Invevitable Policy Response (IPR) 2021 Value Drivers Database Guide

IPR describes the outputs from the IPR Forecast Policy Scenario 2021 (FPS) and 1.5C Required Policy Scenario (RPS) as “value drivers” for portfolio construction.

These value drivers are the same variables for both the IPR FPS and 1.5°C RPS and are set out below.

1.1 IPR FPS 2021 Value Driver Database

The IPR FPS 2021 value driver database includes both energy and land system value drivers and can be found here:
https://www.unpri.org/download?ac=15398

1.2 IPR 1.5°C RPS 2021 Value Driver Database

The IPR 1.5°C 2021 value driver database includes both energy and land system value drivers and can be found here:
https://www.unpri.org/download?ac=15399

Value Diver Data Dictionary

1.3 Energy Overview

- **Time horizon:** 2020-2050
- **Resolution:** 1 year intervals*
- **Jurisdiction:** 21 world regions including 12 G20 countries*
  - **Countries:** Australia, Brazil, Canada, China, India, Indonesia, Japan, Russia, South Africa, South Korea, United Kingdom, United States
  - **Composite regions:** Central and South America, Eastern Europe, Eurasia, Gulf Cooperation Council, Middle East and North Africa, South Asia, South East Asia and Oceania, Sub-Saharan Africa, Western Europe

* for a small number of variables data is published at 10 year intervals, or at the world level

Energy data variables dictionary:

1. Capacity
2. Capex
3. CO2 removals
4. Demand
5. Electricity generation
6. GHG Emissions
7. New deployment
8. Price
9. Primary energy demand
10. Production
11. Sector energy demand

1.4 Land use overview

- **Time horizon:** 2020-2050
- **Resolution:** 5 year intervals
- **Jurisdiction:** 16 world regions including 5 G20 countries
  - **Countries:** Brazil, Canada, China, India, Russia, United States
  - **Composite regions:** Developed East Asia, Latin America (ex. Brazil), Middle East Asia, North Europe, Reforming Economies, South East Asia, South Asia (ex. India), Sub-Saharan Africa, Western Europe, Australia & New Zealand

Land use data variables dictionary:

1. GHG emissions
2. Nature-based solutions
3. Alternative meat
4. Timber
5. Bioenergy
6. Agriculture

2 Energy data variables dictionary

Energy data variables classes table of contents

Source: Vivid Economics

2.1 Capacity

Table 1 Energy - Capacity

Variable ID	Sub variable class	Sector	Definition	Units
Capacity_Electricity generation_Biomass CCS_Power	Electricity generation	Power	Total installed capacity: electricity generation by technology	GW
Capacity_Electricity generation_Biomass_Power	Electricity generation	Power	Total installed capacity: electricity generation by technology	GW
Capacity_Electricity generation_Coal CCS_Power	Electricity generation	Power	Total installed capacity: electricity generation by technology	GW
Capacity_Electricity generation_Coal_Power	Electricity generation	Power	Total installed capacity: electricity generation by technology	GW
Capacity_Electricity generation_Hydro_Power	Electricity generation	Power	Total installed capacity: electricity generation by technology	GW
Capacity_Electricity generation_Hydrogen_Power	Electricity generation	Power	Total installed capacity: electricity generation by technology	GW
Capacity_Electricity generation_Natural gas CCS_Power	Electricity generation	Power	Total installed capacity: electricity generation by technology	GW
Capacity_Electricity generation_Natural gas_Power	Electricity generation	Power	Total installed capacity: electricity generation by technology	GW
Capacity_Electricity generation_Nuclear_Power	Electricity generation	Power	Total installed capacity: electricity generation by technology	GW
Capacity_Electricity generation_Offshore wind_Power	Electricity generation	Power	Total installed capacity: electricity generation by technology	GW

Variable ID	Sub variable class	Sector	Definition	Units
Capacity_Electricity generation_Oil_Power	Electricity generation	Power	Total installed capacity: electricity generation by technology	GW
Capacity_Electricity generation_Solar_Power	Electricity generation	Power	Total installed capacity: electricity generation by technology	GW
Capacity_Electricity generation_Onshore wind_Power	Electricity generation	Power	Total installed capacity: electricity generation by technology	GW

Source: Vivid Economics

2.2 Technology Stock

Table 2 Energy – Technology stock

Variable ID	Sub variable class	Sector	Definition	Units
Technology stock_Electricity generation_Onshore wind_Hydrogen	Electricity generation	Hydrogen	Total installed capacity: electricity generation by technology	GW
Technology stock _Electricity generation_Offshore wind_Hydrogen	Electricity generation	Hydrogen	Total installed capacity: electricity generation by technology	GW
Technology stock _Electricity generation_Solar_Hydrogen	Electricity generation	Hydrogen	Total installed capacity: electricity generation by technology	GW
Technology stock _Heating systems_Biomass_Buildings_Commercial	Heating systems	Buildings	Total installed capacity: space/water heating systems by technology	% mix
Technology stock _Heating systems_Biomass_Buildings_Residential	Heating systems	Buildings	Total installed capacity: space/water heating systems by technology	# units
Technology stock _Heating systems_Coal_Buildings_Commercial	Heating systems	Buildings	Total installed capacity: space/water heating systems by technology	% mix
Technology stock _Heating systems_Coal_Buildings_Residential	Heating systems	Buildings	Total installed capacity: space/water heating systems by technology	# units
Technology stock _Heating systems_District heat_Buildings_Commercial	Heating systems	Buildings	Total installed capacity: space/water heating systems by technology	% mix

