosing the basis for grossing up for non-response as for possible calculation/modelling which could reduce the sample size. Is it correct that you have not found any correlation between current expenditure (and investments in another report) and e.g. turnover?

BK: Correct: there is no correlation with turnover (neither curvilinear correlation).

UJ: I would have thought that there was at least a clear correlation between the size of environmental expenditures (current and capital) and the size of the company (measured e.g. by the number of employees or the size of turnover etc). There is

clearly a correlation between the type of activity (NACE) and the level of expenditure. Maybe this is stronger than the correlation by company size (turnover etc)? Could this have levelled out any correlation on the aggregate industry level? Have you carried out any correlation studies broken into more detailed industries, or with a division of size classes?

- One theory would be that there is a strong correlation within some specific (polluting) industries. An increase in their activity would be followed by higher expenditure for environment protection. In other (less-polluting) industries, the level of environment expenditure could be low and more constant, independent of size.
- A study I did in Sweden suggested that the "environmental shares" could increase with the company size (number of employees) up to a certain point, and then decrease for the highest size classes.

BK: Yes. You are right in your analysis. Unfortunately, we did not find time to study the matter in more detail. But the first step correlation analysis let us make the hypothesis that it was necessary to calculate factors (thus assuming a correlation) for as small groups as possible (the grouping in homogeneous sectors being the most important).

We would be interested in a copy of your study.
The sizes of the classes are based on the turnover and on the number of employees, depending on the sector or even the activity (labour intensive or not). The classical example is a TGV power station with 25 workers but with an enormous turnover. We could even extend this consideration of size class by saying that in environmental activity you can find great polluters (e.g. waste incinerators) with a low turnover and a low number of workers (but big investments and probably big current expenditures). Actually, the size is a function of various factors:
-total number of workers (including self-employed);
-turnover (e.g. for distribution or extraction companies);
-investments (e.g. for public waste companies, nuclear research institutes, …);

UJ: You mention that there is no correlation between current expenditure and environmental investments. Have you made these calculations using the same reference year, the investments of the year before, or a longer time series? (One would assume that current expenditure for operation and maintenance of environmental equipment is linked to capital stock in place.)

BK: We agree with you (but of course, we had no possibility to work on a longer time series). But some current expenditures are not linked to capital stock in place, and could even be replaced by capital (inverse correlation) when for example, a company decides to invest … in order to reduce current costs burden (e.g. for waste management, if you decide to use a machine instead of people to sort waste in order to reduce your "external" waste expenditures).

UJ: I think we should try to develop specific guidelines for the NACE categories 40 and 41. I noticed that a fairly large part of them were included into the environmental

domain "other" (figure 8), in particular NACE 41. Do you have any idea of what could be added here?

BK: For these companies, most of the "other" are indivisible expenditures (in other words, other include some parts of air, waste, soil etc.).
This is not only due to the technical structure, but also to the financial accounting structure. These companies work with different specialized decision levels. Some departments are responsible for sales (e.g. electricity, gas, or water distribution), other departments for production etc. Sometimes, there is only one company with subdepartments, sometimes, there are different companies working together, each one specialised in a specific share of activity. Environmental expenditures can be centralised into a specific department, from an accounting point of view, as a result of accounting engineering. This system makes it difficult, to clearly identify environmental expenditures when we interview a "company". Sometimes we even had to phone e.g. to France to obtain some data, or a company declared that it paid e.g. environmental taxes to Luxembourg but had its accounting centralised in Belgium (so the part paid to Luxembourg had to be deduced … but we do not know how much companies that are registered in other countries have to pay to Belgium)

In conclusion, it is clear that the problem is "generic" to all business surveys, mainly for these sectors of activities: how are enterprises and their local bodies interlinked? This could be solved by a kind of "structure of the company" questionnaire, or by identifying local activity units (or better, kind of activity units) and assigning them a NACE code adapted to their local activity. But then, other problems arise…

One solution would be to try to have environment included in the normalised accounting system and obligations. This implies lobbying from our side.

Concerning the questionnaire itself, the only lasting problem is the difficulty for certain large companies to give us the detail per environmental domain. However, it seems that energy was not included as "environmental", at least not for the largest companies (which I have personally contacted).

UJ: Annex 2 is interesting. I liked the systematic way to check measurement errors and the effects of the validation process. For me the result is rather in line with my earlier experiences. It confirms that in most cases there is an underestimation (certainly for current expenditure) so companies need to be reminded what to include.
- However, it seems also to suggest that respondents remembered to include most of the important items, only some minor expenditure items were lacking. I would have expected larger changes to the overall results; in particular since this was the first time you surveyed this variable.
- I also think it shows quite clearly that figures based on a small number of responding units are very uncertain (the variability for the "small" domains)
One question: When you draw conclusions for all of the 496 initial responses (move from Table 1 to Table 2), are you assuming a non-response error for all the respondents who were not contacted?

