

Package: reporttransport (via r-universe)

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Type Package

Title Reporting package for edgeTransport

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Description This package contains edgeTransport-specific routines to report model results. The main functionality is to generate transport reporting variables in MIF format from a given edgeTransport model run folder or REMIND input data.

Depends R (>= 3.5.0)

License LGPL-3

URL <https://github.com/pik-piam/reporttransport>

Imports data.table, gdx2, piamPlotComparison, quitte, rmndt, utils

Suggests knitr, sf, testthat, edgeTransport

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Contents

aggregateVariables	2
checkConvergence	3
checkForNAsAndDups	3
convertToMIF	4
harmonizeREMINDvsEDGETenergyServiceDemand	5

prepareForREMIND	6
renameDuplicateVariables	7
reportAggregatedCosts	7
reportAnalyticsVarSet	8
reportBaseVarSet	8
reportEdgeTransport	9
reportEmissions	10
reportExtendedTransportVarSet	11
reportFinalEnergy	12
reportFleetVariables	13
reportLiquidsAndGasesComposition	13
reportREMINDinputVarSet	14
reportToREMINDcapitalCosts	15
reportToREMINDenergyEfficiency	16
reportToREMINDesDemand	17
reportToREMINDfinalEnergyDemand	18
reportToREMINDfinalEnergyShares	19
reportTransportVarSet	20
reportUE	20
storeData	21
toolReportsharesLDVtransport	21
transportCompareScenarios	22

Index 24

aggregateVariables	<i>Aggregate variables</i>
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Description

This function aggregates a large set of variables according to the edge transport decision tree and additional aggregation levels that are set manually. The aggregation is applied to all variables simultaneously. Additional transport specific columns are transferred into the variable column entry

Usage

```
aggregateVariables(vars, mapAggregation, weight = NULL)
```

Arguments

vars	Data.table with variables to aggregate in modified quitte style format
mapAggregation	Map containing levels for aggregation in addition to the levels of the decision tree
weight	Weight to aggregate variables

Value

Data.table with aggregated variables

Author(s)

Johanna Hoppe

checkConvergence	<i>Compare parameters in edget and REMIND and store their deviation to track model convergence</i>
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Description

Compare parameters in edget and REMIND and store their deviation to track model convergence

Usage

```
checkConvergence(outputdir)
```

Arguments

outputdir	path to REMIND outputfolder
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Author(s)

Johanna Hoppe

checkForNAsAndDups	<i>Check a data.table for NAs and duplicates and throw an error if needed</i>
--------------------	---

Description

Check a data.table for NAs and duplicates and throw an error if needed

Usage

```
checkForNAsAndDups(dt, varname, codePosition)
```

Arguments

dt	data.table to be checked
varname	name of the variable
codePosition	position in the code to find the bug

Author(s)

Johanna Hoppe

convertToMIF	<i>Convert variables into model intercomparison format MIF</i>
--------------	--

Description

Convert variables into model intercomparison format MIF

Usage

```
convertToMIF(  
  vars,  
  GDPMER,  
  helpers,  
  scenario,  
  model,  
  isTransportExtendedReported = FALSE  
)
```

Arguments

vars	Variables to be aggregated and converted into MIF format
GDPMER	GDP on market exchange rate basis to be used as weight for regional aggregation
helpers	List of helpers
scenario	Scenario name in MIF entry
model	Model name in MIF entry
isTransportExtendedReported	Switch to enable the extended transport variable set

Value

Variables provided in different aggregation levels in MIF format

Author(s)

