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Equations taken from the Text Editor

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# economy\_energy\_transformation\_input

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economy\_energy\_transformation\_input[REGIONS\_9\_I,PRO\_ECONOMY\_CORRESPONDENCE\_I,SECTORS\_TRANSFORMATION\_ENERGY\_I\

,SECTORS\_TRANSFORMATION\_ENERGY\_MAP\_I

]=

IF\_THEN\_ELSE(PRO\_ECONOMY\_CORRESPONDENCE\_I= PROTRA\_CHP\_gas\_fuels:AND:SECTORS\_TRANSFORMATION\_ENERGY\_I\

=DISTRIBUTION\_GAS:AND:

SECTORS\_TRANSFORMATION\_ENERGY\_MAP\_I=ELECTRICITY\_GAS,

TI\_by\_PROTRA\_and\_commodity[REGIONS\_9\_I,PROTRA\_CHP\_gas\_fuels,TI\_gas\_bio]\*ZIDZ(PROTRA\_TO\_allocated\

[REGIONS\_9\_I,TO\_elec,PROTRA\_CHP\_gas\_fuels

], SUM(PROTRA\_TO\_allocated[REGIONS\_9\_I,NRG\_TO\_I!,PROTRA\_CHP\_gas\_fuels]))+TI\_by\_PROTRA\_and\_commodity\

[REGIONS\_9\_I,PROTRA\_CHP\_gas\_fuels

,TI\_gas\_fossil]\*ZIDZ(PROTRA\_TO\_allocated[REGIONS\_9\_I,TO\_elec,PROTRA\_CHP\_gas\_fuels], SUM\

(PROTRA\_TO\_allocated[REGIONS\_9\_I,

NRG\_TO\_I!,PROTRA\_CHP\_gas\_fuels])),

IF\_THEN\_ELSE(PRO\_ECONOMY\_CORRESPONDENCE\_I= PROTRA\_CHP\_gas\_fuels:AND:SECTORS\_TRANSFORMATION\_ENERGY\_I\

=DISTRIBUTION\_GAS:AND:

SECTORS\_TRANSFORMATION\_ENERGY\_MAP\_I=STEAM\_HOT\_WATER,

TI\_by\_PROTRA\_and\_commodity[REGIONS\_9\_I,PROTRA\_CHP\_gas\_fuels,TI\_gas\_bio]\*ZIDZ(PROTRA\_TO\_allocated\

[REGIONS\_9\_I,TO\_heat,PROTRA\_CHP\_gas\_fuels

], SUM(PROTRA\_TO\_allocated[REGIONS\_9\_I,NRG\_TO\_I!,PROTRA\_CHP\_gas\_fuels]))+TI\_by\_PROTRA\_and\_commodity\

[REGIONS\_9\_I,PROTRA\_CHP\_gas\_fuels

,TI\_gas\_fossil]\*ZIDZ(PROTRA\_TO\_allocated[REGIONS\_9\_I,TO\_heat,PROTRA\_CHP\_gas\_fuels], SUM\

(PROTRA\_TO\_allocated[REGIONS\_9\_I,

NRG\_TO\_I!,PROTRA\_CHP\_gas\_fuels])),

IF\_THEN\_ELSE(PRO\_ECONOMY\_CORRESPONDENCE\_I= PROTRA\_CHP\_solid\_fossil:AND:SECTORS\_TRANSFORMATION\_ENERGY\_I\

=MINING\_COAL:AND:

SECTORS\_TRANSFORMATION\_ENERGY\_MAP\_I=ELECTRICITY\_COAL,

TI\_by\_PROTRA\_and\_commodity[REGIONS\_9\_I,PROTRA\_CHP\_solid\_fossil,TI\_solid\_fossil]\*ZIDZ\

(PROTRA\_TO\_allocated[REGIONS\_9\_I,TO\_elec

,PROTRA\_CHP\_solid\_fossil], SUM(PROTRA\_TO\_allocated[REGIONS\_9\_I,NRG\_TO\_I!,PROTRA\_CHP\_solid\_fossil\

])),

IF\_THEN\_ELSE(PRO\_ECONOMY\_CORRESPONDENCE\_I= PROTRA\_CHP\_solid\_fossil:AND:SECTORS\_TRANSFORMATION\_ENERGY\_I\

=MINING\_COAL:AND:

SECTORS\_TRANSFORMATION\_ENERGY\_MAP\_I=STEAM\_HOT\_WATER,

TI\_by\_PROTRA\_and\_commodity[REGIONS\_9\_I,PROTRA\_CHP\_solid\_fossil,TI\_solid\_fossil]\*ZIDZ\

(PROTRA\_TO\_allocated[REGIONS\_9\_I,TO\_heat

,PROTRA\_CHP\_solid\_fossil], SUM(PROTRA\_TO\_allocated[REGIONS\_9\_I,NRG\_TO\_I!,PROTRA\_CHP\_solid\_fossil\

])),

IF\_THEN\_ELSE(PRO\_ECONOMY\_CORRESPONDENCE\_I= PROTRA\_CHP\_gas\_fuels\_CCS:AND:SECTORS\_TRANSFORMATION\_ENERGY\_I\

=DISTRIBUTION\_GAS

:AND:SECTORS\_TRANSFORMATION\_ENERGY\_MAP\_I=ELECTRICITY\_GAS,

TI\_by\_PROTRA\_and\_commodity[REGIONS\_9\_I,PROTRA\_CHP\_gas\_fuels\_CCS,TI\_gas\_bio]\*ZIDZ(PROTRA\_TO\_allocated\

[REGIONS\_9\_I,TO\_elec

,PROTRA\_CHP\_gas\_fuels\_CCS], SUM(PROTRA\_TO\_allocated[REGIONS\_9\_I,NRG\_TO\_I!,PROTRA\_CHP\_gas\_fuels\_CCS\

]))+TI\_by\_PROTRA\_and\_commodity

[REGIONS\_9\_I,PROTRA\_CHP\_gas\_fuels\_CCS,TI\_gas\_fossil]\*ZIDZ(PROTRA\_TO\_allocated[REGIONS\_9\_I\

,TO\_elec,PROTRA\_CHP\_gas\_fuels\_CCS

], SUM(PROTRA\_TO\_allocated[REGIONS\_9\_I,NRG\_TO\_I!,PROTRA\_CHP\_gas\_fuels\_CCS])),

IF\_THEN\_ELSE(PRO\_ECONOMY\_CORRESPONDENCE\_I= PROTRA\_CHP\_gas\_fuels\_CCS:AND:SECTORS\_TRANSFORMATION\_ENERGY\_I\

=DISTRIBUTION\_GAS

:AND:SECTORS\_TRANSFORMATION\_ENERGY\_MAP\_I=STEAM\_HOT\_WATER,

TI\_by\_PROTRA\_and\_commodity[REGIONS\_9\_I,PROTRA\_CHP\_gas\_fuels\_CCS,TI\_gas\_bio]\*ZIDZ(PROTRA\_TO\_allocated\

[REGIONS\_9\_I,TO\_heat

,PROTRA\_CHP\_gas\_fuels\_CCS], SUM(PROTRA\_TO\_allocated[REGIONS\_9\_I,NRG\_TO\_I!,PROTRA\_CHP\_gas\_fuels\_CCS\

]))+TI\_by\_PROTRA\_and\_commodity

[REGIONS\_9\_I,PROTRA\_CHP\_gas\_fuels\_CCS,TI\_gas\_fossil]\*ZIDZ(PROTRA\_TO\_allocated[REGIONS\_9\_I\

,TO\_heat,PROTRA\_CHP\_gas\_fuels\_CCS

], SUM(PROTRA\_TO\_allocated[REGIONS\_9\_I,NRG\_TO\_I!,PROTRA\_CHP\_gas\_fuels\_CCS])),

IF\_THEN\_ELSE(PRO\_ECONOMY\_CORRESPONDENCE\_I= PROTRA\_CHP\_solid\_fossil\_CCS:AND:SECTORS\_TRANSFORMATION\_ENERGY\_I\

=MINING\_COAL:AND:

SECTORS\_TRANSFORMATION\_ENERGY\_MAP\_I=ELECTRICITY\_COAL,

TI\_by\_PROTRA\_and\_commodity[REGIONS\_9\_I,PROTRA\_CHP\_solid\_fossil\_CCS,TI\_solid\_fossil]\*\

ZIDZ(PROTRA\_TO\_allocated[REGIONS\_9\_I

,TO\_elec,PROTRA\_CHP\_solid\_fossil\_CCS], SUM(PROTRA\_TO\_allocated[REGIONS\_9\_I,NRG\_TO\_I!,\

PROTRA\_CHP\_solid\_fossil\_CCS])),

IF\_THEN\_ELSE(PRO\_ECONOMY\_CORRESPONDENCE\_I= PROTRA\_CHP\_solid\_fossil\_CCS:AND:SECTORS\_TRANSFORMATION\_ENERGY\_I\

=MINING\_COAL:AND:

SECTORS\_TRANSFORMATION\_ENERGY\_MAP\_I=STEAM\_HOT\_WATER,

TI\_by\_PROTRA\_and\_commodity[REGIONS\_9\_I,PROTRA\_CHP\_solid\_fossil\_CCS,TI\_solid\_fossil]\*\

ZIDZ(PROTRA\_TO\_allocated[REGIONS\_9\_I

,TO\_heat,PROTRA\_CHP\_solid\_fossil\_CCS], SUM(PROTRA\_TO\_allocated[REGIONS\_9\_I,NRG\_TO\_I!,\

PROTRA\_CHP\_solid\_fossil\_CCS])),

IF\_THEN\_ELSE(PRO\_ECONOMY\_CORRESPONDENCE\_I= PROTRA\_CHP\_solid\_bio\_CCS:AND:SECTORS\_TRANSFORMATION\_ENERGY\_I\

=FORESTRY:AND:SECTORS\_TRANSFORMATION\_ENERGY\_MAP\_I

=ELECTRICITY\_OTHER,

TI\_by\_PROTRA\_and\_commodity[REGIONS\_9\_I,PROTRA\_CHP\_solid\_bio\_CCS,TI\_solid\_bio]\*ZIDZ(PROTRA\_TO\_allocated\

[REGIONS\_9\_I,TO\_elec

,PROTRA\_CHP\_solid\_bio\_CCS], SUM(PROTRA\_TO\_allocated[REGIONS\_9\_I,NRG\_TO\_I!,PROTRA\_CHP\_solid\_bio\_CCS\

