b2f GFRP maint steel new factory (1.313%)(1.687%)n ldf GFRP (3.36%)

> devmonths (3.997%)

> > m air

(4.013%)

takt

(5.024%)

| (5.195%) | (11111) |
|----------|----------------------|
| | F () |
| | E_factory (3.77%) |
| arid aas | |

car travel (1.814%)p incin Ti (1.878%)

CTV: freshwater ecotoxicity

(1.324%)p recycl Ti (1.394%)p_recycl steel

(1.513%)

air travel

grid wind water_factopy ldf_CFRP reuse (0.864%)p ldf inconel (0.943%)**OEW** (1.265%)

wastewater factory

(3.238%)

b2f Al

(4.64%)

p incin CFRP

(2.34%)

p incin Al

(0.796%)

maint Al

(0.816%)

(0.643%) (0.54%) (0.494%)

d air maint pol d sea

(0.775%) (0.732%) (0.683%)

test FH

(1.054%)

m sea

(2.017%)

E office

(3.196%)

p recycl CFRP

(4.232%)

b2f Ti

(1.13%)

p recycl Al

(2.321%)

p recycl GFRP (2.913%)p ldf steel (3.298%)

m lorry

(4.753%)

water factory test FH (0.69%)maint steel p ldf Ti (1.403%)E office (1.776%)grid wind (0.442%)(3.54%)(4.97%)(0.755%)**OEW** p recycl Al (0.51%)(1.428%)d sea d air maint Alp Idf CFRP

CTV: human toxicity

E factory (3.708%)

takt (4.017%) p recycl steel (1.836%)p incin Al (2.027%)

car travel

(2.621%)

p ldf steel

(3.12%)

m air (4.434%)

air travel (1.498%)b2f Al (1.71%)

(0.9%)

wastewater factory

(2.542%)

p incin CFRP

(3.081%)

p ldf GFRP

(4.384%)

p ldf inconel (1.187%)b2f GFRP (1.291%)

m sea

(2.138%)

 $(0.\overline{621\%})$ (0.598%) (0.585%)maint pol (1.032%)p recycl Ti (1.274%)

b2f Ti

(1.004%)

reuse

(1.247%)

p_incin_Ti

(2.132%)

p recycl GFRP

(3.005%)

new factory

(4.106%)

(4.036%)(4.706%)

m lorry

CTV: marine ecotoxicity

| b2f_Al | p_ldf_steel (3.335%) | p_recyc (2.10 | b2f_Ti (1.134%) | | | p_incin_A (0.72%) d air | p_ldf | Ti 8%) CFRP | | | | | |
|-------------------------------|--------------------------------|--------------------------|--------------------|-------------------------|-----------------------|-----------------------------------|------------------------|--------------------|---------------------|---------------------|----|------------------------------------|------|
| (5.175%) | (3.33376) | p_incin_CFRP (2.248%) | | air_travel (1.337%) | | (0.786%) grid_wind (0.839%) | (0.542) wind maint_ | | | a water_fa | | | |
| p_ldf_GFRP | E_office (3.356%) | p_recycl_GFRP | | | | b2f_GF (1.354 | | test_FI (1.0069 | | maint (0.9 | AI | %) (0.65° p_ldf_inco (0.896% | onel |
| (5.351%) | | (2.942 | 2%) | maint_steel (1.684%) | | | | | cl_steel 76%) | p_recycl (1.375) | | | |
| b2f_inconel | wastewater_factory (3.371%) | new_factory (3.281%) | | | | | _sea 065%) |) | p_incir (1.789 | | | car_travel (1.705%) | |
| (5.471%) | p_recycl_CFRP (4.171%) | | | | devmonths (4.031%) | | | | | | | E_factory (3.624%) | |
| wastewater_office (5.859%) | | | | | | | | | | | | | |
| | takt (5.036%) |) | | grid_g (4.965 | | | | | m_lorry (4.835%) | | | | |

maint steel m sea $(1.3\overline{4}4\%)$ new factory p recycl GFRP $(2.\overline{2}36\%)$ (2,7560/) (4.353%)

| (2.75070) | L |
|-----------|---|
| | |
| | |
| | |

reuse

(3.184%)

takt

(3.275%)

