# Resource Adequacy in the Pentalateral Energy Forum WP1: Determining minimum standards and best-practice for requirements regarding data used in resource adequacy assessments

Sheet	Description	Page
A. Remarks for list of data inputs	Descriptions and definitions for the list of input data.	3
B. List of data inputs	Clustered list of data inputs with definition of standards and remarks on potential confidentiality issues.	5
C. List of sources	Overview of databases that can be used as source for data inputs.	27
D. List of sources (detailed)	List of data inputs available in the listed databases.	35

List of abbreviationsaFRRAutomatic frequency restoration reserveBZBidding zoneCAPEXCapital expendituresCCGTCombined cycle gas turbineCHPCombined heat and power	
BZBidding zoneCAPEXCapital expendituresCCGTCombined cycle gas turbine	
CAPEXCapital expendituresCCGTCombined cycle gas turbine	
CCGT Combined cycle gas turbine	
CUD Combined best and power	
CM Capacity mechanism	
CNEC Critical network element and contingency	
CONE Cost of new entry	
CORP Cost of renewal or prolongation	
CY Climate year	
DC Direct current	
DSR Demand-side response	
ED Economic dispatch	
EMR Electricity market regulation	
ENS Energy not served	
EOM Energy-only-market	
EPS Emission performance standard	
ERAA European resource adequacy assessment	
EV Electric vehicle	
EVA Economic viability assessment	
FCR Frequency containment reserve	
FOM Fixed operation and maintenance	
GSK Generation shift key	
GT Gas turbine	
HVDC High-voltage direct current	
mFRR Manual frequency restoration reserve	
MS Member state	
MTU Market time unit	

#### Resource Adequacy in the Pentalateral Energy Forum Results of Work Package 1

	5
NGC	Net generating capacity
NTC	Net transmission capacity
O&M	Operation & maintenance
OCGT	Open cycle gas turbine
OOM	Out-of-market
OPEX	Operational expenditures
PSP	Pumped storage plants
PST	Phase shifting transformers
PTDF	Power transfer distribution factor
PtG	Power-to-gas
PtH	Power-to-heat
RAA	Resource adequacy assessment
RAM	Remaining available margin
RES	Renewable energy source
RoR	Run-of-river
RR	Restoration reserve
RS	Reliability standard
TJ	Turbojet
TSO	Transmission system operator
ΤY	Target year
TYNDP	Ten-year network development plan
V2G	Vehicle-to-grid
VoLL	Value of lost load
WACC	Weighted average cost of capital
WACC	Weighted average cost of capital
WP	Work package

Relevant documents	Link
ACER Decision on the ERAA	https://ec.europa.eu/energy/sites/default/files/methodology_for_the_eur
methodology: Annex 1	opean resource adequacy assessment.pdf
ACER Decision on the	
Methodology for calculating	https://documents.acer.europa.eu/Official_documents/Acts_of_the_Agen
the value of lost load, the cost	cy/Individual%20decisions%20Annexes/ACER%20Decision%20No%202
of new entry, and the reliability	3-2020_Annexes/ACER%20Decision%2023-
standard: Annex I	2020%20on%20VOLL%20CONE%20RS%20-%20Annex%20I.pdf

# Contacts at r2b Energy Consulting

Robert Diels, Managerrobert.diels@r2b-energy.comMarcel Brodhof, Consultantmarcel.brodhof@r2b-energy.com

# A. Remarks for list of data inputs

Column	Description				
Category	Main category of the RAA element: - Electricity supply-side data - Electricity demand-side data - Network and infrastructural data				
	- Policy, regulatory and market design data				
Subcategory	An element of the electricity system that is modelled/reflected in RAA. Interdependencies between the elements may exist. The RAA-elements are: - Conventional electricity demand - Electricity demand of EV - Electricity demand for space heating and cooling - Large-scale PtX - VoLL - Thermal generation - Intermittent RES generation - Hydro modelling - Industrial DSR - Battery storage units - Unplanned outages - CONE/CORP - Balancing requirements - Cross-border trade modelling (between modelled zones) - Exchanges with non-explicitly modelled systems - Capacity mechanisms - Market and regulatory constraints				
Description	Short description of the RAA element.				
Reference (Article)	If not stated otherwise, list of the for the respective element relevant articles in the ACER-approved ENTSO-E methodology.				
Data inputs	<u>Minimum standard</u> : List of data inputs required to fulfil the requirements of EU Regulation when modelling the RAA element. <u>Best-practice</u> : List of data inputs that are not required by the EU Regulation, but that have additional value for the quality of the RAA. If considered, the use of some "minimum standard"-inputs may become obsolete.				
Definition	States briefly how the data inputs of the respective standard should be applied in order to <u>Minimum standard</u> : fulfil the requirements of EU Regulation, or <u>Best-practice</u> : reflect a best-practice approach for RAA.				
Granularity (spatial / temporal)	Indicates in which granularity the variables should be available to fulfil a specific standard.				
Prioritisation/reco mmendation	Short recommendation which standard should be followed based on scope of the assessment and cost-benefit considerations.				
Confidentiality	Identified potential confidentiality issues.				
Restrictions	Indicates whether some information is not applicable for all countries or other limitations of the variables.				
Remarks	Further remarks.				

B. List of data inputs

	А	В	С	D	E	F
1					Data inputs	
2	Category	Sub-category	Description	Reference (Article)	Minimum requirements	Best-practice approach
		Conventional electricity demand	Overall level and structure of electricity demand for conventional and non- flexible applications, e.g. electrical appliances, (street) lighting, rail traffic.	4 (3)	Historical demand time series Temperature Load-temperature sensitivity Economic growth projection Penetration of new technologies Social and demographic developments Energy efficiency Other characteristics of relevant technologies that affect demand levels and shape Network losses Calendar data	Sectoral demand time series Demand time series of specific applications (e.g., lighting, cooking) Wind speed Irradiation Humidity
4	Electricity	Electricity demand of EV	Level and structure of electricity demand of electric vehicles including DSR capability.	4 (3)(a), 5 (11)(ii)(2)	EV electricity demand time series	Number of EV Average mileage per type Average specific energy consumption per type Specific (price-sensitive) charging profiles Share of different charging profiles Average max. load of EV chargers V2G capacity

	В	G	Н	I	J
1		Definition			arity (spatial / temporal)
2	Sub-category	Minimum requirements	Best-practice approach	Minimum	Best-practice
3	demand	The for the model calculations underlying electricity demand is a time series based on historical observations. This time series considers the impact of relevant factors such as climate conditions (i.e., of the considered climate years), climate change, energy efficiency or economic growth on level and structure of electricity demand. The climate-dependency is represented by historic load-temperature sensitivity values.	The for the model calculations underlying electricity demand is a time series based on historical observations and projections of consumption on sectoral/application level . The climate-dependency is represented by climate data exceeding a simple load-temperature relationship.	Per modelled zone, per target year, per MTU	Per sector/application.
4		The model considers EV electricity demand with an exogenous demand time series. Option for DSR is not considered.	The modelling of EV electricity demand reflects the specific characteristics of the EV-fleet and accounts for price-sensitive EV-charging and V2G capabilities.	Per modelled zone, per Target year per MTU (if applicable)	Per modelled zone, per Target year per MTU (if applicable)

	В	К	L	М	Ν
1	Sub-category	Prioritisation/Recommendation	Confidentiality	Restrictions	Remarks
3	Conventional electricity demand	If data inputs on a sector/application level are not available or greater efforts would be needed to obtain/generate those, the minimum requirements approach is sufficient for a high quality RAA. This in particular holds true because non-conventional (and partwise flexible) electricity demands are treated separately.	Sectoral demand level and structure may be confidential.	may be limited.	
4	demand of EV	Best-practice approach is recommended because neglecting flexibility of EV may lead to an underestimation of resource adequacy.	No confidentiality issues identified.		See the report of WP2 for options to incorporate flexibility of electric vehicles in RAA modelling.

	А	В	С	D	E	F
1					Data in	puts
2	Category	Sub-category	Description	Reference (Article)	Minimum requirements	Best-practice approach
5		demand for space heating and cooling	Level and structure of electricity demand arising from space heating and cooling by (hybrid) heat pumps, A/C or other technologies in the private and commercial sector including DSR capability	4 (3)(a)	Space heating/cooling electricity demand time series	demand Share of heat pumps combined with heat storage Heating/cooling load profile Temperature-dependency of heating/cooling demand Heating- and cooling hours Average values of coefficients of performance Thermal inertia constant Threshold of coefficient of performance for switching (hybrid heat pumps)
6	Electricity demand-side data		Level and structure of electricity demand of large- scale PtX-technologies (mainly industrial process heat, electrolysis, etc.) including their DSR capability		Electricity demand time series PtG Electricity demand time series PtH Shedding / opportunity costs	PtX capacities PtH capable heat demand Hydrogen demand Hydrogen import volume/cost Storage capabilities PtX Shedding / opportunity costs Flexibility assumptions PtX
7				methodology	One single VoLL per BZ	One single VoLL per BZ

	В	G	Н	I	J
1		Det	inition	Granula	rity (spatial / temporal)
2	Sub-category	Minimum requirements	Best-practice approach	Minimum	Best-practice
	heating and	The model considers the electricity demand from space heating and cooling with an exogenous demand time series. Option for DSR is not considered.	The modelling of heating/cooling electricity demand reflects the specific characteristics of the heating/cooling technologies and accounts for price- sensitive heating/cooling demands in conjunction with storage capabilities.	Per modelled zone, Per target year, per MTU	Per modelled zone, Per target year, per MTU
5					-
6	Large-scale PtX		The modelling of industrial PtX electricity demand reflects the specific characteristics of the different PtX technologies and accounts for price-sensitive PtX demands in conjunction with alternative generation (e.g. CHP instead of PtH), storage and import capabilities.	Per modelled zone, per Target year, per MTU (if applicable)	Sectoral differentiation Per modelled zone, per Target year, per MTU (if applicable)
7	VoLL	Single VoLL calculated reflecting the willingness to accept load shedding or the willingness to pay to avoid load shedding taking into account the preferences of different consumers not active in DSR on electricity markets.	No differentiation between minimum and best- practice standard applicable.	Per modelled zone, for whole study period	Per modelled zone, for whole study period

	В	К	L	М	Ν
1					
2	Sub-category	Prioritisation/Recommendation	Confidentiality	Restrictions	Remarks
	demand for space	Best-practice approach is recommended because neglecting flexibility of HP may lead to an underestimation of resource adequacy.	No confidentiality issues identified.		Demand for process heat or non-electrified space heating is not considered. See the report of WP2 for options to incorporate flexibility of heating and cooling applications in RAA modelling.
5					
6	-	The choice between modelling alternatives should depend on the importance and role of PtX technologies in the focus area in the study period .	No confidentiality issues identified.		The Regulation does not explicitly require the modelling of PtX technologies. However, Article 1 (2)(d) implies they should be considered. Link to WP2
7	VoLL	Not applicable.	No confidentiality issues identified.	For some MS bidding zones no VoLL values available.	Main sectors refer to the sectors specified in Annex 1 , paragraph (4.1) of the VoLL CONE RS methodology. Link to WP2

	А	В	С	D	E	F
1					Data ir	nputs
2	Category	Sub-category	Description	Reference (Article)	Minimum requirements	Best-practice approach
8	Electricity demand-side data	Industrial DSR	Explicit voluntary load reduction or load shifting of industrial consumers.	4 (3)(c)(d)	DSR installed capacity DSR unit activation price DSR load shifting costs DSR operational constraints DSR maximum activation capacity DSR maximum activation duration Demand elasticity on the DA-market	DSR CAPEX DSR potential
9	Electricity supply-side data	Thermal generation	for the modelled system relevant, thermal generation technologies	4 (3)(e)(i-ii), 4 (3)(f) 4 (4)(a-c), 5 (10)(c), 7 (4)(a)	Available NGC Fuel efficiency Fuel cost Emission factor Carbon price Type of fuel CAPEX Annual fixed costs Variable O&M cost WACC Discount rate Remaining economic lifetime Expected revenues from electricity-related services (e.g. ancillary services) Expected revenues from services outside the electricity sector (e.g. heat supply) Expected revenues from subsidies Expected revenues from CMs	Start-up time Shut-down time Min/max generating capacity Minimum run-time Ramping capability Constraints regarding temperature dependency Seasonal impact on generation capacity availability Fuel availability Cooling water constraints Capacity requirements for system services

	В	G	Н	I	J
1		De	Granula	rity (spatial / temporal)	
2	Sub-category	Minimum requirements	Best-practice approach	Minimum	Best-practice
8	Industrial DSR	Explicit modelling of industrial DSR capacities, considering operational constraints, load shifting and activation costs, based on exogenously determined DSR capacities for each TY. Further price-elastic demand of the private and commercial sector is applied implicitly via price- elastic parts of electricity consumption of these sectors.	Explicit modelling of industrial DSR potentials to be tapped during EVA and then used in the ED, taking into account technical constraints, load shifting and activation costs and CAPEX. Further price elastic demand of the private or commercial sector is also explicitly modelled, considering technical and behavioural constraints (e.g. EVs, electric heat pumps, oom-batteries), thus no implicit DSR input is needed.	Per modelled zone, per target year	Per industrial sector/application, per target year
	Thermal		The model considers thermal generation and the	Per modelled zone,	Per stylized unit,
	generation	characteristics and constraints of thermal generation technologies, as listed, consistently between ED and EVA.	more detailed best-practice data inputs on their technical and economical constraints consistently between ED and EVA.	per target year, per MTU	per target year, per MTU
		Given the two different EVA approaches allowed by the methodology, some distinctions apply: 1) EVA through system cost minimization: Considers those data inputs needed for calculation of wholesale market and CM revenues (c.f. subcategory capacity mechanisms), taking into account minimum data inputs. Other revenue streams are no data inputs, but model results (e.g. heat- or AS-revenues). 2) EVA of individual capacity resources: Besides the wholesale prices from ED, it considers also those minimum data inputs needed for the calculation of other revenue streams than	The EVA/ED is applied analogously to the minimum requirements, but considers more detailed technical constraints enabling more realistic modelling of thermal dispatch.		
9		wholesale markets			

	В	K	L	М	Ν
1					
2	Sub-category	Prioritisation/Recommendation	Confidentiality	Restrictions	Remarks
8	Industrial DSR	If data availability is given, inclusion of DSR in EVA is strongly recommended because otherwise the flexiblily of the electricity system may be underestimated.	Data on industrial consumption may be confidential, esp. In small countries or industries, when even aggregated data may allow for identification of individual actors.		See the report of WP2 for an elaborated assessment of DSR modelling methodology.
9	Thermal generation	Fulfilling minimum requirements is sufficient to deliver high-quality RAA. Following the best-practice approach is computationally complex (or even infeasible) and the added value is unlikely to justify these efforts.	Individual power plant data may be confidential.		4 (3)(f) declares that technical constraints must be considered and lists possible constraints. However, it is not specified whether all of these constraints are required. Possibly, all constraints that are applicable to a specific generation technology may be required to fulfil minimum standard. Link to WP3

	А	В	С	D	E	F
1					Data inj	puts
2	Category	Sub-category	Description	Reference (Article)	Minimum requirements	Best-practice approach
10		Intermittent RES generation		4 (2)(a), 4 (4)(d)	Time-varying load factors Evolution of technical characteristics	Temperature impact on generation Wind speeds Direct solar irradiation Diffuse solar irradiation Performance curves Hub height of wind units
10	Electricity supply-side data	•	Parameters to model hydro generation and storage units (i.e. RoR, PSP).	4 (4)(d) 4 (5)(a)	Run-of-river capacity Time-varying load factors Run-of-river Open-loop storage capacity Closed-loop storage capacity Hydro inflow Reservoir size Minimum energy release requirements Upper/lower reservoir levels Min/max pumped energy Min/max generated energy Min/max generated energy Min/max generation capacity Environmental constraints Operational principles	see minimum requirements

	В	G	н	I	J
1		De	finition	Granula	rity (spatial / temporal)
2	Sub-category	Minimum requirements	Best-practice approach	Minimum	Best-practice
	Intermittent RES generation	The model considers the climate-dependency of RES generation on a regional level and accounts for climate change. The impact of technical developments of the different RES technologies is taken into account.	Climate-dependency of RES generation and climate change is considered with a high spatial resolution. The model translates weather data into load factors accounting for the effects of temperature levels and altitude.	Per modelled zone, Per target year, per MTU	High spatial resolution (10 x 10km or higher), altitude levels (for wind speeds)
10					
	Hydro modelling	<ol> <li>With ex-ante optimisation Run-of-river: Model considers the climate-dependency of RoR generation per CY and MTU (if applicable). Open-loop / closed-loop: Model considers technical and inflow constraints per CY and MTU (if applicable). A time series of hydro storage availability is provided for the ED. This time series is based on an ex-ante optimisation phase and considers all relevant technical, operational and environmental constraints of the (pumped) hydro storage capacities.</li> <li>Direct modelling Feeding all relevant constraints directly into the ED model without any ex-ante optimisation phase, while considering specificities of the respective hydro systems (RoR, Pondage, open/close-loop reservoir, cascadic systems), hydro conditions of the respective climate year, climate change, ecological and water management aspects.</li> </ol>	see minimum requirements	Per modelled zone, per target year, per MTU/hydro inflow resolution	
11					

	В	К	L	М	N
1					
2	Sub-category	Prioritisation/Recommendation	Confidentiality	Restrictions	Remarks
	Intermittent RES generation	If data availability allows, we recommend to choose a high spatial resolution that reflects the variance of climatic conditions in the modelled area appropriately. A possible trade-off between spatial accuracy and number of available climate years needs to be considered. A possible trade-off between spatial accuracy and number of available climate years needs to be considered.	No confidentiality issues identified.		Technical characteristics are not further specified. Acer gives three options to incorporate climate change in RAA. An elaborated assessment of these options is given in the report of WP4.
10					
11	Hydro modelling	Data inputs of the two approaches are very similar. At this point of the project no definition of minimum requirements and best practice approaches as well as no prioritisation is possible. Maybe after the expert workshop we will be able to define those.	identified.	Hydro data may be not available or only with low temporal resolution.	Hydro inflow resolution is allowed to be lower than MTU. Acer gives three options to incorporate climate change in RAA. An elaborated assessment of these options is given in the report of WP4.

	А	В	С	D	E	F
1					Data	inputs
2	Category	Sub-category	Description	Reference (Article)	Minimum requirements	Best-practice approach
12		Battery storage units	Modelling of battery storage units	4 (3)(e) 4 (5)(b)	Maximum power battery Maximum energy storage battery Storage operating cost State of charge Charging/Discharging efficiency OOM battery capacity Peak-reduction ratio of OOM batteries Power-to-energy ratio	Number of out-of-market batteries Maximum total power of OOM batteries Cycle efficiency of OOM batteries Peak reduction of OOM batteries Ramp-rate reduction of OOM batteries CAPEX of battery storage Battery lifetime
13	Electricity	Unplanned outages	Unplanned outages of generation and network units	4 (1)(e)(i), 4 (3)(g)	Unplanned outage rate generation units Unplanned outage rate HVDC interconnections Mean time to repair	Correlation of forced outages with market signals Share of (in)disponible forced outages

	В	G	Н	I	J
1		De	finition	Granula	rity (spatial / temporal)
2	Sub-category	Minimum requirements	Best-practice approach	Minimum	Best-practice
12	Battery storage units	The model considers exogenously determined in- the-market battery storage capacity accounting for technical constraints. Charing/discharging schedules are price- responsive and optimised in the ED. OOM-batteries are implicitly taken into account in overall consumption of commercial and private sector applying peak-shaving abilities, when determining their hourly load.	In-the-market battery storage is a legitimate investment option in the EVA accounting for technical constraints. Charing/discharging schedules are price-responsive and optimised in the ED. In addition to peak-shaving, the use of OOM- batteries for maximizing self-consumption is taken into account.	Per modelled zone, Per target year, per MTU	Per modelled zone, Per target year, per MTU, per battery technology
13	Unplanned outages	Unplanned outages of resources (supply) and grid elements (HVDC lines) reflect historical outages rates and mean time to repair per technology and market zone (if applicable). Outage patterns are determined via Monte-Carlo-simulations.	The model fulfils all minimum requirements. The unplanned outage patters reflect a possible correlation of forced outages with market signals (i.e. less outages in times of high prices and vice versa).	Per modelled zone, per MTU, per technology type, per border	Per modelled zone, per MTU, per technology type, per border

	В	К	L	М	Ν
1	-				
2	Sub-category	Prioritisation/Recommendation	Confidentiality	Restrictions	Remarks
12	Battery storage units	If robust data and projections of battery capacity in the study period exist, the minimum standard may be sufficient for a high-quality RAA. Otherwise, the best-practice approach should be followed to allow battery storage in the EVA as an investment alternative.	No confidentiality issues identified.		The differntiation of battery technologies in the best-practice standard may include second life cycle batteries. Here, it must be distinguished whether they represent an alternative to other storage technologies (in the market) or serve as
12	Unplanned	Minimum requirements sufficient for robust and high	Information regarding	Availability of information	An indisponible forced outage cannot be shifted
	outages	quality results. Fulfilling the best-practice approach is costly for an assumingly low quality improvement.	(in)disposability of forced	regarding (in)disposability of forced outages may be	or can be shifted for no more than twelve hours. A disponible forced outage may be shifted by more than twelve hours and up to four weeks (see VGB Power Tech / eurelectric).
13					

	А	В	C	D	E	F
1					Data ir	iputs
2	Category	Sub-category	Description	Reference (Article)	Minimum requirements	Best-practice approach
14	Electricity supply-side data	CONE/CORP	Cost of new entry and cost of renewal/prolongation mean the fixed and variable cost for the entry of a new unit or respectively the renewal or prolongation of an existing unit.	VoLL CONE RS methodology Articles 9-17	Technology and type Electrical efficiency Emission factor Economic lifetime CAPEX Annual fixed cost WACC Fuel cost Carbon price Variable OPEX	Environmental requirements / compliance costs Construction period Licensing, permitting and spatial planning requirements Location Labour costs Fixed O&M costs Taxes and levies Transaction and control costs Fuel supply service contracts Fixed electricity transmission and distribution charges Cost of equity Cost of debt Long-term inflation rate Gearing Constraints on continuous energy production / demand reduction Expected operational conditions Voltage level Fuel supply network
15	Network and infrastructural data	Balancing requirements	Accounting for system reserve requirements to cover imbalances.	4 (4)(e), 4 (6)(g)	System reserve requirements FCR requirements aFRR/mFRR requirements RR requirements TSO contribution to FCR/FRR Shares of procured balancing reserves for "high- frequency" balancing purposes (i.e., load and RES noise, ramps, schedule jumps) and "low-frequency" balancing purposes (i.e., forced outages, forecast errors).	C.f. "minimum requirements"

	В	G	Н	I	J
1		Det	finition	Granular	rity (spatial / temporal)
2	Sub-category	Minimum requirements	Best-practice approach	Minimum	Best-practice
14	CONE/CORP	The model uses CONE/CORP values that consider all relevant cost types per technology (plants and storage) and type on an aggregated level.	The model uses CONE/CORP values that consider all relevant cost components per technology and type on a detailed level (where applicable).		Per modelled zone, target year, technology and type.
15	Balancing requirements	The model uses balancing requirements for the calculation of the contribution of procured resources to cover load. (Parts of) FCR, aFRR and mFRR may be assumed not being available to cover load (or being used to balance forced outages of plants).	The model uses balancing requirements for the calculation of the contribution of procured resources to cover load. It distinguishes between that part of procured resources for balancing "high-frequency" deviations from 50Hz (i.e., load and RE noise, ramps, schedule jumps) and that part procured for non-high-frequency deviation purposes (i.e., for unplanned outages, forecast errors). The former may not be used to cover load, while the latter is used to cover load as long as such spare capacity exists.	Per target year, per modelled zone	Per target year, per modelled zone

	В	К	L	М	Ν
1					
2	Sub-category	Prioritisation/Recommendation	Confidentiality	Restrictions	Remarks
14		Minimum requirements sufficient for robust and high quality results. DSR should be included in the EVA (cf. Prioritisation/recommendation for "DSR modelling").	Usually cost elements are trade secrets. Thus, calculation and validation of input values may be complex.	requirements,	There is room for discussion which cost elements are required for which standard.
14		Best-practice approach is recommended strongly because	No confidentiality issues		According to Art. 4 (6) g) Acer 24-2020 Annex I a
	requirements	otherwise available capacity to cover load (or to balance forced outages) would be underrepresented. Only for very small and low-/no-interconnected electricity supply systems it may be reasonable to deduct reserve capacity from available load.	identified.		part of procured balancing resources may not be used to cover load and thus be deducted from the available capacity or added to load. We highly recommend to reduce available capacity instead of increasing load, since the latter may distort modelling results (i.e., storage usage and energy balance).
15					

1     Category     Sub-category     Sub-category     Description     Reference (Article)     Minimum requirements     Best-practice approach       2     Cross-border trade modelling (between modelled zones)     Methodology to model cross-border trade and physical flows between explicitly modelled zones.     4 (6)(a-f)     MS action plans pursuant to Art. 15, minimum capacity pursuant to Art. 16(8), Temporary derogations pursuant to Art. 16(9) EMR. Measures to reach electricity interconnection targets (interconnection projects)     see minimum requirements       NTC-approach only: Identified OFE     NTC-approach only: Identified CNEcs Node-to-hub PTDF     NTC-approach only: Identified CNEcs Sub-category     Flow-based approach only: Identified CNEcs Node-to-hub PTDF       YNDP reference grid Expected grid modifications     Flow-based approach only: Identified CNEcs Node-to-hub PTDF     Flow-based approach only: Identified CNEcs Node-to-hub PTDF       YNDP reference grid Expected grid modifications     Maximum admissible power flow Generation shifkey (GSK) Zone-to-hub PTDF		А	В	C	D	E	F
2     Category     Sub-category     Description     (Article)     Minimum requirements     Best-practice approach       2     Cross-border trade modelling (between modelled zones)     Methodology to model cross-border trade and physical flows between explicitly modelled zones.     4 (6)(a-f)     MS action plans pursuant to Art. 15(8). Temporary derogations pursuant to Art. 16(9) EMR. Measures to reach electricity interconnection targets (interconnection projects)       NTC-approach only: NET-approach only: Net transmission capacity (NTC)     NTC-approach only: Net transmission capacity (NTC)       Expected operational practices (i.e. connection agreements)     Flow-based approach only: Identified CNECs Node-to-hub PTDF       TYNDP reference grid Expected grid modifications HVDC flows PST settings     Expected grid modifications HVDC flows PST settings       Mainimum requirements     Minimum capacity pursuant to Art. 16(8). Temporary derogations pursuant to Art. 16(9) EMR.	1					Data in	aputs
Image: statetrade modelling (between modelled zones)cross-border trade and physical flows between explicitly modelled zones.Minimum capacity pursuant to Art. 16(9) EMR. Temporary derogations pursuant to Art. 16(9) EMR. Measures to reach electricity interconnection targets (interconnection projects)TotalTotal ParticityNTC-approach only: NTC-approach only: Net transmission capacity (NTC) Expected operational practices (i.e. connection agreements)Flow-based approach only: Identified CNECs Node-to-hub PTDF TYNDP reference grid Expected grid modifications HVDC flows PST settings Maximum admissible power flow Generation shift key (GSK) Zone-to-hub PTDF RAM	2	Category	Sub-category	Description		Minimum requirements	Best-practice approach
	16		trade modelling (between	cross-border trade and physical flows between	4 (6)(a-f)	Minimum capacity pursuant to Art. 16(8), Temporary derogations pursuant to Art. 16(9) EMR. Measures to reach electricity interconnection targets (interconnection projects) NTC-approach only: Net transmission capacity (NTC) Expected operational practices (i.e. connection agreements) Flow-based approach only: Identified CNECs Node-to-hub PTDF TYNDP reference grid Expected grid modifications HVDC flows PST settings Maximum admissible power flow Generation shift key (GSK) Zone-to-hub PTDF	

	В	G	Н	I	J
1		De	finition	Granula	rity (spatial / temporal)
2	Sub-category	Minimum requirements	Best-practice approach	Minimum	Best-practice
	Cross-border trade modelling (between modelled zones)	The grid model should reflect the current/expected CCM (i.e., NTC or FBMC), considering national action plans and temporal derogations regarding availability of cross-zonal capacities (minRAM). NTC values reflect current and expected bilateral exchange capacities between market zones. FBMC reflects multilatera exchange possibilities between market zones, considering further operational practices and technical constraints (e.g., accounting for the use of PSTs, CNECs and respective PTDFs and GSK). Forced outages of HVDC network elements have to be considered explicitly in the NTC approach, while those outages are implicitly reflected in the FMBC approach.	The model fulfils all minimum requirements. Additionally, the available capacity on CNECs is based on the time-varying admissible power flow value. Network constraints impacted by climate conditions are estimated on a higher temporal granularity than seasonal (summer/winter). GSKs are I calculated dynamically.	Flows: per MTU, Infrastructure: per TY, NTCs: per zone border and TY FBMC-parameters: per MTU (if applicable)	Flows: per MTU, Infrastructure: per TY, NTCs: per zone border and TY FBMC-parameters: per MTU (if applicable)
16					

	В	К	L	М	Ν
1	-				
2	Sub-category	Prioritisation/Recommendation	Confidentiality	Restrictions	Remarks
	(between modelled zones)	Minimum requirements sufficient for robust and high quality results. Costs to apply best-practice approach may exceed the benefits.	No confidentiality issues identified.		See ERAA methodology for a more detailed description of FBMC modelling approach.
16					

	А	В	С	D	E	F
1					Data in	puts
2	Category	Sub-category	Description	Reference (Article)	Minimum requirements	Best-practice approach
17	Network and infrastructural data	Exchanges with non-explicitly modelled systems	not explicitly modelled	4 (1)(j), 4 (7)(a)	(Historical) time series of energy exchange	Price-elasticity of energy exchange or information on generation mix in not explicitly modelled zones.
18	arket design data	Capacity mechanisms	Characteristics of capacity mechanisms that are in place in one or more of the modelled zones.	3 (5), 5 (11)(b)	Type of already contracted capacity resource Volume of already contracted capacity resource Duration of CM contracts Annual amount paid to CM capacity EPS of capacities	For projections of future capacity demand and additional model-constraints: Residual load Reliability standard of MS/BZ De-rating of resources and interconnection Penalties
	Policy, regulatory and market design data	Market and regulatory constraints	Any binding political or regulatory constraints that are imposed on the market participants.	6 (14)	Phase-out restrictions Binding targets for specific technologies Price caps Other restrictions Subsidy schemes Feed-in prioritisation	C.f. "minimum requirements"
19						

	В	G	Н	I	J
1		Det	finition	Granula	rity (spatial / temporal)
2	Sub-category	Minimum requirements	Best-practice approach	Minimum	Best-practice
	-		Cross-border power flows may be sensitive to prices per MTU in the neighbouring explicitly modelled zones.	Per border, per TY, per MTU	Per border, per TY, per MTU
17					
		Model accounts for capacity mechanisms based on the available direct information on the respective capacity market.	the available direct information on the respective	Per modelled zone with capacity mechanism, per target year	Per modelled zone with capacity mechanism, per target year
18					
	constraints	The model considers effective binding political and regulatory constraints appropriately. Price caps are required to be incrementally increased if they are about to be reached (but not more than to the respective VoLL). Sensible assumptions about the removal of regulatory barriers in the long-run should be made.	-	Per modelled zone, per target year	Per modelled zone, per target year
19					

	В	К	L	М	Ν
1					
2	Sub-category	Prioritisation/Recommendation	Confidentiality	Restrictions	Remarks
	non-explicitly	Whether the benefits justify the cost of following the best- practice approach depends on the capacity of the interconnectors with non-explicitly modelled zones relative to the interconnection capacity with modelled zones.	No confidentiality issues identified.	Level and price-sensitivity of future power exchange patters may deviate from historical observations.	
17					
	mechanisms		Details of individual CM contracts may be confidential.	Some capacity mechanisms may already be approved but information on its specific design or amounts to be procured are not yet available.	Link to WP3
18		NI / P II			
	Market and regulatory constraints	Not applicable.	No confidentiality issues identified.		Link to WP3
19					

Resource Adequacy in the Pentalateral Energy Forum Results of Work Package 1

C. List of sources

	A	В	С	D	E	F	G	Н	I	1	К	I	М
1		<u>ـــــّـــــــــــــــــــــــــــــــ</u>	<u> </u>			· · ·			ntrie	s cov			
2	Database/ Publication	Author	Year	Short description	Categories covered	Туре	AT	BE	DE	FR	LU	NL	External Link
3	Adequacy and Flexibility Study for Belgium 2022 - 2032	Elia Group	2021	Resource adequacy and flexibility study by the Belgian TSO published annually	Electricity supply-side data; Electricity demand-side data	forecast	No	Yes	No	No	No	No	https://www.elia.be/en/elect ricity-market-and- system/adequacy/adequacy- studies
4	Aggregated Gas Storage Inventory	GIE AGSI	2022	Database covers storage inventory as per member state, storage operator and storage site.	Infrastructural data	historical	Yes	Yes	Yes	Yes	Yes	No	<u>https://agsi.gie.eu/#/</u>
5	APG Report on Balancing	Austrian Power Grid AG	2018	Balancing report of the Austrian transmission system operator.	Electricity supply-side data	historical	Yes	No	No	No	No	No	<u>https://www.apg.at/en/mark</u> <u>t/balancing</u>
6	Balancing Capacities Platform	Réseau de Transport d'Electricité	2021	Balancing report of the French transmission system operator.	Electricity supply-side data	real-time/ historical	No	No	No	Yes	No	No	https://www.services- rte.com/en/view-data- published-by- rte/balancing.html
7	Balancing energy information Belgium	Elia Group	2022	Information on current and past balancing requirements, activities and auctions of the Belgian TSO	Electricity demand- side data; Electricity supply-side data	historical	No	Yes	No	No	No	No	<u>https://www.elia.be/en/grid-</u> <u>data/balancing</u>
8	Carbon Pricing Dashboard	The World Bank	2021	Frequently updated platform for global (trans-)national carbon prices and carbon price schemes	Electricity supply-side data	real-time/ historical	Yes	Yes	Yes	Yes	Yes	Yes	<u>https://carbonpricingdashbo</u> <u>ard.worldbank.org/map_data</u>
9	Cost of Capital - Update for Electricity Generation, Storage and Demand Side Response Technologies	Europe Economics	2018	Report with hurdle rates for renewable and fossil energy plants in Europe as main results.	Electricity demand- side data; Electricity supply-side data	historical/ forecast	Yes	Yes	Yes	Yes	Yes	Yes	https://assets.publishing.serv ice.gov.uk/government/uplo ads/system/uploads/attachm ent_data/file/910814/Cost_o f_Capital_Update_for_Electri city_Generation_Storage_and _Demand_Side_Response_Te chnologies.pdf

	А	В	С	D	E	F	G	Н	Ι	J	Κ	L	М
1	Database/ Publication	Author	Year	Short description	Categories covered	Туре	АТ			es cov FR		NL	External Link
10	Data & Statistics IRENA	IRENA		Detailed statistics on renewable energy capacity, power generation and renewable energy balances.	Electricity supply-side data	historical	Yes	Yes	Yes	Yes	Yes	Yes	<u>https://www.irena.org/Statis</u> <u>tics</u>
11	Data dictionary	ecad.eu	2021	Database of daily series of observations of National Meteorological and Hydrological Services stations in Europe and the	Electricity supply-side data	historical	Yes	Yes	Yes	Yes	Yes	Yes	<u>https://www.ecad.eu/dailyda</u> <u>ta/datadictionary.php</u>
12	Database of the European energy storage technologies and facilities	Directorate- General for Energy - EU Commission	2022	Database that offers a global view on all energy storage technologies	Electricity supply-side data; Infrastructural data	historical/ forecast	Yes	Yes	Yes	Yes	Yes	Yes	https://data.europa.eu/data/ datasets/database-of-the- european-energy-storage- technologies-and- facilities?locale=en
13	ELECTRICITY GENERATION COSTS 2020	BEIS	2020	Report of the levelized cost estimates for electricity generation technologies, detailing methodology, data and assumptions.	Electricity supply-side data	forecast	Yes	Yes	Yes	Yes	Yes	Yes	https://www.gov.uk/govern ment/publications/beis- electricity-generation-costs- 2020
14	ELIA Balancing Report	: Elia Group	2020	Balancing report of the Belgian transmission system operator, published ever two years.	Electricity supply-side data	historical	No	Yes	No	No	No	No	https://www.elia.be/- /media/project/elia/elia- site/keeping-the- balance/keeping-the- balance/20200622_report- article-60-ebgl_en.pdf?la=en
15	EMHIRES dataset Part I: Wind power generation	European Meteorologic al		EMHIRES provides RES-E generation time series for the EU-28 and neighbouring countries.	Electricity supply-side data	historical	Yes	Yes	Yes	Yes	Yes	Yes	<u>https://setis.ec.europa.eu/e</u> <u>mhires-dataset-part-i-wind-</u> <u>power-generation_de</u>