Variable ID	Sub variable class	Sector	Definition	Units
Technology stock _Heating systems_District heat_Buildings_Residential	Heating systems	Buildings	Total installed capacity: space/water heating systems by technology	# units
Technology stock_Heating systems_Heat pump_Buildings_Commercial	Heating systems	Buildings	Total installed capacity: space/water heating systems by technology	% mix
Technology stock _Heating systems_Heat pump_Buildings_Residential	Heating systems	Buildings	Total installed capacity: space/water heating systems by technology	# units
Technology stock _Heating systems_Hydrogen_Buildings_Commercial	Heating systems	Buildings	Total installed capacity: space/water heating systems by technology	% mix
Technology stock _Heating systems_Hydrogen_Buildings_Residential	Heating systems	Buildings	Total installed capacity: space/water heating systems by technology	# units
Technology stock _Heating systems_Natural gas_Buildings_Commercial	Heating systems	Buildings	Total installed capacity: space/water heating systems by technology	% mix
Technology stock _Heating systems_Natural gas_Buildings_Residential	Heating systems	Buildings	Total installed capacity: space/water heating systems by technology	# units
Technology stock _Heating systems_Oil_Buildings_Commercial	Heating systems	Buildings	Total installed capacity: space/water heating systems by technology	% mix

Variable ID	Sub variable class	Sector	Definition	Units
Technology stock _Heating systems_Oil_Buildings_Residential	Heating systems	Buildings	Total installed capacity: space/water heating systems by technology	# units
Technology stock _Heating systems_Resistive_Buildings_Commercial	Heating systems	Buildings	Total installed capacity: space/water heating systems by technology	% mix
Technology stock _Heating systems_Resistive_Buildings_Residential	Heating systems	Buildings	Total installed capacity: space/water heating systems by technology	# units
Technology stock_Vehicles_BEV_Transport_Cars	Vehicles	Transport	Total stock of vehicles by technology (cars)	Vehicles (thousands)
Technology stock_Vehicles_BEV_Transport_Trucks	Vehicles	Transport	Total stock of vehicles by technology (trucks)	Vehicles (thousands)
Technology stock_Vehicles_BEV_Transport_Vans	Vehicles	Transport	Total stock of vehicles by technology (vans)	Vehicles (thousands)
Technology stock_Vehicles_H2_Transport_Cars	Vehicles	Transport	Total stock of vehicles by technology (cars)	Vehicles (thousands)
Technology stock_Vehicles_H2_Transport_Trucks	Vehicles	Transport	Total stock of vehicles by technology (trucks)	Vehicles (thousands)

Variable ID	Sub variable class	Sector	Definition	Units
Technology stock_Vehicles_H2_Transport_Vans	Vehicles	Transport	Total stock of vehicles by technology (vans)	Vehicles (thousands)
Technology stock_Vehicles_ICE_Transport_Cars	Vehicles	Transport	Total stock of vehicles by technology (cars)	Vehicles (thousands)
Technology stock_Vehicles_ICE_Transport_Trucks	Vehicles	Transport	Total stock of vehicles by technology (trucks)	Vehicles (thousands)
Technology stock_Vehicles_ICE_Transport_Vans	Vehicles	Transport	Total stock of vehicles by technology (vans)	Vehicles (thousands)
Technology stock_Vehicles_PHEV_Transport_Cars	Vehicles	Transport	Total stock of vehicles by technology (cars)	Vehicles (thousands)
Technology stock_Vehicles_PHEV_Transport_Trucks	Vehicles	Transport	Total stock of vehicles by technology (trucks)	Vehicles (thousands)
Technology stock_Vehicles_PHEV_Transport_Vans	Vehicles	Transport	Total stock of vehicles by technology (vans)	Vehicles (thousands)

Source: Vivid Economics

2.3 Capex

Table 3 Energy - Capex

Variable ID	Sub variable class	Sector	Definition	Units
Capex_Electricity generation_Biomass CCS_Power	Electricity generation	Power	Capital investment: electricity generation capacity	USD (million)
Capex_Electricity generation_Biomass_Power	Electricity generation	Power	Capital investment: electricity generation capacity	USD (million)
Capex_Electricity generation_Coal CCS_Power	Electricity generation	Power	Capital investment: electricity generation capacity	USD (million)
Capex_Electricity generation_Coal_Power	Electricity generation	Power	Capital investment: electricity generation capacity	USD (million)
Capex_Electricity generation_Hydro_Power	Electricity generation	Power	Capital investment: electricity generation capacity	USD (million)
Capex_Electricity generation_Hydrogen_Power	Electricity generation	Power	Capital investment: electricity generation capacity	USD (million)
Capex_Electricity generation_Natural gas CCS_Power	Electricity generation	Power	Capital investment: electricity generation capacity	USD (million)
Capex_Electricity generation_Natural gas_Power	Electricity generation	Power	Capital investment: electricity generation capacity	USD (million)
Capex_Electricity generation_Nuclear_Power	Electricity generation	Power	Capital investment: electricity generation capacity	USD (million)
Capex_Electricity generation_Offshore wind_Hydrogen	Electricity generation	Hydrogen	Capital investment: electricity generation capacity	USD (million)