(3.648%)

E factory

(4.067%)

p_incin_Ti (2.27%)

m_lorry

(2.62%)

E office

(3.603%)

p ldf GFRP

(3.989%)

CTV: terrestrial ecotoxicity

d sea $(1.\overline{3}89\%)$ p recycl Ti (1.393%)

p incin Al

(1.702%)

air travel

(1.859%)

(0.889%)maint pol (1.253%)

car travel

(3.581%)

grid gas

(3.824%)

water factory

(0.63%)

p ldf Al

(0.731%)

b2f Ti

(0.591%) (0.584%) (0.538%) b2f GFRP (1.168%)p ldf inconewastewater factory (1.555%)

(4.358%)

p ldf steel (2.359%)p incin CFRP

(1.635%)flights ap (1.788%)

maint Al

(0.534%)

(1.55%)p recycl steel (1.785%)b2f inconel (3.452%)m air

(3.731%)

b2f Al p ldf CFRPgrid wind

flights year

(1.102%)

test FH

water office fleet d air (0.751%)(1.357%)p recycl CFRP (1.635%)(3.31%)water factory (5.164%)b2f GFRP (0.789%)(1.392%)lubricant b2f Ti p incin steel car travel reuse (0.791%)(1.792%)(0.725%) (0.609%) (0.589%) m air air travel (3.343%)(1.491%)grid hydro maint steeldevelopers grid wind (0.947%) (0.825%) (0.821%) (0.82%) p recycl Al b2f Al p incin CFRP p recycl steel (1.819%)p incin Ti

E office

(2.831%)

b2f inconel

(3.095%)

E factory

(4.456%)

(1.502%)

p recycl Ti

(2.501%)

(1.125%)

p recycl GFRP

(3.035%)

p ldf steel

(4.119%)

(1.107%)

m sea

(2.341%)

(1.018%)

p incin Al

(2.042%)

maint Al

(2.903%)

OEW

(4.09%)

CTV: metal depletion

p_ldf_GFRP (3.478%)

devmonths

(3.963%)

wastewater factory

(5.16%)

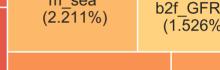
p ldf Ti air travel (1.152%)maint Al (1.68%)p incin Al

 $(3.32\overline{6}\%)$

| (5,0049/) | (/ | | 1 4 1 | vator_ractory | | |
|-------------------------|----------|-------------------------|----------------------------|---------------|----------------------|-----------------------------------|
| (5.004%) | | | p_recycl_steel (1.167%) | (0.110/0) | er_office).483%) | |
| | | p_recycl_Al (2.045%) | | p_ldf_CFRP | test_FH p_incin | _steel d_sea |
| | b2f_Ti | (2.0.1070) | car_travel (1.227%) | (0.81%) | (0.696%) (0.53 | 6 %) (0. 5 06%) |
| n manual Ti | (3.326%) | | (1.22170) | | p_recycl_inconel | |
| p_recycl_Ti (5.147%) | | m_sea | h2f GERP | (0.977%) | (0.957%) | (0.929%) |







new_factory

CTV: agricultural land occupation

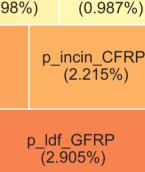
b2f Al $(1.1\overline{49}\%)$ d air

d_lorry

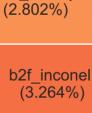
(0.767%)

water factory

maint steel (1.098%)m air $(2.\overline{309\%})$







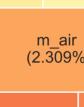
grid gas

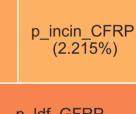
(4.681%)

