IECRE OD-407

IECRE
OPERATIONAL DOCUMENT

IEC System for Certification to Standards relating to Equipment for use in Renewable Energy applications (IECRE System)

PV SYSTEM Performance Data Reporting Requirements

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PV SYSTEM Performance Data Reporting Requirements

PRICE CODE **ZZ**

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IECRE PV Certification Scheme

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PV SYSTEM Performance Data Reporting Requirements

INTRODUCTION

Assessment of a PV system requires the generation of reliable, compatible and interoperable data to characterize PV plant performance and status at critical milestones. Transparency, consistency, accountability and accurate reporting is essential to the proliferation of PV technology.

Stakeholders include Engineering Planning and Construction companies, investors, insurance companies, operators, maintenance companies, utilities and others.

The data exchanged covers all phases of a PV plant and system lifecycle. All relevant data interchanged is unified in form and content across the industry. Technical as well as financial parameters have to be considered for standardization interoperability and reporting.

The standardization of fundamental technical issues dealt with in other IEC standards (e.g. IEC 61724-x) has been considered and the conventions used in this standard are aligned accordingly.

PV SYSTEM Performance Data Reporting Requirements

1 Scope

This Operational Document defines the requirements for the data to be reported in conjunction with issuance of electronic certificates at milestones in the PV system life cycle. The parameters that must be submitted with an electronic submission are named and defined either by other IEC standards, by financial industry standards or are self-evident. This purpose of this Operational Document is to enable the preparation of XML or XBRL and other data sets from data collected during the assessment by IECRE Inspection Bodies in addition to data collected from automated monitoring devices.

Performance data for all PV systems certified under the IECRE PV Certification Scheme shall be reported in the format presented in section 7.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 61724-1 *Photovoltaic system performance – Part 1: Monitoring*

IEC 61724-2 *Photovoltaic system performance – Part 2: Capacity evaluation method*

IEC 61724-3 *Photovoltaic system performance – Part 3: Energy evaluation method*

IEC 62446-2 *Grid connected photovoltaic (PV) systems – Part 2: Maintenance of PV systems*

IEC CA 01 *IEC Conformity Assessment Systems – Basic Rules*

IECRE 01-S *IECRE Supplement to IEC CA 01*

IECRE 02 *Rules of Procedure*

IECRE 04 *Rules of Procedure for the Certification of Photovoltaic Systems according to the IECRE-PV Schemes*

ISO/IEC 17065: *General Requirements for bodies operating certification systems*

ISO/IEC 17025: *General Requirements for the Competence of Testing and Calibration Laboratories*

ISO/IEC 17020: *General Criteria for the Operation of Various Types of Bodies Performing Inspections*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in the International Electrotechnical Commission Glossary (http://std.iec.ch/glossary) apply.

4 General Provisions

The normative IECRE references define the general requirements for CBs and IBs operating under the PV Certification Scheme.

Additional requirements for CBs and IBs operating within the PV Certification Scheme are described in IECRE PV OMC Operational Documents (e.g. OD 401).

5   Documentation of Completion of PV Project Milestone Certificate

Milestone Certificates resulting in XML or XBRL transmission can be transmitted to stakeholders at any date with the certificate identity uniquely assigned by the IECRE CB or IB. Every transmission must be time stamped and cannot be altered once transmitted. Thus, over time, a record of the PV system performance is compiled.

6   PV System Performance Test Results

The PV system performance shall be reported according to specific requirements for a certain milestone as defined in the relevant Operational Document and in accordance with IEC 61724 series requirements for PV system performance measurements. Specific requirements vary by system category, as defined in the IEC 61724 series.

Test results recorded within IEC IB test reports may include other data (e.g., high frequency monitoring data) that is used to compile specified parameters.

Unless indicated as "public" data is treated confidential and available to the IECRE bodies and customers only unless contractually agreed otherwise.

Where no underlying standard IEC standard is define, data is supplied as indicated in the "PV definitions" column or as indicated by industry practise and at the discretion of the IECRE IB or IECRE CB.

The column "table in table" indicates where data elements can be recorded in n instances as a nested table (e.g. multiple types of inverters used within one system).

7   TABLE OF DATA ELEMENTS

	PV parameters Name	PV definitions		Data sample	confidentiality	Table in table data
Metadata						
	CertificateDate	date certificate is issued	**yyyy.mm.dd.hh.mm.ss**	**2015.05.21.08.05.01**	**Public**	
	Certificate_number	defined by IECRE/CB	**N**	**IECREPV458976.1**	**Public**	
	Certificate_type	milestone, i.e. "Final Certificate" (1 year after commissioning)	**Milestone**	**OD402**	**Public**	
	Name_of_System	Common plant designator or name	**Name**	**Gondwana #1**	**Public**	
	Certificate_holder	entity paying	**Name**	**PG&E**	**Public**	
	SubArrayID	Subarray ID numbers	**Text**	**abcd**		**table of sub-arrays**
	# of Units	If a portfolio, number of systems in the portfolio.Or, if a fleet, number of systems in the fleet	**Numeric**	**n**	**1000000**	

	PV parameters Name	PV definitions		Data sample	confide ntiality	Table in table data
Metad ata						
	CityNameSPX	Name of city system is located in or adjacent to	**Text**	**Tokyo**		
	CountryNameSPX	ISO country code here plant is located	**Text**	**FRA**		
	StateNameSPX	Name of state or province	**Text**	**Udar Pradesh**		
	PostalCodeSys	Postal Code where system is located	**Text**	**PED45-556.9**		
	LatitudeRevenueMeter	The latitude of the system at the plant entrance (revenue meter location). ISO 19111	**Numeric**	**Numeric**	**Public**	
	LongitudeRevenueMeter	The longitude of the system at the plant entrance. Revenue (meter location) ISO 19111	**Numeric**	**Numeric**	**Public**	
	Utility_connect	Utility system is connected to	**Name**	**PG&E**		

	PV parameters Name	PV definitions		Data sample	confide ntiality	Table in table data
Metad ata						
	UtilityNameOffTake	Utility Off take contract is signed with	**Text**	**16**		
	time_completed _commissioning	time stamp, (i.e. milestone E at last inverter or string commissioned measured at the revenue meter))	**yyyy.mm.dd. hh.mm.ss**	**2015.05.21. 08.05.01**		
	Plant acceptance date	date plant was signed over to owner	**yyyy.mm.dd**	**2016.08.12.**		
	OperationsCommencedDate1	Date the operations of the PV plant commenced, in CCYY-MM-DD format. (Asset management and transaction/trade , 2015 US GAAP Financial Reporting XBRL Tag)	**yyyy.mm.dd. hh.mm.ss**	**2016.08.12. 12.06**		

