Client:

IRENA – Istarska regionalna energetska agencija
Rudarska 1
52220 Labin

Contract number:
EIHP: 70-11

Legal, technical and administrative procedures required for the installation of photovoltaic system

Author:
Andro Bačan

Director:
Goran Granić, Ph.D.

Publisher:
Energy Institute Hrvoje Požar
Savska cesta 163
10 000 Zagreb
http://www.eihp.hr

Study number:
EIHP-070-11-01

Zagreb, January 2012.

This document has been produced with the financial assistance of the IPA Adriatic Cross-Border Cooperation Programme. The contents of this document are the sole responsibility of Energy Institute Hrvoje Požar and can under no circumstances be regarded as reflecting the position of the IPA Adriatic Cross-Border Cooperation Programme Authorities.

Content

This document has been produced with the financial assistance of the IPA Adriatic Cross-Border Cooperation Programme. The contents of this document are the sole responsibility of Energy Institute Hrvoje Požar and can under no circumstances be regarded as reflecting the position of the IPA Adriatic Cross-Border Cooperation Programme Authorities.

Legal, technical and administrative procedures required for the installation of photovoltaic system

Author: Andro Bačan, dipl.ing., Energy Institute Hrvoje Požar, Savska cesta 163, 10 000 Zagreb, e-mail: abacan@eihp.hr, phone.: +385 1 6326 158,

Introduction

Basis for use of renewable energy sources in Croatia is set with introduction of Law on Energy [1] in 2001, and Law on Electricity Market [2]. However, packet of five by-law acts for renewables introduced in 2007 opened the way for a commercial development of RES projects by obtaining an eligible producer status and right on power purchase by defined price. This packet had defined procedure for obtaining eligible producer status, collected fee for RES funds from the costumers, level of feed-in tariffs and some constraints in use of particular technologies.

However, although legal framework related to the energy sector is favourable to the renewables, many barriers, especially administrative ones, are recognized during the development of the projects. Administrative procedure for obtaining eligible producers status is indentified as main barrier for higher penetration of renewable energy sources in Croatian market. In this case, there are many uncoordinated activities between intuitions from different sectors, as well as institutions from same sectors but in different counties or municipalities.

Intuitions involved in administrative procedure

In the administrative procedure for obtaining the status of eligible producer on a number of institutions at national and local level is involved, as well as independent companies when drafting the necessary documentation. List of institutions which issues different, permits and approvals is as follows:

- **Ministry of Economy (MoEc)** – Ministry responsible for the energy sector and renewable energy sector issues Preliminary Energy Approval and Energy approval and runs Register of Renewable Energy and Cogeneration Projects Registry,
- **Croatian Energy Regulatory Agency (CERA)** – regulator responsible for the energy sector, issues Preliminary Decision on Eligible Producer Status, Energy Licence and Decision on Eligible Producer Status.

- **Croatian Energy Market Operator (CEMO)** – independent operator of energy market, responsible for collection of the fee for RES and purchase of produced electricity by defined feed-in tariffs and for Power Purchase Contract,

- **HEP Distribution System Operator (HEP-DSO)** – responsible for the physically grid connection and take-over of produced electricity on low (up to 10 kV) and middle voltage levels (up to 35 kV). It is also responsible for issuing Techno-economical data, Provisional Grid Connection Authorization and Grid Connection Authorization, Grid Connection Study, Grid Connection Contract and Grid Usage Contract. HEP-DSO is divided into Distribution Areas which covers geographical area. Elektroistra Pula covers area of Istria County.

- **HEP Transmission System Operator (HEP-TSO)** – is responsible for physically grid connection on high voltage (over the 35 kV, generally speaking, plants with capacity greater than 10 MW).

- **County Department responsible for Construction Works (CDCW)** – issues location permit, building permit or equivalent act and usage permit. Based on the organization of Country Departments, this department could be also responsible for the spatial planning, environment protection and/or infrastructure. In Istria County this department is called Administrative Department for Planning and Construction.

Typology of the systems

Photovoltaic systems can be divided into two groups regarding its location – PV systems on building and ground mounted PV system. PV systems on buildings are usually installed on the roof of the building, either it is pitched roof where PV modules are oriented and inclined as roofs is, either on the flat roof where they can be mounted in optimal way. Also, in this group so called Building Integrated Photovoltaics (BIPV) are encountered, where PV modules are used as building material replacing conventional ways to construct façade, building envelope or windows. Ground mounted PV systems are installed on the free surface (ground) which is dedicated for this purpose. Examples of good practice in this case includes installing PV modules on degrader areas such as closed waste disposal, burn areas or any other unused land. Also, these types of system can be built on locations such as parking lots which are not primary intended to be used for electricity generation purposes, but they have enough are for PV modules.

PV systems can be connected to the grid, but they can be also used for supplying remote locations with electricity. As level of feed-in tariffs is higher than price for electricity paid by consumer, practice is that all the energy produced is delivered to the grid, despite of the electricity consumed in building. In this case, it should be emphasized that connection point is practically the same for producer as it is for costumer, thus, from technical side, part of energy produced is actually consumed within building. Also, specific case is the system which all produced energy is consumed

inside of building, without any delivery to the grid. However, because of the high feed-in tariff level, this case is unlikely to happen.

Table 1 shows typology of the photovoltaic systems in building regarding grid connection and installed power for which administrative procedure will be presented. Administrative procedure is practically equal for groups up to 10 kW and for the group from 10 to 30 kW, with only difference in level of feed-in tariffs.

Table 1 Typology of PV systems in buildings

Connection type	Installed power		
	up to 10 kW	10 – 30 kW	over 30 kW
Grid connected system, all energy is delivered to the grid	✓	✓	✓
Grid connected system, energy consumed in building	✓	✓	
Autonomous systems – off grid	✓		

In the case of ground mounted systems, administrative procedure will be shown only for grid connected systems with installed power over 30 kW which all produced electricity is delivered to the grid. Construction of ground mounted systems with installed power less than 30 kW is possible, however, groups of the systems up to 30 kW are intend for the building installed PV systems, what is quite visible from the level of feed-in tariffs.

Eligibility for the feed-in tariff for electricity production is limited on the grid connected systems. Level of feed-in tariffs was defined for base year, 2007, and is increased every year by retail price index growth. Duration of Power Purchase Agreement is 12 years, in which period investor has a right on feed-in tariff. Table 2 shows level of feed-in tariffs for solar power plants for base year, 2007, and for 2011 and 2012.

Table 2 Feed-in tariffs for solar power plants

Description of group	Level of feed-in tariff [kn/kWh]		
	2007.	2011.	2012.
Installed capacity up to 10 kW	3.40	3.8397	
Installed capacity between 10 and 30 kW	3.00	3.3880	
Installed capacity over 30 kW	2.10	2.3715	

It should be noted that current legal framework defines quota for solar power plants. Power purchase contracts will be signed until total installed capacity in solar plants reaches 1 MW. Because of this reason, level of feed-in tariffs in practically limited to the systems up to 1 MW. In theoretical case, PV plants with higher installed capacity will have average market price as tariff for electricity production. In this moment, capacity of all solar plants with Power Purchase Contract is several times over the 1 MW. Croatia has set its targets in renewables according to the Directive EC/28/2009, thus it can be expected that new Law on Renewables will be drafted in which mentioned quota will be increased or removed. Also, decrease in level of feed-in tariffs is expected.

Procedure for installation of grid connected PV system on building

Due its modularity and simple construction of high number of small units (up to several kilowatts) PV systems are especially suitable for installing on the roofs and even facades of buildings. Several positive effects are achieved by installing photovoltaics in buildings: PV modules are placed on already used area, no need for investment in infrastructure and energy is used on the place of production, reducing distribution losses. However, there are also several disadvantages compared to the ground mounted systems: orientation and tilt of the modules are defined by roof, it is not possible to avoid shadings and PV modules have higher thermal losses due to the vicinity of the roof. All the mentioned factors affect on the energy production.

It should be emphasized that presented administrative procedure is related only on legally constructed buildings, with valid building or usage permit. For such buildings, installation of PV system is considered to be "simple construction" which could be done without location or building permit.

Systems up to 30 kW

Administrative procedure for obtaining eligible producer status is identical for the two groups (up to 10 kW and between 10 and 30 kW), with only difference in level of feed-in tariff. Generally, investors in systems less than 10 kW are private persons and smaller enterprises, while systems up to 30 kW are developed by small or medium sized enterprises. Figure 1 graphically presents the administrative procedure, with cross connections between each step.

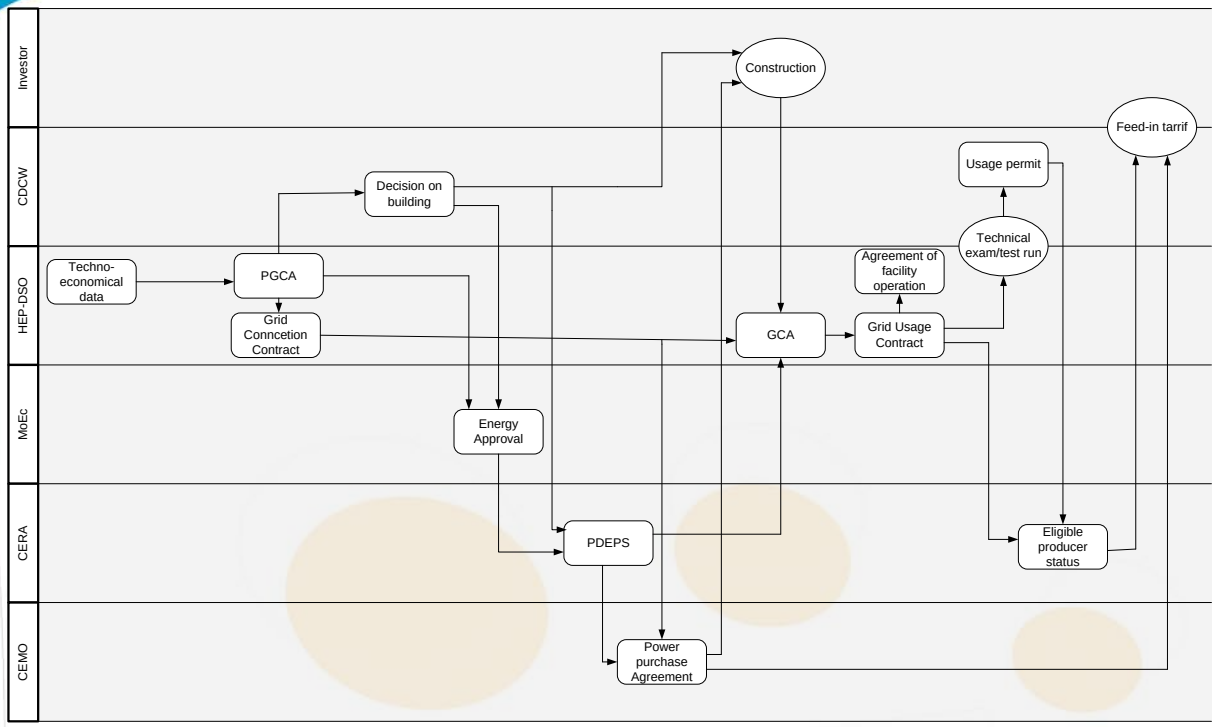

Figure 1 Administrative procedure for grid connected PV systems with installed power less than 30 kW

Step 1: **Business registration**	
Document:	Registration in court register (for a company) Registration in register of tradesmen and craftsmen (for trades and crafts)
Acronym	-
Institution:	Commercial court for companies County office for trades and crafts
Short description:	Company or crafts must be registered for electricity production. The application for registration for additional activities shall be submitted to the competent commercial court.
Needed documents:	• Application registration in court register/Application for registration in register of tradesmen and craftsmen
Cost	70 kn taxes
Comment:	Individuals who are developing PV project must be registered in the register of taxpayers on income. This should be done signing the Power Purchase Agreement, or the commissioning of the plant.