Variable ID	Sub variable class	Sector	Definition	Units
Capex_Electricity generation_Offshore wind_Power	Electricity generation	Power	Capital investment: electricity generation capacity	USD (million)
Capex_Electricity generation_Oil_Power	Electricity generation	Power	Capital investment: electricity generation capacity	USD (million)
Capex_Electricity generation_Onshore wind_Hydrogen	Electricity generation	Hydrogen	Capital investment: electricity generation capacity	USD (million)
Capex_Electricity generation_Onshore wind_Power	Electricity generation	Power	Capital investment: electricity generation capacity	USD (million)
Capex_Electricity generation_Solar_Hydrogen	Electricity generation	Hydrogen	Capital investment: electricity generation capacity	USD (million)
Capex_Electricity generation_Solar_Power	Electricity generation	Power	Capital investment: electricity generation capacity	USD (million)
Capex_Heating systems_Biomass_Buildings_Commercial	Heating systems	Buildings	Capital investment: space/water heating systems by technology (commercial)	USD (million)
Capex_Heating systems_Biomass_Buildings_Residential	Heating systems	Buildings	Capital investment: space/water heating systems by technology (residential)	USD (million)
Capex_Heating systems_Coal_Buildings_Commercial	Heating systems	Buildings	Capital investment: space/water heating systems by technology (commercial)	USD (million)
Capex_Heating systems_Coal_Buildings_Residential	Heating systems	Buildings	Capital investment: space/water heating systems by technology (residential)	USD (million)
Capex_Heating systems_District heat_Buildings_Commercial	Heating systems	Buildings	Capital investment: space/water heating systems by technology (commercial)	USD (million)

Variable ID	Sub variable class	Sector	Definition	Units
Capex_Heating systems_District heat_Buildings_Residential	Heating systems	Buildings	Capital investment: space/water heating systems by technology (residential)	USD (million)
Capex_Heating systems_Heat pump_Buildings_Commercial	Heating systems	Buildings	Capital investment: space/water heating systems by technology (commercial)	USD (million)
Capex_Heating systems_Heat pump_Buildings_Residential	Heating systems	Buildings	Capital investment: space/water heating systems by technology (residential)	USD (million)
Capex_Heating systems_Hydrogen_Buildings_Commercial	Heating systems	Buildings	Capital investment: space/water heating systems by technology (commercial)	USD (million)
Capex_Heating systems_Hydrogen_Buildings_Residential	Heating systems	Buildings	Capital investment: space/water heating systems by technology (residential)	USD (million)
Capex_Heating systems_Natural gas_Buildings_Commercial	Heating systems	Buildings	Capital investment: space/water heating systems by technology (commercial)	USD (million)
Capex_Heating systems_Natural gas_Buildings_Residential	Heating systems	Buildings	Capital investment: space/water heating systems by technology (residential)	USD (million)
Capex_Heating systems_Oil_Buildings_Commercial	Heating systems	Buildings	Capital investment: space/water heating systems by technology (commercial)	USD (million)
Capex_Heating systems_Oil_Buildings_Residential	Heating systems	Buildings	Capital investment: space/water heating systems by technology (residential)	USD (million)
Capex_Heating systems_Resistive_Buildings_Commercial	Heating systems	Buildings	Capital investment: space/water heating systems by technology (commercial)	USD (million)

Variable ID	Sub variable class	Sector	Definition	Units
Capex_Heating systems_Resistive_Buildings_Residential	Heating systems	Buildings	Capital investment: space/water heating systems by technology (residential)	USD (million)
Capex_Vehicles_BEV_Transport_Cars	Vehicles	Transport	Capital investment: vehicles by technology (cars)	USD (million)
Capex_Vehicles_BEV_Transport_Trucks	Vehicles	Transport	Capital investment: vehicles by technology (trucks)	USD (million)
Capex_Vehicles_BEV_Transport_Vans	Vehicles	Transport	Capital investment: vehicles by technology (vans)	USD (million)
Capex_Vehicles_H2_Transport_Cars	Vehicles	Transport	Capital investment: vehicles by technology (cars)	USD (million)
Capex_Vehicles_H2_Transport_Trucks	Vehicles	Transport	Capital investment: vehicles by technology (trucks)	USD (million)
Capex_Vehicles_H2_Transport_Vans	Vehicles	Transport	Capital investment: vehicles by technology (vans)	USD (million)
Capex_Vehicles_ICE_Transport_Cars	Vehicles	Transport	Capital investment: vehicles by technology (cars)	USD (million)
Capex_Vehicles_ICE_Transport_Trucks	Vehicles	Transport	Capital investment: vehicles by technology (trucks)	USD (million)
Capex_Vehicles_ICE_Transport_Vans	Vehicles	Transport	Capital investment: vehicles by technology (vans)	USD (million)