])),

IF\_THEN\_ELSE(PRO\_ECONOMY\_CORRESPONDENCE\_I= PROTRA\_CHP\_solid\_bio\_CCS:AND:SECTORS\_TRANSFORMATION\_ENERGY\_I\

=FORESTRY:AND:SECTORS\_TRANSFORMATION\_ENERGY\_MAP\_I

=STEAM\_HOT\_WATER,

TI\_by\_PROTRA\_and\_commodity[REGIONS\_9\_I,PROTRA\_CHP\_solid\_bio\_CCS,TI\_solid\_bio]\*ZIDZ(PROTRA\_TO\_allocated\

[REGIONS\_9\_I,TO\_heat

,PROTRA\_CHP\_solid\_bio\_CCS], SUM(PROTRA\_TO\_allocated[REGIONS\_9\_I,NRG\_TO\_I!,PROTRA\_CHP\_solid\_bio\_CCS\

])),

IF\_THEN\_ELSE(PRO\_ECONOMY\_CORRESPONDENCE\_I= PROTRA\_CHP\_liquid\_fuels:AND:SECTORS\_TRANSFORMATION\_ENERGY\_I\

=REFINING:AND:SECTORS\_TRANSFORMATION\_ENERGY\_MAP\_I

=ELECTRICITY\_OIL,

TI\_by\_PROTRA\_and\_commodity[REGIONS\_9\_I,PROTRA\_CHP\_liquid\_fuels,TI\_liquid\_bio]\*ZIDZ(PROTRA\_TO\_allocated\

[REGIONS\_9\_I,TO\_elec

,PROTRA\_CHP\_liquid\_fuels], SUM(PROTRA\_TO\_allocated[REGIONS\_9\_I,NRG\_TO\_I!,PROTRA\_CHP\_liquid\_fuels\

]))+TI\_by\_PROTRA\_and\_commodity

[REGIONS\_9\_I,PROTRA\_CHP\_liquid\_fuels,TI\_liquid\_fossil]\*ZIDZ(PROTRA\_TO\_allocated[REGIONS\_9\_I\

,TO\_elec,PROTRA\_CHP\_liquid\_fuels

], SUM(PROTRA\_TO\_allocated[REGIONS\_9\_I,NRG\_TO\_I!,PROTRA\_CHP\_liquid\_fuels])),

IF\_THEN\_ELSE(PRO\_ECONOMY\_CORRESPONDENCE\_I= PROTRA\_CHP\_liquid\_fuels:AND:SECTORS\_TRANSFORMATION\_ENERGY\_I\

=REFINING:AND:SECTORS\_TRANSFORMATION\_ENERGY\_MAP\_I

=STEAM\_HOT\_WATER,

TI\_by\_PROTRA\_and\_commodity[REGIONS\_9\_I,PROTRA\_CHP\_liquid\_fuels,TI\_liquid\_bio]\*ZIDZ(PROTRA\_TO\_allocated\

[REGIONS\_9\_I,TO\_heat

,PROTRA\_CHP\_liquid\_fuels], SUM(PROTRA\_TO\_allocated[REGIONS\_9\_I,NRG\_TO\_I!,PROTRA\_CHP\_liquid\_fuels\

]))+TI\_by\_PROTRA\_and\_commodity

[REGIONS\_9\_I,PROTRA\_CHP\_liquid\_fuels,TI\_liquid\_fossil]\*ZIDZ(PROTRA\_TO\_allocated[REGIONS\_9\_I\

,TO\_heat,PROTRA\_CHP\_liquid\_fuels

], SUM(PROTRA\_TO\_allocated[REGIONS\_9\_I,NRG\_TO\_I!,PROTRA\_CHP\_liquid\_fuels])),

IF\_THEN\_ELSE(PRO\_ECONOMY\_CORRESPONDENCE\_I= PROTRA\_CHP\_liquid\_fuels\_CCS:AND:SECTORS\_TRANSFORMATION\_ENERGY\_I\

=REFINING:AND:

SECTORS\_TRANSFORMATION\_ENERGY\_MAP\_I=ELECTRICITY\_OIL,

TI\_by\_PROTRA\_and\_commodity[REGIONS\_9\_I,PROTRA\_CHP\_liquid\_fuels\_CCS,TI\_liquid\_bio]\*ZIDZ\

(PROTRA\_TO\_allocated[REGIONS\_9\_I,

TO\_elec,PROTRA\_CHP\_liquid\_fuels\_CCS], SUM(PROTRA\_TO\_allocated[REGIONS\_9\_I,NRG\_TO\_I!,PROTRA\_CHP\_liquid\_fuels\_CCS\

]))+TI\_by\_PROTRA\_and\_commodity

[REGIONS\_9\_I,PROTRA\_CHP\_liquid\_fuels\_CCS,TI\_liquid\_fossil]\*ZIDZ(PROTRA\_TO\_allocated[REGIONS\_9\_I\

,TO\_elec,PROTRA\_CHP\_liquid\_fuels\_CCS

], SUM(PROTRA\_TO\_allocated[REGIONS\_9\_I,NRG\_TO\_I!,PROTRA\_CHP\_liquid\_fuels\_CCS])),

IF\_THEN\_ELSE(PRO\_ECONOMY\_CORRESPONDENCE\_I= PROTRA\_CHP\_liquid\_fuels\_CCS:AND:SECTORS\_TRANSFORMATION\_ENERGY\_I\

=REFINING:AND:

SECTORS\_TRANSFORMATION\_ENERGY\_MAP\_I=STEAM\_HOT\_WATER,

TI\_by\_PROTRA\_and\_commodity[REGIONS\_9\_I,PROTRA\_CHP\_liquid\_fuels\_CCS,TI\_liquid\_bio]\*ZIDZ\

(PROTRA\_TO\_allocated[REGIONS\_9\_I,

TO\_heat,PROTRA\_CHP\_liquid\_fuels\_CCS], SUM(PROTRA\_TO\_allocated[REGIONS\_9\_I,NRG\_TO\_I!,PROTRA\_CHP\_liquid\_fuels\_CCS\

]))+TI\_by\_PROTRA\_and\_commodity

[REGIONS\_9\_I,PROTRA\_CHP\_liquid\_fuels\_CCS,TI\_liquid\_fossil]\*ZIDZ(PROTRA\_TO\_allocated[REGIONS\_9\_I\

,TO\_heat,PROTRA\_CHP\_liquid\_fuels\_CCS

], SUM(PROTRA\_TO\_allocated[REGIONS\_9\_I,NRG\_TO\_I!,PROTRA\_CHP\_liquid\_fuels\_CCS])),

IF\_THEN\_ELSE(PRO\_ECONOMY\_CORRESPONDENCE\_I= PROTRA\_HP\_gas\_fuels:AND:SECTORS\_TRANSFORMATION\_ENERGY\_I\

=DISTRIBUTION\_GAS:AND:

SECTORS\_TRANSFORMATION\_ENERGY\_MAP\_I=STEAM\_HOT\_WATER,

TI\_by\_PROTRA\_and\_commodity[REGIONS\_9\_I,PROTRA\_HP\_gas\_fuels,TI\_gas\_bio]\*ZIDZ(PROTRA\_TO\_allocated\

[REGIONS\_9\_I,TO\_heat,PROTRA\_HP\_gas\_fuels

], SUM(PROTRA\_TO\_allocated[REGIONS\_9\_I,NRG\_TO\_I!,PROTRA\_HP\_gas\_fuels]))+TI\_by\_PROTRA\_and\_commodity\

[REGIONS\_9\_I,PROTRA\_HP\_gas\_fuels

,TI\_gas\_fossil]\*ZIDZ(PROTRA\_TO\_allocated[REGIONS\_9\_I,TO\_heat,PROTRA\_HP\_gas\_fuels], SUM\

(PROTRA\_TO\_allocated[REGIONS\_9\_I,NRG\_TO\_I

!,PROTRA\_HP\_gas\_fuels])),

IF\_THEN\_ELSE(PRO\_ECONOMY\_CORRESPONDENCE\_I= PROTRA\_HP\_liquid\_fuels:AND:SECTORS\_TRANSFORMATION\_ENERGY\_I\

=REFINING:AND:SECTORS\_TRANSFORMATION\_ENERGY\_MAP\_I

=STEAM\_HOT\_WATER,

TI\_by\_PROTRA\_and\_commodity[REGIONS\_9\_I,PROTRA\_HP\_liquid\_fuels,TI\_liquid\_bio]\*ZIDZ(PROTRA\_TO\_allocated\

[REGIONS\_9\_I,TO\_heat

,PROTRA\_HP\_liquid\_fuels], SUM(PROTRA\_TO\_allocated[REGIONS\_9\_I,NRG\_TO\_I!,PROTRA\_HP\_liquid\_fuels\

]))+TI\_by\_PROTRA\_and\_commodity

[REGIONS\_9\_I,PROTRA\_HP\_liquid\_fuels,TI\_liquid\_fossil]\*ZIDZ(PROTRA\_TO\_allocated[REGIONS\_9\_I\

,TO\_heat,PROTRA\_HP\_liquid\_fuels

], SUM(PROTRA\_TO\_allocated[REGIONS\_9\_I,NRG\_TO\_I!,PROTRA\_HP\_liquid\_fuels])),

IF\_THEN\_ELSE(PRO\_ECONOMY\_CORRESPONDENCE\_I= PROTRA\_HP\_solid\_fossil:AND:SECTORS\_TRANSFORMATION\_ENERGY\_I\

=MINING\_COAL:AND:SECTORS\_TRANSFORMATION\_ENERGY\_MAP\_I

=STEAM\_HOT\_WATER,

TI\_by\_PROTRA\_and\_commodity[REGIONS\_9\_I,PROTRA\_HP\_solid\_fossil,TI\_solid\_fossil]\*ZIDZ(\

PROTRA\_TO\_allocated[REGIONS\_9\_I,TO\_heat

,PROTRA\_HP\_solid\_fossil], SUM(PROTRA\_TO\_allocated[REGIONS\_9\_I,NRG\_TO\_I!,PROTRA\_HP\_solid\_fossil\

])),

IF\_THEN\_ELSE(PRO\_ECONOMY\_CORRESPONDENCE\_I=PROTRA\_HP\_solid\_bio:AND:SECTORS\_TRANSFORMATION\_ENERGY\_I\

=FORESTRY:AND:SECTORS\_TRANSFORMATION\_ENERGY\_MAP\_I

=STEAM\_HOT\_WATER,

TI\_by\_PROTRA\_and\_commodity[REGIONS\_9\_I,PROTRA\_HP\_solid\_bio,TI\_solid\_bio]\*ZIDZ(PROTRA\_TO\_allocated\

[REGIONS\_9\_I,TO\_heat,PROTRA\_HP\_solid\_bio

], SUM(PROTRA\_TO\_allocated[REGIONS\_9\_I,NRG\_TO\_I!,PROTRA\_HP\_solid\_bio])),