Step 2: **Issuing Techno-economic data**	
Document:	Techno-economic data
Acronym	TEP
Institution:	HEP-Distribution system operator
Short description:	Within the techno-economic data, HEP-DSO suggests a connection point and the technical solution of the grid connection and metering point. Also, within this document HEP-DSO defines necessary works in the existing distribution network, and estimates the cost of power connection. A request for Techno-Economic Data serves as evidence to the DSO of the various interests for construction of PV plants in a particular area.
Needed documents:	• Cadastral plan with micro location of the plant • Macro location of the plant on topographic map • Technical description of the plant (in case of PV plants, especially description and technical data of inverters)
Cost	No charged
Comment:	For PV plants with installed power less than 10 kW, this step could be skipped.

Step 3: **Drafting a Conceptual design**	
Document:	Conceptual design
Acronym	-
Institution:	Company or person authorized for drafting a building designs, according to the Law on Construction and Spatial Planning.
Short description:	Conceptual design defines works in area to be undertaken and confirms that planned works are in line with spatial planning documents.
Needed documents:	Conceptual design should be based on the idea of investor. Following documents are used as basis: • Cadastral plan • Provisional Grid Connection Authorization • Specification of equipment, if available
Cost:	Depending on the offer from building design office. Chamber of engineers in Construction works have predefined prices.
Comment:	Provisional Grid Connection Authorization (as all other utility authorization) is a part of Conceptual design and Location Permit. It is issued based on Preliminary

	design of electrical installations. For small systems installed on buildings, only roof static calculations and design of electrical installations is required. For planned buildings that should be constructed in future, design of PV system should be included into other design works.

Step 4: **Issuing Provisional Grid Connection Authorization**	
Document:	Provisional Grid Connection Authorization
Acronym	PGCA
Institution:	HEP-DSO
Short description:	Provisional Grid Connection Authorization is a document in which technical requirements of the network, conditions for the connection point (power, voltage and type of connection), metering points, works that has to be undertaken by HEP-DSO (such as installing meters and protective elements, the physical connection of power to network) or by investor (like construction of power plant) are defined. Electrical scheme under which it is necessary to perform grid connection is attached to the PGCA.
Needed documents:	• Cadastral plan • Macro location of plant on topographic map • Conceptual design of plant (especially Conceptual design of electrical installations) • technical description of the plant
Cost:	Issuing PGCA is not charged.
Comment:	PGCA strictly defines power of the plant at a relatively early stage of project development. If power of the plant is changed during the project development, it is necessary to request amendment of PGCA-a.

Step 5: **Signing Grid Connection Contract**	
Document:	Grid Connection Contract
Acronym	
Institution:	HEP-DSO

Short description:	This contract defines the mutual rights and obligations between DSO and investor, especially level of the connection fee, deadlines and payment methods for construction of the grid connection. Contract is based on Provisional Grid Connection Authorization. This contract defines the mutual rights and obligations between DSO and investor, especially level of the connection fee, deadlines and payment methods for construction of the grid connection. Contract is based on Provisional Grid Connection Authorization.
Needed documents:	• Provisional Grid Connection Authorization
Cost:	Cost stated in this Contract covers real cost for the construction of grid connection.
Comment:	Generally, this Contract is signed with issuing PGCA.

Step 6: **Issuing of Approval that works can be undertaken without location or building permit**	
Document:	Approval that works can be undertaken without location or building permit
Acronym	-
Institution:	County Department responsible for Construction Works
Short description:	Although Ordinance on simple buildings, as well as further explanation from Ministry of Construction defines “installing of solar collector and photovoltaic cells” as simple construction work that can be undertaken without location or building permit; in further steps this Approval is required.
Needed documents:	• Cadastral plan • Preliminary or Main design • Proof of legal interest of the applicant (proof of ownership - register entry for a particle or a lease or similar, depending on the situation) • Provisional Grid Connection Authorization
Cost:	70 kn tax
Comment:	-

Step 7: **Drafting a Feasibility Study**	
Document:	Feasibility study with techno-economical data and spatial planning data

Acronym	FS
Institution:	Consultants and/or Licensed engineers
Short description:	Feasibility study should cover main data regarding the project (location, size, and investor), technical description of the project (technology, O&M cost), Solar energy potential assessment and electricity generation assessment, grid connection analysis (based on PGCA) and basic data from spatial plans. This study should cover economic analysis as well, with calculation of equipment and construction cost, yearly income and calculation of return on investment.
Needed documents:	As a basis for drafting of this document data from PGCA, location permit and offers by equipment distributors can be used.
Cost:	Depending on the offer.
Comment:	When drafting Feasibility study it should be taken into consideration that same document should be used as basis for loan application and for further steps in the administrative procedure. This, it is recommended to include in this document also technical description of plant according to the guidelines from CERA and plans for electricity production on monthly and yearly basis. Feasibility study and Main design should be done simultaneously.

Step 8: **Issuing Energy Approval**	
Document:	Energy Approval
Acronym	EO
Institution:	Ministry of Economy
Short description:	Energy Approval

Needed documents:	• Cadastral plan • Statement from Court register (for a company) or Statement from Register of Crafts and Trades (for crafts) or a certificate of residence in the Republic of Croatia (for a private person) • Confirmation of the tax administration of all outstanding tax liabilities and liabilities for pension and health insurance and other public liabilities • A certified statement of good conduct legal and private person regarding with participation in a criminal organization, corruption, fraud or money laundering • Feasibility study • Location of plant on topographic map • Location permit (if needed) or Approval that construction can be undertaken without location permit
Cost:	70 kn tax
Comment:	Location of the plant must be shown on the topographic map 1:25000 and defined with points in Gauss-Krüger projection. Precise coordinates can be defined in Cadastral office.

Step 9: **Drafting a Main design**	
Document:	Main design
Acronym	-
Institution:	Company or person authorized for drafting a building designs (Licensed Engineer), according to the Law on Construction and Spatial Planning.
Short description:	Main design is a set of coordinated designs (in this case, electrical design and calculation of statics) which provides the technical solution of the building and confirming compliance with the essential requirements for facilities and technical specifications. Main design must comply with the Conceptual design. Bill of work forms part of a project.
Needed documents:	Licensed engineers drafts Main design based on following documents: • Cadastral plan • Conceptual design • Location permit or existing building permit of the building • Specification of the equipment

Cost:	Depending on the offer from building design office. Chamber of engineers in Construction works have predefined prices.
Comment:	For PV systems installed on buildings, only electrical design and static calculations should be drafted. If PV system will be installed on planed building, PV system design should be included in building design.

Step 10: **Issuing Preliminary Decision on Eligible Producer Status**	
Document:	Preliminary Decision on Eligible Producer Status
Acronym	PDEPS
Institution:	Croatian Energy Regulatory Agency
Short description:	With this Decision, CERA confirms that planed project meet the requirements for acquiring the status of eligible producer.
Needed documents:	• Energy Approval • Approval that construction can be undertaken without location permit • Technical description of the planned facility • Proof of payment of the cost of issuing a preliminary decision on granting the status of eligible
Cost:	250 kn + VAT for plants up to 10 kW 500 kn + VAT for plants from 10 kW up to 30 kW
Comment:	Content and data for the Technical description are defined by Guidelines from CERA, which should be followed when drafting this document. This Decision is valid for two years.

Step 11: **Signing Power Purchase Contract**	
Document:	Power Purchase Contract
Acronym	-
Institution:	Croatian Energy Market Operator
Short description:	Power Purchase Contract purchase of produced electricity is guaranteed to the investor by incentivised price. The contract is concluded for a period of 12 years. This agreement defines the manner and deadlines for payment of funds to the investor.

Needed documents:	• Grid Connection Contract • Preliminary Decision on Eligible Producer Status
Cost:	No charged.
Comment:	Power Purchase Contract is valid after the issuing of Final Decision on Eligible Producer Status. The contract is, in fact, the only guarantee that the project will receive incentivized tariff for electricity production. In this step, the risk of development of the project is practically limited to the technical side, or failure to meet technical requirements for access contained in PGCA.

Step 12: **Selection and procurement of equipment and installation**	
Document:	-
Acronym	-
In charge	Investor
Short description:	Investor, with the help of consultants or designers, will seek for the bids for purchase of equipment and installation works for PV plant. The expected production of electricity can vary for different photovoltaic modules, inverters, and their configuration, and thus the expected revenue, and in this case it is advisable to choose the most economically advantageous offer or an offer that will offer the best value for money. The main criterion for selection could be a payback period of investment, or net present value, depending on the preferences of the investor. When selecting contractors, experience and expertise of the contractor must be taken into account.
Needed documents:	• Main design: cost estimates, equipment specifications
Cost:	Price of equipment depends of the quality of equipment and current market situation.
Comment:	The selection of equipment and the contractor is a continuous process that needs to be conducted throughout the project development process. However, it is advisable to make a final decision after signing the Power Purchase Contract.

Step 13: **Financing the project**	
Document:	-

Acronym	-
In charge	Investor and financial institutions
Short description:	Financing of the project one of the key steps that is not bound by the administrative procedure, but on it depends most of the work. Usually, loans from commercial banks are used for financing the project, but it can be financed also through various funds.
Needed documents:	In this step, various documents can be presented to the financial institution. Documents listed below are one of the most wanted. • Evidence on the creditworthiness • Proof of ownership or rights for construction (e.g. land registry extract or lease of land) • Building permit • Power Purchase Contract • Feasibility study
Cost:	-
Comment:	Financing of the project is a continuous process that needs to be conducted throughout the project development process. However, it is advisable to make a final decision after signing the purchase of electricity.

Step 14: **Construction of the plant**	
Document:	
Acronym	
In charge	Contracted installers
Short description:	Although construction of the plant is not part of administrative procedure, it is presented as it should be clearly visible when is advisable to construct the plant.
Needed documents:	• Main/Working design
Cost:	According to the offer from contractor.
Comment:	-

Step 15: **Drafting a Study on the impact of plant on electrical grid**

Document:	Study on the impact of plant on electrical grid
Acronym	SIPoEG
Institution:	HEP-DSO or Licensed electrical engineer
Short description:	Provisional Grid Connection Authorization defines the need for drafting a Study on the impact of the plant on electrical grid. This study is made to identify and analyze the feedback impact of the plant on electrical grid. Study must contain data on the plant, situation in grid before and after construction of the plant, analysis on impact of the plant on voltage waveform, power flows and voltage conditions in the grid. Within study it is necessary to analyze the impact of plant on remote control system. If a study is drafted by Licensed engineer, it should be approved by HEP-DSO. If the ratio of short-circuit power and installed power of power is higher than 150, study is not needed.
Needed documents:	• Provisional Grid Connection Authorization • Main design of plant • Data on electrical grid in vicinity of the plant
Cost:	Depends of the offer/estimate from HEP-DSO
Comment:	Study on the impact of plant on electrical grid is made by HEP-DSO, but this task can be assigned to the independent companies.

Step 16: **Issuing Grid Connection Authorization**	
Document:	Grid Connection Authorization
Acronym	GCA
Institution:	HEP-DSO
Short description:	Grid Connection Authorization is a final authorization from DSO for connection and test run of the plant. In Grid Connection Authorization following information's is given: technical data of power meter, conditions and requirements for usage of the grid.

Needed documents:	• Building permit • Main design of plant • Study on the impact of plant on electrical grid • Testing program under test run • List of metering sites with connection capacities • Technical description of the plant • Preliminary Decision on Eligible Producer Status • Proof of payment of the cost for connection
Cost:	226.85 kn
Comment:	Together with GCA, following contracts are signed with HEP-DSO: • Agreement on user facility operation management at the interface with the system • Grid Usage Contract Grid Connection Authorization is valid after successful and verified test run.