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2	Database/ Publication	Author	Year	Short description	Categories covered	Туре	AT	BE	DE	FR	LU	NL	External Link
16	EMHIRES dataset Part II Solar power generation	European Meteorologic al	2016	EMHIRES provides RES-E generation time series for the EU-28 and neighbouring countries.	Electricity supply-side data	historical	Yes	Yes	Yes	Yes	Yes	Yes	<u>https://setis.ec.europa.eu/e</u> <u>mhires-dataset-part-ii-solar-</u> <u>power-generation_de</u>
17	Energiedaten: Gesamtausgabe	BMWI	2019	Comprehensive statistics on energy supply and consumption in Germany published by the German Federal Government.	Electricity demand- side data; Electricity supply-side data	historical	No	No	Yes	No	No	No	<u>https://www.bmwi.de/Redak</u> <u>tion/DE/Artikel/Energie/ene</u> <u>rgiedaten-</u> gesamtausgabe.html
18	Energy Statistics	STATBEL	2020	Energy statistics by economic sector and by energy source published by the Belgian Statistics Agency	Electricity demand- side data; Electricity supply-side data	historical	No	Yes	No	No	No	No	<u>https://statbel.fgov.be/en/th</u> <u>emes/energy/energy-</u> <u>statistics-economic-sector-</u> <u>and-energy-source</u>
19	ENTSO-E Balancing Report	ENTSO-E	2020	Report that outlines the work achieved by TSO in implementing the Capacity Allocation and Congestion Management Regulation, the Forward Capacity Allocation Regulation and the Electricity Balancing Regulation.	Electricity supply-side data	historical	Yes	Yes	Yes	Yes	Yes	Yes	https://www.entsoe.eu/news /2020/06/30/2020-entso-e- market-reports/
20	ENTSO-E HVDC Utilisation and Unavailability Statistics 2020	ENTSO-E	2020	Report that presents the availability and utilisation of HVDC links connected to the Nordic and Baltic power system in 2020	Infrastructural data	historical	No	No	Yes	No	Yes	No	https://eepublicdownloads.a zureedge.net/clean- documents/SOC%20docume nts/Nordic/ENTSO- E_HVDC_Utilisation_and_Un availability_Statistics_2020.p df
21	Eurostat Database	Eurostat	2022	Energy statistics published by the European Statistics Agency	Electricity demand- side data	historical	Yes	Yes	Yes	Yes	Yes	Yes	<u>https://ec.europa.eu/eurosta</u> <u>t/web/energy/data/database</u>
22	Eurostat Energy Balances	Eurostat	2022	Energy balances published by the European Statistics Agency	Electricity demand- side data; Electricity supply-side data; Infrastructural data	historical	Yes	Yes	Yes	Yes	Yes	Yes	https://ec.europa.eu/eurosta t/de/web/energy/data/energ y-balances

	A	В	С	D	E	F	G	Н	Ι	J	Κ	L	М
1	Database/ Publication	Author	Year	Short description	Categories covered	Туре	АТ		ntries DE		ered LU	NL	External Link
23	FfE Open Data Platform	FfE	2022	Overview of free datasets for modelling energy demand and generation		historical/ forecast	Yes	Yes	Yes	Yes	Yes	Yes	http://opendata.ffe.de/
24	GDP growth	The World Bank	2021	Historical national GDP growth data published by the World Bank	Policy, regulatory and market design data	historical	Yes	Yes	Yes	Yes	Yes	Yes	https://data.worldbank.org/i ndicator/NY.GDP.MKTP.KD. ZG
25	Gesamtenergiebilanz Österreich	Statistik Austria	2021	Comprehensive statistics on energy supply and consumption in Austria published by the Austrian Statistics Agency	Electricity demand- side data; Policy data (policy-driven assumptions)	historical	Yes	No	No	No	No	No	https://www.statistik.at/web _de/statistiken/energie_umw elt_innovation_mobilitaet/en ergie_und_umwelt/energie/e nergiebilanzen/index.html
26	Heating Market Report	ehi.eu	2020	Heating market report of the European heating association including data and descriptions of up-to-date heating applications	Electricity demand- side data	historical	Yes	Yes	Yes	Yes	No	Yes	<u>https://ehi.eu/heating-</u> market-report/heating- market-report-2020/
27	IEA Data explorer	IEA	2022	This database, updated monthly, provides production, consumption and trade data for all OECD Member Countries and electricity production data for a selection of other economies.	Electricity supply-side data; Electricity demand-side data	historical	Yes	Yes	Yes	Yes	Yes	Yes	https://www.iea.org/reports/ monthly-electricity-statistics- overview/data-explorer
28	Jahresdurchschnittsp reise und -steuern für die wichtigsten Energieträger	Statistik Austria		Data including average prices and taxes for energy carriers published by the Austrian Statistics Agency	Electricity supply-side data	historical	Yes	No	No	No	No	No	https://www.statistik.at/web _de/statistiken/energie_umw elt_innovation_mobilitaet/en ergie_und_umwelt/energie/p reise_steuern/index.html

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1								Cou	ntrie	es cov	vered		
2	Database/ Publication	Author	Year	Short description	Categories covered	Туре	АТ	BE	DE	FR	LU	NL	External Link
29	LEVELIZED COST OF ELECTRICITY RENEWABLE ENERGY TECHNOLOGIES	Fraunhofer ISE	2021	The study provides a current cost comparison for the conversion of different forms of energy into electricity as well as a forecast for the further cost development until the year 2040	data	historical/ forecast	Yes	Yes	Yes	; Yes	Yes	Yes	https://www.ise.fraunhofer.d e/de/veroeffentlichungen/st udien/studie- stromgestehungskosten- erneuerbare-energien.html
30	Mapping and analyses of the current and future (2020 - 2030) heating/cooling fuel deployment (fossil/renewables)	Fraunhofer ISI	2016	Project report providing a comprehensive picture of the state of the EU's H/C sector in 2015 as well as possible trajectories until 2020 and 2030.	Electricity demand- side data	historical/ forecast	Yes	Yes	Yes	Yes	Yes	Yes	https://www.isi.fraunhofer.d e/de/competence- center/energiepolitik- energiemaerkte/projekte/ma pping-heating_331945.html
31	Market Report	ehpa - European heat pump association	2021	Comprehensive publication on the European Heat Pump market provided by the European heat pump association	Electricity demand- side data	historical	Yes	Yes	Yes	i Yes	No	Yes	<u>https://www.ehpa.org/marke</u> <u>t-data/market-report-2021/</u>
32	METIS Technical Note T4	European Commission	2019	Overview of European member state's electricity market policy framework and imposed changes according to EU regulation	Policy, regulatory and market design data	historical	No	Yes	Yes	; Yes	No	Yes	https://op.europa.eu/en/publ ication-detail/- /publication/1cff0934-adc1- 11e9-9d01-01aa75ed71a1
33	Mittelfristprognose	50Hertz, Amprion, TenneT, TransnetBW		Medium-term forecast for Germany- wide electricity generation from EEG- subsidised power plants for the calendar years 2022 to 2026 on behalf of the German TSOs	Electricity supply-side data	forecast	No	No	Yes	i No	No	No	https://www.netztransparen z.de/EEG/Mittelfristprognos en/Mittelfristprognose-2022- 2026
34	NECP AT	BMNT	2019	National Climate and Energy Plan published by the Austrian Government	Electricity demand- side data	historical/ forecast	Yes	No	No	No	No	No	<u>https://ec.europa.eu/energy/ topics/energy-</u> <u>strategy/national-energy-</u> <u>climate-plans_en</u>

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2	Database/ Publication	Author	Year	Short description	Categories covered	Туре	AT	BE	DE	FR	LU	NL	External Link
35	NECP BE	Belgian Government	2019	National Climate and Energy Plan published by the Belgian Government	Electricity demand- side data	historical/ forecast	No	Yes	No	No	No	No	<u>https://ec.europa.eu/energy/ topics/energy-</u> <u>strategy/national-energy-</u> <u>climate-plans_en</u>
36	NECP DE	BMWK	2019	National Climate and Energy Plan published by the German Government	Electricity demand- side data	historical/ forecast	No	No	Yes	No	No	No	https://ec.europa.eu/energy/ topics/energy- strategy/national-energy- climate-plans_en
37	NECP FR	DFBEW	2020	National Climate and Energy Plan published by the French Government	Electricity demand- side data; Policy data (policy-driven assumptions)	historical/ forecast	No	No	No	Yes	No	No	https://ec.europa.eu/energy/ topics/energy- strategy/national-energy- climate-plans_en
38	NECP LU	Government of Luxembourg	2018	National Climate and Energy Plan published by the Government of Luxembourg	Electricity demand- side data; Policy data (policy-driven assumptions)	historical/ forecast	No	No	No	No	Yes	No	https://ec.europa.eu/energy/ topics/energy- strategy/national-energy- climate-plans_en
39	NECP NL	Government of the Netherlands	2019	National Climate and Energy Plan published by the Government of the Netherlands	Electricity demand- side data; Policy data (policy-driven assumptions)	historical/ forecast	No	No	No	No	No	Yes	<u>https://ec.europa.eu/energy/ topics/energy- strategy/national-energy- climate-plans_en</u>
40	PECD	ENTSO-E	2021	Pan-European Climate Database including waterflow, wind speed and irradiation data	Electricity supply-side data	forecast	Yes	Yes	Yes	Yes	Yes	Yes	<u>https://www.entsoe.eu/outlo</u> oks/eraa/eraa-downloads/
41	PEMMDB	ENTSO-E	2021	Pan European Market Modelling Database	Electricity demand- side data; Electricity supply-side data; Infrastructural data	historical	Yes	Yes	Yes	Yes	Yes	Yes	<u>https://www.entsoe.eu/outlo</u> oks/eraa/eraa-downloads/
42	Population, total	The World Bank	2021	Historical national population growth data published by the World Bank	Policy, regulatory and market design data	historical	Yes	Yes	Yes	Yes	Yes	Yes	https://data.worldbank.org/i ndicator/SP.POP.TOTL

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1	-							Cοι	untri	ies co	/ered		
2	Database/ Publication	Author	Year	Short description	Categories covered	Туре	AT	BE	DE	E FR	LU	NL	External Link
43	Projected Costs of Generating Electricity 2020	IEA	2020	Joint report by the International Energy Agency and the OECD Nuclear Energy Agency on electricity generating costs	Electricity supply-side data	forecast	Yes	Yes	Ye	s Yes	No	Yes	https://www.iea.org/reports/ projected-costs-of- generating-electricity-2020
44	Regelleistung.net - Datencenter	50Hertz, Amprion, TenneT, TransnetBW	2021	Joint data platform of the German TSOs providing information and data on balancing energy requirements and balancing energy tenders.	Electricity supply-side data	real-time/ historical	No	No	Ye	s No	Yes	No	https://www.regelleistung.ne t/apps/datacenter/tenders/? productTypes=PRL,SRL,MRL &markets=BALANCING_CA PACITY,BALANCING_ENER GY&date=2021-12- 20&tenderTab=PRL\$CAPAC ITY\$1
45	Revision of World Population Prospects	United Nations	2019	Historical and future national population growth data published by the United Nations	Policy, regulatory and market design data	historical/ forecast	Yes	Yes	Ye	s Yes	Yes	Yes	<u>https://population.un.org/wp</u> <u>p/</u>
46	STATISTICAL FACTSHEET	ENTSO-E	2019	Annually updated factsheet providing essential information and data on ENTSO-E and its 41 member TSOs	Electricity supply-side data; Infrastructural data	historical	Yes	Yes	Ye	s Yes	Yes	Yes	<u>https://www.entsoe.eu/publi</u> <u>cations/statistics-and-data/</u>
47	Study on the estimation of the value of lost load of electricity supply in Europe	ACER	2016	Study on the estimation of the Value of Lost Load (VoLL) of electricity supply in Europe	Electricity demand- side data	historical	Yes	Yes	Ye	s Yes	Yes	Yes	https://extranet.acer.europa. eu/en/Electricity/Infrastruct ure_and_network%20develo pment/Infrastructure/Docu ments/CEPA%20study%20o n%20the%20Value%20of%2 OLost%20Load%20in%20the %20electricity%20supply.pdf

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1			-					Cou	ntrie	s cov	vered		
2	Database/ Publication	Author	Year	Short description	Categories covered	Туре	АТ	BE	DE	FR	LU	NL	External Link
48	Technology Data - Generation of Electricity and District heating	Danish Energy Agency and Energinet	2021	Report providing technology descriptions and projections for long- term energy system planning.	Electricity supply-side data	historical/ forecast	Yes	Yes	Yes	Yes	Yes	Yes	<u>https://ens.dk/sites/ens.dk/fi</u> <u>les/Analyser/technology_dat</u> <u>a_catalogue_for_el_and_dh.p</u> <u>df</u>
49	Transparency Platform	ENTSO-E	2022	Central collection and publication of electricity generation, transportation and consumption data and information for the pan-European market by the European TSOs	Electricity demand- side data; Electricity supply-side data; Infrastructural data	real-time/ historical	Yes	Yes	Yes	Yes	Yes	Yes	https://transparency.entsoe. eu/transmission- domain/physicalFlow/show
50	TYNDP 2020	ENTSO-E	2020	Joint Ten-Year Network Development Plan of the European TSOs	Infrastructural data	forecast	Yes	Yes	Yes	Yes	Yes		https://tyndp2020-project- platform.azurewebsites.net/ projectsheets

Resource Adequacy in the Pentalateral Energy Forum Results of Work Package 1

# D. List of sources (detailed)

	А	В	С	D	E	F	G	Н	Ι	J	K	L
1							•	Cour	ntries	5		
2	Database	Author	Category	RAA element	Data input	AT	BE	DE	FR	NL	LU	Years
	Adequacy and Flexibility Study		Electricity demand-	Electricity demand of								
3	for Belgium 2022 - 2032	Elia Group	side data	EV	Number of EV	No	Yes	No	No	No	No	2022; 2025; 2028; 2030; 2032
				Electricity demand for								
	Adequacy and Flexibility Study		Electricity demand-	space heating and	Heat pump							
4	for Belgium 2022 - 2032	Elia Group	side data	cooling	penetration	No	Yes	No	No	No	No	2022; 2025; 2028; 2030; 2032
	Adequacy and Flexibility Study		Electricity demand-		Electrolyser							
5	for Belgium 2022 - 2032	Elia Group	side data	Large-scale PtX	capacity	No	Yes	No	No	No	No	2022; 2025; 2028; 2030; 2032
	Adequacy and Flexibility Study		Electricity demand-		Shedding							
6	for Belgium 2022 - 2032	Elia Group	side data	Industrial DSR	capacity	No	Yes	No	No	No	No	2022; 2025; 2028; 2030; 2032
	Adequacy and Flexibility Study		Electricity demand-									
7	for Belgium 2022 - 2032	Elia Group	side data	Industrial DSR	• • •	No	Yes	No	No	No	No	2022; 2025; 2028; 2030; 2032
	Adequacy and Flexibility Study		Electricity supply-side		Pumped storage							
8	for Belgium 2022 - 2032	Elia Group	data	Hydro modelling	capacity	No	Yes	No	No	No	No	2022; 2025; 2028; 2030; 2032
				Battery storage units,	Small, large and							
	Adequacy and Flexibility Study		Electricity supply-side	Electricity demand of	V2G battery							
9	for Belgium 2022 - 2032	Elia Group	data	EV	capacity	No	Yes	No	No	No	No	2022; 2025; 2028; 2030; 2032
	Adequacy and Flexibility Study		Electricity supply-side									
10	for Belgium 2022 - 2032	Elia Group	data	RES generation	PV capacity	No	Yes	No	No	No	No	2022; 2025; 2028; 2030; 2032
	Adequacy and Flexibility Study		Electricity supply-side		Onshore Wind							
11	for Belgium 2022 - 2032	Elia Group	data	RES generation	capacity	No	Yes	No	No	No	No	2022; 2025; 2028; 2030; 2032
	Adequacy and Flexibility Study		Electricity supply-side		Offshore Wind							
12	for Belgium 2022 - 2032	Elia Group	data	RES generation	capacity	No	Yes	No	No	No	No	2022; 2025; 2028; 2030; 2032
	Adequacy and Flexibility Study		Electricity supply-side		Hydro RoR							
13	for Belgium 2022 - 2032	Elia Group	data	RES generation	capacity	No	Yes	No	No	No	No	2022; 2025; 2028; 2030; 2032
	Adequacy and Flexibility Study		Electricity supply-side		Biomass + Waste							
14	for Belgium 2022 - 2032	Elia Group	data	RES generation	capacity	No	Yes	No	No	No	No	2022; 2025; 2028; 2030; 2032
4-	Adequacy and Flexibility Study		Electricity supply-side			l	.,					
15	for Belgium 2022 - 2032	Elia Group	data	Thermal generation	Nuclear capacity	No	Yes	No	No	No	No	2022; 2025; 2028; 2030; 2032
	Adequacy and Flexibility Study		Electricity supply-side									
16	for Belgium 2022 - 2032	Elia Group	data	Thermal generation	CHP capacity	No	Yes	No	No	No	No	2022; 2025; 2028; 2030; 2032
	Adequacy and Flexibility Study		Electricity supply-side	<b>T</b> I I	CCGT/OCGT	Ι.,	V					
1/	for Belgium 2022 - 2032	Elia Group	data	Thermal generation	capacity	No	Yes	No	No	No	No	2022; 2025; 2028; 2030; 2032
10	Adequacy and Flexibility Study		Electricity supply-side	<b>T</b> I I	CCGT-CHP	L.	V					
18	for Belgium 2022 - 2032	Elia Group	data	Thermal generation	capacity	No	Yes	No	NO	No	No	2022; 2025; 2028; 2030; 2032
10	Adequacy and Flexibility Study		Electricity supply-side	The sum of the second state	Turbojets	N	V	NL-	NI -	NI -	N.I	2022, 2025, 2022, 2020, 2020
19	for Belgium 2022 - 2032	Elia Group	data	Thermal generation	capacity	NO	Yes	NO	INO	NO	NO	2022; 2025; 2028; 2030; 2032

	А	В	М	N	0	Р	Q	R
1				Temporal	Spatial			
2	Database	Author	Data input	resolution	resolution	Remarks	Additional Description	Link
	Adequacy and Flexibility Study							
3	for Belgium 2022 - 2032	Elia Group	Number of EV	target years	by country			Link
	Adequacy and Flexibility Study		Heat pump					
4	for Belgium 2022 - 2032	Elia Group	penetration	target years	by country			Link
	Adequacy and Flexibility Study		Electrolyser					
5	for Belgium 2022 - 2032	Elia Group	capacity	target years	by country			<u>Link</u>
	Adequacy and Flexibility Study					including ancillary services		
6	for Belgium 2022 - 2032	Elia Group	Shedding capacity	target years	by country	volume		Link
	Adequacy and Flexibility Study							
7	for Belgium 2022 - 2032	Elia Group		target years	by country			<u>Link</u>
	Adequacy and Flexibility Study		Pumped storage					
8	for Belgium 2022 - 2032	Elia Group		target years	by country			<u>Link</u>
			Small, large and					
	Adequacy and Flexibility Study		V2G battery					
9	for Belgium 2022 - 2032	Elia Group	capacity	target years	by country			<u>Link</u>
	Adequacy and Flexibility Study							
10	for Belgium 2022 - 2032	Elia Group		target years	by country			<u>Link</u>
	Adequacy and Flexibility Study		Onshore Wind					
11	for Belgium 2022 - 2032	Elia Group		target years	by country			<u>Link</u>
	Adequacy and Flexibility Study		Offshore Wind					
12	for Belgium 2022 - 2032	Elia Group		target years	by country			<u>Link</u>
	Adequacy and Flexibility Study		Hydro RoR					
13	for Belgium 2022 - 2032	Elia Group		target years	by country			<u>Link</u>
	Adequacy and Flexibility Study		Biomass + Waste					
14	for Belgium 2022 - 2032	Elia Group	capacity	target years	by country			<u>Link</u>
1	Adequacy and Flexibility Study							
15	for Belgium 2022 - 2032	Elia Group	Nuclear capacity	target years	by country			<u>Link</u>
1.0	Adequacy and Flexibility Study							
16	for Belgium 2022 - 2032	Elia Group	CHP capacity	target years	by country			Link
17	Adequacy and Flexibility Study		CCGT/OCGT		L			
1/	for Belgium 2022 - 2032	Elia Group	capacity CCGT-CHP	target years	by country			Link
10	Adequacy and Flexibility Study			1	h			1.25.1
18	for Belgium 2022 - 2032	Elia Group	capacity	target years	by country			<u>Link</u>
10	Adequacy and Flexibility Study		Turbojets	towast	h.,			L tools
19	for Belgium 2022 - 2032	Elia Group	capacity	target years	by country			<u>Link</u>

	А	В	C	D	E	F	G	Н	Ι	J	K	L
1	Database	Author	Catagoni	DAA element	Data innut	АТ	DE		ntries			Years
	Database	Author	Category	RAA element	Data input	AI	DE	DE	FK	INL	LU	rears
	Adequacy and Flexibility Study		Electricity supply-side		Forced Outage							
	for Belgium 2022 - 2032	Elia Group	data	Unplanned outages	Rate Nuclear	No	Yes	No	No	No	No	2011-2020
	Adequacy and Flexibility Study		Electricity supply-side		Forced Outage							
21	for Belgium 2022 - 2032	Elia Group	data	Unplanned outages	Rate CCGT	No	Yes	No	No	No	No	2011-2020
	A da avec av and Else ibility Church		Electricite consults side		Farrad Outage							
	Adequacy and Flexibility Study for Belgium 2022 - 2032	Elia Group	Electricity supply-side data	Unplanned outages	Forced Outage Rate GT	No	Voc	No	No	No	No	2011-2020
			uala	Onplanned Outages	Nate GT	INO	163	INU	INU	NU	INU	2011-2020
	Adequacy and Flexibility Study		Electricity supply-side		Forced Outage							
	for Belgium 2022 - 2032	Elia Group	data	Unplanned outages	Rate TJ	No	Yes	No	No	No	No	2011-2020
	Adequacy and Flexibility Study		Electricity supply-side		Forced Outage							
24	for Belgium 2022 - 2032	Elia Group	data	Unplanned outages	Rate Waste	No	Yes	No	No	No	No	2011-2020
					E 10 1							
	Adequacy and Flexibility Study for Belgium 2022 - 2032	Elia Group	Electricity supply-side data	Unplanned outages	Forced Outage Rate CHP	No	Voc	No	No	No	No	2011-2020
25	Tor Beigium 2022 - 2032	Ella Group	uala	Onplanned Outages	Forced Outage	INO	res	INU	INU	INU	INU	2011-2020
	Adequacy and Flexibility Study		Electricity supply-side		Rate Pumped							
	for Belgium 2022 - 2032	Elia Group	data	Unplanned outages	storage	No	Yes	No	No	No	No	2011-2020
					Forced Outage							
	Adequacy and Flexibility Study		Electricity supply-side		Rate DC links (in							
27	for Belgium 2022 - 2032	Elia Group	data	Unplanned outages	each direction)	No	Yes	No	No	No	No	2011-2020
					availability of							
	Adequacy and Flexibility Study for Belgium 2022 - 2032	Elia Group	Electricity supply-side data	Thermal generation	thermal generation units	No	Voc	No	No	No	No	2020 - 2032
_20			uata	Therman generation	FOM (including	NU	165	INU	INU	INU	INU	2020-2032
	Adequacy and Flexibility Study		Electricity supply-side	Thermal generation:	major overhauls)							
	for Belgium 2022 - 2032	Elia Group	data	CONE/CORP	[€/kW/y]	No	Yes	No	No	No	No	Current prices
					Hurdle rate in							
	Adequacy and Flexibility Study		Electricity supply-side	÷	EOM (WACC +							
30	for Belgium 2022 - 2032	Elia Group	data	CONE/CORP	premium)	No	Yes	No	No	No	No	Current prices
				The second second	<b>F</b>							
	Adequacy and Flexibility Study	Elia Group	Electricity supply-side	Thermal generation; CONE/CORP	Economic	No	Vac	Na	No	Na	Na	Current accumption
31	for Belgium 2022 - 2032	Elia Group	data	COINE/CORP	Lifetime of units	INO	res	INO	INO	INO	INO	Current assumption

	А	В	М	N	0	Р	Q	R
1				Temporal	Spatial		•	
2	Database	Author	Data input	resolution	resolution	Remarks	Additional Description	Link
						Variable given in number of		
	Adequacy and Flexibility Study		Forced Outage			occurrence, rate [%] and		
20	for Belgium 2022 - 2032	Elia Group	Rate Nuclear	average	by country	duration [h]		Link
						Variable given in number of		
	Adequacy and Flexibility Study		Forced Outage			occurrence, rate [%] and		
21	for Belgium 2022 - 2032	Elia Group	Rate CCGT	average	by country	duration [h]		Link
						Variable given in number of		
	Adequacy and Flexibility Study		Forced Outage			occurrence, rate [%] and		
22	for Belgium 2022 - 2032	Elia Group	Rate GT	average	by country	duration [h]		Link
						Variable given in number of		
	Adequacy and Flexibility Study		Forced Outage			occurrence, rate [%] and		
23	for Belgium 2022 - 2032	Elia Group	Rate TJ	average	by country	duration [h]		<u>Link</u>
						Variable given in number of		
	Adequacy and Flexibility Study		Forced Outage			occurrence, rate [%] and		
24	for Belgium 2022 - 2032	Elia Group	Rate Waste	average	by country	duration [h]		<u>Link</u>
						Variable given in number of		
	Adequacy and Flexibility Study		Forced Outage			occurrence, rate [%] and		
25	for Belgium 2022 - 2032	Elia Group	Rate CHP	average	by country	duration [h]		<u>Link</u>
			Forced Outage			Variable given in number of		
	Adequacy and Flexibility Study		Rate Pumped			occurrence, rate [%] and		
26	for Belgium 2022 - 2032	Elia Group	storage	average	by country	duration [h]		<u>Link</u>
			Forced Outage			Variable given in number of		
	Adequacy and Flexibility Study		Rate DC links (in			occurrence, rate [%] and		
27	for Belgium 2022 - 2032	Elia Group		average	by country	duration [h]		<u>Link</u>
			availability of				Combined Cycle - Gas Turbine;	
	Adequacy and Flexibility Study		thermal				Combined Cycle - Steam Turbine;	
28	for Belgium 2022 - 2032	Elia Group	generation units	target years	by country		Classic Gas Turbine; Steam Turbine;	<u>Link</u>
			FOM (including			WACC proposed for this study is		
	Adequacy and Flexibility Study		major overhauls)			5.53%; All prices are assumed to		
29	for Belgium 2022 - 2032	Elia Group	[€/kW/y]		by country	be in €2019.		<u>Link</u>
			Hurdle rate in			WACC proposed for this study is		
	Adequacy and Flexibility Study		EOM (WACC +			5.53%; All prices are assumed to	Combined Cycle - Steam Turbine;	
30	for Belgium 2022 - 2032	Elia Group	premium)		by country	be in €2019.	Classic Gas Turbine; Steam Turbine;	<u>Link</u>
						WACC proposed for this study is		
	Adequacy and Flexibility Study		Economic			5.53%; All prices are assumed to	Combined Cycle - Steam Turbine;	
31	for Belgium 2022 - 2032	Elia Group	Lifetime of units		by country	be in €2019.	Classic Gas Turbine; Steam Turbine;	<u>Link</u>

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1	Database	Author	Category	RAA element	Data input	AT			ntries FR		LU	Years
	Adequacy and Flexibility Study for Belgium 2022 - 2032	Elia Group	Electricity supply-side data	Thermal generation; CONE/CORP	CAPEX [€/kW]	No	Yes	No	No	No	No	Current assumption
	Adequacy and Flexibility Study for Belgium 2022 - 2032	Elia Group	Network and infrastructural data	Thermal generation	Minimum up time	No	Yes	No	No	No	No	Current assumption
	Adequacy and Flexibility Study for Belgium 2022 - 2032	Elia Group	Network and infrastructural data	Thermal generation	Minimum down time	No	Vec	No	No	No	No	Current assumption
	TOT Beigium 2022 - 2032		inirastructurai dată	mermal generation	ume		res				INO	Current assumption
	Adequacy and Flexibility Study for Belgium 2022 - 2032	Elia Group	Network and infrastructural data	Thermal generation	Hot start up time	No	Yes	No	No	No	No	Current assumption

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1 2	Database	Author	Data input	Temporal resolution	Spatial resolution	Remarks	Additional Description	Link
32	Adequacy and Flexibility Study for Belgium 2022 - 2032	Elia Group	CAPEX [€/kW]		by country	The industry wide reference WACC proposed for this study is 5.53%; All prices are assumed to be in €2019.	Turbojet; Cogeneration Unit	<u>Link</u>
33	Adequacy and Flexibility Study for Belgium 2022 - 2032	Elia Group	Minimum up time		by country		Units include: Combined Cycle; Combined Cycle - Gas Turbine; Combined Cycle - Steam Turbine; Classic Gas Turbine; Steam Turbine; Incineration Station; Nuclear; Turbojet; Cogeneration Unit; RES Generation Units; Interconnections (AC&DC); V2G; Electrolysers; Pumped Storage;	Link
	Adequacy and Flexibility Study for Belgium 2022 - 2032	Elia Group	Minimum down time		by country	The industry wide reference WACC proposed for this study is	Units include: Combined Cycle; Combined Cycle - Gas Turbine; Combined Cycle - Steam Turbine; Classic Gas Turbine; Steam Turbine; Incineration Station; Nuclear; Turbojet; Cogeneration Unit; RES Generation Units; Interconnections (AC&DC); V2G; Electrolysers; Pumped Storage;	
	Adequacy and Flexibility Study for Belgium 2022 - 2032	Elia Group	Hot start up time		by country	The industry wide reference WACC proposed for this study is	Units include: Combined Cycle; Combined Cycle - Gas Turbine; Combined Cycle - Steam Turbine; Classic Gas Turbine; Steam Turbine; Incineration Station; Nuclear; Turbojet; Cogeneration Unit; RES Generation Units; Interconnections (AC&DC); V2G; Electrolysers; Pumped Storage;	

	А	В	C	D	E	F			Ι	J	Κ	L
1	Database	Author	Category	RAA element	Data input	AT		Cour DE			LU	Years
	Adequacy and Flexibility Study		Network and		Warm start up							
	for Belgium 2022 - 2032	Elia Group	infrastructural data	Thermal generation	time	No	Yes	No	No	No	No	Current assumption
	Adequacy and Flexibility Study		Network and									
37	for Belgium 2022 - 2032	Elia Group	infrastructural data	Thermal generation	Cold start up time	No	Yes	No	No	No	No	Current assumption
	Adequacy and Flexibility Study for Belgium 2022 - 2032	Elia Group	Network and infrastructural data	Thermal generation	Transition time from "hot" to "warm"	No	Yes	No	Νο	No	No	Current assumption
	Adequacy and Flexibility Study		Network and		Transition time from "warm" to							
	for Belgium 2022 - 2032	Elia Group	infrastructural data	Thermal generation	"cold"	No	Yes	No	No	No	No	Current assumption

	А	В	М	Ν	0	Р	Q	R
1 2	Database	Author	Data input	Temporal resolution	Spatial resolution	Remarks	Additional Description	Link
	Adequacy and Flexibility Study		Warm start up			5.53%; All prices are assumed to	Units include: Combined Cycle; Combined Cycle - Gas Turbine; Combined Cycle - Steam Turbine; Classic Gas Turbine; Steam Turbine; Incineration Station; Nuclear; Turbojet; Cogeneration Unit; RES Generation Units; Interconnections (AC&DC); V2G; Electrolysers; Pumped	
36	for Belgium 2022 - 2032	Elia Group	time		by country	be in €2019.	Storage;	<u>Link</u>
							Units include: Combined Cycle; Combined Cycle - Gas Turbine; Combined Cycle - Steam Turbine; Classic Gas Turbine; Steam Turbine; Incineration Station; Nuclear;	
						The industry wide reference	Turbojet; Cogeneration Unit; RES	
	Adequacy and Flexibility Study						Generation Units; Interconnections (AC&DC); V2G; Electrolysers; Pumped	
	for Belgium 2022 - 2032	Elia Group	Cold start up time		by country	be in €2019.	Storage;	<u>Link</u>
			Transition time			The industry wide reference WACC proposed for this study is	Units include: Combined Cycle; Combined Cycle - Gas Turbine; Combined Cycle - Steam Turbine; Classic Gas Turbine; Steam Turbine; Incineration Station; Nuclear; Turbojet; Cogeneration Unit; RES Generation Units; Interconnections	
	Adequacy and Flexibility Study		from "hot" to				(AC&DC); V2G; Electrolysers; Pumped	
38	for Belgium 2022 - 2032	Elia Group	"warm"		by country	be in €2019.	Storage; Units include: Combined Cycle; Combined Cycle - Gas Turbine; Combined Cycle - Steam Turbine; Classic Gas Turbine; Steam Turbine; Incineration Station; Nuclear;	<u>Link</u>
			Transition time			The industry wide reference	Turbojet; Cogeneration Unit; RES Generation Units; Interconnections	
	Adequacy and Flexibility Study		from "warm" to			1 · · · · · · · · · · · · · · · · · · ·	(AC&DC); V2G; Electrolysers; Pumped	
	for Belgium 2022 - 2032	Elia Group	"cold"		by country	be in €2019.	Storage;	<u>Link</u>

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1	Database	Author	Catagoni	RAA element	Dete in put	лт	рг		ntrie:			Veere	
	Database	Author	Category	RAA element	Data input	AI	DE		FK	INL	LU	Years	
	Adequacy and Flexibility Study		Network and										
40	for Belgium 2022 - 2032	Elia Group	infrastructural data	Thermal generation	Min Stable power	No	Yes	No	No	No	No	Current assumption	
	Adequacy and Flexibility Study		Network and										
	for Belgium 2022 - 2032	Elia Group	infrastructural data	Thermal generation	Ramp Rate	No	Yes	No	No	No	No	Current assumption	
	Aggregated Gas Storage		Network and		Gas storage								
	Inventory	GIE AGSI	infrastructural data	N/A	capacity	Yes	Yes	Yes	Yes	Yes	No	current	
		Austrian Power	Network and	Balancing	aFRR								
43	APG Report on Balancing	Grid AG	infrastructural data	requirements	requirements	Yes	No	No	No	No	No		2018
			Network and	Balancing	mFRR								
44	APG Report on Balancing	Grid AG	infrastructural data	requirements	requirements	Yes	No	No	No	No	No		2018
			Network and	Balancing	Total FRR								
45	APG Report on Balancing	Grid AG	infrastructural data	requirements	requirements	Yes	No	No	No	No	No	2018	