	PV parameters Name	PV definitions		Data sample	confide ntiality	Table in table data
Metad ata						
	LongTermContractForPurchaseOfElectricPowerDateOfContra ctInitiation	Date of contract initiation of long-term contract to purchase electricity from a production plant, in CCYY-MM-DD format. (Asset management and transaction/trade)	**yyyy.mm.dd. hh.mm.ss**	**2016.08.12. 12.07**		
	LongTermContractForPurchaseOfElectricPowerDateOfContra ctExpiration	Date of contract expiration of long-term contract to purchase electricity from a production plant, in CCYY-MM-DD format. (Asset management and transaction/trade , 2015 US GAAP Financial Reporting XBRL Tag)	**yyyy.mm.dd. hh.mm.ss**	**2016.08.12. 12.08**		

	PV parameters Name	PV definitions		Data sample	confide ntiality	Table in table data
Metad ata						
	Authorized_viewer n	person or entity authorized to access the data - security ticket, multiple security tickets can be issued to link certifier and viewer of data	**alphanumeri c**	**a6233578f d**		
	IECRE_Certification_body	IEC RE CB	**Name**	**TUVR**	**Public**	
	IECRE_Inspection _Body	IEC RE IB	**Name**	**TUVR**	**Public**	
	Operator		**Name**			
	EPC_1	Prime contractor	**Name**	**First Solar**		
	EPC_2	General contractor	**Name**	**McCarthhy**		
	contract_currency	Currency major contract transactions are conducted with	**currency letters**	**EUR**		
	Site_Climate_Classification	Per IEC 60721	**alphanumeri c**			

	PV parameters Name	PV definitions		Data sample	confide ntiality	Table in table data
Metad ata						
	ModuleTypeManufacturer	Manufacturer, Name of the manufacturer of the panels. (Database would extend dimensionally to account for multiple modules used within the plant)	**Name**	**YINGLI**		**Table of table "Module s"**
	ModuleIDdesignator	Model designator, type designator (Database would extend dimensionally to account for multiple modules used within the plant)	**Name**	**SD-NG7**		**Table of table "Module s"**
	Module_Type_technology	CdTe, CIGS, ASi, MonoSi, MultiSi, CPV	**technology type**	**Csi**		**Table of table "Module s"**
	Module - Rating (kW DC STC)	Maximum power output, under standard test conditions, of the panel model. In Watt	**Numeric**	**0.245**		**Table of table "Module s"**

	PV parameters Name	PV definitions		Data sample	confide ntiality	Table in table data
Metad ata						
	Module - Total Number	Total number of panels.	**Numeric**	**2500000**		**Table of table "Module s"**
	Module - Product Warranty End Date	Date when the product warranty expires for the panels.	**yyyy.mm.dd**	**2016.08.12.**		**Table of table "Module s"**
	InverterTypeManufacturer	Manufacturer name	**Name**	**GE**		**Table of table "Inverte rs"**
	InverteTypeTechnology	Central, String, Distributed, Micro, Transformerless, Grounded	**technology type**	**String**		**Table of table "Inverte rs"**
	InverterModelDesignator	Manufacturer's model number of the inverters. Serial number if applicable	**Name**			**Table of table "Inverte rs"**
	Inverter, Rating (kW AC)	Maximum power output, in AC, of the inverter model.	**Numeric**			**Table of table "Inverte**

	PV parameters Name	PV definitions		Data sample	confide ntiality	Table in table data
Metad ata						
						rs"
	Inverter, Product Warranty End Date	Date when the product warranty expires for the inverters.	**yyyy.mm.dd**	**2016.08.12.**		**Table of table "Inverte rs"**
	Inverter, Total Number	Total number of inverters in aggregate and total by inverter model.	**Numeric**	**62**		**Table of table "Inverte rs"**
	TransformerLVManufacturer	Manufacturer of transformer Medium Voltage (LV naming in error)	**Name**	**GE**		**Table of table "transfo rmers"**
	TransformerLVModelDesignator	Transformer Model/type designation and serial number if applicable	**Name**	**GET480TF E 235**		**Table of table "transfo rmers"**
	Transformer_LV_Type_technology	2/3/4 winding, Inverter step up transformer	**technology type**	**Dual Winding**		**Table of table "transfo rmers"**

	PV parameters Name	PV definitions		Data sample	confidentiality	Table in table data
Metadata						
	Fixed tilt tracker	Fixed mounting	**Y/N**	**Y**		**table of table "trackers"**
	Tracker_dual_axis	Boolean	**Y/N**	**Y**		**table of table "trackers"**
	Tracker_single_axis	Boolean	**Y/N**	**N**		
	System_Capacity_contract	max power accepted by grid	**kW**	**100000**		
	Rated_Power_kWpeakAC	Power plant rating at revenue meter	**kW**	**1000**		
	DC_rated_power_at_STC	contracted DC array rating/Sum of modul ratings	**kW**	**10000**		

	PV parameters Name	PV definitions		Data sample	confide ntiality	Table in table data
Metad ata						
	Monitoring System Provider Name	Name of the monitoring system provider. (Platform) (Database would extend dimensionally to account for multiple modules used within the plant)	**Name**	**70**		**table of table "Monito ring Sys"**
	Monitoring System Provider Web Site	Website specific to this PV system	**Name**	**70**		**table of table "Monito ring Sys"**
	PVSystemPerformanceSamplingInterval	Rate at which performance data is collected	**Seconds**	**60**		**table of table "Monito ring Sys"**
	PVSystemWeatherSource	Choices are None, Local, Satellite, Modelled, Mixed	**Name**	**Local**		**table of table "Monito ring Sys"**