Step 17: **Signing Agreement on user facility operation management at the interface with the system and Grid Usage Contract**	
Document:	Agreement on user facility operation management at the interface with the system Grid Usage Contract
Acronym	-
Institution:	HEP-DSO
Short description:	Agreement on user facility operation management at the interface with the system defines acting of the operator in case of grid failure or plant failure. Grid Usage Contract includes obligations of the contractual relationship between producers and the distribution system. This contract defines the place of take-over of the electricity produced, metering point, the conditions for use of the network (voltage quality, frequency deviation, etc.), measurement services and fees for network use, and other mutual rights and obligations.
Needed documents:	• Grid Connection Authorization
Cost:	No charged.

Comment:	Mentioned Contracts are signed just after the issuing of GCA. Mentioned Contracts are signed just after the issuing of GCA.

Step 18: **Test run (trial run)**	
Document:	-
Acronym	-
Institution:	HEP-DSO
Short description:	During test run, impact of the plant on the grid and other parameters (power quality) defined in PGCA and GCA are measured.
Needed documents:	• Test run program • Certificate from the contractor-installer that all works are done properly and in line with PGCA • Grid Connection Authorization • Grid Usage Contract • Agreement on user facility operation management at the interface with the system • Power Purchase Contract
Cost:	Depending of the estimate from HEP-DSO
Comment:	There is no defined timeframe for test run. Usually, test run for PV plants up to 30 kW takes up to several weeks. Under test run, electricity produced is delivered to the grid without any payment.

Step 19: **Issuing a Decision on Eligible Producer Status**	
Document:	Issuing a Decision on Eligible Producer Status
Acronym	DEPS
Institution:	Croatian Energy Regulatory Agency
Short description:	With Decision on Litigable Producer Status, CERA confirms that plant is constructed under the requirements for the RES projects. Also, Power Purchase Contract came into power and investor has a right to claim payment for electric produced.

Needed documents:	• Usage permit or Report from Test run • Grid Usage Contract • Technical description of the plant • List of measurement points and power meters technical data • Plans on yearly and monthly energy production for average climate conditions, expected monthly deviations
Cost:	300 kn+VAT for plants up to 10 kW 1.000 kn+VAT for plants from 10 kW up to 30 kW
Comment:	List of measurement points and power meters technical data should clearly present positions, purpose and types of all power meters in plant, and is made by Licensed engineer (electrical designer). For PV plants, only grid connection power meter should be elaborated under this list, and all its relevant data are present in Grid Usage Contract.

PV plants with installed power over 30 kW

Difference between administrative procedure for systems with installed power less than 30 kW and ones with installed power over 30 kW is only in first steps of the procedure, as for second ones Preliminary Energy Approval should be issued. Procedure for the grid connection is somewhat complicated, if plant is connected to the medium voltage line (if installed power is over 500 kW). Figure 2 graphically shows steps and its interconnections in the administrative procedure.

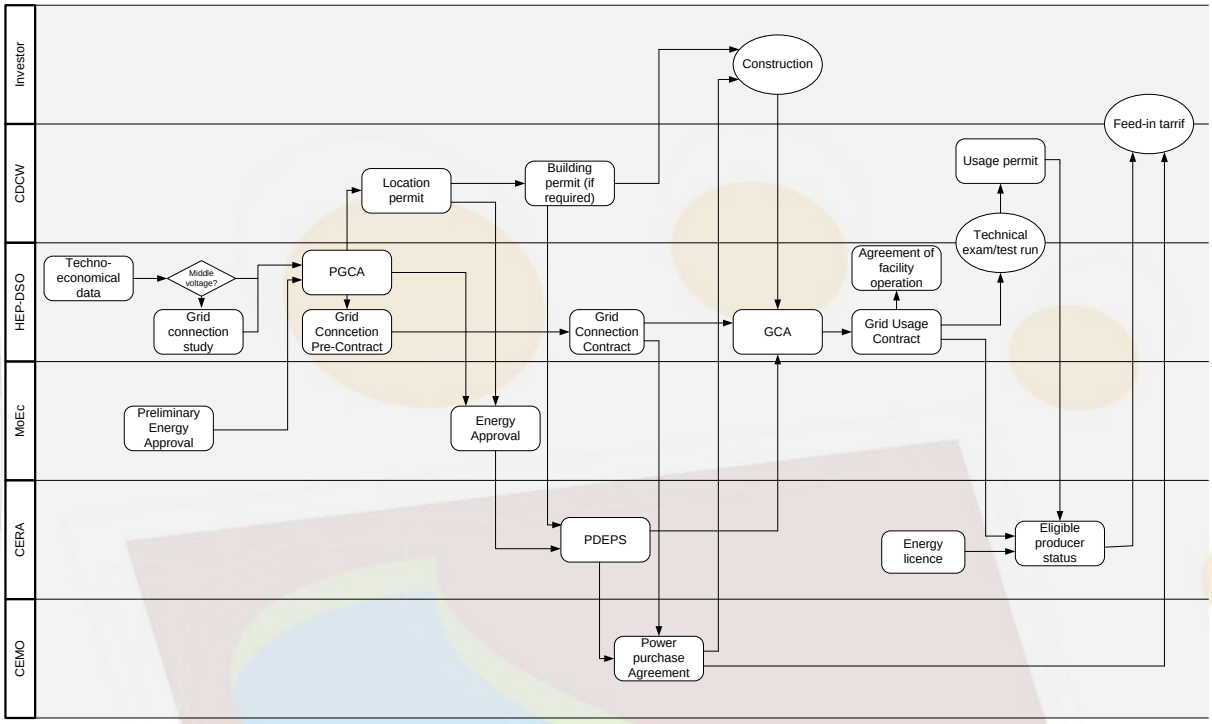

Figure 2 Administrative procedure for grid connected PV plant with installed capacity over 30 kW

Step 1: **Business registration**	
Document:	Record in court register (for a company) Record in register of tradesmen and craftsmen (for trades and crafts)
Acronym	-
Institution:	Commercial court for companies County office for trades and crafts
Short description:	Company or crafts must be registered for electricity production. The application for registration for additional activities shall be submitted to the competent commercial court.

Needed documents:	• Application registration in court register/Application for registration in register of tradesmen and craftsmen
Cost	70 kn taxes
Comment:	

Step 2: **Issuing Techno-economic data**	
Document:	Techno-economic data
Acronym	TED
Institution:	HEP-Distribution system operator
Short description:	Within Techno-economic data, HEP-DSO Within the techno-economic data, HEP-DSO suggests a connection point and the technical solution of the grid connection and metering point. Also, within this document HEP-DSO defines necessary works in the existing distribution network, and estimates the cost of grid connection. A request for Techno-Economic Data serves as evidence to the DSO of the various interests for construction of PV plants in a particular area.
Needed documents:	• Cadastral plan with micro location of the plant • Macro location of the plant • Technical description of the plant (in case of PV plants, especially description and technical data of inverters)
Cost	No charged
Comment:	TED is sufficient only if plant is connected to the low voltage network (less than 500 kW). In the case of connection on medium voltage, Grid connection study should be drafted.

Step 3: **Drafting a Grid connection study**	
Document:	Grid connection study
Acronym	GCS
Institution:	HEP-Distribution system operator

Short description:	GCS is needed for the plants connected to the medium voltage grid and DSO is responsible for the drafting of it, however, it is made by independent company. GCS includes a detailed analysis of the grid with the plant and without it, analysis of possible variants of connections and network conditions, and the optimum ways of connecting with a cost estimate.
Needed documents:	GSC is drafted based on the Request for Techno-economic data • Cadastral plan with micro location of plant • Macro location of the plant • Technical description of the plant (in case of PV plants, especially description and technical data of inverters) • Proof of payment of costs for making GCS
Cost	Typical price is between 20000 and 40000, but it depends on many factors, thus it can vary regarding the case.
Comment:	

Step 4: **Issuing Provisional Grid Connection Authorization**	
Document:	Provisional Grid Connection Authorization
Acronym	PGCA
Institution:	HEP-DSO
Short description:	Provisional Grid Connection Authorizations a document in which technical requirements of the network, conditions for the connection point (power, voltage and type of connection), metering points, works that has to be undertaken by HEP-DSO (such as installing meters and protective elements, the physical connection of power to network) or by investor (like construction of power plant) are defined. Electrical scheme under which it is necessary to perform grid connection is attached to the PGCA.
Needed documents:	• Cadastral plan • Macro location of plant on topographic map • Conceptual design of plant (especially Conceptual design of electrical installations) • Technical description of the plant
Cost:	Issuing PGCAis not charged.

Comment:	PGCA strictly defines power of the plant at a relatively early stage of project development. If power of the plant is changed during the project development, it is necessary to request amendment of PGCA-a.

Step 4: **Drafting a Prefeasibility study**	
Document:	Prefeasibility study
Acronym	PFS
Drafted by:	Consultant
Short description:	This document should present information on project location, technical description of the project, preliminary assessment of the solar resource and electricity generation, assessment of grid connection and spatial planning data. Expected results from economic calculation are payback time, IRR and NPV of the project.
Needed documents:	This document should be based on data from GCS, price of equipment and solar resource data.
Cost:	Depending on the offer.
Comment:	Detailed solar resource assessment should be presented after issuing PEA, thus this document should elaborate this information as well.

Step 5: **Issuing Preliminary Energy Approval**	
Document:	Preliminary Energy Approval
Acronym	PEA
Institution:	Ministry of Economy
Short description:	With PEA, project is registered into RES project register. Also, PEG gives the investor temporary rights on the location and to resolve land ownership issues (if land is owned by state).

Needed documents:	• Cadastral plan • Statement from Court register (for a company) or Statement from Register of Crafts and Trades (for crafts) or a certificate of residence in the Republic of Croatia (for a private person) • Confirmation of the tax administration of all outstanding tax liabilities and liabilities for pension and health insurance and other public liabilities • A certified statement of good conduct legal and private person regarding with participation in a criminal organization, corruption, fraud or money laundering • Prefeasibility study • Location of the plant on topographic map • Location of the plant on topographic map
Cost:	70 kn taxes
Comment:	Location of the plant should be presented on the topographic map 1:25000, and end points should be presented in Gauss-Krüger projection. PEA is valid on limited time, in which investor should: • in the period of six months start with measurement or assessment of Solar energy potential at location, • in the period of 36 months request issuing of a Location permit • in the period of 48 months request issuing of a Energy Approval

Step 6: **Measurement or assessment of Solar energy potential**	
Document:	Assessment of Solar energy potential
Acronym	-
Institution:	Ministry of Economy
Short description:	Within PEA, Ministry requests measurement or assessment of Solar energy potential on location. Measurement of Solar energy potential is a long term process with very high unreliability in short term (fee. one year). In this case, Solar energy potential could be estimated with high reliability based on data from measurement sites in vicinity of location with long-term measurements. Solar energy atlas of Croatia presents a very power database and it can be used for this task. For larger projects (over few megawatts) it is recommended to start a measurements of solar radiation, on which Solar energy potential will be estimated, as well used for control of proper work of plant.

Needed documents:	Assessment of Solar energy potential should be based on acknowledged solar resource data publications and on data from measurement stations in vicinity of location. Assessment of Solar energy potential should be based on acknowledged solar resource data publications and on data from measurement stations in vicinity of location.
Cost:	Depending on the offer.
Comment:	Assessment of Solar energy potential could be drafted under Prefeasibility study, and attached as separate document just after issuing PEA.