	А	В	М	Ν	0	Р	Q	R
1	Database	Author	Data input	Temporal resolution	Spatial resolution	Remarks	Additional Description	Link
	Adequacy and Flexibility Study for Belgium 2022 - 2032	Elia Group	Min Stable power		by country	The industry wide reference WACC proposed for this study is	Units include: Combined Cycle; Combined Cycle - Gas Turbine; Combined Cycle - Steam Turbine; Classic Gas Turbine; Steam Turbine; Incineration Station; Nuclear; Turbojet; Cogeneration Unit; RES Generation Units; Interconnections (AC&DC); V2G; Electrolysers; Pumped Storage; Units include: Combined Cycle; Combined Cycle - Gas Turbine; Combined Cycle - Steam Turbine; Classic Gas Turbine; Steam Turbine; Incineration Station; Nuclear;	
	Adequacy and Flexibility Study for Belgium 2022 - 2032	Elia Group	Ramp Rate		by country		Turbojet; Cogeneration Unit; RES Generation Units; Interconnections (AC&DC); V2G; Electrolysers; Pumped Storage;	<u>Link</u>
42	Aggregated Gas Storage Inventory	GIE AGSI	Gas storage capacity	updated frequently	by country; unit based	hydrogen storage capacity can be derived from this		<u>Link</u>
43	APG Report on Balancing	Austrian Power Grid AG	aFRR requirements	report published every 2 years	by country	in Accordance with Article 60(1) of Commission Regulation (EU) 2017/2195 of November 2017 establishing a guideline on electricity balancing	automatic Frequency Restoration Reserve	Link
44	APG Report on Balancing	Austrian Power Grid AG	mFRR requirements	report published every 2 years	by country	in Accordance with Article 60(1) of Commission Regulation (EU) 2017/2195 of November 2017 establishing a guideline on electricity balancing	manual Frequency Restoration Reserve	Link
45	APG Report on Balancing	Austrian Power Grid AG	Total FRR requirements	report published every 2 years	by country	in Accordance with Article 60(1) of Commission Regulation (EU) 2017/2195 of November 2017 establishing a guideline on electricity balancing		Link

	А	В	С	D	E	F	G	Н	Ι	J	K	L
1	Database	Author	Catagoriu	RAA element	Data innut	лт	DE		ntrie			Years
	Database	Author	Category	RAA element	Data input	AT	DE	UE	FK	INL	LU	fears
		Réseau de Transport	Network and	Balancing	FCR							
46	Balancing Capacities Platform	d'Electricité	infrastructural data	requirements	requirements	No	No	No	Yes	No	No	historical - today
					1							
		Réseau de										
			Network and	Balancing	aFRR							
47	Balancing Capacities Platform	d'Electricité	infrastructural data	requirements	requirements	No	No	No	Yes	No	No	historical - today
		Réseau de										
		Transport	Network and	Balancing	mFRR							
48	Balancing Capacities Platform	d'Electricité	infrastructural data	requirements	requirements	No	No	No	Yes	No	No	historical - today
		Réseau de										
			Network and	Balancing								
49	Balancing Capacities Platform	d'Electricité	infrastructural data	requirements	<b>RR</b> requirements	No	No	No	Yes	No	No	historical - today
					Imbalance Price:							
EO	Balancing energy information Belgium	Elia Group	Network and infrastructural data	Balancing requirements	Current system imbalance	No	Vac	No	No	No	Na	2005 - 2021
50		Ella Group	inn astructur ar data	requirements	Imbalance Imbalance Price:		res	INU	INU	INU	INU	2003-2021
	Balancing energy information		Network and	Balancing	Imbalance prices							
51	Belgium	Elia Group	infrastructural data	requirements	(1 minute)	No	Yes	No	No	No	No	2005 - 2021
					Imbalance Price:							
<sub>-</sub> -	Balancing energy information		Network and	Balancing	Imbalance price	NL -	V	NL.	NI -	NL -	N1 -	2005 2021
52	Belgium	Elia Group	infrastructural data	requirements	(5 minutes)	No	Yes	No	No	No	No	2005 - 2021

	А	В	М	Ν	0	Р	Q	R
1				Temporal	Spatial			
2	Database	Author	Data input	resolution	resolution	Remarks	Additional Description	Link
						Frequently updated interactive		
						data register; in Accordance		
						with Article 60(1) of		
						Commission Regulation (EU)		
		Réseau de				2017/2195 of November 2017		
		Transport	FCR	30 minutes;		establishing a guideline on		
46	Balancing Capacities Platform	d'Electricité	requirements	daily; yearly	by country	electricity balancing	Frequency Containment Reserves	<u>Link</u>
						Frequently updated interactive		
						data register; in Accordance		
						with Article 60(1) of		
						Commission Regulation (EU)		
		Réseau de				2017/2195 of November 2017		
		Transport	aFRR	30 minutes;		establishing a guideline on	automatic Frequency Restoration	
47	Balancing Capacities Platform	d'Electricité	requirements	daily; yearly	by country	electricity balancing	Reserve	Link
						Frequently updated interactive		
						data register; in Accordance		
						with Article 60(1) of		
						Commission Regulation (EU)		
		Réseau de				2017/2195 of November 2017		
		Transport	mFRR	30 minutes;		establishing a guideline on	manual Frequency Restoration	
48	Balancing Capacities Platform	d'Electricité	requirements	daily; yearly	by country	electricity balancing	Reserve	Link
				,,,,,,,	, ,	Frequently updated interactive		
						data register; in Accordance		
						with Article 60(1) of		
						Commission Regulation (EU)		
		Réseau de				2017/2195 of November 2017		
		Transport		30 minutes;		establishing a guideline on		
49	Balancing Capacities Platform	d'Electricité	RR requirements	daily; yearly	by country	electricity balancing	Replacement Reserve	Link
	· _ ·		Imbalance Price:			ý č	•	
	Balancing energy information		Current system					
	Belgium	Elia Group	imbalance	minute	by country			Link
		•	Imbalance Price:					
	Balancing energy information		Imbalance prices					
	Belgium	Elia Group		minute	by country			Link
		•	Imbalance Price:		, ,			
	Balancing energy information		Imbalance price (5					
	Belgium	Elia Group	minutes)	minute	by country			Link

	А	В	С	D	E	F	G	Н	Ι	J	K	L	
1									ntries				
2	Database	Author	Category	RAA element	Data input	AT	BE	DE	FR	NL	LU	Years	
	Balancing energy information		Network and	Balancing									
	Belgium	Elia Group	infrastructural data	requirements	aFRR	No	Yes	No	No	No	No	2005 - 2021	
	Balancing energy information		Network and	Balancing									
54	Belgium	Elia Group	infrastructural data	requirements	mFRR	No	Yes	No	No	No	No	2005 - 2021	
	Balancing energy information		Network and	Balancing	Balancing energy								
55	Belgium	Elia Group	infrastructural data	requirements	activated	No	Yes	No	No	No	No	2005 - 2021	
					Prices per								
					product of the								
					activated								
	Balancing energy information		Network and	Balancing	balancing energy								
56	Belgium	Elia Group	infrastructural data	requirements	per minute	No	Yes	No	No	No	No	2005 - 2021	
				<b>.</b>	Balancing Energy:								
	Balancing energy information		Network and	Balancing	Available								
57	Belgium	Elia Group	infrastructural data	requirements	volumes	No	Yes	No	No	No	No	2005 - 2021	
				<b>.</b>	Balancing Energy:								
	Balancing energy information		Network and	Balancing	Activated								
58	Belgium	Elia Group	infrastructural data	requirements	volumes	No	Yes	No	No	No	No	2005 - 2021	
				<b>.</b>	Volume of								
	Balancing energy information		Network and	Balancing	balancing							0005 0004	
59	Belgium	Elia Group	infrastructural data	requirements	capacity required	No	Yes	No	No	No	No	2005 - 2021	
					Dec. Herefelter								
					Results of the								
				<b>.</b>	auctions held to								
	Balancing energy information		Network and	Balancing	provide balancing							0005 0004	
60	Belgium	Elia Group	infrastructural data	requirements	capacity	NO	Yes	NO	No	NO	NO	2005 - 2021	
			Nationalisation	Deleveire	Volume needs of								
	Balancing energy information		Network and	Balancing	FCR and aFRR	<u>ы.</u>	V.	ы.	N I .	ΝΙ.	м.	0001 0000	
61	Belgium	Elia Group	infrastructural data	requirements	Capacity	INO	Yes	INO	No	INO	INO	2021; 2022	
6	Carle and Database Development	The March Dr. 1	Electricity supply-side		Carlana	V	V	V	V	V	V	1000 0004	
62	Carbon Pricing Dashboard	The World Bank	data	CONE/CORP	Carbon price Hurdle rate for	res	res	res	Yes	res	Yes	1990 - 2021	
	Cost of Capital - Update for				the								
	Electricity Generation, Storage	<b>F</b>	Electricite de servici		commissioning of								
	and Demand Side Response	Europe	Electricity demand-	Industrial DSR;	new DSR	V.	V.	V.	V.	V.	V.		0040
63	Technologies	Economics	side data	CONE/CORP	capacities	Yes	Yes	Yes	Yes	Yes	Yes	1	2018

	А	В	М	Ν	0	Р	Q	R
1		•		Temporal	Spatial		•	
2	Database	Author	Data input	resolution	resolution	Remarks	Additional Description	Link
	Balancing energy information						automatic Frequency Restoration	
53	Belgium	Elia Group	aFRR	minute	by country		Reserve	Link
	Balancing energy information						manual Frequency Restoration	
54	Belgium	Elia Group	mFRR	minute	by country		Reserve	<u>Link</u>
	Balancing energy information		Balancing energy					
55	Belgium	Elia Group		minute	by country			<u>Link</u>
			Prices per					
			product of the					
			activated					
50	Balancing energy information		balancing energy		1			1.1.1
56	Belgium	Elia Group	per minute	minute	by country			Link
	Balancing energy information		Balancing Energy:					
57	Belgium	Elia Group	Available volumes	minute	by country			Link
57	Deigidin		Available volumes	minute	by country			
			Balancing Energy:					
	Balancing energy information		Activated					
58	Belgium	Elia Group		minute	by country			Link
	20.8.0				2,000.00,			
			Volume of					
	Balancing energy information		balancing					
59	Belgium	Elia Group	capacity required	minute	by country			Link
					· · ·			
			Results of the					
			auctions held to					
	Balancing energy information		provide balancing					
60	Belgium	Elia Group	. ,	minute	by country			Link
			Volume needs of					
	Balancing energy information		FCR and aFRR					
61	Belgium	Elia Group	Capacity	target years	by country			<u>Link</u>
				_			Overview of carbon price policy and	
62	Carbon Pricing Dashboard	The World Bank		yearly	by country	frequently updated	carbon price	<u>Link</u>
			Hurdle rate for					
	Cost of Capital - Update for		the					
	Electricity Generation, Storage	<b>F</b>	commissioning of					
	and Demand Side Response	Europe	new DSR	4	h			1.1.1
63	Technologies	Economics	capacities	target years	by country			<u>Link</u>

	А	В	С	D	E	F	G	Н	Ι	J	Κ	L
1		-		•	•		·		ntries			
2	Database	Author	Category	RAA element	Data input	AT	BE	DE	FR	NL	LU	Years
	Cost of Capital - Update for				Hurdle rate for the							
	Electricity Generation, Storage				commissioning of							
	and Demand Side Response	Europe	Electricity supply-side	Thermal generation:	new CCGT							
61	Technologies	Economics	data	CONE/CORP	capacities	Vac	۷۵۵	Vec	Vac	νος	Vec	2020; 2025
04		Leonomies	uata		Hurdle rate for	103	103	103	103	103	103	2020, 2023
	Cost of Capital - Update for				the							
	Electricity Generation, Storage				commissioning of							
	and Demand Side Response	Europe	Electricity supply-side	Thermal generation;	new OCGT							
65	Technologies	Economics	data	CONE/CORP	capacities	Yes	Yes	Yes	Yes	Yes	Yes	2020; 2025
					Hurdle rate for							
	Cost of Capital - Update for				the							
	Electricity Generation, Storage				commissioning of							
	and Demand Side Response	Europe	Electricity supply-side	-	new Biomass							
66	Technologies	Economics	data	CONE/CORP	capacities	Yes	Yes	Yes	Yes	Yes	Yes	2020; 2025
					the							
	Cost of Capital - Update for				commissioning of							
	Electricity Generation, Storage				new Wind							
	and Demand Side Response	Europe	Electricity supply-side	RES generation;	onshore							
67	Technologies	Economics	data	CONE/CORP	capacities	Yes	Yes	Yes	Yes	Yes	Yes	2020; 2025
					Hurdle rate for							
					the							
	Cost of Capital - Update for				commissioning of							
	Electricity Generation, Storage	-			new Wind							
	and Demand Side Response	Europe	Electricity supply-side	-	offshore	V	V	V	V	V	V	2020 2025
68	Technologies	Economics	data	CONE/CORP	capacities Hurdle rate for	Yes	Yes	Yes	Yes	Yes	Yes	2020; 2025
	Cost of Capital - Update for				the							
1	Electricity Generation, Storage				commissioning of							
1	and Demand Side Response	Europe	Electricity supply-side	RES generation:	new Solar PV							
69	Technologies	Economics	data	CONE/CORP		Yes	Yes	Yes	Yes	Yes	Yes	2020; 2025
<u> </u>					Hurdle rate for							,
	Cost of Capital - Update for				Hurdle rate for							
1	Electricity Generation, Storage				the commissioning of							
1	and Demand Side Response	Europe	Electricity supply-side	RES generation:	new Hydropower							
70	Technologies	Economics	data	CONE/CORP	, ,	Vec	Vor	Var	Vac	Vor	Vac	2020; 2025
10	reennoiogies	LCOHOHIICS	uata	CONL/CORF	capacities	165	162	162	162	162	162	2020, 2023

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1 2	Database	Author	Data input	Temporal resolution	Spatial resolution	Remarks	Additional Description	Link
64	Cost of Capital - Update for Electricity Generation, Storage and Demand Side Response Technologies	Europe Economics	Hurdle rate for the commissioning of new CCGT capacities	target years	by country			Link
	Cost of Capital - Update for Electricity Generation, Storage and Demand Side Response Technologies	Europe Economics	Hurdle rate for the commissioning of new OCGT	target years	by country			Link
05	Cost of Capital - Update for Electricity Generation, Storage and Demand Side Response	Europe	Hurdle rate for the commissioning of new Biomass	target years	by country			
66	Technologies	Economics	capacities	target years	by country			Link
67	Cost of Capital - Update for Electricity Generation, Storage and Demand Side Response Technologies	Europe Economics	the commissioning of new Wind onshore capacities	target years	by country			<u>Link</u>
68	Cost of Capital - Update for Electricity Generation, Storage and Demand Side Response Technologies	Europe Economics		target years	by country			Link
69	Cost of Capital - Update for Electricity Generation, Storage and Demand Side Response Technologies	Europe Economics	Hurdle rate for the commissioning of new Solar PV capacities	target years	by country			<u>Link</u>
70	Cost of Capital - Update for Electricity Generation, Storage and Demand Side Response Technologies	Europe Economics	Hurdle rate for the commissioning of new Hydropower capacities	target years	by country			Link

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1									ntries			
2	Database	Author	Category	RAA element	Data input Hurdle rate for	AI	BF	DE	FR	NL	LU	Years
	Cost of Capital - Update for				the							
	Electricity Generation, Storage	_			commissioning of							
71	and Demand Side Response Technologies	Europe Economics	Electricity supply-side data	RES generation; CONE/CORP	new other RES capacities	Vaa	Vaa	Vaa	Vaa	Vaa	Vaa	2020; 2025
71		Economics	data	CONE/CORP	capacities	res	res	res	res	res	res	2020; 2025
	Cost of Capital - Update for											
	Electricity Generation, Storage	_			Levelised Cost							
70	and Demand Side Response	Europe	Electricity supply-side		estimates for	V	V	V	V	V	V	2047 2040 2020 2025 2020
72	Technologies	Economics	data	CONE/CORP	CCGT	Yes	Yes	Yes	Yes	Yes	Yes	2016; 2018; 2020; 2025; 2030
	Cost of Capital - Update for											
	Electricity Generation, Storage				Levelised Cost							
	and Demand Side Response	Europe	Electricity supply-side	÷	estimates for							
73	Technologies	Economics	data	CONE/CORP	OCGT	Yes	Yes	Yes	Yes	Yes	Yes	2016; 2018; 2020; 2025; 2030
	Cost of Capital - Update for											
	Electricity Generation, Storage				Levelised Cost							
	and Demand Side Response	Europe	Electricity supply-side	-	estimates for							
74	Technologies	Economics	data	CONE/CORP	Biomass	Yes	Yes	Yes	Yes	Yes	Yes	2016; 2018; 2020; 2025; 2030
	Cost of Capital - Update for											
	Electricity Generation, Storage				Levelised Cost							
	and Demand Side Response	Europe	Electricity supply-side	RES generation;	estimates for							
75	Technologies	Economics	data	CONE/CORP	offshore Wind	Yes	Yes	Yes	Yes	Yes	Yes	2016; 2018; 2020; 2025; 2030
	Cost of Capital - Update for											
	Electricity Generation, Storage				Levelised Cost							
	and Demand Side Response	Europe	Electricity supply-side	RES generation;	estimates for							
76	Technologies	Economics	data	CONE/CORP	onshore Wind	Yes	Yes	Yes	Yes	Yes	Yes	2016; 2018; 2020; 2025; 2030
	Cost of Capital - Update for Electricity Generation, Storage				Levelised Cost							
	and Demand Side Response	Europe	Electricity supply-side	RES generation:	estimates for							
77	Technologies	Economics	data	CONE/CORP		Yes	Yes	Yes	Yes	Yes	Yes	2016; 2018; 2020; 2025; 2030

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1				Temporal	Spatial			
2	Database	Author	Data input Hurdle rate for	resolution	resolution	Remarks	Additional Description	Link
	Cost of Capital - Update for		the					
	Electricity Generation, Storage		commissioning of					
	and Demand Side Response	Europe	new other RES					
71	Technologies	Economics	capacities	target years	by country			<u>Link</u>
	Cost of Capital - Update for							
	Electricity Generation, Storage		Levelised Cost					
	and Demand Side Response	Europe	estimates for					
72	Technologies	Economics		target years	by country			Link
	Cost of Capital - Update for		Levelised Cost					
	Electricity Generation, Storage and Demand Side Response	Europe	estimates for					
73	Technologies	Economics		target years	by country			Link
15		Leonomies			by country			
	Cost of Capital - Update for							
	Electricity Generation, Storage		Levelised Cost					
	and Demand Side Response	Europe	estimates for					
74	Technologies	Economics	Biomass	target years	by country			Link
	Cost of Capital - Update for							
	Electricity Generation, Storage		Levelised Cost					
	and Demand Side Response	Europe	estimates for					
75	Technologies	Economics	offshore Wind	target years	by country			<u>Link</u>
	Cost of Capital - Update for							
	Electricity Generation, Storage		Levelised Cost					
	and Demand Side Response	Europe	estimates for					
76	Technologies	Economics		target years	by country			<u>Link</u>
	Cost of Capital - Update for							
1	Electricity Generation, Storage	<b>F</b>	Levelised Cost					
77	and Demand Side Response	Europe	estimates for	townot voor-	by country (			Link
77	Technologies	Economics	large scale PV	target years	by country			<u>Link</u>

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1			<i>c</i> .				DE		ntries			
2	Database	Author	Category	RAA element	Data input	AI	BF	DE	FR	NL	LU	Years
78	Cost of Capital - Update for Electricity Generation, Storage and Demand Side Response Technologies	Europe Economics	Electricity supply-side data	Thermal generation; CONE/CORP	Levelised Cost estimates for Nuclear Power	Yes	Yes	Yes	Yes	Yes	Yes	2025; 2030
79	Cost of Capital - Update for Electricity Generation, Storage and Demand Side Response Technologies	Europe Economics	Electricity supply-side data	Thermal generation; CONE/CORP	Levelised Cost estimates for Coal	Yes	Yes	Yes	Yes	Yes	Yes	2025; 2030
80	Cost of Capital - Update for Electricity Generation, Storage and Demand Side Response Technologies	Europe Economics	Electricity supply-side data	Thermal generation; CONE/CORP	Levelised Cost estimates for Coal with CCS	Yes	Yes	Yes	Yes	Yes	Yes	2025; 2030
81	Cost of Capital - Update for Electricity Generation, Storage and Demand Side Response Technologies	Europe Economics	Electricity supply-side data	Thermal generation; CONE/CORP	CAPEX for CCGT	Yes	Yes	Yes	Yes	Yes	Yes	2018; 2020; 2025
	Cost of Capital - Update for Electricity Generation, Storage and Demand Side Response Technologies	Europe Economics	Electricity supply-side data	Thermal generation; CONE/CORP	CAPEX for OCGT	Yes	Yes	Yes	Yes	Yes	Yes	2018; 2020; 2025
	Cost of Capital - Update for Electricity Generation, Storage and Demand Side Response Technologies	Europe Economics	Electricity supply-side data	Thermal generation; CONE/CORP	CAPEX for Biomass	Yes	Yes	Yes	Yes	Yes	Yes	2018; 2020; 2025
	Cost of Capital - Update for Electricity Generation, Storage and Demand Side Response Technologies	Europe Economics	Electricity supply-side data	RES generation; CONE/CORP	CAPEX for offshore Wind	Yes	Yes	Yes	Yes	Yes	Yes	2018; 2020; 2025

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1	Database	Author	Data input	Temporal resolution	Spatial resolution	Remarks	Additional Description	Link
	Cost of Capital - Update for Electricity Generation, Storage and Demand Side Response Technologies	Europe Economics	Levelised Cost estimates for	target years	by country			Link
79	Cost of Capital - Update for Electricity Generation, Storage and Demand Side Response Technologies	Europe Economics	Levelised Cost estimates for Coal	target years	by country			Link
80	Cost of Capital - Update for Electricity Generation, Storage and Demand Side Response Technologies	Europe Economics	Levelised Cost estimates for Coal with CCS	target years	by country			Link
81	Cost of Capital - Update for Electricity Generation, Storage and Demand Side Response Technologies	Europe Economics	CAPEX for CCGT	target years	by country			Link
82	Cost of Capital - Update for Electricity Generation, Storage and Demand Side Response Technologies	Europe Economics	CAPEX for OCGT	target years	by country			Link
83	Cost of Capital - Update for Electricity Generation, Storage and Demand Side Response Technologies	Europe Economics	CAPEX for Biomass	target years	by country			Link
84	Cost of Capital - Update for Electricity Generation, Storage and Demand Side Response Technologies	Europe Economics	CAPEX for offshore Wind	target years	by country			Link

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1									tries			
2	Database	Author	Category	RAA element	Data input	AT	BE	DE	FR	NL	LU	Years
85	Cost of Capital - Update for Electricity Generation, Storage and Demand Side Response Technologies	Europe Economics	Electricity supply-side data	RES generation; CONE/CORP	CAPEX for onshore Wind	Yes	Yes	Yes	Yes	Yes	Yes	2018; 2020; 2025
86	Cost of Capital - Update for Electricity Generation, Storage and Demand Side Response Technologies	Europe Economics	Electricity supply-side data	RES generation; CONE/CORP	CAPEX for large scale PV	Yes	Yes	Yes	Yes	Yes	Yes	2018; 2020; 2025
87	Cost of Capital - Update for Electricity Generation, Storage and Demand Side Response Technologies	Europe Economics	Electricity supply-side data	Thermal generation; CONE/CORP	CAPEX for Nuclear Power	Yes	Yes	Yes	Yes	Yes	Yes	2018; 2020; 2025
	Cost of Capital - Update for Electricity Generation, Storage and Demand Side Response Technologies	Europe Economics	Electricity supply-side data	Thermal generation; CONE/CORP	CAPEX for Coal	Yes	Yes	Yes	Yes	Yes	Yes	2018; 2020; 2025
	Cost of Capital - Update for Electricity Generation, Storage and Demand Side Response Technologies	Europe Economics	Electricity supply-side data	Thermal generation; CONE/CORP	CAPEX for Coal with CCS	Yes	Yes	Yes	Yes	Yes	Yes	2018; 2020; 2025
	Cost of Capital - Update for Electricity Generation, Storage and Demand Side Response Technologies	Europe Economics	Electricity supply-side data	Thermal generation; CONE/CORP	O&M costs for CCGT	Yes	Yes	Yes	Yes	Yes	Yes	2018; 2020; 2025
91	Cost of Capital - Update for Electricity Generation, Storage and Demand Side Response Technologies	Europe Economics	Electricity supply-side data	Thermal generation; CONE/CORP	O&M costs for OCGT	Yes	Yes	Yes	Yes	Yes	Yes	2018; 2020; 2025

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1		A		Temporal	Spatial			
2	Database	Author	Data input	resolution	resolution	Remarks	Additional Description	Link
	Cost of Capital - Update for							
	Electricity Generation, Storage							
	and Demand Side Response	Europe	CAPEX for					
85	Technologies	Economics	onshore Wind	target years	by country			Link
	Cost of Capital - Update for							
	Electricity Generation, Storage							
	and Demand Side Response	Europe	CAPEX for large					
86	Technologies	Economics	scale PV	target years	by country			<u>Link</u>
	Cost of Capital - Update for							
	Electricity Generation, Storage							
	and Demand Side Response	Europe	CAPEX for					
87	Technologies	Economics	Nuclear Power	target years	by country			Link
	Cost of Capital - Update for							
	Electricity Generation, Storage							
	and Demand Side Response	Europe						
88	Technologies	Economics	CAPEX for Coal	target years	by country			Link
	Cost of Capital - Update for							
	Electricity Generation, Storage							
	and Demand Side Response	Europe	CAPEX for Coal					
89	Technologies	Economics	with CCS	target years	by country			<u>Link</u>
	Cost of Capital - Update for							
1	Electricity Generation, Storage							
1	and Demand Side Response	Europe	O&M costs for					
90	Technologies	Economics	CCGT	target years	by country			<u>Link</u>
1	Cost of Capital - Update for Electricity Generation, Storage							
	and Demand Side Response	Europe	O&M costs for					
91	Technologies	Economics	OCGT	target years	by country			Link
<u> </u>								<u></u>

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1	Database	Author	Category	RAA element	Data input	АТ		ount DE		NL	LU	Years
92	Cost of Capital - Update for Electricity Generation, Storage and Demand Side Response Technologies	Europe Economics	Electricity supply-side data	Thermal generation; CONE/CORP	O&M costs for Biomass	Yes `	Yes Y	′es Y	(es \	Yes	Yes	2018; 2020; 2025
93	Cost of Capital - Update for Electricity Generation, Storage and Demand Side Response Technologies	Europe Economics	Electricity supply-side data	RES generation; CONE/CORP	O&M costs for offshore Wind	Yes `	Yes Y	′es Y	(es \	Yes	Yes	2018; 2020; 2025
94	Cost of Capital - Update for Electricity Generation, Storage and Demand Side Response Technologies	Europe Economics	Electricity supply-side data	RES generation; CONE/CORP	O&M costs for onshore Wind	Yes `	Yes Y	′es Y	(es \	Yes	Yes	2018; 2020; 2025
95	Cost of Capital - Update for Electricity Generation, Storage and Demand Side Response Technologies	Europe Economics	Electricity supply-side data	RES generation; CONE/CORP	O&M costs for large scale PV	Yes `	Yes Y	′es Y	(es \	Yes	Yes	2018; 2020; 2025
96	Cost of Capital - Update for Electricity Generation, Storage and Demand Side Response Technologies	Europe Economics	Electricity supply-side data	Thermal generation; CONE/CORP	O&M costs for Nuclear Power	Yes `	Yes Y	′es Y	/es `	Yes	Yes	2018; 2020; 2025
97	Cost of Capital - Update for Electricity Generation, Storage and Demand Side Response Technologies	Europe Economics	Electricity supply-side data	Thermal generation; CONE/CORP	O&M costs for Coal	Yes `	Yes Y	′es Y	(es \	Yes	Yes	2018; 2020; 2025
98	Cost of Capital - Update for Electricity Generation, Storage and Demand Side Response Technologies	Europe Economics	Electricity supply-side data	Thermal generation; CONE/CORP	O&M costs for Coal with CCS	Yes `	Yes Y	′es Y	(es `	Yes	Yes	2018; 2020; 2025

	A	В	М	N	0	Р	Q	R
1 2	Database	Author	Data input	Temporal resolution	Spatial resolution	Remarks	Additional Description	Link
92	Cost of Capital - Update for Electricity Generation, Storage and Demand Side Response Technologies	Europe Economics	O&M costs for Biomass	target years	by country			Link
93	Cost of Capital - Update for Electricity Generation, Storage and Demand Side Response Technologies	Europe Economics	O&M costs for offshore Wind	target years	by country			<u>Link</u>
94	Cost of Capital - Update for Electricity Generation, Storage and Demand Side Response Technologies	Europe Economics	O&M costs for onshore Wind	target years	by country			Link
95	Cost of Capital - Update for Electricity Generation, Storage and Demand Side Response Technologies	Europe Economics	O&M costs for large scale PV	target years	by country			Link
96	Cost of Capital - Update for Electricity Generation, Storage and Demand Side Response Technologies	Europe Economics	O&M costs for Nuclear Power	target years	by country			<u>Link</u>
97	Cost of Capital - Update for Electricity Generation, Storage and Demand Side Response Technologies	Europe Economics	O&M costs for Coal	target years	by country			Link
98	Cost of Capital - Update for Electricity Generation, Storage and Demand Side Response Technologies	Europe Economics	O&M costs for Coal with CCS	target years	by country			Link

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1	Database	Author	Category	RAA element	Data input	Cou AT BE DE	untries E FR N	NL LU	Years
			Electricity supply-side		CAPEX of RE-				
99	Data & Statistics IRENA	IRENA	data	RES generation	technologies	Yes Yes Yes	s Yes Y	'es Yes	2010 - 2020
			Electricity supply-side		OPEX of RE-				
100	Data & Statistics IRENA	IRENA	data	<b>RES</b> generation	technologies	Yes Yes Yes	s Yes Y	es Yes	2010 - 2020
101			Electricity supply-side		WACC for RE-	Vaa Vaa Va	- V V		2010, 2020
101	Data & Statistics IRENA	IRENA	data	RES generation	technologies	res res res	s res r	es res	2010 - 2020
			Electricity demand-	Electricity demand for space heating and	Time series of air				
102	Data dictionary	ecad.eu	side data	cooling	temperature	Yes Yes Yes	s Yes Y	'es Yes	1890 - today
				Electricity demand for					
			Electricity demand-	space heating and	Time series of				
103	Data dictionary	ecad.eu	side data	cooling	humidity	Yes Yes Yes	s Yes Y	es Yes	1890 - today
					Times and				
104	Data dictionary	ecad.eu	Electricity supply-side data	<b>RES</b> generation	Times series of cloud cover	Yes Yes Yes	s Yes Y	es Yes	1890 - today
			Electricity supply-side		Times series of				
105	Data dictionary	ecad.eu	data	RES generation	global radiation	Yes Yes Yes	s Yes Y	'es Yes	1890 - today
			<b></b>						
106	Data dictionary	ecad.eu	Electricity supply-side data	<b>RES</b> generation	Times series of precipitation	Yes Yes Yes	s Yes Y	es Yes	1890 - today
					F. Colpitation				
			Electricity supply-side		Times series sea				
107	Data dictionary	ecad.eu	data	<b>RES</b> generation	level pressure	Yes Yes Yes	s Yes Y	'es Yes	1890 - today

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1				Temporal	Spatial			
2	Database	Author	Data input	resolution	resolution	Remarks	Additional Description	Link
						Available for solar PV, wind on-		
			-	yearly		/offshore, biomass, hydropower,		
			CAPEX of RE-	published	by country: by	geothermal, renewable heat		
99	Data & Statistics IRENA	IRENA	technologies	article	country	costs, concentrated solar power		Link
						Available for solar PV, wind on-		
				yearly		/offshore, biomass, hydropower,		
			OPEX of RE-	published	by country; by	geothermal, renewable heat		
100	Data & Statistics IRENA	IRENA	technologies	article	country	costs, concentrated solar power		<u>Link</u>
						Associated a few a class DV (seeind as		
						Available for solar PV, wind on-		
			WACC for RE-	yearly published	by country by	/offshore, biomass, hydropower, geothermal, renewable heat		
101	Data & Statistics IRENA	IRENA	technologies	article	country	costs, concentrated solar power		Link
101		INLINA	technologies		country	costs, concentrated solar power		
					based on local			
			Time series of air		meteorologic	data availability depends on		
102	Data dictionary	ecad.eu	temperature	daily	al stations	respective weather station		<u>Link</u>
					h			
			Time series of		based on local meteorologic	data availability depends on		
102	Data dictionary	ecad.eu	humidity	daily	al stations	respective weather station		Link
105		ecau.eu	numuity	ually	arstations			
					based on local			
			Times series of		meteorologic	data availability depends on		
104	Data dictionary	ecad.eu	cloud cover	daily	al stations	respective weather station		<u>Link</u>
					1			
			Times series of		based on local	data availability depends on		
105	Data dictionary	ecad.eu	global radiation	daily	meteorologic al stations	respective weather station		Link
105		ecau.eu	giobalitadiation	ually	arstations			
					based on local			
			Times series of		meteorologic	data availability depends on		
106	Data dictionary	ecad.eu	precipitation	daily	al stations	respective weather station		<u>Link</u>
			Timos corias co-		based on local	data availability damanda an		
107	Data dictionary	ecad.eu	Times series sea level pressure	daily	meteorologic al stations	data availability depends on respective weather station		Link
107	Data ultional y	ecdu.eu	level pressure	ually	aistatiulis	respective weather station		<u>Link</u>

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1						• -			ntries			
2	Database	Author	Category	RAA element	Data input	AI	BE	DE	FK	NL	LU	Years
				Electricity demand for								
			Electricity demand-	space heating and	Times series of							
108	Data dictionary	ecad.eu	side data	cooling	snow depth	Yes	Yes	Yes	Yes	Yes	Yes	1890 - today
			Electricity supply-side		Times series of							
109	Data dictionary	ecad.eu	data	<b>RES</b> generation	sunshine hours	Yes	Yes	Yes	Yes	Yes	Yes	1890 - today
			Electricity supply-side		Times series wind							
110	Data dictionary	ecad.eu	data	<b>RES</b> generation	direction	Yes	Yes	Yes	Yes	Yes	Yes	1890 - today
			Electricity supply-side		Times series of							
111	Data dictionary	ecad.eu	data	<b>RES</b> generation		Yes	Yes	Yes	Yes	Yes	Yes	1890 - today
<u> </u>												
					Τ							
112	Data distignant	ecad.eu	Electricity supply-side		Times series of	Vaa	Vaa	Vaa	Vaa	Vaa	Vaa	1800 today
112	Data dictionary	ecad.eu	data	RES generation	wind speed	res	res	res	res	res	res	1890 - today
		Dimenterrate			Mechanical							
	Database of the European energy	Directorate- General for			storage technology:							
	storage technologies and	Energy - EU	Electricity supply-side		storage duration							
	facilities	Commission	data	Battery storage units	-	Yes	Yes	Yes	Yes	Yes	Yes	constant variable
				, etc. 4.60 annto								

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1				Temporal	Spatial			
2	Database	Author	Data input	resolution	resolution	Remarks	Additional Description	Link
					based on local			
			Times series of			data availability depends on		
108	Data dictionary	ecad.eu		daily	al stations	respective weather station		Link
100		ceduced		duny	urstations			
					based on local			
			Times series of		meteorologic	data availability depends on		
109	Data dictionary	ecad.eu	sunshine hours	daily	alstations	respective weather station		Link
					based on local			
			Times series wind			data availability depends on		
110	Data dictionary	ecad.eu		daily	al stations	respective weather station		Link
110		ecau.eu		uany	aistations			
					based on local			
			Times series of		meteorologic	data availability depends on		
111	Data dictionary	ecad.eu	wind gust	daily	al stations	respective weather station		<u>Link</u>
			Times series of		based on local	data availability depends on		
112	Data dictionary	ecad.eu		daily	meteorologic al stations	respective weather station		Link
112	Data dictionary	ecau.eu	wind speed	ually	arstations			LIIK
						Available for Pumped Hydro		
						Storage (PHS), Pumped Heat		
						Electrical Storage (PHES),		
			Mechanical			Adiabatic Compressed Air		
		Directorate-	storage			Energy Storage (ACAES),		
	Database of the European energy	General for	technology:			Compressed Air Energy Storage		
	storage technologies and	Energy - EU	storage duration			(CAES), Liquid Air Energy		
113	facilities	Commission	at full power		by country	Storage (LAES) and Flywheel		<u>Link</u>