	PV parameters Name	PV definitions		Data sample	confide ntiality	Table in table data
Metad ata						
ESS syste m data						
	BatteryManagementSystemModel	Manufacturer's model number of the BMS.	**Name**	**OFT LLC**		
	BatteryManagementSystemPowerRating	Maximum capacity, under standard test conditions, of the BMS.	**Wh**	**10000**		
	NumberofBatteryManagementSystems	Total number of BMS.	**Numeric**	**54**		
	BatteryManagementSystemWarrantyEndDate	Date when warranty expires for the BMS.	**yyyy.mm.dd**	**2016.08.12.**		
	BatteryManufacturerName	Name of the manufacturer of the battery.	**Name**	**OFT LLC**		
	BatteryModelDesignator	Manufacturer's model number of the battery.	**Name**	**OESSg64**		

	PV parameters Name	PV definitions		Data sample	confidentiality	Table in table data
Metadata						
	BatteryRatingDC	Maximum power output, under standard test conditions, of the battery. IEC62933-1	**kW**	**10000**		
	NumberofBatteriesTotal	Total number of battery.	**n**	**54**		
	BatteryWarrantyEndDate	Date when warranty expires for the battery.	**yyyy.mm.dd**	**2016.08.12.**		
	BatteryChemistryType	Battery chemistry type of the battery (see "Types").	**LiOn, Pb, NiCad**	**LioN**		
	BatteryInverterManufacturerName	Name of the manufacturer of the inverters.	**Name**	**OFT LLC**		
	BatteryInverterModelDesignator	Manufacturer's model number of the inverters.	**Name**	**OBnSSg64**		

	PV parameters Name	PV definitions		Data sample	confide ntiality	Table in table data
Metad ata						
	BatteryInverterACPowerRating	Maximum power output, in AC, of the inverter model, IEC62933-1	**kW**	**10000**		
	NumberofBatteryInverters	Total number of inverters.	**n**	**54**		
	BatteryInverterWarrantyEndDate	Date when warranty expires for the inverters.	**yyyy.mm.dd**	**2016.08.12.**		
	DemandChargeReduction	KW reduced from	**kW**	**10000**		
Predict ed metad ata						
	Assumed_irradiation_design model2	plane of array irradiation per annum	**kWh/m2a**			
	Major Design Model	version used for Perf. Prediction	**Design Model**	**NREL SAM**		
	Updated_Design_Model	version used for 2nd Perf. Prediction	**Design Model**	**NREL SAM**		

	PV parameters Name	PV definitions		Data sample	confide ntiality	Table in table data
Metad ata						
	Assumed_irradiation_design model1	plane of array irradiation per annum	**kWh/m2a**			
	Assumed_irradiation_design model2	plane of array irradiation per annum	**kWh/m2a**			
	Model_factors_soiling	Is soiling considered in Model?	**Yes/No**	**Yes**		
	Model_factors_snow	Are snow effects considered in model?	**Yes/No**	**Yes**		
	Model_factors_parasitic_Loss	Are parasitic losses considered in model?	**Yes/No**	**Yes**		
	Model_factors_external_curtailment	Is external curtailment considered in model?	**Yes/No**	**Yes**		
	Model_factors_Non_Unity_power_factor	Is power factor (non unity) considered in model?	**Yes/No**	**No**		
	Predicted_energy_revenue _meter	Predicted Active Electrical Production at the revenue meter for indicated time period, Eout (kWh) per IEC 61724-3	**kWh/a**	**60000**		

	PV parameters Name	PV definitions		Data sample	confidentiality	Table in table data
Metadata						
		using historical weather data that is considered to be representative for the site; the Predicted energy should be reduced from the total predicted energy to reflect times of unavailability				
	Predicted_Energy_Availability	Predicted Energy Availability Estimate by Year; the modelled predicted energy for unity availability may be obtained by dividing "Predicted energy" by "Predicted_Energy_Availability"	**ratio, dimensionless**	**1**		
	TargetMaxPower	MaxPlannedPower	**KW**	**10000**		
	DemandCharge	varies by time (residential, commercial)	**currency/kWh**	**0.12/kWh**		

	PV parameters Name	PV definitions		Data sample	confide ntiality	Table in table data
Metad ata						
	EnergyCharge	by time element	**currency/kW h**	**0.12/kWh**		
	ExportRate	Energy Exported above demand	**kWh**	**1000**		
	ExportRateConsumed	Energy consumed over time	**kWh**	**1000**		
	EnergyChargeReduction	Energy Offset as a result of power generated (actual) peak	**kWh**	**10000**		
Table of Param eters: measu red						
	Start_date_electrical_energy_expectation	time stamp, (i.e. milestone E at last inverter or string commissioned measured at the revenue meter))	**yyyy.mm.dd. hh.mm.ss**	**2015.05.21. 08.05.01**		

	PV parameters Name	PV definitions		Data sample	confidentiality	Table in table data
Metadata						
	Expected_energy_revenue _meter	Expected Active Electrical Production at the revenue meter for indicated time period, Eout (kWh) per IEC 61724-3 using historical weather data that is considered to be representative for the site; the Predicted energy should be reduced from the total predicted energy to reflect times of unavailability	**kWh/a**	**60000**		
	Expected_Energy_Availability	Expect Energy Availability Estimate by Year; the modelled predicted energy for unity availability may be obtained by dividing "Predicted_energy" by "Predicted_Energy_Availability"	**ratio, dimensionless**	**1**		

	PV parameters Name	PV definitions		Data sample	confide ntiality	Table in table data
Metad ata						
	Predicted_O&M_Cost	Predicted cost of ownership for system by Year	**currency/W**	**1**		
	Expected Power	Needed for Commissioning/Provis ional Certificate	**kW**	**1000**		
	Measured Capacity	Needed for Commissioning/Provis ional Certificate	**kWh**	**1000**		
	Power Performance Index	Needed for Commissioning/Provis ional Certificate	**ratio, dimensionle ss**	**0.65**		
	Expected_Energy_Total	Calculated from measured irradiance, weather.	**kWh**	**1000**		
	Expected_Energy_Available_Times	Calculated from measured irradiance, weather.	**kWh**	**1000**		
	Expected_Energy_Unavailable_Times	Calculated from measured irradiance, weather.	**kWh**	**1000**		