Source: Vivid Economics

2.4 CO_2 removals

Table 4 Energy - CO_2 removals

Variable ID	Sub variable class	Sector	Definition	Units
CO2 removals_BECCS_Industry	BECCS	Industry	Carbon sequestration: biomass (industry)	Mt
CO2 removals_BECCS_Power	BECCS	Power	Carbon sequestration: biomass (power)	Mt
CO2 removals_DACS_Total	DACS	Total	Carbon sequestration: direct air capture	Mt

Source: Vivid Economics

2.5 Demand

Table 5 Energy - Demand

Variable ID	Sub variable class	Sector	Definition	Units
Demand_Aviation_Transport	Aviation	Transport	Aviation revenue tonne km	RTK (billion)

Source: Vivid Economics

2.6 Electricity generation

Table 6 Energy - Electricity generation

Variable ID	Sub variable class	Sector	Definition	Units
Electricity generation_Biomass CCS_Power	Biomass CCS	Power	Electricity generation by technology	TWh
Electricity generation_Biomass_Power	Biomass	Power	Electricity generation by technology	TWh
Electricity generation_Coal CCS_Power	Coal CCS	Power	Electricity generation by technology	TWh
Electricity generation_Coal_Power	Coal	Power	Electricity generation by technology	TWh
Electricity generation_Hydro_Power	Hydro	Power	Electricity generation by technology	TWh
Electricity generation_Hydrogen_Power	Hydrogen	Power	Electricity generation by technology	TWh
Electricity generation_Natural gas CCS_Power	Natural gas CCS	Power	Electricity generation by technology	TWh
Electricity generation_Natural gas_Power	Natural gas	Power	Electricity generation by technology	TWh
Electricity generation_Nuclear_Power	Nuclear	Power	Electricity generation by technology	TWh
Electricity generation_Offshore wind_Power	Offshore wind	Power	Electricity generation by technology	TWh
Electricity generation_Oil_Power	Oil	Power	Electricity generation by technology	TWh

Variable ID	Sub variable class	Sector	Definition	Units
Electricity generation_Onshore wind_Power	Onshore wind	Power	Electricity generation by technology	TWh
Electricity generation_Solar_Power	Solar	Power	Electricity generation by technology	TWh

Source: Vivid Economics

2.7 GHG Emissions

Table 7 Energy - GHG Emissions

Variable ID	Sub variable class	Sector	Definition	Units
GHG emissions_CO2_Buildings	CO2	Buildings	CO2 emissions in buildings	Mt
GHG emissions_CO2_Industry_Chemicals	CO2	Industry	CO2 emissions in industry (iron and steel)	Mt
GHG emissions_CO2_Industry_Iron and steel	CO2	Industry	CO2 emissions in industry (non-metallic minerals)	Mt
GHG emissions_CO2_Industry_Non-metallic minerals	CO2	Industry	CO2 emissions in industry (chemicals)	Mt
GHG emissions_CO2_Industry_Other industry	CO2	Industry	CO2 emissions in industry (other industry)	Mt
GHG emissions_CO2_Other energy	CO2	Other energy	CO2 emissions in other sectors	Mt
GHG emissions_CO2_Power	CO2	Power	CO2 emissions in power	Mt
GHG emissions_CO2_Total	CO2	Total	CO2 emissions (total)	Mt
GHG emissions_CO2_Transport	CO2	Transport	CO2 emissions in transport	Mt
GHG emissions_CO2_Transport_Cars	CO2	Transport	CO2 emissions in transport (Cars)	Mt

Variable ID	Sub variable class	Sector	Definition	Units
GHG emissions_CO2_Transport_Trucks	CO2	Transport	CO2 emissions in transport (Trucks)	Mt
GHG emissions_CO2_Transport_Aviation	CO2	Transport	CO2 emissions in transport (Aviation)	Mt
GHG emissions_CO2_Transport_Shipping	CO2	Transport	CO2 emissions in transport (Shipping)	Mt
GHG emissions_CO2_Transport_Other transport	CO2	Transport	CO2 emissions in transport (Transport Other)	Mt

Source: Vivid Economics

2.8 New deployment

Table 8 Energy - New deployment

Variable ID	Sub variable class	Sector	Definition	Units
New deployment_Battery capacity_Total	Battery capacity	Total	Total battery capacity	GWh
New deployment_Electricity generation_Biomass CCS_Power	Electricity generation	Power	New electricity generation capacity by technology for grid electricity	GW
New deployment_Electricity generation_Biomass_Power	Electricity generation	Power	New electricity generation capacity by technology for grid electricity	GW
New deployment_Electricity generation_Coal CCS_Power	Electricity generation	Power	New electricity generation capacity by technology for grid electricity	GW
New deployment_Electricity generation_Coal_Power	Electricity generation	Power	New electricity generation capacity by technology for grid electricity	GW
New deployment_Electricity generation_Hydro_Power	Electricity generation	Power	New electricity generation capacity by technology for grid electricity	GW
New deployment_Electricity generation_Hydrogen_Power	Electricity generation	Power	New electricity generation capacity by technology for grid electricity	GW
New deployment_Electricity generation_Natural gas CCS_Power	Electricity generation	Power	New electricity generation capacity by technology for grid electricity	GW
New deployment_Electricity generation_Natural gas_Power	Electricity generation	Power	New electricity generation capacity by technology for grid electricity	GW
New deployment_Electricity generation_Nuclear_Power	Electricity generation	Power	New electricity generation capacity by technology for grid electricity	GW