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1	Database	Author	Catagory	RAA element	Data innut	АТ		Coun				Years
	Database	Author	Category	RAA element	Data input	AI	DE	DE	FK	INL	LU	rears
		Directorate-			Electro chemical storage							
	Database of the European energy	General for			technology:							
	storage technologies and	Energy - EU	Electricity supply-side		storage duration							
114	facilities	Commission	data	Battery storage units	at full power	Yes	Yes	Yes	Yes	Yes	Yes	constant variable
		Directorate-			Electrical storage							
		General for			technology:							
	storage technologies and	Energy - EU	Electricity supply-side		storage duration	V	V	V	V	V	V	
115	facilities	Commission	data	Battery storage units	at full power	Yes	Yes	Yes	Yes	Yes	Yes	constant variable
		Distant			Charles							
	Database of the European energy	Directorate- General for			Chemical storage technology:							
	storage technologies and	Energy - EU	Electricity supply-side		storage duration							
	facilities	Commission	data	Battery storage units	at full power	Yes	Yes	Yes	Yes	Yes	Yes	constant variable
		<b>D</b>			<b>-</b>							
	Database of the European energy	Directorate- General for			Thermal storage technology:							
	storage technologies and	Energy - EU	Electricity supply-side		storage duration							
	facilities	Commission	data	Battery storage units	at full power	Yes	Yes	Yes	Yes	Yes	Yes	constant variable
		Directorate-			Mechanical							
		General for			storage							
	storage technologies and	Energy - EU	Electricity supply-side		technology:		.,	.,	.,	.,	.,	
118	facilities	Commission	data	Battery storage units	CAPEX	Yes	Yes	Yes	Yes	Yes	Yes	2016; 2030

	А	В	М	N	0	Р	Q	R
1				Temporal	Spatial			
2	Database	Author	Data input	resolution	resolution	Remarks	Additional Description	Link
						batteries, Lead Acid batteries,		
						Sodium Nickel Chloride		
						batteries, Lithium-ion batteries,		
						Lithium-S batteries R&D,		
						Lithium-Metal-Polymer		
						batteries, Metal Air batteries		
			Electro chemical			R&D, Ni-Cd batteries, Ni-MH		
		Directorate-	storage			batteries, Na-ion batteries R&D,		
	Database of the European energy	General for	technology:			Redow flow batteries Zn Fe,		
	storage technologies and	Energy - EU	storage duration			Redox flow batteries Vanadium		
114	facilities	Commission	at full power		by country	and Redox flow batteries Zn Br		<u>Link</u>
		Directorate-	Electrical storage					
	Database of the European energy	General for	technology:			Available for Superconducting		
	storage technologies and	Energy - EU	storage duration			Magnetic Energy Storage		
115	facilities	Commission	at full power		by country	(SMES) and Supercapacitor		Link
		Commostori			by country			
		Directorate-	Chemical storage			Available for Power to Gas (H2),		
	Database of the European energy	General for	technology:			Power to Ammonia – Gasoline,		
	storage technologies and	Energy - EU	storage duration			Power to Methane and Power to		
116	facilities	Commission	at full power		by country	Methanol + Gasoline		<u>Link</u>
			<b>-</b>			Available for Molten salts,		
		Directorate-	Thermal storage			Sensible Thermal Energy		
	Database of the European energy		technology:			Storage (STES), Phase Change		
447	storage technologies and	Energy - EU	storage duration			Material (PCM) and		
117	facilities	Commission	at full power		by country	Thermochemical Storage (TCS)		Link
						Available for Pumped Hydro		
						Storage (PHS), Pumped Heat		
						Electrical Storage (PHES),		
		Directorate	Machanical			Adiabatic Compressed Air		
	Database of the Funances	Directorate-	Mechanical			Energy Storage (ACAES),		
	Database of the European energy	General for	storage			Compressed Air Energy Storage		
110	storage technologies and	Energy - EU Commission	technology:	targetycare	bycountry	(CAES), Liquid Air Energy		Link
0110	facilities	Commission	CAPEX	target years	by country	Storage (LAES) and Flywheel		<u>Link</u>

	А	В	С	D	E	F	G	Н	I	J	К	L
1	Database	Author	Category	RAA element	Data input	АТ		Coun DE			LU	Years
		Directorate-			Electro chemical							
					storage							
	storage technologies and		Electricity supply-side data		technology: CAPEX	Vac	Vaa	Vaa	Vaa	Vaa	Vaa	2016; 2030
119	facilities	Directorate-	uata	Battery storage units	CAPEX	res	res	res	res	res	res	2010; 2030
	Database of the European energy				Electrical storage							
	storage technologies and facilities		Electricity supply-side data	Battery storage units	technology: CAPEX	Vec	۷۵۵	νος	Vac	νος	νος	2016; 2030
120		Commission		Dattery storage units	CALLA	103	103	103	103	103	103	2010, 2030
		Directorate-			Charles							
	Database of the European energy storage technologies and		Electricity supply-side		Chemical storage technology:							
	facilities	Commission	data	Battery storage units	CAPEX	Yes	Yes	Yes	Yes	Yes	Yes	2016; 2030
		Directorate-										
	Database of the European energy	General for			Thermal storage							
	storage technologies and		Electricity supply-side		technology:			V	V	V	V	0047 0000
122	facilities	Commission	data	Battery storage units	CAPEX	Yes	Yes	Yes	Yes	Yes	Yes	2016; 2030
					Mechanical							
	Database of the European energy	Directorate-			storage							
	storage technologies and		Electricity supply-side		technology: Round-trip							
123	facilities	Commission	data	Battery storage units		Yes	Yes	Yes	Yes	Yes	Yes	constant variable

	А	В	М	Ν	0	Р	Q	R
1 2	Database	Author	Data input	Temporal resolution	Spatial resolution	Remarks	Additional Description	Link
	Database of the European energy	Directorate- General for	Electro chemical storage			Available for Sodium Sulphur batteries, Lead Acid batteries, Sodium Nickel Chloride batteries, Lithium-ion batteries, Lithium-S batteries R&D, Lithium-Metal-Polymer batteries, Metal Air batteries R&D, Ni-Cd batteries, Ni-MH batteries, Na-ion batteries R&D, Redow flow batteries Zn Fe,		
119	storage technologies and facilities	Energy - EU Commission	technology: CAPEX	target years	by country	Redox flow batteries Vanadium and Redox flow batteries Zn Br		Link
		Directorate- General for Energy - EU Commission	Electrical storage technology: CAPEX	target years	by country	Available for Superconducting Magnetic Energy Storage (SMES) and Supercapacitor		Link
121	Database of the European energy storage technologies and facilities	Directorate- General for Energy - EU Commission	Chemical storage technology: CAPEX	target years	by country	Available for Power to Gas (H2), Power to Ammonia – Gasoline, Power to Methane and Power to Methanol + Gasoline		Link
	Database of the European energy storage technologies and facilities	Directorate- General for Energy - EU Commission	Thermal storage technology: CAPEX	target years	by country	Available for Molten salts, Sensible Thermal Energy Storage (STES), Phase Change Material (PCM) and Thermochemical Storage (TCS)		Link
	Database of the European energy storage technologies and facilities	Directorate- General for Energy - EU Commission	Mechanical storage technology: Round-trip efficiency		by country	Available for Pumped Hydro Storage (PHS), Pumped Heat Electrical Storage (PHES), Adiabatic Compressed Air Energy Storage (ACAES), Compressed Air Energy Storage (CAES), Liquid Air Energy Storage (LAES) and Flywheel		Link

	А	В	C	D	E	F	G	Н	Ι	J	К	L
1	Database	Author	Category	RAA element	Data input	АТ		Cour DE			LU	Years
					Electro chemical							
		Directorate-			storage							
	Database of the European energy storage technologies and	General for Energy - EU	Electricity supply-side		technology: Round-trip							
	facilities	Commission	data	Battery storage units	efficiency	Yes	Yes	Yes	Yes	Yes	Yes	constant variable
		Directorate-			Electrical storage							
	Database of the European energy				technology:							
	storage technologies and	Energy - EU	Electricity supply-side		Round-trip							
125	facilities	Commission	data	Battery storage units	efficiency	Yes	Yes	Yes	Yes	Yes	Yes	constant variable
		Directorate-			Chemical storage							
	1 8,	General for			technology:							
	storage technologies and facilities	Energy - EU Commission	Electricity supply-side data	Battery storage units	Round-trip efficiency	Ves	Ves	Vec	νος	Vec	Vec	constant variable
120		Commission	uata	Dattery storage units	emelency	103	103	103	103	103	103	
		Directorate-			Thermal storage							
	Database of the European energy storage technologies and	General for Energy - EU	Electricity supply-side		technology: Round-trip							
	facilities	Commission	data	Battery storage units	efficiency	Yes	Yes	Yes	Yes	Yes	Yes	constant variable
		Directorate-			Chemical storage							
	Database of the European energy				technology:							
	storage technologies and	Energy - EU	Electricity supply-side		Conversion							
128	facilities	Commission	data	Battery storage units	efficiency	Yes	Yes	Yes	Yes	Yes	Yes	constant variable
		Directorate-			Mechanical							
	Database of the European energy				storage							
	storage technologies and	Energy - EU	Electricity supply-side		technology:	Vec	Vec	Vac	Vec	Vac	Vac	constant variable
129	facilities	Commission	data	Battery storage units	Response time	res	res	res	res	res	res	constant variable

	А	В	М	N	0	Р	Q	R
1				Temporal	Spatial			
2	Database	Author	Data input	resolution	resolution	Remarks	Additional Description	Link
						Available for Sodium Sulphur		
						batteries, Lead Acid batteries,		
						Sodium Nickel Chloride		
			Electro chemical			batteries, Lithium-ion batteries,		
		Directorate-	storage			Ni-Cd batteries, Ni-MH		
	1 87	General for	technology:			batteries, Redox flow batteries		
	storage technologies and	Energy - EU	Round-trip			Vanadium and Redox flow		
124	facilities	Commission	efficiency		by country	batteries Zn Br		Link
		Directorate-	Electrical storage					
	Database of the European energy	General for	technology:			Available for Superconducting		
	storage technologies and	Energy - EU	Round-trip			Magnetic Energy Storage		
	facilities	Commission	efficiency		by country	(SMES) and Supercapacitor		Link
					· · ·			
		Directorate-	Chemical storage					
	Database of the European energy	General for	technology:					
	storage technologies and	Energy - EU	Round-trip					
126	facilities	Commission	efficiency		by country	Available for Power to Gas (H2)		<u>Link</u>
						Available for Molten salts,		
		Directorate-	Thermal storage			Sensible Thermal Energy		
	1 87		technology:			Storage (STES), Phase Change		
	storage technologies and	Energy - EU	Round-trip			Material (PCM) and		
127	facilities	Commission	efficiency		by country	Thermochemical Storage (TCS)		Link
		Directorate-	Chemical storage			Available for Power to Gas (H2),		
	Database of the European energy	General for	technology:			Power to Ammonia - Gasoline,		
	storage technologies and	Energy - EU	Conversion			Power to Methane and Power to		
	facilities	Commission	efficiency		by country	Methanol + Gasoline		<u>Link</u>
						Available for Dummed Lludge		
						Available for Pumped Hydro		
						Storage (PHS), Pumped Heat		
						Electrical Storage (PHES),		
		Diverterate	Maahanissi			Adiabatic Compressed Air		
		Directorate-	Mechanical			Energy Storage (ACAES),		
		General for	storage			Compressed Air Energy Storage		
	storage technologies and	Energy - EU	technology:		L	(CAES), Liquid Air Energy		
129	facilities	Commission	Response time		by country	Storage (LAES) and Flywheel		<u>Link</u>

	А	В	С	D	E	F	G	Н	I	J	К	L
1		·		·	-				ntrie			
2	Database	Author	Category	RAA element	Data input	AT	BE	DE	FR	NL	LU	Years
		Directorate-			Electro chemical							
	Database of the European energy	General for			storage							
	storage technologies and		Electricity supply-side		technology:							
	facilities		data	Battery storage units		Yes	Yes	Yes	Yes	Yes	Yes	constant variable
	Database of the European energy storage technologies and facilities	Energy - EU Commission	Electricity supply-side data		Electrical storage technology:	Yes	Yes	Yes	Yes	Yes	Yes	constant variable
	Database of the European energy storage technologies and	Energy - EU	Electricity supply-side		Chemical storage technology:							
	facilities Database of the European energy storage technologies and	Directorate- General for	data Electricity supply-side	Battery storage units	Response time Mechanical storage technology: storage capacity	Yes	Yes	Yes	Yes	Yes	Yes	constant variable
133	facilities	Commission	data	Battery storage units	(project list)	Yes	Yes	Yes	Yes	Yes	Yes	

	А	В	М	Ν	0	Р	Q	R
1				Temporal	Spatial			
2	Database	Author	Data input	resolution	resolution	Remarks	Additional Description	Link
						Available for Sodium Sulphur		
						batteries, Lead Acid batteries,		
						Sodium Nickel Chloride		
						batteries, Lithium-ion batteries,		
						Lithium-S batteries R&D,		
						Lithium-Metal-Polymer		
						batteries, Metal Air batteries		
						R&D, Ni-Cd batteries, Ni-MH		
		Directorate-	Electro chemical			batteries, Na-ion batteries R&D,		
	Database of the European energy	General for	storage			Redow flow batteries Zn Fe,		
	storage technologies and	Energy - EU	technology:			Redox flow batteries Vanadium		
130	facilities	Commission	Response time		by country	and Redox flow batteries Zn Br		Link
		Directorate-						
	Database of the European energy	General for	Electrical storage			Available for Superconducting		
	storage technologies and	Energy - EU	technology:		L	Magnetic Energy Storage		1.1.1
131	facilities	Commission Directorate-	Response time		by country	(SMES) and Supercapacitor		Link
	Database of the European energy		Chemical storage					
	storage technologies and	Energy - EU	technology:					
	facilities	Commission	Response time		by country	Available for Power to Gas (H2)		Link
					,,			
						Available for Pumped Hydro		
						Storage (PHS), Pumped Heat		
						Electrical Storage (PHES),		
			Mechanical			Adiabatic Compressed Air		
		Directorate-	storage			Energy Storage (ACAES),		
	Database of the European energy	General for	technology:			Compressed Air Energy Storage		
	storage technologies and	Energy - EU	• • •	updated		(CAES), Liquid Air Energy		
133	facilities	Commission	(project list)	frequently	by country	Storage (LAES) and Flywheel		<u>Link</u>

	А	В	C	D	E	F	G	Н	I	J	J	K		L	
1	Databasa	Author	Catagoria		Dete in sut	АТ	DE		untri				Maawa		
	Database	Author	Category	RAA element	Data input	AI	BE	: DE	: FI	K N	IL L	.0	Years		
					Electro chemical										
		Directorate-			storage										
	Database of the European energy storage technologies and		Electricity supply-side		technology: storage capacity										
134	facilities	Commission	data	Battery storage units	(project list)	Yes	Yes	s Ye	s Ye	s Ye	es Y	es			
101		Directorate-			Electrical storage										
	Database of the European energy				technology:										
	storage technologies and		Electricity supply-side		storage capacity										
135	facilities	Commission	data	Battery storage units	(project list)	Yes	Yes	s Ye	s Ye	s Ye	es Y	es			
		Directorate-			Chemical storage										
	Database of the European energy				technology:										
	storage technologies and		Electricity supply-side		storage capacity										
136	facilities	Commission	data	Battery storage units	(project list)	Yes	Yes	s Ye	s Ye	s Ye	es Y	es			
		Directorate-			Thermal storage										
	Database of the European energy				technology:										
	storage technologies and		Electricity supply-side		storage capacity										
137	facilities	Commission	data	Battery storage units	(project list)	Yes	Yes	s Ye	s Ye	s Ye	es Y	es			
		Directorate-													
	Database of the European energy														
	storage technologies and		Electricity supply-side		Installed behind										
138	facilities	Commission	data	Battery storage units	the meter storage	Yes	No	Ye	s Ye	s No	o N	ю			

	А	В	М	N	0	Р	Q	R
1		•		Temporal	Spatial			
2	Database	Author	Data input	resolution	resolution	Remarks	Additional Description	Link
						Available for Sodium Sulphur		
						batteries, Lead Acid batteries,		
						Sodium Nickel Chloride		
						batteries, Lithium-ion batteries,		
						Lithium-S batteries R&D,		
						Lithium-Metal-Polymer		
						batteries, Metal Air batteries		
			Electro chemical			R&D, Ni-Cd batteries, Ni-MH		
		Directorate-	storage			batteries, Na-ion batteries R&D,		
	Database of the European energy		technology:			Redow flow batteries Zn Fe,		
	storage technologies and	Energy - EU		updated		Redox flow batteries Vanadium		
134	facilities	Commission	(project list)	frequently	by country	and Redox flow batteries Zn Br		Link
		Directorate-	Electrical storage					
	Database of the European energy	General for	technology:			Available for Superconducting		
	storage technologies and	Energy - EU	÷.	updated		Magnetic Energy Storage		
135	facilities	Commission		frequently	by country	(SMES) and Supercapacitor		Link
		Directorate-	Chemical storage			Available for Power to Gas (H2),		
	Database of the European energy	General for	technology:			Power to Ammonia – Gasoline,		
	storage technologies and	Energy - EU	storage capacity	updated		Power to Methane and Power to		
136	facilities	Commission	(project list)	frequently	by country	Methanol + Gasoline		<u>Link</u>
						Available for Molten salts,		
		Directorate-	Thermal storage			Sensible Thermal Energy		
	Database of the European energy	General for	technology:			Storage (STES), Phase Change		
	storage technologies and	Energy - EU	• • •	updated		Material (PCM) and		
137	facilities	Commission	(project list)	frequently	by country	Thermochemical Storage (TCS)		<u>Link</u>
						Available for Molten salts,		
		Directorate-				Sensible Thermal Energy		
	Database of the European energy					Storage (STES), Phase Change		
	storage technologies and	Energy - EU		updated		Material (PCM) and		
138	facilities	Commission	the meter storage	frequently	by country	Thermochemical Storage (TCS)		<u>Link</u>

	А	В	C	D	E	F	G	Н	Ι	J	Κ	L
1	Database	Author	Category	RAA element	Data input	AT			tries FR		LU	Years
		Directorate- General for Energy - EU Commission	Electricity supply-side data		Mechanical storage technology: Energy Capacity (GWh)							constant variable
	Database of the European energy storage technologies and facilities	Directorate- General for Energy - EU Commission	Electricity supply-side data	Battery storage units	Electro chemical storage technology: Energy Capacity (GWh)	Yes	Yes	Yes	Yes	Yes \	Yes	constant variable
	Database of the European energy storage technologies and facilities	Directorate- General for Energy - EU Commission	Electricity supply-side data		Electrical storage technology: Energy Capacity (GWh)	Yes	Yes	Yes	Yes	Yes `	Ƴes	constant variable
	Database of the European energy storage technologies and facilities	Directorate- General for Energy - EU Commission	Electricity supply-side data	Battery storage units	Chemical storage technology: Energy Capacity _(GWh)	Yes	Yes	Yes	Yes	Yes `	Yes	constant variable
	Database of the European energy storage technologies and facilities	Directorate- General for Energy - EU Commission	Electricity supply-side data	Battery storage units	Thermal storage technology: Energy Capacity (GWh)	Yes	Yes	Yes	Yes	Yes `	Yes	constant variable

	А	В	М	Ν	0	Р	Q	R
1 2	Database	Author	Data input	Temporal resolution	Spatial resolution	Remarks	Additional Description	Link
	Database of the European energy storage technologies and facilities	Directorate- General for Energy - EU Commission	Mechanical storage technology: Energy Capacity (GWh)			Available for Pumped Hydro Storage (PHS), Pumped Heat Electrical Storage (PHES), Adiabatic Compressed Air Energy Storage (ACAES), Compressed Air Energy Storage (CAES), Liquid Air Energy Storage (LAES) and Flywheel	min-max capacity range per unit of installation	Link
	Database of the European energy storage technologies and facilities	Directorate- General for Energy - EU Commission	Electro chemical storage technology: Energy Capacity (GWh)			Available for Sodium Sulphur batteries, Lead Acid batteries, Sodium Nickel Chloride batteries, Lithium-ion batteries, Lithium-S batteries R&D, Lithium-Metal-Polymer batteries, Metal Air batteries R&D, Ni-Cd batteries, Ni-MH batteries, Na-ion batteries R&D, Redow flow batteries Zn Fe, Redox flow batteries Vanadium and Redox flow batteries Zn Br	min-max capacity range per unit of installation	Link
	Database of the European energy storage technologies and facilities	Directorate- General for Energy - EU Commission	Electrical storage technology: Energy Capacity (GWh)			Available for Superconducting Magnetic Energy Storage (SMES) and Supercapacitor	min-max capacity range per unit of installation	Link
	Database of the European energy storage technologies and facilities	Directorate- General for Energy - EU Commission	Chemical storage technology: Energy Capacity (GWh)		by country	Available for Power to Gas (H2), Power to Ammonia – Gasoline, Power to Methane and Power to Methanol + Gasoline Available for Molten salts.	min-max capacity range per unit of installation	<u>Link</u>
	Database of the European energy storage technologies and facilities	Directorate- General for Energy - EU Commission	Thermal storage technology: Energy Capacity (GWh)			Sensible Thermal Energy Storage (STES), Phase Change Material (PCM) and Thermochemical Storage (TCS)	min-max capacity range per unit of installation	<u>Link</u>

	А	В	C	D	E	F	G	Н	Ι	J	Κ	L
1	Database	Author	Category	RAA element	Data input	AT		Coun DE			LU	Years
		Directorate- General for Energy - EU Commission	Electricity supply-side data		Mechanical storage technology: Power installed capacity (MW)							<u>constant variable</u>
	Database of the European energy storage technologies and facilities	Directorate- General for Energy - EU Commission	Electricity supply-side data	Battery storage units	Electro chemical storage technology: Power installed capacity (MW)	Yes	Yes	Yes	Yes	Yes	Yes	constant variable
	Database of the European energy storage technologies and facilities	Directorate- General for Energy - EU Commission	Electricity supply-side data	Battery storage units	Electrical storage technology: Power installed capacity (MW)	Yes	Yes	Yes	Yes	Yes	Yes	constant variable
	Database of the European energy storage technologies and facilities	Directorate- General for Energy - EU Commission	Electricity supply-side data	Battery storage units	Chemical storage technology: Power installed capacity (MW)	Yes	Yes	Yes	Yes	Yes	Yes	constant variable
	Database of the European energy storage technologies and facilities	Directorate- General for Energy - EU Commission	Electricity supply-side data	Battery storage units	Thermal storage technology: Power installed capacity (MW)	Yes	Yes	Yes	Yes	Yes	Yes	constant variable

	А	В	М	Ν	0	Р	Q	R
1	Database	Author	Data input	Temporal resolution	Spatial resolution	Remarks	Additional Description	Link
	Database of the European energy storage technologies and	Directorate- General for Energy - EU Commission	Mechanical storage technology: Power installed capacity (MW)		by country	Available for Pumped Hydro Storage (PHS), Pumped Heat Electrical Storage (PHES), Adiabatic Compressed Air Energy Storage (ACAES), Compressed Air Energy Storage (CAES), Liquid Air Energy Storage (LAES) and Flywheel	min-max capacity range per unit of installation	Link
	Database of the European energy storage technologies and facilities	Directorate- General for Energy - EU Commission	Electro chemical storage technology: Power installed capacity (MW)		by country	Available for Sodium Sulphur batteries, Lead Acid batteries, Sodium Nickel Chloride batteries, Lithium-ion batteries, Lithium-S batteries R&D, Lithium-Metal-Polymer batteries, Metal Air batteries R&D, Ni-Cd batteries, Ni-MH batteries, Na-ion batteries R&D, Redow flow batteries Zn Fe, Redox flow batteries Vanadium and Redox flow batteries Zn Br	min-max capacity range per unit of installation	Link
		Directorate- General for Energy - EU Commission	Electrical storage technology: Power installed capacity (MW)		by country	Available for Superconducting Magnetic Energy Storage (SMES) and Supercapacitor	min-max capacity range per unit of installation	Link
	Database of the European energy storage technologies and facilities	Directorate- General for Energy - EU Commission	Chemical storage technology: Power installed capacity (MW)		by country	Methanol + Gasoline	min-max capacity range per unit of installation	Link
	Database of the European energy storage technologies and facilities	Directorate- General for Energy - EU Commission	Thermal storage technology: Power installed capacity (MW)		by country	Available for Molten salts, Sensible Thermal Energy Storage (STES), Phase Change Material (PCM) and Thermochemical Storage (TCS)	min-max capacity range per unit of installation	<u>Link</u>

	А	В	С	D	E	F	G	Н	Ι	J	Κ	L
1					-				ntries			
2	Database	Author	Category	RAA element	Data input	AT	BE	DE	FR	NL	LU	Years
	ELECTRICITY GENERATION		Electricity supply-side									
149	COSTS 2020	BEIS		CONE/CORP	CAPEX for CCGT	Yes	Yes	Yes	Yes	Yes	Yes	2025; 2030; 2035; 2040
	ELECTRICITY GENERATION		Electricity supply-side	•								
150	COSTS 2020	BEIS		CONE/CORP		Yes	Yes	Yes	Yes	Yes	Yes	2025; 2030; 2035; 2040
	ELECTRICITY GENERATION		Electricity supply-side	÷	CAPEX for							
151	COSTS 2020	BEIS		CONE/CORP	Biomass	Yes	Yes	Yes	Yes	Yes	Yes	2025; 2030; 2035; 2040
	ELECTRICITY GENERATION		Electricity supply-side		CAPEX for							
152	COSTS 2020	BEIS		CONE/CORP	offshore Wind	Yes	Yes	Yes	Yes	Yes	Yes	2025; 2030; 2035; 2040
	ELECTRICITY GENERATION		Electricity supply-side	÷	CAPEX for							
153	COSTS 2020	BEIS		CONE/CORP	onshore Wind	Yes	Yes	Yes	Yes	Yes	Yes	2025; 2030; 2035; 2040
	ELECTRICITY GENERATION		Electricity supply-side	÷	CAPEX for large							
154	COSTS 2020	BEIS		CONE/CORP	scale PV	Yes	Yes	Yes	Yes	Yes	Yes	2025; 2030; 2035; 2040
	ELECTRICITY GENERATION		Electricity supply-side	Thermal generation;	CAPEX for							
155	COSTS 2020	BEIS		CONE/CORP	Nuclear Power	Yes	Yes	Yes	Yes	Yes	Yes	2025; 2030; 2035; 2040
	ELECTRICITY GENERATION		Electricity supply-side									
	COSTS 2020	BEIS		CONE/CORP		Yes	Yes	Yes	Yes	Yes	Yes	2025; 2030; 2035; 2040
	ELECTRICITY GENERATION		Electricity supply-side	Thermal generation;	CAPEX for Coal							
157	COSTS 2020	BEIS		CONE/CORP	with CCS	Yes	Yes	Yes	Yes	Yes	Yes	2025; 2030; 2035; 2040
	ELECTRICITY GENERATION		Electricity supply-side	Thermal generation;	O&M costs for							
158	COSTS 2020	BEIS		CONE/CORP	CCGT	Yes	Yes	Yes	Yes	Yes	Yes	2025; 2030; 2035; 2040
	ELECTRICITY GENERATION		Electricity supply-side		O&M costs for							
159	COSTS 2020	BEIS		CONE/CORP	OCGT	Yes	Yes	Yes	Yes	Yes	Yes	2025; 2030; 2035; 2040
	ELECTRICITY GENERATION		Electricity supply-side	Thermal generation;	O&M costs for							
160	COSTS 2020	BEIS	data	CONE/CORP	Biomass	Yes	Yes	Yes	Yes	Yes	Yes	2025; 2030; 2035; 2040
	ELECTRICITY GENERATION		Electricity supply-side	RES generation;	O&M costs for							
161	COSTS 2020	BEIS		CONE/CORP	offshore Wind	Yes	Yes	Yes	Yes	Yes	Yes	2025; 2030; 2035; 2040
	ELECTRICITY GENERATION		Electricity supply-side	RES generation;	O&M costs for							
162	COSTS 2020	BEIS		CONE/CORP	onshore Wind	Yes	Yes	Yes	Yes	Yes	Yes	2025; 2030; 2035; 2040
	ELECTRICITY GENERATION		Electricity supply-side	RES generation;	O&M costs for							
163	COSTS 2020	BEIS		CONE/CORP	large scale PV	Yes	Yes	Yes	Yes	Yes	Yes	2025; 2030; 2035; 2040
	ELECTRICITY GENERATION		Electricity supply-side	Thermal generation;	O&M costs for							
	COSTS 2020	BEIS		CONE/CORP	Nuclear Power	Yes	Yes	Yes	Yes	Yes	Yes	2025; 2030; 2035; 2040
	ELECTRICITY GENERATION		Electricity supply-side	Thermal generation;	O&M costs for							
165	COSTS 2020	BEIS	data	CONE/CORP	Coal	Yes	Yes	Yes	Yes	Yes	Yes	2025; 2030; 2035; 2040
	ELECTRICITY GENERATION		Electricity supply-side	Thermal generation;	O&M costs for							
166	COSTS 2020	BEIS	data	CONE/CORP	Coal with CCS	Yes	Yes	Yes	Yes	Yes	Yes	2025; 2030; 2035; 2040

	А	В	М	N	0	Р	Q	R
1				Temporal	Spatial			
2	Database	Author	Data input	resolution	resolution	Remarks	Additional Description	Link
	ELECTRICITY GENERATION							
149	COSTS 2020	BEIS	CAPEX for CCGT	target years	by country			Link
	ELECTRICITY GENERATION							
150	COSTS 2020	BEIS	CAPEX for OCGT	target years	by country			Link
	ELECTRICITY GENERATION		CAPEX for					
151	COSTS 2020	BEIS	Biomass	target years	by country			Link
	ELECTRICITY GENERATION		CAPEX for					
152	COSTS 2020	BEIS	offshore Wind	target years	by country			<u>Link</u>
	ELECTRICITY GENERATION		CAPEX for					
153	COSTS 2020	BEIS	onshore Wind	target years	by country			<u>Link</u>
	ELECTRICITY GENERATION		CAPEX for large					
154	COSTS 2020	BEIS	scale PV	target years	by country			<u>Link</u>
	ELECTRICITY GENERATION		CAPEX for					
155	COSTS 2020	BEIS	Nuclear Power	target years	by country			<u>Link</u>
	ELECTRICITY GENERATION							
	COSTS 2020	BEIS	CAPEX for Coal	target years	by country			<u>Link</u>
	ELECTRICITY GENERATION		CAPEX for Coal					
157	COSTS 2020	BEIS	with CCS	target years	by country			<u>Link</u>
	ELECTRICITY GENERATION		O&M costs for					
	COSTS 2020	BEIS	CCGT	target years	by country			Link
	ELECTRICITY GENERATION		O&M costs for					
159	COSTS 2020	BEIS	OCGT	target years	by country			Link
	ELECTRICITY GENERATION		O&M costs for					
160	COSTS 2020	BEIS	Biomass	target years	by country			<u>Link</u>
	ELECTRICITY GENERATION		O&M costs for					
161	COSTS 2020	BEIS	offshore Wind	target years	by country			Link
	ELECTRICITY GENERATION		O&M costs for					
162	COSTS 2020	BEIS	onshore Wind	target years	by country			<u>Link</u>
	ELECTRICITY GENERATION		O&M costs for					
163	COSTS 2020	BEIS	large scale PV	target years	by country			<u>Link</u>
	ELECTRICITY GENERATION		O&M costs for					
164	COSTS 2020	BEIS	Nuclear Power	target years	by country			<u>Link</u>
	ELECTRICITY GENERATION		O&M costs for					
165	COSTS 2020	BEIS	Coal	target years	by country			Link
	ELECTRICITY GENERATION		O&M costs for					
166	COSTS 2020	BEIS	Coal with CCS	target years	by country			<u>Link</u>

	А	В	С	D	E	F	G	Н	Ι	J	Κ	L
1	Database	Author	Category	RAA element	Data input	лт	DE		ntries			Years
	Database	Author	Category	RAAelement	Data input	AI	DE	DE	ГК	INL	LU	
1.67			Network and	Balancing	aFRR		.,					
167	ELIA Balancing Report	Elia Group	infrastructural data	requirements	requirements	No	Yes	No	No	No	No	2018; 2019
			Network and	Balancing	mFRR							
168	ELIA Balancing Report	Elia Group	infrastructural data	requirements	requirements	No	Yes	No	No	No	No	2018; 2019
			Network and	Balancing	Total FRR							
169	ELIA Balancing Report	Elia Group	infrastructural data	requirements	requirements	No	Yes	No	No	No	No	2018; 2019
					Time series of							
	EMHIRES dataset Part I: Wind	European	Electricity supply-side		solar PV							
170	power generation	Meteorological	data	RES generation	generation	Yes	Yes	Yes	Yes	Yes	Yes	1986 - 2015
					Time series of							
	EMHIRES dataset Part II Solar	European	Electricity supply-side		wind power							
171	power generation	Meteorological	data	RES generation	generation Electricity	Yes	Yes	Yes	Yes	Yes	Yes	1986 - 2015
			Electricity demand-	Conventional	demand							
172	Energiedaten: Gesamtausgabe	BMWI	side data	electricity demand	agriculture	No	No	Yes	No	No	No	1990 - 2020
					Electricity							
			Electricity demand-	Conventional	demand commercial/servi							
173	Energiedaten: Gesamtausgabe	BMWI	side data	electricity demand	ce	No	No	Yes	No	No	No	1990 - 2020
	<u> </u>				Electricity							
174	En ancie de terre Constante de la		Electricity demand-	Conventional	demand		NI -	V	NI -	N	NI -	1000, 2020
1/4	Energiedaten: Gesamtausgabe	BMWI	side data Electricity demand-	electricity demand Conventional	households Electricity	INO	INO	res	INO	INO	INO	1990 - 2020
175	Energiedaten: Gesamtausgabe	BMWI	side data	electricity demand	demand industry	No	No	Yes	No	No	No	1990 - 2020

	А	В	М	Ν	0	Р	Q	R
1				Temporal	Spatial			
2	Database	Author	Data input	resolution	resolution	Remarks	Additional Description	Link
						in Accordance with Article 60(1) of Commission Regulation (EU)		
			-	report		2017/2195 of November 2017		
			aFRR	published		establishing a guideline on	automatic Frequency Restoration	
167	ELIA Balancing Report	Elia Group	requirements	every 2 years	by country	electricity balancing	Reserve	<u>Link</u>
						in Accordance with Article 60(1)		
				report		of Commission Regulation (EU) 2017/2195 of November 2017		
			mFRR	published		establishing a guideline on	manual Frequency Restoration	
168	ELIA Balancing Report	Elia Group	requirements	every 2 years		electricity balancing	Reserve	<u>Link</u>
						in Accordance with Article 60(1)		
						of Commission Regulation (EU)		
			Total FRR	report published		2017/2195 of November 2017 establishing a guideline on		
169	ELIA Balancing Report	Elia Group	requirements	every 2 years	by country	electricity balancing		Link
			<b>-</b>		data available			
	EMHIRES dataset Part I: Wind	European	Time series of solar PV		on country, NUTS1 and	data available on country,		
170	power generation	Meteorological		hourly		NUTS1 and NUTS2 level		Link
			Time series of		data available			
	EMHIRES dataset Part II Solar	European	wind power		on country, NUTS1 and	data available on country,		
	power generation	Meteorological		hourly		NUTS1 and NUTS2 level		<u>Link</u>
			Electricity					
170	Energia datan: Casamtayanaha	BMWI	demand agriculture		by country (		Time series of demand in agriculture	Link
172	Energiedaten: Gesamtausgabe	DIMINAI	Electricity	yearly	by country		sector	<u>Link</u>
			demand					
			commercial/servi				Time series of demand in	
173	Energiedaten: Gesamtausgabe	BMWI	ce Electricity	yearly	by country		commercial/service sector	Link
			demand				Time series of demand in household	
174	Energiedaten: Gesamtausgabe	BMWI	households	yearly	by country		sector	<u>Link</u>
4		D. ().4 ()	Electricity				Time series of demand in industry	
175	Energiedaten: Gesamtausgabe	BMWI	demand industry	yearly	by country		sector	<u>Link</u>