IF\_THEN\_ELSE(PRO\_ECONOMY\_CORRESPONDENCE\_I=PROTRA\_CHP\_solid\_bio:AND:SECTORS\_TRANSFORMATION\_ENERGY\_I\

=FORESTRY:AND:SECTORS\_TRANSFORMATION\_ENERGY\_MAP\_I

=ELECTRICITY\_OTHER,

TI\_by\_PROTRA\_and\_commodity[REGIONS\_9\_I,PROTRA\_CHP\_solid\_bio,TI\_solid\_bio]\*ZIDZ(PROTRA\_TO\_allocated\

[REGIONS\_9\_I,TO\_elec,

PROTRA\_CHP\_solid\_bio], SUM(PROTRA\_TO\_allocated[REGIONS\_9\_I,NRG\_TO\_I!,PROTRA\_CHP\_solid\_bio\

])),

IF\_THEN\_ELSE(PRO\_ECONOMY\_CORRESPONDENCE\_I=PROTRA\_CHP\_solid\_bio:AND:SECTORS\_TRANSFORMATION\_ENERGY\_I\

=FORESTRY:AND:SECTORS\_TRANSFORMATION\_ENERGY\_MAP\_I

=STEAM\_HOT\_WATER,

TI\_by\_PROTRA\_and\_commodity[REGIONS\_9\_I,PROTRA\_CHP\_solid\_bio,TI\_solid\_bio]\*ZIDZ(PROTRA\_TO\_allocated\

[REGIONS\_9\_I,TO\_heat,

PROTRA\_CHP\_solid\_bio], SUM(PROTRA\_TO\_allocated[REGIONS\_9\_I,NRG\_TO\_I!,PROTRA\_CHP\_solid\_bio\

])),

IF\_THEN\_ELSE(PRO\_ECONOMY\_CORRESPONDENCE\_I=PROTRA\_PP\_solid\_bio:AND:SECTORS\_TRANSFORMATION\_ENERGY\_I\

=FORESTRY:AND:SECTORS\_TRANSFORMATION\_ENERGY\_MAP\_I

=STEAM\_HOT\_WATER,

TI\_by\_PROTRA\_and\_commodity[REGIONS\_9\_I,PROTRA\_PP\_solid\_bio,TI\_solid\_bio]\*ZIDZ(PROTRA\_TO\_allocated\

[REGIONS\_9\_I,TO\_elec,PROTRA\_PP\_solid\_bio

], SUM(PROTRA\_TO\_allocated[REGIONS\_9\_I,NRG\_TO\_I!,PROTRA\_PP\_solid\_bio])),

IF\_THEN\_ELSE(PRO\_ECONOMY\_CORRESPONDENCE\_I=PROTRA\_PP\_solid\_bio\_CCS:AND:SECTORS\_TRANSFORMATION\_ENERGY\_I\

=FORESTRY:AND:SECTORS\_TRANSFORMATION\_ENERGY\_MAP\_I

=ELECTRICITY\_OTHER,

TI\_by\_PROTRA\_and\_commodity[REGIONS\_9\_I,PROTRA\_PP\_solid\_bio\_CCS,TI\_solid\_bio]\*ZIDZ(PROTRA\_TO\_allocated\

[REGIONS\_9\_I,TO\_elec

,PROTRA\_PP\_solid\_bio\_CCS], SUM(PROTRA\_TO\_allocated[REGIONS\_9\_I,NRG\_TO\_I!,PROTRA\_PP\_solid\_bio\_CCS\

])),

IF\_THEN\_ELSE(PRO\_ECONOMY\_CORRESPONDENCE\_I=PROTRA\_PP\_gas\_fuels:AND:SECTORS\_TRANSFORMATION\_ENERGY\_I\

=DISTRIBUTION\_GAS:AND:

SECTORS\_TRANSFORMATION\_ENERGY\_MAP\_I=ELECTRICITY\_GAS,

TI\_by\_PROTRA\_and\_commodity[REGIONS\_9\_I,PROTRA\_PP\_gas\_fuels,TI\_gas\_bio]\*ZIDZ(PROTRA\_TO\_allocated\

[REGIONS\_9\_I,TO\_elec,PROTRA\_PP\_gas\_fuels

], SUM(PROTRA\_TO\_allocated[REGIONS\_9\_I,NRG\_TO\_I!,PROTRA\_PP\_gas\_fuels]))+TI\_by\_PROTRA\_and\_commodity\

[REGIONS\_9\_I,PROTRA\_PP\_gas\_fuels

,TI\_gas\_fossil]\*ZIDZ(PROTRA\_TO\_allocated[REGIONS\_9\_I,TO\_elec,PROTRA\_PP\_gas\_fuels], SUM\

(PROTRA\_TO\_allocated[REGIONS\_9\_I,NRG\_TO\_I

!,PROTRA\_PP\_gas\_fuels])),

IF\_THEN\_ELSE(PRO\_ECONOMY\_CORRESPONDENCE\_I=PROTRA\_PP\_liquid\_fuels:AND:SECTORS\_TRANSFORMATION\_ENERGY\_I\

=REFINING:AND:SECTORS\_TRANSFORMATION\_ENERGY\_MAP\_I

=ELECTRICITY\_OIL,

TI\_by\_PROTRA\_and\_commodity[REGIONS\_9\_I,PROTRA\_PP\_liquid\_fuels,TI\_liquid\_bio]\*ZIDZ(PROTRA\_TO\_allocated\

[REGIONS\_9\_I,TO\_elec

,PROTRA\_PP\_liquid\_fuels], SUM(PROTRA\_TO\_allocated[REGIONS\_9\_I,NRG\_TO\_I!,PROTRA\_PP\_liquid\_fuels\

]))+TI\_by\_PROTRA\_and\_commodity

[REGIONS\_9\_I,PROTRA\_PP\_liquid\_fuels,TI\_liquid\_fossil]\*ZIDZ(PROTRA\_TO\_allocated[REGIONS\_9\_I\

,TO\_elec,PROTRA\_PP\_liquid\_fuels

], SUM(PROTRA\_TO\_allocated[REGIONS\_9\_I,NRG\_TO\_I!,PROTRA\_PP\_liquid\_fuels])),

IF\_THEN\_ELSE(PRO\_ECONOMY\_CORRESPONDENCE\_I=PROTRA\_PP\_nuclear:AND:SECTORS\_TRANSFORMATION\_ENERGY\_I\

=MINING\_AND\_MANUFACTURING\_URANIUM\_THORIUM

:AND:SECTORS\_TRANSFORMATION\_ENERGY\_MAP\_I=ELECTRICITY\_NUCLEAR,

TI\_by\_PROTRA\_and\_commodity[REGIONS\_9\_I,PROTRA\_PP\_nuclear,TI\_nuclear]\*ZIDZ(PROTRA\_TO\_allocated\

[REGIONS\_9\_I,TO\_elec,PROTRA\_PP\_nuclear

], SUM(PROTRA\_TO\_allocated[REGIONS\_9\_I,NRG\_TO\_I!,PROTRA\_PP\_nuclear])),

IF\_THEN\_ELSE(PRO\_ECONOMY\_CORRESPONDENCE\_I=PROTRA\_PP\_solid\_fossil:AND:SECTORS\_TRANSFORMATION\_ENERGY\_I\

=MINING\_COAL:AND:SECTORS\_TRANSFORMATION\_ENERGY\_MAP\_I

=ELECTRICITY\_COAL,

TI\_by\_PROTRA\_and\_commodity[REGIONS\_9\_I,PROTRA\_PP\_solid\_fossil,TI\_solid\_fossil]\*ZIDZ(\

PROTRA\_TO\_allocated[REGIONS\_9\_I,TO\_elec

,PROTRA\_PP\_solid\_fossil], SUM(PROTRA\_TO\_allocated[REGIONS\_9\_I,NRG\_TO\_I!,PROTRA\_PP\_solid\_fossil\

])),

IF\_THEN\_ELSE(PRO\_ECONOMY\_CORRESPONDENCE\_I=PROTRA\_PP\_solid\_fossil\_CCS:AND:SECTORS\_TRANSFORMATION\_ENERGY\_I\

=MINING\_COAL:AND:

SECTORS\_TRANSFORMATION\_ENERGY\_MAP\_I=ELECTRICITY\_COAL,

TI\_by\_PROTRA\_and\_commodity[REGIONS\_9\_I,PROTRA\_PP\_solid\_fossil\_CCS,TI\_solid\_fossil]\*ZIDZ\

(PROTRA\_TO\_allocated[REGIONS\_9\_I

,TO\_elec,PROTRA\_PP\_solid\_fossil\_CCS], SUM(PROTRA\_TO\_allocated[REGIONS\_9\_I,NRG\_TO\_I!,PROTRA\_PP\_solid\_fossil\_CCS\

])),

IF\_THEN\_ELSE(PRO\_ECONOMY\_CORRESPONDENCE\_I=PROTRA\_blending\_gas\_fuels:AND:SECTORS\_TRANSFORMATION\_ENERGY\_I\

=DISTRIBUTION\_GAS

:AND:SECTORS\_TRANSFORMATION\_ENERGY\_MAP\_I=DISTRIBUTION\_GAS,

TI\_by\_PROTRA\_and\_commodity[REGIONS\_9\_I,PROTRA\_blending\_gas\_fuels,TI\_gas\_bio]\*ZIDZ(PROTRA\_TO\_allocated\

[REGIONS\_9\_I,TO\_gas

,PROTRA\_blending\_gas\_fuels], SUM(PROTRA\_TO\_allocated[REGIONS\_9\_I,NRG\_TO\_I!,PROTRA\_blending\_gas\_fuels\

]))+TI\_by\_PROTRA\_and\_commodity

[REGIONS\_9\_I,PROTRA\_blending\_gas\_fuels,TI\_gas\_fossil]\*ZIDZ(PROTRA\_TO\_allocated[REGIONS\_9\_I\

,TO\_gas,PROTRA\_blending\_gas\_fuels

], SUM(PROTRA\_TO\_allocated[REGIONS\_9\_I,NRG\_TO\_I!,PROTRA\_blending\_gas\_fuels])),

IF\_THEN\_ELSE(PRO\_ECONOMY\_CORRESPONDENCE\_I=PROTRA\_blending\_liquid\_fuels:AND:SECTORS\_TRANSFORMATION\_ENERGY\_I\

=REFINING:AND:

SECTORS\_TRANSFORMATION\_ENERGY\_MAP\_I=REFINING,

TI\_by\_PROTRA\_and\_commodity[REGIONS\_9\_I,PROTRA\_blending\_liquid\_fuels,TI\_liquid\_bio]\*ZIDZ\

