

IPM Input for SAGE Data Dictionary

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This dictionary defines fields, codes, and aggregation rules for IPM outputs used as input to SAGE. The inputs to SAGE identify power-sector expense deltas and generation by year, region, technology vintage, and category/type.

Users should be cautious when generating summary statistics from these data. In particular, simple sums of *expenses* may double count certain expenses by including elements of these data that are aggregates (e.g., subtotals) of others, such as transfers, or include alternative approaches to accounting for the same expense (e.g., overnight versus amortized capital expenses).

The input file fields are *year*, *ipm_year*, *sage_year*, *sage_region*, *vintage*, *ct*, *cost_type*, *expenses*, *base_generation* and *policy_generation*

Data are ordered by fields *year*, *sage_region*, *vintage*, *ct*, *cost_type*

year – calendar years

2026 to 2081

ipm_year– IPM model year or monitoring, reporting, and recordkeeping (MR&R) year

MR&R cost for CPS repeal: 2026

IPM run year: 2028, 2030, 2035, 2040, 2045, 2050, 2055

sage_year – SAGE model years

2026 to 2081 in 5-year increments

*sage_region*ⁱ – SAGE region

nor : north

mid : midwest

sou : south

wes : west

can : Canadaⁱⁱ

vintage – vintage of generating capacity

e : existing generating capacity operational in IPM

n : new generating capacity operational in IPMⁱⁱⁱ

s : states^{iv}

ct – broad category of expense and/or generation

a : generation and pollution control (*cost_type*=cp_f, cp_n, cp_o, fom, fuel, tns, vom)
f : fuel (*cost_type*=bio, col, dfo, fos, gas, geo, hgn, hyd, lfg, nfo, pet, rfo, sol, str, urm, wnd)
i : imports^v (*cost_type*=imp)
l : labor (*cost_type*=lbr)
s : subsidy^{vi} (*cost_type*=eor, q45, rc_a, rc_o, rtc, v45)
t : transportation (*cost_type*=ct_f, ct_n, ct_o, ttn, trn)

cost_type – specific category of expense and/or generation

lbr : labor

cp_f : amortized generation and pollution control capital including real and transfers

cp_n : amortized generation and pollution control capital excluding transfers (i.e., real only)

cp_o : overnight generation and pollution control capital excluding transfers (i.e., real only)

fom : generation and pollution control fixed operating and maintenance

fuel : generation fuel

tns : CO₂ transportation and storage

vom : generation and pollution control variable operating and maintenance

bio : biomass

col : coal

dfo : distillate fuel oil

fos : fossil waste

gas : natural gas

geo : geothermal

hgn^{vii} : hydrogen

hyd : hydro

lfg : landfill gas

nfo : non-fossil waste

pet : petroleum coke

rfo : residual fuel oil

sol : solar photovoltaic

str : solar thermal

urm : uranium

wnd : wind

imp : net imports

eor : enhanced oil recovery

q45 : IRC Q45

rc_a : annual IRC 45Y and IRC 48E

rc_o : overnight IRC 45Y and IRC 48E

rtc : renewable tax credits

v45 : IRC V45

ct_f : amortized transmission capital inclusive of real and transfers

ct_n : amortized transmission capital excluding transfers (i.e., real only)

ct_o : overnight transmission capital excluding transfers (i.e., real only)

trn : non-truck fuel transportation

ttn : truck transportation

expenses – electricity sector expense difference between baseline and policy scenario in million 2022\$

expenses notes:

cost_type="lbr" is change in expenses for states to administer the regulation (i.e., MR&R costs).

cost_type="fuel" is sum of all fuel (*ct*=f) and non-transmission transportation expenses (*cost_type*="ttn", "trn")

cost_type="tns" excludes enhanced oil recovery (*cost_type*="eor") revenues and 45Q tax credit payments (*cost_type*="45Q")

cost_type="col", "gas", "dfo", "rfo" exclude transportation expenses. All other *ct*="f" types include transportation expenses (i.e., represent the difference in delivered costs), as appropriate.

cost_type="trn" includes non-truck transportation costs for *cost_type*="col", "gas", "dfo", "rfo"

cost_type="ttn" includes truck transportation costs for *cost_type*="col"

ct="s" represent changes in receipts of tax credits and eor between baseline and policy scenario

cost_type="rc_a" includes 45Y (production tax credit) as well as 48E (investment tax credit) converted to an annualized payment to capital over book life of eligible technologies.

cost_type="rc_o" includes 48E (investment tax credit) as well as 45Y (production tax credit) converted to an overnight payment to capital using book life of eligible technologies.

cost_type="rtc" is sum of annual 45Y and 48E expenses (i.e., tax credit receipts).

base_generation – GWh generation for any *ct=f* in baseline scenario

policy_generation – GWh generation for any *ct=f* in policy scenario

ⁱ IPM regional results are mapped to SAGE regions by the code that translates IPM outputs into SAGE inputs.

ⁱⁱ Expenses on electricity supply in Canada from IPM results are not used within SAGE, but this information is retained for completeness and diagnostics. In the can region the values of the overnight and amortized generation and transmission capital excluding transfers are not the actual estimates and should not be used.

ⁱⁱⁱ Includes planned new capacity (i.e., new capacity hardwired in IPM) and endogenous new capacity in the IPM simulation. See the version of NEEDS corresponding to IPM scenarios for list of hardwired generating capacity.

^{iv} The vintage code states (s) is used to account for changes in MR&R costs incurred by the States to administer the regulation. This code does not apply to costs incurred by state-owned sources subject to the regulation.

^v While IPM accounts for expenses on electricity imports, this information is not currently collected from IPM for use in SAGE. SAGE has its own representation of trade.

^{vi} Except for enhanced oil recovery (eor), the *cost_type* labels all represent tax credits. They are labeled as subsidies for convenience of data organization. eor is grouped in this category because it similarly requires treatment as a source of revenue for the power sector, but it does not represent a subsidy.

^{vii} Hydrogen expenses are not tracked separately in this version of the translation of IPM outputs to SAGE inputs. Expenses for hydrogen are accounted for in natural gas expenses.