Step 7: **Drafting a Conceptual design**	
Document:	Conceptual design
Acronym	-
Institution:	Company or person authorized for drafting a building designs (Licensed Engineer), according to the Law on Construction and Spatial Planning.
Short description:	Conceptual design defines works in area to be undertaken and confirms that planned works are in line with spatial planning documents.
Needed documents:	Conceptual design should be based on the idea of investor. Following documents are used as basis: • Cadastral plan • Provisional Grid Connection Authorization • Specification of equipment, if available
Cost:	Depending on the offer from building design office. Chamber of engineers in Construction works have predefined prices.
Comment:	Provisional Grid Connection Authorization (as all other utility authorization) is a part of Preliminary Design and Location Permit. It is issued based on Preliminary design of electrical installations. For small systems installed on buildings, only roof static calculations and design of electrical installations is required. For planned buildings that should be constructed in future, design of PV system should be included into other design works.

Step 8: **Issuing Provisional Grid Connection Authorization**

Document:	Provisional Grid Connection Authorization
Acronym	PGCA
Institution:	HEP-DSO
Short description:	Provisional Grid Connection Authorizations a document in which technical requirements of the network, conditions for the connection point (power, voltage and type of connection), metering points, works that has to be undertaken by HEP-DSO (such as installing meters and protective elements, the physical connection of power to network) or by investor (like construction of power plant) are defined. Electrical scheme under which it is necessary to perform grid connection is attached to the PGCA.
Needed documents:	• Cadastral plan • Macro location of plant on topographic map • Conceptual design (especially Conceptual design of electrical installations) • Technical description of the plant
Cost:	PGCA issuing is not charged.
Comment:	PGCA strictly defines power of the plant at a relatively early stage of project development. If power of the plant is changed during the project development, it is necessary to request amendment of PGCA-a.

Step 9: **Signing Grid Connection Contract**	
Document:	Grid Connection Contract
Acronym	
Institution:	HEP-DSO
Short description:	This contract defines the mutual rights and obligations between DSO and investor, especially level of the connection fee, deadlines and payment methods for construction of the grid connection. Contract is based on Provisional Grid Connection Authorization.
Needed documents:	• Provisional Grid Connection Authorization
Cost:	Cost presented in thick Contract represents a real cost of construction of grid connection.
Comment:	Generally, this Contract is signed with issuing PGCA.

Step 10: **Issuing of Approval that works can be undertaken without location or building permit**	
Document:	Approval that works can be undertaken without location or building permit
Acronym	-
Institution:	County Department responsible for Construction Works
Short description:	Although Ordinance on simple buildings, as well as further explanation from Ministry of Construction defines "installing of solar collector and photovoltaic cells" as simple construction work that can be undertaken without location or building permit; in further steps this Approval is required.
Needed documents:	• Cadastral plan • Preliminary or Main design • Proof of legal interest of the applicant (proof of ownership - register entry for a particle or a lease or similar, depending on the situation) • Provisional Grid Connection Authorization
Cost:	70 kn tax
Comment:	If parameters of the building are changed with installation of larger PV system on building, Amendment of Location and Building permit should be issued.

Step 11: **Drafting a Feasibility Study**	
Document:	Feasibility study with techno-economical data and spatial planning data
Acronym	AO
Institution:	Consultants and/or Licensed engineers
Short description:	Feasibility study should present information about the project (location, size, investor), technical description of the project (design, technology, O&M costs), Solar energy resource assessment and estimation of electricity production, grid connection analysis (current situation, data from PGCA), spatial planning data on location and preliminary environmental impact assessment. Financial-economic analysis should calculate payback time of investment, cash flow and other economical parameter (IRR, NPV) for different financing possibilities. Financial-economic analysis should calculate payback time of investment, cash flow and other economical parameter (IRR, NPV) for different financing possibilities.

Needed documents:	This document is drafted by consultants and should be based on data from PGCA, location permit, offers by equipment distributors and data on financing possibilities for the project. This document is drafted by consultants and should be based on data from PGCA, location permit, offers by equipment distributors and data on financing possibilities for the project.
Cost:	Depending on the offer.
Comment:	When drafting Feasibility study it should be taken into consideration that same document should be used as basis for loan application and for further steps in the administrative procedure. This, it is recommended to include in this document also technical description of plant according to the guidelines from CERA and plans for electricity production on monthly and yearly basis. Feasibility study and Main design should be done simultaneously.

Step 12: **Issuing Energy Approval**	
Document:	Energy Approval
Acronym	EO
Institution:	Ministry of Economy
Short description:	Energy Approval
Needed documents:	• Cadastral plan • Statement from Court register (for a company) or Statement from Register of Crafts and Trades (for crafts) or a certificate of residence in the Republic of Croatia (for a private person) • Confirmation of the tax administration of all outstanding tax liabilities and liabilities for pension and health insurance and other public liabilities • A certified statement of good conduct legal and private person regarding with participation in a criminal organization, corruption, fraud or money laundering • Feasibility study • Location of plant on topographic map • Location permit (if needed) or Approval that construction can be undertaken without location permit
Cost:	70 kn taxes

Comment:	Location of the plant must be shown on the topographic map 1:25000 and defined with points in Gauss-Krüger projection. Precise coordinates can be defined in Cadastral office. EA is valid on 12 months, in which Building permit must be issued.

Step 13: **Drafting a Main design**	
Document:	Main design
Acronym	-
Institution:	Company or person authorized for drafting a building designs (Licensed Engineer), according to the Law on Construction and Spatial Planning.
Short description:	Main design is a set of coordinated designs (in this case, electrical design and calculation of statics) which provides the technical solution of the building and confirming compliance with the essential requirements for facilities and technical specifications. Main design must comply with the preliminary design. Bill of work forms part of a project.
Needed documents:	Licensed engineers drafts Main design based on following documents: • Cadastral plan • Preliminary design • Location permit or existing building permit of the building • Specification of the equipment
Cost:	Depending on the offer from building design office. Chamber of engineers in Construction works have predefined prices.
Comment:	For PV systems installed on buildings, only electrical design and static calculations should be drafted. If PV system will be installed on planed building, PV system design should be included in building design.

Step 14: **Amendment of Building Permit**	
Document:	Building permit
Acronym	BP
Institution:	County Department responsible for Construction Works

Short description:	If parameters of the building are changed with installation of PV system, amendment of Building permit shall be issued. If parameters of the building are changed with installation of PV system, amendment of Building permit shall be issued.
Needed documents:	• Cadastral plan • Main design in three copies • Copy of location permit • Proof of legal interest of the applicant (proof of ownership - register entry for a particle or a lease or similar, depending on the situation)
Cost:	70 kn taxes
Comment:	

Step 15: **Issuing Preliminary Decision on Eligible Producer Status**	
Document:	Preliminary Decision on Eligible Producer Status
Acronym	PDEPS
Institution:	Croatian Energy Regulatory Agency
Short description:	With this Decision, CERA confirms that planed project meet the requirements for acquiring the status of eligible producer.
Needed documents:	• Energy Approval • Approval that construction can be undertaken without location permit or Amendment of Building Permit • Technical description of the planned facility • Proof of payment of the cost of issuing a preliminary decision on status of eligible producer status
Cost:	1500 kn+VAT
Comment:	Content and data for the Technical description are defined by Guidelines from CERA, which should be followed when drafting this document. This Decision is valid for two years.

Step 16: **Signing Power Purchase Contract**	
Document:	Power Purchase Contract
Acronym	-

Institution:	Croatian Energy Market Operator
Short description:	Power Purchase Contract purchase of produced electricity is guaranteed to the investor by incentivised price. The contract is concluded for a period of 12 years. This agreement defines the manner and deadlines for payment of funds to the investor.
Needed documents:	• Grid Connection Contract • Preliminary Decision on Eligible Producer Status
Cost:	No charged.
Comment:	Power Purchase Contract is valid after the issuing of Final Decision on Eligible Producer Status. The contract is, in fact, the only guarantee that the project will receive incentivised tariff for electricity production. In this step, the risk of development of the project is practically limited to the technical side, or failure to meet technical requirements for access contained in PGCA-u.

Step 17: **Selection and procurement of equipment and installation**	
Document:	-
Acronym	-
In charge	Investor
Short description:	Investor, with the help of consultants or designers, will seek for the bids for purchase of equipment and installation works for PV plant. The expected production of electricity can vary for different photovoltaic modules, inverters, and their configuration, and thus the expected revenue, and in this case it is advisable to choose the most economically advantageous offer or an offer that will offer the best value for money. The main criterion for selection could be a payback period of investment, or net present value, depending on the preferences of the investor. When selecting contractors, experience and expertise of the contractor must be taken into account.
Needed documents:	• Main design: cost estimates, equipment specifications
Cost:	Price of equipment depends of the quality of equipment and current market situation.

Comment:	The selection of equipment and the contractor is a continuous process that needs to be conducted throughout the project development process. However, it is advisable to make a final decision after signing the Power Purchase Contract.

Step 18: **Financing the project**	
Document:	-
Acronym	-
In charge	Investor/financial institutions
Short description:	Financing of the project one of the key steps that is not bound by the administrative procedure, but on it depends most of the work. Usually, loans from commercial banks are used for financing the project, but it can be financed also through various funds.
Needed documents:	In this step, various documents can be presented to the financial institution. Documents listed below are one of the most wanted. • Evidence on the creditworthiness • Proof of ownership or rights for construction (e.g. land registry extract or lease of land) • Building permit • Power Purchase Contract • Feasibility study
Cost:	-
Comment:	Financing of the project is a continuous process that needs to be conducted throughout the project development process. However, it is advisable to make a final decision after signing Power Purchase Contract.

Step 19: **Construction of the plant**	
Document:	
Acronym	
In charge	Contracted installers
Short description:	Although construction of the plant is not part of administrative procedure, it is presented as it should be clearly visible when is advisable to construct the plant.

Needed documents:	• Main design • Amendment of Building Permit
Cost:	According to the offer from contractor
Comment:	-

Step 20: **Drafting a Study on the impact of plant on electrical grid**	
Document:	Study on the impact of plant on electrical grid
Acronym	SOIPOEG
Institution:	HEP-DSO or Licensed electrical engineer
Short description:	Provisional Grid Connection Authorization defines the need for drafting a Study on the impact of the plant on electrical grid. This study is made to identify and analyze the feedback impact of the plant on electrical grid. Study must contain data on the plant, situation in grid before and after construction of the plant, analysis on impact of the plant on voltage waveform, power flows and voltage conditions in the grid. Within study it is necessary to analyze the impact of plant on remote control system. If a study is drafted by Licensed engineer, it should be approved by HEP-DSO. If the ratio of short-circuit power and installed power of power is higher than 150 for low voltage connection, or 1000 for medium voltage connection, study is not needed.
Needed documents:	• Provisional Grid Connection Authorization • Main design of plant • Data on electrical grid in vicinity of the plant
Cost:	Depends of the offer/estimate from HEP-DSO
Comment:	Study on the impact of plant on electrical grid is made by HEP-DSO, but this task can be assigned to the independent companies.

Step 21: **Issuing Grid Connection Authorization**	
Document:	Grid Connection Authorization
Acronym	GCA
Institution:	HEP-DSO

Short description:	Grid Connection Authorization is a final authorization from DSO for connection and test run of the plant. In Grid Connection Authorization following information are given: technical data of power meter, conditions and requirements for usage of the grid.
Needed documents:	• Building permit • Main design of plant • Study on the impact of plant on electrical grid • Testing program under test run • List of metering sites with connection capacities • Technical description of the plant • Preliminary Decision on Eligible Producer Status • Proof of payment of the cost for connection
Cost:	226,85 kn
Comment:	Together with GCA, following contracts are signed with HEP-DSO: • Agreement on user facility operation management at the interface with the system • Grid Usage Contract Grid Connection Authorization is valid after successful and verified test run.

Step 22: **Signing Agreement on user facility operation management at the interface with the system and Grid Usage Contract**	
Document:	Agreement on user facility operation management at the interface with the system Grid Usage Contract
Acronym	-
Institution:	HEP-DSO
Short description:	Agreement on user facility operation management at the interface with the system defines acting of the operator in case of grid failure or plant failure. Grid Usage Contract includes obligations of the contractual relationship between producers and the distribution system. This contract defines the place of take-over of the electricity produced, metering point, the conditions for use of the network (voltage quality, frequency deviation, etc.), measurement services and fees for network use, and other mutual rights and obligations.