Johanna Hoppe

harmonizeREMINDvsEDGETenergyServiceDemand

Harmonize variables reported by REMIND and EDGE-T. REMIND reports energy service demand based on the last REMIND iteration before REMIND converged and EDGE-T based on the last EDGE-T iteration. Depending on the number of REMIND iterations (<25/25-45/>45) until convergence, the last EDGE-T run happened up to (3/5/8) iterations ago. Therefore the Energy service demand on CES node level differs between REMIND and EDGE-T. We want to harmonize ES, FE and Emi to equal the REMIND values. Consequently, we want the detailed transport variables to be reported using the ES demand on CES node level from the last REMIND iteration. We want to keep the energy intensity of REMIND, which is the energy intensity from the last EDGE-T run. Therefore, we don't want to take the fuel prices from the last REMIND iteration and keep the vehicle sales and mode shares/stock composition as they are. Deviations are stored in EDGE-T/trackConvergence.csv (parameter) check REMIND-vs-EDGE-T/mifVariables.csv (mif variables)

Description

Harmonize variables reported by REMIND and EDGE-T. REMIND reports energy service demand based on the last REMIND iteration before REMIND converged and EDGE-T based on the last EDGE-T iteration. Depending on the number of REMIND iterations (<25/25-45/>45) until convergence, the last EDGE-T run happened up to (3/5/8) iterations ago. Therefore the Energy service demand on CES node level differs between REMIND and EDGE-T. We want to harmonize ES, FE and Emi to equal the REMIND values. Consequently, we want the detailed transport variables to be reported using the ES demand on CES node level from the last REMIND iteration. We want to keep the energy intensity of REMIND, which is the energy intensity from the last EDGE-T run. Therefore, we don't want to take the fuel prices from the last REMIND iteration and keep the vehicle sales and mode shares/stock composition as they are. Deviations are stored in EDGE-T/trackConvergence.csv (parameter) checkREMINDvsEDGE-TmifVariables.csv (mif variables)

Usage

```
harmonizeREMINDvsEDGETEnergyServiceDemand(
   .gdx,
    ESdemandFVsalesLevel,
    fleetESdemand,
    helpers
)
```

Arguments

gdx	path to REMIND fulldata.gdx
ESdemandFVsalesLevel	Energy service demand on sales level

fleetESdemand Energy service demand on fleet level
helpers EDGE-T helpers that include e.g. the decision tree

Value

harmonizedDemand harmonized energy service demand on FV (Fuel to vehicle) fleet level

Author(s)

Johanna Hoppe

prepareForREMIND	<i>Prepare data to report to REMIND</i>
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Description

Prepare data to report to REMIND

Usage

prepareForREMIND(dt, demScen, SSPscen, transportPolScen)

Arguments

dt data.table with data to report to REMIND
demScen demand scenario
SSPscen SSP scenario
transportPolScen transport policy scenario

Value

data table ready to report to REMIND

Author(s)

Johanna Hoppe

```
renameDuplicateVariables
```

Renames vertain variables to prevent duplicates for variables that are reported also in remind2

Description

Renames vertain variables to prevent duplicates for variables that are reported also in remind2

Usage

```
renameDuplicateVariables(vars)
```

Arguments

vars MIF variables

Value

MIF variables that are renamed to "Transport edge" where necessary

Author(s)

Johanna Hoppe

```
reportAggregatedCosts
```

Report cost variables in aggregated levels: Capital costs sales, operating costs (total non-fuel), fuel costs

Description

Report cost variables in aggregated levels: Capital costs sales, operating costs (total non-fuel), fuel costs

Usage

```
reportAggregatedCosts(combinedCAPEXandOPEX)
```

Arguments

combinedCAPEXandOPEX
detailed data on cost variables

Value

aggregated cost variables

Author(s)

Johanna Hoppe

reportAnalyticsVarSet	<i>Report analytics variable set</i>
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Description

Report analytics variable set

Usage

reportAnalyticsVarSet(data, timeResReporting)

Arguments

- data List that contains the model results to report the analytics variable set
- timeResReporting Timesteps to be reported

Value

Analytics variable set

Author(s)

Johanna Hoppe

reportBaseVarSet	<i>Report basic variable set needed to report REMIND input data and detailed transport data</i>
------------------	---

Description

Report basic variable set needed to report REMIND input data and detailed transport data

Usage

reportBaseVarSet(data)

Arguments

- data List that contains at least the model results to report the basic variable set

Value

list of intensive and extensive output variables

Author(s)