	А	В	С	D	E	F	G	Н	I	J	Κ	L
1	Database	Author	Category	RAA element	Data input	АТ	BE		ntrie FR		LU	Years
			Electricity supply-side		Powerplant self-							
176	Energiedaten: Gesamtausgabe	BMWI	data	Thermal generation	consumption	No	No	Yes	No	No	No	1990 - 2020
					Electricity							
			Electricity demand-	Conventional	demand							
177	Energiedaten: Gesamtausgabe	BMWI	side data	electricity demand	transportation	No	No	Yes	No	No	No	1990 - 2020
			Electricity supply-side	Thermal generation;								
178	Energiedaten: Gesamtausgabe	BMWI	data	CONE/CORP	Cost for fuels	No	No	Yes	No	No	No	1990 - 2020
			Electricity demand-	Conventional	Electricity							
179	Energy Statistics	STATBEL	side data	electricity demand	demand industry	No	Yes	No	No	No	No	1990 - 2019
			Electricity supply-side		Powerplant self-							
180	Energy Statistics	STATBEL	data	Thermal generation	consumption	No	Yes	No	No	No	No	1990 - 2019
			Electricity supply-side	Thermal generation;								
181	Energy Statistics	STATBEL	data	CONE/CORP	Cost for fuels	No	Yes	No	No	No	No	1990 - 2019
			Electricity supply-side		Generation							
182	Energy Statistics	STATBEL	data	<b>RES</b> generation	biomass	No	Yes	No	No	No	No	1990 - 2019
			Electricity supply-side									
183	Energy Statistics	STATBEL	data	<b>RES</b> generation	Generation hydro	No	Yes	No	No	No	No	1990 - 2019
			Electricity supply-side		Generation hydro		-					
184	Energy Statistics	STATBEL	data	<b>RES</b> generation	storage	No	Yes	No	No	No	No	1990 - 2019
-			Electricity supply-side		0							
185	Energy Statistics	STATBEL	data	<b>RES</b> generation	Generation PV	No	Yes	No	No	No	No	1990 - 2019
			Electricity supply-side				-					
186	Energy Statistics	STATBEL	data	<b>RES</b> generation	Generation waste	No	Yes	No	No	No	No	1990 - 2019
		-	Electricity supply-side				-					
187	Energy Statistics	STATBEL	data	<b>RES</b> generation	Generation wind	No	Yes	No	No	No	No	1990 - 2019
107					0011010101011							
1			Network and	Balancing								
188	ENTSO-E Balancing Report	ENTSO-E	infrastructural data	requirements	Balancing reserve	Yec	Yec	Yee	Yee	Yee	Yee	2018 - 2019
					-	103	103	103	103	103	103	2010 2017
1					Unplanned							
1				Cross-border trade	outage rate							
100	ENTSO-E HVDC Utilisation and		Network and	modelling (between	HVDC							2020
189	Unavailability Statistics 2020	ENTSO-E	infrastructural data	modelled zones)	interconnections	No	No	Yes	No	Yes	No	2020

A	В	М	N	0	Р	Q	R
Database	Author	Data input	Temporal resolution	Spatial resolution	Remarks	Additional Description	Link
Energiedaten: Gesamtausgabe	BMWI	consumption Electricity	yearly	by country		Time series of demand by powerplants	<u>Link</u>
Energiedaten: Gesamtausgabe	BMWI	demand transportation	yearly	by country		Time series of demand by transportation	<u>Link</u>
Energiedaten: Gesamtausgabe	BMWI	Cost for fuels	yearly	by country		natural gas plus transportation cost.	<u>Link</u>
Energy Statistics	STATBEL	demand industry	yearly	by country	report published every year	sector	<u>Link</u>
Energy Statistics	STATBEL	consumption	yearly	by country	report published every year	Time series of demand by powerplants	<u>Link</u>
Energy Statistics	STATBEL	Cost for fuels	yearly	by country	report published every year	natural gas plus transportation cost.	<u>Link</u>
Energy Statistics	STATBEL	Generation biomass	yearly	by country	report published every year		<u>Link</u>
Energy Statistics	STATBEL		yearly	by country	report published every year		<u>Link</u>
Energy Statistics	STATBEL	Generation hydro storage	yearly	by country	report published every year		<u>Link</u>
Energy Statistics	STATBEL	Generation PV	yearly	by country	report published every year		<u>Link</u>
Energy Statistics	STATBEL	Generation waste	yearly	by country	report published every year		<u>Link</u>
Energy Statistics	STATBEL	Generation wind	yearly	by country	report published every year Report includes numbers for RR,		<u>Link</u>
					countries; in Accordance with Article 60(1) of Commission Regulation (EU) 2017/2195 of		
ENTSO-E Balancing Report	ENTSO-E	Balancing reserve	report published every 2 years	by country	November 2017 establishing a guideline on electricity balancing		<u>Link</u>
ENTSO-E HVDC Utilisation and		Unplanned outage rate HVDC					Link
	Energiedaten: Gesamtausgabe Energiedaten: Gesamtausgabe Energiedaten: Gesamtausgabe Energy Statistics Energy Statistics	Energiedaten: GesamtausgabeBMWIEnergiedaten: GesamtausgabeBMWIEnergiedaten: GesamtausgabeBMWIEnergy StatisticsSTATBELEnergy StatisticsSTATBELENTSO-E Balancing ReportENTSO-EENTSO-E HVDC Utilisation andENTSO-E	Energiedaten: GesamtausgabeBMWIPowerplant self-consumptionEnergiedaten: GesamtausgabeBMWIElectricity demand transportationEnergiedaten: GesamtausgabeBMWICost for fuelsEnergiedaten: GesamtausgabeBMWICost for fuelsEnergy StatisticsSTATBELdemand industry Powerplant self- consumptionEnergy StatisticsSTATBELCost for fuelsEnergy StatisticsSTATBELCost for fuelsEnergy StatisticsSTATBELGeneration biomassEnergy StatisticsSTATBELGeneration hydro Generation hydro storageEnergy StatisticsSTATBELGeneration nydro storageEnergy StatisticsSTATBELGeneration on hydro storageEnergy StatisticsSTATBELGeneration on hydro storageEnergy StatisticsSTATBELGeneration wasteEnergy StatisticsSTATBELGeneration wasteEnergy StatisticsSTATBELGeneration wasteEnergy StatisticsSTATBELGeneration windEnergy StatisticsSTATBELGeneration windEnergy StatisticsSTATBELGeneration windENTSO-E Balancing ReportENTSO-EBalancing reserve Unplanned outage rate HVDC	DatabaseAuthorData inputresolutionEnergiedaten: GesamtausgabeBMWIPowerplant self- consumptionyearlyEnergiedaten: GesamtausgabeBMWIElectricity demand transportationyearlyEnergiedaten: GesamtausgabeBMWICost for fuelsyearlyEnergiedaten: GesamtausgabeBMWICost for fuelsyearlyEnergy StatisticsSTATBELdemand industryyearlyEnergy StatisticsSTATBELconsumptionyearlyEnergy StatisticsSTATBELCost for fuelsyearlyEnergy StatisticsSTATBELCost for fuelsyearlyEnergy StatisticsSTATBELCost for fuelsyearlyEnergy StatisticsSTATBELGenerationyearlyEnergy StatisticsSTATBELGeneration hydroyearlyEnergy StatisticsSTATBELGeneration hydroyearlyEnergy StatisticsSTATBELGeneration mydroyearlyEnergy StatisticsSTATBELGeneration wasteyearlyEnergy 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hydroyearlyby countryEnergy StatisticsSTATBELGeneration hydroyearlyby countryEnergy StatisticsSTATBELGeneration wasteyearlyby countryEnergy Statistics<t< td=""><td>DatabaseAuthorData inputresolutionresolutionRemarksEnergiedaten: GesamtausgabeBMWIconsumptionyearlyby countryElectricity demandEnergiedaten: GesamtausgabeBMWICost for fuelsyearlyby countryElectricity demandEnergiedaten: GesamtausgabeBMWICost for fuelsyearlyby countryreport published every yearEnergy StatisticsSTATBELCost for fuelsyearlyby countryreport published every yearEnergy StatisticsSTATBELGeneration hydro storageyearlyby countryreport published every yearEnergy StatisticsSTATBELGeneration wind yearlyyearlyby countryreport publis</td><td>DatabaseAuthorData inputresolutionRemarksAdditional DescriptionEnergiedaten: GesamtausgabeBMWIconsumptionyearlyby countryTime series of demand by powerplantsElectricitydemandyearlyby countryTime series of demand byEnergiedaten: GesamtausgabeBMWIcost for fuelsyearlyby countryTime series 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inputresolutionresolutionEnergiedaten: GesamtausgabeBMWIPowerplant self- consumptionyearlyby countryEnergiedaten: GesamtausgabeBMWICost for fuelsyearlyby countryEnergiedaten: GesamtausgabeBMWICost for fuelsyearlyby countryEnergiedaten: GesamtausgabeBMWICost for fuelsyearlyby countryEnergy StatisticsSTATBELdemand industryyearlyby countryEnergy StatisticsSTATBELconsumptionyearlyby countryEnergy StatisticsSTATBELCost for fuelsyearlyby countryEnergy StatisticsSTATBELCost for fuelsyearlyby countryEnergy StatisticsSTATBELGenerationbiomassyearlyby countryEnergy StatisticsSTATBELGeneration hydroyearlyby countryEnergy StatisticsSTATBELGeneration hydroyearlyby countryEnergy StatisticsSTATBELGeneration hydroyearlyby countryEnergy StatisticsSTATBELGeneration wasteyearlyby countryEnergy Statistics <t< td=""><td>DatabaseAuthorData inputresolutionresolutionRemarksEnergiedaten: GesamtausgabeBMWIconsumptionyearlyby countryElectricity demandEnergiedaten: GesamtausgabeBMWICost for fuelsyearlyby countryElectricity demandEnergiedaten: GesamtausgabeBMWICost for fuelsyearlyby countryreport published every yearEnergy StatisticsSTATBELCost for fuelsyearlyby countryreport published every yearEnergy StatisticsSTATBELGeneration hydro storageyearlyby countryreport published every yearEnergy StatisticsSTATBELGeneration wind yearlyyearlyby countryreport publis</td><td>DatabaseAuthorData inputresolutionRemarksAdditional DescriptionEnergiedaten: GesamtausgabeBMWIconsumptionyearlyby countryTime series of demand by powerplantsElectricitydemandyearlyby countryTime series of demand byEnergiedaten: GesamtausgabeBMWIcost for fuelsyearlyby countryTime series of demand byEnergiedaten: GesamtausgabeBMWICost for fuelsyearlyby countryTime series of demand in dustryEnergiedaten: GesamtausgabeSTATBELdemand industryreport published every yearTime series of demand in industryEnergy StatisticsSTATBELCost for fuelsyearlyby countryreport published every yearTime series of demand by powerplantsEnergy 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powerplantsEnergy StatisticsSTATBELGeneration hydroyearlyby countryreport published every yearnatural gas plus transportation cost.Energy StatisticsSTATBELGeneration hydroyearlyby countryreport published every yearEnergy StatisticsSTATBELGeneration hydroyearlyby countryreport published every yearEnergy StatisticsSTATBELGeneration hydroyearlyby countryreport published e

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1	Database	Author	Catagony	RAA element	Data input	лт			tries			Years
	Database	Author	Category		Cooling and	AI	DE	DE	FK	INL	LU	rears
			Electricity demand-	space heating and	heating degree							
190	Eurostat Database	Eurostat	side data	cooling	days	Yes	Yes	Yes	Yes	Yes	Yes	1979 - 2020
			Electricity demand-	Conventional	Electricity demand							
191	Eurostat Database	Eurostat	side data	electricity demand	households	Yes	Yes	Yes	Yes	Yes	Yes	2009 - 2020
131												
			Electricity demand-	Conventional	Electricity							
192	Eurostat Database	Eurostat	side data	electricity demand	demand industry	Yes	Yes	Yes	Yes	Yes	Yes	2009 - 2020
				Conventional								
				electricity demand;	Electricity							
			Electricity demand-	Electricity demand of	demand road							
193	Eurostat Database	Eurostat	side data	EV	transportation	Yes	Yes	Yes	Yes	Yes	Yes	2009 - 2020
					Electricity							
			Electricity demand-	Conventional	demand commercial/servi							
194	Eurostat Database	Eurostat	side data	electricity demand	ce	Yes	Yes	Yes	Yes	Yes	Yes	2009 - 2020
					Electricity							
			Electricity demand-	Conventional	demand		.,	.,	.,	.,	.,	
195	Eurostat Database	Eurostat	side data	electricity demand	transportation	Yes	Yes	Yes	Yes	Yes	Yes	2009 - 2020
			Electricity demand-	Conventional								
196	Eurostat Energy Balances	Eurostat	side data	electricity demand	Network losses	Yes	Yes	Yes	Yes	Yes	Yes	2010 - 2019
			Electricity demand-		Regionalization							
197	FfE Open Data Platform	FfE	side data	Large-scale PtX	Factors for PtH	Yes	Yes	Yes	Yes	Yes	Yes	

	А	В	М	N	0	Р	Q	R
1				Temporal	Spatial		•	
2	Database	Author	Data input	resolution	resolution	Remarks	Additional Description	Link
			Cooling and			Cooling and heating degree days		1
			heating degree	yearly;		by country. Online data code:		
190	Eurostat Database	Eurostat	days	monthly	by country	NRG_CHDD_A		Link
			Electricity			Final energy consumption in		
			demand			households by type of fuel.		
191	Eurostat Database	Eurostat	households	yearly	by country	Online data code: ten00125		<u>Link</u>
						Final energy consumption in		
			Electricity			industry by type of fuel. Online		
192	Eurostat Database	Eurostat	demand industry	yearly	by country	data code: ten00129		<u>Link</u>
							Final energy consumption in road	
							transport covers the energy	
							consumption of the following road	
							transport modes: scooters,	
							motorcycles, tricycles, quads, cars,	
							vans, mini-buses, buses, truck and	
			Electricity			Final energy consumption in	other on-road vehicles (for example:	
			demand road			road transport by type of fuel.	snow plows, fire trucks, ambulances,	
193	Eurostat Database	Eurostat	transportation	yearly	by country	Online data code: ten00127	etc.).	<u>Link</u>
			Electricity					
			demand			Final energy consumption in		
			commercial/servi			services by type of fuel. Online		
194	Eurostat Database	Eurostat	се	yearly	by country	data code: ten00128		<u>Link</u>
							Final energy consumption in transport	
							covers the energy consumption of the	
							following transport modes: road	
							transport (cars, buses, trucks, etc), rail	
			Electricity			Final energy consumption in	transport (trains, metro, trams, etc.),	
			demand				domestic aviation, domestic	
195	Eurostat Database	Eurostat	transportation	yearly	by country	data code: ten00126	navigation and pipeline transport.	<u>Link</u>
				yearly				
		-		published				
196	Eurostat Energy Balances	Eurostat	Network losses	report	by country			<u>Link</u>
			Regionalization					
197	FfE Open Data Platform	FfE	Factors for PtH		NUTS-2			<u>Link</u>

	А	В	С	D	E	F	G	Н	Ι	J	К	L
1	Database	6 th	Catalogue	DAA	Datalanat	AT	DE		ntrie			V
2	Database	Author	Category	RAA element	Data input	AI	BE	DE	FR	NL	LU	Years
					Load curves of							
			Electricity demand-	Conventional	the private							2020; 2025; 2030; 2035; 2040;
100	FfE Open Data Platform	FfE	side data	electricity demand	household sector	Voc	Voc	Voc	Voc	Voc	Voc	
190	FIE Open Data Flationni		Electricity demand-	Conventional	Load curves of	Tes	Tes	Tes	Tes	Tes	Tes	2020; 2025; 2030; 2035; 2040;
100	FfE Open Data Platform	FfE	side data	electricity demand	the industry	Vac	Vac	Vac	Vec	Vac	νος	2045; 2050
155					Load curves of	103	103	103	103	103	103	2043, 2030
			Electricity demand-	Conventional	the tertiary							2020; 2025; 2030; 2035; 2040;
200	FfE Open Data Platform	FfE	side data	electricity demand	sector	Ves	Ves	Vec	Vec	νρς	Ves	2045; 2050
200					Load curves of	103	103	105	105	103	105	2043, 2030
			Electricity demand-	Conventional	the transport							2020; 2025; 2030; 2035; 2040;
201	FfE Open Data Platform	FfE	side data	electricity demand	sector	Yes	Yes	Yes	Yes	Yes	Yes	2045; 2050
201					variable RES	1 00	100	105	100	100	100	2010,2000
			Electricity supply-side		generation							
202	FfE Open Data Platform	FfE	data	<b>RES</b> generation	potentials	Yes	Yes	Yes	Yes	Yes	Yes	2012
			Electricity supply-side		Time series of		-	-			-	
203	FfE Open Data Platform	FfE	data	<b>RES</b> generation	wind onshore	Yes	Yes	Yes	Yes	Yes	Yes	2012
	·		Electricity supply-side									
204	FfE Open Data Platform	FfE	data	<b>RES</b> generation	Time series of PV	Yes	Yes	Yes	Yes	Yes	Yes	2012
			Electricity demand-	Conventional								
205	GDP growth	The World Bank	side data	electricity demand	Economic growth	Yes	Yes	Yes	Yes	Yes	Yes	1921 - 2020
					Electricity							
			Electricity demand-	Conventional	demand							
206	Gesamtenergiebilanz Österreich	Statistik Austria	side data	electricity demand	agriculture	Yes	No	No	No	No	No	1970 - 2020
					Electricity							
					demand							
			Electricity demand-	Conventional	commercial/servi							
207	Gesamtenergiebilanz Österreich	Statistik Austria	side data	electricity demand	се	Yes	No	No	No	No	No	1970 - 2020
					Electricity							
	<b>a</b>	<b>•</b> •••••••••••••••••••••••••••••••••••	Electricity demand-	Conventional	demand							
208	Gesamtenergiebilanz Österreich	Statistik Austria	side data	electricity demand	households	Yes	No	No	No	No	No	1970 - 2020
200			Electricity demand-	Conventional	Electricity							1070 0000
209	Gesamtenergiebilanz Österreich	Statistik Austria	side data	electricity demand	demand industry	Yes	NO	NO	NO	No	No	1970 - 2020
210	Cocomtonovaichilana Österneich	Ctatiatile Amatuit	Electricity supply-side	They mal concustion	Powerplant self-	Vac	NIa	Na	Na	Na	Nia	1070 2020
210	Gesamtenergiebilanz Österreich	Statistik Austria	data	Thermal generation	consumption Electricity	res	INO	INO	INO	INO	INO	1970 - 2020
			Electricity demand-	Conventional	demand							
211	Cocomtonorgiabilanz Östarraish	Statistik Austria	,			Vac	Nic	Ne	Ne	No	No	1970 2020
211	Gesamtenergiebilanz Österreich	Statistik Austria	side data	electricity demand	transportation	res	INO	100	INO	INO	INO	1970 - 2020

	А	В	М	Ν	0	Р	Q	R
1				Temporal	Spatial			
2	Database	Author	Data input	resolution	resolution	Remarks	Additional Description	Link
			Load curves of the private household					
100	FfE Open Data Platform	FfE		haurb.	NUTS-3		eXtremOS solidEU Scenario	Link
190	FIE Open Data Platform	FIE	sector Load curves of the	hourly	NU15-3		extremOS solidEO Scenario	<u>Link</u>
100	FfE Open Data Platform	FfE		hourly	NUTS-3		eXtremOS solidEU Scenario	Link
155		116	industry	nourry	1015.5			
			Load curves of the					
200	FfE Open Data Platform	FfE		hourly	NUTS-3		eXtremOS solidEU Scenario	<u>Link</u>
200				nourry	110150			
			Load curves of the					
201	FfE Open Data Platform	FfE	transport sector	hourly	NUTS-3		eXtremOS solidEU Scenario	Link
			variable RES					
			generation			For wind onshore, freestanding		
202	FfE Open Data Platform	FfE	potentials		NUTS-3	PV and PV on buildings		Link
			Time series of					
203	FfE Open Data Platform	FfE	wind onshore	hourly	NUTS-3			<u>Link</u>
204	FfE Open Data Platform	FfE	Time series of PV	hourly	NUTS-3			<u>Link</u>
							Development of economic	
205	GDP growth	The World Bank	Economic growth	yearly	by country		performance in terms of GDP	<u>Link</u>
			Electricity					
	- · · · · · · · · · · · · · · · · · · ·		demand				Time series of demand in agriculture	
206	Gesamtenergiebilanz Österreich	Statistik Austria	agriculture	yearly	by country		sector	<u>Link</u>
			Electricity					
			demand commercial/servi				Time series of demand in	
207	Casamtanavaiahilana Östavusiah	Ctatistile Austria			by country (		commercial/service sector	Link
207	Gesamtenergiebilanz Österreich	Statistik Austria	ce Electricity	yearly	by country		commercial/service sector	<u>Link</u>
			demand				Time series of demand in household	
208	Gesamtenergiebilanz Österreich	Statistik Austria	-	yearly	by country		sector	Link
200			Electricity	ycarry	by country		Time series of demand in industry	
209	Gesamtenergiebilanz Österreich	Statistik Austria	,	yearly	by country		sector	<u>Link</u>
<u> </u>			Powerplant self-	,,	.,			<u></u>
210	Gesamtenergiebilanz Österreich	Statistik Austria	consumption	yearly	by country		Time series of demand by powerplants	Link
<u> </u>			Electricity		,,			
			demand				Time series of demand by	
211	Gesamtenergiebilanz Österreich	Statistik Austria	transportation	yearly	by country		transportation	Link

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1	Database	Author	Category	RAA element	Data input	лт		Coun		NII		Years	
	Database	Autio	Category	RAA element	Data input	AI	DL		IN	INL	LU	T Cars	
					Economic growth								
212	Gesamtenergiebilanz Österreich	Ctatiatile Accetaio	Electricity demand- side data	Conventional	relative to energy	Vac		Na	Na	Na	Na	1970 - 2020	
212	Gesamtenergieblianz Osterreich	Statistik Austria	side data	electricity demand	consumption	res i	101	INO	INO	INO	INO	1970-2020	
				Electricity demand for	Type and number								
			Electricity demand-	space heating and	of domestic								
213	Heating Market Report	ehi.eu	side data	cooling	heating systems	Yes \	Yes `	Yes	Yes	Yes	No	2015; 2017	
			Electricity supply-side		Total RES								
214	IEA Data explorer	IEA	data	<b>RES</b> generation	generation	Yes	Yes `	Yes	Yes	Yes	Yes	2010 - today	
					-		-		-				
245			Electricity supply-side	<b>-</b>	Total fossil	· · ·							
215	IEA Data explorer	IEA	data	Thermal generation Cross-border trade	generation	Yes	res	Yes	Yes	Yes	Yes	2010 - today	
				modelling (between									
				modelled zones);									
			Network and	Exchanges with non- explicitly modelled									
216	IEA Data explorer	IEA	infrastructural data	systems	Total imports	Yes \	Yes `	Yes	Yes	Yes	Yes	2010 - today	
				Cross-border trade									
				modelling (between modelled zones);									
				Exchanges with non-									
			Network and	explicitly modelled									
217	IEA Data explorer	IEA	infrastructural data	systems	Total exports	Yes \	Yes `	Yes	Yes	Yes	Yes	2010 - today	
			Electricity demand-	Conventional									
218	IEA Data explorer	IEA	side data	electricity demand	Network losses	Yes \	Yes	Yes	Yes	Yes	Yes	2010 - today	
				Commentional									
219	IEA Data explorer	IEA	Electricity demand- side data	Conventional electricity demand	Final electricity consumption	Yes	Yes `	Yes	Yes	Yes	Yes	2010 - today	
	Jahresdurchschnittspreise und -			clean loty demand	consumption	105		. 05		. 05	105	2010 1000	
	steuern für die wichtigsten		Electricity supply-side										
220	Energieträger	Statistik Austria	data	CONE/CORP	Cost for fuels	Yes 1	No I	No	No	No	No		

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1	Database	Author	Data input	Temporal resolution	Spatial resolution	Remarks	Additional Description	Link
	Gesamtenergiebilanz Österreich		Economic growth relative to energy consumption	yearly	by country	Kentarko	Development of economic performance in relation to Energy consumption	Link
				report published in 2020 for the		Types include: Liquid fuel non- condensing boilers, Gaseous fuel non-condensing boilers, Liquid fuel condensing boilers, Gaseous fuel condensing boilers, Heat	·	
213	Heating Market Report	ehi.eu	heating systems	first time	by country	pumps, Biomass boilers, Others		<u>Link</u>
214	IEA Data explorer	IEA	generation	monthly; updated monthly monthly;	by country			Link
215	IEA Data explorer	IEA	Total fossil generation	updated monthly	by country			<u>Link</u>
216	IEA Data explorer	IEA	Total imports	monthly; updated monthly	by country			Link
217	IEA Data explorer	IEA		monthly; updated monthly	by country			Link
	IEA Data explorer	IEA		monthly; updated monthly	by country			
	IEA Data explorer	IEA	Final electricity	monthly; updated monthly				Link
	Jahresdurchschnittspreise und - steuern für die wichtigsten		consumption		by country		Wholesale price for hard coal and	
220	Energieträger	Statistik Austria	Cost for fuels	yearly	by country		natural gas plus transportation cost	<u>Link</u>

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1		A 11						Coun				
	Database	Author	Category	RAA element	Data input	AI	BF	DE	FK	NL	LU	Years
	LEVELIZED COST OF											
	ELECTRICITY RENEWABLE		Electricity supply-side	•								
		Fraunhofer ISE	data	CONE/CORP	CAPEX for CCGT	Yes	Yes	Yes	Yes	Yes	Yes	2021; 2030
	LEVELIZED COST OF											
	ELECTRICITY RENEWABLE		Electricity supply-side	-								
		Fraunhofer ISE	data	CONE/CORP	CAPEX for OCGT	Yes	Yes	Yes	Yes	Yes	Yes	2021; 2031
	LEVELIZED COST OF											
	ELECTRICITY RENEWABLE		Electricity supply-side	-	CAPEX for							
		Fraunhofer ISE	data	CONE/CORP	Biomass	Yes	Yes	Yes	Yes	Yes	Yes	2021; 2032
	LEVELIZED COST OF											
	ELECTRICITY RENEWABLE		Electricity supply-side	RES generation;	CAPEX for							
		Fraunhofer ISE	data	CONE/CORP	offshore Wind	Yes	Yes	Yes	Yes	Yes	Yes	2021; 2032
1	LEVELIZED COST OF											
F	ELECTRICITY RENEWABLE		Electricity supply-side	RES generation;	CAPEX for							
225 F	ENERGY TECHNOLOGIES	Fraunhofer ISE	data	CONE/CORP	onshore Wind	Yes	Yes	Yes	Yes	Yes	Yes	2021; 2032
	LEVELIZED COST OF											
F	ELECTRICITY RENEWABLE		Electricity supply-side	RES generation;	CAPEX for small							
226	ENERGY TECHNOLOGIES	Fraunhofer ISE	data	CONE/CORP	scale PV	Yes	Yes	Yes	Yes	Yes	Yes	2021; 2032
I	LEVELIZED COST OF											
F	ELECTRICITY RENEWABLE		Electricity supply-side	RES generation;	CAPEX for large							
227 F	ENERGY TECHNOLOGIES	Fraunhofer ISE	data	CONE/CORP	scale PV	Yes	Yes	Yes	Yes	Yes	Yes	2021; 2032
I	LEVELIZED COST OF											
F	ELECTRICITY RENEWABLE		Electricity supply-side	Thermal generation;	O&M costs for							
228 F	ENERGY TECHNOLOGIES	Fraunhofer ISE	data	CONE/CORP	CCGT	Yes	Yes	Yes	Yes	Yes	Yes	2021; 2032
I	LEVELIZED COST OF											
F	ELECTRICITY RENEWABLE		Electricity supply-side	Thermal generation;	O&M costs for							
229	ENERGY TECHNOLOGIES	Fraunhofer ISE	data	CONE/CORP	OCGT	Yes	Yes	Yes	Yes	Yes	Yes	2021; 2032
Ī	LEVELIZED COST OF											
I F	ELECTRICITY RENEWABLE		Electricity supply-side	Thermal generation;	O&M costs for							
230	ENERGY TECHNOLOGIES	Fraunhofer ISE	data	CONE/CORP	Biomass	Yes	Yes	Yes	Yes	Yes	Yes	2021; 2032
ī	LEVELIZED COST OF											
I I	ELECTRICITY RENEWABLE		Electricity supply-side	RES generation;	O&M costs for							
231	ENERGY TECHNOLOGIES	Fraunhofer ISE	data	CONE/CORP	offshore Wind	Yes	Yes	Yes	Yes	Yes	Yes	2021; 2032
ī	LEVELIZED COST OF											
	ELECTRICITY RENEWABLE		Electricity supply-side	RES generation;	O&M costs for							
		Fraunhofer ISE	data	CONE/CORP	onshore Wind	Yes	Yes	Yes	Yes	Yes	Yes	2021; 2032

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1		•		Temporal	Spatial			
2	Database	Author	Data input	resolution	resolution	Remarks	Additional Description	Link
	LEVELIZED COST OF							
	ELECTRICITY RENEWABLE							
221	ENERGY TECHNOLOGIES	Fraunhofer ISE	CAPEX for CCGT	target years	by country			<u>Link</u>
	LEVELIZED COST OF							
	ELECTRICITY RENEWABLE							
222	ENERGY TECHNOLOGIES	Fraunhofer ISE	CAPEX for OCGT	target years	by country			Link
	LEVELIZED COST OF							
	ELECTRICITY RENEWABLE		CAPEX for					
223	ENERGY TECHNOLOGIES	Fraunhofer ISE	Biomass	target years	by country			Link
	LEVELIZED COST OF							
	ELECTRICITY RENEWABLE		CAPEX for					
224	ENERGY TECHNOLOGIES	Fraunhofer ISE	offshore Wind	target years	by country			Link
	LEVELIZED COST OF							
	ELECTRICITY RENEWABLE		CAPEX for					
225	ENERGY TECHNOLOGIES	Fraunhofer ISE	onshore Wind	target years	by country			Link
	LEVELIZED COST OF							
	ELECTRICITY RENEWABLE		CAPEX for small					
226	ENERGY TECHNOLOGIES	Fraunhofer ISE	scale PV	target years	by country			Link
	LEVELIZED COST OF							
	ELECTRICITY RENEWABLE		CAPEX for large					
227	ENERGY TECHNOLOGIES	Fraunhofer ISE	scale PV	target years	by country			Link
	LEVELIZED COST OF							
	ELECTRICITY RENEWABLE		O&M costs for					
228	ENERGY TECHNOLOGIES	Fraunhofer ISE	CCGT	target years	by country			Link
	LEVELIZED COST OF							
	ELECTRICITY RENEWABLE		O&M costs for					
229	ENERGY TECHNOLOGIES	Fraunhofer ISE	OCGT	target years	by country			Link
	LEVELIZED COST OF							
	ELECTRICITY RENEWABLE		O&M costs for					
230	ENERGY TECHNOLOGIES	Fraunhofer ISE	Biomass	target years	by country			Link
	LEVELIZED COST OF							
	ELECTRICITY RENEWABLE		O&M costs for					
231	ENERGY TECHNOLOGIES	Fraunhofer ISE	offshore Wind	target years	by country			Link
	LEVELIZED COST OF				. ,			
	ELECTRICITY RENEWABLE		O&M costs for					
232	ENERGY TECHNOLOGIES	Fraunhofer ISE	onshore Wind	target years	by country			Link

	А	В	C	D	E	F	G	Н	I	J	Κ	L	
1	Database	6 th	Colorado	DAA alamaat	Dataland	• •	DE		ntries				
	Database	Author	Category	RAA element	Data input	AI	BE	DE	FK	NL	LU	Years	
	LEVELIZED COST OF												
	ELECTRICITY RENEWABLE		Electricity supply-side		O&M costs for					.,		0004 0000	
		Fraunhofer ISE	data	CONE/CORP	small scale PV	Yes	Yes	Yes	Yes	Yes	Yes	2021; 2032	
	LEVELIZED COST OF			550	0014								
	ELECTRICITY RENEWABLE		Electricity supply-side		O&M costs for	.,	.,	.,		.,	.,		
	ENERGY TECHNOLOGIES	Fraunhofer ISE	data	CONE/CORP	large scale PV	Yes	Yes	Yes	Yes	Yes	Yes	2021; 2032	
	LEVELIZED COST OF			550									
	ELECTRICITY RENEWABLE		Electricity supply-side	-	Learning rate								
	ENERGY TECHNOLOGIES	Fraunhofer ISE	data	CONE/CORP	Solar PV	Yes	Yes	Yes	Yes	Yes	Yes		2021
	LEVELIZED COST OF												
	ELECTRICITY RENEWABLE		Electricity supply-side		Learning rate								
	ENERGY TECHNOLOGIES	Fraunhofer ISE	data	CONE/CORP	Wind Energy	Yes	Yes	Yes	Yes	Yes	Yes		2021
	LEVELIZED COST OF												
	ELECTRICITY RENEWABLE		Electricity supply-side	-	Learning rate								
-	ENERGY TECHNOLOGIES	Fraunhofer ISE	data	CONE/CORP	CSP	Yes	Yes	Yes	Yes	Yes	Yes	2021	
	Mapping and analyses of the												
	current and future (2020 - 2030)			Electricity demand for	Total heating								
	heating/cooling fuel deployment		Electricity demand-	space heating and	demand industry								
	(fossil/renewables)	Fraunhofer ISI	side data	cooling	sector	Yes	Yes	Yes	Yes	Yes	Yes	2012; 2020; 2030	
	Mapping and analyses of the												
	current and future (2020 - 2030)			Electricity demand for	Space heating								
	heating/cooling fuel deployment		Electricity demand-	space heating and	demand industry								
	(fossil/renewables)	Fraunhofer ISI	side data	cooling	sector	Yes	Yes	Yes	Yes	Yes	Yes	2012; 2020; 2030	
	Mapping and analyses of the												
	current and future (2020 - 2030)				Water heating								
	heating/cooling fuel deployment		Electricity demand-	Conventional	demand industry								
	(fossil/renewables)	Fraunhofer ISI	side data	electricity demand	sector	Yes	Yes	Yes	Yes	Yes	Yes	2012; 2020; 2030	
	Mapping and analyses of the												
	current and future (2020 - 2030)				Process heating								
	heating/cooling fuel deployment		Electricity demand-	Conventional	demand industry								
	(fossil/renewables)	Fraunhofer ISI	side data	electricity demand	sector	Yes	Yes	Yes	Yes	Yes	Yes	2012; 2020; 2030	
	Mapping and analyses of the												
	current and future (2020 - 2030)			Electricity demand for	Space cooling								
	heating/cooling fuel deployment		Electricity demand-	space heating and	demand industry								
242	(fossil/renewables)	Fraunhofer ISI	side data	cooling	sector	Yes	Yes	Yes	Yes	Yes	Yes	2012; 2020; 2030	

	А	В	М	N	0	Р	Q	R
1				Temporal	Spatial			
2	Database	Author	Data input	resolution	resolution	Remarks	Additional Description	Link
	LEVELIZED COST OF							
	ELECTRICITY RENEWABLE		O&M costs for					
233	ENERGY TECHNOLOGIES	Fraunhofer ISE	small scale PV	target years	by country			<u>Link</u>
	LEVELIZED COST OF							
	ELECTRICITY RENEWABLE		O&M costs for					
234	ENERGY TECHNOLOGIES	Fraunhofer ISE	large scale PV	target years	by country			<u>Link</u>
	LEVELIZED COST OF							
	ELECTRICITY RENEWABLE		Learning rate					
235	ENERGY TECHNOLOGIES	Fraunhofer ISE	Solar PV	target years	by country			<u>Link</u>
	LEVELIZED COST OF							
	ELECTRICITY RENEWABLE		Learning rate					
236	ENERGY TECHNOLOGIES	Fraunhofer ISE	Wind Energy	target years	by country			<u>Link</u>
	LEVELIZED COST OF							
	ELECTRICITY RENEWABLE							
237	ENERGY TECHNOLOGIES	Fraunhofer ISE	Learning rate CSP	target years	by country			Link
	Mapping and analyses of the							
	current and future (2020 - 2030)		Total heating					
	heating/cooling fuel deployment		demand industry			Data available for primary, final		
238	(fossil/renewables)	Fraunhofer ISI	sector	target years	by country	and useful energy		Link
	Mapping and analyses of the							
	current and future (2020 - 2030)		Space heating					
	heating/cooling fuel deployment		demand industry			Data available for primary, final		
239	(fossil/renewables)	Fraunhofer ISI	sector	target years	by country	and useful energy		<u>Link</u>
1	Mapping and analyses of the							
	current and future (2020 - 2030)		Water heating					
	heating/cooling fuel deployment		demand industry			Data available for primary, final		
240	(fossil/renewables)	Fraunhofer ISI	sector	target years	by country	and useful energy		<u>Link</u>
	Mapping and analyses of the							
	current and future (2020 - 2030)		Process heating					
	heating/cooling fuel deployment		demand industry			Data available for primary, final		
241	(fossil/renewables)	Fraunhofer ISI	sector	target years	by country	and useful energy		<u>Link</u>
	Mapping and analyses of the							
	current and future (2020 - 2030)		Space cooling					
	heating/cooling fuel deployment		demand industry			Data available for primary, final		
242	(fossil/renewables)	Fraunhofer ISI	sector	target years	by country	and useful energy		<u>Link</u>