(PROTRA\_TO\_allocated[REGIONS\_9\_I

,TO\_liquid,PROTRA\_blending\_liquid\_fuels], SUM(PROTRA\_TO\_allocated[REGIONS\_9\_I,NRG\_TO\_I\

!,PROTRA\_blending\_liquid\_fuels]))+

TI\_by\_PROTRA\_and\_commodity[REGIONS\_9\_I,PROTRA\_blending\_liquid\_fuels,TI\_liquid\_fossil]\

\*ZIDZ(PROTRA\_TO\_allocated[REGIONS\_9\_I

,TO\_liquid,PROTRA\_blending\_liquid\_fuels], SUM(PROTRA\_TO\_allocated[REGIONS\_9\_I,NRG\_TO\_I\

!,PROTRA\_blending\_liquid\_fuels])),

IF\_THEN\_ELSE(PRO\_ECONOMY\_CORRESPONDENCE\_I=PROTRA\_PP\_gas\_fuels\_CCS:AND:SECTORS\_TRANSFORMATION\_ENERGY\_I\

=DISTRIBUTION\_GAS:AND:

SECTORS\_TRANSFORMATION\_ENERGY\_MAP\_I=ELECTRICITY\_GAS,

TI\_by\_PROTRA\_and\_commodity[REGIONS\_9\_I,PROTRA\_PP\_gas\_fuels\_CCS,TI\_gas\_bio]\*ZIDZ(PROTRA\_TO\_allocated\

[REGIONS\_9\_I,TO\_elec

,PROTRA\_PP\_gas\_fuels\_CCS], SUM(PROTRA\_TO\_allocated[REGIONS\_9\_I,NRG\_TO\_I!,PROTRA\_PP\_gas\_fuels\_CCS\

]))+TI\_by\_PROTRA\_and\_commodity

[REGIONS\_9\_I,PROTRA\_PP\_gas\_fuels\_CCS,TI\_gas\_fossil]\*ZIDZ(PROTRA\_TO\_allocated[REGIONS\_9\_I\

,TO\_elec,PROTRA\_PP\_gas\_fuels\_CCS

], SUM(PROTRA\_TO\_allocated[REGIONS\_9\_I,NRG\_TO\_I!,PROTRA\_PP\_gas\_fuels\_CCS])),

IF\_THEN\_ELSE(PRO\_ECONOMY\_CORRESPONDENCE\_I=PROTRA\_PP\_liquid\_fuels\_CCS:AND:SECTORS\_TRANSFORMATION\_ENERGY\_I\

=REFINING:AND:SECTORS\_TRANSFORMATION\_ENERGY\_MAP\_I

=ELECTRICITY\_OIL,

TI\_by\_PROTRA\_and\_commodity[REGIONS\_9\_I,PROTRA\_PP\_liquid\_fuels\_CCS,TI\_liquid\_bio]\*ZIDZ\

(PROTRA\_TO\_allocated[REGIONS\_9\_I,TO\_elec

,PROTRA\_PP\_liquid\_fuels\_CCS], SUM(PROTRA\_TO\_allocated[REGIONS\_9\_I,NRG\_TO\_I!,PROTRA\_PP\_liquid\_fuels\_CCS\

]))+TI\_by\_PROTRA\_and\_commodity

[REGIONS\_9\_I,PROTRA\_PP\_liquid\_fuels\_CCS,TI\_liquid\_fossil]\*ZIDZ(PROTRA\_TO\_allocated[REGIONS\_9\_I\

,TO\_elec,PROTRA\_PP\_liquid\_fuels\_CCS

], SUM(PROTRA\_TO\_allocated[REGIONS\_9\_I,NRG\_TO\_I!,PROTRA\_PP\_liquid\_fuels\_CCS])),

IF\_THEN\_ELSE(PRO\_ECONOMY\_CORRESPONDENCE\_I=PROREF\_refinery\_bio:AND:SECTORS\_TRANSFORMATION\_ENERGY\_I\

=CROPS:AND:SECTORS\_TRANSFORMATION\_ENERGY\_MAP\_I

=REFINING,

PE\_by\_PROREF\_and\_commodity[REGIONS\_9\_I,PROREF\_refinery\_bio,PE\_agriculture\_products]\*\

ZIDZ(TI\_by\_PROREF\_and\_commodity[REGIONS\_9\_I

,PROREF\_refinery\_bio,TI\_gas\_bio], SUM(TI\_by\_PROREF\_and\_commodity[REGIONS\_9\_I,PROREF\_refinery\_bio\

,NRG\_TI\_I!]))+PE\_by\_PROREF\_and\_commodity

[REGIONS\_9\_I,PROREF\_refinery\_bio,PE\_agriculture\_products]\*ZIDZ(TI\_by\_PROREF\_and\_commodity\

[REGIONS\_9\_I,PROREF\_refinery\_bio

,TI\_liquid\_bio], SUM(TI\_by\_PROREF\_and\_commodity[REGIONS\_9\_I,PROREF\_refinery\_bio,NRG\_TI\_I\

!])),

IF\_THEN\_ELSE(PRO\_ECONOMY\_CORRESPONDENCE\_I=PROREF\_refinery\_bio:AND:SECTORS\_TRANSFORMATION\_ENERGY\_I\

=FORESTRY:AND:SECTORS\_TRANSFORMATION\_ENERGY\_MAP\_I

=REFINING,

PE\_by\_PROREF\_and\_commodity[REGIONS\_9\_I,PROREF\_refinery\_bio,PE\_forestry\_products]\*ZIDZ\

(TI\_by\_PROREF\_and\_commodity[REGIONS\_9\_I

,PROREF\_refinery\_bio,TI\_gas\_bio], SUM(TI\_by\_PROREF\_and\_commodity[REGIONS\_9\_I,PROREF\_refinery\_bio\

,NRG\_TI\_I!]))+PE\_by\_PROREF\_and\_commodity

[REGIONS\_9\_I,PROREF\_refinery\_bio,PE\_forestry\_products]\*ZIDZ(TI\_by\_PROREF\_and\_commodity\

[REGIONS\_9\_I,PROREF\_refinery\_bio,TI\_liquid\_bio

], SUM(TI\_by\_PROREF\_and\_commodity[REGIONS\_9\_I,PROREF\_refinery\_bio,NRG\_TI\_I!])),

IF\_THEN\_ELSE(PRO\_ECONOMY\_CORRESPONDENCE\_I=PROREF\_refinery\_bio:AND:SECTORS\_TRANSFORMATION\_ENERGY\_I\

=CROPS:AND:SECTORS\_TRANSFORMATION\_ENERGY\_MAP\_I

=HYDROGEN\_PRODUCTION,

PE\_by\_PROREF\_and\_commodity[REGIONS\_9\_I,PROREF\_refinery\_bio,PE\_agriculture\_products]\*\

ZIDZ(TI\_by\_PROREF\_and\_commodity[REGIONS\_9\_I

,PROREF\_refinery\_bio,TI\_hydrogen], SUM(TI\_by\_PROREF\_and\_commodity[REGIONS\_9\_I,PROREF\_refinery\_bio\

,NRG\_TI\_I!])),

IF\_THEN\_ELSE(PRO\_ECONOMY\_CORRESPONDENCE\_I=PROREF\_refinery\_bio:AND:SECTORS\_TRANSFORMATION\_ENERGY\_I\

=FORESTRY:AND:SECTORS\_TRANSFORMATION\_ENERGY\_MAP\_I

=HYDROGEN\_PRODUCTION,

PE\_by\_PROREF\_and\_commodity[REGIONS\_9\_I,PROREF\_refinery\_bio,PE\_forestry\_products]\*ZIDZ\

(TI\_by\_PROREF\_and\_commodity[REGIONS\_9\_I

,PROREF\_refinery\_bio,TI\_hydrogen], SUM(TI\_by\_PROREF\_and\_commodity[REGIONS\_9\_I,PROREF\_refinery\_bio\

,NRG\_TI\_I!])),

IF\_THEN\_ELSE(PRO\_ECONOMY\_CORRESPONDENCE\_I=PROREF\_refinery\_coal:AND:SECTORS\_TRANSFORMATION\_ENERGY\_I\

=MINING\_COAL:AND:SECTORS\_TRANSFORMATION\_ENERGY\_MAP\_I

=REFINING,

PE\_by\_PROREF\_and\_commodity[REGIONS\_9\_I,PROREF\_refinery\_coal,PE\_coal]\*ZIDZ(TI\_by\_PROREF\_and\_commodity\

[REGIONS\_9\_I,PROREF\_refinery\_coal

,TI\_gas\_fossil], SUM(TI\_by\_PROREF\_and\_commodity[REGIONS\_9\_I,PROREF\_refinery\_coal,NRG\_TI\_I\

!]))+PE\_by\_PROREF\_and\_commodity

[REGIONS\_9\_I,PROREF\_refinery\_coal,PE\_coal]\*ZIDZ(TI\_by\_PROREF\_and\_commodity[REGIONS\_9\_I\

,PROREF\_refinery\_coal,TI\_liquid\_fossil

], SUM(TI\_by\_PROREF\_and\_commodity[REGIONS\_9\_I,PROREF\_refinery\_coal,NRG\_TI\_I!])),

IF\_THEN\_ELSE(PRO\_ECONOMY\_CORRESPONDENCE\_I=PROREF\_refinery\_coal:AND:SECTORS\_TRANSFORMATION\_ENERGY\_I\

=MINING\_COAL:AND:SECTORS\_TRANSFORMATION\_ENERGY\_MAP\_I

=HYDROGEN\_PRODUCTION,

PE\_by\_PROREF\_and\_commodity[REGIONS\_9\_I,PROREF\_refinery\_coal,PE\_coal]\*ZIDZ(TI\_by\_PROREF\_and\_commodity\

[REGIONS\_9\_I,PROREF\_refinery\_coal

,TI\_hydrogen], SUM(TI\_by\_PROREF\_and\_commodity[REGIONS\_9\_I,PROREF\_refinery\_coal,NRG\_TI\_I\

!])),

IF\_THEN\_ELSE(PRO\_ECONOMY\_CORRESPONDENCE\_I=PROREF\_refinery\_oil:AND:SECTORS\_TRANSFORMATION\_ENERGY\_I\

=EXTRACTION\_OIL:AND:SECTORS\_TRANSFORMATION\_ENERGY\_MAP\_I

=REFINING,

PE\_by\_PROREF\_and\_commodity[REGIONS\_9\_I,PROREF\_refinery\_oil,PE\_oil]\*ZIDZ(TI\_by\_PROREF\_and\_commodity\

[REGIONS\_9\_I,PROREF\_refinery\_oil

,TI\_gas\_fossil], SUM(TI\_by\_PROREF\_and\_commodity[REGIONS\_9\_I,PROREF\_refinery\_oil,NRG\_TI\_I\

