



Trajets domicile-travail

Bassin de Lannion

D.Bonjour, novembre 2020

Méthodologie



- Tout part d'un tweet briochin (merci Sébastien !)
 - « les habitants travaillent pas loin de là où ils résident, merci de faire des aménagements cyclables »
- Données issues de la base « open data » du recensement INSEE 2017
- Choix de 22 communes
 - Couronne autour de Lannion + Bégard et Plestin
 - Toutes les autres communes agrégées comme Z_Autre
- Calcul des flux domicile-travail bidirectionnels
 - Sur x actifs habitants à ..., y travaillent à ...
 - Soit en valeur absolue soit en pourcentage
 - Représentation en matrice ou en graphique

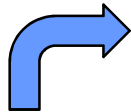
Flux en nombre

82% travaillent en local

FLUX2	TRAVAIL																				Total général				
DOMICILE	Bégard	Caouënnec-Lanvézéac	Cavan	Kermaria-Sulard	Lanmérin	Lannion	Louannec	Perros-Guirec	Plestin-les-Grèves	Pleumeur-Bodou	Ploubezre	Ploulec'h	Ploumilliau	Quemperven	Rospéz	Saint-Quay-Perros	Tonquédec	Trébeurden	Trédrez-Loquémeau	Trégastel	Trélévern	Trézény	Z_Autre	Total général	
Bégard	734	46				208	10	25	5				10				5	5						603	1650
Caouënnec-l	5	65	20			139	5	5		15			5			15				10				75	358
Cavan	42		131			189	5	5							5		5							215	597
Kermaria-Su	5			70		105	20	85	5	5						5		5				5		80	389
Lanmérin	5				10	90		10				5			25			5						70	224
Lannion	92	12	54	13		5210	30	220	52	92	21	31	26		26	80	5	65	9	55	9	3		982	7089
Louannec	25		5	5		466	120	125		25	5	5			5	15	5	15		15		5		180	1022
Perros-Guirec	15		15	5		621	30	853	5	30			5		5	35		30	5	76				177	1909
Plestin-les-Grèves						144		20	498		5	10	10			5			5					430	1127
Pleumeur-Br	35		5	5		597	5	111		354		10	20			30		46		101		5		152	1477
Ploubezre	20		35		5	689	15	30	10	15	293	10	25		5	15	10	15		5				181	1378
Ploulec'h	5					326		10	21			109	16		5					10				73	575
Ploumilliau	20		15			340	10	15	15		5	15	205		10	15		5	5					160	835
Quemperven				5		60		5		10				65										50	194
Rospéz	15		20			265	5	5		5	10	10	5	15	115	5								195	670
Saint-Quay-f	10	5				197	5	66		25						51		10				5		76	455
Tonquédec	20	5	35			180		5	5	10	5	5	5			5	135	10						80	510
Trébeurden	15					527	5	49		49			5			10		428		20				134	1242
Trédrez-Loquémeau						210	5		25	5		10	20			5			85			5		160	530
Trégastel	10					250		85		15					5	10		5		260				85	725
Trélévern	5		5			112	15	20		5	5		5			5					5	80		103	365
Trézény	5			10		50	5	20								10							65	25	189
Z_Autre	974	10	166	60	5	3692	72	296	328	52	30	39	60	10	40	76	10	40	35	56	75			4284	29635
Total général	2057	97	556	173	20	14666	362	2065	969	712	379	259	423	90	246	392	175	684	144	623	190	68		4284	29635