Variable ID	Sub variable class	Sector	Definition	Units
New deployment_Electricity generation_Offshore wind_Hydrogen	Electricity generation	Hydrogen	New electricity generation capacity by technology for hydrogen production	GW
New deployment_Electricity generation_Offshore wind_Power	Electricity generation	Power	New electricity generation capacity by technology for grid electricity	GW
New deployment_Electricity generation_Oil_Power	Electricity generation	Power	New electricity generation capacity by technology for grid electricity	GW
New deployment_Electricity generation_Onshore wind_Hydrogen	Electricity generation	Hydrogen	New electricity generation capacity by technology for hydrogen production	GW
New deployment_Electricity generation_Onshore wind_Power	Electricity generation	Power	New electricity generation capacity by technology for grid electricity	GW
New deployment_Electricity generation_Solar_Hydrogen	Electricity generation	Hydrogen	New electricity generation capacity by technology for hydrogen production	GW
New deployment_Electricity generation_Solar_Power	Electricity generation	Power	New electricity generation capacity by technology for grid electricity	GW
New deployment_Heating systems_Biomass_Buildings_Commercial	Heating systems	Buildings	New capacity additions: space/water heating systems by technology (commercial)	% mix
New deployment_Heating systems_Biomass_Buildings_Residential	Heating systems	Buildings	New capacity additions: space/water heating systems by technology (commercial)	# units

Variable ID	Sub variable class	Sector	Definition	Units
New deployment_Heating systems_Coal_Buildings_Commercial	Heating systems	Buildings	New capacity additions: space/water heating systems by technology (commercial)	% mix
New deployment_Heating systems_Coal_Buildings_Residential	Heating systems	Buildings	New capacity additions: space/water heating systems by technology (commercial)	# units
New deployment_Heating systems_District heat_Buildings_Commercial	Heating systems	Buildings	New capacity additions: space/water heating systems by technology (commercial)	% mix
New deployment_Heating systems_District heat_Buildings_Residential	Heating systems	Buildings	New capacity additions: space/water heating systems by technology (commercial)	# units
New deployment_Heating systems_Heat pump_Buildings_Commercial	Heating systems	Buildings	New capacity additions: space/water heating systems by technology (commercial)	% mix
New deployment_Heating systems_Heat pump_Buildings_Residential	Heating systems	Buildings	New capacity additions: space/water heating systems by technology (commercial)	# units
New deployment_Heating systems_Hydrogen_Buildings_Commercial	Heating systems	Buildings	New capacity additions: space/water heating systems by technology (commercial)	% mix
New deployment_Heating systems_Hydrogen_Buildings_Residential	Heating systems	Buildings	New capacity additions: space/water heating systems by technology (commercial)	# units

Variable ID	Sub variable class	Sector	Definition	Units
New deployment_Heating systems_Natural gas_Buildings_Commercial	Heating systems	Buildings	New capacity additions: space/water heating systems by technology (commercial)	% mix
New deployment_Heating systems_Natural gas_Buildings_Residential	Heating systems	Buildings	New capacity additions: space/water heating systems by technology (commercial)	# units
New deployment_Heating systems_Oil_Buildings_Commercial	Heating systems	Buildings	New capacity additions: space/water heating systems by technology (commercial)	% mix
New deployment_Heating systems_Oil_Buildings_Residential	Heating systems	Buildings	New capacity additions: space/water heating systems by technology (commercial)	# units
New deployment_Heating systems_Resistive_Buildings_Commercial	Heating systems	Buildings	New capacity additions: space/water heating systems by technology (commercial)	% mix
New deployment_Heating systems_Resistive_Buildings_Residential	Heating systems	Buildings	New capacity additions: space/water heating systems by technology (commercial)	# units
New deployment_Vehicles_BEV_Transport_Cars	Vehicles	Transport	New vehicle sales by technology (cars)	Vehicles (thousands)
New deployment_Vehicles_BEV_Transport_Trucks	Vehicles	Transport	New vehicle sales by technology (trucks)	Vehicles (thousands)

Variable ID	Sub variable class	Sector	Definition	Units
New deployment_Vehicles_BEV_Transport_Vans	Vehicles	Transport	New vehicle sales by technology (vans)	Vehicles (thousands)
New deployment_Vehicles_H2_Transport_Cars	Vehicles	Transport	New vehicle sales by technology (cars)	Vehicles (thousands)
New deployment_Vehicles_H2_Transport_Trucks	Vehicles	Transport	New vehicle sales by technology (trucks)	Vehicles (thousands)
New deployment_Vehicles_H2_Transport_Vans	Vehicles	Transport	New vehicle sales by technology (vans)	Vehicles (thousands)
New deployment_Vehicles_ICE_Transport_Cars	Vehicles	Transport	New vehicle sales by technology (cars)	Vehicles (thousands)
New deployment_Vehicles_ICE_Transport_Trucks	Vehicles	Transport	New vehicle sales by technology (trucks)	Vehicles (thousands)
New deployment_Vehicles_ICE_Transport_Vans	Vehicles	Transport	New vehicle sales by technology (vans)	Vehicles (thousands)

Source: Vivid Economics

2.9 Population

Table 9 Energy - Population

Variable ID	Sub variable class	Sector	Definition	Units
Population_Total	N/A	Total	Population	Million