!]))+PE\_by\_PROREF\_and\_commodity[

REGIONS\_9\_I,PROREF\_refinery\_oil,PE\_oil]\*ZIDZ(TI\_by\_PROREF\_and\_commodity[REGIONS\_9\_I,PROREF\_refinery\_oil\

,TI\_liquid\_fossil

], SUM(TI\_by\_PROREF\_and\_commodity[REGIONS\_9\_I,PROREF\_refinery\_oil,NRG\_TI\_I!])),

IF\_THEN\_ELSE(PRO\_ECONOMY\_CORRESPONDENCE\_I=PROREF\_transformation\_PE\_natural\_gas\_2\_TI\_hydrogen\

:AND:SECTORS\_TRANSFORMATION\_ENERGY\_I

=DISTRIBUTION\_GAS:AND:SECTORS\_TRANSFORMATION\_ENERGY\_MAP\_I=HYDROGEN\_PRODUCTION,

PE\_by\_PROREF\_and\_commodity[REGIONS\_9\_I,PROREF\_transformation\_PE\_natural\_gas\_2\_TI\_hydrogen\

,PE\_natural\_gas]\*ZIDZ(TI\_by\_PROREF\_and\_commodity

[REGIONS\_9\_I,PROREF\_transformation\_PE\_natural\_gas\_2\_TI\_hydrogen,TI\_hydrogen], SUM(TI\_by\_PROREF\_and\_commodity\

[REGIONS\_9\_I

,PROREF\_transformation\_PE\_natural\_gas\_2\_TI\_hydrogen,NRG\_TI\_I!])),

IF\_THEN\_ELSE(PRO\_ECONOMY\_CORRESPONDENCE\_I=PROSUP\_transmission\_losses\_elec:AND:SECTORS\_TRANSFORMATION\_ENERGY\_I\

=DISTRIBUTION\_ELECTRICITY

:AND:SECTORS\_TRANSFORMATION\_ENERGY\_MAP\_I=DISTRIBUTION\_ELECTRICITY,

PROSUP\_transmission\_losses[REGIONS\_9\_I,TO\_elec],

IF\_THEN\_ELSE(PRO\_ECONOMY\_CORRESPONDENCE\_I=PROSUP\_transmission\_losses\_gas:AND:SECTORS\_TRANSFORMATION\_ENERGY\_I\

=DISTRIBUTION\_GAS

:AND:SECTORS\_TRANSFORMATION\_ENERGY\_MAP\_I=DISTRIBUTION\_GAS,

PROSUP\_transmission\_losses[REGIONS\_9\_I,TO\_gas],

IF\_THEN\_ELSE(PRO\_ECONOMY\_CORRESPONDENCE\_I=PROSUP\_transmission\_losses\_heat:AND:SECTORS\_TRANSFORMATION\_ENERGY\_I\

=STEAM\_HOT\_WATER

:AND:SECTORS\_TRANSFORMATION\_ENERGY\_MAP\_I=STEAM\_HOT\_WATER,

PROSUP\_transmission\_losses[REGIONS\_9\_I,TO\_heat],

IF\_THEN\_ELSE(PRO\_ECONOMY\_CORRESPONDENCE\_I=PROSUP\_storage\_losses\_elec:AND:SECTORS\_TRANSFORMATION\_ENERGY\_I\

=DISTRIBUTION\_ELECTRICITY

:AND:SECTORS\_TRANSFORMATION\_ENERGY\_MAP\_I=DISTRIBUTION\_ELECTRICITY,

PROSUP\_storage\_losses[REGIONS\_9\_I,TO\_elec],

IF\_THEN\_ELSE(PRO\_ECONOMY\_CORRESPONDENCE\_I=PROSUP\_storage\_losses\_gas:AND:SECTORS\_TRANSFORMATION\_ENERGY\_I\

=DISTRIBUTION\_GAS

:AND:SECTORS\_TRANSFORMATION\_ENERGY\_MAP\_I=DISTRIBUTION\_GAS,

PROSUP\_storage\_losses[REGIONS\_9\_I,TO\_gas],

IF\_THEN\_ELSE(PRO\_ECONOMY\_CORRESPONDENCE\_I=PROSUP\_storage\_losses\_heat:AND:SECTORS\_TRANSFORMATION\_ENERGY\_I\

=STEAM\_HOT\_WATER

:AND:SECTORS\_TRANSFORMATION\_ENERGY\_MAP\_I=STEAM\_HOT\_WATER,

PROSUP\_storage\_losses[REGIONS\_9\_I,TO\_heat],

IF\_THEN\_ELSE(PRO\_ECONOMY\_CORRESPONDENCE\_I=PROSUP\_P2H\_heat\_pump:AND:SECTORS\_TRANSFORMATION\_ENERGY\_I\

=DISTRIBUTION\_ELECTRICITY

:AND:SECTORS\_TRANSFORMATION\_ENERGY\_MAP\_I=STEAM\_HOT\_WATER,

PROSUP\_flexibility\_technologies[REGIONS\_9\_I, PROSUP\_P2H\_heat\_pump,TO\_elec],

IF\_THEN\_ELSE(PRO\_ECONOMY\_CORRESPONDENCE\_I=PROSUP\_P2H\_electric\_boiler:AND:SECTORS\_TRANSFORMATION\_ENERGY\_I\

=DISTRIBUTION\_ELECTRICITY

:AND:SECTORS\_TRANSFORMATION\_ENERGY\_MAP\_I=STEAM\_HOT\_WATER,

PROSUP\_flexibility\_technologies[REGIONS\_9\_I, PROSUP\_P2H\_electric\_boiler,TO\_elec],

IF\_THEN\_ELSE(PRO\_ECONOMY\_CORRESPONDENCE\_I=PROSUP\_elec\_2\_liquid:AND:SECTORS\_TRANSFORMATION\_ENERGY\_I\

=DISTRIBUTION\_ELECTRICITY

:AND:SECTORS\_TRANSFORMATION\_ENERGY\_MAP\_I=HYDROGEN\_PRODUCTION,

PROSUP\_flexibility\_technologies[REGIONS\_9\_I,PROSUP\_elec\_2\_liquid,TO\_elec],

IF\_THEN\_ELSE(PRO\_ECONOMY\_CORRESPONDENCE\_I=PROSUP\_elec\_2\_gas:AND:SECTORS\_TRANSFORMATION\_ENERGY\_I\

=DISTRIBUTION\_ELECTRICITY

:AND:SECTORS\_TRANSFORMATION\_ENERGY\_MAP\_I=HYDROGEN\_PRODUCTION,

PROSUP\_flexibility\_technologies[REGIONS\_9\_I,PROSUP\_elec\_2\_gas,TO\_elec],

IF\_THEN\_ELSE(PRO\_ECONOMY\_CORRESPONDENCE\_I=PROSUP\_sector\_energy\_own\_consumption\_elec:AND:\

SECTORS\_TRANSFORMATION\_ENERGY\_I

=DISTRIBUTION\_ELECTRICITY:AND:SECTORS\_TRANSFORMATION\_ENERGY\_MAP\_I=DISTRIBUTION\_ELECTRICITY\

,

PROSUP\_sector\_energy\_own\_consumption\_per\_commodity[REGIONS\_9\_I,TO\_elec],

IF\_THEN\_ELSE(PRO\_ECONOMY\_CORRESPONDENCE\_I=PROSUP\_sector\_energy\_own\_consumption\_gas:AND:\

SECTORS\_TRANSFORMATION\_ENERGY\_I=

DISTRIBUTION\_GAS:AND:SECTORS\_TRANSFORMATION\_ENERGY\_MAP\_I=DISTRIBUTION\_GAS,

PROSUP\_sector\_energy\_own\_consumption\_per\_commodity[REGIONS\_9\_I,TO\_gas],

IF\_THEN\_ELSE(PRO\_ECONOMY\_CORRESPONDENCE\_I=PROSUP\_sector\_energy\_own\_consumption\_heat:AND:\

SECTORS\_TRANSFORMATION\_ENERGY\_I

=STEAM\_HOT\_WATER:AND:SECTORS\_TRANSFORMATION\_ENERGY\_MAP\_I=STEAM\_HOT\_WATER,

PROSUP\_sector\_energy\_own\_consumption\_per\_commodity[REGIONS\_9\_I,TO\_heat],

IF\_THEN\_ELSE(PRO\_ECONOMY\_CORRESPONDENCE\_I=PROSUP\_sector\_energy\_own\_consumption\_liquid\

:AND:SECTORS\_TRANSFORMATION\_ENERGY\_I

=REFINING:AND:SECTORS\_TRANSFORMATION\_ENERGY\_MAP\_I=REFINING,

PROSUP\_sector\_energy\_own\_consumption\_per\_commodity[REGIONS\_9\_I,TO\_liquid],

IF\_THEN\_ELSE(PRO\_ECONOMY\_CORRESPONDENCE\_I=PROSUP\_elec\_2\_hydrogen:AND:SECTORS\_TRANSFORMATION\_ENERGY\_I\

=DISTRIBUTION\_ELECTRICITY

:AND:SECTORS\_TRANSFORMATION\_ENERGY\_MAP\_I=HYDROGEN\_PRODUCTION,

PROSUP\_flexibility\_technologies[REGIONS\_9\_I,PROSUP\_elec\_2\_hydrogen,TO\_elec],

IF\_THEN\_ELSE(PRO\_ECONOMY\_CORRESPONDENCE\_I=PROSUP\_sector\_energy\_own\_consumption\_solid\_fossil\

:AND:SECTORS\_TRANSFORMATION\_ENERGY\_I

=MINING\_COAL:AND:SECTORS\_TRANSFORMATION\_ENERGY\_MAP\_I=ELECTRICITY\_COAL,

PROSUP\_sector\_energy\_own\_consumption\_per\_commodity[REGIONS\_9\_I,TO\_solid\_fossil]

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# economy\_energy\_transformation\_output

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economy\_energy\_transformation\_output[REGIONS\_9\_I,PRO\_ECONOMY\_CORRESPONDENCE\_I,SECTORS\_TRANSFORMATION\_ENERGY\_I\

,SECTORS\_TRANSFORMATION\_ENERGY\_MAP\_I]= IF\_THEN\_ELSE(PRO\_ECONOMY\_CORRESPONDENCE\_I=PROTRA\_CHP\_gas\_fuels:AND:SECTORS\_TRANSFORMATION\_ENERGY\_I\

=ELECTRICITY\_GAS:AND:SECTORS\_TRANSFORMATION\_ENERGY\_MAP\_I=DISTRIBUTION\_ELECTRICITY,PROTRA\_TO\_allocated\

[REGIONS\_9\_I,TO\_elec,PROTRA\_CHP\_gas\_fuels]\*ZIDZ(TI\_by\_PROTRA\_and\_commodity[REGIONS\_9\_I\

