

Date:
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Final report

1. Project title	PV Island Bornholm
2. Project identification	Energinet.dk project no. 010664
3. Project period (date, year)	15-01-2012 to 30-06-2015
4. Entity responsible for the project	EnergiMidt Energi A/S
5. Reporting period	15-01-2012 to 30-06-2015

<p>6. Signature of authorised signatory</p> <p>Date: 28. August 2015</p> <p>Name: Rasmus Refshauge</p> <p>Signature:</p>

7. Summary of the project and the results obtained

The overall purpose of PV Island Bornholm (PVIB) is to facilitate installation of up to 5 MWp PV capacity on the island of Bornholm. This is foreseen to be realized through 3 phases with individual budgets and specific goals.

This final report concern the second of these 3 phases - PVIB phase II - which was scheduled to run from December 31st 2012 to June 2014 but was extended to June 2015 due to legislation changes for municipal PV installations.

From the start of 2014, PVIB phase II has run in parallel with the succeeding phase III, which for its part will run from January 2014 to December 2015, however it is anticipated that fase III need to be extended maybe up to 12 month.

Purpose of PVIB phase II

As a follow-up to the ongoing PV Island Bornholm, Phase II (PVIB-II) project targeting implementation of approximately 1,5 MWp of PV on the island of Bornholm, it is proposed to establish a phase III targeting an additional 1,5 MWp. PVIB-II receives support from the ForskVE 2011 programme.

Of the total 5 MWp envisaged in the PVIB concept approximately 1,5 MWp is expected to be implemented in the ongoing phase III of the PVIB project with a necessary PV installation support figure in average of about DKK 2-4.000/kWp. The support figure in PVIB fase II have been around DKK 4-7.000/kWp. With respect to the building integrated systems, this second phase of the PVIB project (PVIB-II) will continue the focus on the deployment of PV roof tops on residential houses and on deployment of PV plants on the municipal buildings. In this context, the architectural integration will be treated as an important element as well as including attention to the local architecture. In Phase 2 new business models for deployment on municipal entities will be developed.

Furthermore, due to increasing cost of electricity for the consumers mainly due to increasing taxes the net-metering scheme will be more and more attractive for private consumers and institutions, and Denmark can be expected during the PVIB-II to reach or at least get very close to grid-parity as one of the first countries in Europe. PVIB-II will closely monitor this trend and actively use it to accelerate the deployment of PV on Bornholm.

Bornholm will thus be a Danish "lighthouse" PV project demonstrating a high penetration of PV technology in the residential as well as the public sector – a penetration rate that may later be expected in the whole country.

The main purpose of the project is to implement a demonstration activity, which can serve as the final catalyst needed to disseminate PV utilization to a significant level. This is due to the fact, that the proposed action addresses all major customer groups in a systematic and coherent approach while at the same time summaries all knowledge gained in previously activities targeting limited customer segments. The entire PVIB project will change the Bornholm grid system to a PV high penetration grid with a penetration rate of about 10 %, which will further increase the usefulness of Bornholm as a real life laboratory in the ECO-GRID project. To realise phase II of PV Island Bornholm, a co-financing of approx. DKK 11million is applied for in this application.

Implementation of the project

Originally the objective of PVIB phase 1 was to facilitate establishment of 1 MWp PV capacity mainly on private households. The way to reach this goal was by carrying out information campaigns combined with a financial support of initially 25 % of the costs for setting up the systems. However the approval process of the private household installation was too slow to register the extremely fast moving private market development in 2011. In late 2011 the approval process was stopped but already at that time the budget of phase I was exceeded by approx. 1 MW which was transferred to phase II in full agreement with Energinet.dk in order not to disappoint customers that were already approved.

It was also agreed with Energinet.dk not to process anymore private PV installations in general and however try to implement a high PV penetration area with up to 20 installations in one radial with private customers; this was planned in close cooperation with the PV-Net project.