Needed documents:	• Grid Connection Authorization
Cost:	No charged
Comment:	Mentioned Contracts are signed just after the issuing of GCA.

Step 23: **Test run (trial run)**	
Document:	-
Acronym	-
Institution:	HEP-DSO
Short description:	During test run, impact of the plant on the grid and other parameters (power quality) defined in PGCA and GCA are measured.
Needed documents:	• Test run program • Certificate from the contractor-installer that all works are done properly and in line with PGCA • Grid Connection Authorization • Grid Usage Contract • Agreement on user facility operation management at the interface with the system • Power Purchase Contract
Cost:	
Comment:	There is no defined timeframe for test run. Usually, test run for PV plants over 30 kW takes up to one month. Under test run, electricity produced is delivered to the grid without any payment.

Step 24: **Issuing a Decision on Eligible Producer Status**	
Document:	Issuing a Decision on Eligible Producer Status
Acronym	DEPS
Institution:	Croatian Energy Regulatory Agency

Short description:	With Decision on Eligible Producer Status, CERA confirms that plant is constructed under the requirements for the RES projects. Also, Power Purchase Contract came into power and investor has a right to claim payment for electricity produced.
Needed documents:	• Usage permit • Grid Usage Contract • Technical description of the plant • List of measurement points and power meters technical data • Plans on yearly and monthly energy production for average climate conditions, expected monthly deviations
Cost:	3.000 kn+VAT
Comment:	List of measurement points and power meters technical data should clearly present positions, purpose and types of all power meters in plant, and is made by Licensed engineer (electrical designer). For PV plants, only grid connection power meter should be elaborated under this list, and all its relevant data are present in Grid Usage Contract.

Procedure for installation of PV system on building, which whole electricity production will be consumed in the building

PV systems are usually used in way to deliver all produced energy to the grid by incentivised price, which is usually higher than price for consumer. From technical side, this energy is consumed inside of building. Difference between this system and system in which electricity is consumed inside of building is practically only in connection point.

In the case of system which is not deliver energy to the grid, it should be emphasised this system is in parallel operation with grid, thus all necessary permits and protections must be undertaken in order to avoid failure in normal operation of grid, as well as safety of workers working on maintenance of grid.

Investor in this kind of system will not be able to apply for incentivized price. These systems also fulfil all the requirements for simple building under the Ordinance on simple buildings, thus there is no need for issuing Location or Building permit.

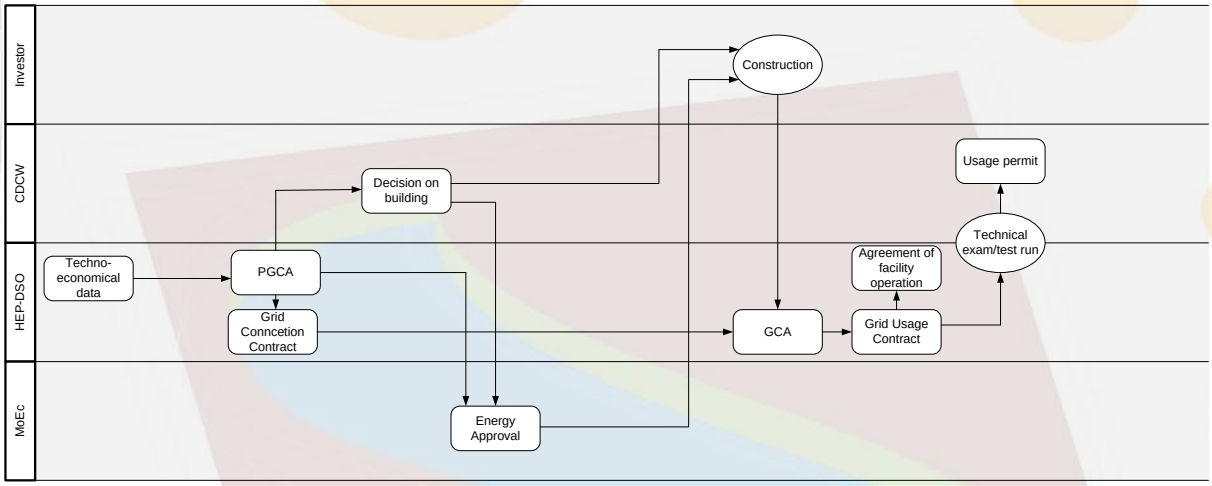

Figure 3 Procedure for grid-connected PV system which all producer energy is consumed inside of building

Step 1: **Issuing Techno-economic data**	
Document:	Techno-economic data
Acronym	TEP
Institution:	HEP-Distribution system operator
Short description:	Within the techno-economic data, HEP-DSO suggests a connection point and the technical solution of the grid connection and metering point. Also, within this document HEP-DSO defines necessary works in the existing distribution

	network, and estimates the cost of connection. A request for Techno-Economic Data serves as evidence to the DSO of the various interests for construction of PV plants in a particular area.
Needed documents:	• Cadastral plan • Macro location of plant • Technical description of the plant (in case of PV plants, especially description and technical data of inverters)
Cost	No charged
Comment:	For PV plants with installed power less than 10 kW, this step could be skipped.

Step 2: **Drafting a Conceptual design**	
Document:	Conceptual design
Acronym	-
Institution:	Company or person authorized for drafting a building designs (Licensed Engineer), according to the Law on Construction and Spatial Planning.
Short description:	Conceptual design defines works in area to be undertaken and confirms that planned works are in line with spatial planning documents.
Needed documents:	Conceptual design should be based on the idea of investor. Following documents are used as basis: • Cadastral plan • Provisional Grid Connection Authorization • Specification of equipment, if available
Cost:	Depending on the offer from building design office. Chamber of engineers in Construction works have predefined prices.
Comment:	Provisional Grid Connection Authorization (as all other utility authorization) is a part of Preliminary Design and Location Permit. It is issued based on Preliminary design of electrical installations. For small systems installed on buildings, only roof static calculations and design of electrical installations is required. For planned buildings that should be constructed in future, design of PV system should be included into other design works.

Step 3: **Issuing Provisional Grid Connection Authorization**

Document:	Provisional Grid Connection Authorization
Acronym	PGCA
Institution:	HEP-DSO
Short description:	Provisional Grid Connection Authorization a document in which technical requirements of the network, conditions for the connection point (power, voltage and type of connection), metering points, works that has to be undertaken by HEP-DSO (such as installing meters and protective elements, the physical connection of power to network) or by investor (like construction of power plant) are defined. Electrical scheme under which it is necessary to perform grid connection is attached to the PGCA.
Needed documents:	• Cadastral plan • Macro location of plant on topographic map • Conceptual design of plant (especially Conceptual design of electrical installations) • technical description of the plant
Cost:	Issuing PGCAis not charged.
Comment:	PGCA strictly defines power of the plant at a relatively early stage of project development. If power of the plant is changed during the project development, it is necessary to request amendment of PGCA-a. Although no energy will be delivered to the grid, this system is in parallel operation with network, thus authorization form HEP-DSO is needed.

Step 4: **Signing Grid Connection Contract**	
Document:	Grid Connection Contract
Acronym	
Institution:	HEP-DSO
Short description:	This contract defines the mutual rights and obligations between DSO and investor, especially level of the connection fee, deadlines and payment methods for construction of the grid connection. Contract is based on Provisional Grid Connection Authorization.
Needed documents:	• Provisional Grid Connection Authorization
Cost:	Cost presented in this Contract represents a real cost of construction of grid connection.

Comment:	Generally, this Contract is signed with issuing PGCA.

Step 5: **Drafting a Feasibility Study**	
Document:	Feasibility study with techno-economical data and spatial planning data
Acronym	AO
Institution:	Consultants and/or Licensed engineers
Short description:	Feasibility study should present information about the project (location, size, and investor), technical description of the project (design, technology, O&M costs), Solar energy resource assessment and estimation of electricity production, grid connection analysis (current situation, data from PGCA), spatial planning data on location and preliminary environmental impact assessment. Financial-economic analysis should calculate payback time of investment, cash flow and other economical parameter (IRR, NPV) for different financing possibilities.
Needed documents:	This document is drafted by consultants and should be based on data from PGCA, location permit, offers by equipment distributors and data on financing possibilities for the project.
Cost:	Depending on the offer.
Comment:	When drafting Feasibility study it should be taken into consideration that same document should be used as basis for loan application and for further steps in the administrative procedure. Feasibility study and Main design should be done simultaneously.

Step 6: **Issuing of Approval that works can be undertaken without location or building permit**	
Document:	Approval that works can be undertaken without location or building permit
Acronym	
Institution:	County Department responsible for Construction Works
Short description:	Although Ordinance on simple buildings, as well as further explanation from Ministry of Construction defines “installing of solar collector and photovoltaic cells” as simple construction work that can be undertaken without location or building permit; in further steps this Approval is required.

Needed documents:	• Cadastral plan • Preliminary or Main design • Proof of legal interest of the applicant (proof of ownership - register entry for a particle or a lease or similar, depending on the situation) • Provisional Grid Connection Authorization
Cost:	70 kn
Comment:	

Step 7: **Issuing Energy Approval**	
Document:	Energy Approval
Acronym	EO
Institution:	Ministry of Economy
Short description:	Energy Approval is a final approval from Ministry of Economy with which construction of plant is approved by laws regarding energy sector.
Needed documents:	• Cadastral plan • Statement from Court register (for a company) or Statement from Register of Crafts and Trades (for crafts) or a certificate of residence in the Republic of Croatia (for a private person) • Confirmation of the tax administration of all outstanding tax liabilities and liabilities for pension and health insurance and other public liabilities • A certified statement of good conduct legal and private person regarding with participation in a criminal organization, corruption, fraud or money laundering • Feasibility study • Location of plant on topographic map • Location permit (if needed) or Approval that construction can be undertaken without location permit
Cost:	70 kn taxes
Comment:	Location of the plant must be shown on the topographic map 1:25000 and defined with points in Gauss-Krüger projection. Precise coordinates can be defined in Cadastral office. This kind of system can be recognized as “Energy object”, thus issuing an Energy approval is required.

Step 8: **Drafting a Main design**	
Document:	Main design
Acronym	-
Institution:	Company or person authorized for drafting a building designs (Licensed Engineer), according to the Law on Construction and Spatial Planning.
Short description:	Main design is a set of coordinated designs (in this case, electrical design and calculation of statics) which provides the technical solution of the building and confirming compliance with the essential requirements for facilities and technical specifications. Main design must comply with the preliminary design. Bill of work forms part of a project.
Needed documents:	Licensed engineers drafts Main design based on following documents: • Cadastral plan • Preliminary design • Location permit or existing building permit of the building • Specification of the equipment
Cost:	Depending on the offer from building design office. Chamber of engineers in Construction works have predefined prices.
Comment:	For PV systems installed on buildings, only electrical design and static calculations should be drafted. If PV system will be installed on planed building, PV system design should be included in building design.

Step 9: **Selection and procurement of equipment and installation**	
Document:	-
Acronym	-
In charge	Investor

Short description:	Investor, with the help of consultants or designers, will seek for the bids for purchase of equipment and installation works for PV plant. The expected production of electricity can vary for different photovoltaic modules, inverters, and their configuration, and thus the expected revenue, and in this case it is advisable to choose the most economically advantageous offer or an offer that will offer the best value for money. The main criterion for selection could be a payback period of investment, or net present value, depending on the preferences of the investor. When selecting contractors, experience and expertise of the contractor must be taken into account.
Needed documents:	• Main design: cost estimates, equipment specifications
Cost:	Price of equipment depends of the quality of equipment and current market situation.
Comment:	The selection of equipment and the contractor is a continuous process that needs to be conducted throughout the project development process. However, it is advisable to make a final decision after signing the Power Purchase Contract.