(2.398%)p recycl CFRP (3.249%)

wastewater factory

(4.235%)





reuse

(4.207%)

flights ap

takt p_recycl_steel d_sea car travel (2 518%)

| (4.119%) | (2.310%) | (1.839%) | (1.657%) | grid wind |
|-------------|---------------------------|------------|-------------|--|
| (4.11970) | | , | | p. ldf. At. (0.518%) |
| | | | | p idi Ai |
| | n recycl GEPP | | | (1.052%)water_factory2f_Al p_ldf_Ti |
| | p_recycl_GFRP (2.629%) | air_travel | p_recyci_11 | (0.593%) (0.47%)(0.413%) |
| new factory | ` / | (1.849%) | (1.720%)wa | stewater factory bot Ti flights am ldf CER |

p_incin_Ti

(2.395%)

m air (3.663%)

p_incin_CFRP

(3.973%)

CTV: climate change

grid gas (2.971%)

p ldf GFRP

(3.149%)

wastewater office

(3.803%)

reuse (4.119%) p_ldf_inconel (1.916%)

test FH

(1.773%)

m sea

(2.265%)

 $(1.11\overline{\%})$ p_incin_Al

b2f GFRP

(1.005%)

b2t_Ti (0.834%)maint pol (1.485%)

lifetime

(0.491%)

flights_app_ldf_CFRP (0.639%) (0.635%)maint steel (1.406%)

E office

(3.515%)

flights year

(3.86%)

(1.607%)

p_ldf_steel (2.264%)

m lorry (2.121%)

(4.566%)

b2f inconel (3.195%)

E_factory

(3.859%)

lifetime p_incin_Al takt (0.607%)air travel (1.602%)(2.485%)(1.834%)p ldf CFRP (4.171%) p_ldf Ti (0.626%)d sea (0.401%)

CTV: fossil depletion

p recycl GFRP (2.611%)

(3.06%)

p ldf GFRP

(3.108%)

E factory

(3.781%)

car travel

(4.137%)

new factory

(4.569%)

grid_gas

p recycl steel (1.841%)p ldf inconel

(1.912%)

p incin Ti

(2.408%)

m air

(3.667%)

flights year

(4.027%)

p recycl Ti (1.689%)test FH

(1.652%)

(1.769%)

p ldf steel

(2.256%)

E office

(3.514%)

p incin CFRP

(3.948%)

m sea

 $(2.\overline{252\%})$

b2f inconel

(3.233%)

wastewater office

(3.788%)

h2f Ti

| m_lorry (5.26%) | wastewater_factory (3.354%) | p_recycl_steel (1.773%) | (1.177%) p_recycl_Al (1.308%) | | water_fac (0.759% p_ldf_inco | onel | | | | |
|--|--------------------------------|----------------------------|-------------------------------------|------------------------|------------------------------------|-------|---------------------------|---|--|--|
| (5.26%) | n left ata al | m_sea (1.8%) | | | (0.832% p_recycl_ (0.852% | Ti ma | aint_pol .723%) | | t_ <u>pAl</u> recycl_incc 69%) (0.593%) | |
| grid_gas | p_ldf_steel (3.643%) | | b2f_GF (1.332 | | d_a (1.036 | ir | OE | , | grid_wind (0.878%) | |
| (5.506%) | new_factory | maint_steel (1.949%) | b2f_/ (1.57 | | test_F (1.148 | | reus (1.13 | | air_travel (1.09%) | |
| | (3.811%) | | | p_incin_Ti (2.149%) | | | p_incin_Al (2.078%) | | car_travel (1.964%) | |
| b2f_inconel (5.806%) p_recycl_CFRP (4.236%) | | E_offic (3.19% | E_factory (3.1%) | | | | p_recycl_GFRP (2.966%) | | | |
| wastewater_office (6.004%) | p_ldf_GFRP (4.931%) | takt (4.819%) | | | m_a (4.42 | | | | vmonths 1.266%) | |