60% des emplois sont à Lannion

Flux en pourcentage

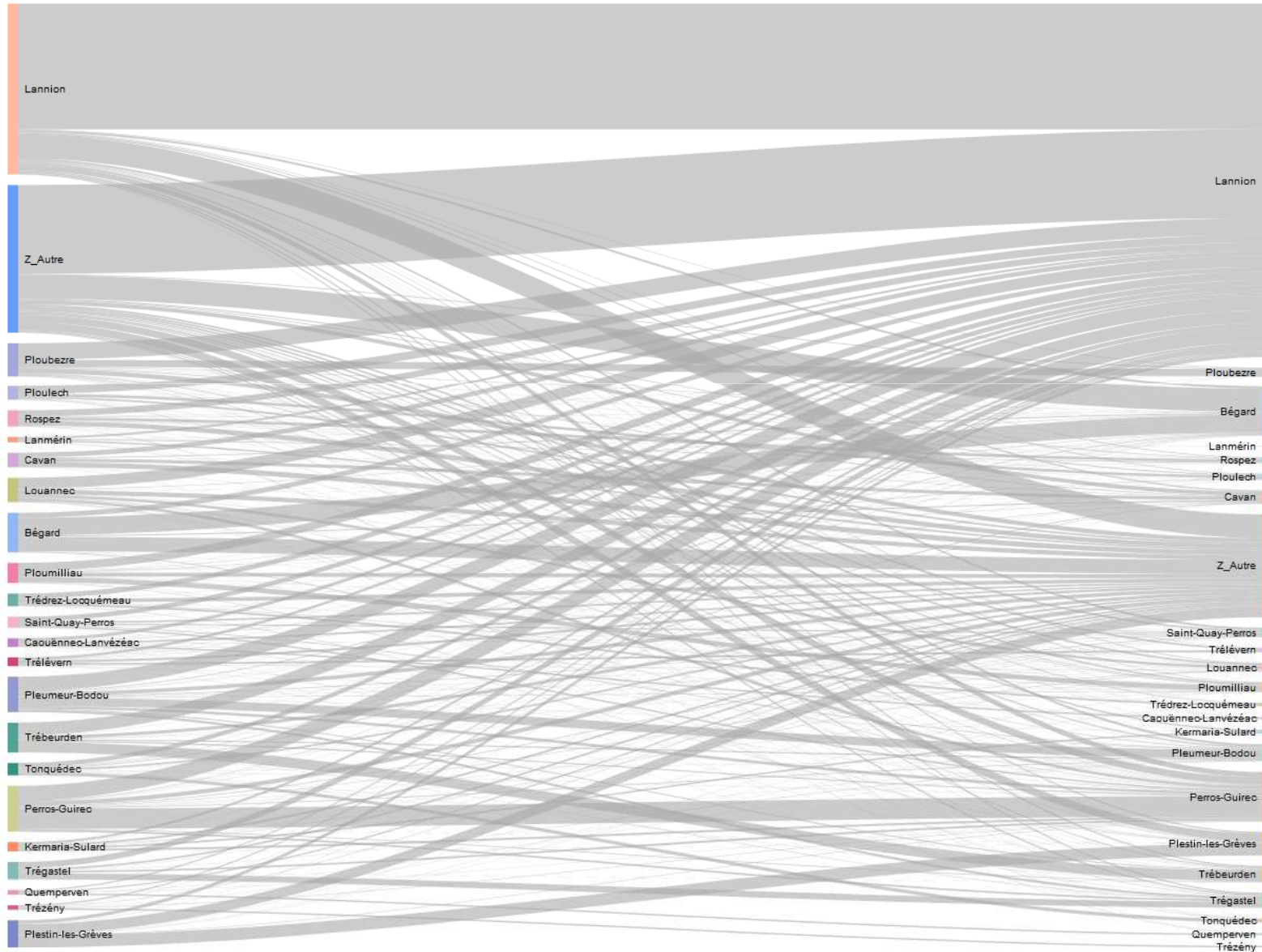


FLUX		TRAVAIL																						Total généra	
DOMICILE	Bégar	Caouënnec-I	Cavan	Kermaria-Sul	Lanmérin	Lannion	Louannec	Perros-Guire	Plestin-les-C	Pleumeur-Bc	Ploubezre	Ploulec'h	Ploumilliau	Quemperv	Rospez	Saint-Quay-F	Tonquédec	Trébeurden	Trédrez-Locc	Trégastel	Trélévern	Trézény	Z_Autre	Total généra	
Bégar	44%	0%	3%	0%	0%	13%	1%	2%	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	37%	100%
Caouënnec-I	1%	18%	6%	0%	0%	39%	1%	1%	0%	4%	0%	0%	1%	0%	0%	4%	0%	0%	0%	3%	0%	0%	0%	21%	100%
Cavan	7%	0%	22%	0%	0%	32%	1%	1%	0%	0%	0%	0%	0%	0%	1%	0%	1%	0%	0%	0%	0%	0%	0%	36%	100%
Kermaria-Sul	1%	0%	0%	18%	0%	27%	5%	22%	1%	1%	0%	0%	0%	0%	0%	1%	0%	1%	0%	0%	1%	0%	0%	21%	100%
Lanmérin	2%	0%	0%	2%	4%	40%	0%	4%	0%	0%	0%	2%	0%	0%	11%	0%	0%	2%	0%	0%	0%	0%	0%	31%	100%
Lannion	1%	0%	1%	0%	0%	74%	0%	3%	1%	1%	0%	0%	0%	0%	0%	1%	0%	1%	0%	1%	0%	0%	0%	14%	100%
Louannec	2%	0%	0%	0%	0%	46%	12%	12%	0%	2%	0%	0%	0%	0%	0%	1%	0%	1%	0%	1%	0%	1%	0%	18%	100%
Perros-Guire	1%	0%	1%	0%	0%	33%	2%	45%	0%	2%	0%	0%	0%	0%	0%	0%	2%	0%	2%	0%	4%	0%	0%	9%	100%
Plestin-les-C	0%	0%	0%	0%	0%	13%	0%	2%	44%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	38%	100%