	А	В	C	D	E	F	G	Н	Ι	J	Κ	L
1					-				ntries			
2	Database	Author	Category	RAA element	Data input	AT	BE	DE	FR	NL	LU	Years
	Mapping and analyses of the											
	current and future (2020 - 2030)				Process cooling							
	heating/cooling fuel deployment		Electricity demand-	Conventional	demand industry							
243	(fossil/renewables)	Fraunhofer ISI	side data	electricity demand	sector	Yes	Yes	Yes	Yes	Yes	Yes	2012; 2020; 2030
	Mapping and analyses of the											
	current and future (2020 - 2030)				Total heating							
	heating/cooling fuel deployment		Electricity demand-	Conventional	demand service							
244	(fossil/renewables)	Fraunhofer ISI	side data	electricity demand	sector	Yes	Yes	Yes	Yes	Yes	Yes	2012; 2020; 2030
	Mapping and analyses of the			-								
	current and future (2020 - 2030)			Electricity demand for	Space heating							
	heating/cooling fuel deployment		Electricity demand-	space heating and	demand service					.,	.,	
245	(fossil/renewables)	Fraunhofer ISI	side data	cooling	sector	Yes	Yes	Yes	Yes	Yes	Yes	2012; 2020; 2030
	Mapping and analyses of the											
	current and future (2020 - 2030)				Water heating							
	heating/cooling fuel deployment		Electricity demand-	Conventional	demand service							
246	(fossil/renewables)	Fraunhofer ISI	side data	electricity demand	sector	Yes	Yes	Yes	Yes	Yes	Yes	2012; 2020; 2030
	Mapping and analyses of the				<b>D</b>							
	current and future (2020 - 2030)				Process heating							
	heating/cooling fuel deployment		Electricity demand-	Conventional	demand service							
247	(fossil/renewables)	Fraunhofer ISI	side data	electricity demand	sector	Yes	Yes	Yes	Yes	Yes	Yes	2012; 2020; 2030
	Mapping and analyses of the				<b>C</b>							
	current and future (2020 - 2030)			Electricity demand for	Space cooling							
	heating/cooling fuel deployment		Electricity demand-	space heating and	demand service	V	V	V	Var	V-	V	2012, 2020, 2020
248	(fossil/renewables) Mapping and analyses of the	Fraunhofer ISI	side data	cooling	sector	res	res	Yes	res	res	res	2012; 2020; 2030
	current and future (2020 - 2030)				Dracass saaling							
	heating/cooling fuel deployment		Electricity demand-	Conventional	Process cooling demand service							
		Fraunhofer ISI				Vac	Var	Vac	Vac	Var	Vac	2012: 2020: 2020
249	(fossil/renewables) Mapping and analyses of the	Fraunnoter ISI	side data	_electricity demand	sector	res	res	res	res	res	res	2012; 2020; 2030
	current and future (2020 - 2030)				Total heating							
			Electricity demand	Conventional	demand							
	heating/cooling fuel deployment (fossil/renewables)	Fraunhofer ISI	Electricity demand- side data		demand residential	Vac	Vac	Vac	Vac	Vac	Vac	2012; 2020; 2030
250	(rossil/renewables) Mapping and analyses of the	FI autitioter 151	รามยันสเส	electricity demand	residential	res	res	res	res	res	res	2012, 2020, 2030
	current and future (2020 - 2030)			Electricity demand for	Space heating							
	heating/cooling fuel deployment		Electricity demand-	space heating and	demand							
	(fossil/renewables)	Fraunhofer ISI	·		residential	Voc	Vac	Voc	Voc	Voc	Voc	2012; 2020; 2030
231		FIGUINOIEFISI	side data	cooling	residential	res	res	res	res	res	res	2012, 2020, 2030

	А	В	М	N	0	Р	Q	R
1		•		Temporal	Spatial			
2	Database	Author	Data input	resolution	resolution	Remarks	Additional Description	Link
	Mapping and analyses of the							
	current and future (2020 - 2030)		Process cooling					
	heating/cooling fuel deployment		demand industry			Data available for primary, final		
243	(fossil/renewables)	Fraunhofer ISI	sector	target years	by country	and useful energy		Link
	Mapping and analyses of the							
	current and future (2020 - 2030)		Total heating					
	heating/cooling fuel deployment		demand service			Data available for primary, final		
244	(fossil/renewables)	Fraunhofer ISI	sector	target years	by country	and useful energy		Link
	Mapping and analyses of the							
	current and future (2020 - 2030)		Space heating					
	heating/cooling fuel deployment		demand service			Data available for primary, final		
245	(fossil/renewables)	Fraunhofer ISI	sector	target years	by country	and useful energy		Link
	Mapping and analyses of the							
	current and future (2020 - 2030)		Water heating					
	heating/cooling fuel deployment		demand service			Data available for primary, final		
246	(fossil/renewables)	Fraunhofer ISI	sector	target years	by country	and useful energy		<u>Link</u>
	Mapping and analyses of the							
	current and future (2020 - 2030)		Process heating					
	heating/cooling fuel deployment		demand service			Data available for primary, final		
247	(fossil/renewables)	Fraunhofer ISI	sector	target years	by country	and useful energy		<u>Link</u>
	Mapping and analyses of the							
	current and future (2020 - 2030)		Space cooling					
	heating/cooling fuel deployment		demand service			Data available for primary, final		
248	(fossil/renewables)	Fraunhofer ISI	sector	target years	by country	and useful energy		Link
	Mapping and analyses of the		L					
	current and future (2020 - 2030)		Process cooling					
	heating/cooling fuel deployment		demand service			Data available for primary, final		
249	(fossil/renewables)	Fraunhofer ISI	sector	target years	by country	and useful energy		<u>Link</u>
	Mapping and analyses of the		<b>_</b>					
	current and future (2020 - 2030)		Total heating					
	heating/cooling fuel deployment		demand			Data available for primary, final		
250	(fossil/renewables)	Fraunhofer ISI	residential	target years	by country	and useful energy		<u>Link</u>
	Mapping and analyses of the							
	current and future (2020 - 2030)		Space heating					
	heating/cooling fuel deployment		demand			Data available for primary, final		
251	(fossil/renewables)	Fraunhofer ISI	residential	target years	by country	and useful energy		<u>Link</u>

	А	В	С	D	E	F	G	Н	Ι	J	К	L
1	Database	Author	Category	RAA element	Data input	ΔΤ			ntries FR			Years
	Mapping and analyses of the current and future (2020 - 2030) heating/cooling fuel deployment (fossil/renewables) Mapping and analyses of the	Fraunhofer ISI	Electricity demand- side data	Conventional electricity demand	Water heating demand residential							2012; 2020; 2030
	current and future (2020 - 2030) heating/cooling fuel deployment (fossil/renewables)	Fraunhofer ISI	Electricity demand- side data	Electricity demand for space heating and cooling	Space cooling demand residential	Yes	Yes	Yes	Yes	Yes	Yes	2012; 2020; 2030
	Mapping and analyses of the current and future (2020 - 2030) heating/cooling fuel deployment (fossil/renewables)	Fraunhofer ISI	Electricity demand- side data	Electricity demand for space heating and cooling	Installed capacity for building heat supply	Yes	Yes	Yes	Yes	Yes	Yes	201
	Mapping and analyses of the current and future (2020 - 2030) heating/cooling fuel deployment (fossil/renewables)	Fraunhofer ISI	Electricity demand- side data	Electricity demand for space heating and cooling	Number of units installed for heat supply of buildings	Yes	Yes	Yes	Yes	Yes	Yes	201
	Mapping and analyses of the current and future (2020 - 2030) heating/cooling fuel deployment (fossil/renewables)	Fraunhofer ISI	Electricity demand- side data	Electricity demand for space heating and cooling	Electrical efficiency of industrial heat applications	Yes	Yes	Yes	Yes	Yes	Yes	
	Mapping and analyses of the current and future (2020 - 2030) heating/cooling fuel deployment (fossil/renewables)	Fraunhofer ISI	Electricity demand- side data	Electricity demand for space heating and cooling	Percentage of citizens served by district heating		Yes	Yes	Yes	Yes	Yes	2013
	Mapping and analyses of the current and future (2020 - 2030) heating/cooling fuel deployment (fossil/renewables)	Fraunhofer ISI	Electricity demand- side data	Electricity demand for space heating and cooling	Electrical efficiency net of district heat applications	Yes	Yes	Yes	Yes	Yes	Yes	2016; 2020; 2030

	А	В	М	N	0	Р	Q	R
1				Temporal	Spatial			
2	Database	Author	Data input	resolution	resolution	Remarks	Additional Description	Link
	Mapping and analyses of the							
	current and future (2020 - 2030)		Water heating					
	heating/cooling fuel deployment		demand			Data available for primary, final		
252	(fossil/renewables)	Fraunhofer ISI	residential	target years	by country	and useful energy		Link
	Mapping and analyses of the							
	current and future (2020 - 2030)		Space cooling demand			Data available for primon (final		
	heating/cooling fuel deployment (fossil/renewables)	Fraunhofer ISI	residential	towastycoors	hu country (	Data available for primary, final		Link
255	(IOSSII/renewables)	Fraunnoier isi	residential	target years	by country	and useful energy		Link
						Data available for gas, oil, coal,		
	Mapping and analyses of the					CHP-IC, direct electric, biomass,		
	current and future (2020 - 2030)		Installed capacity			solar thermal, heat pumps,		
	heating/cooling fuel deployment		for building heat			individual biomass stove and air		
	(fossil/renewables)	Fraunhofer ISI	supply	target years	by country	conditioning applications		Link
254			Supply	target years	by country			
						Data available for gas, oil, coal,		
	Mapping and analyses of the		Number of units			CHP-IC, direct electric, biomass,		
	current and future (2020 - 2030)		installed for heat			solar thermal, heat pumps,		
	heating/cooling fuel deployment		supply of			individual biomass stove and air		
255	(fossil/renewables)	Fraunhofer ISI	buildings	target years	by country	conditioning applications		Link
	Mapping and analyses of the		Electrical					
	current and future (2020 - 2030)		efficiency of			Data available for CHP steam		
	heating/cooling fuel deployment		industrial heat	constant		turbine, CHP gas turbine, CHP		
256	(fossil/renewables)	Fraunhofer ISI	applications	variable	by country	combined cycle and CHP ICE		Link
	Mapping and analyses of the							
	current and future (2020 - 2030)		Percentage of					
	heating/cooling fuel deployment		citizens served by					
257	(fossil/renewables)	Fraunhofer ISI	district heating	target years	by country			<u>Link</u>
						Data available for ICE, steam		
						turbine, gas, waste, boilers (gas,		
	Mapping and analyses of the		Electrical			oil, coal, biomass, electric), solar thermal, heat pumps,		
	current and future (2020 - 2030)		efficiency net of			geothermal, compression		
	heating/cooling fuel deployment		district heat			refrigerated, absorption cooling,		
	(fossil/renewables)	Fraunhofer ISI	applications	targetvoare	by country	district heating network		Link
200	(iossii/renewables)	Fraunnoter ISI	applications	target years	by country	uistrict neating network		<u>Link</u>

	А	В	С	D	E	F	G	Н	Ι	J	Κ	L	
1				•	-		(	Coun	tries				
2	Database	Author	Category	RAA element	Data input	AT	BE	DE	FR	NL	LU	Years	
					Total installed								
					thermal capacity								
	Mapping and analyses of the				of different								
	current and future (2020 - 2030)			,	technologies for								
	heating/cooling fuel deployment		Electricity demand-	space heating and	the supply of								
259	(fossil/renewables)	Fraunhofer ISI	side data	cooling	district heat	Yes `	Yes	Yes	Yes	Yes	Yes		2012
	Mapping and analyses of the				Installed capacity								
	current and future (2020 - 2030)			Electricity demand for	of large CHP								
	heating/cooling fuel deployment		Electricity demand-	space heating and	applications of								
	(fossil/renewables)	Fraunhofer ISI	side data	cooling	different sizes	Yes `	νρς	Vec	νρς	Vec	Ves		2012
	Mapping and analyses of the				Giner Citt 51205	105	. 05	. 05		105	105		2012
	current and future (2020 - 2030)			Electricity demand for	Share of								
	heating/cooling fuel deployment		Electricity demand-	space heating and	renewable energy								
	(fossil/renewables)	Fraunhofer ISI	side data	cooling	in heat supply		Yes	Yes	Yes	Yes	Yes	2012; 2020; 2030	
	Mapping and analyses of the											,,,	
	current and future (2020 - 2030)			Electricity demand for	Share of fossil								
	heating/cooling fuel deployment		Electricity demand-	space heating and	energy in heat								
	(fossil/renewables)	Fraunhofer ISI	side data	cooling		Yes `	Yes	Yes	Yes	Yes	Yes	2012; 2020; 2031	
		ehpa - European		Electricity demand for			-	-	-	-		, , , , , , , , , , , , , , , , , , , ,	
		heat pump	Electricity demand-	space heating and	Number of heat								
263	Market Report	association	side data	cooling	pumps	Yes `	Yes	Yes	Yes	Yes	No	2008 - 2020	
					· ·								
		European		Market and regulatory									
264	METIS Technical Note T4	Commission	market design data	constraints	Market design	Yes `	Yes	Yes	Yes	Yes	Yes	2016	
		50Hertz,											
		Amprion,											
		TenneT.	Electricity supply-side		Generation								
265	Mittelfristprognose	TransnetBW	data			No	No	Vec	No	No	Na	5 year forecast	
205		TIANSHELDVV	uald	Thermal generation	biomass		UNU	res	INU	INO	INO	5 year forecast	
		50Hertz,											
		Amprion,											
		TenneT.	Electricity supply-side										
266	Mittelfristprognose	TransnetBW	data	Hydro modelling	Generation hydro	No	No	Yes	No	No	No	5 year forecast	

	А	В	М	N	0	Р	Q	R
1				Temporal	Spatial			
2	Database	Author	Data input	resolution	resolution	Remarks	Additional Description	Link
			Total installed					
			thermal capacity					
	Mapping and analyses of the		of different					
	current and future (2020 - 2030)		technologies for					
	heating/cooling fuel deployment		the supply of			Data availability per technology		
259	(fossil/renewables)	Fraunhofer ISI	district heat	target years	by country	depending on the country		<u>Link</u>
						Data available for CHP steam		
	Mapping and analyses of the		Installed capacity			turbine, CHP gas turbine, CHP		
	current and future (2020 - 2030)		of large CHP			combined cycle, CHP ICE and		
	heating/cooling fuel deployment		applications of			others (stirling engines, fuel		
	(fossil/renewables)	Fraunhofer ISI	different sizes	target years	by country	cells, ORC)		Link
	Mapping and analyses of the							
	current and future (2020 - 2030)		Share of					
	heating/cooling fuel deployment		renewable energy					
	(fossil/renewables)	Fraunhofer ISI	in heat supply	target years	by country			Link
	Mapping and analyses of the							
	current and future (2020 - 2030)		Share of fossil					
	heating/cooling fuel deployment		energy in heat					
262	(fossil/renewables)	Fraunhofer ISI	supply	target years	by country			Link
		ehpa - European						
202		heat pump	Number of heat		ь	and the first second second second	Number of residential heat pumps in	1.1.1
263	Market Report	association	pumps	yearly	by country	report published every year report published in 2019; in	operation	<u>Link</u>
						Accordance with Article 60(1) of		
						Commission Regulation (EU)		
						2017/2195 of November 2017		
		European				establishing a guideline on	Overview of European Electricity	
261	METIS Technical Note T4	Commission	Market design		by country	electricity balancing	Market Designs	Link
204		Commission	Market design		by country		Market Designs	LIIIK
		50Hertz,			regional			
		Amprion,			resolution	Data available for the different		
		TenneT.	Generation			marketing forms pursuant tog §		
265	Mittelfristprognose	TransnetBW	biomass	yearly	control area	21a EEG 2021		Link
205		T distict D V V	51011033	, curry	control di ca			
		50Hertz,			regional			
		Amprion,			resolution	Data available for the different		
		TenneT,			based on TSO	marketing forms pursuant tog §		
4 I	Mittelfristprognose	TransnetBW	Generation hydro	vearly		21a EEG 2021		Link

	А	В	С	D	E	F	G	Н	1	J	К	L
1				•					ntries			
2	Database	Author	Category	RAA element	Data input	AT	BE	DE	FR	NL	LU	Years
		50Hertz,										
		Amprion,										
		•	Electricity supply-side		Generation hydro							
267		·	data	Hydro modelling			No	Yes	No	No	No	5 year forecast
207		Transfield	uuu	- Tryaro modeling	5101480	110	110	105	110	110	110	
		50Hertz,										
		Amprion,										
			Electricity supply-side									
268	Mittelfristprognose	TransnetBW	data	RES generation	Generation PV	No	No	Yes	No	No	No	5 year forecast
		FOLlow										
		50Hertz, Amprion,										
		-	Electricity supply-side									
269			data	<b>RES</b> generation	Generation wind	No	No	Yes	No	No	No	5 year forecast
205												
		50Hertz,										
		Amprion,			Generation							
			Electricity supply-side		Geothermal							
270	Mittelfristprognose	TransnetBW	data	Thermal generation	energy	No	No	Yes	No	No	No	5 year forecast
		50Hertz,										
		Amprion,										
			Electricity supply-side		Generation other							
271			data	Thermal generation		No	No	Yes	No	No	No	5 year forecast
		50Hertz,										
		Amprion,										
			Electricity supply-side		Installed capacity							
272	Mittelfristprognose	TransnetBW	data	Thermal generation	of biomass	No	No	Yes	No	No	No	5 year forecast
		50Hertz,										
		Amprion,										
		TenneT,	Electricity supply-side		Installed capacity							
273		TransnetBW	data	Hydro modelling		No	No	Yes	No	No	No	5 year forecast

	А	В	М	Ν	0	Р	Q	R
1				Temporal	Spatial			
2	Database	Author	Data input	resolution	resolution	Remarks	Additional Description	Link
		50Hertz,			regional			
		Amprion,			resolution	Data available for the different		
		TenneT,	Generation hydro			marketing forms pursuant tog §		
267	Mittelfristprognose	TransnetBW	storage	yearly	control area	21a EEG 2021		Link
		50Hertz,			regional			
		Amprion,			resolution	Data available for the different		
		TenneT,				marketing forms pursuant tog §		
268	Mittelfristprognose	TransnetBW	Generation PV	vearly	control area	21a EEG 2021		Link
200				ycarry	controrarea	218 LLO 2021		
		50Hertz,			regional			
		Amprion,			resolution	Data available for the different		
		TenneT,				marketing forms pursuant tog §		
269	Mittelfristprognose	TransnetBW	Generation wind	yearly	control area	21a EEG 2021		Link
		50Hertz,			regional			
		Amprion,	Generation		resolution	Data available for the different		
		TenneT,	Geothermal			marketing forms pursuant tog §		
270	Mittelfristprognose	TransnetBW	energy	yearly	control area	21a EEG 2021		<u>Link</u>
						Data available for the different		
		50Hertz,			regional	marketing forms pursuant tog §		
		Amprion,			resolution	21a EEG 2021; Other RES		
0.74		TenneT,	Generation other			includes landfill gas, sewage gas,		
271	Mittelfristprognose	TransnetBW	RES	yearly	control area	mine gas		Link
		50Hertz,			regional			
		Amprion,			regional	Data available for the different		
		TenneT,	Installed capacity			marketing forms pursuant tog §		
272	Mittelfristprognose	TransnetBW	of biomass	yearly	control area	21a EEG 2021		Link
212				ycarry	controrarea			
		50Hertz,			regional			
		Amprion,			resolution	Data available for the different		
		TenneT,	Installed capacity			marketing forms pursuant tog §		
273	Mittelfristprognose	TransnetBW	of hydro	yearly	control area	21a EEG 2021		Link

	А	В	C	D	E	F	G	Н	Ι	J	К	L
1	Database	Author	Category	RAA element	Data input	۸т		Count		NI		Years
2	Database	Autioi	Category	KAA element		AI	DE		ГК	INL	LU	Tears
274		50Hertz, Amprion, TenneT, TransnetBW	Electricity supply-side data	Hydro modelling	Installed capacity of hydro storage	No 1	No `	Yes	No I	No	No	5 year forecast
275		50Hertz, Amprion, TenneT, TransnetBW	Electricity supply-side data	RES generation	Installed capacity of PV	No 1	No No	Yes	No I	No	No	5 year forecast
276		50Hertz, Amprion, TenneT, TransnetBW	Electricity supply-side data	RES generation	Installed capacity of wind	No 1	No No	Yes	No I	No	No	5 year forecast
277		50Hertz, Amprion, TenneT, TransnetBW	Electricity supply-side data	<b>RES</b> generation	Installed capacity of geothermal energy	No 1	No `	Yes	No I	No	No	5 year forecast
	U	50Hertz, Amprion, TenneT, TransnetBW	Electricity supply-side		Installed capacity							5 year forecast
			Electricity demand-	Conventional	Net imports							
279	NECPAT	BMNT	side data	electricity demand	· · · · · ·	Yes N	No I	No	No I	No	No	2015; 2020; 2030; 2040
280	NECP AT	BMNT	Electricity demand- side data	Conventional electricity demand	Electricity demand overall	Yes N	No I	No	No I	No	No	2015; 2020; 2030; 2040
281	NECP AT	BMNT	Electricity demand- side data	Conventional electricity demand	Electricity demand agriculture Electricity demand	Yes 1	No I	No	No I	No	No	2015; 2020; 2030; 2040
282	NECP AT	BMNT	Electricity demand- side data	Conventional electricity demand	commercial/servi	Yes N	No I	No I	No I	No	No	2015; 2020; 2030; 2040

	А	В	М	Ν	0	Р	Q	R
1				Temporal	Spatial			
2	Database	Author	Data input	resolution	resolution	Remarks	Additional Description	Link
		50Hertz,			regional			ſ
		Amprion,			resolution	Data available for the different		ſ
		TenneT,	Installed capacity		based on TSO	marketing forms pursuant tog §		ſ
274	Mittelfristprognose	TransnetBW	of hydro storage	yearly	control area	21a EEG 2021		<u>Link</u>
								ſ
		50Hertz,			regional			ſ
		Amprion,			resolution	Data available for the different		
		TenneT,	Installed capacity			marketing forms pursuant tog §		ſ
275	Mittelfristprognose	TransnetBW	of PV	yearly	control area	21a EEG 2021		Link
		5011						
		50Hertz,			regional			ſ
		Amprion,			resolution	Data available for the different		ſ
		TenneT,	Installed capacity			marketing forms pursuant tog §		
276	Mittelfristprognose	TransnetBW	of wind	yearly	control area	21a EEG 2021		<u>Link</u>
		5011						ſ
		50Hertz,			regional			
		Amprion,	Installed capacity		resolution	Data available for the different		
		TenneT,	of geothermal			marketing forms pursuant tog §		
277	Mittelfristprognose	TransnetBW	energy	yearly	control area	21a EEG 2021		Link
		5011				Data available for the different		ſ
		50Hertz,			regional	marketing forms pursuant tog §		
		Amprion,			resolution	21a EEG 2021; Other RES		ſ
		TenneT,	Installed capacity			includes landfill gas, sewage gas,		
278	Mittelfristprognose	TransnetBW		yearly	control area	mine gas		<u>Link</u>
070			Net imports					1
279	NECP AT	BMNT		target years	by country			Link
200			Electricity					1
280	NECP AT	BMNT	demand overall	target years	by country			Link
			Electricity					1
201			demand					1
281	NECP AT	BMNT	agriculture	target years	by country			Link
			Electricity					1
			demand					
			commercial/servi					
282	NECP AT	BMNT	се	target years	by country			<u>Link</u>

	А	В	С	D	E	F	G	Н	Ι	J	К	L
1									ntries			
2	Database	Author	Category	RAA element	Data input	AT	BE	DE	FR	NL	LU	Years
					Electricity							
			Electricity demand-	Conventional	demand							
283	NECP AT	BMNT	side data	electricity demand	households	Yes	No	No	No	No	No	2015; 2020; 2030; 2040
			Electricity demand-	Conventional	Electricity							
284	NECP AT	BMNT	side data	electricity demand		Yes	No	No	No	No	No	2015; 2020; 2030; 2040
					Electricity							
			Electricity demand-	Conventional	demand							
285	NECP AT	BMNT	side data	electricity demand	transportation	Yes	No	No	No	No	No	2015; 2020; 2030; 2040
			Electricity demand-	Conventional								
286	NECPAT	BMNT	side data	electricity demand	Energy efficiency	Yes	No	No	No	No	No	2030
0.07		Belgian	Electricity demand-	Conventional	Electricity							
287	NECP BE	Government	side data	electricity demand	demand overall	No	Yes	No	No	No	No	2007; 2013 - 2017; 2030
		<b>.</b>			Electricity							
200		Belgian	Electricity demand-	Conventional	demand							
288	NECP BE	Government	side data	electricity demand	agriculture	No	Yes	No	No	No	No	2007; 2013 - 2017; 2031
					Electricity							
		Delates			demand							
200		Belgian	Electricity demand-	Conventional	commercial/servi		v					0007 0040 0047 0000
289	NECP BE	Government	side data	electricity demand	ce	NO	Yes	NO	No	No	NO	2007; 2013 - 2017; 2032
		Delater	Electricite e de mand	Commentional	Electricity							
200		Belgian	Electricity demand-	Conventional	demand	N	V	NI.	N I .	N	N1.	0007 0010 0017 0000
290	NECP BE	Government	side data	electricity demand	households	NO	Yes	NO	No	No	NO	2007; 2013 - 2017; 2033
201		Belgian	Electricity demand-		Electricity	NI-	Vee	NI-	N	NI-	NI-	2007, 2012, 2017, 2024
291	NECP BE	Government	side data	electricity demand	Electricity	INO	Yes	INO	INO	INO	INO	2007; 2013 - 2017; 2034
		Belgian	Electricity demand-	Conventional	demand							
202	NECP BE	-				NI-	V	NI-	NI-	NI-	NI-	2007; 2013 - 2017; 2035
292	INECP BE	Government Belgian	side data Electricity demand-	electricity demand	transportation Efficiency gains	INO	res	INO	INO	INO	INO	2007; 2013 - 2017; 2035
202	NECP BE	Beigian Government	side data	electricity demand	from renovating	No	Voc	No	No	No	No	2030
295		Bundesministeri	Side data		Ironnenovating	INO	res	INO	INO	INO	INO	2030
		um für			Electricity							
		Wirtschaft und	Electricity demand-	Conventional	demand							
201	NECP DE	Klimaschutz	side data	electricity demand	transportation	No	No	Ver	No	No	No	2020; 2025; 2030
294		Bundesministeri	Siuc uata	cicculicity demaild		0	INU	165	INU	110	INU	2020, 2023, 2030
		um für		Electricity demand for	Electricity							
		Wirtschaft und	Electricity demand-	space heating and	demand heating							
295	NECP DE	Klimaschutz	side data	cooling	and cooling	No	No	Yec	No	No	No	2020; 2025; 2030
255		Rinnaschutz	Side data	cooning		110	110	103	110	110	110	2020, 2023, 2030

	А	В	М	N	0	Р	Q	R
1				Temporal	Spatial			
2	Database	Author	Data input	resolution	resolution	Remarks	Additional Description	Link
			Electricity					
			demand					
283	NECPAT	BMNT	households	target years	by country			<u>Link</u>
			Electricity					
284	NECP AT	BMNT		target years	by country			Link
			Electricity					
			demand					
285	NECP AT	BMNT	transportation	target years	by country			<u>Link</u>
							Efficiency gains of electricity users	
							(more efficient appliances, energy	
286	NECP AT	BMNT		target years	by country	reference year 2015	saving)	<u>Link</u>
		Belgian	Electricity					
287	NECP BE	Government	demand overall	target years	by country			<u>Link</u>
			Electricity					
		Belgian	demand					
288	NECP BE	Government	agriculture	target years	by country			<u>Link</u>
			Electricity					
		5.1.1	demand					
		Belgian	commercial/servi					
289	NECP BE	Government	ce	target years	by country			Link
		<b>D</b> 1 ·	Electricity					
200		Belgian	demand					
290	NECP BE	Government	households	target years	by country			Link
201		Belgian	Electricity		1			
291	NECP BE	Government		target years	by country			Link
		Belgian	Electricity demand					
202		•			h			1 Sector
292	NECP BE	Government Belgian	transportation Efficiency gains	target years	by country			Link
202	NECP BE	Beigian Government	from renovating	target years	by country			Link
295		Bundesministeri	Trontrenovating	target years	by country			
		um für	Electricity					
		Wirtschaft und	demand				Demand as a percentage of total	
201	NECP DE	Klimaschutz	transportation	target years	by country		demand	<u>Link</u>
2.54		Bundesministeri		taiget years	by country		ucmanu	
		um für	Electricity					
		Wirtschaft und	demand heating				Demand as a percentage of total	
295	NECP DE		-	target vears	by country			Link
295	NECP DE	Klimaschutz	and cooling	target years	by country		demand	Li

	А	В	С	D	E	F	G	Н	Ι	J	Κ	L
1									ntries			
2	Database	Author	Category	RAA element	Data input	AT	BE	DE	FR	NL	LU	Years
					Renewable and							
				Electricity demand for								
			Electricity demand-	space heating and	and cold in							
296	NECP FR	DFBEW	side data	cooling	district heating	No	No	No	Yes	No	No	2030
			Electricity demand-	Conventional								
297	NECP FR	DFBEW	side data	electricity demand	Economic growth	No	No	No	Yes	No	No	2015 - 2050
			Electricity demand-	Conventional	Demographic							
298	NECP FR	DFBEW	side data	electricity demand	development	No	No	No	Yes	No	No	2015 - 2050
					Number of							
			Electricity demand-	Conventional	primary							
299	NECP FR	DFBEW	side data	electricity demand	residences	No	No	No	Yes	No	No	2012; 2017; 2018; 2023
				Electricity demand for	Number of							
			Electricity demand-	space heating and	aerothermal heat							
300	NECP FR	DFBEW	side data	cooling		No	No	No	Yes	No	No	2012; 2017; 2018; 2023
				,	Number of							
			Electricity demand-	space heating and	geothermal heat							
301	NECP FR	DFBEW	side data	cooling	pumps	No	No	No	Yes	No	No	2012; 2017; 2018; 2023
				Electricity demand for	Share of each							
			Electricity demand-	space heating and	energy source for							
302	NECP FR	DFBEW	side data	cooling	the heat supply	No	No	No	Yes	No	No	2023; 2028
					Electricity							
					demand							
			Electricity demand-	Conventional	commercial/servi							
303	NECP FR	DFBEW	side data	electricity demand	се	No	No	No	Yes	No	No	2015; 2020; 2030; 2040; 2050
					Electricity							
			Electricity demand-	Conventional	demand							
304	NECP FR	DFBEW	side data	electricity demand	households	No	No	No	Yes	No	No	2015; 2020; 2030; 2040; 2050
			Electricity demand-	Conventional	Electricity							
305	NECP FR	DFBEW	side data	electricity demand	demand industry	No	No	No	Yes	No	No	2015; 2020; 2030; 2040; 2050
		Government of	Electricity demand-	Electricity demand of								
306	NECP LU	Luxembourg	side data	EV	Number of EV	No	No	No	No	No	Yes	2030
		Government of	Electricity demand-	Conventional	Efficiency gains							
307	NECP LU	Luxembourg	side data	electricity demand	from renovating	No	No	No	No	No	Yes	2030
		Government of	Electricity demand-	Conventional								
308	NECP LU	Luxembourg	side data	electricity demand		No	No	No	No	No	Yes	2020; 2025; 2030; 2035; 2040
		Government of	Electricity demand-	Conventional	Demographic							
309	NECP LU	Luxembourg	side data	electricity demand	development	No	No	No	No	No	Yes	2020; 2025; 2030; 2035; 2040

	А	В	М	N	0	Р	Q	R
1				Temporal	Spatial			
2	Database	Author	Data input	resolution	resolution	Remarks	Additional Description	Link
			Renewable and					
			recovered heat					
			and cold in district					
296	NECP FR	DFBEW	heating	target years	by country	reference year 2012		Link
				in intervals of			Development of economic	
297	NECP FR	DFBEW	Economic growth		by country		performance in terms of GDP	<u>Link</u>
			Demographic	in intervals of				
298	NECP FR	DFBEW	development	5 to 15 years	by country		Development of demographics	<u>Link</u>
			Number of					_
			primary					
299	NECP FR	DFBEW	residences	target years	by country			<u>Link</u>
			Number of					_
			aerothermal heat					
300	NECP FR	DFBEW	pumps	target years	by country		Number of Aerothermal heat pumps	Link
			Number of					
			geothermal heat					
301	NECP FR	DFBEW	pumps	target years	by country		Number of Geothermal heat pumps	Link
			Share of each					
			energy source for					
302	NECP FR	DFBEW	the heat supply	target years	by country			Link
			Electricity					
			demand					
			commercial/servi					
303	NECP FR	DFBEW	се	target years	by country	bar chart		Link
			Electricity					-
			demand					
304	NECP FR	DFBEW	households	target years	by country	bar chart		Link
			Electricity					_
305	NECP FR	DFBEW	demand industry	target years	by country	bar chart		Link
		Government of	,				Share of EVs of total number of	
306	NECP LU	Luxembourg	Number of EV	target years	by country		vehicles	Link
		Government of	Efficiency gains					
307	NECP LU	Luxembourg	from renovating		by country			Link
		Government of					Development of economic	
308	NECP LU	Luxembourg	Economic growth		by country		performance in terms of GDP	Link
		Government of	Demographic		, ,		•	
309	NECP LU	Luxembourg	development		by country		Development of demographics	Link