Step 10: **Construction of the plant**	
Document:	
Acronym	
In charge	Contracted installers
Short description:	Although construction of the plant is not part of administrative procedure, it is presented as it should be clearly visible when is advisable to construct the plant.
Needed documents:	• Main design
Cost:	Depending on the offer
Comment:	-

Step 11: **Drafting a Study on the impact of plant on electrical grid**	
Document:	Study on the impact of plant on electrical grid
Acronym	SOIPOEG

Institution:	HEP-DSO or Licensed electrical engineer
Short description:	Provisional Grid Connection Authorization defines the need for drafting a Study on the impact of the plant on electrical grid. This study is made to identify and analyze the feedback impact of the plant on electrical grid. Study must contain data on the plant, situation in grid before and after construction of the plant, analysis on impact of the plant on voltage waveform, power flows and voltage conditions in the grid. Within study it is necessary to analyze the impact of plant on remote control system. If a study is drafted by Licensed engineer, it should be approved by HEP-DSO. If the ratio of short-circuit power and installed power of power is higher than 150, study is not needed.
Needed documents:	• Provisional Grid Connection Authorization • Main design of plant • Data on electrical grid in vicinity of the plant
Cost:	Depends of the offer/estimate from HEP-DSO
Comment:	Study on the impact of plant on electrical grid is made by HEP-DSO, but this task can be assigned to the independent companies.

Step 12: **Issuing Grid Connection Authorization**	
Document:	Grid Connection Authorization
Acronym	GCA
Institution:	HEP-DSO
Short description:	Grid Connection Authorization is a final authorization from DSO for connection and test run of the plant. In Grid Connection Authorization following information are given: technical data of power meter, conditions and requirements for usage of the grid.
Needed documents:	• Building permit • Main design of plant • Study on the impact of plant on electrical grid • Testing program under test run • List of metering sites with connection capacities • Technical description of the plant • Proof of payment of the cost for connection
Cost:	226.85 kn

Comment:	Together with GCA, following contracts are signed with HEP-DSO: • Agreement on user facility operation management at the interface with the system • Grid Usage Contract Grid Connection Authorization is valid after successful and verified test run.

Step 13: **Signing Agreement on user facility operation management at the interface with the system and Grid Usage Contract**	
Document:	Agreement on user facility operation management at the interface with the system Grid Usage Contract
Acronym	-
Institution:	HEP-DSO
Short description:	Agreement on user facility operation management at the interface with the system defines acting of the operator in case of grid failure or plant failure. Grid Usage Contract includes obligations of the contractual relationship between producers and the distribution system. This contract defines the place of take-over of the electricity produced, metering point, the conditions for use of the network (voltage quality, frequency deviation, etc.), measurement services and fees for network use, and other mutual rights and obligations.
Needed documents:	• Grid Connection Authorization
Cost:	Not charged.
Comment:	Mentioned Contracts are signed just after the issuing of GCA.

Step 14: **Test run (trial run)**	
Document:	-
Acronym	-
Institution:	HEP-DSO
Short description:	During test run, impact of the plant on the grid and other parameters (power quality) defined in PGCA and GCA are measured.

Needed documents:	• Test run program • Certificate from the contractor-installer that all works are done properly and in line with PGCA • Grid Connection Authorization • Grid Usage Contract • Agreement on user facility operation management at the interface with the system • Power Purchase Contract
Cost:	
Comment:	There is no defined timeframe for test run. Usually, test run for PV plants up to 30 kW takes up to several weeks.

Procedure for installation off-grid photovoltaic system

Photovoltaic systems are often used for power supply of remote objects with no access to the electrical grid, such as lighthouses, mobile phone network stations and holyday houses. Installed capacities of these systems ranges from few hundreds of watts up to several kilowatts, rarely exceeding capacity of 10 kW. Alongside the photovoltaic modules, small wind turbine could be used for electricity generation as well. Because of the interminnecy of solar resource, these systems must have energy storage device in order to secure supply during the period with limited or no resource.

Off grid systems can not receive any payment based on energy production, thus are not eligible for incentivized tariff. As these systems are not connected to the electrical grid, whole procedure related to the distribution system operator is needless in this case, as well as approvals and decisions related to the eligible producer status. Investor in this system shall pass only procedure related to the construction of system; however, as photovoltaic system is defined as simple building, practically no permits are need either from this area.

Step 1: **Drafting a Conceptual design**	
Document:	Conceptual design
Acronym	-
Institution:	Company or person authorized for drafting a building designs (Licensed Engineer), according to the Law on Construction and Spatial Planning.
Short description:	Conceptual design defines works in area to be undertaken and confirms that planned works are in line with spatial planning documents.
Needed documents:	Conceptual design should be based on the idea of investor. Following documents are used as basis: • Cadastral plan • Specification of equipment, if available
Cost:	Depending on the offer from building design office. Chamber of engineers in Construction works have predefined prices.
Comment:	For small systems installed on buildings, only roof static calculations and design of electrical installations is required. For planned buildings that should be constructed in future, design of PV system should be included into other design works.

Step 2: **Issuing of Approval that works can be undertaken without location or building permit**

Document:	Approval that works can be undertaken without location or building permit
Acronym	-
Institution:	County Department responsible for Construction Works
Short description:	Ordinance on simple buildings defines installation of solar collector, in which are also encountered PV modules as simple construction works that can be undertaken without location or building permit. This kind of system can be fully recognized under this ordinance, so this Approval can be asked only in case of subsidy to the system.
Needed documents:	• Cadastral plan • Preliminary or Main design • Proof of legal interest of the applicant (proof of ownership - register entry for a particle or a lease or similar, depending on the situation)
Cost:	70 kn tax
Comment:	-

Step 9: **Drafting a Main design**	
Document:	Main design
Acronym	-
Institution:	Company or person authorized for drafting a building designs (Licensed Engineer), according to the Law on Construction and Spatial Planning.
Short description:	Main design is a set of coordinated designs (in this case, electrical design and calculation of statics) which provides the technical solution of the building and confirming compliance with the essential requirements for facilities and technical specifications. Main design must comply with the Conceptual design. Bill of work forms part of a project.
Needed documents:	Licensed engineers drafts Main design based on following documents: • Cadastral plan • Conceptual design • Location permit or existing building permit of the building • Specification of the equipment
Cost:	Depending on the offer from building design office. Chamber of engineers in Construction works have predefined prices.

Comment:	For PV systems installed on buildings, only electrical design and static calculations should be drafted. If PV system will be installed on planed building, PV system design should be included in building design.

Step 4: **Selection and procurement of equipment and installation**	
Document:	-
Acronym	-
In charge	Investor
Short description:	Investor, with the help of consultants or designers, will seek for the bids for purchase of equipment and installation works for PV plant. The expected production of electricity can vary for different photovoltaic modules, inverters, and their configuration, and thus the expected revenue, and in this case it is advisable to choose the most economically advantageous offer or an offer that will offer the best value for money. The main criterion for selection could be a payback period of investment, or net present value, depending on the preferences of the investor. When selecting contractors, experience and expertise of the contractor must be taken into account.
Needed documents:	• Main design: cost estimates, equipment specifications
Cost:	Price of equipment depends of the quality of equipment and current market situation.
Comment:	Selection of the equipment is a continuous task during the development of the project.

Step 5: **Construction of the plant**	
Document:	
Acronym	
In charge	Contracted installers
Short description:	Although Construction of the plant is not a real step in administrative procedure, it should be pointed exact, recommended position of this step in the procedure.
Needed documents:	• Main design

Cost:	According to the offer from contractor.
Comment:	-

Procedure for installation of PV system on ground

Ground mounted PV systems are generally systems with somewhat higher installed capacities, in most cases connected to the middle voltage grid. Usually, installed capacities of these system ranges from several hundreds of kilowatts up to few tenths of megawatts. Area on which these systems are mounted can be up to 30 hectares.

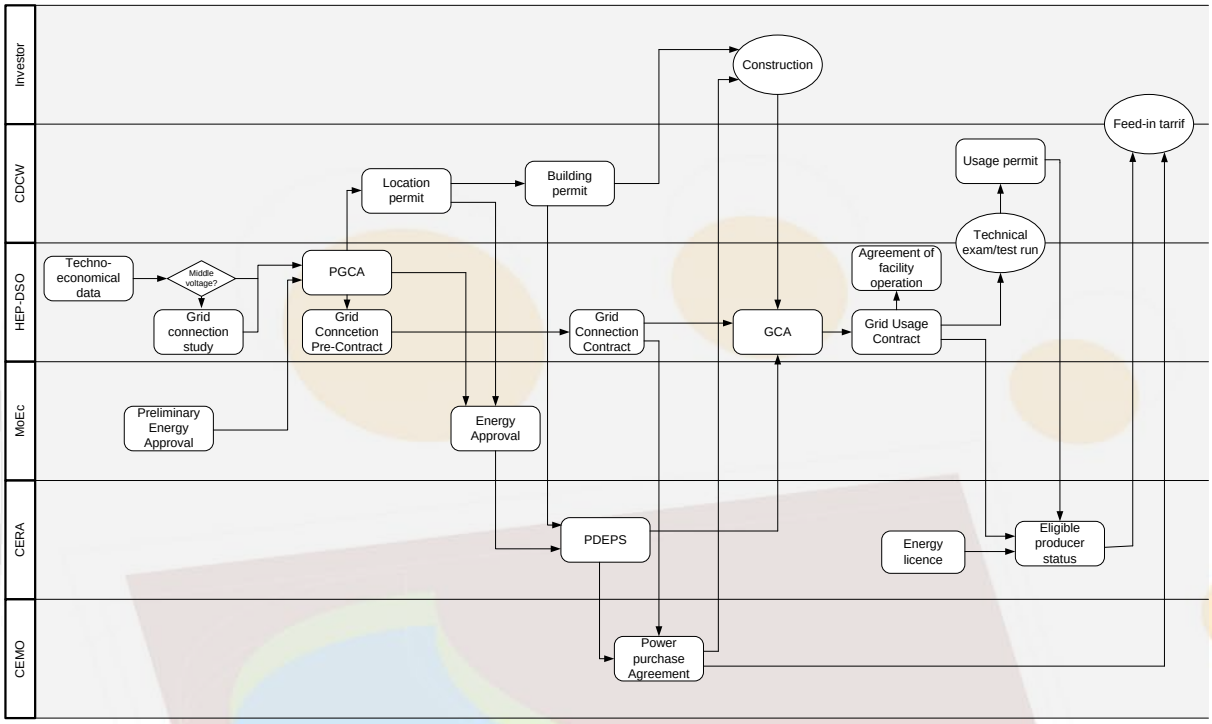

Figure 4 Procedure for installation of PV system on ground

Step 1: **Business registration**	
Document:	Record in court register (for a company) Record in register of tradesmen and craftsmen (for trades and crafts)
Acronym	-
Institution:	Commercial court for companies County office for trades and crafts
Short description:	Company or crafts must be registered for electricity production. The application for registration for additional activities shall be submitted to the competent commercial court.
Needed	• Application registration in court register/Application for registration in

documents:	register of tradesmen and craftsmen
Cost	70 kn taxes
Comment:	

Step 2: **Issuing Techno-economic data**	
Document:	Techno-economic data
Acronym	TED
Institution:	HEP-Distribution system operator
Short description:	Within the techno-economic data, HEP-DSO suggests a connection point and the technical solution of the grid connection and metering point. Also, within this document HEP-DSO defines necessary works in the existing distribution network, and estimates the costs of construction of grid connection. A request for Techno-Economic Data serves as evidence to the DSO of the various interests for construction of PV plants in a particular area.
Needed documents:	• Cadastral plan with micro location of PV plant • Macro location of plant • Technical description of the plant (in case of PV plants, especially description and technical data of inverters)
Cost	No charged
Comment:	TED is sufficient only if plant is connected to the low voltage network (less than 500 kW). In the case of connection on medium voltage, Grid connection study should be drafted.