Source: Vivid Economics

2.10 Price

Table 10 Energy - Price

Variable ID	Sub variable class	Sector	Definition	Units
Price_Aluminium	Aluminium		Commodity price	USD / tonne
Price_Cobalt	Cobalt		Commodity price	USD / tonne
Price_Copper	Copper		Commodity price	USD / tonne
Price_Lithium	Lithium		Commodity price	USD / tonne
Price (high)_Natural gas	Natural gas		Commodity price	USD / MMBtu
Price (low)_Natural gas	Natural gas		Commodity price	USD / MMBtu
Price_Nickel	Nickel		Commodity price	USD / tonne
Price (high)_Oil	Oil		Commodity price	USD / Barrel
Price (low)_Oil	Oil		Commodity price	USD / Barrel
Price_Battery	Battery		Commodity price	USD / kWh
Price_Coal	Coal		Commodity price	USD / tonne
Price_Carbon	Carbon		Carbon price	USD / tCO2

Note: Prices of key minerals (aluminium, cobalt, copper, lithium, nickel) assume no major structural changes in the cost of supply, such as costs involved in new production methods (e.g. subsea extraction) environmental permitting. Prices reflect current evidence on costs; there is a high degree of uncertainty in long-run costs for immature markets such as lithium

Source: Vivid Economics

2.11 Primary energy demand

Table 11 Energy - Primary energy demand

Variable ID	Sub variable class	Sector	Definition	Units
Primary energy demand_Biomass_ Total	Biomass	Total	Total primary energy demand by fuel	PJ
Primary energy demand_Coal (thermal)_ Total	Coal	Total	Total primary energy demand by fuel	PJ
Primary energy demand_Natural gas_ Total	Natural gas	Total	Total primary energy demand by fuel	PJ
Primary energy demand_Oil_ Total	Oil	Total	Total primary energy demand by fuel	PJ

Source: Vivid Economics

2.12 Production

Table 12 Energy - Production

Variable ID	Sub variable class	Sector	Definition	Units
Production_Aggregates_Cement_Industry	Aggregates	Industry	Commodity production	Mt
Production_Aluminium_Industry	Aluminium	Industry	Commodity production	KT
Production_Cement_Biomass CCS_Industry	Cement	Industry	Commodity production	Mt
Production_Cement_Biomass_Industry	Cement	Industry	Commodity production	Mt
Production_Cement_Coal CCS_Industry	Cement	Industry	Commodity production	Mt
Production_Cement_Coal_Industry	Cement	Industry	Commodity production	Mt
Production_Cement_Natural gas CCS_Industry	Cement	Industry	Commodity production	Mt
Production_Cement_Natural gas_Industry	Cement	Industry	Commodity production	Mt
Production_Cement_Oil_Industry	Cement	Industry	Commodity production	Mt
Production_Chemicals_Plastics_Industry	Chemicals	Industry	Commodity production	Mt
Production_Cobalt_Industry	Cobalt	Industry	Commodity production	Kt
Production_Copper_Industry	Copper	Industry	Commodity production	Kt

Variable ID	Sub variable class	Sector	Definition	Units
Production_Hydrogen_Blue_Hydrogen	Hydrogen	Hydrogen	Hydrogen production by technology	Mt
Production_Hydrogen_Green_Hydrogen	Hydrogen	Hydrogen	Hydrogen production by technology	Mt
Production_Hydrogen_Unabated_Hydrogen	Hydrogen	Hydrogen	Hydrogen production by technology	Mt
Production_Lithium_Industry	Lithium	Industry	Commodity production	Kt
Production_Nickel_Industry	Nickel	Industry	Commodity production	Kt
Production_Steel_BFBOF with CCS_Industry	Steel	Industry	Commodity production	Mt
Production_Steel_Conventional coal (BF-BOF)_Industry	Steel	Industry	Commodity production	Mt
Production_Steel_Gas DRI_Industry	Steel	Industry	Commodity production	Mt
Production_Steel_Hydrogen DRI_Industry	Steel	Industry	Commodity production	Mt
Production_Steel_Industry	Steel	Industry	Commodity production	Mt
Production_Steel_Scrap with EAF_Industry	Steel	Industry	Commodity production	Mt

Source: Vivid Economics

2.13 Sector energy demand

Table 13 Energy - Sector energy demand variables

Variable ID	Sub variable class	Sector	Definition	Units
Sector energy demand_Biomass_Buildings	Biomass	Buildings	Energy demand by sector and fuel	PJ
Sector energy demand_Biomass_Industry	Biomass	Industry	Energy demand by sector and fuel	PJ
Sector energy demand_Biomass_Other energy	Biomass	Other energy	Energy demand by sector and fuel	PJ
Sector energy demand_Biomass_Power	Biomass	Power	Energy demand by sector and fuel	PJ
Sector energy demand_Biomass_Transport	Biomass	Transport	Energy demand by sector and fuel	PJ
Sector energy demand_Coal (metallurgical)_Industry	Coal (metallurgical)	Industry	Energy demand by sector and fuel	PJ
Sector energy demand_Coal (thermal)_Buildings	Coal	Buildings	Energy demand by sector and fuel	PJ
Sector energy demand_Coal (thermal)_Industry	Coal	Industry	Energy demand by sector and fuel	PJ