Johanna Hoppe

reportEdgeTransport	<i>Report EDGE-Transport Model results</i>
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Description

This function reports the transport model results of an iterative or standalone run. If not handed over in the function call, it first loads the transport model results from the stored RDS files. Then it calculates the output variables and brings the data into the right format. A basic output variables set is always calculated that is needed for all reporting packages. With the help of switches, different reporting packages can be generated: - isTransportReported activates the reduced reporting of transport variables in MIF format to be attached to a REMIND.mif. It includes the variables needed to create REMIND compareScenarios2 and report results for projects - isTransportReported + isTransportExtendedReported activates further the extended reporting of transport variables and if isStored is activated as well, triggers the generation of a separate transport.MIF. It includes the reduced reporting and additional transport variables for a detailed analysis of the transport sector using transportCompareScenarios - isTransportReported + isTransportExtendedReported + isAnalyticsReported activates further the generation of additional variables for the analysis of the model behavior such as the inconvenience costs over iterations. They can be analyzed in the analytics sheet in compareScenariosTransport. It can be used in combination or without isTransportExtendedReported. - isREMINDinputReported activates the reporting of REMIND input data from a standalone run. This mode is used in the REMIND input data generation with all other switches turned off. It can be also used in combination with the other switches.

Usage

```
reportEdgeTransport(
  folderPath = file.path(".", "EDGE-T"),
  data = NULL,
  isTransportReported = TRUE,
  isTransportExtendedReported = FALSE,
  isAnalyticsReported = FALSE,
  isREMINDinputReported = FALSE,
  isStored = TRUE,
  isHarmonized = FALSE,
  ...
)
```

Arguments

folderPath	Path to the EDGE-Transport output folder of an iterative or standalone run
data	List of model results. If not handed over, the data is loaded from the RDS files in the output folder
isTransportReported	Switch for activating the reporting of transport data in MIF format
isTransportExtendedReported	Switch for activating the reporting of detailed transport data im MIF format needed to create transportCompareScenarios
isAnalyticsReported	Switch for activating reporting of model analytics data
isREMINDinputReported	Switch for activating reporting of REMIND input data
isStored	Switch for activating data storage and creating the transport.MIF file
isHarmonized	Switch for activating ouput harmonization with REMIND
...	Additional model results/parameter that are handed over individually

Value

The function either returns the REMINDinputData if isREMINDinputReported is enabled or the transport data in MIF format

Author(s)

Johanna Hoppe

reportEmissions	<i>Report emissions allocated to the transport sector. Only direkt emissions from liquid or gaseous energy carriers used in ICEs are considered. Indirect emissions from electricity and hydrogen are not allocated to the transport sector.</i>
-----------------	--

Description

Report emissions allocated to the transport sector. Only direkt emissions from liquid or gaseous energy carriers used in ICEs are considered. Indirect emissions from electricity and hydrogen are not allocated to the transport sector.

Usage

```
reportEmissions(dtFE,.gdxPath, prefix, helpers)
```

Arguments

dtFE	Final energy data for liquids and gases
gdxPath	Path to REMIND fulldata.gdx containing emission factors
prefix	Prefix that specifies the emissions we are referring to in the variable name (either tailpipe or demand)
helpers	List of helpers

Value

Emissions data for provided values in dtFE

Author(s)

Johanna Hoppe

reportExtendedTransportVarSet

Report extended detailed transport variable set

Description

Report extended detailed transport variable set

Usage

```
reportExtendedTransportVarSet(data, baseVarSet, timeResReporting)
```

Arguments

data	List that contains the model results to report the extended detailed transport variable set
baseVarSet	List that contains the basic variables
timeResReporting	Time resolution for variable reporting

Value

Extended detailed transport output variable set

Author(s)

Johanna Hoppe

reportFinalEnergy	<i>Report variables in relation to the vehicle fleet.</i>
-------------------	---

Description

Variables like energy intensity and capital costs are linked to the construction year of a vehicle. As energy intensity and capital costs change over time for new sales, the composition of the fleet from vehicles of different construction years needs to be taken into account to report these variables.