Step 3: **Drafting a Grid connection study**	
Document:	Grid connection study
Acronym	GCS
Institution:	HEP-Distribution system operator
Short description:	GCS is needed for the plants connected to the medium voltage grid and DSO is responsible for the drafting of it, however, it is made by independent company. GCS includes a detailed analysis of the grid with the plant and without it, analysis of possible variants of connections and network conditions, and the optimum ways of connecting with a cost estimate.

Needed documents:	GSC is drafted based on the Request for Techno-economic data • Cadastral plan with micro location of the plant • Macro location of plant • Technical description of the plant (in case of PV plants, especially description and technical data of inverters) • Proof of payment of costs for making GCS-a
Cost	Typical cost of GCS is between 20,000 and 40,000 kn
Comment:	GCS is drafted only for the plants with installed capacity over 500 kW, that is these ones connected to the middle voltage grid.

Step 4: **Drafting Prefeasibility study**	
Document:	Prefeasibility study
Acronym	PFS
Drafted by:	Consultant
Short description:	This document should present information on project location, technical description of the project, preliminary assessment of the solar resource and electricity generation, assessment of grid connection and spatial planning data. Expected results from economic calculation are payback time, IRR and NPV of the project.
Needed documents:	This document should be based on data from GCS, price of equipment and solar resource data.
Cost:	Depending on the offer.
Comment:	Detailed solar resource assessment should be presented after issuing PEA, thus this document should elaborate this information as well.

Step 5: **Issuing Preliminary Energy Approval**	
Document:	Preliminary Energy Approval
Acronym	PEA
Institution:	Ministry of Economy
Short description:	With PEA, project is registered into RES project register. Also, PEG gives the investor temporary rights on the location and to resolve land ownership issues (if land is owned by state).

Needed documents:	• Cadastral plan • Statement from Court register (for a company) or Statement from Register of Crafts and Trades (for crafts) or a certificate of residence in the Republic of Croatia (for a private person) • Confirmation of the tax administration of all outstanding tax liabilities and liabilities for pension and health insurance and other public liabilities • A certified statement of good conduct legal and private person regarding with participation in a criminal organization, corruption, fraud or money laundering • Prefeasibility study • Location of the plant on topographic map
Cost:	70 kn taxes
Comment:	Location of the plant should be presented on the topographic map 1:25000, and end points should be presented in Gauss-Krüger projection. PEA is valid on limited time, in which investor should: • in the period of six months start with measurement or assessment of Solar energy potential at location • in the period of 36 months request issuing of a Location permit • in the period of 48 months request issuing of a Energy Approval

Step 6: **Measurement or assessment of Solar energy potential**	
Document:	Assessment of Solar energy potential
Acronym	-
Institution:	Ministry of Economy
Short description:	Within PEA, Ministry requests measurement or assessment of Solar energy potential on location. Measurement of Solar energy potential is a long term process with very high unreliability in short term (i.e. one year). In this case, Solar energy potential could be estimated with high reliability based on data from measurement sites in vicinity of location with long-term measurements. Solar energy atlas of Croatia presents a very powerful database and it can be used for the assessment of solar energy potential. For larger projects (over few megawatts) it is recommended to start a measurements of solar radiation, on which Solar energy potential will be estimated, as well used for control of proper work of plant.

Needed documents:	Assessment of Solar energy potential should be based on acknowledged solar resource data publications and on data from measurement stations in vicinity of location.
Cost:	Depending on the offer.
Comment:	Provisional Grid Connection Authorization (as all other utility authorization) is a part of Preliminary Design and Location Permit. It is issued based on Preliminary design of electrical installations.

Step 7: **Spatial planning documentation**	
Document:	County/Municipality spatial plan
Acronym	SP
Institution:	County or municipality Department responsible for spatial planning
Short description:	Prior to issuing Location permit location on which construction of power plant is planed shall be registered in Spatial plans as location for solar power plant. As most of the spatial plans has not defined exact locations, than spatial plan has to be changed and location(s) shall be registered. Currently, solar power plants are permitted to be constructed in the areas defined in spatial plans as “locations for economic activities”.
Needed documents:	• Conceptual design the plant with layout of the plant
Cost:	County or municipality Department may require the investor to cover part or the overall cost of modification of spatial plan.
Comment:	During the preparatory work for the selection of locations, it is advisable to consult the spatial-planning documentation of municipalities, and consult with municipality officials regarding the admissibility of the construction of solar power at a particular location.

Step 8: **Assessment of the acceptance of planned activities on ecological network**	
Document:	Assessment of the acceptance of planned activities on ecological network
Acronym	AAPAEN
Institution:	Ministry of Culture or responsible county department

Short description:	This study analyzes the impact of planned project to the objectives of preserving certain areas of ecological networks and then estimates the cumulative effects with other plans, programs and projects. It shall propose alternative options and identify mitigation measures. On the basis of the study prior assessment procedure for the ecological network, the competent authority shall issue a certificate of eligibility which states that the procedure has no significant impact on conservation objectives and integrity of the ecological network, or issue a decision stating that the project may have a significant impact on conservation objectives and integrity of the ecological network. In this case, an Environmental impact assessment shall be conducted. Study of the pre-assessment of the planned project on the ecological network is drafted by Licensed persons for environmental protection. Study must include the features of the plan and program, or information on the objectives and scope, and a description of procedures and activities that are planned to be performed; ecological characteristics of the ecological networks: a description of the ecological network, a description of the goals of preserving the ecological network, and map views, a description of the characteristics of the impact of implementing the plan the ecological network: the probability, duration and frequency of the possible impact of the implementation plan for the ecological network, the cumulative impact of the plan on the conservation objectives and integrity of the ecological network, the size and scope of the plan, and a conclusion.
Needed documents:	• Conceptual design the plant with layout of the plant • Study of the acceptance of the planned project on ecological network • Spatial planning documentation
Cost:	Depending on the offer from Licensed person.
Comment:	This study shall be conducted in the area is within or near the Eco Natura 2000 network. Assessment is not performed if the location is within the construction areas within the ecological network.

Step 9: **Drafting a Conceptual design**	
Document:	Conceptual design
Acronym	-
Institution:	Company or person authorized for drafting a building designs (Licensed Engineer), according to the Law on Construction and Spatial Planning.
Short description:	Conceptual design defines works in area to be undertaken and confirms that planned works are in line with spatial planning documents.

Needed documents:	Conceptual design should be based on the idea of investor. Following documents are used as basis: • Cadastral plan • Provisional Grid Connection Authorization • Specification of equipment, if available
Cost:	Depending on the offer from building design office. Chamber of engineers in Construction works have predefined prices.
Comment:	Provisional Grid Connection Authorization (as other utility authorizations) is essential parts of Concept design and location permit. PGCA is issued based on Conceptual design of electrical installations.

Step 10: **Issuing Provisional Grid Connection Authorization**	
Document:	Provisional Grid Connection Authorization
Acronym	PGCA
Institution:	HEP-DSO
Short description:	Provisional Grid Connection Authorizations a document in which technical requirements of the network, conditions for the connection point (power, voltage and type of connection), metering points, works that has to be undertaken by HEP-DSO (such as installing meters and protective elements, the physical connection of power to network) or by investor (like construction of power plant) are defined. Electrical scheme under which it is necessary to perform grid connection is attached to the PGCA.
Needed documents:	• Cadastral plan • Macro location of plant on topographic map • Conceptual design of plant (especially Conceptual design of electrical installations) • technical description of the plant
Cost:	Issuing PGCAis not charged.
Comment:	Provisional Grid Connection Authorization (as other utility authorizations) is essential parts of Concept design and location permit. PGCA strictly defines power of the plant at a relatively early stage of project development. If power of the plant is changed during the project development, it is necessary to request amendment of PGCA-a.

Step 11: **Signing Grid Connection Contract**	
Document:	Grid Connection Contract
Acronym	
Institution:	HEP-DSO
Short description:	This contract defines the mutual rights and obligations between DSO and investor, especially level of the connection fee, deadlines and payment methods for construction of the grid connection. Contract is based on Provisional Grid Connection Authorization.
Needed documents:	• Provisional Grid Connection Authorization
Cost:	Cost presented in this Contract represents a real cost of construction of grid connection.
Comment:	Generally, this Contract is signed with issuing PGCA. In case that cost of construction of the connection point can not be estimated accurately in the moment of signing PGCA, Pre-Grid Connection Contract is signed.

Step 12: **Issuing of location permit**	
Document:	Location permit
Acronym	LP
Institution:	County Department responsible for Construction Works
Short description:	Location permit is a legal act which proves that planed actions are in line with spatial plan. In the location permit, shape and size of the plant, usage and area used are defined.
Needed documents:	• Cadastral plan • Conceptual design (in three copies) • Declaration of Licensed engineer that Conceptual design is in line with Spatial plan • Proof of legal interest of the applicant (proof of ownership - register entry for a particle or a lease or similar, depending on the situation) • Provisional Grid Connection Authorization
Cost:	750 kn
Comment:	

Step 13: **Drafting a Feasibility Study**	
Document:	Feasibility study with techno-economical data and spatial planning data
Acronym	AO
Institution:	Consultant
Short description:	Feasibility study should present information about the project (location, size, and investor), technical description of the project (design, technology, O&M costs), Solar energy resource assessment and estimation of electricity production, grid connection analysis (current situation, data from PGCA), spatial planning data on location and preliminary environmental impact assessment. Financial-economic analysis should calculate payback time of investment, cash flow and other economical parameter (IRR, NPV) for different financing possibilities.
Needed documents:	As a basis for drafting of this document data from PGCA, location permit and offers by equipment distributors can be used.
Cost:	Depending on the offer.
Comment:	When drafting Feasibility study it should be taken into consideration that same document should be used as basis for loan application and for further steps in the administrative procedure. This, it is recommended to include in this document also technical description of plant according to the guidelines from CERA and plans for electricity production on monthly and yearly basis. Feasibility study and Main design should be done simultaneously.

Step 14: **Issuing Energy Approval**	
Document:	Energy Approval
Acronym	EA
Institution:	Ministry of Economy
Short description:	Energy Approval is an approval from Ministry of Economy that project is in line with energy policy of the state.

Needed documents:	• Cadastral plan • Statement from Court register (for a company) or Statement from Register of Crafts and Trades (for crafts) or a certificate of residence in the Republic of Croatia (for a private person) • Confirmation of the tax administration of all outstanding tax liabilities and liabilities for pension and health insurance and other public liabilities • A certified statement of good conduct legal and private person regarding with participation in a criminal organization, corruption, fraud or money laundering • Feasibility study • Location of plant on topographic map • Location permit
Cost:	70 kn taxes
Comment:	Location of the plant should be presented on the topographic map 1:25000, and end points should be presented in Gauss-Krüger projection. EA is valid on 12 months, in which Building permit must be issued.

Step 15: **Drafting a Main design**	
Document:	Main design
Acronym	-
Institution:	Company or person authorized for drafting a building designs (Licensed Engineer), according to the Law on Construction and Spatial Planning.
Short description:	Main design is a set of coordinated designs (electrical design, construction design, mechanical design) which provides the technical solution of the building and confirming compliance with the essential requirements for facilities and technical specifications. Main design must comply with the Conceptual design. Bill of work forms part of a project.
Needed documents:	Drafting of a Main design should be based on following documents: • Cadastral plan • Conceptual design • Location permit • Specification of the equipment
Cost:	Depending on the offer from building design office. Chamber of engineers in Construction works have predefined prices.