Variable ID	Sub variable class	Sector	Definition	Units
Sector energy demand_Coal (thermal)_Non-energy use	Coal	Non-energy use	Energy demand by sector and fuel	PJ
Sector energy demand_Coal (thermal)_Other energy	Coal	Other energy	Energy demand by sector and fuel	PJ
Sector energy demand_Coal (thermal)_Power	Coal	Power	Energy demand by sector and fuel	PJ
Sector energy demand_Electricity_Buildings	Electricity	Buildings	Energy demand by sector and fuel	PJ
Sector energy demand_Electricity_Industry	Electricity	Industry	Energy demand by sector and fuel	PJ
Sector energy demand_Electricity_Other energy	Electricity	Other energy	Energy demand by sector and fuel	PJ
Sector energy demand_Electricity_Power	Electricity	Power	Energy demand by sector and fuel	PJ
Sector energy demand_Electricity_Transport	Electricity	Transport	Energy demand by sector and fuel	PJ

Variable ID	Sub variable class	Sector	Definition	Units
Sector energy demand_Hydrogen_Buildings	Hydrogen	Buildings	Energy demand by sector and fuel	PJ
Sector energy demand_Hydrogen_Industry	Hydrogen	Industry	Energy demand by sector and fuel	PJ
Sector energy demand_Hydrogen_Other energy	Hydrogen	Other energy	Energy demand by sector and fuel	PJ
Sector energy demand_Hydrogen_Power	Hydrogen	Power	Energy demand by sector and fuel	PJ
Sector energy demand_Hydrogen_Transport	Hydrogen	Transport	Energy demand by sector and fuel	PJ
Sector energy demand_Natural gas_Buildings	Natural gas	Buildings	Energy demand by sector and fuel	PJ
Sector energy demand_Natural gas_Industry	Natural gas	Industry	Energy demand by sector and fuel	PJ
Sector energy demand_Natural gas_Non-energy use	Natural gas	Non-energy use	Energy demand by sector and fuel	PJ

Variable ID	Sub variable class	Sector	Definition	Units
Sector energy demand_Natural gas_Other energy	Natural gas	Other energy	Energy demand by sector and fuel	PJ
Sector energy demand_Natural gas_Power	Natural gas	Power	Energy demand by sector and fuel	PJ
Sector energy demand_Natural gas_Transport	Natural gas	Transport	Energy demand by sector and fuel	PJ
Sector energy demand_Oil_Buildings	Oil	Buildings	Energy demand by sector and fuel	PJ
Sector energy demand_Oil_Industry	Oil	Industry	Energy demand by sector and fuel	PJ
Sector energy demand_Oil_Non-energy use	Oil	Non-energy use	Energy demand by sector and fuel	PJ
Sector energy demand_Oil_Other energy	Oil	Other energy	Energy demand by sector and fuel	PJ
Sector energy demand_Oil_Power	Oil	Power	Energy demand by sector and fuel	PJ
Sector energy demand_Oil_Transport	Oil	Transport	Energy demand by sector and fuel	PJ

Source: Vivid Economics

3 Land use data variables dictionary

Table 14 Land use data variables table of contents

Source: Vivid Economics

3.1 GHG Emissions

Table 15 Land use - GHG Emissions

Sub variable	Sub variable class	Description	unit
CO_2	N/A	CO2 emissions from land use change, including gross forest degradation, regrowth, timber plantations, secondary forest and other land	Mt CO_2

Source: Vivid Economics

3.2 Nature-based solutions

Table 16 Land use - Nature Based Solutions

Sub variable	Sub variable class	Description	unit
Area	Forest-restore-plant	Area of natural forest regrowth and managed afforestation, including NDC commitments and timber plantations	Million ha
Area	Forest-restore	Area of natural forest regrowth and managed afforestation, including NDC commitments	Million ha
Area	Forest-avoid	Area of protected and conserved primary and secondary forest	Million ha
Area	Peat-restore	Area of restored peatland	Million ha
Area	Mangrove-restore	Area of restored mangroves	Million ha
Area	Cropland-improve	Area of improved cropland through trees in cropland (agroforestry)	Million ha
Area	Pasture-improve	Area of pastureland improvements through silvopasture	Million ha
Carbon value	Forest-restore-plant	Carbon value of natural forest regrowth and managed afforestation, including NDC commitments and timber plantations	USD 2020
Carbon value	Forest-avoid	Carbon value of protected and conserved primary and secondary forest	USD 2020
Carbon value	Peat-restore	Carbon value of peatland restoration	USD 2020
Carbon value	Mangrove-restore	Carbon value of mangrove restoration	USD 2020
Carbon value	Cropland-improve	Carbon value of improved cropland through trees in cropland (agroforestry)	USD 2020
Carbon value	Pasture-improve	Carbon value of pastureland improvements through silvopasture	USD 2020