BK: This hypothesis was based on a small quality check (22/401) of the "credible" respondents (see 2 paragraph before table 2). Of 22 calls (5% sample), none of thee

respondents changed their answer. There is of course a risk of error in this deduction, but it is reduced.

The low rate of underestimation can be linked to the fact that the industries were asked a similar question (on investments) since 1995. Moreover, in recent years, some punctual surveys covering current environmental expenditures were conducted within large companies, e.g. within the Food federation, the Chemical federation, and all sectors in Wallonia. Accountants will now have some background concerning environmental domains and the concept "current" will be clear to them.

Questions by Ulf Johansson (Eurostat)
Answers by Bruno Kestemont (Statistics Belgium)

Résultats détaillés (1000 EUR) : industries de plus de 20 travailleurs ou d'un chiffre d'affaire de plus de 4,96 millions EUR

Detailed results (1000 EUR), industries with more than 20 employees or with a turnover of more than 4,96 million EUR

Belgique, industries de plus de 20 travailleurs ou d'un chiffre d'affaire de plus
de 4,96 millions EUR, estimations (x1000 EUR)

Belgium, industries with more than 20 employees or with a turnover of more
than 4,96 million EUR, estimates (x1000 EUR)

NACE	CA	Energie	21110	21120	21140	Air	Eau	Déchets	Sols	Bruit	Autres
NACE	Turnover	Energy	21110	21120	Current 21140	Current Air	Current Water	Current Waste	Current Soil	Current Noise	Current Other
151	3666564	50886	399	888	10586	473	3599	4465	825	96	1128
152	370927	2775	0	51	1362	39	522	607	81	11	102
153	1731198	49251	4125	1613	5583	167	1805	2398	348	61	804
154	2146982	14329	51	163	5565	224	2042	2468	470	60	301
155	2751763	33187	2936	299	8969	343	2653	4276	726	102	869
156	1063913	22075	1560	21	2710	69	1742	647	109	23	120
157	2019871	19597	392	140	4480	239	1479	1940	359	49	414
158	5588682	83665	4282	980	17080	598	5130	8267	1511	134	1440
159	2922597	41188	3076	310	12025	190	2554	8130	439	93	619
160	1615919	3537	87	191	2345	593	35	373	95	1138	111
171	527381	17293	11	0	1757	19	685	757	137	5	154
172	1349219	38179	525	44	4775	77	1975	1820	407	15	481
173	389183	15975	2036	2	2475	26	1057	932	253	4	203
174	754997	4526	579	0	3094	25	1071	1611	217	16	154
175	2791622	50451	764	541	10539	88	3950	4780	719	26	976
176	70631	1486	0	0	161	3	67	67	14	1	9
177	39201	550	0	0	63	1	27	23	5	0	7
181	12182	11	0	0	0	0	0	0	0	0	0
182	1492960	5002	0	0	2438	235	385	1732	31	0	55
183	21878	722	0	0	73	3	34	31	0	0	5
191	34687	549	0	130			139	113			22
192	222116	1250	0	0			888	783			143
193	36699	719	0	0			147	139			24
201	237742	3805	50	42	3130	80	14	2936	8	34	58
202	840441	27852	439	205	5896	685	108	4271	69	286	477
203	315413	4505	295	312	1837	165	28	1444	18	73	109
204	149229	1387	0	7	963	87	14	756	9	37	60
205	44224	585	0	54	133	16	3	94	2	7	11
211	1851163	97476	164	2082	6078	950	1127	3199	135	142	525
212	1817896	26896	992	1710	8041	1264	1557	4184	180	189	667
221	2128977	8044	0	62	11309	3	1834	9234	59	1	178
222	1904166	24507	413	2383	29574	4	2708	26628	76	1	157
231	100775	3214	35	294	943	2	10	911	16	0	4
232	9412395	346468	4092	10145	43084	154	977	41445	106	0	402
233	502314	2743	51	208	49394	8	52	49307	6	0	21
241	11800355	623754	18412	21996	164380	30552	50298	31566	4249	3173	44542
242	989365	16481	1559	372	707	97	37	197	14	228	134
243	1553104	9908	37	436	14908	2677	3881	3483	383	369	4115
244	5070840	38485	6423	1897	46007	7576	11714	16494	1422	827	7974
245	1784329	17379	252	18469	16569	2472	4311	5103	430	348	3905
246	2838611	35857	768	1014	31788	5390	9737	7951	816	622	7272
247	922155	32706	537	292	8111	1523	2532	1533	228	174	2121
251	1243742	12047	3426	90	2865	117	209	2190	110	44	195
252	5045401	91356	1353	4941	11525	514	915	8555	485	196	860
261	2004985	83757	992	2580	13332	590	9057	2527	310	83	765