	PV parameters Name	PV definitions		Data sample	confidentiality	Table in table data
Metadata						
	Expected_Energy_Unavailable_Times_External	Calculated from measured irradiance, weather.	**kWh**	**1000**		
	One-year_in-plane_measured_irradiation	One-year in-plane irradiation, Hi, as described in IEC 61724-1 Ed. 2 in Table 10, Section 9.3 and Table 3, section 7 and as tabulated under the guidance of IEC 61724-3., measured	**kWh/m2**	**1000**		
	1yearplus_timestop	One year stop point chosen	**yyyy.mm.dd.hh.mm.ss**	**2015.05.21.08.05.01**		
	Measurement_Class	Measurement class per IEC 71724	**Class type**	**A**		
	Parasitic_Loss_Measured	Are parasitic losses measured in the test?	**Yes/No**	**No**		
	Measurement_Procedure_Deviations	Test Procedure pertains to IEC 61724-3	**Yes/No**	**No**		

	PV parameters Name	PV definitions		Data sample	confide ntiality	Table in table data
Metad ata						
	Measured_Energy	Active (real) energy measured for the year ending at the 1yearplus_timestop according to IEC 61724-3 sec 6.7	**kWh**	**1000**		
	Measured_Energy_Availability	Measured Active (Real) Energy Availability For the Year as defined in IEC 61724-3 section 6.8; same as ratio of Expected_Energy_Av ailable_Times to Expected_Energy_Tot al	**ratio, dimensionle ss**	**0.97**		
	External_Cause_Excluded_Energy_Availability	Actual Energy Availability For the Year excluding time of external or other outage causes per IEC 61724-3 section 6.8.1	**ratio, dimensionle ss**	**0.99**		

	PV parameters Name	PV definitions		Data sample	confide ntiality	Table in table data
Metad ata						
	All-In_Energy_Performance_Index	Active (real) energy performance index including times when the system is not functioning	**ratio, dimensionle ss**	**0.9**		
	In-Service_Energy_Performance_Index	Active (real) Energy Performance Index during times when the system is functioning (offline times removed)	**ratio, dimensionle ss**	**0.9**		
	Energy Unavailability	From IEC 61724-3	**kWh**	**10000**		
	Energy Unavailability External	From IEC 61724-3	**kWh**	**10000**		
	Energy Availability	From IEC 61724-3	**kWh**	**10000**		
	Capacity Factor	Active (Real) energy generation of plant relative to energy that would have been generated if the plant was operating continuously at its AC rated power, per IEC 61724-3 section 6.8.2	**dimensionle ss**	**0.25**		

	PV parameters Name	PV definitions		Data sample	confide ntiality	Table in table data
Metad ata						
	Performance_ratio	Ratio of measured active (real) energy out to real energy expected if plant operated at its DC rated efficiency, per IEC 61724-3 section 6.8.3	**dimensionle ss**	**0.8**		
	Measurement_Uncertainity_Basis	Standard method used to calculate Uncertainty of measurement	**Method Used**	**ISO/IEC Guide 98- 1:2009**		
	Stated_Uncertainity_Value_Expected_Energy		**Percentage**	**±3**		
	Stated_Uncertainity_Value_Energy_Measured	Value Quantification of Total Uncertainty (including bias and precision)of Energy Measured	**Percentage**	**±3**		
	RPN	Risk Priority Number, placeholder for numeric plant health indicator	**dimensionle ss**	**1**		

	PV parameters Name	PV definitions		Data sample	confide ntiality	Table in table data
Metad ata						
	PQL	Plant Quality Level, placeholder for plant health indicator	**dimensionle ss 1-10**			
Report and contract reviews						
	Gridcode_compliance	IEC 62446-1 or local Gridcode met: Yes/No	**Boolean**	**Yes**		
	Soil_in_site_report	Report providing details of soil consistency, chemistry, site soil measurements (probing trench, probing drill, etc)	**Boolean**	**No**		
	IECRE_ROP_compliance	IEC RE Rules Of Procedure met: Yes/No	**Boolean**	**No**		
	PPA_contract_review	PPA contract reviewed considered: Yes/No	**Boolean**	**Yes**		
	Site_permitt_review	Site permit review considered: Yes/No	**Boolean**	**Yes**		

	PV parameters Name	PV definitions		Data sample	confide ntiality	Table in table data
Metad ata						
	Off_taker_contract_review	Off taker contract review considered: Yes/No	**Boolean**	**Yes**		
	O&M contract considered	O&M contract review considered: Yes/No	**Boolean**	**No**		
	EPC_contract_review	EPC contract review considered: Yes/No	**Boolean**	**Yes**		
	Supplier_contracts_review	Suppliers contract review considered: Yes/No	**Boolean**	**Yes**		
	GeotechnicalReport	Geotechnical report reviewed	**Boolean**	**No**		
	Fire risk assessment report	fire risk report submitted	**Boolean**	**Yes**		
	Ecological/wildlife/Plant life report	Eco report reviewed	**Boolean**	**Yes**		
	Cultural resources and archeological report	Cultural report reviewed	**Boolean**	**Yes**		

	PV parameters Name	PV definitions		Data sample	confide ntiality	Table in table data
Metad ata						
	Environmental report	Combined environmental impact report Yes/No	**Boolean**	**Yes**		
Table financi al identifi ers						
	EnergyChargeReduction	Energy Offset as a result of power generated (actual) peak	**currency**	**23**		
	DemandReduction	Energy Offset as a result of power generated (actual) peak	**currency**	**23**		
	Actual_Cost_Expenses_O&M	Annual cost incurred for corrective maintenance inclusive of parts, logistics and labour	**currency/W**	**1**		

	PV parameters Name	PV definitions		Data sample	confide ntiality	Table in table data
Metad ata						
	Actual_Cost_unavailability_driven_lost_energy	Annual cost for lost revenue from lost energy generation	**currency/W**	**1**		
	Actual_Cost_penalties_lost energy	Annual cost of penalties for loss of performance	**currency/W**	**1**		
	Actual_Cost_Low_Performance_driven_lost_energy	Should track both the cost of unavailability and performance	**currency/W**	**1**		
	Actual_Cost_penalties_perf_lost energy	Should track both the cost of unavailability and performance	**currency/W**	**1**		
	Financing_Name	Financing Name	**Name**			
	Financing_Loan_Number	Loan Number	**alphanumeri c**			
	Financing_Name_2	Financing Name 2	**Name**			
	Financing_Loan_Number_2	Loan Number 2	**alphanumeri c**			