,PROTRA\_CHP\_gas\_fuels,TI\_gas\_bio], SUM(TI\_by\_PROTRA\_and\_commodity[REGIONS\_9\_I,PROTRA\_CHP\_gas\_fuels\

, NRG\_TI\_I!]))+PROTRA\_TO\_allocated[REGIONS\_9\_I,TO\_elec,PROTRA\_CHP\_gas\_fuels]\*ZIDZ(TI\_by\_PROTRA\_and\_commodity\

[REGIONS\_9\_I,PROTRA\_CHP\_gas\_fuels,TI\_gas\_fossil], SUM(TI\_by\_PROTRA\_and\_commodity[REGIONS\_9\_I\

,PROTRA\_CHP\_gas\_fuels, NRG\_TI\_I!])),

IF\_THEN\_ELSE(PRO\_ECONOMY\_CORRESPONDENCE\_I=PROTRA\_CHP\_geothermal:AND:SECTORS\_TRANSFORMATION\_ENERGY\_I\

=ELECTRICITY\_OTHER:AND:SECTORS\_TRANSFORMATION\_ENERGY\_MAP\_I=DISTRIBUTION\_ELECTRICITY\

,PROTRA\_TO\_allocated[REGIONS\_9\_I,TO\_elec,PROTRA\_CHP\_geothermal]\*ZIDZ(TI\_by\_PROTRA\_and\_commodity\

[REGIONS\_9\_I,PROTRA\_CHP\_geothermal,TI\_geothermal], SUM(TI\_by\_PROTRA\_and\_commodity[REGIONS\_9\_I\

,PROTRA\_CHP\_geothermal, NRG\_TI\_I!])),

IF\_THEN\_ELSE(PRO\_ECONOMY\_CORRESPONDENCE\_I=PROTRA\_CHP\_solid\_fossil:AND:SECTORS\_TRANSFORMATION\_ENERGY\_I\

=ELECTRICITY\_COAL:AND:SECTORS\_TRANSFORMATION\_ENERGY\_MAP\_I=DISTRIBUTION\_ELECTRICITY,\

PROTRA\_TO\_allocated[REGIONS\_9\_I,TO\_elec,PROTRA\_CHP\_solid\_fossil]\*ZIDZ(TI\_by\_PROTRA\_and\_commodity\

[REGIONS\_9\_I,PROTRA\_CHP\_solid\_fossil,TI\_solid\_fossil], SUM(TI\_by\_PROTRA\_and\_commodity\

[REGIONS\_9\_I,PROTRA\_CHP\_solid\_fossil, NRG\_TI\_I!])),

IF\_THEN\_ELSE(PRO\_ECONOMY\_CORRESPONDENCE\_I=PROTRA\_CHP\_waste:AND:SECTORS\_TRANSFORMATION\_ENERGY\_I\

=ELECTRICITY\_OTHER:AND:SECTORS\_TRANSFORMATION\_ENERGY\_MAP\_I=DISTRIBUTION\_ELECTRICITY\

,PROTRA\_TO\_allocated[REGIONS\_9\_I,TO\_elec,PROTRA\_CHP\_waste]\*ZIDZ(TI\_by\_PROTRA\_and\_commodity\

[REGIONS\_9\_I,PROTRA\_CHP\_waste,TI\_waste], SUM(TI\_by\_PROTRA\_and\_commodity[REGIONS\_9\_I\

,PROTRA\_CHP\_waste, NRG\_TI\_I!])),

IF\_THEN\_ELSE(PRO\_ECONOMY\_CORRESPONDENCE\_I=PROTRA\_CHP\_gas\_fuels\_CCS:AND:SECTORS\_TRANSFORMATION\_ENERGY\_I\

=ELECTRICITY\_GAS:AND:SECTORS\_TRANSFORMATION\_ENERGY\_MAP\_I=DISTRIBUTION\_ELECTRICITY,PROTRA\_TO\_allocated\

[REGIONS\_9\_I,TO\_elec,PROTRA\_CHP\_gas\_fuels\_CCS]\*ZIDZ(TI\_by\_PROTRA\_and\_commodity[REGIONS\_9\_I\

,PROTRA\_CHP\_gas\_fuels\_CCS,TI\_gas\_bio], SUM(TI\_by\_PROTRA\_and\_commodity[REGIONS\_9\_I,PROTRA\_CHP\_gas\_fuels\_CCS\

, NRG\_TI\_I!]))+PROTRA\_TO\_allocated[REGIONS\_9\_I,TO\_elec,PROTRA\_CHP\_gas\_fuels\_CCS]\*ZIDZ\

(TI\_by\_PROTRA\_and\_commodity[REGIONS\_9\_I,PROTRA\_CHP\_gas\_fuels\_CCS,TI\_gas\_fossil], SUM\

(TI\_by\_PROTRA\_and\_commodity[REGIONS\_9\_I,PROTRA\_CHP\_gas\_fuels\_CCS, NRG\_TI\_I!])),

IF\_THEN\_ELSE(PRO\_ECONOMY\_CORRESPONDENCE\_I=PROTRA\_CHP\_solid\_fossil\_CCS:AND:SECTORS\_TRANSFORMATION\_ENERGY\_I\

=ELECTRICITY\_COAL:AND:SECTORS\_TRANSFORMATION\_ENERGY\_MAP\_I=DISTRIBUTION\_ELECTRICITY,\

PROTRA\_TO\_allocated[REGIONS\_9\_I,TO\_elec,PROTRA\_CHP\_solid\_fossil\_CCS]\*ZIDZ(TI\_by\_PROTRA\_and\_commodity\

[REGIONS\_9\_I,PROTRA\_CHP\_solid\_fossil\_CCS,TI\_solid\_fossil], SUM(TI\_by\_PROTRA\_and\_commodity\

[REGIONS\_9\_I,PROTRA\_CHP\_solid\_fossil\_CCS, NRG\_TI\_I!])),

IF\_THEN\_ELSE(PRO\_ECONOMY\_CORRESPONDENCE\_I=PROTRA\_CHP\_solid\_bio\_CCS:AND:SECTORS\_TRANSFORMATION\_ENERGY\_I\

=ELECTRICITY\_OTHER:AND:SECTORS\_TRANSFORMATION\_ENERGY\_MAP\_I=DISTRIBUTION\_ELECTRICITY\

,PROTRA\_TO\_allocated[REGIONS\_9\_I,TO\_elec,PROTRA\_CHP\_solid\_bio\_CCS]\*ZIDZ(TI\_by\_PROTRA\_and\_commodity\

[REGIONS\_9\_I,PROTRA\_CHP\_solid\_bio\_CCS,TI\_solid\_bio], SUM(TI\_by\_PROTRA\_and\_commodity\

[REGIONS\_9\_I,PROTRA\_CHP\_solid\_bio\_CCS, NRG\_TI\_I!])),

IF\_THEN\_ELSE(PRO\_ECONOMY\_CORRESPONDENCE\_I=PROTRA\_CHP\_liquid\_fuels:AND:SECTORS\_TRANSFORMATION\_ENERGY\_I\

=ELECTRICITY\_OIL:AND:SECTORS\_TRANSFORMATION\_ENERGY\_MAP\_I=DISTRIBUTION\_ELECTRICITY,PROTRA\_TO\_allocated\

[REGIONS\_9\_I,TO\_elec,PROTRA\_CHP\_liquid\_fuels]\*ZIDZ(TI\_by\_PROTRA\_and\_commodity[REGIONS\_9\_I\

,PROTRA\_CHP\_liquid\_fuels,TI\_liquid\_bio], SUM(TI\_by\_PROTRA\_and\_commodity[REGIONS\_9\_I\

,PROTRA\_CHP\_liquid\_fuels, NRG\_TI\_I!]))+PROTRA\_TO\_allocated[REGIONS\_9\_I,TO\_elec,PROTRA\_CHP\_liquid\_fuels\

]\*ZIDZ(TI\_by\_PROTRA\_and\_commodity[REGIONS\_9\_I,PROTRA\_CHP\_liquid\_fuels,TI\_liquid\_fossil\

], SUM(TI\_by\_PROTRA\_and\_commodity[REGIONS\_9\_I,PROTRA\_CHP\_liquid\_fuels, NRG\_TI\_I!]))\

,

IF\_THEN\_ELSE(PRO\_ECONOMY\_CORRESPONDENCE\_I=PROTRA\_CHP\_liquid\_fuels\_CCS:AND:SECTORS\_TRANSFORMATION\_ENERGY\_I\

=ELECTRICITY\_OIL:AND:SECTORS\_TRANSFORMATION\_ENERGY\_MAP\_I=DISTRIBUTION\_ELECTRICITY,PROTRA\_TO\_allocated\

[REGIONS\_9\_I,TO\_elec,PROTRA\_CHP\_liquid\_fuels\_CCS]\*ZIDZ(TI\_by\_PROTRA\_and\_commodity[REGIONS\_9\_I\

,PROTRA\_CHP\_liquid\_fuels\_CCS,TI\_liquid\_bio], SUM(TI\_by\_PROTRA\_and\_commodity[REGIONS\_9\_I\

,PROTRA\_CHP\_liquid\_fuels\_CCS, NRG\_TI\_I!]))+PROTRA\_TO\_allocated[REGIONS\_9\_I,TO\_elec,\

PROTRA\_CHP\_liquid\_fuels\_CCS]\*ZIDZ(TI\_by\_PROTRA\_and\_commodity[REGIONS\_9\_I,PROTRA\_CHP\_liquid\_fuels\_CCS\

,TI\_liquid\_fossil], SUM(TI\_by\_PROTRA\_and\_commodity[REGIONS\_9\_I,PROTRA\_CHP\_liquid\_fuels\_CCS\

, NRG\_TI\_I!])),

IF\_THEN\_ELSE(PRO\_ECONOMY\_CORRESPONDENCE\_I=PROTRA\_CHP\_solid\_bio:AND:SECTORS\_TRANSFORMATION\_ENERGY\_I\

=ELECTRICITY\_OTHER:AND:SECTORS\_TRANSFORMATION\_ENERGY\_MAP\_I=DISTRIBUTION\_ELECTRICITY\

,PROTRA\_TO\_allocated[REGIONS\_9\_I,TO\_elec,PROTRA\_CHP\_solid\_bio]\*ZIDZ(TI\_by\_PROTRA\_and\_commodity\

[REGIONS\_9\_I,PROTRA\_CHP\_solid\_bio,TI\_solid\_bio], SUM(TI\_by\_PROTRA\_and\_commodity[REGIONS\_9\_I\