	А	В	С	D	E	F	G	Н		J	Κ	L
1									ntries			
2	Database	Author	Category	RAA element	Data input	AT	BE	DE	FR	NL	LU	Years
		Government of	Electricity demand-	Conventional	Electricity							2015; 2020; 2025; 2030; 2035;
310	NECP LU	Luxembourg	side data	electricity demand	demand industry	No	No	No	No	No	Yes	2040
					Electricity							
		Government of	Electricity demand-	Conventional	demand							2015; 2020; 2025; 2030; 2035;
311	NECP LU	Luxembourg	side data	electricity demand	households	No	No	No	No	No	Yes	2040
					Electricity							
					demand							
		Government of	Electricity demand-	Conventional	commercial/servi							2015; 2020; 2025; 2030; 2035;
312	NECP LU	Luxembourg	side data	electricity demand	ce	No	No	No	No	No	Yes	2040
					Electricity							
		Government of	Electricity demand-	Conventional	demand							2015; 2020; 2025; 2030; 2035;
313	NECP LU	Luxembourg	side data	electricity demand	transportation	No	No	No	No	No	Yes	2040
				Cross-border trade								
		Government of	Network and	modelling (between	Interconnectors							
314	NECP LU	Luxembourg	infrastructural data	modelled zones)	capacity	No	No	No	No	No	Yes	2016; 2020; 2030; 2040
		Government of	Network and	Conventional	Electricity							
315	NECP LU	Luxembourg	infrastructural data	electricity demand	demand overall	No	No	No	No	No	Yes	2020; 2025; 2030; 2035; 2040
		Government of	Electricity demand-	Conventional	Demographic							2000; 2010; 2018; 2020; 2025;
316	NECP NL	the Netherlands	side data	electricity demand	development	No	No	No	No	Yes	No	2030
					Number of							
		Government of	Electricity demand-	Conventional	primary							2000; 2010; 2018; 2020; 2025;
317	NECP NL	the Netherlands	side data	electricity demand	residences	No	No	No	No	Yes	No	2030
		Government of	Electricity demand-	Conventional	Electricity							
318	NECP NL		side data	electricity demand	demand overall	No	No	No	No	Yes	No	2014 - 2019; 2022; 2025
		Government of	Electricity supply-side		Non-operational							
319	NECP NL	the Netherlands	data	Thermal generation	capacity	No	No	No	No	Yes	No	2014 - 2019; 2022; 2025
				Cross-border trade								
		Government of	Network and	modelling (between	Interconnectors							
320	NECP NL	the Netherlands	infrastructural data	modelled zones)	capacity	No	No	No	No	Yes	No	2019; 2020; 2025; 2030
		Government of	Electricity supply-side	Thermal generation;								
321	NECP NL	the Netherlands	data	CONE/CORP	Carbon price	No	No	No	No	Yes	No	2021 - 2030
			Electricity supply-side		Time series of							
322	PECD	ENTSO-E	data	<b>RES</b> generation	water inflow	Yes	Yes	Yes	Yes	Yes	Yes	2025: 2030
			Electricity supply-side		Time series of							
323	PECD	ENTSO-E	data	<b>RES</b> generation	solar irradiance	Yes	Yes	Yes	Yes	Yes	Yes	2025: 2030
			Electricity supply-side		Time series of							
324	PECD	ENTSO-E	data	<b>RES</b> generation	wind speed	Yes	Yes	Yes	Yes	Yes	Yes	2025: 2030

	А	В	М	N	0	Р	Q	R
1				Temporal	Spatial			
2	Database	Author	Data input	resolution	resolution	Remarks	Additional Description	Link
		Government of	Electricity					
310	NECP LU	Luxembourg	demand industry		by country			<u>Link</u>
			Electricity					
		Government of	demand					
311	NECPLU	Luxembourg	households		by country			<u>Link</u>
			Electricity					
			demand					
		Government of	commercial/servi					
312	NECP LU	Luxembourg	се		by country			<u>Link</u>
			Electricity					
		Government of	demand				Time series of demand by	
313	NECP LU	Luxembourg	transportation		by country		transportation	<u>Link</u>
		Government of	Interconnectors					
314	NECP LU	Luxembourg	capacity		by country			<u>Link</u>
		Government of	Electricity					
315	NECP LU	Luxembourg	demand overall		by country		Time series of electricity demand	Link
		Government of	Demographic					
316	NECP NL	the Netherlands	development	target years	by country			<u>Link</u>
			Number of					
		Government of	primary					
317	NECP NL	the Netherlands	residences	target years	by country			Link
		Government of	Electricity					
318	NECP NL	the Netherlands	demand overall	target years	by country		Time series of electricity demand	<u>Link</u>
		Government of	Non-operational					
319	NECP NL	the Netherlands	capacity	target years	by country			<u>Link</u>
		Government of	Interconnectors					
320	NECP NL	the Netherlands	capacity	target years	by country			Link
		Government of		linear				
321	NECP NL	the Netherlands	Carbon price	interpolation	by country		Tax on top of ETS	<u>Link</u>
			Time series of	target years;				
322	PECD	ENTSO-E	water inflow	hourly	by country			<u>Link</u>
			Time series of	target years;				
323	PECD	ENTSO-E	solar irradiance	hourly	by country		Full load hours	<u>Link</u>
			Time series of	target years;				
324	PECD	ENTSO-E	wind speed	hourly	by country		Full load hours	Link

	А	В	C	D	E	F G H	I J K	L
1	Database	Anthree	Colorado	DAA slavest	Detailment	Count		No
	Database	Author	Category	RAA element	Data input	AT BE DE	FR NL LU	rears
			Electricity demand-					
325	PEMMDB	ENTSO-E	side data	Industrial DSR	DSR potential	Yes Yes Yes `		2025.2030
525				Industrial DSR	DSR maximum		103 103 103	2023, 2030
			Electricity demand-		activation			
326	PEMMDB	ENTSO-E	side data	Industrial DSR	capacity	Yes Yes Yes `	Yes Yes Yes	2025:2030
520					DSR maximum			2023, 2000
			Electricity demand-		activation			
327	PEMMDB	ENTSO-E	side data	Industrial DSR	duration	Yes Yes Yes `	Yes Yes Yes	N/A
527					Net capacity			
			Electricity supply-side		Battery storage			
328	PEMMDB	ENTSO-E	data	Battery storage units	(MW)	Yes Yes Yes	Yes Yes Yes	2025: 2030
520					Net capacity			
			Electricity supply-side		Battery storage			
329	PEMMDB	ENTSO-E	data	Battery storage units		Yes Yes Yes `	Yes Yes Yes	2025; 2030
			Electricity demand-	Electricity demand of				
330	PEMMDB	ENTSO-E	side data	EV	Number of EV	Yes Yes Yes `	Yes Yes Yes	2025; 2030
			Electricity demand-	Conventional	Electricity			
331	PEMMDB	ENTSO-E	side data	electricity demand	demand overall	Yes Yes Yes `	Yes Yes Yes	2025; 2030
			Electricity supply-side		Net capacity			
332	PEMMDB	ENTSO-E	data	Thermal generation	Nuclear	Yes Yes Yes `	Yes Yes Yes	2025; 2030
			Electricity supply-side		Net capacity			
333	PEMMDB	ENTSO-E	data	Thermal generation	Lignite	Yes Yes Yes `	Yes Yes Yes	2025; 2030
			Electricity supply-side		Net capacity			
334	PEMMDB	ENTSO-E	data	Thermal generation	Hard Coal	Yes Yes Yes Y	Yes Yes Yes	2025; 2030
			Electricity supply-side					
335	PEMMDB	ENTSO-E	data	Thermal generation	Net capacity Gas	Yes Yes Yes Y	Yes Yes Yes	2025; 2030
			Electricity supply-side					
336	PEMMDB	ENTSO-E	data	Thermal generation	· ·	Yes Yes Yes `	Yes Yes Yes	2025; 2030
			Electricity supply-side		Net capacity			
337	PEMMDB	ENTSO-E	data	RES generation	Hydro	Yes Yes Yes `	Yes Yes Yes	2025; 2030
					Net capacity			
			Electricity supply-side		Hydro Run of			
338	PEMMDB	ENTSO-E	data	RES generation	River & Pondage	Yes Yes Yes	Yes Yes Yes	2025; 2030

	А	В	М	Ν	0	Р	Q	R
1				Temporal	Spatial			
2	Database	Author	Data input	resolution	resolution	Remarks	Additional Description	Link
							DSR activation curve, consisting of	
							different price and volume bands,	
							indicating minimum price required to	
							activate the corresponding volumes of	
325	PEMMDB	ENTSO-E	DSR potential	target years	by country		DSR.	Link
			DSR maximum				Indicates the maximum DSR activation	1
			activation				capacity for a volume band of the DSR	
326	PEMMDB	ENTSO-E	capacity	target years	by country		activation function.	Link
			DSR maximum				Indicates the maximum DSR activation	1
			activation				duration for a volume band of the DSR	
327	PEMMDB	ENTSO-E	duration	target years	by country		activation function.	Link
			Net capacity				Installed non-market participating	
			Battery storage				Battery storage capacities (output,	
328	PEMMDB	ENTSO-E	(MW)	target years	by country		MW)	Link
			Net capacity				Installed non-market participating	
			Battery storage				Battery storage capacities (storage,	
329	PEMMDB	ENTSO-E	(MWh)	target years	by country		MWh)	Link
330	PEMMDB	ENTSO-E	Number of EV	target years	by country	Reference year 2017	Number of electric vehicles.	Link
			Electricity			Historical Data from 1982 -		
331	PEMMDB	ENTSO-E	demand overall	hourly	by country	2016	Time series of electricity demand	Link
			Net capacity				Net installed capacity of nuclear	
332	PEMMDB	ENTSO-E	Nuclear	target years	by country		energy	Link
			Net capacity					
333	PEMMDB	ENTSO-E	Lignite	target years	by country		Net installed capacity of Lignite	Link
			Net capacity Hard					
334	PEMMDB	ENTSO-E	Coal	target years	by country		Net installed capacity of Hard Coal	<u>Link</u>
335	PEMMDB	ENTSO-E	Net capacity Gas	target years	by country		Net installed capacity of Gas	<u>Link</u>
336	PEMMDB	ENTSO-E	Net capacity Oil	target years	by country		Net installed capacity of Oil	<u>Link</u>
			Net capacity					
337	PEMMDB	ENTSO-E	Hydro	target years	by country		Net installed capacity of Hydro	<u>Link</u>
			Net capacity					
			Hydro Run of				Net installed capacity of Hydro Run of	
338	PEMMDB	ENTSO-E	River & Pondage	target years	by country		River & Pondage	Link

	А	В	С	D	E	F	G	Н	Ι	J	Κ	L	
1				•	-		(	Coun	tries				
2	Database	Author	Category	RAA element	Data input	AT	BE	DE	FR	NL	LU	Years	
					Net capacity								
					Hydro Pump								
			Electricity supply-side		Storage Open								
339	PEMMDB	ENTSO-E	data	Hydro modelling	Loop	Yes `	Yes	Yes	Yes	Yes	Yes	2025; 2030	
					Net capacity								
					Hydro Pump								
			Electricity supply-side		Storage Closed								
340	PEMMDB	ENTSO-E	data	Hydro modelling	Loop	Yes `	Yes	Yes	Yes	Yes	Yes	2025; 2030	
					Net capacity								
					Hydro Pump								
			Electricity supply-side		Storage Open								
341	PEMMDB	ENTSO-E	data	Hydro modelling	Loop	Yes `	Yes	Yes	Yes	Yes	Yes	2025; 2030	
					Net capacity								
					Hydro Pump								
			Electricity supply-side		Storage Closed								
342	PEMMDB	ENTSO-E	data	Hydro modelling	Loop	Yes `	Yes	Yes	Yes	Yes	Yes	2025; 2030	
			Electricity supply-side		Net capacity								
343	PEMMDB	ENTSO-E	data	RES generation	Wind onshore	Yes `	Yes	Yes	Yes	Yes	Yes	2025; 2030	
			Electricity supply-side		Net capacity								
344	PEMMDB	ENTSO-E	data	<b>RES</b> generation	Wind offshore	Yes `	Yes	Yes	Yes	Yes	Yes	2025; 2030	
			Electricity supply-side		Net capacity								
345	PEMMDB	ENTSO-E	data	<b>RES</b> generation	Solar thermal	Yes `	Yes	Yes	Yes	Yes	Yes	2025; 2030	
					Net capacity								
			Electricity supply-side		Solar								
346	PEMMDB	ENTSO-E	data	<b>RES</b> generation	photovoltaic	Yes `	Yes	Yes	Yes	Yes	Yes	2025; 2030	
			Electricity supply-side		Net capacity								
347	PEMMDB	ENTSO-E	data	Thermal generation	Other RES	Yes `	Yes	Yes	Yes	Yes	Yes	2025; 2030	
			Electricity supply-side		Net capacity								
348	PEMMDB	ENTSO-E	data	Thermal generation	Biofuel	Yes `	Yes	Yes	Yes	Yes	Yes	2025; 2030	
					Energy storage								
			Electricity supply-side		Hydro - Run of								
349	PEMMDB	ENTSO-E	data	Hydro modelling	River & Pondage	Yes `	Yes	Yes	Yes	Yes	Yes	2025; 2030	
					Energy storage								
			Electricity supply-side		Hydro - Units								
350	PEMMDB	ENTSO-E	data	Hydro modelling	with reservoir	Yes `	Yes	Yes	Yes	Yes	Yes	2025; 2030	
			Electricity supply-side		Energy storage								
351	PEMMDB	ENTSO-E	data	Battery storage units	Batteries	Yes `	Yes	Yes	Yes	Yes	Yes	2025; 2030	

	А	В	М	Ν	0	Р	Q	R
1				Temporal	Spatial			
2	Database	Author	Data input	resolution	resolution	Remarks	Additional Description	Link
			Net capacity					
			Hydro Pump					
			Storage Open				Net installed capacity of Hydro Pump	
339	PEMMDB	ENTSO-E	Loop	target years	by country		Storage Open Loop	<u>Link</u>
			Net capacity					
			Hydro Pump					
240			Storage Closed				Net installed capacity of Hydro Pump	
340	PEMMDB	ENTSO-E	Loop	target years	by country		Storage Closed Loop	<u>Link</u>
			Net capacity					
			Hydro Pump					
241			Storage Open				Net installed capacity of Hydro Pump	
341	PEMMDB	ENTSO-E	Loop	target years	by country		Storage Open Loop	Link
			Net capacity					
			Hydro Pump				Net installed as a site of the due Domes	
242		ENTSO-E	Storage Closed		h		Net installed capacity of Hydro Pump	1.5.1.
342	PEMMDB	ENTSO-E	Loop Net capacity	target years	by country		Storage Closed Loop	<u>Link</u>
242	PEMMDB	ENTSO-E	Wind onshore	towastycows	by country.		Net installed capacity of Wind onshore	Link
343	PEMIMDB	ENTSO-E	Net capacity	target years	by country		Net installed capacity of Wind onshore	
244	PEMMDB	ENTSO-E	Wind offshore	target years	by country		offshore	Link
544	PEMIMDB	EN130-E	Net capacity Solar	larget years	by country		onshore	<u>Link</u>
215	PEMMDB	ENTSO-E	thermal	target years	by country		Net installed capacity of Solar thermal	Link
545	FEMMOB	LINI JO-L		taiget years	by country		Net installed capacity of solar thermal	
			Net capacity Solar				Net installed capacity of Solar	
346	PEMMDB	ENTSO-E	photovoltaic	target years	by country		photovoltaic	Link
540		LINISO L	Net capacity		by country		photovoltale	
347	PEMMDB	ENTSO-E	Other RES	target years	by country		Net installed capacity of Other RES	Link
547		EN150 E	Net capacity		by country		Net installed capacity of other RES	
348	PEMMDB	ENTSO-E	Biofuel	target years	by country		Net installed capacity of Biofuel	Link
510			Energy storage		by country			
			Hydro - Run of					
349	PEMMDB	ENTSO-E		target years	by country		in MWh	Link
			Energy storage					
			Hydro - Units					
350	PEMMDB	ENTSO-E	with reservoir	target years	by country		in MWh	Link
			Energy storage		,,		Market participating battery storage	
351	PEMMDB	ENTSO-E	Batteries	target years	by country		(MWh)	Link

	А	В	С	D	E	F	G	Н	Ι	J	К	L
1	Database	Andlern	<b>C</b> -1	DAA damaat	Detailment	A.T.			tries			Marina
2	Database	Author	Category	RAA element	Data input	AI	BE	DE	FK	NL	LU	Years
			Network and	Delensing	System reserve							
252	PEMMDB	ENTSO-E	infrastructural data	Balancing requirements	requirements for balancing energy	Voc	Voc	Voc	Voc	Voc	Voc	2025; 2030
352		LINI 30-E	Network and	Balancing	Sum of reserve	Tes	res	res	Tes	Tes	Tes	2023, 2030
353	PEMMDB	ENTSO-E	infrastructural data	requirements	Hydro	Vec '	Vec	Vec	Vec	Vec	Vec	2025: 2030
555				requirements	Tiyaro	103	105	105	105	103	105	2023, 2000
					Capacity-							
			Electricity supply-side		weighted average							
354	PEMMDB	ENTSO-E	data	Thermal generation	must-run ratio	No	Yes	Yes	No	Yes	No	2025; 2030
												´
			Electricity supply-side		Sum of must-run							
355	PEMMDB	ENTSO-E	data	Thermal generation	capacity (MW)	No	Yes	Yes	No	Yes	No	2025; 2030
					Capacity-							
					weighted							
			Electricity supply-side		Average Derating							
356	PEMMDB	ENTSO-E	data	Thermal generation	Ratio	No	No	No	No	No	No	2025; 2030
					Sum of average							
			Electricity supply-side		derating capacity							
357	PEMMDB	ENTSO-E	data	Thermal generation	(MW)	No	No	No	No	No	No	2025; 2030
					Capacity- weighted							
			Electricity supply-side		Average Forced							
250	PEMMDB	ENTSO-E	data	Unplanned outages	Outage Rate	Yes	Voc	Voc	Voc	Voc	No	2025: 2030
550			uata	Onplanned Outages	Sum of Average	165	163	165	165	165	INU	2023, 2030
			Electricity supply-side		Forced Outage							
359	PEMMDB	ENTSO-E	data	Unplanned outages	capacity (MW)	Yes	Yes	Yes	Yes	Yes	No	2025; 2030
<u> </u>				Cross-border trade								
1			Network and	modelling (between	Net transfer							
360	PEMMDB	ENTSO-E	infrastructural data	modelled zones)	capacity (HVAC)	Yes	Yes	Yes	Yes	Yes	No	2025: 2030
				Cross-border trade								
			Network and	modelling (between	Net transfer							
361	PEMMDB	ENTSO-E	infrastructural data	modelled zones)	capacity (HVDC)	No	Yes	Yes	Yes	Yes	Yes	2025: 2030
				Cross-border trade								
			Network and	modelling (between								
362	PEMMDB	ENTSO-E	infrastructural data	modelled zones)	Import limit	No	No	No	No	Yes	No	2025: 2030
				Cross-border trade								
1202			Network and	modelling (between	Example 11 and 1	NLC 1	N 1 -	NL:	NLS	V	NI -	2025-2020
363	PEMMDB	ENTSO-E	infrastructural data	modelled zones)	Export limit	NO	IN0	INO	INO	Yes	NO	2025: 2030

	А	В	М	Ν	0	Р	Q	R
1				Temporal	Spatial			
2	Database	Author	Data input	resolution	resolution	Remarks	Additional Description	Link
			System reserve				Minimum system reserve	
			requirements for				requirements for balancing energy	
352	PEMMDB	ENTSO-E	balancing energy	target years	by country		products FCR, FRR and RR.	Link
			Sum of reserve				Sum of reserve provided by HYDRO	
353	PEMMDB	ENTSO-E	Hydro	target years	by country		(MW)	<u>Link</u>
						L		
			Capacity-			The data in this sheet is only		
			weighted average			valid for the "National		
354	PEMMDB	ENTSO-E	must-run ratio	target years	by country	Estimates" scenario		<u>Link</u>
						The data in this sheet is only		
			Sum of must-run			valid for the "National	Must run capacity is	
355	PEMMDB	ENTSO-E	capacity (MW)	target years	by country	Estimates" scenario	mustrun_ratio*capacity	Link
			Capacity-			The data in this sheet is only		
			weighted Average			valid for the "National		
256	PEMMDB	ENTSO-E	Derating Ratio		bycountry	Estimates" scenario		Link
330	PEMIMDB	ENTSO-E	Sum of average	target years	by country	The data in this sheet is only		<u>Link</u>
			derating capacity			valid for the "National	Effective capacity is	
257	PEMMDB	ENTSO-E	(MW)	target years	by country	Estimates" scenario	derating_ratio*capacity	Link
557	FEIMIMDB	EN130-E	Capacity-	taiget years	by country			
			weighted Average			The data in this sheet is only		
			Forced Outage			valid for the "National		
358	PEMMDB	ENTSO-E	Rate	target years	by country	Estimates" scenario		Link
550		EN130 E	Sum of Average	target years	by country	The data in this sheet is only		
			Forced Outage			valid for the "National		
359	PEMMDB	ENTSO-E	capacity (MW)	target years	by country	Estimates" scenario		Link
					2,000,			
			Net transfer	target years;			Net transfer capacity in High-Voltage-	
360	PEMMDB	ENTSO-E	capacity (HVAC)	hourly	by country		Alternating-Current	Link
				,	, , ,		0.00	
			Net transfer	target years;			Net transfer capacity in High-Voltage-	
361	PEMMDB	ENTSO-E	capacity (HVDC)	hourly	by country		Direct-Current	Link
					· · ·			
				target years;			Gross / Net import limit of energy	
362	PEMMDB	ENTSO-E	Import limit	hourly	by country		resources	<u>Link</u>
				target years;			Gross / Net export limit of energy	
363	PEMMDB	ENTSO-E	Export limit	hourly	by country		resources	<u>Link</u>

	А	В	С	D	E	F	G	Н	Ι	J	Κ	L
1	Database	Author	Category	RAA element	Data input	ΔΤ			ntries FR			Years
	Database	Addior	category		Datamput					INE	EO	
				Cross-border trade	Power transfer							
			Network and	modelling (between	distribution							
364	PEMMDB	ENTSO-E	infrastructural data	modelled zones)	factor (PTDF)	Yes	Yes	Yes	Yes	Yes	No	2021
				Current la curde a tare de	Demeining							
			Network and	Cross-border trade modelling (between	Remaining available margin							
265	PEMMDB	ENTSO-E	infrastructural data	modelled zones)	-	Voc	Voc	Voc	Voc	Voc	No	2021
505				Electricity demand for	(1*1**)	103	103	103	103	103	110	2021
			Electricity demand-	space heating and	Hybrid Heat							
366	PEMMDB	ENTSO-E	side data	cooling	•	Yes	Yes	Yes	Yes	Yes	Yes	N/A
				Electricity demand for								
			Electricity demand-	space heating and								
367	PEMMDB	ENTSO-E	side data	cooling	Heat Pump COP	Yes	Yes	Yes	Yes	Yes	Yes	N/A
			Electricity demand-	Conventional	Air Conditioning							
368	PEMMDB	ENTSO-E	side data	electricity demand		Yes	Yes	Yes	Yes	Yes	Yes	N/A
260			Electricity demand-	Electricity demand of	country specific	Vaa	Na	Vaa	Nia	Vaa	Na	
369	PEMMDB	ENTSO-E	side data Electricity demand-	EV Conventional	charging profile Demographic	Yes	INO	res	INO	res	INO	
370	Population, total	The World Bank	side data	electricity demand		Yes	Yes	Yes	Yes	Yes	Yes	1921 - 2020
570					development	105	100	105	100	100	100	1/21 2020
					Fixed operating							
	Projected Costs of Generating		Electricity supply-side	-	cost for existing							
371	Electricity 2020	IEA	data	CONE/CORP	fossil units	Yes	Yes	Yes	Yes	Yes	No	
					Fixed operating							
	Projected Costs of Generating		Electricity supply-side	Thermal generation:	cost for new							
	Electricity 2020	IEA	data	CONE/CORP	fossil units	Yes	Yes	Yes	Yes	Yes	No	
5.2												
					Variable							
					operating cost for							
	Projected Costs of Generating		Electricity supply-side	-	existing fossil							
373	Electricity 2020	IEA	data	CONE/CORP	units	Yes	Yes	Yes	Yes	Yes	No	

	А	В	М	Ν	0	Р	Q	R
1				Temporal	Spatial			
2	Database	Author	Data input	resolution	resolution	Remarks	Additional Description	Link
						Available in 3 different domains		
			Power transfer			including alternating	real power that occurs on transmission	1
			distribution factor	hourly; index		assumptions such as voltage	lines due to real power transfers	
364	PEMMDB	ENTSO-E	(PTDF)	based	by country	level of grid	between two regions.	<u>Link</u>
						Correlates with PDTF-Table;		
			<b>_</b>			Available in 3 different domains		
			Remaining			including alternating		
265			available margin	hourly; index		assumptions such as voltage	Determines the feasible transmission	
365	PEMMDB	ENTSO-E	(MW)	based	by country	level of grid	region at any given point in time	<u>Link</u>
			Hybrid Heat	constant				
366	PEMMDB	ENTSO-E	Pump COP	variable	by country			Link
500		LINISO-L	r unip COr	Variable	by country			
				constant				
367	PEMMDB	ENTSO-E	Heat Pump COP	variable	by country			Link
507			Air Conditioning	constant	by country			
368	PEMMDB	ENTSO-E	COP	variable	by country			Link
			country specific	weekday,	, ,			
369	PEMMDB	ENTSO-E	charging profile	weekend	by country			Link
			Demographic					
370	Population, total	The World Bank	development	yearly	by country		Development of demographics	Link
						Report includes various		
						countries, regions, assumptions		
			Fixed operating	publication in		and sensitivities; not all		
	Projected Costs of Generating		cost for existing	a 5 year		variables are available for all		
371	Electricity 2020	IEA	fossil units	interval	by country	countries		<u>Link</u>
						Report includes various		
			Fixed operating	publication in		countries, regions, assumptions and sensitivities; not all		
	Projected Costs of Generating		Fixed operating cost for new fossil	•		and sensitivities; not all variables are available for all		
	Electricity 2020	IEA	units	interval	by country	countries		Link
512					by country	Report includes various		
			Variable			countries, regions, assumptions		
			operating cost for	publication in		and sensitivities; not all		
	Projected Costs of Generating		existing fossil	a 5 year		variables are available for all		
	Electricity 2020	IEA	units	interval	by country	countries		Link

	А	В	C	D	E	F	G	Н	Ι	J	K	L
1	Database	Author	Catagoni	RAA element	Data input	АТ			itries			Years
2	Database	Author	Category	KAA element	Data input	AI	DE	DE	FK	INL	LU	rears
	Projected Costs of Generating Electricity 2020	IEA	Electricity supply-side data	Thermal generation; CONE/CORP	Variable operating cost for new fossil units	Yes	Yes	Yes	Yes	Yes	No	
	Projected Costs of Generating Electricity 2020	IEA	Electricity supply-side data	Thermal generation; CONE/CORP	CAPEX hard coal	Yes	Yes	Yes	Yes	Yes	No	
	Projected Costs of Generating Electricity 2020	IEA	Electricity supply-side data	Thermal generation; CONE/CORP	CAPEX new CCGT and OCGT	Yes	Yes	Yes	Yes	Yes	No	
	Projected Costs of Generating Electricity 2020	IEA	Electricity supply-side data	Battery storage units; CONE/CORP	CAPEX storage	Yes	Yes	Yes	Yes	Yes	No	
378	Regelleistung.net - Datencenter	50Hertz, Amprion, TenneT, TransnetBW	Network and infrastructural data	Balancing requirements	FCR requirements	No	No	Yes	No	No	Yes	historical - today
379	Regelleistung.net - Datencenter	50Hertz, Amprion, TenneT, TransnetBW	Network and infrastructural data	Balancing requirements	aFRR requirements	No	No	Yes	No	No	Yes	historical - today

	А	В	М	N	0	Р	Q	R
1		-		Temporal	Spatial		·	
2	Database	Author	Data input	resolution	resolution	Remarks	Additional Description	Link
						Report includes various		
						countries, regions, assumptions		
			Variable	publication in		and sensitivities; not all		
	Projected Costs of Generating		operating cost for	a 5 year		variables are available for all		
374	Electricity 2020	IEA	new fossil units	interval	by country	countries		Link
						Report includes various		
						countries, regions, assumptions		
				publication in		and sensitivities; not all		
	Projected Costs of Generating			a 5 year		variables are available for all		
375	Electricity 2020	IEA	CAPEX hard coal	interval	by country	countries		<u>Link</u>
						Report includes various		
						countries, regions, assumptions		
				publication in		and sensitivities; not all		
	Projected Costs of Generating		CAPEX new	a 5 year		variables are available for all		
376	Electricity 2020	IEA	CCGT and OCGT	interval	by country	countries		<u>Link</u>
						Report includes various		
						countries, regions, assumptions		
				publication in		and sensitivities; not all		
	Projected Costs of Generating			a 5 year		variables are available for all		
377	Electricity 2020	IEA	CAPEX storage	interval	by country	countries		<u>Link</u>
						Frequently updated interactive		
						data register; in Accordance		
						with Article 60(1) of		
		50Hertz,			regional	Commission Regulation (EU)		
		Amprion,			resolution	2017/2195 of November 2017		
		TenneT,	FCR	30 minutes;		establishing a guideline on		
378	Regelleistung.net - Datencenter	TransnetBW	requirements	daily; yearly	control area	electricity balancing	Frequency Containment Reserves	<u>Link</u>
						Frequently updated interactive		
						data register; in Accordance		
		5011				with Article 60(1) of		
		50Hertz,			regional	Commission Regulation (EU)		
		Amprion,			resolution	2017/2195 of November 2017		
		TenneT,	aFRR	30 minutes;		establishing a guideline on	automatic Frequency Restoration	
379	Regelleistung.net - Datencenter	TransnetBW	requirements	daily; yearly	control area	electricity balancing	Reserve	<u>Link</u>

	А	В	C	D	E	F	G	Н	1	J	Κ	L
1	Database	Author	Category	RAA element	Data input	ΔΤ	BF		intrie FR		10	Years
	Regelleistung.net - Datencenter	50Hertz, Amprion, TenneT, TransnetBW	Network and infrastructural data	Balancing requirements	mFRR requirements							historical - today
381	Regelleistung.net - Datencenter	50Hertz, Amprion, TenneT, TransnetBW	Network and infrastructural data	Balancing requirements	RR requirements	No	No	Yes	s No	No	Yes	historical - today
	Revision of World Population Prospects	United Nations	Electricity demand- side data	Conventional electricity demand	Demographic development	Yes	Yes	Yes	s Yes	s Yes	s Yes	1950 - 2100
383	STATISTICAL FACTSHEET	ENTSO-E	Electricity supply-side data	Thermal generation	Minimum load	Yes	Yes	Yes	s Yes	s Yes	s Yes	2009 - 2018
	STATISTICAL FACTSHEET Study on the estimation of the value of lost load of electricity supply in Europe	ENTSO-E	Network and infrastructural data Electricity demand- side data	Cross-border trade modelling (between modelled zones)	Flow-based market coupling / Net transmission capacity Value of lost load (VoLL)						S Yes	2009 - 2018 2015

	А	В	М	N	0	Р	Q	R
1				Temporal	Spatial		· · · · · · · · · · · · · · · · · · ·	
2	Database	Author	Data input	resolution	resolution	Remarks	Additional Description	Link
						Frequently updated interactive data register; in Accordance		
			-			with Article 60(1) of		
		50Hertz,			regional	Commission Regulation (EU)		
		Amprion,			resolution	2017/2195 of November 2017		
		TenneT,	mFRR	30 minutes:		establishing a guideline on	manual Frequency Restoration	
380	Regelleistung.net - Datencenter	TransnetBW		daily; yearly		electricity balancing	Reserve	Link
500		Transfietbw	requirements	dany, yearry	controlarca	Frequently updated interactive	Reserve	
						data register; in Accordance		
						with Article 60(1) of		
		50Hertz,			regional	Commission Regulation (EU)		
		Amprion,			resolution	2017/2195 of November 2017		
		TenneT,		30 minutes;	based on TSO	establishing a guideline on		
381	Regelleistung.net - Datencenter	TransnetBW	<b>RR</b> requirements	daily; yearly	control area	electricity balancing	Replacement Reserve	<u>Link</u>
						Vast dataset for worldwide		
						country-wise demographic		
						development; includes scenarios	5	
						based on various assumptions		
	Revision of World Population		Demographic			such as fertility rate and		
382	Prospects	United Nations	development	yearly	by country	migration data		<u>Link</u>
				yearly				
				published				
				report (most				
				recent version				
383	STATISTICAL FACTSHEET	ENTSO-E	Minimum load	from 2019)	by country		lowest hourly load values	Link
					, , ,		· · · · · · · · · · · · · · · · · · ·	
				yearly				
			Flow-based	published				
			market coupling /	report (most				
				recent version				
	STATISTICAL FACTSHEET	ENTSO-E	capacity	from 2019)	by country			<u>Link</u>
	Study on the estimation of the							
	value of lost load of electricity	1055	Value of lost load			Available for domestic and non		
385	supply in Europe	ACER	(VoLL)	variable	by country	domestic sectors		<u>Link</u>

	A	В	C	D	E	F	G	Н	Ι	J	Κ	L
1	Database	6 th	Colorado	DAA	Detailment	AT	DE		ntrie			No. and
<u> </u>	Database	Author	Category	RAA element	Data input	AI	BE	DE	FK	NL	LU	Years
	Study on the estimation of the											
	value of lost load of electricity		Electricity demand-		Value of lost							
386	supply in Europe	ACER	side data	VoLL	adequacy (VoLA)	Yes	Yes	Yes	Yes	Yes	Yes	2015
		Danish Energy										
	Technology Data - Generation of	Agency and	Electricity supply-side	•	Electricity							
387	Electricity and District heating	Energinet	data	CONE/CORP	efficiency, net (%)	Yes	Yes	Yes	Yes	Yes	Yes	2015; 2020; 2030; 2050
	Technology Data - Generation of	Danish Energy Agency and	Electricity supply-side	Thormal concration:								
288	Electricity and District heating	Energinet	data	CONE/CORP	Availability (%)	Voc	Voc	Voc	Voc	Voc	Voc	2015; 2020; 2030; 2050
300		Ellerginet	uala	CONE/CORF	Availability (70)	res	Tes	res	res	Tes	res	2013, 2020, 2030, 2030
		Danish Energy										
	Technology Data - Generation of	Agency and	Electricity supply-side		Technical lifetime							
389	Electricity and District heating	Energinet	data	CONE/CORP	(years)	Yes	Yes	Yes	Yes	Yes	Yes	2015; 2020; 2030; 2050
		Danish Energy										
	Technology Data - Generation of	Agency and	Electricity supply-side		Construction	、 <i>/</i>						
390	Electricity and District heating	Energinet	data	CONE/CORP	time (year) Emission of SO2,	Yes	Yes	Yes	Yes	Yes	Yes	2015; 2020; 2030; 2050
	Technology Data - Generation of	Danish Energy Agency and	Electricity supply-side	Thermal generation:	NOx, CH4, N2O							
201	Electricity and District heating	Energinet	data	CONE/CORP		Vec	۷۵۵	Vac	Vec	Vec	Vec	2015; 2020; 2030; 2050
551	Licetheity and District ficating	Liferginet	uata		and rarticles	103	103	103	103	103	103	2013, 2020, 2030, 2030
		Danish Energy										
	Technology Data - Generation of	Agency and	Electricity supply-side	Thermal generation;	Nominal							
392	Electricity and District heating	Energinet	data	CONE/CORP	investment	Yes	Yes	Yes	Yes	Yes	Yes	2015; 2020; 2030; 2050
		Danish Energy		<b>-</b>								
202		Agency and	Electricity supply-side		End OCM	Ver	V-	V	V-	V	V	2015, 2020, 2020, 2050
393	Electricity and District heating	Energinet	data	CONE/CORP	Fixed O&M	res	res	Yes	res	Yes	res	2015; 2020; 2030; 2050

	А	В	М	Ν	0	Р	Q	R
1		- 		Temporal	Spatial			
2	Database	Author	Data input	resolution	resolution	Remarks	Additional Description	Link
	Study on the estimation of the							
200	value of lost load of electricity			historical		Available for domestic and non		
386	supply in Europe	ACER	adequacy (VoLA)	variable	by country	domestic sectors		<u>Link</u>
		Danish Energy						
0.07	Technology Data - Generation of		Electricity			Available for: Coal, Gas,		
387	Electricity and District heating	Energinet	efficiency, net (%)	target years	by country	Biomass, Diesel		Link
		Danish Energy						
200	Technology Data - Generation of	Agency and	<b>A 11 1 11 (0</b> ()					
388	Electricity and District heating	Energinet	Availability (%)	target years	by country	Available for: Coal, Wind, PV Available for: Coal, Gas,		Link
						Biomass, Diesel, Wind, Solar PV,		
		Danish Energy						
	Technology Data Commission of		T			Solar thermal, Wave Energy,		
200	Technology Data - Generation of	Agency and	Technical lifetime	<b>.</b>	h	Heat pumps, Electric boilers, Geothermal		1 Sector
389	Electricity and District heating	Energinet	(years)	target years	by country	Available for: Coal, Gas,		Link
						Biomass, Diesel, Wind, Solar PV,		
		Danish Energy				Solar thermal, Wave Energy,		
	Technology Data - Generation of	Agency and	Construction time			Heat pumps, Electric boilers,		
200	Electricity and District heating		(vear)		by country	Geothermal		Link
390	Electricity and District heating	Danish Energy	(year) Emission of SO2,	target years	by country	Geothermal		
	Technology Data - Generation of	•,	NOx, CH4, N2O			Available for: Coal, Gas,		
201	Electricity and District heating	Energinet	and Particles	target years	by country	Biomass, Diesel		Link
591		Lifergillet	and Fai ticles	talget years	by country	Available for: Coal, Gas, CCS,		
						Biomass, Diesel, Wind, Solar PV,		
		Danish Energy				Solar thermal, Wave Energy,		
	Technology Data - Generation of	Agency and	Nominal			Heat pumps, Electric boilers,		
392	Electricity and District heating	Energinet		target years	by country	Geothermal		Link
552				carger years	by country	Available for: Coal, Gas, CCS,		
						Biomass, Diesel, Wind, Solar PV,		
		Danish Energy				Solar thermal, Wave Energy,		
	Technology Data - Generation of	Agency and				Heat pumps, Electric boilers,		
393	Electricity and District heating	Energinet	Fixed O&M	target years	by country	Geothermal		Link
555		Energinet	r med Odini	ta get years	S, country			<u> </u>