Pleumeur-Bc	2%	0%	0%	0%	0%	40%	0%	8%	0%	24%	0%	1%	1%	0%	0%	2%	0%	3%	0%	7%	0%	0%	0%	10%	100%
Ploubezre	1%	0%	3%	0%	0%	50%	1%	2%	1%	1%	21%	1%	2%	0%	0%	1%	1%	1%	0%	0%	0%	0%	0%	13%	100%
Ploulec'h	1%	0%	0%	0%	0%	57%	0%	2%	4%	0%	0%	19%	3%	0%	1%	0%	0%	0%	0%	2%	0%	0%	0%	13%	100%
Ploumilliau	2%	0%	2%	0%	0%	41%	1%	2%	2%	0%	1%	2%	25%	0%	1%	2%	0%	1%	1%	0%	0%	0%	0%	19%	100%
Quemperv	0%	0%	3%	0%	0%	31%	0%	3%	0%	5%	0%	0%	0%	33%	0%	0%	0%	0%	0%	0%	0%	0%	0%	26%	100%
Rospez	2%	0%	3%	0%	0%	40%	1%	1%	0%	1%	1%	1%	1%	2%	17%	0%	1%	0%	0%	0%	0%	0%	0%	29%	100%
Saint-Quay-F	2%	1%	0%	0%	0%	43%	1%	14%	0%	6%	0%	0%	0%	0%	0%	11%	0%	2%	0%	1%	1%	0%	0%	17%	100%
Tonquédec	4%	1%	7%	0%	0%	35%	0%	1%	1%	2%	1%	1%	1%	0%	0%	1%	26%	0%	1%	0%	1%	0%	0%	16%	100%
Trébeurden	1%	0%	0%	0%	0%	42%	0%	4%	0%	4%	0%	0%	0%	0%	0%	1%	0%	34%	0%	2%	0%	0%	0%	11%	100%
Trédrez-Locc	0%	0%	0%	0%	0%	40%	1%	0%	5%	1%	0%	2%	4%	0%	0%	1%	0%	0%	16%	0%	1%	0%	0%	30%	100%
Trégastel	1%	0%	0%	0%	0%	34%	0%	12%	0%	2%	0%	0%	0%	0%	1%	0%	1%	0%	36%	0%	0%	0%	0%	12%	100%
Trélévern	1%	0%	1%	0%	0%	31%	4%	5%	0%	1%	1%	0%	1%	0%	0%	1%	0%	0%	0%	1%	22%	0%	0%	28%	100%
Trézény	3%	0%	0%	5%	0%	26%	3%	10%	0%	0%	0%	0%	0%	0%	0%	5%	0%	0%	0%	0%	0%	0%	34%	13%	100%
Z_Autre	16%	0%	3%	1%	0%	60%	1%	5%	5%	1%	0%	1%	1%	0%	1%	1%	0%	1%	1%	1%	1%	0%	0%	0%	100%