However after careful screening of the grid system, potential installations on 20 selected radials and meeting with the end users on one of the most promising areas for high penetration it was clearly proved that it would be almost impossible and very expensive to do so. Due to this, no further private installations were conducted in phase II of the PVIB project.

The project has used a great amount of time and resources on taxation of private PV installations, several meetings were held with tax authorities.

It was finally concluded that the taxation of subsidised PV installations had to be done.

To make it possible to install in a high penetration area the legislation had to be circumvented by renting the rooftops of the owners in the project period (this was part of the very expensive and difficult solution). PWC was involved in finding this solution and it was granted by tax authorities that this model could be used in future similar situations.

In order to motivate BRK a number of meetings and workshops were conducted to facilitate the selection of possible municipal buildings. Also a lot of visits on municipal buildings were carried out both with architect and technical people. This resulted in preliminary potential of 1,8 MW PV.

In 2013 the interpretation of "elforsynings loven" by the Danish Energy Agency resulted in a requirement of a special operation company for each individual PV installation. This stopped all activities of municipal installation in the project for nearly one year.

When the dispensation for the 20MW lot of municipal PV installation was decided BRK applied for the 1,8MW installation but only got approx. 500kW approved. However due to already installed PV with no dispensation from "elforsynings loven" only 340kW could further be implemented, dispensation granted for the approx. 140kW was moved to already installed systems by the end of 2014.

All municipal installations were ended 31/3 2015.

PVIB fase II total Private 1.094 kWp + municipal 635 kWp

Plants established through PVIB

Installations

Ultimo June 2015, a total of 2.800 kWp have been installed in the PVIB project and another 772 kWp have been approved for installation.

Private plants (fase I & II)

323 projects totalling 1.737 kWp have been installed.

Commercial plants (fase I & II & III)

14 projects totalling 428 kWp have been installed.

Another 8 Projects totalling 722 kWp are approved and being installed in fase 3.

Municipal plants (fase I & II & III)

15 projects totalling 635 kWp Have been installed.

The private plants vary in size, the main part, however, are relatively close to the limit for utilizing the netmetering scheme, and thus the average size of the private plants is 5,2 kWp.

The commercial plants vary in size from 11 to 317kWp

Supporting other R&D projects

Cooperation between the PVIB project and the ForskEL project named "PV-NET", is now fully working and as part of this activity a specific inverter was chosen for the remaining installations within PVIB project.

A number of the inverters on the PV plants installed in PVIB have been equipped with remote control facilities and have been included in tests regarding power grid stability in PV-NET project. All PV plants from BRK is now monitored from DTU power lab.

8. Publication and dissemination

(Describe the activities scheduled in relation to the technical milestones agreed upon.)

Several activities have been carried out regarding dissemination of knowledge regarding the PVIB activities. Afterwards a list containing the main publication and dissemination activities is presented.

- A website – www.grønstrømbornholm.dk – has been Re-launched. On this, general information regarding PV and PVIB as well as the possibility for potential PV plant owners to receive a grant, was given.
- In local newspapers etc. advertising of the project were publicized in which the basic information of PVIB were given. In these ads also the readers were encouraged to visit the above mentioned website to seek further and detailed information regarding possibilities for participation.
- A two-day course regarding Quality and instalment of PV, targeting installers who participate in the project were carried out
- A folder describing the project has been prepared and printed in x.000 copies. This folder has been utilized in many of the dissemination activities mentioned below.
- On numerous occasions PVIB have been mentioned in the local media on Bornholm as well as in the national press.
- Møde med private "må vi låne dit tag?"

Må vi Låne dit tag?