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NACE	Turnover	Energy	21110	21120	Current 21140	Current Air	Current Water	Current Waste	Current Soil	Current Noise	Current Other
262	210041	6675	39	87	1462	226	674	451	25	8	78
264	320077	30492	0	8	2106	85	1416	403	61	13	128
265	1054737	80792	4259	2326	8792	386	6038	1542	218	60	548
266	1535262	28208	130	980	20745	591	15674	2702	451	130	1197
267	188028	3025	0	0	1447	65	965	277	44	10	86
268	216306	9736	0	212	1712	69	1057	455	35	9	87
271	5006689	314964	13265	20392	22200	1666	5187	12011	814	1081	1441
272	129145	2288	2	7	372	25	58	224	10	14	41
273	1368194	38355	1760	761	6815	398	1586	3651	316	354	510
274	4039057	98585	621	1947	17646	1494	4350	9122	665	852	1163
275	484209	15027	368	748	2935	266	465	1756	76	197	175
281	1910563	19281	2	69	3521	187	637	2070	128	14	485
282	705982	8946	65	486	1404	68	249	794	93	7	193
283	220148	2167	0	0	354	22	64	202	13	1	52
284	121062	1952	0	0	235	13	46	131	9	1	35
285	1303322	32482	2692	591	3059	138	719	1787	93	10	312
286	280480	3780	52	524	426	61	95	176	17	1	76
287	1030635	16186	86	60	2722	172	460	1409	83	10	588
291	1882984	9382	272	100	1690	111	105	996	78	34	366
292	1733803	12774	79	372	1828	103	96	1031	106	35	457
293	654148	3482	0	613	612	43	40	358	31	13	127
294	291440	2145	0	0	178	11	13	108	8	4	34
295	2675477	21635	196	358	2630	224	190	1487	140	51	538
296	214169	2597	322	0	184	10	9	124	7	3	31
297	143195	1217	0	0	296	11	24	207	4	22	28
300	142579	639	5	0	81	0	2	71	0	0	8
311	532409	3871	68	18	991	46	37	494	155	18	241
312	1488766	7332	2082	461	1330	79	49	843	113	27	219
313	117967	1073	0	0	140	13	8	77	18	4	20
314	556842	3386	440	3508	808	60	31	467	83	21	146
315	745923	8024	476	155	1075	79	47	601	131	27	190
316	464414	5630	1042	35	1001	147	48	468	83	48	207
321	748273	7349	132	86	849	58	286	460	42	0	3
322	1329055	6927	0	0	1424	130	458	763	68	0	5
323	1830495	4960	6	24	2016	166	655	1092	96	0	7
331	426000	3311	0	0	921	0	192	564	65	0	100
332	276184	1540	0	0	678	0	121	440	31	0	86
333	176681	651	0	0	215	0	44	136	12	0	23
334	85927	572	0	0	261	0	84	148	10	0	19
335	17792	214	0	0	14	0	2	9	1	0	2
341	1,3E+07	50054	1	10554	17224	317	1480	11572	881	112	2862
342	1113113	7260	40	284	1516	29	119	1046	82	9	231
343	1884552	16065	2269	697	2404	46	226	1528	124	18	462
351	97555	1509	0	326	190	17	26	111	6	2	28
352	246092	2255	0	74	566	16	110	305	23	7	105
353	1128548	6829	0	87	2784	66	543	1518	111	33	513
354	62069	519	0	0	107	4	23	49	5	2	24

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NACE	Turnover	Energy	21110	21120	Current 21140	Current Air	Current Water	Current Waste	Current Soil	Current Noise	Current Other
361	1800612	20729	503	609	8294	4096	1429	2080	186	2	501
362	627761	474	0	0	1775	832	364	427	43	0	109
364	7139	80	0	0	30	14	6	7	1	0	2
365	77659	1026	49	106	722	116	460	105	5	0	36
366	121577	1285	99	0	557	245	88	180	12	0	32
371	379286	6061	292	495	6351	204	286	5324	62	285	190
372	284898	3907	112	164	2074	182	150	1496	44	73	129
401	18039756	7502337	13202	53886	78250	7549	27350	17097	0	0	26254
402	2457542	1570454	0	0	10660	1028	3726	2329	0	0	3577
410	959309	24945	78	3215	41006	0	99	1665	0	0	39242

Source :
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