Usage

```
reportFinalEnergy(  
  fleetEnergyIntensity,  
  fleetESdemand,  
  loadFactor,  
  hybridElecShare,  
  helpers  
)
```

Arguments

- fleetEnergyIntensity Energy intensity linked to the vehicle fleet
- fleetESdemand Energy service on technology level linked to the vehicle fleet
- loadFactor Persons or tons per vehicle
- hybridElecShare Share of electric driving in hybrid electric vehicles
- helpers list of helpers

Value

Final energy consumed by all modes and technologies

Author(s)

Johanna Hoppe

reportFleetVariables *Report variables in relation to the vehicle fleet.*

Description

Variables like energy intensity and capital costs are linked to the construction year of a vehicle. As energy intensity and capital costs change over time for new sales, the composition of the fleet from vehicles of different construction years needs to be taken into account to report these variables.

Usage

```
reportFleetVariables(salesData, vehiclesConstrYears, helpers)
```

Arguments

salesData	variables linked to new sales in the respective years
vehiclesConstrYears	vehicle numbers and their construction years for the respective years
helpers	list of helpers

Value

Variable in relation to the vehicle fleet

Author(s)

Johanna Hoppe

reportLiquidsAndGasesComposition
Report the split of liquids and gases into fossil/bio/hydrogen

Description

Report the split of liquids and gases into fossil/bio/hydrogen

Usage

```
reportLiquidsAndGasesComposition(dtFE,.gdxPath, helpers)
```

Arguments

dtFE	Final energy data for liquids and gases
.gdxPath	Path to REMIND.gdx, which contains the share of the various production routes for liquid and gaseous energy carriers
helpers	List of helpers

Value

Final energy for liquids and gases split into fossil/biohydrogen

Author(s)

Johanna Hoppe

reportREMINDinputVarSet

Report REMIND/iterative EDGE-T input data

Description

Report REMIND/iterative EDGE-T input data

Usage

```
reportREMINDinputVarSet(
  fleetESdemand,
  fleetFEdemand,
  fleetEnergyIntensity,
  scenSpecLoadFactor,
  fleetCapCosts,
  combinedCAPEXandOPEX,
  scenSpecPrefTrends,
  scenSpecEnIntensity,
  initialIncoCosts,
  annualMileage,
  timeValueCosts,
  hybridElecShare,
  demScen,
  SSPscen,
  transportPolScen,
  timeResReporting,
  helpers
)
```

Arguments

fleetESdemand	energy service demand on fleet level
fleetFEdemand	final energy demand on fleet level
fleetEnergyIntensity	energy intensity on fleet level
scenSpecLoadFactor	scenario specific load factor data
fleetCapCosts	annualized capital costs on fleet level

combinedCAPEXandOPEX	CAPEX and OPEX on sales level in high temporal resolution
scenSpecPrefTrends	scenario specific preference trends in high temporal resolution
scenSpecEnIntensity	scenario specific energy intensity in high temporal resolution
initialIncoCosts	initial inconvenience cost
annualMileage	annual mileage in high temporal resolution
timeValueCosts	time value cost equivalent in high temporal resolution
hybridElecShare	share of electric driving for hybrid electric vehicles
demScen	demand scenario
SSPscen	SSP scenario
transportPolScen	transport policy scenario
timeResReporting	time resolution reporting
helpers	list with helpers

Value

REMIND/iterative EDGE-T input data

Author(s)

Johanna Hoppe

reportToREMINDcapitalCosts

Report to REMIND p35_esCapCost

Description

Report to REMIND p35_esCapCost

Usage

```
reportToREMINDcapitalCosts(
  fleetCapCosts,
  fleetESdemand,
  hybridElecShare,
  timeResReporting,
  demScen,
  SSPscen,
  transportPolScen,
  helpers
)
```