Comment:	

Step 16: **Issuing Building permit**	
Document:	Building permit
Acronym	BP
Institution:	County Department responsible for Construction Works
Short description:	Building permit is an act which allows construction of the billings. This permit confirms that main design is drafted according to the regulations and conditions for the building, and that all pre conditions are satisfied. Several acts issued are legally equivalent to the Building permit: Several different named acts are issued as Building permit: Decision for construction, Approval of main design or Building permit.
Needed documents:	• Cadastral plan • Main design (three copies) • Copy of location permit • Cartelization of the plot • Proof of legal interest of the applicant (proof of ownership - register entry for a particle or a lease or similar, depending on the situation)
Cost:	Between 0.50 and 0.35 ‰ of the cost of the construction, depending of the area of the building. With issuing this act, investor must pay all the utility costs, which are related to the specific municipality.
Comment:	

Step 17: **Issuing Preliminary Decision on Eligible Producer Status**	
Document:	Preliminary Decision on Eligible Producer Status
Acronym	PDEPS
Institution:	Croatian Energy Regulatory Agency
Short description:	With this Decision, CERA confirms that planed project meet the requirements for acquiring the status of eligible producer.

Needed documents:	• Energy Approval • Building permit • Technical description of the designed plant • Proof of payment of the cost of issuing a preliminary decision on granting the status of eligible
Cost:	1500 kn+VAT
Comment:	Content and data for the Technical description are defined by Guidelines from CERA, which should be followed when drafting this document. This Decision is valid for two years.

Step 18: **Signing Power Purchase Contract**	
Document:	Power Purchase Contract
Acronym	-
Institution:	Croatian Energy Market Operator
Short description:	Power Purchase Contract purchase of produced electricity is guaranteed to the investor by incentivised price. The contract is concluded for a period of 12 years. This agreement defines the manner and deadlines for payment of funds to the investor.
Needed documents:	• Grid Connection Contract • Preliminary Decision on Eligible Producer Status
Cost:	No charged.
Comment:	Power Purchase Contract is valid after the issuing of Final Decision on Eligible Producer Status. The contract is, in fact, the only guarantee that the project will receive incentivised tariff for electricity production. In this step, the risk of development of the project is practically limited to the technical side, or failure to meet technical requirements for access contained in PGCA-u.

Step 19: **Selection and procurement of equipment and installation**	
Document:	-
Acronym	-
In charge	Investor

Short description:	Investor, with the help of consultants or designers, will seek for the bids for purchase of equipment and installation works for PV plant. The expected production of electricity can vary for different photovoltaic modules, inverters, and their configuration, and thus the expected revenue, and in this case it is advisable to choose the most economically advantageous offer or an offer that will offer the best value for money. The main criterion for selection could be a payback period of investment, or net present value, depending on the preferences of the investor. When selecting contractors, experience and expertise of the contractor must be taken into account.
Needed documents:	• Main design: cost estimates, equipment specifications
Cost:	Price of equipment depends of the quality of equipment and current market situation.
Comment:	The selection of equipment and the contractor is a continuous process that needs to be conducted throughout the project development process. However, it is advisable to make a final decision after signing the Power Purchase Contract.

Step 20: **Financing the project**	
Document:	-
Acronym	-
In charge	Investor-financial institutions
Short description:	Financing of the project one of the key steps that is not bound by the administrative procedure, but on it depends most of the work. Usually, loans from commercial banks are used for financing the project, but it can be financed also through various funds.
Needed documents:	In this step, various documents can be presented to the financial institution. Documents listed below are one of the most wanted. • Evidence about the solvency • Proof of ownership or rights for construction (e.g. land registry extract or lease of land) • Building permit • Power Purchase Contract • Feasibility study
Cost:	-

Comment:	Financing of the project is a continuous process that needs to be conducted throughout the project development process. However, it is advisable to make a final decision after signing Power Purchase Contract.

Step 21: **Construction of the plant**	
Document:	
Acronym	
In charge	Contracted installers
Short description:	Although construction of the plant is not part of administrative procedure, it is presented as it should be clearly visible when is advisable to construct the plant.
Needed documents:	• Main/Working design • Building permit
Cost:	According to the offer from contractor
Comment:	-

Step 22: **Issuing Energy Licence**	
Document:	Energy Licence
Acronym	
Institution:	Croatian Energy Regulatory Agency
Short description:	Energy licence is a proof that Investor has all necessary qualifications and resources required for the energy activity.
Needed documents:	• Proof that legal person is register for energy activity • Proof that legal person has technical competence for energy activity • Proof that legal person is trained in specific field • Proof that legal person is financially competent for energy activity • A certified statement of good conduct legal and private person regarding with participation in a criminal organization, corruption, fraud or money laundering
Cost:	20,000 kn

Comment:	Energy licence is necessary for the plants over the 1 MW of capacity

Step 23: **Drafting a Study on the impact of plant on electrical grid**	
Document:	Study on the impact of plant on electrical grid
Acronym	SOIPOEG
Institution:	HEP-DSO or Licensed electrical engineer
Short description:	Provisional Grid Connection Authorization defines the need for drafting a Study on the impact of the plant on electrical grid. This study is made to identify and analyze the feedback impact of the plant on electrical grid. Study must contain data on the plant, situation in grid before and after construction of the plant, analysis on impact of the plant on voltage waveform, power flows and voltage conditions in the grid. Within study it is necessary to analyze the impact of plant on remote control system. If a study is drafted by Licensed engineer, it should be approved by HEP-DSO. If the ratio of short-circuit power and installed power of power is higher than 150 for low voltage connection, or 1000 for medium voltage connection, study is not needed.
Needed documents:	• Provisional Grid Connection Authorization • Main design of plant • Data on electrical grid in vicinity of the plant
Cost:	Depends of the offer/estimate from HEP-DSO
Comment:	Study on the impact of plant on electrical grid is made by HEP-DSO, but this task can be assigned to the independent companies.

Step 24: **Issuing Grid Connection Authorization**	
Document:	Grid Connection Authorization
Acronym	GCA
Institution:	HEP-DSO
Short description:	Grid Connection Authorization is a final authorization from DSO for connection and test run of the plant. In Grid Connection Authorization following information are given: technical data of power meter, conditions and requirements for usage of the grid.

Needed documents:	• Building permit • Main design of plant • Study on the impact of plant on electrical grid • Testing program under test run • List of metering sites with connection capacities • Technical description of the plant • Preliminary Decision on Eligible Producer Status • Proof of payment of the cost for connection
Cost:	226,85 kn
Comment:	Together with GCA, following contracts are signed with HEP-DSO: • Agreement on user facility operation management at the interface with the system • Grid Usage Contract Grid Connection Authorization is valid after successful and verified test run.

Step 25: **Signing Agreement on user facility operation management at the interface with the system and Grid Usage Contract**	
Document:	Agreement on user facility operation management at the interface with the system Grid Usage Contract
Acronym	-
Institution:	HEP-DSO
Short description:	Agreement on user facility operation management at the interface with the system defines acting of the operator in case of grid failure or plant failure. Grid Usage Contract includes obligations of the contractual relationship between producers and the distribution system. This contract defines the place of take-over of the electricity produced, metering point, the conditions for use of the network (voltage quality, frequency deviation, etc.), measurement services and fees for network use, and other mutual rights and obligations.
Needed documents:	• Grid Connection Authorization
Cost:	Not charged
Comment:	Mentioned Contracts are signed just after the issuing of GCA.

Step 26: **Test run (trial run)**	
Document:	Report from the test run
Acronym	-
Institution:	HEP-DSO
Short description:	During test run, impact of the plant on the grid and other parameters (power quality) defined in PGCA and GCA are measured.
Needed documents:	• Test run program • Certificate from the contractor-installer that all works are done properly and in line with PGCA • Grid Connection Authorization • Grid Usage Contract • Agreement on user facility operation management at the interface with the system • Power Purchase Contract
Cost:	Depending of the estimate from HEP-DSO.
Comment:	There is no defined timeframe for test run. Usually, test run for PV plants over 500 kW takes up to several weeks. Under test run, electricity produced is delivered to the grid without any payment.

Step 27: **Issuing Usage permit**	
Document:	Usage permit
Acronym	UP
Institution:	County Department responsible for Construction Works
Short description:	Usage permit is issued after the test run and technical exam which confirms that building is constructed according to the Building permit and valid technical requirements.
Needed documents:	• Copy of the building permit • Statement from the constructor and installers about the construction of the plant regarding all valid laws and technical requirements • Final report of licensed engineer in charge for construction
Cost:	

Comment:	Usage permit is not necessary for building with area under the 400 m^2.

Step 28: **Issuing a Decision on Eligible Producer Status**	
Document:	Decision on Eligible Producer Status
Acronym	DEPS
Institution:	Croatian Energy Regulatory Agency
Short description:	With Decision on Eligible Producer Status, CERA confirms that plant is constructed under the requirements for the RES projects. Also, Power Purchase Contract came into power and investor has a right to claim payment for electricity produced.
Needed documents:	• Usage permit • Grid Usage Contract • Technical description of the plant • List of measurement points and power meters technical data • Plans on yearly and monthly energy production for average climate conditions, expected monthly deviations
Cost:	3.000 kn+VAT
Comment:	List of measurement points and power meters technical data should clearly present positions, purpose and types of all power meters in plant, and is made by Licensed engineer (electrical designer). For PV plants, only grid connection power meter should be elaborated under this list, and all its relevant data are present in Grid Usage Contract.

Step 29: **Registering of a Building in Cadastral Plan**	
Document:	Decision on Registering a Building in Cadastral plan
Acronym	-
Institution:	Local Cadastral Office
Short description:	Registration in the cadastral plan according to a new purpose and use of the cadastral plot. Geodetic elaborate on change of land usage is drafted by licensed geodetic engineer. This elaborate is a basis for changing the use of land and maintenance of cadastre.

Needed documents:	• Usage permit • Geodetic elaborate on change of land usage
Cost:	170 kn taxes Price of elaborate according to the offer.
Comment:	

Step 30: **Obtain a decision of Registering a building into Land Registry**	
Document:	Decision of Registering a building into Land Registry
Acronym	-
Institution:	Municipality court, Land Registry Department
Short description:	Registering a newly constructed building into Land Registry is a proof of the ownership and change of usage of the land.
Needed documents:	• Cadastral plan • Usage permit
Cost:	70 kn
Comment:	

Conclusion

Administrative procedure for achieving Eligible Producer Status is very complex, even in case of small system. This issue has been recognized as main barrier for the higher development of the PV market in Croatia. However, with higher number of project, positive movements can be seen on this field, which is in some cases related to the harmonization of legislative acts, and on other side with higher experience on involved bodies and actors in this process. Unfortunately, some problems are still present, especially in acting of different bodies on local level, which can be assigned to the inexperience of the actors in the field of RES.

Taking into account requirements from Directive EC/28/2009, administrative procedure shall be significantly reduced in the future. This is mostly related to the small systems in buildings, which in main market for PV systems.

Literature, references and sources

[1] Energy Law, OG 68/01, 177/04, 76/07, 152/08

[2] Law on Electrical Energy Market, OG 177/04, 76/07, 152/08

[3] Ordinance on Use of Renewable Energy Sources and Cogeneration, OG 67/07

[4] Tariff System for Electricity Production from Renewable and Cogeneration, OG 33/07

[5] Grid Code, OG 36/06

[6] Law on Spatial Planning and Construction, OG 38/09, 76/07, 55/11, 90/11

[7] Ordinance on Simple Buildings and Works, OG 21/09, 57/10, 126/10, 48/11

[8] Ordinance on Obtaining Eligible Producer Status, OG 67/07

[9] Guidelines for the application of laws and ordinances regarding connection of renewable energy and cogeneration projects to the distribution network, HEP-DSO, 2008., Internally

[10] The Decision on the Charges for Carrying out the Regulation of Energy Activities, OG 155/08, 50/09 103/09

[11] Ordinance on Licences for Energy Activity, OG 118/07