Une bonne proportion d'emplois intra-commune

Flux visuels

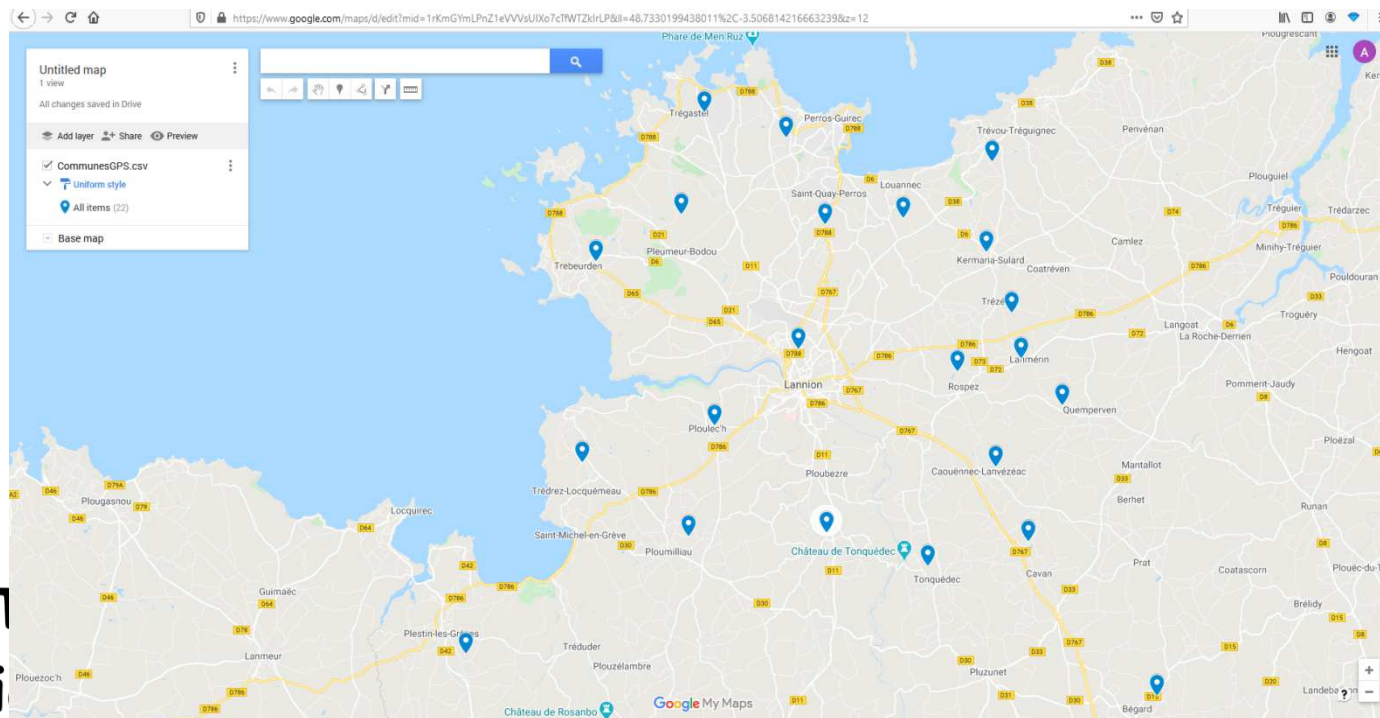
<https://jsfiddle.net/qzf95nx3/1/show>



Une autre approche



- Estimer les distances domicile-travail
 - Croisement des données avec la géolocalisation
 - Flux ramenés au « centre » de chaque commune
 - Ajustement manuel pour quelques communes
 - Attention $d = 0$ si trajet intra commune