,PROTRA\_CHP\_solid\_bio, NRG\_TI\_I!])),

IF\_THEN\_ELSE(PRO\_ECONOMY\_CORRESPONDENCE\_I=PROTRA\_PP\_solid\_bio:AND:SECTORS\_TRANSFORMATION\_ENERGY\_I\

=STEAM\_HOT\_WATER:AND:SECTORS\_TRANSFORMATION\_ENERGY\_MAP\_I=DISTRIBUTION\_ELECTRICITY,PROTRA\_TO\_allocated\

[REGIONS\_9\_I,TO\_elec,PROTRA\_PP\_solid\_bio]\*ZIDZ(TI\_by\_PROTRA\_and\_commodity[REGIONS\_9\_I\

,PROTRA\_PP\_solid\_bio,TI\_solid\_bio], SUM(TI\_by\_PROTRA\_and\_commodity[REGIONS\_9\_I,PROTRA\_PP\_solid\_bio\

, NRG\_TI\_I!])),

IF\_THEN\_ELSE(PRO\_ECONOMY\_CORRESPONDENCE\_I=PROTRA\_PP\_solid\_bio\_CCS:AND:SECTORS\_TRANSFORMATION\_ENERGY\_I\

=ELECTRICITY\_OTHER:AND:SECTORS\_TRANSFORMATION\_ENERGY\_MAP\_I=DISTRIBUTION\_ELECTRICITY\

,PROTRA\_TO\_allocated[REGIONS\_9\_I,TO\_elec,PROTRA\_PP\_solid\_bio\_CCS]\*ZIDZ(TI\_by\_PROTRA\_and\_commodity\

[REGIONS\_9\_I,PROTRA\_PP\_solid\_bio\_CCS,TI\_solid\_bio], SUM(TI\_by\_PROTRA\_and\_commodity[\

REGIONS\_9\_I,PROTRA\_PP\_solid\_bio\_CCS, NRG\_TI\_I!])),

IF\_THEN\_ELSE(PRO\_ECONOMY\_CORRESPONDENCE\_I=PROTRA\_PP\_gas\_fuels:AND:SECTORS\_TRANSFORMATION\_ENERGY\_I\

=ELECTRICITY\_GAS:AND:SECTORS\_TRANSFORMATION\_ENERGY\_MAP\_I=DISTRIBUTION\_ELECTRICITY,PROTRA\_TO\_allocated\

[REGIONS\_9\_I,TO\_elec,PROTRA\_PP\_gas\_fuels]\*ZIDZ(TI\_by\_PROTRA\_and\_commodity[REGIONS\_9\_I\

,PROTRA\_PP\_gas\_fuels,TI\_gas\_bio], SUM(TI\_by\_PROTRA\_and\_commodity[REGIONS\_9\_I,PROTRA\_PP\_gas\_fuels\

, NRG\_TI\_I!]))+PROTRA\_TO\_allocated[REGIONS\_9\_I,TO\_elec,PROTRA\_PP\_gas\_fuels]\*ZIDZ(TI\_by\_PROTRA\_and\_commodity\

[REGIONS\_9\_I,PROTRA\_PP\_gas\_fuels,TI\_gas\_fossil], SUM(TI\_by\_PROTRA\_and\_commodity[REGIONS\_9\_I\

,PROTRA\_PP\_gas\_fuels, NRG\_TI\_I!])),

IF\_THEN\_ELSE(PRO\_ECONOMY\_CORRESPONDENCE\_I=PROTRA\_PP\_geothermal:AND:SECTORS\_TRANSFORMATION\_ENERGY\_I\

=STEAM\_HOT\_WATER:AND:SECTORS\_TRANSFORMATION\_ENERGY\_MAP\_I=DISTRIBUTION\_ELECTRICITY,PROTRA\_TO\_allocated\

[REGIONS\_9\_I,TO\_elec,PROTRA\_PP\_geothermal]\*ZIDZ(TI\_by\_PROTRA\_and\_commodity[REGIONS\_9\_I\

,PROTRA\_PP\_geothermal,TI\_geothermal], SUM(TI\_by\_PROTRA\_and\_commodity[REGIONS\_9\_I,PROTRA\_PP\_geothermal\

, NRG\_TI\_I!])),

IF\_THEN\_ELSE(PRO\_ECONOMY\_CORRESPONDENCE\_I=PROTRA\_PP\_hydropower\_run\_of\_river:AND:SECTORS\_TRANSFORMATION\_ENERGY\_I\

=ELECTRICITY\_HYDRO:AND:SECTORS\_TRANSFORMATION\_ENERGY\_MAP\_I=DISTRIBUTION\_ELECTRICITY\

,PROTRA\_TO\_allocated[REGIONS\_9\_I,TO\_elec,PROTRA\_PP\_hydropower\_run\_of\_river]\*ZIDZ(TI\_by\_PROTRA\_and\_commodity\

[REGIONS\_9\_I,PROTRA\_PP\_hydropower\_run\_of\_river,TI\_hydropower], SUM(TI\_by\_PROTRA\_and\_commodity\

[REGIONS\_9\_I,PROTRA\_PP\_hydropower\_run\_of\_river, NRG\_TI\_I!])),

IF\_THEN\_ELSE(PRO\_ECONOMY\_CORRESPONDENCE\_I=PROTRA\_PP\_hydropower\_dammed:AND:SECTORS\_TRANSFORMATION\_ENERGY\_I\

=ELECTRICITY\_HYDRO:AND:SECTORS\_TRANSFORMATION\_ENERGY\_MAP\_I=DISTRIBUTION\_ELECTRICITY\

,PROTRA\_TO\_allocated[REGIONS\_9\_I,TO\_elec,PROTRA\_PP\_hydropower\_dammed]\*ZIDZ(TI\_by\_PROTRA\_and\_commodity\

[REGIONS\_9\_I,PROTRA\_PP\_hydropower\_dammed,TI\_hydropower], SUM(TI\_by\_PROTRA\_and\_commodity\

[REGIONS\_9\_I,PROTRA\_PP\_hydropower\_dammed, NRG\_TI\_I!])),

IF\_THEN\_ELSE(PRO\_ECONOMY\_CORRESPONDENCE\_I=PROTRA\_PP\_liquid\_fuels:AND:SECTORS\_TRANSFORMATION\_ENERGY\_I\

=ELECTRICITY\_OIL:AND:SECTORS\_TRANSFORMATION\_ENERGY\_MAP\_I=DISTRIBUTION\_ELECTRICITY,PROTRA\_TO\_allocated\

[REGIONS\_9\_I,TO\_elec,PROTRA\_PP\_liquid\_fuels]\*ZIDZ(TI\_by\_PROTRA\_and\_commodity[REGIONS\_9\_I\

,PROTRA\_PP\_liquid\_fuels,TI\_liquid\_bio], SUM(TI\_by\_PROTRA\_and\_commodity[REGIONS\_9\_I,\

PROTRA\_PP\_liquid\_fuels, NRG\_TI\_I!]))+PROTRA\_TO\_allocated[REGIONS\_9\_I,TO\_elec,PROTRA\_PP\_liquid\_fuels\

]\*ZIDZ(TI\_by\_PROTRA\_and\_commodity[REGIONS\_9\_I,PROTRA\_PP\_liquid\_fuels,TI\_liquid\_fossil\

], SUM(TI\_by\_PROTRA\_and\_commodity[REGIONS\_9\_I,PROTRA\_PP\_liquid\_fuels, NRG\_TI\_I!])),

IF\_THEN\_ELSE(PRO\_ECONOMY\_CORRESPONDENCE\_I=PROTRA\_PP\_nuclear:AND:SECTORS\_TRANSFORMATION\_ENERGY\_I\

=ELECTRICITY\_NUCLEAR:AND:SECTORS\_TRANSFORMATION\_ENERGY\_MAP\_I=DISTRIBUTION\_ELECTRICITY\

,PROTRA\_TO\_allocated[REGIONS\_9\_I,TO\_elec,PROTRA\_PP\_nuclear]\*ZIDZ(TI\_by\_PROTRA\_and\_commodity\

[REGIONS\_9\_I,PROTRA\_PP\_nuclear,TI\_nuclear], SUM(TI\_by\_PROTRA\_and\_commodity[REGIONS\_9\_I\

,PROTRA\_PP\_nuclear, NRG\_TI\_I!])),

IF\_THEN\_ELSE(PRO\_ECONOMY\_CORRESPONDENCE\_I=PROTRA\_PP\_oceanic:AND:SECTORS\_TRANSFORMATION\_ENERGY\_I\

=ELECTRICITY\_OTHER:AND:SECTORS\_TRANSFORMATION\_ENERGY\_MAP\_I=DISTRIBUTION\_ELECTRICITY\

,PROTRA\_TO\_allocated[REGIONS\_9\_I,TO\_elec,PROTRA\_PP\_oceanic]\*ZIDZ(TI\_by\_PROTRA\_and\_commodity\

[REGIONS\_9\_I,PROTRA\_PP\_oceanic,TI\_oceanic], SUM(TI\_by\_PROTRA\_and\_commodity[REGIONS\_9\_I\

,PROTRA\_PP\_oceanic, NRG\_TI\_I!])),

IF\_THEN\_ELSE(PRO\_ECONOMY\_CORRESPONDENCE\_I=PROTRA\_PP\_solar\_open\_space\_PV:AND:SECTORS\_TRANSFORMATION\_ENERGY\_I\

=ELECTRICITY\_SOLAR\_PV:AND:SECTORS\_TRANSFORMATION\_ENERGY\_MAP\_I=DISTRIBUTION\_ELECTRICITY\

,PROTRA\_TO\_allocated[REGIONS\_9\_I,TO\_elec,PROTRA\_PP\_solar\_open\_space\_PV]\*ZIDZ(TI\_by\_PROTRA\_and\_commodity\

[REGIONS\_9\_I,PROTRA\_PP\_solar\_open\_space\_PV,TI\_solar], SUM(TI\_by\_PROTRA\_and\_commodity\

[REGIONS\_9\_I,PROTRA\_PP\_solar\_open\_space\_PV, NRG\_TI\_I!])),

IF\_THEN\_ELSE(PRO\_ECONOMY\_CORRESPONDENCE\_I=PROTRA\_PP\_solar\_CSP:AND:SECTORS\_TRANSFORMATION\_ENERGY\_I\

=ELECTRICITY\_SOLAR\_THERMAL:AND:SECTORS\_TRANSFORMATION\_ENERGY\_MAP\_I=DISTRIBUTION\_ELECTRICITY\

,PROTRA\_TO\_allocated[REGIONS\_9\_I,TO\_elec,PROTRA\_PP\_solar\_CSP]\*ZIDZ(TI\_by\_PROTRA\_and\_commodity\