CTV: freshwater eutrophication

grid gas air travel d sea p recycl CFRP (2.441%)(1.848%)(1.738%)(4.545%)

p_incin_Ti (2.504%)

p recycl GFRP

car_travel

(4.236%)

lifetime (1.949%)

m lorry

(1.954%)

m sea

(2.258%)

m air

(3.565%)

p_recycl_Al

(4.234%)

CTV: ionising radiation

test FH (1.821%)p recycl steel

(1.84%)

(1.141%) water_factorycl_incomæf_Al

(0.617%)(0.4%)(0.4%)maint steel b2f GFRP (1.398%)(0.94%)p recycl Ti p incin Al

grid wind

(0.489%)

wastewater_factory_ldf_Ti

(1.005%)

p ldf Al

(1.585%)

(2.54%)p_ldf_GFRP (2.931%)wastewater office (3.62%)

(4.548%)

takt (2.214%)

p ldf steel (2.153%)E factory (3.478%)

p incin CFRP

(4.133%)

(1.564%)

(1.965%)b2f inconel (3.087%)

E office

(3.639%)

b2f Tip ldf CFRP

maint pol

(1.543%)

p ldf inconel

(0.797%)(0.624%)

test FH p recycl GFRP air travel $(1.7\overline{2}7\%)$ (2.683%)(1.845%)new factory (4.578%)p incin Al

grid gas (2.765%)

flights year

(3.158%)

b2f inconel

(3.267%)

E office

(3.733%)

car travel

p ldf inconel (1.911%)

m lorry

(2.262%)

takt

(2.478%)

(3.688%)

p incin CFRP

(3.972%)

CTV: marine eutrophication

(1.732%)p recycl Ti (1.812%)

p_recycl steel

(1.821%)

flights_ap p ldf CFRPwater_factorgrid_wind (0.813%)(0.639%) (0.62%) (0.521%) wastewater factory (1.229%)

d_sea

(1.623%)

b2f Al

(0.666%)

p ldf Al

(0.788%)

p ldf Ti

(0.431%) maint Al

(0.442%)

p_incin_Ti (2.424%)E factory

p ldf steel (2.29%)reuse (3.625%)

wastewater office

(3.889%)

b2f GFRP

(1.036%)

maint pol

(1.457%)

m sea (2.278%)p ldf GFRP (3.314%)

m air

(3.759%)

b2f Ti

(0.859%)

maint steel

(1.412%)

| p_ldf_GFRP (5.099%) | p_recycl_GFRP (3.349%) | b2f_Ti (1.691%) | | 691%) | | (0.794%) | maint_Al air_travel (0.794%) (0.458%) b2f_steel m sea (0.464%) | | | |
|--|------------------------------|----------------------|-------------------------|----------------------------------|-------|---------------------|---|-----------------|----------------------------|--|
| | | E_offi (1.72 | | b2f_Al (1.232%) car_travel | | (0.848%) | fleet maint_pol OEW (0.48%)(0.419%(0.404%) | | | |
| wastewater_factory (5.722%) takt (6.632%) | p_recycl_inconel (3.444%) | grid_w | vind | (1.258%) | | | FRIP_incin_steel | | | |
| | | (1.757 | | | .65%) | p_incin_ (1.128% | Al p_inci %) (1 | n_CFRP .11%) | p_recycl_steel (1.078%) | |
| | d_air (3.627%) | devmonths (2.93%) | | | | | | cl_CFRP 29%) | b2f_GFRP (1.789%) | |
| | wastewater_office (4.89%) | | p_recycl_Al (4.037%) | | | | _incin_Ti (3.761%) | | aint_steel 3.633%) | |
| grid_gas (6.997%) | (110010) | | | | | | | | | |
| | p_ldf_steel (4.998%) | m_lorry (4.943%) | | | | | m_ai (4.909 | r %) | | |