Noter fra Møde på Den Lille Havfrue, Snogebæk, 4. februar 2015, V. Mikkel Høst

Noter i kroligisk rækkefølge:

- Man fornemmer positiv stemning fra starten af mødet, og der lyttes interesseret.
- Flere af deltagerne tror hele Snogebæk er inviteret og er derfor overrasket over hvor få der er mødt frem. (vi fortæller, og viser på kort – de er "de få udvalgte".)
- SPG: Kan jeg ikke udnytte strømmen direkte i min husstand under forsøget?
- SPG: Er anlægget virkelig 40 pct. værd efter et år ved forsøgets afslutning? (opfattes som et forsøg på at "presse prisen")
- SPG: Kan jeg koble mig helt fra Østkraft, hvis jeg går med i forsøget?
- SPG: Jeg har finansieringsudfordringer, svært ved at låne i banken pga. faldende værdi på huset. Kan i hjælpe med det via. Projektet? (problematik omkring finansiering nævnes efterfølgende flere gang, hvilket påpeger at det er en problemstilling vi skal arbejde videre med.)
- Kenn Spørg åbent ud i forsamlingen: SPG: "Er det en dum ide det her?" Flere svar herefter "Nej, det kan være interessant."
- SPG: Kan man forestille sig en løsning med et fælles anlæg?
- SPG: Kunne der være mulighed for et mindre anlæg? For jeg bruger kun ca. 3000 kWh el årligt.
- SPG: Kunne man ved forsøgets afslutning tilpasse anlægget ved at nedtage et antal solcelle moduler, således at det tilpasses det aktuelle forbrug?



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- Bodil Brandt: Jeg er keramikker, og brænder keramik i en el-ovn, Jeg kunne tilpasse min brug af ovnen, således at det passer med solen og anlæggets produktion. Jeg er meget interesseret.
- SPG: Kan man få rådgivning om hvordan man kan bruge mere strøm og dermed opnå en bedre udnyttelse af anlægget? Det er vel oplagt at gå over til luft-til-luft varmepumpe?
- SPG: Er der god holdbarhed på inverter/vekselretter i tilbyder?
- SPG: Bliver de ikke hele tiden bedre moduler og vekselrettere, med en højere virkningsgrad?
- SPG: Hvor meget fylder vekselretteren?





9. Status of time schedule	Year 2012				Year 2013				Year 2014				Year 2015			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Activities																
Scanning of municipal buildings		■	■	■												
Projecting and tendering			■	■	■	■	■	■								
Instalment on municipal buildings									■	■	■	■	■	■	■	■
High penetrating PV area			■	■	■	■	■	■	■	■	■	■	■	■	■	■
Phase 3 preparatory activities			■	■	■	■	■	■								
Reporting, dissemination etc.		■			■				■				■			
Payment			@		@				@				@			

□ Duration scheduled for the activity

□ or ■ Activity status

* Milestone, originally

@ Payment

□ PVIB phase 2 activity

10.

(List the publications, articles, etc that have been published.)

11. Project costs

The costs related to this period are stated in the table below.

Project costs for this period (sum of partners)

	Total Krx1000	PSO funding Krx1000	Other fundin Krx1000	Internal Krx1000
Wages	139,9	209,8	0	124,4
Overhead wages	194,3			
Travel and accommodation	18,2	.	.	.
External services	-	.	.	.
Machinery, equipment,	3.881,2	1.113,7	0	2.785,7
Others, various	-	.	.	.
Overhead other expences	-	.	.	.
Total costs and fundings	4233,6	1323,6	0,0	2910,1

* to interim report

The total expenditures held in the project are presented below in 1.000 DDK.

Project Number

10664

Title

PV Island Bornholm phase II (PVIB II)

(DDKx1000)

Budget	Total	PSO funding	Other funding	Internal
Contract sum	33.562,5	11.183,7	-	22.378,8
Supplementary grant 1				-
Supplementary grant 2				-
Total	33.562,5	11.183,7	-	22.378,8
	Start	End		
Previous periods:				-
Accumulated costs (periods in this worksheet)	27.264,3	9.079,2	-	18.185,0
Residual sum / residual commitment	6.298,2	2.104,5	-	4.193,8