	PV parameters Name	PV definitions		Data sample	confide ntiality	Table in table data
Metad ata						
	Financial_Security_Name	Name of Financial Security	**alphanumeri c**			
	Financial_Security_Number	Number of Financial Security	**alphanumeri c**			
	PerformanceInsurance_Name	Name of Performance Insurance Company	**Name**			
	Insurance_Policy_Number	Insurance Policy Number	**alphanumeri c**			
	Insurance_Name_2	Name of Performance Insurance Company 2	**Name**			
	Insurance_Policy_Number_2	Insurance Policy 2, Number	**alphanumeri c**			
Extend ed financi al param eters						
	OperationsCommencedDate1	Operations commencement date	**yyyy.mm.dd. hh.mm.ss**			

	PV parameters Name	PV definitions		Data sample	confide ntiality	Table in table data
Metad ata						
	LongTermContractForPurchaseOfElectricPowerDateOfContra ctInitiation	Long Term Contract for Purchase of Electric Power, Date Of Contract Initiation	**yyyy.mm.dd. hh.mm.ss**			
	LongTermContractForPurchaseOfElectricPowerDateOfContra ctExpiration	Long Term Contract for Purchase of Electric Power, Date of Contract Expiration	**yyyy.mm.dd. hh.mm.ss**			
	Predicted OperatingExpenses	Generally, recurring costs associated with normal operations except for the portion of these expenses which can be clearly related to production and included in cost of sales or services. Includes selling, general and administrative expense. (Asset management and transaction/trade , 2015 US GAAP Financial Reporting XBRL Tag)	**currency/W**			

	PV parameters Name	PV definitions		Data sample	confide ntiality	Table in table data
Metad ata						
	Predicted AssetManagementCosts	The aggregate costs related to asset management during the reporting period. (Asset management and transaction/trade , 2015 US GAAP Financial Reporting XBRL Tag)	**currency/W**			
	Predicted GeneralInsuranceExpense	The expense in the period incurred with respect to protection provided by insurance entities against risks other than risks associated with production (which are allocated to cost of sales). (Asset management and transaction/trade , 2015 US GAAP Financial Reporting XBRL Tag)	**currency/W**			

	PV parameters Name	PV definitions		Data sample	confide ntiality	Table in table data
Metad ata						
	Predicted ExciseAndSalesTaxes	The amount of excise and sales taxes included in sales and revenues, which are then deducted as a cost of sales. Includes excise taxes, which are applied to specific types of transactions or items (such as gasoline or alcohol); and sales, use and value added taxes, which are applied to a broad class of revenue-producing transactions involving a wide range of goods and services. (Asset management and transaction/trade , 2015 US GAAP Financial Reporting XBRL Tag)	**currency/W**			

	PV parameters Name	PV definitions		Data sample	confide ntiality	Table in table data
Metad ata						
	Predicted RealEstateTaxExpense	A tax based on the assessed value of real estate by the local government. The tax is usually based on the value of property (including the land). (Asset management and transaction/trade , 2015 US GAAP Financial Reporting XBRL Tag)	**currency/W**			
	Predicted UtilitiesCosts	Utilities costs incurred during the reporting period for services, such as water, sewer, gas, electricity and telephone required to operate a building. (Asset management and transaction/trade , 2015 US GAAP Financial Reporting XBRL Tag)	**currency/W**			

	PV parameters Name	PV definitions		Data sample	confide ntiality	Table in table data
Metad ata						
	Predicted OtherExpenses	Amount of expense classified as other. (Asset management and transaction/trade , 2015 US GAAP Financial Reporting XBRL Tag)	**currency/W**			
	Predicted AuditingFee	Fee for auditing financial information. (Asset management and transaction/trade)	**currency/W**			
	Predicted TaxPreparationFee	Fee for preparing tax returns. (Asset management and transaction/trade)	**currency/W**			
	Predicted OtherAdministrativeFees	Other administrative fees. (Asset management and transaction/trade)	**currency/W**			
	Predicted SiteLeasePayment	Site lease expense. (Asset management and transaction/trade)	**currency/W**			

	PV parameters Name	PV definitions		Data sample	confide ntiality	Table in table data
Metad ata						
	Predicted CurrentFederalTaxExpenseBenefit	Amount of current federal tax expense (benefit) pertaining to income (loss) from continuing operations. (Asset management and transaction/trade , 2015 US GAAP Financial Reporting XBRL Tag)	**currency/W**			
	Predicted CurrentStateAndLocalTaxExpenseBenefit	Amount of current state and local tax expense (benefit) pertaining to income (loss) from continuing operations. (Asset management and transaction/trade , 2015 US GAAP Financial Reporting XBRL Tag)	**currency/W**			

	PV parameters Name	PV definitions		Data sample	confide ntiality	Table in table data
Metad ata						
	Predicted OtherTaxExpenseBenefit	Amount of other income tax expense (benefit). (Asset management and transaction/trade , 2015 US GAAP Financial Reporting XBRL Tag)	**currency/W**			
	Predicted CostsAndExpenses	Total costs of sales and operating expenses for the period. (Asset management and transaction/trade , 2015 US GAAP Financial Reporting XBRL Tag)	**currency/W**			
	Predicted PaymentsForRent	Cash payments to lessor's for use of assets under operating leases. (Asset management and transaction/trade , 2015 US GAAP Financial Reporting XBRL Tag)	**currency/W**			

	PV parameters Name	PV definitions		Data sample	confidentiality	Table in table data
Metadata						
	Predicted ElectricalGenerationRevenue	Revenue from generation of electricity, a process of producing electric energy by transforming other forms of energy such as nuclear, fossil fuel, solar, geothermal, hydro, and wind. (Asset management and transaction/trade , 2015 US GAAP Financial Reporting XBRL Tag)	**currency/W**			
	Predicted PBIRevenue	Revenue from energy production based incentive. (Asset management and transaction/trade)	**currency/W**			
	Predicted RECRevenue	Revenue from renewable energy credits. (Asset management and transaction/trade)	**currency/W**			

	PV parameters Name	PV definitions		Data sample	confide ntiality	Table in table data
Metad ata						
	Predicted RebateRevenue	Revenue from renewable energy rebate program. (Asset management and transaction/trade)	**currency/W**			
	Predicted OtherIncome	Amount of revenue and income classified as other. (Asset management and transaction/trade , 2015 US GAAP Financial Reporting XBRL Tag)	**currency/W**			