Arguments

fleetCapCosts	capital costs on fleet level
fleetESdemand	energy service demand on fleet level
hybridElecShare	share of electric driving for hybrid electric vehicles
timeResReporting	time resolution reporting
demScen	demand scenario
SSPscen	SSP scenario
transportPolScen	transport policy scenario
helpers	list of helpers

Value

Capital Costs per CES node in [US\$2017/pkm or US\$2017/tkm]

Author(s)

Johanna Hoppe

reportToREMINDenergyEfficiency
Report to REMIND f35_fe2es

Description

Report to REMIND f35_fe2es

Usage

```
reportToREMINDenergyEfficiency(  
  fleetFEdemand,  
  fleetESdemand,  
  hybridElecShare,  
  timeResReporting,  
  demScen,  
  SSPscen,  
  transportPolScen,  
  helpers  
)
```

Arguments

fleetFEdemand	final energy demand on fleet level
fleetESdemand	energy service demand on fleet level
hybridElecShare	share of electric driving for hybrid electric vehicles
timeResReporting	time resolution reporting
demScen	demand scenario
SSPscen	SSP scenario
transportPolScen	transport policy scenario
helpers	list of helpers

Value

Energy efficiency of transport fuel technologies in [trn pkm/Twa or trn tkm/Twa]

Author(s)

Johanna Hoppe

reportToREMINDesDemand

Report energy service demand to REMIND

Description

Note that this is a helpers function that accounts for structural differences in REMIND and EDGE-T. The REMIND CES tree cannot represent active modes, as they deliver valuable energy service demand without capital cost and final energy production. Just filtering out the active modes energy service demand allocated by EDGE-Transport would lead to inconsistencies between both models: E.g. REMIND would split the whole trn_pass energy service demand according to the FE shares and energy efficiencies reported by EDGE-T (without considering the active modes) and would calculate a different FE value compared to EDGE-T that reserves a part of the trn_pass energy service demand to the active modes.

Usage

```
reportToREMINDesDemand(
  fleetESdemand,
  hybridElecShare,
  timeResReporting,
  demScen,
  SSPscen,
  transportPolScen,
  helpers
)
```

Arguments

fleetESdemand	energy service demand on fleet level
hybridElecShare	share of electric driving for hybrid electric vehicles
timeResReporting	time resolution reporting
demScen	demand scenario
SSPscen	SSP scenario
transportPolScen	transport policy scenario
helpers	list of helpers

Details

Solution: split and distribute the energy service demand of active modes across all technologies to calculate energy efficiency and capital cost per pkm. Consequence: This leads to the fact that in REMIND energy service demand, energy efficiencies, and capital costs on technology level are rather abstract values that are not technically correct. Hence, they should not be reported on technology level by REMIND (only by EDGE-T). The FE values on technology level are represented correctly as well as the energy service demand on CES node level. The decision of the technology share is anyway made by EDGE-T and not by REMIND.

Value

Energy service demand per technology in [trillion pkm/trillion tkm]

Author(s)

Johanna Hoppe

reportToREMINDfinalEnergyDemand

Report to REMIND f35_demByTech

Description

Report to REMIND f35_demByTech

Usage

```
reportToREMINDfinalEnergyDemand(
  fleetFEdemand,
  timeResReporting,
  demScen,
  SSPscen,
  transportPolScen,
  helpers
)
```

Arguments

fleetFEdemand	final energy demand on fleet level
timeResReporting	time resolution reporting
demScen	demand scenario
SSPscen	SSP scenario
transportPolScen	transport policy scenario
helpers	list of helpers

Value

Final energy demand on CES level per transport fuel technology [TWa]

Author(s)

Johanna Hoppe

reportToREMINDfinalEnergyShares

Report to REMIND final energy shares f35_shFeCes

Description

Report to REMIND final energy shares f35_shFeCes

Usage

```
reportToREMINDfinalEnergyShares(
  fleetFEdemand,
  timeResReporting,
  demScen,
  SSPscen,
  transportPolScen,
  helpers
)
```

Arguments

fleetFEdemand	Final energy demand on fleet level
timeResReporting	time resolution reporting
demScen	demand scenario
SSPscen	SSP scenario
transportPolScen	transport policy scenario
helpers	list of helpers