Bi

Distribution des distances au travail

Ville Domicile	Distance en km										
	2	4	6	8	10	12	14	16	18	20	20+
Bégard	44%	44%	47%	50%	54%	54%	65%	66%	85%	86%	100%
Caouënnec-Lanvézéac	18%	24%	24%	25%	65%	74%	81%	81%	85%	86%	100%
Cavan	22%	23%	26%	34%	34%	66%	68%	74%	74%	82%	100%
Kermaria-Sulard	18%	24%	27%	81%	82%	91%	91%	92%	94%	95%	100%
Lanmérin	4%	18%	18%	67%	71%	82%	84%	89%	91%	91%	100%
Lannion	74%	74%	77%	81%	83%	85%	85%	87%	90%	90%	100%
Louannec	12%	26%	73%	74%	78%	81%	85%	85%	85%	87%	100%
Perros-Guirec	45%	48%	52%	87%	89%	89%	89%	91%	92%	92%	100%
Plestin-les-Grèves	44%	44%	50%	52%	53%	55%	56%	68%	80%	82%	100%
Pleumeur-Bodou	24%	27%	76%	85%	85%	87%	88%	88%	88%	89%	100%
Ploubezre	21%	21%	75%	78%	81%	87%	88%	90%	90%	91%	100%
Ploulec'h	19%	22%	78%	78%	79%	85%	87%	87%	87%	89%	100%
Ploumilliau	25%	26%	28%	30%	75%	80%	82%	86%	88%	89%	100%
Quemperven	33%	33%	38%	41%	72%	77%	85%	90%	90%	90%	100%
Rospéz	17%	19%	60%	66%	72%	75%	79%	81%	81%	81%	100%
Saint-Quay-Perros	11%	27%	77%	79%	82%	83%	83%	83%	83%	84%	100%
Tonquédec	26%	33%	36%	38%	80%	80%	82%	87%	91%	93%	100%
Trébeurden	34%	38%	38%	40%	87%	88%	88%	88%	88%	88%	100%
Trédrez-Locquémeau	16%	17%	23%	27%	69%	71%	72%	73%	74%	75%	100%
Trégastel	36%	36%	50%	52%	86%	86%	87%	87%	87%	87%	100%
Trélévern	22%	32%	34%	40%	70%	80%	82%	82%	85%	86%	100%
Trézény	34%	40%	45%	79%	89%	95%	95%	97%	97%	97%	100%

A titre de comparaison : agglo Landerneau

Ville Domicile	Distance en km										
	2	4	6	8	10	12	14	16	18	20	20+
Daoulas	21%	22%	27%	27%	33%	46%	49%	51%	53%	84%	100%
Dirinon	14%	19%	40%	42%	56%	56%	58%	61%	87%	90%	100%
Hanvec	23%	31%	31%	39%	43%	45%	45%	50%	53%	61%	100%
Hôpital-Camfrout	15%	18%	18%	23%	24%	30%	31%	35%	46%	53%	100%
Irvillac	23%	23%	27%	29%	30%	41%	51%	53%	56%	59%	100%
La Forest-Landerneau	8%	9%	24%	46%	48%	51%	51%	85%	87%	88%	100%
La Martyre	20%	30%	33%	53%	55%	67%	69%	69%	75%	78%	100%
La Roche-Maurice	15%	18%	45%	45%	48%	58%	60%	69%	73%	75%	100%
Landerneau	34%	39%	43%	44%	53%	57%	61%	64%	68%	89%	100%
Lanneuffret	7%	21%	21%	29%	36%	50%	50%	57%	71%	71%	100%
Le Tréhou	31%	31%	37%	46%	50%	69%	73%	73%	73%	75%	100%
Logonna-Daoulas	13%	18%	18%	26%	28%	33%	48%	49%	79%	81%	100%
Loperhet	18%	19%	30%	34%	46%	47%	49%	87%	88%	90%	100%
Pencran	10%	39%	50%	50%	52%	56%	58%	67%	71%	71%	100%
Ploudiry	20%	22%	27%	33%	56%	74%	74%	81%	81%	83%	100%
Plouédern	20%	43%	46%	51%	54%	56%	62%	68%	73%	73%	100%
Saint-Divy	19%	19%	44%	53%	55%	56%	57%	91%	91%	91%	100%
Saint-Eloy	9%	9%	14%	41%	45%	55%	55%	59%	68%	73%	100%
Saint-Thonan	13%	14%	22%	37%	38%	45%	48%	78%	78%	84%	100%
Saint-Urbain	10%	13%	15%	34%	38%	40%	55%	60%	62%	64%	100%
Tréflévénez	25%	29%	38%	58%	67%	71%	75%	75%	83%	83%	100%
Trémaouézan	9%	18%	24%	42%	44%	44%	53%	64%	69%	69%	100%