	PV parameters Name	PV definitions		Data sample	confide ntiality	Table in table data
Metad ata						
	Predicted Revenues	Amount of revenue recognized from goods sold, services rendered, insurance premiums, or other activities that constitute an earning process. Includes, but is not limited to, investment and interest income before deduction of interest expense when recognized as a component of revenue, and sales and trading gain (loss). (Asset management and transaction/trade , 2015 US GAAP Financial Reporting XBRL Tag)	**currency for n series**			

	PV parameters Name	PV definitions		Data sample	confide ntiality	Table in table data
Metad ata						
	Predicted CostOfServicesDepreciationAndAmortization	Depreciation of property, plant and equipment directly related to services rendered by an entity during the reporting period. (Asset management and transaction/trade , 2015 US GAAP Financial Reporting XBRL Tag)	**currency/W**			
	Predicted PrincipalAmountOutstandingOnLoansManagedAndSecuritized	This is the sum of principal amount outstanding for both securitized and unsecuritized loans of all types. (Asset management and transaction/trade , 2015 US GAAP Financial Reporting XBRL Tag)	**currency/W**			

	PV parameters Name	PV definitions		Data sample	confide ntiality	Table in table data
Metad ata						
	Predicted InvestedCapital	The total invested capital at the end of the reporting period. (Asset management and transaction/trade)	**currency/W**			
	Predicted TotalOfAllProjectAccountBalances	Total of all project account balances at the end of the reporting period. (Asset management and transaction/trade)	**currency/W**			
	Predicted UnleveredInternalRateOfReturn	Unlevered internal rate of return. (Asset management and transaction/trade)	**Percentage**			
	Predicted All-inYield	Total (all-in) yield. (Asset management and transaction/trade)	**Percentage**			

	PV parameters Name	PV definitions		Data sample	confide ntiality	Table in table data
Metad ata						
	Predicted PropertyPlantAndEquipmentUsefulLife	Useful life of long lived, physical assets used in the normal conduct of business and not intended for resale, in 'PnYnMnDTnHnMnS' format, for example, 'P1Y5M13D' represents the reported fact of one year, five months, and thirteen days. Examples include, but not limited to, land, buildings, machinery and equipment, office equipment, furniture and fixtures, and computer equipment. (Asset management and transaction/trade , 2015 US GAAP Financial Reporting XBRL Tag)	**yyyy.mm.dd. hh.mm.ss**			

	PV parameters Name	PV definitions		Data sample	confide ntiality	Table in table data
Metad ata						
	Predicted PropertyPlantAndEquipmentSalvageValue	The estimated or actual value of the asset at the end of its useful life or when it is no longer serviceable (cannot be used for its original purpose). (Asset management and transaction/trade , 2015 US GAAP Financial Reporting XBRL Tag)	**currency/W**			
	Predicted Tax-EquityCashDistributions	Amount of payment to tax-equity investors in the reporting period. (Asset transaction/trade only)	**currency/W**			
	Predicted OtherPaymentsToFinanciers	Amount of payments to other financiers in the reporting period. (Asset transaction/trade only)	**currency/W**			

	PV parameters Name	PV definitions		Data sample	confide ntiality	Table in table data
Metad ata						
	Predicted HypotheticalLiquidationAtBookValueBalance	The total Hypothetical Liquidation at Book Value balance at the end of the reporting period. (Asset transaction/trade only)	**currency/W**			
	Predicted PartnershipFlipDate	Date flip (change) in ownership from tax equity investors to long-term owners takes place. (Asset transaction/trade only)	**yyyy.mm.dd. hh.mm.ss**			
	Predicted PartnershipFlipYield	Tax equity investment yield used to trigger partnership flip. (Asset transaction/trade only)	**Percentage**			
	Predicted All-inYield	Total (all-in) yield. (Asset transaction/trade only)	**Percentage**			

	PV parameters Name	PV definitions		Data sample	confide ntiality	Table in table data
Metad ata						
	Predicted DebtInstrumentPeriodicPaymentPrincipal	Amount of the required periodic payments applied to principal. (Asset transaction/trade only, 2015 US GAAP Financial Reporting XBRL Tag)	**currency/W**			
	Predicted DebtInstrumentPeriodicPaymentInterest	Amount of the required periodic payments applied to interest. (Asset transaction/trade only, 2015 US GAAP Financial Reporting XBRL Tag)	**currency/W**			
	Predicted DeficitRestorationObligation	Amount of deficit restoration obligation in the reporting period. (Asset transaction/trade only)	**currency/W**			

	PV parameters Name	PV definitions		Data sample	confide ntiality	Table in table data
Metad ata						
	Predicted DeficitRestorationObligationLimit	Limit to deficit restoration obligation. (Asset transaction/trade only)	**currency/W**			
	Actual OperatingExpenses	Generally recurring costs associated with normal operations except for the portion of these expenses which can be clearly related to production and included in cost of sales or services. Includes selling, general and administrative expense.	**currency/W**			
	Actual AssetManagementCosts	The aggregate costs related to asset management during the reporting period.	**currency/W**			

	PV parameters Name	PV definitions		Data sample	confide ntiality	Table in table data
Metad ata						
	Actual GeneralInsuranceExpense	The expense in the period incurred with respect to protection provided by insurance entities against risks other than risks associated with production (which are allocated to cost of sales)	**currency/W**			
	Actual ExciseAndSalesTaxes	The amount of excise and sales taxes included in sales and revenues, which are then deducted as a cost of sales. Includes excise taxes, which are applied to specific types of transactions or items (such as gasoline or alcohol); and sales, use and value added taxes, which are applied to a broad class of revenue-producing transactions involving a wide range of goods and services.	**currency/W**			

	PV parameters Name	PV definitions		Data sample	confide ntiality	Table in table data
Metad ata						
	Actual RealEstateTaxExpense	A tax based on the assessed value of real estate by the local government. The tax is usually based on the value of property	**currency/W**			
	Actual UtilitiesCosts	Utilities costs incurred during the reporting period for services, such as water, sewer, gas, electricity and telephone required to operate a building.	**currency/W**			
	Actual OtherExpenses	Amount of expense classified as other.	**currency/W**			
	Actual AuditingFee	Fee for auditing financial information.	**currency/W**			
	Actual TaxPreparationFee	Fee for preparing tax returns.	**currency/W**			
	Actual OtherAdministrativeFees	Other administrative fees.	**currency/W**			