Value

Final energy shares of transport fuel technologies in [-]

reportTransportVarSet	<i>Report detailed transport variable set</i>
-----------------------	---

Description

Report detailed transport variable set

Usage

reportTransportVarSet(data, baseVarSet)

Arguments

- | | |
|------------|--|
| data | List that contains the model results to report the detailed transport variable set |
| baseVarSet | Basic output variable set |

Value

Detailed transport output variable set

Author(s)

Johanna Hoppe

reportUE	<i>Report variables in relation to the vehicle fleet.</i>
----------	---

Description

Report variables in relation to the vehicle fleet.

Usage

reportUE(FEdemand, helpers)

Arguments

- | | |
|----------|----------------------|
| FEdemand | Finale energy demand |
| helpers | List with helpers |

Value

Useful energy demand

Author(s)

Johanna Hoppe

storeData	<i>Store EDGE-Transport model results</i>
-----------	---

Description

This function creates the EDGE-Transport outputfolder and stores all outputfiles in the respective subfolders

Usage

```
storeData(outputFolder, varsList = NULL, ...)
```

Arguments

outputFolder	Path to folder for storing output data
varsList	Raw model results
...	Optional passing of additional variables

Author(s)

Johanna Hoppe

toolReportsharesLDVtransport	<i>Report FE shares of LDV in transport liquids</i>
------------------------------	---

Description

Report FE shares of LDV in transport liquids

Usage

```
toolReportsharesLDVtransport(
  fleetFEdemand,
  timeResReporting,
  demScen,
  SSPscen,
  transportPolScen,
  helpers
)
```

Arguments

fleetFEdemand	final energy demand on fleet level
timeResReporting	time resolution reporting
demScen	demand scenario
SSPscen	SSP scenario
transportPolScen	transport policy scenario
helpers	list of helpers

Value

Final energy shares of LDV in transport liquids [-]

Author(s)

Johanna Hoppe

transportCompareScenarios

Render CompareScenarios for EDGE Transport

Description

A wrapper for `piamPlotComparison::compareScenarios`

Usage

```
transportCompareScenarios(
  mifScen,
  mifHist,
  outputDir = getwd(),
  outputFile = "CompareScenarios",
  outputFormat = "PDF"
)
```

Arguments

mifScen	character(n), optionally named. Paths to scenario mifs. If the vector has names, those are used to refer to the scenarios in the output file.
mifHist	character(1). Path to historical mif.
outputDir	character(1). The directory where the output document and intermediary files are created.
outputFile	character(1). File name (without extension) of the output document to be created.
outputFormat	character(1), not case-sensitive. "html", "pdf", or "rmd".

Value

The value returned by `render()`.

Index

aggregateVariables, [2](#)

checkConvergence, [3](#)
checkForNAsAndDups, [3](#)
convertToMIF, [4](#)

harmonizeREMINDvsEDGETenergyServiceDemand,
[5](#)

prepareForREMIND, [6](#)

renameDuplicateVariables, [7](#)
render(), [23](#)
reportAggregatedCosts, [7](#)
reportAnalyticsVarSet, [8](#)
reportBaseVarSet, [8](#)
reportEdgeTransport, [9](#)
reportEmissions, [10](#)
reportExtendedTransportVarSet, [11](#)
reportFinalEnergy, [12](#)
reportFleetVariables, [13](#)
reportLiquidsAndGasesComposition, [13](#)
reportREMINDinputVarSet, [14](#)
reportToREMINDcapitalCosts, [15](#)
reportToREMINDenergyEfficiency, [16](#)
reportToREMINDesDemand, [17](#)
reportToREMINDfinalEnergyDemand, [18](#)
reportToREMINDfinalEnergyShares, [19](#)
reportTransportVarSet, [20](#)
reportUE, [20](#)

storeData, [21](#)

toolReportsharesLDVtransport, [21](#)
transportCompareScenarios, [22](#)