	А	В	C	D	E	F	G	Н	Ι	J	К	L
1									ntries			
2	Database	Author	Category	RAA element	Data input	AT	BE	DE	FR	NL	LU	Years
	Taskaslas Data Consertion of	Danish Energy	Electricite consults state	The survey of th								
1.04	Technology Data - Generation of	<b>-</b> .	Electricity supply-side	-		V	V	V	V	V	V	2015 2020 2020 2050
394	Electricity and District heating	Energinet Danish Energy	data	CONE/CORP	Variable O&M	res	res	res	Yes	Yes	res	2015; 2020; 2030; 2050
	Technology Data - Generation of	Agency and	Network and	Balancing	Minimum load							
205	Electricity and District heating	Energinet	infrastructural data	requirements	(%)	Voc	Voc	Voc	Voc	Voc	Voc	2015; 2020; 2030; 2050
393		Danish Energy		requirements	Primary load	Tes	res	Tes	165	165	Tes	2013, 2020, 2030, 2030
	Technology Data - Generation of	÷.	Network and	Balancing	support (% per 30							
396	Electricity and District heating	Energinet	infrastructural data	requirements	seconds)	Ves	Ves	Vec	Vec	Ves	Ves	2015; 2020; 2030; 2050
		Danish Energy			Secondary load	105	105	105	105	105	105	2013, 2020, 2000, 2030
	Technology Data - Generation of		Network and	Balancing	support (% per							
397	Electricity and District heating	Energinet	infrastructural data	requirements	minute)	Yes	Yes	Yes	Yes	Yes	Yes	2015; 2020; 2030; 2050
		0			Life time		-	-	_	-		
					extension of coal							
		Danish Energy			power plant,							
	Technology Data - Generation of	Agency and	Electricity supply-side		nominal							
398	Electricity and District heating	Energinet	data	CONE/CORP	investment	Yes	Yes	Yes	Yes	Yes	Yes	2015; 2020; 2030; 2050
		Danish Energy										
	Technology Data - Generation of	Agency and	Electricity supply-side		Warm start-up							
399	Electricity and District heating	Energinet	data	Thermal generation	time	Yes	Yes	Yes	Yes	Yes	Yes	2015; 2020; 2030; 2050
		Danish Energy										
	Technology Data - Generation of	Agency and	Electricity supply-side		Cold start-up							
400	Electricity and District heating	Energinet	data	Thermal generation	time	Yes	Yes	Yes	Yes	Yes	Yes	2015; 2020; 2030; 2050
		Denich Frank										
	Taskaslan Data Canan in f	Danish Energy	Flandstate and the state		Ferred Outer							
101		Agency and	Electricity supply-side		Forced Outage	Vac	Vac	Vac	Vac	Vac	Var	2015, 2020, 2020, 2050
40 I	Electricity and District heating	Energinet	data	Unplanned outages	Rate (%)	res	res	res	res	res	res	2015; 2020; 2030; 2050

	А	В	М	Ν	0	Р	Q	R
1				Temporal	Spatial			
2	Database	Author	Data input	resolution	resolution	Remarks	Additional Description	Link
						Available for: Coal, Gas, CCS,		
						Biomass, Diesel, Wind, Solar PV,		
		Danish Energy				Solar thermal, Wave Energy,		
	Technology Data - Generation of	Agency and				Heat pumps, Electric boilers,		
394	Electricity and District heating	Energinet	Variable O&M	target years	by country	Geothermal		Link
		Danish Energy				Available for: Coal, Gas,		
	Technology Data - Generation of	Agency and				Biomass, Diesel, Heat pumps,		
395	Electricity and District heating	Energinet	Minimum load (%)	target years	by country	Electric boilers, Geothermal		Link
		Danish Energy	Primary load			Available for: Coal, Gas,		
	Technology Data - Generation of	Agency and	support (% per 30			Biomass, Diesel, Heat pumps,		
396	Electricity and District heating	Energinet	seconds)	target years	by country	Electric boilers		Link
		Danish Energy	Secondary load			Available for: Coal, Gas,		
	Technology Data - Generation of	Agency and	support (% per			Biomass, Diesel, Heat pumps,		
397	Electricity and District heating	Energinet	minute)	target years	by country	Electric boilers		Link
			Life time					
			extension of coal					
		Danish Energy	power plant,					
	Technology Data - Generation of	Agency and	nominal					
398	Electricity and District heating	Energinet	investment	target years	by country	Available for: Coal		<u>Link</u>
		Danish Energy				Available for: Coal, Gas,		
	Technology Data - Generation of	Agency and	Warm start-up			Biomass, Diesel, Heat pumps,		
399	Electricity and District heating	Energinet	time	target years	by country	Electric boilers		<u>Link</u>
		Danish Energy				Available for: Coal, Gas,		
	Technology Data - Generation of	Agency and				Biomass, Diesel, Heat pumps,		
400	Electricity and District heating	Energinet	Cold start-up time	target years	by country	Electric boilers		<u>Link</u>
							Forced outage is defined as the	
							number of weighted forced outage	
							hours divided by the sum of forced	
							outage hours and operation hours. The	:
						Available for: Coal, Gas,	weighted forced outage hours are the	
						Biomass, Diesel, Wind, Solar PV,	sum of hours of reduced production	
		Danish Energy				Solar thermal, Wave Energy,	caused by unplanned outages,	
	Technology Data - Generation of	Agency and	Forced Outage			Heat pumps, Electric boilers,	weighted according to how much	
401	Electricity and District heating	Energinet	Rate (%)	target years	by country	Geothermal	capacity was out	<u>Link</u>

	А	В	C	D	E	F	G	Н	Ι	J	Κ	L
1	Database	Author	Catagony	RAA element	Data input	AT	DE	Cour DE	ntries FR			Vooro
2	Database	Author	Category	KAA element	Data input	AI	DE		ГК	INL	LU	Years
		Danish Energy										
	Technology Data - Generation of	Agency and	Electricity supply-side		Planned Outage							
402	Electricity and District heating	Energinet	data	Thermal generation	(d/a)	Yes	Yes	Yes	Yes	Yes	Yes	2015; 2020; 2030; 2050
		Danish Energy			Space							
	Technology Data - Generation of	Agency and	Electricity supply-side		requirement							
403	Electricity and District heating	Energinet	data	CONE/CORP	(1000m2/MW)	Yes	Yes	Yes	Yes	Yes	Yes	2015; 2020; 2030; 2050
		Danish Energy			CO2 Storage							
	Technology Data - Generation of	Agency and	Electricity supply-side		costs (€/t Co2							Values collected from studies
404	Electricity and District heating	Energinet	data	Thermal generation	stored)	Yes	Yes	Yes	Yes	Yes	Yes	published between 2010 - 2014
	Technology Data - Generation of	Danish Energy Agency and	Electricity supply-side		CO2 Storage costs (specific							Values collected from studies
405	Electricity and District heating	Energinet	data	Thermal generation	investment costs)	Yes	Yes	Yes	Yes	Yes	Yes	published between 2010 - 2014
		Danish Energy			CO2 Storage							
	Technology Data - Generation of	Agency and	Electricity supply-side		costs (fixed							Values collected from studies
406	Electricity and District heating	Energinet	data	Thermal generation	0&M)	Yes	Yes	Yes	Yes	Yes	Yes	published between 2010 - 2014
		Danish Energy			CO2 Storage							
	Technology Data - Generation of	Agency and	Electricity supply-side		costs (variable							Values collected from studies
407	Electricity and District heating	Energinet	data	Thermal generation	0&M)	Yes	Yes	Yes	Yes	Yes	Yes	published between 2010 - 2014

	А	В	М	Ν	0	Р	Q	R
1		•		Temporal	Spatial		•	
2	Database	Author	Data input	resolution	resolution	Remarks	Additional Description	Link
						Available for: Coal, Gas,		
						Biomass, Diesel, Wind, Solar PV,		
		Danish Energy				Solar thermal, Wave Energy,		
	Technology Data - Generation of	Agency and	Planned Outage			Heat pumps, Electric boilers,	Planned outage for example due to	
402	Electricity and District heating	Energinet	(d/a)	target years	by country	Geothermal	renovations	<u>Link</u>
						Available for: Coal, Gas,		
						Biomass, Diesel, Wind, Solar PV,		
		Danish Energy	Space			Solar thermal, Wave Energy,		
	Technology Data - Generation of	Agency and	requirement			Heat pumps, Electric boilers,		
403	Electricity and District heating	Energinet	(1000m2/MW)	target years	by country	Geothermal		<u>Link</u>
		Danish Energy	CO2 Storage			3 different scenarios for 3		
	Technology Data - Generation of	Agency and	costs (€/t Co2			onshore solutions and 3		
404	Electricity and District heating	Energinet	stored)		by country	offshore solutions		<u>Link</u>
		Danish Energy	CO2 Storage			3 different scenarios for 3		
	Technology Data - Generation of	Agency and	costs (specific			onshore solutions and 3		
405	Electricity and District heating	Energinet	investment costs)		by country	offshore solutions		<u>Link</u>
		Danish Energy				3 different scenarios for 3		
	Technology Data - Generation of	Agency and	CO2 Storage			onshore solutions and 3		
406	Electricity and District heating	Energinet	costs (fixed O&M)		by country	offshore solutions		<u>Link</u>
		Danish Energy	CO2 Storage			3 different scenarios for 3		
	Technology Data - Generation of	Agency and	costs (variable			onshore solutions and 3		
407	Electricity and District heating	Energinet	0&M)		by country	offshore solutions		<u>Link</u>

	А	В	C	D	E	F G H I J	K L
1	Database	Author	Category	RAA element	Data input	Countries AT BE DE FR NL	LU Years
		Danish Energy Agency and	Electricity supply-side		Auxiliary electricity consumption (%		
	Electricity and District heating	Energinet Danish Energy	data	Thermal generation	Incineration capacity of Biomass plants	Yes Yes Yes Yes Yes `	Yes 2015; 2020; 2030; 2050
	Technology Data - Generation of Electricity and District heating	Agency and Energinet	Electricity supply-side data	Thermal generation	(Fuel input) (tonnes/h)	Yes Yes Yes Yes Yes Y	Yes 2015; 2020; 2030; 2050
	Technology Data - Generation of Electricity and District heating	Danish Energy Agency and Energinet	Electricity supply-side data	Thermal generation	Additional heat potential of Biomass plants with heat pumps (% of thermal input)	Yes Yes Yes Yes Yes	Yes 2015; 2020; 2030; 2050

	А	В	М	N	0	Р	Q	R
1 2	Database	Author	Data input	Temporal resolution	Spatial resolution	Remarks	Additional Description	Link
	Technology Data - Generation of Electricity and District heating	Danish Energy Agency and Energinet	Auxiliary electricity consumption (% of thermal input) Incineration	target years	by country	Available for: Biomass, Heat pumps, Electrical boilers, Geothermal	For heat-only technologies the consumption of electricity for auxiliary equipment such as pumps, ventilation systems, etc. is stated separately in percentage of heat generation capacity (i.e. MW auxiliary/MW heat). For heat pumps, internal consumption is considered part of the efficiency (coefficient of performance, COP), while other electricity demand for external pumping, e.g. ground water pumping, is stated under auxiliary electricity consumption. For CHP generation, auxiliary consumption is not stated separately but included in the net efficiency and for non-thermal plants, as a reduction in the number of full load hours.	Link
	Technology Data - Generation of Electricity and District heating	Danish Energy Agency and Energinet	capacity of Biomass plants (Fuel input) (tonnes/h)	target years	by country	Available for Biomass plants of different sizes		<u>Link</u>
	Technology Data - Generation of Electricity and District heating	Danish Energy Agency and Energinet	Additional heat potential of Biomass plants with heat pumps (% of thermal input)	target years	by country	Available for Biomass plants of different sizes	Additional heat potential for heat pump is the flue gas condensation potential remaining after the direct condensation stage (condensation by heat exchange with DH-water). Direct condensation is included in all cases, and combustion air humidification is included in lower/upper ranges of 2020 and 2050	Link

1 2DatabaseAuthorCategoryRAA elementData inputATBEDEFRNLLUYears1 2DatabaseDanish Energy Agency and Electricity and District heatingDanish Energy Electricity supply-sideHub height wind power plantsYes <th>2030; 2050 2030; 2050</th>	2030; 2050 2030; 2050
Danish Energy 411Danish Energy Agency and Electricity and District heatingDanish Energy 	2030; 2050 2030; 2050
Technology Data - Generation of 411Agency and EnerginetElectricity supply-side dataHub height wind 	2030; 2050 2030; 2050
411Electricity and District heatingEnerginetdataRES generationpower plantsYes <td>2030; 2050 2030; 2050</td>	2030; 2050 2030; 2050
Danish Energy Technology Data - Generation of All 2Danish Energy EnerginetRotor diameter wind power412Electricity and District heatingEnerginet Danish Energy Electricity and District heatingEnerginet 	2030; 2050 2030; 2050
Technology Data - Generation of 412Agency and EnerginetElectricity supply-side datawind power 	2030; 2050
412Electricity and District heatingEnerginetdataRES generationplantsYes <thy< td=""><td>2030; 2050</td></thy<>	2030; 2050
Danish Energy Technology Data - Generation of Electricity and District heatingDanish Energy Agency and EnerginetElectricity supply-side dataGrid connection costsYes Yes Yes Yes Yes Yes Yes 2015; 2020;Technology Data - Generation of 414Agency and EnerginetElectricity supply-side dataCONE/CORPCosts related to rent of land decommissioning of existing wind415Electricity and District heatingDanish Energy EnerginetElectricity supply-side dataCONE/CORPCosts related to rent of land decommissioning of existing wind415Electricity and District heatingEnerginet Danish Energy EnerginetElectricity supply-side dataCONE/CORPVes Yes Yes Yes Yes Yes Yes Yes 2015; 2020; Costs related to decommissioning of existing wind415Electricity and District heatingEnerginet Danish Energy Technology Data - Generation of Agency and EnerginetElectricity supply-side dataCONE/CORPVes Yes Yes Yes Yes Yes Yes Yes 2015; 2020; data416Electricity and District heatingEnerginet Danish Energy Danish EnergyElectricity supply-side dataCONE/CORPAverage capacity factor416Electricity and District heatingEnerginet Danish EnergyCoNE/CORPYes Yes Yes Yes Yes Yes Yes Yes Yes Yes	2030; 2050
Technology Data - Generation of 413Agency and EnerginetElectricity supply-side dataGrid connection costsYes Yes Yes Yes Yes Yes Yes Yes 2015; 2020; Danish Energy Danish Energy Agency and Electricity and District heatingDanish Energy Agency and Electricity supply-side dataCosts related to rent of landYes Yes Yes Yes Yes Yes Yes Yes Yes Yes	
413Electricity and District heatingEnerginetdataCONE/CORPcostsYes <td></td>	
A14Danish Energy Agency and Electricity and District heatingDanish Energy Agency and EnerginetCosts related to rent of landYes	
Technology Data - Generation of 414Agency and EnerginetElectricity supply-side dataCosts related to rent of landYes <td>2030; 2050</td>	2030; 2050
414Electricity and District heatingEnerginetdataCONE/CORPrent of landYes <th< td=""><td>2030; 2050</td></th<>	2030; 2050
AltoDanish Energy Agency and Electricity and District heatingDanish Energy Agency and Energinet Danish EnergyElectricity supply-side CONE/CORPCosts related to decommissioning of existing windYes <t< td=""><td>2030; 2050</td></t<>	2030; 2050
415       Danish Energy       Agency and       Electricity supply-side       of existing wind         415       Electricity and District heating       Energinet       data       CONE/CORP       turbines       Yes       Yes <td< td=""><td></td></td<>	
Technology Data - Generation of 415Agency and Energinet Danish EnergyElectricity supply-side dataof existing wind turbinesYes Yes<	
415Electricity and District heatingEnerginet Danish EnergydataCONE/CORPturbinesYes<	
Danish Energy Technology Data - Generation of Electricity and District heatingDanish Energy Agency and EnerginetElectricity supply-side dataRES generation; CONE/CORPAverage capacity factorYes Yes Yes Yes Yes Yes Yes 2015; 2020; Ves Yes Yes Yes Yes Yes Yes Yes Yes Yes Y	
Technology Data - Generation of Agency and       Electricity supply-side RES generation;       Average capacity         416       Electricity and District heating       Energinet       data       CONE/CORP       factor       Yes Yes Yes Yes Yes Yes Yes Yes 2015; 2020;         Danish Energy       Danish Energy       Electricity and District heating       Yes	2030; 2050
416       Electricity and District heating       Energinet       data       CONE/CORP       factor       Yes Yes Yes Yes Yes Yes Yes 2015; 2020;         Danish Energy       Danish Energy       Danish Energy       Danish Energy	
Danish Energy	
	2030; 2050
	2020 2050
417 Electricity and District heating Energinet data CONE/CORP availability (%) Yes Yes Yes Yes Yes Yes Yes Yes 2015; 2020;	2030; 2050
Danish Energy     Specific area       Technology Data - Generation of Agency and     Electricity supply-side     coverage	
	2020, 2050
418         Electricity and District heating         Energinet         data         CONE/CORP         (MW/km2)         Yes         Ye	2030, 2030
Technology Data - Generation of Agency and Electricity supply-side RES generation; ratio (measure of	
419 Electricity and District heating Energinet data CONE/CORP combined losses) Yes	2030-2050
Average PV	2030, 2030
Danish Energy module	
Technology Data - Generation of Agency and Electricity supply-side RES generation; conversion	
420 Electricity and District heating Energinet data CONE/CORP efficiency (%) Yes	2030-2050
Danish Energy	
Technology Data - Generation of Agency and Electricity supply-side RES generation; Inverter lifetime	
421 Electricity and District heating Energinet data CONE/CORP (years) Yes	
Danish Energy	2030: 2050
Technology Data - Generation of Agency and Electricity supply-side RES generation; Full-load hours	2030; 2050
422 Electricity and District heating Energinet data CONE/CORP (kWh/kw) Yes	2030; 2050

	А	В	М	Ν	0	Р	Q	R
1		-		Temporal	Spatial			
2	Database	Author	Data input	resolution	resolution	Remarks	Additional Description	Link
		Danish Energy				Available for different Wind		
	Technology Data - Generation of	Agency and	Hub height wind			power plant sizes offshore and		
411	Electricity and District heating	Energinet	power plants	target years	by country	onshore		<u>Link</u>
		Danish Energy				Available for different Wind		
	Technology Data - Generation of	Agency and	Rotor diameter			power plant sizes offshore and		
412	Electricity and District heating	Energinet	wind power plants	target years	by country	onshore		<u>Link</u>
		Danish Energy				Available for Wind power, Solar		
	Technology Data - Generation of	Agency and	Grid connection			PV and Heat pumps of different		
413	Electricity and District heating	Energinet	costs	target years	by country	sizes		<u>Link</u>
		Danish Energy						
	Technology Data - Generation of	Agency and	Costs related to			Available for Wind power and		
414	Electricity and District heating	Energinet	rent of land	target years	by country	Solar PV of different sizes		<u>Link</u>
			Costs related to					
		Danish Energy	decommissioning					
	Technology Data - Generation of	Agency and	of existing wind					
415	Electricity and District heating	Energinet	turbines	target years	by country	Available for Wind power		<u>Link</u>
		Danish Energy						
	Technology Data - Generation of	Agency and	Average capacity			Available for Wind power plants		
416	Electricity and District heating	Energinet	factor	target years	by country	of different sizes		Link
		Danish Energy				Available for Wind power plants		
		Agency and	Average			and solar power plants of		
417	Electricity and District heating	Energinet		target years	by country	different sizes		<u>Link</u>
		Danish Energy	Specific area					
	Technology Data - Generation of	Agency and	coverage			Available for Wind power plants		
418	Electricity and District heating	Energinet		target years	by country	of different sizes		<u>Link</u>
		Danish Energy	Performance					
	Technology Data - Generation of	Agency and	ratio (measure of			Available for solar power plants		
419	Electricity and District heating	Energinet		target years	by country	of different sizes		<u>Link</u>
			Average PV					
		Danish Energy	module					
	Technology Data - Generation of	Agency and	conversion			Available for solar power plants		
420	Electricity and District heating	Energinet	efficiency (%)	target years	by country	of different sizes		<u>Link</u>
		Danish Energy						
	Technology Data - Generation of	Agency and	Inverter lifetime			Available for solar power plants		
421	Electricity and District heating	Energinet	(years)	target years	by country	of different sizes		<u>Link</u>
		Danish Energy						
	Technology Data - Generation of	Agency and	Full-load hours			Available for solar power plants		
422	Electricity and District heating	Energinet	(kWh/kw)	target years	by country	of different sizes		<u>Link</u>

	А	В	С	D	E	F	G	Н	Ι	J	К	L
1									ntries			
2	Database	Author	Category	RAA element	Data input	AT	BE	DE	FR	NL	LU	Years
		Danish Energy		550	Peak power full-							
	÷.		Electricity supply-side		load hours			.,	.,			
423	Electricity and District heating	Energinet	data	CONE/CORP	(kWh/kWp)	Yes	Yes	Yes	Yes	Yes	Yes	2015; 2020; 2030; 2050
		Danish Energy										
	÷.	Agency and	Electricity supply-side									
424	Electricity and District heating	Energinet	data	CONE/CORP	PV module cost	Yes	Yes	Yes	Yes	Yes	Yes	2015; 2020; 2030; 2050
	Technology Data - Generation of	Danish Energy Agency and	Electricity supply-side		Balance of Plant							
125	Electricity and District heating	Energinet	data	CONE/CORP	cost	Vaa	Vaa	Vaa	Vaa	Vaa	Vaa	2015; 2020; 2030; 2050
425		Ellerginet	uala	CONE/CORP	Average annual	res	res	res	res	res	res	2013, 2020, 2030, 2030
		Danish Energy			degradation of							
	Technology Data - Generation of	υ,	Electricity supply-side	RFS generation.	full-load hours							
426	Electricity and District heating	Energinet	data	CONE/CORP	(%)	Yes	Yes	Yes	Yes	Yes	Yes	2015; 2020; 2030; 2050
-20		Energinet			Total efficiency of	105	105	105	105	105	105	2013, 2020, 2000, 2030
					heat pumps of							
		Danish Energy			different sizes,							
	Technology Data - Generation of	Agency and	Electricity supply-side	RES generation;	net (%), annual							
427	Electricity and District heating	Energinet	data	CONE/CORP	average	Yes	Yes	Yes	Yes	Yes	Yes	2015; 2020; 2030; 2050
		Danish Energy			Heat generation							
	Technology Data - Generation of	Agency and	Electricity supply-side	RES generation;	from geothermal							
428	Electricity and District heating	Energinet	data	CONE/CORP	heat (MJ/s)	Yes	Yes	Yes	Yes	Yes	Yes	2015; 2020; 2030; 2050
		Danish Energy			Electric efficiency							
	÷.	• ,	Electricity supply-side		of different CCS							
429	Electricity and District heating	Energinet	data	CONE/CORP	technologies	Yes	Yes	Yes	Yes	Yes	Yes	2015; 2020; 2030; 2050
	TenneT TSO BV (NL) biennial		Network and	Balancing	aFRR							
430	report on Balancing	TenneT	infrastructural data	requirements	requirements	No	No	No	No	Yes	No	2017; 2018; 2019
	TenneT TSO BV (NL) biennial		Network and	Balancing	mFRR							
121	report on Balancing	TenneT	infrastructural data	requirements	requirements	No	No	No	No	Var	No	2017: 2018: 2019
43 I	report on balancing		inin astructur ar uata	requirements	requirements	UVI	INU	UNI	UNI	165	UNI	2017, 2010, 2017

	А	В	М	N	0	Р	Q	R
1 2	Database	Author	Data input	Temporal resolution	Spatial resolution	Remarks	Additional Description	Link
423	Technology Data - Generation of Electricity and District heating	Danish Energy Agency and Energinet	Peak power full- load hours (kWh/kWp)	target years	by country	Available for solar power plants of different sizes		Link
		Danish Energy Agency and Energinet	PV module cost	target years	by country	Available for solar power plants of different sizes		Link
425	Technology Data - Generation of Electricity and District heating	Danish Energy Agency and Energinet	Balance of Plant cost	target years	by country	Available for solar power plants of different sizes		<u>Link</u>
426	Technology Data - Generation of Electricity and District heating	Danish Energy Agency and Energinet		target years	by country	Available for solar power plants of large sizes		Link
427	Technology Data - Generation of Electricity and District heating	Danish Energy Agency and Energinet Danish Energy	Total efficiency of heat pumps of different sizes, net (%), annual average Heat generation	target years	by country	Available for solar power plants of large sizes		Link
428	Technology Data - Generation of Electricity and District heating	Agency and Energinet	from geothermal heat (MJ/s)	target years	by country	Available for solar power plants of large sizes		<u>Link</u>
429	Technology Data - Generation of Electricity and District heating	Danish Energy Agency and Energinet	Electric efficiency of different CCS technologies	target years	by country	Available for solar power plants of large sizes		<u>Link</u>
430	TenneT TSO BV (NL) biennial report on Balancing	TenneT	aFRR requirements	report published every 2 years	by country	in Accordance with Article 60(1) of Commission Regulation (EU) 2017/2195 of November 2017 establishing a guideline on electricity balancing	automatic Frequency Restoration Reserve	<u>Link</u>
431	TenneT TSO BV (NL) biennial report on Balancing	TenneT	mFRR requirements	report published every 2 years	by country	in Accordance with Article 60(1) of Commission Regulation (EU) 2017/2195 of November 2017 establishing a guideline on electricity balancing	manual Frequency Restoration Reserve	Link

	А	В	С	D	E	F	G	i F	1	I	J	К	L
1									unt				
2	Database	Author	Category	RAA element	Data input	AT	BE	ED	E I	FR	NL	LU	Years
	TenneT TSO BV (NL) biennial		Network and	Balancing	Total FRR								
432	report on Balancing	TenneT	infrastructural data	requirements	requirements	No	No	N	οΝ	lo i	Yes	No	2017; 2018; 2019
	TenneT TSO BV (NL) biennial		Network and	Balancing									
	report on Balancing	TenneT	infrastructural data	requirements	Total Imbalance	No	No	N	n N		Yes	No	2017; 2018; 2019
		Termer		requirements	rotal inibiliariee	110	110	<u> </u>		10	105	110	2017,2010,2017
	TenneT TSO BV (NL) biennial		Network and	Balancing	Total Balancing						.,		
434	report on Balancing	TenneT	infrastructural data	requirements	energy	No	No	) N	οΝ	10	Yes	No	2017; 2018; 2019
	TenneT TSO BV (NL) biennial		Network and	Balancing	[-/-, +/+] Largest								
435	report on Balancing	TenneT	infrastructural data	requirements	Incidents	No	No	N	οΝ	lo i	Yes	No	2017; 2018; 2019
				Cross-border trade									
426			Network and	modelling (between	Cross-border	V.	V				V	V.	2015
436	Transparency Platform	ENTSO-E	infrastructural data	modelled zones)	physical flows	Yes	Yes	s Y€	es Y	es	Yes	Yes	2015 - ongoing
					Planned								
			Electricity supply-side		Unavailability of								
437	Transparency Platform	ENTSO-E	data	Thermal generation	Generation Units	Yes	Yes	s Ye	es Y	'es	Yes	Yes	2014 - forecast

	А	В	М	N	0	Р	Q	R
1				Temporal	Spatial			
2	Database	Author	Data input	resolution	resolution	Remarks	Additional Description	Link
						in Accordance with Article 60(1)		
						of Commission Regulation (EU)		
				wanawt		2017/2195 of November 2017		
	Tennet TCO DV (NU ) bienniel		Total FRR	report published				
	TenneT TSO BV (NL) biennial	TenneT		every 2 years	by country (	establishing a guideline on		Link
432	report on Balancing	Tennet	requirements	every Z years	by country	electricity balancing		<u>Link</u>
						in Accordance with Article 60(1)		
						of Commission Regulation (EU)		
				report		2017/2195 of November 2017		
	TenneT TSO BV (NL) biennial			published		establishing a guideline on	(all ISP) Negative (BRP short)  +	
	report on Balancing	TenneT	Total Imbalance	every 2 years	bycountry	electricity balancing	Positive (BRP long)	Link
455		Termer	Total impalance	every z years	by country			
						in Accordance with Article 60(1)		
						of Commission Regulation (EU)		
				report		2017/2195 of November 2017		
	TenneT TSO BV (NL) biennial		Total Balancing	published		establishing a guideline on	Balance sheet of total imbalance	
	report on Balancing	TenneT	energy	every 2 years	by country	electricity balancing	settlement period (ISP)	Link
	report on Balancing	Termer	chergy		by country		Settlement period (ISF)	
						in Accordance with Article 60(1)		
						of Commission Regulation (EU)		
				report		2017/2195 of November 2017		
	TenneT TSO BV (NL) biennial		[-/-, +/+] Largest	published		establishing a guideline on	[-/-, +/+] Deterministic criteria FRR	
	report on Balancing	TenneT	Incidents	every 2 years	by country	electricity balancing	dimensioning	Link
				, ,	, ,		5	
			Cross-border		by country; by			
436	Transparency Platform	ENTSO-E	physical flows	hourly	bidding zone			Link
						The planned and forced		
						unavailabilities of production		
						and generation units expected		
			Planned			to last for at least one market		
			Unavailability of	quarter	by country; by	time unit up to three years		
437	Transparency Platform	ENTSO-E	<b>Generation Units</b>	hourly	bidding zone	ahead.	Planned outage	Link

	А	В	C	D	E	F	G	Н	Ι	J	Κ	L
1	Database	Author	Catagony	RAA element	Data input	лт		Coun				Years
	Dalabase	Author	Category	RAA element	Data Input	AI	DE	DE	FK	INL	LU	rears
					Changes in Actual							
120	Transportance Diatform	ENTSO-E	Electricity supply-side		Availability of Generation Units	Vaa	Vaa	Vaa	Vaa	Vac	Vaa	2014 forecast
430	Transparency Platform	ENTSO-E	data	Unplanned outages	Generation Units	res	res	res	res	res	res	2014 - Torecast
					Planned							
120	Transparency Platform	ENTSO-E	Electricity supply-side data	Thermal generation	Unavailability of Production Units	Vac	Vac	Vac	Vac	Vec	Vac	2014 forecast
439		ENTSO-E	uata	Thermal generation	Production Units	res	res	res	res	res	res	2014 - Torecast
					Changes in Actual							
140	Transparency Platform	ENTSO-E	Electricity supply-side data	Unplanned outages	Availability of Production Units	Vac	Vac	Vac	Vac	Vec	Vac	2014 forecast
440		ENTSO-E	uata	Unplanned outages	Production Units	res	res	res	res	res	res	2014 - Torecast
					Planned							
			Electricity supply-side		Unavailability in the Transmission							
441	Transparency Platform	ENTSO-E	data	Thermal generation		Yes	Yes	Yes	Yes	Yes `	Yes	2014 - forecast
					Changes in Actual Availability in the							
			Electricity supply-side		Transmission							
442	Transparency Platform	ENTSO-E	data	Unplanned outages	Grid	Yes	Yes	Yes	Yes	Yes `	Yes	2014 - forecast

	А	В	М	N	0	Р	Q	R
1				Temporal	Spatial			
2	Database	Author	Data input	resolution	resolution	Remarks	Additional Description	Link
						The planned and forced		
						unavailabilities of production		
						and generation units expected		
			Changes in Actual			to last for at least one market		
			Availability of	quarter	by country; by	time unit up to three years		
438	Transparency Platform	ENTSO-E	Generation Units	hourly		ahead.	Forced outage	Link
						The planned and forced		
						unavailabilities of production		
						and generation units expected		
			Planned			to last for at least one market		
			Unavailability of	quarter	by country: by	time unit up to three years		
439	Transparency Platform	ENTSO-E	Production Units	hourly		ahead.	Planned outage	Link
133			i i oudetion onito	nouny	braaning zonie	The planned and forced		
						unavailabilities of production		
						and generation units expected		
			Changes in Actual			to last for at least one market		
			Availability of	quarter	by country: by	time unit up to three years		
110	Transparency Platform	ENTSO-E	Production Units	hourly		ahead.	Forced outage	Link
440				nourry	bidding 20nc	The planned and forced	1 of ceu outage	
						unavailabilities, including		
						changes in unavailability of		
						interconnections in the		
						transmission grid that reduce		
						transfer capacities between		
			Planned			areas during at least one market		
			Unavailability in			time unit including information		
			the Transmission	quarter		about new Net Transfer		
111	Transparency Platform	ENTSO-E	Grid	•		Capacity.	Planned outage	Link
44	Transparency Platform	ENTSO-E	Grid	hourly	bluding zone	The planned and forced	Planned outage	Link
						unavailabilities, including		
						changes in unavailability of		
						interconnections in the		
						transmission grid that reduce		
						transfer capacities between		
						areas during at least one market		
			Changes in Art. 1			-		
			Changes in Actual			time unit including information		
4.40			Availability in the			about new Net Transfer	E I	
442	Transparency Platform	ENTSO-E	Transmission Grid	nourly	bidding zone	Capacity.	Forced outage	<u>Link</u>

	А	В	С	D	E	F	G	Н		J	Κ	L	
1									ntries				
2	Database	Author	Category	RAA element	Data input	AT	BE	DE	FR	NL	LU	Years	
					Planned Unavailability of								
			Electricity supply-side		Consumption								
443	Transparency Platform		data	Thermal generation	Units	Yes	Yes	Yes	Yes	Yes	Yes	2014 - forecast	
	· · · · · · · · · · · · · · · · · · ·												
					Changes in Actual								
					Availability of								
			Electricity supply-side		Consumption								
444	Transparency Platform	ENTSO-E	data	Unplanned outages	Units	Yes	Yes	Yes	Yes	Yes	Yes	2014 - forecast	
				Cross-border trade	New								
<b>_</b>			Network and	modelling (between	interconnection								
445	TYNDP 2020	ENTSO-E	infrastructural data	modelled zones)	projects	Yes	Yes	Yes	Yes	Yes	Yes		2020

	А	В	М	Ν	0	Р	Q	R
1				Temporal	Spatial			
2	Database	Author	Data input	resolution	resolution	Remarks	Additional Description	Link
						View on unavailability of		
						consumption units in aggregated		
						form. All planned and forced		
						outages in selected area are		
			Planned			aggregated according the		
			Unavailability of			market time unit. List of specific		
			Consumption	quarter	by country; by	consumption units is not		
443	Transparency Platform	ENTSO-E	Units	hourly	bidding zone	provided	Planned outage	<u>Link</u>
						View on unavailability of		
						consumption units in aggregated		
						form. All planned and forced		
						outages in selected area are		
			Changes in Actual			aggregated according the		
			Availability of			market time unit. List of specific		
			Consumption	quarter	by country; by	consumption units is not		
444	Transparency Platform	ENTSO-E	Units	hourly	bidding zone	provided	Forced outage	<u>Link</u>
			New					
			interconnection					
445	TYNDP 2020	ENTSO-E	projects	Project based	by country			<u>Link</u>