Sub variable	Sub variable class	Description	unit
CAPEX	Forest-restore	Capital expenditure per hectare for natural forest regrowth and managed afforestation, including NDC commitments	USD 2020/ha
CAPEX	Forest-plant	Capital expenditure per hectare for timber plantations	USD 2020/ha
CAPEX	Forest-avoid	Capital expenditure per hectare for protection and conservation of primary and secondary forest	USD 2020/ha
CAPEX	Peat-restore	Capital expenditure per hectare for restoration of peatland	USD 2020/ha
CAPEX	Mangrove-restore	Capital expenditure per hectare for restoration of mangroves	USD 2020/ha
CAPEX	Cropland-improve	Capital expenditure per hectare for cropland improvement through trees in cropland (agroforestry)	USD 2020/ha
CAPEX	Pasture-improve	Capital expenditure per hectare for pastureland improvement through silvopasture	USD 2020/ha
CAPEX	Forest-restore cumulative CAPEX investment	Cumulative capital expenditure for natural forest regrowth and managed afforestation, including NDC commitments	USD 2020
CAPEX	Forest-plant cumulative CAPEX investment	Cumulative capital expenditure for timber plantations	USD 2020
CAPEX	Forest-avoid cumulative CAPEX investment	Cumulative capital expenditure for protection and conservation of primary and secondary forest	USD 2020
CAPEX	Peat-restore cumulative CAPEX investment	Cumulative capital expenditure for restoration of peatland	USD 2020

Sub variable	Sub variable class	Description	unit
CAPEX	Mangrove-restore cumulative CAPEX investment	Cumulative capital expenditure for restoration of mangroves	USD 2020
CAPEX	Cropland-improve cumulative CAPEX investment	Cumulative capital expenditure for cropland improvement through trees in cropland (agroforestry)	USD 2020
CAPEX	Pasture-improve cumulative CAPEX investment	Cumulative capital expenditure for pastureland improvement through silvopasture	USD 2020
CAPEX	Land-price index	Land price index	Index (2020 = 100)
OPEX	Forest-restore	Operational expenditure per hectare for natural forest regrowth and managed afforestation, including NDC commitments	USD 2020/ha/yr
OPEX	Forest-plant	Operational expenditure per hectare for timber plantations	USD 2020/ha/yr
OPEX	Forest-avoid	Operational expenditure per hectare for protected and conserved primary and secondary forest	USD 2020/ha/yr
OPEX	Peat-restore	Operational expenditure per hectare for peatland restoration	USD 2020/ha/yr
OPEX	Mangrove-restore	Operational expenditure per hectare for mangrove restoration	USD 2020/ha/yr
OPEX	Cropland-improve	Operational expenditure per hectare for cropland improvement through trees in cropland	USD 2020/ha/yr
OPEX	Pasture-improve	Operational expenditure per hectare for pastureland improvement through silvopasture	USD 2020/ha/yr

Source: Vivid Economics

3.3 Alternative meat

Table 17 Land use - Alternative meat

Sub variable	Sub variable class	Description	unit
Production	N/A	Production of alternative meat, including both cell-based meat and plant-based meat	Megatonnes dry matter
Production cost	Plant-based meat	Production cost of plant-based meat in index form	Index (average cost of animal meat in 2020 = 100)
Production cost	Cell-based meat	Production cost of cell-based meat in index form	Index (average cost of animal meat in 2020 = 100)
Production cost	Monogastric	Production cost of monogastric meat in index form	Index (average cost of animal meat in 2020 = 100)
Production cost	Poultry	Production cost of poultry meat in index form	Index (average cost of animal meat in 2020 = 100)
Production cost	Ruminant	Production cost of ruminant meat in index form	Index (average cost of animal meat in 2020 = 100)
Production cost	Animal meat average	Average production cost of monogastric, poultry and ruminant meat in index form	Index (average cost of animal meat in 2020 = 100)

Source: Vivid Economics

3.4 Timber

Table 18 Land use - Timber

Sub variable	Sub variable class	Description	unit
Production	Industrial roundwood	Production of industrial roundwood	Million m3
Production	Industrial roundwood	Indexed price of industrial roundwood	Index (2020 = 100)

Source: Vivid Economics

3.5 Bioenergy

Table 19 Land use - Bioenergy

Sub variable	Sub variable class	Description	unit
Production	Second-generation	Production of second-generation bioenergy	EJ/yr
Price index	Second-generation	Indexed price of second-generation bioenergy	Index (2025 = 100)

Source: Vivid Economics

3.6 Agriculture

Table 20 Land use - Agriculture

Sub variable	Sub variable class	Description	unit
Production	Maize	Production of maize	Mt DM/yr
Production	Oil palm fruit	Production of oil palm fruit	Mt DM/yr
Production	Potatoes	Production of potatoes	Mt DM/yr
Production	Rice	Production of rice	Mt DM/yr
Production	Soybean	Production of soybean	Mt DM/yr
Production	Sugar cane	Production of sugar cane	Mt DM/yr
Production	Ruminant meat	Production of ruminant meat	Mt DM/yr
Production	Poultry meat	Production of poultry meat	Mt DM/yr
Production	Monogastric meat	Production of monogastric meat	Mt DM/yr
Production	Dairy	Production of dairy	Mt DM/yr
Production	Temperate cereals	Production of temperate cereals (wheat, barley, rye, mixed, grain, oats, triticale)	Mt DM/yr
Yield	Global crop yield	Global crop yield	Mt DM/ha
Price	Average price change	Average annual food price change 2020-2050	Percentage

Source: Vivid Economics