	PV parameters Name	PV definitions		Data sample	confidentiality	Table in table data
Metadata						
	Actual SiteLeasePayment	Site lease expense.	**currency/W**			
	Actual CurrentFederalTaxExpenseBenefit	Amount of current federal tax expense	**currency/W**			
	Actual CurrentStateAndLocalTaxExpenseBenefit	Amount of current state and local tax expense	**currency/W**			
	Actual OtherTaxExpenseBenefit	Amount of other income tax expense	**currency/W**			
	Actual CostsAndExpenses	Total costs of sales and operating expenses for the period.	**currency/W**			
	Actual PaymentsForRent	Cash payments to lessor's for use of assets under operating leases.	**currency/W**			

	PV parameters Name	PV definitions		Data sample	confide ntiality	Table in table data
Metad ata						
	Actual ElectricalGenerationRevenue	Revenue from generation of electricity, a process of producing electric energy by transforming other forms of energy such as nuclear, fossil fuel, solar, geothermal, hydro, and wind.	**currency/W**			
	Actual PBIRevenue	Revenue from energy production based incentive.	**currency/W**			
	Actual RECRevenue	Revenue from renewable energy credits.	**currency/W**			
	Actual RebateRevenue	Revenue from renewable energy rebate program.	**currency/W**			
	Actual OtherIncome	Amount of revenue and income classified as other.	**currency/W**			

	PV parameters Name	PV definitions		Data sample	confide ntiality	Table in table data
Metad ata						
	Actual Revenues	Amount of revenue recognized from goods sold, services rendered, insurance premiums, or other activities that constitute an earning process. Includes, but is not limited to, investment and interest income before deduction of interest expense when recognized as a component of revenue, and sales and trading gain	**currency/W**			
	Actual CostOfServicesDepreciationAndAmortization	Depreciation of property, plant and equipment directly related to services rendered by an entity during the reporting period.	**currency/W**			

	PV parameters Name	PV definitions		Data sample	confide ntiality	Table in table data
Metad ata						
	Actual PrincipalAmountOutstandingOnLoansManagedAndSecuritized	This is the sum of principal amount outstanding for both securitized and unsecuritized loans of all types.	**currency/W**			
	Actual InvestedCapital	The total invested capital at the end of the reporting period.	**currency/W**			
	Actual TotalOfAllProjectAccountBalances	Total of all project account balances at the end of the reporting period.	**currency/W**			
	Actual UnleveredInternalRateOfReturn	Unlevered internal rate of return.	**Percentage**			
	Actual All-inYield	Total (all-in) yield.	**Percentage**			

	PV parameters Name	PV definitions		Data sample	confide ntiality	Table in table data
Metad ata						
	Actual PropertyPlantAndEquipmentUsefulLife	Useful life of long lived, physical assets used in the normal conduct of business and not intended for resale, in 'PnYnMnDTnHnMnS' format, for example, 'P1Y5M13D' represents the reported fact of one year, five months, and thirteen days. Examples include, but not limited to, land, buildings, machinery and equipment, office equipment, furniture and fixtures, and computer equipment.	**yyyy.mm.dd. hh.mm.ss**			
	Actual PropertyPlantAndEquipmentSalvageValue	The estimated or actual value of the asset at the end of its useful life or when it is no longer serviceable	**currency/W**			

	PV parameters Name	PV definitions		Data sample	confide ntiality	Table in table data
Metad ata						
	Actual Tax-EquityCashDistributions	Amount of payment to tax-equity investors in the reporting period.	**currency/W**			
	Actual OtherPaymentsToFinanciers	Amount of payments to other financiers in the reporting period.	**currency/W**			
	Actual HypotheticalLiquidationAtBookValueBalance		**currency/W**			
	Actual PartnershipFlipDate	Flip date	**yyyy.mm.dd. hh.mm.ss**			
	Actual PartnershipFlipYield	Tax equity investment yield used to trigger partnership flip.	**Percentage**			
	Actual All-inYield	Total (all-in) yield.	**Percentage**			
	Actual DebtInstrumentPeriodicPaymentPrincipal	Amount of the required periodic payments applied to principal.	**currency/W**			

	PV parameters Name	PV definitions		Data sample	confide ntiality	Table in table data
Metad ata						
	Actual DebtInstrumentPeriodicPaymentInterest	Amount of the required periodic payments applied to interest.	**currency/W**			
	Actual DeficitRestorationObligation	Amount of deficit restoration obligation in the reporting period.	**currency/W**			
	Actual DeficitRestorationObligationLimit	Limit to deficit restoration obligation.	**currency/W**			
	PowerCustomerName	Name of Power receiving customer	**Name**			
	PercentMerchantPowerSales	Percentage of Merchant Power Sales	**Percentage**			
	GeneralPartnerMember0	Party to a partnership business who has unlimited liability.	**Name**			

	PV parameters Name	PV definitions		Data sample	confide ntiality	Table in table data
Metad ata						
	LimitedPartnerMember1	Party to a partnership business who has limited liability (1) (Asset transaction/trade only, 2015 US GAAP Financial Reporting XBRL Tag)	**Name**			
	LimitedPartnerMember2	Party to a partnership business who has limited liability (2) (Asset transaction/trade only, 2015 US GAAP Financial Reporting XBRL Tag)	**Name**			
	LimitedPartnerMember3	Party to a partnership business who has limited liability (3) (Asset transaction/trade only, 2015 US GAAP Financial Reporting XBRL Tag)	**Name**			

	PV parameters Name	PV definitions		Data sample	confide ntiality	Table in table data
Metad ata						
	LimitedPartnerMember4	Party to a partnership business who has limited liability (4) (Asset transaction/trade only, 2015 US GAAP Financial Reporting XBRL Tag)	**Name**			
	LimitedPartnerMember5	Party to a partnership business who has limited liability (5) (Asset transaction/trade only, 2015 US GAAP Financial Reporting XBRL Tag)	**Name**			