Deux améliorations au calcul



- Trajets inter commune
 - Calcul « à vol d'oiseau » oublie le réseau routier
 - Calcul manuel d'itinéraire sur le top 30 : facteur 1,25
- Trajets intra commune
 - Distance = 0 pour l'intra commune : faux !
 - Estimation d'un « rayon » des 22 communes
 - De 1 à 4 km
 - Pas de prise en compte de la densité de l'habitat : pessimiste
 - Pessimiste pour les trajets 1-2 km, optimiste pour les 5+ km

Essayons donc de faire mieux



Domicile	Distance en km																				
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20 20+	
Bégard	0%	0%	44%	44%	44%	45%	46%	47%	50%	50%	50%	54%	54%	54%	54%	63%	65%	65%	66%	66%	100%
Caouënnec-Lanvézéac	0%	18%	18%	24%	24%	24%	24%	24%	25%	64%	64%	64%	67%	74%	74%	74%	81%	81%	81%	81%	100%
Cavan	0%	22%	22%	22%	23%	24%	26%	26%	34%	34%	34%	66%	66%	66%	66%	66%	68%	68%	70%	74%	100%
Kermaria-Sulard	0%	18%	18%	19%	24%	26%	26%	27%	81%	81%	82%	82%	88%	90%	91%	91%	91%	92%	92%	92%	100%
Lanmérin	0%	4%	16%	16%	18%	18%	18%	18%	67%	67%	71%	76%	82%	82%	84%	84%	84%	84%	84%	89%	100%
Lannion	0%	0%	0%	74%	74%	75%	77%	81%	81%	81%	82%	83%	83%	85%	85%	85%	85%	86%	87%	87%	100%
Louannec	0%	12%	12%	13%	26%	26%	27%	73%	74%	74%	78%	78%	79%	79%	81%	82%	85%	85%	85%	85%	100%
Perros-Guirec	0%	0%	45%	47%	48%	48%	52%	86%	87%	87%	87%	87%	89%	89%	89%	89%	89%	89%	90%	91%	100%
Plestin-les-Grèves	0%	0%	44%	44%	44%	45%	50%	50%	50%	52%	53%	53%	53%	54%	55%	55%	56%	56%	57%	57%	100%
Pleumeur-Bodou	0%	0%	0%	24%	27%	27%	37%	85%	85%	85%	85%	85%	86%	87%	87%	87%	88%	88%	88%	88%	100%
Ploubezre	0%	0%	21%	21%	21%	72%	75%	75%	75%	78%	78%	81%	83%	84%	87%	87%	87%	89%	89%	90%	100%
Ploulec'h	0%	19%	19%	19%	22%	78%	78%	78%	78%	78%	79%	79%	79%	81%	85%	87%	87%	87%	87%	87%	100%
Ploumilliau	0%	0%	25%	25%	26%	27%	28%	28%	28%	30%	72%	74%	76%	77%	80%	82%	82%	83%	85%	86%	100%
Quemperven	0%	33%	33%	33%	33%	36%	38%	41%	41%	41%	41%	72%	74%	74%	77%	79%	85%	85%	90%	90%	100%
Rospez	0%	17%	17%	17%	19%	19%	19%	60%	65%	66%	67%	72%	73%	75%	75%	77%	79%	80%	81%	81%	100%
Saint-Quay-Perros	0%	11%	11%	27%	70%	70%	76%	77%	78%	79%	79%	82%	82%	83%	83%	83%	83%	83%	83%	83%	100%
Tonquédec	0%	26%	26%	26%	33%	34%	36%	36%	36%	38%	40%	45%	80%	80%	80%	80%	82%	84%	86%	87%	100%
Trébeurden	0%	0%	34%	34%	38%	38%	38%	38%	38%	82%	82%	83%	88%	88%	88%	88%	88%	88%	88%	88%	100%
Trédrez-Locquémeau	0%	16%	16%	16%	17%	23%	23%	23%	23%	27%	29%	69%	69%	69%	71%	72%	72%	72%	73%	73%	100%
Trégastel	0%	0%	36%	36%	36%	36%	48%	50%	51%	52%	86%	86%	86%	86%	86%	86%	86%	87%	87%	87%	100%
Trélévern	0%	22%	27%	27%	32%	32%	33%	40%	40%	70%	70%	70%	77%	78%	80%	81%	82%	82%	82%	82%	100%
Trézény	34%	34%	40%	40%	40%	42%	42%	45%	74%	79%	79%	89%	95%	95%	95%	95%	95%	97%	97%	97%	100%

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	20+
0%	5%	19%	43%	46%	51%	53%	64%	66%	70%	74%	77%	79%	80%	80%	81%	82%	83%	83%	84%	100%

46% ≤ 5 km ; 70% ≤ 10 km

Comment aller plus loin ?