CTV: natural land transformation

p incin Ti p recycl Ti air travel (2.483%)(1.851%)(1.677%)(4.482%)

p recycl GFRP (2.557%)

grid gas

(2.606%)

p_ldf_GFRP

(3.033%)

p recycl steel (1.87%)

p ldf inconel

(1.956%)

takt

(2.302%)

m air

(3.607%)

car travel

(4.194%)

CTV: ozone depletion

d sea (1.705%)

test FH

(1.804%)

m sea

 $(2.\overline{257\%})$

(1.118%)water_factorg2f_Al p_ldf_Ti (0.604%)(0.423%)(0.41%) lifetime (1.32%)

wastewater_factory ap

(1.057%)

p ldf Al

p_incin_Al

(1.571%)

E factory

(3.591%)

p incin CFRP

(4.078%)

(0.458%)

grid wind

(0.505%)

(2.2%)

b2f GFRP b2f_Tip_ldf_CFRP (0.958%)(0.807%)(0.624%)maint pol (1.529%)p ldf steel

m lorry (2.008%)b2f inconel (3.137%)

wastewater office

(3.708%)

maint steel

(1.424%)

(4.632%)

E office (3.63%)

p_recycl_Al

(4.388%)

p recycl Ti p recycl GFRP air travel (1.68%)(2.732%)(1.854%)new factory (4.519%)

flights year

(2.813%)

grid gas

(2.824%)

p ldf GFRP

(3.319%)

E office

(3.695%)

p incin CFRP

(4.015%)

p recycl steel (1.884%)

m sea

 $(2.\overline{196\%})$

takt

(2.574%)

reuse

(3.608%)

car travel

test FH

CTV: particulate matter formation

(1.701%)p incin Al (1.738%)

p ldf inconel

(1.812%)

p incin Ti

(2.392%)

(1.289%)flights ap (1.368%)d sea

(1.509%)

E factory

(3.605%)

wastewater office

(3.914%)

p ldf steel

(2.344%)

b2f GFRP

(1.038%)

wastewater factoryb2f Al

p ldf Ti

(0.428%) maint Al

(0.452%)

(0.539%)

p ldf Al

(0.949%)

maint steel

(1.453%)

p ldf CFR Pater factor grid wind

(0.626%) (0.614%) (0.546%)

b2f Ti

(0.848%)

maint pol

(1.447%)

m lorry

(2.317%)

b2f inconel

(3.47%)

m air (3.791%)

b2f GFRP p_incin_Ti d_sea air_travel (0.977%)flights_year (2.458%) $(1.\overline{6}41\%)$ (1.845%)(4 293%)

| ilights_year | (2.458%) | (1.845%) | (1.641%) | water | factory | |
|--------------|--------------------------|----------------|------------------------|---------------------------------|------------------------------|-------------------------|
| (4.293%) | | , , , , | | p ldf Al $(0.\overline{6})$ | 0 1%) | |
| | LOFER | | | (1.083%) p_ldf_ | CFRP _{b2f} | Al p ldf Ti |
| | p_recycl_GFRP (2.59%) | p_recycl_steel | p_recycl_Ti | (0.6 | (24%) (0.4 $\overline{6}$ | %)(0.40 4 %) |
| new_factory | (2.5970) | (1.867%) | (1.711%) _{wa} | stewater_factory _{ife} | etime b | 2f_Ti flights_ap |
| (4.562%) | | | | (1.55170) (0. | 827%) (0 | .825%) (0.646%) |

grid_gas (2.64%)

p_ldf_GFRP

 $(3.\overline{0}8\%)$

m_air

(3.675%)

reuse

(4.191%)

(4.562%)

p_ldf_inconel (1.928%)

takt

(2.357%)

E office

(3.655%)

car_travel

(4.188%)