	PV parameters Name	PV definitions		Data sample	confide ntiality	Table in table data
Metad ata						
	LimitedLiabilityCompanyLLCOrLimitedPartnershipLPManaging MemberOrGeneralPartnerOwnershipInterest0	Percentage investment held by the managing member or general partner of the limited liability company (LLC) or limited partnership (LP). (0) (Asset transaction/trade only, 2015 US GAAP Financial Reporting XBRL Tag)	**Percentage**			
	LimitedLiabilityCompanyLLCOrLimitedPartnershipLPMembers OrLimitedPartnersOwnershipInterest1	The number of units or percentage investment held by one or more members or limited partners of the LLC or LP. (1) (Asset transaction/trade only, 2015 US GAAP Financial Reporting XBRL Tag)	**Percentage**			

	PV parameters Name	PV definitions		Data sample	confide ntiality	Table in table data
Metad ata						
	LimitedLiabilityCompanyLLCOrLimitedPartnershipLPMembers OrLimitedPartnersOwnershipInterest2	The number of units or percentage investment held by one or more members or limited partners of the LLC or LP. (2) (Asset transaction/trade only, 2015 US GAAP Financial Reporting XBRL Tag)	**Percentage**			
	LimitedLiabilityCompanyLLCOrLimitedPartnershipLPMembers OrLimitedPartnersOwnershipInterest3	The number of units or percentage investment held by one or more members or limited partners of the LLC or LP. (3) (Asset transaction/trade only, 2015 US GAAP Financial Reporting XBRL Tag)	**Percentage**			
	LimitedLiabilityCompanyLLCOrLimitedPartnershipLPMembers OrLimitedPartnersOwnershipInterest4		**Percentage**			

	PV parameters Name	PV definitions		Data sample	confide ntiality	Table in table data
Metad ata						
	LimitedLiabilityCompanyLLCOrLimitedPartnershipLPMembers OrLimitedPartnersOwnershipInterest4	The number of units or percentage investment held by one or more members or limited partners of the LLC or LP. (4) (Asset transaction/trade only, 2015 US GAAP Financial Reporting XBRL Tag)	**Percentage**			
	IncomeTaxExpenseBenefitIntraperiodTaxAllocation0	Amount of income tax expense (benefit) for continuing operations, discontinued operations, other comprehensive income, and items charged (credited) directly to shareholders' equity. (0) (Asset transaction/trade only, 2015 US GAAP Financial Reporting XBRL Tag)	**currency/W**			

	PV parameters Name		PV definitions		Data sample	confide ntiality	Table in table data
Metad ata							
	IncomeTaxExpenseBenefitIntraperiodTaxAllocation1		Amount of income tax expense (benefit) for continuing operations, discontinued operations, other comprehensive income, and items charged (credited) directly to shareholders' equity. (1) (Asset transaction/trade only, 2015 US GAAP Financial Reporting XBRL Tag)	**currency/W**			
	IncomeTaxExpenseBenefitIntraperiodTaxAllocation2		Amount of income tax expense (benefit) for continuing operations, discontinued operations, other comprehensive income, and items charged (credited) directly to shareholders' equity. (2) (Asset transaction/trade only, 2015 US GAAP Financial Reporting	**currency/W**			

	PV parameters Name	PV definitions		Data sample	confidentiality	Table in table data
Metadata						
		XBRL Tag)				
	IncomeTaxExpenseBenefitIntraperiodTaxAllocation3	Amount of income tax expense (benefit) for continuing operations, discontinued operations, other comprehensive income, and items charged (credited) directly to shareholders' equity. (3) (Asset transaction/trade only, 2015 US GAAP Financial Reporting XBRL Tag)	**currency/W**			

	PV parameters Name	PV definitions		Data sample	confide ntiality	Table in table data
Metad ata						
	IncomeTaxExpenseBenefitIntraperiodTaxAllocation4	Amount of income tax expense (benefit) for continuing operations, discontinued operations, other comprehensive income, and items charged (credited) directly to shareholders' equity. (4) (Asset transaction/trade only, 2015 US GAAP Financial Reporting XBRL Tag)	**currency/W**			
	IncomeTaxExpenseBenefitIntraperiodTaxAllocation5	Amount of income tax expense (benefit) for continuing operations, discontinued operations, other comprehensive income, and items charged (credited) directly to shareholders' equity. (5) (Asset transaction/trade only, 2015 US GAAP Financial Reporting	**currency/W**			

	PV parameters Name	PV definitions		Data sample	confide ntiality	Table in table data
Metad ata						
		XBRL Tag)				
	DistributionMadeToLimitedPartnerCashDistributionsPaid0	Amount of cash distribution paid to unit-holder of limited partnership	**currency/W**			
	DistributionMadeToLimitedPartnerCashDistributionsPaid1	Amount of cash distribution paid to unit-holder of limited partnership	**currency/W**			
	DistributionMadeToLimitedPartnerCashDistributionsPaid2	Amount of cash distribution paid to unit-holder of limited partnership	**currency/W**			
	DistributionMadeToLimitedPartnerCashDistributionsPaid3	Amount of cash distribution paid to unit-holder of limited partnership	**currency/W**			
	DistributionMadeToLimitedPartnerCashDistributionsPaid5	Amount of cash distribution paid to unit-holder of limited partnership	**currency/W**			

	PV parameters Name	PV definitions		Data sample	confide ntiality	Table in table data
Metad ata						
	DistributionMadeToLimitedPartnerCashDistributionsPaid4	Amount of cash distribution paid to unit-holder of limited partnership	**currency/W**			
	EquityMethodInvestmentOwnershipPercentage0	The percentage of ownership of common stock or equity participation in the investee accounted for under the equity method of accounting.	**Percentage**			
	EquityMethodInvestmentOwnershipPercentage1	The percentage of ownership of common stock or equity participation in the investee accounted for under the equity method of accounting.	**Percentage**			
	EquityMethodInvestmentOwnershipPercentage2	The percentage of ownership of common stock or equity participation in the investee accounted for under the equity method of accounting.	**Percentage**			

	PV parameters Name	PV definitions		Data sample	confide ntiality	Table in table data
Metad ata						
	EquityMethodInvestmentOwnershipPercentage3	The percentage of ownership of common stock or equity participation in the investee accounted for under the equity method of accounting.	**Percentage**			
	EquityMethodInvestmentOwnershipPercentage4	The percentage of ownership of common stock or equity participation in the investee accounted for under the equity method of accounting.	**Percentage**			
	EquityMethodInvestmentOwnershipPercentage5	The percentage of ownership of common stock or equity participation in the investee accounted for under the equity method of accounting.	**Percentage**			

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