Domicile	Distance en km																				
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	20+
Bégard																			66%	66%	100%
Caouënnec-Lanvézéac																			81%	81%	100%
Cavan																			70%	74%	100%
Kermaria-Sulard																			92%	92%	100%
Lanmérin																			84%	89%	100%
Lannion																			87%	87%	100%
Louannec																			85%	85%	100%
Perros-Guirec																			90%	91%	100%
Plestin-les-Grèves	0%	0%	44%	44%	44%	45%	50%	50%	50%	52%	53%	53%	53%	54%	55%	55%	56%	56%	57%	57%	100%
Pleumeur-Bodou	0%	0%	0%	24%	27%	27%	37%	85%	85%	85%	85%	85%	86%	87%	87%	87%	88%	88%	88%	88%	100%
Ploubezre	0%	0%	21%	21%	21%	72%	75%	75%	75%	78%	78%	81%	83%	84%	87%	87%	87%	89%	89%	90%	100%
Ploulec'h	0%	19%	19%	19%	22%	78%	78%	78%	78%	78%	79%	79%	79%	81%	85%	87%	87%	87%	87%	87%	100%
Ploumilliau	0%	0%	25%	25%	26%	27%	28%	28%	28%	30%	72%	74%	76%	77%	80%	82%	82%	83%	85%	86%	100%
Quemperven																			90%	90%	100%
Rospéz																			81%	81%	100%
Saint-Quay-Perros																			83%	83%	100%
Tonquédec																			86%	87%	100%
Trébeurden																			88%	88%	100%
Trédrez-Locquémeau																			73%	73%	100%
Trégastel																			87%	87%	100%
Trélévern																			82%	82%	100%
Trézény																			97%	97%	100%

Si seulement on pouvait avoir un échantillon important de distances réelles domicile-travail dans le Trégor

Bon sang mais c'est bien sûr !
Utilisons les données du Challenge « à vélo au boulot » !



Comparaisons

- Le kilométrage quotidien des participants au Challenge est \geq à la distance domicile-travail
 - A/R le midi
 - Détours et trajets supplémentaires
- Autre biais : plus on habite loin, moins on vient à vélo
 - La fraction qui habite loin sera sous-représentée dans les distances du Challenge

Distance km	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	20+
Année Lannion	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	20+
2019	1%	8%	25%	39%	52%	62%	69%	75%	81%	86%	88%	90%	93%	94%	96%	96%	97%	97%	98%	99%	100%

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	20+
0%	5%	19%	43%	46%	51%	53%	64%	66%	70%	74%	77%	79%	80%	80%	81%	82%	83%	83%	84%	100%

Divergence à partir de 5 km



Résultat final

- Les chiffres du Challenge donnent une bonne idée sur les petites distances (1 à 4 km)

Année Lannion	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	20+
2019	1%	8%	25%	39%	52%	62%	69%	75%	81%	86%	88%	90%	93%	94%	96%	96%	97%	97%	98%	99%	100%

- Résultats Challenge-calcul similaires sur d = 4-5 km
- Probablement à partir de 6 km, le calcul est plus fiable

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	20+
0%	5%	19%	43%	46%	51%	53%	64%	66%	70%	74%	77%	79%	80%	80%	81%	82%	83%	83%	84%	100%

- Synthèse facile à mémoriser
 - Distance domicile-travail bassin de Lannion

25% ≤ 3 km ; 50% ≤ 5 km ; 70% ≤ 10 km

Modes de transport domicile-travail (I)



Figure 1 - Part du mode de transport selon la distance domicile-travail effectuée par les actifs ayant un emploi

Voiture, camion, fourgonnette Transports en commun Marche (ou rollers, patinette)
Deux-roues motorisés Vélo

Source INSEE