CTV: photochemical oxidant formation

test FH (1.796%)

p ldf steel

(2.277%)

grid_wind

(0.517%)

m sea

 $(2.\overline{237\%})$

maint pol

(1.483%)

maint steel

(1.433%)

m lorry

(2.083%)

b2f inconel

(3.209%)

wastewater office

(3.753%)

p_incin_Al

(1.598%)

E factory

(3.58%)

p_incin_CFRP

(4.025%)

maint steel m sea (1.433%)E factory (2.254%)new factory

(3.659%)

reuse

(3.677%)

E office (3.679%)

m air

(3.752%)

car travel

(4.179%)

(4.627%)

p ldf_steel (2.292%)

> takt (2.403%)

p_incin_Ti

(2.447%)

b2f inconel

(3.282%)

p incin CFRP

(4.016%)

CTV: terrestrial acidification

maint pol (1.527%)d_sea (1.624%)

p recycl steel

(1.838%)

m_lorry

(2.104%)

p ldf GFRP

(3.123%)

b2f_Ti water factoryb2f Al p ldf Ti (0.814%) (0.615%)(0.507%(0.414%) wastewater factory p ldf Al (1.151%)(1.076%)

p ldf inconel

(1.944%)

grid gas

(2.739%)

p ldf_CFRPgrid_wind

flights ap

test FH

(1.792%)

flights year

(3.977%)

(0.621%) (0.532%)

(0.705%) (0.566%)

lifetime

p recycl Ti

(1.775%)

(1.893%)p recycl GFRP (2.665%)wastewater office

(3.808%)

air travel

b2f GFRP

(1.022%)

p incin Al

(1.675%)

maint_pol p_recycl_Ti p_incin_Al (1.317%) (0.62%)_p (0.374%) incin_steel E office b2f inconel (2.097%)water factory (0.444%) p_recycl_Al (2.832%)(0.682%) idf inconel new_factory (0.505%)b2f Al d air (1.327%)p ldf CFRP air travel maint Al (0.94%)(2.255%)(0.614%) (0.549%) (0.509%) devmonths b2f GFRP b2f Ti test FH m sea (1.405%)(1.095%)

CTV: urban land occupation

(3.172%)p recycl GFRP

(3.359%)

p ldf GFRP

(4.095%)

wastewater factory

(5.456%)

reuse (2.352%)

p_recycl CFRP

(2.696%)

p ldf steel

(3.917%)

E factory (1.671%)

p recycl inconel

(2.015%)

takt

(5.34%)

(1.299%)grid wind (1.654%)

p_incin_Ti

(3.657%)

car travel

(1.926%)

p_incin_CFRP

(1.924%)

maint steel

(3.459%)

m air (4.803%)

grid gas p recycl steel d sea p_recycl CFRP (2.469%)(1.87%)(1.732%)(4.556%)

(4.605%)

p_incin_Ti (2.486%)

p recycl GFRP

(2.562%)

p ldf GFRP

(3.017%)

wastewater office

(3.644%)

p_recycl_Al

(4.318%)

air travel (1.872%)

p_ldf_inconel

(1.971%)

takt

(2.308%)

E office

(3.604%)

car_travel

(4.245%)

CTV: water depletion

test FH (1.819%)p_recycl_Ti

(1.827%)

(1.159%) water_factor 2 fp Arlecycl_inconel (0.616%) (0.416%) (0.393%) lifetime b2f GFRP (1.378%)(0.943%)p incin Al maint pol

wastewater_facto(0.416%)

grid wind

(0.488%)

(1.03%)

p ldf Al

(1.576%)

p incin CFRP

(4.099%)

m sea (2.277%)m_air (3.562%)

p ldf_steel (2.165%)

(1.545%)

(1.976%)b2f inconel (3.03%)

E_factory

(3.652%)

b2f Tip ldf CFRP

maint steel

(1.384%)

(0.815%) (0.631%)

m lorry