[REGIONS\_9\_I,PROTRA\_PP\_solar\_CSP,TI\_solar], SUM(TI\_by\_PROTRA\_and\_commodity[REGIONS\_9\_I\

,PROTRA\_PP\_solar\_CSP, NRG\_TI\_I!])),

IF\_THEN\_ELSE(PRO\_ECONOMY\_CORRESPONDENCE\_I=PROTRA\_PP\_solar\_urban\_PV:AND:SECTORS\_TRANSFORMATION\_ENERGY\_I\

=ELECTRICITY\_SOLAR\_PV:AND:SECTORS\_TRANSFORMATION\_ENERGY\_MAP\_I=DISTRIBUTION\_ELECTRICITY\

,PROTRA\_TO\_allocated[REGIONS\_9\_I,TO\_elec,PROTRA\_PP\_solar\_urban\_PV]\*ZIDZ(TI\_by\_PROTRA\_and\_commodity\

[REGIONS\_9\_I,PROTRA\_PP\_solar\_urban\_PV,TI\_solar], SUM(TI\_by\_PROTRA\_and\_commodity[REGIONS\_9\_I\

,PROTRA\_PP\_solar\_urban\_PV, NRG\_TI\_I!])),

IF\_THEN\_ELSE(PRO\_ECONOMY\_CORRESPONDENCE\_I=PROTRA\_PP\_solid\_fossil:AND:SECTORS\_TRANSFORMATION\_ENERGY\_I\

=ELECTRICITY\_COAL:AND:SECTORS\_TRANSFORMATION\_ENERGY\_MAP\_I=DISTRIBUTION\_ELECTRICITY,\

PROTRA\_TO\_allocated[REGIONS\_9\_I,TO\_elec,PROTRA\_PP\_solid\_fossil]\*ZIDZ(TI\_by\_PROTRA\_and\_commodity\

[REGIONS\_9\_I,PROTRA\_PP\_solid\_fossil,TI\_solid\_fossil], SUM(TI\_by\_PROTRA\_and\_commodity\

[REGIONS\_9\_I,PROTRA\_PP\_solid\_fossil, NRG\_TI\_I!])),

IF\_THEN\_ELSE(PRO\_ECONOMY\_CORRESPONDENCE\_I=PROTRA\_PP\_waste:AND:SECTORS\_TRANSFORMATION\_ENERGY\_I\

=ELECTRICITY\_OTHER:AND:SECTORS\_TRANSFORMATION\_ENERGY\_MAP\_I=DISTRIBUTION\_ELECTRICITY\

,PROTRA\_TO\_allocated[REGIONS\_9\_I,TO\_elec,PROTRA\_PP\_waste]\*ZIDZ(TI\_by\_PROTRA\_and\_commodity\

[REGIONS\_9\_I,PROTRA\_PP\_waste,TI\_waste], SUM(TI\_by\_PROTRA\_and\_commodity[REGIONS\_9\_I,\

PROTRA\_PP\_waste, NRG\_TI\_I!])),

IF\_THEN\_ELSE(PRO\_ECONOMY\_CORRESPONDENCE\_I=PROTRA\_PP\_wind\_onshore:AND:SECTORS\_TRANSFORMATION\_ENERGY\_I\

=ELECTRICITY\_WIND:AND:SECTORS\_TRANSFORMATION\_ENERGY\_MAP\_I=DISTRIBUTION\_ELECTRICITY,\

PROTRA\_TO\_allocated[REGIONS\_9\_I,TO\_elec,PROTRA\_PP\_wind\_onshore]\*ZIDZ(TI\_by\_PROTRA\_and\_commodity\

[REGIONS\_9\_I,PROTRA\_PP\_wind\_onshore,TI\_wind], SUM(TI\_by\_PROTRA\_and\_commodity[REGIONS\_9\_I\

,PROTRA\_PP\_wind\_onshore, NRG\_TI\_I!])),

IF\_THEN\_ELSE(PRO\_ECONOMY\_CORRESPONDENCE\_I=PROTRA\_PP\_wind\_offshore:AND:SECTORS\_TRANSFORMATION\_ENERGY\_I\

=ELECTRICITY\_WIND:AND:SECTORS\_TRANSFORMATION\_ENERGY\_MAP\_I=DISTRIBUTION\_ELECTRICITY,\

PROTRA\_TO\_allocated[REGIONS\_9\_I,TO\_elec,PROTRA\_PP\_wind\_offshore]\*ZIDZ(TI\_by\_PROTRA\_and\_commodity\

[REGIONS\_9\_I,PROTRA\_PP\_wind\_offshore,TI\_wind], SUM(TI\_by\_PROTRA\_and\_commodity[REGIONS\_9\_I\

,PROTRA\_PP\_wind\_offshore, NRG\_TI\_I!])),

IF\_THEN\_ELSE(PRO\_ECONOMY\_CORRESPONDENCE\_I=PROTRA\_PP\_solid\_fossil\_CCS:AND:SECTORS\_TRANSFORMATION\_ENERGY\_I\

=ELECTRICITY\_COAL:AND:SECTORS\_TRANSFORMATION\_ENERGY\_MAP\_I=DISTRIBUTION\_ELECTRICITY,\

PROTRA\_TO\_allocated[REGIONS\_9\_I,TO\_elec,PROTRA\_PP\_solid\_fossil\_CCS]\*ZIDZ(TI\_by\_PROTRA\_and\_commodity\

[REGIONS\_9\_I,PROTRA\_PP\_solid\_fossil\_CCS,TI\_solid\_fossil], SUM(TI\_by\_PROTRA\_and\_commodity\

[REGIONS\_9\_I,PROTRA\_PP\_solid\_fossil\_CCS, NRG\_TI\_I!])),

IF\_THEN\_ELSE(PRO\_ECONOMY\_CORRESPONDENCE\_I=PROTRA\_PP\_waste\_CCS:AND:SECTORS\_TRANSFORMATION\_ENERGY\_I\

=ELECTRICITY\_OTHER:AND:SECTORS\_TRANSFORMATION\_ENERGY\_MAP\_I=DISTRIBUTION\_ELECTRICITY\

,PROTRA\_TO\_allocated[REGIONS\_9\_I,TO\_elec,PROTRA\_PP\_waste\_CCS]\*ZIDZ(TI\_by\_PROTRA\_and\_commodity\

[REGIONS\_9\_I,PROTRA\_PP\_waste\_CCS,TI\_waste], SUM(TI\_by\_PROTRA\_and\_commodity[REGIONS\_9\_I\

,PROTRA\_PP\_waste\_CCS, NRG\_TI\_I!])),

IF\_THEN\_ELSE(PRO\_ECONOMY\_CORRESPONDENCE\_I=PROTRA\_PP\_gas\_fuels\_CCS:AND:SECTORS\_TRANSFORMATION\_ENERGY\_I\

=ELECTRICITY\_GAS:AND:SECTORS\_TRANSFORMATION\_ENERGY\_MAP\_I=DISTRIBUTION\_ELECTRICITY,PROTRA\_TO\_allocated\

[REGIONS\_9\_I,TO\_elec,PROTRA\_PP\_gas\_fuels\_CCS]\*ZIDZ(TI\_by\_PROTRA\_and\_commodity[REGIONS\_9\_I\

,PROTRA\_PP\_gas\_fuels\_CCS,TI\_gas\_bio], SUM(TI\_by\_PROTRA\_and\_commodity[REGIONS\_9\_I,PROTRA\_PP\_gas\_fuels\_CCS\

, NRG\_TI\_I!]))+PROTRA\_TO\_allocated[REGIONS\_9\_I,TO\_elec,PROTRA\_PP\_gas\_fuels\_CCS]\*ZIDZ\

(TI\_by\_PROTRA\_and\_commodity[REGIONS\_9\_I,PROTRA\_PP\_gas\_fuels\_CCS,TI\_gas\_fossil], SUM\

(TI\_by\_PROTRA\_and\_commodity[REGIONS\_9\_I,PROTRA\_PP\_gas\_fuels\_CCS, NRG\_TI\_I!])),

IF\_THEN\_ELSE(PRO\_ECONOMY\_CORRESPONDENCE\_I=PROTRA\_PP\_liquid\_fuels\_CCS:AND:SECTORS\_TRANSFORMATION\_ENERGY\_I\

=ELECTRICITY\_OIL:AND:SECTORS\_TRANSFORMATION\_ENERGY\_MAP\_I=DISTRIBUTION\_ELECTRICITY,PROTRA\_TO\_allocated\

[REGIONS\_9\_I,TO\_elec,PROTRA\_PP\_liquid\_fuels\_CCS]\*ZIDZ(TI\_by\_PROTRA\_and\_commodity[REGIONS\_9\_I\

,PROTRA\_PP\_liquid\_fuels\_CCS,TI\_liquid\_bio], SUM(TI\_by\_PROTRA\_and\_commodity[REGIONS\_9\_I\

,PROTRA\_PP\_liquid\_fuels\_CCS, NRG\_TI\_I!]))+PROTRA\_TO\_allocated[REGIONS\_9\_I,TO\_elec,PROTRA\_PP\_liquid\_fuels\_CCS\

]\*ZIDZ(TI\_by\_PROTRA\_and\_commodity[REGIONS\_9\_I,PROTRA\_PP\_liquid\_fuels\_CCS,TI\_liquid\_fossil\

], SUM(TI\_by\_PROTRA\_and\_commodity[REGIONS\_9\_I,PROTRA\_PP\_liquid\_fuels\_CCS, NRG\_TI\_I!\

])),

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# economy\_energy\_transformation\_matrix\_input\_aggregated

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economy\_energy\_transformation\_matrix\_input\_aggregated[REGIONS\_9\_I, SECTORS\_TRANSFORMATION\_ENERGY\_I\

, SECTORS\_TRANSFORMATION\_ENERGY\_MAP\_I]=

SUM(economy\_energy\_transformation\_input[REGIONS\_9\_I,PRO\_ECONOMY\_CORRESPONDENCE\_I!,SECTORS\_TRANSFORMATION\_ENERGY\_I\

,SECTORS\_TRANSFORMATION\_ENERGY\_MAP\_I])

~ EJ/Year

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# economy\_energy\_transformation\_output\_aggregated

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economy\_energy\_transformation\_output\_aggregated[REGIONS\_9\_I,SECTORS\_TRANSFORMATION\_ENERGY\_I\

]=

SUM(economy\_energy\_transformation\_output[REGIONS\_9\_I,PRO\_ECONOMY\_CORRESPONDENCE\_I!,SECTORS\_TRANSFORMATION\_ENERGY\_I\

,SECTORS\_TRANSFORMATION\_ENERGY\_MAP\_I!])

~ EJ/Year

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